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Service Manual

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CHRYSLER/DODGE

SERVICE MANUAL

2002
SEBRING/STRATUS
SEDAN AND CONVERTIBLE

DaimlerChrysler Corporation reserves the right to make changes in design or to make additions to or improvements in its products without imposing any obligations upon itself to install them on its products previously manufactured.

FOREWORD

The information contained in this service manual has been prepared for the professional automotive technician involved in daily repair operations. Information describing the operation and use of standard and optional equipment is included in the Owner's Manual provided with the vehicle.

Information in this manual is divided into groups. These groups contain description, operation, diagnosis, testing, adjustments, removal, installation, disassembly, and assembly procedures for the systems and components. To assist in locating a group title page, use the Group Tab Locator by clicking to the following page. The first page of the group has a contents section that lists major topics within the group.

A Service Manual Comment form is included at the rear of this manual. Use the form to provide DaimlerChrysler Corporation with your comments and suggestions.

Tightening torques are provided as a specific value throughout this manual. This value represents the midpoint of the acceptable engineering torque range for a given fastener application. These torque values are intended for use in service assembly and installation procedures using the correct OEM fasteners. When replacing fasteners, always use the same type (part number) fastener as removed.

DaimlerChrysler Corporation reserves the right to change testing procedures, specifications, diagnosis, repair methods, or vehicle wiring at any time without prior notice or incurring obligation.

GROUP TAB LOCATOR

INTRODUCTION

TABLE OF CONTENTS

BODY CODE PLATE

DESCRIPTION

The Body Code Plate (Fig. 1) is located in the engine compartment on the driver side strut tower. There are seven lines of information on the body code plate. Lines 4, 5, 6, and 7 are not used to define service information. Information reads from left to right, starting with line 3 in the center of the plate to line 1 at the bottom of the plate.

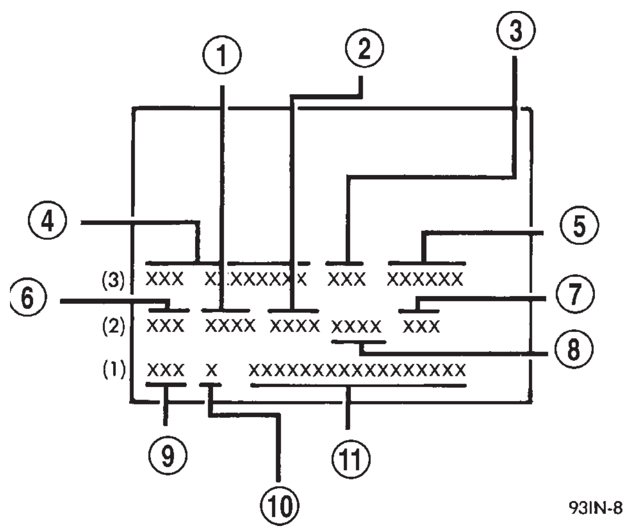


Fig. 1 BODY CODE PLATE

1 - PRIMARY PAINT
2 - SECONDARY PAINT
3 - VINYL ROOF
4 - VEHICLE ORDER NUMBER
5 - CAR LINE SHELL
6 - PAINT PROCEDURE
7 - ENGINE
8 - TRIM
9 - TRANSMISSION
10 - MARKET
11 - VIN

BODY CODE PLATE LINE 2

DIGITS 1, 2, AND 3

Paint procedure

DIGIT 4

Open Space

DIGITS 5 THROUGH 7

Primary paint
(Refer to 23 - BODY/PAINT - SPECIFICATIONS) for Body Color Codes.

DIGIT 8 AND 9

Open Space

DIGITS 10 THROUGH 12

Secondary Paint

DIGIT 13 AND 14

Open Space

BODY CODE PLATE (Continued)

DIGITS 15 THROUGH 18

Interior Trim Code

DIGIT 19

Open Space

DIGITS 20, 21, AND 22

Engine Code

- ECC = 2.0L Four Cylinder 16 Valves DOHC Gasoline
- EDZ = 2.4L Four Cylinder 16 Valves DOHC Gasoline
- EER = 2.7L Six Cylinder 24 Valves DOHC Gasoline

DIGIT 23

Open Space

BODY CODE PLATE LINE 1

DIGITS 1, 2, AND 3

Transaxle Codes

- DGL = 41TE 4-Speed Electronic Automatic Transaxle
- DD5 = NV T350 5-Speed Manual Transaxle

DIGIT 4

Open Space

DIGIT 5

Market Code

- C = Canada
- B = International
- M = Mexico
- U = United States

DIGIT 6

Open Space

DIGITS 7 THROUGH 23

Vehicle Identification Number

- Refer to Vehicle Identification Number (VIN) paragraph for proper breakdown of VIN code.

IF TWO BODY CODE PLATES ARE REQUIRED

The last code shown on either plate will be followed by END. When two plates are required, the last code space on the first plate will indicate (CTD)

When a second plate is required, the first four spaces of each line will not be used due to overlap of the plates.

FASTENER IDENTIFICATION

DESCRIPTION

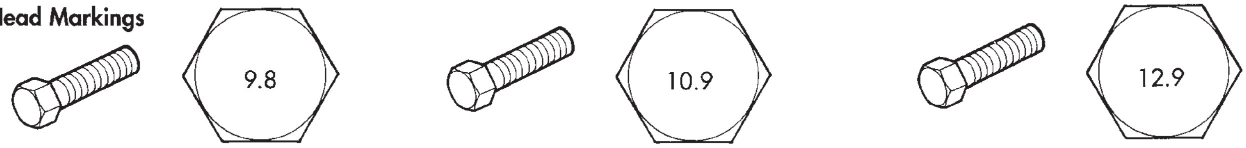
The SAE bolt strength grades range from grade 2 to grade 8. The higher the grade number, the greater the bolt strength. Identification is determined by the line marks on the top of each bolt head. The actual bolt strength grade corresponds to the number of line marks plus 2. The most commonly used metric bolt strength classes are 9.8 and 10.9. The metric strength class identification number is imprinted on the head of the bolt. The higher the class number, the greater the bolt strength. Some metric nuts are imprinted with a single-digit strength class on the nut face. Refer to the Fastener Identification and Fastener Strength Charts (Fig. 2) and (Fig. 3).

FASTENER IDENTIFICATION (Continued)

Bolt Markings and Torque - Metric

Commercial Steel Class: 9.8, 10.9, 12.9

Bolt Head Markings

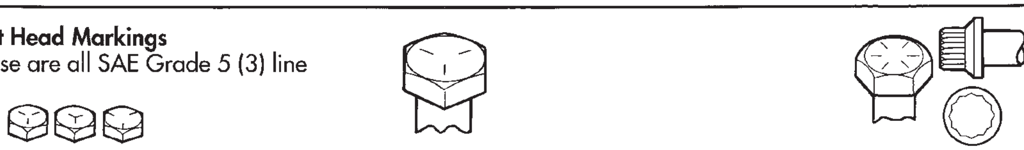


Body Size	9.8 Torque				10.9 Torque				12.9 Torque			
Diam.	Cast Iron		Aluminum		Cast Iron		Aluminum		Cast Iron		Aluminum	
mm	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb
6	9	5	7	4	14	9	11	7	14	9	11	7
7	14	9	11	7	18	14	14	11	23	18	18	14
8	25	18	18	14	32	23	25	18	36	27	28	21
10	40	30	30	25	60	45	45	35	70	50	55	40
12	70	55	55	40	105	75	80	60	125	95	100	75
14	115	85	90	65	160	120	125	95	195	145	150	110
16	180	130	140	100	240	175	190	135	290	210	220	165
18	230	170	180	135	320	240	250	185	400	290	310	230

Bolt Markings and Torque Values - U.S. Customary

SAE Grade Number: 5, 8

Bolt Head Markings
These are all SAE Grade 5 (3) line



Body Size	Bolt Torque - Grade 5 Bolt				Bolt Torque - Grade 8 Bolt			
	Cast Iron		Aluminum		Cast Iron		Aluminum	
	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb
1/4 - 20	9	7	8	6	15	11	12	9
- 28	12	9	9	7	18	13	14	10
5/16 - 18	20	15	16	12	30	22	24	18
- 24	23	17	19	14	33	24	25	19
3/8 - 16	40	30	25	20	55	40	40	30
- 24	40	30	35	25	60	45	45	35
7/16 - 14	60	45	45	35	90	65	65	50
- 20	65	50	55	40	95	70	75	55
1/2 - 13	95	70	75	55	130	95	100	75
- 20	100	75	80	60	150	110	120	90
9/16 - 12	135	100	110	80	190	140	150	110
- 18	150	110	115	85	210	155	170	125
5/8 - 11	180	135	150	110	255	190	205	150
- 18	210	155	160	120	290	215	230	170
3/4 - 10	325	240	255	190	460	340	365	270
- 16	365	270	285	210	515	380	410	300
7/8 - 9	490	360	380	280	745	550	600	440
- 14	530	390	420	310	825	610	660	490
1 - 8	720	530	570	420	1100	820	890	660
- 14	800	590	650	480	1200	890	960	710

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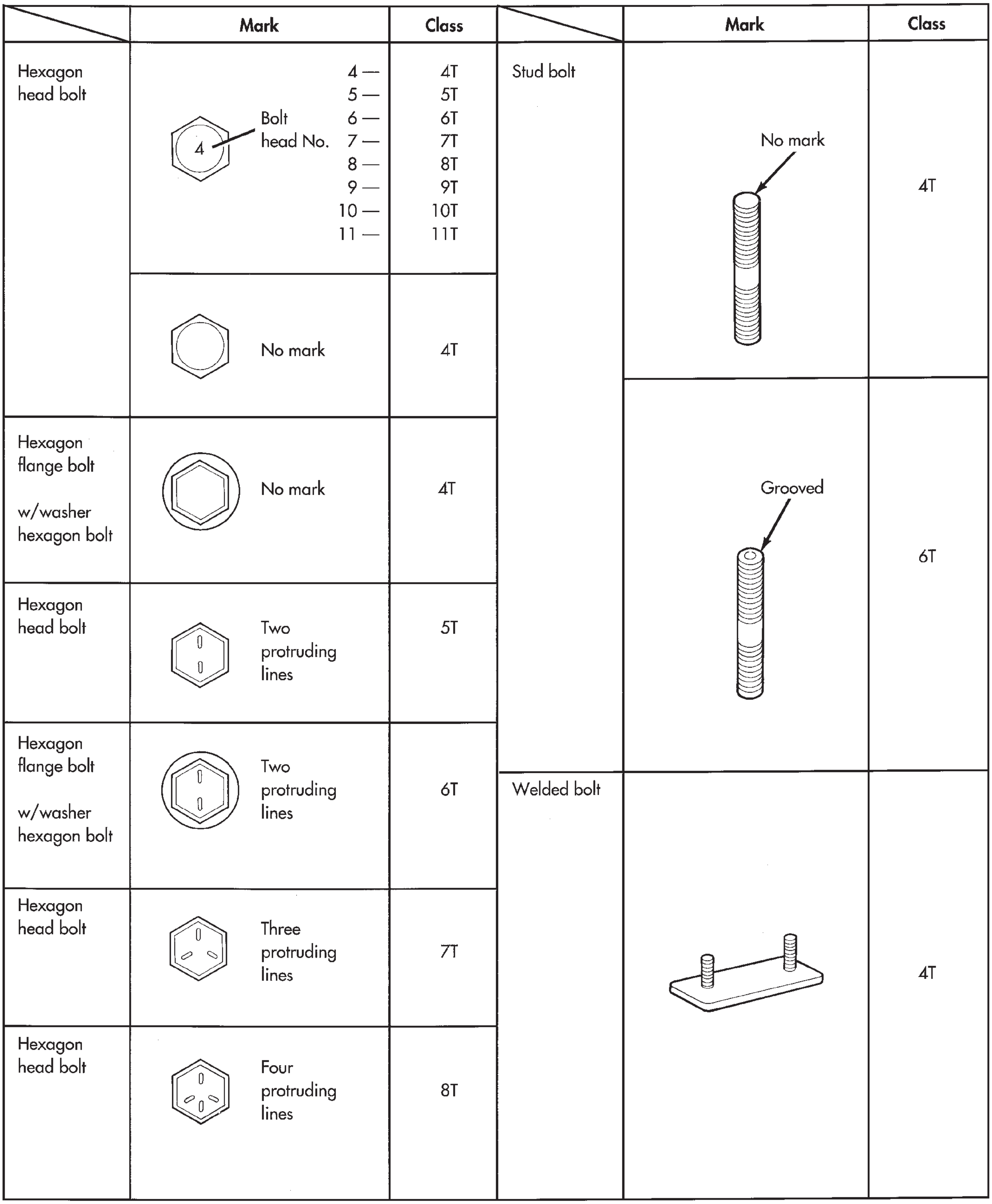
Fig. 2 FASTENER IDENTIFICATION

FASTENER IDENTIFICATION (Continued)



HOW TO DETERMINE BOLT STRENGTH

	Mark	Class
Hexagon head bolt	Bolt head No. 4 — 5 — 6 — 7 — 8 — 9 — 10 — 11 —	4T 5T 6T 7T 8T 9T 10T 11T
	No mark	4T
Hexagon flange bolt w/washer hexagon bolt	No mark	4T
Hexagon head bolt	Two protruding lines	5T
Hexagon flange bolt w/washer hexagon bolt	Two protruding lines	6T
Hexagon head bolt	Three protruding lines	7T
Hexagon head bolt	Four protruding lines	8T

	Mark	Class
Stud bolt	No mark	4T
	Grooved	6T
Welded bolt		4T

95IN-4

Fig. 3 FASTENER STRENGTH

FASTENER USAGE

DESCRIPTION

WARNING: USE OF AN INCORRECT FASTENER MAY RESULT IN COMPONENT DAMAGE OR PERSONAL INJURY.

Figure art, specifications and torque references in this Service Manual are identified in metric and SAE format.

During any maintenance or repair procedures, it is important to salvage all fasteners (nuts, bolts, etc.) for reassembly. If the fastener is not salvageable, a fastener of equivalent specification must be used.

THREADED HOLE REPAIR

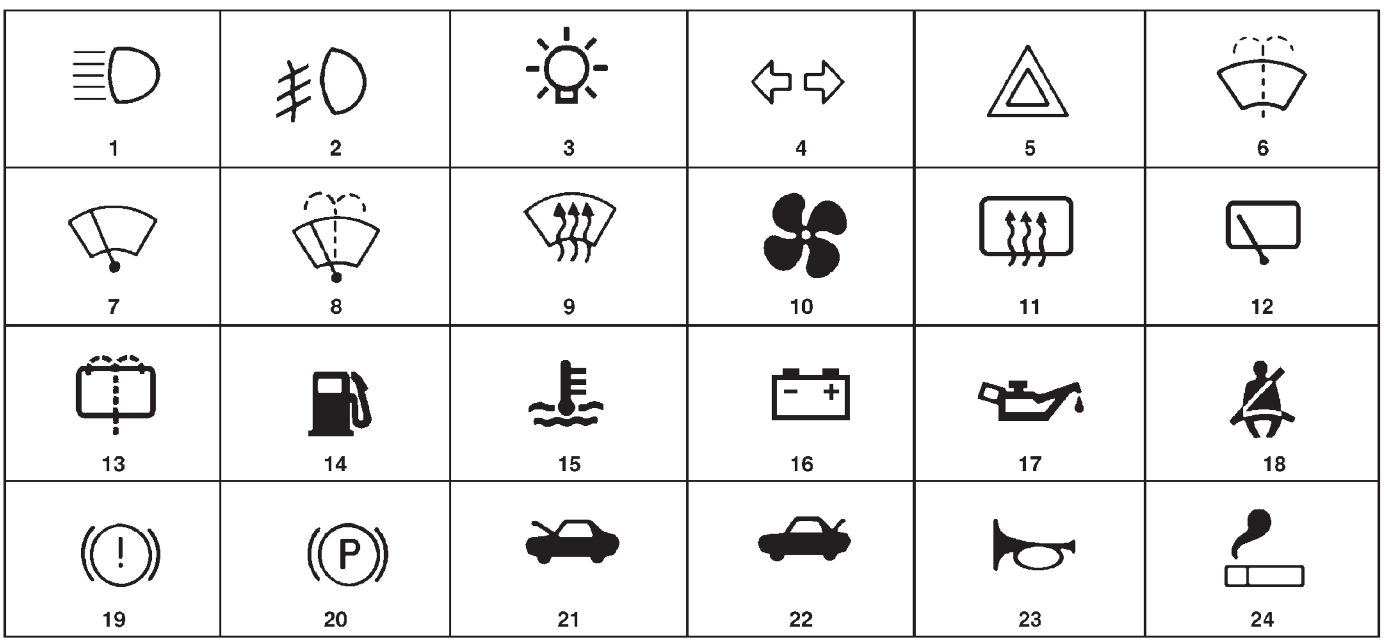
DESCRIPTION

Most stripped threaded holes can be repaired using a Helicoil®. Follow the vehicle or Helicoil® recommendations for application and repair procedures.

INTERNATIONAL VEHICLE CONTROL AND DISPLAY SYMBOLS

DESCRIPTION - INTERNATIONAL SYMBOLS

The graphic symbols illustrated in the following International Control and Display Symbols Chart are used to identify various instrument controls. The symbols correspond to the controls and displays that are located on the instrument panel.



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INTERNATIONAL SYMBOLS

1	High Beam	13	Rear Window Washer
2	Fog Lamps	14	Fuel
3	Headlamp, Parking Lamps, Panel Lamps	15	Engine Coolant Temperature
4	Turn Warning	16	Battery Charging Condition
5	Hazard Warning	17	Engine Oil
6	Windshield Washer	18	Seat Belt
7	Windshield Wiper	19	Brake Failure
8	Windshield Wiper and Washer	20	Parking Brake
9	Windscreen Demisting and Defrosting	21	Front Hood
10	Ventilating Fan	22	Rear hood (Decklid)
11	Rear Window Defogger	23	Horn
12	Rear Window Wiper	24	Lighter

METRIC SYSTEM

DESCRIPTION

The metric system is based on quantities of one, ten, one hundred, one thousand and one million.

The following chart will assist in converting metric units to equivalent English and SAE units, or vise versa.

CONVERSION FORMULAS AND EQUIVALENT VALUES

MULTIPLY	BY	TO GET	MULTIPLY	BY	TO GET
in. lbs.	x 0.11298	= Newton Meters (N·m)	N·m	x 8.851	= in. lbs.
ft. lbs.	x 1.3558	= Newton Meters (N·m)	N·m	x 0.7376	= ft. lbs.
Inches Hg (60° F)	x 3.377	= Kilopascals (kPa)	kPa	x 0.2961	= Inches Hg
psi	x 6.895	= Kilopascals (kPa)	kPa	x 0.145	= psi
Inches	x 25.4	= Millimeters (mm)	mm	x 0.03937	= Inches
Feet	x 0.3048	= Meters (M)	M	x 3.281	= Feet
Yards	x 0.9144	= Meters	M	x 1.0936	= Yards
m.p.h.	x 1.6093	= Kilometers/Hr. (Km/h)	Km/h	x 0.6214	= m.p.h.
Feet/Sec.	x 0.3048	= Meters/Sec. (M/S)	M/S	x 3.281	= Feet/Sec.
m.p.h.	x 0.4470	= Meters/Sec. (M/S)	M/S	x 2.237	= m.p.h.
Kilometers/Hr. (Km/h)	x 0.27778	= Meters/Sec. (M/S)	M/S	x 3.600	Kilometers/Hr. (Km/h)

COMMON METRIC EQUIVALENTS

1 inch = 25 Millimeters	1 Cubic Inch = 16 Cubic Centimeters
1 Foot = 0.3 Meter	1 Cubic Foot = 0.03 Cubic Meter
1 Yard = 0.9 Meter	1 Cubic Yard = 0.8 Cubic Meter
1 Mile = 1.6 Kilometers	

Refer to the Metric Conversion Chart to convert torque values listed in metric Newton- meters (N·m). Also, use the chart to convert between millimeters (mm) and inches (in.) (Fig. 4).

METRIC SYSTEM (Continued)

in-lbs to N•m

in-lb	N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m
2	.2260	42	4.7453	82	9.2646	122	13.7839	162	18.3032
4	.4519	44	4.9713	84	9.4906	124	14.0099	164	18.5292
6	.6779	46	5.1972	86	9.7165	126	14.2359	166	18.7552
8	.9039	48	5.4232	88	9.9425	128	14.4618	168	18.9811
10	1.1298	50	5.6492	90	10.1685	130	14.6878	170	19.2071
12	1.3558	52	5.8751	92	10.3944	132	14.9138	172	19.4331
14	1.5818	54	6.1011	94	10.6204	134	15.1397	174	19.6590
16	1.8077	56	6.3270	96	10.8464	136	15.3657	176	19.8850
18	2.0337	58	6.5530	98	11.0723	138	15.5917	178	20.1110
20	2.2597	60	6.7790	100	11.2983	140	15.8176	180	20.3369
22	2.4856	62	7.0049	102	11.5243	142	16.0436	182	20.5629
24	2.7116	64	7.2309	104	11.7502	144	16.2696	184	20.7889
26	2.9376	66	7.4569	106	11.9762	146	16.4955	186	21.0148
28	3.1635	68	7.6828	108	12.2022	148	16.7215	188	21.2408
30	3.3895	70	7.9088	110	12.4281	150	16.9475	190	21.4668
32	3.6155	72	8.1348	112	12.6541	152	17.1734	192	21.6927
34	3.8414	74	8.3607	114	12.8801	154	17.3994	194	21.9187
36	4.0674	76	8.5867	116	13.1060	156	17.6253	196	22.1447
38	4.2934	78	8.8127	118	13.3320	158	17.8513	198	22.3706
40	4.5193	80	9.0386	120	13.5580	160	18.0773	200	22.5966

N•m to in-lbs

N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m	in-lb
.2	1.7702	4.2	37.1747	8.2	72.5792	12.2	107.9837	16.2	143.3882
.4	3.5404	4.4	38.9449	8.4	74.3494	12.4	109.7539	16.4	145.1584
.6	5.3107	4.6	40.7152	8.6	76.1197	12.6	111.5242	16.6	146.9287
.8	7.0809	4.8	42.4854	8.8	77.8899	12.8	113.2944	16.8	148.6989
1	8.8511	5	44.2556	9	79.6601	13	115.0646	17	150.4691
1.2	10.6213	5.2	46.0258	9.2	81.4303	13.2	116.8348	17.2	152.2393
1.4	12.3916	5.4	47.7961	9.4	83.2006	13.4	118.6051	17.4	154.0096
1.6	14.1618	5.6	49.5663	9.6	84.9708	13.6	120.3753	17.6	155.7798
1.8	15.9320	5.8	51.3365	9.8	86.7410	13.8	122.1455	17.8	157.5500
2	17.7022	6	53.1067	10	88.5112	14	123.9157	18	159.3202
2.2	19.4725	6.2	54.8770	10.2	90.2815	14.2	125.6860	18.5	163.7458
2.4	21.2427	6.4	56.6472	10.4	92.0517	14.4	127.4562	19	168.1714
2.6	23.0129	6.6	58.4174	10.6	93.8219	14.6	129.2264	19.5	172.5970
2.8	24.7831	6.8	60.1876	10.8	95.5921	14.8	130.9966	20	177.0225
3	26.5534	7	61.9579	11	97.3624	15	132.7669	20.5	181.4480
3.2	28.3236	7.2	63.7281	11.2	99.1326	15.2	134.5371	21	185.8736
3.4	30.0938	7.4	65.4983	11.4	100.9028	15.4	136.3073	22	194.7247
3.6	31.8640	7.6	67.2685	11.6	102.6730	15.6	138.0775	23	203.5759
3.8	33.6342	7.8	69.0388	11.8	104.4433	15.8	139.8478	24	212.4270
4	35.4045	8	70.8090	12	106.2135	16	141.6180	25	221.2781

ft-lbs to N•m

ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m
1	1.3558	21	28.4722	41	55.5885	61	82.7049	81	109.8212
2	2.7116	22	29.8280	42	56.9444	62	84.0607	82	111.1770
3	4.0675	23	31.1838	43	58.3002	63	85.4165	83	112.5328
4	5.4233	24	32.5396	44	59.6560	64	86.7723	84	113.8888
5	6.7791	25	33.8954	45	61.0118	65	88.1281	85	115.2446
6	8.1349	26	35.2513	46	62.3676	66	89.4840	86	116.6004
7	9.4907	27	36.6071	47	63.7234	67	90.8398	87	117.9562
8	10.8465	28	37.9629	48	65.0793	68	92.1956	88	119.3120
9	12.2024	29	39.3187	49	66.4351	69	93.5514	89	120.6678
10	13.5582	30	40.6745	50	67.7909	70	94.9073	90	122.0236
11	14.9140	31	42.0304	51	69.1467	71	96.2631	91	123.3794
12	16.2698	32	43.3862	52	70.5025	72	97.6189	92	124.7352
13	17.6256	33	44.7420	53	71.8583	73	98.9747	93	126.0910
14	18.9815	34	46.0978	54	73.2142	74	100.3316	94	127.4468
15	20.3373	35	47.4536	55	74.5700	75	101.6862	95	128.8026
16	21.6931	36	48.8094	56	75.9258	76	103.0422	96	130.1586
17	23.0489	37	50.1653	57	77.2816	77	104.3980	97	131.5144
18	24.4047	38	51.5211	58	78.6374	78	105.7538	98	132.8702
19	25.7605	39	52.8769	59	79.9933	79	107.1196	99	134.2260
20	27.1164	40	54.2327	60	81.3491	80	108.4654	100	135.5820

N•m to ft-lbs

N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb
1	.7376	21	15.9888	41	30.2400	61	44.9913	81	59.7425
2	1.4751	22	16.2264	42	30.9776	62	45.7289	82	60.4801
3	2.2127	23	16.9639	43	31.7152	63	46.4664	83	61.2177
4	2.9502	24	17.7015	44	32.4527	64	47.2040	84	61.9552
5	3.6878	25	18.4391	45	33.1903	65	47.9415	85	62.6928
6	4.4254	26	19.1766	46	33.9279	66	48.6791	86	63.4303
7	5.1629	27	19.9142	47	34.6654	67	49.4167	87	64.1679
8	5.9005	28	20.6517	48	35.4030	68	50.1542	88	64.9545
9	6.6381	29	21.3893	49	36.1405	69	50.8918	89	65.6430
10	7.3756	30	22.1269	50	36.8781	70	51.6293	90	66.3806
11	8.1132	31	22.8644	51	37.6157	71	52.3669	91	67.1181
12	8.8507	32	23.6020	52	38.3532	72	53.1045	92	67.8557
.13	9.5883	33	24.3395	53	39.0908	73	53.8420	93	68.5933
14	10.3259	34	25.0771	54	39.8284	74	54.5720	94	69.3308
15	11.0634	35	25.8147	55	40.5659	75	55.3172	95	70.0684
16	11.8010	36	26.5522	56	41.3035	76	56.0547	96	70.8060
17	12.5386	37	27.2898	57	42.0410	77	56.7923	97	71.5435
18	13.2761	38	28.0274	58	42.7786	78	57.5298	98	72.2811
19	14.0137	39	28.7649	59	43.5162	79	58.2674	99	73.0187
20	14.7512	40	29.5025	60	44.2537	80	59.0050	100	73.7562

in. to mm

in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
.01	.254	.21	5.334	.41	10.414	.61	15.494	.81	20.574
.02	.508	.22	5.588	.42	10.668	.62	15.748	.82	20.828
.03	.762	.23	5.842	.43	10.922	.63	16.002	.83	21.082
.04	1.016	.24	6.096	.44	11.176	.64	16.256	.84	21.336
.05	1.270	.25	6.350	.45	11.430	.65	16.510	.85	21.590
.06	1.524	.26	6.604	.46	11.684	.66	16.764	.86	21.844
.07	1.778	.27	6.858	.47	11.938	.67	17.018	.87	22.098
.08	2.032	.28	7.112	.48	12.192	.68	17.272	.88	22.352
.09	2.286	.29	7.366	.49	12.446	.69	17.526	.89	22.606
.10	2.540	.30	7.620	.50	12.700	.70	17.780	.90	22.860
.11	2.794	.31	7.874	.51	12.954	.71	18.034	.91	23.114
.12	3.048	.32	8.128	.52	13.208	.72	18.288	.92	23.368
.13	3.302	.33	8.382	.53	13.462	.73	18.542	.93	23.622
.14	3.556	.34	8.636	.54	13.716	.74	18.796	.94	23.876
.15	3.810	.35	8.890	.55	13.970	.75	19.050	.95	24.130
.16	4.064	.36	9.144	.56	14.224	.76	19.304	.96	24.384
.17	3.318	.37	9.398	.57	14.478	.77	19.558	.97	24.638
.18	4.572	.38	9.652	.58	14.732	.78	19.812	.98	24.892
.19	4.826	.39	9.906	.59	14.986	.79	20.066	.99	25.146
.20	5.080	.40	10.160	.60	15.240	.80	20.320	1.00	25.400

mm to in.

mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
.01	.00039	.21	.00827	.41	.01614	.61	.02402	.81	.03189
.02	.00079	.22	.00866	.42	.01654	.62	.02441	.82	.03228
.03	.00118	.23	.00906	.43	.01693	.63	.02480	.83	.03268
.04	.00157	.24	.00945	.44	.01732	.64	.02520	.84	.03307
.05	.00197	.25	.00984	.45	.01772	.65	.02559	.85	.03346
.06	.00236	.26	.01024	.46	.01811	.66	.02598	.86	.03386
.07	.00276	.27	.01063	.47	.01850	.67	.02638	.87	.03425
.08	.00315	.28	.01102	.48	.01890	.68	.02677	.88	.03465
.09	.00354	.29	.01142	.49	.01929	.69	.02717	.89	.03504
.10	.00394	.30	.01181	.50	.01969	.70	.02756	.90	.03543
.11	.00433	.31	.01220	.51	.02008	.71	.02795	.91	.03583
.12	.00472	.32	.01260	.52	.02047	.72	.02835	.92	.03622
.13	.00512	.33	.01299	.53	.02087	.73	.02874	.93	.03661
.14	.00551	.34	.01339	.54	.02126	.74	.02913	.94	.03701
.15	.00591	.35	.01378	.55	.02165	.75	.02953	.95	.03740
.16	.00630	.36	.01417	.56	.02205	.76	.02992	.96	.03780
.17	.00669	.37	.01457	.57	.02244	.77	.03032	.97	.03819
.18	.00709	.38	.01496	.58	.02283	.78	.03071	.98	.03858
.19	.00748	.39	.01535	.59	.02323	.79	.03110	.99	.03898
.20	.00787	.40	.01575	.60	.02362	.80	.03150	1.00	.03937

J901N-10

Fig. 4 METRIC CONVERSION CHART

TORQUE REFERENCES

DESCRIPTION

Individual Torque Charts appear within many or the Groups. Refer to the Standard Torque Specifications Chart for torque references not listed in the individual torque charts (Fig. 5).

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque: Hexagon head bolt N•m	Hexagon head bolt kgf-cm	Hexagon head bolt ft-lbf	Hexagon flange bolt N•m	Hexagon flange bolt kgf-cm	Hexagon flange bolt ft-lbf
4T	6	1	5	55	48 in.-lbf	6	60	52 in.-lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	—	—	—
5T	6	1	6.5	65	56 in.-lbf	7.5	75	65 in.-lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	—	—	—
6T	6	1	8	80	69 in.-lbf	9	90	78 in.-lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	—	—	—
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	—	—	—
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

Fig. 5 TORQUE SPECIFICATIONS

VEHICLE IDENTIFICATION NUMBER

DESCRIPTION

The Vehicle Identification Number (VIN) is located on the upper left corner of the instrument panel, near the left windshield pillar (Fig. 6). The VIN consists of 17 characters in a combination of letters and numbers that provide specific information about the vehicle. Refer to VIN Code Breakdown table for decoding information.

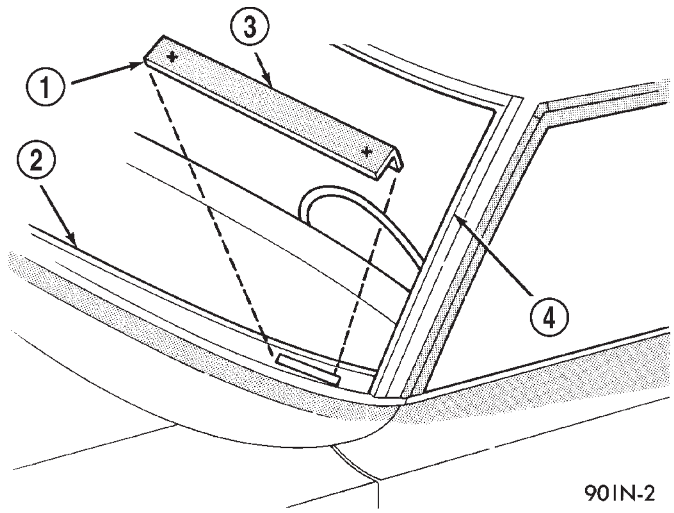

Fig. 6 Vehicle Identification Number (VIN Plate)

1 - V.I.N. PLATE
2 - DASH PANEL
3 - 17 DIGITS
4 - WINDSHIELD OPENING

VIN CODE BREAKDOWN

POSITION	INTERPRETATION	CODE = DESCRIPTION
1	Country of Origin	1 = Built in United States by DaimlerChrysler Corporation.
2	Make	B = Dodge C = Chrysler
3	Vehicle Type2	3 = Passenger Car
4	Passenger Safety	A = Active Front and Side Airbag E = Active Driver and Passenger Airbag
5	Car Line	J = Stratus L = Sebring
6	Series	4 = High line 5 = Premium 6 = Special
	Transmission Table For Bux w/ABB, ABJ	N = 5-Speed Manual B = 4 Speed Automatic
7	Body Style	5 = Convertible / Open Body 6 = 4 Door Sedan
8	Engines	Y = 2.0L 4 Cyl. 16V DOHC Gasoline S = 2.4L 4 Cyl. 16V DOHC Gasoline R = 2.7L 6 Cyl. 24V DOHC Gasoline
9	Check Digit	0 through 9 or X
10	Model Year	2 = 2002
11	Plant	N = Sterling Heights Assembly Plant
12 through 17	Sequence Number	6 digit number assigned by assembly plant.

VEHICLE IDENTIFICATION NUMBER (Continued)

VIN CHECK DIGIT

DESCRIPTION

To protect the consumer from theft and possible fraud the manufacturer is required to include a Check Digit at the ninth position of the Vehicle Identification Number. The check digit is used by the manufacturer and government agencies to verify the authenticity of the vehicle and official documentation. The formula to use the check digit is not released to the general public.

VEHICLE SAFETY CERTIFICATION LABEL

DESCRIPTION

A vehicle safety certification label is attached to the left side of B-pillar or on the rearward facing of the front door (Fig. 7). This label indicates date of manufacture (month and year), Gross Vehicle Weight Rating (GVWR), Gross Axle Weight Rating (GAWR) front, Gross Axle Weight Rating (GAWR) rear and the Vehicle Identification Number (VIN). The Month, Day and Hour of manufacture is also included.

All communications or inquiries regarding the vehicle should include the Month-Day-Hour and Vehicle Identification Number.

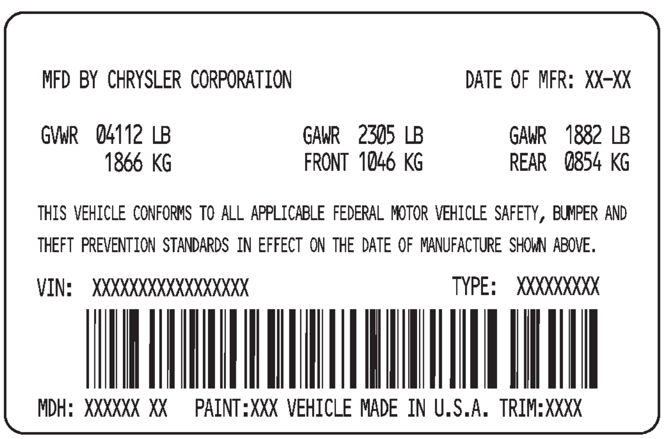

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Fig. 7 VEHICLE SAFETY CERTIFICATION LABEL

E-MARK LABEL

DESCRIPTION

An E-mark Label (Fig. 8) is located on the rear shut face of the driver's door. The label contains the following information:

- Date of Manufacture
- Month-Day-Hour (MDH)
- Vehicle Identification Number (VIN)
- Country Codes
- Regulation Number
- Regulation Amendment Number
- Approval Number

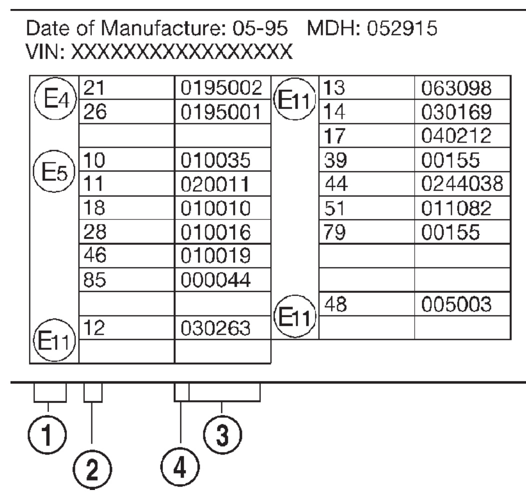

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Fig. 8 E-Mark Label

1 - Country Code
2 - Regulation Number
3 - Approval Number
4 - Amendment Number

VECI LABEL

DESCRIPTION

All models have a Vehicle Emission Control Information (VECI) Label. Chrysler permanently attaches the label in the engine compartment. It cannot be removed without defacing information and destroying the label.

The label contains the vehicle's emission specifications and vacuum hose routings. All hoses must be connected and routed according to the label.

MANUFACTURE PLATE

DESCRIPTION

The Manufacturer Plate (Fig. 9) is located in the engine compartment on the passenger side strut tower. The plate contains five lines of information:

- Vehicle Identification Number (VIN)
- Gross Vehicle Mass (GVM)
- Gross Train Mass (GTM)
- Gross Front Axle Rating (GFAR)
- Gross Rear Axle Rating (GRAR)

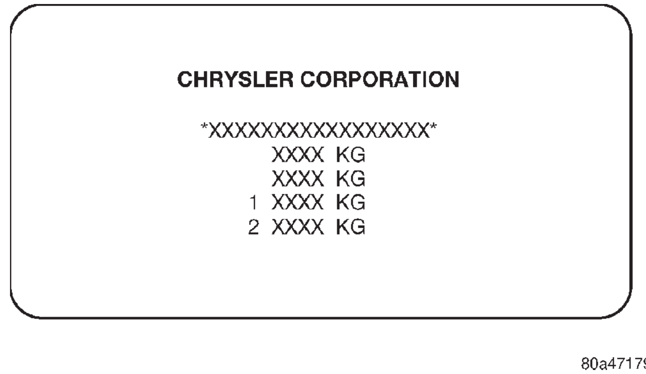


Fig. 9 Manufacturer Plate

LUBRICATION & MAINTENANCE

TABLE OF CONTENTS

LUBRICATION & MAINTENANCE

SPECIFICATIONS

FLUID CAPACITIES

DESCRIPTION	SPECIFICATION
Fuel Tank	60.5L (16.0 gal.)
Engine Oil	
2.0L Engines*	4.7L (5.0 qts.)
2.4L Engines*	4.7L (5.0 qts.)
2.7L Engines*	4.7L (5.0 qts.)
COOLING SYSTEM**	
2.0L Engine	8.0L (8.5 qts.)
2.4L Engine	10.0L (10.5 qts.)
2.7L Engine	9.0L (9.5 qts.)
AUTOMATIC TRANSAXLE	
Automatic Transaxle - Estimated Service Fill	3.8L (4.0 qts.)
Automatic Transaxle - Overhaul Capacity with Torque Converter Empty	8.7L (9.2 qts.)
MANUAL TRANSAXLE	
Capacity-T350	2.4-2.7L (2.5-2.8 qts.)
Capacity-T850	2.4-2.7L (2.5-2.8 qts.)
*(includes new filter)	
**(includes heater and recovery bottle)	

INTERNATIONAL SYMBOLS

DESCRIPTION

DaimlerChrysler Corporation uses international symbols to identify engine compartment lubricant and fluid inspection and fill locations (Fig. 1).

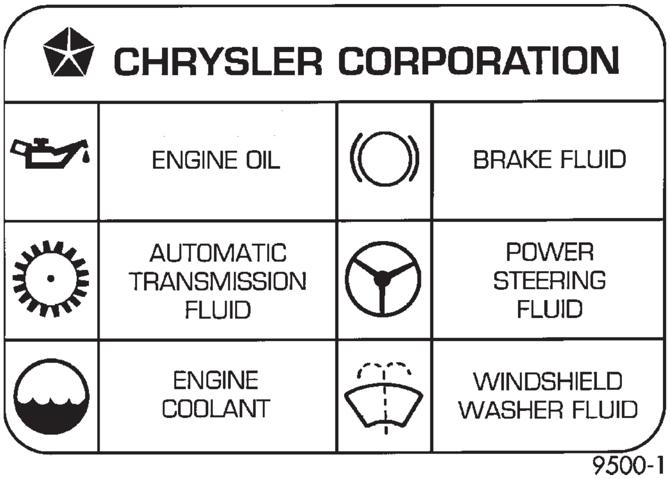


Fig. 1 International Symbols

FLUID TYPES

DESCRIPTION

DESCRIPTION - ENGINE OIL AND LUBRICANTS

WARNING: NEW OR USED ENGINE OIL CAN BE IRRITATING TO THE SKIN. AVOID PROLONGED OR REPEATED SKIN CONTACT WITH ENGINE OIL. CONTAMINANTS IN USED ENGINE OIL, CAUSED BY INTERNAL COMBUSTION, CAN BE HAZARDOUS TO YOUR HEALTH. THOROUGHLY WASH EXPOSED SKIN WITH SOAP AND WATER. DO NOT WASH SKIN WITH GASOLINE, DIESEL FUEL, THINNER, OR SOLVENTS, HEALTH PROBLEMS CAN RESULT. DO NOT POLLUTE, DISPOSE OF USED ENGINE OIL PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA.

When service is required, DaimlerChrysler Corporation recommends that only Mopar® brand parts, lubricants and chemicals be used. Mopar® provides the best engineered products for servicing DaimlerChrysler Corporation vehicles.

Only lubricants bearing designations defined by the following organization should be used.

- Society of Automotive Engineers (SAE)
- American Petroleum Institute (API)
- National Lubricating Grease Institute (NLGI)

API SERVICE GRADE CERTIFIED

Use an engine oil that is API Certified. MOPAR® provides engine oils, meeting Material Standard MS-6395, that meet or exceed this requirement.

SAE VISCOSITY

An SAE viscosity grade is used to specify the viscosity of engine oil. Use only engine oils with multiple viscosities such as 5W-30 or 10W-30. These are specified with a dual SAE viscosity grade which indicates the cold-to-hot temperature viscosity range. Select an engine oil that is best suited to your particular temperature range and variation (Fig. 2).

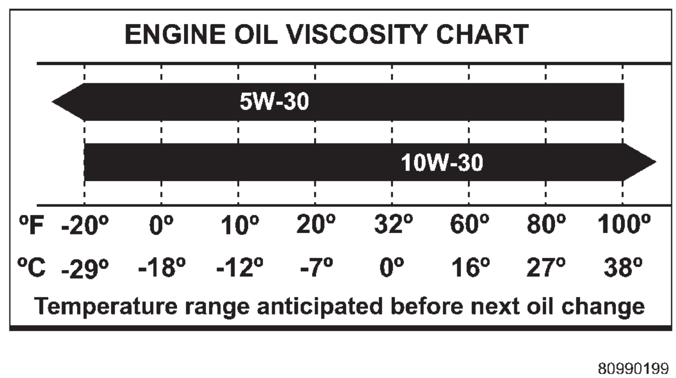


Fig. 2 TEMPERATURE/ENGINE OIL VISCOSITY

ENERGY CONSERVING OIL

An Energy Conserving type oil is recommended for gasoline engines. The designation of ENERGY CONSERVING is located on the label of an engine oil container.

CONTAINER IDENTIFICATION

Standard engine oil identification notations have been adopted to aid in the proper selection of engine oil. The identifying notations are located on the front label of engine oil plastic bottles and the top of engine oil cans (Fig. 3).

This symbol means that the oil has been certified by the American Petroleum Institute (API). Diamler-Chrysler only recommend API Certified engine oils that meet the requirements of Material Standard MS-6395. Use Mopar or an equivalent oil meeting the specification MS-6395.

FLUID TYPES (Continued)

9400-9

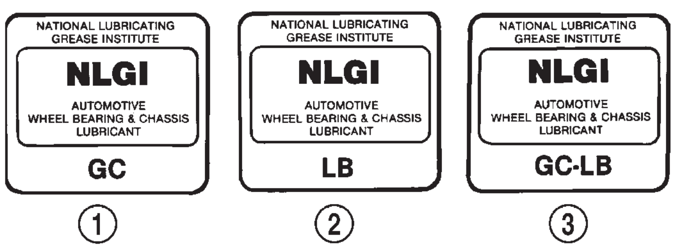
Fig. 3 API Symbol

GEAR LUBRICANTS

SAE ratings also apply to multigrade gear lubricants. In addition, API classification defines the lubricants usage. Such as API GL-5 and SAE 75W-90.

LUBRICANTS AND GREASES

Lubricating grease is rated for quality and usage by the NLGI. All approved products have the NLGI symbol (Fig. 4) on the label. At the bottom NLGI symbol is the usage and quality identification letters. Wheel bearing lubricant is identified by the letter "G". Chassis lubricant is identified by the latter "L". The letter following the usage letter indicates the quality of the lubricant. The following symbols indicate the highest quality.



9200-7

Fig. 4 NLGI Symbol

1 - WHEEL BEARINGS
2 - CHASSIS LUBRICATION
3 - CHASSIS AND WHEEL BEARINGS

SPECIALIZED LUBRICANTS AND OILS

Some maintenance or repair procedures may require the use of specialized lubricants or oils. Consult the appropriate sections in this manual for the correct application of these lubricants.

DESCRIPTION - ENGINE COOLANT

WARNING: ANTIFREEZE IS AN ETHYLENE GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL. KEEP OUT OF REACH OF CHILDREN. DISPOSE OF GLYCOL BASE COOLANT PROPERLY, CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA. DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT OPERATING TEMPERATURE OR HOT UNDER PRESSURE, PERSONAL INJURY CAN RESULT. AVOID RADIATOR COOLING FAN WHEN ENGINE COMPARTMENT RELATED SERVICE IS PERFORMED, PERSONAL INJURY CAN RESULT.

CAUTION: Use of Propylene Glycol based coolants is not recommended, as they provide less freeze protection and less boiling protection.

The cooling system is designed around the coolant. The coolant must accept heat from engine metal, in the cylinder head area near the exhaust valves and engine block. Then coolant carries the heat to the radiator where the tube/fin radiator can transfer the heat to the air.

The use of aluminum cylinder blocks, cylinder heads, and water pumps requires special corrosion protection. Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (MS-9769), or the equivalent ethylene glycol base coolant with hybrid organic corrosion inhibitors (called HOAT, for Hybrid Organic Additive Technology) is recommended. This coolant offers the best engine cooling without corrosion when mixed with 50% Ethylene Glycol and 50% distilled water to obtain a freeze point of -37°C (-35°F). If it loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed coolant solution.

The green coolant **MUST NOT BE MIXED** with the orange or magenta coolants. When replacing coolant the complete system flush must be performed before using the replacement coolant.

FLUID TYPES (Continued)

CAUTION: Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (MS-9769) may not be mixed with any other type of antifreeze. Doing so will reduce the corrosion protection and may result in premature water pump seal failure. If non-HOAT coolant is introduced into the cooling system in an emergency, it should be replaced with the specified coolant as soon as possible.

DESCRIPTION - AUTOMATIC/MANUAL TRANSAXLE FLUID

NOTE: Refer to the maintenance schedules in the vehicle owner's manual for the recommended maintenance (fluid/filter change) intervals for this transaxle.

NOTE: All transaxles have a common transmission and differential sump. Filling the transaxle accommodates the differential as well.

TRANSMISSION FLUID

Mopar® ATF+4 (Automatic Transmission Fluid-Type 9602) is required in the 41TE automatic and T350 manual transaxles. Substitute fluids can induce torque converter clutch shudder, or premature geartrain failure.

Mopar® ATF+4 (Automatic Transmission Fluid-Type 9602) when new is red in color. The ATF is dyed red so it can be identified from other fluids used in the vehicle such as engine oil or antifreeze. The red color is not permanent and is not an indicator of fluid condition. As the vehicle is driven, the ATF will begin to look darker in color and may eventually become brown. **This is normal.** A dark brown/black fluid accompanied with a burnt odor and/or deterioration in shift quality may indicate fluid deterioration or transmission component failure.

FLUID ADDITIVES

DaimlerChrysler strongly recommends against the addition of any fluids to the transmission, other than those automatic transmission fluids listed above. Exceptions to this policy are the use of special dyes to aid in detecting fluid leaks.

Various "special" additives and supplements exist that claim to improve shift feel and/or quality. These additives and others also claim to improve converter clutch operation and inhibit overheating, oxidation, varnish, and sludge. These claims have not been supported to the satisfaction of DaimlerChrysler and these additives **must not be used.** The use of transmission "sealers" should also be avoided, since they may adversely affect the integrity of transmission seals.

DESCRIPTION - FUEL REQUIREMENTS

Your engine is designed to meet all emissions regulations and provide excellent fuel economy and performance when using high quality unleaded gasoline having an octane rating of 87. The use of premium gasoline is not recommended. The use of premium gasoline will provide no benefit over high quality regular gasoline, and in some circumstances may result in poorer performance.

Light spark knock at low engine speeds is not harmful to your engine. However, continued heavy spark knock at high speeds can cause damage and immediate service is required. Engine damage resulting from operation with a heavy spark knock may not be covered by the new vehicle warranty.

Poor quality gasoline can cause problems such as hard starting, stalling and hesitations. If you experience these symptoms, try another brand of gasoline before considering service for the vehicle.

Over 40 auto manufacturers world-wide have issued and endorsed consistent gasoline specifications (the Worldwide Fuel Charter, WWFC) to define fuel properties necessary to deliver enhanced emissions, performance and durability for your vehicle. We recommend the use of gasolines that meet the WWFC specifications if they are available.

REFORMULATED GASOLINE

Many areas of the country require the use of cleaner burning gasoline referred to as "reformulated" gasoline. Reformulated gasoline contain oxygenates, and are specifically blended to reduce vehicle emissions and improve air quality.

We strongly supports the use of reformulated gasoline. Properly blended reformulated gasoline will provide excellent performance and durability for the engine and fuel system components.

GASOLINE/OXYGENATE BLENDS

Some fuel suppliers blend unleaded gasoline with oxygenates such as 10% ethanol, MTBE, and ETBE. Oxygenates are required in some areas of the country during the winter months to reduce carbon monoxide emissions. Fuels blended with these oxygenates may be used in your vehicle.

CAUTION: DO NOT use gasoline containing METHANOL. Gasoline containing methanol may damage critical fuel system components.

FLUID TYPES (Continued)

MMT IN GASOLINE

MMT is a manganese-containing metallic additive that is blended into some gasoline to increase octane. Gasoline blended with MMT provide no performance advantage beyond gasoline of the same octane number without MMT. Gasoline blended with MMT reduce spark plug life and reduce emission system performance in some vehicles. We recommend that gasoline free of MMT be used in your vehicle. The MMT content of gasoline may not be indicated on the gasoline pump; therefore, you should ask your gasoline retailer whether or not his/her gasoline contains MMT.

It is even more important to look for gasoline without MMT in Canada because MMT can be used at levels higher than allowed in the United States. MMT is prohibited in Federal and California reformulated gasoline.

SULFUR IN GASOLINE

If you live in the northeast United States, your vehicle may have been designed to meet California low emission standards with Cleaner-Burning California reformulated gasoline with low sulfur. If such fuels are not available in states adopting California emission standards, your vehicles will operate satisfactorily on fuels meeting federal specifications, but emission control system performance may be adversely affected. Gasoline sold outside of California is permitted to have higher sulfur levels which may affect the performance of the vehicle's catalytic converter. This may cause the Malfunction Indicator Lamp (MIL), Check Engine or Service Engine Soon light to illuminate. We recommend that you try a different brand of unleaded gasoline having lower sulfur to determine if the problem is fuel related prior to returning your vehicle to an authorized dealer for service.

CAUTION: If the Malfunction Indicator Lamp (MIL), Check Engine or Service Engine Soon light is flashing, immediate service is required; see on-board diagnostics system section.

MATERIALS ADDED TO FUEL

All gasoline sold in the United States and Canada are required to contain effective detergent additives. Use of additional detergents or other additives is not needed under normal conditions.

FUEL SYSTEM CAUTIONS

CAUTION: Follow these guidelines to maintain your vehicle's performance:

- The use of leaded gas is prohibited by Federal law. Using leaded gasoline can impair engine performance, damage the emission control system, and could result in loss of warranty coverage.
- An out-of-tune engine, or certain fuel or ignition malfunctions, can cause the catalytic converter to overheat. If you notice a pungent burning odor or some light smoke, your engine may be out of tune or malfunctioning and may require immediate service. Contact your dealer for service assistance.
- When pulling a heavy load or driving a fully loaded vehicle when the humidity is low and the temperature is high, use a premium unleaded fuel to help prevent spark knock. If spark knock persists, lighten the load, or engine piston damage may result.
- The use of fuel additives which are now being sold as octane enhancers is not recommended. Most of these products contain high concentrations of methanol. Fuel system damage or vehicle performance problems resulting from the use of such fuels or additives is not the responsibility of DaimlerChrysler Corporation and may not be covered under the new vehicle warranty.

NOTE: Intentional tampering with emissions control systems can result in civil penalties being assessed against you.

FLUID FILL/CHECK LOCATIONS

DESCRIPTION

The fluid check/fill points and lubrication locations are located in each applicable service manual section.

LUBRICATION POINTS

DESCRIPTION

Lubrication point locations are located in each applicable Sections.

MAINTENANCE SCHEDULES

DESCRIPTION

″Maintenance Schedule Information not included in this section, is located in the appropriate Owner's Manual.″

HOISTING

STANDARD PROCEDURE - HOISTING

Refer to Owner's Manual provided with vehicle for proper emergency jacking procedures.

WARNING: THE HOISTING AND JACK LIFTING POINTS PROVIDED ARE FOR A COMPLETE VEHICLE. WHEN THE ENGINE OR REAR SUSPENSION IS REMOVED FROM A VEHICLE, THE CENTER OF GRAVITY IS ALTERED MAKING SOME HOISTING CONDITIONS UNSTABLE. PROPERLY SUPPORT OR SECURE VEHICLE TO HOISTING DEVICE WHEN THESE CONDITIONS EXIST.

CAUTION: Do not position hoisting device on suspension components, damage to vehicle can result. Refer to (Fig. 5), OR (Fig. 6) for proper locations.

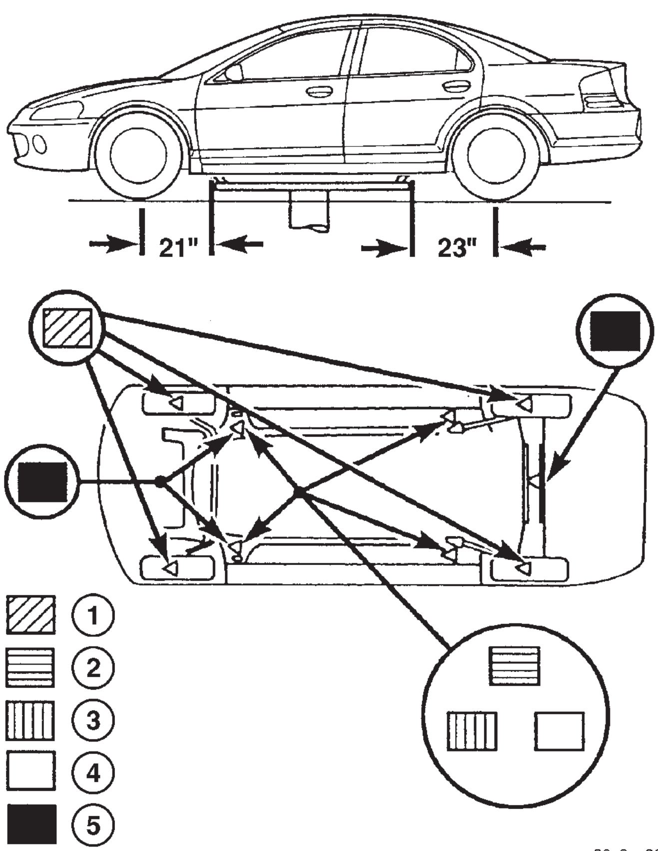


Fig. 5 HOISTING AND JACKING POINTS - JR-41

1 - DRIVE ON LIFT
2 - FRAME CONTACT LIFT (SINGLE POST)
3 - CHASSIS LIFT (DUAL POST)
4 - OUTBOARD LIFT (DUAL LIFT)
5 - FLOOR JACK

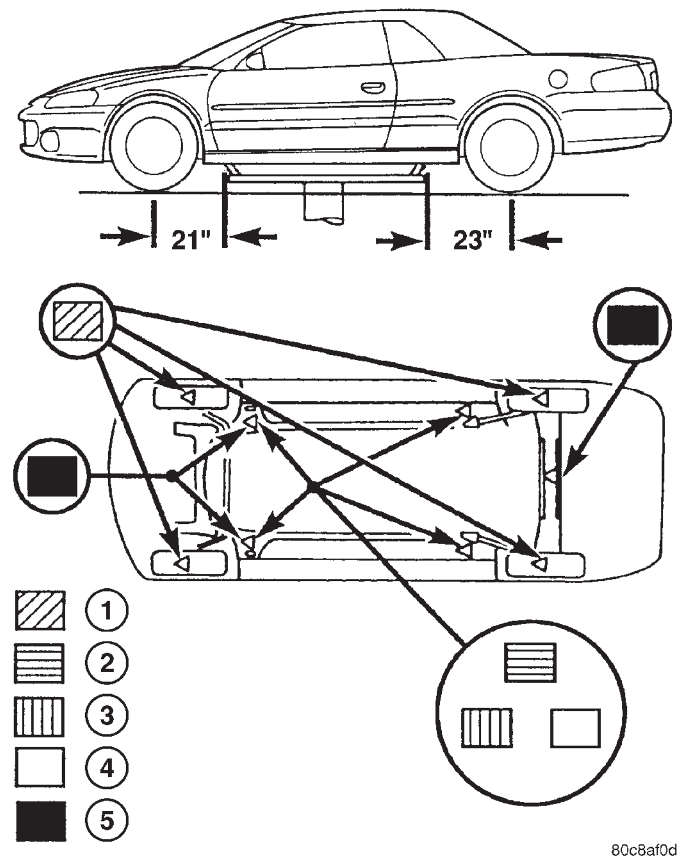


Fig. 6 HOISTING AND JACKING POINTS - JR-27

1 - DRIVE ON LIFT
2 - FRAME CONTACT LIFT (SINGLE POST)
3 - CHASSIS LIFT (DUAL POST)
4 - OUTBOARD LIFT (DUAL LIFT)
5 - FLOOR JACK

JUMP STARTING

STANDARD PROCEDURE - JUMP STARTING

WARNING: DO NOT JUMP START A FROZEN BATTERY, PERSONAL INJURY CAN RESULT. DO NOT JUMP START WHEN MAINTENANCE FREE BATTERY INDICATOR DOT IS YELLOW OR BRIGHT COLOR. DO NOT JUMP START A VEHICLE WHEN THE BATTERY FLUID IS BELOW THE TOP OF LEAD PLATES. DO NOT ALLOW JUMPER CABLE CLAMPS TO TOUCH EACH OTHER WHEN CONNECTED TO A BOOSTER SOURCE. DO NOT USE OPEN FLAME NEAR BATTERY. REMOVE METALLIC JEWELRY WORN ON HANDS OR WRISTS TO AVOID INJURY BY ACCIDENTAL ARCING OF BATTERY CURRENT. WHEN USING A HIGH OUTPUT BOOSTING DEVICE, DO NOT ALLOW BATTERY VOLTAGE TO EXCEED 16 VOLTS. REFER TO INSTRUCTIONS PROVIDED WITH DEVICE BEING USED.

JUMP STARTING (Continued)

CAUTION: When using another vehicle as a booster, do not allow vehicles to touch. Electrical systems can be damaged on either vehicle.

TO JUMP START A DISABLED VEHICLE:

(1) Raise hood on disabled vehicle and visually inspect engine compartment for:

- Battery cable clamp condition, clean if necessary.
- Frozen battery.
- Yellow or bright color test indicator, if equipped.
- Low battery fluid level.
- Generator drive belt condition and tension.
- Fuel fumes or leakage, correct if necessary.

CAUTION: If the cause of starting problem on disabled vehicle is severe, damage to booster vehicle charging system can result.

(2) When using another vehicle as a booster source, park the booster vehicle within cable reach. Turn off all accessories, set the parking brake, place the automatic transmission in PARK or the manual transmission in NEUTRAL and turn the ignition OFF.

(3) On disabled vehicle, place gear selector in park or neutral and set park brake. Turn off all accessories.

(4) Connect jumper cables to booster battery. RED clamp to positive terminal (+). BLACK clamp to negative terminal (-). DO NOT allow clamps at opposite end of cables to touch, electrical arc will result. Review all warnings in this procedure.

(5) On disabled vehicle, connect RED jumper cable clamp to positive (+) terminal. Connect BLACK jumper cable clamp to engine ground as close to the ground cable attaching point as possible (Fig. 7).

(6) Start the engine in the vehicle which has the booster battery, let the engine idle a few minutes, then start the engine in the vehicle with the discharged battery.

CAUTION: Do not crank starter motor on disabled vehicle for more than 15 seconds, starter will overheat and could fail.

(7) Allow battery in disabled vehicle to charge to at least 12.4 volts (75% charge) before attempting to start engine. If engine does not start within 15 seconds, stop cranking engine and allow starter to cool (15 minutes), before cranking again.

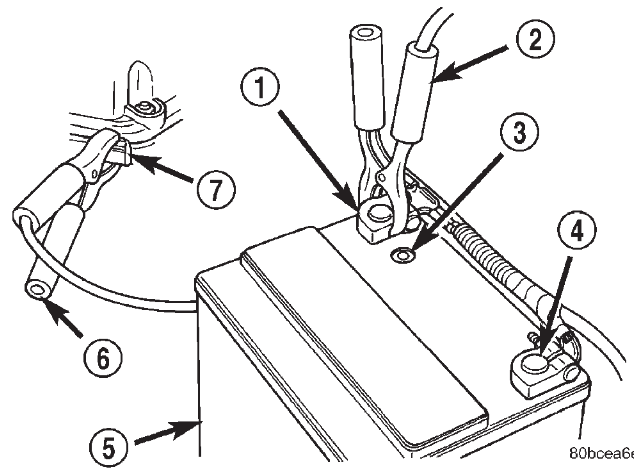


Fig. 7 Jumper Cable Clamp Connections

1 - BATTERY POSITIVE CABLE
2 - POSITIVE JUMPER CABLE
3 - TEST INDICATOR
4 - BATTERY NEGATIVE CABLE
5 - BATTERY
6 - NEGATIVE JUMPER CABLE
7 - ENGINE GROUND

DISCONNECT CABLE CLAMPS AS FOLLOWS:

- Disconnect BLACK cable clamp from engine ground on disabled vehicle.
- When using a Booster vehicle, disconnect BLACK cable clamp from battery negative terminal. Disconnect RED cable clamp from battery positive terminal.
- Disconnect RED cable clamp from battery positive terminal on disabled vehicle.

TOWING

STANDARD PROCEDURE - TOWING

WARNINGS AND PRECAUTIONS

WARNING: DO NOT ALLOW TOWING ATTACHMENT DEVICES TO CONTACT THE FUEL TANK OR LINES, FUEL LEAK CAN RESULT. DO NOT LIFT OR TOW VEHICLE BY FRONT OR REAR BUMPER, OR BUMPER ENERGY ABSORBER UNITS. DO NOT VENTURE UNDER A LIFTED VEHICLE IF NOT SUPPORTED PROPERLY ON SAFETY STANDS. DO NOT ALLOW PASSENGERS TO RIDE IN A TOWED VEHICLE. USE A SAFETY CHAIN THAT IS INDEPENDENT FROM THE TOWING ATTACHMENT DEVICE.

TOWING (Continued)

CAUTION: Do not damage brake lines, exhaust system, shock absorbers, sway bars, or any other under vehicle components when attaching towing device to vehicle. Do not attach towing device to front or rear suspension components. Do not secure vehicle to towing device by the use of front or rear suspension or steering components. Remove or secure loose or protruding objects from a damaged vehicle before towing. Refer to state and local rules and regulations before towing a vehicle. Do not allow weight of towed vehicle to bear on lower fascia, air dams, or spoilers.

RECOMMENDED TOWING EQUIPMENT

To avoid damage to bumper fascia and air dams use of a flat bed towing device or wheel lift (Fig. 8) is recommended. When using a wheel lift towing device, be sure the unlifted end of disabled vehicle has at least 100 mm (4 in.) ground clearance. If minimum ground clearance cannot be reached, use a towing dolly. If a flat bed device is used, the approach angle should not exceed 15 degrees.

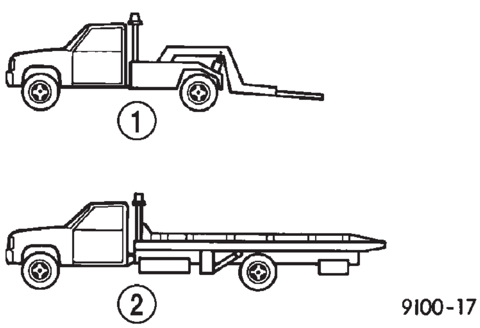


Fig. 8 Recommended Towing Equipment

1 - WHEEL LIFT
2 - FLAT BED

GROUND CLEARANCE

CAUTION: If vehicle is towed with wheels removed, install lug nuts to retain brake drums or rotors.

A towed vehicle should be raised until the lifted wheels are a minimum 100 mm (4 in.) from the ground. Be sure there is at least 100 mm (4 in.) clearance between the tail pipe and the ground. If necessary, remove the wheels from the lifted end of the vehicle and lower the vehicle closer to the ground, to increase the ground clearance at the rear of the vehicle. Install lug nuts on wheel attaching studs to retain brake drums or rotors.

LOCKED VEHICLE TOWING

When a locked vehicle must be towed with the front wheels on the ground, use a towing dolly or flat bed hauler.

FLAT TOWING WITH TOW BAR

- Three speed automatic transaxle vehicles can be flat towed at speeds not to exceed 40 km/h (25 mph) for not more than 25 km (15 miles). The steering column must be unlocked and gear selector in neutral.
- Five speed manual transaxle vehicles can be flat towed at any legal highway speed for extended distances. The gear selector must be in the neutral position.

FLAT BED TOWING TIE DOWNS

CAUTION: Do not tie vehicle down by attaching chains or cables to suspension components or engine mounts, damage to vehicle can result.

JR vehicles can be tied to a flat bed device using the reinforced loops located under the front and rear bumpers on the drivers side of the vehicle. There are also four reinforced elongated holes for T or R hooks located on the bottom of the front frame rail torque boxes behind the front wheels and forward of the rear wheels inboard of the rocker panel weld seam.

TOWING – FRONT WHEEL LIFT

DaimlerChrysler Corporation recommends that a vehicle be towed with the front end lifted, whenever possible. A 90 cm (36 in.) length of 4x4 wood beam can be placed between the wheel lift device and the bottom of the fascia to prevent damage to vehicle during the lifting operation. The beam can removed after lifting the front of the vehicle.

TOWING – REAR WHEEL LIFT

If a vehicle cannot be towed with the front wheels lifted, the rear wheels can be lifted provided the following guide lines are observed.

CAUTION: Do not use steering column lock to secure steering wheel during towing operation.

- Unlock steering column and secure steering wheel in straight ahead position with a clamp device designed for towing.
- Place front wheels on a towing dolly.

SUSPENSION

TABLE OF CONTENTS

SUSPENSION

STANDARD PROCEDURE - LUBRICATION POINTS

There are no serviceable lubrication points on the suspension of this vehicle. All joints are sealed-for-life type and require no maintenance.

FRONT SUSPENSION

TABLE OF CONTENTS

FRONT SUSPENSION

DESCRIPTION - FRONT SUSPENSION

This vehicle's front suspension is a short long arm (SLA) design used in conjunction with a gas pressurized shock absorber and coil spring assembly (Fig. 1).

SLA offers three advantages over the customary MacPherson strut system for front-wheel-drive vehicles.

- Better handling through geometry that keeps the tires more perpendicular to the road
- Better noise isolation

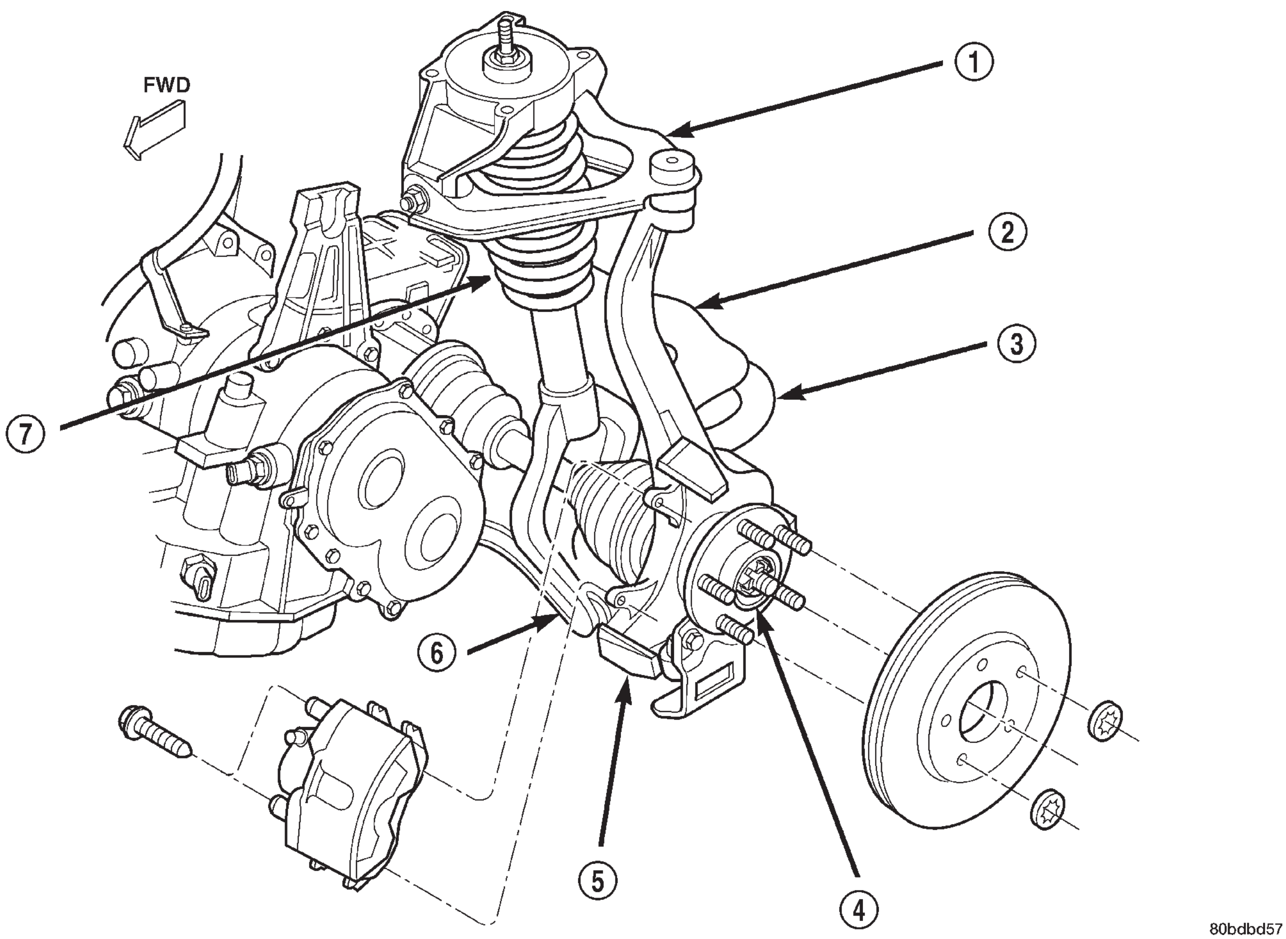


Fig. 1 Front Suspension Components (Typical)

1 - UPPER CONTROL ARM
2 - FRONT SUSPENSION CROSSMEMBER
3 - STABILIZER BAR
4 - HUB AND BEARING
5 - STEERING KNUCKLE
6 - LOWER CONTROL ARM
7 - SHOCK ASSEMBLY

FRONT SUSPENSION (Continued)

- Better ride through reduced friction

The upper control arm of the vehicle is mounted using rubber isolation bushings to an aluminum casting which is attached to the shock tower using 4 mounting bolts. This aluminum casting is also used as the upper mount for the front shock/coil spring assembly. The shock absorber is isolated from the aluminum bracket using a microcellular urethane isolator. The lower control arm is mounted to the vehicle's front suspension crossmember using 2 through bolts per control arm. The lower control arm is also isolated from the vehicle using 2 rubber bushings of unique design for the front and rear mounting location. The bottom of the shock absorber is mounted to the lower control arm by a clevis bracket which is part of the shock absorber assembly. The clevis bracket is mounted to and isolated from the lower control arm using a rubber isolation bushing and a through-bolt. The front steering knuckle is mounted to the vehicle by a ball joint located in the upper and lower control arms.

A sealed for life front hub and bearing assembly is attached to the front steering knuckle. The outer C/V joint assembly is splined to the front hub and bearing assembly and is retained by a nut, nut retainer and cotter pin.

OPERATION - FRONT SUSPENSION

The front suspension allows each front wheel on vehicle to adapt to different road surfaces and conditions without affecting the control of the vehicle. Each side of the front suspension is allowed to move independently from the other. Both sides of the front suspension are allowed to pivot so the vehicle can be steered in the direction preferred. Steering of the vehicle is provided by a rack and pinion steering gear which is connected directly to each steering knuckle by an outer tie rod.

WARNING

WARNING: DO NOT REMOVE A SHOCK ROD NUT WHILE THE SHOCK ASSEMBLY IS INSTALLED IN VEHICLE, OR BEFORE THE SHOCK ASSEMBLY SPRING IS COMPRESSED.

CAUTION

CAUTION: Only frame contact hoisting equipment should be used on this vehicle. All vehicles have a fully independent rear suspension. Vehicles must not be hoisted using equipment designed to lift a vehicle by the rear axle. If this type of hoisting equipment is used, damage to rear suspension components will occur.

CAUTION: At no time when servicing a vehicle, can a sheet metal screw, bolt or other metal fastener be installed in the shock tower to take the place of an original plastic clip. Also, NO holes can be drilled into the front shock tower in the area shown in (Fig. 2), for the installation of any metal fasteners into the shock tower. Because of the minimum clearance in this area installation of metal fasteners could damage the coil spring coating and lead to a corrosion failure of the spring.

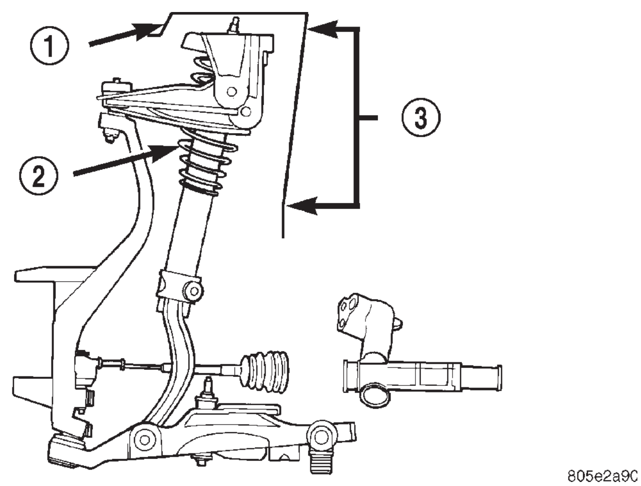


Fig. 2 Shock Tower To Spring Minimum Clearance Area

1 - SHOCK TOWER
2 - COIL SPRING
3 - NO SHEET METAL SCREWS, BOLTS, OR ANY OTHER METAL FASTENERS ARE TO BE INSTALLED IN SHOCK TOWER AREA. ALSO, NO HOLES ARE TO BE DRILLED INTO SHOCK TOWER IN THIS SAME AREA.

NOTE: If a suspension component becomes bent, damaged or fails, no attempt should be made to straighten or repair it. Always replace it with a new component.

FRONT SUSPENSION (Continued)

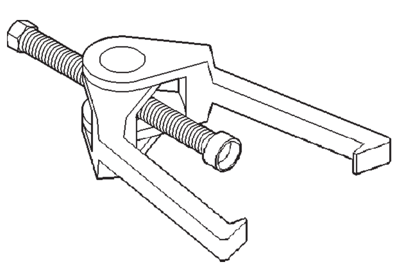
SPECIFICATIONS

FRONT SUSPENSION FASTENER TORQUE

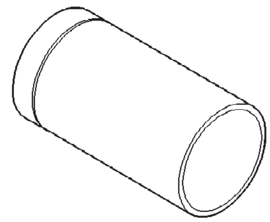
DESCRIPTION	TORQUE
Shock Assembly	
Clevis Pinch Bolt	88 N·m (65 ft. lbs.)
Shock Tower Bolts	101 N·m (75 ft. lbs.)
Clevis To Control Arm Bolt	88 N·m (65 ft. lbs.)
Rod To Upper Mount Nut	54 N·m (40 ft. lbs.)
Steering Knuckle	
Disc Brake Caliper Adapter Bolts	169 N·m (125 ft. lbs.)
Tie Rod Nut	61 N·m (45 ft. lbs.)
Tie Rod Adjustment Jam Nuts	61 N·m (45 ft. lbs.)
Hub And Bearing	
Axle Hub Nut	203 N·m (150 ft. lbs.)
Wheel Stud Lug Nut	135 N.m (100 ft. lbs.)
Upper Control Arm	
Ball Joint Stud Nut	27 N·m (20 ft. lbs.)
Shock Bracket Bolt	90 N·m (66 ft. lbs.)
Lower Control Arm	
Ball Joint Stud Castle Nut	74 N·m (55 ft. lbs.)
Crossmember Front Pivot Bolt	183 N·m (135 ft. lbs.)
Crossmember Rear Bolt	95 N·m (70 ft. lbs.)
Ball Joint Heat Shield Attaching Bolts	13 N·m (10 ft. lbs.)
Stabilizer Bar	
Bushing Clamp Bolts	61 N·m (45 ft. lbs.)
Link Nuts	101 N·m (75 ft. lbs.)

SPECIAL TOOLS

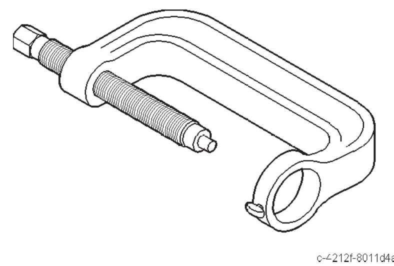
FRONT SUSPENSION



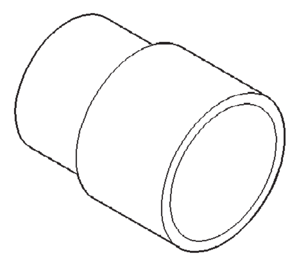
Puller C-3894-A



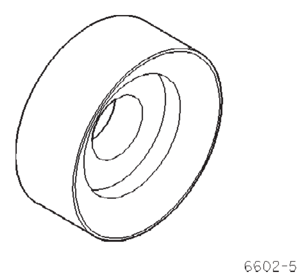
Installer, Ball Joint 6758



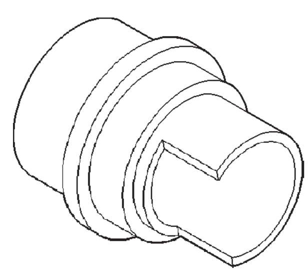
Press, Ball Joint Remover/Installer C-4212F



Remover, Ball Joint MB-990799

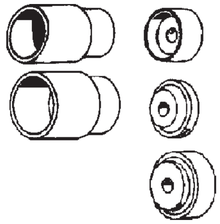


Remover/Installer Control Arm Bushing 6602–5 (In Tool Kit 6602)

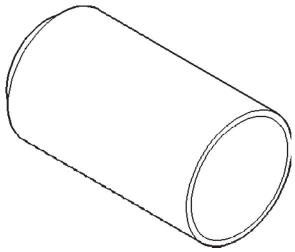


Installer/Receiver, Control Arm Bushing 6876

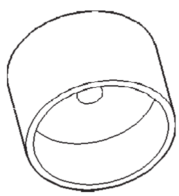
FRONT SUSPENSION (Continued)



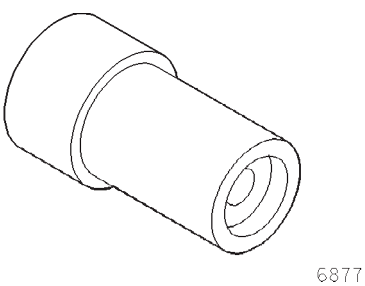
Remover / Installer C-4366-2 (In Tool Kit C-4366)



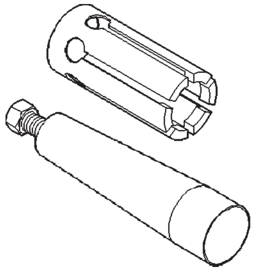
Receiver, Ball Joint 6756



Installer, Bushing 6760



Remover/Installer Control Arm Clevis Bushing 6877

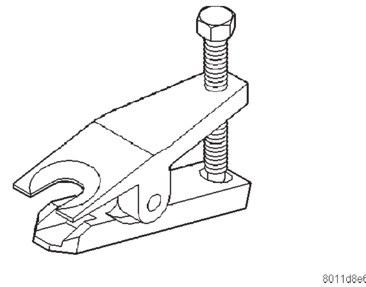


Installer, Ball Joint Seal Boot Retainer 6875

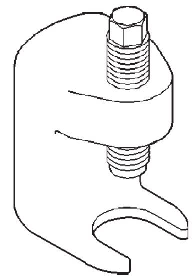
HUB / BEARING

DESCRIPTION

The bearing used on the front hub of this vehicle is the combined hub and bearing unit type assembly. This unit combines the front wheel mounting hub (flange) and the front wheel bearing into a one piece unit. The hub and bearing assembly is mounted to the steering knuckle and is retained by three mounting bolts accessible from the back of the steering knuckle. The hub and bearing unit is not serviceable and must be replaced as an assembly if the bearing or the hub is determined to be defective. The wheel mounting studs used to mount the tire and wheel to the vehicle are the only replaceable components of the hub and bearing assembly.



Remover, Tie Rod



Remover, Lower Ball Joint C-4150A

OPERATION

The hub and bearing has internal bearings that allow the hub to rotate with the driveshaft and tire and wheel.

DIAGNOSIS AND TESTING - HUB AND BEARING

The hub and bearing is designed for the life of the vehicle and requires no type of periodic maintenance. The following procedure may be used for diagnosing the condition of the wheel bearing and hub.

With the wheel, disc brake caliper, and brake rotor removed, rotate the wheel hub. Any roughness or resistance to rotation may indicate dirt intrusion or a failed hub bearing. If the bearing exhibits any of these conditions during diagnosis, the hub bearing will require replacement. The bearing is not serviceable.

Damaged bearing seals and the resulting excessive grease loss may also require bearing replacement. Moderate grease weapage from the bearing is considered normal and should not require replacement of the wheel bearing.

HUB / BEARING (Continued)

To diagnose a bent hub, (Refer to 2 - BRAKES/HYDRAULIC-MECHANICAL/ROTOR - DIAGNOSIS AND TESTING).

REMOVAL

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - SERVICE PROCEDURE).

(2) Remove front tire and wheel assembly from the hub.

CAUTION: Wheel bearing damage will result if hub nut is loose, then vehicle is rolled on the ground or the weight of the vehicle is allowed to be supported by the tires.

(3) Loosen hub nut with the brakes applied. **The hub and driveshaft are splined together through the knuckle (bearing) and retained by the hub nut.**

(4) Remove the disc brake caliper, adapter, shoes and rotor from the steering knuckle. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - REMOVAL)

(5) Remove nut attaching the outer tie rod end to the steering knuckle (Fig. 3). **Nut is to be removed from tie rod end using the following procedure, hold tie rod end stud with a socket while loosening and removing nut with wrench (Fig. 3).**

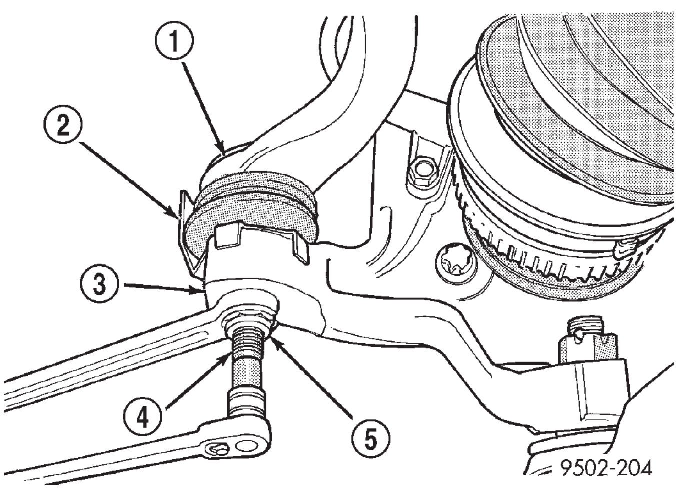


Fig. 3 Tie Rod End Attaching Nut Removal/ Installation

1 - TIE ROD END
2 - HEAT SHIELD
3 - STEERING KNUCKLE
4 - TIE ROD END STUD
5 - NUT

(6) Remove the tie rod end from the steering knuckle arm, using Remover, Special Tool MB-991113 (Fig. 4).

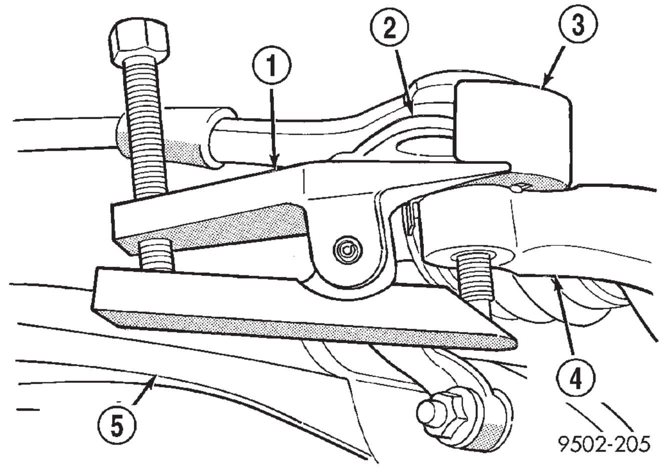


Fig. 4 Tie Rod End Removal From Steering Knuckle

1 - SPECIAL TOOL MB-991113
2 - TIE ROD END
3 - HEAT SHIELD
4 - STEERING KNUCKLE
5 - LOWER CONTROL ARM

(7) If equipped with antilock brakes remove the speed sensor cable routing bracket (Fig. 5) from the steering knuckle.

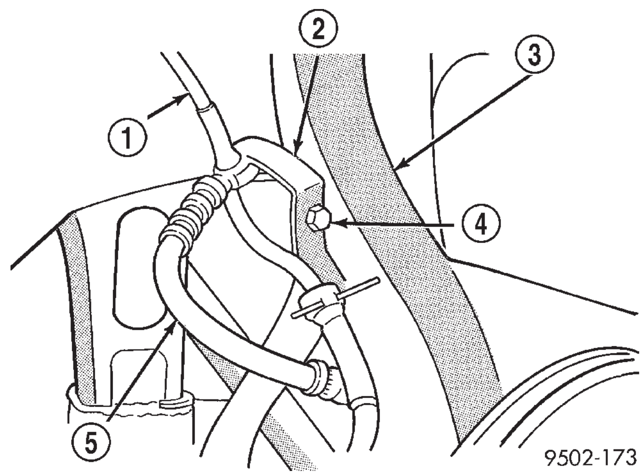


Fig. 5 Speed Sensor Cable Routing Bracket

1 - WHEEL SPEED SENSOR CABLE
2 - SPEED SENSOR CABLE ROUTING BRACKET
3 - STEERING KNUCKLE
4 - ATTACHING BOLT
5 - BRAKE CALIPER FLEX HOSE

(8) Remove cotter pin and castle nut (Fig. 6) from the stud of the lower ball joint.

HUB / BEARING (Continued)

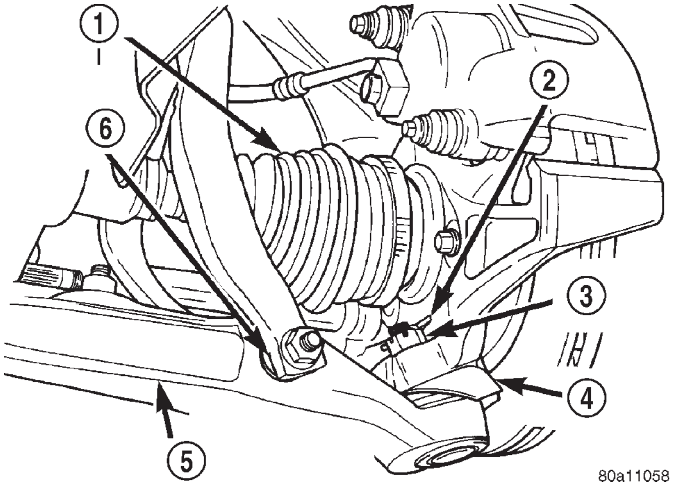


Fig. 6 Lower Ball Joint Attachment To Steering Knuckle

1 - DRIVESHAFT
2 - COTTER PIN
3 - CASTLE NUT
4 - HEAT SHIELD
5 - LOWER CONTROL ARM
6 - SHOCK ABSORBER CLEVIS

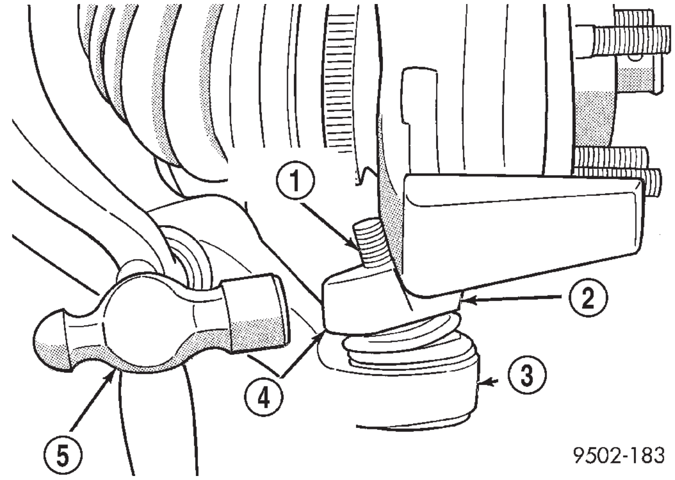


Fig. 7 Separating Ball Joint Stud From Steering Knuckle

1 - BALL JOINT STUD
2 - STEERING KNUCKLE
3 - LOWER CONTROL ARM
4 - STEERING KNUCKLE BOSS
5 - HAMMER

CAUTION: No tool is to be inserted between the steering knuckle and the lower ball joint to separate stud of lower ball joint from the steering knuckle. The steering knuckle is to be separated from the stud of the ball joint only using the procedure as described in Step 9 below.

(9) Turn steering knuckle so the front of the steering knuckle is facing as far outboard in the wheel well as possible. Using a hammer strike the boss on the steering knuckle, (Fig. 7) until steering knuckle separates from stud of lower ball joint. **When striking steering knuckle, care MUST be taken not to hit lower control arm or ball joint grease seal.**

CAUTION: Pulling steering knuckle out from vehicle after releasing from ball joint can separate inner C/V joint, thus damaging it.

(10) Lift up on steering knuckle separating it from the lower ball joint stud. **Use caution when separating ball joint stud from steering knuckle, so ball joint seal does not get cut.**

NOTE: Care must be taken not to separate the inner C/V joint during this operation. Do not allow driveshaft to hang by inner C/V joint, driveshaft must be supported.

(11) Separate the steering knuckle from the outer C/V joint. Separate steering knuckle from outer C/V joint, by supporting the driveshaft while pulling steering knuckle away from the outer C/V joint (Fig. 8).

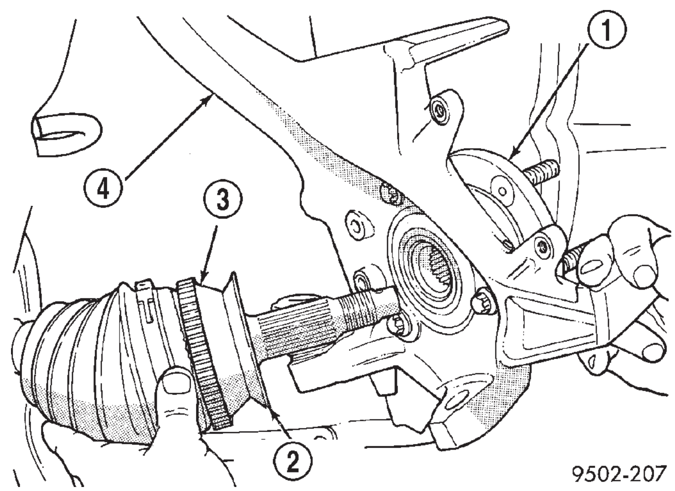


Fig. 8 Separating Steering Knuckle From Outer C/V Joint

1 - HUB/BEARING
2 - BEARING SHIELD
3 - OUTER C/V JOINT
4 - STEERING KNUCKLE

(12) Remove the nut from the upper ball joint stud.

(13) Remove the upper ball joint stud from the steering knuckle using Puller, Special Tool, C3894-A (Fig. 9).

(14) Remove steering knuckle from vehicle.

HUB / BEARING (Continued)

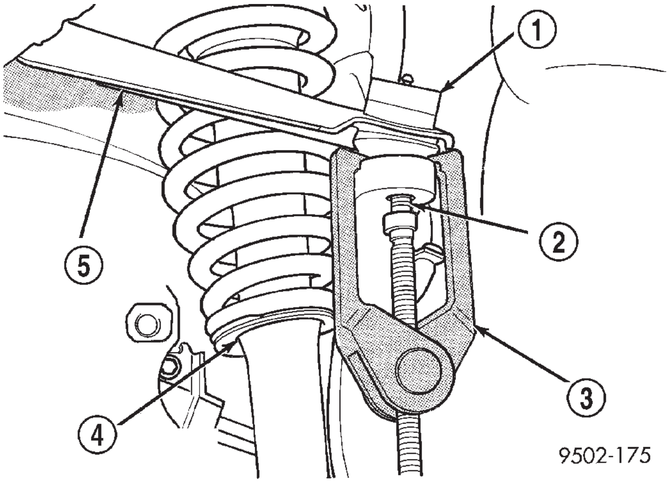


Fig. 9 Ball Joint Stud Removal From Steering Knuckle

1 - BALL JOINT
2 - BALL JOINT STUD
3 - SPECIAL TOOL C3894–A
4 - SHOCK ABSORBER ASSEMBLY
5 - UPPER CONTROL ARM

(15) Mount steering knuckle securely in a vise.

(16) Remove the 3 bolts attaching the hub/bearing assembly to the steering knuckle (Fig. 10).

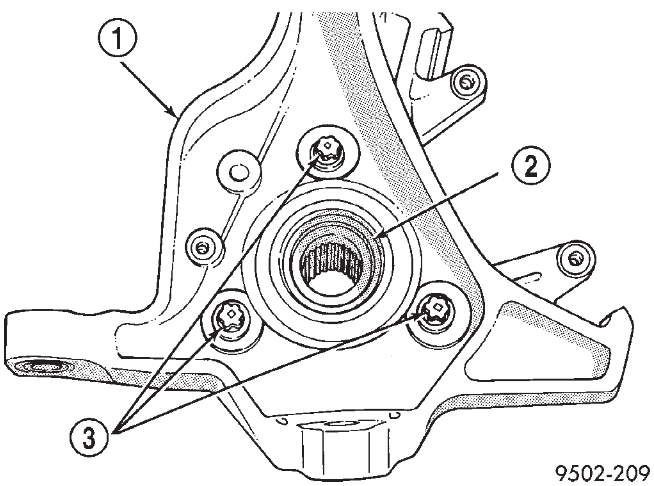


Fig. 10 Hub/Bearing Attaching Bolts

1 - STEERING KNUCKLE
2 - HUB/BEARING ASSEMBLY
3 - HUB/BEARING ATTACHING BOLTS

(17) Remove the hub and bearing assembly from the front of the steering knuckle.

NOTE: If bearing will not come out of steering knuckle, it can be tapped out using a soft faced hammer.

INSTALLATION

(1) Thoroughly clean all hub and bearing assembly mounting surfaces on steering knuckle.

(2) Install the replacement hub and bearing assembly in steering knuckle aligning bolt boles in bearing flange with holes in steering knuckle.

(3) Install the 3 mounting bolts (Fig. 10) and tighten evenly to ensure bearing is square to face of steering knuckle. The tighten the 3 mounting bolts (Fig. 10) to a torque of 110 N·m (80 ft. lbs.).

(4) Slide drive shaft back into front hub and bearing assembly.

(5) Install the steering knuckle on the lower control arm ball joint.

(6) Install the steering knuckle to lower ball joint castle nut.

(7) Install the steering knuckle onto upper ball joint stud and install nut.

(8) Using a crow foot and torque wrench, tighten the upper and lower ball joint nuts to the following torque specifications.

- Lower ball joint castle nut 74 N·m (55 ft. lbs.).
- Upper ball joint nut 27 N·m (20 ft. lbs.).

(9) Install cotter pin in lower ball joint stud and castle nut.

(10) If equipped with antilock brakes install the speed sensor cable routing bracket on the steering knuckle (Fig. 5) and securely tighten attaching bolt.

CAUTION: When installing tie rod on steering knuckle the heat shield (Fig. 11) must be installed. If heat shield is not installed, tie rod seal boot can fail due to excessive heat from brake rotor.

(11) Install tie rod end into the steering knuckle. Start tie rod end to steering knuckle attaching nut onto stud of tie rod end. While holding the stud of the tie rod end stationary, tighten tie rod end to steering knuckle attaching nut (Fig. 3). Then using a crowfoot and socket tighten the attaching nut to a torque of 61 N·m (45 ft. lbs.) (Fig. 11).

(12) Install brake rotor, and caliper, shoes and adapter assembly. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - INSTALLATION)

(13) Clean all foreign matter from the threads of the outer C/V joint stub axle. Install hub nut onto the driveshaft stub axle.

(14) With vehicle brakes applied to keep stub axle from turning, tighten hub nut to a torque of 203 N·m (150 ft. lbs.) of torque.

(15) Install wheel and tire assembly. Install wheel lug nuts and progressively tighten in crisscross sequence. Tighten nuts to a torque of 135 N·m (100 ft. lbs.).

(16) Lower vehicle.

HUB / BEARING (Continued)

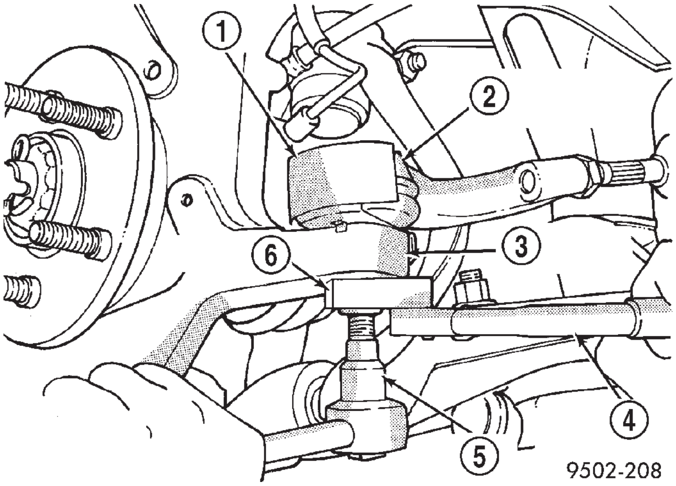


Fig. 11 Torquing Tie Rod End Attaching Nut

1 - HEAT SHIELD
2 - TIE ROD END
3 - STEERING KNUCKLE
4 - TORQUE WRENCH
5 - 11/32 SOCKET
6 - CROWFOOT

(17) Set front toe on vehicle to required specification. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).

KNUCKLE

DESCRIPTION

The steering knuckle is a single casting with legs machined for attachment to the vehicle's upper and lower control arm ball joints. the steering knuckle has the hub and bearing mounted in its center. The axle shaft constant velocity joint stub shaft is splined through the hub and bearing assembly in the center of the knuckle. The steering knuckle also supports and aligns the front brake caliper adapter and caliper assembly.

OPERATION

The steering knuckle pivots between the upper and lower ball joints. The steering gear outer tie rod end connects to the trailing end of each knuckle, allowing the vehicle to be steered.

The center of the knuckle supports the hub and bearing and axle shaft.

DIAGNOSIS AND TESTING - STEERING KNUCKLE

The front suspension steering knuckle is not a repairable component of the front suspension. It must be replaced if found to be damaged in any way. If it is determined that the steering knuckle is bent when servicing the vehicle, no attempt is to be made to straighten the steering knuckle.

REMOVAL

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - SERVICE PROCEDURE).

(2) Remove front tire and wheel assembly from the hub.

CAUTION: Wheel bearing damage will result if hub nut is loosened, then vehicle is rolled on the ground or the weight of the vehicle is allowed to be supported by the tires.

(3) Loosen hub nut with the brakes applied.**The hub and driveshaft are splined together through the knuckle (bearing) and retained by the hub nut.**

(4) Remove the disc brake caliper, adapter, shoes and rotor from the steering knuckle. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - REMOVAL)

(5) Remove nut attaching outer tie rod end to the steering knuckle (Fig. 12). **Nut is to be removed from tie rod end using the following procedure, hold tie rod end stud with a socket while loosening and removing nut with wrench (Fig. 12).**

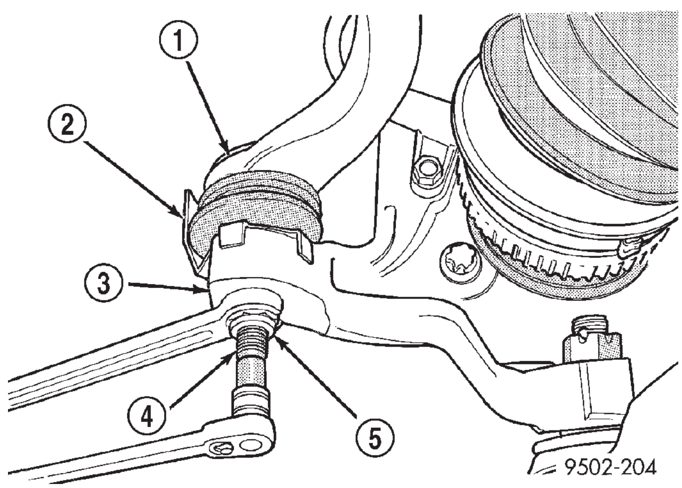


Fig. 12 Tie Rod End Attaching Nut

1 - TIE ROD END
2 - HEAT SHIELD
3 - STEERING KNUCKLE
4 - TIE ROD END STUD
5 - NUT

(6) Remove the tie rod end from the steering knuckle using Remover, Special Tool MB-991113 (Fig. 13).

(7) Remove the speed sensor cable routing bracket (Fig. 14) from the steering knuckle.

KNUCKLE (Continued)

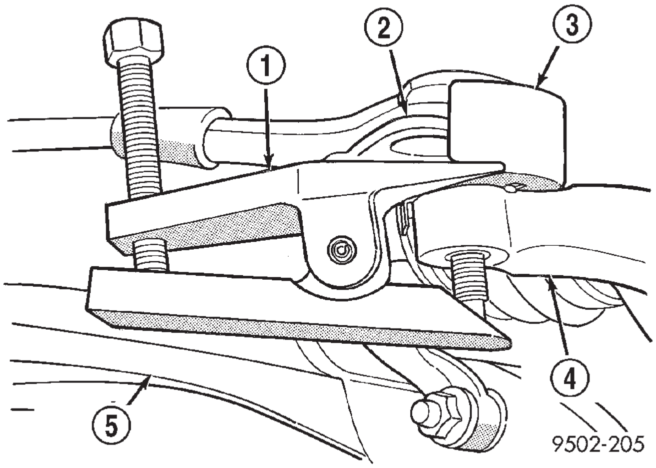


Fig. 13 Tie Rod End Removal From Steering Knuckle

1 - SPECIAL TOOL MB-991113
2 - TIE ROD END
3 - HEAT SHIELD
4 - STEERING KNUCKLE
5 - LOWER CONTROL ARM

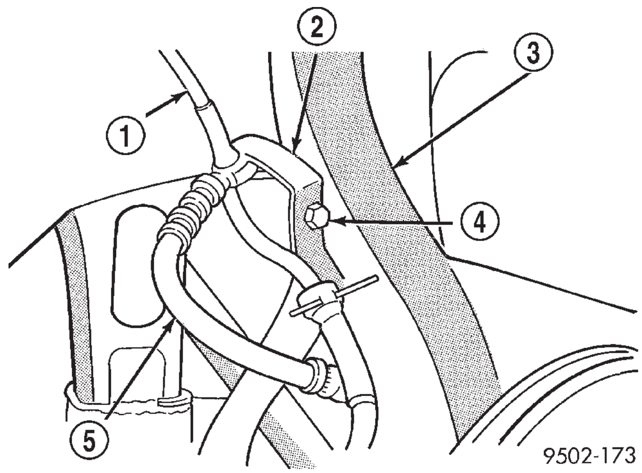


Fig. 14 Speed Sensor Cable Routing Bracket

1 - WHEEL SPEED SENSOR CABLE
2 - SPEED SENSOR CABLE ROUTING BRACKET
3 - STEERING KNUCKLE
4 - ATTACHING BOLT
5 - BRAKE CALIPER FLEX HOSE

(8) Remove cotter pin and castle nut (Fig. 15) from the stud of the lower ball joint.

CAUTION: No tool is to be inserted between the steering knuckle and the lower ball joint to separate stud of lower ball joint from the steering knuckle. The steering knuckle is to be separated from the stud of the ball joint only using the procedure as described in Step 9 below.

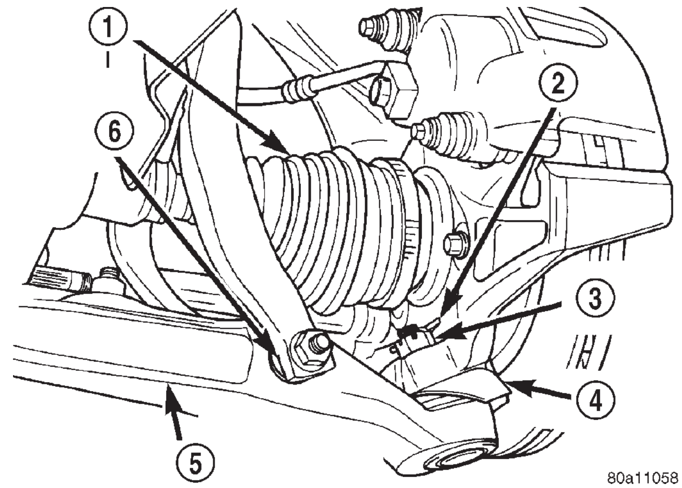


Fig. 15 Lower Ball Joint Attachment To Steering Knuckle

1 - DRIVESHAFT
2 - COTTER PIN
3 - CASTLE NUT
4 - HEAT SHIELD
5 - LOWER CONTROL ARM
6 - SHOCK ABSORBER CLEVIS

CAUTION: When striking the steering knuckle, do not hit the heat shield covering the ball joint grease seal. Bending the heat shield against the ball joint grease seal will cause the grease seal to fail.

(9) Turn steering knuckle so the front of the steering knuckle is facing as far outboard in the wheel well as possible. Using a hammer strike the boss on the steering knuckle, (Fig. 16) until the steering knuckle separates from the stud of lower ball joint.

CAUTION: Pulling steering knuckle out from vehicle after releasing from ball joint can separate inner C/V joint, thus damaging it.

(10) Lift up on steering knuckle separating it from the lower ball joint stud. **Use caution when separating ball joint stud from steering knuckle, so ball joint seal does not get cut.**

NOTE: Care must be taken not to separate the inner C/V joint during this operation. Do not allow driveshaft to hang by inner C/V joint, driveshaft must be supported.

(11) Separate the steering knuckle from the outer C/V joint. Separate steering knuckle from outer C/V joint, by supporting the driveshaft while pulling steering knuckle away from the outer C/V joint (Fig. 17).

(12) Remove the nut from the upper ball joint stud.

KNUCKLE (Continued)

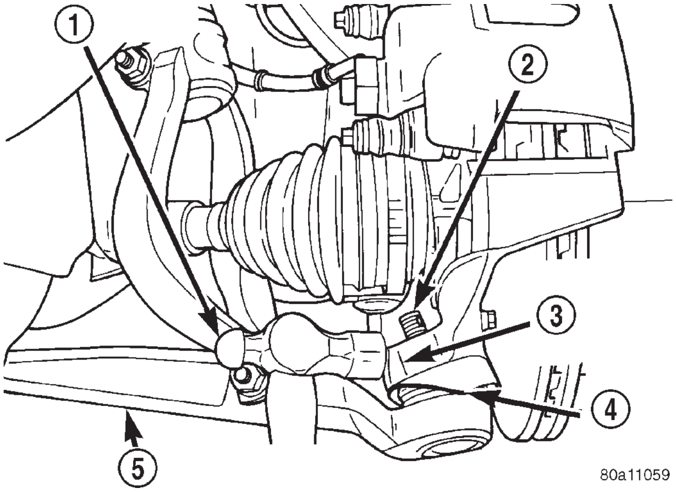


Fig. 16 Separating Ball Joint Stud From Steering

1 - HAMMER
2 - BALL JOINT STUD
3 - STEERING KNUCKLE BOSS
4 - HEAT SHIELD
5 - LOWER CONTROL ARM

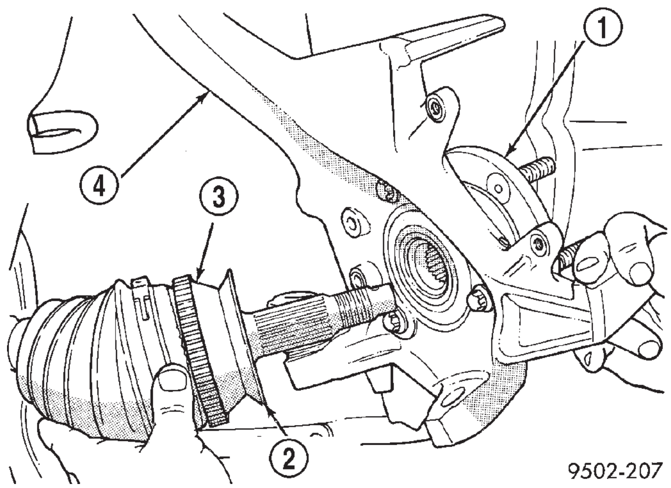


Fig. 17 Separating Steering knuckle from driveshaft

1 - HUB/BEARING
2 - BEARING SHIELD
3 - OUTER C/V JOINT
4 - STEERING KNUCKLE

(13) Remove the upper ball joint stud from the steering knuckle using Puller, Special Tool, C-3894-A (Fig. 18).

(14) Remove steering knuckle from vehicle.

(15) If steering knuckle is being replaced and hub and bearing is found to be in usable condition, it can be transferred to replacement steering knuckle. To remove the hub and bearing, (Refer to 2 - SUSPENSION/FRONT/HUB / BEARING - REMOVAL).

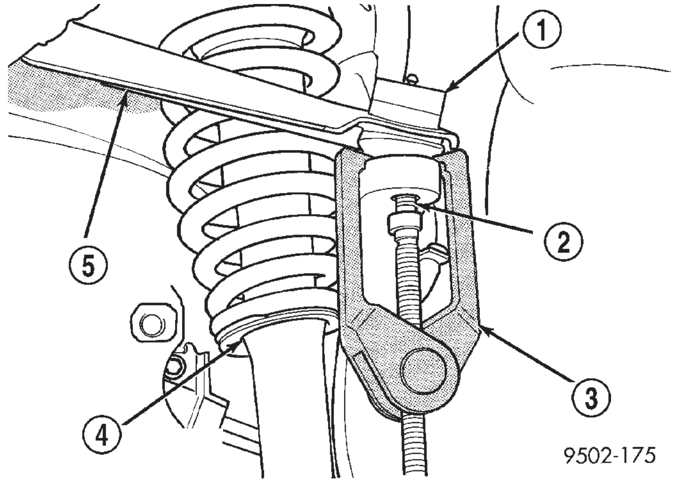


Fig. 18 Ball Joint Stud Removal From Steering Knuckle

1 - BALL JOINT
2 - BALL JOINT STUD
3 - SPECIAL TOOL C3894–A
4 - SHOCK ABSORBER ASSEMBLY
5 - UPPER CONTROL ARM

INSTALLATION

(1) If required install a hub/bearing assembly into the steering knuckle before installing steering knuckle on vehicle. (Refer to 2 - SUSPENSION/FRONT/HUB / BEARING - INSTALLATION).

(2) Install the heat shield for the lower control arm ball joint grease seal before beginning the installation of the steering knuckle on the vehicle.

(3) Slide drive shaft back into front hub/bearing assembly. Then install steering knuckle onto the ball joint stud in lower control arm.

(4) Install the steering knuckle to lower ball joint stud castle nut.

(5) Install upper ball joint in steering knuckle. Install the steering knuckle to upper ball joint nut. Tighten the upper ball joint nut to a torque of 27 N·m (20 ft. lbs.). Then, using a crowfoot and torque wrench, tighten the lower ball joint nut to a torque of 75 N·m (55 ft. lbs.) (Fig. 15).

(6) Install the speed sensor cable routing bracket on the steering knuckle (Fig. 14) and securely tighten the attaching bolt.

CAUTION: When installing tie rod on steering knuckle the heat shield (Fig. 19) must be installed. If heat shield is not installed, tie rod seal boot can fail due to excessive heat from brake rotor.

(7) Install tie rod end into the steering knuckle. Start tie rod end to steering knuckle attaching nut onto stud of tie rod end. While holding stud of tie rod end stationary, tighten tie rod end to steering

KNUCKLE (Continued)

knuckle attaching nut (Fig. 12). Then using a crow-foot and socket tighten the attaching nut to a torque of 61 N·m (45 ft. lbs.) (Fig. 19).

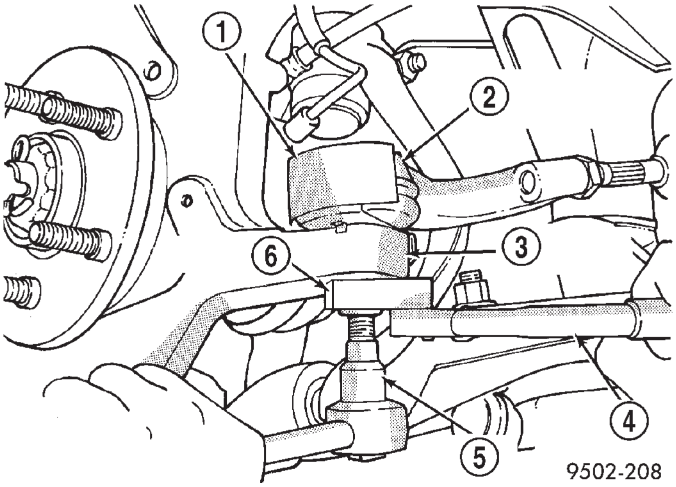


Fig. 19 Torquing Tie Rod End Attaching Nut

1 - HEAT SHIELD
2 - TIE ROD END
3 - STEERING KNUCKLE
4 - TORQUE WRENCH
5 - 11/32 SOCKET
6 - CROWFOOT

(8) Install brake rotor, and caliper, shoes and adapter assembly. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - INSTALLATION)

(9) Clean all foreign matter from the threads of the outer C/V joint stub axle. Install hub nut onto driveshaft stub axle.

(10) With vehicle brakes applied to keep braking disc from turning, tighten hub nut to 203 N·m (150 ft. lbs.) of torque.

(11) Install front wheel and tire assembly. Install front wheel lug nuts and progressively tighten in crisscross sequence. Tighten to a torque of 135 N·m (100 ft.lbs.).

(12) Lower vehicle.

(13) Set front toe on vehicle to required specification. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).

LOWER BALL JOINT

DESCRIPTION

The ball joint used in the lower control arm of this vehicle is a sealed for life ball joint. The ball joint can not be replaced as a separate component of the lower control arm assembly. If the ball joint is determined to be defective it will require replacement of the complete lower control arm assembly.

The lower ball joint connection to the steering knuckle is achieved by an interference fit created by the tapered stud of the ball joint and a tapered hole in the steering knuckle. The ball joint stud is retained in the steering knuckle using a castle nut and a cotter pin. The cotter pin is used for positive retention of the castle nut.

The lower ball joint is lubricated for life at the time it is assembled in the lower control arm.

NOTE: The ball joint does not require any type of additional lubrication for the life of the vehicle. No attempt should be made to ever add any lubrication to the lower ball joint.

OPERATION

The ball joint is a pivotal joint that allows the knuckle to move up and down, and turn with ease.

DIAGNOSIS AND TESTING - LOWER BALL JOINT

(1) Raise the vehicle on jack stands or centered on a frame contact type hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - SERVICE PROCEDURE).

(2) Install a dial indicator on the vehicle so it is contacting the top surface of the steering knuckle near the lower ball joint stud castle nut.

(3) Grab wheel and tire assembly and push it up and down firmly.

(4) Record the amount of up and down movement of the steering knuckle recorded on the dial indicator.

(5) Replace lower control arm if the movement in the lower control arm exceeds 1.5 mm (.059 in.).

LOWER BALL JOINT SEAL BOOT

REMOVAL

CAUTION: The replacement of the lower ball joint seal boot can only be done in the event that the seal boot is damaged while performing a service procedure on the vehicle.

LOWER BALL JOINT SEAL BOOT (Continued)

CAUTION: Under no circumstances can a lower ball joint seal boot be replaced if it is determined that the vehicle had been driven with the seal boot damaged. If the vehicle has been driven with a damaged seal boot contamination of the ball joint has occurred. When contamination of the ball joint has occurred the lower control arm must be replaced. This is to ensure excessive wear of the ball joint does not occur from the contamination present in the ball joint.

CAUTION: Excessive wear in the ball joint can lead to a separation of the ball joint from the lower control arm.

CAUTION: The procedure below must be carefully followed when replacing the ball joint seal in the event it is damaged while servicing a vehicle.

CAUTION: The ball joint used in the lower control arm of this vehicle is a lubricated for life ball joint. This ball joint does not required any additional lubrication for the life of the vehicle. Do not alter the lower control arm or ball joint in an attempt to lubricate the lower control arm ball joint. If it is determined that the ball joint is lacking proper lubrication, the lower control arm will need to be replaced.

(1) Remove lower control arm assembly from vehicle. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - REMOVAL).

(2) Wrap a shop towel around the ball joint and seal boot. This is to prevent dirt and cleaning solvent to enter ball joint when cleaning area around ball joint.

(3) Using **ONLY** a solvent such as Mopar Foamy Engine Degreaser or an equivalent, thoroughly clean lower control arm in area around ball joint and seal. Then using a shop towel saturated with the engine degreaser, carefully wipe off the ball joint seal boot.

(4) Using 2 screwdrivers (Fig. 20) remove the ball joint seal retaining ring from the bottom of the ball joint seal.

(5) Remove ball joint seal from ball joint.

INSTALLATION

CAUTION: The replacement of the lower ball joint seal boot can only be done in the event that the seal boot is damaged while performing a service procedure on the vehicle.

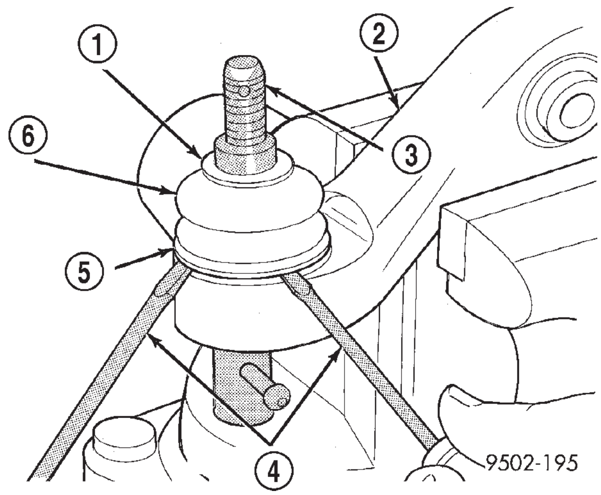


Fig. 20 Removing Ball Joint Seal Retaining Ring

1 - UPPER SEALING RING
2 - LOWER CONTROL ARM
3 - BALL JOINT
4 - SCREWDRIVERS
5 - BALL JOINT SEAL RETAINING RING
6 - BALL JOINT SEAL

CAUTION: Under no circumstances can a lower ball joint seal boot be replaced if it is determined that the vehicle had been driven with the seal boot damaged. If the vehicle has been driven with a damaged seal boot contamination of the ball joint has occurred. When contamination of the ball joint has occurred the lower control arm must be replaced. This is to ensure excessive wear of the ball joint does not occur from the contamination present in the ball joint.

CAUTION: Excessive wear in the ball joint can lead to a separation of the ball joint from the lower control arm.

CAUTION: The procedure below must be carefully followed when replacing the ball joint seal in the event it is damaged while servicing a vehicle.

CAUTION: The ball joint used in the lower control arm of this vehicle is a lubricated for life ball joint. This ball joint does not required any additional lubrication for the life of the vehicle. Do not alter the lower control arm or ball joint in an attempt to lubricate the lower control arm ball joint. If it is determined that the ball joint is lacking proper lubrication, the lower control arm will need to be replaced.

LOWER BALL JOINT SEAL BOOT (Continued)

CAUTION: When replacing ball joint seal, do not use any other type of grease to lubricate ball joint other than the lubricant provided in the Mopar Ball Joint Seal service kit.

(1) Apply grease from the ball joint seal kit, to the specified areas of the ball joint stud and seal (Fig. 21). Be sure no grease is present on the seal boot installation section of the seal boot or lower control arm (Fig. 21).

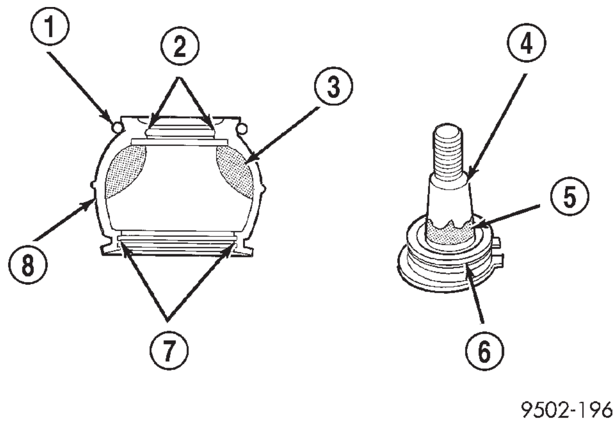


Fig. 21 Grease Correctly Applied To Ball Joint Stud And Seal Boot

1 - UPPER SEALING RING
2 - LIP
3 - GREASE
4 - BALL JOINT STUD TAPERED SECTION
5 - GREASE
6 - BOOT INSTALLATION SECTION
Wipe off the grease.
7 - BOOT INSTALLATION SECTION
Wipe off the grease.
8 - BALL JOINT SEAL BOOT

(2) Slide ball joint seal boot with upper seal ring installed, (Fig. 21) down tapered section of ball joint stud (Fig. 21). Seal boot is to be installed on stud of ball joint until seal boot is sitting on seal groove in lower control arm.

(3) Carefully position ball joint seal boot in seal retaining groove on lower control arm. After installing seal boot in retaining groove, carefully bleed air out of sealing boot without getting grease pushed into seal boot retaining groove in lower control arm.

(4) Place Retaining Ring Installer, Special Tool, 6875-1 over ball joint seal boot (Fig. 22). Using adjusting knob, adjust tool so bottom edge of tool is even with top of retaining ring groove in seal boot (Fig. 22).

(5) Place seal boot retaining ring on Installer, Special Tool, 6875- 1 (Fig. 23). Then place expandable collar from Installer, Special Tool, 6875 over tapered cone of the special tool (Fig. 23).

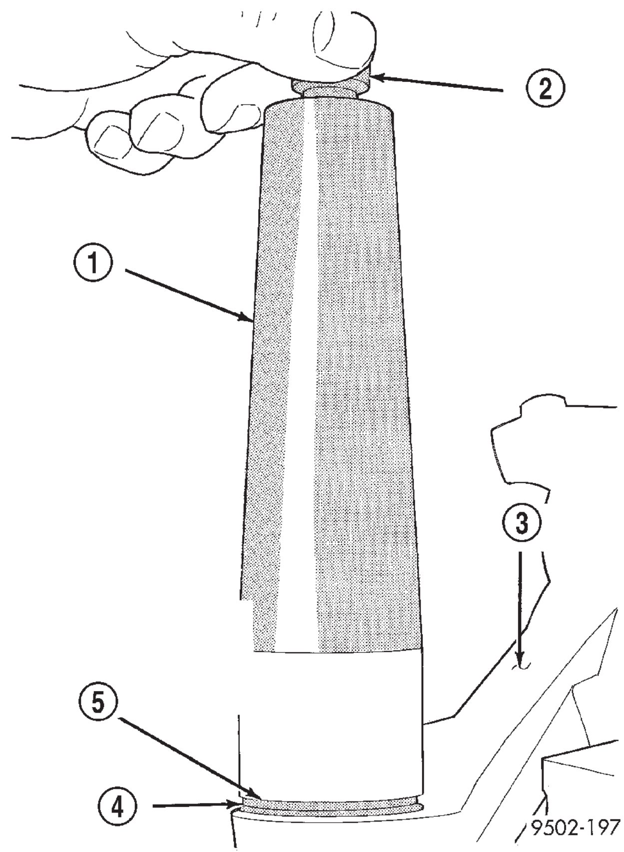


Fig. 22 Correctly Installed Ball Joint Seal Retaining Ring Tool

1 - SPECIAL TOOL 6875-1
2 - ADJUSTING KNOB
3 - LOWER CONTROL ARM
4 - SEAL BOOT RETAINING RING GROOVE
5 - BOTTOM EDGE OF TOOL MUST BE EVEN WITH TOP OF RETAINING RING GROOVE IN SEAL BOOT AS SHOWN

(6) Using the expandable collar of Installer, Special Tool, 6875 (Fig. 24) push the seal boot retaining ring down the cone of Installer, Special Tool, 6875.

(7) Continue pushing retaining ring down Installer, Special Tool, 6875, until it is installed in the retaining ring groove of the seal boot (Fig. 25)

(8) Remove Installer, Special Tool, 6875 from the ball joint seal boot. **When removing tool from seal boot be careful not to damage the seal boot with the tool.**

(9) Check retaining ring installation on seal boot to ensure it is fully seated in seal boot groove and the ends are not twisted (Fig. 26). Also, make sure upper sealing ring is on seal boot and correctly installed (Fig. 26). Check seal boot for damage before installing back on car.

(10) Install lower control arm assembly back on vehicle. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - INSTALLATION).

LOWER BALL JOINT SEAL BOOT (Continued)

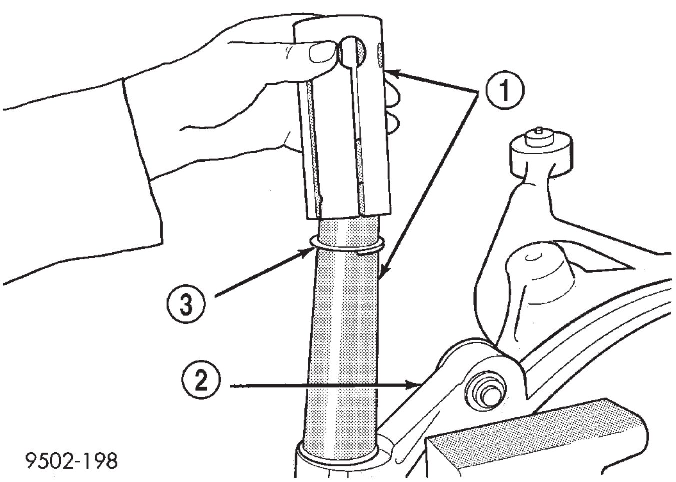


Fig. 23 Retaining Ring And Expandable Collar Installed On Tool

1 - SPECIAL TOOL 6875
2 - LOWER CONTROL ARM
3 - SEAL BOOT RETAINING RING

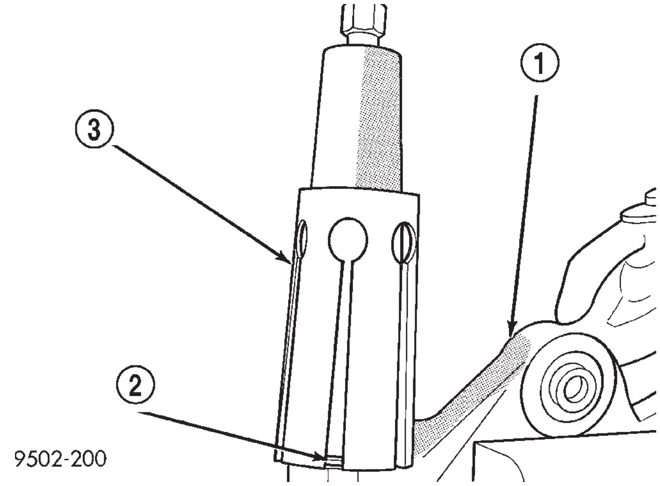


Fig. 25 Retaining Ring Installed In Ball Joint Seal Boot

1 - LOWER CONTROL ARM
2 - SEAL BOOT RETAINING RING
3 - SPECIAL TOOL 6875

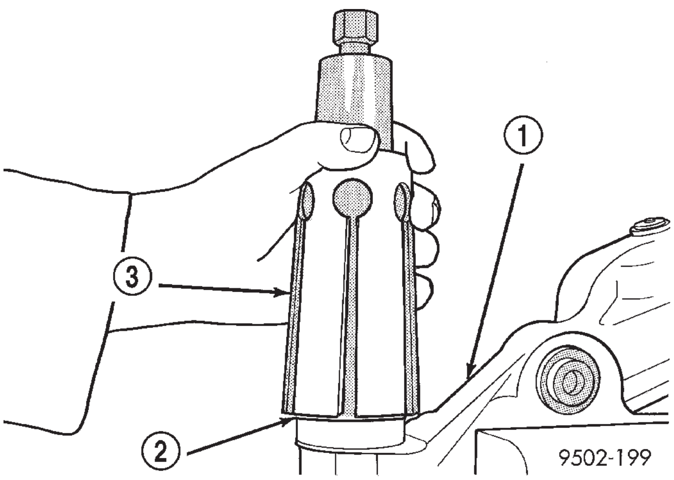


Fig. 24 Installing Seal Boot Retaining Ring

1 - LOWER CONTROL ARM
2 - RETAINING RING
3 - SPECIAL TOOL 6875

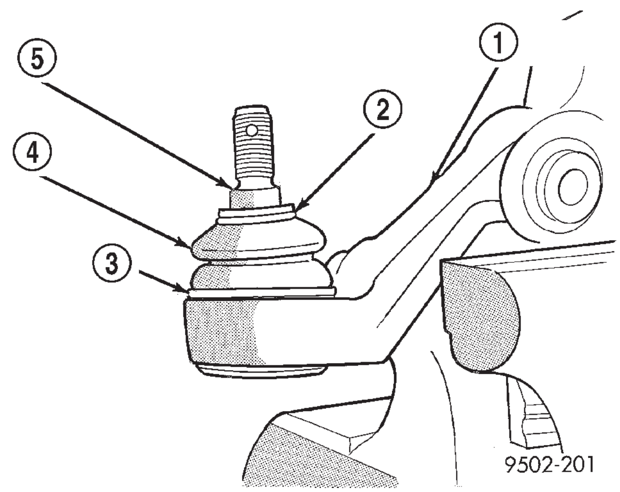


Fig. 26 Properly Installed Ball Joint Seal Boot

1 - LOWER CONTROL ARM
2 - UPPER SEALING RING
3 - SEAL BOOT RETAINING RING
4 - SEAL BOOT
5 - BALL JOINT STUD

LOWER CONTROL ARM

DESCRIPTION

The lower control arm is a ductile iron casting using 2 rubber bushings to isolate it from the front suspension crossmember and body of the vehicle. The isolator bushings consist of 2 metal encased rubber isolated pivot bushings. The front of the lower control arm is bolted to the front crossmember using a bolt through the center of the rubber pivot bushing. The rear of the lower control arm is mounted to the front suspension crossmember using a through-bolt. The lower control arms are inter-connected through a linked rubber isolated sway bar.

OPERATION

The lower control arm supports the lower end of the steering knuckle and allows for the up and down movement of the suspension during the jounce and rebound travel. It also provides a lower mounting point for the shock assembly.

LOWER CONTROL ARM (Continued)

DIAGNOSIS AND TESTING - LOWER CONTROL ARM

If damaged, the lower control arm casting is serviced only as a complete component. Inspect lower control arm for signs of damage from contact with the ground or road debris. If lower control arm shows any sign of damage, inspect lower control arm for distortion. **Do not attempt to repair or straighten a broken or bent lower control arm.**

The replaceable components of the lower control arm are: the ball joint grease seal and the control arm bushings. Inspect both control arm bushings for severe deterioration, and replace if required.

Inspect the lower ball joint for wear. Use the wear inspection procedure in the diagnosis and testing section in this group of service manual to determine if the wear is excessive and ball joint (lower control arm) replacement is required.

Service procedures to replace these components are detailed in the specific component removal and installation sections in this group of the service manual.

REMOVAL

(1) Raise vehicle on jack stands or centered on a frame contact type hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - SERVICE PROCEDURE).

(2) Remove the tire and wheel from the vehicle.

NOTE: Removing the tie rod end from the steering knuckle allows the steering knuckle to be turned further. This allows better access to the steering knuckle when striking it to remove the ball joint stud from the steering knuckle.

(3) Remove nut attaching the outer tie rod end to the steering knuckle (Fig. 27). **Nut is to be removed from tie rod end using the following procedure, hold tie rod end stud with a 11/32 socket while loosening and removing nut with wrench (Fig. 27).**

(4) Remove the tie rod end from the steering knuckle using Remover, Special Tool MB-991113 (Fig. 28).

(5) Remove cotter pin and castle nut (Fig. 29) from stud of lower ball joint.

CAUTION: No tool is to be inserted between the steering knuckle and the lower ball joint to separate the lower ball joint from the steering knuckle. The steering knuckle is to be separated from the ball joint only using the procedure as described in step Step 6 below.

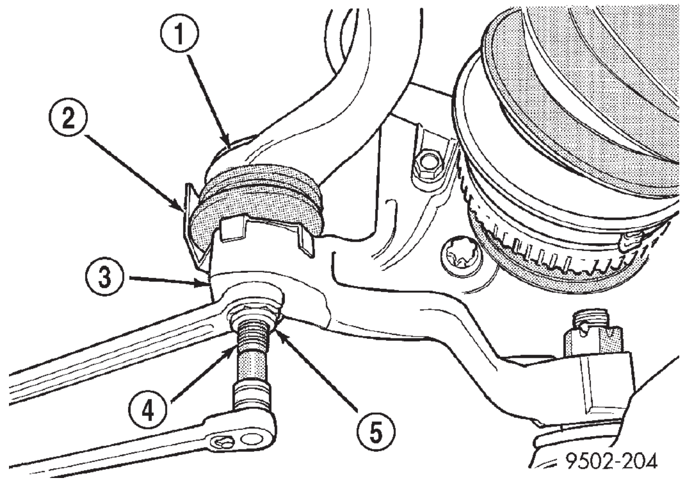


Fig. 27 Tie Rod End Attaching Nut

1 - TIE ROD END
2 - HEAT SHIELD
3 - STEERING KNUCKLE
4 - TIE ROD END STUD
5 - NUT

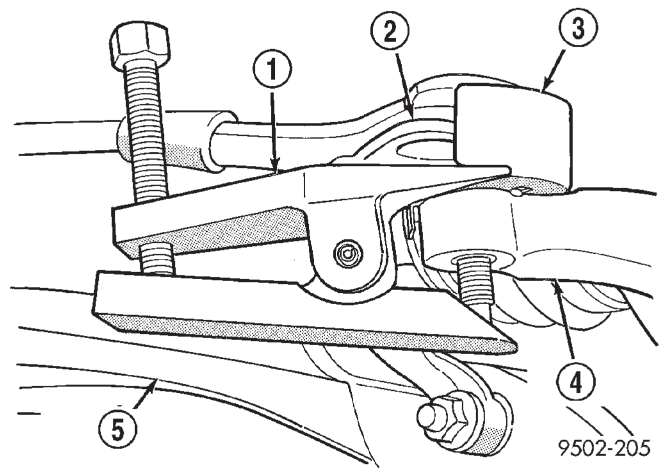


Fig. 28 Tie Rod End Removal From Steering Knuckle

1 - SPECIAL TOOL MB-991113
2 - TIE ROD END
3 - HEAT SHIELD
4 - STEERING KNUCKLE
5 - LOWER CONTROL ARM

CAUTION: When striking the steering knuckle, do not hit the heat shield covering the ball joint grease seal. Bending the heat shield against the ball joint grease seal will cause the grease seal to fail.

(6) Turn steering knuckle so the front of the steering knuckle is facing as far outboard in the wheel opening as possible (Fig. 30). Using a hammer, strike steering knuckle boss (Fig. 30) until steering knuckle separates from the lower ball joint. **When striking**

LOWER CONTROL ARM (Continued)

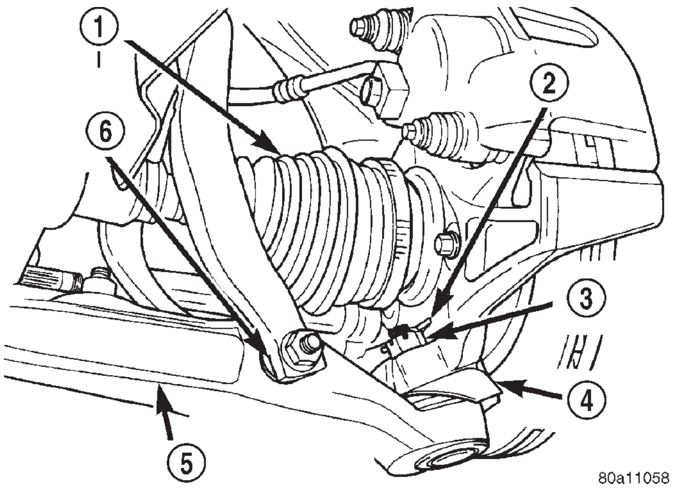


Fig. 29 Lower Ball Joint Attachment To Steering Knuckle

1 - DRIVESHAFT
2 - COTTER PIN
3 - CASTLE NUT
4 - HEAT SHIELD
5 - LOWER CONTROL ARM
6 - SHOCK ABSORBER CLEVIS

steering knuckle care MUST be taken not to hit lower control arm or ball joint grease seal.

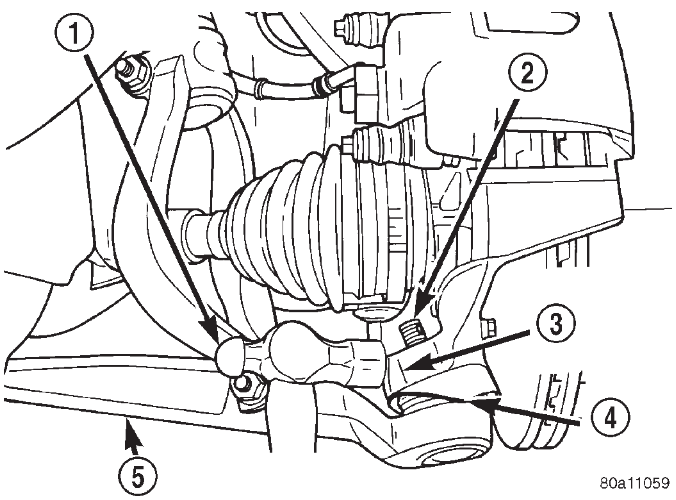


Fig. 30 Separating Lower Ball Joint Stud From Steering Knuckle

1 - HAMMER
2 - BALL JOINT STUD
3 - STEERING KNUCKLE BOSS
4 - HEAT SHIELD
5 - LOWER CONTROL ARM

CAUTION: Pulling the steering knuckle outward from the vehicle after releasing it from the ball joint, can separate inner C/V joint. (Refer to 2 - DRIVELINE AND DRIVESHAFT/HALFSHAFT - REMOVAL).

(7) Remove the shock absorber clevis to lower control arm bushing, nut and thru-bolt. Separate the clevis from lower control arm (Fig. 31).

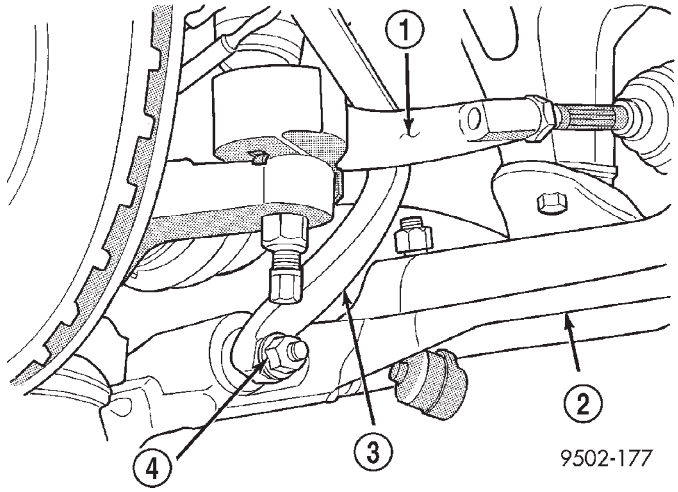


Fig. 31 Clevis To Lower Control Arm Attachment

1 - TIE ROD END
2 - LOWER CONTROL ARM
3 - SHOCK ABSORBER CLEVIS
4 - THRU-BOLT

(8) Remove nut attaching the stabilizer bar link to the lower control arm (Fig. 32). When removing nut, hold stud of stabilizer bar link from turning by inserting an allen wrench in the end of the stud (Fig. 32).

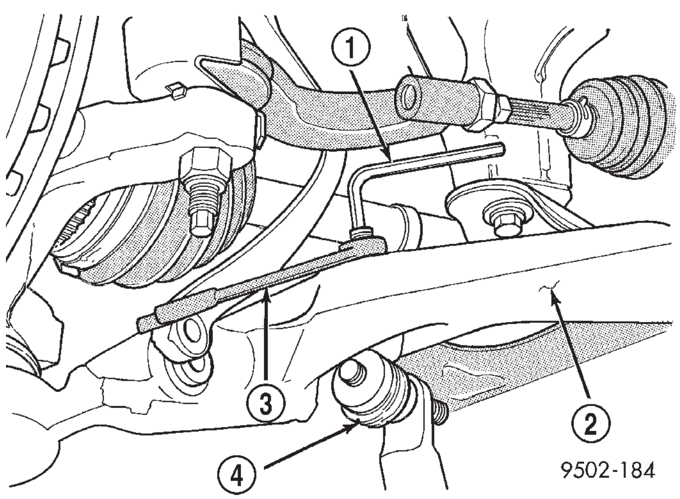


Fig. 32 Removing/ Installing Nut From Stud Of Stabilizer Link

1 - ALLEN WRENCH
2 - LOWER CONTROL ARM
3 - WRENCH
4 - STABILIZER BAR LINK ASSEMBLY

LOWER CONTROL ARM (Continued)

(9) Remove the bolts (Fig. 33) attaching the one stabilizer bar bushing clamp to the front suspension crossmember and the body of the vehicle.

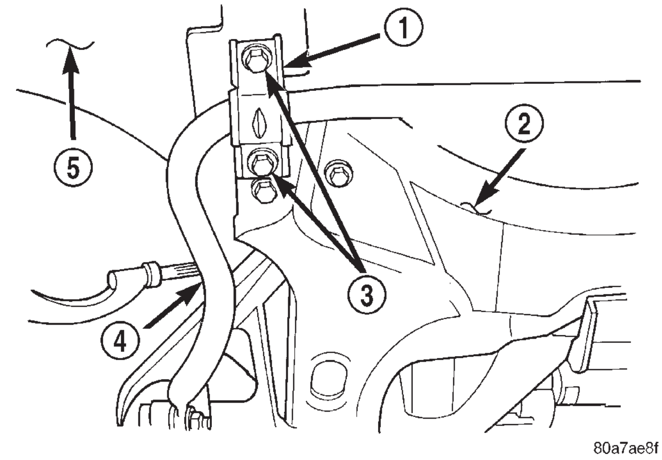


Fig. 33 Stabilizer Bar Bushing Clamp Attachment To Vehicle

1 - STABILIZER BAR BUSHING CLAMP
2 - FRONT SUSPENSION CROSSMEMBER
3 - ATTACHING BOLTS
4 - STABILIZER BAR
5 - VEHICLE BODY

(10) Lower the one side of the stabilizer bar away from the lower control arm and body of vehicle.

(11) Remove the nut and bolt (Fig. 34) attaching the rear of the lower control arm to the front suspension crossmember.

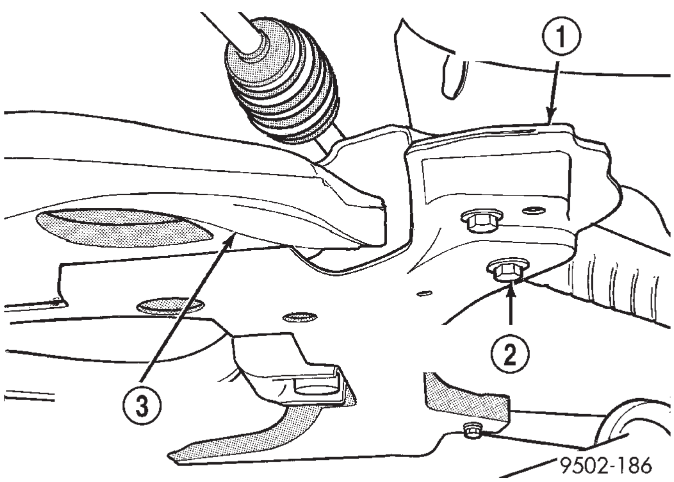


Fig. 34 Lower Control Arm Attachment To Front Suspension Crossmember

1 - FRONT SUSPENSION CROSSMEMBER
2 - LOWER CONTROL ARM ATTACHING BOLT AND NUT
3 - LOWER CONTROL ARM

(12) Remove nut and bolt attaching the front of the lower control arm to the front suspension crossmember (Fig. 35).

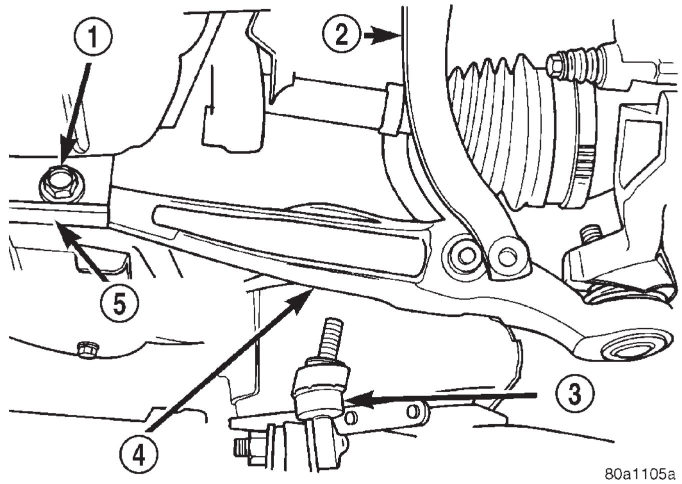


Fig. 35 Attaching Front Of Lower Control Arm To Suspension Crossmember

1 - ATTACHING BOLT AND NUT
2 - SHOCK CLEVIS
3 - STABILIZER BAR
4 - LOWER CONTROL ARM
5 - FRONT SUSPENSION CROSSMEMBER

CAUTION: When removing lower control arm from crossmember care must be taken to prevent hitting lower ball joint seal against steering knuckle, causing damage to the ball joint seal.

(13) Remove the front of the lower control arm from the front suspension crossmember first.

(14) Then, remove the rear of the lower control arm from the front suspension crossmember. When removing rear of lower control arm from crossmember, keep control arm as level as possible. This will keep rear bushing from binding on crossmember making it easier to remove control arm from crossmember.

DISASSEMBLY

DISASSEMBLY - FRONT ISOLATOR BUSHING

To perform removal and replacement of the lower control arm isolator bushings, the lower control arm must be removed from the vehicle.

(1) Remove lower control arm assembly from vehicle. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - REMOVAL).

(2) Install Bushing Remover, Special Tool 6602-5 and Bushing Receiver, Special Tool MB-990799 on Special Tool C-4212-F.

LOWER CONTROL ARM (Continued)

(3) Install lower control arm on Special Tools assembled for removal of the front isolator bushing. Be sure Special Tool MB-990799 is square on lower control arm and Special Tool 6602-5 is positioned correctly on isolator bushing (Fig. 36).

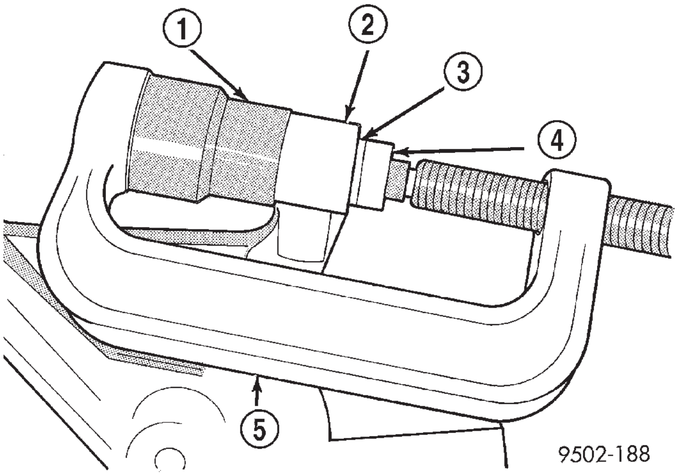


Fig. 36 Removing Front Bushing From Lower Control Arm

1 - SPECIAL TOOL MB-990799
2 - LOWER CONTROL ARM
3 - FRONT ISOLATOR BUSHING
4 - SPECIAL TOOL 6602-5
5 - SPECIAL TOOL C-4212-F

(4) Tighten screw on Remover/Installer Special Tool C-4212-F to press front bushing out of lower control arm.

DISASSEMBLY - REAR ISOLATOR BUSHING

To perform removal and replacement of the lower control arm isolator bushings, the lower control arm must be removed from the vehicle.

(1) Remove lower control arm assembly from vehicle. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - REMOVAL).

(2) Install Bushing Remover, Special Tool 6756 and Bushing Receiver, Special Tool C-4366-2 on Special Tool C-4212-F (Fig. 37).

(3) Install Special Tools assembled for removal of the rear isolator bushing on the lower control arm. Be sure Special Tool C-4366-2 is square on lower control arm and Special Tool 6756 is positioned correctly on isolator bushing (Fig. 37).

(4) Tighten screw on Remover/Installer Special Tool C-4212-F to press rear bushing out of lower control arm.

DISASSEMBLY - CLEVIS BUSHING

To perform removal and replacement of the lower control arm clevis bushing, the lower control arm must be removed from the vehicle.

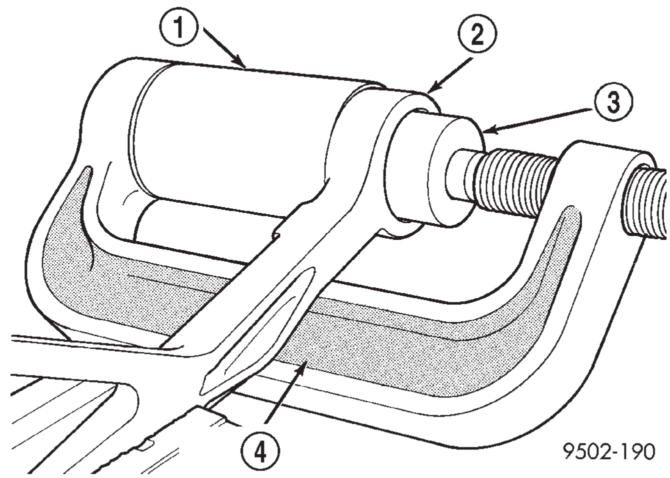


Fig. 37 Removing Lower Control Arm Rear Bushing

1 - SPECIAL TOOL C-4366-2
2 - LOWER CONTROL ARM
3 - SPECIAL TOOL 6756
4 - SPECIAL TOOL C-4212-F

(1) Remove lower control arm assembly from vehicle. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - REMOVAL).

(2) Install Bushing Remover, Special Tool 6877 and Bushing Receiver, Special Tool 6876 on Special Tool C-4212-F.

(3) Install lower control arm on Special Tools assembled for removal of the clevis isolator bushing. Be sure Special Tool 6876 is square on lower control arm and Special Tool 6877 is positioned correctly on clevis bushing (Fig. 38).

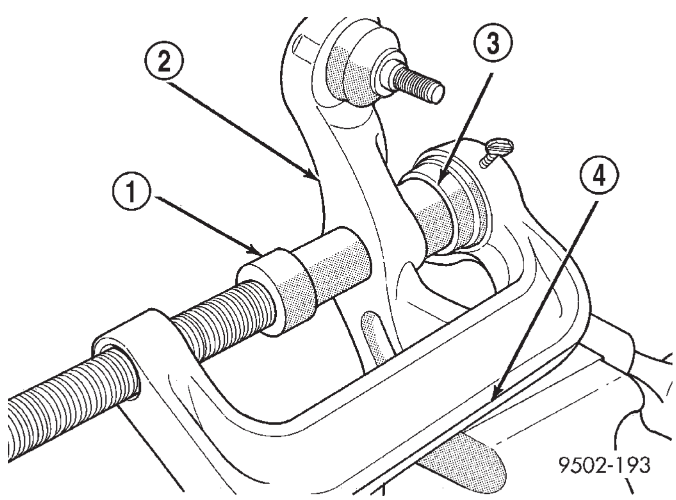


Fig. 38 Removing Clevis Bushing From Lower Control Arm

1 - SPECIAL TOOL 6877
2 - LOWER CONTROL ARM
3 - SPECIAL TOOL 6876
4 - SPECIAL TOOL C-4212-F

LOWER CONTROL ARM (Continued)

(4) Tighten screw on Remover/Installer Special Tool C-4212-F to press clevis bushing out of lower control arm.

ASSEMBLY

ASSEMBLY - FRONT ISOLATOR BUSHING

To perform removal and replacement of the lower control arm isolator bushings, the lower control arm must be removed from the vehicle.

(1) Mount Bushing Installer, Special Tool 6876 on screw portion of Remover/Installer Special Tool C-4212-F (Fig. 39).

(2) Start front bushing into lower control arm **by hand, making sure it is square with its mounting hole in the lower control arm.** Bushing is to be installed in lower control arm from the machined surface side of lower control arm bushing hole.

(3) Install lower control arm on Special Tools assembled for installation of front isolator bushing into lower control arm (Fig. 39). Be sure Special Tool 6758 is square on lower control arm and Special Tool 6876 is positioned correctly on isolator bushing.

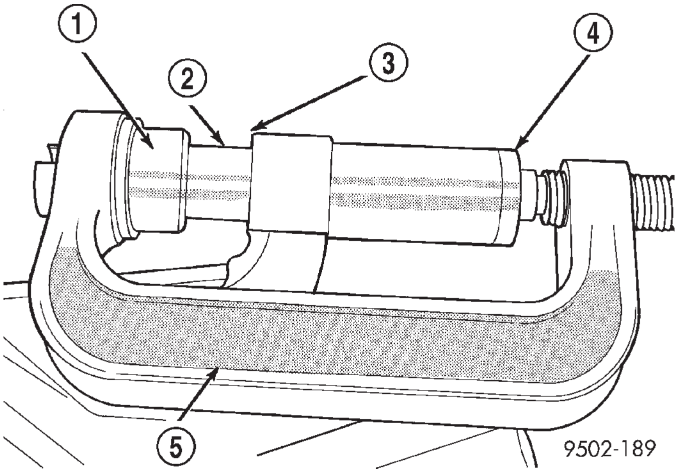


Fig. 39 Installing

1 - SPECIAL TOOL 6876
2 - ISOLATOR BUSHING
3 - MACHINED SURFACE SIDE OF LOWER CONTROL ARM
4 - SPECIAL TOOL 6758
5 - SPECIAL TOOL C-4212-F

(4) Tighten screw on Remover/Installer Special Tool C-4212-F pressing front bushing into lower control arm. Continue pressing front bushing into lower control arm until bushing is sitting flush on the machined surface of the lower control arm. This will correctly position front bushing in lower control arm.

(5) Install lower control arm assembly back on vehicle. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - INSTALLATION).

ASSEMBLY - REAR ISOLATOR BUSHING

To perform removal and replacement of the lower control arm isolator bushings, the lower control arm must be removed from the vehicle.

(1) Start rear bushing into lower control arm **by hand, making sure it is square with its mounting hole in the lower control arm.** Bushing is to be installed from the machined surface side of lower control arm bushing hole, with the void in rubber portion of bushing facing away from ball joint (Fig. 40).

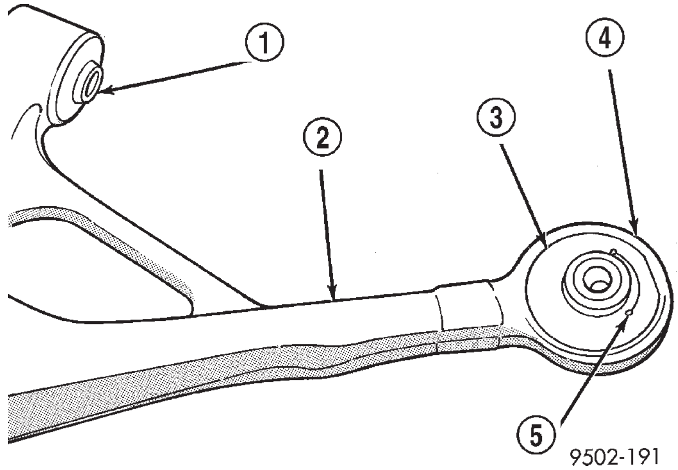


Fig. 40 Correctly Positioned Rear Isolator Bushing In Control Arm

1 - FRONT ISOLATOR BUSHING
2 - LOWER CONTROL ARM
3 - REAR ISOLATOR BUSHING
4 - MACHINED SURFACE
5 - VOID IN BUSHING IN THIS DIRECTION

(2) Mount Bushing Installer, Special Tool 6760 on screw portion of Remover/Installer Special Tool C-4212-F (Fig. 41).

(3) Install Special Tools assembled for installation of rear isolator bushing into lower control arm on the lower control arm. Be sure Special Tool 6756 is square on lower control arm and Special Tool 6760 is positioned correctly on isolator bushing (Fig. 41).

(4) Tighten screw on Remover/Installer Special Tool C-4212-F pressing rear bushing into lower control arm. Continue pressing rear bushing into lower control arm until bushing is sitting flush on the machined surface (Fig. 41) of the lower control arm. This will correctly position rear bushing in lower control arm.

(5) Install lower control arm assembly back on vehicle. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - INSTALLATION).

LOWER CONTROL ARM (Continued)

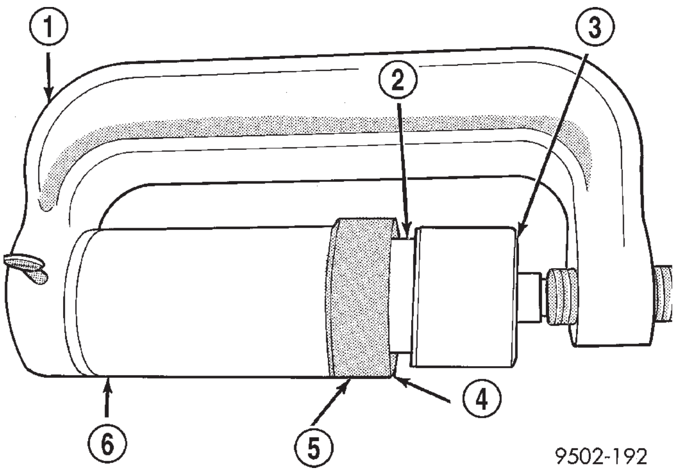


Fig. 41 Installing Rear Bushing In Lower Control Arm

1 - SPECIAL TOOL C-4212-F
2 - REAR BUSHING
3 - SPECIAL TOOL 6760
4 - MACHINED SURFACE ON LOWER CONTROL ARM
5 - LOWER CONTROL ARM
6 - SPECIAL TOOL 6756

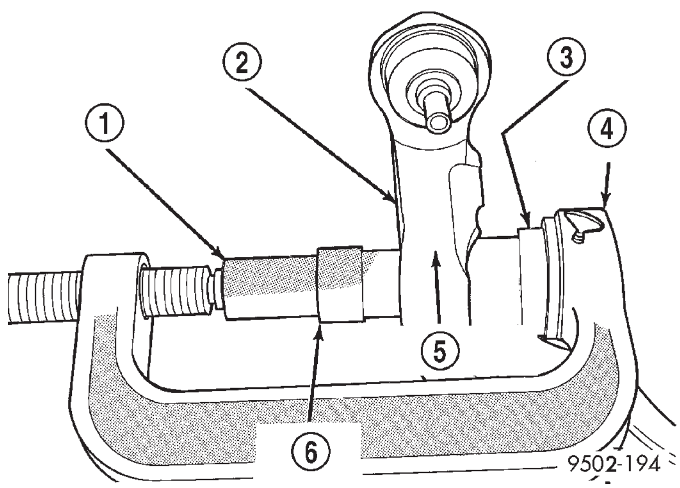


Fig. 42 Installing Clevis Bushing In Lower Control Arm

1 - SPECIAL TOOL 6877
2 - MACHINED SURFACE SIDE OF LOWER CONTROL ARM
3 - SPECIAL TOOL 6876
4 - SPECIAL TOOL C-4212-F
5 - LOWER CONTROL ARM
6 - CLEVIS BUSHING

ASSEMBLY - CLEVIS BUSHING

To perform removal and replacement of the lower control arm clevis bushing, the lower control arm must be removed from the vehicle.

(1) Start clevis bushing into lower control arm **by hand, making sure it is square with its mounting hole in the lower control arm.** Bushing is to be installed in lower control arm from the machined surface side of lower control arm bushing hole.

(2) Mount Bushing Installer, Special Tool 6877 on screw portion of Remover/Installer Special Tool C-4212-F as shown in (Fig. 42).

(3) Install the assembled special tools for installing the clevis bushing into the lower control arm, on the lower control arm and clevis bushing (Fig. 42). Be sure Special Tool 6876 is square on lower control arm and Special Tool 6877 is positioned correctly on clevis bushing (Fig. 42).

(4) Tighten screw on Remover/Installer Special Tool C-4212-F pressing clevis bushing into lower control arm. Continue pressing clevis bushing into lower control arm until bushing is sitting flush with the machined surface of the lower control arm. This will correctly position the clevis bushing in the lower control arm.

(5) Install lower control arm assembly back on vehicle. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - INSTALLATION).

INSTALLATION

(1) Position rear of lower control arm into front suspension crossmember first. Then install front of lower control arm in front suspension crossmember. Install bolts and nuts (Fig. 35) and (Fig. 34) attaching the front and rear of lower control arm to front suspension crossmember. **Do not tighten front attaching bolt at this time**.

(2) Tighten lower control arm rear attaching nut and bolt (Fig. 34) to a torque of 95 N·m (70 ft. lbs.).

(3) Install the lower control arm ball joint stud into the steering knuckle. Install the steering knuckle to ball joint stud castle nut (Fig. 29).

(4) Install the tie rod end into the steering knuckle. Start the tie rod end to steering knuckle attaching nut onto stud of tie rod end. While holding stud of tie rod end stationary, tighten tie rod end to steering knuckle attaching nut (Fig. 27). Then using a crowfoot and 11/32 socket tighten the attaching nut to a torque of 61 N·m (45 ft. lbs.) (Fig. 43).

(5) Tighten the lower control arm ball joint stud castle nut (Fig. 29) to a torque of 74 N·m (55 ft. lbs.). Install the cotter pin (Fig. 29) in the ball joint stud.

(6) Position sway bar link into its lower control arm mounting hole.

(7) Align sway bar bushing clamp with mounting holes in front suspension crossmember and body of vehicle. Then install and securely tighten the bushing clamp mounting bolts (Fig. 33) to a torque of 61 N·m (45 ft. lbs.).

(8) Install and securely tighten the stabilizer bar link to lower control arm attaching nut to a torque of 102 N·m (75 ft. lbs.). When tightening and torquing attaching nut, hold stud of attaching link from turning with an allen wrench (Fig. 32).

LOWER CONTROL ARM (Continued)

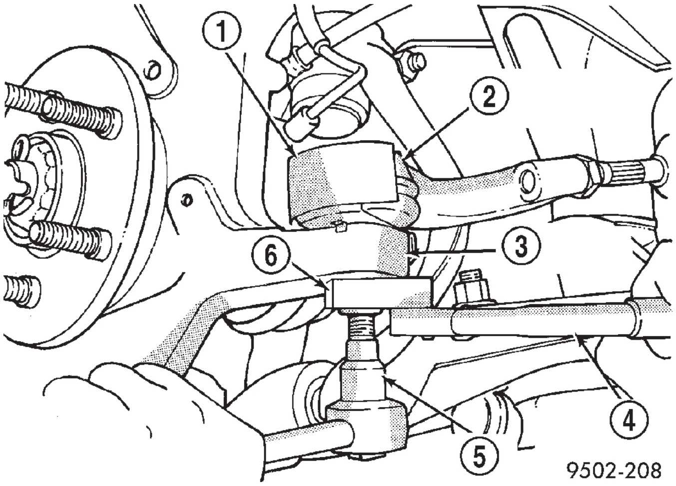


Fig. 43 Torquing Tie Rod End Attaching Nut

1 - HEAT SHIELD
2 - TIE ROD END
3 - STEERING KNUCKLE
4 - TORQUE WRENCH
5 - 11/32 SOCKET
6 - CROWFOOT

(9) Install the clevis on the lower control arm. Loosely install the clevis to bushing thru-bolt (Fig. 31).

CAUTION: When supporting lower control arm with jack stand, do not position jack stand under the ball joint cap on the lower control arm. Position in area of lower control arm shown in (Fig. 44).

(10) Lower vehicle to the ground with a jack stand positioned under the lower control arm (Fig. 44). Continue to lower vehicle so the total weight of the vehicle is supported by the jack stand and lower control arm.

CAUTION: When tightening the thru-bolt do not turn the bolt in the clevis. The serrations on the bolt and the hole in the clevis will be damaged.

(11) **With the vehicle's suspension at curb height,** tighten the clevis to lower control arm bushing thru-bolt nut (Fig. 31) to a torque of 88 N·m (65 ft. lbs.).

(12) Tighten front lower control arm nut and bolt (Fig. 35) to a torque of 182 N·m (135 ft. lbs.).

(13) Install wheel and tire assembly.

(14) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(15) Remove jack stand from under lower control arm and lower vehicle to the ground.

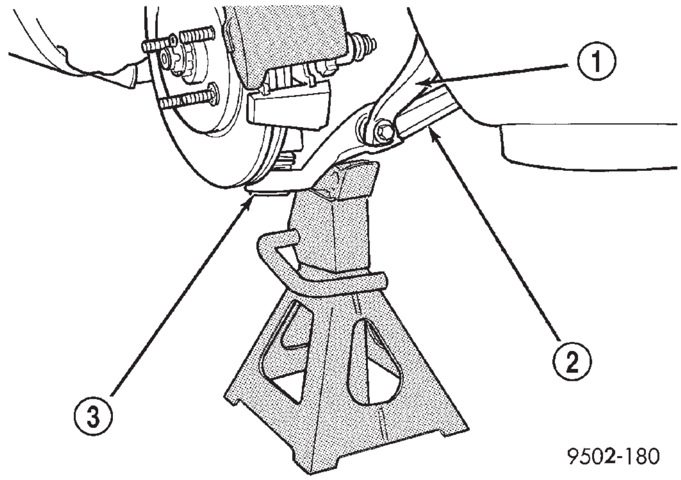


Fig. 44 Supporting Lower Control Arm With Jack Stand

1 - SHOCK ABSORBER CLEVIS
2 - LOWER CONTROL ARM
3 - BALL JOINT CAP

(16) Check the vehicles alignment specifications and set front Toe to preferred specifications.

SHOCK ASSEMBLY

DESCRIPTION - SHOCK ASSEMBLY

The front shock assembly and suspension of the vehicle is supported by coil springs positioned around shock absorbers. The springs are contained between an upper seat located in the upper mounting bracket and a lower spring seat on the shock absorber.

The top of each shock absorber is bolted to a cast shock absorber/upper control arm bracket which is bolted to the shock tower of the vehicle using 4 mounting bolts.

The bottom of the shock absorber attaches to a clevis bracket using a pinch bolt. The clevis bracket attaches to the lower control arm of the vehicle using a through-bolt and prevailing torque nut.

If shock absorbers require replacement, be sure that they are replaced with shock absorbers meeting the correct specifications for the particular vehicle.

A coil spring is housed within each shock assembly. Coil springs are rated separately for each corner or side of the vehicle depending on optional equipment and type of vehicle service. If the coil springs require replacement, be sure that the springs needing replacement, are replaced with springs meeting the correct load rating and spring rate for the vehicle and its specific options.

The components of the shock assembly listed below are serviceable if found to be defective (Fig. 45):

- Upper mounting bracket

SHOCK ASSEMBLY (Continued)

- Upper spring isolator
- Dust shield
- Cup
- Jounce bumper
- Coil spring
- Shock absorber
- Lower spring isolator

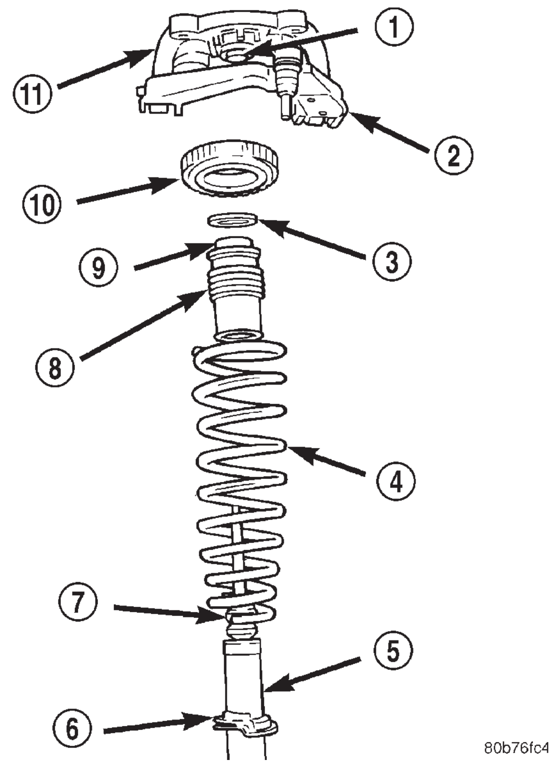


Fig. 45 Shock Assembly Components

1 - SHOCK ABSORBER ROD BUSHING
2 - UPPER CONTROL ARM
3 - RETAINER WASHER
4 - COIL SPRING
5 - SHOCK ABSORBER
6 - LOWER SPRING ISOLATOR
7 - JOUNCE BUMPER
8 - DUST SHIELD
9 - CUP
10 - UPPER SPRING ISOLATOR
11 - UPPER MOUNTING BRACKET

The shock absorber/upper control arm mounting bracket also provides a pivotal mounting point for the upper control arm.

OPERATION - SHOCK ASSEMBLY

The shock absorber assembly cushions the ride of the vehicle, controlling vibration, and jounce and rebound of the suspension.

The coil spring controls ride quality and maintains proper ride height.

The spring isolators isolate the coil spring at the top and bottom from coming into metal-to-metal contact with the upper mounting bracket and shock absorber.

The jounce bumper limits suspension travel and metal-to-metal contact under full jounce condition.

The shock absorber dampens jounce and rebound motions of the coil spring and suspension.

DIAGNOSIS AND TESTING - SHOCK ASSEMBLY (FRONT)

(1) Inspect for damaged or broken coil springs (Fig. 46).

(2) Inspect for torn or damaged shock absorber dust boots (Fig. 46).

(3) Lift the dust boot and inspect the shock absorber for evidence of fluid running from the upper end of fluid reservoir. (Actual leakage will be a stream of fluid running down the side and dripping off the lower end of the shock absorber). A slight amount of seepage between the shock absorber rod and the seal is not unusual and does not affect performance of the shock absorber. Also inspect jounce bumpers for signs of damage or deterioration (Fig. 46).

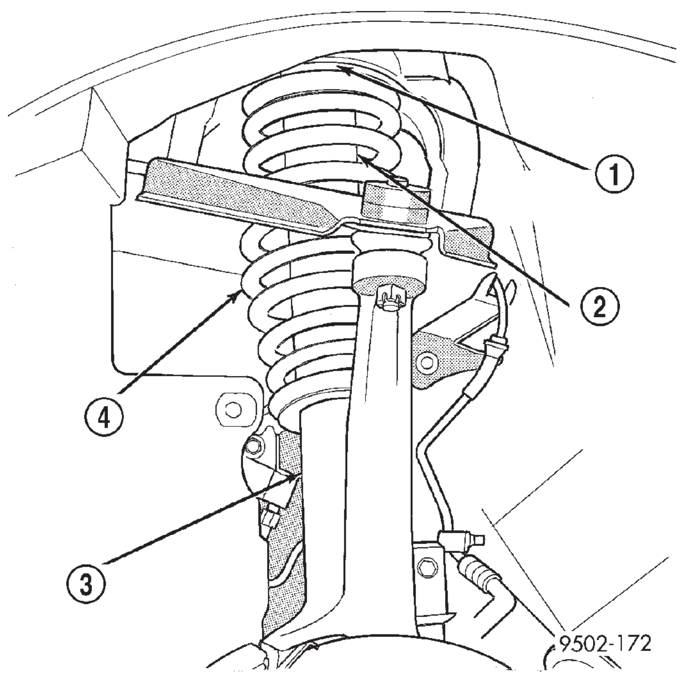


Fig. 46 On Vehicle Inspection

1 - UPPER SPRING SEAT
2 - DUST BOOT
3 - SHOCK ABSORBER
4 - COIL SPRING

SHOCK ASSEMBLY (Continued)

REMOVAL - SHOCK ASSEMBLY

NOTE: Before proceeding, (Refer to 2 - SUSPENSION/FRONT - WARNING).

(1) Loosen wheel nuts.

(2) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - SERVICE PROCEDURE).

(3) Remove the wheel and tire assembly.

(4) If both shock assemblies are removed, mark the shock assemblies right and left according to which side of the vehicle they were removed from.

(5) Remove the wheel speed sensor cable routing bracket (Fig. 47) from the steering knuckle.

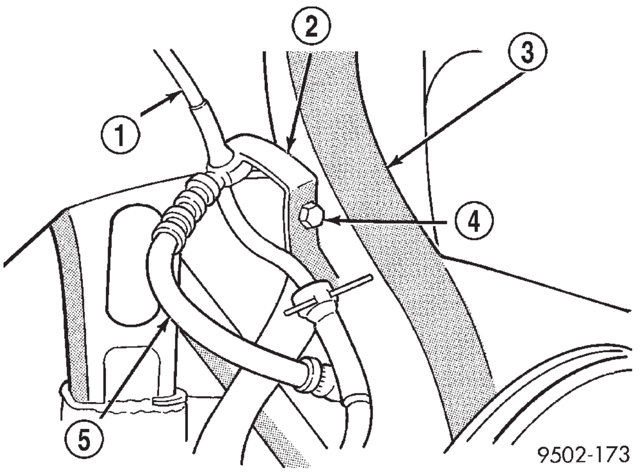


Fig. 47 Wheel Speed Sensor Cable Routing Bracket

1 - WHEEL SPEED SENSOR CABLE
2 - SPEED SENSOR CABLE ROUTING BRACKET
3 - STEERING KNUCKLE
4 - ATTACHING BOLT
5 - BRAKE CALIPER FLEX HOSE

(6) Remove the nut from the upper ball joint stud.

(7) Remove the upper ball joint stud from the steering knuckle using Puller, Special Tool, C-3894-A (Fig. 48). Pull steering knuckle outward and position toward the rear of the front wheel opening.

(8) Remove pinch bolt attaching shock absorber clevis to shock absorber (Fig. 49).

(9) Remove the nut and thru-bolt (Fig. 50) attaching the shock absorber clevis to the lower control arm.

(10) Remove the clevis from the shock absorber by carefully tapping the clevis off the shock absorber using a soft (brass) drift.

(11) Remove the 4 bolts (Fig. 51) attaching the shock absorber/upper control arm mounting bracket to the shock tower of the vehicle.

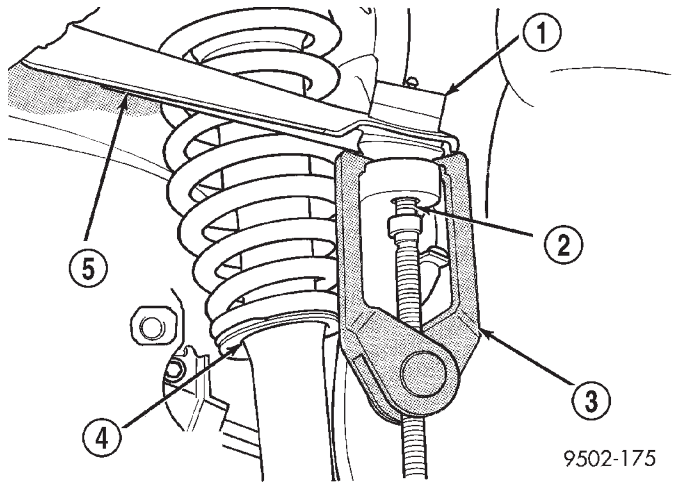


Fig. 48 Ball Joint Stud Removal From Steering Knuckle

1 - BALL JOINT
2 - BALL JOINT STUD
3 - SPECIAL TOOL C3894–A
4 - SHOCK ABSORBER ASSEMBLY
5 - UPPER CONTROL ARM

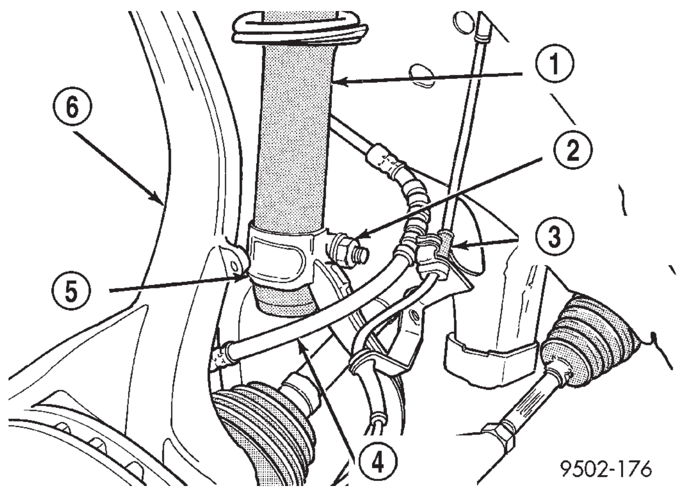


Fig. 49 Shock Absorber Clevis Bracket Pinch Bolt

1 - SHOCK ABSORBER ASSEMBLY
2 - PINCH BOLT AND NUT
3 - WHEEL SPEED SENSOR CABLE
4 - BRAKE FLEX HOSE
5 - CLEVIS BRACKET
6 - STEERING KNUCKLE

(12) Remove the shock assembly from the vehicle. The shock assembly is removed out through the front area of the front wheel well.

(13) For disassembly of the shock assembly, (Refer to 2 - SUSPENSION/FRONT/SHOCK - DISASSEMBLY).

SHOCK ASSEMBLY (Continued)

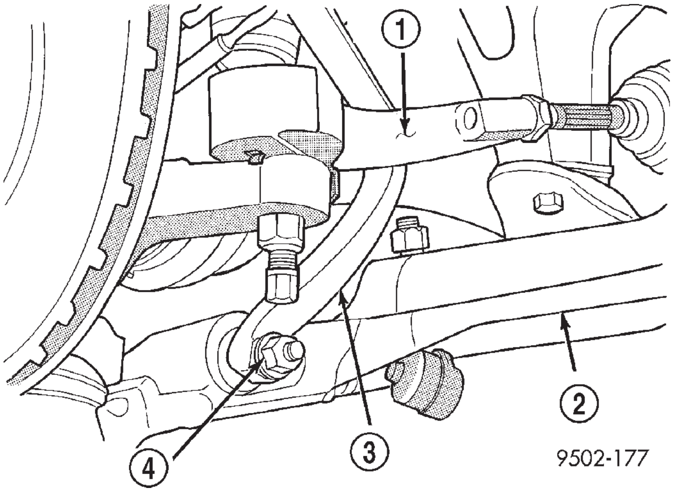


Fig. 50 Clevis To Lower Control Arm Attaching Bolt

1 - TIE ROD END
2 - LOWER CONTROL ARM
3 - SHOCK ABSORBER CLEVIS
4 - THRU-BOLT

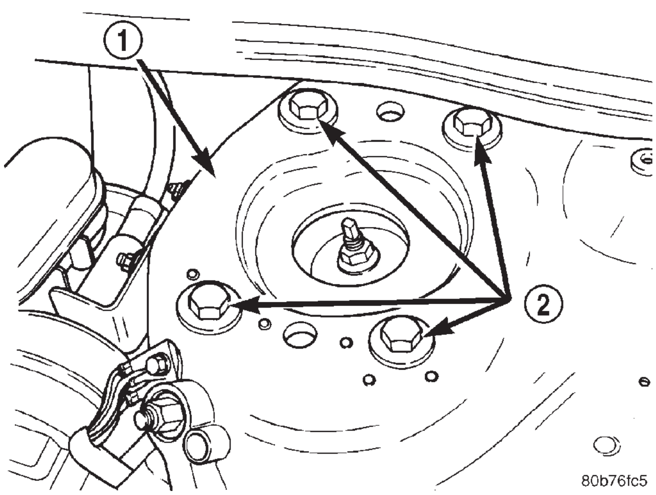


Fig. 51 Shock Assembly Attachment To Shock Tower

1 - SHOCK TOWER
2 - MOUNTING BOLTS

DISASSEMBLY - SHOCK ASSEMBLY

The shock assembly must be removed from the vehicle for it to be disassembled and assembled. (Refer to 2 - SUSPENSION/FRONT/SHOCK - REMOVAL)

For the disassembly and assembly of the shock assembly, use strut spring compressor Pentastar Service Equipment (PSE) tool W-7200, or equivalent, to compress the coil spring. Follow the manufacturer's instructions closely.

(1) If both shocks are being serviced at the same time, mark the coil spring and shock assembly according to which side of the vehicle the shock was removed from, and which shock the coil spring was removed from.

(2) Position the shock assembly in the strut coil spring compressor following the manufacturer's instructions. Set the lower hooks and install the clamp on the lower end of the coil spring, so the shock is held in place once the shock shaft nut is removed (Fig. 52). Rotate the shock assembly so the upper control arm ball joint sits directly below the front upper hook as shown (Fig. 53). Position the upper hooks on top of the upper mounting bracket (Fig. 53).

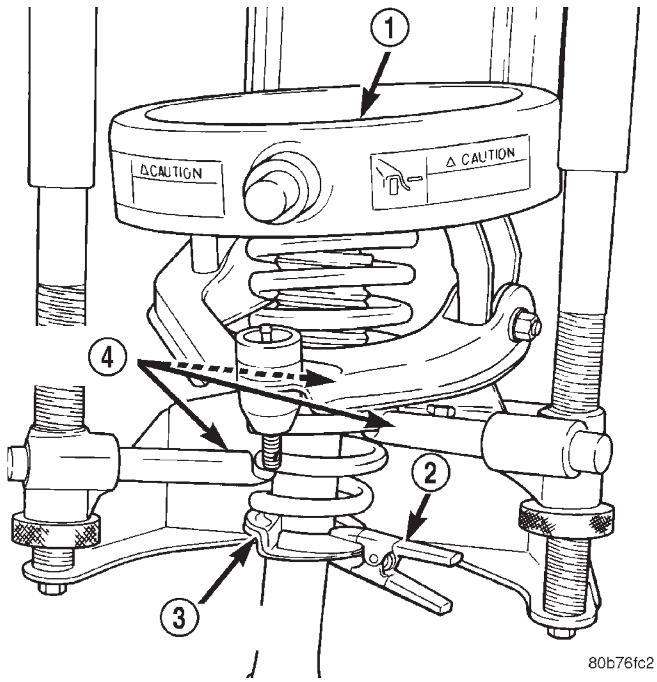


Fig. 52 Lower Hooks And Clamp

1 - COMPRESSOR
2 - CLAMP
3 - COIL SPRING
4 - LOWER HOOKS

WARNING: DO NOT REMOVE THE SHOCK ROD NUT BEFORE THE COIL SPRING IS COMPRESSED. THE COIL SPRING IS HELD UNDER PRESSURE AND MUST BE COMPRESSED, REMOVING SPRING TENSION FROM THE UPPER MOUNTING BRACKET BEFORE THE ROD NUT IS REMOVED.

(3) Compress the coil spring until all coil spring tension is removed from the upper mounting bracket.

(4) Hold the shock rod from rotating using special socket Snap-On A136®, or an equivalent, and remove the retainer nut (Fig. 54).

(5) Remove the upper bushing retainer washer (Fig. 55) from the shock absorber rod.

SHOCK ASSEMBLY (Continued)

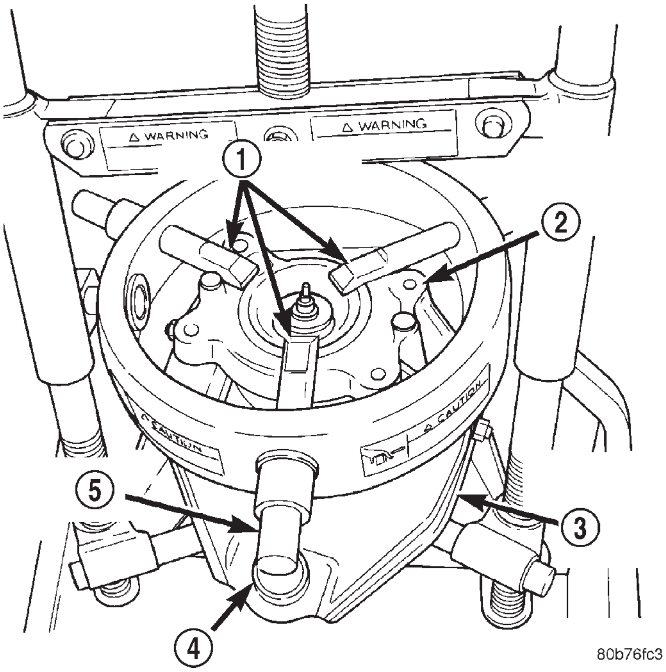


Fig. 53 Upper Hooks Positioned

1 - UPPER HOOKS
2 - UPPER MOUNTING BRACKET
3 - UPPER CONTROL ARM
4 - UPPER BALL JOINT
5 - FRONT HOOK

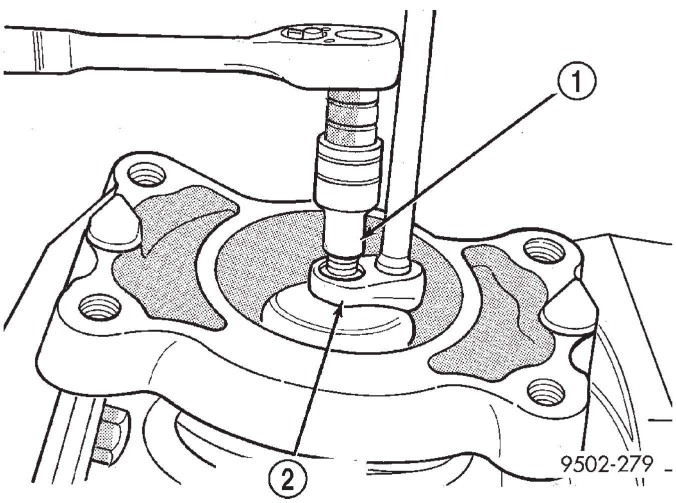


Fig. 54 Retainer Nut Removal/Installation

1 - SHOCK ABSORBER SOCKET SNAP-ON A136 ®
2 - CROW FOOT

(6) Remove the clamp from the bottom of the coil spring and remove the shock absorber, lower spring isolator, jounce bumper, cup, dust boot, and lower bushing retainer washer out through the bottom of the coil spring.

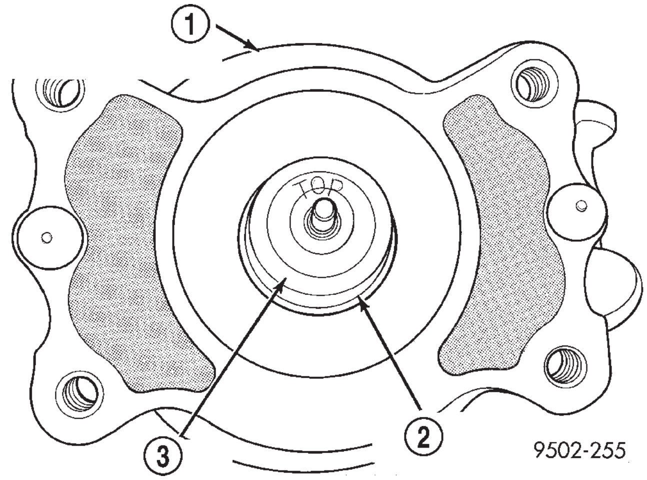


Fig. 55 Washer

1 - SHOCK ABSORBER/UPPER CONTROL ARM MOUNTING BRACKET
2 - ISOLATOR BUSHING
3 - WASHER

NOTE: If the coil spring, upper mounting bracket, rod bushings, upper coil spring isolator, or upper control arm need to be serviced, proceed with the next step, otherwise, proceed with step 11.

NOTE: Before removing the coil spring from the spring compressor, note the position of the lower coil spring end to the spring compressor. The coil spring will need to be in this position on reassembly for proper coil spring-to-shock absorber and upper mounting bracket orientation.

(7) Release the tension from the coil spring by backing off the compressor drive fully. Push back the compressor upper hooks and remove the upper mounting bracket and upper control arm from the coil spring.

(8) Note the position of the coil spring in the spring compressor as listed in the above note before removal. This is necessary for proper alignment of the shock assembly components when reassembly is made. Remove the coil spring from the spring compressor.

(9) Remove the shock absorber rod upper isolator bushing from the upper (shock absorber/upper control arm) mounting bracket (Fig. 56).

(10) Remove the shock absorber rod lower isolator bushing and sleeve from the upper (shock absorber/ upper control arm) mounting bracket (Fig. 57). Remove upper coil spring isolator from mounting bracket.

SHOCK ASSEMBLY (Continued)

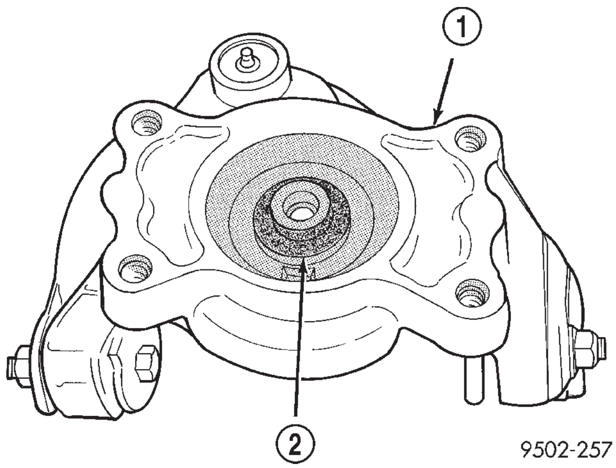


Fig. 56 Shock Absorber Rod Upper Isolator Bushing

1 - SHOCK ABSORBER/CONTROL ARM MOUNTING BRACKET
2 - SHOCK ABSORBER ROD UPPER ISOLATOR BUSHING

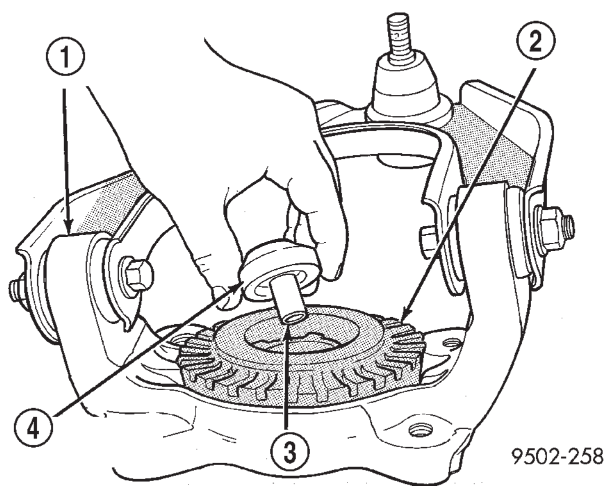


Fig. 57 Shock Absorber Rod Lower Isolator Bushing

1 - SHOCK ABSORBER/CONTROL ARM MOUNTING BRACKET
2 - UPPER SPRING ISOLATOR
3 - SLEEVE
4 - LOWER ISOLATOR BUSHING

NOTE: If removal of the upper control arm is necessary, (Refer to 2 - SUSPENSION/FRONT/UPPER CONTROL ARM - REMOVAL).

(11) Remove the lower shock rod bushing retainer washer from the shock absorber rod (Fig. 58).

(12) Remove the dust shield and cup as an assembly from the shock absorber rod by pulling both straight up and off the shock rod (Fig. 58). The jounce bumper may come off at the same time. Remove the jounce bumper and metal collar.

(13) Remove the lower spring isolator (Fig. 58) from the lower spring seat on the shock absorber.

(14) Inspect the shock assembly components for the following and replace as necessary:

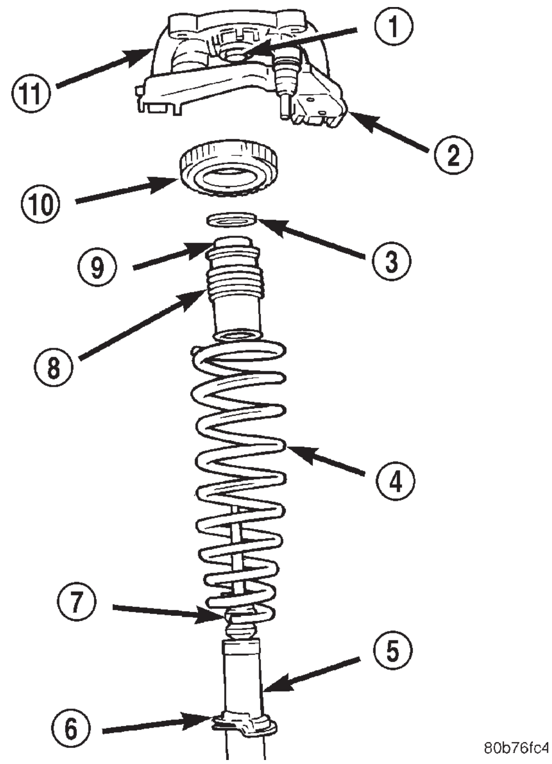


Fig. 58 Shock Assembly Components

1 - SHOCK ABSORBER ROD BUSHING
2 - UPPER CONTROL ARM
3 - RETAINER WASHER
4 - COIL SPRING
5 - SHOCK ABSORBER
6 - LOWER SPRING ISOLATOR
7 - JOUNCE BUMPER
8 - DUST SHIELD
9 - CUP
10 - UPPER SPRING ISOLATOR
11 - UPPER MOUNTING BRACKET

- Inspect the shock for any condition of rod binding over the full stroke of the shaft.
- Check the upper mounting bracket for cracks, distortion and any sign of damage.
- Inspect the upper mounting bracket-upper control bushings for deterioration.
- Check the upper and lower shock rod isolator bushings for severe deterioration.
- Check the upper and lower spring isolators for severe deterioration.
- Inspect the dust shield for rips and deterioration.
- Inspect the jounce bumper for cracks and signs of deterioration.
- Inspect the coil spring for any sign of damage to the coating.

SHOCK ASSEMBLY (Continued)

ASSEMBLY - SHOCK ASSEMBLY

For the disassembly and assembly of the shock assembly, use strut spring compressor Pentastar Service Equipment (PSE) tool W-7200, or the equivalent, to compress the coil spring. Follow the manufacturer's instructions closely.

NOTE: If the coil spring, upper mounting bracket, rod bushings, upper coil spring isolator, and upper control arm have been removed from the spring compressor, proceed with the next step, otherwise, proceed with step 7.

NOTE: If installation of the upper control arm on the upper mounting bracket is necessary, (Refer to 2 - SUSPENSION/FRONT/UPPER CONTROL ARM - INSTALLATION).

(1) Install the upper coil spring isolator on the upper (shock absorber/upper control arm) mounting bracket (Fig. 57).

CAUTION: The top and bottom shock absorber rod isolator bushings are unique to the position which they are installed on the rod. When installing the bushings on the rod, attention must be paid to their location so they are installed correctly (Fig. 59).

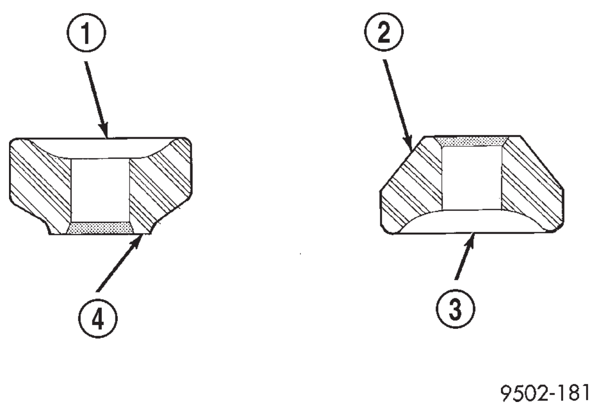


Fig. 59 Shock Absorber Rod Bushing Identification (Typical)

1 - INSTALL ON SHOCK ABSORBER ROD IN THIS DIRECTION
2 - SHOCK ABSORBER ROD UPPER ISOLATOR BUSHING
3 - INSTALL ON SHOCK ABSORBER ROD IN THIS DIRECTION
4 - SHOCK ABSORBER ROD LOWER ISOLATOR BUSHING

(2) Install the sleeve into the lower shock absorber rod isolator bushing (Fig. 57). Install the shock absorber rod lower isolator bushing and sleeve in the bottom of the upper (shock absorber/upper control arm) mounting bracket as shown (Fig. 57). From the top, install the shock absorber rod upper isolator bushing into the center of the upper mounting bracket over the sleeve protruding from the lower isolator bushing (Fig. 56). The smaller end of each bushing is to face away from the upper mounting bracket once installed.

(3) Place the lower end (smaller diameter) of the coil spring in the spring compressor supported by the lower hooks, following the manufacturer's instructions. Position the coil spring lower end tip at the position it was at before coil spring removal from the compressor as noted in Step 8 of DISASSEMBLY (Refer to 2 - SUSPENSION/FRONT/SHOCK - DISASSEMBLY). Proper orientation of the spring in the compressor is necessary for proper alignment of all shock assembly components.

(4) Install the upper (shock absorber/upper control arm) mounting bracket on top of the coil spring matching the coil spring tip to the built-in step in the isolator on the upper mounting bracket. Position the upper control arm ball joint so it lies directly below the front upper hook as shown (Fig. 53).

(5) Position the upper hooks on top of the upper mounting bracket as shown (Fig. 53).

(6) Compress the coil spring.

(7) Install the lower spring isolator on the lower spring seat of the shock absorber (Fig. 58). When installing the spring isolator, be sure the isolator sets in the notch made for the lower coil spring end.

(8) Install the jounce bumper on the shock rod (Fig. 60). Install the jounce bumper with the pointed end pointing downward.

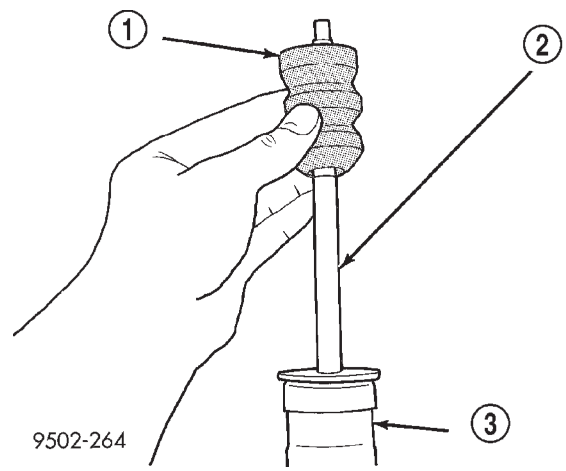


Fig. 60 Jounce Bumper Installation

1 - JOUNCE BUMPER
2 - SHOCK ABSORBER ROD
3 - SHOCK ABSORBER

(9) Install the collar, undercut side facing down, on the rod of the shock absorber (Fig. 61). Be sure the collar is positioned squarely on the step of the shock absorber rod.

(10) Install the dust shield and cup (Fig. 58) onto the shock rod until the cup contacts the collar just

SHOCK ASSEMBLY (Continued)

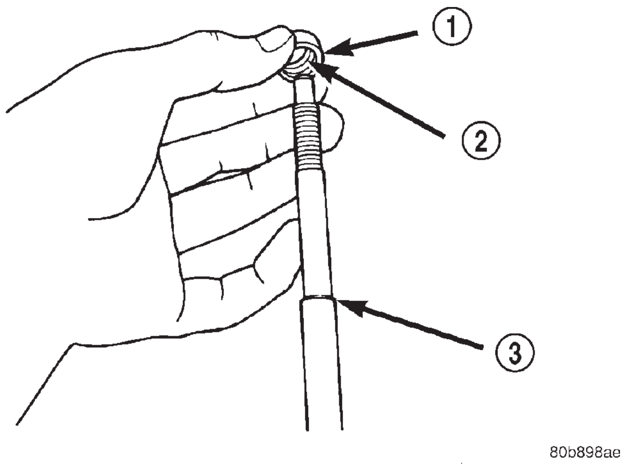


Fig. 61 Shock Absorber Rod Collar Installation

1 - COLLAR
2 - UNDERCUT
3 - SHOCK ABSORBER ROD STEP

installed. The dust boot will snap over the jounce bumper. Install the lower shock rod bushing retainer washer.

(11) Install the shock through the bottom of the coil spring until the lower spring seat contacts the lower end of the coil spring. The lower coil spring end should set into the notch of the shock absorber lower seat and isolator. Install the clamp temporarily securing the shock absorber to the coil spring (Fig. 52).

(12) Install the upper shock rod bushing retainer washer. Make sure the concave side is facing up.

(13) Install the shock assembly retainer nut. Hold the shock rod from rotating using special socket Snap-On A136 ®, or an equivalent, and tighten the retainer nut using a crow foot wrench (on the end of a torque wrench and extension) to a torque of 55 N·m (40 ft. lbs.) (Fig. 54).

(14) Slowly release the tension from the coil spring by backing off the compressor drive fully. As the tension is relieved, make sure the upper mounting bracket, isolator, and coil spring align properly. Remove the clamp from the lower end of the coil spring and shock. Push back the spring compressor upper and lower hooks, then remove the shock assembly from the spring compressor.

(15) Install shock assembly on the vehicle. (Refer to 2 - SUSPENSION/FRONT/SHOCK - INSTALLATION)

INSTALLATION - SHOCK ASSEMBLY

(1) Install the shock assembly, with the clevis removed, into shock tower. Aligning the 2 locating pins and the 4 mounting holes on the upper control arm shock absorber mount with the 4 holes in shock tower. Install the 4 upper control arm mount to shock tower mounting bolts (Fig. 51). Tighten the 4 bolts to a torque of 95 N·m (70 ft. lbs.).

(2) Install the clevis on the shock absorber. Clevis is installed by tapping it onto the fluid reservoir of the shock absorber using a soft (brass) drift until fully seated against locating tab on shock absorber (Fig. 62). Orientation tab on locating tab must be positioned in the split of the clevis (Fig. 62).

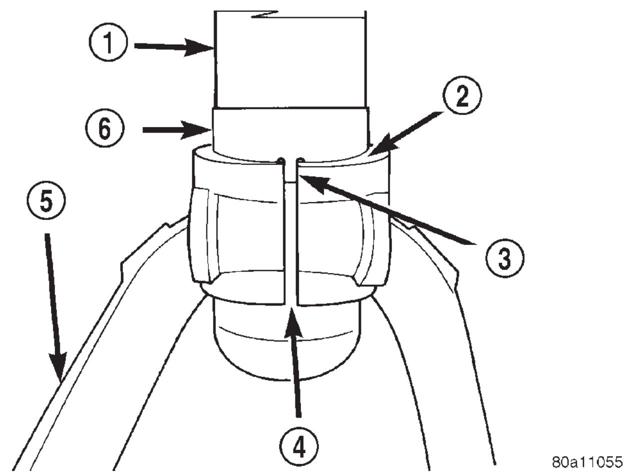


Fig. 62 Clevis Correctly Installed On Shock Absorber

1 - SHOCK ABSORBER
2 - SHOCK CLEVIS MUST BE INSTALLED FLUSH AGAINST LOCATING TAB HERE
3 - ORIENTATION TAB
4 - CLEVIS SPLIT
5 - SHOCK CLEVIS
6 - LOCATING TAB

(3) Install the pinch bolt retaining the shock clevis to the shock absorber (Fig. 49). Tighten the pinch bolt to a torque of 88 N·m (65 ft. lbs.)

(4) Install the clevis bracket to lower control arm thru-bolt (Fig. 50). Do not tighten the thru-bolt at this time.

(5) Install upper ball joint into steering knuckle. Install nut on ball joint stud. Tighten nut to a torque of 27 N·m (20 ft. lbs.).

(6) Install the routing bracket for the wheel speed sensor cable (Fig. 47) on the steering knuckle. Install and securely tighten the routing bracket attaching bolt (Fig. 47).

CAUTION: When supporting lower control arm with jack stand, do not position jack stand under the ball joint cap on the lower control arm. Position in area of lower control arm shown in (Fig. 63).

(7) Lower vehicle to the ground with a jack stand positioned under the lower control arm (Fig. 63). Continue to lower vehicle so the total weight of the

SHOCK ASSEMBLY (Continued)

vehicle is supported by the jack stand and lower control arm.

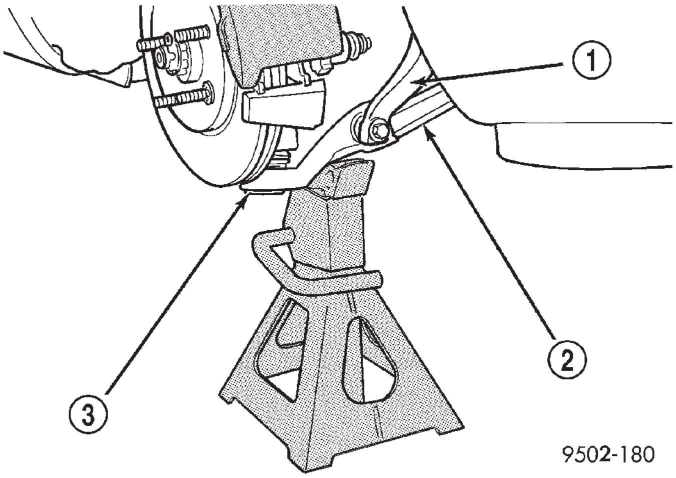


Fig. 63 Lower Control Arm Correctly Supported By Jack Stand

1 - SHOCK ABSORBER CLEVIS
2 - LOWER CONTROL ARM
3 - BALL JOINT CAP

(8) Tighten the shock absorber clevis to lower control arm bushing thru-bolt nut to a torque of 88 N·m (65 ft. lbs.).

(9) Raise the vehicle, then remove the jack stand.

(10) Install the tire and wheel assembly. Progressively tighten the wheel mounting nuts in a criss-cross sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(11) Lower the vehicle.

STABILIZER BAR

DESCRIPTION

The stabilizer bar interconnects both front lower control arms of the vehicle and is attached to the front suspension cradle and the underbody of the vehicle.

Attachment of the stabilizer bar to the front suspension cradle is through 2 rubber-isolator bushings and bushing retainers. The stabilizer bar to lower control arm attachment is done utilizing a ball joint type, stabilizer bar attaching link. All parts of the stabilizer bar are replaceable as individual components, and the bushings attaching the stabilizer bar to crossmember are split for easy removal and installation.

OPERATION

Jounce and rebound movements affecting one wheel are partially transmitted to the opposite wheel of the vehicle to stabilize body roll through the stabilizer bar.

DIAGNOSIS AND TESTING - STABILIZER BAR

Inspect for broken or distorted stabilizer bar bushings, bushing retainers, and worn or damaged stabilizer bar to control arm attaching links.

REMOVAL

REMOVAL - STABILIZER BAR

(1) Raise vehicle on jack stands or centered on a frame contact type hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - SERVICE PROCEDURE).

(2) Remove nuts and stabilizer bar attaching link assemblies from the front lower control arms (Fig. 64). When removing attaching link nut, keep stud from turning by installing an allen wrench in the end of the stud (Fig. 64).

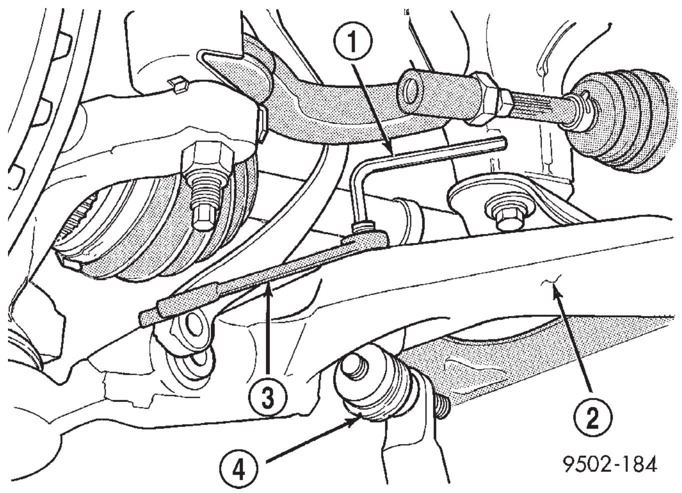


Fig. 64 Stabilizer Bar Attaching Link Nut Removal

1 - ALLEN WRENCH
2 - LOWER CONTROL ARM
3 - WRENCH
4 - STABILIZER BAR LINK ASSEMBLY

(3) Remove the 4 bolts attaching the stabilizer bar bushing retainers to the front suspension crossmember and body (Fig. 65). Then remove the stabilizer bar assembly from the vehicle.

STABILIZER BAR INSPECTION

Inspect for broken or distorted stabilizer bar bushings, clamps and attaching links. If stabilizer bar to front crossmember bushing replacement is required, bushing can be removed using the stabilizer bar bushing removal procedure in the Disassembly And Assembly section in this group of the service manual.

STABILIZER BAR (Continued)

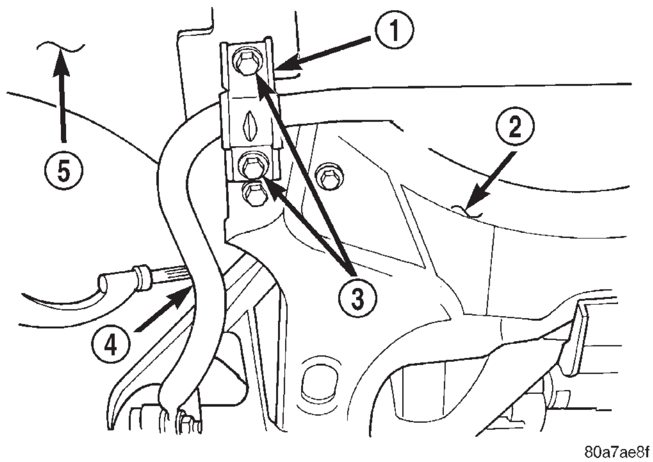


Fig. 65 Stabilizer Bar Bushing Retainer Attaching Bolts

1 - STABILIZER BAR BUSHING CLAMP
2 - FRONT SUSPENSION CROSSMEMBER
3 - ATTACHING BOLTS
4 - STABILIZER BAR
5 - VEHICLE BODY

If inspection determines that replacement of a stabilizer bar to lower control arm attachment link is required, replace the link before installing stabilizer bar.

REMOVAL - STABILIZER BAR BUSHING (FRONT)

(1) Bend back the 4 crimp locations on the stabilizer bar bushing retainer (Fig. 66).

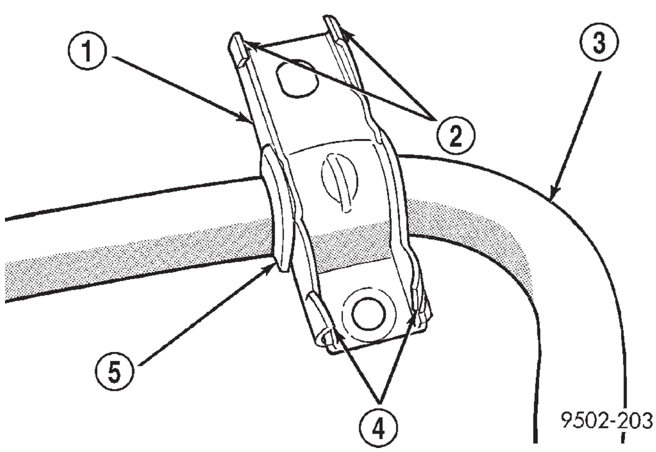


Fig. 66 Stabilizer Bar Bushing Retainer

1 - STABILIZER BAR BUSHING RETAINER
2 - CRIMPS
3 - STABILIZER BAR
4 - CRIMPS
5 - STABILIZER BAR BUSHING

(2) Separate the stabilizer bar bushing retainer.

(3) Stabilizer bar bushings are removed by opening slit and peeling bushing off stabilizer bar.

INSTALLATION

INSTALLATION - STABILIZER BAR

(1) Position stabilizer bar and bushings as an assembly into front crossmember. Install the stabilizer bar bushing retainer to crossmember and body attaching bolts (Fig. 65).

(2) Tighten the bushing retainer attaching bolts to a torque of 61 N·m (45 ft. lbs.).

(3) Align stabilizer bar attaching link assemblies with attaching link mounting holes in the lower control arms. Install stabilizer bar attaching links into both lower control arms. Install the attaching link to lower control arm retaining nuts. Torque the stabilizer bar attaching link nuts to 101 N·m (75 ft. lbs.).

INSTALLATION - STABILIZER BAR BUSHING

(1) Install new stabilizer bar bushings on the stabilizer bar. **Bushings must be installed on sway bar with slit in bushing facing front of vehicle when sway bar is installed.**

(2) Install bushing retainers back on stabilizer bar bushings.

UPPER BALL JOINT

DESCRIPTION

The ball joint is pressed into the upper control arm and has a tapered stud for attachment to the steering knuckle. The ball joint stud is attached and locked into the steering knuckle using a special nut. The ball joint is a sealed-for-life type and requires no maintenance. If the ball joint is defective it will require replacement of the entire upper control arm.

OPERATION

The ball joint is a pivotal joint that allows the knuckle to move up and down and turn with ease.

DIAGNOSIS AND TESTING - UPPER BALL JOINT

With the weight of the vehicle resting on the road wheels, grasp the grease fitting and with no mechanical assistance or added force, attempt to move the grease fitting.

If the ball joint is worn the grease fitting will move easily. If movement is noted, replacement of the upper control arm is required.

UPPER CONTROL ARM

DESCRIPTION

The upper control arm is a high strength steel stamping. The upper control arm uses the 2 rubber bushings of the upper control arm/shock absorber mounting bracket to isolate it from the mounting bracket and the body of the vehicle. The upper control arm is bolted to the top of the steering knuckle through the upper ball joint.

If damaged, the upper control arm is serviced only as a complete component. Inspect the upper control arm for any signs of damage. If control arm shows any sign of damage the upper control arm must be replaced. Do not attempt to repair or straighten a broken or bent upper control arm.

OPERATION

The upper control arm supports the upper end of the steering knuckle and allows for the up and down movement of the suspension during the jounce and rebound travel.

REMOVAL - UPPER CONTROL ARM

(1) Remove the front shock assembly from the vehicle. (Refer to 2 - SUSPENSION/FRONT/SHOCK - REMOVAL)

(2) Disassemble the shock assembly until the upper (shock absorber/upper control arm) mounting bracket is removed from the coil spring. (Refer to 2 - SUSPENSION/FRONT/SHOCK - DISASSEMBLY)

(3) Remove the 2 bolts attaching the upper control arm to the bushings in the upper mounting bracket (Fig. 67).

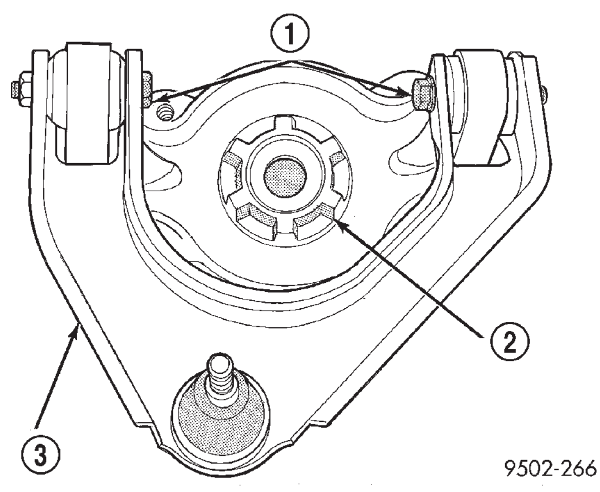


Fig. 67 Upper Control Arm To Mounting Bracket Attachment

1 - CONTROL ARM MOUNTING BOLTS
2 - UPPER CONTROL ARM MOUNTING BRACKET
3 - UPPER CONTROL ARM

(4) Remove the upper control arm from the mounting bracket.

INSPECTION - UPPER CONTROL ARM

If damaged, the upper control arm is serviced only as a complete component. Inspect the upper control arm for any signs of damage. If control arm shows any sign of damage the upper control arm must be replaced. Do not attempt to repair or straighten a broken or bent upper control arm.

INSTALLATION - UPPER CONTROL ARM

(1) Install the upper control arm on the upper (shock absorber/upper control arm) mounting bracket.

(2) Install the 2 bolts attaching the upper control arm to the bushings in the mounting bracket (Fig. 67). The bolts must be installed from center, so the heads are toward the coil spring when it is installed. **The bolts MUST be installed so the head of the bolt will be toward the coil spring when the mounting bracket is installed on shock absorber (Fig. 67).**

CAUTION: For clearance reasons the control arm mounting bolts must be installed from center, so the heads are toward the coil spring when it is installed. Otherwise the bolts may rub the coil spring, damaging it.

(3) Install the control arm mounting bolt nuts. Position the control arm at a 90 degree angle to the mounting bracket and tighten the bolts to a torque of 90 N·m (66 ft. lbs.).

(4) Reinstall the upper mounting bracket and control arm on the coil spring. Reassemble the front shock assembly. (Refer to 2 - SUSPENSION/FRONT/SHOCK - ASSEMBLY)

(5) Reinstall the front shock assembly on the vehicle. (Refer to 2 - SUSPENSION/FRONT/SHOCK - INSTALLATION)

REAR SUSPENSION

TABLE OF CONTENTS

REAR SUSPENSION

DESCRIPTION - REAR SUSPENSION

The rear suspension used on this vehicle is a fully independent short and long arm style suspension. Each side of the rear suspension consists of these major components:

- a shock assembly
- a knuckle
- an upper control arm
- two lateral links
- a trailing link
- a stabilizer bar (one per vehicle shared by each side)

OPERATION - REAR SUSPENSION

The rear suspension allows each rear wheel on vehicle to adapt to different road surfaces and conditions without affecting the control of the vehicle. Each side of the suspension is allowed to move independently from the other.

WARNING

WARNINGS AND CAUTIONS

WARNING: DO NOT REMOVE A SHOCK ROD NUT WHILE THE SHOCK ASSEMBLY IS INSTALLED IN VEHICLE, OR BEFORE THE SHOCK ASSEMBLY SPRING IS COMPRESSED.

REAR SUSPENSION (Continued)

CAUTION: Only frame contact or wheel lift hoisting equipment can be used on vehicles having a fully independent rear suspension. Vehicles with independent rear suspension can not be hoisted using equipment designed to lift a vehicle by the rear axle. If this type of hoisting equipment is used damage to rear suspension components will occur.

NOTE: If a rear suspension component becomes bent, damaged or fails, no attempt should be made to straighten or repair it. Always replace it with a new component.

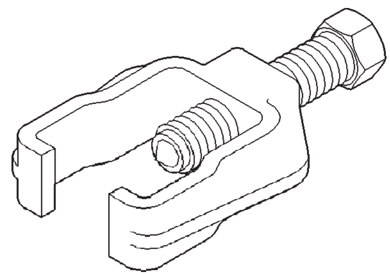
SPECIFICATIONS

REAR SUSPENSION FASTENER TORQUE

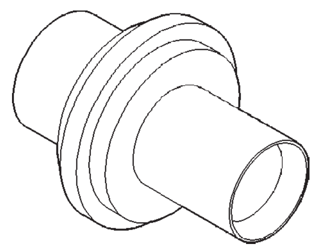
DESCRIPTION	TORQUE
Shock Assembly:	
Body Mounting Nuts	54 N·m (40 ft. lbs.)
Knuckle Bolt/Nut	95 N·m (70 ft. lbs.)
Rod To Upper Mount Nut	55 N·m (40 ft. lbs.)
Knuckle:	
Brake Adapter Mounting Bolts	61 N·m (45 ft. lbs.)
Hub And Bearing:	
Knuckle Retaining Nut	250 N·m (185 ft. lbs.)
Wheel Mounting Nuts	135 N·m (100 ft. lbs.)
Upper Control Arm:	
Pivot Bar To Crossmember	107 N·m (80 ft. lbs.)
Lateral Links:	
To Knuckle Nuts	108 N·m (80 ft. lbs.)
Jam Nuts	92 N·m (68 ft. lbs.)
To Suspension Crossmember Nuts	108 N·m (80 ft. lbs.)
Trailing Link:	
Shaft Nuts (Front And Rear)	99 N·m (73 ft. lbs.)
Bracket To Body Mounting Bolts	34 N·m (25 ft. lbs.)
Ball Joint:	
Stud Nut	27 N·m (20 ft. lbs.)
Rear Suspension Crossmember:	
Body Attaching Bolts	108 N·m (80 ft. lbs.)
Stabilizer Bar:	
Isolator Bushing Retainer Bolt	28 N·m (20 ft. lbs.)
Lateral Link Stabilizer Link Nut	35 N·m (26 ft. lbs.)
Bracket To Crossmember Bolts	28 N·m (20 ft. lbs.)

SPECIAL TOOLS

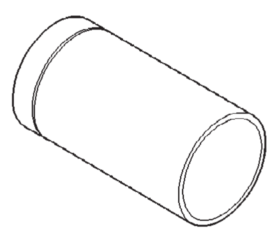
REAR SUSPENSION



Puller, Pitman Arm CT-1106



Remover, Suspension Arm Bushing And Ball Joint 6804



Installer, Ball Joint

HUB / BEARING

DESCRIPTION

The hub and bearing is a combined rear wheel hub and wheel bearing unit. All vehicles are equipped with permanently lubricated and sealed for life rear hub and bearing assemblies. There is no periodic lubrication or maintenance recommended for these units.

The hub and bearing is mounted to the rear knuckle's spindle using a retaining nut. The tire and wheel assembly, and rear brake drum or disc attaches to the studs protruding from the hub flange with wheel mounting studs.

OPERATION

The hub and bearing has internal bearings that allow it to rotate with the tire and wheel.

DIAGNOSIS AND TESTING - HUB AND BEARING

The rear hub and bearing assembly is designed for the life of the vehicle and should require no maintenance. The following procedure may be used for evaluation of bearing condition.

With wheel and brake drum removed, rotate flanged outer ring of hub. Excessive roughness, lateral play or resistance to rotation may indicate dirt intrusion or bearing failure. If the rear wheel bearings exhibit these conditions during inspection, the hub and bearing assembly should be replaced.

Damaged bearing seals and resulting excessive grease loss may also require bearing replacement. Moderate grease loss from bearing is considered normal and should not require replacement of the hub and bearing assembly.

REMOVAL - HUB AND BEARING

(1) Raise vehicle on jackstands or centered on a frame contact type hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

(2) Remove rear wheel and tire assembly.

(3) Remove the rear brake caliper and rotor. (Refer to 5 - BRAKES/HYDRAULIC-MECHANICAL/ROTORS — REMOVAL). Remove the brake rotor by pulling the rotor straight off the wheel mounting studs.

(4) Remove dust cap from rear hub and bearing assembly by prying it off.

(5) Remove hub and bearing retaining nut.

(6) Remove rear hub and bearing from the spindle by pulling it straight off the spindle by hand.

INSTALLATION - HUB AND BEARING

(1) Install the hub and bearing assembly on the knuckle spindle. Install a NEW retaining nut. Tighten the retaining nut to a torque of 250 N·m (185 ft. lbs.).

(2) Install the hub and bearing dust cap using a soft faced hammer.

(3) Install the brake rotor on the hub and bearing.

(4) Install the disc brake caliper. Refer to Brakes.

(5) Install the rear tire and wheel assembly on vehicle. Tighten all wheel stud nuts in crisscross pattern to one-half the specified torque. Repeat pattern, fully tightening the stud nuts to a torque of 135 N·m (100 ft. lbs.).

(6) Lower the vehicle.

KNUCKLE

DESCRIPTION

A cast iron rear knuckle is attached to each side of the vehicle through the upper control arm and ball joint, the rear shock assembly, the lateral links and the trailing link. The knuckle serves as a mounting point for the rear hub and bearing, tire and wheel, and rear brakes.

OPERATION

The knuckle moves up and down with the tire and wheel under jounce and rebound conditions while acting as a mount for the rear hub and bearing, tire and wheel, and rear brakes. The lateral movement of the rear knuckle is controlled using two lateral arms attached to the bottom of the knuckle and by the upper control arm attached to the top of the knuckle.

DIAGNOSIS AND TESTING - KNUCKLE

Inspect the knuckle for physical damage. If it is determined that the knuckle is cracked, bent or broken when servicing the vehicle, no attempt is to be made to repair or to straighten the knuckle. The rear knuckle is not a repairable component of the rear suspension and must be replaced if found to be damaged in any way.

REMOVAL

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

(2) Remove the rear wheel and tire assembly.

(3) Remove rear brake drum from rear hub and bearing assembly.

(4) If vehicle is equipped with antilock brakes remove the rear wheel speed sensor from the brake support plate and brake flex hose routing bracket (Fig. 1).

KNUCKLE (Continued)

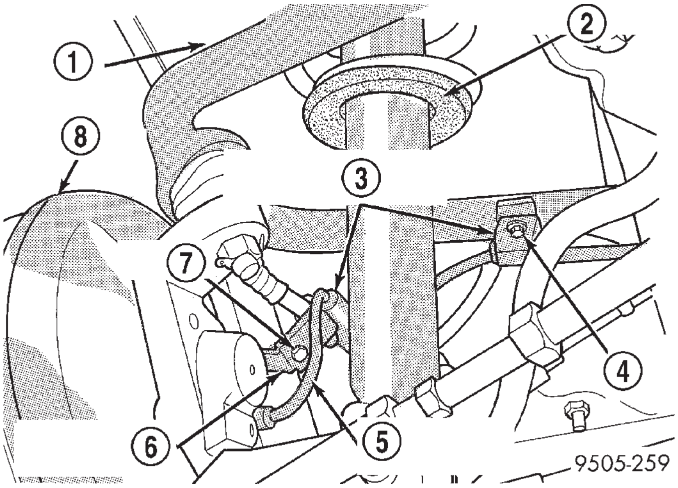


Fig. 1 Rear Wheel Speed Cable Routing And Attachment

1 - UPPER CONTROL ARM
2 - SHOCK ABSORBER
3 - SPEED SENSOR CABLE ROUTING CLIPS
4 - BOLT
5 - SPEED SENSOR CABLE
6 - BRAKE FLEX HOSE BRACKET
7 - BOLT
8 - BRAKES

(5) Remove the park brake cable from the park brake actuating lever (Fig. 2). Then remove the park brake cable from the rear brake support plate (Fig. 3). Park brake cable is removed from brake support plate using this procedure. Position a 1/2 inch box end wrench over cable retainer (Fig. 3) to collapse retaining tabs. Then pull bear brake cable from brake support plate.

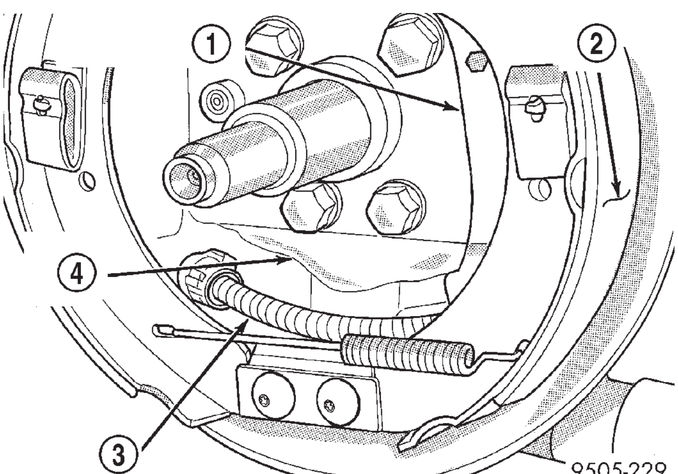


Fig. 2 Park Brake Cable Attachment To Actuating Lever

1 - PARK BRAKE ACTUATING LEVER
2 - TRAILING BRAKE SHOE
3 - PARK BRAKE CABLE
4 - BRAKE SUPPORT PLATE

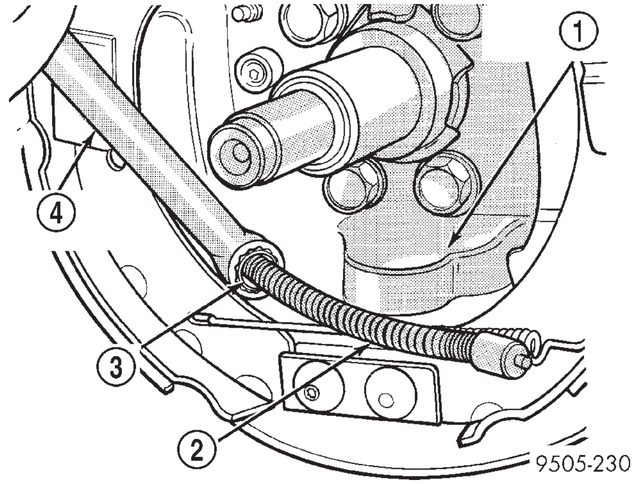


Fig. 3 Park Brake Cable Removal From Brake Support Plate

1 - REAR BRAKE SUPPORT PLATE
2 - PARK BRAKE CABLE
3 - PARK BRAKE CABLE RETAINER
4 - 1/2″ BOX END WRENCH

(6) Remove the rear hub/bearing assembly retaining nut (Fig. 4). Then remove the washer and the hub/bearing assembly from the knuckle.

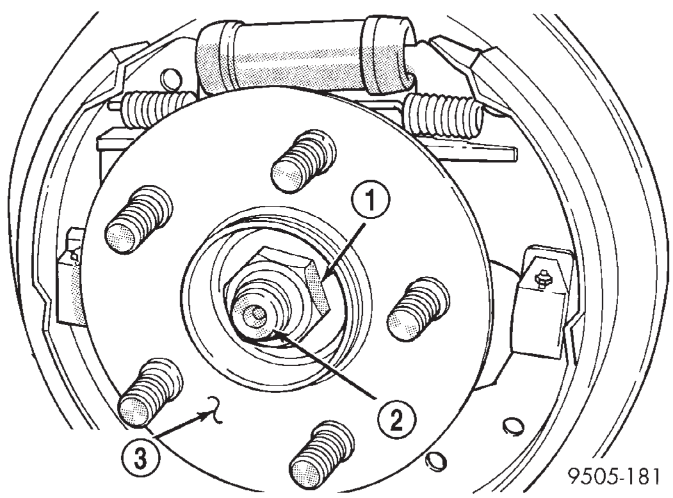


Fig. 4 Hub/Bearing Assembly Retaining Nut

1 - RETAINING NUT
2 - SPINDLE
3 - HUB/BEARING ASSEMBLY

(7) Remove the 4 bolts (Fig. 5) attaching rear brake support plate to knuckle. Then remove brake support plate, brake shoes and wheel cylinder as an assembly from rear knuckle. **It is not necessary to remove brake flex hose from wheel cylinder when removing support plate.** Brake support plate when removed, must be supported using mechanics wire as shown in (Fig. 6).

KNUCKLE (Continued)

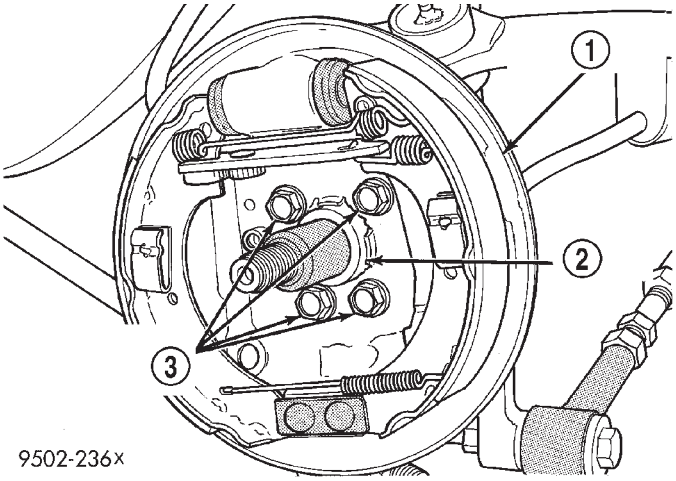


Fig. 5 Rear Brake Support Plate Mounting Bolts

1 - REAR BRAKE SUPPORT PLATE
2 - REAR KNUCKLE
3 - BRAKE SUPPORT PLATE ATTACHING BOLTS

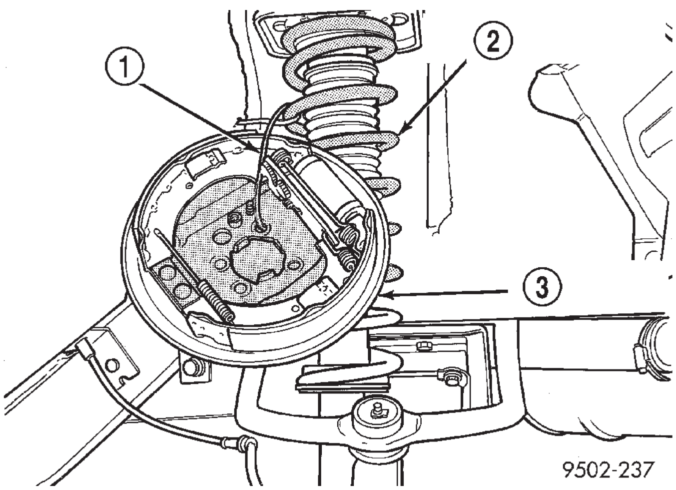


Fig. 6 Correctly Stored Rear Brake Support Plate

1 - WIRE HANGER
2 - REAR SHOCK ABSORBER ASSEMBLY
3 - REAR BRAKE SUPPORT PLATE

(8) Remove the nuts and bolts attaching the forward and rear lateral links (Fig. 7) to the rear knuckle.

(9) Back off nut retaining upper control arm ball joint to knuckle until it is flush with the end of the ball joint stud. Leaving the nut on in this fashion will protect threads from damage during next step.

(10) Release ball joint stud from knuckle using Puller, Special Tool, CT-1106 (Fig. 8).

(11) Remove nut retaining upper control arm ball joint to knuckle.

(12) Remove the nut and washer attaching the trailing link to the rear knuckle. Use a wrench on the flat of the trailing link to keep it from turning when removing nut (Fig. 9).

(13) Remove the shock absorber clevis bracket to knuckle attaching nut and bolt (Fig. 10).

(14) Remove the knuckle from the vehicle.

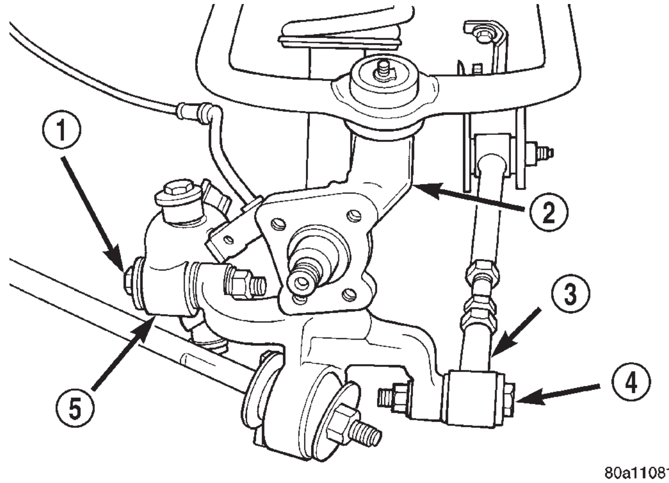


Fig. 7 Lateral Link Attachment To Rear Knuckle

1 - BOLT
2 - KNUCKLE
3 - REAR LATERAL LINK
4 - BOLT
5 - FORWARD LATERAL LINK

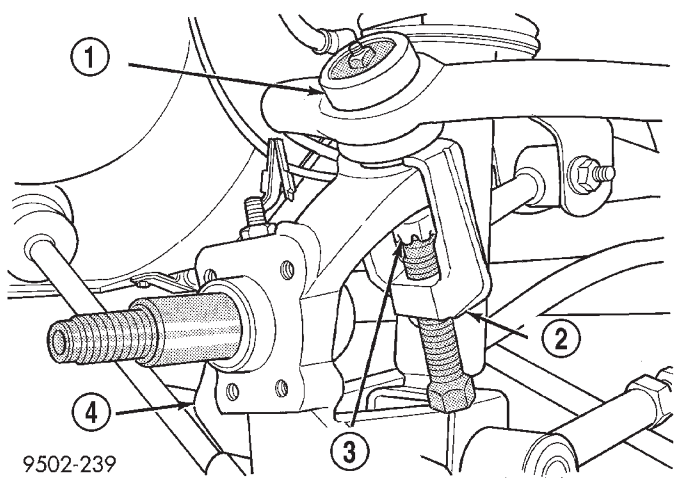


Fig. 8 Removing Ball Joint Stud From Knuckle

1 - BALL JOINT
2 - SPECIAL TOOL CT1106
3 - BALL JOINT STUD
4 - KNUCKLE

INSTALLATION

(1) Install knuckle on clevis bracket of rear shock absorber. Then install clevis bracket to shock absorber attaching bolt with head of bolt facing rear of vehicle (Fig. 10).

KNUCKLE (Continued)

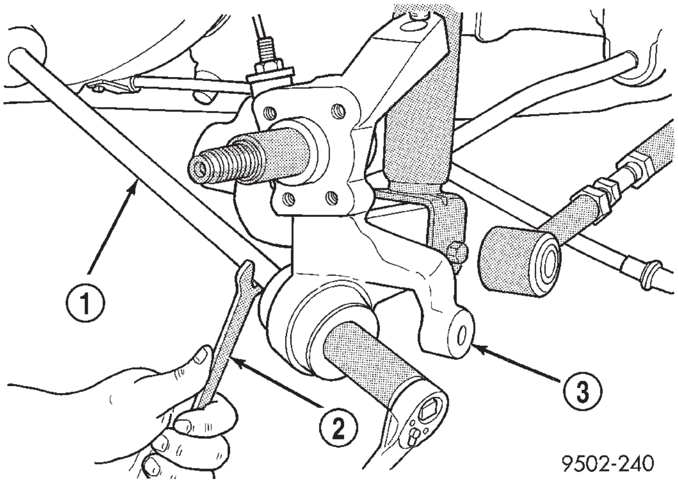


Fig. 9 Trailing Link Attachment To Rear Knuckle

1 - TENSION NUT
2 - WRENCH
3 - KNUCKLE

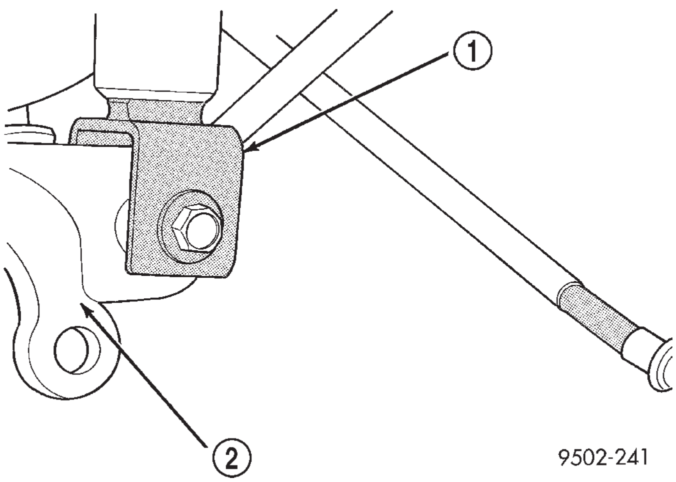


Fig. 10 Shock Absorber Attachment To Knuckle

1 - SHOCK ABSORBER CLEVIS BRACKET
2 - KNUCKLE

CAUTION: When installing trailing link bushing retainers, retainers must be installed with cupped side of retainer facing away from bushing and knuckle (Fig. 11).

(2) Install knuckle on trailing link. Install the trailing link outer bushing, gold bushing retainer and retaining nut on trailing link (Fig. 11). Using a large adjustable wrench, to keep trailing link from rotating securely tighten the trailing link retaining nut (Fig. 11) to a torque of 99 N·m (73 ft. lbs.).

(3) Install the upper ball joint stud in the knuckle. Install and tighten the ball joint stud nut to a torque of 27 N·m (20 ft. lbs.).

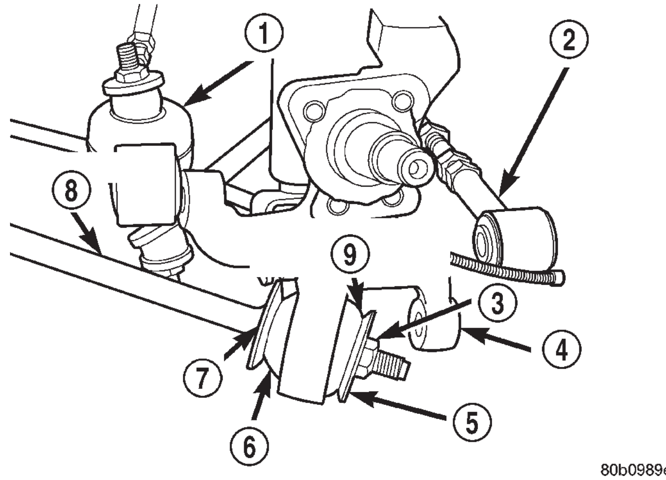


Fig. 11 Trailing Link Bushing And Retainer Installation

1 - FORWARD LATERAL ARM
2 - REAR LATERAL ARM
3 - NUT
4 - KNUCKLE
5 - OUTER TRAILING LINK RETAINER (GOLD)
6 - INNER TRAILING LINK BUSHING
7 - INNER TRAILING LINK RETAINER (BLACK)
8 - TRAILING LINK
9 - OUTER TRAILING LINK BUSHING

(4) Install the front and rear lateral links and attaching nuts and bolts on the knuckle (Fig. 7). Tighten the lateral links to knuckle attaching bolts and nuts to 108 N·m (80 ft. lbs.).

(5) Install rear brake support plate assembly onto the knuckle. Install the 4 bolts attaching rear brake support plate to rear knuckle (Fig. 5). Tighten the attaching bolts to a torque of 61 N·m (45 ft. lbs.).

(6) If vehicle is equipped with ABS brakes, install speed sensor head into rear brake support plate (Fig. 12). Torque speed sensor head mounting bolt to 7 N·m (60 in. lbs.).

(7) Attach routing bracket for speed sensor cable to brake flex hose bracket and securely tighten attaching bolt (Fig. 1).

(8) Install park brake cable into brake support plate. Ensure cable retainer is securely holding cable to support plate. Then connect park brake cable to park brake lever on brake shoe.

(9) Install rear hub and bearing assembly on knuckle and install hub and bearing assembly retaining nut. Tighten retaining nut to a torque of 250 N·m (185 ft. lbs).

(10) Install the brake drum on the hub/bearing assembly.

(11) Install wheel and tire assembly on vehicle. Progressively tighten the wheel mounting nuts in crisscross sequence until all nuts are torqued to half

KNUCKLE (Continued)

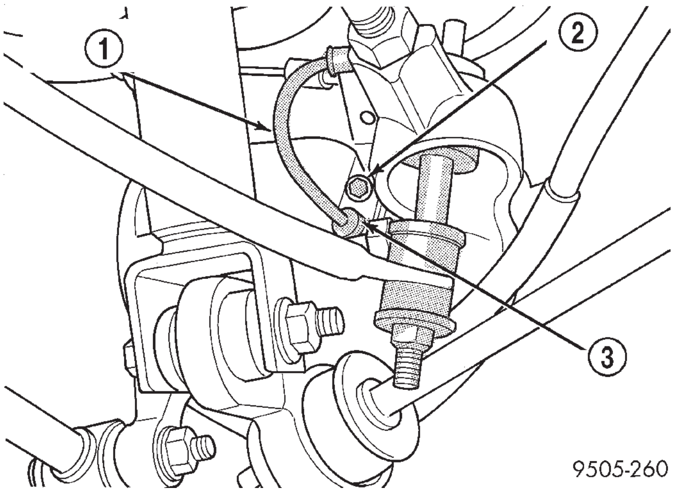


Fig. 12 Speed Sensor Head Attachment To Brake Support Plate

1 - SPEED SENSOR CABLE
2 - BOLT
3 - SPEED SENSOR HEAD

specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(12) Lower vehicle.

(13) Check and reset rear wheel alignment to specifications if required. (Refer to 2 - SUSPENSION/ WHEEL ALIGNMENT - STANDARD PROCEDURE)

LATERAL LINK

DESCRIPTION

The lateral links connect the lower front and rear of the knuckle to the rear crossmember. They have rubber isolator bushings at each end to isolate suspension noise from the body of the vehicle. The forward link allows for stabilizer bar attachment through stabilizer bar attachment links.

OPERATION

The lateral movement of the rear knuckle is controlled by the lateral links connecting the front and rear of the knuckle to the rear suspension crossmember. The metal sleeves of the links are adjustable for setting rear wheel alignment.

DIAGNOSIS AND TESTING - LATERAL LINKS

Inspect the lateral link isolator bushings and sleeves for signs of damage or deterioration. If the lateral link isolator bushings or sleeves are damaged or are deteriorated, replacement of the lateral link assembly will be required. The isolator bushings are not serviceable as a separate component of the lateral link assembly.

Inspect the lateral links for signs of contact with the ground or road debris which has bent or caused other damage to the lateral link. If the lateral link is bent or damaged, the lateral link will require replacement. **Do not attempt to repair or straighten a lateral link.**

CAUTION: Do not apply heat to the lateral link adjusting screws or to the jam nuts, when loosening or adjusting the lateral links.

REMOVAL

CAUTION: Do not attempt to straighten or repair a lateral link. Do not apply heat to the lateral link adjusting screws or to the jam nuts, when loosening or adjusting the lateral links.

NOTE: The rear suspension lateral links are only serviced as complete assemblies. The isolator bushings used in the lateral links are not serviced as separate components.

FORWARD LATERAL LINK

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

(2) Remove the rear wheel and tire assembly.

(3) Remove the rear stabilizer bar link from the forward lateral link (Fig. 13).

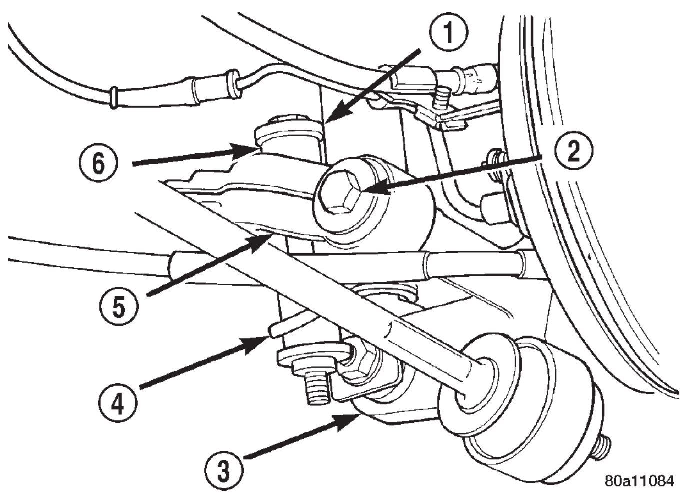


Fig. 13 Stabilizer Bar To Lateral Link Attachment

1 - WASHER
2 - BOLT AND WASHER
3 - KNUCKLE
4 - STABILIZER BAR
5 - FORWARD LATERAL LINK
6 - STABILIZER BAR ATTACHING LINK

LATERAL LINK (Continued)

(4) Remove the nut, bolt and washer (Fig. 13) attaching the forward lateral link to the knuckle.

(5) Remove the nut and bolt attaching the lateral link to the rear suspension crossmember (Fig. 14).

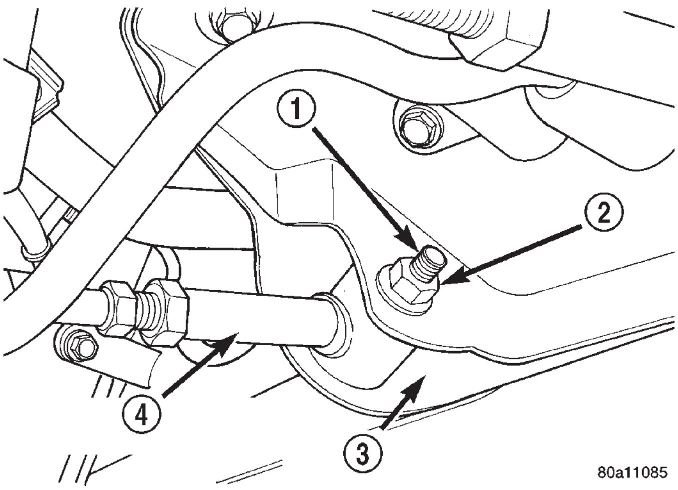


Fig. 14 Lateral Link Attachment To Rear Suspension Crossmember

1 - BOLT
2 - NUT
3 - REAR SUSPENSION CROSSMEMBER
4 - FORWARD LATERAL LINK

(6) Remove the forward lateral link from the vehicle.

REAR LATERAL LINK

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

(2) Remove the rear wheel and tire assembly.

(3) Remove the nut, bolt and washer attaching the lateral link to the knuckle (Fig. 15).

(4) Remove the bolt (Fig. 16) and nut attaching the lateral link to the rear suspension crossmember.

(5) Remove rear lateral link from vehicle.

INSTALLATION

CAUTION: Do not attempt to straighten or repair a lateral link. Do not apply heat to the lateral link adjusting screws or to the jam nuts, when loosening or adjusting the lateral links.

FORWARD LATERAL LINK

(1) Install the lateral link and the attaching nut and bolt at rear suspension crossmember (Fig. 14). **The forward lateral link is to be installed with the cup in cast portion facing down and toward rear knuckle (Fig. 13).**

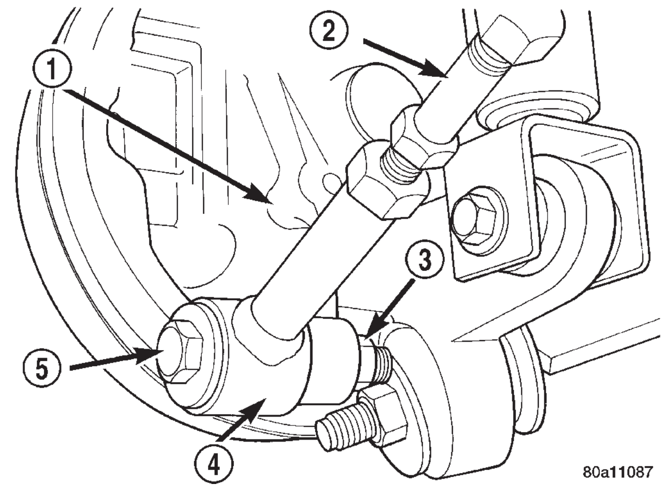


Fig. 15 Rear Lateral Link Attachment To Knuckle

1 - KNUCKLE
2 - ADJUSTING SCREW
3 - NUT
4 - REAR LATERAL LINK
5 - BOLT

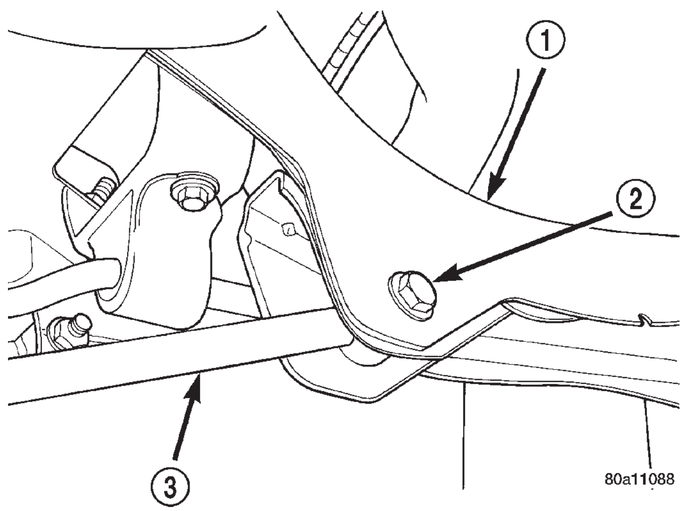


Fig. 16 Lateral Link Attachment To Rear Suspension Crossmember

1 - REAR SUSPENSION CROSSMEMBER
2 - BOLT
3 - REAR LATERAL LINK

(2) Install the lateral link and attaching nut, bolt and washer at rear knuckle (Fig. 13).

(3) Torque both lateral link attaching bolts to 108 N·m (80 ft. lbs.).

(4) Install the rear stabilizer bar attaching link, isolator bushings and attaching nut on the forward lateral link (Fig. 13). Tighten the attaching nut to a torque of 35 N·m (26 ft. lbs.).

(5) Install wheel and tire assembly on vehicle. Progressively tighten the wheel mounting nuts in criss-

LATERAL LINK (Continued)

cross sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(6) Lower vehicle to the ground.

(7) Check and reset rear wheel Camber and Toe to specifications if required. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).

REAR LATERAL LINK

(1) Install the lateral link and the attaching nut and bolt at rear suspension crossmember (Fig. 16). **The rear lateral link is to be installed with the adjusting screw toward rear suspension crossmember, not rear knuckle.**

(2) Install the lateral link and the attaching nut, bolt and washer at rear knuckle (Fig. 15).

(3) Torque both lateral link attaching bolts to 108 N·m (80 ft. lbs.).

(4) Install wheel and tire assembly on vehicle. Progressively tighten the wheel mounting nuts in crisscross sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(5) Lower vehicle.

(6) Check and reset rear wheel Camber and Toe to specifications if required. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).

SHOCK ASSEMBLY

DESCRIPTION - SHOCK ASSEMBLY

The rear shock absorber assemblies support the weight of the vehicle using coil springs positioned around the shock absorbers. The coil springs are contained between the upper mount of the shock absorber and a lower spring seat on the body of the shock absorber.

The top of each shock absorber assembly is bolted to the top of the inner fender through a microcellular urethane isolated mount.

The bottom of the shock absorber assembly attaches to the rear knuckle using a thru-bolt.

The rear coil springs are rated separately for each corner or side of the vehicle depending on optional equipment and type of vehicle service. Coil springs come in a various rates; be sure the correct spring is in use.

The components of the shock assembly listed below are serviceable:

- Shock rod nut
- Shock mount
- Shock rod bushings
- Upper spring isolator
- Dust shield
- Cup
- Jounce bumper
- Lower spring isolator
- Coil spring
- Strut

OPERATION - SHOCK ASSEMBLY

The shock absorber assembly cushions the ride of the vehicle, controlling vibration, jounce and rebound of the suspension.

The coil spring controls ride quality and maintains ride height.

The jounce bumper limits suspension travel and metal-to-metal contact under full jounce.

The shock absorber dampens jounce and rebound motions of the coil spring and suspension.

DIAGNOSIS AND TESTING - SHOCK ASSEMBLY

(1) Inspect for damaged or broken coil springs.

(2) Inspect for torn or damaged shock absorber dust shield.

(3) Inspect for damaged lower spring isolator.

(4) Lift dust boot and inspect shock absorber for evidence of fluid running from the upper end of fluid reservoir. (Actual leakage will be a stream of fluid running down the side and dripping off lower end of unit). A slight amount of seepage between the shock absorber rod and shock absorber rod seal is not unusual and does not affect performance of the shock absorber. Also inspect jounce bumpers for signs of damage or deterioration.

REMOVAL - SHOCK ASSEMBLY

NOTE: Access for the nuts attaching the rear shock assembly upper mount to the vehicle is through the inside of the trunk.

(1) Roll back carpeting on top of the rear shock tower to access shock mounting nuts.

(2) Remove plastic cover from the top of the shock assembly.

(3) Remove 2 nuts attaching the shock assembly upper mount/spring seat to the shock tower.

(4) Raise vehicle on jackstands or centered on a frame contact type hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(5) Remove the rear wheel and tire assembly from the vehicle.

(6) Remove two fasteners holding the splash shield to the shock assembly upper mount.

(7) Remove bolt attaching shock absorber to rear knuckle (Fig. 17).

SHOCK ASSEMBLY (Continued)

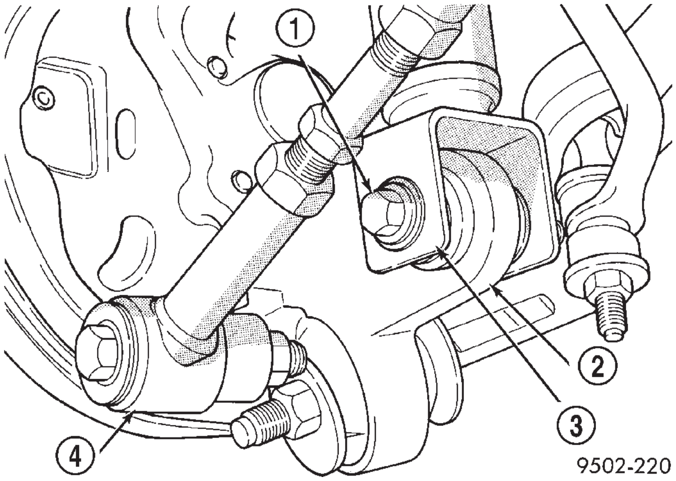


Fig. 17 Shock Absorber Attachment To Knuckle

1 - ATTACHING BOLT
2 - REAR KNUCKLE
3 - SHOCK ABSORBER CLEVIS BRACKET
4 - LATERAL LINK

(8) Remove the shock absorber from the rear knuckle first when removing the shock absorber from vehicle by pushing down on the rear suspension.

(9) Move shock assembly downward and tilt top of shock outward, then remove shock assembly from vehicle through top of wheel opening.

DISASSEMBLY - SHOCK ASSEMBLY

The shock assembly must be removed from the vehicle for it to be disassembled and assembled. (Refer to 2 - SUSPENSION/REAR/SHOCK - REMOVAL)

For the disassembly and assembly of the shock assembly, use strut spring compressor Pentastar Service Equipment (PSE) tool W-7200, or the equivalent, to compress the coil spring. Follow the manufacturer's instructions closely.

WARNING: DO NOT REMOVE THE SHOCK ROD NUT BEFORE THE COIL SPRING IS COMPRESSED. THE COIL SPRING IS HELD UNDER PRESSURE AND MUST BE COMPRESSED, REMOVING SPRING TENSION FROM THE UPPER MOUNTING BRACKET BEFORE THE ROD NUT IS REMOVED.

(1) If both shocks are being serviced at the same time, mark the coil spring and shock assembly according to which side of the vehicle the shock was removed from, and which shock the coil spring was removed from.

(2) Position the shock assembly in the strut coil spring compressor following the manufacturer's instructions. Set the lower hooks and install the clamp on the lower end of the coil spring, so the shock is held in place once the shock shaft nut is removed. Lower the upper hooks and position them on the coil spring near the top.

(3) Compress the coil spring until all coil spring tension is removed from the upper mounting bracket.

(4) Hold the shock rod from rotating using special socket Snap-On® A136, or equivalent, and remove the retainer nut.

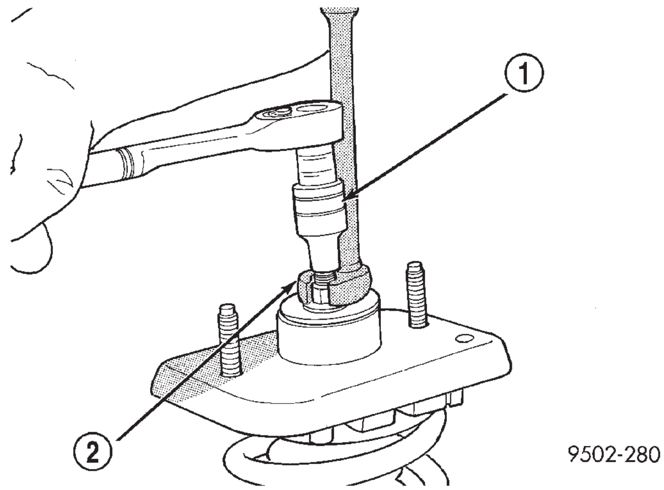


Fig. 18 Retainer Nut Removal/Installation (Typical)

1 - SHOCK ABSORBER SOCKET
2 - CROW FOOT

(5) Remove the upper shock rod bushing retainer washer from the shock rod.

(6) Remove the upper shock mount and the rod isolator bushings as an assembly from the rod of the shock absorber.

(7) Remove the upper coil spring isolator from the top of the coil spring.

(8) Remove the lower shock rod bushing washer from the top of the dust boot and shock absorber rod.

(9) Remove the dust shield and cup as an assembly from the shock absorber rod by pulling both straight up and off the shock rod.

(10) Remove the clamp from the bottom of the coil spring and remove the shock absorber, lower spring isolator, jounce bumper, and collar out through the bottom of the coil spring.

(11) Remove the jounce bumper and the collar (Fig. 19) from the rod of the shock absorber.

(12) Remove the lower coil spring isolator (Fig. 20) from the lower spring seat on the shock absorber.

(13) Remove the upper shock rod isolator bushing and sleeve from the upper shock mount.

(14) Remove the lower shock rod isolator bushing from the upper shock mount.

(15) Inspect the shock assembly components for the following and replace as necessary:

- Inspect the shock for any condition of rod binding over the full stroke of the shaft.

SHOCK ASSEMBLY (Continued)

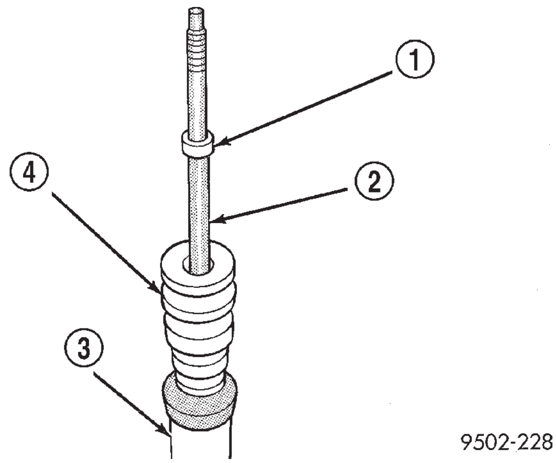


Fig. 19 Shock Absorber Jounce Bumper And Collar

1 - COLLAR
2 - SHOCK ABSORBER ROD
3 - SHOCK ABSORBER
4 - JOUNCE BUMPER

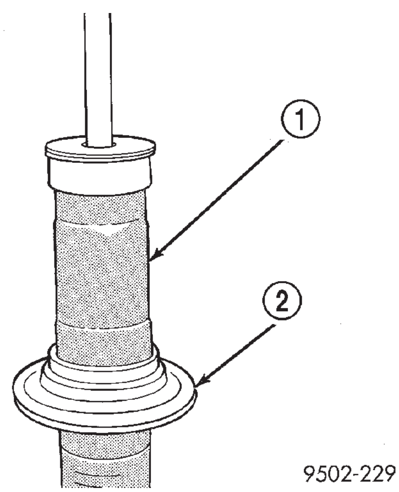


Fig. 20 Lower Coil Spring Isolator

1 - SHOCK ABSORBER
2 - COIL SPRING ISOLATOR

• Check the upper shock mount for cracks and distortion, and locating studs for any sign of damage.
• Check the upper and lower shock rod isolator bushings for severe deterioration of the rubber.
• Check the upper and lower coil spring isolators for severe deterioration of the rubber.
• Inspect the dust shield for rips and deterioration.
• Inspect the jounce bumper for cracks and signs of deterioration.
• Inspect the coil spring for any sign of damage to the coating.

(16) If the coil spring needs to be serviced, release the tension from the coil spring by backing off the compressor drive fully. Push back the compressor upper hooks and remove the coil spring from the compressor.

ASSEMBLY - SHOCK ASSEMBLY

(1) If the coil spring has been removed from the compressor, place the lower end (smaller diameter) of the coil spring in the spring compressor supported by the lower hooks at the same position as in disassembly, following the manufacturer's instructions.

(2) Position the upper hooks of the spring compressor on the coil spring near the top as in disassembly.

(3) Compress the coil spring enough to reinstall the shock absorber and upper mount.

(4) Install the lower shock rod isolator bushing in the bottom of the upper shock mount. The smaller end is to be pointed away from the mount when installed.

(5) Install the upper shock rod isolator bushing and sleeve in the upper shock mount until seated into lower bushing. The smaller end of the bushing is to be pointed away from the mount when installed.

(6) Install the lower coil spring isolator on the lower spring seat of the shock absorber (Fig. 20).

(7) Install the jounce bumper as shown on the rod of the shock absorber (Fig. 21).

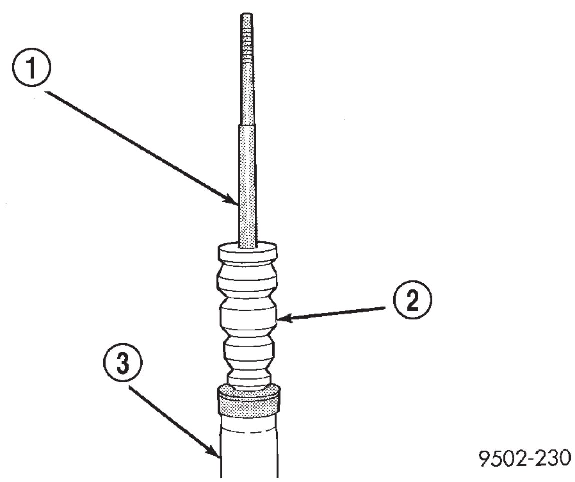


Fig. 21 Jounce Bumper Installed

1 - SHOCK ABSORBER ROD
2 - SHOCK ABSORBER JOUNCE BUMPER
3 - SHOCK ABSORBER

(8) Install the collar on the rod of the shock absorber assembly with the undercut side of sleeve facing down (Fig. 22). Push the collar down until seated on the step of the shock absorber rod.

(9) Install the shock through the bottom of the coil spring until the lower spring seat contacts the lower end of the coil spring. Install the clamp temporarily securing the shock absorber to the coil spring.

(10) Install dust shield and cup over the jounce bumper and onto the rod of the shock absorber.

SHOCK ASSEMBLY (Continued)

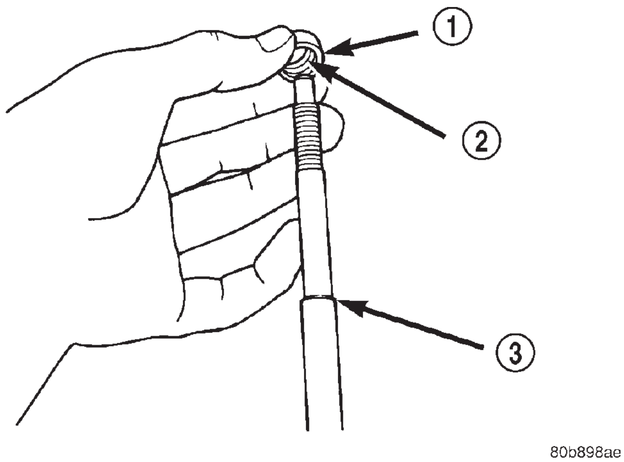


Fig. 22 Installing Collar On Shock

1 - COLLAR
2 - UNDERCUT
3 - SHOCK ABSORBER ROD STEP

(11) Install the lower shock rod bushing retainer washer on the shock absorber rod.

(12) Install the upper spring isolator on the top of the coil spring. The bottom of the isolator is contoured to fit around the inside diameter of the coil spring and has a step built into it that the end of the coil spring must fit into upon installation.

(13) Install the upper shock mount bracket and rod isolator bushings as an assembly on the top of the rod of the shock absorber.

(14) Install the upper shock rod bushing retainer washer. Make sure the concave side is facing up.

(15) Install the shock assembly retainer nut. Hold the shock rod from rotating using special socket Snap-On® A136, or equivalent, and tighten the retainer nut using a crow foot wrench (on the end of a torque wrench and extension) to a torque of 55 N·m (40 ft. lbs.) (Fig. 18).

(16) Position the upper shock mount so it's studs are in line with the bolt hole in the shock absorber lower bracket.

(17) Slowly release the tension from the coil spring by backing off the compressor drive fully. As the tension is relieved, make sure the upper mount, isolator, and coil spring align properly. Remove the clamp from the lower end of the coil spring and shock. Push back the spring compressor upper and lower hooks, then remove the shock assembly from the spring compressor.

(18) Install shock assembly on the vehicle. (Refer to 2 - SUSPENSION/REAR/SHOCK - INSTALLATION)

INSTALLATION - SHOCK ASSEMBLY

(1) Install shock assembly back in vehicle using the reverse sequence of removal.

(2) Install upper shock mount into the mounting holes in rear shock tower.

(3) Push down on rear knuckle to obtain clearance and then install shock absorber clevis bracket on rear knuckle.

(4) Align clevis bracket on shock absorber with bushing in knuckle. Install and tighten bolt to a torque of 95 N·m (70 ft. lbs.).

(5) Lower vehicle far enough to gain access to the trunk.

(6) Install and tighten the 2 shock assembly upper mounting nuts to a torque of 54 N·m (40 ft. lbs.).

(7) Install plastic cover on shock assembly.

(8) Install carpeting back on shock tower.

(9) Install fasteners securing splash shield to shock mount.

(10) Install wheel and tire assembly on vehicle. Install all wheel mounting nuts in proper sequence until all nuts are torqued to half specification. Repeat tightening sequence to full specified torque of 135 N·m (100 ft. lbs.).

(11) Lower vehicle to the ground.

STABILIZER BAR

DESCRIPTION

The stabilizer bar interconnects the forward lateral links of the vehicle's rear suspension and is attached to the rear suspension crossmember of the vehicle.

Attachment of the stabilizer bar to the rear crossmember of the vehicle is through 2 rubber-isolator bushings and bushing retainers. The stabilizer bar to lateral link attachment is done utilizing a rubber isolated stabilizer bar attaching link. All parts of the stabilizer bar are serviceable, and the stabilizer bar to rear suspension isolator bushings are split for easy removal and installation. The split in the stabilizer bar to crossmember bushing must be positioned toward the front of the vehicle, when the stabilizer bar is installed on the vehicle.

OPERATION

Jounce and rebound movements affecting one rear wheel of the vehicle are partially transmitted to the opposite wheel of the vehicle through the stabilizer bar to stabilize body roll.

DIAGNOSIS AND TESTING - STABILIZER BAR

Inspect the stabilizer bar for damage or bending.

Inspect for broken or distorted stabilizer bar bushings, and bushing retainers. When inspecting the stabilizer bar bushings, be sure that the slit in the bushings are positioned so that it is facing toward the front of the vehicle.

STABILIZER BAR (Continued)

Inspect the bushings and sleeves in the stabilizer bar attaching links for damage or deterioration. Inspect the stabilizer bar attaching link to ensure it is not bent or broken. If any of these conditions are present when inspecting the attaching links, replacement of the attaching link is required.

REMOVAL

(1) Raise vehicle on jackstands or centered on a frame contact type hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

(2) Remove both rear wheel and tire assemblies from the vehicle.

(3) From each side of the vehicle, remove the nut (Fig. 23) attaching the stabilizer bar attaching link/isolator bushings to the stabilizer bar.

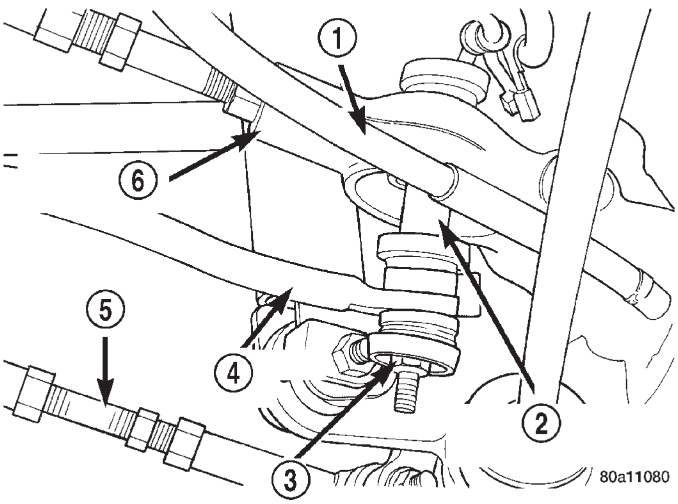


Fig. 23 Stabilizer Bar Attaching Link

1 - PARK BRAKE CABLE
2 - STABILIZER BAR ATTACHING LINK
3 - NUT
4 - STABILIZER BAR
5 - REAR LATERAL LINK
6 - FORWARD LATERAL LINK

(4) Remove the 4 bolts attaching the stabilizer bar bushing clamps to the rear suspension crossmember (Fig. 24).

(5) Remove the rear stabilizer bar to crossmember bushing clamps and bushings from the stabilizer bar.

(6) Remove stabilizer bar from vehicle. Stabilizer bar will come out of vehicle between the exhaust pipe and the rear suspension crossmember.

STABILIZER BAR BUSHING INSPECTION

Inspect for broken or distorted retainers and bushings. If bushing replacement is required, bushings can be removed by opening slit in bushing and removing bushing from around stabilizer bar.

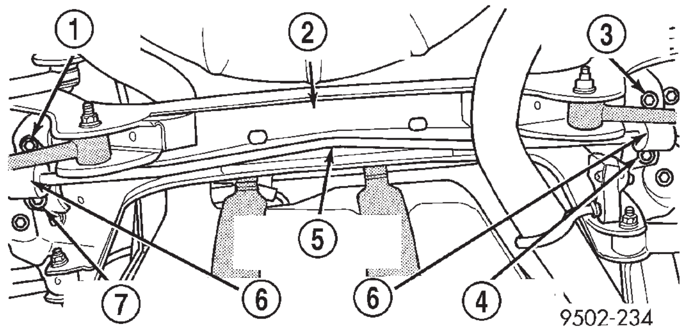


Fig. 24 Stabilizer Bar Attachment To Rear Suspension

1 - ATTACHING BOLT
2 - REAR SUSPENSION CROSSMEMBER
3 - ATTACHING BOLT
4 - ATTACHING BOLT
5 - REAR STABILIZER BAR
6 - STABILIZER BAR ATTACHING BRACKETS
7 - ATTACHING BOLT

INSTALLATION

(1) Install stabilizer bar back in vehicle with the bushings removed using the reverse sequence of removal.

(2) When stabilizer bar is installed in vehicle, it must be installed with the bend in the end of the stabilizer bar positioned up in vehicle when viewed from the side (Fig. 25).

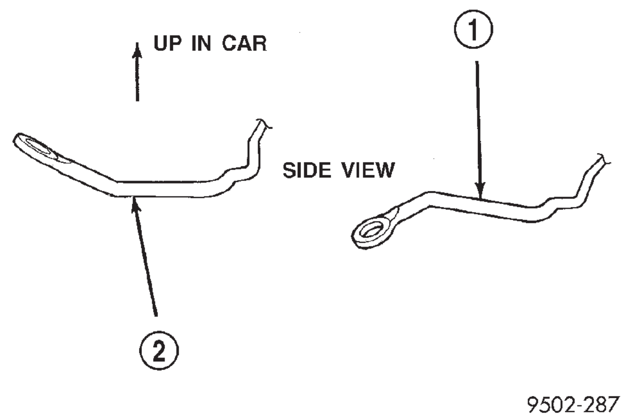


Fig. 25 Installed

1 - INCORRECTLY INSTALLED POSITION OF STABILIZER BAR
2 - CORRECTLY INSTALLED POSITION OF STABILIZER BAR

(3) Install the stabilizer bar onto the stabilizer bar to forward lateral link attaching links (Fig. 23). Install the stabilizer bar to attaching link bushings on attaching links. Tighten the bushing retaining nuts to a torque of 35 N·m (26 ft. lbs.).

(4) Loosely install the stabilizer bar bushing clamps on the rear suspension crossmember

STABILIZER BAR (Continued)

(5) Position the stabilizer bar so it is centered in the vehicle and does not contact other suspension components or vehicle body.

(6) Tighten the bolts attaching the stabilizer bar bushing clamps to the rear crossmember to a torque of 27 N·m (19 ft. lbs.) (Fig. 24).

(7) Install wheel and tire assembly on vehicle. Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(8) Lower vehicle to the ground.

TRAILING LINK

DESCRIPTION

The trailing link on each side of the vehicle bolts to the bottom of the knuckle and to a bracket attached to the floor pan of the vehicle. The trailing link is steel and has rubber isolator bushings, retainer washers and nuts at each end to isolate suspension noise from the body of the vehicle.

OPERATION

Fore and aft movement of the knuckle is controlled by a trailing link.

DIAGNOSIS AND TESTING - TRAILING LINK

Inspect the trailing link bushings and retainers for signs of deterioration or damage. If the trailing link bushings are deteriorated or the retainers are damaged, replacement of the trailing link bushings and or the retainers will be required. The bushings and retainers are serviceable as separate components of the trailing link.

Inspect the trailing link for signs of contact with the ground or road debris which has bent or caused other damage to the trailing link. If the trailing link is bent or damaged the trailing link will require replacement. Do not ever attempt to repair or straighten a trailing link.

REMOVAL

(1) Raise vehicle on jackstands or centered on a frame contact type hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

(2) Remove rear wheel and tire assembly from the vehicle.

(3) At the knuckle, remove the nut, bushing retainer and outer trailing link bushing (Fig. 26) from the trailing link.

(4) Remove the 4 bolts (Fig. 27) attaching the trailing link hanger bracket to the floor pan and frame rail.

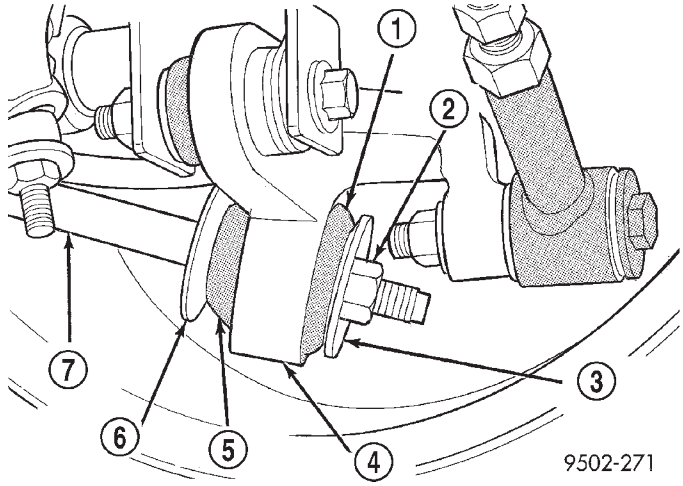


Fig. 26 Trailing Link To Knuckle Attachment

1 - BUSHING
2 - NUT
3 - BUSHING RETAINER
4 - KNUCKLE
5 - BUSHING
6 - BUSHING RETAINER
7 - TRAILING LINK

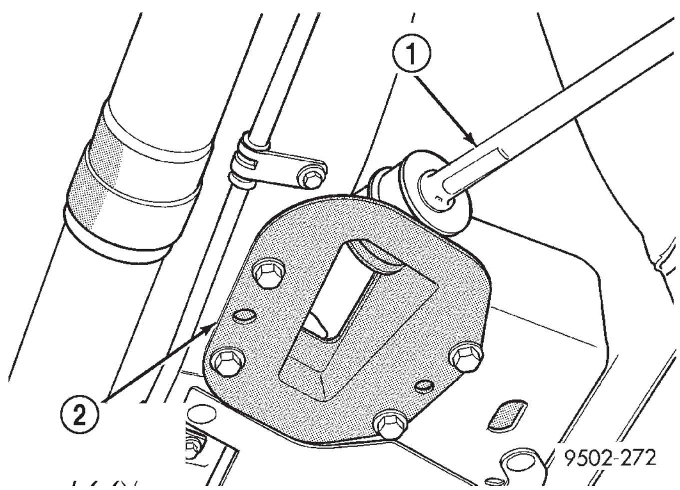


Fig. 27 Trailing Link Hanger Bracket Attachment To Vehicle

1 - TRAILING LINK
2 - TRAILING LINK HANGER BRACKET

(5) Remove the trailing link and mounting bracket as an assembly from the vehicle.

CAUTION: The installation position of the bushings and retainers on the trailing link is important. When separating the trailing link from the hanger bracket, note the position and orientation on the bushings and retainers to ensure they are re-installed correctly.

TRAILING LINK (Continued)

(6) Separate the trailing link from the hanger bracket. To separate trailing link from hanger bracket, use a large adjustable wrench on flat of trailing link to turn link while holding nut stationary (Fig. 28).

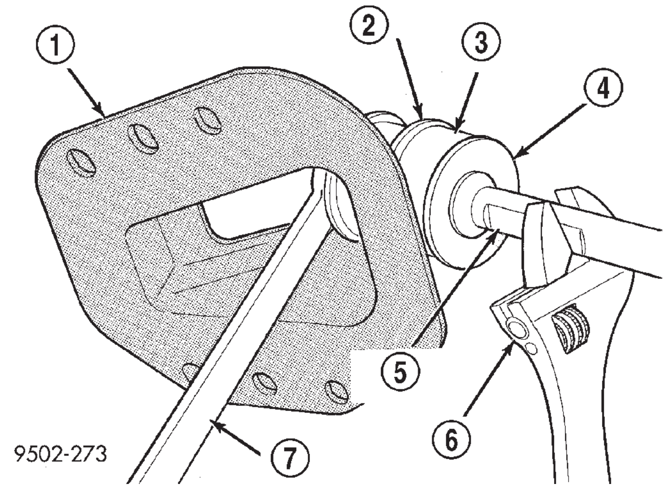


Fig. 28 Separating Trailing Link From Hanger Bracket

1 - HANGER BRACKET
2 - SPACER
3 - BUSHING
4 - RETAINER
5 - TRAILING LINK
6 - ADJUSTABLE WRENCH
7 - WRENCH

INSTALLATION

CAUTION: The inner and outer trailing link to hanger bracket bushings and retainers must be installed in their correct position on the trailing link. Do not reverse the position of the inner and outer trailing link bushing or retainers on the trailing link.

NOTE: When installing trailing link into hanger bracket, the flat on the trailing link (Fig. 28) must be positioned at the hanger bracket.

(1) Install the (black) inner bushing retainer, and inner bushing (Fig. 29) on the trailing link. Install the trailing link, retainer and bushing on the hanger bracket (Fig. 29). Then install the outer bushing, (gold) outer bushing retainer and nut (Fig. 29) on the trailing link. Using a large adjustable wrench on flat of trailing link to keep it from rotating, tighten the trailing link retaining nut to a torque of 99 N·m (73 ft. lbs.).

(2) Install the (black) inner bushing retainer, and inner bushing (Fig. 29) on the trailing link.

(3) Install knuckle end of trailing link in rear knuckle.

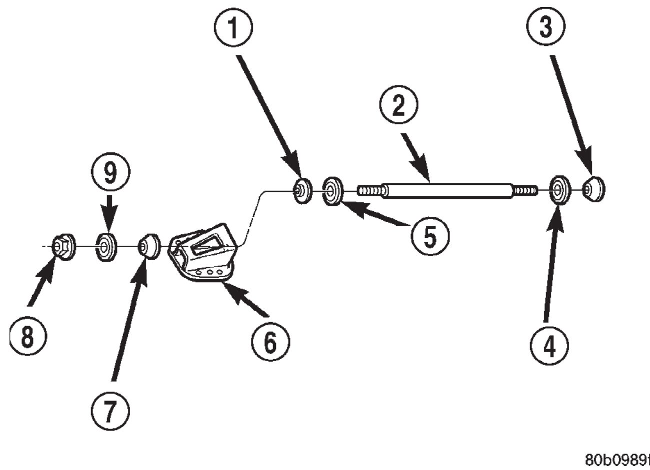


Fig. 29 Trailing Link Bushing Installation

1 - INNER TRAILING LINK BUSHING
2 - TRAILING LINK
3 - INNER TRAILING LINK BUSHING
4 - TRAILING LINK INNER BUSHING RETAINER (BLACK)
5 - INNER BUSHING RETAINER (BLACK)
6 - TRAILING LINK HANGER BRACKET
7 - OUTER TRAILING LINK BUSHING
8 - NUT
9 - OUTER BUSHING RETAINER (GOLD)

CAUTION: It is important that the following procedure be done when installing the trailing arm hanger bracket to the body of the vehicle. This procedure will ensure that the hanger bracket is installed in the correct position on the vehicle.

(4) Install trailing link hanger bracket on vehicle and loosely install the 4 attaching bolts (Fig. 30). Then install 2 drift pins of appropriate size in positioning holes on hanger bracket and into locating holes in body (Fig. 30). With hanger bracket correctly positioned on vehicle tighten the 4 hanger bracket mounting bolts to a torque of 34 N·m (25 ft. lbs.).

CAUTION: When installing trailing link bushing retainers, the retainers must be installed with cupped side of retainer facing away from bushing and knuckle (Fig. 26).

(5) At the knuckle, install the outer trailing link bushing, (gold) outer bushing retainer and retaining nut on trailing link (Fig. 26). Using a large adjustable wrench on flat of trailing link to keep it from rotating tighten the trailing link retaining nut (Fig. 26) to a torque of 99 N·m (73 ft. lbs.).

TRAILING LINK (Continued)

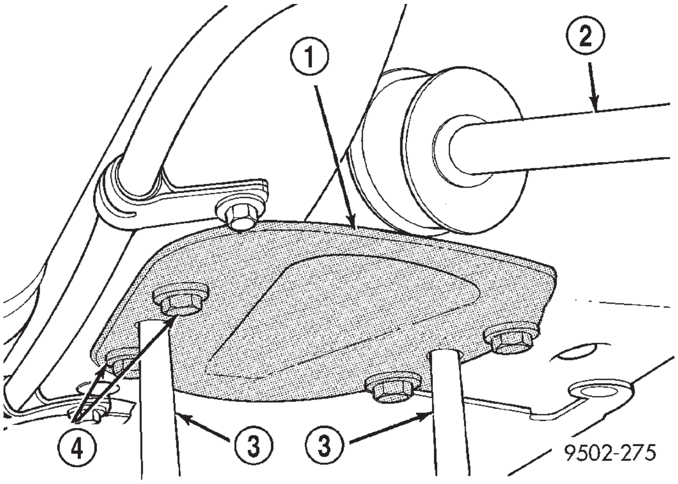


Fig. 30 Trailing Link Hanger Bracket Installation

1 - HANGER BRACKET
2 - TRAILING LINK
3 - LOCATING DRIFT PINS
4 - ATTACHING BOLTS 4

UPPER BALL JOINT

DESCRIPTION

The ball joint is pressed into the upper control arm and has a tapered stud for attachment to the steering knuckle. The ball joint stud is attached and locked into the steering knuckle using a special nut. The ball joint is a sealed-for-life type and requires no maintenance.

DIAGNOSIS AND TESTING - UPPER BALL JOINT

With the weight of the vehicle resting on the road wheels, grasp the grease fitting and with no mechanical assistance or added force, attempt to move the grease fitting.

If the ball joint is worn, the grease fitting will move easily. If movement is noted, replacement of the ball joint is required.

UPPER CONTROL ARM

DESCRIPTION

An upper control arm is attached to the top of each rear knuckle, connecting the knuckle to the rear suspension crossmember.

The attachment of the upper control arm to the knuckle is achieved through a ball joint in the upper control arm. The upper control arm is bolted to the rear suspension crossmember using a pivot bar which is rubber isolated from the upper control arm.

OPERATION

The upper control arm supports the upper end of the knuckle and allows for the up and down movement of the suspension under jounce and rebound travel.

REMOVAL

NOTE: The rear control arm, control arm bushings, and pivot bar are serviced as a complete assembly on this vehicle. Do not attempt to disassemble the control arm from the pivot bar to service the rear control arm bushings.

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

(2) Remove both rear wheel and tire assemblies from the vehicle.

(3) Remove the shock absorber clevis bracket to rear knuckle attaching bolt and nut (Fig. 31) on both sides of the vehicle.

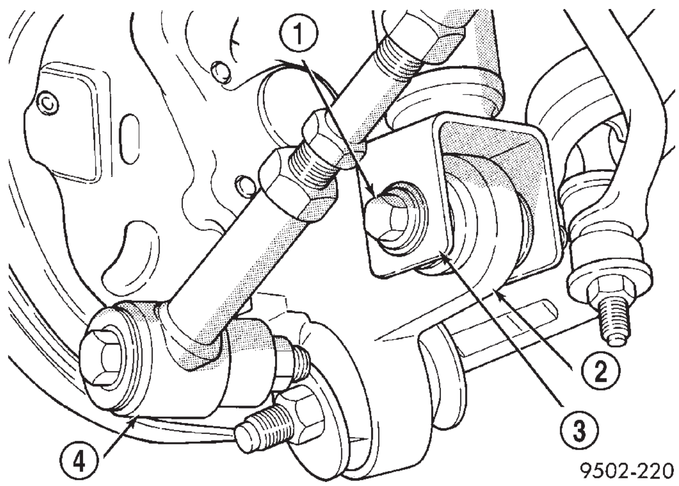


Fig. 31 Shock Absorber To Knuckle Attaching

1 - ATTACHING BOLT
2 - REAR KNUCKLE
3 - SHOCK ABSORBER CLEVIS BRACKET
4 - LATERAL LINK

(4) Remove muffler support bracket from rear frame rail (Fig. 32).

(5) Remove the rear exhaust pipe hanger bracket from the rear suspension crossmember (Fig. 33). Let exhaust system drop down as far as possible.

(6) If vehicle is equipped with antilock brakes, remove routing clips for wheel speed sensor cable from brackets on both upper control arms (Fig. 34).

(7) If vehicle is equipped with antilock brakes, remove bolts and wheel speed sensor heads from both rear knuckles.

UPPER CONTROL ARM (Continued)

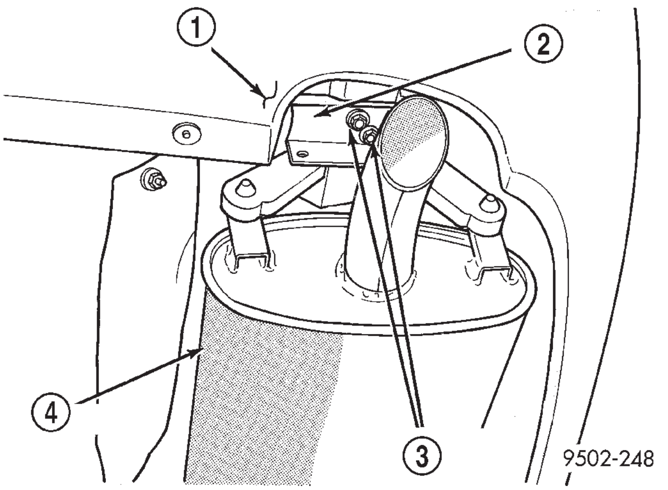


Fig. 32 Muffler Support Bracket

1 - REAR FASCIA
2 - MUFFLER SUPPORT BRACKET
3 - ATTACHING BOLTS
4 - MUFFLER

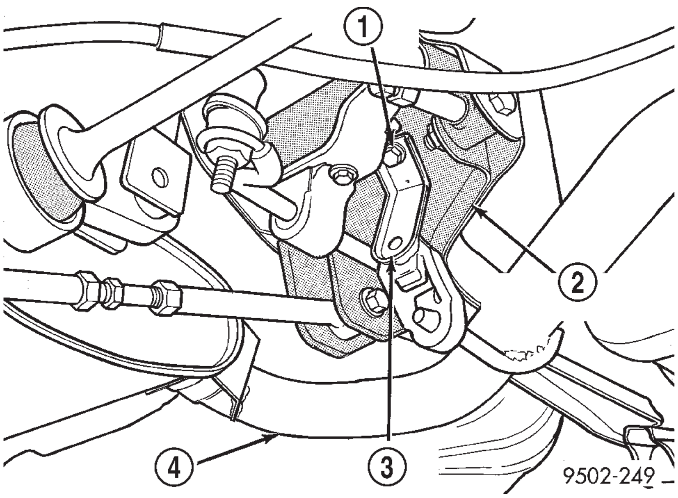


Fig. 33 Exhaust Pipe Hanger At Rear Suspension Crossmember

1 - BOLT
2 - REAR SUSPENSION CROSSMEMBER
3 - HANGER BRACKET
4 - EXHAUST PIPE

(8) Remove both rear disc brake calipers from knuckles and hang out of way using wire or cord. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/BRAKE PADS/SHOES - REMOVAL). Do not allow calipers to hang by brake hoses.

(9) Release brake tubing from clips on top of crossmember.

(10) On the side of the vehicle requiring control arm removal, separate the control arm ball joint from the rear knuckle using following procedure:

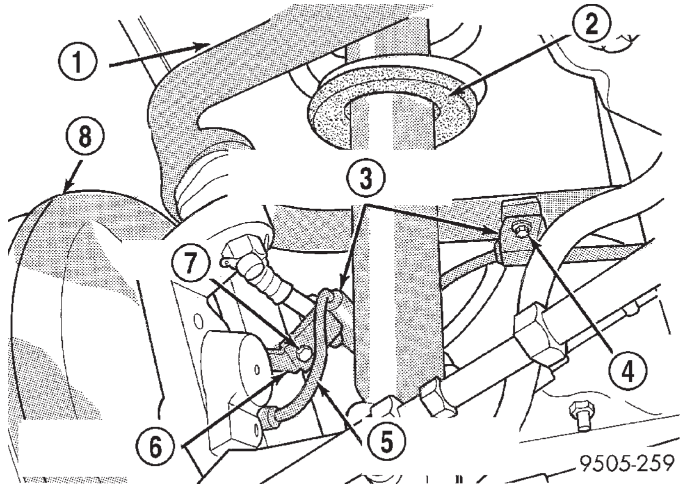


Fig. 34 Speed Sensor Cable Attachment To Control Arm

1 - UPPER CONTROL ARM
2 - SHOCK ABSORBER
3 - SPEED SENSOR CABLE ROUTING CLIPS
4 - BOLT
5 - SPEED SENSOR CABLE
6 - BRAKE FLEX HOSE BRACKET
7 - BOLT
8 - BRAKES

(a) Back off nut retaining upper control arm ball joint to knuckle until nut is even with end of stud. This action will help avoid damaging the stud threads when the stud is released from the knuckle in the following step.

(b) Remove ball joint stud from knuckle using Puller, Special Tool, CT- 1106 (Fig. 35).

(c) Remove nut retaining upper control arm ball joint to knuckle.

(11) Position a transmission jack and wooden block under the center of the rear suspension crossmember to support and lower crossmember during removal (Fig. 36).

(12) Remove the 4 bolts (Fig. 37) attaching rear suspension crossmember to rear frame rails.

CAUTION: When lowering rear suspension crossmember do not put a strain on the rear brake flex hoses.

(13) Lower the rear suspension crossmember far enough to access the upper control arm pivot bar to crossmember attaching bolts.

(14) Remove the 2 bolts attaching the upper control arm to the rear suspension crossmember (Fig. 38).

(15) Remove the upper control arm from the rear suspension crossmember.

(16) Transfer any required components to the replacement control arm.

UPPER CONTROL ARM (Continued)

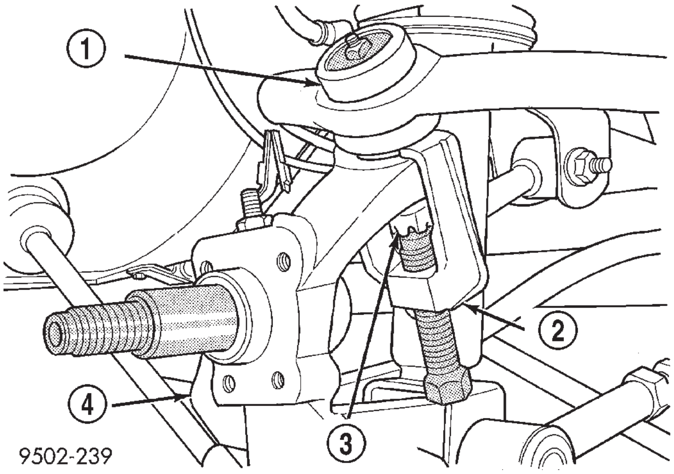


Fig. 35 Ball Joint Stud Removal From Knuckle

1 - BALL JOINT
2 - SPECIAL TOOL CT1106
3 - BALL JOINT STUD
4 - KNUCKLE

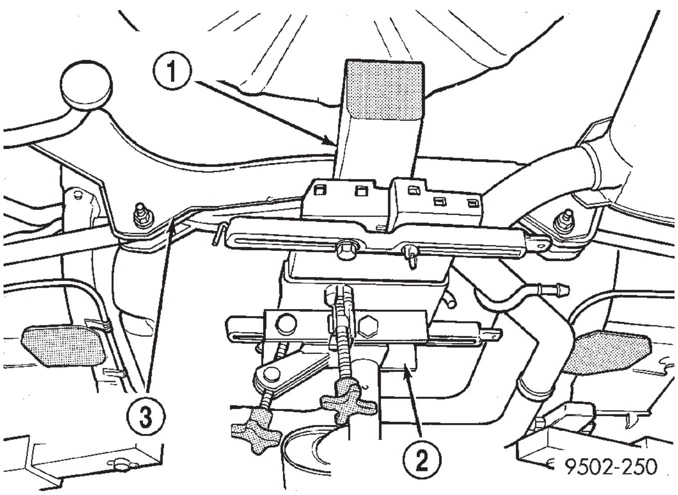


Fig. 36 Lowering And Supporting Rear Suspension Crossmember

1 - WOODEN BLOCK
2 - TRANSMISSION JACK
3 - REAR SUSPENSION CROSSMEMBER

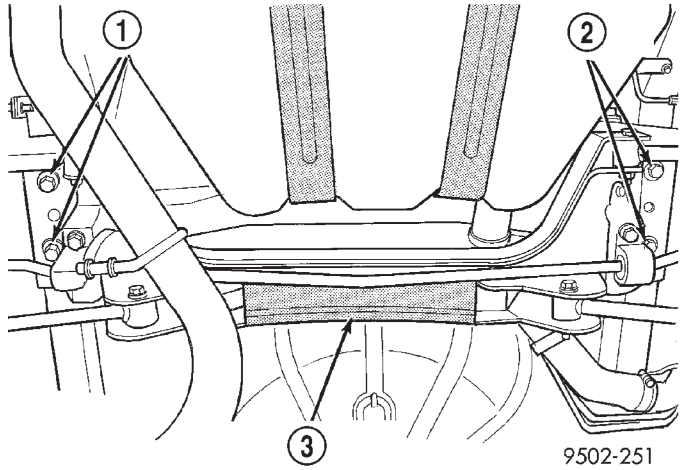


Fig. 37 Crossmember Attachment To Frame Rails

1 - ATTACHING BOLTS
2 - ATTACHING BOLTS
3 - REAR SUSPENSION CROSSMEMBER

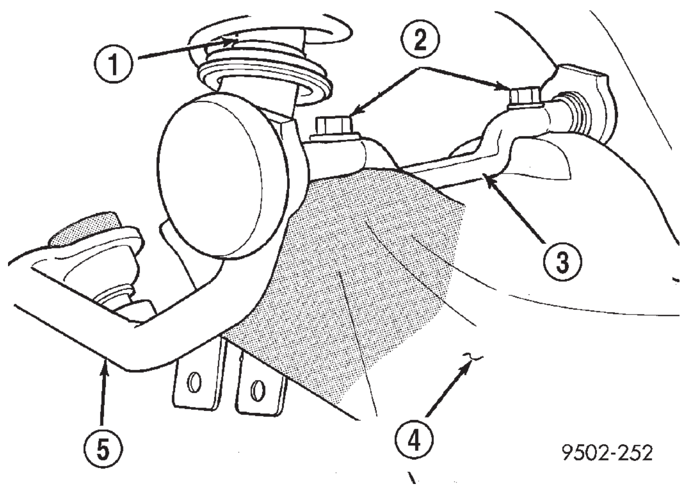


Fig. 38 Upper Control Arm Attachment To Crossmember

1 - SHOCK ABSORBER
2 - ATTACHING BOLTS
3 - UPPER CONTROL ARM PIVOT BAR
4 - REAR SUSPENSION CROSSMEMBER
5 - UPPER CONTROL ARM

UPPER CONTROL ARM (Continued)

DISASSEMBLY - UPPER BALL JOINT

The rear upper control arm must be removed from the vehicle for replacement of the ball joint. (Refer to 2 - SUSPENSION/REAR/UPPER CONTROL ARM - REMOVAL)

(1) Position Receiving Cup, Special Tool 6758, to support control arm when removing ball joint assembly (Fig. 39). Install Remover/Installer, Special Tool 6804 on top of ball joint assembly (Fig. 39).

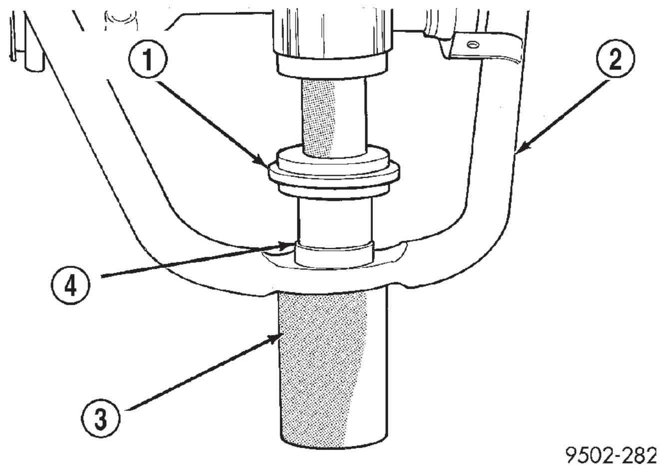


Fig. 39 Removing Ball Joint From Upper Control Arm

1 - SPECIAL TOOL 6804
2 - CONTROL ARM
3 - SPECIAL TOOL 6758
4 - BALL JOINT

(2) Using an arbor press, press the ball joint assembly out of the control arm.

INSPECTION

Inspect the control arm for physical damage. If it is determined that the upper control arm is broken or bent, the upper control arm must be replaced. The rear suspension upper control arm is not a repairable component and no attempt is to be made to repair or to straighten it. The upper control arm must be replaced if found to be damaged in any way.

Inspect the control arm pivot bushings for deterioration. If found to need replacement, the upper control arm is to be replaced.

The rear control arm, control arm bushings, and pivot bar are serviced as a complete assembly on this vehicle. Do not attempt to disassemble the control arm from the pivot bar to service the rear control arm bushings.

The only component on the upper control arm that is serviceable is the rear upper ball joint and its seal.

ASSEMBLY - UPPER BALL JOINT

(1) By hand, position ball joint assembly into ball joint bore of control arm. Be sure ball joint assembly is not cocked in the bore of the control arm. This will cause binding of the ball joint assembly when being pressed into lower control arm.

(2) Position assembly in an arbor press with Receiving Cup, Special Tool 6758, supporting lower control arm (Fig. 40). Then install Remover/Installer, Special Tool 6804, on the top of the ball joint assembly (Fig. 40).

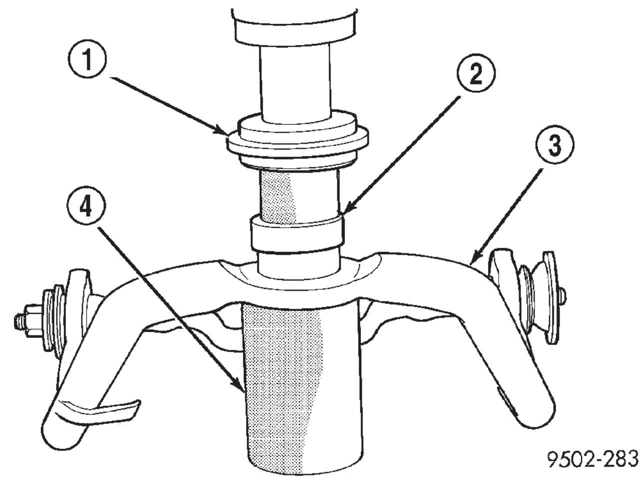


Fig. 40 Installing Ball Joint In Upper Control Arm

1 - SPECIAL TOOL 6804
2 - BALL JOINT
3 - CONTROL ARM
4 - SPECIAL TOOL 6758

CAUTION: When installing the ball joint in the upper control arm, do not press the ball joint into the control arm all the way. The lip on the ball joint must not touch the surface of the control arm. Refer to Step 3 below when installing the ball joint.

(3) Carefully align all pieces. Using the arbor press, press the ball joint into the control arm until a gap of 3 mm (1/8 inch) is between lip on ball joint and surface of lower control arm.

(4) Reinstall the control arm on the vehicle. (Refer to 2 - SUSPENSION/REAR/UPPER CONTROL ARM - INSTALLATION)

INSTALLATION

(1) Align the pivot bar on the upper control arm with the mounting holes in the rear suspension crossmember. Install the pivot bar attaching bolts (Fig. 38). Tighten the 2 pivot bar attaching bolts to a torque of 108 N·m (80 ft. lbs.).

(2) Using transmission jack, raise rear suspension crossmember up to the rear frame rails and loosely install the 4 attaching bolts (Fig. 37).

UPPER CONTROL ARM (Continued)

(3) Position an appropriate size drift into the positioning hole in each side of rear suspension crossmember and crossmember locating holes in frame rails of the vehicle (Fig. 41). This is required to properly position rear suspension crossmember to the body of the vehicle. Tighten the 4 crossmember to frame rail attaching bolts to 108 N·m (80 ft. lbs.). Remove drifts from rear suspension crossmember.

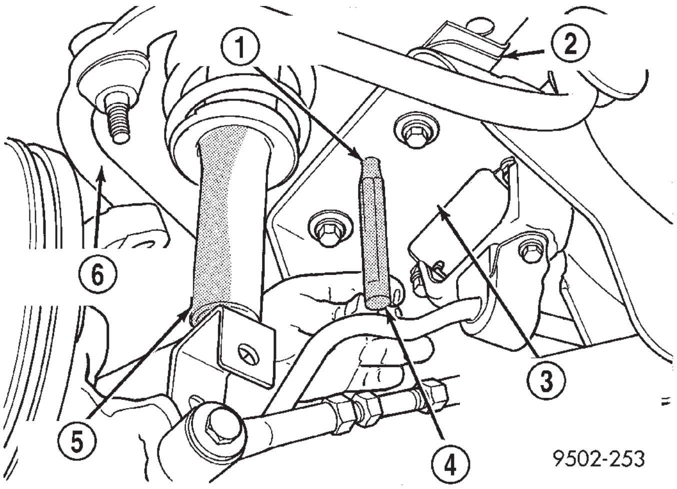


Fig. 41 Locating Rear Suspension Crossmember In Vehicle

1 - POSITIONING HOLE
2 - FRAME RAIL
3 - REAR SUSPENSION CROSSMEMBER
4 - DRIFT
5 - SHOCK ABSORBER
6 - UPPER CONTROL ARM

(4) Remove transmission jack supporting rear suspension crossmember.

(5) Install upper ball joint stud in knuckle. Install and tighten the ball joint stud nut to a torque of 27 N·m (20 ft. lbs.).

(6) Install the brake tubing above the rear suspension crossmember into the routing clips on top of the crossmember.

Install rear brake calipers onto rear knuckles. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ BRAKE PADS/SHOES - INSTALLATION)

(7) If vehicle is equipped with antilock brakes, attach wheel speed sensor heads to both rear knuckles. Tighten sensor mounting bolts to a torque of 8 N·m (75 in. lbs.).

(8) If vehicle is equipped with antilock brakes, install routing clips for wheel speed sensor cables onto brackets on both upper control arms (Fig. 34). Securely tighten routing clip attaching bolts.

(9) Install muffler support bracket on rear frame rail (Fig. 32).

(10) Install rear exhaust pipe hanger on rear suspension crossmember (Fig. 33).

(11) Install the shock absorber clevis brackets on the rear knuckles (Fig. 31). Tighten the shock absorber mounting bolts to a torque of 95 N·m (70 ft. lbs.).

(12) Install wheel and tire assembly on vehicle. Progressively tighten the wheel mounting nuts in crisscross sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(13) Lower vehicle.

(14) Check and reset if required, rear wheel Camber and Toe to preferred specifications (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).

WHEEL ALIGNMENT

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WHEEL ALIGNMENT

DESCRIPTION - WHEEL ALIGNMENT

Vehicle wheel alignment is the positioning of all interrelated front and rear suspension angles. These angles affect the handling and steering of the vehicle when it is in motion. Proper wheel alignment is essential for efficient steering, good directional stability, and proper tire wear.

The method of checking a vehicle's front and rear wheel alignment varies depending on the manufacturer and type of equipment used. The manufacturer's instructions should always be followed to ensure accuracy of the alignment, except when DaimlerChrysler Corporation's wheel alignment specifications differ.

On this vehicle, the suspension angles that can be adjusted are as follows:

Front
- Camber (using special procedure)
- Toe

Rear
- Camber
- Toe

Check the wheel alignment and make all wheel alignment adjustments with the vehicle standing at its proper curb height specification. Curb height is the normal riding height of the vehicle. It is measured from a certain point on the vehicle to the ground or a designated area while the vehicle is sitting on a flat, level surface. Refer to Curb Height Measurement in this section for additional information.

Typical wheel alignment angles and measurements are described in the following paragraphs.

CAMBER

Camber is the inward or outward tilt of the top of the tire and wheel assembly (Fig. 1). Camber is measured in degrees of angle relative to a true vertical line. Camber is a tire wearing angle.

- Excessive negative camber will cause tread wear at the inside of the tire.
- Excessive positive camber will cause tread wear on the outside of the tire.

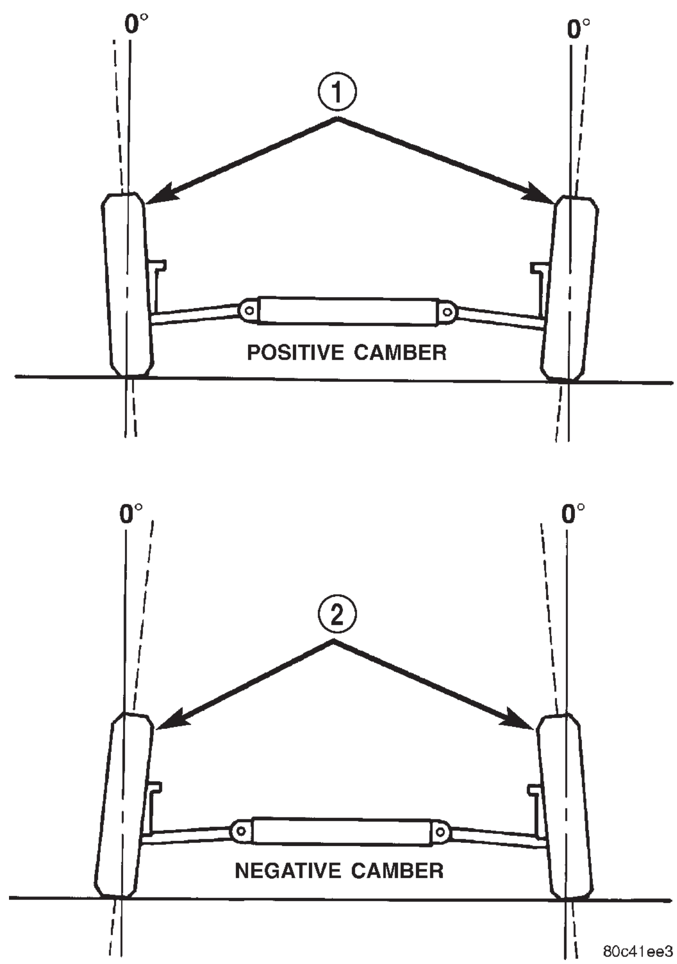


Fig. 1 Camber

1 - WHEELS TILTED OUT AT TOP
2 - WHEELS TILTED IN AT TOP

WHEEL ALIGNMENT (Continued)

CROSS CAMBER

Cross camber is the difference between left and right camber. To achieve the cross camber reading, subtract the right side camber reading from the left. For example, if the left camber is +0.3° and the right camber is 0.0°, the cross camber would be +0.3°.

CASTER

Caster is the forward or rearward tilt of the steering knuckle in reference to the position of the upper and lower ball joints. Caster is measured in degrees of angle relative to a true vertical center line. This line is viewed from the side of the tire and wheel assembly (Fig. 2).

- Forward tilt (upper ball joint ahead of lower) results in a negative caster angle.
- Rearward tilt (upper ball joint trailing lower) results in a positive caster angle.

Although caster does not affect tire wear, a caster imbalance between the two front wheels may cause the vehicle to lead to the side with the least positive caster.

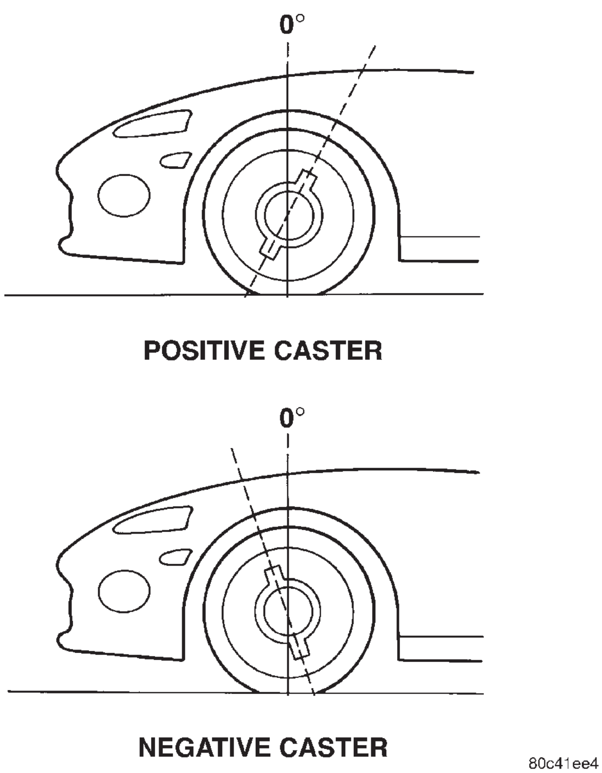


Fig. 2 Caster

CROSS CASTER

Cross caster is the difference between left and right caster.

TOE

Toe is the inward or outward angle of the wheels as viewed from above the vehicle (Fig. 3).

- Toe-in is produced when the front edges of the wheels on the same axle are closer together than the rear edges.
- Toe-out is produced when the front edges of the wheels on the same axle are farther apart than the rear edges.

Toe-in and toe-out can occur at the front wheels and the rear wheels.

Toe is measured in degrees or inches. The measurement identifies the amount that the front of the wheels point inward (toe-in) or outward (toe-out). Toe is measured at the spindle height. Zero toe means the front and rear edges of the wheels on the same axle are equally distant.

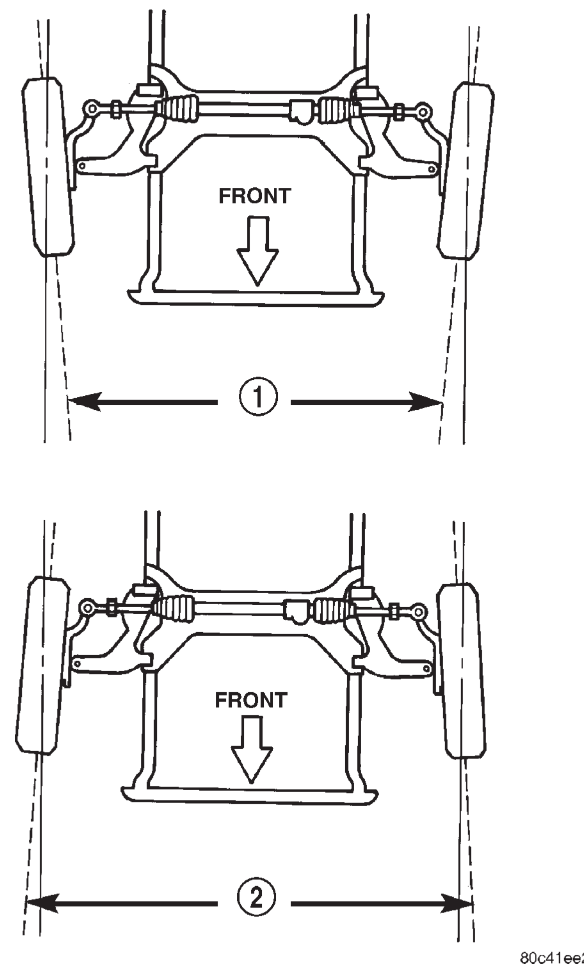


Fig. 3 Toe

1 - TOE-IN
2 - TOE-OUT

WHEEL ALIGNMENT (Continued)

TOE-OUT ON TURNS

Toe-out on turns is the relative positioning of the front wheels while steering through a turn (Fig. 4). This compensates for each front wheel's turning radius. As the vehicle encounters a turn, the outboard wheel must travel in a larger radius circle than the inboard wheel. The steering system is designed to make each wheel follow its particular radius circle. To accomplish this, the front wheels must progressively toe outward as the steering is turned from center. This eliminates tire scrubbing and undue tire wear when steering a vehicle through a turn.

Although toe-out on turns is an important angle, it is generally not necessary to check or adjust when performing a wheel alignment.

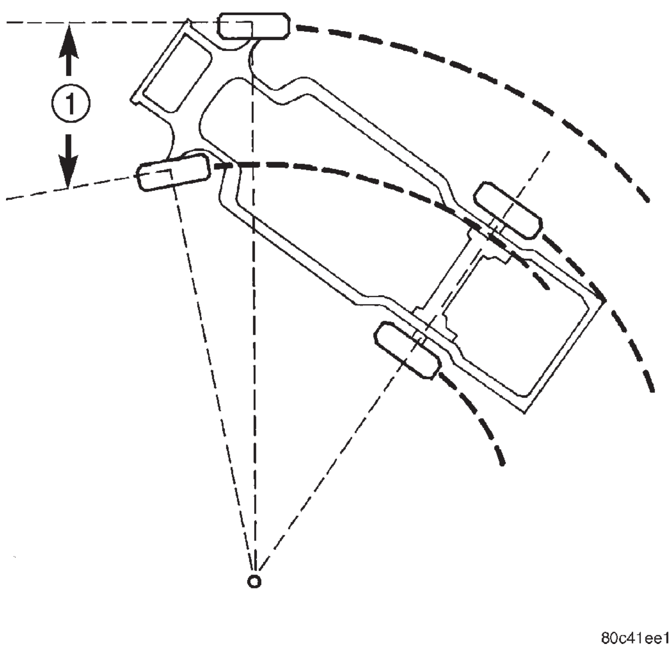


Fig. 4 Toe-Out On Turns

1 - TOE-OUT ON TURNS

DYNAMIC TOE PATTERN

Dynamic toe pattern is the inward and outward toe movement of the front and rear tires through the suspension's jounce and rebound travel. As the vehicle's suspension moves up and down, the toe pattern varies. Toe pattern is critical in controlling the directional stability of the vehicle while in motion. Front and rear dynamic toe pattern is preset by the factory at the time the vehicle is assembled.

It is not necessary to check or adjust front or rear dynamic toe pattern when doing a normal wheel alignment. The only time dynamic toe pattern needs to be checked or adjusted is if the frame of the vehicle has been damaged.

STEERING AXIS INCLINATION (S. A. I.)

Steering axis inclination is the angle between a true vertical line starting at the center of the tire at the road contact point and a line drawn through the center of the upper ball joint (or strut) and the lower ball joint (Fig. 5). S.A.I. is built into the vehicle and is not an adjustable angle. If S.A.I. is not within specifications, a bent or damaged suspension component may be the cause.

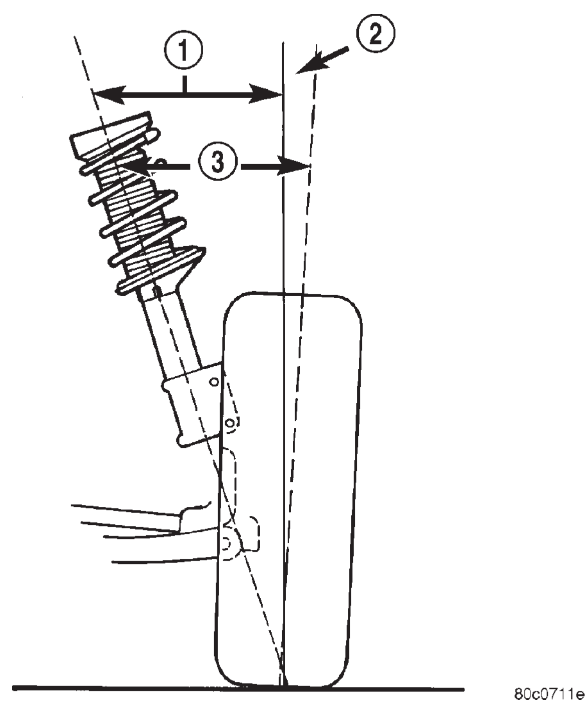


Fig. 5 S.A.I. and I.A.

1 - S.A.I.
2 - CAMBER
3 - I.A.

WHEEL ALIGNMENT (Continued)

INCLUDED ANGLE (I. A.)

Included angle is the sum of the S.A.I. angle plus or minus the camber angle, depending on whether or not the wheel has positive or negative camber (Fig. 5). If camber is positive, add the camber angle to the S.A.I. angle. If camber is negative, subtract the camber angle from the S.A.I. angle. Included angle is not adjustable, but can be used to diagnose a frame misalignment or bent suspension component (spindle, strut).

THRUST ANGLE

Thrust angle is the averaged direction the rear wheels are pointing in relation to the vehicle's center line (Fig. 6). The presence of negative or positive thrust angle causes the rear tires to track improperly to the left or right of the front tires (dog tracking).

- Negative thrust angle means the rear tires are tracking to the left of the front tires.
- Positive thrust angle means the rear tires are tracking to the right of the front tires.

Improper tracking can cause undue tire wear, a lead or pull and a crooked steering wheel. Excessive thrust angle can usually be corrected by adjusting the rear wheel toe so that each wheel has one-half of the total toe measurement.

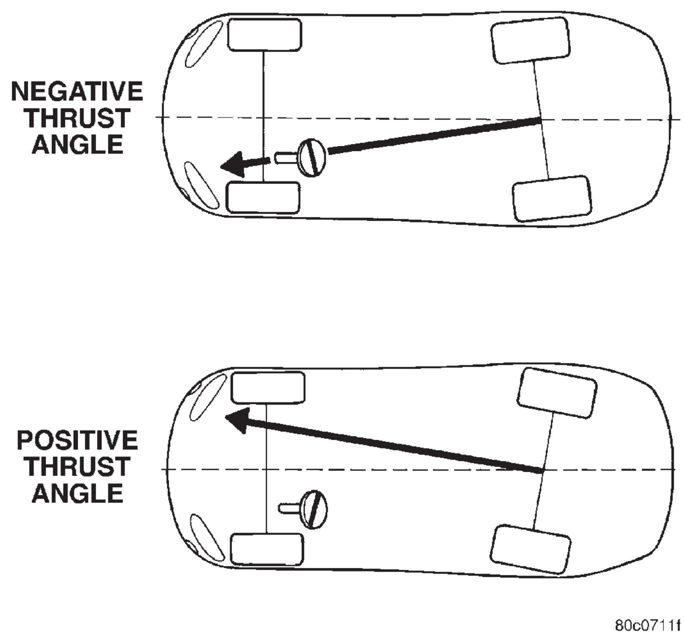


Fig. 6 Thrust Angle

DIAGNOSIS AND TESTING - SUSPENSION AND STEERING

CONDITION	POSSIBLE CAUSES	POTENTIAL CORRECTIONS
Front End Whine On Turns	1. Defective Wheel Bearing	1. Replace Wheel Bearing
	2. Incorrect Wheel Alignment	2. Check And Reset Wheel Alignment
	3. Worn Tires	3. Replace Tires
Front End Growl Or Grinding On Turns	1. Defective Wheel Bearing	1. Replace Wheel Bearing
	2. Engine Mount Grounding Against Frame Or Body Of Vehicle.	2. Check For Motor Mount Hitting Frame Rail And Reposition Engine As Required
	3. Worn Or Broken C/V Joint	3. Replace C/V Joint
	4. Loose Wheel Lug Nuts	4. Verify Wheel Lug Nut Torque
	5. Incorrect Wheel Alignment	5. Check And Reset Wheel Alignment
	6. Worn Tires	6. Replace Tires
Front End Clunk Or Snap On Turns	1. Loose Wheel Lug Nuts	1. Verify Wheel Lug Nut Torque
	2. Worn Or Broken C/V Joint	2. Replace C/V Joint
	3. Worn Or Loose Tie Rod Or Ball Joint	3. Tighten Or Replace Tie Rod End Or Ball Joint
	4. Worn Control Arm Bushing	4. Replace Control Arm Bushing
	5. Loose Sway Bar Or Upper Strut Attachment	5. Tighten Sway Bar Or Upper Strut Attachment To Specified Torque

WHEEL ALIGNMENT (Continued)

CONDITION	POSSIBLE CAUSES	POTENTIAL CORRECTIONS
Front End Whine With Vehicle Going Straight At A Constant Speed	1. Defective Wheel Bearing	1. Replace Wheel Bearing
	2. Incorrect Wheel Alignment	2. Check And Reset Wheel Alignment
	3. Worn Tires	3. Replace Tires
Front End Growl Or Grinding With Vehicle Going Straight At A Constant Speed	1. Engine Mount Grounding	1. Reposition Engine As Required
	2. Worn Or Broken C/V Joint	2. Replace C/V Joint
Front End Whine When Accelerating Or Decelerating	1. Worn Or Defective Transaxle Gears Or Bearings	1. Replace Transaxle Gears Or Bearings
Front End Clunk When Accelerating Or Decelerating	1. Worn Or Broken Engine Mount	1. Replace Engine Mount
	2. Worn Or Defective Transaxle Gears Or Bearings	2. Replace Transaxle Gears Or Bearings
	3. Loose Wheel Lug Nuts	3. Verify Wheel Lug Nut Torque
	4. Worn Or Broken C/V Joint	4. Replace C/V Joint
	5. Worn Or Loose Ball Joint	5. Tighten Or Replace Ball Joint
	6. Worn Or Loose Control Arm Bushing	6. Tighten To Specified Torque Or Replace Control Arm Bushing
	7. Loose Crossmember Bolts	7. Tighten Crossmember Bolts To Specified Torque
Road Wander	1. Incorrect Tire Pressure	1. Inflate Tires To Recommended Pressure
	2. Incorrect Front Or Rear Wheel Toe	2. Check And Reset Front Wheel Toe
	3. Worn Wheel Bearings	3. Replace Wheel Bearing
	4. Worn Control Arm Bushings	4. Replace Control Arm Bushing
	5. Excessive Friction In Steering Gear	5. Replace Steering Gear
	6. Excessive Friction In Steering Shaft Coupling	6. Replace Steering Coupler
	7. Excessive Friction In Strut Upper Bearing	7. Replace Strut Bearing
Lateral Pull	1. Unequal Tire Pressure	1. Inflate All Tires To Recommended Pressure
	2. Radial Tire Lead	2. Perform Lead Correction Procedure
	3. Incorrect Front Wheel Camber	3. Check And Reset Front Wheel Camber
	4. Power Steering Gear Imbalance	4. Replace Power Steering Gear
	5. Wheel Braking	5. Correct Braking Condition Causing Lateral Pull

WHEEL ALIGNMENT (Continued)

CONDITION	POSSIBLE CAUSES	POTENTIAL CORRECTIONS
Excessive Steering Free Play	1. Incorrect Steering Gear Adjustment	1. Adjust Or Replace Steering Gear
	2. Worn Or Loose Tie Rod Ends	2. Replace Or Tighten Tie Rod Ends
	3. Loose Steering Gear Mounting Bolts	3. Tighten Steering Gear Bolts To The Specified Torque
	4. Loose Or Worn Steering Shaft Coupler	4. Replace Steering Shaft Coupler
Excessive Steering Effort	1. Low Tire Pressure	1. Inflate All Tires To Recommended Pressure
	2. Lack Of Lubricant In Steering Gear	2. Replace Steering Gear
	3. Low Power Steering Fluid Level	3. Fill Power Steering Fluid Reservoir To Correct Level
	4. Loose Power Steering Pump Belt	4. Check and replace automatic belt tensioner as necessary. If drive belt is worn or glazed, replace belt.
	5. Lack Of Lubricant In Steering Ball Joints	5. Lubricate Or Replace Steering Ball Joints
	6. Steering Gear Malfunction	6. Replace Steering Gear
	7. Lack Of Lubricant In Steering Coupler	7. Replace Steering Coupler

STANDARD PROCEDURE

STANDARD PROCEDURE - PRE-WHEEL ALIGNMENT INSPECTION

Before any attempt is made to change or correct the wheel alignment, the following inspection and necessary corrections must be made to the vehicle to ensure proper alignment.

(1) Be sure the fuel tank is full of fuel. If the fuel tank is not full, the reduction in weight will affect the curb height of the vehicle and the alignment specifications.

(2) The passenger and luggage compartments of the vehicle should be free of any load that is not factory equipment.

(3) Check the tires on the vehicle. The tires are to be inflated to the recommended air pressure. All tires must be the same size and in good condition with approximately the same tread wear.

(4) Check the front tire and wheel assemblies for excessive radial runout.

(5) Inspect all suspension component fasteners for looseness and torque.

(6) Inspect the ball joints and all steering linkage for looseness and any sign of wear or damage.

(7) Inspect the rubber bushings on all the suspension components for signs of wear or deterioration. If any bushings show signs of wear or deterioration, they should be replaced prior to aligning the vehicle.

(8) Check vehicle curb height to verify it is within specifications. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE). If curb height is out of specifications, check for broken or sagged springs.

STANDARD PROCEDURE - CURB HEIGHT MEASUREMENT

The wheel alignment is to be checked and all alignment adjustments made with the vehicle at its required curb height specification.

Vehicle height is to be checked with the vehicle on a flat, level surface, preferably a vehicle alignment rack. The tires are to be inflated to the recommended pressure. All tires are to be the same size as standard equipment. Vehicle height is checked with the fuel tank full of fuel, and no passenger or luggage compartment load.

Vehicle height is not adjustable. If the measurement is not within specifications, inspect the vehicle for bent or weak suspension components. Compare the parts tag on the suspect coil spring(s) to the parts book and the vehicle sales code, checking for a match. Once removed from the vehicle, compare the coil spring height to a correct new or known good coil

WHEEL ALIGNMENT (Continued)

spring. The heights should vary if the suspect spring is weak.

(1) Measure from the inboard edge of the wheel opening fender lip directly above the wheel center (spindle), to the floor or alignment rack surface.

(2) When measuring, maximum left-to-right differential is not to exceed 20 mm (0.79 in.).

(3) Compare the measurements to specifications listed in the following CURB HEIGHT SPECIFICATIONS chart.

CURB HEIGHT SPECIFICATIONS

VEHICLE	FRONT	REAR
ALL	705 mm ± 12 mm 27.75 in. ± 0.47 in.	710 mm ± 12 mm 28.0 in. ± 0.47 in.

STANDARD PROCEDURE - WHEEL ALIGNMENT

(1) Position the vehicle on an alignment rack.

(2) Perform the PRE-WHEEL ALIGNMENT INSPECTION. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).

(3) Install all required alignment equipment on the vehicle per the alignment equipment manufacturer's instructions. On this vehicle, a four-wheel alignment is recommended.

NOTE: Prior to reading the vehicle's alignment readouts, the front and rear of vehicle should be jounced. Induce jounce (rear first, then front) by grasping the center of the bumper and jouncing each end of vehicle an equal number of times. The bumper should always be released when vehicle is at the bottom of the jounce cycle.

(4) Read the vehicle's current front and rear alignment settings. Compare the vehicle's current alignment settings to the vehicle specifications for camber, caster and toe-in. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - SPECIFICATIONS).

NOTE: Set the rear wheel alignment first before proceeding to the front to set the front wheel alignment.

(5) If rear camber or toe is not within specifications, proceed to REAR CAMBER AND TOE below. If rear camber and toe are within specifications, but front camber and caster are not, proceed to FRONT CAMBER AND CASTER which can be found following REAR CAMBER AND TOE. If rear camber and toe, and front camber and caster are within specifications, proceed to FRONT TOE.

Rear Caster on this vehicle is not adjustable and is not shown as an alignment specification.

CAUTION: Do not attempt to adjust the vehicle's wheel alignment by heating, bending or modifying any component of the suspension.

REAR CAMBER AND TOE

Rear Camber on this vehicle is adjustable. The rear camber on this vehicle is adjusted using the adjusting screw located in the forward and rear lateral links of the vehicles rear suspension (Fig. 7).

CAUTION: When checking the rear alignment on this vehicle, the alignment rack must be equipped with rear skid plates.

(1) For either rear wheel needing alignment, loosen the adjusting screw jam nuts (Fig. 7) on both the front and the rear lateral links.

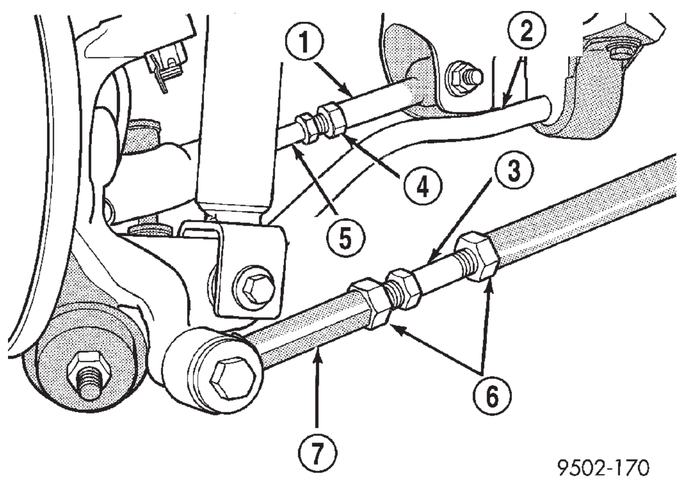


Fig. 7 Lateral Link Adjusting Screw Jam Nuts

1 - FORWARD LATERAL ARM
2 - STABILIZER BAR
3 - ADJUSTING SCREW
4 - JAM NUT
5 - ADJUSTING SCREW
6 - JAM NUTS
7 - REAR LATERAL LINK

CAUTION: Do not attempt to move the adjusting screws without properly loosening the jam nuts. Note that each adjusting screw has one right-handed nut and one left-handed nut.

WHEEL ALIGNMENT (Continued)

CAUTION: When setting rear camber and toe on the vehicle, the maximum lengths of the adjustable lateral link at the locations shown (Fig. 8) must not be exceeded. If these maximum lengths are exceeded, inadequate retention of adjustment link to the inner and outer link may result.

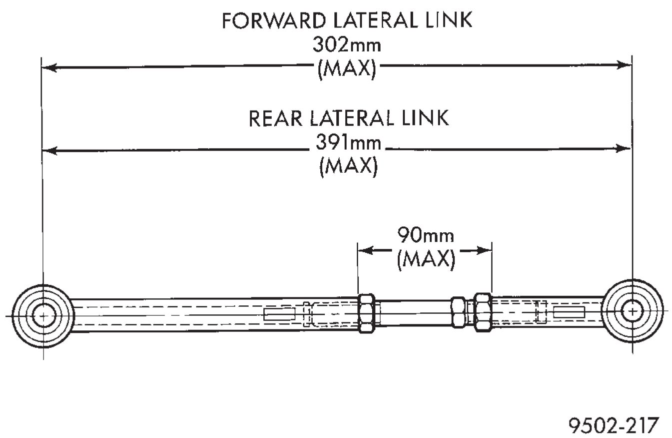


Fig. 8 Rear Lateral Link Maximum Length Dimensions

(2) Rough-in the rear camber setting as close as possible to the preferred specification by mainly adjusting the rear lateral link adjusting screw (Fig. 7). Some adjustment of the forward lateral link adjusting screw will also be required to get the rear camber setting to the preferred specification. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - SPECIFICATIONS).

(3) Adjust the forward lateral link adjusting screw (Fig. 7)to set rear toe to the preferred specification. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - SPECIFICATIONS).

NOTE: Adjusting toe will cause a slight change in the camber setting. If during the setting of toe, camber is no longer at the preferred specification, continue to adjust camber and toe until both are at their preferred specifications.

(4) While holding adjustment screws from turning, use a crow foot and torque wrench, and tighten all lateral link adjusting screw jam nuts to a torque of 92 N·m (68 ft. lbs.). This will securely hold the adjusting screws from turning.

(5) Proceed to FRONT CASTER AND CAMBER, or FRONT TOE if front caster and camber are within specifications.

FRONT CAMBER AND CASTER

Camber and caster settings on this vehicle are determined at the time the vehicle is designed, by the location of the vehicle's suspension components. This is referred to as NET BUILD. The result is no required adjustment of camber and caster after the vehicle is built or when servicing the suspension components. Thus, when performing a wheel alignment, caster and camber are not normally considered adjustable angles. Camber and caster should be checked to ensure they meet vehicle specifications. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - SPECIFICATIONS).

If front camber is found not to meet alignment specifications, it can be adjusted using a procedure listed here. Before performing the camber adjustment procedure, inspect the suspension components for any signs of damage or bending.

CAMBER ADJUSTMENT PROCEDURE

(1) Open the hood and mark the position of all four shock assembly mounting bolts on the shock tower (Fig. 9) on the side of the vehicle requiring front camber adjustment.

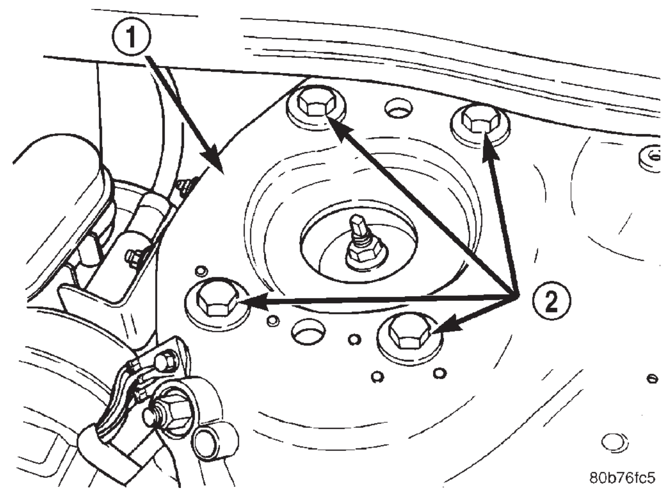


Fig. 9 Shock Assembly Mounting Bolts

1 - SHOCK TOWER
2 - MOUNTING BOLTS

(2) Raise the vehicle by the frame until the tires and front suspension are not supporting the weight of the vehicle.

(3) Loosen the shock assembly mounting bolts on the side marked in step 1. Loosen the bolts enough to allow adequate space for removal of the plastic locating pins that align the upper mounting bracket with the shock tower.

(4) Remove and discard both plastic locating pins from the shock assembly upper mounting bracket using a punch or pliers.

NOTE: Do not leave the plastic locating pins in the cavity of the shock tower or mount. Objectionable noise may result.

WHEEL ALIGNMENT (Continued)

(5) Position the shock assembly inboard or outboard as required to adjust the camber. Make sure the fore and aft position is in the same as indicated by the marks made prior to adjustment, and also the forward and rearward bolts are moved equal amounts inward or outward.

NOTE: Do not attempt to enlarge any existing holes to increase adjustment range.

(6) Torque the upper shock assembly mounting bolts to 90 N·m (68 ft. lbs.)

(7) Lower the vehicle. Jounce the front and rear of vehicle an equal amount of times.

(8) Check and adjust the front camber as necessary. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - SPECIFICATIONS).

(9) If toe readings obtained are not within the required specification range, adjust toe to meet the preferred specification setting. Toe is adjustable using the following procedure.

FRONT TOE

(1) Center the steering wheel and lock in place using a steering wheel clamp.

CAUTION: Do not twist front inner tie rod to steering gear rubber boots during front wheel Toe adjustment.

(2) Loosen front inner to outer tie rod end jam nuts (Fig. 10). Grasp inner tie rods at serrations and rotate inner tie rods of steering gear to set front toe to the preferred toe specification. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - SPECIFICATIONS).

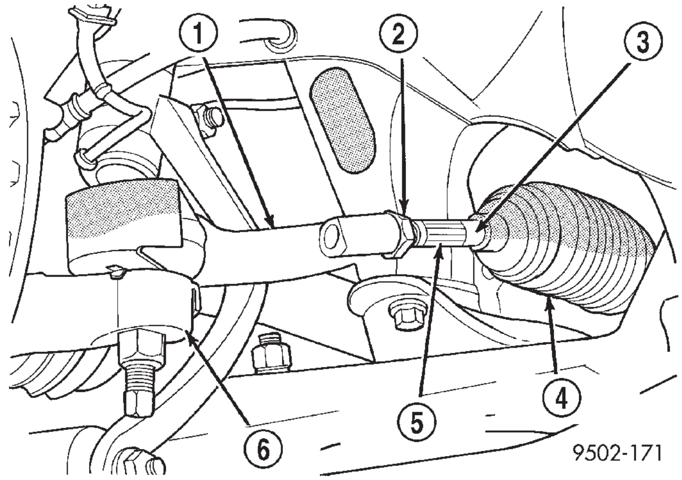


Fig. 10 Front Wheel Toe Adjustment

1 - OUTER TIE ROD
2 - JAM NUT
3 - INNER TIE ROD
4 - STEERING GEAR BOOTS
5 - ADJUSTMENT SERRATIONS
6 - STEERING KNUCKLE

(3) Tighten tie rod jam nuts (Fig. 10) to 61 N·m (45 ft. lbs.) torque.

(4) Adjust steering gear to tie rod boots at the inner tie rod.

(5) Remove steering wheel clamp.

(6) Remove the alignment equipment.

(7) Road test the vehicle to verify the steering wheel is straight and the vehicle does not wander or pull.

WHEEL ALIGNMENT (Continued)

SPECIFICATIONS

WHEEL ALIGNMENT

NOTE: All specifications are given in degrees.

NOTE: All wheel alignments are to be set with the vehicle at its proper curb height. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE).

FRONT WHEEL ALIGNMENT	PREFERRED SETTING	ACCEPTABLE RANGE
CAMBER	−0.3°	−0.9° to +0.3°
Cross Camber (Maximum side-to-side difference)	0.0°	0.7°
CASTER	+3.3°	+2.3° to +4.3°
Cross Caster (Maximum side-to-side difference)	0.0°	1.0°
TOE* - RIGHT OR LEFT	+0.12°	+0.02° to +0.22°
TOTAL TOE* **	+0.24°	+0.04° to +0.44°
REAR WHEEL ALIGNMENT	**PREFERRED SETTING**	**ACCEPTABLE RANGE**
CAMBER	−0.5°	−0.9° to −0.1°
TOE* - RIGHT OR LEFT	+0.05°	−0.05° to +0.15°
TOTAL TOE* **	+0.10°	−0.10° to +0.30°
THRUST ANGLE	0.00°	−0.15 to 0.15°
*Positive (+) toe is toe-in, negative (−) toe is toe-out. **Total toe is the arithmetic sum of the left and right wheel toe settings. Total Toe must be equally split between each front wheel to ensure the steering wheel is centered after setting Toe. Left and right toe must be equal to within 0.02 degrees.		

DIFFERENTIAL & DRIVELINE

TABLE OF CONTENTS

HALF SHAFT

DESCRIPTION

This vehicle is equipped with an unequal length halfshaft system (Fig. 1). These halfshafts consist of two constant velocity joints connected by a solid shaft. A solid short interconnecting shaft is used on the left side. A long solid interconnecting shaft is used on the right side.

Some halfshafts use a tuned rubber damper weight. When replacing a halfshaft assembly, be sure the replacement halfshaft has the same damper weight as the original.

Both halfshaft assemblies use the same type of inner and outer joints. The inner joint of both halfshaft assemblies is a tripod joint, and the outer joint of both halfshaft assemblies is a Rzeppa joint. Both tripod joints and Rzeppa joints are true constant velocity (C/V) joint assemblies. The inner tripod joint allows for the changes in halfshaft length through the jounce and rebound travel of the front suspension.

On vehicles equipped with ABS brakes, the outer C/V joint is equipped with a tone wheel used to determine vehicle speed for ABS brake operation.

The inner tripod joint of both halfshafts is splined into the transaxle side gears. The inner tripod joints are retained in the side gears of the transaxle using a snap ring located in the stub shaft of the tripod joint. The outer C/V joint has a stub shaft that is splined into the wheel hub and retained by a steel hub nut.

OPERATION

Halfshaft assemblies are designed to transmit power from the transaxle to the front wheels, while allowing for powertrain and suspension flex.

HALF SHAFT (Continued)

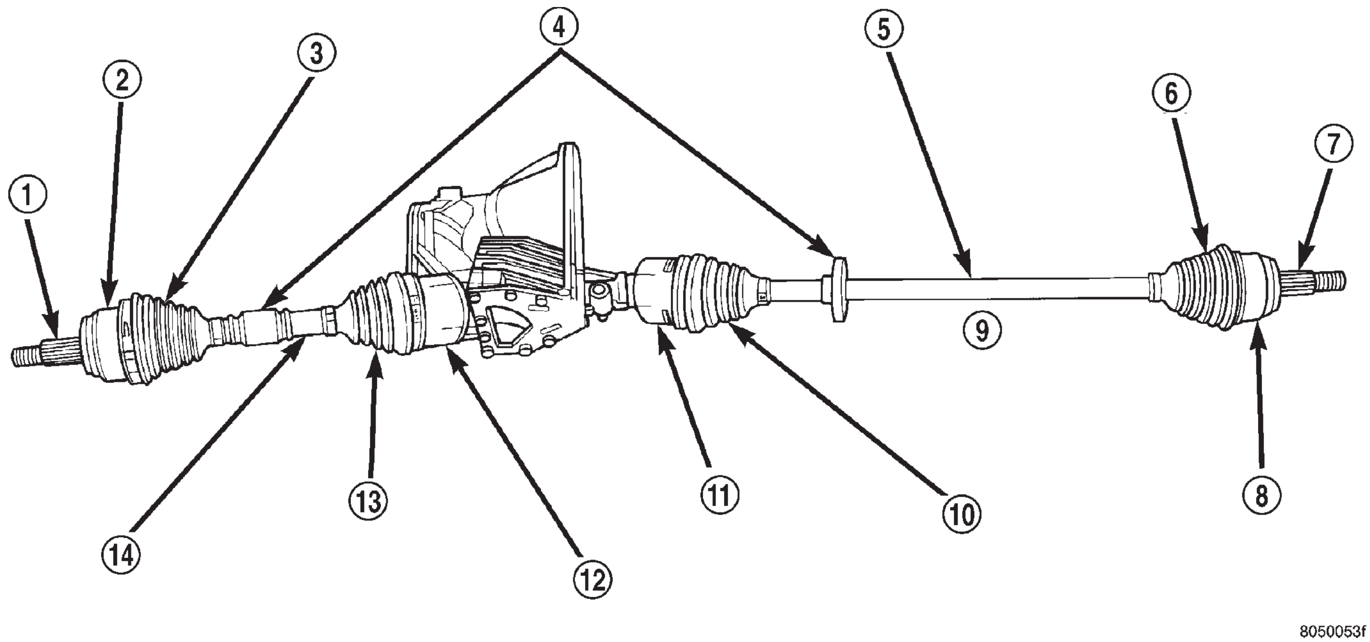


Fig. 1 Unequal Length Halfshaft System

1 - STUB AXLE
2 - OUTER C/V JOINT
3 - OUTER C/V JOINT BOOT
4 - TUNED RUBBER DAMPER WEIGHT
5 - INTERCONNECTING SHAFT
6 - OUTER C/V JOINT BOOT
7 - STUB AXLE
8 - OUTER C/V JOINT
9 - RIGHT HALFSHAFT
10 - INNER TRIPOD JOINT BOOT
11 - INNER TRIPOD JOINT
12 - INNER TRIPOD JOINT
13 - INNER TRIPOD JOINT BOOT
14 - INTERCONNECTING SHAFT-LEFT HALFSHAFT

DIAGNOSIS AND TESTING

HALFSHAFT DIAGNOSIS

VEHICLE INSPECTION

(1) Check for grease in the vicinity of the inboard tripod joint and outboard C/V joint; this is a sign of inner or outer joint seal boot or seal boot clamp damage.

(2) A light film of grease may appear on the right inner tripod joint seal boot; this is considered normal and should not require replacement of the seal boot.

NOISE AND/OR VIBRATION IN TURNS

A clicking noise and/or a vibration in turns could be caused by one of the following conditions:

(1) Damaged outer C/V or inner tripod joint seal boot or seal boot clamps. This will result in the loss and/or contamination of the joint grease, resulting in inadequate lubrication of the joint.

(2) Noise may also be caused by another component of the vehicle coming in contact with the halfshafts.

CLUNKING NOISE DURING ACCELERATION

This noise may be a result of one of the following conditions:

(1) A torn seal boot on the inner or outer joint of the halfshaft assembly.

(2) A loose or missing clamp on the inner or outer joint of the halfshaft assembly.

(3) A damaged or worn halfshaft C/V joint.

SHUDDER OR VIBRATION DURING ACCELERATION

This problem could be a result of:

(1) A worn or damaged halfshaft inner tripod joint.

(2) A sticking tripod joint spider assembly (inner tripod joint only).

(3) Improper wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

VIBRATION AT HIGHWAY SPEEDS

This problem could be a result of:

(1) Foreign material (mud, etc.) packed on the backside of the wheel(s).

(2) Out of balance front tires or wheels. (Refer to 22 - TIRES/WHEELS - STANDARD PROCEDURE)

(3) Improper tire and/or wheel runout. (Refer to 22 - TIRES/WHEELS - STANDARD PROCEDURE)

HALF SHAFT (Continued)

REMOVAL

(1) Raise vehicle on hoist.

(2) Remove front tire and wheel assembly.

(3) Remove caliper adapter-to-knuckle bolts.

(4) Remove caliper/adapter assembly and support with mechanic's wire or equivalent (Fig. 2). **Do not support assembly by the flexible brake hose.**

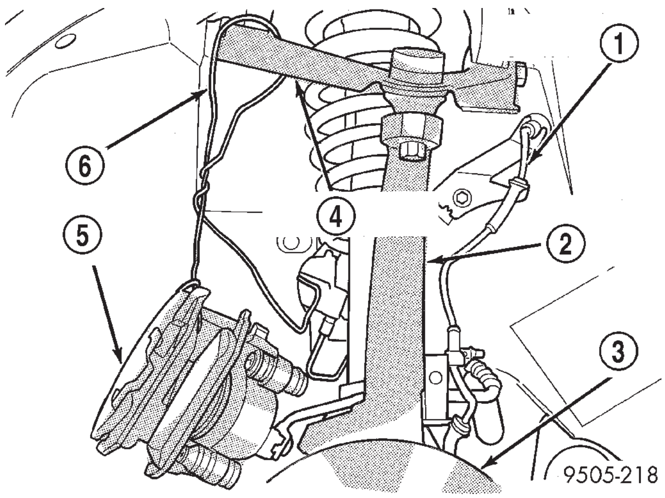


Fig. 2 Properly Supported Brake Caliper—Typical

1 - ABS SPEED SENSOR CABLE
2 - STEERING KNUCKLE
3 - ROTOR
4 - UPPER CONTROL ARM
5 - DISC BRAKE CALIPER ASSEMBLY
6 - WIRE HANGER

(5) Remove the brake rotor (Fig. 3).

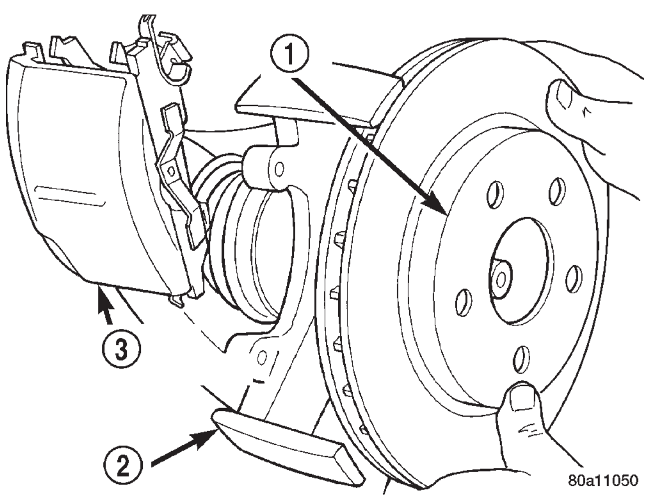


Fig. 3 Brake Rotor Removal—Typical

1 - BRAKING DISC
2 - STEERING KNUCKLE
3 - DISC BRAKE CALIPER ASSEMBLY (STORED)

(6) Remove the tie rod-to-steering knuckle nut (Fig. 4). **Remove nut from tie rod end by holding tie rod end stud with a 11/32 socket and loosen and remove nut (Fig. 4).**

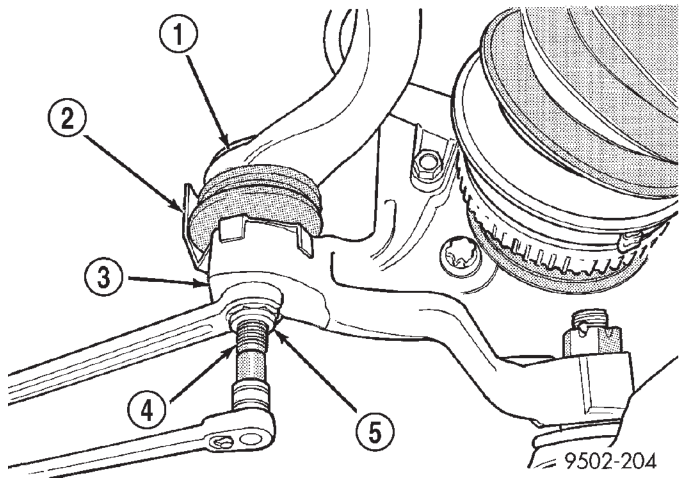


Fig. 4 Removing Tie Rod End-to-Knuckle Nut

1 - TIE ROD END
2 - HEAT SHIELD
3 - STEERING KNUCKLE
4 - TIE ROD END STUD
5 - NUT

(7) Separate tie rod end from steering knuckle arm, using Tool MB-991113 (Fig. 5).

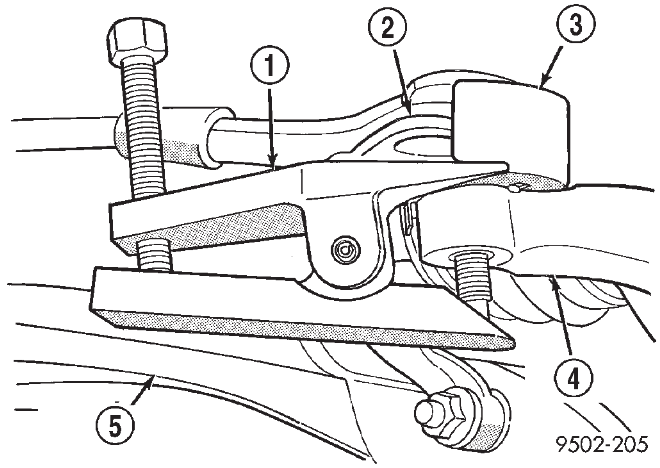


Fig. 5 Tie Rod End Removal from Steering Knuckle

1 - SPECIAL TOOL MB-991113
2 - TIE ROD END
3 - HEAT SHIELD
4 - STEERING KNUCKLE
5 - LOWER CONTROL ARM

HALF SHAFT (Continued)

(8) Remove the halfshaft-to-hub and bearing retaining nut (Fig. 6).

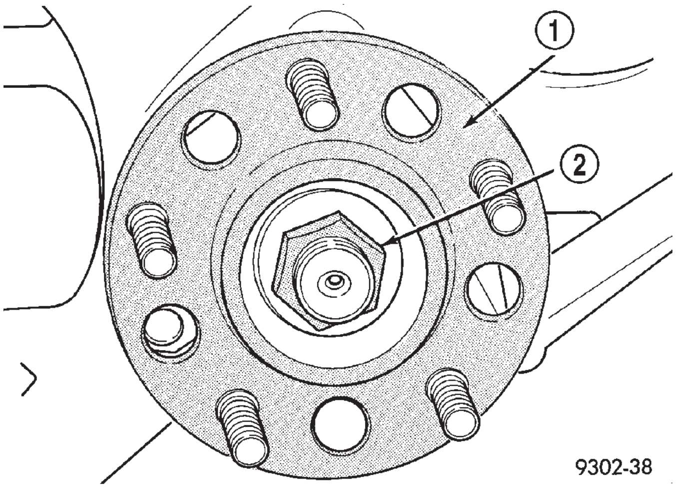


Fig. 6 Halfshaft Retaining Nut—Typical

1 - HUB/BEARING ASSEMBLY
2 - NUT

(9) Remove cotter pin and castle nut (Fig. 7) from stud of lower ball joint at the steering knuckle.

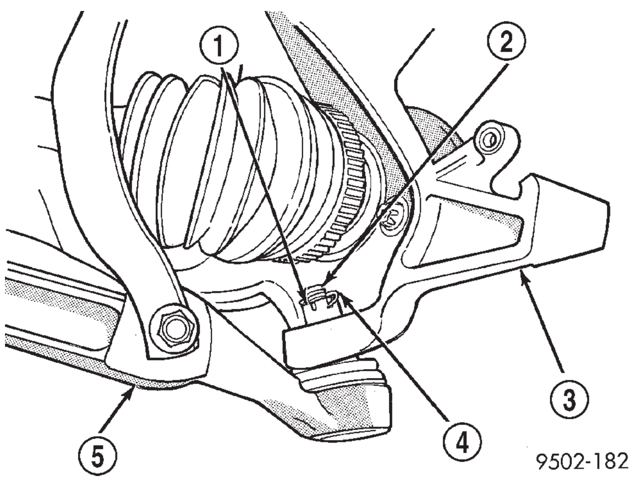


Fig. 7 Lower Ball Joint to Knuckle Attachment

1 - CASTLE NUT
2 - BALL JOINT STUD
3 - STEERING KNUCKLE
4 - COTTER PIN
5 - LOWER CONTROL ARM

CAUTION: No tool is to be inserted between the steering knuckle and the lower ball joint to separate stud of lower ball joint from the steering knuckle. The steering knuckle is to be separated from the stud of the ball joint only using the procedure as described in Step 10.

(10) Turn steering knuckle so the front of the steering knuckle is facing as far outboard in the wheel well as possible. Using a hammer strike steering knuckle boss until steering knuckle separates from stud of lower ball joint (Fig. 8). **When striking steering knuckle, care MUST be taken not to hit lower control arm or ball joint grease seal.**

NOTE: Care must be taken not to separate the inner C/V joint during this operation. Do not allow driveshaft to hang by inner C/V joint. Driveshaft must be supported.

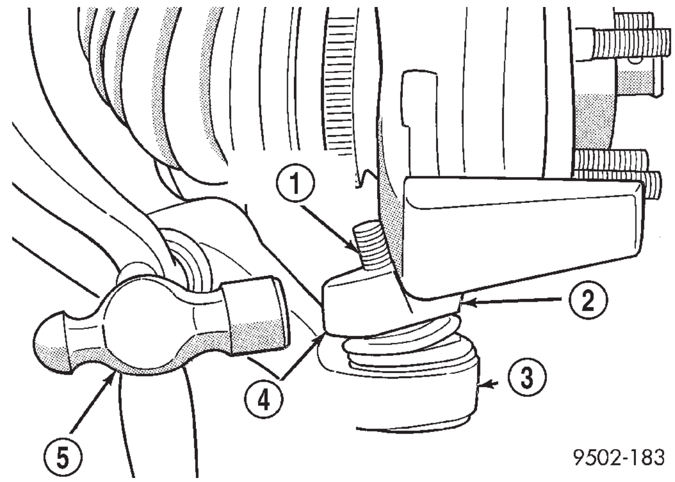


Fig. 8 Separating Ball Joint Stud from Steering Knuckle

1 - BALL JOINT STUD
2 - STEERING KNUCKLE
3 - LOWER CONTROL ARM
4 - STEERING KNUCKLE BOSS
5 - HAMMER

(11) Separate halfshaft from steering knuckle (Fig. 9). **If difficulty is encountered separating halfshaft from knuckle, DO NOT strike halfshaft with a hammer to break free. Install Puller 1026 (Fig. 10) as shown in to press shaft out of hub/bearing assembly.**

CAUTION: When inserting pry bar between inner tripod joint and transaxle case, care must be used to ensure no damage occurs to oil seal in transaxle case.

(12) Support the outer end of the halfshaft assembly. Insert a pry bar between inner tripod joint and transaxle case (Fig. 11). Pry against inner tripod joint, until tripod joint retaining snap ring is disengaged from transaxle side gear.

(13) Hold inner tripod joint and interconnecting shaft of driveshaft assembly. Remove inner tripod joint from transaxle, by pulling it straight out of transaxle side gear and transaxle oil seal (Fig. 12). **When removing tripod joint, do not let spline or**

HALF SHAFT (Continued)

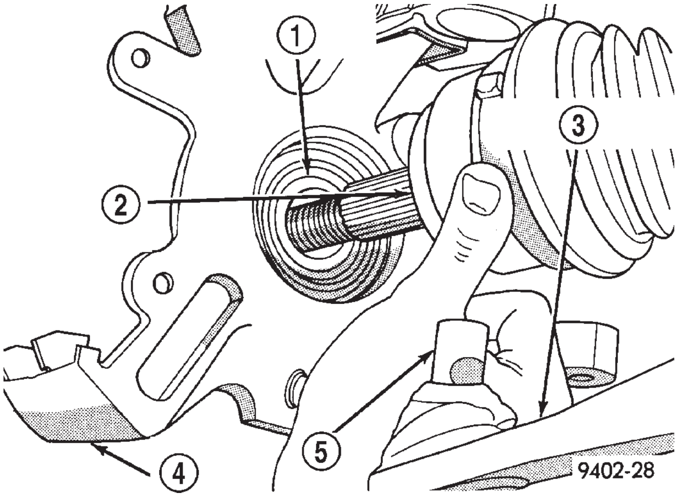


Fig. 9 Separating Halfshaft from Steering Knuckle

1 - HUB/BEARING ASSEMBLY
2 - HALFSHAFT
3 - LOWER CONTROL ARM
4 - STEERING KNUCKLE
5 - BALL JOINT

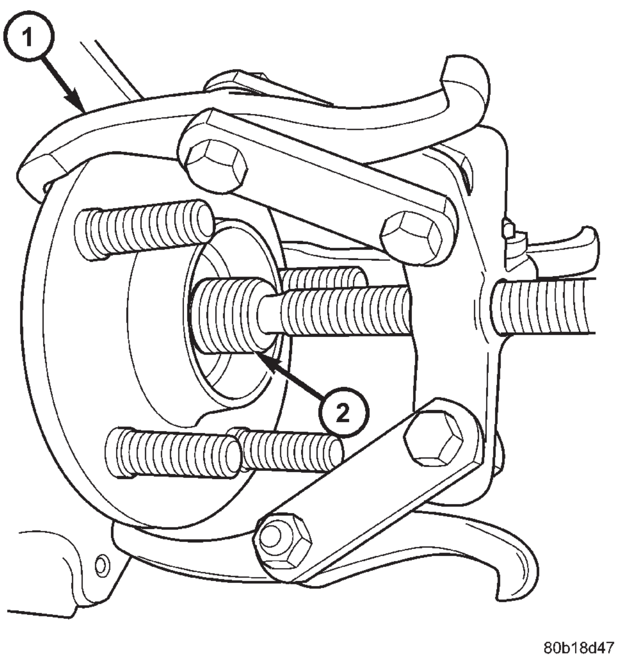


Fig. 10 Separating Halfshaft from Hub/Bearing

1 - PULLER 1026
2 - HALFSHAFT

snap ring drag across sealing lip of the transaxle to tripod joint oil seal.

INSTALLATION

(1) Thoroughly clean spline and oil seal sealing surface, on tripod joint. Lightly lubricate oil seal sealing surface on tripod joint with fresh clean transmission lubricant.

(2) Holding halfshaft assembly by tripod joint and interconnecting shaft, install tripod joint into transaxle side gear as far as possible by hand (Fig. 12).

(3) Grasp inner tripod joint and interconnecting shaft. Forcefully push the tripod joint into side gear of transaxle, until snap ring is engaged with transaxle side gear. **Test that snap ring is fully engaged with side gear by attempting to**

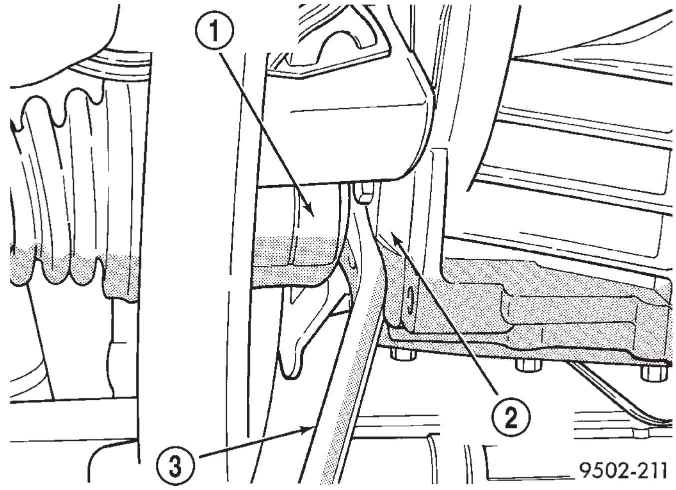


Fig. 11 Disengaging Inner Tripod Joint From Transaxle

1 - INNER TRIPOD JOINT
2 - TRANSAXLE CASE
3 - PRY BAR

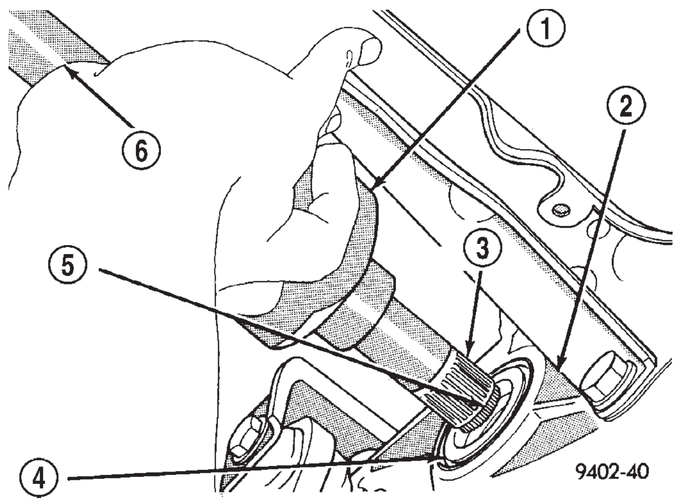


Fig. 12 Tripod Joint Removal from Transaxle

1 - INNER TRIPOD JOINT
2 - TRANSAXLE
3 - SPLINE
4 - OIL SEAL
5 - SNAP RING
6 - INTERCONNECTING SHAFT

HALF SHAFT (Continued)

remove tripod joint from transaxle by hand. If snap ring is fully engaged with side gear, tripod joint will not be removable by hand.

(4) Clean all debris and moisture out of steering knuckle, in the area were outer C/V joint will be installed into steering knuckle.

(5) Ensure that front of outer C/V joint which fits against the face of the hub and bearing is free of debris and moisture before installing outer C/V joint into hub and bearing assembly (Fig. 13).

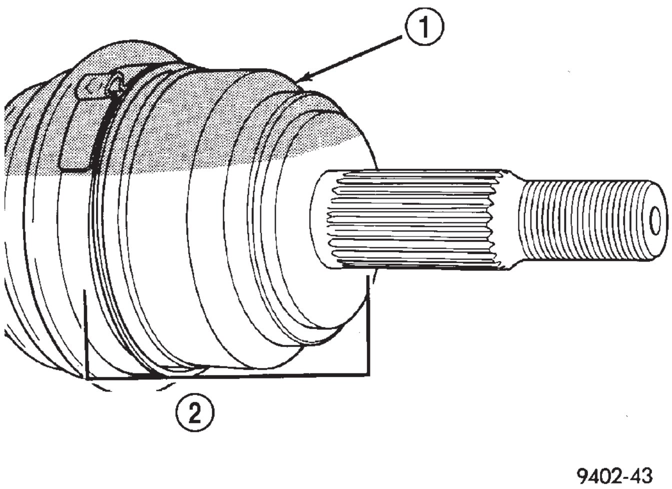


Fig. 13 Outer C/V Joint Inspection

1 - OUTER C/V JOINT
2 - THIS AREA OF OUTER C/V JOINT MUST BE FREE OF ALL DEBRIS AND MOISTURE, BEFORE INSTALLATION INTO STEERING KNUCKLE.

(6) Slide halfshaft back into front hub (Fig. 14). Then install steering knuckle onto the lower control arm ball joint stud.

(7) Install the steering knuckle to ball joint stud castle nut (Fig. 15). Tighten the castle nut to 95 N·m (70 ft. lbs.).

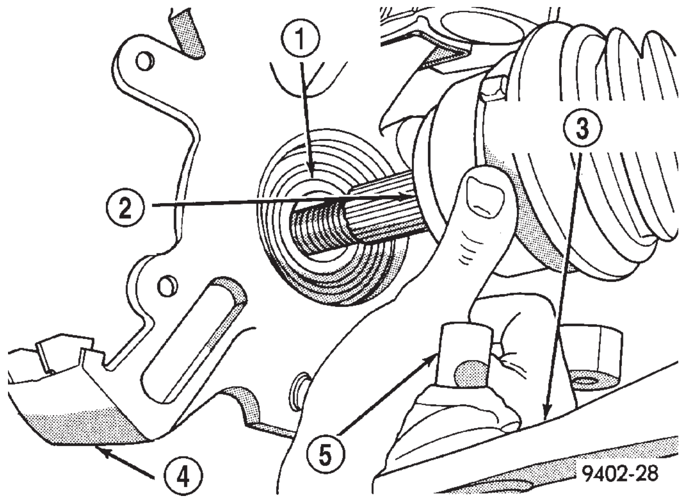


Fig. 14 Steering Knuckle Installation on Outer C/V Joint

1 - HUB/BEARING ASSEMBLY
2 - HALFSHAFT
3 - LOWER CONTROL ARM
4 - STEERING KNUCKLE
5 - BALL JOINT

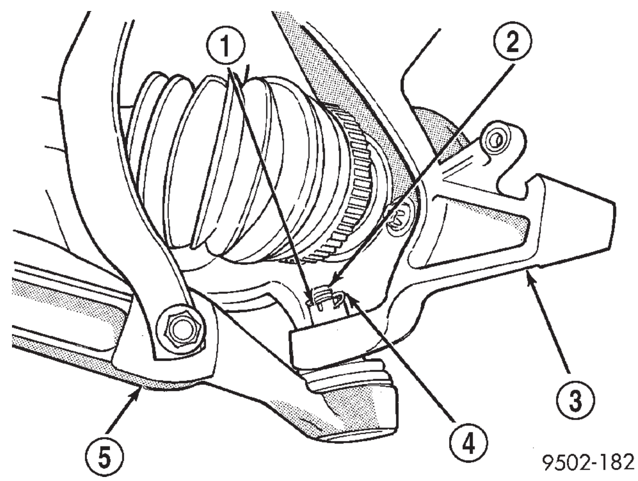


Fig. 15 Lower Ball Joint to Steering Knuckle Attachment

1 - CASTLE NUT
2 - BALL JOINT STUD
3 - STEERING KNUCKLE
4 - COTTER PIN
5 - LOWER CONTROL ARM

HALF SHAFT (Continued)

(8) Install tie rod end into the steering knuckle. Start tie rod end to steering knuckle nut onto stud of tie rod end. While holding stud of tie rod end stationary (Fig. 16), tighten tie rod end to steering knuckle nut. Using a crowfoot and 11/32 socket, tighten the nut to 55 N·m (41 ft. lbs.) (Fig. 17).

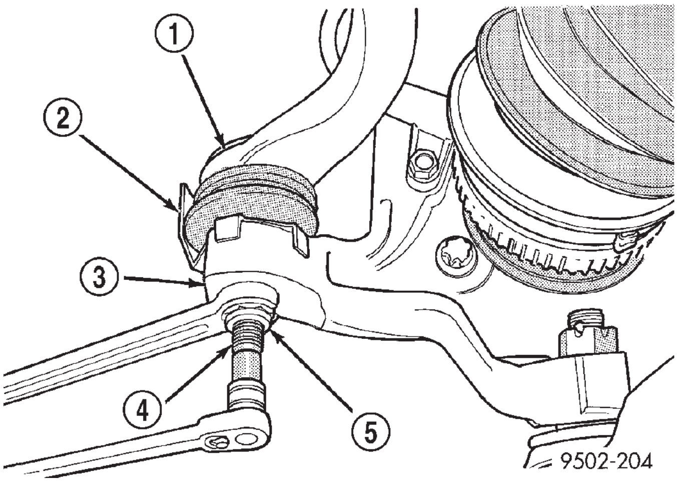


Fig. 16 Installing Tie Rod End Nut

1 - TIE ROD END
2 - HEAT SHIELD
3 - STEERING KNUCKLE
4 - TIE ROD END STUD
5 - NUT

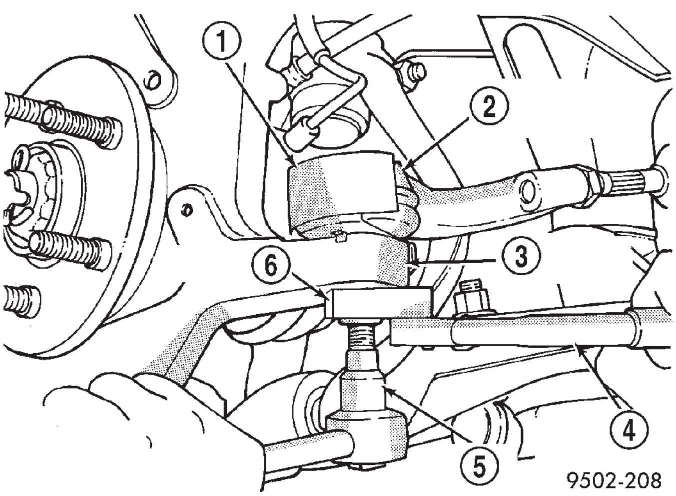


Fig. 17 Torquing Tie Rod End Nut

1 - HEAT SHIELD
2 - TIE ROD END
3 - STEERING KNUCKLE
4 - TORQUE WRENCH
5 - 11/32 SOCKET
6 - CROWFOOT

(9) Install brake rotor to hub (Fig. 18).

(10) Install caliper/adapter bracket assembly on steering knuckle. Install and torque caliper adapter-to-knuckle bolts to 88 N·m (65 ft. lbs.).

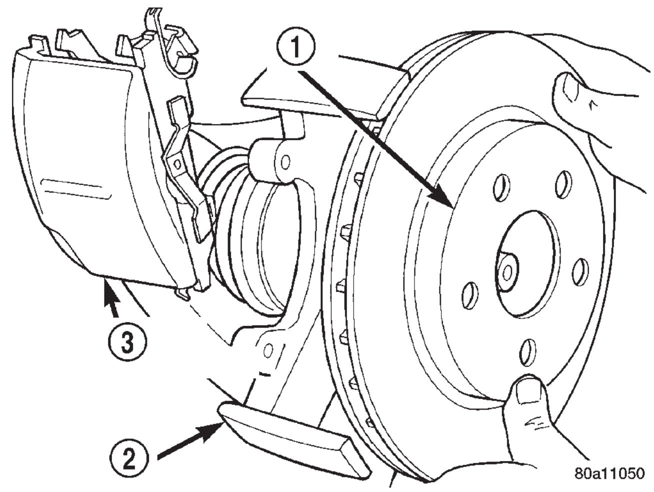


Fig. 18 Installing Disc Brake Caliper and Rotor

1 - BRAKING DISC
2 - STEERING KNUCKLE
3 - DISC BRAKE CALIPER ASSEMBLY (STORED)

(11) Clean all foreign matter from the threads of the outer C/V joint stub axle. Install hub nut onto threads of halfshaft (Fig. 19). With vehicle brakes applied to keep braking disc from turning, tighten hub nut to 150 N·m (110 ft. lbs.) (Fig. 20).

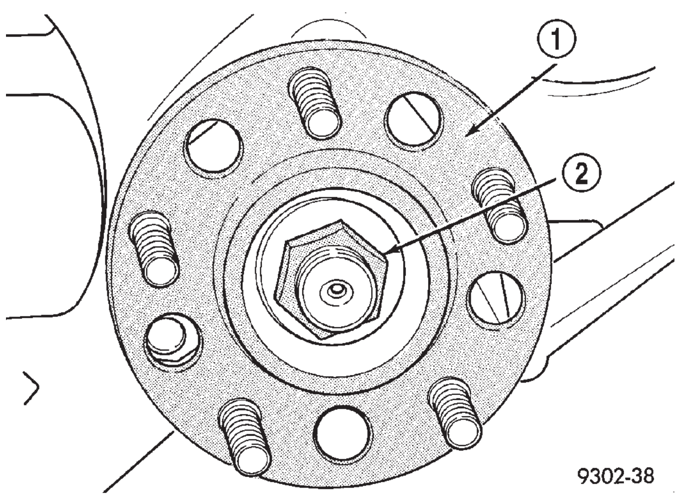


Fig. 19 Halfshaft Retaining Nut—Typical

1 - HUB/BEARING ASSEMBLY
2 - NUT

HALF SHAFT (Continued)

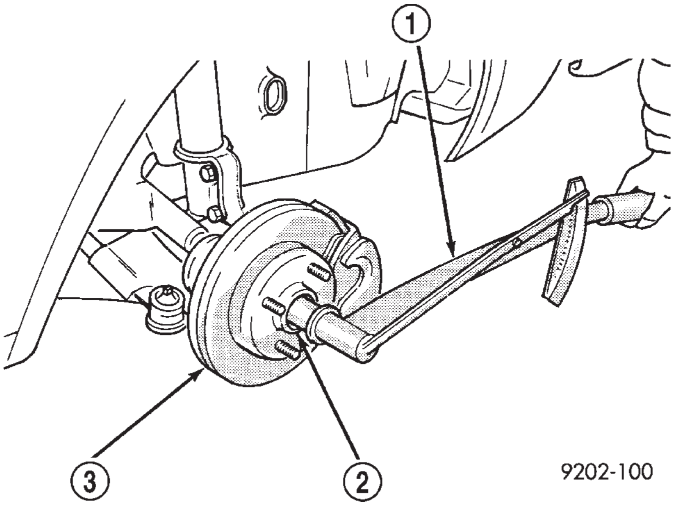


Fig. 20 Torquing Front Hub Nut—Typical

1 - TORQUE WRENCH
2 - HUB
3 - BRAKING DISC

(12) Install front wheel and tire assembly. Install front wheel lug nuts and tighten in the correct sequence (Fig. 21). Tighten lug nuts to 135 N·m (100 ft. lbs.).

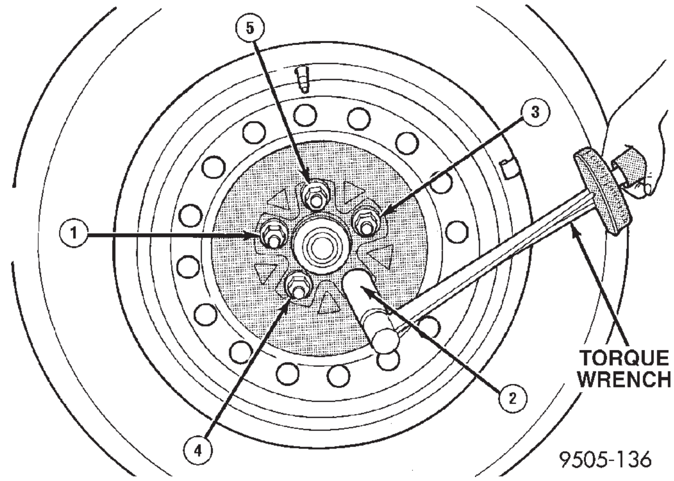


Fig. 21 Wheel Lug Torquing Sequence—Typical

(13) Lower vehicle.

SPECIFICATIONS - HALFSHAFT

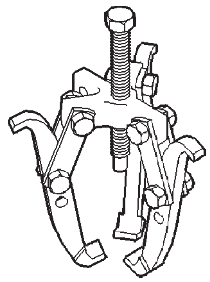
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Nut, Ball Joint-to-Knuckle	95	70	—
Nut, Halfshaft-to-Hub/ Bearing	150	110	—
Nut, Tie Rod-to-Knuckle	55	41	—
Nut, Wheel-to-Hub	135	100	—

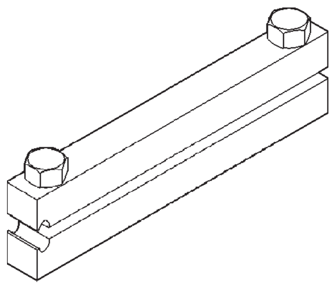
HALF SHAFT (Continued)

SPECIAL TOOLS

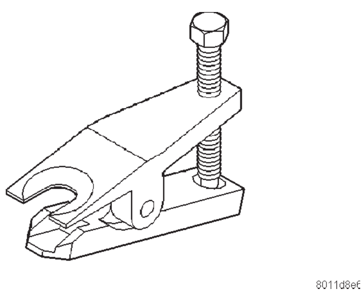
HALFSHAFT



Puller 1026



Boot Clamp Installer C-4975A



Tie Rod Remover MB-991113

CV BOOT - INNER

REMOVAL

(1) Remove large boot clamp which retains inner tripod joint sealing boot to tripod joint housing and discard. Remove small clamp which retains inner tripod joint sealing boot to interconnecting shaft and discard. Remove the sealing boot from the tripod housing and slide it down the interconnecting shaft.

CAUTION: When removing the tripod joint housing from the spider assembly, hold the bearings in place on the spider trunions to prevent the bearings from falling away.

(2) Slide the tripod joint housing off the spider assembly and the interconnecting shaft (Fig. 22).

(3) Remove snap ring which retains spider assembly to interconnecting shaft (Fig. 23). Remove the spider assembly from interconnecting shaft. If spider

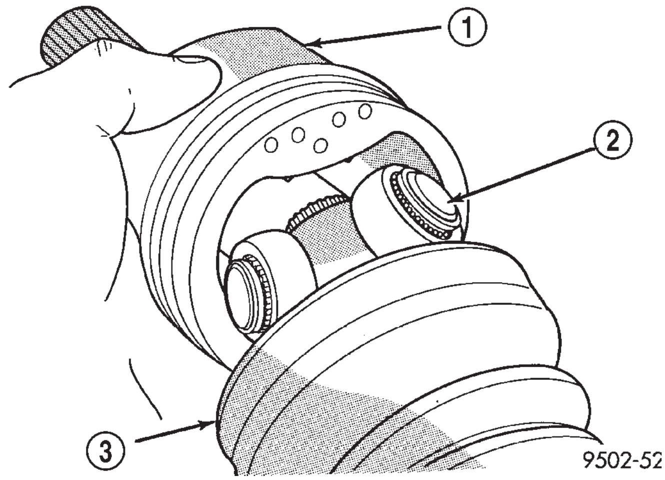


Fig. 22 Spider Assembly Removal from Tripod Joint Housing

1 - TRIPOD JOINT HOUSING
2 - SPIDER ASSEMBLY
3 - SEALING BOOT

assembly will not come off interconnecting shaft by hand, it can be removed by tapping spider assembly with a brass drift (Fig. 24). **Do not hit the outer tripod bearings in an attempt to remove spider assembly from interconnecting shaft.**

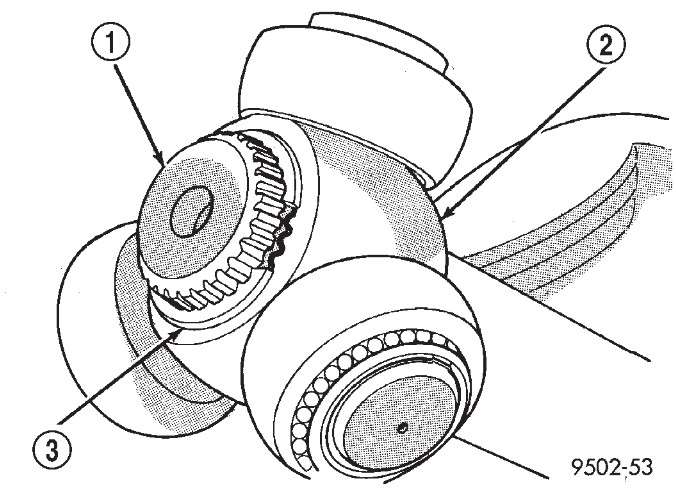


Fig. 23 Spider Assembly Retaining Snap Ring

1 - INTERCONNECTING SHAFT
2 - SPIDER ASSEMBLY
3 - RETAINING SNAP RING

(4) Slide sealing boot off interconnecting shaft.

(5) Thoroughly clean and inspect spider assembly, tripod joint housing, and interconnecting shaft for any signs of excessive wear. **If any parts show signs of excessive wear, the driveshaft assembly will require replacement. Component parts of these driveshaft assemblies are not serviceable.**

CV BOOT - INNER (Continued)

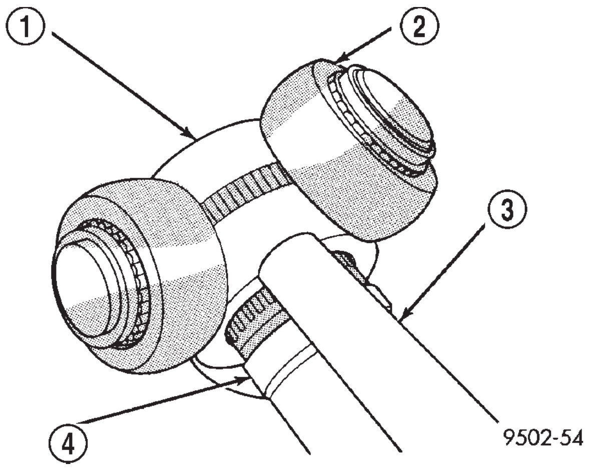


Fig. 24 Spider Assembly Removal from Interconnecting Shaft

1 - SPIDER ASSEMBLY
2 - DO NOT HIT SPIDER ASSEMBLY BEARINGS WHEN REMOVING SPIDER ASSEMBLY
3 - BRASS DRIFT
4 - INTERCONNECTING SHAFT

INSTALLATION

(1) Slide inner tripod joint seal boot retaining clamp, onto interconnecting shaft. Then, slide the replacement inner tripod joint sealing boot onto the interconnecting shaft. **Inner tripod joint seal boot MUST be positioned on interconnecting shaft, so the raised bead on the inside of the seal boot is in groove on interconnecting shaft (Fig. 25).**

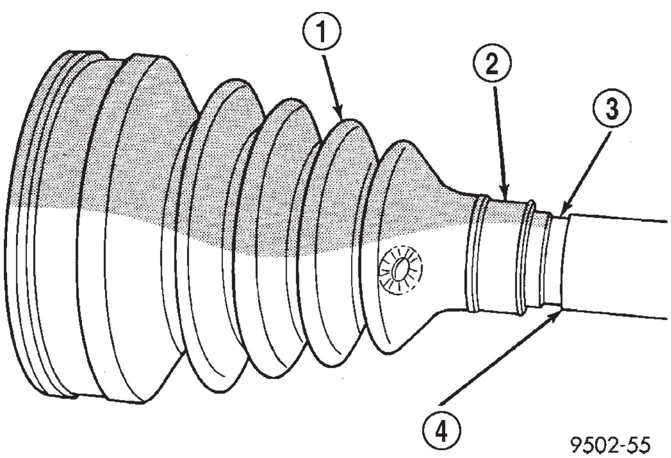


Fig. 25 Sealing Boot Installation on Interconnecting Shaft

1 - SEALING BOOT
2 - RAISED BEAD IN THIS AREA OF SEALING BOOT
3 - GROOVE
4 - INTERCONNECTING SHAFT

(2) Install spider assembly onto interconnecting shaft (Fig. 26). Spider assembly must be installed on interconnecting shaft far enough to fully install spider retaining snap ring. If spider assembly will not fully install on interconnecting shaft by hand, it can be installed by tapping the spider body with a brass drift (Fig. 27). **Do not hit the outer tripod bearings in an attempt to install spider assembly on interconnecting shaft.**

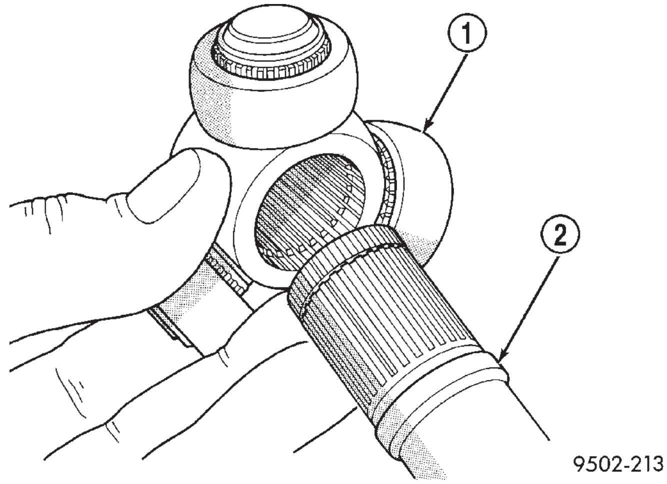


Fig. 26 Spider Assembly Installation on Interconnecting Shaft

1 - SPIDER ASSEMBLY
2 - INTERCONNECTING SHAFT

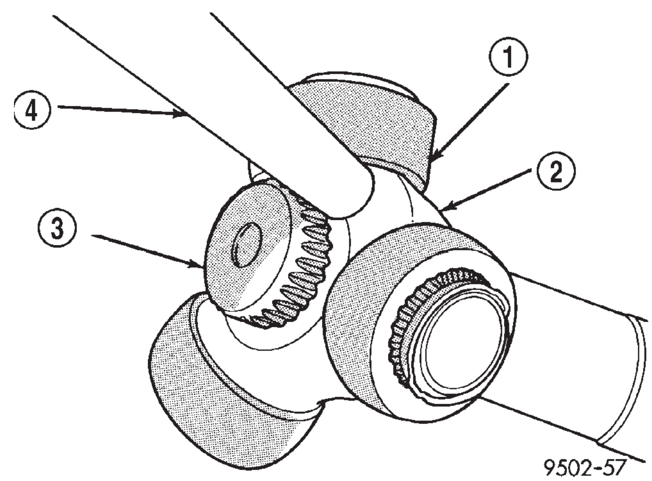


Fig. 27 Installing Spider Assembly on Interconnecting Shaft

1 - DO NOT HIT BEARINGS WHEN INSTALLING THE SPIDER ASSEMBLY
2 - SPIDER ASSEMBLY
3 - INTERCONNECTING SHAFT
4 - BRASS DRIFT

CV BOOT - INNER (Continued)

(3) Install the spider assembly to interconnecting shaft retaining snap ring into groove on end of interconnecting shaft (Fig. 28). Be sure the snap ring is fully seated into groove on interconnecting shaft.

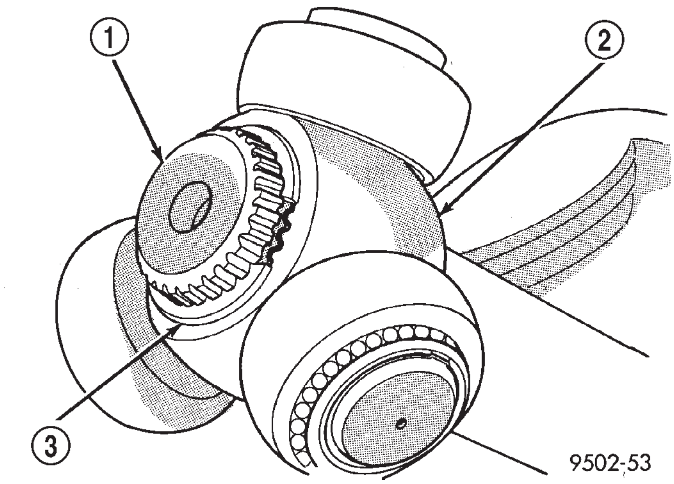


Fig. 28 Spider Assembly Retaining Snap Ring Installed

1 - INTERCONNECTING SHAFT
2 - SPIDER ASSEMBLY
3 - RETAINING SNAP RING

(4) Distribute 1/2 the amount of grease provided in the seal boot service package (DO NOT USE ANY OTHER TYPE OF GREASE) into tripod housing. Put the remaining amount into the sealing boot.

(5) Align tripod housing with spider assembly and then slide tripod housing over spider assembly and interconnecting shaft (Fig. 29).

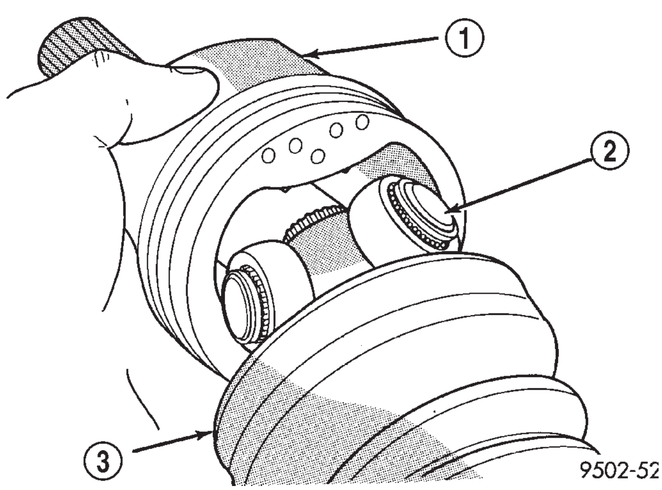


Fig. 29 Installing Tripod Housing on Spider Assembly

1 - TRIPOD JOINT HOUSING
2 - SPIDER ASSEMBLY
3 - SEALING BOOT

(6) Install inner tripod joint seal boot to interconnecting shaft clamp evenly on sealing boot.

(7) Clamp sealing boot onto interconnecting shaft using crimper, Special Tool C-4975-A and the following procedure. Place crimping tool C-4975-A over bridge of clamp (Fig. 30). Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 31).

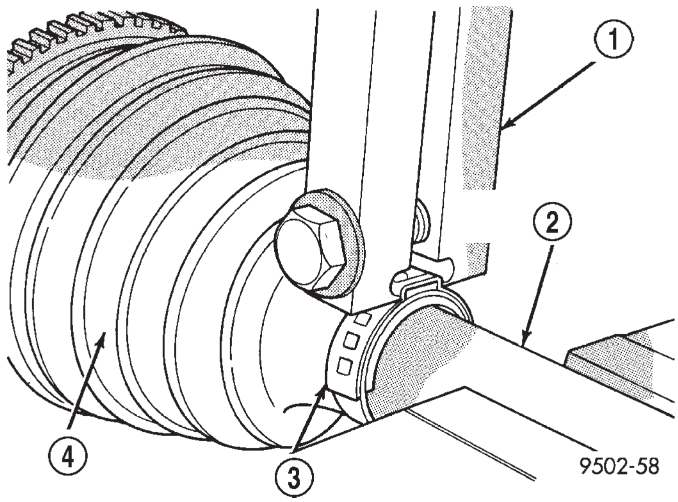


Fig. 30 Crimping Tool Installed on Sealing Boot Clamp

1 - SPECIAL TOOL C-4975A
2 - INTERCONNECTING SHAFT
3 - CLAMP
4 - SEALING BOOT

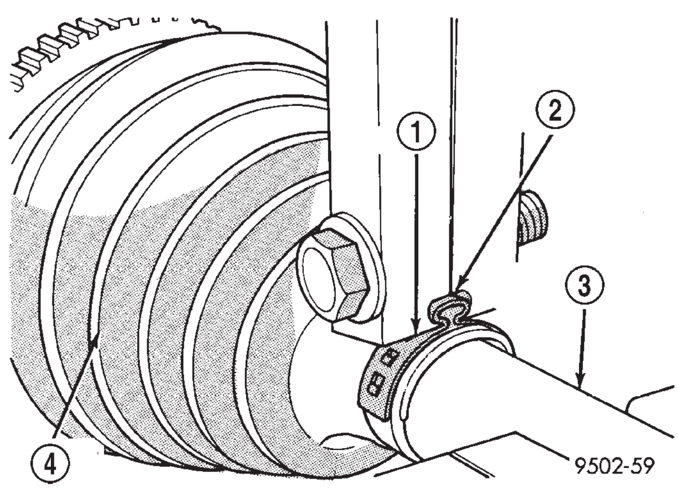


Fig. 31 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - JAWS OF SPECIAL TOOL C-4975A MUST BE CLOSED COMPLETELY TOGETHER HERE
3 - INTERCONNECTING SHAFT
4 - SEALING BOOT

CV BOOT - INNER (Continued)

CAUTION: Seal must not be dimpled, stretched or out of shape in any way. If seal is NOT shaped correctly, equalize pressure in seal and shape it by hand.

(8) Position sealing boot into the tripod housing retaining groove. Install seal boot retaining clamp evenly on sealing boot.

CAUTION: The following positioning procedure determines the correct air pressure inside the inner tripod joint assembly prior to clamping the sealing boot to inner tripod joint housing. If this procedure is not done prior to clamping sealing boot to tripod joint housing sealing boot durability can be adversely affected.

CAUTION: When venting the inner tripod joint assembly, use care so inner tripod sealing boot does not get punctured, or in any other way damaged. If sealing boot is punctured, or damaged in any way while being vented, the sealing boot can not be used.

(9) Insert a trim stick between the tripod joint and the sealing boot to vent inner tripod joint assembly (Fig. 32). **When inserting trim stick between tripod housing and sealing boot ensure trim stick is held flat and firmly against the tripod housing. If this is not done damage to the sealing boot can occur.** If inner tripod joint has a Hytrel (hard plastic) sealing boot, be sure trim stick is inserted between soft rubber insert and tripod housing not the hard plastic sealing boot and soft rubber insert.

(10) With trim stick inserted between sealing boot and tripod joint housing, position the interconnecting shaft so it is at the center of its travel in the tripod joint housing. Remove the trim stick from between the sealing boot and the tripod joint housing. **This procedure will equalize the air pressure in the tripod joint, preventing premature sealing boot failure.**

(11) Position trilobal boot to interface with the tripod housing. The lobes of the boot must be properly aligned with the recess's of the tripod housing.

(12) Clamp tripod joint sealing boot to tripod joint, using required procedure for type of boot clamp application.

CRIMP TYPE BOOT CLAMP

If seal boot uses crimp type boot clamp:

- Clamp sealing boot onto tripod housing using Crimper, Special Tool C-4975-A.
- Place crimping tool C-4975-A over bridge of clamp (Fig. 33).

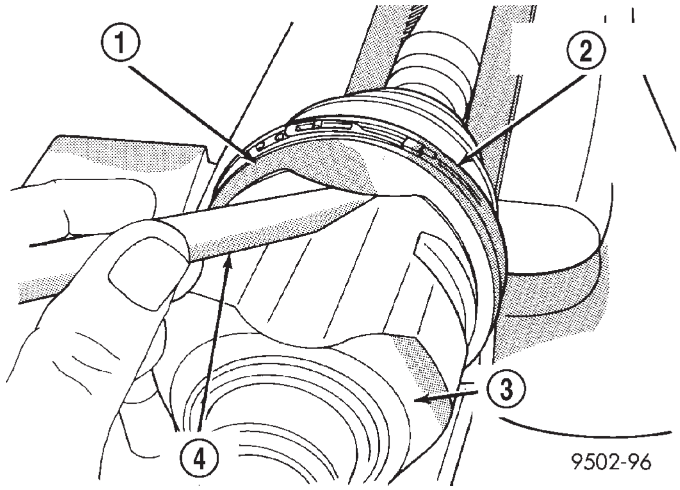


Fig. 32 Trim Stick Inserted for Venting Tripod Joint

1 - INNER TRIPOD JOINT SEALING BOOT
2 - SEALING BOOT CLAMP
3 - INNER TRIPOD JOINT HOUSING
4 - TRIM STICK

- Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 34).

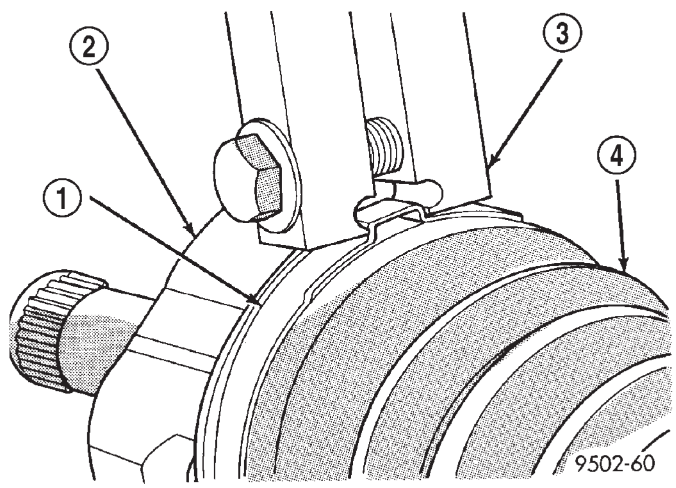


Fig. 33 Crimping Tool Installed on Sealing Boot Clamp

1 - CLAMP
2 - TRIPOD JOINT HOUSING
3 - SPECIAL TOOL C-4975A
4 - SEALING BOOT

LATCHING TYPE BOOT CLAMP

If seal boot uses low profile latching type boot clamp:

- Clamp sealing boot onto tripod housing using clamp locking tool, Snap-On YA3050 or an equivalent.
- Place prongs of clamp locking tool in the holes of the clamp (Fig. 35).

CV BOOT - INNER (Continued)

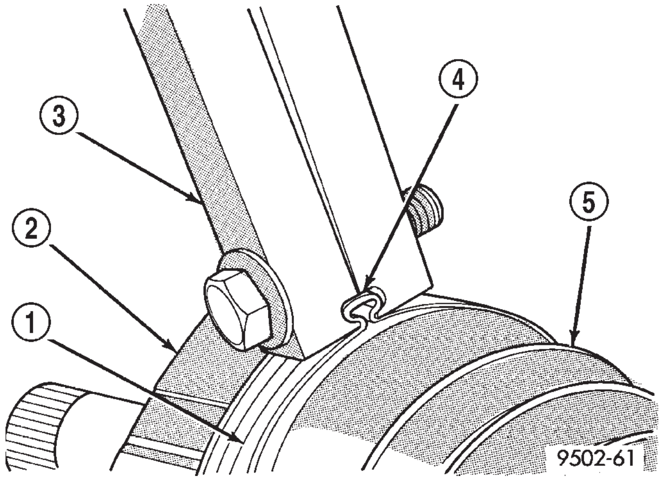


Fig. 34 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - TRIPOD HOUSING
3 - SPECIAL TOOL C-4975A
4 - JAWS OF SPECIAL TOOL C-4975A MUST BE CLOSED COMPLETELY TOGETHER HERE
5 - SEALING BOOT

• Squeeze tool together until top band of clamp is latched behind the two tabs on lower band of clamp (Fig. 36).

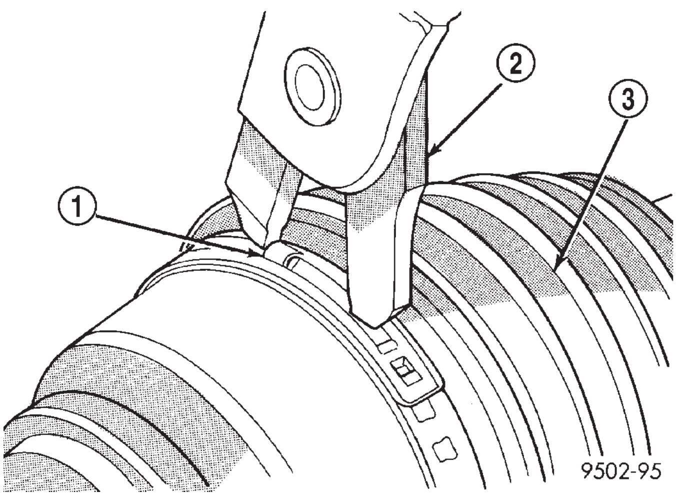


Fig. 35 Clamping Tool Installed on Sealing Boot Clamp

1 - CLAMP
2 - SPECIAL TOOL YA3050
3 - SEALING BOOT

CV BOOT - OUTER

REMOVAL

(1) Remove large boot clamp retaining C/V joint sealing boot to C/V joint housing (Fig. 37) and discard. Remove small clamp that retains outer C/V joint sealing boot to interconnecting shaft and dis-

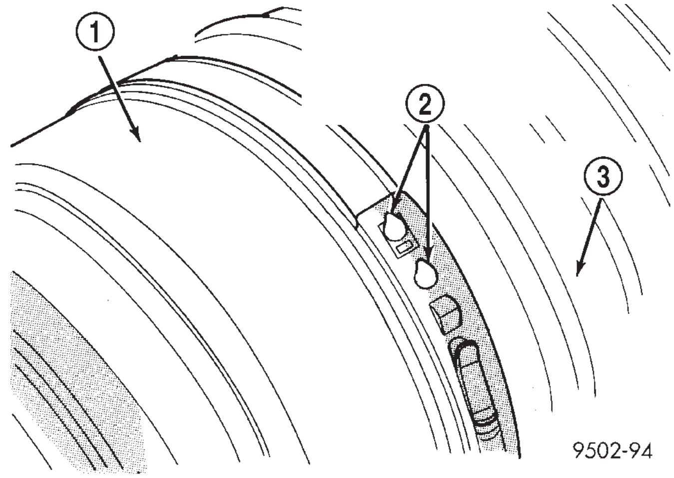


Fig. 36 Sealing Boot Clamp Properly Installed

1 - INNER TRIPOD JOINT HOUSING
2 - TOP BAND OF CLAMP MUST BE RETAINED BY TABS AS SHOWN HERE TO CORRECTLY LATCH BOOT CLAMP
3 - SEALING BOOT

card. Remove sealing boot from outer C/V joint housing and slide it down interconnecting shaft.

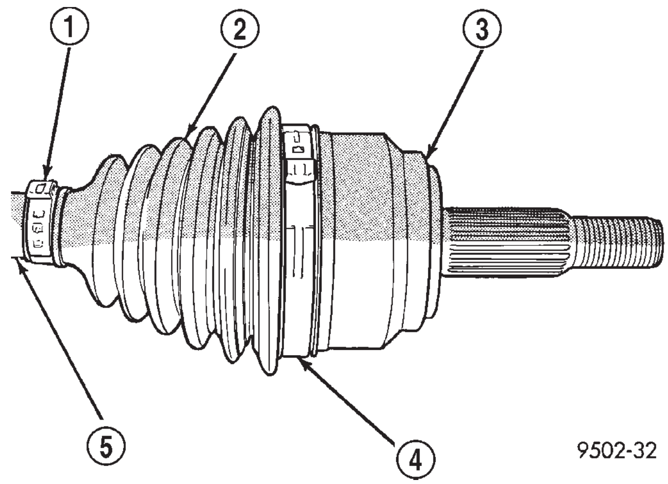


Fig. 37 Outer C/V Joint Seal Boot Clamps

1 - SMALL CLAMP
2 - SEALING BOOT
3 - OUTER C/V JOINT HOUSING
4 - LARGE CLAMP
5 - INTERCONNECTING SHAFT

(2) Wipe away grease to expose outer C/V joint and interconnecting shaft.

(3) Remove outer C/V joint from interconnecting shaft using the following procedure: Support interconnecting shaft in a vise **equipped with protective caps on jaws of vise to prevent damage to interconnecting shaft.** Then, using a **soft–faced hammer,** sharply hit the end of the C/V joint housing to dislodge housing from internal circlip on intercon-

CV BOOT - OUTER (Continued)

necting shaft (Fig. 38). Then slide outer C/V joint off end of interconnecting shaft, joint may have to be tapped off shaft using a **soft–faced** hammer.

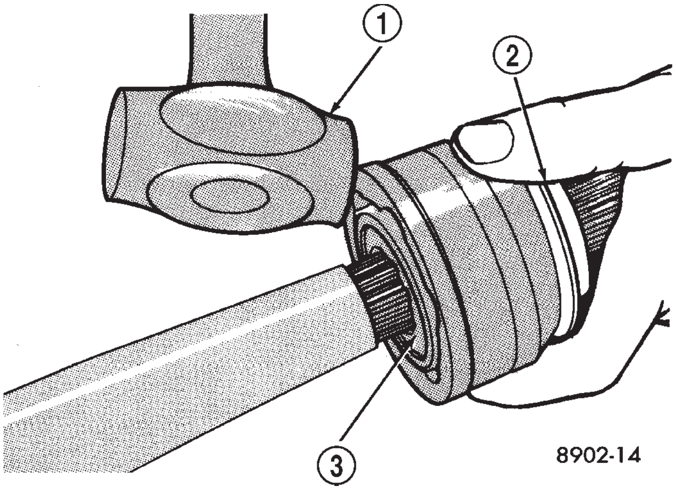


Fig. 38 Outer C/V Joint Removal from Interconnecting Shaft

1 - SOFT HAMMER (TAP HOUSING)
2 - WEAR SLEEVE
3 - CIRCLIP (OUTER END OF SHAFT)

(4) Remove large circlip (Fig. 39) from the interconnecting shaft before attempting to remove outer C/V joint sealing boot.

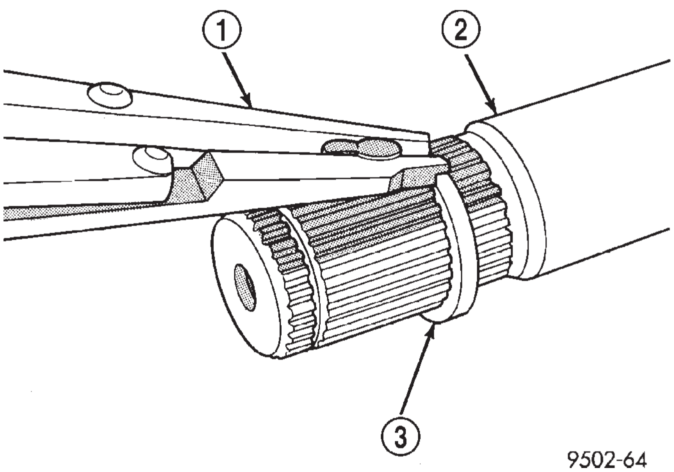


Fig. 39 Circlip Removal from Interconnecting Shaft

1 - SNAP RING PLIERS
2 - INTERCONNECTING SHAFT
3 - CIRCLIP

(5) Slide failed sealing boot off interconnecting shaft.

(6) Thoroughly clean and inspect outer C/V joint assembly and interconnecting joint for any signs of excessive wear. **If any parts show signs of excessive wear, the driveshaft assembly will require replacement. Component parts of these driveshaft assemblies are not serviceable.**

INSTALLATION

(1) Slide new sealing boot to interconnecting shaft retaining clamp onto interconnecting shaft. Slide the outer C/V joint assembly sealing boot onto the interconnecting shaft (Fig. 40). **Seal boot MUST be positioned on interconnecting shaft so the raised bead on the inside of the seal boot is in groove on interconnecting shaft.**

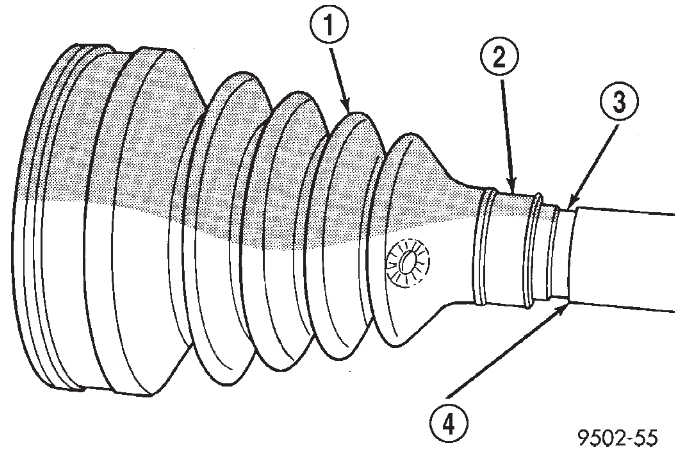


Fig. 40 Sealing Boot Installation on Interconnecting Shaft

1 - SEALING BOOT
2 - RAISED BEAD IN THIS AREA OF SEALING BOOT
3 - GROOVE
4 - INTERCONNECTING SHAFT

CV BOOT - OUTER (Continued)

(2) Align splines on interconnecting shaft with splines on cross of outer C/V joint assembly and start outer C/V joint onto interconnecting shaft.

(3) Install outer C/V joint assembly onto interconnecting shaft by using a **soft–faced** hammer and tapping end of stub axle (with nut installed) until outer C/V joint is fully seated on interconnecting shaft (Fig. 41).

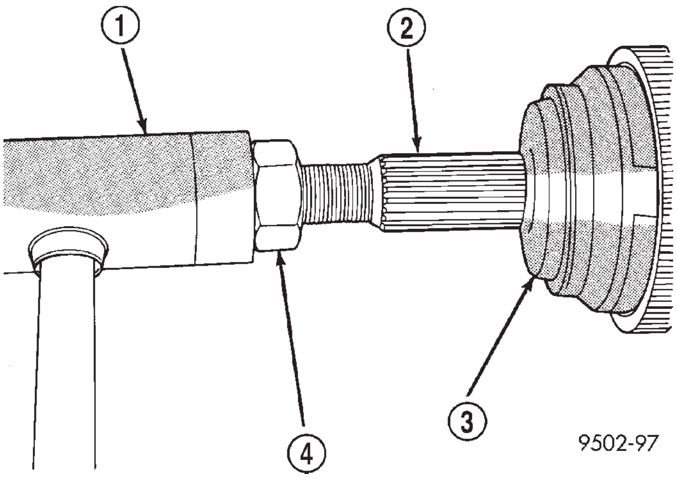


Fig. 41 Outer C/V

1 - SOFT FACED HAMMER
2 - STUB AXLE
3 - OUTER C/V JOINT
4 - NUT

(4) Outer C/V joint assembly must be installed on interconnecting shaft until cross of outer C/V joint assembly is seated against circlip on interconnecting shaft (Fig. 42).

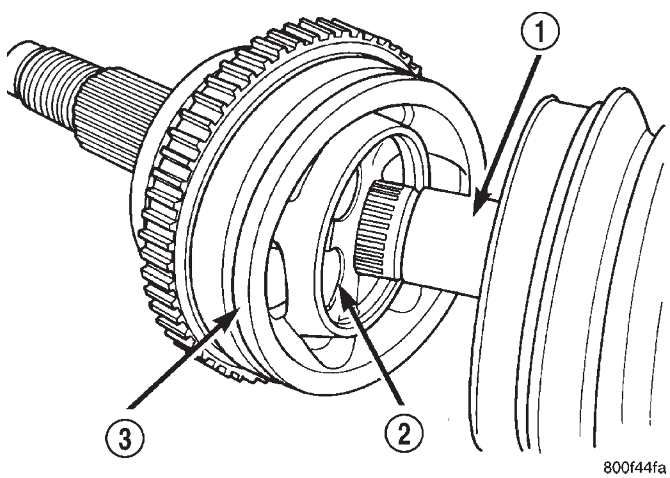


Fig. 42 Outer C/V Joint Correctly Installed on Interconnecting Shaft

1 - INTERCONNECTING SHAFT
2 - CROSS
3 - OUTER C/V JOINT ASSEMBLY

(5) Distribute 1/2 the amount of grease provided in seal boot service package (DO NOT USE ANY OTHER TYPE OF GREASE) into outer C/V joint assembly housing. Put the remaining amount into the sealing boot.

(6) Install outer C/V joint sealing boot to interconnecting shaft clamp evenly on sealing boot.

(7) Clamp sealing boot onto interconnecting shaft using crimper, Special Tool C-4975-A and the following procedure. Place crimping tool C-4975-A over bridge of clamp (Fig. 43). Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 44).

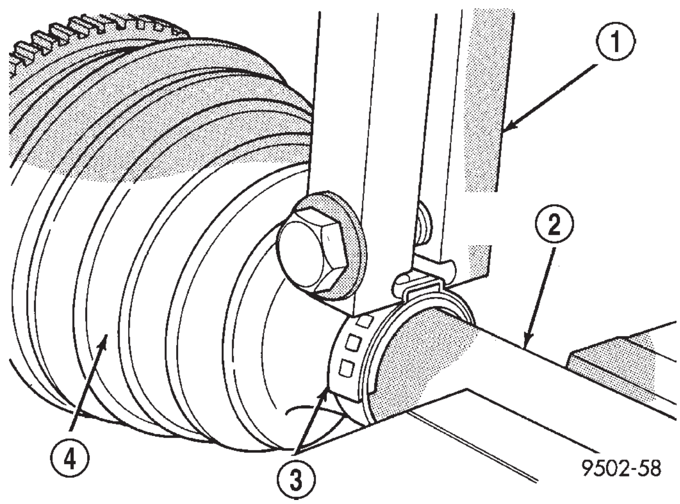


Fig. 43 Crimping Tool Installed on Sealing Boot Clamp

1 - SPECIAL TOOL C-4975A
2 - INTERCONNECTING SHAFT
3 - CLAMP
4 - SEALING BOOT

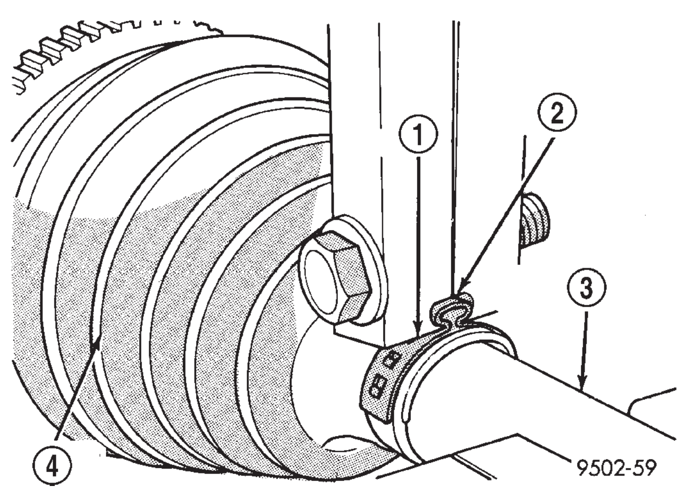


Fig. 44 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - JAWS OF SPECIAL TOOL C-4975A MUST BE CLOSED COMPLETELY TOGETHER HERE
3 - INTERCONNECTING SHAFT
4 - SEALING BOOT

CV BOOT - OUTER (Continued)

CAUTION: Seal must not be dimpled, stretched, or out–of–shape in any way. If seal is NOT shaped correctly, equalize pressure in seal and shape it by hand.

(8) Position outer C/V joint sealing boot into its retaining groove on outer C/V joint housing. Install sealing boot to outer C/V joint retaining clamp evenly on sealing boot.

(9) Clamp sealing boot onto outer C/V joint housing using Crimper, Special Tool C-4975-A and the following procedure. Place crimping tool C-4975-A over bridge of clamp (Fig. 45). Tighten nut on crimping tool C-4975-A until jaws on tool are closed completely together, face to face (Fig. 46).

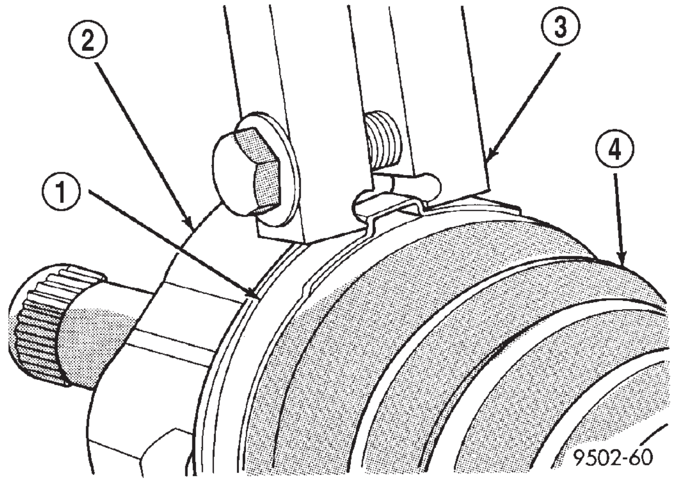


Fig. 45 Crimping Tool Installed on Sealing Boot Clamp

1 - CLAMP
2 - TRIPOD JOINT HOUSING
3 - SPECIAL TOOL C-4975A
4 - SEALING BOOT

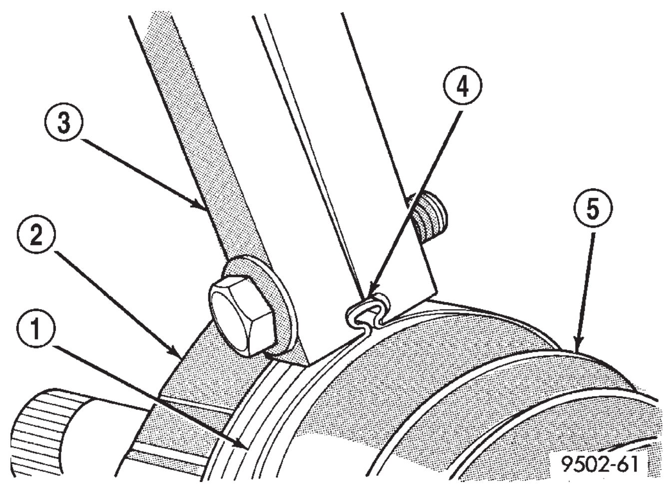


Fig. 46 Sealing Boot Retaining Clamp Installed

1 - CLAMP
2 - TRIPOD HOUSING
3 - SPECIAL TOOL C-4975A
4 - JAWS OF SPECIAL TOOL C-4975A MUST BE CLOSED COMPLETELY TOGETHER HERE
5 - SEALING BOOT

BRAKES

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BRAKES - BASE

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BRAKES - BASE

WARNING

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET BRAKE LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT SAND OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. CLEANING SHOULD BE DONE BY DAMPENING THE BRAKE COMPONENTS WITH A FINE MIST OF WATER, THEN WIPING THE BRAKE COMPONENTS CLEAN WITH A DAMPENED CLOTH. DISPOSE OF CLOTH AND ALL RESIDUE CONTAINING ASBESTOS FIBERS IN AN IMPERMEABLE CONTAINER WITH THE APPROPRIATE LABEL. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA) FOR THE HANDLING, PROCESSING, AND DISPOSING OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

CAUTION

CAUTION: During service procedures, grease or any other foreign material must be kept off brake shoe assemblies, and braking surfaces of brake rotor or drum, and external surfaces of hub and bearing assembly.

CAUTION: Handling of brake rotors and calipers must be done in such a way as to avoid damage to the rotor and scratching or nicking of brake lining on the brake shoes.

CAUTION: At no time when servicing a vehicle, can a sheet metal screw, bolt or other metal fastener be installed in the shock tower to take the place of an original plastic clip. Also, NO holes can be drilled into the front shock tower in the area shown in (Fig. 1), for the installation of any metal fasteners into the shock tower. Because of the minimum clearance in this area (Fig. 1), installation of metal fasteners could damage the coil spring coating and lead to a corrosion failure of the spring. If a plastic clip is missing, or is lost or broken during servicing a vehicle, replace only with the equivalent part listed in the Mopar parts catalog.

BRAKES - BASE (Continued)

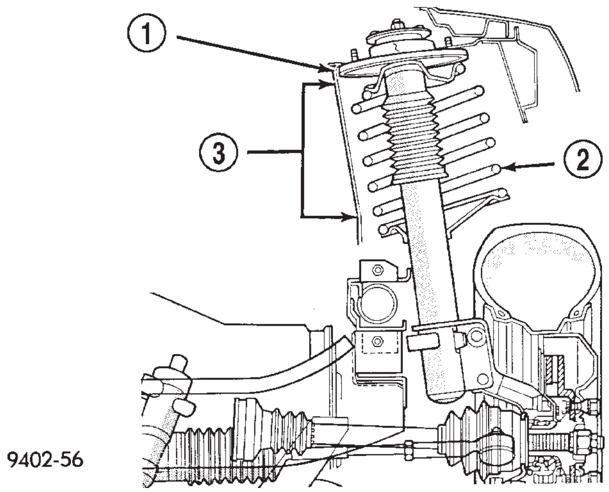


Fig. 1 Shock Tower To Spring Minimum Clearance Area

1 - SHOCK TOWER
2 - COIL SPRING
3 - NO SHEET METAL SCREWS, BOLTS, OR ANY OTHER METAL FASTENERS ARE TO BE INSTALLED INTO SHOCK TOWER IN THIS AREA. ALSO, NO HOLES ARE TO BE DRILLED INTO SHOCK TOWER IN THIS SAME AREA.

CAUTION: Only the recommended jacking or hoisting positions for this vehicle are to be used whenever it is necessary to lift a vehicle. Failure to raise a vehicle from the recommended locations could result in lifting a vehicle by the hydraulic control unit mounting bracket. Lifting a vehicle by the hydraulic control unit mounting bracket will result in damage to the mounting bracket and the hydraulic control unit.

STANDARD PROCEDURE - BASE BRAKE BLEEDING

NOTE: For bleeding the ABS hydraulic system, refer to in BRAKES - ABS/STANDARD PROCEDURE - ANTILOCK BRAKE SYSTEM BLEEDING.

CAUTION: Before removing the master cylinder cap, wipe it clean to prevent dirt and other foreign matter from dropping into the master cylinder reservoir.

CAUTION: Use only Mopar® brake fluid or an equivalent from a fresh, tightly sealed container. Brake fluid must conform to DOT 3 specifications.

Do not pump the brake pedal at any time while having a bleeder screw open during the bleeding process. This will only increase the amount of air in the system and make additional bleeding necessary.

Do not allow the master cylinder reservoir to run out of brake fluid while bleeding the system. An empty reservoir will allow additional air into the brake system. Check the fluid level frequently and add fluid as needed.

The following wheel circuit sequence for bleeding the brake hydraulic system should be used to ensure adequate removal of all trapped air from the hydraulic system.

- Left rear wheel
- Right front wheel
- Right rear wheel
- Left front wheel

MANUAL BLEEDING

NOTE: To bleed the brakes manually, the aid of a helper will be required.

(1) Attach a clear plastic hose to the bleeder screw and feed the hose into a clear jar containing enough fresh brake fluid to submerge the end of the hose (Fig. 2).

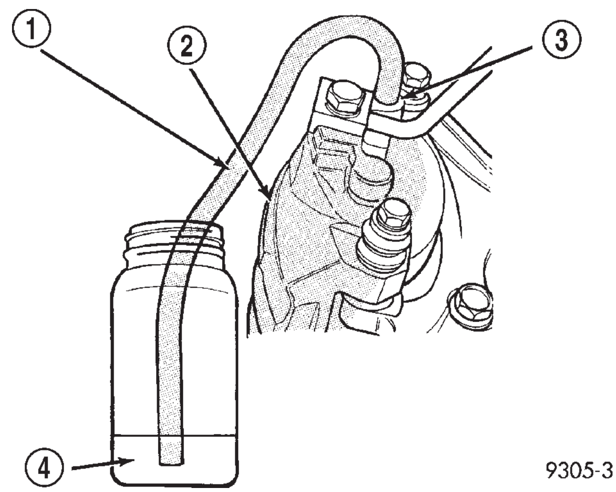


Fig. 2 Proper Method for Purging Air From Brake System (Typical)

1 - CLEAR HOSE
2 - BRAKE CALIPER
3 - BLEEDER SCREW
4 - CLEAN BRAKE FLUID

(2) Have a helper pump the brake pedal three or four times and hold it in the down position.

(3) With the pedal in the down position, open the bleeder screw at least 1 full turn.

(4) Once the brake pedal has dropped, close the bleeder screw. After the bleeder screw is closed, release the brake pedal.

(5) Repeat the above steps until all trapped air is removed from that wheel circuit (usually four or five times).

BRAKES - BASE (Continued)

(6) Bleed the remaining wheel circuits in the same manner until all air is removed from the brake system. Monitor the fluid level in the master cylinder reservoir to make sure it does not go dry.

(7) Check the brake pedal travel. If pedal travel is excessive or has not been improved, some air may still be trapped in the system. Rebleed the brakes as necessary.

(8) Test drive the vehicle to verify the brakes are operating properly and pedal feel is correct.

PRESSURE BLEEDING

NOTE: Follow pressure bleeder manufacturer's instructions for use of pressure bleeding equipment.

Use bleeder tank, Special Tool C-3496-B or equivalent, with master cylinder reservoir adapter, Special Tool 8224, to pressurize the hydraulic system for bleeding.

Following the same wheel circuit sequence as prescribed for manual bleeding.

(1) Attach a clear plastic hose to the bleeder screw and feed the hose into a clear jar containing enough fresh brake fluid to submerge the end of the hose (Fig. 2).

(2) Open the bleeder screw at least one full turn or more to obtain a steady stream of brake fluid.

(3) After approximately 4–8 ounces of fluid have been bled through the brake circuit and an air-free flow is maintained in the clear plastic hose and jar, close the bleeder screw.

(4) Repeat this procedure at all the remaining bleeder screws.

(5) Check the brake pedal travel. If pedal travel is excessive or has not been improved, some air may still be trapped in the system. Rebleed the brakes as necessary.

(6) Test drive the vehicle to verify the brakes are operating properly and pedal feel is correct.

SPECIFICATIONS

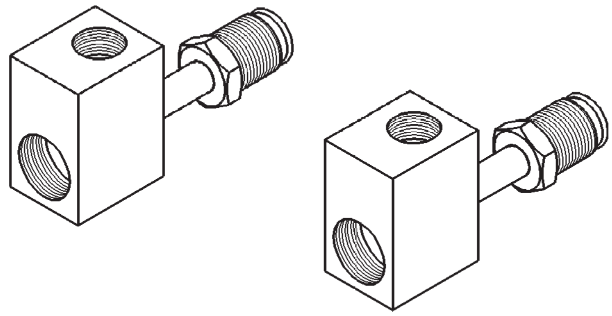
BRAKE FASTENER TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
ABS ICU Mounting Bolts To Bracket	11	—	97
ABS ICU Mounting Bracket-To-Lower Radiator Support Bolts	28	21	250
ABS CAB-To-HCU Mounting Screws	2	—	17
ABS Wheel Speed Sensor Mounting Bolt	8	—	75
Brake Tube Nuts	17	—	145
Brake Hose Intermediate Bracket Bolt	12	—	105
Brake Hose-To-Caliper Mounting Bolt	35	26	—
Disc Brake Caliper Guide Pin Bolts	35	26	—
Disc Brake Caliper Bleeder Screw	15	—	125
Front Caliper Adapter Mounting Bolts	80	60	—
Junction Block (Non-ABS Brakes) Mounting Bolts	28	21	250
Master Cylinder Mounting Nuts	26	19	230
Power Brake Booster Mounting Nuts	28	21	250
Parking Brake Lever Mounting Bolts	28	21	250
Wheel Mounting (Lug) Nuts	135	100	—

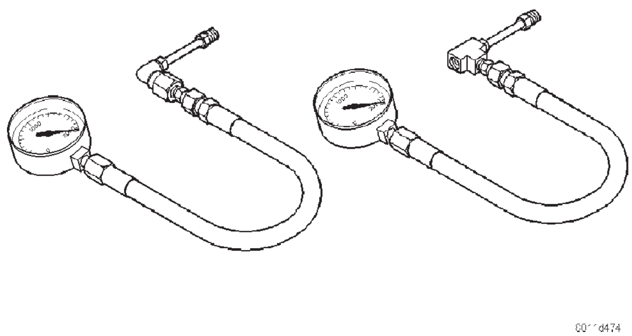
BRAKES - BASE (Continued)

SPECIAL TOOLS

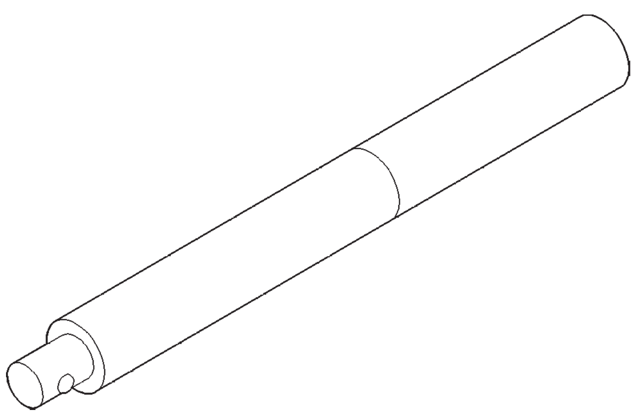
BASE BRAKE SYSTEM



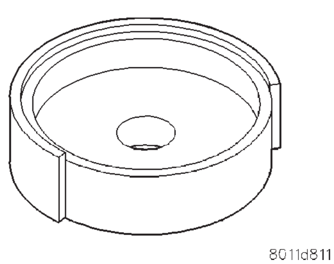
Adapters, Brake Pressure Test 8187



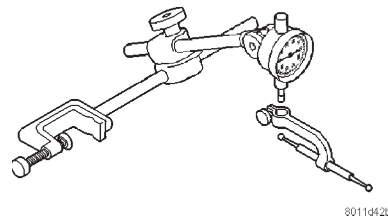
Gauge Set



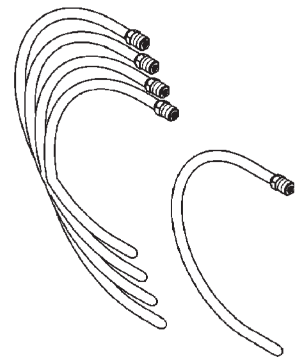
Handle, Universal C-4171



Installer, Dust Boot C-4689



Dial Indicator C-3339



Tubes, Master Cylinder Bleed 8358

BRAKE FLUID LEVEL SWITCH

REMOVAL

(1) Remove wiring harness connector from brake fluid reservoir level switch on the side of the reservoir (Fig. 3).

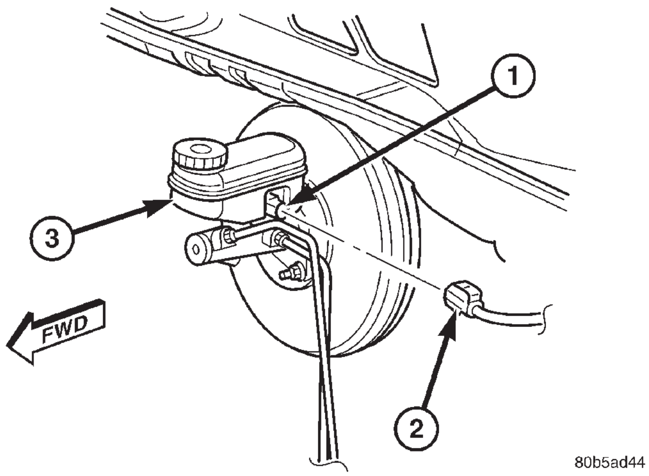


Fig. 3 BRAKE FLUID LEVEL SWITCH

1 - BRAKE FLUID LEVEL SWITCH
2 - WIRING CONNECTOR
3 - FLUID RESERVOIR

(2) Using a small screwdriver, release the retaining tabs on the opposite end of brake fluid level switch (on right side of reservoir) securing it to the reservoir (Fig. 4).

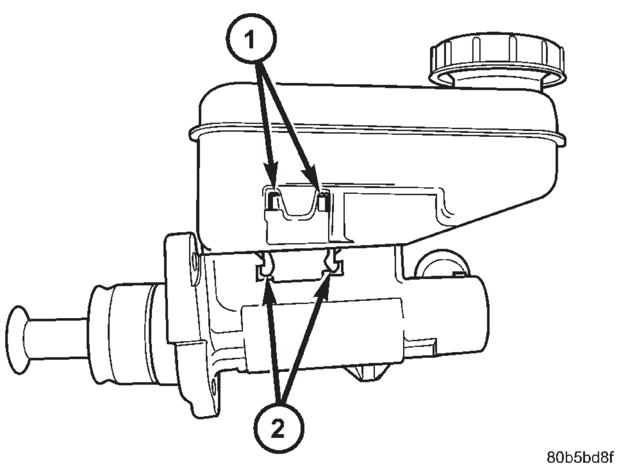


Fig. 4 RETAINING TABS

1 - RETAINING TABS FOR FLUID LEVEL SWITCH
2 - RETAINING TABS FOR FLUID RESERVOIR

(3) With retaining tabs compressed, grasp the connector end of brake fluid level switch and pull it out of master cylinder brake fluid reservoir.

INSTALLATION

(1) Insert brake fluid level switch into left side of brake fluid reservoir. Be sure switch is pushed in until retaining tabs lock it to brake fluid reservoir.

(2) Connect vehicle wiring harness connector to brake fluid level switch.

ASPIRATOR VALVE

DESCRIPTION

The aspirator valve is located in the vacuum hose leading to the power brake booster from the engine on V-6 equipped vehicles.

OPERATION

The aspirator valve helps improve vacuum assist response in low vacuum situations.

REMOVAL

(1) Remove hose leading from vacuum source to aspirator valve at valve.

(2) Remove hose leading to booster from valve.

(3) Remove hose leading to air cleaner housing from valve and remove valve from vehicle.

INSTALLATION

(1) Install smaller port on brown half of aspirator valve in hose leading to air cleaner housing.

(2) Install open port on black half of valve in hose leading to power brake booster.

(3) Install larger port on brown half of valve in hose leading from vacuum source.

BRAKE LINES

DESCRIPTION - BRAKE TUBES AND HOSES

The brake tubes are steel with a corrosion-resistant nylon coating applied to the external surfaces. The flex hoses are made of reinforced rubber with fittings at each end.

OPERATION - BRAKE TUBES AND HOSES

The purpose of the chassis brake tubes and flex hoses is to transfer the pressurized brake fluid developed by the master cylinder to the wheel brakes of the vehicle. The flex hoses are made of rubber to allow for the movement of the vehicle's suspension.

INSPECTION - BRAKE TUBES AND HOSES

Flexible rubber hose is used at both front brakes and at the rear axle. Inspection of brake hoses should be performed whenever the brake system is serviced and every 7,500 miles or 12 months, whichever comes first (every engine oil change). Inspect

BRAKE LINES (Continued)

hydraulic brake hoses for surface cracking, scuffing, or worn spots. If the fabric casing of the rubber hose becomes exposed due to cracks or abrasions in the rubber hose cover, the hose should be replaced immediately. Eventual deterioration of the hose can take place with possible burst failure. Faulty installation can cause twisting, resulting in wheel, tire, or chassis interference.

The brake tubing should be inspected periodically for evidence of physical damage or contact with moving or hot components.

The flexible brake tube sections used on this vehicle in the primary and secondary tubes from the master cylinder to the ABS hydraulic control unit connections must also be inspected. This flexible tubing must be inspected for kinks, fraying and contact with other components or with the body of the vehicle.

BRAKE PADS/SHOES - FRONT

REMOVAL - FRONT DISC BRAKE SHOES

(1) Raise the vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

(2) Remove both front wheel and tire assemblies.

NOTE: Using this procedure, begin on one side of the vehicle.

(3) Remove the anti-rattle spring from the outboard side of the caliper and adapter (Fig. 5).

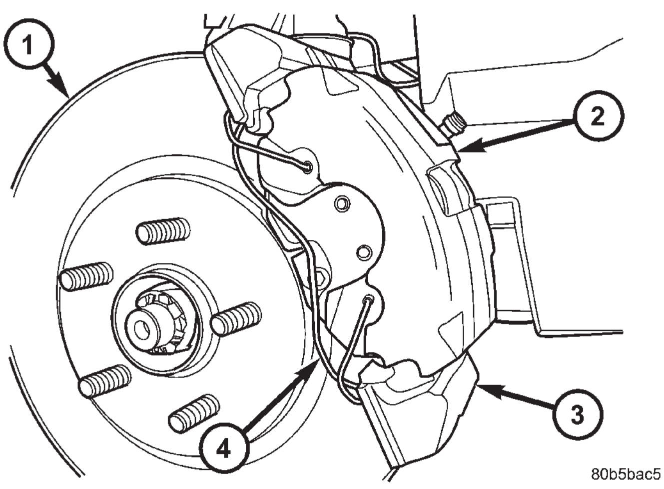


Fig. 5 FRONT DISC BRAKES

1 - BRAKE ROTOR
2 - BRAKE CALIPER
3 - BRAKE CALIPER ADAPTER
4 - ANTI-RATTLE SPRING

(4) Remove the two caps in place over the caliper guide pin bolts (Fig. 6).

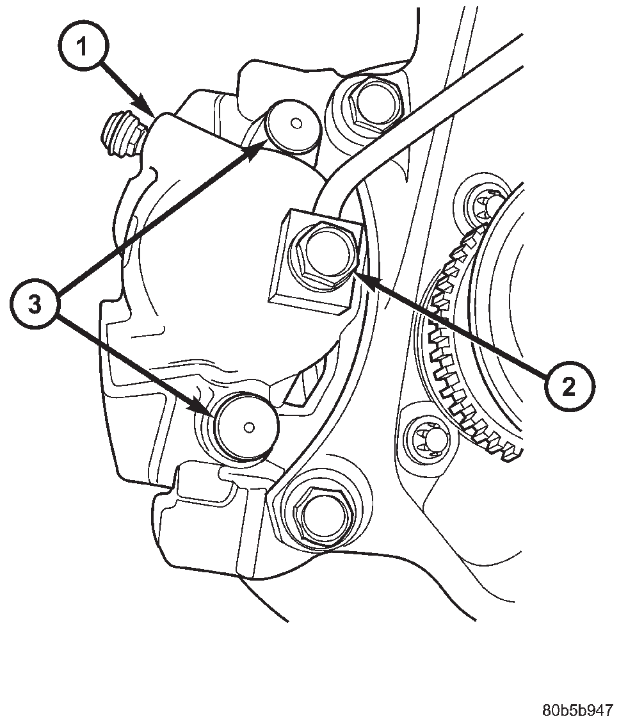


Fig. 6 CALIPER GUIDE PIN BOLT CAPS

1 - FRONT BRAKE CALIPER
2 - BRAKE HOSE BANJO BOLT
3 - CAPS

(5) Remove the two caliper guide pin bolts (Fig. 7).

(6) Remove caliper from caliper adapter and brake rotor. The outboard shoe will probably stay with the caliper adapter while the inboard shoe will come off with the caliper as the caliper is removed.

CAUTION: Supporting weight of caliper by the flexible brake fluid hose can damage the hose.

(7) Using wire or cord, hang the caliper from the front strut assembly (Fig. 8). Support the caliper firmly to prevent weight of caliper from being supported by the brake fluid hose.

(8) Remove the outboard brake shoe from the caliper adapter.

(9) Pull the inboard brake shoe away from the caliper piston until the retaining clip on shoe is free from the cavity in the caliper piston (Fig. 9).

(10) Repeat the above procedure on other side of the vehicle.

BRAKE PADS/SHOES - FRONT (Continued)

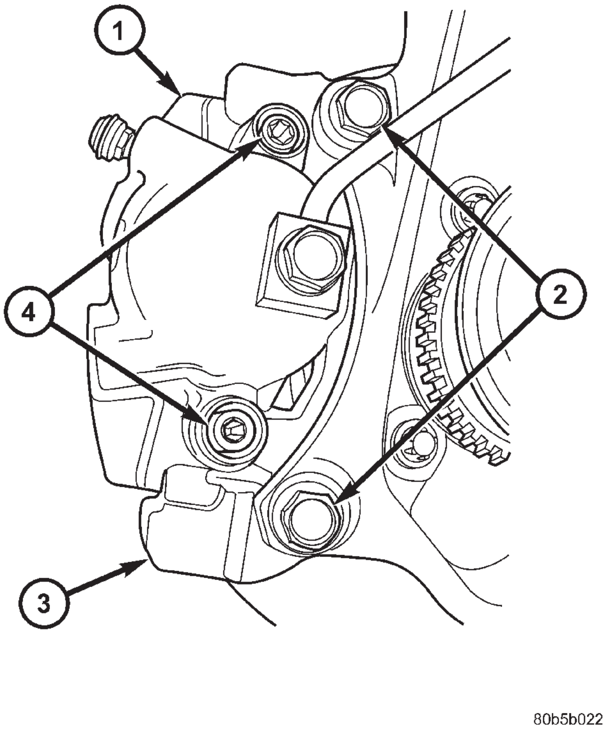


Fig. 7 CALIPER MOUNTING

1 - FRONT BRAKE CALIPER
2 - CALIPER ADAPTER MOUNTING BOLTS
3 - CALIPER ADAPTER
4 - CALIPER GUIDE PIN BOLTS

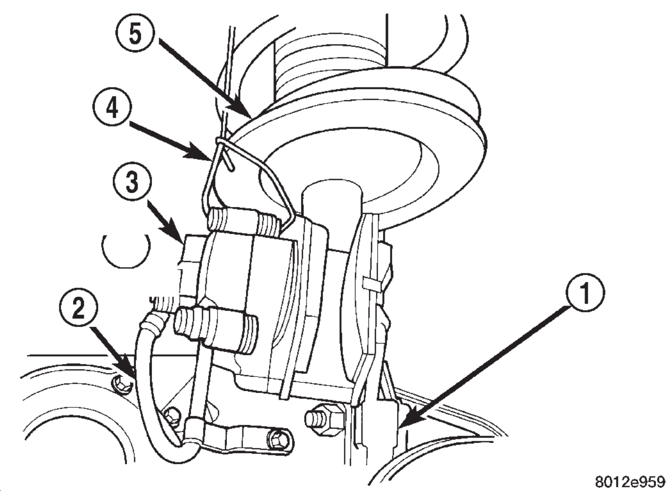


Fig. 8 Stored Front Disc Brake Caliper

1 - STEERING KNUCKLE
2 - BRAKE FLEX HOSE
3 - CALIPER ASSEMBLY
4 - WIRE HANGER
5 - STRUT ASSEMBLY

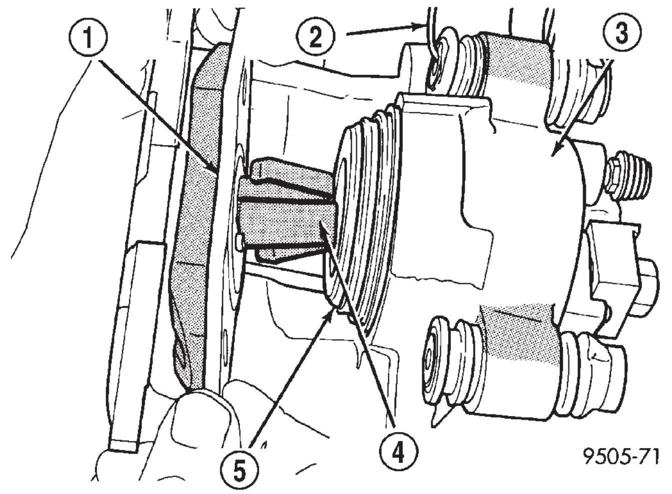


Fig. 9 Removing Inboard Shoe

1 - INBOARD BRAKE SHOE
2 - HANGER WIRE
3 - CALIPER ASSEMBLY
4 - RETAINING CLIP
5 - PISTON

CLEANING - DISC BRAKE SHOES

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET BRAKE LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT SAND OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. CLEANING SHOULD BE DONE BY DAMPENING THE BRAKE COMPONENTS WITH A FINE MIST OF WATER, THEN WIPING THE BRAKE COMPONENTS CLEAN WITH A DAMPENED CLOTH. DISPOSE OF CLOTH AND ALL RESIDUE CONTAINING ASBESTOS FIBERS IN AN IMPERMEABLE CONTAINER WITH THE APPROPRIATE LABEL. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA) FOR THE HANDLING, PROCESSING, AND DISPOSING OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

INSPECTION - DISC BRAKE SHOES

Visually inspect brake shoes (pads) for uneven lining wear. Also inspect for excessive lining deterioration. Check the clearance between the tips of the

BRAKE PADS/SHOES - FRONT (Continued)

wear indicators on the shoes (if equipped) and the brake rotors.

If a visual inspection does not adequately determine the condition of the lining, a physical check will be necessary. To check the amount of lining wear, remove the disc brake shoes from the calipers.

Measure each brake shoe. The combined brake shoe and its lining material thickness should be measured at its thinnest point.

- For front disc brake shoes, when a set of brake shoes are worn to a thickness of approximately 7.0 mm (9/32 inch), they should be replaced.
- For rear disc brake shoes, when a set of brake shoes are worn to a thickness of approximately 7.0 mm (9/32 inch), they should be replaced.
- Typically, if front shoes are worn out, both fronts and rears need to be replaced. Make sure to check rears.

Replace **both** disc brake shoes (inboard and outboard) on each caliper. It is necessary to replace the shoes on the opposite side of the vehicle as well as the shoes failing inspection.

If the brake shoe assemblies do not require replacement, be sure to reinstall the brake shoes in the original position they were remove from.

INSTALLATION - FRONT DISC BRAKE SHOES

NOTE: There may be more than 1 lining material released. Make sure proper linings are being installed.

(1) Begin on one side of the vehicle or the other.

(2) Completely retract the caliper piston back into its bore in the brake caliper (This is required for caliper installation on the brake rotor with new brake shoes installed).

(3) If applied, remove the protective paper from the noise suppression gasket on the rear of both the inner and outer brake shoe assemblies.

NOTE: Inboard brake shoes are stamped L or R for left or right side of the vehicle. The P-slot or void on piston insulator must be positioned upward when brake caliper is mounted (Fig. 10).

(4) Install the new inboard brake shoe into the caliper piston by firmly pressing its retaining clip into the piston bore. Be sure the inboard brake shoe is positioned squarely against the face of the caliper piston.

(5) Lubricate both adapter abutments where the shoes slide with a small amount of Mopar® Dielectric grease, or equivalent.

(6) Slide the new outboard brake shoe into the caliper adapter with the lining up against the outside of the brake rotor.

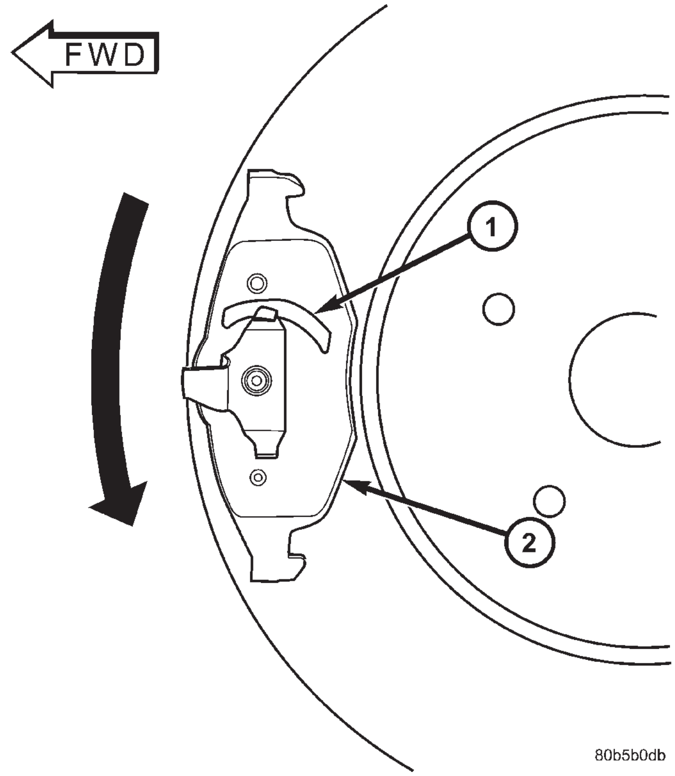


Fig. 10 INBOARD SHOE ORIENTATION TO TURNING ROTOR

1 - P-SLOT/VOID
2 - INBOARD DISC BRAKE SHOE/PAD

CAUTION: Use care when installing the caliper assembly onto the caliper adapter, so the caliper guide pin bushings do not get damaged by the adapter bosses.

(7) Carefully position the brake caliper over the brake rotor and adapter.

(8) Install the caliper guide pin bolts and tighten to a torque of 35 N·m (26 ft. lbs.). **Extreme caution should be taken not to cross thread the caliper guide pin bolts.**

(9) Install the caps over the caliper guide pin bolts (Fig. 6).

(10) Install the new caliper hold down spring (anti-rattle clip) on the outboard side of the caliper. Start the spring into the holes on the caliper, then stretch the clip legs past the abutments on the caliper adapter (Fig. 5).

(11) Repeat the above procedure on other side of the vehicle.

(12) Install the wheel and tire assemblies. Tighten the wheel mounting nuts in proper sequence until all nuts are torqued to half specification, then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(13) Lower vehicle.

BRAKE PADS/SHOES - FRONT (Continued)

(14) Pump the brake pedal several times. This will set the shoes to the brake rotor.

(15) Check and adjust brake fluid level as necessary.

(16) Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake shoes.

BRAKE PADS/SHOES - REAR

REMOVAL - REAR DISC BRAKE SHOES

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove rear wheels and tires from vehicle.

(3) Remove the 2 guide pin bolts mounting the caliper to the adapter (Fig. 11).

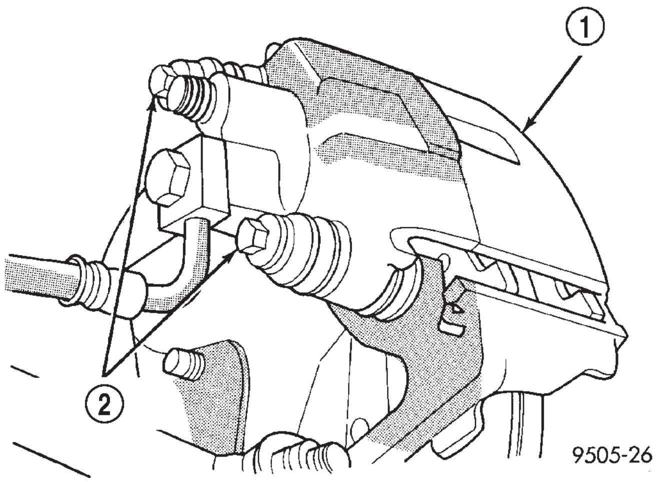


Fig. 11 Caliper Guide Pin Bolts

1 - DISC BRAKE CALIPER
2 - CALIPER GUIDE PIN BOLTS

(4) Remove caliper from adapter and rotor by first rotating the top of the caliper away from adapter, and then lifting the caliper off the lower machined abutment on adapter (Fig. 12).

(5) Support caliper from rear strut to prevent weight of caliper from damaging the flexible brake hose (Fig. 13).

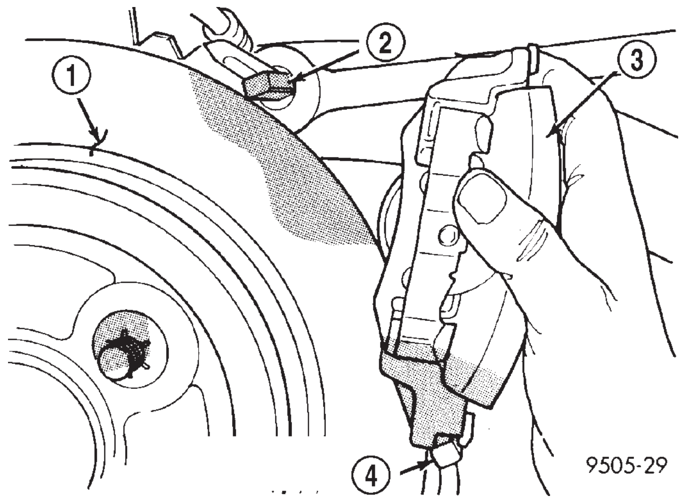


Fig. 12 Caliper Removal/Installation

1 - BRAKING DISC
2 - CALIPER ADAPTER
3 - CALIPER
4 - LOWER MACHINED ADAPTER ABUTMENT

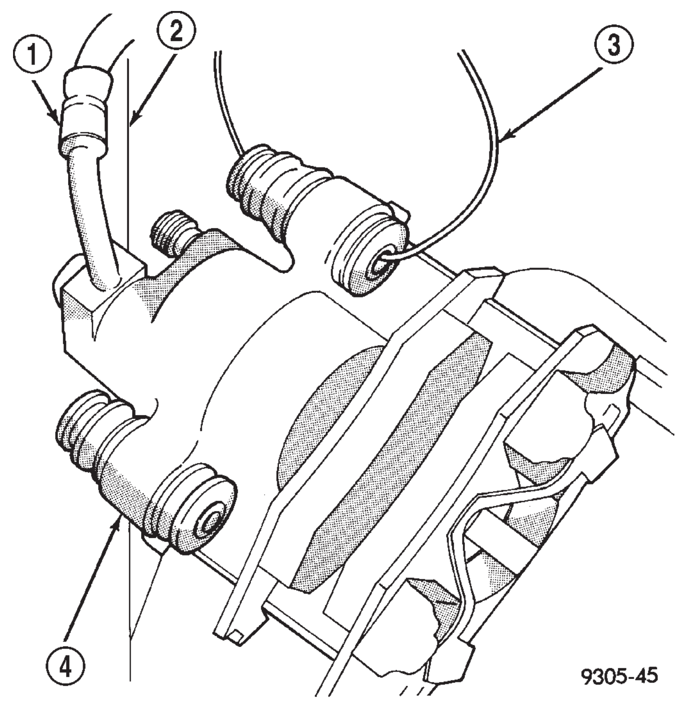


Fig. 13 Storing Caliper

1 - FLEX HOSE
2 - STRUT
3 - WIRE HANGER
4 - CALIPER ASSEMBLY

BRAKE PADS/SHOES - REAR (Continued)

(6) Remove rear rotor from hub/bearing (Fig. 14). Then inspect drum-in-hat parking brake shoes and parking brake braking surface on rotor for any signs of excessive wear or damage. Replace parking brake shoes if required.

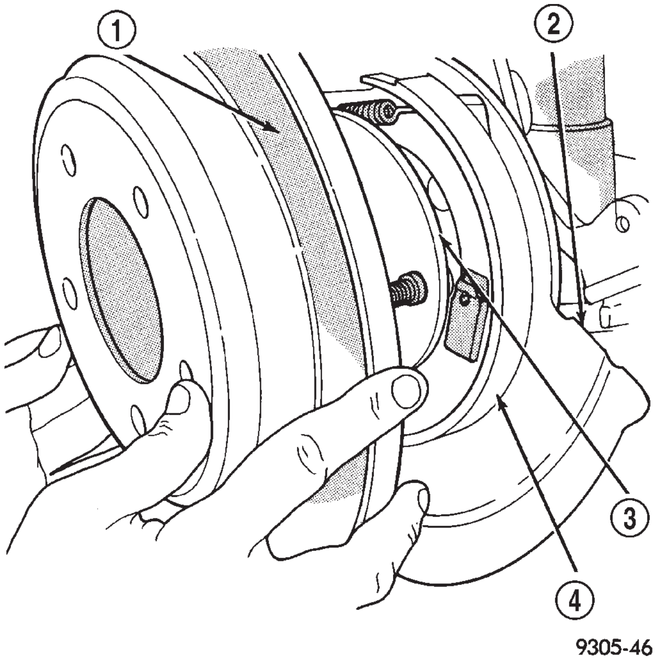


Fig. 14 Rear Brake Rotor

1 - BRAKING DISC
2 - DISC SHIELD
3 - HUB
4 - DRUM-IN-HAT PARKING BRAKE

(7) Remove outboard brake pad from caliper by prying brake pad retaining clip over raised area on caliper. Then slide brake pad down and off the caliper (Fig. 15).

(8) Pull inboard brake pad away from caliper piston, until retaining clip is free from cavity in piston. (Fig. 16).

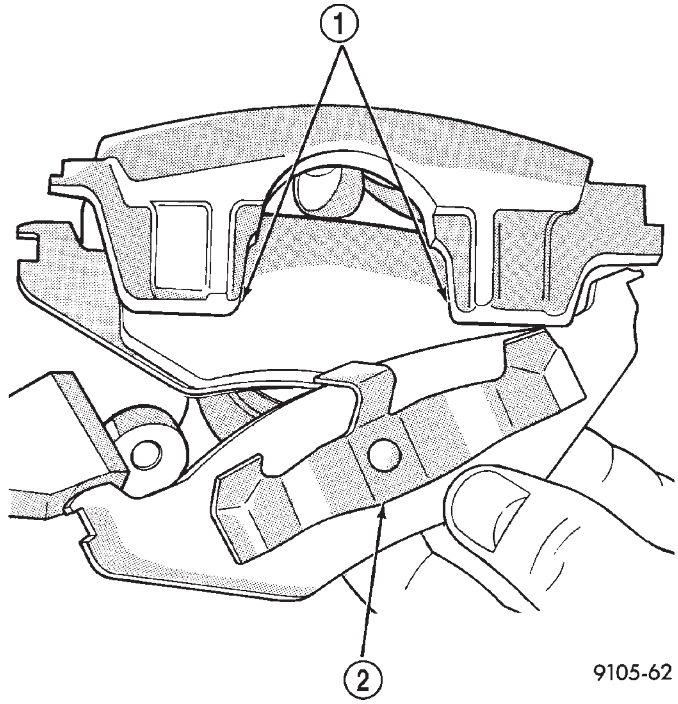


Fig. 15 Removing Outboard Brake Pad

1 - CALIPER FINGERS
2 - RETAINING CLIP

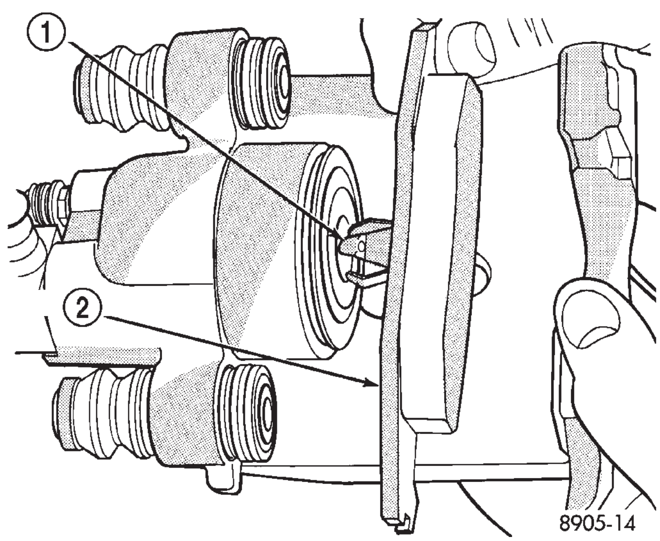


Fig. 16 Removing Inboard Brake Pad

1 - RETAINING CLIP
2 - INBOARD SHOE

BRAKE PADS/SHOES - REAR (Continued)

CLEANING - DISC BRAKE SHOES

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET BRAKE LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT SAND OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. CLEANING SHOULD BE DONE BY DAMPENING THE BRAKE COMPONENTS WITH A FINE MIST OF WATER, THEN WIPING THE BRAKE COMPONENTS CLEAN WITH A DAMPENED CLOTH. DISPOSE OF CLOTH AND ALL RESIDUE CONTAINING ASBESTOS FIBERS IN AN IMPERMEABLE CONTAINER WITH THE APPROPRIATE LABEL. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA) FOR THE HANDLING, PROCESSING, AND DISPOSING OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

INSPECTION - DISC BRAKE SHOES

Visually inspect brake shoes (pads) for uneven lining wear. Also inspect for excessive lining deterioration. Check the clearance between the tips of the wear indicators on the shoes (if equipped) and the brake rotors.

If a visual inspection does not adequately determine the condition of the lining, a physical check will be necessary. To check the amount of lining wear, remove the disc brake shoes from the calipers.

Measure each brake shoe. The combined brake shoe and its lining material thickness should be measured at its thinnest point.

- For front disc brake shoes, when a set of brake shoes are worn to a thickness of approximately 7.0 mm (9/32 inch), they should be replaced.
- For rear disc brake shoes, when a set of brake shoes are worn to a thickness of approximately 7.0 mm (9/32 inch), they should be replaced.
- Typically, if front shoes are worn out, both fronts and rears need to be replaced. Make sure to check rears.

Replace **both** disc brake shoes (inboard and outboard) on each caliper. It is necessary to replace the shoes on the opposite side of the vehicle as well as the shoes failing inspection.

If the brake shoe assemblies do not require replacement, be sure to reinstall the brake shoes in the original position they were remove from.

INSTALLATION - REAR DISC BRAKE SHOES

(1) Completely retract the caliper piston back into the piston bore of the caliper. This is required for caliper installation when new brake pad assemblies are installed on caliper.

(2) Lubricate both adapter abutments with a liberal amount of Mopar® Multipurpose Lubricant, or equivalent.

(3) Install rear rotor on hub making sure it is squarely seated on face of hub (Fig. 14).

(4) Remove protective paper from noise suppression gasket on both inner and outer brake pad assemblies (if equipped).

(5) Install new inboard brake pad into caliper piston by firmly pressing it into bore of piston using thumbs (Fig. 15). **Be sure inboard brake shoe is positioned squarely against face of piston.**

(6) Slide new outboard brake pad onto the caliper (Fig. 15). Be sure retaining clip is squarely seated in the depressed areas on the caliper.

CAUTION: Use care when installing caliper assembly onto adapter, so the guide pin bushings and sleeves do not get damaged by the mounting bosses on adapter.

(7) Carefully lower caliper and brake shoes over rotor reversing the required removal procedure (Fig. 12). Make sure that caliper guide pin bolts, bushings and sleeves are clear of the adapter bosses.

CAUTION: Extreme caution should be taken not to cross thread the caliper guide pin bolts when they are installed.

(8) Install caliper guide pin bolts into adapter. (Fig. 11). Tighten the guide pin bolts to a torque of 22 N·m (192 in. lbs.).

(9) Install the wheels and tires.

(10) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(11) Lower vehicle.

(12) Check brake fluid level.

NOTE: Before vehicle is moved after any brake service work, pump the brake pedal several times to insure the vehicle has a firm brake pedal.

(13) Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake pads.

DISC BRAKE CALIPERS - FRONT

REMOVAL - FRONT DISC BRAKE CALIPER

(1) Depress the brake pedal past its first inch of travel and hold it in this position using a brake pedal depressor (holding) tool. This is done to isolate the master cylinder from the brake hydraulic system dis-allowing the brake fluid to completely drain out of the brake fluid reservoir.

(2) Raise the vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

(3) Remove front wheel and tire assembly.

(4) Remove the anti-rattle spring from the out-board side of the caliper and adapter (Fig. 17).

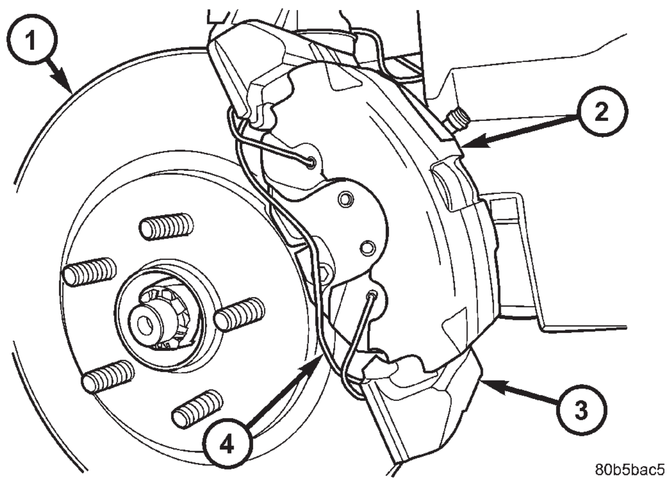


Fig. 17 FRONT DISC BRAKES

1 - BRAKE ROTOR
2 - BRAKE CALIPER
3 - BRAKE CALIPER ADAPTER
4 - ANTI-RATTLE SPRING

(5) Remove the banjo bolt connecting the brake hose to the brake caliper (Fig. 18). There are two washers (one on each side of the brake hose fitting) that will come off with the banjo bolt. Discard these washers.

(6) Remove the two caps in place over the caliper guide pin bolts (Fig. 18).

(7) Remove the two caliper guide pin bolts (Fig. 19).

(8) Remove caliper from caliper adapter and brake rotor. The outboard shoe will probably stay with the caliper adapter while the inboard shoe will come off with the caliper as the caliper is removed.

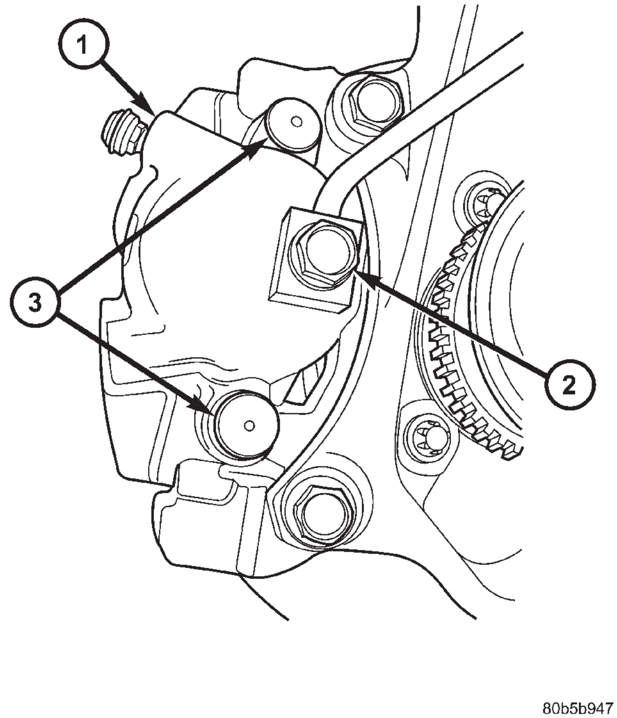


Fig. 18 CALIPER GUIDE PIN BOLT CAPS

1 - FRONT BRAKE CALIPER
2 - BRAKE HOSE BANJO BOLT
3 - CAPS

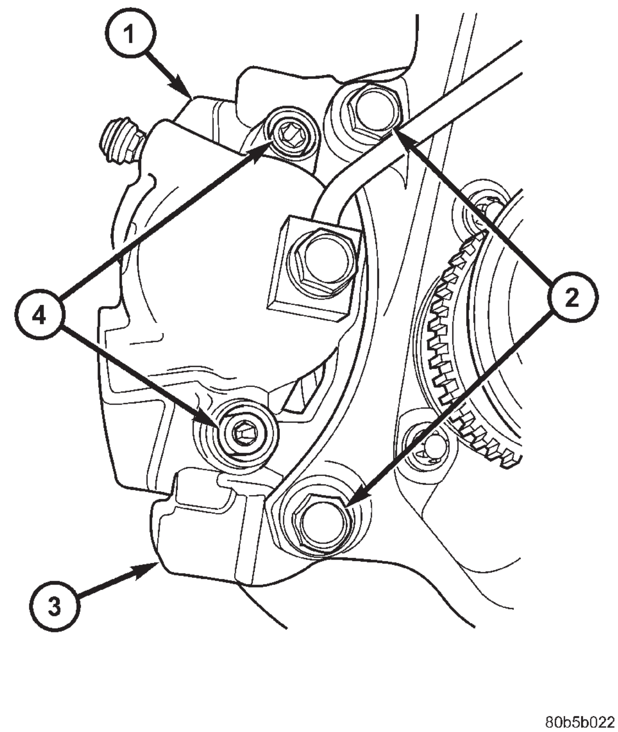


Fig. 19 CALIPER MOUNTING

1 - FRONT BRAKE CALIPER
2 - CALIPER ADAPTER MOUNTING BOLTS
3 - CALIPER ADAPTER
4 - CALIPER GUIDE PIN BOLTS

DISASSEMBLY

DISASSEMBLY - CALIPER GUIDE PIN BUSHINGS (DISC/DISC BRAKES)

Before disassembling the brake caliper, clean and inspect it. Refer to CLEANING or INSPECTION in this section.

(1) Using your fingers, collapse one side of the rubber guide pin bushing. Pull the guide pin bushing out the other side of the brake caliper mounting boss.

(2) Repeat this procedure on the remaining bushing.

DISASSEMBLY - CALIPER PISTON AND SEAL

WARNING: UNDER NO CONDITION SHOULD HIGH PRESSURE AIR EVER BE USED TO REMOVE A PISTON FROM A CALIPER BORE. PERSONAL INJURY COULD RESULT FROM SUCH A PRACTICE.

NOTE: Before disassembling the brake caliper, clean and inspect it. Refer to CLEANING AND INSPECTION in this section.

NOTE: The safest way to remove the piston from the caliper bore is to use the hydraulic pressure of the vehicle's brake system.

(1) Following the removal procedure in DISC BRAKE SHOES found in this section, remove the caliper from the brake rotor and hang the assembly on a wire hook away from rotor and body of the vehicle so brake fluid cannot get on these components. Remove the brake shoes, and place a small piece of wood between the piston and caliper fingers.

(2) Carefully depress the brake pedal to hydraulically push piston out of its bore. Once completed, apply and hold down the brake pedal to any position beyond the first inch of pedal travel using a brake pedal holding tool. This will prevent the fluid in the master cylinder reservoir from completely draining out.

(3) Disconnect the brake fluid flex hose from the caliper assembly and remove it from the vehicle.

CAUTION: Do not use excessive force when clamping caliper in vise. Excessive vise pressure will cause bore distortion.

(4) Mount the caliper in a vise equipped with protective jaws.

(5) Remove the piston dust boot from the caliper and discard (Fig. 20).

NOTE: Do not use a screw driver or other metal tool for seal removal. Using such tools can scratch the bore or leave burrs on the seal groove edges.

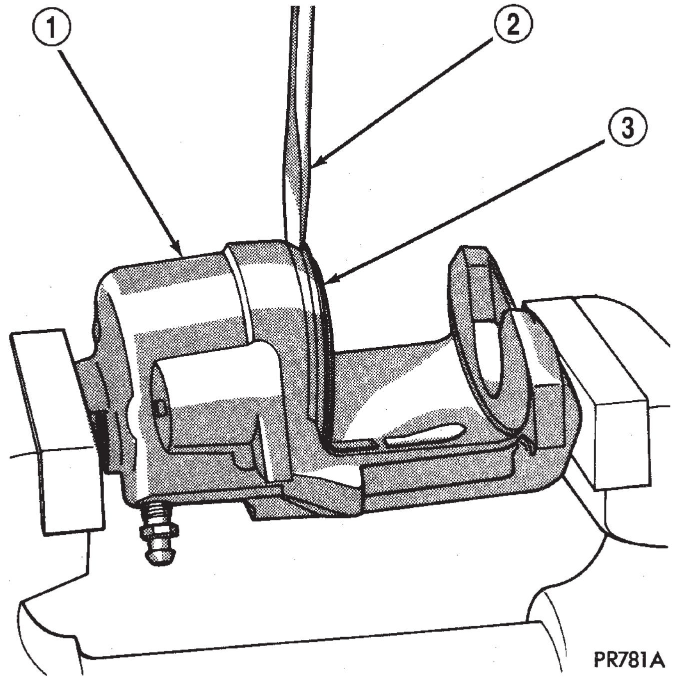


Fig. 20 Removing Caliper/Piston Dust Boot

1 - CALIPER
2 - SCREWDRIVER
3 - BOOT

(6) Using a soft tool such as a plastic trim stick, work the piston seal out of its groove in caliper piston bore (Fig. 21). Discard the old seal.

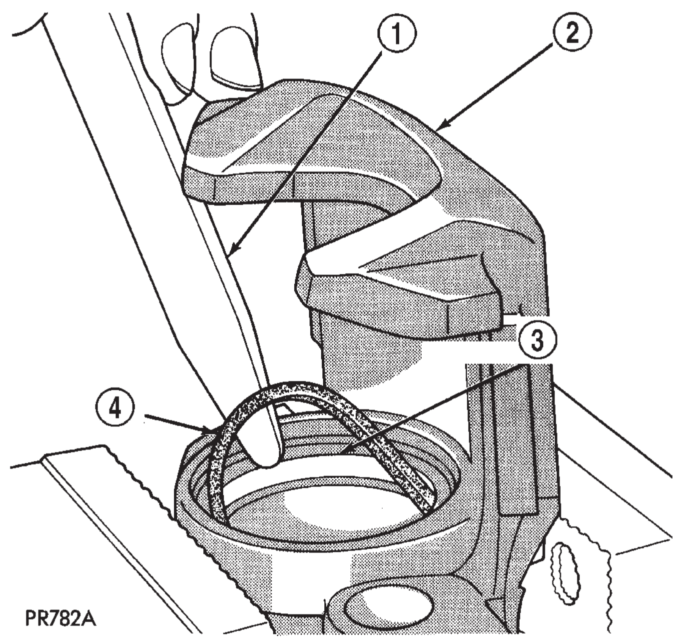


Fig. 21 Removing Piston Seal

1 - PLASTIC TRIM STICK
2 - CALIPER
3 - PISTON SEAL GROOVE
4 - PISTON SEAL

DISC BRAKE CALIPERS - FRONT (Continued)

(7) Clean the piston bore and drilled passage ways using alcohol or a suitable solvent. Wipe it dry using only a lint-free cloth.

(8) Inspect the piston bore for scoring or pitting. Bores that show light scratches or corrosion can usually be cleared of the light scratches or corrosion using crocus cloth.

CLEANING - CALIPER

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET BRAKE LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT SAND OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. CLEANING SHOULD BE DONE BY DAMPENING THE BRAKE COMPONENTS WITH A FINE MIST OF WATER, THEN WIPING THE BRAKE COMPONENTS CLEAN WITH A DAMPENED CLOTH. DISPOSE OF CLOTH AND ALL RESIDUE CONTAINING ASBESTOS FIBERS IN AN IMPERMEABLE CONTAINER WITH THE APPROPRIATE LABEL. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA) FOR THE HANDLING, PROCESSING, AND DISPOSING OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

To clean or flush the internal passages of the brake caliper, use fresh brake fluid or Mopar® Non-Chlorinated Brake Parts Cleaner. Never use gasoline, kerosene, alcohol, oil, transmission fluid or any fluid containing mineral oil to clean the caliper. These fluids will damage rubber cups and seals.

INSPECTION - CALIPER

Inspect the disc brake caliper for the following:

• Brake fluid leaks in and around boot area and inboard lining

• Ruptures, brittleness or damage to the piston dust boot

• Damaged, dry or brittle guide pin dust boots

If caliper fails inspection, disassemble and recondition caliper, replacing the seals and dust boots.

ASSEMBLY

ASSEMBLY - CALIPER GUIDE PIN BUSHINGS (DISC/DISC BRAKES)

(1) Fold the guide pin bushing in half lengthwise.

NOTE: To avoid damage to the bushing, do not use a sharp object to install the guide pin bushing.

(2) Insert the folded bushing into the caliper mounting boss using your fingers from the rear of the caliper.

(3) Unfold the bushing using your fingers or a wooden dowel until the bushing is fully seated into the caliper housing. The bushing flanges should be seated evenly on both sides of the bushing hole.

(4) Lubricate inside surfaces of bushing using Mopar® Dielectric Grease or equivalent.

(5) Repeat the procedure for remaining bushing.

ASSEMBLY - CALIPER PISTON AND SEAL

NOTE: Never use an old piston seal.

(1) Dip the new piston seal in clean brake fluid and install it in the groove of the caliper bore. The seal should be started at one area of the groove and gently worked around and into the groove (Fig. 22)using only your clean fingers to seat it.

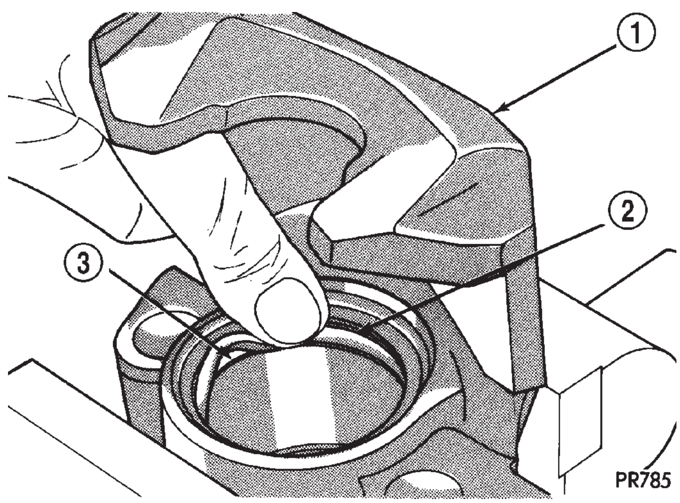


Fig. 22 Installing New Piston Seal

1 - CALIPER
2 - PISTON SEAL
3 - SEAL GROOVE

(2) Coat the new piston boot with clean brake fluid leaving a generous amount inside the boot.

(3) Position the dust boot over the piston after coating it with brake fluid.

DISC BRAKE CALIPERS - FRONT (Continued)

CAUTION: Force applied to the piston to seat it in the bore must be applied uniformly to avoid cocking and binding of the piston.

(4) Install piston into caliper bore pushing it past the piston seal until it bottoms in the caliper bore (Fig. 23).

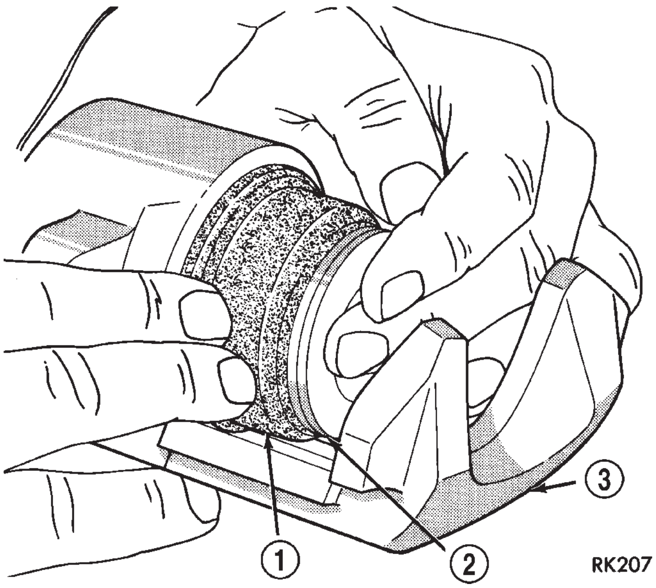


Fig. 23 Installing Piston Into Caliper Bore

1 - BOOT
2 - PISTON
3 - CALIPER

(5) Position the dust boot into the counterbore of the caliper assembly piston bore.

(6) Using a hammer and Installer, Special Tool C-4689 or C-4842 (depending on piston size), and Handle, Special Tool C-4171, drive the boot into the counterbore of the caliper as necessary (Fig. 24).

(7) Reinstall the caliper on the vehicle and bleed the brakes as necessary. Refer to Installation in this section.

INSTALLATION - FRONT DISC BRAKE CALIPER

(1) Completely retract the caliper piston back into piston bore of the caliper.

(2) Lubricate both caliper adapter abutments where the shoes slide with a sufficient amount of Mopar® Dielectric Grease, or equivalent.

NOTE: If shoes are being tranferred or newly installed, make note that the inboard brake shoes are stamped L or R for left or right side of the vehicle. The P-slot or void on piston insulator must be positioned upward when brake caliper is mounted (Fig. 25).

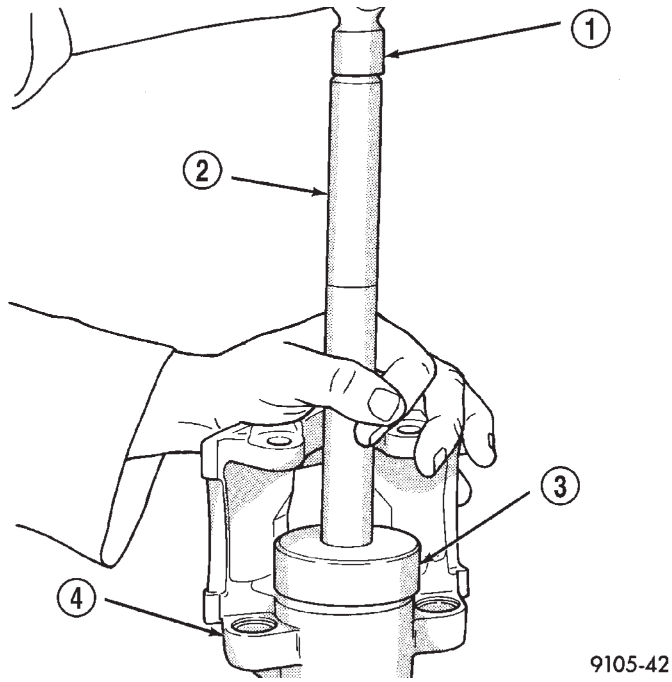


Fig. 24 Installing Dust Boot

1 - HAMMER
2 - SPECIAL TOOL C-4171
3 - SPECIAL TOOL C-4689 or C-4842
4 - CALIPER

CAUTION: Use care when installing the brake caliper assembly onto the adapter, so that the seals on the caliper guide pin bushings do not get damaged by the adapter bosses.

(3) Carefully position the brake caliper (with inboard shoe) over the brake rotor, outboard shoe and adapter. For proper positioning of shoes when installing caliper, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/BRAKE PADS/SHOES - INSTALLATION).

(4) Install the caliper guide pin bolts and tighten to a torque of 35 N·m (26 ft. lbs.) (Fig. 19). **Extreme caution should be taken not to cross thread the caliper guide pin bolts.**

(5) Install the caps over the ends of the guide pin bolts (Fig. 18).

(6) Install the anti-rattle spring on the outboard side of the caliper (Fig. 17). Start the clip into the holes on the caliper, then stretch the clip legs past the abutments on the caliper adapter.

CAUTION: When connecting the brake hose to the caliper, install new brake hose to caliper special washers.

(7) Install the brake hose on the caliper. To do this, first place one NEW special fitting washer on each side of the hose fitting, then slide the banjo bolt

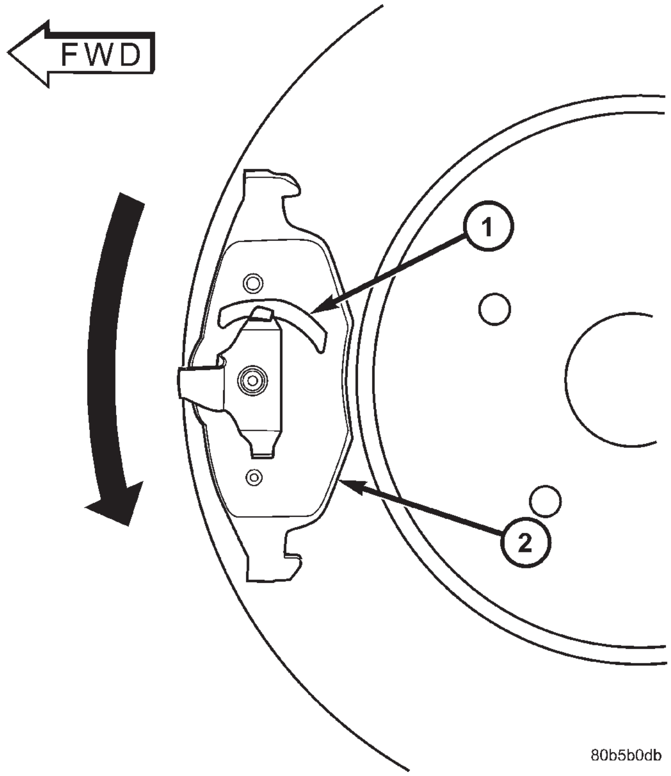


Fig. 25 INBOARD SHOE ORIENTATION TO TURNING ROTOR

1 - P-SLOT/VOID
2 - INBOARD DISC BRAKE SHOE/PAD

through the fitting. Next, thread the banjo bolt into the threaded port on the rear of the brake caliper (Fig. 18). Tighten the banjo bolt to a torque of 35 N·m (26 ft. lbs.).

(8) Install the wheel and tire assembly. Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification, then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(9) Lower the vehicle.

(10) Remove the brake pedal depressor (holding) tool.

(11) Bleed the hydraulic brake circuit to the brake caliper. (Refer to 5 - BRAKES - STANDARD PROCEDURE)

(12) Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake shoe linings.

DISC BRAKE CALIPERS - REAR

REMOVAL - REAR DISC BRAKE CALIPER

(1) Depress the brake pedal past its first inch of travel and hold it in this position using a brake pedal depressor (holding) tool. This is done to isolate the master cylinder from the brake hydraulic system disallowing the brake fluid to completely drain out of the brake fluid reservoir.

(2) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(3) Remove rear wheel and tire from vehicle.

(4) Remove the banjo bolt connecting the brake hose to the brake caliper. There are two washers (one on each side of the brake hose fitting) that will come off with the banjo bolt. Discard these washers.

(5) Remove the 2 guide pin bolts mounting the caliper to the adapter (Fig. 26).

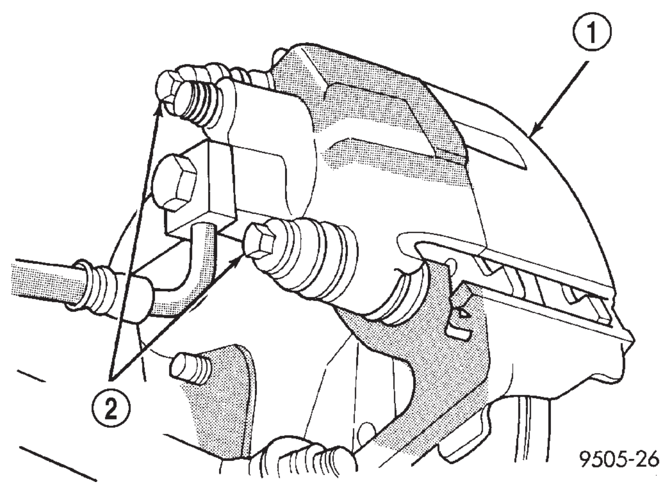


Fig. 26 Caliper Guide Pin Bolts

1 - DISC BRAKE CALIPER
2 - CALIPER GUIDE PIN BOLTS

DISC BRAKE CALIPERS - REAR (Continued)

(6) Remove caliper from adapter and rotor by first rotating top of caliper away from the adapter, then lifting the caliper off lower machined abutment on adapter (Fig. 27).

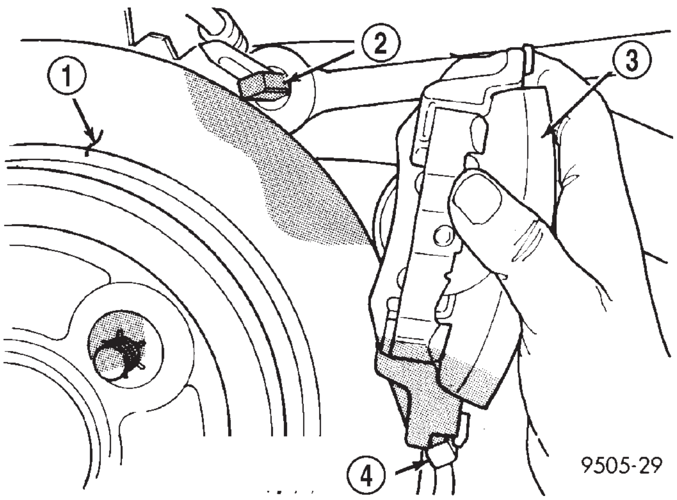


Fig. 27 Removing Caliper From Adapter

1 - BRAKING DISC
2 - CALIPER ADAPTER
3 - CALIPER
4 - LOWER MACHINED ADAPTER ABUTMENT

DISASSEMBLY

DISASSEMBLY - CALIPER GUIDE PIN BUSHINGS (DISC/DISC BRAKES)

Before disassembling the brake caliper, clean and inspect it. Refer to CLEANING or INSPECTION in this section.

(1) Using your fingers, collapse one side of the rubber guide pin bushing. Pull the guide pin bushing out the other side of the brake caliper mounting boss.

(2) Repeat this procedure on the remaining bushing.

DISASSEMBLY - CALIPER PISTON AND SEAL

WARNING: UNDER NO CONDITION SHOULD HIGH PRESSURE AIR EVER BE USED TO REMOVE A PISTON FROM A CALIPER BORE. PERSONAL INJURY COULD RESULT FROM SUCH A PRACTICE.

NOTE: Before disassembling the brake caliper, clean and inspect it. Refer to CLEANING AND INSPECTION in this section.

NOTE: The safest way to remove the piston from the caliper bore is to use the hydraulic pressure of the vehicle's brake system.

(1) Following the removal procedure in DISC BRAKE SHOES found in this section, remove the caliper from the brake rotor and hang the assembly on a wire hook away from rotor and body of the vehicle so brake fluid cannot get on these components. Remove the brake shoes, and place a small piece of wood between the piston and caliper fingers.

(2) Carefully depress the brake pedal to hydraulically push piston out of its bore. Once completed, apply and hold down the brake pedal to any position beyond the first inch of pedal travel using a brake pedal holding tool. This will prevent the fluid in the master cylinder reservoir from completely draining out.

(3) Disconnect the brake fluid flex hose from the caliper assembly and remove it from the vehicle.

CAUTION: Do not use excessive force when clamping caliper in vise. Excessive vise pressure will cause bore distortion.

(4) Mount the caliper in a vise equipped with protective jaws.

(5) Remove the piston dust boot from the caliper and discard (Fig. 28).

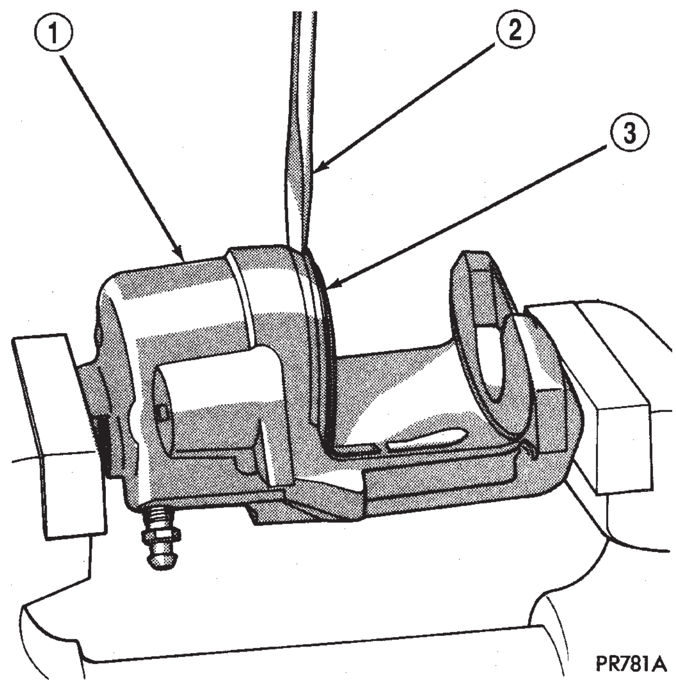


Fig. 28 Removing Caliper/Piston Dust Boot

1 - CALIPER
2 - SCREWDRIVER
3 - BOOT

NOTE: Do not use a screw driver or other metal tool for seal removal. Using such tools can scratch the bore or leave burrs on the seal groove edges.

DISC BRAKE CALIPERS - REAR (Continued)

(6) Using a soft tool such as a plastic trim stick, work the piston seal out of its groove in caliper piston bore (Fig. 29). Discard the old seal.

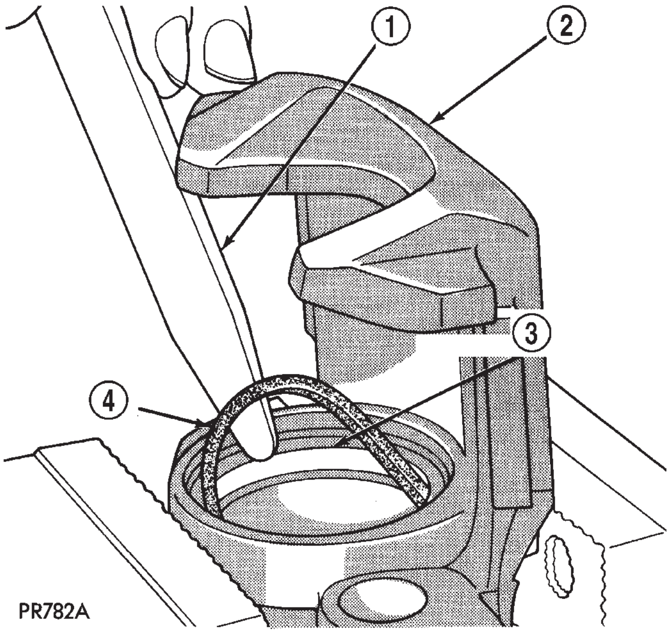


Fig. 29 Removing Piston Seal

1 - PLASTIC TRIM STICK
2 - CALIPER
3 - PISTON SEAL GROOVE
4 - PISTON SEAL

(7) Clean the piston bore and drilled passage ways using alcohol or a suitable solvent. Wipe it dry using only a lint-free cloth.

(8) Inspect the piston bore for scoring or pitting. Bores that show light scratches or corrosion can usually be cleared of the light scratches or corrosion using crocus cloth.

CLEANING - CALIPER

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET BRAKE LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT SAND OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. CLEANING SHOULD BE DONE BY DAMPENING THE BRAKE COMPONENTS WITH A FINE MIST OF WATER, THEN WIPING THE BRAKE COMPONENTS CLEAN WITH A DAMPENED CLOTH. DISPOSE OF CLOTH AND ALL RESIDUE CONTAINING ASBESTOS FIBERS IN AN IMPERMEABLE CONTAINER WITH THE APPROPRIATE LABEL. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA) FOR THE HANDLING, PROCESSING, AND DISPOSING OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

To clean or flush the internal passages of the brake caliper, use fresh brake fluid or Mopar® Non-Chlorinated Brake Parts Cleaner. Never use gasoline, kerosene, alcohol, oil, transmission fluid or any fluid containing mineral oil to clean the caliper. These fluids will damage rubber cups and seals.

INSPECTION - CALIPER

Inspect the disc brake caliper for the following:

- Brake fluid leaks in and around boot area and inboard lining
- Ruptures, brittleness or damage to the piston dust boot
- Damaged, dry or brittle guide pin dust boots

If caliper fails inspection, disassemble and recondition caliper, replacing the seals and dust boots.

ASSEMBLY

ASSEMBLY - CALIPER GUIDE PIN BUSHINGS (DISC/DISC BRAKES)

(1) Fold the guide pin bushing in half lengthwise.

NOTE: To avoid damage to the bushing, do not use a sharp object to install the guide pin bushing.

(2) Insert the folded bushing into the caliper mounting boss using your fingers from the rear of the caliper.

(3) Unfold the bushing using your fingers or a wooden dowel until the bushing is fully seated into the caliper housing. The bushing flanges should be seated evenly on both sides of the bushing hole.

(4) Lubricate inside surfaces of bushing using Mopar® Dielectric Grease or equivalent.

(5) Repeat the procedure for remaining bushing.

ASSEMBLY - CALIPER PISTON AND SEAL

NOTE: Never use an old piston seal.

(1) Dip the new piston seal in clean brake fluid and install it in the groove of the caliper bore. The seal should be started at one area of the groove and gently worked around and into the groove (Fig. 30)using only your clean fingers to seat it.

(2) Coat the new piston boot with clean brake fluid leaving a generous amount inside the boot.

DISC BRAKE CALIPERS - REAR (Continued)

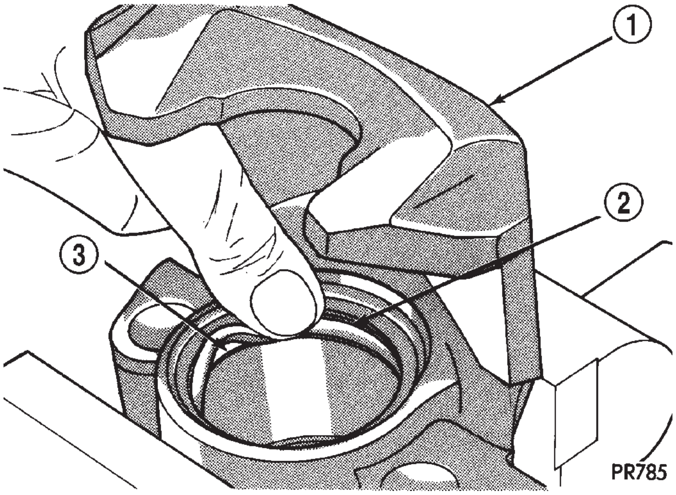


Fig. 30 Installing New Piston Seal

1 - CALIPER
2 - PISTON SEAL
3 - SEAL GROOVE

(3) Position the dust boot over the piston after coating it with brake fluid.

CAUTION: Force applied to the piston to seat it in the bore must be applied uniformly to avoid cocking and binding of the piston.

(4) Install piston into caliper bore pushing it past the piston seal until it bottoms in the caliper bore (Fig. 31).

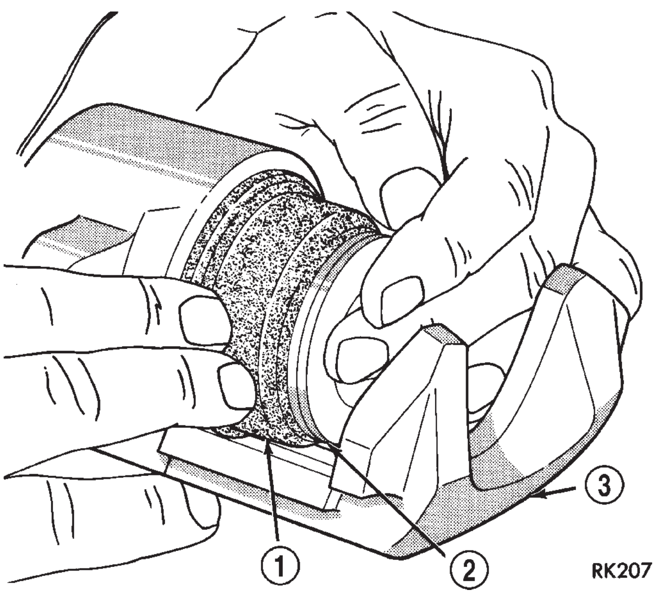


Fig. 31 Installing Piston Into Caliper Bore

1 - BOOT
2 - PISTON
3 - CALIPER

(5) Position the dust boot into the counterbore of the caliper assembly piston bore.

(6) Using a hammer and Installer, Special Tool C-4689 or C-4842 (depending on piston size), and Handle, Special Tool C-4171, drive the boot into the counterbore of the caliper as necessary (Fig. 32).

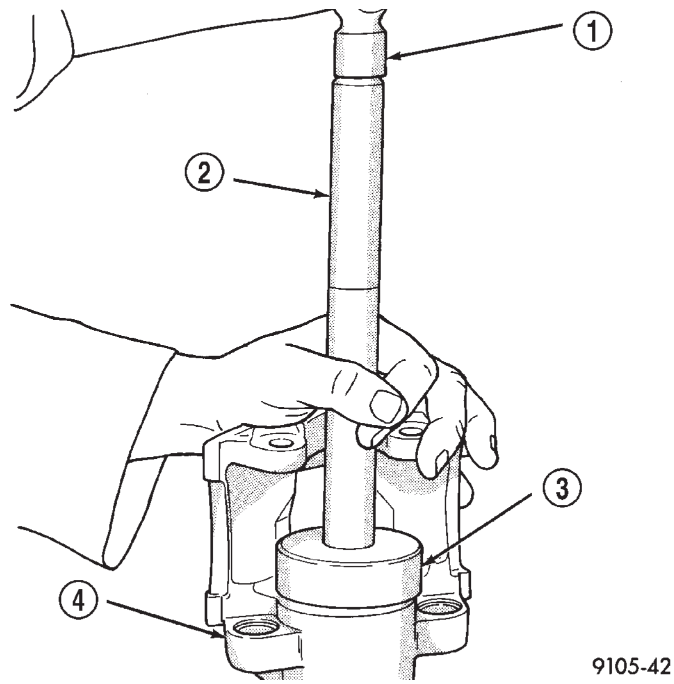


Fig. 32 Installing Dust Boot

1 - HAMMER
2 - SPECIAL TOOL C-4171
3 - SPECIAL TOOL C-4689 or C-4842
4 - CALIPER

(7) Reinstall the caliper on the vehicle and bleed the brakes as necessary. Refer to Installation in this section.

INSTALLATION - REAR DISC BRAKE CALIPER

(1) Completely retract caliper piston back into piston bore of caliper assembly.

(2) Lubricate both adapter abutments with a liberal amount of Mopar® Multipurpose Lubricant, or equivalent.

(3) If removed, install the rotor on the hub making sure it is squarely seated on the face of the hub (Fig. 33).

CAUTION: Use care when installing caliper assembly onto adapter so the guide pin bushings and sleeves do not get damaged by the mounting bosses on adapter.

(4) Carefully lower caliper and brake shoes over rotor reversing the removal procedure (Fig. 27).

DISC BRAKE CALIPERS - REAR (Continued)

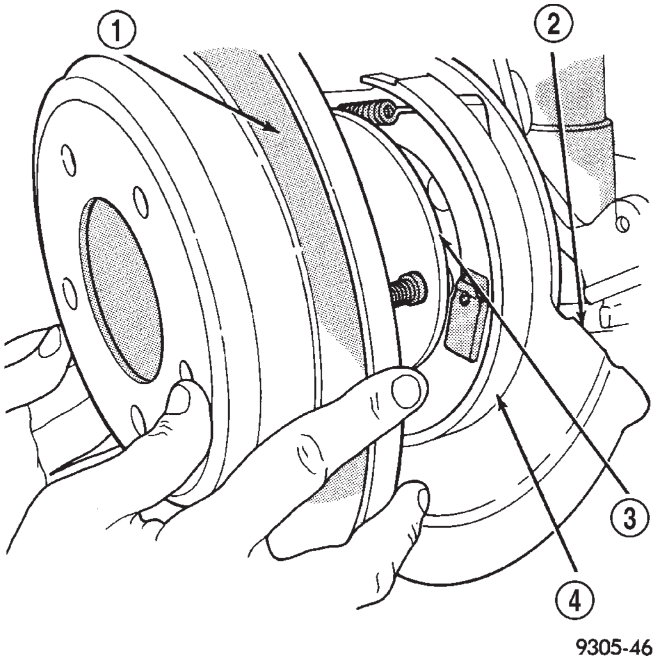


Fig. 33 Installing Rear Rotor

1 - BRAKING DISC
2 - DISC SHIELD
3 - HUB
4 - DRUM-IN-HAT PARKING BRAKE

Make sure that the caliper guide pin bolts, bushings and sleeves are clear of the adapter bosses.

CAUTION: Extreme caution should be taken not to cross thread the caliper guide pin bolts when they are installed.

(5) Install the caliper guide pin bolts (Fig. 26). Tighten the caliper guide pin bolts to a torque of 22 N·m (192 in. lbs.).

(6) Install the brake hose on the caliper. To do this, first place one NEW special fitting washer on each side of the hose fitting, then slide the banjo bolt through the fitting. Next, thread the banjo bolt into the threaded port on the rear of the brake caliper. Tighten the banjo bolt to a torque of 35 N·m (26 ft. lbs.).

(7) Install wheels and tire assembly.

(8) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(9) Lower vehicle.

(10) Remove the brake pedal depressor (holding) tool.

(11) Bleed the hydraulic brake circuit to the brake caliper. (Refer to 5 - BRAKES - STANDARD PROCEDURE)

(12) Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake pads.

FLUID

DIAGNOSIS AND TESTING - BRAKE FLUID CONTAMINATION

Indications of fluid contamination are swollen or deteriorated rubber parts.

Swollen rubber parts indicate the presence of petroleum in the brake fluid.

To test for contamination, put a small amount of drained brake fluid in clear glass jar. If fluid separates into layers, there is mineral oil or other fluid contamination of the brake fluid.

If brake fluid is contaminated, drain and thoroughly flush system. Replace master cylinder, proportioning valve, caliper seals, wheel cylinder seals, Antilock Brakes hydraulic unit and all hydraulic fluid hoses.

STANDARD PROCEDURE - BRAKE FLUID LEVEL CHECKING

Brake fluid level should be checked a minimum of twice a year.

Master cylinder reservoirs are marked, FULL and MIN, indicating the allowable brake fluid level range in the master cylinder brake fluid reservoir.

CAUTION: Use only Mopar® brake fluid or an equivalent from a tightly sealed container. Brake fluid must conform to DOT 3 specifications. Do not use petroleum-based fluid because seal damage in the brake system will result.

Although there is a range, the preferred level is FULL. If necessary, adjust the brake fluid level, bringing it to the FULL mark on the side of the master cylinder brake fluid reservoir.

SPECIFICATIONS

BRAKE FLUID

The brake fluid used in this vehicle must conform to DOT 3 specifications and SAE J1703 standards. No other type of brake fluid is recommended or approved for usage in the vehicle brake system. Use only Mopar brake fluid or an equivalent from a tightly sealed container.

FLUID (Continued)

CAUTION: Never use reclaimed brake fluid or fluid from an container which has been left open. An open container will absorb moisture from the air and contaminate the fluid.

CAUTION: Never use any type of a petroleum-based fluid in the brake hydraulic system. Use of such type fluids will result in seal damage of the vehicle brake hydraulic system causing a failure of the vehicle brake system. Petroleum based fluids would be items such as engine oil, transmission fluid, power steering fluid, etc.

JUNCTION BLOCK

DESCRIPTION

A junction block is used on vehicles that are not equipped with antilock brakes (ABS). The junction block is located on the left side of the lower radiator support (Fig. 34). The junction block mounts in the same location as the ABS integrated control unit (ICU) does on vehicles with ABS.

It has six threaded ports to which the brake tubes connect. Two are for the brake tubes coming from the master cylinder. The remaining four ports are for the brake tubes going to each brake assembly. The valve is permanently mounted to a bracket which fastens to the lower radiator support.

The junction block includes two proportioning valves for the rear brakes. One valve is mounted in each end of the block (Fig. 34). The proportioning valves are not serviced separately from the junction block.

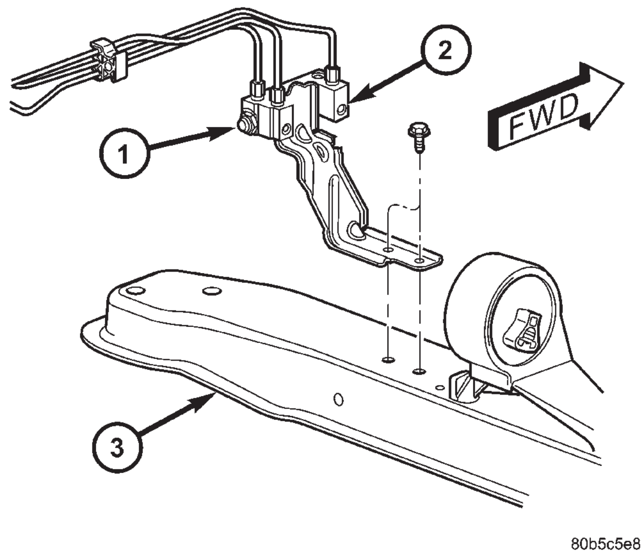


Fig. 34 JUNCTION BLOCK MOUNTING

1 - PROPORTIONING VALVE
2 - JUNCTION BLOCK
3 - LOWER RADIATOR SUPPORT

OPERATION

The junction block distributes the brake fluid coming from the master cylinder primary and secondary ports to the four brake tubes leading to the brakes. Since the junction block mounts in the same location as the ABS integrated control unit (ICU), it allows for the common use of brake tubes on the vehicle whether it is equipped with or without ABS.

The junction block includes two proportioning valves. Placed in the fluid flow passages leading to the rear brake tube ports, they balance front-to-rear braking. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/PROPORTIONING VALVE - OPERATION)

REMOVAL

(1) Disconnect and isolate the negative battery connection at the left front strut tower.

(2) Using a brake pedal holding tool such as shown (Fig. 35), depress brake pedal past its first 1 inch of travel and secure in this position. This will isolate the master cylinder reservoir from the brake hydraulic system, not allowing the brake fluid to drain out of the reservoir.

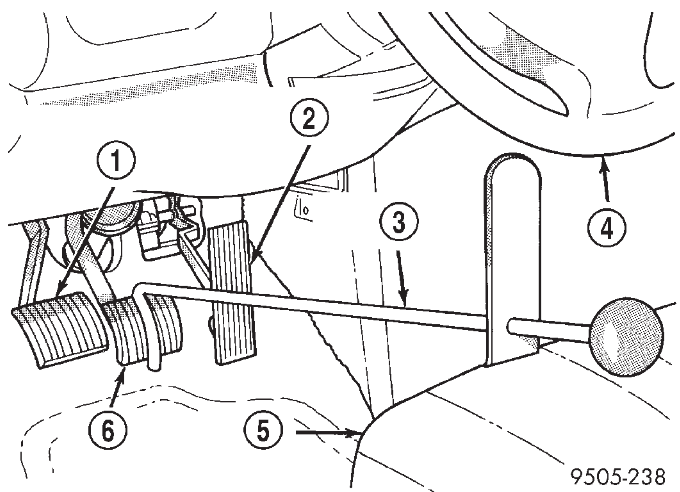


Fig. 35 Brake Pedal Holding Tool Installed (Typical)

1 - CLUTCH PEDAL (IF EQUIPPED WITH MANUAL TRANSAXLE)
2 - THROTTLE PEDAL
3 - BRAKE PEDAL HOLDING TOOL
4 - STEERING WHEEL
5 - DRIVER'S SEAT
6 - BRAKE PEDAL

(3) Remove the air cleaner housing. Refer to 9 - ENGINE/AIR INTAKE SYSTEM

JUNCTION BLOCK (Continued)

(4) Clean any debris away from the fittings on top of the junction block.

(5) Remove the two brake tubes coming from the primary and secondary master cylinder ports at the junction block (Fig. 36).

(6) Remove the four chassis brake tubes going to each brake, mounted across the front top of the junction block (Fig. 36).

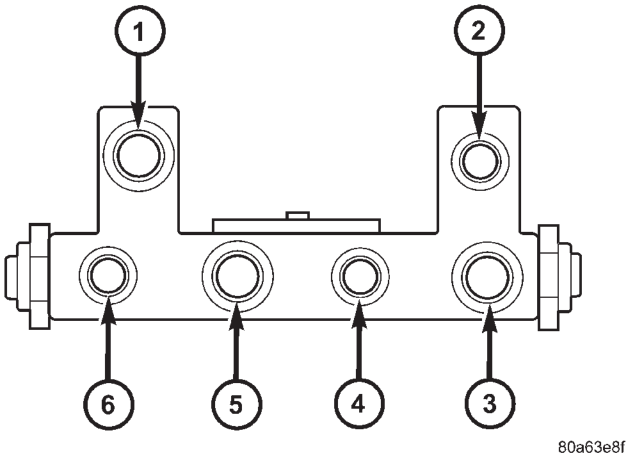


Fig. 36 Junction Block Fitting Identification

1 - FROM MASTER CYLINDER PRIMARY
2 - FROM MASTER CYLINDER SECONDARY
3 - TO LEFT FRONT BRAKE
4 - TO RIGHT REAR BRAKE
5 - TO LEFT REAR BRAKE
6 - TO RIGHT FRONT BRAKE

(7) Remove the bolts fastening the junction block mounting bracket to the lower radiator support (Fig. 34).

(8) Remove the junction block and bracket from the vehicle.

INSTALLATION

(1) Install the junction block with mounting bracket onto the lower radiator support. Install and tighten the mounting bolts to 38 N·m (28 ft. lbs.) torque.

(2) Install the four chassis brake tubes (going to each brake) to the junction block (Fig. 36). Tighten the tube fittings to 17 N·m (145 in. lbs.) torque with the aid of a crow foot wrench.

(3) Install the two brake tubes coming from the primary and secondary master cylinder ports to the top rear corners of the junction block (Fig. 36). Tighten the tube fittings to 17 N·m (145 in. lbs.) torque with the aid of a crow foot wrench.

(4) Install the air cleaner housing. Refer to 9 - ENGINE/AIR INTAKE SYSTEM.

(5) Remove the brake pedal holding tool.

(6) Reconnect the battery negative cable.

(7) Bleed the base brake system. (Refer to 5 - BRAKES - BASE - STANDARD PROCEDURE)

MASTER CYLINDER

STANDARD PROCEDURE - MASTER CYLINDER BLEEDING

(1) Clamp the master cylinder in a vise using only the mounting flange.

(2) Thread Bleeding Tubes, Special Tool 8358, into master cylinder primary and secondary ports. Position outlet ends of bleeding tubes in reservoir with the outlets below surface of brake fluid when reservoir is filled to its proper level.

(3) Fill brake fluid reservoir with Mopar® brake fluid or equivalent conforming to DOT 3 specifications.

(4) Using a wooden dowel, depress push rod slowly, and then allow pistons to return to released position. Repeat several times until all air bubbles are expelled from master cylinder.

(5) Remove bleeding tubes from master cylinder outlet ports, and then plug outlet ports and install fill cap on reservoir.

(6) Remove master cylinder from vise.

(7) Install the filler cap on master cylinder fluid reservoir.

(8) Install master cylinder. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/MASTER CYLINDER - INSTALLATION)

REMOVAL

(1) Remove vehicle wiring harness connector from brake fluid level switch in side of master cylinder brake fluid reservoir (Fig. 37).

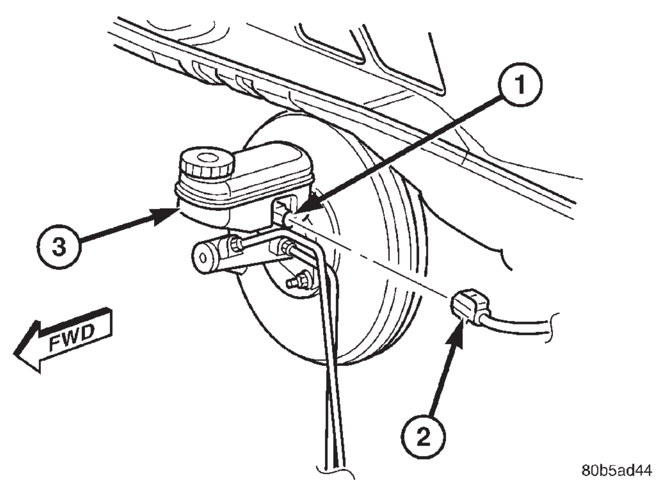


Fig. 37 BRAKE FLUID LEVEL SWITCH

1 - BRAKE FLUID LEVEL SWITCH
2 - WIRING CONNECTOR
3 - FLUID RESERVOIR

MASTER CYLINDER (Continued)

(2) Disconnect the primary and secondary brake tubes from master cylinder outlet ports (Fig. 38). Install plugs at open brake tube outlets on master cylinder assembly.

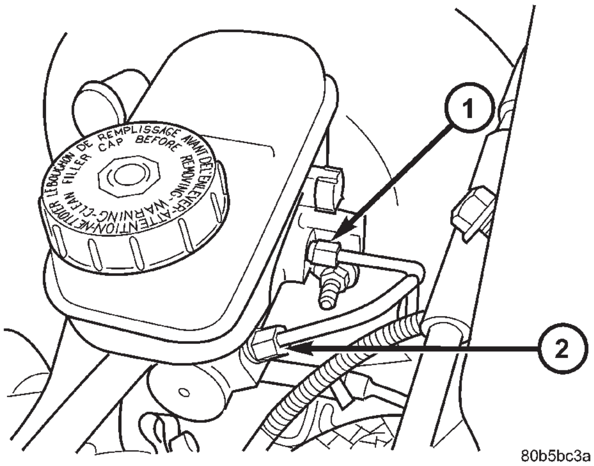


Fig. 38 PRIMARY AND SECONDARY BRAKE TUBES

1 - PRIMARY BRAKE TUBE
2 - SECONDARY BRAKE TUBE

(3) Using Mopar® Brake Parts Cleaner or equivalent, clean area where master cylinder attaches to booster.

(4) Remove the 2 nuts attaching master cylinder assembly to power brake vacuum booster.

(5) Slide master cylinder assembly straight off its mounting studs on power brake vacuum booster.

INSTALLATION

(1) Position master cylinder assembly on studs of power brake unit, aligning push rod on power brake vacuum booster with piston of master cylinder.

(2) Install the 2 master cylinder to power brake vacuum booster mounting nuts. Tighten both nuts to a torque of 26 N·m (230 in. lbs.).

(3) Connect brake tubes to master cylinder primary and secondary ports. Then tighten the tube nuts to a torque of 17 N·m (145 in. lbs.).

(4) Connect wiring harness connector to brake fluid level switch.

(5) Fill master cylinder with clean, fresh Mopar® Brake Fluid or equivalent.

(6) Road test vehicle to ensure proper operation of brakes.

POWER BRAKE BOOSTER

DIAGNOSIS AND TESTING - POWER BRAKE BOOSTER

BASIC TEST

(1) With engine off, depress and release the brake pedal several times to purge all vacuum from the power brake booster.

(2) Depress and hold the pedal with light effort (15 to 25 lbs. pressure), then start the engine.

The pedal should fall slightly, then hold. Less effort should be needed to apply the pedal at this time. If the pedal fell as indicated, perform the VACUUM LEAK TEST listed after the BASIC TEST. If the pedal did not fall, continue on with this BASIC TEST.

(3) Disconnect the vacuum hose on the side of the vacuum check valve that leads to the speed control, then connect a vacuum gauge to the open vacuum port on the valve.

(4) Start the engine.

(5) When the engine is at warm operating temperature, allow it to idle and check the vacuum at the gauge.

If the vacuum supply is 12 inches Hg (40.5 kPa) or more, the power brake booster is defective and must be replaced. If the vacuum supply is below 12 inches, continue on with this BASIC TEST.

(6) Shut off the engine.

(7) Connect the vacuum gauge to the vacuum reference port on the engine intake manifold.

(8) Start the engine and observe the vacuum gauge.

If the vacuum is still low, check the engine tune and repair as necessary. If the vacuum is above 12 inches, the hose or check to the booster has a restriction or leak.

Once an adequate vacuum supply is obtained, repeat the BASIC TEST.

VACUUM LEAK TEST

(1) Disconnect the vacuum hose on the side of the power brake booster vacuum check valve that leads to the speed control, then connect a vacuum gauge to the open vacuum port on the valve.

(2) Remove the remaining hose on the vacuum check valve that is not the vacuum supply hose coming from the intake manifold. Cap off the open port on the check valve.

(3) Start the engine.

(4) Allow the engine to warm up to normal operating temperature and engine idle.

(5) Using vacuum line pliers, close off the vacuum supply hose near the booster and observe the vacuum gauge.

POWER BRAKE BOOSTER (Continued)

If the vacuum drop exceeds 1.0 inch Hg (3.3 kPa) in one minute, repeat the above steps to confirm the reading. The vacuum loss should be less than 1.0 inch Hg in one minute time span. If the loss is more than 1.0 inch Hg, replace the power brake booster. If it is not, continue on with this test.

(6) Remove the pliers from the hose temporarily.

(7) Apply light effort (approximately 15 lbs. of force) to the brake pedal and hold the pedal steady. Do not move the pedal once the pressure is applied or the test results may vary.

(8) Have an assistant reattach the pliers to the vacuum supply hose.

(9) Allow 5 seconds for stabilization, then observe the vacuum gauge.

If the vacuum drop exceeds 3.0 inches Hg (10 kPa) in 15 seconds, repeat the above steps to confirm the reading. The vacuum loss should be less than 3.0 inches Hg in 15 seconds time span. If the loss is more than 3.0 inches Hg, replace the power brake booster. If it is not, the booster is not defective.

REMOVAL - POWER BRAKE BOOSTER

(1) Remove the remote ground cable from the ground stud located on the left shock tower.

(2) Correctly isolate remote ground cable by installing the ground cable insulator on the strut tower ground stud as shown (Fig. 39). **This will prevent accidental grounding of the remote ground cable.**

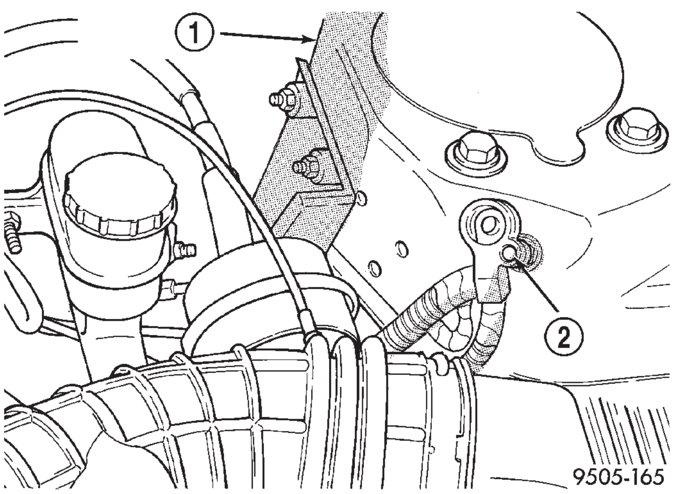


Fig. 39 Correctly Isolated Remote Ground Cable

1 - LEFT STRUT TOWER
2 - GROUND STUD

(3) Disconnect the wiring harness connector and vacuum hose at speed control servo.

(4) Remove speed control servo mounting nuts. Leaving cable attached, move servo out off to the side.

(5) Remove the master cylinder from the booster. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/MASTER CYLINDER - REMOVAL)

(6) Remove the vacuum hoses from the check valve located on the power brake vacuum booster.

(7) Remove the electrical connector and mounting screw from the purge solenoid mounted on the left frame rail (Fig. 40). Allow the solenoid to drop downward.

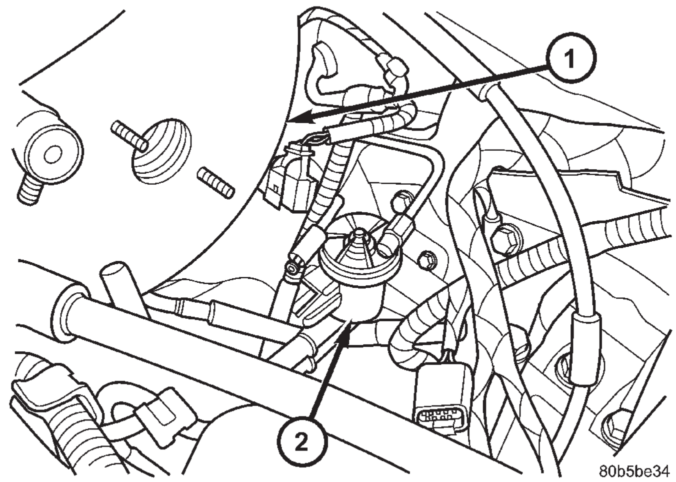


Fig. 40 PURGE SOLENOID

1 - POWER BRAKE BOOSTER
2 - PURGE SOLENOID

(8) Locate the power brake vacuum booster input rod to brake pedal attachment under instrument panel. Position a small screwdriver between the center tang on the power brake booster input rod to brake pedal pin retaining clip (Fig. 41). Rotate screwdriver enough to allow retaining clip center tang to pass over end of brake pedal pin. Then pull retaining clip off brake pedal pin. **Discard retaining clip. Replace only with a new retaining clip when assembled.**

(9) Remove the 4 nuts attaching power brake vacuum booster to dash panel. Nuts are accessible from under dash panel in area of the steering column and pedal bracket assembly (Fig. 42).

(10) Slide power brake vacuum booster straight forward until mounting studs clear dash panel, and remove from vehicle.

CAUTION: Do not attempt to disassemble the power brake vacuum booster it is to be serviced ONLY as a complete assembly.

INSTALLATION - POWER BRAKE BOOSTER

(1) Position power brake booster onto dash panel.

POWER BRAKE BOOSTER (Continued)

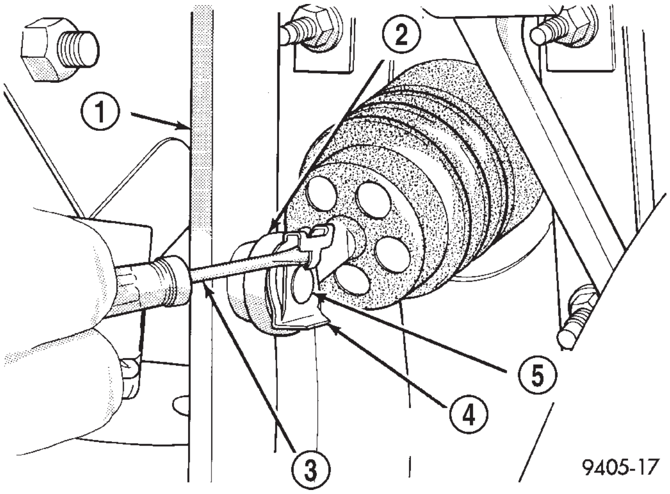


Fig. 41 Input Rod Retaining Pin

1 - BRAKE PEDAL
2 - INPUT ROD
3 - SCREWDRIVER
4 - RETAINING CLIP
5 - BRAKE PEDAL PIN

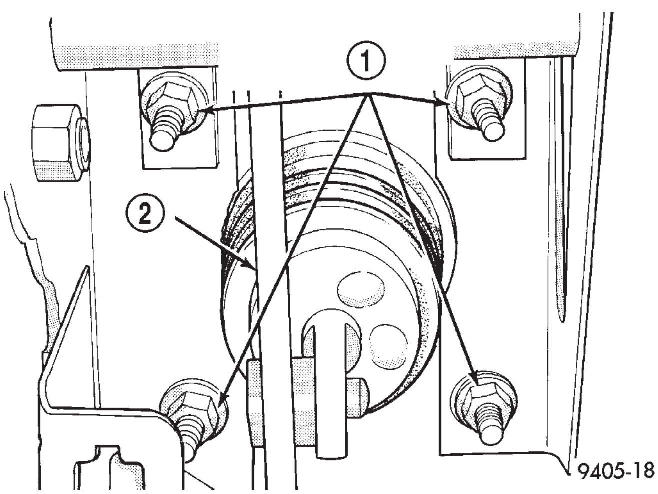


Fig. 42 Power Brake Booster Mounting

1 - POWER BRAKE BOOSTER MOUNTING NUTS
2 - BRAKE PEDAL

(2) Install and torque the 4 power brake vacuum booster mounting nuts (Fig. 42) to 29 N·m (250 in. lbs.) torque.

(3) Using lubriplate, or an equivalent, coat the surfaces of the brake pedal pin that contact the power brake vacuum booster input rod.

(4) Connect power brake vacuum booster input rod to brake pedal pin and install a NEW retaining clip. **Use only a new retainer clip DO NOT USE the old clip.**

(5) Install the purge solenoid to the left frame rail and connect its wiring harness (Fig. 40).

(6) Install the vacuum hoses on the booster check valve.

(7) Install the master cylinder and connect the fluid level switch. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/MASTER CYLINDER - INSTALLATION)

(8) If equipped, install speed control servo on the mounting studs. Install the 2 speed control servo bracket mounting nuts and tighten to a torque of 6 N·m (55 in. lbs.). Install electrical connector and vacuum hose on speed control servo.

(9) Install the throttle cable, and if equipped, the speed control cable on the cam of the throttle body assembly.

(10) Install the remote ground cable on the ground stud located on the left strut tower. Install and securely tighten the ground cable attaching nut.

(11) Check brake lamp operation. If required, adjust brake lamp switch as necessary. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/BRAKE LAMP SWITCH - ADJUSTMENTS)

(12) Road test vehicle to ensure proper operation of the vehicles brake system and speed control.

PROPORTIONING VALVE

DESCRIPTION

Proportioning valves are included on vehicles **without** antilock brakes (ABS). They are located in the junction block. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/JUNCTION BLOCK - DESCRIPTION)

NOTE: Vehicles with ABS do not have proportioning valves. They have electronic variable brake proportioning (EVBP).

OPERATION

Proportioning valves balance front to rear braking by controlling (at a given ratio) brake hydraulic pressure to the rear brakes above a preset level (split point). On light pedal applications equal brake pressure is transmitted to both the front and rear brakes. On heavier pedal applications, through the use of proportioning valves, the pressure transmitted to the rear will be lower than the front brakes. This prevents premature rear wheel skid.

If hydraulic pressure is lost in one-half of the diagonally split brake hydraulic system, the operation of the proportioning valve in the remaining half is not affected.

ROTOR

DIAGNOSIS AND TESTING - BRAKE ROTOR

Any servicing of the rotor requires extreme care to maintain the rotor within service tolerances to ensure proper brake action.

Excessive runout or wobble in a rotor can increase pedal travel due to piston knock-back. This increases guide pin sleeve wear due to the tendency of the caliper to follow the rotor wobble.

When diagnosing a brake noise or pulsation, the machined disc braking surface should be checked and inspected.

BRAKING SURFACE INSPECTION

Light braking surface scoring and wear is acceptable. If heavy scoring or warping is evident, the rotor must be refaced or replaced. For information on brake rotor machining, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - STANDARD PROCEDURE).

Excessive wear and scoring of the rotor can cause improper lining contact on the rotor's braking surface. If the ridges on the rotor are not removed before new brake shoes are installed, improper wear of the shoes will result.

If a vehicle has not been driven for a period of time, the rotor's braking surface will rust in the areas not covered by the brake shoes at that time. Once the vehicle is driven, noise and chatter from the disc brakes can result when the brakes are applied.

Some discoloration or wear of the rotor surface is normal and does not require resurfacing when linings are replaced. If cracks or burned spots are evident, the rotor must be replaced.

ROTOR MINIMUM THICKNESS

Measure rotor thickness at the center of the brake shoe contact surface. Replace the rotor if it is worn below minimum thickness or if machining the rotor will cause its thickness to fall below specifications.

CAUTION: Do not machine the rotor if it will cause the rotor to fall below minimum thickness.

Minimum thickness specifications are cast on the rotor's unmachined surface (Fig. 43). Limits can also be found in the table at the end of this brake rotor information.

ROTOR THICKNESS VARIATION

Thickness variation in a rotor's braking surface can result in pedal pulsation, chatter and surge. This can also be caused by excessive runout in the rotor or the hub.

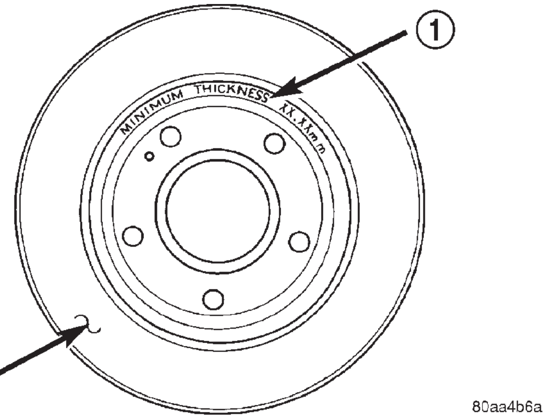


Fig. 43 Minimum Thickness Markings (Typical)

1 - ROTOR MINIMUM THICKNESS MARKING
2 - ROTOR

Rotor thickness variation measurements should be made in conjunction with measuring runout. Measure thickness of the brake rotor at 12 equal points around the rotor braking surface with a micrometer at a radius approximately 25 mm (1 inch) from edge of rotor (Fig. 44). If thickness measurements vary by more than 0.013 mm (0.0005 inch), the rotor should refaced or replaced. For information on brake rotor machining, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - STANDARD PROCEDURE).

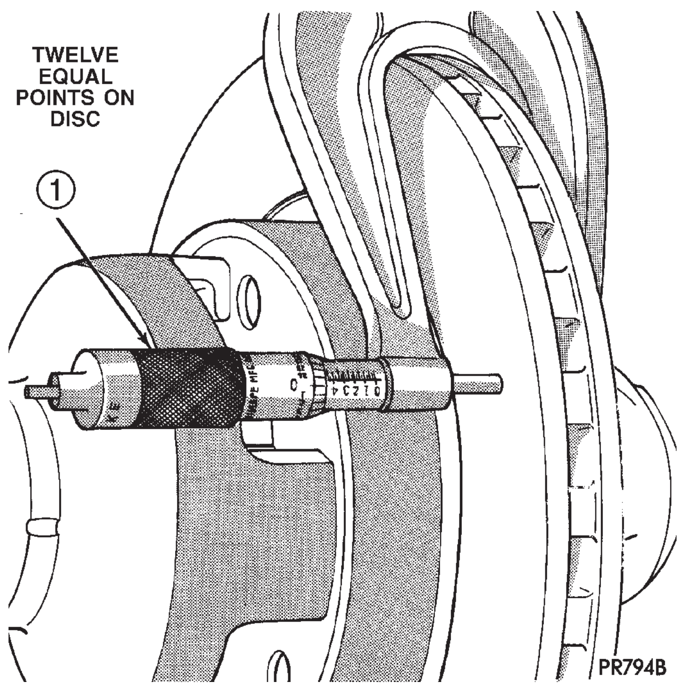


Fig. 44 Checking Rotor For Thickness

1 - MICROMETER

ROTOR (Continued)

ROTOR RUNOUT

On-vehicle rotor runout is the combination of the individual runout of the hub face and the runout of the rotor. (The hub and rotor runouts are separable). To measure rotor runout on the vehicle, first remove the tire and wheel assembly. Reinstall the wheel mounting nuts on the studs, tightening the rotor to the hub. Mount the Dial Indicator, Special Tool C-3339, with Mounting Adaptor, Special Tool SP-1910 on steering arm. The dial indicator plunger should contact braking surface of rotor approximately 25 mm (one inch) from outer edge of rotor (Fig. 45). Check lateral runout on both sides of the rotor, marking the low and high spots on both. Runout limits can be found in the table at the end of this brake rotor information.

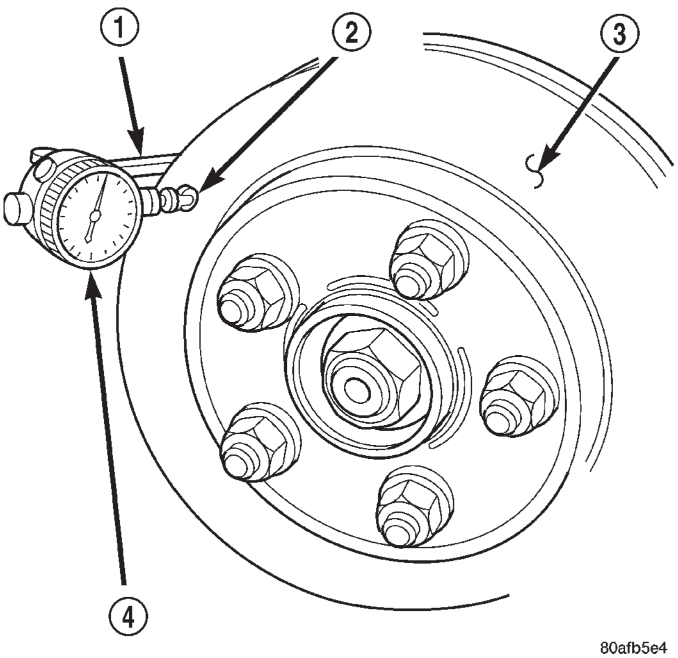


Fig. 45 Checking Rotor Runout

1 - SPECIAL TOOL SP-1910
2 - 25 mm FROM EDGE
3 - DISC SURFACE
4 - SPECIAL TOOL C-3339

If runout is in excess of the specification, check the lateral runout of the hub face. Before removing the rotor from the hub, place a chalk mark across both the rotor and the one wheel stud closest to where the high runout measurement was taken. This way, the original mounting spot of the rotor on the hub is indexed (Fig. 46).

Remove the rotor from the hub.

NOTE: Clean the hub face surface before checking runout. This provides a clean surface to get an accurate indicator reading.

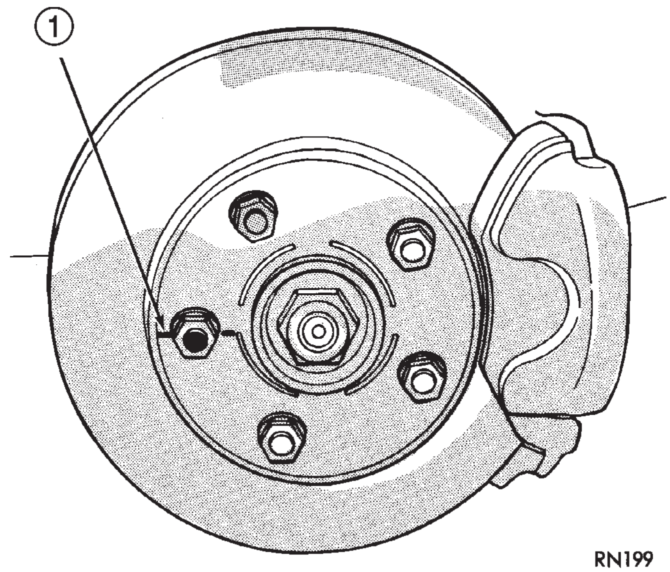


Fig. 46 Marking Rotor and Wheel Stud

1 - CHALK MARK

Mount Dial Indicator, Special Tool C-3339, and Mounting Adaptor, Special Tool SP-1910, to the steering knuckle. Position the indicator stem so it contacts the hub face near the outer diameter. Care must be taken to position stem outside of the stud circle, but inside of the chamfer on the hub rim (Fig. 47).

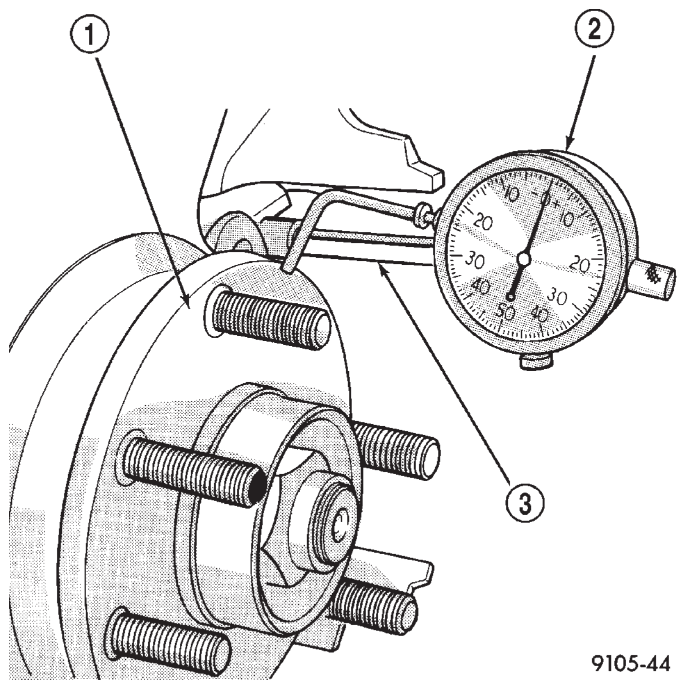


Fig. 47 Checking Hub Runout

1 - HUB SURFACE
2 - SPECIAL TOOL C-3339
3 - SPECIAL TOOL SP-1910

ROTOR (Continued)

Hub runout should not exceed 0.05 mm (0.0019 inch). If runout exceeds this specification, the hub must be replaced. Refer to SUSPENSION.

If the hub runout does not exceed this specification, install the rotor back on the hub, aligning the chalk marks on the rotor with a wheel mounting stud, two studs apart from the original stud (Fig. 48). Tighten nuts in the proper sequence and torque to specifications.

Recheck brake rotor runout to see if the runout is now within specifications.

If runout is not within specifications, reface or replace the brake rotor. For information on brake rotor machining, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - STANDARD PROCEDURE).

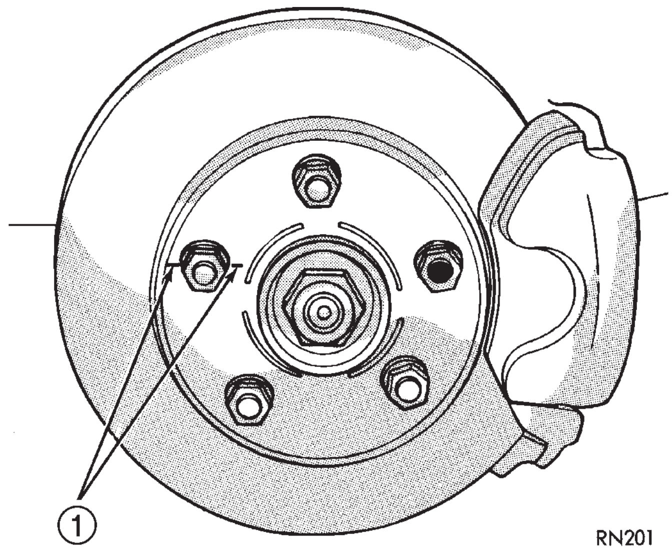


Fig. 48 Index Rotor And Wheel Stud

1 - CHALK MARK

BRAKE ROTOR LIMITS

Braking Rotor	Rotor Thickness	Minimum Rotor Thickness	Rotor Thickness Variation	Rotor Runout*	Rotor Micro Finish
Front Rotor	22.87–23.13 mm 0.900-0.911 in.	21.4 mm 0.843 in.	0.013 mm 0.0005 in.	0.10 mm 0.004 in.	15-80 RMS
Rear Rotor	8.87–9.13 mm 0.350-0.360 in.	7.25 mm 0.285 in.	0.013 mm 0.0005 in.	0.10 mm 0.004 in.	15-80 RMS
* TIR—Total Indicator Reading (Measured On Vehicle)					

STANDARD PROCEDURE - BRAKE ROTOR MACHINING

NOTE: Refacing the rotor is not required each time the brake pads are replaced, only when the need is foreseen.

Any servicing of the rotor requires extreme care to maintain the rotor within service tolerances to ensure proper brake action.

If the rotor surface is deeply scored or warped, or there is a complaint of brake roughness or brake pedal pulsation, the rotor should be refaced using a hub-mounted on-car brake lathe (Fig. 49), or replaced.

The use of a hub-mounted on-car brake lathe is highly recommended to eliminate the possibility of excessive runout. It trues the brake rotor to the vehicle's hub and bearing.

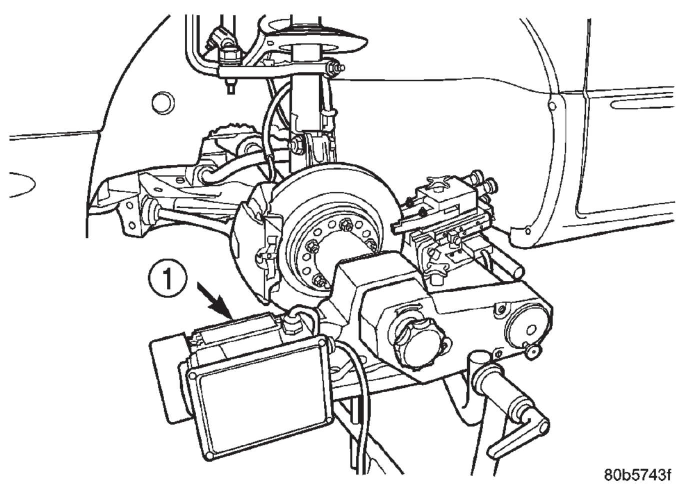


Fig. 49 On-Car Brake Lathe

1 - ON-CAR BRAKE LATHE

ROTOR (Continued)

NOTE: All rotors have markings for minimum allowable thickness cast on an un-machined surface of the rotor (Fig. 50).

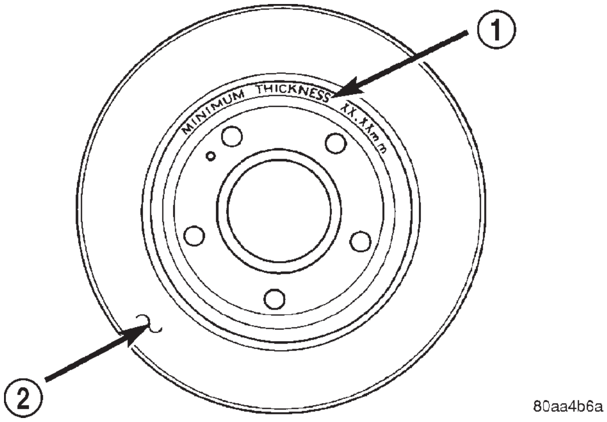


Fig. 50 Minimum Brake Rotor Thickness Markings (Typical)

1 - ROTOR MINIMUM THICKNESS MARKING
2 - ROTOR

Minimum allowable thickness is the minimum thickness which the brake rotor machined surface may be cut to.

CAUTION: Do not machine the rotor if it will cause the rotor to fall below minimum thickness.

Before installation, verify the brake rotor face and the hub adapters are free of any chips, rust, or contamination.

When mounting and using the brake lathe, strict attention to the brake lathe manufacturer's operating instructions is required.

Machine both sides of the brake rotor at the same time. Cutting both sides at the same time minimizes the possibility of a tapered or uneven cut.

SPECIFICATIONS AND LIMITS

When refacing a rotor, the required TIR (Total Indicator Reading) and thickness variation limits MUST BE MAINTAINED. Extreme care in the operation of rotor turning equipment is required.

LIMITS/SPECIFICATIONS

Braking Rotor	Rotor Thickness	Minimum Rotor Thickness	Rotor Thickness Variation	Rotor Runout*	Rotor Micro Finish
Front Rotor	22.87–23.13 mm 0.900-0.911 in.	21.4 mm 0.843 in.	0.013 mm 0.0005 in.	0.10 mm 0.004 in.	15-80 RMS
Rear Rotor	8.87–9.13 mm 0.350-0.360 in.	7.25 mm 0.285 in.	0.013 mm 0.0005 in.	0.10 mm 0.004 in.	15-80 RMS
* TIR—Total Indicator Reading (Measured On Vehicle)					

REMOVAL

REMOVAL - FRONT ROTOR

(1) Raise the vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove the front tire and wheel assembly.

(3) Slide the caliper outward in an effort to retract the caliper piston into its bore.

(4) Remove the two bolts securing disc brake caliper adapter to the steering knuckle (Fig. 51).

(5) Remove the disc brake caliper and adapter from the knuckle as an assembly. Hang the assembly out of the way using wire or a bungee cord. Use care not to overextend the brake hose when doing this.

(6) Remove the clips retaining the brake rotor to the wheel studs.

(7) Remove the brake rotor.

REMOVAL - REAR ROTOR

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove rear tire and wheel.

(3) Remove the caliper and shoes from adapter and hang out of way. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/BRAKE PADS/SHOES - REMOVAL)

(4) Remove any clips on the wheel mounting studs.

(5) Remove rotor from hub (Fig. 52).

INSTALLATION

INSTALLATION - FRONT ROTOR

(1) Install the brake rotor over the studs on the hub.

(2) Install the disc brake caliper and adapter assembly over the brake rotor.

ROTOR (Continued)

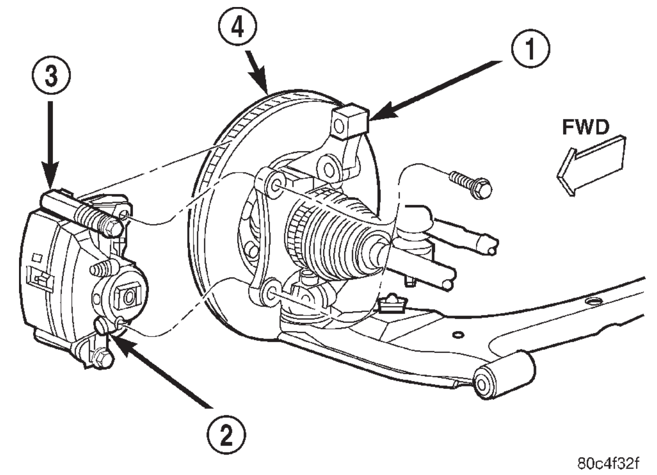


Fig. 51 Caliper/Adapter Mounting (Typical)

1 - STEERING KNUCKLE
2 - DISC BRAKE CALIPER
3 - DISC BRAKE CALIPER ADAPTER
4 - BRAKE ROTOR

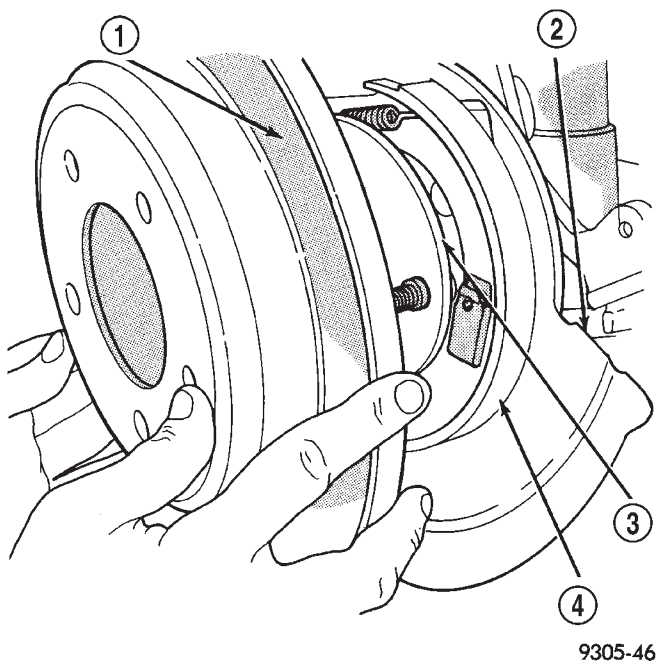


Fig. 52 Removing/Installing Rear Rotor

1 - BRAKING DISC
2 - DISC SHIELD
3 - HUB
4 - DRUM-IN-HAT PARKING BRAKE

(3) Install the mounting bolts securing the caliper adapter to the steering knuckle (Fig. 51). Tighten the bolts to a torque of 80 N·m (60 ft. lbs.).

(4) Install the tire and wheel assembly. Tighten the wheel mounting nuts to a torque of 135 N·m (100 ft. lbs.).

(5) Lower the vehicle.

(6) Pump the brake pedal several times before moving the vehicle to set the shoes to the brake rotor.

(7) Road test the vehicle and make several stops to seat the brake shoes to the rotor.

INSTALLATION - REAR ROTOR

(1) Install rotor on wheel mounting studs (Fig. 52).

(2) Install caliper and shoes on vehicle. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/BRAKE PADS/SHOES - INSTALLATION)

(3) Install wheel and tire assembly.

(4) Lower vehicle.

PARKING BRAKE

ADJUSTMENTS

ADJUSTMENT - PARKING BRAKE

This vehicle uses a bent nail type park brake cable tension equalizer (Fig. 53). The bent nail tension equalizer it to be used only one time to set the park brake cable tension. If the park brake cables require adjustment during the life of the vehicle, a **NEW** tension equalizer **MUST** be installed before doing the park cable adjustment procedure.

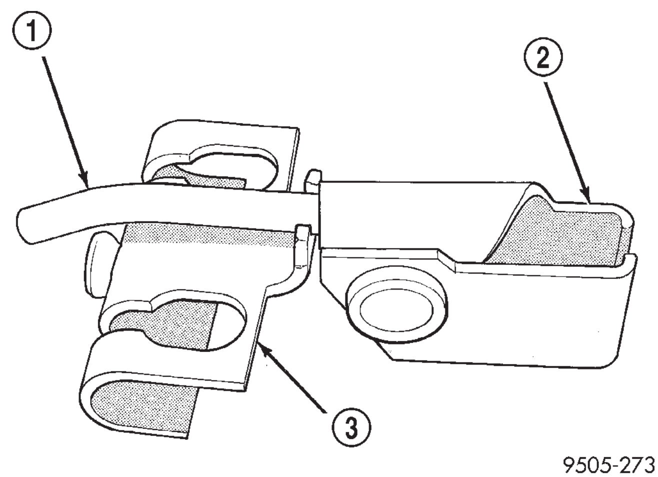


Fig. 53 Bent Nail Park Brake Cable Tension Equalizer

1 - BENT NAIL
2 - PARK BRAKE LEVER OUTPUT CABLE ATTACHMENT TO TENSION EQUALIZER
3 - REAR PARK BRAKE CABLE ATTACHMENT TO TENSION EQUALIZER

PARKING BRAKE (Continued)

(1) Remove the center floor console. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)

(2) Lower park brake lever handle.

(3) Loosen adjusting nut (Fig. 54) on park brake cable output cable. This will take tension off output cable, allowing it to be easily removed from tension equalizer.

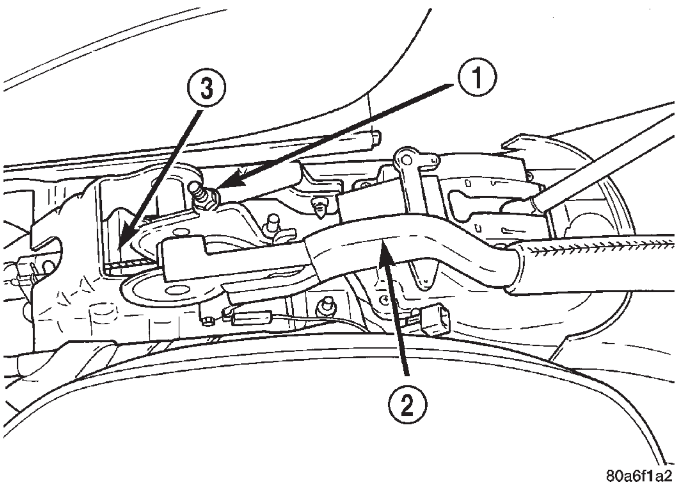


Fig. 54 Park Brake Lever Output Cable Adjustment Nut

1 - ADJUSTING NUT
2 - PARK BRAKE LEVER
3 - PARK BRAKE LEVER OUTPUT CABLE

CAUTION: Discard output cable retaining clip after removing it from park brake cable tension equalizer. Retainer is not to be re-used, a new retainer is to be installed when attaching output cable to tension equalizer.

(4) Using a screwdriver (Fig. 55), unlatch the park brake output cable retainer. Then remove cable retainer from park brake cable tension equalizer.

(5) Remove the park brake cable tension equalizer from the park brake lever output cable and the rear park brake cables (Fig. 56).

CAUTION: A new cable tension equalizer must be installed when adjusting park brake cable tension.

(6) Install a **NEW** park brake cable tension equalizer on the park brake lever output cable and rear park brake cables (Fig. 56).

CAUTION: A new park brake lever output cable retainer must be used when installing output cable on cable tension equalizer. Cable retainer usage is required to ensure output cable can not separate from tension equalizer.

(7) Install a **new** park brake lever output cable to tension equalizer retaining clip (Fig. 57) on tension

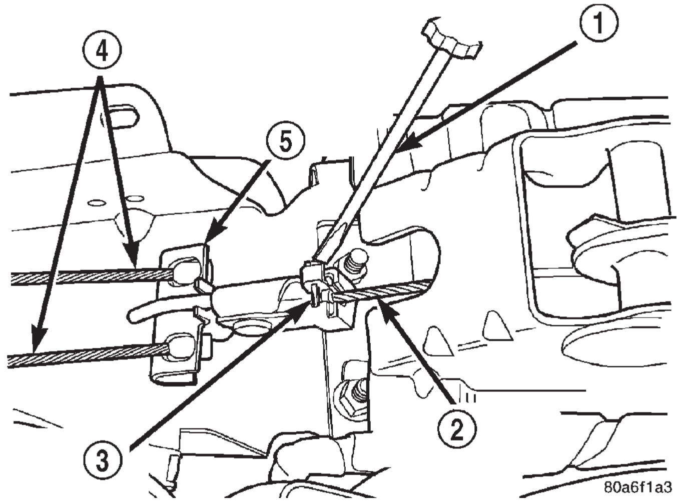


Fig. 55 Output Cable To Equalizer Retaining Clip

1 - SCREWDRIVER
2 - PARK BRAKE LEVER OUTPUT CABLE
3 - CABLE RETAINER
4 - REAR PARK BRAKE CABLES
5 - PARK BRAKE CABLE TENSION EQUALIZER

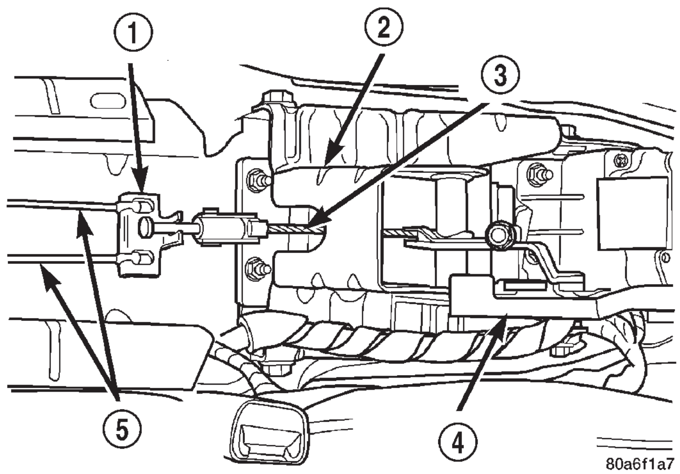


Fig. 56 Park Brake Cable Tension Equalizer

1 - PARK BRAKE CABLE TENSION EQUALIZER
2 - PARK BRAKE MECHANISM
3 - PARK BRAKE LEVER OUTPUT CABLE
4 - PARK BRAKE LEVER
5 - REAR PARK BRAKE CABLES

equalizer. The cable retainer (Fig. 57) must be closed and securely latched.

(8) Adjust cable tension for the parking brake system using the following steps.

• Position park brake lever so it is in the fully released position.

• Tighten the adjusting nut on the parking brake lever output cable until 26 millimeters of thread is out past top edge of adjustment nut (Fig. 58).

PARKING BRAKE (Continued)

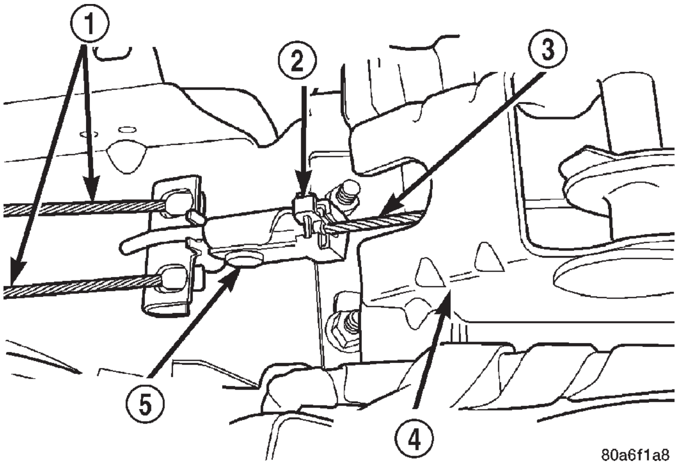


Fig. 57 Cable Retainer Installed On Tension Equalizer

1 - REAR PARK BRAKE CABLES
2 - CABLE RETAINING CLIP
3 - PARKING BRAKE MECHANISM OUTPUT CABLE
4 - PARK BRAKE MECHANISM
5 - PARK BRAKE CABLE TENSION EQUALIZER

• Actuate the parking brake lever to its fully applied position (15 clicks) 1 time and then reposition the lever to its fully released position.

NOTE: Actuating the parking brake lever to its fully applied position one time after tightening the adjustment nut will yield (stretch) the bent nail portion of the tension equalizer approximately 1/4 inch. This process will correctly set the parking brake cable tension.

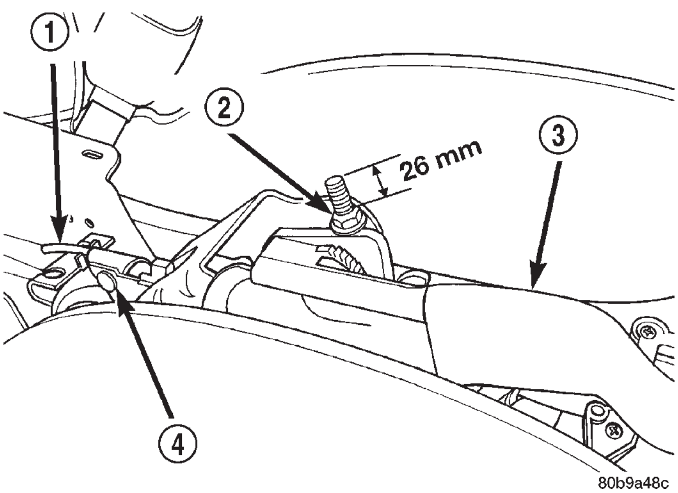


Fig. 58 Parking Brake Adjustment (Rear Disc Brakes)

1 - BENT NAIL
2 - ADJUSTING NUT
3 - PARKING BRAKE LEVER
4 - PARKING BRAKE CABLE TENSION EQUALIZER

(9) Check the rear wheels of the vehicle; they should rotate freely without dragging.

(10) After the park brake cable tension has been properly adjusted, check for free play in park brake lever. Park brake hand lever should feel firm at all clicks, with a maximum of 15 clicks of lever travel possible.

(11) Install the center floor console. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION)

CABLES - PARKING BRAKE

REMOVAL

For servicing of either the left or right rear parking brake cable, follow the procedure as listed below.

(1) Remove center floor console. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)

(2) Lower park brake lever handle.

(3) Loosen adjusting nut (Fig. 59) on park brake cable output cable. This will take tension off park brake cables, allowing rear park brake cables to be easily removed from tension equalizer.

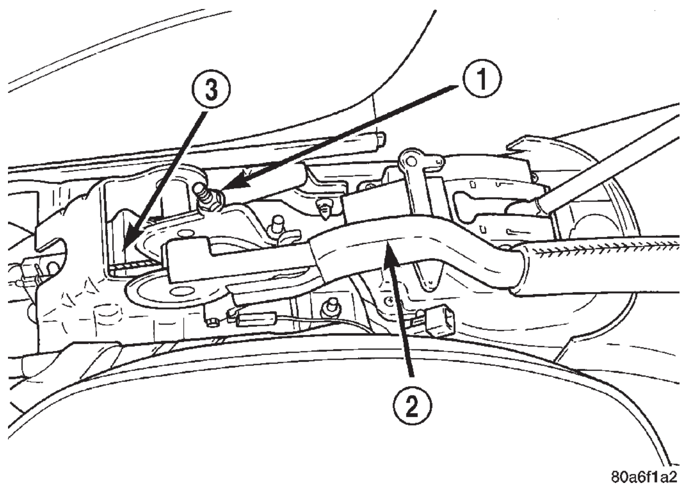


Fig. 59 Park Brake Lever Output Cable Adjustment Nut

1 - ADJUSTING NUT
2 - PARK BRAKE LEVER
3 - PARK BRAKE LEVER OUTPUT CABLE

(4) Remove the rear park brake cable requiring service from the park brake cable tension equalizer (Fig. 60).

(5) Remove rear seat cushion from vehicle. (Refer to 23 - BODY/SEATS/SEAT CUSHION - REMOVAL)

(6) Remove scuff plates from right and left rear door sills. Scuff plates are attached to door sills using clips on bottom of scuff plates. Remove by carefully prying scuff plate retaining clips out of door sills.

CABLES - PARKING BRAKE (Continued)

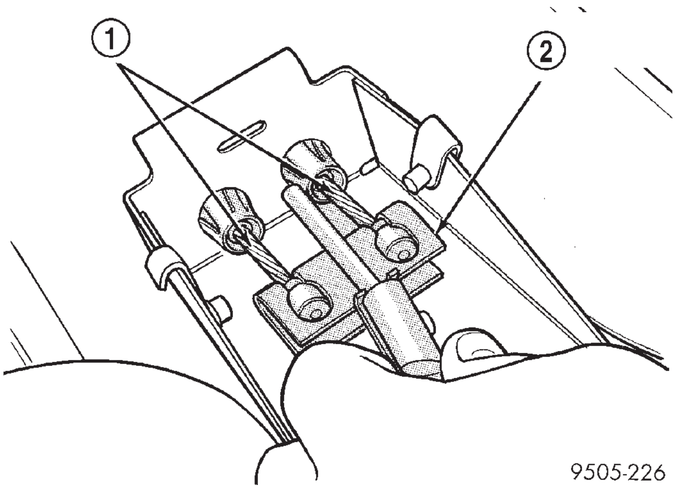


Fig. 60 Rear Park Brake Cables At Tension

1 - REAR PARK BRAKE CABLES
2 - PARK BRAKE CABLE TENSION EQUALIZER

(7) Fold rear carpeting forward to expose park brake cables.

(8) Install the box end of a 1/2 in. wrench over the park brake cable retainer as indicated in (Fig. 61). This will compress tabs on park brake cable retainer, allowing cable to be removed from console bracket. From under carpet, grasp park brake cable housing and pull cable straight out of console bracket.

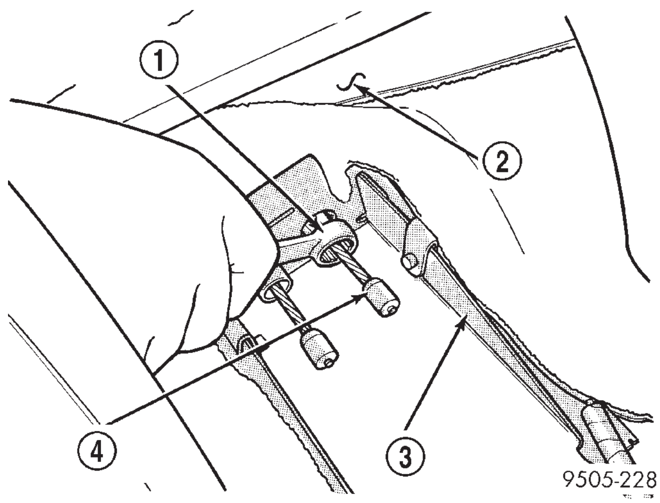


Fig. 61 Compressing Park Brake Cable Retaining Tabs

1 - 1/2″ BOX END WRENCH
2 - VEHICLE CARPETING
3 - CONSOLE BRACKET
4 - REAR PARK BRAKE CABLE

(9) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(10) Remove rear wheel and tire assembly from the side of the vehicle requiring park brake cable service.

(11) Remove parking brake shoes. (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - REMOVAL)

(12) Remove the park brake cable from the park brake shoe actuating lever.

(13) Remove park brake cable from rear brake adapter. To do this, Place a 1/2 inch wrench on cable housing and compress locking tabs on park brake cable retainer (Fig. 62).

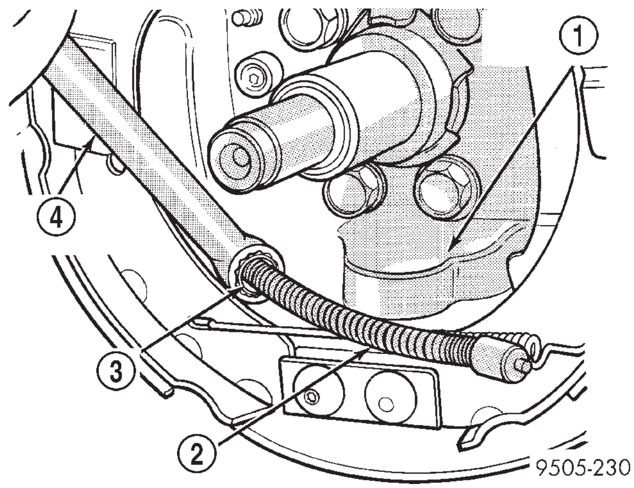


Fig. 62 Park Brake Cable Removal (Typical)

1 - REAR BRAKE SUPPORT PLATE
2 - PARK BRAKE CABLE
3 - PARK BRAKE CABLE RETAINER
4 - 1/2″ BOX END WRENCH

(14) Remove the fasteners securing the 2 brake cable routing clips to the frame rail.

(15) Remove the park brake cable and sealing grommet (Fig. 63) from the floor pan of the vehicle.

INSTALLATION

For servicing of either the left or right rear parking brake cable, follow the procedure as listed below.

(1) Install parking brake cable into floor pan of vehicle making sure sealing grommet is installed in floor pan as far as possible to insure a proper seal (Fig. 63).

(2) Install park brake cable into the rear brake adapter. Be sure locking tabs on cable retainer are expanded to ensure park brake cable is securely held in the adapter.

NOTE: The park brake cable routing and routing clips are different on the right and left side of the vehicle. Be sure the correct routing clips are installed on the correct side of the vehicle.

CABLES - PARKING BRAKE (Continued)

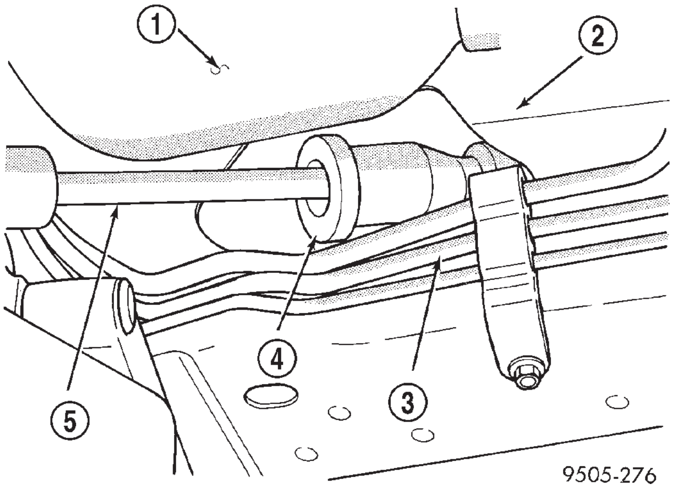


Fig. 63 Park Brake Cable Removal / Installation At Floor Pan

1 - FUEL TANK
2 - VEHICLE FLOOR PAN
3 - FUEL LINES
4 - SEALING GROMMET
5 - PARK BRAKE CABLE

(3) Attach the 2 park brake cable routing clips on the rear frame rail. Install and securely tighten routing clip attaching screws.

(4) Install the park brake cable on the park brake shoe actuating lever.

(5) Install the parking brake shoes, hub and bearing, rotor and caliper. (Refer to 5 - BRAKES/PARKING BRAKE/SHOES - INSTALLATION)

(6) Install rear wheel and tire assembly on vehicle. Tighten all wheel lug nuts in crisscross pattern to one-half specified torque. Then repeat pattern, fully tightening nuts to 135 N·m (100 ft. lbs.).

(7) Lower vehicle.

(8) Grasp park brake cable to floor pan seal grommet by hand, and pull it into floor pan to ensure seal grommet is fully seated into floor pan.

(9) Route park brake cable under carpeting and up to park brake cable hole in console bracket on floor pan.

(10) Install park brake cable into console bracket (Fig. 64). Be sure tabs on park brake cable retainer, have expanded out to hold park brake cable in console bracket.

CAUTION: Discard output cable retaining clip and tension equalizer after removing it from the park brake output cable. A new tension equalizer and retaining clip is to be used when installing a new rear park brake cable.

(11) Using a screwdriver (Fig. 65), unlatch the park brake output cable retainer. Then remove cable

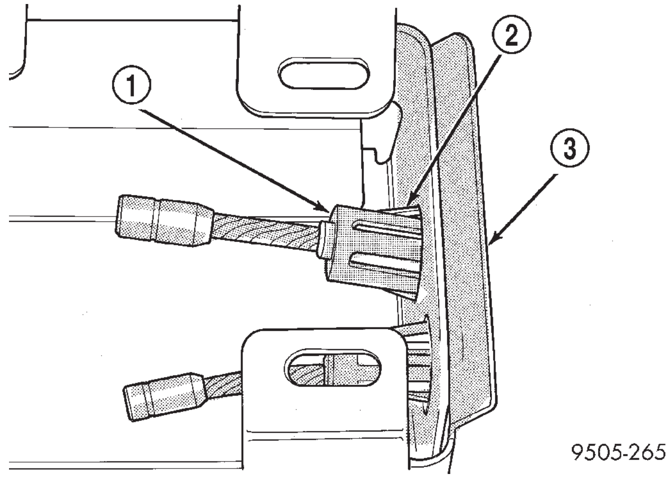


Fig. 64 Park Brake Cable Installed In Console Bracket

1 - PARK BRAKE CABLE RETAINER
2 - RETAINING TABS
3 - PARK BRAKE CABLE RETAINING BRACKET

retainer and park brake cable tension equalizer from park brake lever output cable **and discard components.**

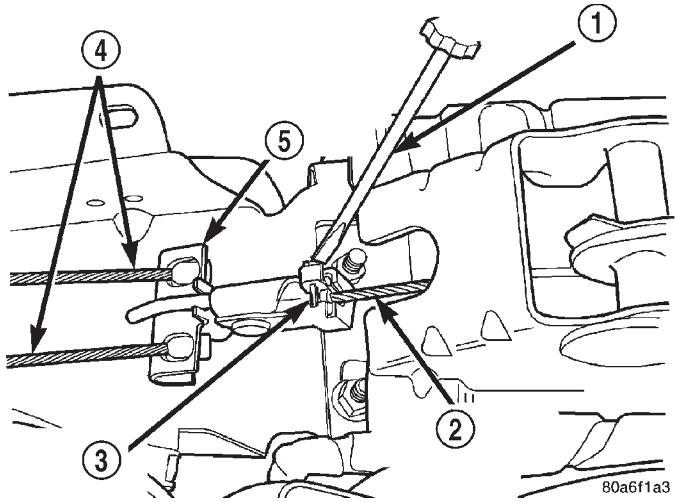


Fig. 65 Output Cable To Equalizer Retaining Clip

1 - SCREWDRIVER
2 - PARK BRAKE LEVER OUTPUT CABLE
3 - CABLE RETAINER
4 - REAR PARK BRAKE CABLES
5 - PARK BRAKE CABLE TENSION EQUALIZER

CAUTION: A new cable tension equalizer must be installed when replacing a rear park brake cable. The new cable tension equalizer is required to correctly adjust park brake cable tension after installing a new rear park brake cable.

CABLES - PARKING BRAKE (Continued)

(12) Install a NEW park brake cable tension equalizer on the park brake lever output cable and rear park brake cables (Fig. 66).

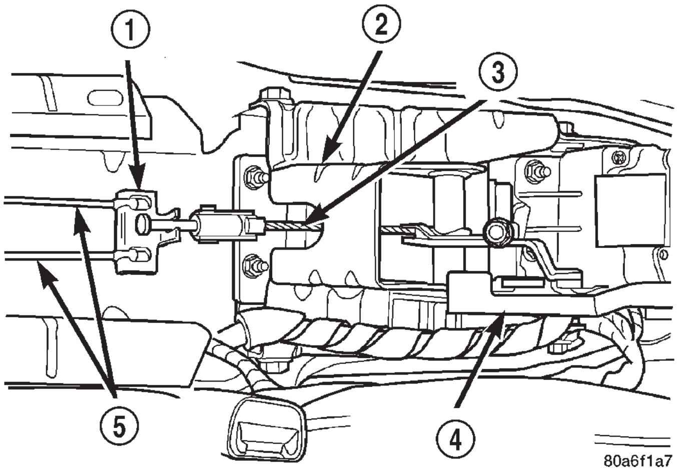


Fig. 66 Park Brake Cable Tension Equalizer

1 - PARK BRAKE CABLE TENSION EQUALIZER
2 - PARK BRAKE MECHANISM
3 - PARK BRAKE LEVER OUTPUT CABLE
4 - PARK BRAKE LEVER
5 - REAR PARK BRAKE CABLES

CAUTION: A new retainer (Fig. 67) must be used when installing the park brake mechanism output cable on the cable tension equalizer. Cable retainer usage is required to ensure output cable can not separate from tension equalizer.

(13) Install a NEW park brake lever output cable to tension equalizer retaining clip (Fig. 67) on tension equalizer. The cable retainer must be closed and securely latched.

(14) Adjust cable tension for the parking brake system using the following steps.

- Position parking brake lever so it is in the fully released position.
- Tighten the adjusting nut on the parking brake lever output cable until 26 mm millimeters of thread is out past top edge of adjustment nut (Fig. 68).
- Actuate the parking brake lever to its fully applied position (15 clicks) 1 time and then reposition the lever to its fully released position.

NOTE: Actuating the parking brake lever to its fully applied position one time after tightening the adjustment nut will yield (stretch) the bent nail portion of the tension equalizer approximately 1/4 inch. This process will correctly set the parking brake cable tension.

(15) Check the rear wheels of the vehicle with the park brake lever fully released, they should rotate freely without dragging.

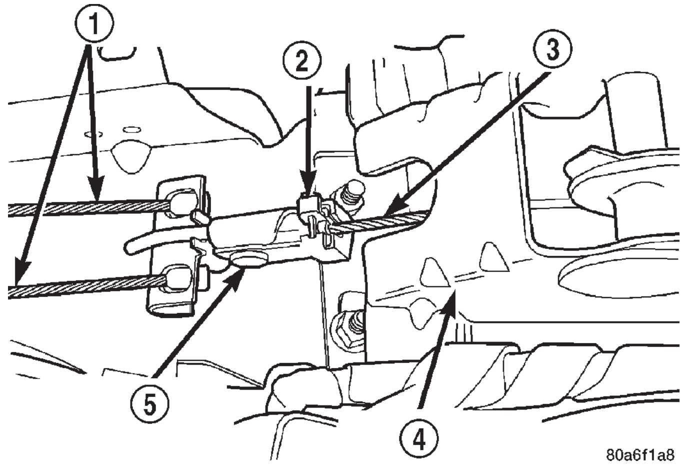


Fig. 67 Cable Retainer Installed On Tension Equalizer

1 - REAR PARK BRAKE CABLES
2 - CABLE RETAINING CLIP
3 - PARKING BRAKE MECHANISM OUTPUT CABLE
4 - PARK BRAKE MECHANISM
5 - PARK BRAKE CABLE TENSION EQUALIZER

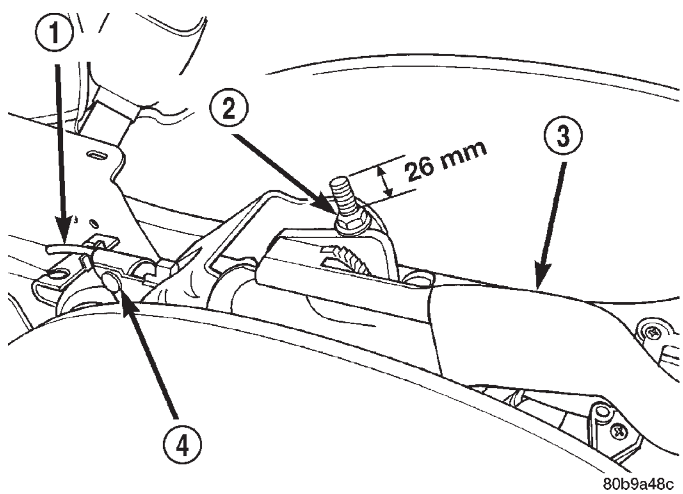


Fig. 68 Parking Brake Adjustment

1 - BENT NAIL
2 - ADJUSTING NUT
3 - PARKING BRAKE LEVER
4 - PARKING BRAKE CABLE TENSION EQUALIZER

(16) After the park brake cable tension has been properly adjusted, check for free play in park brake lever. Park brake hand lever should feel firm at all clicks, with a maximum of 15 clicks of lever travel possible.

(17) Install the center floor console. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION)

(18) Install rear carpeting.

CABLES - PARKING BRAKE (Continued)

(19) Install both rear door sill plate moldings by snapping them onto rear door sills.

(20) Install lower rear seat cushion.

LEVER - PARKING BRAKE

REMOVAL

(1) Remove the floor console. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)

(2) Lower parking brake lever handle.

(3) Loosen adjusting nut on park brake lever output cable (Fig. 69). This will take tension off output cable, allowing it to be easily removed from tension equalizer.

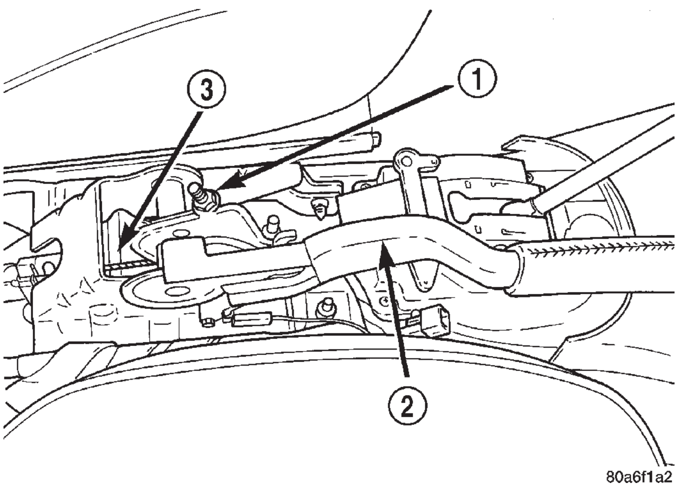


Fig. 69 Park Brake Lever Output Cable Adjustment Nut (Typical)

1 - ADJUSTING NUT
2 - PARK BRAKE LEVER
3 - PARK BRAKE LEVER OUTPUT CABLE

CAUTION: Discard output cable retaining clip after removing it from park brake cable tension equalizer. Retainer is not to be re-used, a new retainer is to be installed when attaching output cable to tension equalizer.

(4) Using a screwdriver (Fig. 70), unlatch the park brake output cable retainer, then remove cable retainer from park brake cable tension equalizer.

(5) Remove the park brake cable tension equalizer from the park brake lever output cable.

(6) Remove the electrical connector from the ground switch on the park brake lever mechanism.

(7) Unclip the wiring harness from the park brake mechanism bracket.

(8) Remove the 4 bolts attaching the park brake lever mechanism bracket (Fig. 71).

(9) Remove the park brake lever mechanism from the vehicle.

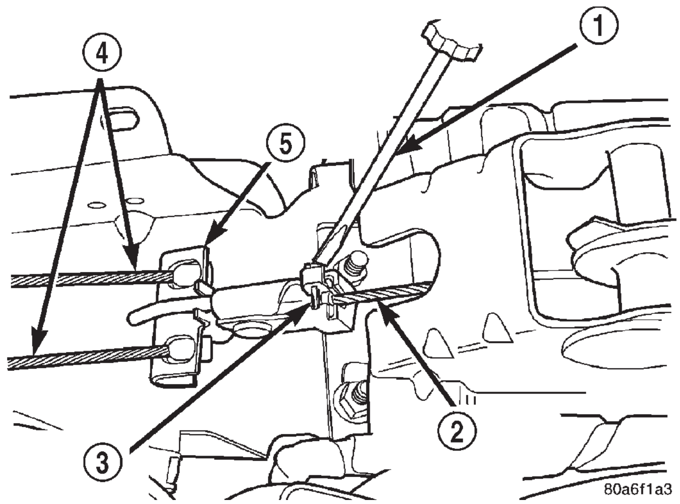


Fig. 70 Output Cable-To-Equalizer Retaining Clip

1 - SCREWDRIVER
2 - PARK BRAKE LEVER OUTPUT CABLE
3 - CABLE RETAINER
4 - REAR PARK BRAKE CABLES
5 - PARK BRAKE CABLE TENSION EQUALIZER

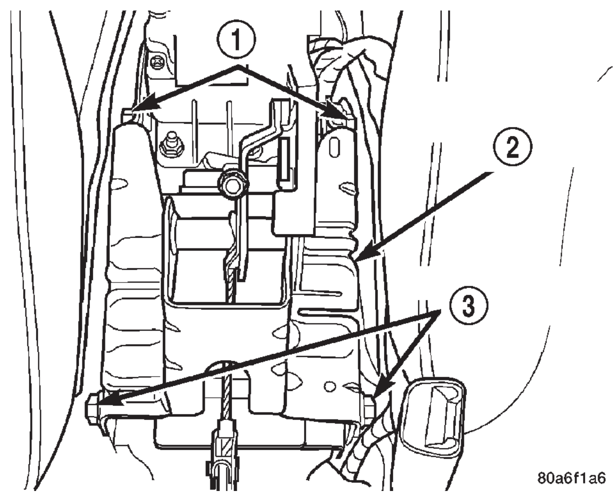


Fig. 71 Park Brake Lever Bracket Mounting

1 - MOUNTING BOLTS
2 - PARK BRAKE MECHANISM BRACKET
3 - MOUNTING BOLTS

INSTALLATION

(1) Place the parking brake lever mechanism on the console bracket. Install the 4 bolts mounting the park brake lever mechanism to the console bracket (Fig. 71). Tighten the 4 mounting bolts to a torque of 28 N·m (250 in. lbs.).

(2) Install the wiring harness on the park brake mechanism bracket.

LEVER - PARKING BRAKE (Continued)

(3) Install the electrical connector on the ground switch of the park brake lever mechanism.

CAUTION: A new cable tension equalizer must be installed when replacing the park brake mechanism. The new cable tension equalizer is required to correctly adjust park brake cable tension after installing park brake mechanism.

(4) Install a NEW park brake cable tension equalizer on the park brake lever output cable and rear park brake cables (Fig. 72).

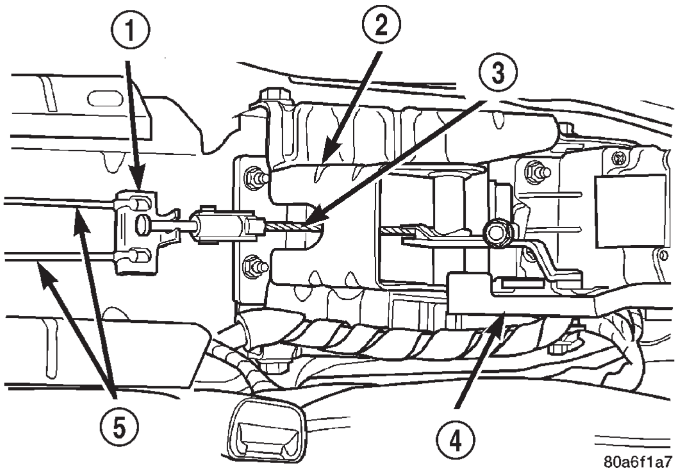


Fig. 72 Park Brake Cable Tension Equalizer

1 - PARK BRAKE CABLE TENSION EQUALIZER
2 - PARK BRAKE MECHANISM
3 - PARK BRAKE LEVER OUTPUT CABLE
4 - PARK BRAKE LEVER
5 - REAR PARK BRAKE CABLES

CAUTION: A new park brake lever output cable retainer must be used when installing output cable on cable tension equalizer. Cable retainer usage is required to ensure output cable can not separate from tension equalizer.

(5) Install a NEW parking brake lever output cable to tension equalizer retaining clip (Fig. 73) on tension equalizer. The cable retainer must be closed and securely latched.

(6) Adjust cable tension for the parking brake system using the following steps.

• Position park brake lever so it is in the fully released position.

• Tighten the adjusting nut on the parking brake lever output cable until 26 millimeters of thread is out past top edge of adjustment nut (Fig. 74).

• Actuate the parking brake lever to its fully applied position (15 clicks) 1 time and then reposition the lever to its fully released position.

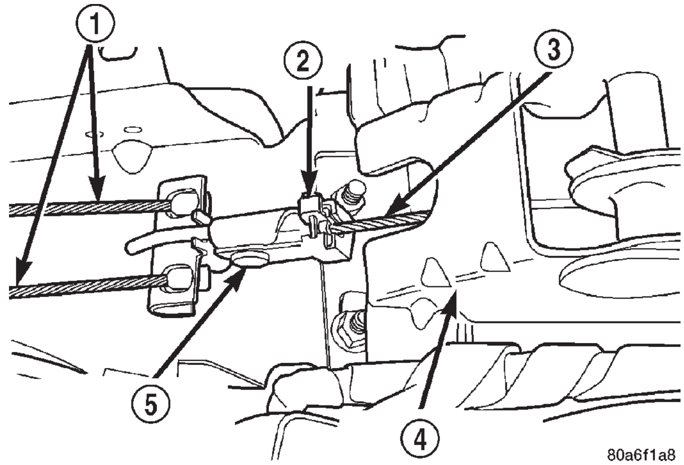


Fig. 73 Cable Retainer Installed On Tension Equalizer

1 - REAR PARK BRAKE CABLES
2 - CABLE RETAINING CLIP
3 - PARKING BRAKE MECHANISM OUTPUT CABLE
4 - PARK BRAKE MECHANISM
5 - PARK BRAKE CABLE TENSION EQUALIZER

NOTE: Actuating the parking brake lever to its fully applied position one time after tightening the adjustment nut will yield (stretch) the bent nail portion of the tension equalizer approximately 1/4 inch. This process will correctly set the parking brake cable tension.

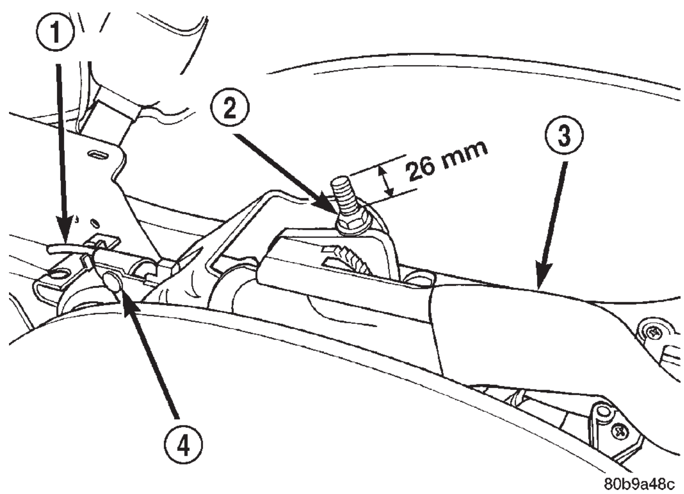


Fig. 74 Parking Brake Adjustment (Rear Disc Brakes)

1 - BENT NAIL
2 - ADJUSTING NUT
3 - PARKING BRAKE LEVER
4 - PARKING BRAKE CABLE TENSION EQUALIZER

(7) Check the rear wheels of the vehicle with the park brake lever fully released, they should rotate freely without dragging.

LEVER - PARKING BRAKE (Continued)

(8) After the park brake cable tension has been properly adjusted, check for free play in park brake lever. Park brake hand lever should feel firm at all clicks, with a maximum of 15 clicks of lever travel possible.

(9) Install the floor console back in the vehicle. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION)

SHOES - PARKING BRAKE

REMOVAL

(1) Remove disc brake caliper from adapter and rotor (See Disc Brake Shoe Removal).

(2) Remove rotor from hub/bearing.

(3) Remove dust cap from hub/bearing.

(4) Remove hub/bearing rear retaining nut and washer.

(5) Remove hub/bearing from knuckle.

(6) Remove hold down clip from rear park brake shoe (Fig. 75) .

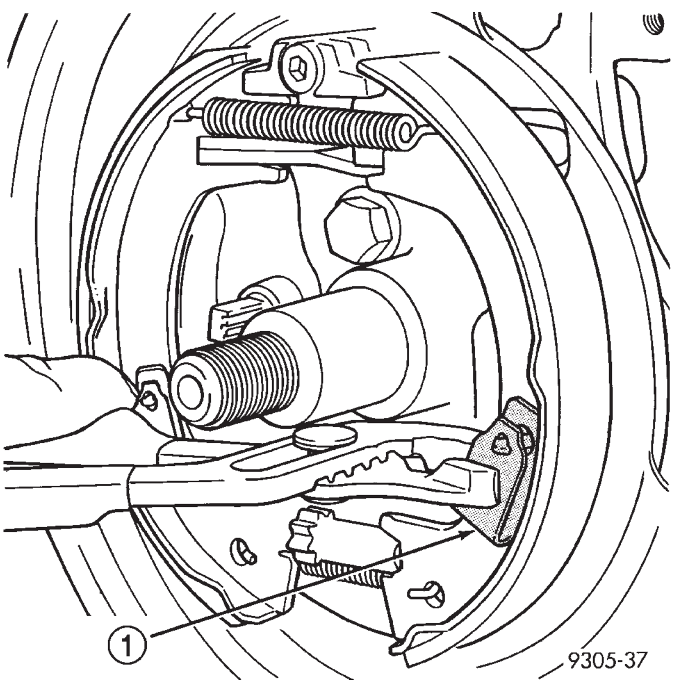


Fig. 75 Rear Park Brake Shoe Hold-Down Clip

1 - HOLD DOWN CLIP

(7) Turn park brake shoe adjuster wheel until adjuster is at its shortest length.

(8) Remove the park brake shoe adjuster from the park brake shoes (Fig. 76) .

(9) Remove the lower return spring (Fig. 77) between the park brake shoes.

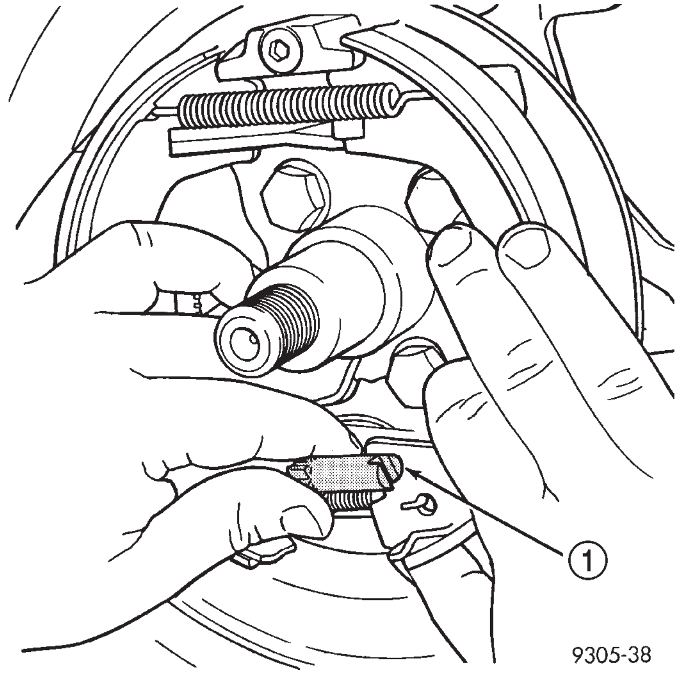


Fig. 76 Park Brake Shoe Adjuster

1 - ADJUSTER

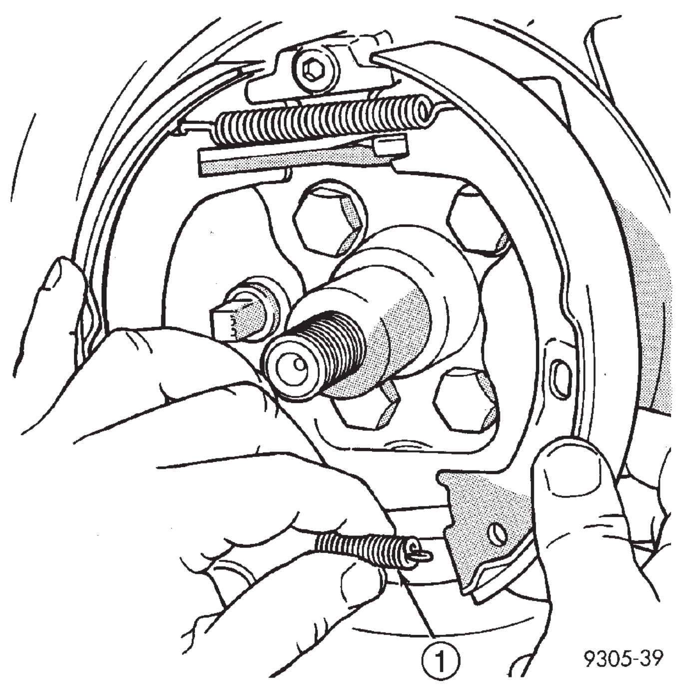


Fig. 77 Brake Shoe Lower Return Spring

1 - LOWER SPRING

SHOES - PARKING BRAKE (Continued)

(10) Pull the rear park brake shoe away from the caliper adapter (Fig. 78) . Remove the upper return spring (Fig. 78) from between the park brake shoes.

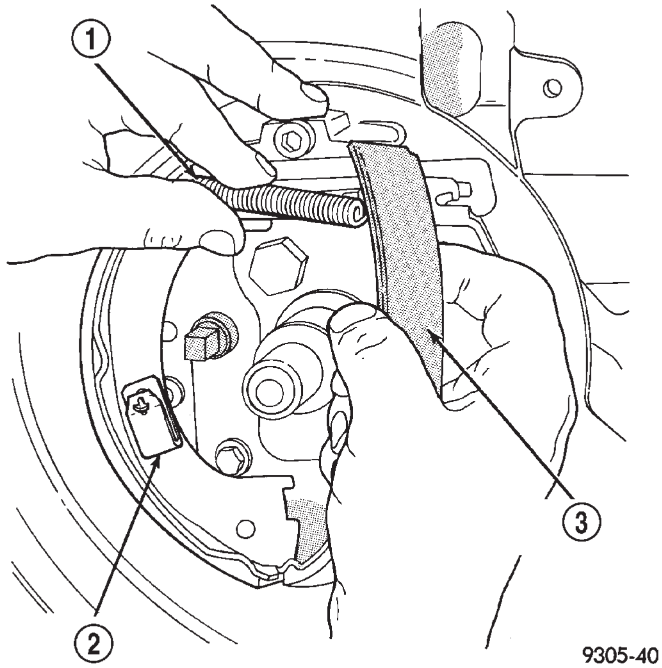


Fig. 78 Brake Shoe and Upper Spring

1 - UPPER SPRING
2 - HOLD DOWN CLIP
3 - REAR PARKING BRAKE SHOE

(11) Remove the hold-down clip from the front park brake shoe (Fig. 79) . Then remove front park brake shoe.

INSTALLATION

(1) Install front brake shoe and hold down clip (Fig. 79).

(2) Install the rear park brake shoe and the park brake shoe upper return spring (Fig. 78).

(3) Pull rear brake shoe over anchor block until properly located on adapter.

(4) Install the park brake lower return spring (Fig. 77).

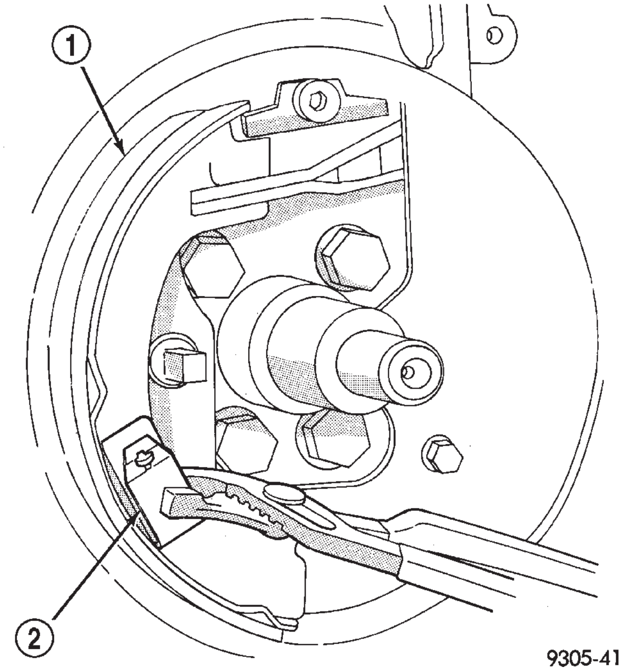


Fig. 79 Front Park Brake Shoe Hold Down Clip

1 - FRONT BRAKE SHOE ASSEMBLY
2 - HOLD DOWN CLIP

(5) Install the adjuster between the park brake shoes. Adjuster must be installed with the star wheel toward the rear of the vehicle (Fig. 76).

(6) Install hold down clip on rear park brake shoe (Fig. 75).

(7) Adjust park brake shoes to an outside diameter of 171 mm (6.75 inch).

(8) Install hub/bearing on knuckle.

(9) Install **A NEW** hub/bearing retaining nut. Tighten the hub/ bearing retaining nut to a torque of 250 N·m (185 ft. lbs.).

(10) Install dust cap on hub/bearing.

(11) Install rotor.

(12) Install rear disc brake caliper on adapter (See Brake Shoe Removal).

(13) Install wheel and tire.

(14) Tighten wheel stud nuts to 135 N·m (100 ft.lbs.).

BRAKES - ABS

TABLE OF CONTENTS

BRAKES - ABS

DESCRIPTION

DESCRIPTION - ANTILOCK BRAKES

This section covers the Mark 20e Antilock Brake System.

The purpose of this four-channel design antilock brake system is to prevent wheel lockup under braking conditions on virtually any type of road surface. Antilock braking is desirable because a vehicle that is stopped without locking the wheels retains directional stability and some steering capability. This allows the driver to retain greater control of the vehicle during braking.

This ABS system has ABS Plus and Electronic Variable Brake Proportioning (EVBP). (Refer to 5 - ABS - BRAKES - DESCRIPTION)

DESCRIPTION - ABS PLUS

There is an ABS Plus function built into the ABS CAB. ABS Plus is a brake-on stability enhancement. It is designed to help maintain the directional stability of the vehicle during braking.

DESCRIPTION - ELECTRONIC VARIABLE BRAKE PROPORTIONING

Vehicles equipped with ABS use electronic variable brake proportioning (EVBP) to balance front-to-rear braking. The EVBP is used in place of a rear proportioning valve. The EVBP system uses the ABS system to control the slip of the rear wheels in partial braking range. The braking force of the rear wheels is controlled electronically by using the inlet and outlet valves located in the integrated control unit (ICU).

OPERATION

OPERATION - ANTILOCK BRAKES

There are a few performance characteristics of the Mark 20e Antilock Brake System that may at first seem abnormal, but in fact are normal. These characteristics are described below.

NORMAL BRAKING

Under normal braking conditions, the ABS functions the same as a standard base brake system with

BRAKES - ABS (Continued)

a diagonally split master cylinder and conventional vacuum assist.

ABS BRAKING

ABS operation is available at all vehicle speeds above 5–8 km/h (3–5 mph). If a wheel locking tendency is detected during a brake application, the brake system enters the ABS mode. During ABS braking, hydraulic pressure in the four wheel circuits is modulated to prevent any wheel from locking. Each wheel circuit is designed with a set of electric solenoids to allow modulation and each wheel receives its own separate electrical signal. Wheel lockup may be perceived at the very end of an ABS stop and is considered normal.

During an ABS stop, the brakes hydraulic system is still diagonally split. However, the brake system pressure is further split into four control channels. During antilock operation of the vehicle's brake system, the front wheels are controlled independently and are on two separate control channels, and the rear wheels are controlled together for better vehicle stability.

The system can build and release pressure at each wheel, depending on signals generated by the wheel speed sensors (WSS) at each wheel and received at the controller antilock brake (CAB).

NOISE AND BRAKE PEDAL FEEL

During ABS braking, some brake pedal movement may be felt. In addition, ABS braking will create ticking, popping, or groaning noises heard by the driver. This is normal and is due to pressurized fluid being transferred between the master cylinder and the brakes. If ABS operation occurs during hard braking, some pulsation may be felt in the vehicle body due to fore and aft movement of the suspension as brake pressures are modulated.

At the end of an ABS stop, ABS is turned off when the vehicle is slowed to a speed of 5–7 km/h (3–4 mph). There may be a slight brake pedal drop anytime that the ABS is deactivated, such as at the end of the stop when the vehicle speed is less than 5 km/h (3 mph) or during an ABS stop where ABS is no longer required. These conditions exist when a vehicle is being stopped on a road surface with patches of ice, loose gravel, or sand on it. Also, stopping a vehicle on a bumpy road surface activates ABS because of the wheel hop caused by the bumps.

TIRE NOISE AND MARKS

Although the ABS system prevents complete wheel lockup, some wheel slip is desired in order to achieve optimum braking performance. Wheel slip is defined as follows: 0 percent slip means the wheel is rolling freely and 100 percent slip means the wheel is fully locked. During brake pressure modulation, wheel slip is allowed to reach up to 25–30 percent. This means that the wheel rolling velocity is 25–30 percent less than that of a free rolling wheel at a given vehicle speed. This slip may result in some tire chirping, depending on the road surface. This sound should not be interpreted as total wheel lockup.

Complete wheel lockup normally leaves black tire marks on dry pavement. The ABS will not leave dark black tire marks since the wheel never reaches a fully locked condition. However, tire marks may be noticeable as light patched marks.

START-UP CYCLE

When the ignition is turned on, a popping sound and a slight brake pedal movement may be noticed. The ABS warning indicator lamp will also be on for up to 5 seconds after the ignition is turned on. These conditions occur as part of ABS self-diagnosis check. The popping sound is a result of brief activation of the solenoids in the integrated control unit.

DRIVE-OFF CYCLE

When the vehicle is first driven off, a humming may be heard or felt by the driver at approximately 25–40 km/h (15–25 mph). This is caused by brief activation of the ABS pump/motor and is a normal function of ABS as part of the self-diagnosis check.

PREMATURE ABS CYCLING

Symptoms of premature ABS cycling include: clicking sounds from the solenoid valves; pump/motor running; and pulsations in the brake pedal. Premature ABS cycling can occur at any braking rate of the vehicle and on any type of road surface. Neither the red BRAKE warning indicator lamp, nor the amber ABS warning indicator lamp, illuminate and no fault codes are stored in the CAB.

Premature ABS cycling is a condition that needs to be correctly assessed when diagnosing problems with the antilock brake system. It may be necessary to use a DRBIII® scan tool to detect and verify premature ABS cycling.

Check the following common causes when diagnosing premature ABS cycling: damaged tone wheels; incorrect tone wheels; damaged steering knuckle wheel speed sensor mounting bosses; loose wheel speed sensor mounting bolts; excessive tone wheel runout; or an excessively large tone wheel-to-wheel speed sensor air gap. Give special attention to these components when diagnosing a vehicle exhibiting premature ABS cycling.

After diagnosing the defective component, repair or replace it as required. When the component repair or replacement is completed, test drive the vehicle to

BRAKES - ABS (Continued)

verify that premature ABS cycling has been corrected.

OPERATION - ABS PLUS

When the brake pedal is depressed far enough to actuate the brake lamp switch, the CAB monitors and compares the speeds of the front (driving) wheels. It senses vehicle speed, brake application, and detects vehicle cornering and applies the brakes selectively to stabilize the vehicle.

OPERATION - ELECTRONIC VARIABLE BRAKE PROPORTIONING

Upon entry into EVBP the inlet valve for the rear brake circuit is switched on so that the fluid supply from the master cylinder is shut off. In order to decrease the rear brake pressure, the outlet valve for the rear brake circuit is pulsed. This allows fluid to enter the low pressure accumulator (LPA) in the hydraulic control unit (HCU) resulting in a drop in fluid pressure to the rear brakes. In order to increase the rear brake pressure, the outlet valve is switched off and the inlet valve is pulsed. This increases the pressure to the rear brakes. This back-and-forth process will continue until the required slip difference is obtained. At the end of EVBP braking (brakes released) the fluid in the LPA drains back to the master cylinder by switching on the outlet valve and draining through the inlet valve check valve. At the same time the inlet valve is switched on in case of another brake application.

The EVBP will remain functional during many ABS fault modes. If both the red BRAKE and amber ABS warning indicators are illuminated, the EVBP may not be functioning.

CAUTION

The ABS uses an electronic control module, the CAB. This module is designed to withstand normal current draws associated with vehicle operation. Care must be taken to avoid overloading the CAB circuits.

CAUTION: In testing for open or short circuits, do not ground or apply voltage to any of the circuits unless instructed to do so for a diagnostic procedure.

CAUTION: These circuits should only be tested using a high impedance multi-meter or the DRBIII® scan tool as described in this section. Power should never be removed or applied to any control module with the ignition in the ON position. Before removing or connecting battery cables, fuses, or connectors, always turn the ignition to the OFF position.

CAUTION: The CAB 24-way connector should never be connected or disconnected with the ignition switch in the ON position.

CAUTION: This vehicle utilizes active wheel speed sensors. Do not apply voltage to wheel speed sensors at any time.

CAUTION: Use only factory wiring harnesses. Do not cut or splice wiring to the brake circuits. The addition of aftermarket electrical equipment (car phone, radar detector, citizen band radio, trailer lighting, trailer brakes, etc.) on a vehicle equipped with antilock brakes may affect the function of the antilock brake system.

CAUTION: When performing any service procedure on a vehicle equipped with ABS, do not apply a 12-volt power source to the ground circuit of the pump motor in the HCU. Doing this will damage the pump motor and will require replacement of the entire HCU.

CAUTION: An attempt to remove or disconnect certain system components may result in improper system operation. Only those components with approved removal and installation procedures in this manual should be serviced.

CAUTION: If welding work is to be performed on the vehicle, using an electric arc welder, the CAB connector should be disconnected during the welding operation.

CAUTION: Many components of the ABS System are not serviceable and must be replaced as an assembly. Do not disassemble any component which is not designed to be serviced.

CAUTION: Only the recommended jacking or hoisting positions for this vehicle are to be used whenever it is necessary to lift a vehicle. Failure to raise a vehicle from the recommended locations could result in lifting a vehicle by the hydraulic control unit mounting bracket. Lifting a vehicle by the hydraulic control unit mounting bracket will result in damage to the mounting bracket and the hydraulic control unit.

BRAKES - ABS (Continued)

CAUTION: Brake fluid will damage painted surfaces. If brake fluid is spilled on any painted surface, wash off with water immediately.

DIAGNOSIS AND TESTING - INSPECTION AND ROAD TEST

(1) Visually inspect the ABS for damaged or disconnected components and connectors.

(2) Verify the brake lamps are operational. If they are not, repair them prior to continuing.

(3) Connect the DRBIII® scan tool to the Data Link Connector located under the instrument panel to the right of the steering column. If the DRBIII® does not power-up, check the power and ground supplies to the connector.

(4) Turn the ignition key to the ON position. Select ANTILOCK BRAKES.

(5) Read and record any Diagnostic Trouble Codes (DTCs). If any DTCs are present, refer to the appropriate chassis diagnostic information.

NOTE: Diagnostic trouble codes (DTCs) are kept in the controller's memory until either erased by the technician using the DRBIII®, or erased automatically after 3500 miles. DTCs are retained by the controller even if the ignition is turned off or the battery is disconnected. More than one DTC can be stored at a time. When accessed, the number of occurrences and the DTC that is stored are displayed.

If no problems are observed, it will be necessary to road test the vehicle.

Many ABS conditions judged to be a problem by the driver may be normal operating conditions. See Antilock Brake System - Operation to become familiarized with the normal characteristics of this antilock brake system.

WARNING: CONDITIONS THAT RESULT IN TURNING ON THE RED BRAKE WARNING INDICATOR LAMP MAY INDICATE REDUCED BRAKING ABILITY.

Before road testing a brake complaint vehicle, note whether the red BRAKE warning indicator lamp, amber ABS warning indicator lamp, or both are turned on. If it is the red BRAKE warning indicator, there is a brake hydraulic problem that must be corrected before driving the vehicle. Refer to the Base Brake System - Diagnosis And Testing. If the red BRAKE warning indicator is illuminated, there is also a possibility that there is an ABS problem and the amber ABS warning indicator is not able to illuminate, so the MIC turns on the red BRAKE warning indicator by default.

If the amber ABS warning indicator is on, road test the vehicle as described below. While the amber ABS warning indicator is on, the ABS is not functional. The ability to stop the car using the base brake system should not be affected.

(6) Turn the key to the OFF position and then back to the ON position. Note whether the amber ABS warning lamp continues to stay on.

(7) If the amber ABS warning indicator lamp stays on, shift into gear and drive the car to a speed of approximately 25 km/h (15 mph) to complete the ABS Start-Up and Drive-Off Cycles (see Antilock Brake System - Operation). If at this time the amber ABS warning indicator lamp stays on, refer to the Appropriate Diagnostic Information.

(8) If the amber ABS warning indicator lamp goes out at any time, drive the vehicle a short distance. Accelerate the vehicle to a speed of at least 64 km/h (40 mph). Bring the vehicle to a complete stop, braking hard enough to cause the ABS to cycle. Repeat this action several times. Using the DRBIII®, read and record any Diagnostic Trouble Codes (DTCs). If any DTCs are present, refer to the Appropriate Diagnostic Information.

STANDARD PROCEDURE - ANTILOCK BRAKE SYSTEM BLEEDING

The base brake's hydraulic system must be bled anytime air enters the hydraulic system. The ABS though, particularly the ICU (HCU), should only be bled when the HCU is replaced or removed from the vehicle. The ABS must always be bled anytime it is suspected that the HCU has ingested air. Under most circumstances that require the bleeding of the brakes hydraulic system, only the base brake hydraulic system needs to be bled.

It is important to note that excessive air in the brake system will cause a soft or spongy feeling brake pedal.

During the brake bleeding procedure, be sure the brake fluid level remains close to the FULL level in the master cylinder fluid reservoir. Check the fluid level periodically during the bleeding procedure and add DOT 3 brake fluid as required.

The ABS must be bled as two independent braking systems. The non-ABS portion of the brake system with ABS is to be bled the same as any non-ABS system.

The ABS portion of the brake system must be bled separately. Use the following procedure to properly bleed the brake hydraulic system including the ABS.

BLEEDING

When bleeding the ABS system, the following bleeding sequence must be followed to insure complete and adequate bleeding.

BRAKES - ABS (Continued)

(1) Make sure all hydraulic fluid lines are installed and properly torqued.

(2) Connect the DRBIII® scan tool to the diagnostics connector. The diagnostic connector is located under the lower steering column cover to the left of the steering column.

(3) Using the DRB, check to make sure the CAB does not have any fault codes stored. If it does, clear them using the DRB.

WARNING: WHEN BLEEDING THE BRAKE SYSTEM WEAR SAFETY GLASSES. A CLEAR BLEED TUBE MUST BE ATTACHED TO THE BLEEDER SCREWS AND SUBMERGED IN A CLEAR CONTAINER FILLED PART WAY WITH CLEAN BRAKE FLUID. DIRECT THE FLOW OF BRAKE FLUID AWAY FROM YOURSELF AND THE PAINTED SURFACES OF THE VEHICLE. BRAKE FLUID AT HIGH PRESSURE MAY COME OUT OF THE BLEEDER SCREWS WHEN OPENED.

(4) Bleed the base brake system using the standard pressure or manual bleeding procedure. (Refer to 5 - BRAKES - BASE - STANDARD PROCEDURE)

(5) Using the DRB, select ANTILOCK BRAKES, followed by MISCELLANEOUS, then BLEED BRAKES. Follow the instructions displayed. When the scan tool displays TEST COMPLETED, disconnect the scan tool and proceed.

(6) Bleed the base brake system a second time. Check brake fluid level in the reservoir periodically to prevent emptying, causing air to enter the hydraulic system.

(7) Fill the master cylinder reservoir to the full level.

(8) Test drive the vehicle to be sure the brakes are operating correctly and that the brake pedal does not feel spongy.

SPECIFICATIONS

ABS FASTENER TORQUE

(Refer to 5 - BRAKES - BASE - SPECIFICATIONS)

TONE WHEEL RUNOUT

DESCRIPTION	SPECIFICATION
Front Tone Wheel Maximum Runout	0.25 mm (0.009 in.)
Rear Tone Wheel Maximum Runout	0.25 mm (0.009 in.)

WHEEL SPEED SENSOR AIR GAP

DESCRIPTION	SPECIFICATION
Front Sensor	0.42 – 1.71 mm 0.017 – 0.067 in.
Rear Sensor	0.38 – 1.31 mm 0.015 – 0.052 in.

FRONT WHEEL SPEED SENSOR

REMOVAL

This procedure is for the removal and installation of one of the two front wheel speed sensors.

(1) Raise vehicle on jack stands or centered on a frame contact type hoist. See Hoisting in the Lubrication and Maintenance section of this manual, for the required lifting procedure to be used for this vehicle.

(2) Remove the tire and wheel assembly from the vehicle.

(3) Remove the speed sensor cable routing bracket (Fig. 1) from the steering knuckle. Remove the wiring harness sealing grommet retainer and speed sensor routing bracket from the inner fender.

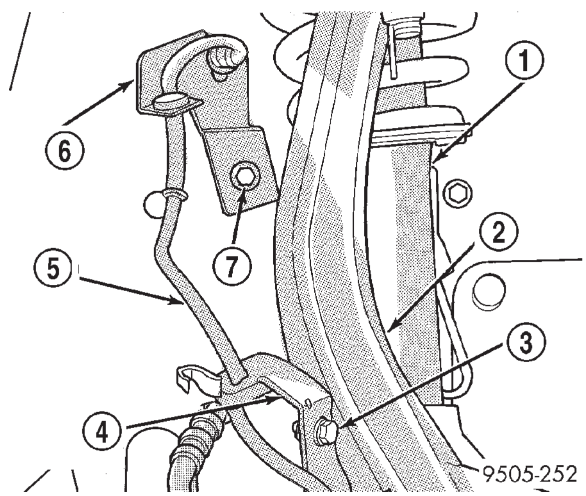


Fig. 1 Speed Sensor Cable Routing

1 - SHOCK ABSORBER
2 - STEERING KNUCKLE
3 - BOLT
4 - SPEED SENSOR ROUTING BRACKET
5 - WHEEL SPEED SENSOR CABLE
6 - GROMMET RETAINER AND CABLE ROUTING BRACKET
7 - BOLT

FRONT WHEEL SPEED SENSOR (Continued)

(4) Remove speed sensor sealing grommet from the inner fender (Fig. 2) . Then unplug the speed sensor cable from the vehicle wiring harness (Fig. 2) .

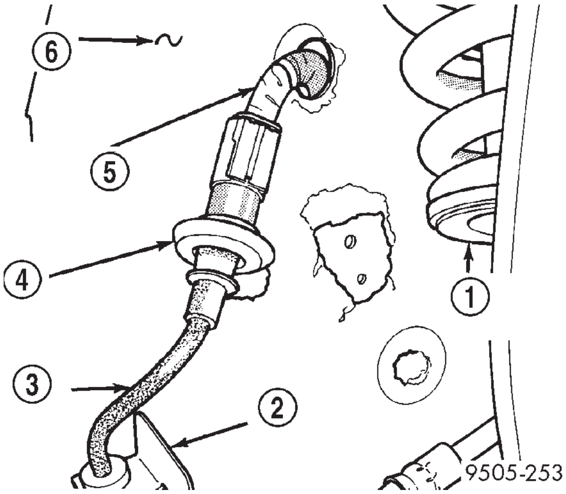


Fig. 2 Wheel Speed Sensor Connection To Vehicle Wiring Harness

1 - FRONT SHOCK ABSORBER
2 - GROMMET RETAINING BRACKET
3 - WHEEL SPEED SENSOR CABLE
4 - SEALING GROMMET
5 - VEHICLE WIRING HARNESS
6 - INNER FENDER

(5) Remove bolt (Fig. 3) attaching speed sensor to steering knuckle. Then remove speed sensor head from steering knuckle

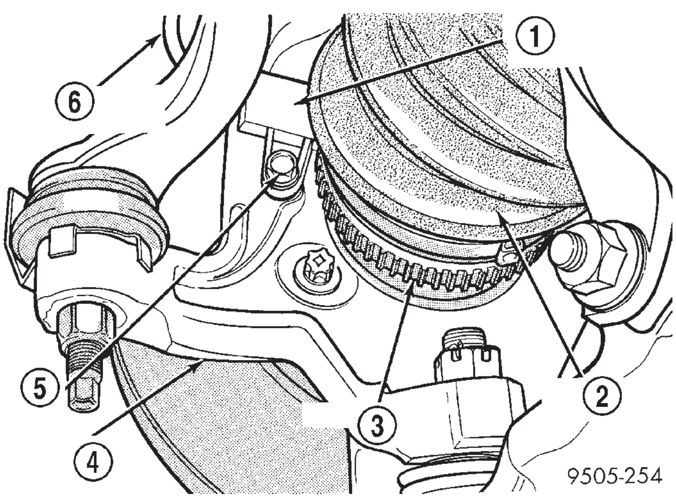


Fig. 3 Speed Sensor Head Attachment To Steering Knuckle

1 - SPEED SENSOR HEAD
2 - DRIVESHAFT
3 - TONE WHEEL
4 - STEERING KNUCKLE
5 - BOLT
6 - SPEED SENSOR CABLE

CAUTION: If speed sensor head locating pin has seized to the steering knuckle, do not attempt to remove speed sensor head by grasping with pliers and turning. This will damage the speed sensor head. Use only the following procedure.

(6) If speed sensor head can not be removed from steering knuckle by hand, the locating pin on the speed sensor head has seized to the steering knuckle do to corrosion. Remove speed sensor head from steering knuckle using the following procedure. Remove disc brake caliper from steering knuckle, and remove brake rotor from hub/bearing assembly. Then insert a pin punch through hole in front steering knuckle (Fig. 4) and tap speed sensor head locating pin out of steering knuckle.

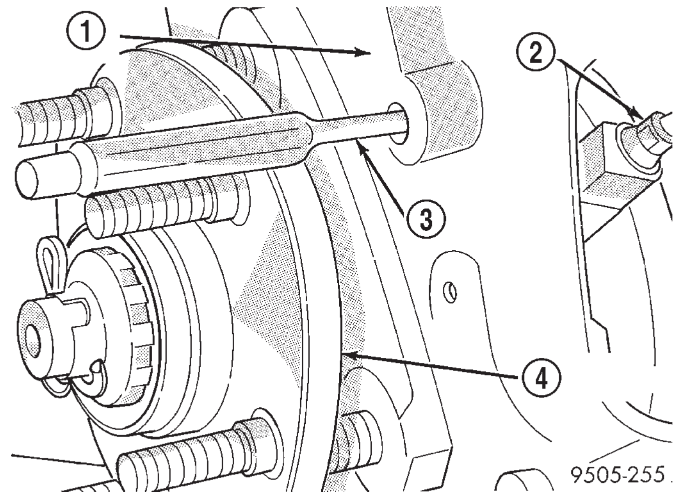


Fig. 4 Speed Sensor Head Removal From Steering Knuckle

1 - STEERING KNUCKLE
2 - SPEED SENSOR HEAD
3 - PIN PUNCH
4 - HUB/BEARING

INSTALLATION

This procedure is for the removal and installation of one of the two front wheel speed sensors.

CAUTION: Proper installation of wheel speed sensor cables is critical to continued system operation. Be sure that cables are installed in retainers. Failure to install cables in retainers as shown in this section may result in contact with moving parts and/or over extension of cables, resulting in an open circuit.

(1) Connect the wheel speed sensor cable connector to the vehicle wiring harness (Fig. 2) .

(2) Install the speed sensor cable assembly grommet into the front inner fender (Fig. 2) . Install speed sensor cable grommet retainer/routing bracket on the

FRONT WHEEL SPEED SENSOR (Continued)

inner fender of the vehicle and install and securely tighten attaching bolt (Fig. 1) .

CAUTION: When installing the wheel speed sensor cable routing bracket on the steering knuckle, (Fig. 1) the speed sensor cable must be looped toward the shock absorber as shown in (Fig. 5) . If speed sensor cable is not routed in this direction it will rub against the tire or wheel, damaging the speed sensor cable.

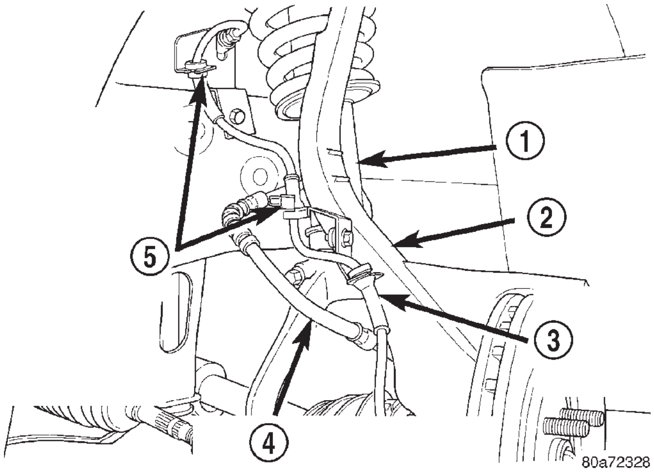


Fig. 5 Correct Front Wheel Speed Sensor Cable Routing

1 - SHOCK ABSORBER
2 - STEERING KNUCKLE
3 - WHEEL SPEED SENSOR CABLE
4 - BRAKE FLEX HOSE
5 - WHEEL SPEED SENSOR CABLE MUST BE LOOPED TOWARD SHOCK ABSORBER BETWEEN THESE ROUTING BRACKETS.

(3) Install the speed sensor cable routing bracket on the steering knuckle. Install and tighten routing bracket mounting bolt to a torque of 12 N·m (105 in. lbs.)

(4) Install speed sensor head on steering knuckle (Fig. 6) . When installing speed sensor head on steering knuckle, apply a small amount of grease on speed sensor locating pin (Fig. 6) . Use Mopar, Multi-Purpose Grease or an equivalent on speed sensor head locating pin. Install the speed sensor head attaching screw and tighten to a torque of 6 N·m (55 in. lbs.).

(5) Install the wheel and tire assembly on vehicle.

(6) Road test vehicle to ensure proper operation of the base and ABS systems.

REAR WHEEL SPEED SENSOR

REMOVAL

REMOVAL - JR27

(1) Remove rear seat cushion and back. (Refer to 23 - BODY/SEATS/REAR SEAT BACK - REMOVAL)

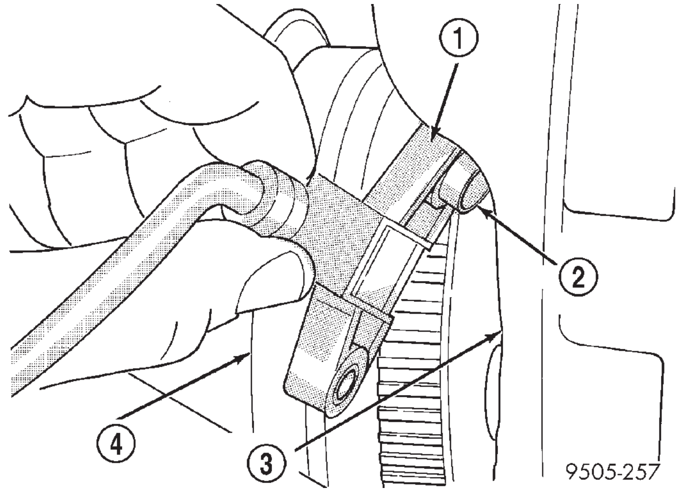


Fig. 6 Installing Speed Sensor Head In Steering Knuckle

1 - SPEED SENSOR HEAD
2 - LOCATING PIN
3 - STEERING KNUCKLE
4 - DRIVESHAFT

(2) Roll back the main silencer pad along the side to expose the wheel speed sensor harness connector located behind the wheel house silencer (Fig. 7).

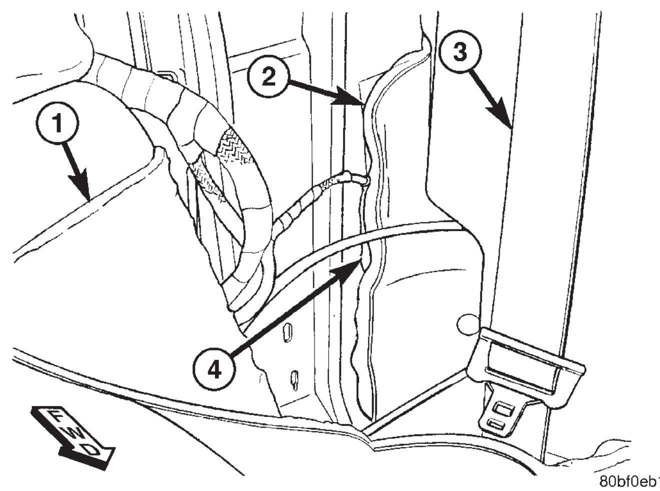


Fig. 7 SPEED SENSOR HARNESS CONNECTOR LOCATION

1 - MAIN SILENCER PAD
2 - WHEEL HOUSE SILENCER
3 - SEAT BELT
4 - SENSOR HARNESS CONNECTOR

REAR WHEEL SPEED SENSOR (Continued)

(3) Pull the wheel speed sensor harness connector out from behind the wheel house silencer. It should have a foam sleeve covering it (Fig. 8).

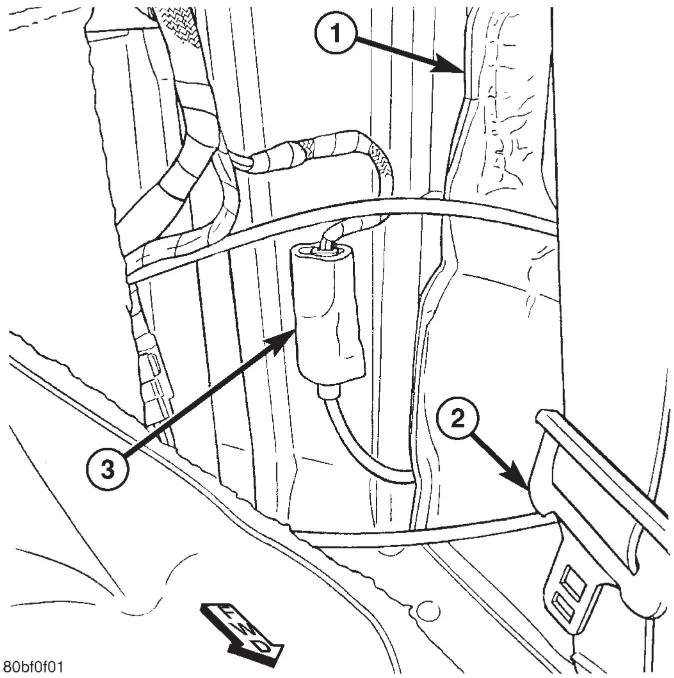


Fig. 8 FOAM SLEEVE COVERED SENSOR HARNESS CONNECTOR

1 - WHEEL HOUSE SILENCER
2 - SEAT BELT
3 - FOAM SLEEVE COVERED CONNECTOR

(4) Push foam sleeve up off connector (Fig. 9) and disconnect speed sensor harness connector from vehicle wiring harness.

(5) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(6) Remove speed sensor harness sealing grommet retainer from the rear frame rail of the vehicle (Fig. 10).

(7) Remove speed sensor harness sealing grommet and harness from hole in body of vehicle.

(8) Remove speed sensor routing clips from the rear upper control arm.

(9) Remove bolt, then wheel speed sensor from vehicle (Fig. 11).

REMOVAL - JR41

(1) Fold down rear seat back.

(2) Disconnect speed sensor connector at vehicle wiring harness found at lower outside corner of seat back.

(3) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

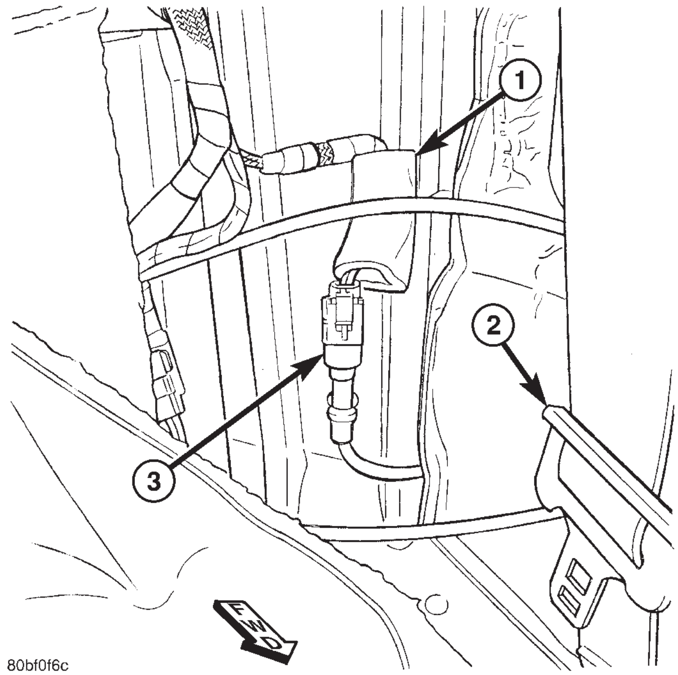


Fig. 9 SENSOR HARNESS CONNECTOR

1 - FOAM SLEEVE
2 - SEAT BELT
3 - CONNECTOR

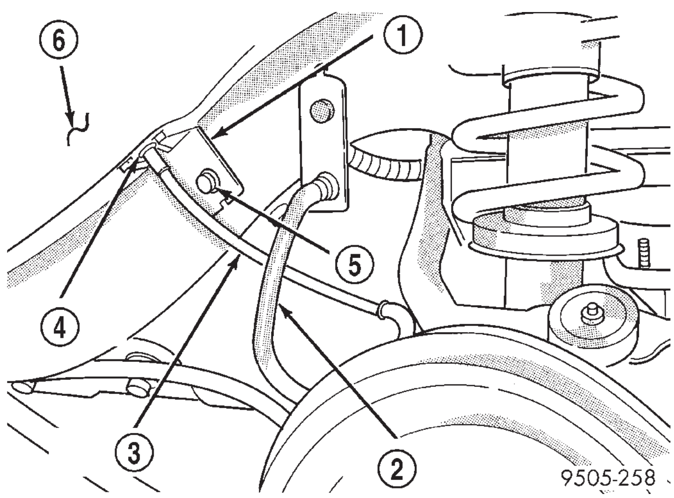


Fig. 10 Rear Speed Senor Cable Attachment To Body

1 - SEALING GROMMET RETAINER
2 - BRAKE FLEX HOSE
3 - SPEED SENSOR CABLE
4 - SEALING GROMMET
5 - BOLT
6 - REAR INNER FENDER

(4) Remove rear tire and wheel assembly from vehicle.

REAR WHEEL SPEED SENSOR (Continued)

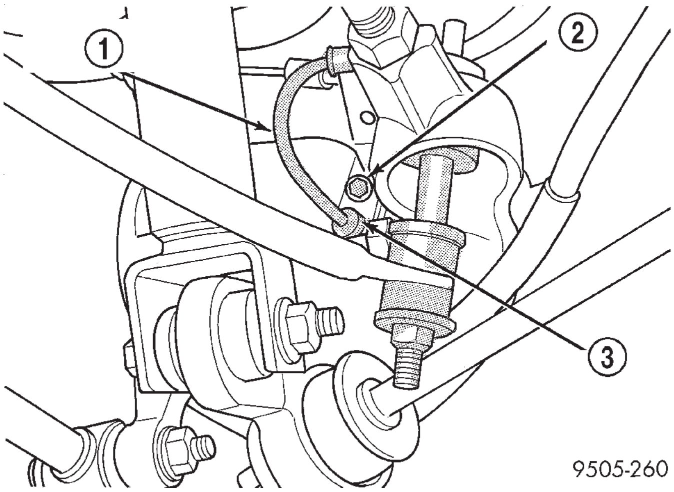


Fig. 11 Rear Speed Sensor Head Attachment To Brake Support Plate

1 - SPEED SENSOR CABLE
2 - BOLT
3 - SPEED SENSOR HEAD

(5) Remove speed sensor harness sealing grommet retainer from the rear frame rail of the vehicle (Fig. 10).

(6) Remove speed sensor harness sealing grommet and harness from hole in body of vehicle.

(7) Remove speed sensor routing clips from the rear upper control arm.

(8) Remove bolt, then wheel speed sensor from vehicle (Fig. 11).

INSTALLATION

INSTALLATION - JR27

CAUTION: Proper installation of wheel speed sensor harness is critical to continued system operation. Be sure that harness is installed properly to avoid harness contact with moving parts or over-extension, resulting in an open circuit.

(1) Install speed sensor head into brake adapter (Fig. 11). Install bolt through routing clip and secure wheel speed sensor in place. Tighten bolt to 8 N·m (75 in. lbs.)

(2) Install speed sensor harness routing clip on upper control arm. Install and securely tighten the routing clip attaching bolt.

(3) Install connector end of speed sensor harness through hole at frame rail.

(4) Install speed sensor harness sealing grommet into hole. Install the sealing grommet retainer and attaching bolt (Fig. 10). Securely tighten retainer attaching bolt.

(5) Lower vehicle.

(6) Connect speed sensor harness connector to vehicle wiring harness (Fig. 9).

(7) Install foam sleeve back over the speed sensor harness connection to prevent rattling (Fig. 8).

(8) Slide the sensor harness connector back behind the wheel house silencer (Fig. 7).

(9) Lay the main silencer pad back into its normal place.

(10) Install the rear seat back and cushion. (Refer to 23 - BODY/SEATS/REAR SEAT BACK - INSTALLATION)

(11) Road test vehicle to ensure proper operation of the base and ABS systems.

INSTALLATION - JR41

CAUTION: Proper installation of wheel speed sensor harness is critical to continued system operation. Be sure that harness is installed properly to avoid harness contact with moving parts or over-extension, resulting in an open circuit.

(1) Install speed sensor head into brake adapter (Fig. 11). Install bolt through routing clip and secure wheel speed sensor in place. Tighten bolt to 8 N·m (75 in. lbs.)

(2) Install speed sensor harness routing clip on upper control arm. Install and securely tighten the routing clip attaching bolt.

(3) Install connector end of speed sensor harness through hole at frame rail.

(4) Install speed sensor harness sealing grommet into hole. Install the sealing grommet retainer and attaching bolt (Fig. 10). Securely tighten retainer attaching bolt.

(5) Install the tire and wheel assembly on vehicle.

(6) Lower vehicle.

(7) Connect speed sensor harness connector to vehicle wiring harness behind rear seat back. **Install sleeve back over the speed sensor harness connection to prevent rattling.**

(8) Road test vehicle to ensure proper operation of the base and ABS systems.

TONE WHEEL

INSPECTION - TONE WHEEL

Tone wheels can cause erratic wheel speed sensor signals. Inspect tone wheels for the following possible causes.

- missing, chipped, or broken teeth
- contact with the wheel speed sensor
- wheel speed sensor to tone wheel alignment
- wheel speed sensor to tone wheel clearance
- excessive tone wheel runout

TONE WHEEL (Continued)

- tone wheel loose on its mounting surface

If a front tone wheel is found to need replacement, the drive shaft must be replaced. No attempt should be made to replace just the tone wheel. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL)

If a rear tone wheel is found to need replacement, the tone wheel is incorportaed into the hub and bearing assembly and the hub and bearing must be replaced. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - REMOVAL)

If wheel speed sensor to tone wheel contact is evident, determine the cause and correct it before replacing the wheel speed sensor or tone wheel.

Check the gap between the speed sensor head and the tone wheel to ensure it is within specifications. (Refer to 5 - BRAKES - ABS/ELECTRICAL - SPECIFICATIONS)

Excessive wheel speed sensor runout can cause erratic wheel speed sensor signals. Refer to SPECIFICATIONS in this section of the service manual for the maximum allowed tone wheel runout (Refer to 5 - BRAKES - ABS/ELECTRICAL - SPECIFICATIONS). If tone wheel runout is excessive, determine if it is caused by a defect in the driveshaft assembly or hub and bearing. Replace as necessary.

Tone wheels are pressed onto their mounting surfaces and should not rotate independently from the mounting surface. Replacement of the front driveshaft or rear hub and bearing is necessary.

HCU (HYDRAULIC CONTROL UNIT)

DESCRIPTION

The hydraulic control unit (HCU) is mounted to the CAB as part of the ICU (Fig. 14). The HCU controls the flow of brake fluid to the brakes using a series of valves and accumulators. A pump/motor is mounted on the HCU to supply build pressure to the brakes during an ABS stop.

OPERATION - HYDRAULIC CIRCUITS AND VALVES

The hydraulic fluid control valves control the flow of pressurized brake fluid to the wheel brakes during the different modes of ABS braking. The following paragraphs explain how this works. For purposes of explanation only, it is assumed that only the right front wheel is experiencing antilock braking; the following diagrams show only the right front wheel in an antilock braking operation.

NORMAL BRAKING HYDRAULIC CIRCUIT AND SOLENOID VALVE FUNCTION

The hydraulic diagram (Fig. 12) shows the vehicle in the normal braking mode of the base brake hydraulic system. The diagram shows no wheel spin or slip occurring relative to the speed of the vehicle. The driver is applying the brake pedal; this builds pressure in the brake hydraulic system to engage the brakes and stop the vehicle.

ABS HYDRAULIC CIRCUIT AND SOLENOID VALVE FUNCTION

The hydraulic diagram (Fig. 13) shows the vehicle in the ABS braking mode. The diagram shows one wheel is slipping because the driver is attempting to stop the vehicle at a faster rate than is allowed by the surface on which the tires are riding.

- The normally open and normally closed valves modulate (build/decay) the brake hydraulic pressure as required.
- The pump/motor is switched on so that the brake fluid from the low pressure accumulators is returned to the master cylinder circuits.
- The brake fluid is routed to either the master cylinder or the wheel brake depending on the position of the normally open valve.

HCU (HYDRAULIC CONTROL UNIT) (Continued)

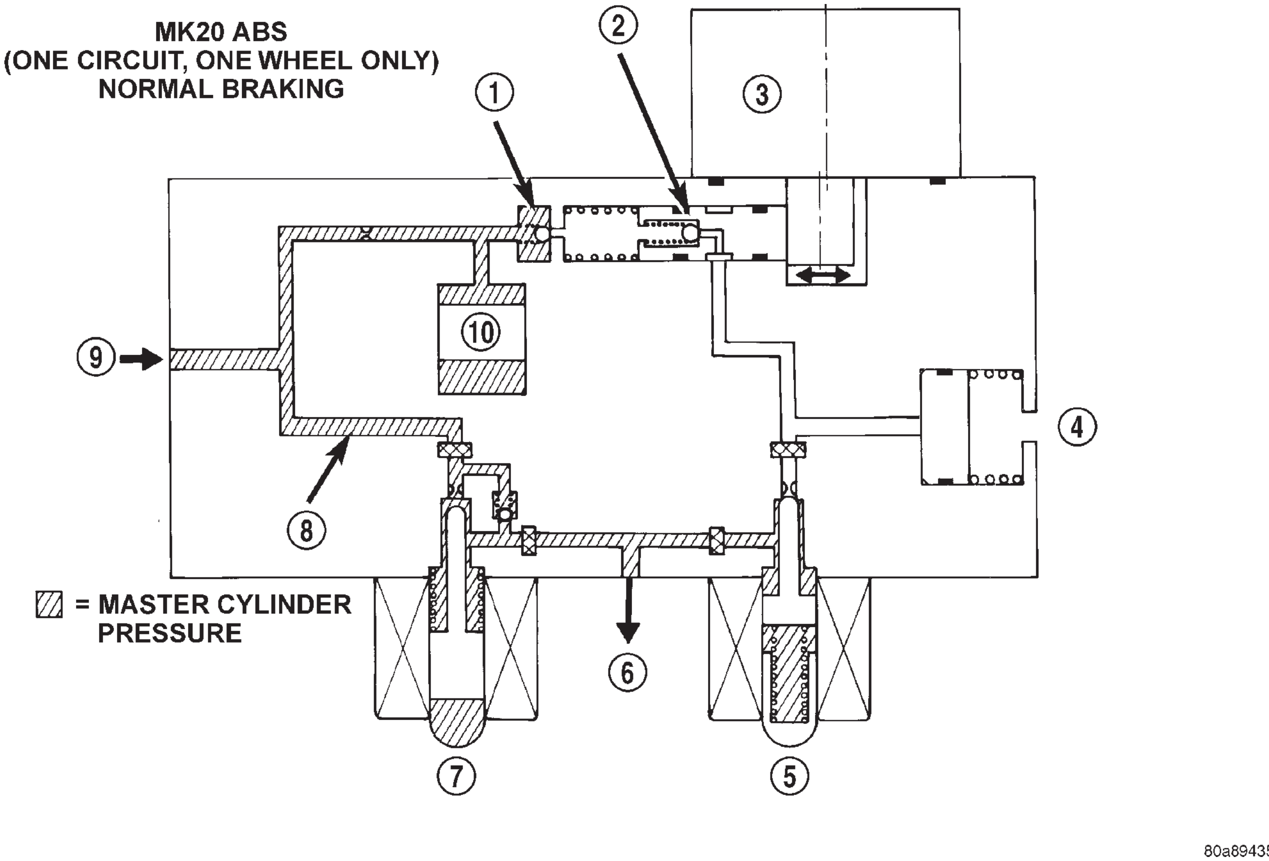


Fig. 12 Normal Braking Hydraulic Circuit

1 - OUTLET VALVE
2 - PUMP PISTON
3 - PUMP MOTOR (OFF)
4 - LOW PRESSURE ACCUMULATOR
5 - NORMALLY CLOSED VALVE (OFF)
6 - TO RIGHT FRONT WHEEL
7 - NORMALLY OPEN VALVE (OFF)
8 - MASTER CYLINDER PRESSURE
9 - FROM MASTER CYLINDER
10 - NOISE DAMPER CHAMBER

HCU (HYDRAULIC CONTROL UNIT) (Continued)

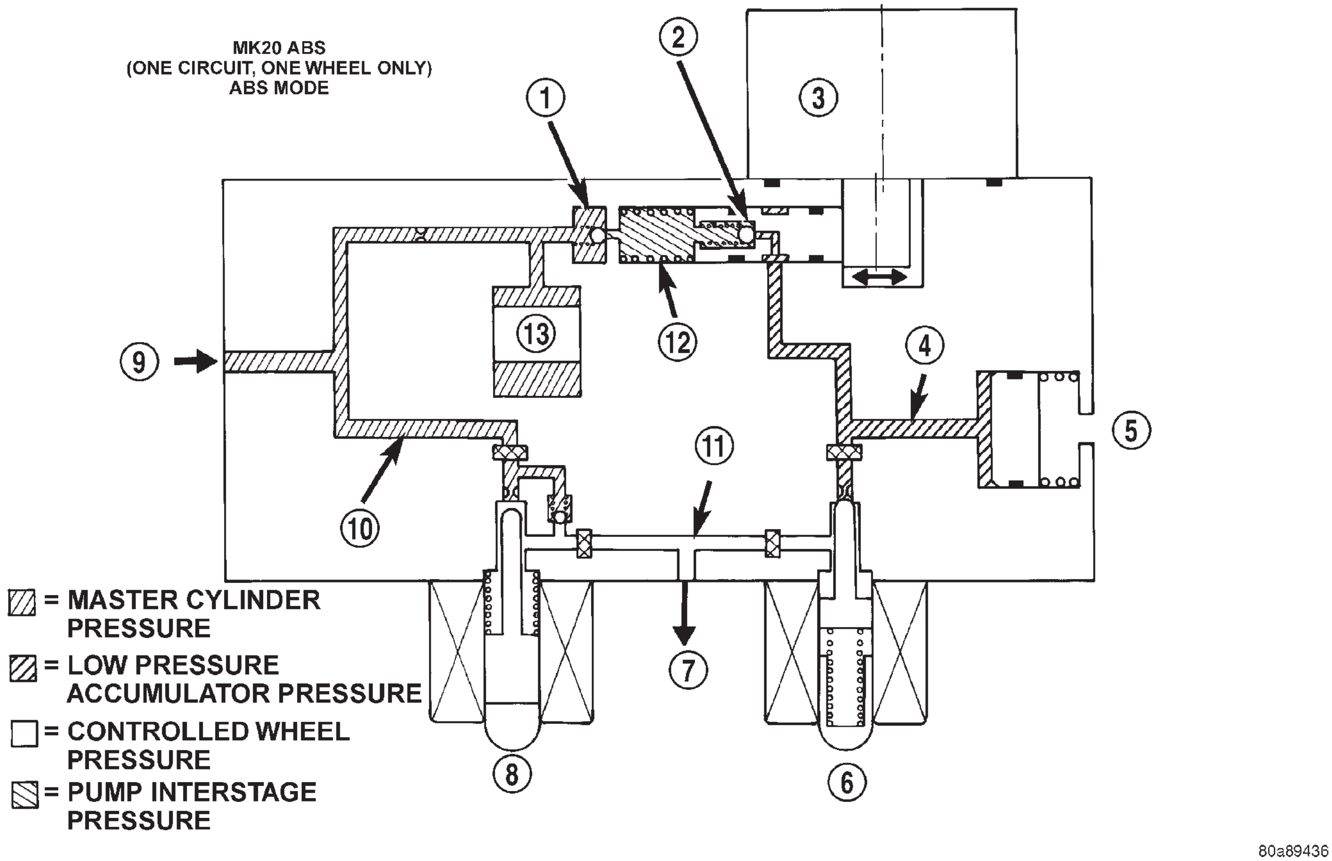


Fig. 13 ABS Mode Hydraulic Circuit (Without Traction Control)

1 - OUTLET VALVE
2 - PUMP PISTON
3 - PUMP MOTOR (ON)
4 - LOW PRESSURE ACCUMULATOR PRESSURE
5 - LOW PRESSURE ACCUMULATOR
6 - NORMALLY CLOSED VALVE (MODULATING)
7 - TO RIGHT FRONT WHEEL
8 - NORMALLY OPEN VALVE (MODULATING)
9 - FROM MASTER CYLINDER
10 - MASTER CYLINDER PRESSURE
11 - CONTROLLED WHEEL PRESSURE
12 - PUMP INTERSTAGE PRESSURE
13 - NOISE DAMPER CHAMBER

ICU (INTEGRATED CONTROL UNIT)

DESCRIPTION

The hydraulic control unit (HCU) and the controller antilock brake (CAB) used with this antilock brake system are combined (integrated) into one unit, which is called the integrated control unit (ICU) (Fig. 14). The ICU is located below the air cleaner housing on the lower radiator support (Fig. 15).

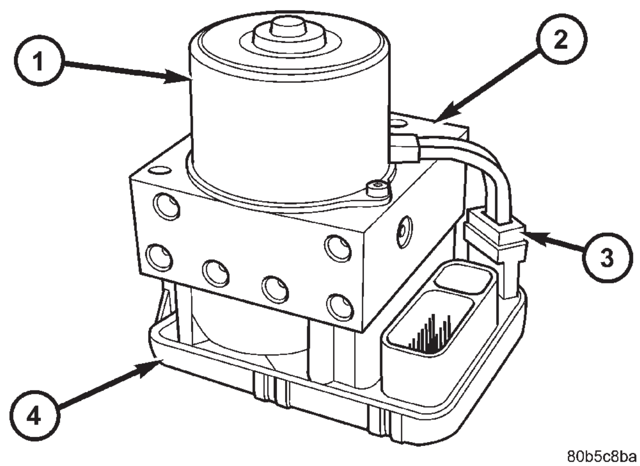


Fig. 14 INTEGRATED CONTROL UNIT (ICU)

1 - PUMP/MOTOR
2 - HCU
3 - PUMP/MOTOR WIRING CONNECTOR
4 - CAB

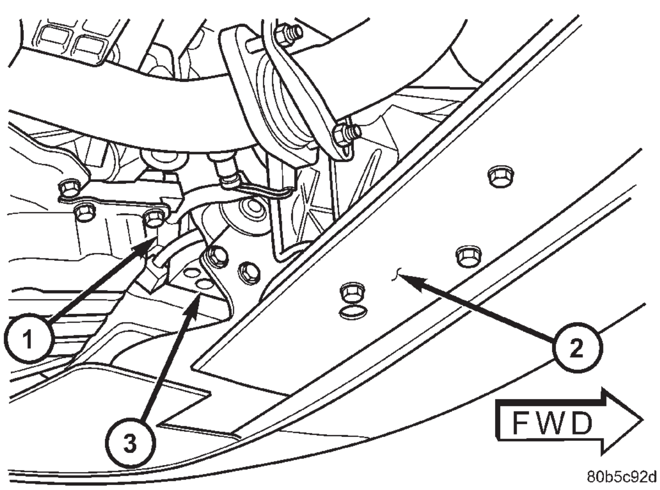


Fig. 15 ICU LOCATION

1 - 24-WAY CAB CONNECTOR
2 - LOWER RADIATOR SUPPORT
3 - ICU

The ICU consists of the following components: the CAB, eight (build/decay) solenoid valves (four inlet valves and four outlet valves), valve block, fluid accumulators, a pump, and an electric motor.

The replaceable components of the ICU are the HCU and the CAB. No attempt should be made to service any individual components of the HCU or CAB. For information on the CAB, (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/CONTROLLER ANTILOCK BRAKE - DESCRIPTION).

OPERATION

For information of the ICU, refer to these individual components of the ICU:

• CONTROLLER ANTILOCK BRAKE (CAB) (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/CONTROLLER ANTILOCK BRAKE - OPERATION)

• HYDRAULIC CONTROL UNIT (HCU) (Refer to 5 - BRAKES - ABS/HYDRAULIC/MECHANICAL/HCU (HYDRAULIC CONTROL UNIT) - OPERATION)

For information on the ICU's hydraulic circuits, refer to HYDRAULIC CIRCUITS AND VALVE OPERATION. (Refer to 5 - BRAKES - ABS/HYDRAULIC/MECHANICAL - OPERATION)

REMOVAL - ICU

(1) Remove the remote ground cable from the ground stud on the left strut tower.

(2) Correctly isolate remote ground cable when servicing vehicle by installing the ground cable insulator on the strut tower ground stud. **This will prevent accidental grounding of the remote ground cable.**

(3) Using a brake pedal positioning tool (Fig. 16), depress brake pedal past its first 1 inch of travel and hold in this position. This will isolate the master cylinder reservoir from the brake hydraulic system, not allowing the brake fluid to drain out of the reservoir.

(4) Remove the air cleaner housing. Refer to 9 - ENGINE/AIR INTAKE SYSTEM

(5) Clean any debris away from the fittings on top of the ICU.

(6) Remove the two brake tubes coming from the primary and secondary master cylinder ports at the ICU (Fig. 17).

(7) Remove the four chassis brake tubes going to each brake, mounted in-line across the top of the junction block (Fig. 17).

(8) Disconnect the 24-way wiring harness connector from the CAB (Fig. 17) using the following procedure. Grasp the lock on the 24-way connector and pull it up from the connector as far as possible. This

ICU (INTEGRATED CONTROL UNIT) (Continued)

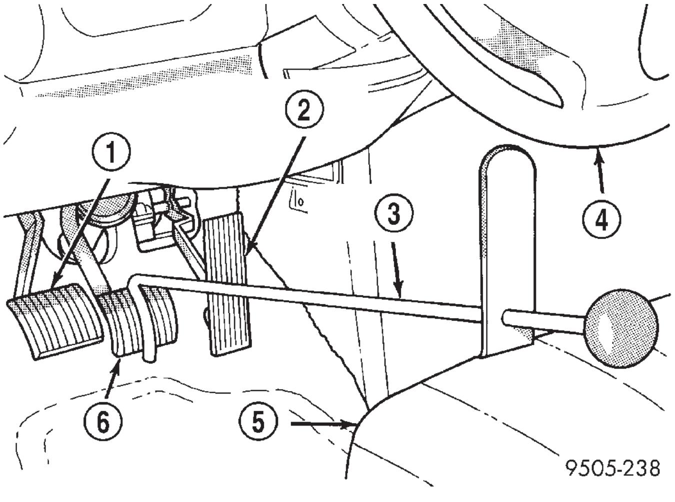


Fig. 16 Brake Pedal Holding Tool Installed (Typical)

1 - CLUTCH PEDAL (IF EQUIPPED WITH MANUAL TRANSAXLE)
2 - THROTTLE PEDAL
3 - BRAKE PEDAL HOLDING TOOL
4 - STEERING WHEEL
5 - DRIVER'S SEAT
6 - BRAKE PEDAL

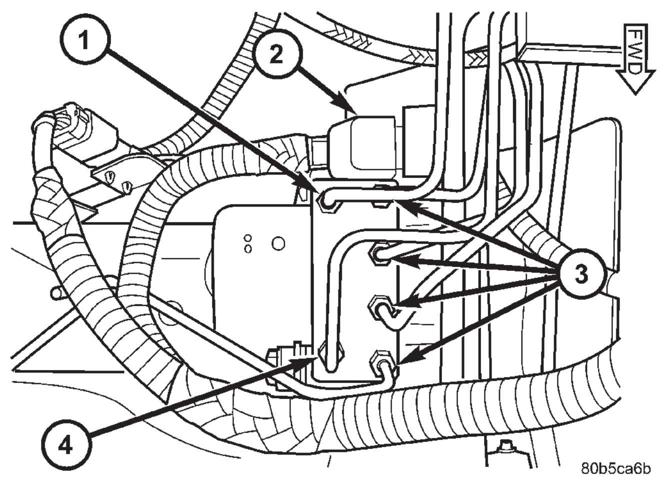


Fig. 17 BRAKE TUBE FITTINGS

1 - SECONDARY BRAKE TUBE FROM MASTER CYLINDER
2 - CAB CONNECTOR
3 - CHASSIS TUBES TO BRAKES
4 - PRIMARY BRAKE TUBE FROM MASTER CYLINDER

will unlock and raise the connector out of the socket on the CAB.

(9) Remove the three bolts fastening the ICU to its mounting bracket (Fig. 18). Remove the ICU from the vehicle.

(10) To separate the HCU from the CAB, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - DISASSEMBLY).

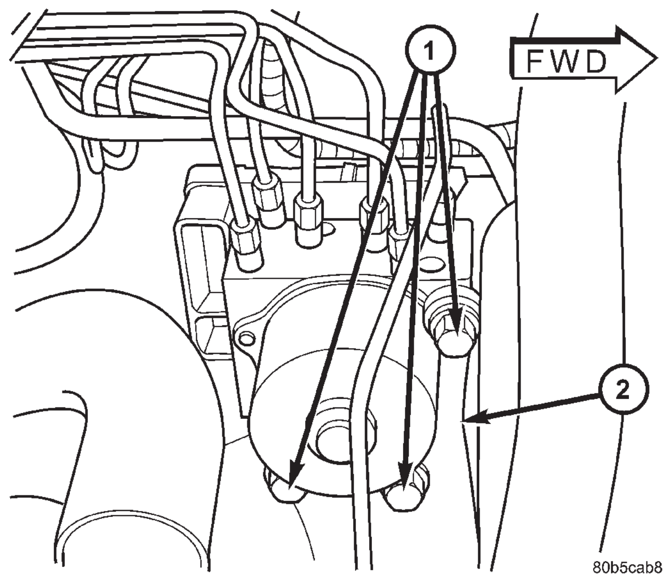


Fig. 18 ICU MOUNTING BOLTS

1 - MOUNTING BOLTS
2 - ICU MOUNTING BRACKET

DISASSEMBLY - ICU

(1) Remove the ICU from the vehicle. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - REMOVAL)

(2) Disconnect the pump/motor wiring harness from the CAB (Fig. 14).

(3) Remove the 4 bolts (Fig. 19) attaching the CAB to the HCU.

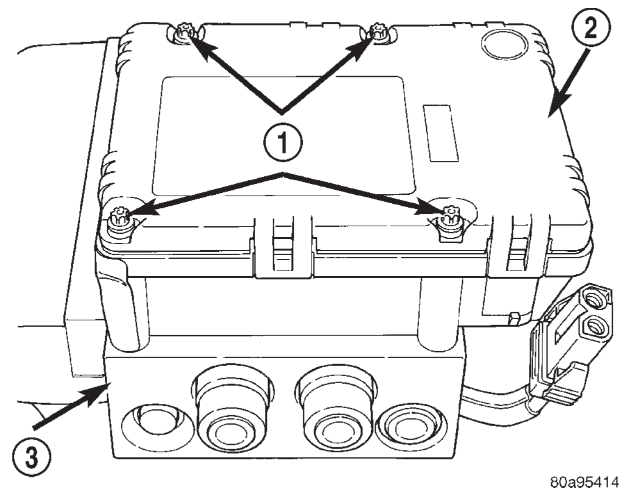


Fig. 19 (TYPICAL) CAB Attaching Bolts

1 - MOUNTING BOLTS
2 - CAB
3 - HCU VALVE BLOCK

(4) Remove the CAB from the HCU (Fig. 20).

ICU (INTEGRATED CONTROL UNIT) (Continued)

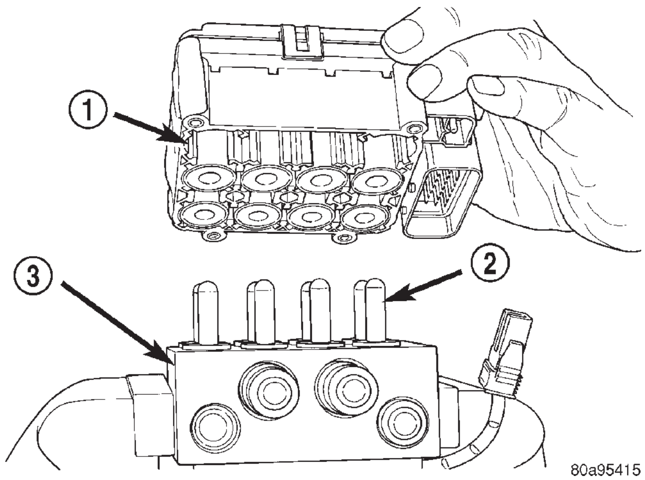


Fig. 20 (TYPICAL) Remove/Install CAB

1 - CAB
2 - HCU VALVES
3 - HCU VALVE BLOCK

ASSEMBLY - ICU

(1) Install the CAB (Fig. 20) on the HCU.

(2) Install the 4 bolts mounting the CAB (Fig. 19) to the HCU. Tighten the CAB mounting bolts to a torque of 2 N·m (17 in. lbs.).

(3) Plug the pump/motor wiring harness into the CAB.

(4) Install the ICU in the vehicle and bleed the base and ABS hydraulic systems. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - INSTALLATION)

INSTALLATION - ICU

(1) Install the ICU back in the vehicle on its mounting bracket (Fig. 18).

(2) Install isolators, washers and attaching bolts, mounting the ICU to its mounting bracket. Tighten the 3 HCU mounting bolts to a torque of 11 N·m (97 in. lbs.).

CAUTION: Before installing the 24-way connector in the CAB be sure that the seal is properly installed in the connector.

(3) Install the 24-way connector into the socket on the CAB (Fig. 17). The connector is installed using the following procedure. Position the 24-way connector in the socket on the CAB and carefully push it down as far as it will go. When connector is fully seated into the CAB socket push in the connector lock as far as it will go. This will pull the connector into the socket on the CAB and lock it in the installed position.

(4) Install the four chassis brake tubes (going to each brake) to the top of the ICU (Fig. 17). Tighten the tube fittings to 17 N·m (145 in. lbs.) torque with the aid of a crow foot wrench.

(5) Install the two brake tubes coming from the primary and secondary master cylinder ports to the top corners of the ICU (Fig. 17). Tighten the tube fittings to 17 N·m (145 in. lbs.) torque with the aid of a crow foot wrench.

(6) Install the air cleaner housing. Refer to 9 - ENGINE/AIR INTAKE SYSTEM.

(7) Remove the brake pedal holding tool.

(8) Install the remote ground cable onto the ground stud located on left shock tower.

(9) Bleed the base brakes and the ABS brakes hydraulic system. (Refer to 5 - BRAKES - ABS - STANDARD PROCEDURE)

(10) Road test vehicle to ensure proper operation of the base and ABS systems.

CLUTCH

TABLE OF CONTENTS

CLUTCH

DESCRIPTION

Manual transaxle equipped models (2.0L/2.7L) utilize a modular clutch assembly. The clutch system consists of a modular clutch assembly (Fig. 1), a sleeve type release bearing, a self adjusting clutch cable (2.0L models), hydraulic clutch release system (2.7L models), and a clutch pedal that is part of a brake/clutch pedal bracket assembly.

The modular clutch assembly consists of a single, dry-type clutch disc, a diaphragm style clutch cover, and an integrated flywheel. The clutch cover is riveted to the flywheel, containing the clutch disc within. The modular clutch can only be serviced as an assembly.

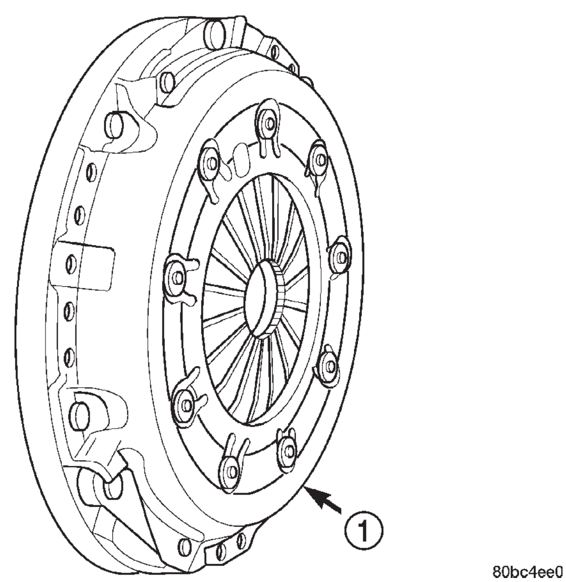


Fig. 1 Modular Clutch Assembly

1 - MODULAR CLUTCH ASSEMBLY

CLUTCH (Continued)

OPERATION

MECHANICAL

The clutch assembly is designed to transmit power from the engine to the manual transaxle. This is accomplished by the friction and clamping force generated when the spring loaded pressure plate locks the clutch disc to the flywheel (Fig. 2). The clutch disc, which is splined to the transaxle input shaft, transmits power until the center of the diaphragm spring is depressed, and the clamp force is removed from the disc.

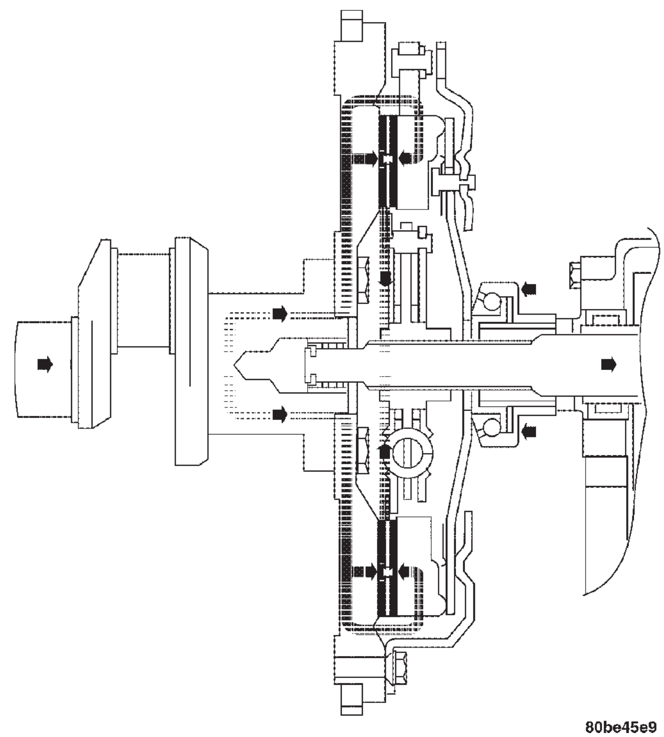


Fig. 2 Clutch Coupling Powerflow - Typical

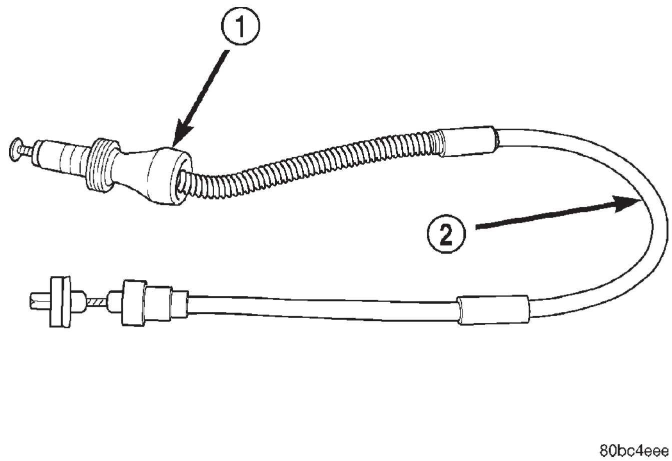


Fig. 3 Clutch Cable Assembly

1 - ADJUSTER MECHANISM
2 - CLUTCH CABLE

RELEASE SYSTEM - 2.0L/T350 TRANSAXLE

A sleeve-type release bearing is used to engage and disengage the clutch cover pressure plate. The release bearing is operated by a pivoting release lever in the clutch housing (Fig. 4). The lever pivots on a ball stud within the housing. The release lever is actuated by a self-adjusting clutch cable (Fig. 3).

The clutch cable has a unique self-adjuster mechanism (Fig. 3) built into the cable which compensates for clutch disc wear. The preload spring maintains tension on the cable. This tension keeps the clutch release bearing (Fig. 4) continuously loaded against the fingers of the clutch cover assembly. The cable requires no maintenance or lubrication.

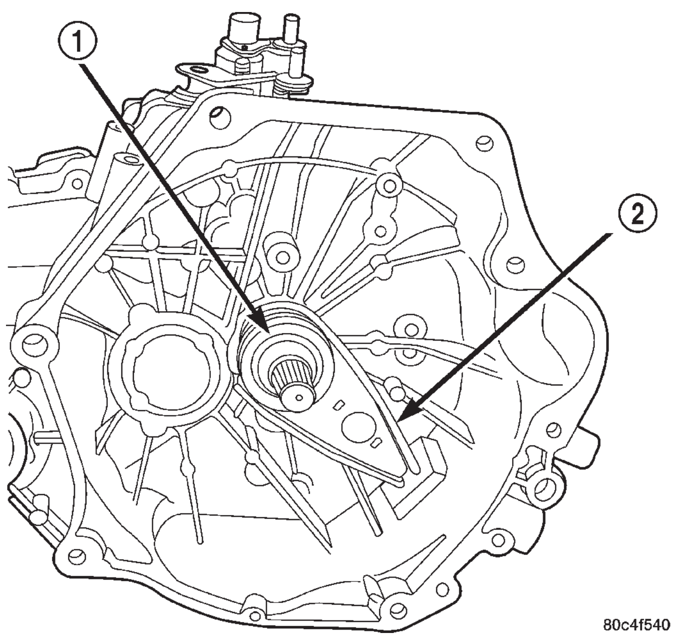


Fig. 4 Clutch Release Bearing and Lever (2.0L/T350)

1 - RELEASE BEARING
2 - LEVER

CLUTCH (Continued)

RELEASE SYSTEM - 2.7L/T850 TRANSAXLE

The clutch hydraulic system is responsible for engaging and disengaging the clutch. Depressing the clutch pedal develops fluid pressure in the clutch master cylinder. This pressure is transmitted to the slave cylinder through a connecting line. In turn, the slave cylinder operates the clutch release lever (Fig. 5).

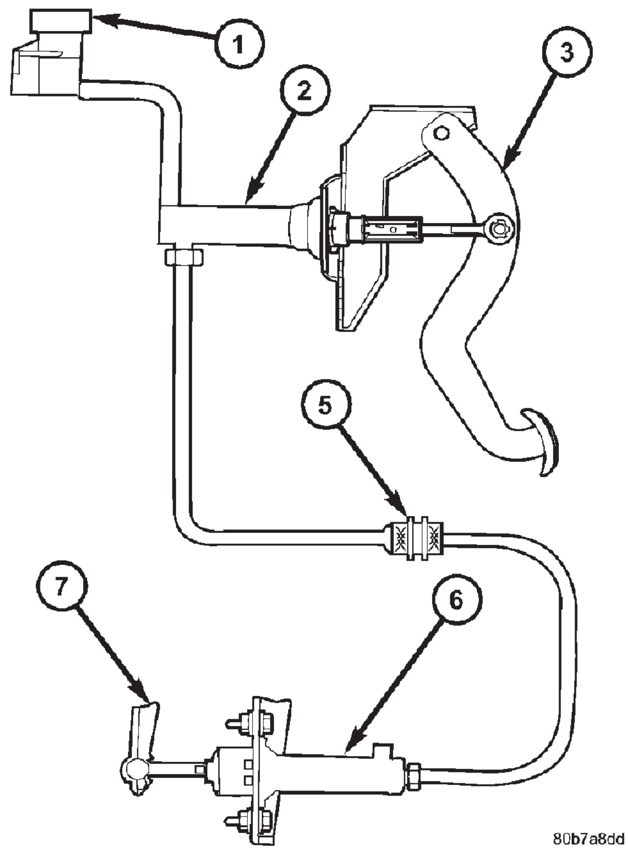


Fig. 5 Clutch Hydraulic System—Typical

1 - RESERVOIR
2 - MASTER CYLINDER
3 - CLUTCH PEDAL
5 - QUICK CONNECT
6 - SLAVE CYLINDER
7 - RELEASE LEVER

The slave cylinder spring causes the release lever to hold the release bearing in constant contact with the diaphragm spring (release bearing preload). During a clutch pedal actuation, the hydraulic fluid pressure applies additional force to the release lever and bearing (Fig. 6). As additional force is applied, the bearing presses the diaphragm spring fingers inward on the fulcrums. This action moves the pressure plate rearward, relieving clamp force on the disc.

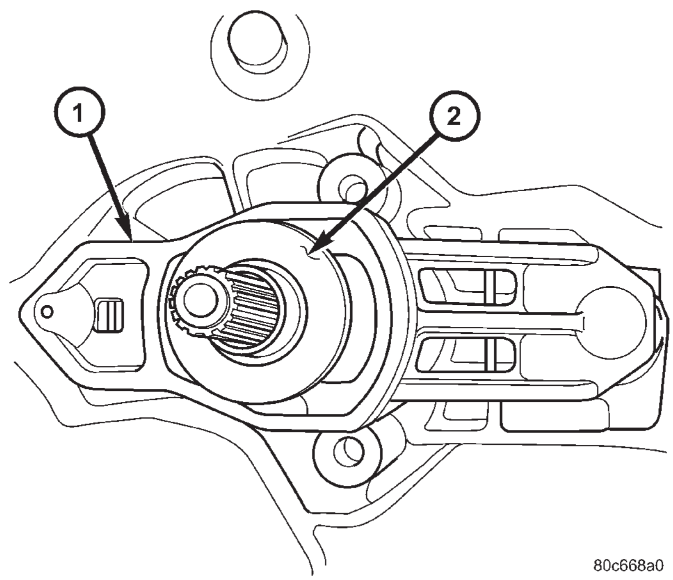


Fig. 6 Clutch Release Bearing and Lever (2.7L/T850)

1 - RELEASE LEVER
2 - RELEASE BEARING

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - CLUTCH SYSTEM

Clutch problem diagnosis will generally require a road test to determine the type of fault. Component inspection will then determine the problem after road testing.

Drive the vehicle at normal speeds during road test. Shift the transaxle through all gear ranges and observe clutch action. If chatter, grab, slip, or improper release is experienced, remove and inspect the clutch components. If the problem is noise or hard shifting, further diagnosis may be needed. The transaxle or other driveline components may actually be at fault.

CLUTCH (Continued)

SERVICE DIAGNOSIS - CLUTCH GRAB/CHATTER

CONDITION	POSSIBLE CAUSES	CORRECTION
CLUTCH DISC FACING COVERED WITH OIL OR GREASE	Oil leak at engine rear main or transaxle input shaft seal.	Correct leak and replace modular clutch assembly.
	Too much grease applied to splines of disc and input shaft.	Apply lighter coating of grease to splines.
NO FAULT FOUND WITH CLUTCH COMPONENTS	Problem actually related to suspension or driveline component.	Further diagnosis required. Check engine/transmission mounts, suspension attaching parts and other driveline components as needed.
	Engine related problems.	Check EFI and ignition systems.
PARTIAL ENGAGEMENT OF CLUTCH DISC	Clutch cover, spring, or release fingers bent, distorted (rough handling, improper assembly).	Replace modular clutch assembly.
	Clutch disc damaged or distorted.	Replace modular clutch assembly.
	Clutch misalignment.	Verify modular clutch pilot plate alignment to crankshaft. Replace the modular clutch assembly if the pilot plate is loose or bent.

SERVICE DIAGNOSIS - CLUTCH SLIPS

CONDITION	POSSIBLE CAUSES	CORRECTION
DISC FACING WORN OUT	Normal wear.	Replace modular clutch assembly.
	Driver frequently rides (slips) clutch, results in rapid wear, overheating.	Replace modular clutch assembly.
	Insufficient clutch cover diaphragm spring tension	Replace modular clutch assembly.
CLUTCH DISC FACING CONTAMINATED WITH OIL OR GREASE	Leak at rear main oil seal or transaxle input shaft seal	Replace leaking seals. Replace modular clutch assembly.
	Excessive amount of grease applied to input shaft splines	Apply less grease to input shaft. Replace modular clutch assembly
	Road splash, water entering housing	Seal housing. Inspect clutch assembly.
CLUTCH IS RUNNING PARTIALLY DISENGAGED	Release bearing sticking or binding, does not return to normal running position.	Verify that bearing is actually binding. Then, replace bearing and transmission front bearing retainer if sleeve surface is damaged.
	Cable self-adjuster mechanism sticking or binding causing high preload.	Verify that self-adjuster is free to move.
CLUTCH DISC FACINGS HAVE FRACTURED INTO SMALL PIECES	Leak at rear main or transaxle input shaft seal	Replace seal. Replace modular clutch assembly.
	Excessive heat from slippage	Replace modular clutch assembly

CLUTCH (Continued)

SERVICE DIAGNOSIS - IMPROPER CLUTCH RELEASE

CONDITION	POSSIBLE CAUSES	CORRECTION
CLUTCH DISC BINDS ON INPUT SHAFT SPLINES	Clutch disc hub splines damaged during installation	Clean, smooth, and lubricate disc and shaft splines. Replace modular clutch assembly, or clutch disc, and/or input shaft if splines are severely damaged.
	Input shaft splines rough, damaged.	Clean input shaft splines. Then lube.
	Corrosion or rust formations on splines of input shaft and disc	Clean input shaft splines and disc splines, then lube
CLUTCH DISC RUSTED TO FLYWHEEL AND/OR PRESSURE PLATE	Occurs in vehicles stored or not driven for extended period of time. Also occurs after steam cleaning if vehicle is not used for extended period.	Replace modular clutch assembly
CLUTCH WILL NOT DISENGAGE PROPERLY	Disc bent, distorted during transaxle installation	Replace modular clutch assembly
	Clutch cover diaphragm spring damaged during transaxle installation	Replace modular clutch assembly
	Release fork bent, loose, or damaged	Replace fork if worn or damaged
	Clutch cable binding or routed incorrectly.	Check and correct cable routing.
	Self-adjuster in cable not functioning properly, resulting in excess cable slack.	Pull on cable conduit at transaxle (as if disconnecting cable) to check adjuster operation.

SERVICE DIAGNOSIS - CLUTCH PEDAL NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
CLUTCH PEDAL SQUEAKS WHEN DEPRESSED TO FLOOR	Pedal bushings worn out or inadequate lubrication	Replace or lubricate bushings
	Clutch pedal return spring worn out	Lubricate or replace return spring
CLUTCH PEDAL SQUEAKS DURING OPERATION	Clutch release lever pivot stud has inadequate lubrication	Lubricate or replace clutch release lever

DIAGNOSIS AND TESTING - DRIVE PLATE MISALIGNMENT

Common causes of misalignment are:

- Heat warping
- Mounting drive plate on a dirty crankshaft flange
- Incorrect bolt tightening
- Improper seating on the crankshaft shoulder
- Loose crankshaft bolts

Clean the crankshaft flange before mounting the drive plate. Dirt and grease on the flange surface may misalign the flywheel, causing excessive runout. Use new bolts when mounting drive plate to crankshaft. Tighten drive plate bolts to specified torque only. Over-tightening can distort the drive plate hub causing excessive runout.

DIAGNOSIS AND TESTING - CLUTCH COVER AND DISC RUNOUT

Check condition of the clutch cover before installation. A warped cover or diaphragm spring will cause grab and/or incomplete release or engagement. Use care when handling the clutch assembly. Impact can distort the cover, diaphragm spring, and release fingers.

CLUTCH (Continued)

DIAGNOSIS AND TESTING - CLUTCH CHATTER COMPLAINTS

For all clutch chatter complaints, perform the following:

(1) Check for loose, misaligned, or broken engine and transmission mounts. If present, they should be corrected at this time. Test vehicle for chatter. If chatter is gone, there is no need to go any further.

(2) If chatter persists, check hydraulic clutch release system is functioning properly.

(3) Check for loose connections in drivetrain. Correct any problems and determine if clutch chatter complaints have been satisfied. If not:

(a) Remove transaxle.

(b) Check to see if the release bearing is sticky or binding. Replace bearing, if needed.

(c) Check linkage for excessive wear on the pivot stud and fork fingers. Replace all worn parts.

(d) Check clutch assembly for contamination (dirt, oil). Replace clutch assembly, if required.

(e) Check to see if the clutch disc hub splines are damaged. Replace with new clutch assembly, if necessary.

(f) Check input shaft splines for damage. Replace, if necessary.

(g) Check for uneven wear on clutch fingers.

(h) Check for broken clutch cover diaphragm spring fingers. Replace with new clutch assembly, if necessary.

DIAGNOSIS AND TESTING - CLASH-INTO-REVERSE COMPLAINTS

All T350 manual transaxles are equipped with a reverse brake. It prevents clash when shifting into reverse, but only if the vehicle is not moving.

(1) Depress clutch pedal to floor and hold. After three seconds, shift to reverse. If clash is present, clutch has excessive spin time, and the reverse brake may not be functioning.

(2) Remove transaxle.

(3) Check the input shaft spline, clutch disc splines, and release bearing for dry rust. If present, clean rust off and apply a light coat of bearing grease to the input shaft splines. Apply grease on the input shaft splines only where the clutch disc slides. Verify that the clutch disc slides freely along the input shaft spline.

(4) Check to see if the clutch disc hub splines are damaged, and replace with new clutch assembly if required.

(5) Check the input shaft for damaged splines. Replace as necessary.

(6) Check for broken clutch cover diaphragm spring fingers.

(7) Install clutch assembly and transaxle.

SPECIFICATIONS

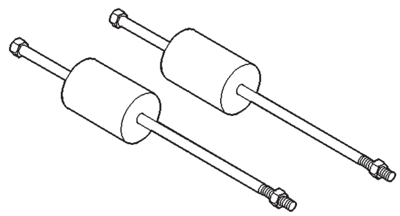
CLUTCH

TORQUE SPECIFICATIONS

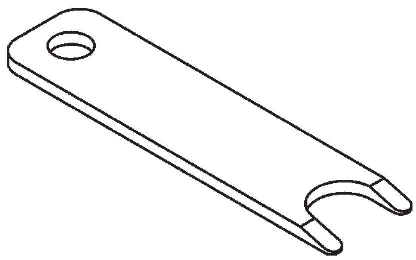
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Clutch Pedal Pivot Shaft Nut	34	25	—
Modular Clutch-to-Drive Plate	88	65	—
Transaxle-to-Engine Mounting Bolts	95	70	—

CLUTCH (Continued)

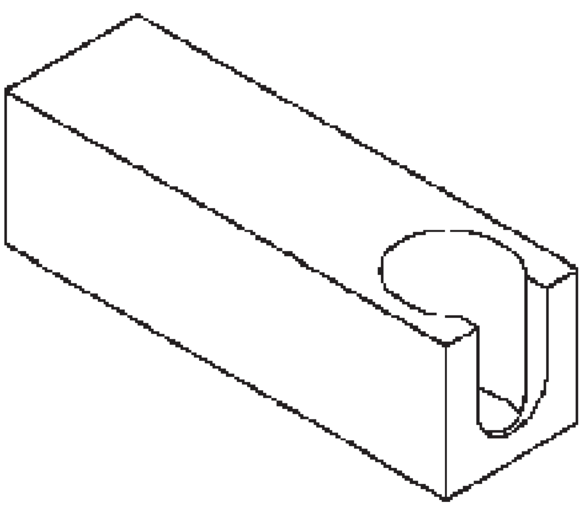
SPECIAL TOOLS



Puller, C-3752



Disconnect Tool, 6638A



Remover/Installer, 6891

CLUTCH MASTER CYLINDER (2.7L/T850 MODELS)

REMOVAL

(1) Open hood.

(2) Disconnect battery negative cable at strut tower.

(3) Remove fuse box access cover.

(4) Remove instrument panel lower close-out panel.

(5) Disconnect clutch master cylinder pushrod from clutch pedal pin.

(6) Remove air cleaner assembly.

(7) Remove clutch master cylinder reservoir from speed control servo bracket.

(8) Lift purge solenoid off of mounting bracket and secure out of way.

(9) Disconnect speed control servo connector. Remove speed control servo/bracket from strut tower and secure out of way.

(10) Raise vehicle on hoist.

(11) Using tool 6638, disconnect clutch hydraulic circuit quick-connect fitting.

(12) Lower vehicle.

(13) Rotate master cylinder ¼ turn counter-clockwise and remove from dash panel/clutch pedal bracket.

(14) Work master cylinder and plumbing out of engine compartment, using care not to bend or damage plumbing. Note routing of plumbing for reassembly.

INSTALLATION

(1) Install master cylinder and plumbing into position as removed. Use care not to bend or damage plumbing.

(2) Install master cylinder pushrod through dash panel hole. Index master cylinder ¼ turn counter-clockwise, then apply pressure towards dash panel and rotate ¼ turn clockwise. If necessary, have helper guide installation from inside vehicle.

(3) Connect master cylinder pushrod to clutch pedal pin. An audible click should be heard. Verify plastic retainer is intact and secures pushrod. **If retainer is damaged, it MUST be replaced.**

(4) Install instrument panel lower close-out panel.

(5) Install fuse box access panel.

(6) Raise vehicle.

(7) Route master cylinder plumbing into position and connect to slave cylinder. An audible click should be heard. Verify by pulling outward on connection.

(8) Lower vehicle.

(9) Install purge solenoid to mounting bracket.

(10) Connect brake master cylinder level sensor connector.

(11) Install speed control servo and connect connector.

(12) Install clutch master cylinder reservoir.

(13) Install air cleaner assembly.

(14) Install battery negative cable.

(15) Verify clutch pedal operation. Actuate clutch pedal at least ten (10) times to purge any trapped air from system.

(16) Check and adjust clutch master cylinder fluid level.

CLUTCH PEDAL INTERLOCK SWITCH

DIAGNOSIS AND TESTING - CLUTCH PEDAL INTERLOCK SWITCH

CLUTCH PEDAL INTERLOCK SWITCH–ELECTRICAL TEST

Disconnect clutch pedal interlock switch harness from instrument panel wiring harness. Using an ohmmeter, check for continuity between the two terminals in the connector on the switch harness. There should be no continuity between the terminals when the switch is in its normal (fully extended) position. When the switch is depressed more than 1.25 mm (0.050), the ohmmeter should show continuity (zero ohms).

If ohmmeter readings do not fall within these ranges, the switch is defective, and must be replaced.

CLUTCH PEDAL INTERLOCK SWITCH–MECHANICAL TEST

With the park brake set and the vehicle **IN NEUTRAL,** turn the key to the start position. The vehicle should not crank. If the vehicle cranks, the switch is defective (shorted out) and must be replaced. If the vehicle does not crank proceed to the next step.

WARNING: BEFORE PERFORMING THIS STEP, BE SURE THAT THE AREA IN FRONT OF THE VEHICLE IS CLEAR OF OBSTRUCTIONS AND PEOPLE. VEHICLE MAY MOVE WHEN PERFORMING THIS TEST.

With the park brake set and the vehicle **IN GEAR,** turn the key to the start position and hold it there.

Slowly depress the clutch pedal and feel for any vehicle motion when the starter is energized. If there is no motion the switch is working properly.

If motion is felt, check to see if the switch is making contact when the pedal is between 25 mm (1.0 in.) and 6 mm (0.25 in.) from the floor. If this condition is met, then the problem is either the clutch or the self-adjusting cable (See “Clutch Will Not Disengage Properly”). If this condition is not met, then the switch mounting tab on the brake bracket is bent, and the brake bracket must be replaced.

If vehicle will not crank, even with clutch pedal pressed to the floor, refer to “Service Diagnosis-Clutch Pedal Position Switch” chart in this section.

SERVICE DIAGNOSIS–CLUTCH PEDAL POSITION SWITCH

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WON’T CRANK WHEN CLUTCH PEDAL IS DEPRESSED TO THE FLOOR	Switch does not have continuity when plunger is depressed 1.25 mm	Defective switch. Replace switch.
	Switch plunger is not depressed when clutch pedal is depressed to the floor.	Floor mat or other obstruction interferes with clutch pedal movement.
	Problem is related to other components in the starting circuit.	Check other components in the starting circuit. Refer to Section 8A.

REMOVAL

(1) Disconnect battery negative cable.
(2) Remove steering column lower panel.
(3) Remove knee bolster.
(4) Disconnect position switch connector.
(5) Depress wing tabs on switch and push switch out of mounting bracket (Fig. 7).

INSTALLATION

(1) Slide switch wires through slot in bracket.
(2) Line up switch tab with slot in bracket and push switch into position (Fig. 7).
(3) Attach switch connector.
(4) Install knee bolster.
(5) Install steering column lower panel.
(6) Connect battery negative cable.

CLUTCH PEDAL INTERLOCK SWITCH (Continued)

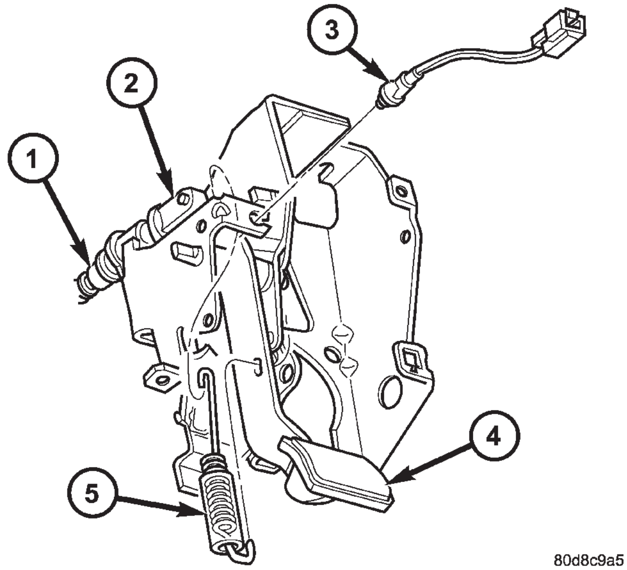


Fig. 7 Clutch Pedal Interlock Switch

1 - CLUTCH CABLE
2 - UPSTOP SPACER
3 - CLUTCH PEDAL INTERLOCK SWITCH
4 - CLUTCH PEDAL
5 - CLUTCH PEDAL RETURN SPRING

CLUTCH RELEASE BEARING AND LEVER

DESCRIPTION

A conventional release bearing is used to engage and disengage the clutch pressure plate. The clutch release bearing is mounted on the transaxle front bearing retainer. The bearing is attached to and operated by the release lever (Fig. 8) (Fig. 9), which moves the bearing into contact with the clutch cover diaphragm spring.

OPERATION

The release bearing is operated by the release lever (Fig. 8) (Fig. 9). Slave cylinder force causes the release lever to move the release bearing into contact with the diaphragm spring. As additional force is applied, the bearing presses the diaphragm spring fingers inward on the fulcrums. This action moves the pressure plate rearward, relieving clamping force on the clutch disc. Releasing pedal pressure removes clutch hydraulic pressure. The release bearing then moves away from the diaphragm spring which allows the pressure plate to exert clamping force on the clutch disc.

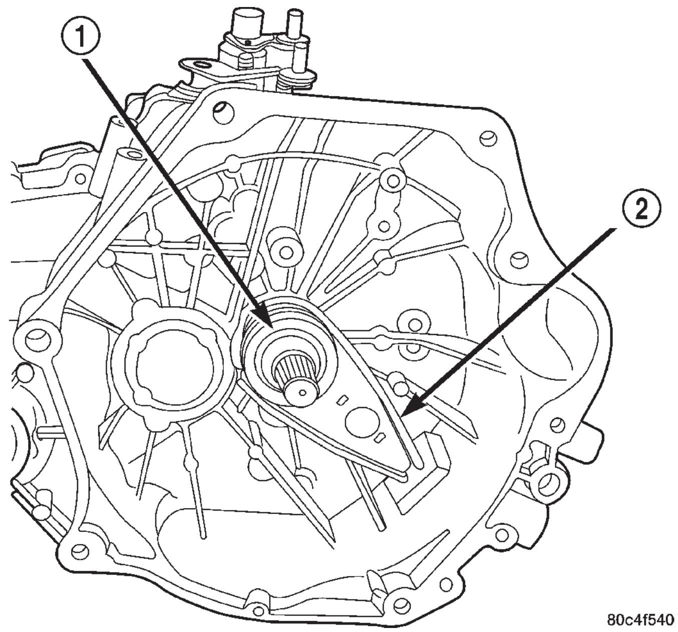


Fig. 8 Clutch Release Bearing and Lever (2.0L/T350)

1 - RELEASE BEARING
2 - RELEASE LEVER

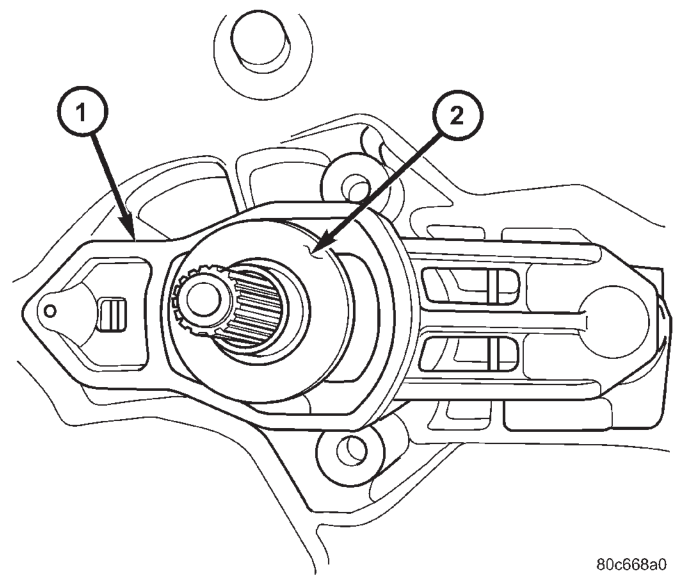


Fig. 9 Clutch Release Bearing and Lever (2.7L/T850)

1 - RELEASE LEVER
2 - RELEASE BEARING

REMOVAL

REMOVAL - T350 EQUIPPED MODELS

(1) Remove the transaxle from the vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/T350 MANUAL - REMOVAL)

CLUTCH RELEASE BEARING AND LEVER (Continued)

(2) Move the lever and bearing assembly (Fig. 10) to a vertical in-line position. Grasp the release lever with two hands in the pivot stud socket area. Pull with even pressure and the lever will pop off the pivot–stud. Do not use a screwdriver or pry bar to pop off the lever. This may damage the spring clip on the lever.

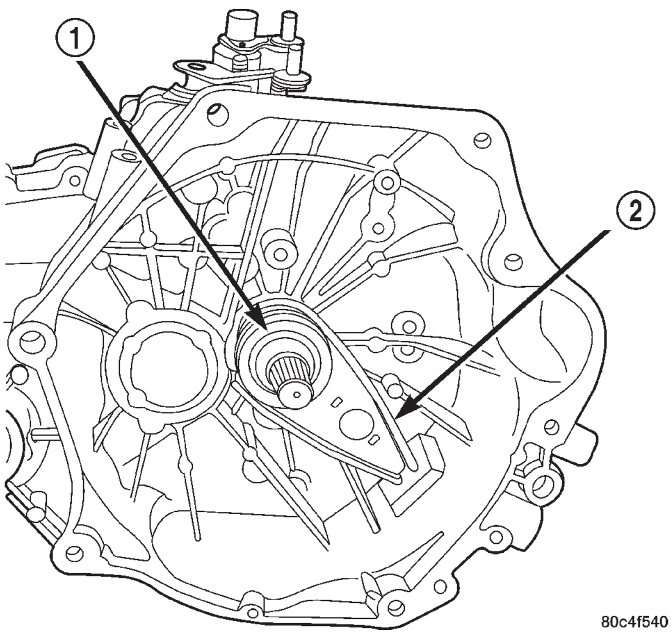


Fig. 10 Clutch Release Bearing and Lever

1 - RELEASE BEARING
2 - RELEASE LEVER

(3) As a unit, remove the lever from the bearing thrust plate. Be careful not to damage retention tabs on bearing.

(4) Examine the condition of the bearing. **It is pre-lubricated and sealed and should not be immersed in oil or solvent.**

(5) The bearing should turn smoothly when held in the hand under a light thrust load. A light drag caused by the lubricant fill is normal. If the bearing is noisy, rough, or dry, replace the complete bearing assembly with a new bearing.

(6) Check the condition of the pivot stud spring clips on back side of clutch release lever. If the clips are broken or distorted, replace the release lever.

REMOVAL - T850 EQUIPPED MODELS

(1) Remove transaxle assembly. (Refer to 21 - TRANSMISSION/TRANSAXLE/T850 MANUAL - REMOVAL)

(2) Remove modular clutch assembly from input shaft.

(3) Grasp clutch release lever and bearing (Fig. 11) with both hands and pull outward using moderate pressure to release lever from pivot ball(s).

(4) Separate release bearing from lever.

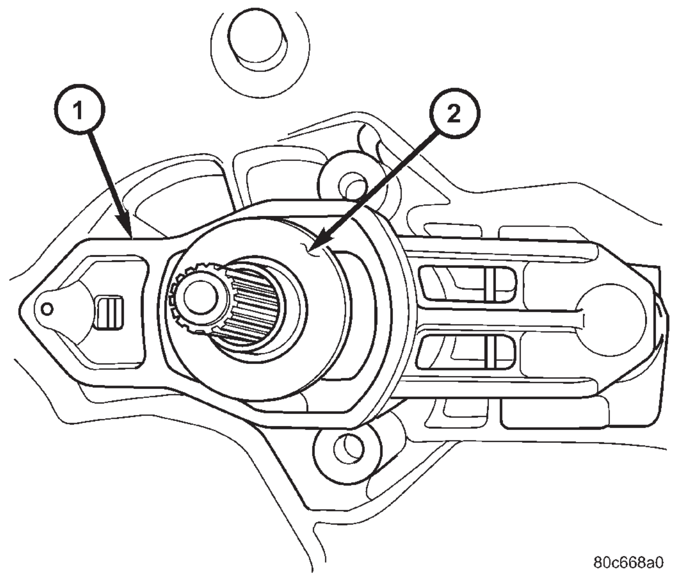


Fig. 11 Release Bearing and Lever (2.7L/T850)

1 - RELEASE LEVER
2 - RELEASE BEARING

NOTE: Remove release lever pivot ball(s) ONLY if replacement is necessary.

(5) Remove pivot ball(s) using slide hammer C-3752 and remover/installer 6891 (Fig. 12).

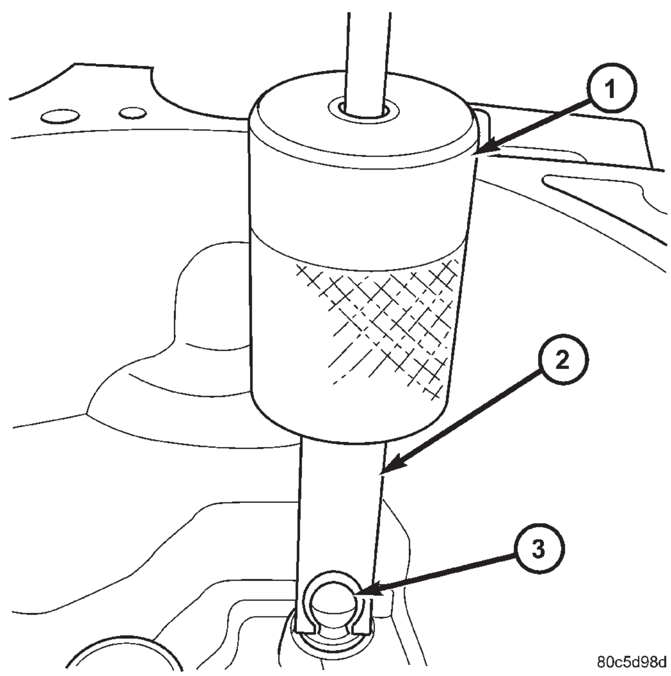


Fig. 12 Pivot Ball Removal/Installation

1 - C-3752 SLIDE HAMMER
2 - REMOVER/INSTALLER 6891
3 - PIVOT BALL

CLUTCH RELEASE BEARING AND LEVER (Continued)

INSTALLATION

INSTALLATION - T350 EQUIPPED MODELS

(1) The pivot ball pocket in the lever, as well as the lever arms should be lubricated with grease prior to installation.

(2) Assemble the lever to the bearing. The small pegs on the bearing must go over the lever arms.

(3) Slide the bearing and lever assembly onto the input shaft bearing retainer, as a unit (Fig. 10).

(4) Snap the clutch release lever onto the pivot ball.

(5) Reinstall transaxle assembly. (Refer to 21 - TRANSMISSION/TRANSAXLE/T350 MANUAL - INSTALLATION)

INSTALLATION - T850 EQUIPPED MODELS

(1) If removed, install **new** release lever pivot ball(s) using slide hammer C-3752 and remover/installer 6891 (Fig. 13) (Fig. 14).

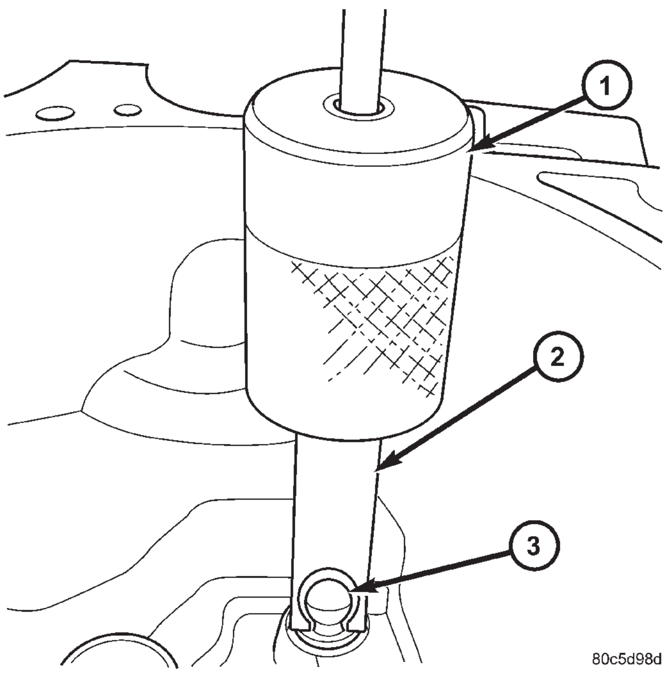


Fig. 13 Pivot Ball Removal/Installation

1 - C-3752 SLIDE HAMMER
2 - REMOVER/INSTALLER 6891
3 - PIVOT BALL

(2) Install clutch release bearing to lever. Apply grease to interface points. Make sure release bearing retainers engage lever pocket as shown in (Fig. 15).

(3) Apply grease to pivot ball, and on release lever at slave cylinder contact point.

(4) Install clutch release bearing/lever assembly into position by sliding bearing onto input bearing retainer, and using moderate hand pressure to seat

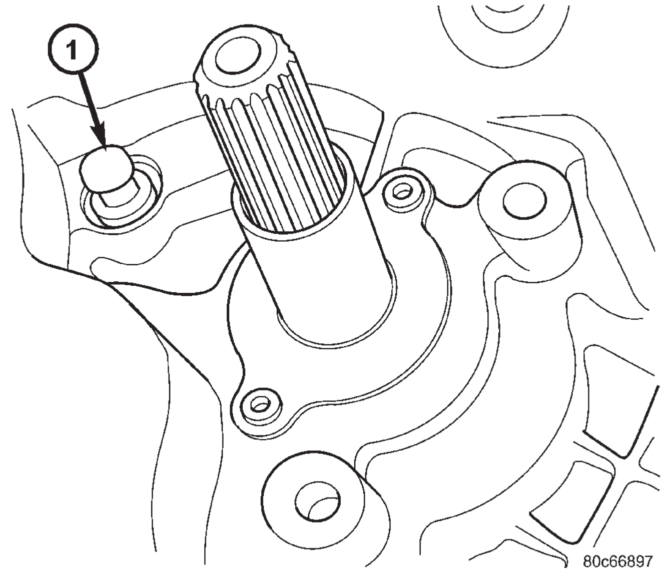


Fig. 14 Pivot Ball Position

1 - PIVOT BALL (1)

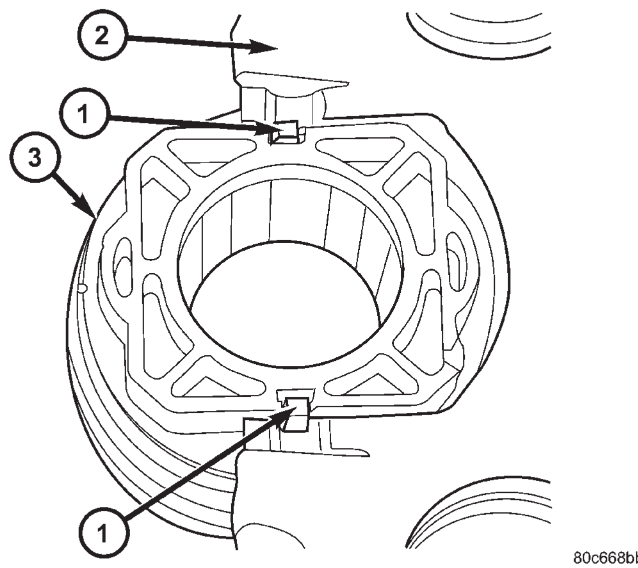


Fig. 15 Release Bearing-to-Lever

1 - RETAINER (2)
2 - RELEASE LEVER
3 - RELEASE BEARING

release lever to pivot ball (Fig. 16). A “pop” sound should be heard. Verify proper engagement by lightly pulling outward on lever at pivot ball location, and then actuating lever and bearing to ensure proper operation.

(5) Reinstall transaxle assembly (Refer to 21 - TRANSMISSION/TRANSAXLE/T 850 MANUAL - INSTALLATION)

CLUTCH RELEASE BEARING AND LEVER (Continued)

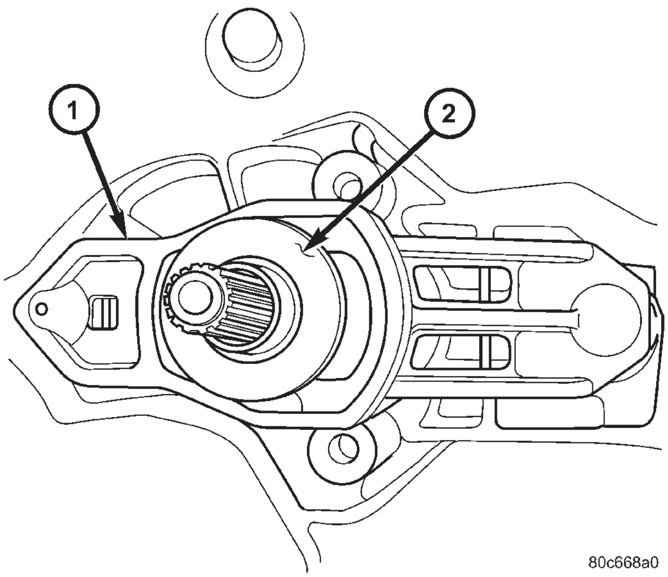


Fig. 16 Release Bearing and Lever

1 - RELEASE LEVER
2 - RELEASE BEARING

CLUTCH RELEASE CABLE (2.0L/T350 MODELS)

DESCRIPTION

2.0L equipped models use a cable style clutch release system. The clutch cable assembly (Fig. 17) carries the movement of the clutch pedal to the clutch release bearing. The cable is designed to maintain tension against the clutch fork, or lever, and has a built in self-adjusting mechanism, which compensates for clutch disc wear.

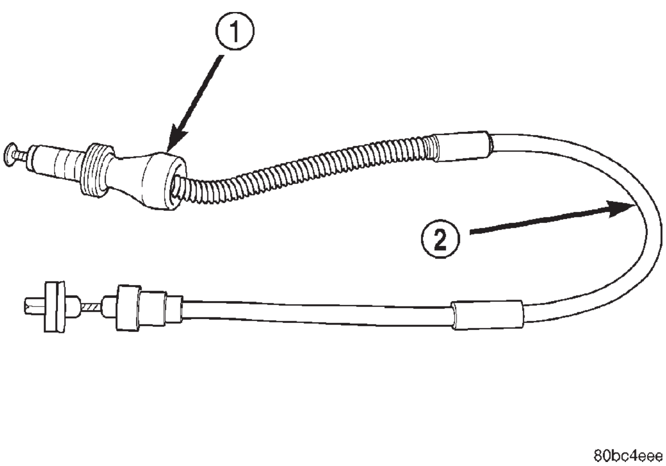


Fig. 17 Clutch Cable Assembly

1 - ADJUSTER MECHANISM
2 - CLUTCH CABLE

REMOVAL

(1) Disconnect battery negative cable.
(2) Remove air cleaner assembly.
(3) Remove bellhousing cap (Fig. 18).
(4) Disconnect clutch cable from release lever (Fig. 18).

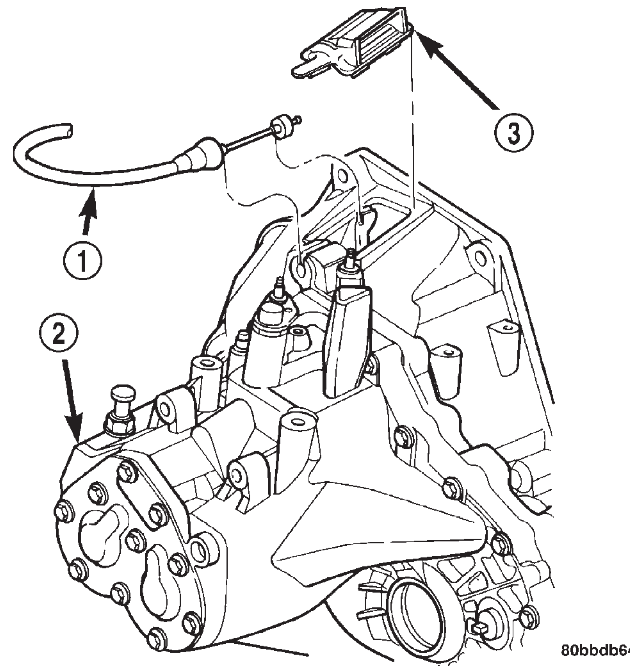


Fig. 18 Clutch Cable at Transaxle

1 - CLUTCH CABLE
2 - TRANSAXLE
3 - BELLHOUSING CAP

(5) Remove steering column lower shroud.
(6) Remove knee bolster.
(7) Remove upstop spacer retainer clip from pedal pin.

NOTE: Depressing the clutch pedal provides access to the clutch cable strand. Disconnect the cable upstop/spacer from the pedal pivot pin by removing the retaining clip at the top of the clutch pedal. Wedge a flat–blade pry tool between the pin and the retaining tab. While holding the tab slightly separated from the pin, pull the upstop/spacer off the pedal. Now remove the cable end from the upstop/spacer.

(8) Remove clutch release cable core from upstop spacer (Fig. 19).
(9) Loosen but do not remove four (4) brake booster to dash panel nuts.
(10) Remove clutch release cable through engine compartment.

CLUTCH RELEASE CABLE (2.0L/T350 MODELS) (Continued)

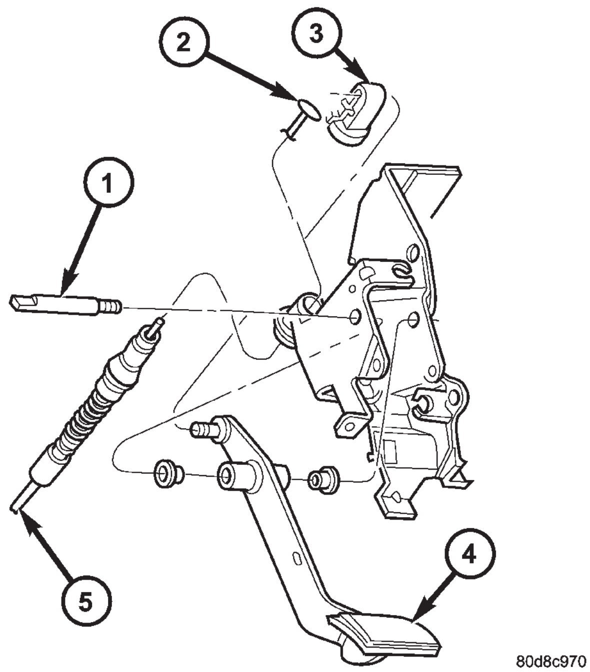


Fig. 19 Clutch Cable at Pedal Bracket Assembly

1 - PIVOT PIN
2 - CABLE END
3 - UPSTOP SPACER
4 - CLUTCH PEDAL
5 - CLUTCH CABLE

INSTALLATION

(1) Feed clutch release cable through dash panel hole and into passenger compartment (Fig. 19).

(2) Connect clutch release cable core to upstop spacer (Fig. 19).

(3) Connect upstop spacer to clutch pedal pin and secure with retainer clip.

(4) Route clutch release cable through engine compartment as removed, and connect clutch release cable to clutch release lever (Fig. 18).

(5) Verify adjuster mechanism operation: With slight pressure, pull the clutch release lever end of the cable to draw the cable taut. Push the clutch cable housing toward the dash panel (With less than 25 lbs. of effort, the cable housing should move 30-50mm.). This indicates proper adjuster mechanism function. If the cable does not adjust, determine if the mechanism is properly seated on the bracket.

(6) Install bellhousing cap (Fig. 18).

(7) Torque brake booster nuts.

(8) Install knee bolster.

(9) Install steering column lower shroud.

(10) Install air cleaner assembly.

(11) Connect battery negative cable.

CLUTCH SLAVE CYLINDER (2.7L/T850 MODELS)

DESCRIPTION

2.7L equipped models that utilize the T850 transaxle use a clutch slave cylinder to operate the release lever and bearing. The clutch slave cylinder fastens to the transaxle bellhousing (Fig. 20), and consists of a hydraulic piston and cylinder, seal, return spring, and integrated hydraulic quick connect fitting for ease of service.

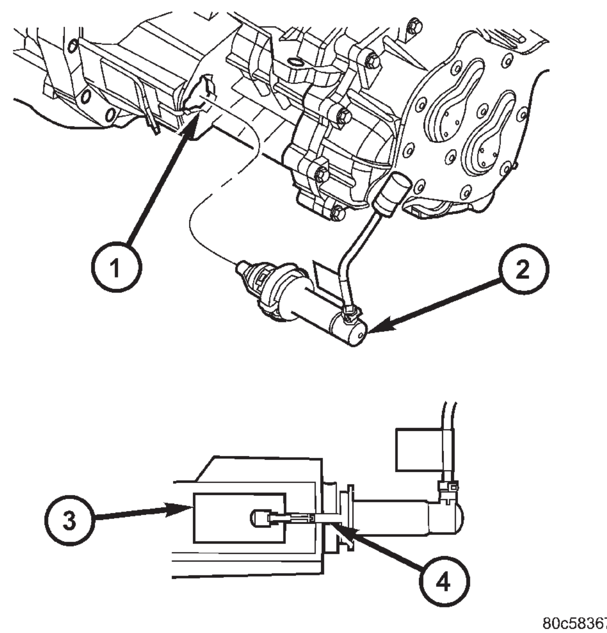


Fig. 20 Slave Cylinder Location

1 - MOUNTING HOLE
2 - SLAVE CYLINDER
3 - ACCESS HOLE
4 - NYLON ANTI-ROTATION TAB

OPERATION

When the clutch pedal is depressed, fluid pressurized by the clutch master cylinder pushes the slave cylinder piston, extending the push rod and operating the clutch release lever and bearing.

CLUTCH SLAVE CYLINDER (2.7L/T850 MODELS) (Continued)

REMOVAL

(1) Raise vehicle on hoist.

(2) Using Tool 6638A, disconnect hyrdraulic clutch circuit quick connect fitting.

(3) Remove clutch slave cylinder (Fig. 21) by lifting nylon tab with a small screwdriver, and then depressing cylinder inward towards case and rotating cylinder 60° counter-clockwise.

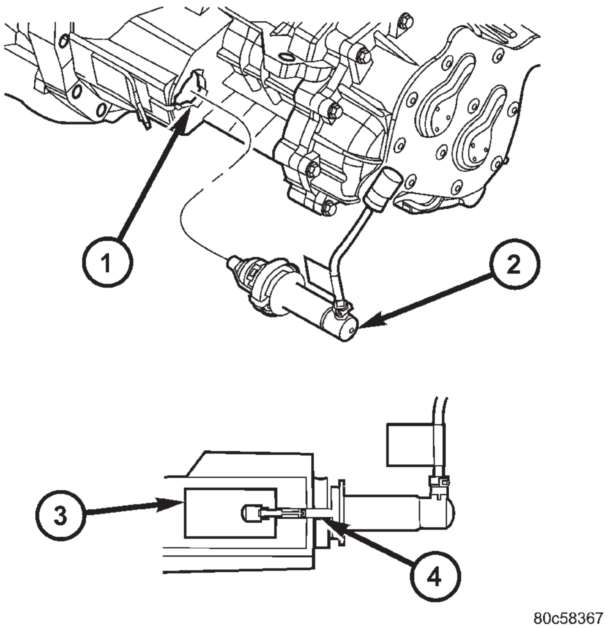


Fig. 21 Slave Cylinder Removal/Installation

1 - MOUNTING HOLE
2 - SLAVE CYLINDER
3 - ACCESS HOLE
4 - NYLON ANTI-ROTATION TAB

INSTALLATION

(1) Install clutch slave cylinder into position, noting orientation of different sized lugs. While depressing inward, rotate slave cylinder clockwise until nylon locating tab rests in transaxle case cutout, and the hydraulic tube is vertical (Fig. 21).

(2) Connect “quick-connect” connection until an audible “click” is heard. Verify connection by pulling outward on connection.

(3) Lower vehicle.

MODULAR CLUTCH

DESCRIPTION

Manual transaxle equipped vehicles utilize a modular clutch assembly (Fig. 22). The transaxle must be removed to gain access to and replace the modular clutch, drive plate, and/or clutch release bearing and lever.

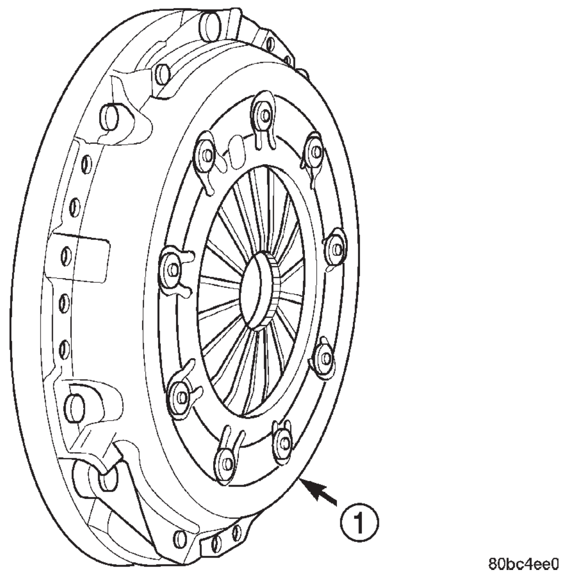


Fig. 22 Modular Clutch Assembly

1 - MODULAR CLUTCH ASSEMBLY

The modular clutch assembly used in this vehicle consists of a single, dry-type clutch disc, a diaphragm style clutch cover, and an integrated flywheel. The clutch cover is riveted to the flywheel, containing the clutch disc within. The modular clutch can only be serviced as an assembly.

The clutch disc has cushion springs riveted to the disc hub assembly. The clutch disc facings are riveted to the cushion springs. The facings are made from a non-asbestos material.

The clutch cover pressure plate assembly is a diaphragm type unit with a one-piece diaphragm spring with multiple release fingers. The pressure plate release fingers are preset during manufacture and are not adjustable.

MODULAR CLUTCH (Continued)

REMOVAL

(1) Remove transaxle and modular clutch assembly from vehicle. Refer to Transmission Removal/Installation.

(2) Remove the modular clutch asseembly fom the transaxle input shaft. Handle carefully to avoid contaminating the friction surfaces (Fig. 23).

INSTALLATION

(1) Install modular clutch assembly onto input shaft (Fig. 23).

(2) Install transaxle to vehicle. Refer to Transaxle Removal/Installation.

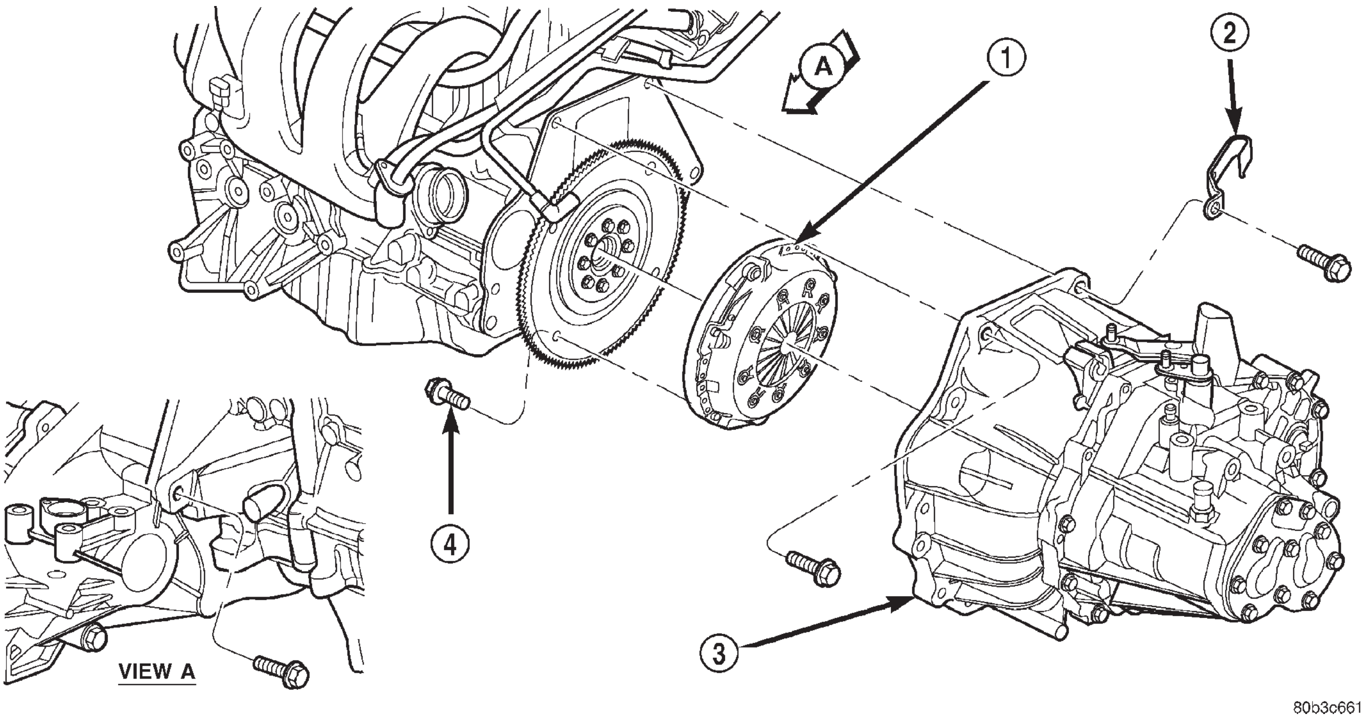


Fig. 23 Modular Clutch Removal/Installation (2.0L/T350 Shown - 2.7L/T850 Similar)

1 - MODULAR CLUTCH ASSEMBLY
2 - CLIP
3 - TRANSAXLE
4 - CLUTCH MODULE BOLT (4)

COOLING

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COOLING

SPECIFICATIONS

COOLING SYSTEM CAPACITY

Engine	2.0L	2.4L	2.7L
COOLANT CAPACITY*			
Liters	7.5	7.5	9.0
U.S. Qts.	8.0	8.0	9.5
*Includes Heater and Coolant Recovery System			

ACCESSORY DRIVE BELT TENSION

2.0L/2.4L

Accessory Drive Belt	Belt Tension		
Air Conditioning Compressor/ Generator	Dynamic Tensioned		
Power Steering Pump	New	120 - 180 lbs.	160 - 223 Hz
	Used*	70 - 115 lbs.	114 - 179 Hz
*A belt is considered used after 15 minutes of run-in time.			

2.7L

Accessory Drive Belt	Belt Tension		
Air Conditioning Compressor/ Generator	New	185 - 235 lbs.	204 - 230 Hz
	Used*	110 - 160 lbs.	157 - 190 Hz
Power Steering Pump	New	120 - 180 lbs.	122 - 170 Hz
	Used*	70 - 115 lbs.	94 - 136 Hz
*A belt is considered used after 15 minutes of run-in time.			

COOLING (Continued)

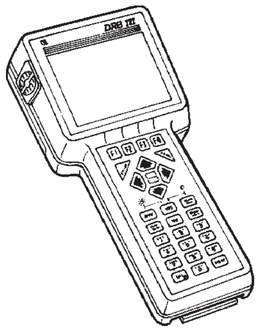
TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Accessory Drive Belt Tensioner Bracket (2.0L/2.4L)—Fasteners	30	—	265
Accessory Drive Belt Tensioner Bracket (2.7L)—Fasteners	28	—	250
A/C Condenser to Radiator—Fasteners	5	—	45
Coolant Outlet Connector —Bolts	12	—	105
Cooling System Bleed Valve	12	—	105
Fan Module to Radiator—Fasteners	5	—	45
Fan Motor to Shroud—Fasteners	5	—	45
Thermostat Housing to cylinder head - 2.0L/2.4L—Bolts	28	—	250
Thermostat Housing 2.7L—Bolts	12	—	105
Transmission Cooler Tube Bracket—Fastener	5	—	45
Transmission Cooler Tube—Fastener	9	—	80
Transmission Cooler—Hose Clamps	3.2	—	28
Water Pump Mounting 2.0L/2.4L/2.7L—Bolts	12	—	105
Water Pump Inlet Tube to Block 2.0L/2.4L—Bolts	12	—	105

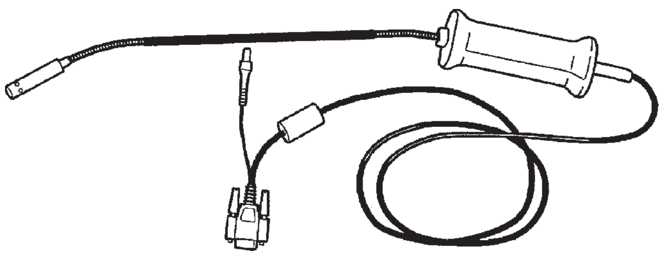
COOLING (Continued)

SPECIAL TOOLS

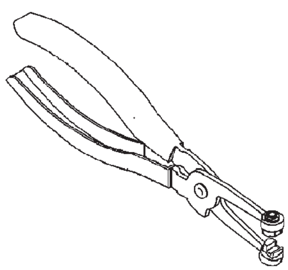
COOLING SYSTEM



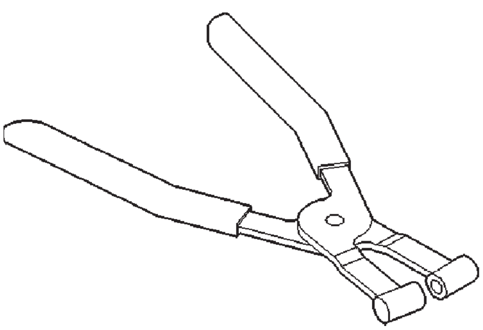
DRB III® with PEP Module – OT-CH6010A



Belt Tension Gauge Adapter – 8371

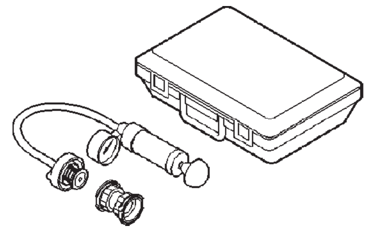


Hose Clamp Pliers 8495

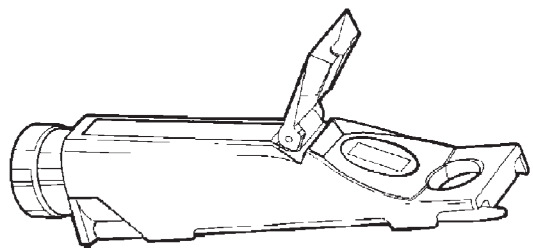


Hose Clamp Pliers 6094

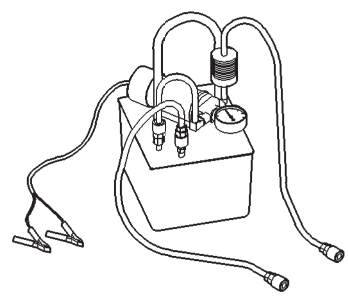
Filling Aid Funnel 8195



Cooling System Tester 7700



Coolant Refractometer 8286



Cooler Flusher 6906-C

ACCESSORY DRIVE

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DRIVE BELTS

DESCRIPTION

The accessory drive consists of two Poly-V type belts (Fig. 1) or (Fig. 2). One belt drives the power steering pump, the other drives the generator and air conditioning compressor. Both belts on the 2.7L engine are manually tensioned. The power steering belt on the 2.0L/2.4L engine is manually tensioned. The air conditioning/generator belt on the 2.0L/2.4L engine has an automatic belt tensioner.

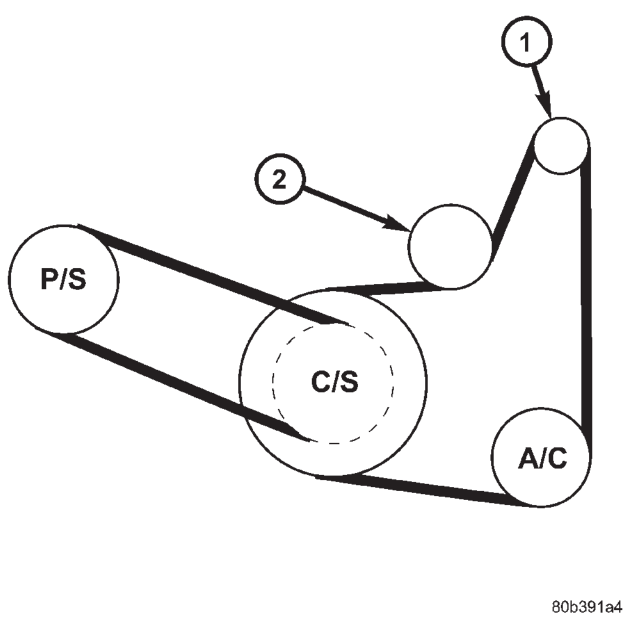

Fig. 1 Accessory Drive Belt System - 2.0L/2.4L

1 - GENERATOR
2 - IDLER/TENSIONER

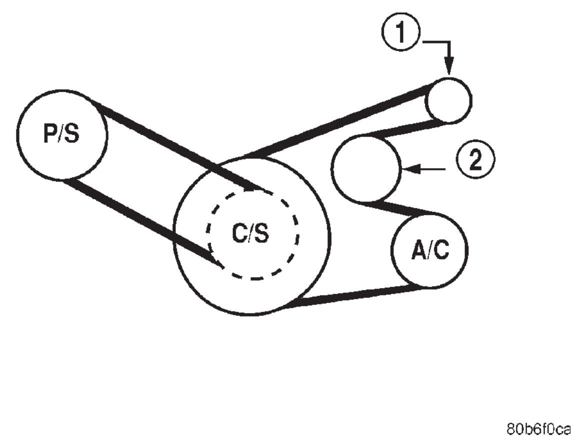

Fig. 2 Accessory Drive Belt System - 2.7L

1 - GENERATOR
2 - IDLER/TENSIONER

OPERATION

The accessory drive belts form the link between the engine crankshaft and the engine driven accessories.

DIAGNOSIS AND TESTING - ACCESSORY DRIVE BELTS

Satisfactory performance of the belt driven accessories depends on belt condition and proper belt tension.

DRIVE BELTS (Continued)

ACCESSORY DRIVE BELT DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
INSUFFICIENT ACCESSORY OUTPUT DUE TO BELT SLIPPAGE	1. Belt too loose. 2. Belt excessively glazed or worn.	1. Adjust belt tension. 2. Replace and tighten as specified.
BELT SQUEAL WHEN ACCELERATING ENGINE	1. Belts too loose. 2. Belts glazed.	1. Adjust belt tension. 2. Replace belts.
BELT CHIRP AT IDLE	1. Belts too loose. 2. Foreign material imbedded in belt. 3. Non-uniform belt. 4. Misaligned pulley(s). 5. Non-uniform groove or eccentric pulley.	1. Adjust belt tension. 2. Replace belt. 3. Replace belt. 4. Align accessories. 5. Replace pulley(s).
BELT ROLLED OVER IN GROOVE OR BELT JUMPS OFF	1. Broken cord in belt. 2. Belt too loose, or too tight. 3. Misaligned pulleys. 4. Non-uniform grooves or eccentric pulley.	1. Replace belt. 2. Adjust belt tension. 3. Align accessories. 4. Replace pulley(s).

STANDARD PROCEDURE - CHECKING ACCESSORY DRIVE BELT TENSION - 2.7L

WARNING: DO NOT CHECK BELT TENSION WITH ENGINE RUNNING.

Accessory drive belt tension can be measured with Special Tool 8371 – Belt Tension Gauge Adapter, and the DRBIII® using the following procedures:

(1) Connect 8371 to the DRBIII® following the instructions provided with tool.

(2) Place end of microphone probe approximately 2.54 cm (1 in.) from belt at one of the belt center span locations shown in (Fig. 3).

(3) Pluck the belt a minimum of 3 times. (Use your finger or other suitable tool) The frequency of the belt in hertz (Hz) will display on DRBIII® screen.

(4) Adjust belt to obtain proper frequency (tension). Refer to ACCESSORY DRIVE BELT TENSION CHART for belt tension specifications.

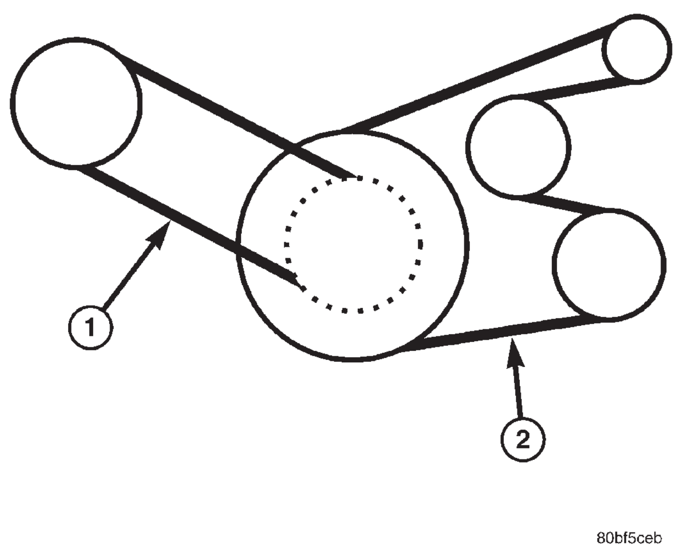

Fig. 3 Belt Center Span Locations - 2.7L

1 - POWER STEERING BELT CENTER SPAN
2 - AC/GENERATOR BELT CENTER SPAN

DRIVE BELTS (Continued)

2.7L ACCESSORY DRIVE BELT TENSION CHART

Accessory Drive Belt	Belt Tension		
Air Conditioning Compressor/ Generator	New	185 - 235 lbs.	204 - 230 Hz
	Used*	110 - 160 lbs	157 - 190 Hz
Power Steering Pump	New	120 - 180 lbs.	122 - 170 Hz
	Used*	70 - 115 lbs.	94 - 136 Hz
*A belt is considered used after 15 minutes of run-in time.			

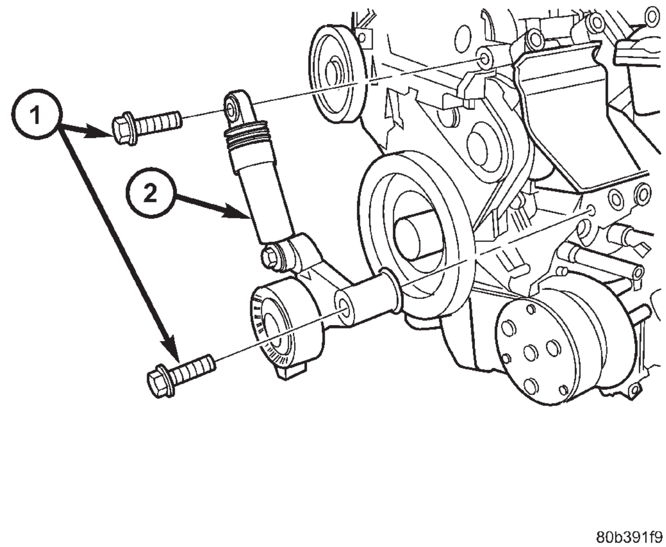

Fig. 4 Accessory Drive Belt Tensioner

1 - ATTACHING BOLTS
2 - HYDRAULIC TENSIONER

REMOVAL

REMOVAL - 2.0L/2.4L

AIR CONDITIONING COMPRESSOR/GENERATOR BELT

(1) Raise vehicle on hoist.
(2) Remove right front wheel and belt splash shield.
(3) Insert a 3/8” drive breaker bar into the square opening of the belt tensioner pivot bracket.

CAUTION: Avoid excessive force to over compress belt tensioner. This may result in damage to the belt tensioner.

(4) Gently apply a force to rotate belt tensioner clockwise until the belt tensioner bottoms out and the belt can be removed from pulleys (Fig. 4).
(5) Remove belt.
(6) Gently release tensioner.

POWER STEERING PUMP BELT

(1) Raise vehicle on hoist.
(2) Remove right front wheel and belt splash shield.
(3) Remove air conditioning compressor/generator belt.
(4) Loosen pivot bolt and locking bolt/nut.
(5) Release tension on belt by moving pump assembly inward towards engine.
(6) Remove belt.

REMOVAL - 2.7L

AIR CONDITIONING COMPRESSOR/GENERATOR BELT

(1) Raise vehicle on hoist.
(2) Remove right front wheel and belt splash shield.
(3) Loosen tensioner locking bolt and pivot bolt.
(4) Rotate tensioner clockwise to allow enough slack to remove belt.

POWER STEERING PUMP BELT

(1) Raise vehicle on hoist.
(2) Remove right front wheel and belt splash shield.
(3) Remove the air conditioning compressor/generator belt.
(4) Loosen belt adjusting bolt. It is not necessary to loosen the pivot bolt on the power steering pump. There is a bushing incorporated into the power steering pump/bracket that allows it to pivot.
(5) Remove power steering belt.

CLEANING

Clean all foreign debris from belt pulley grooves. The belt pulleys must be free of oil, grease, and coolants before installing the drive belt.

DRIVE BELTS (Continued)

INSPECTION

Belt replacement under any or all of the following conditions is required:

- Excessive wear
- Frayed cords
- Severe glazing

Poly-V Belt system may develop minor cracks across the ribbed side (due to reverse bending). These minor cracks are considered normal and acceptable. Parallel cracks are not (Fig. 5).

NOTE: Do not use any type of belt dressing or restorer on Poly-V Belts.

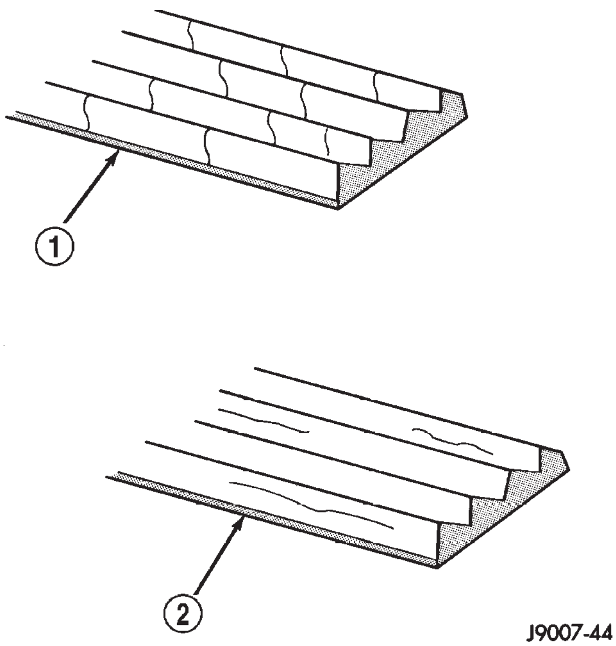

Fig. 5 Drive Belt Wear Pattern

1 - NORMAL CRACKS - BELT OK
2 - NOT NORMAL CRACKS - REPLACE BELT

INSTALLATION

INSTALLATION - 2.0L/2.4L

NOTE: When installing drive belt onto pulleys, make sure that belt is properly routed and all V-grooves make proper contact with pulley.

AIR CONDITIONING COMPRESSOR/GENERATOR BELT

(1) Install belt over all pulleys except for the air conditioning compressor pulley (Fig. 6).

(2) Insert a 3/8" drive breaker bar into the square opening of the belt tensioner pivot bracket.

CAUTION: Avoid excessive force to over compress belt tensioner. This may result in damage to the belt tensioner.

(3) Gently apply a force to rotate belt tensioner clockwise until the belt tensioner bottoms out and the belt can be installed onto air conditioning compressor pulley (Fig. 4).

(4) Install belt over air conditioning compressor pulley.

(5) Release spring tension onto belt.

(6) Remove breaker bar from belt tensioner pivot bracket.

(7) Install belt splash shield and right front wheel.

(8) Lower vehicle.

POWER STEERING PUMP BELT

(1) Install power steering pump belt on pulleys (Fig. 6).

(2) Insert a 1/2" drive breaker bar into the square opening on the power steering pump bracket.

(3) Hold clockwise pressure on power steering pump bracket and tighten adjusting bolt/nut.

(4) Tighten pivot bolt.

(5) Install air conditioning compressor/generator belt.

(6) Install belt splash shield and right front wheel.

(7) Lower vehicle.

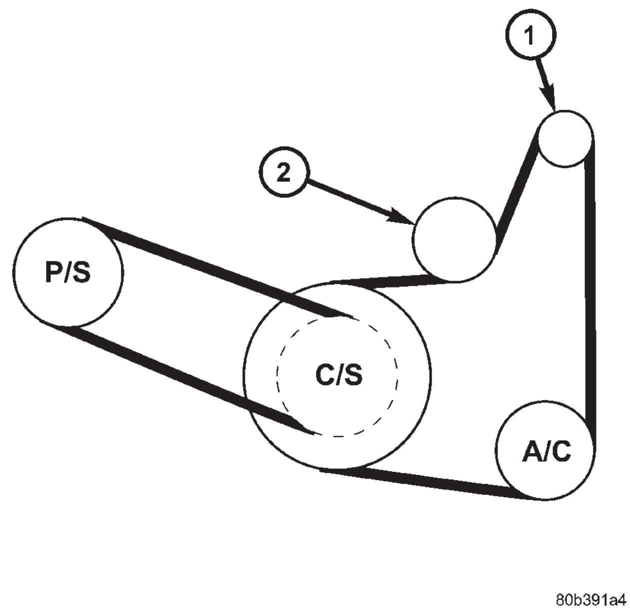

Fig. 6 Accessory Drive Belt System - 2.0L/2.4L

1 - GENERATOR
2 - IDLER/TENSIONER

DRIVE BELTS (Continued)

INSTALLATION - 2.7L

NOTE: When installing drive belt onto pulleys, make sure that belt is properly routed and all V-grooves make proper contact with pulley.

AIR CONDITIONING COMPRESSOR/GENERATOR BELT

(1) Install air conditioning compressor/generator belt on pulleys, tensioner in slack position, slip belt over idler last (Fig. 7).

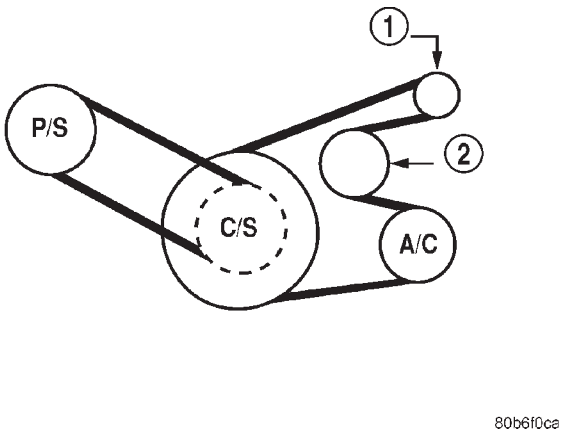

Fig. 7 Accessory Drive Belt System - 2.7L

1 - GENERATOR
2 - IDLER/TENSIONER

(2) (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - ADJUSTMENTS) for proper drive belt tension adjustment.
(3) Install belt splash shield and right front wheel.
(4) Lower vehicle.

POWER STEERING PUMP BELT

(1) Install power steering belt on pulleys (Fig. 7).
(2) (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - ADJUSTMENTS) for proper drive belt tension adjustment.
(3) Install air conditioning compressor/generator belt.
(4) Install belt splash shield and right front wheel.
(5) Lower vehicle.

ADJUSTMENTS

ADJUSTMENT - 2.7L ACCESSORY DRIVE BELTS

NOTE: A belt is considered "used" after 15 minutes of run time.

AIR CONDITIONING COMPRESSOR/GENERATOR BELT TENSIONING

WARNING: DO NOT EXERT MORE THAN 190 N·m (140 ft. lbs.) OF FORCE ON AIR CONDITIONING COMPRESSOR/GENERATOR BELT TENSIONER BRACKET DURING TENSIONING PROCEDURE.

NOTE: Ensure lower tensioner bracket bolt is finger tight/seated to prevent bending.

NEW BELT

(1) Engage a torque wrench, with a maximum 2 inch extension in the 1/2 inch square opening of the tensioner bracket (Fig. 8).
(2) Apply 141 N·m (104 ft. lbs.) of torque, counterclockwise to the tensioner bracket while tightening the upper fastener. Torque fastener to 28 N·m (250 in. lbs.) (Fig. 8).
(3) Remove torque wrench from tensioner bracket, and torque lower tensioner bracket fastener to 28 N·m (250 in. lbs.).
(4) Verify proper belt tension (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - STANDARD PROCEDURE - CHECKING ACCESSORY DRIVE BELT TENSION - 2.7L).

DRIVE BELTS (Continued)

USED BELT

(1) Engage a torque wrench, with a maximum 2 inch extension in the 1/2 inch square opening of the tensioner bracket (Fig. 8).

(2) Apply 96 N·m (71 ft. lbs.) of torque, counter-clockwise to the tensioner bracket while tightening the upper fastener. Torque fastener to 28 N·m (250 in. lbs.) (Fig. 8).

(3) Remove torque wrench from tensioner bracket, and torque lower tensioner bracket fastener to 28 N·m (250 in. lbs.).

(4) Verify proper belt tension (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - STANDARD PROCEDURE - CHECKING ACCESSORY DRIVE BELT TENSION - 2.7L).

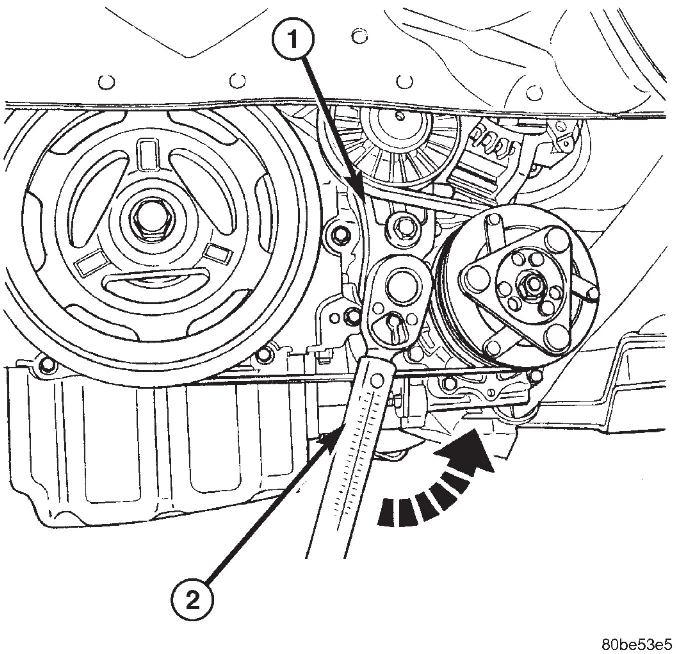

Fig. 8 Air Conditioning Compressor/Generator Belt Adjustment - 2.7L

1 - TENSIONER BRACKET
2 - TORQUE WRENCH WITH TWO INCH EXTENSION

POWER STEERING PUMP BELT TENSIONING

(1) Insert a 1/2” drive breaker bar into the square opening on the power steering pump bracket.

(2) Hold clockwise pressure on power steering pump bracket and tighten adjusting bolt.

(3) Verify proper belt tension (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - STANDARD PROCEDURE - CHECKING ACCESSORY DRIVE BELT TENSION - 2.7L).

ENGINE

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ENGINE

DESCRIPTION - COOLING SYSTEM

The cooling system consists of an engine cooling module, thermostat, coolant recovery/reserve system (2.0L/2.4L) or coolant pressure container (2.7L), coolant, hoses, and a water pump to circulate the coolant. The engine cooling module consists of a radiator, electric fans, shroud, transmission oil cooler, and air conditioning condenser (Fig. 1).

OPERATION

The primary purpose of a cooling system is to maintain engine temperature in a range that will provide satisfactory engine performance and emission levels under all expected driving conditions. It also provides hot water (coolant) for heater performance (Fig. 2) or (Fig. 3).

ENGINE (Continued)

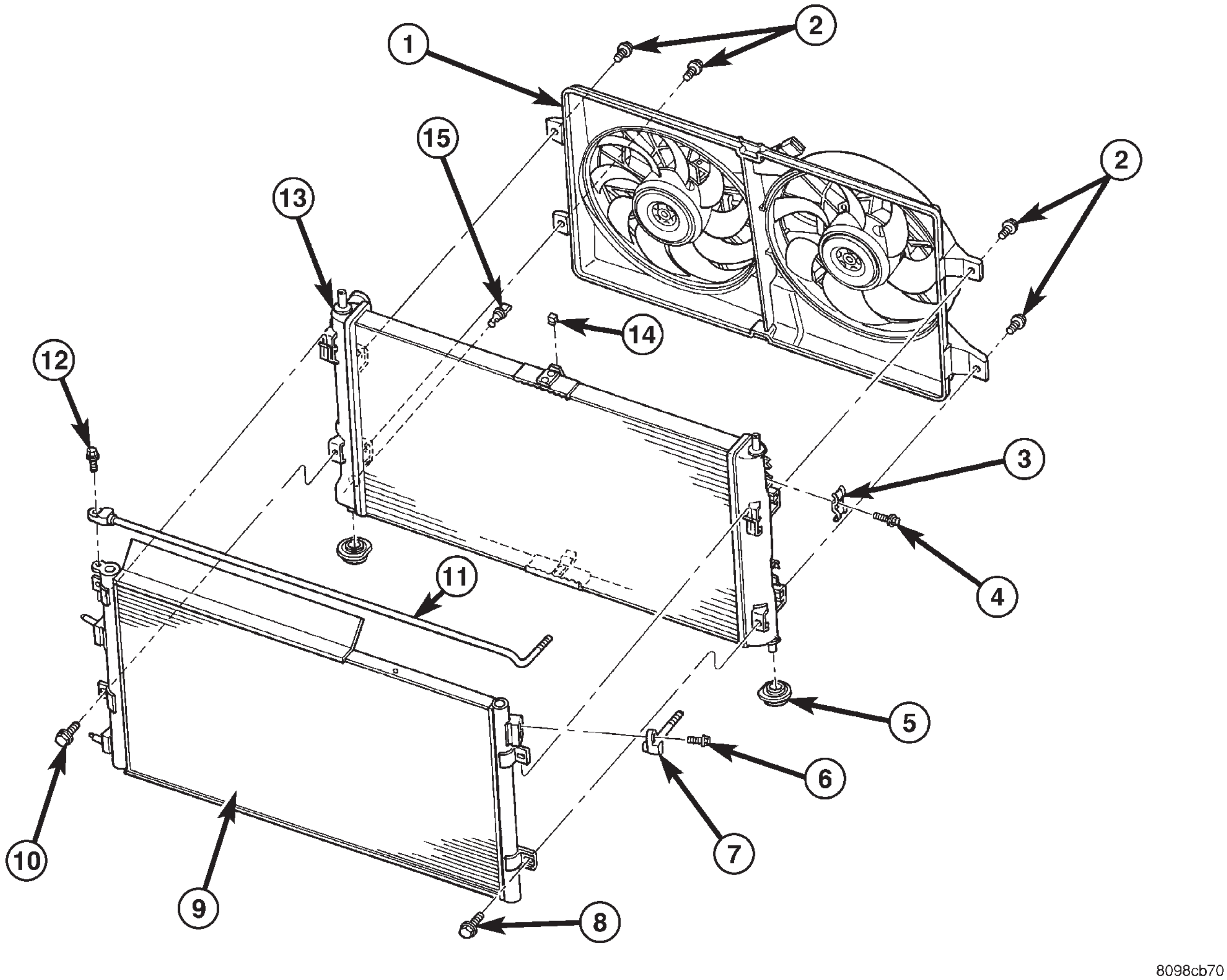

Fig. 1 COOLING MODULE

1 - RADIATOR FAN MODULE
2 - FAN MODULE TO RADIATOR FASTENERS
3 - TRANSMISSION COOLER TUBE BRACKET
4 - BRACKET FASTENER
5 - ISOLATOR
6 - TRANSMISSION COOLER TUBE FASTENER
7 - TRANSMISSION COOLER TUBE (INLET)
8 - CONDENSER TO RADIATOR FASTENER
9 - COMBINATION A/C CONDENSER AND TRANSMISSION OIL COOLER
10 - CONDENSER TO RADIATOR FASTENER
11 - TRANSMISSION COOLER TUBE (OUTLET)
12 - TRANSMISSION COOLER TUBE FASTENER
13 - RADIATOR
14 - CLIP
15 - RADIATOR DRAINCOCK

ENGINE (Continued)

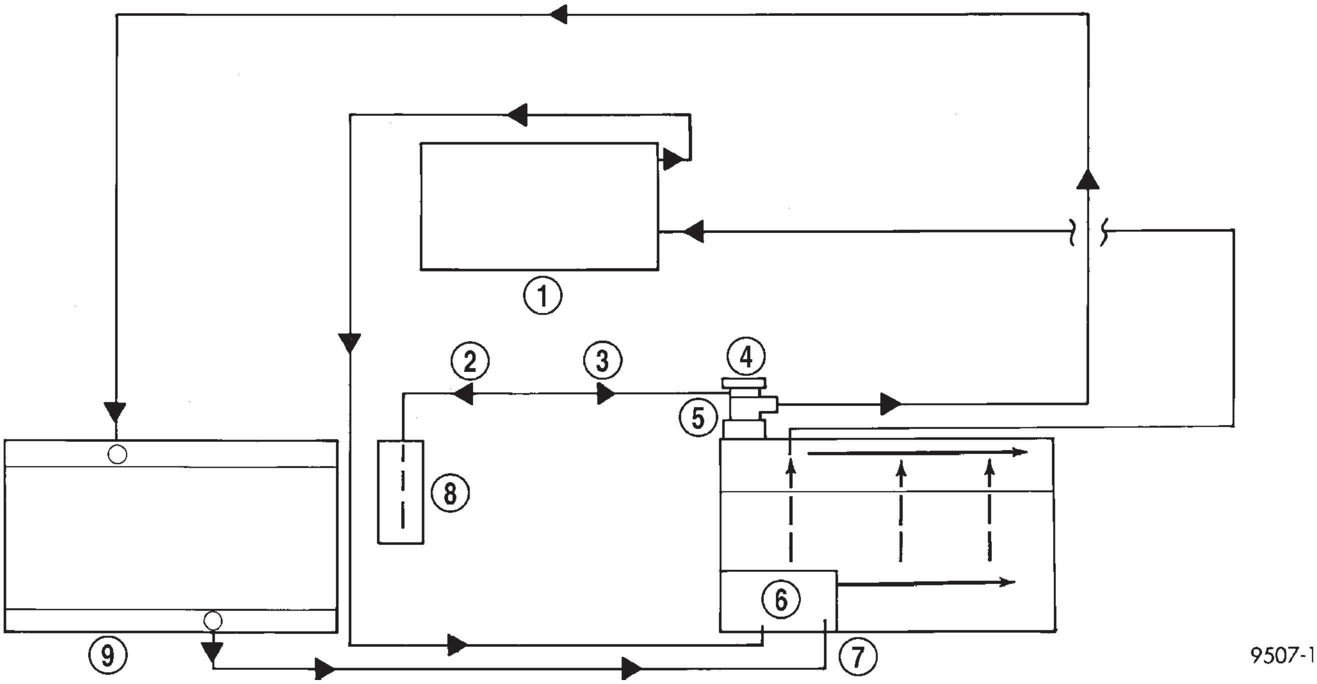

Fig. 2 Cooling System Operation - 2.0L/2.4L

1 - HEATER
2 - HEAT UP
3 - COOL DOWN
4 - PRESSURE CAP
5 - COOLANT OUTLET CONNECTOR
6 - WATER PUMP
7 - ENGINE
8 - COOLANT RECOVERY CONTAINER
9 - RADIATOR

ENGINE (Continued)

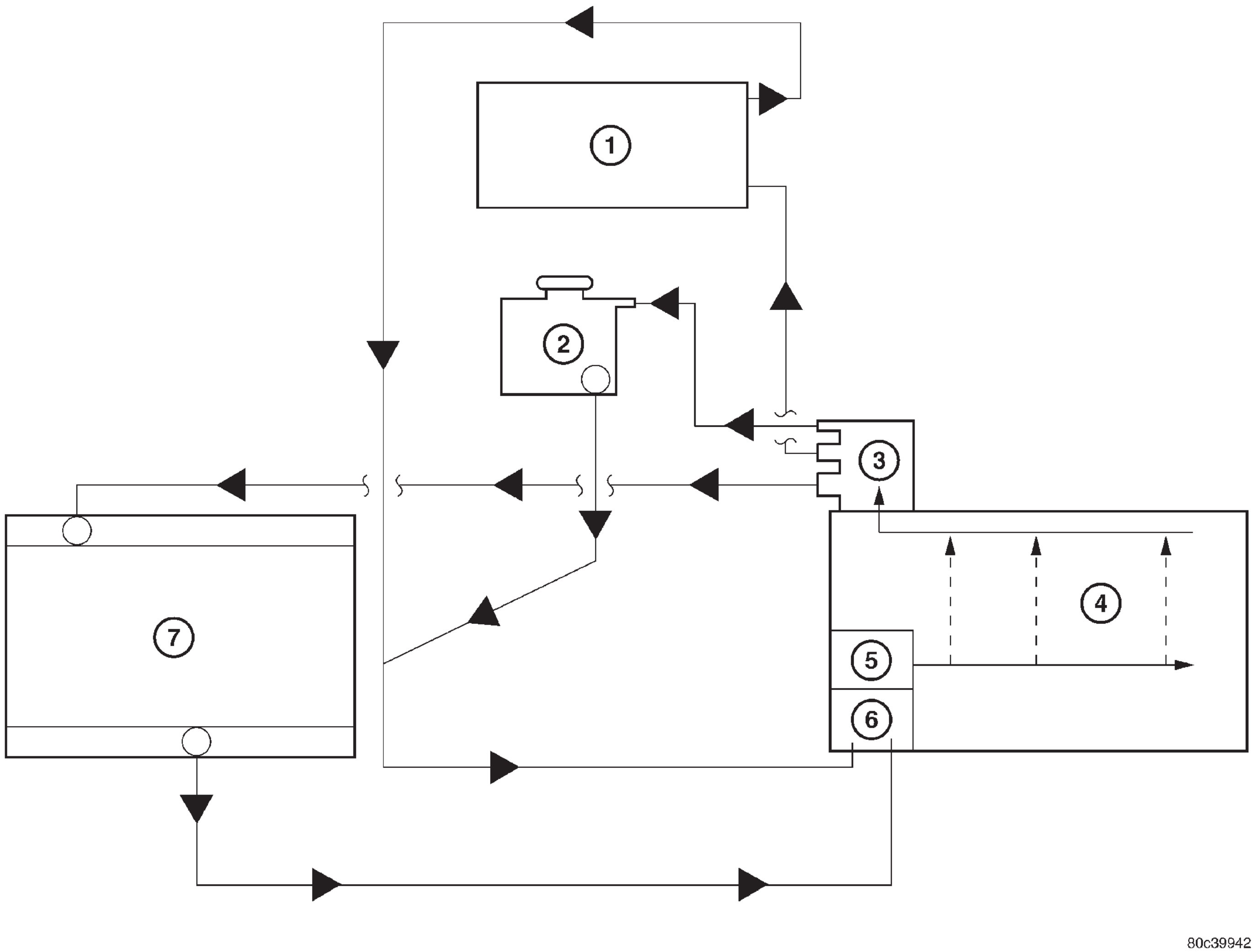

Fig. 3 Cooling System Operation - 2.7L

1 - HEATER CORE
2 - COOLANT PRESSURE CONTAINER
3 - COOLANT OUTLET CONNECTOR
4 - ENGINE
5 - WATER PUMP
6 - THERMOSTAT
7 - RADIATOR

ENGINE (Continued)

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - COOLING SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
TEMPERATURE GAUGE READS LOW	1. Diagnostic Trouble Code (DTC) set indicating a stuck open engine thermostat.	1. (Refer to Appropriate Diagnostic Information) Replace thermostat, if necessary. If a (DTC) has not been set, the problem may be with the temperature gauge.
	2. Problem with engine coolant temperature (ECT) sensor or circuit.	2. Refer to the Appropriate Diagnostic Information for checking the ECT sensor
	3. Problem with Temperature gauge.	3. Check Gauge operation. (Refer to the Appropriate Diagnostic Information)
	4. Coolant level low during cold ambient temperature, accompanied by poor heater performance.	4. Check coolant level. (Refer to 7 - COOLING - STANDARD PROCEDURE) Inspect the system for leaks. Repair as necessary.
TEMPERATURE GAUGE READS HIGH OR ENGINE COOLANT WARNING LAMP ILLUMINATES. COOLANT MAY OR MAY NOT BE LOST FROM SYSTEM.	1. Trailer being towed, a steep hill being climbed, vehicle being operated in slow moving traffic, or engine idling during high ambient (outside) temperatures with air conditioning on. High altitudes could cause these conditions.	1. This may be a temporary condition and repair is not necessary. Turn off the air conditioning and drive the vehicle without any of the previous conditions. Observe the temperature gauge. The gauge should return to the normal range. If the gauge does not return to the normal range, determine the cause of the overheating and repair. Refer to POSSIBLE CAUSES in this section.
	2. Is temperature gauge (if equipped) reading correctly?	2. Check the gauge. (Refer to the Appropriate Diagnostic Information) Repair as necessary.
	3. Is temperature warning lamp (if equipped) illuminating unnecessarily?	3. Check warning lamp operation. (Refer to the Appropriate Diagnostic Information) Repair as necessary.
	4. Low coolant level.	4. Check for coolant leaks. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING) Repair as necessary.
	5. Pressure cap not installed tightly. If cap is loose, boiling point of coolant will be lowered. Also refer to the following step 6.	5. Tighten pressure cap.

ENGINE (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
	6. Poor seals at pressure cap.	6. (a) Check condition of cap and cap seals. (Refer to 7 - COOLING/ ENGINE/RADIATOR PRESSURE CAP - INSPECTION) Replace cap if necessary. (b) Check condition of filler neck. If neck is damaged, replace as necessary.
	7. Wrong pressure cap installed.	7. Vehicles equipped with 2.0L/2.4L engines use different pressure caps than vehicles equipped with 2.7L engines. Verify proper pressure cap part number.
	8. 2.0L/2.4L Vehicles: Coolant level low in radiator, but not in coolant recovery container. This indicates the radiator is not drawing coolant from the coolant recovery container as the engine cools. As the engine cools, a vacuum is formed inside the cooling system. If the radiator cap seals are defective, or the cooling system has a leak, a vacuum cannot be formed.	8. (a) Check condition of pressure cap and seals. Replace cap if necessary. (b) Check condition of filler neck. Replace if damaged. (c) Check condition of hose from filler neck to coolant container. It should be tight at both ends without any kinks or tears. Replace hose as necessary. (d) Check coolant recovery container and hose for blockage. Repair as necessary.
	9. Freeze point of coolant not correct. Mixture ratio may be too rich.	9. Check coolant concentration. (Refer to 7 - COOLING/ENGINE/ COOLANT - DIAGNOSIS AND TESTING) Adjust glycol-to-water ratio as required.
	10. Coolant not flowing through system.	10. (a) 2.0L/2.4L Vehicles: Check for coolant flow at filler neck with some coolant removed, engine warm, and thermostat open. Coolant should be observed flowing through filler neck. If flow is not observed, determine reason for lack of flow and repair as necessary. (b) 2.7L Vehicles: Engine coolant motion should be observable in coolant pressure container when revving the engine while running.
	11. Radiator or A/C condenser fins are dirty or clogged.	11. Clean obstruction from fins.
	12. Radiator core is plugged or corroded.	12. Clean or replace radiator as necessary.
	13. Fuel or ignition system problems.	13. (Refer to the Appropriate Diagnostic Information)

ENGINE (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
	14. Dragging Brakes.	14. Inspect brake system and repair as necessary. (Refer to 5 - BRAKES/HYDRAULIC/ MECHANICAL - DIAGNOSIS AND TESTING)
	15. Bug screen or other aftermarket accessory is being used causing reduced air flow.	15. Remove bug screen or accessory.
	16. Thermostat partially or completely closed.	16. Check thermostat operation and replace as necessary. (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT THERMOSTAT - DIAGNOSIS AND TESTING)
	17. Electric radiator fan not operating properly.	17. Check electric fan operation and repair as necessary.
	18. Cylinder head gasket leaking.	18. Check cylinder head gasket for leaks. (Refer to 9 - ENGINE/ CYLINDER HEAD - DIAGNOSIS AND TESTING)
	19. Heater core leaking.	19. Check heater core for leaks. Repair as necessary.
TEMPERATURE GAUGE READING IS INCONSISTENT (FLUCTUATES, CYCLES OR IS ERRATIC)	1. The gauge may cycle up and down. This is due to the cycling of the electric radiator fan and/or changing vehicle operating conditions.	1. A normal condition. No correction is necessary. If gauge cycling is going into the hot zone, check electric fan operation and repair as necessary. (Refer to 7 - COOLING/ ENGINE/RADIATOR FAN - DIAGNOSIS AND TESTING)
	2. During cold weather operation with the heater blower in the high position, the gauge reading may drop slightly.	2. A normal condition. No correction is necessary.
	3. Temperature gauge or engine coolant temperature sensor is defective or shorted.	3. Check operation of gauge and repair as necessary. (Refer to the Appropriate Diagnostic Information)
	4. Gauge reading rises when vehicle is brought to a stop after heavy use (engine still running).	4. A normal condition. No correction is necessary. The gauge should return to normal range after vehicle is driven.
	5. Gauge reading high after restarting a warmed-up (hot) engine.	5. A normal condition. No correction is necessary. The gauge should return to normal range after a few minutes of engine operation.
	6. Coolant level low (air will build up in the cooling system causing the thermostat to open late).	6. Check cooling system for leaks. Repair as necessary. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING)

ENGINE (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
	7. Cylinder head gasket leaking allowing exhaust gas to enter cooling system. This will cause thermostat to open late.	7. (a) Check for cylinder head gasket leaks. Repair as necessary. (Refer to 9 - ENGINE/CYLINDER HEAD - DIAGNOSIS AND TESTING) (b) Check for coolant in the engine oil. Inspect for white steam emitting from exhaust system. Repair as necessary.
	8. Water pump impeller or pulley loose on shaft.	8. Check water pump and replace as necessary.
	9. Air leak on the suction side of water pump allows air to build up in cooling system. This will cause the thermostat to open late.	9. Locate leak and repair as necessary.
PRESSURE CAP IS BLOWING OFF STEAM AND/OR COOLANT FLOWING INTO RECOVERY CONTAINER. TEMPERATURE GAUGE READING MAY BE ABOVE NORMAL, BUT NOT HIGH. COOLANT LEVEL MAY BE HIGH IN RECOVERY CONTAINER.	1. Pressure relief valve in pressure cap defective or wrong pressure cap installed.	1. Verify proper pressure cap part number. Check condition of pressure cap and seals. Replace as necessary. (Refer to 7 - COOLING/ ENGINE/RADIATOR PRESSURE CAP - DIAGNOSIS AND TESTING)
COOLANT LOSS TO THE GROUND WITHOUT PRESSURE CAP BLOWOFF. GAUGE IS READING HIGH OR HOT.	1. Coolant leaks in radiator, cooling system hoses, water pump or engine.	1. Pressure test and repair as necessary. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING)
DETONATION OR PRE-IGNITION (NOT CAUSED BY IGNITION SYSTEM). GAUGE MAY OR MAY NOT BE READING HIGH.	1. Engine overheating.	1. Check reason for overheating and repair as necessary.
	2. Freeze point of coolant not correct.	2. Check the freeze point of the coolant. (Refer to 7 - COOLING/ ENGINE/COOLANT - DIAGNOSIS AND TESTING) Adjust glycol-to-water ratio as required.

ENGINE (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
HOSE OR HOSES COLLAPSE WHEN ENGINE IS COOLING	1. Vacuum created in cooling system on engine cool-down is not being relieved through coolant recovery container system.	1. (a) Radiator pressure cap relief valve stuck. (Refer to 7 - COOLING/ ENGINE/RADIATOR PRESSURE CAP - DIAGNOSIS AND TESTING) Replace as necessary.
		(b) Hose between coolant recovery container and radiator is kinked. Repair as necessary.
		(c) Vent at coolant recovery container is plugged. Clean vent and repair as necessary.
		(d) Coolant recovery container is internally blocked or plugged. Check for blockage and repair as necessary.
ELECTRIC RADIATOR FAN OPERATES ALL THE TIME.	1. Fan relay, powertrain control module (PCM) or engine coolant temperature sensor defective.	1. (Refer to the Appropriate Diagnostic Information) Repair as necessary.
	2. Check for low coolant level.	2. (Refer to 7 - COOLING - STANDARD PROCEDURE) Repair as necessary.
ELECTRIC RADIATOR FAN WILL NOT OPERATE. GAUGE READING HIGH OR HOT	1. Radiator fan motor defective.	1. (Refer to the Appropriate Diagnostic Information) Repair as necessary.
	2. Radiator fan relay, powertrain control module (PCM) or engine coolant temperature sensor defective.	2. (Refer to the Appropriate Diagnostic Information) Repair as necessary.
	3. Blown fuse in power distribution center (PDC).	3. Determine reason for blown fuse and repair as necessary.
NOISY FAN	1. Radiator fan blade loose.	1. Replace fan assembly.
	2. Radiator fan blade striking a surrounding object.	2. Locate point of fan blade contact and repair as necessary.
	3. Air obstructions at radiator or A/C condenser.	3. Remove obstructions and/or clean debris from radiator and/or A/C condenser.
	4. Radiator fan motor defective.	4. Replace as necessary. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - DISASSEMBLY)

ENGINE (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
INADEQUATE AIR CONDITIONER PERFORMANCE (COOLING SYSTEM SUSPECTED)	1. Radiator and/or air conditioning condenser is restricted, obstructed or dirty.	1. Remove restriction and/or clean as necessary.
	2. Electric radiator fan not operating when A/C is on.	2. (Refer to the Appropriate Diagnostic Information) Repair as necessary.
	3. Engine is overheating (heat may be transferred from radiator to A/C condenser). High underhood temperature due to engine overheating may also transfer heat to A/C components.	3. Correct overheating condition.
INADEQUATE HEATER PERFORMANCE.	1. Has a diagnostic trouble code (DTC) been set?	1. (Refer to the Appropriate Diagnostic Information)
	2. Coolant level low.	2. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING) Repair as necessary.
	3. Obstructions in heater hose fittings at engine.	3. Remove heater hoses at both ends and check for obstructions. Repair as necessary.
	4. Heater hose kinked.	4. Locate kinked area and repair as necessary.
	5. Water pump is not pumping coolant to heater core. When the engine is fully warmed up, both heater hoses should be hot to the touch.	5. (Refer to 7 - COOLING/ENGINE/ WATER PUMP - DIAGNOSIS AND TESTING) Repair as necessary.
HEAT ODOR	1. Various heat shields are used at certain driveline components. One or more of these shields may be missing.	1. Locate missing shields and replace or repair as necessary.
	2. Is temperature gauge reading above the normal range?	2. Refer to the previous Temperature Gauge Reads High in these Diagnostic Charts. Repair as necessary.
	3. Radiator fan operating incorrectly.	3. (Refer to 7 - COOLING/ENGINE/ RADIATOR FAN - DIAGNOSIS AND TESTING) Repair as necessary.
	4. Has undercoating been applied to any unnecessary component?	4. Clean undercoating as necessary.
	5. Engine may be running rich causing the catalytic converter to overheat.	5. (Refer to the Appropriate Diagnostic Information) Repair as necessary.

ENGINE (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
POOR DRIVEABILITY (THERMOSTAT POSSIBLY STUCK OPEN). GAUGE MAY BE READING LOW	1. For proper driveability, good vehicle emissions and for preventing build-up of engine oil sludge, the thermostat must be operating properly. Has a diagnostic trouble code (DTC) been set?	1. (Refer to the Appropriate Diagnostic Information) Replace thermostat if necessary.
STEAM IS COMING FROM FRONT OF VEHICLE NEAR GRILL AREA WHEN WEATHER IS WET, ENGINE IS WARMED UP, RUNNING, AND VEHICLE IS STATIONARY. TEMPERATURE GAUGE IS IN NORMAL RANGE.	1. During wet weather, moisture (snow, ice or rain condensation) on the radiator will evaporate when the thermostat opens. This opening allows heated water into the radiator. When the moisture contact the hot radiator, steam may be emitted. This usually occurs in cold weather with no fan or airflow to blow it away.	1. Occasional steam emitting from this area is normal. No repair is necessary.
COOLANT COLOR	1. Coolant color is not necessarily an indication of adequate corrosion or temperature protection. Do not rely on coolant color for determining condition of coolant.	1. Check the freeze point of the coolant. (Refer to 7 - COOLING/ ENGINE/COOLANT - DIAGNOSIS AND TESTING) Adjust the glycol-to-water ratio as required.
COOLANT LEVEL CHANGES IN COOLANT RECOVERY CONTAINER	1. Level changes are to be expected as coolant volume fluctuates with engine temperature. If the level in the container was between the MIN and MAX marks when the engine was cold, the level should return to within that range after operation at elevated temperatures.	1. A normal condition. No repair is necessary.

DIAGNOSIS AND TESTING - COOLING SYSTEM FLOW CHECK

To determine whether coolant is flowing through the cooling system, use one of the following procedures:

PREFERRED METHOD

WARNING: DO NOT REMOVE THE COOLING SYSTEM PRESSURE CAP OR ANY HOSE WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

- **2.0L/2.4L:** Remove pressure cap when engine is cold. Remove small amount of coolant. Idle engine until thermostat opens. You should observe coolant flow while looking down the filler neck. Once flow is detected install the pressure cap. Replace removed coolant into coolant recovery container.
- **2.7L:** Start engine, coolant flow should be observable in coolant pressure container when revving the engine.

ALTERNATIVE METHOD

- If engine is cold, idle engine until normal operating temperature is reached. Feel the upper radiator hose. If it is hot, coolant is circulating.

ENGINE (Continued)

DIAGNOSIS AND TESTING - COOLING SYSTEM LEAK TESTING

WARNING: IF VEHICLE HAS BEEN RUN RECENTLY, WAIT 15 MINUTES BEFORE REMOVING PRESSURE CAP. PLACE A SHOP TOWEL OVER THE CAP, AND WITHOUT PUSHING DOWN, ROTATE IT COUNTER-CLOCKWISE TO THE FIRST STOP. ALLOW FLUIDS TO ESCAPE THROUGH THE OVERFLOW TUBE. WHEN THE SYSTEM STOPS PUSHING COOLANT AND STEAM INTO THE COOLANT RECOVERY BOTTLE AND PRESSURE DROPS, PUSH DOWN ON THE CAP AND REMOVE IT COMPLETELY. SQUEEZING THE RADIATOR INLET HOSE WITH A SHOP TOWEL (TO CHECK PRESSURE) BEFORE AND AFTER TURNING TO THE FIRST STOP IS RECOMMENDED.

Coolant level should be full. Add coolant if necessary. With engine not running, remove pressure cap and wipe the coolant filler neck sealing seat clean.

Attach a cooling system pressure tester (Tool 7700 or equivalent) to the coolant filler neck, as shown in (Fig. 4) or (Fig. 5) and apply 104 kPa (15 psi) pressure. If the pressure drops more than 2 psi in 2 minutes inspect all points for external leaks.

All hoses, radiator and heater, should be moved while at 104 kPa (15 psi) since some leaks occur while driving due to engine rock, etc.

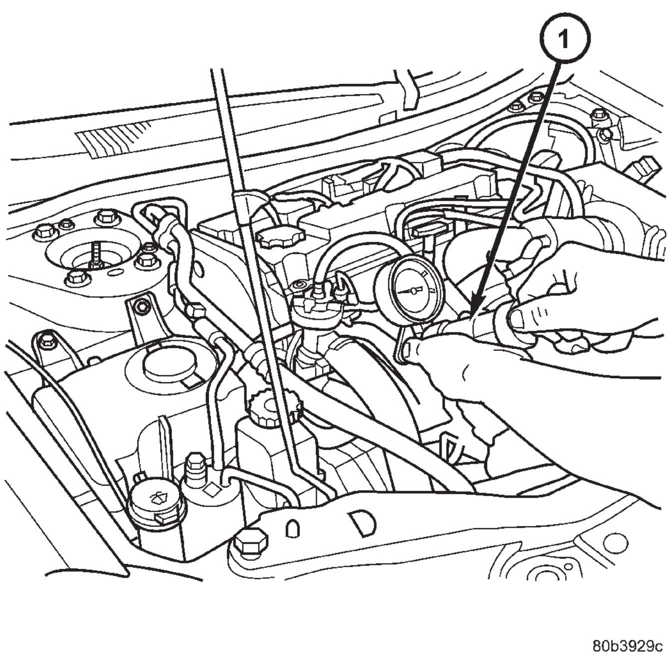

Fig. 4 PRESSURE TESTING COOLING SYSTEM - 2.0L/2.4L

1 - SPECIAL TOOL 7700

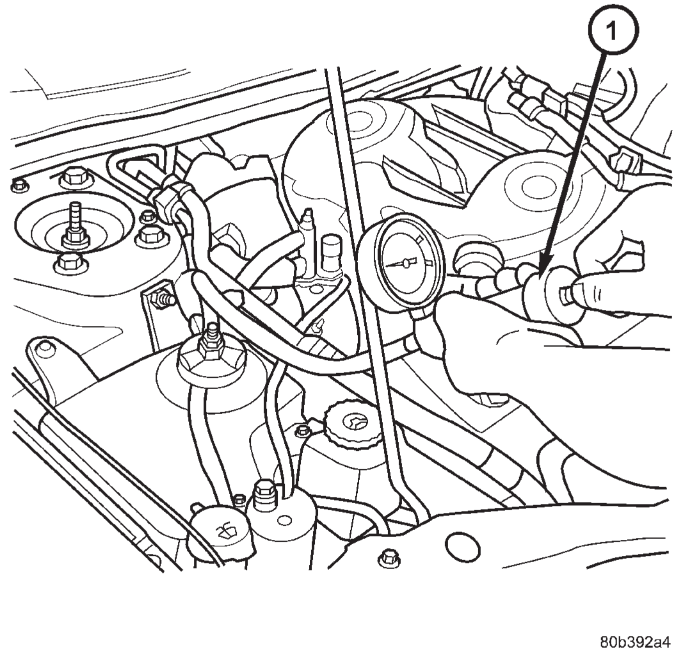

Fig. 5 PRESSURE TESTING COOLING SYSTEM - 2.7L

1 - SPECIAL TOOL 7700

If there are no external leaks after the gauge dial shows a drop in pressure, detach the tester. Start engine and run the engine to normal operating temperature in order to open the thermostat and allow the coolant to expand. Reattach the tester. If the needle on the dial fluctuates, it indicates a combustion leak and is usually a head gasket leak.

WARNING: WITH TOOL IN PLACE PRESSURE BUILDS UP FAST. ANY EXCESSIVE AMOUNT OF PRESSURE BUILT UP BY CONTINUOUS ENGINE OPERATION MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

If the needle on the dial does not fluctuate, race the engine a few times. If an abnormal amount of coolant or steam is emitted from the tailpipe, it may indicate a faulty head gasket, cracked engine block or cylinder head.

There may be internal leaks which can be determined by removing the oil dipstick. If water globules appear intermixed with the oil, it will indicate a internal leak in the engine. If there is an internal leak, the engine must be disassembled for repair.

ENGINE (Continued)

DIAGNOSIS AND TESTING - COOLING SYSTEM AERATION

Low coolant level in a cross flow radiator will equalize in both tanks with engine off. With engine at running and at operating temperature, the high pressure inlet tank runs full and the low pressure outlet tank drops, resulting in cooling system aeration. Aeration will draw air into the water pump resulting in the following:

- High reading shown on the temperature gauge.
- Loss of coolant flow through the heater core.
- Corrosion in the cooling system.
- Water pump seal may run dry, increasing the risk of premature seal failure.
- Combustion gas leaks into the coolant can also cause the above problems.

DIAGNOSIS AND TESTING - COOLING SYSTEM DEAERATION

2.0L/2.4L

Removal of air from the engine cooling system only occurs when the engine is first warming up. Air in the cooling system will collect under the cooling system pressure cap while the engine is run and will be pushed into the coolant recovery container. When the engine cools down, coolant will be drawn from the coolant recovery container back into the active cooling system. Once the thermostat opens, deaeration no longer occurs. Multiple warm up and cool down cycles may be required to remove all the air in the cooling system. If the system is very low on coolant, deaeration will not occur. Following the proper cooling system fill procedure is essential for proper operation. This system will not function if the wrong cooling system pressure cap is installed. Ensure proper cooling system pressure cap is used. Verify proper pressure cap part number.

2.7L

This engine has a premium system to remove air from the engine cooling system. Removal of air from the engine cooling system occurs continuously when the engine is run at speeds above idle. Thirty minutes of normal driving after a properly completed service fill will deaerate the engine cooling system. This system will not function if the wrong cooling system pressure cap is installed. Ensure proper cooling system pressure cap is used. Verify proper pressure cap part number.

STANDARD PROCEDURE

COOLANT LEVEL CHECK - ROUTINE

NOTE: Do not remove pressure cap for routine coolant level inspections.

The coolant bottle provides a quick visual method for determining the coolant level without removing the pressure cap. **With the engine cold and not running**, simply observe the level of the coolant in the coolant recovery container (2.0L/2.4L) (Fig. 6) or the coolant pressure container (2.7L) (Fig. 7). The level should be between the MIN and MAX marks.

COOLING SYSTEM - DRAINING

When servicing the cooling system, it is essential that coolant does not drip onto the accessory drive belts and/or pulleys. Shield the belts with shop towels before working on the cooling system. If coolant contacts the belts or pulleys, flush both with clean water.

WARNING: MAKE SURE ENGINE COOLING SYSTEM IS COOL BEFORE SERVICING. DO NOT REMOVE ANY CLAMPS OR HOSES , PRESSURE CAP, OR OPEN THE RADIATOR DRAINCOCK. WHEN THE SYSTEM IS HOT AND UNDER PRESSURE SERIOUS BURNS FROM COOLANT CAN OCCUR.

(1) Position a clean collecting container under draincock location.

(2) Open radiator draincock located at the lower right side of radiator. Turn draincock counterclockwise until it stops.

(3) Remove coolant pressure cap and open cooling system bleed valve.

(4) Raise vehicle on hoist.

(5) **2.7L:** Remove heater hose at heater tube located at the right front inner frame rail and direct coolant flow into container.

COOLING SYSTEM - FILLING

CAUTION: Do not use well water or suspect water supply in cooling system. A 50/50 mixture of the recommended ethylene glycol and distilled water is recommended.

NOTE: Make sure all hoses are connected and radiator draincock is closed.

ENGINE (Continued)

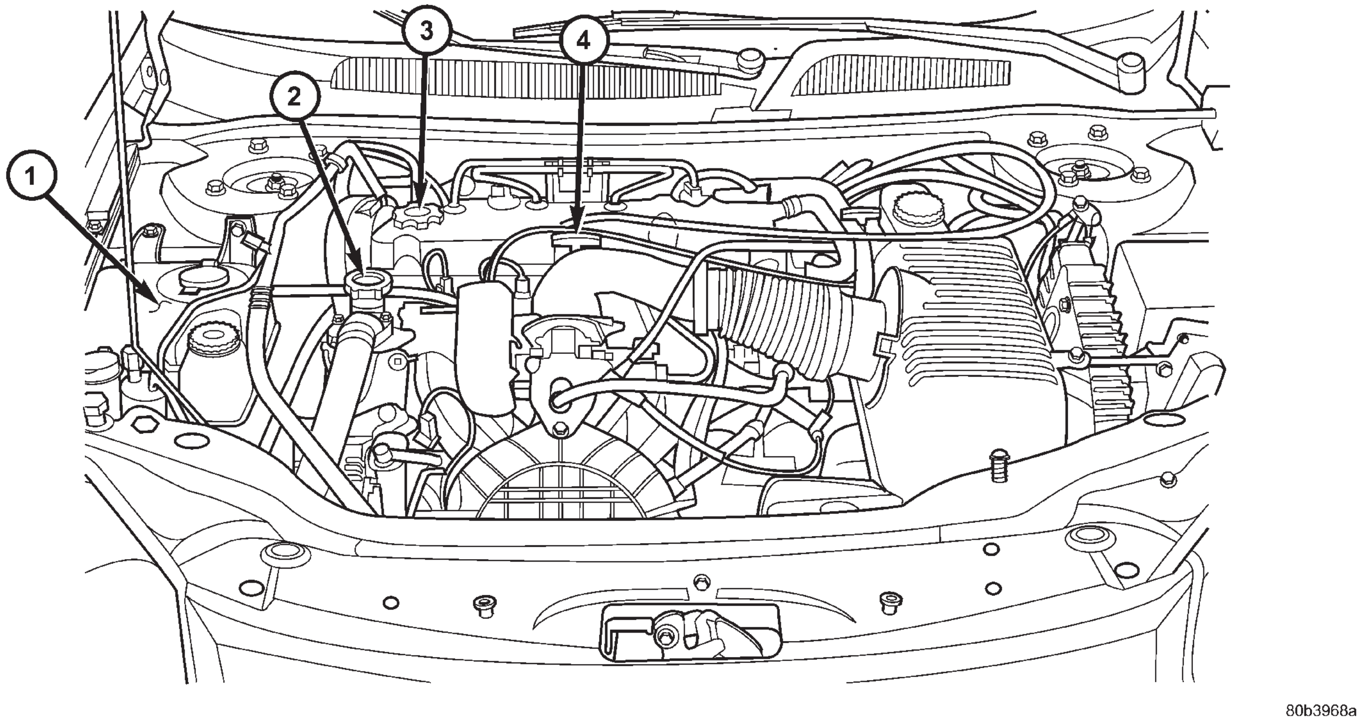

Fig. 6 Fluid Level Check - 2.0/2.4L

1 - COOLANT RECOVERY CONTAINER
2 - COOLANT PRESSURE CAP
3 - ENGINE OIL FILL CAP
4 - ENGINE OIL DIPSTICK

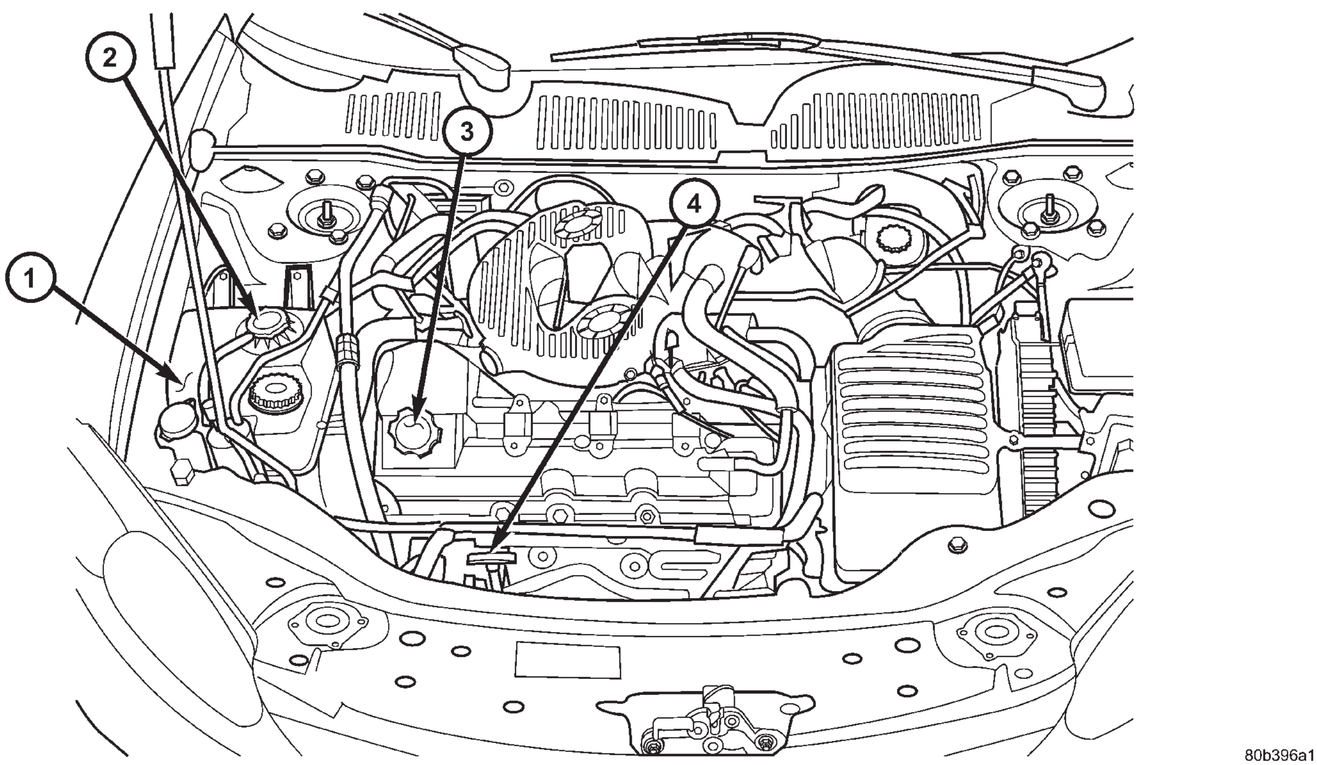

Fig. 7 Fluid Level Check - 2.7L

1 - COOLANT PRESSURE CONTAINER
2 - COOLANT PRESSURE CAP
3 - ENGINE OIL FILL
4 - ENGINE OIL DIPSTICK

ENGINE (Continued)

FILLING - 2.0L/2.4L

(1) Close radiator draincock by turning clockwise.

(2) Open cooling system bleed valve (Fig. 8).

(3) Attach a 6.35 mm (0.250 in.) inside diameter clear hose that is 120.0 cm (48 in.) long to the bleed valve. Route the hose away from accessory drive belts and radiator fan. Position the other end of hose into a collecting container. The hose will prevent coolant from contacting accessory drive belts and other components.

(4) Remove cooling system pressure cap and fill cooling system with recommended coolant.

(5) Slowly continue filling until a steady stream of coolant flows from attached hose on bleed valve.

(6) Close bleed valve and remove hose.

(7) Fill coolant to the top of pressure cap neck.

(8) Install cooling system pressure cap.

(9) Fill coolant recovery container to the MAX mark.

(10) Start engine and allow to run until thermostat opens and radiator fans cycle.

NOTE: It may be necessary to add additional coolant to the coolant recovery container after three or four warm-up/cool down cycles to maintain coolant level between the MIN and MAX marks; as additional trapped air is removed from the system.

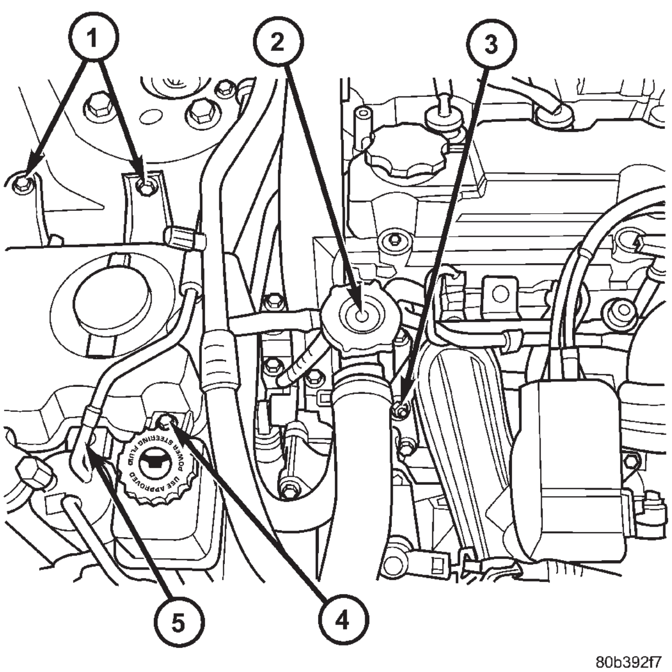

Fig. 8 Cooling System Filling - 2.0L/2.4L

1 - COOLANT RECOVERY CONTAINER FASTENERS
2 - COOLANT PRESSURE CAP
3 - COOLING SYSTEM BLEED VALVE
4 - POWER STEERING RESERVIOR FASTENER
5 - RECEIVER/DRIER FASTENER

FILLING - 2.7L

(1) Close radiator draincock by turning clockwise.

(2) Open cooling system bleed valve (Fig. 9).

(3) Attach a 6.35 mm (0.250 in.) inside diameter clear hose that is 120.0 cm (48 in.) long to the bleed valve. Route the hose away from accessory drive belts and radiator fan. Position the other end of hose into a collecting container. The hose will prevent coolant from contacting accessory drive belts and other components.

(4) Remove cooling system pressure cap. Attach Special Tool 8195, Filling Aid Funnel to coolant pressure container filler neck.

(5) Use the supplied clip to pinch overflow hose that connects between the two chambers of the pressure container (Fig. 9).

(6) Pour coolant into the larger section of Filling Aid Funnel (the smaller section of funnel is to allow air to escape).

(7) Slowly continue filling until a steady stream of coolant flows from attached hose on bleed valve.

(8) Close bleed valve and continue filling system to top of Filling Aid Funnel.

(9) Remove clip from overflow hose.

(10) Allow coolant in Filling Aid Funnel to drain into overflow chamber of pressure container.

(11) Remove Special Tool 8195, Filling Aid Funnel and install pressure cap on pressure container.

(12) Remove hose from bleed valve.

(13) Start engine and allow to run until thermostat opens and radiator fans cycle.

NOTE:
The engine cooling system will push any remaining air into the pressure container within about one half hour of normal driving. As a result, a drop in coolant level in the pressure container may occur.
If the engine cooling system overheats and pushes coolant into the overflow chamber of the pressure container, this coolant will be sucked back into the cooling system ONLY IF THE PRESSURE CAP IS LEFT ON THE PRESSURE CONTAINER. Removing the pressure cap breaks the vacuum path between the two chambers of the pressure container and the coolant will not return to the cooling system.

(14) Shut off engine and allow it to cool down. This permits coolant to be drawn into the pressure chamber.

(15) With engine COLD, observe coolant level in pressure chamber. Coolant level should be within MIN and MAX marks. Adjust coolant level as necessary.

ENGINE (Continued)

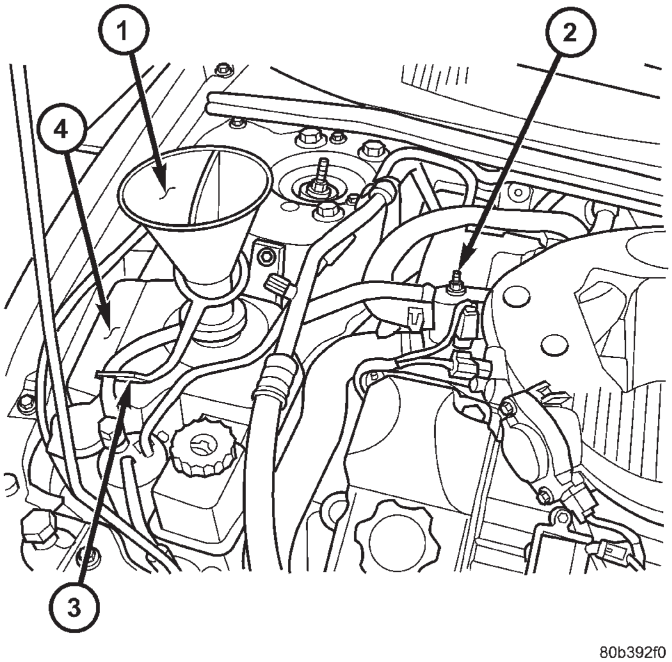

Fig. 9 Cooling System Filling - 2.7L

1 - SPECIAL TOOL 8195
2 - COOLING SYSTEM BLEED VALVE
3 - PINCH OVERFLOW HOSE
4 - COOLANT PRESSURE CONTAINER

CLEANING

Drain cooling system and refill with clean water. Refer to drain and fill procedures in this section. Run engine with radiator cap installed until upper radiator hose is hot. Stop engine and drain water from system. If water is dirty; fill, run, and drain system again, until water runs clear. Refill cooling system with a 50/50 mixture of the recommended ethylene glycol and distilled water (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION).

INSPECTION

After performing a cleaning/flush procedure, inspect all hoses, clamps and connections for deterioration and leaks. Inspect radiator and heater core for leaks.

COOLANT

DESCRIPTION

CAUTION: Use of Propylene Glycol based coolants is not recommended, as they provide less freeze and corrosion protection. Do not mix coolant types. If coolant other than Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula or equivalent is added, the mixed coolant will have a reduced service schedule.

The use of aluminum cylinder blocks, cylinder heads, and water pumps requires special corrosion protection. Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula or equivalent ethylene glycol based coolant with corrosion inhibitors (called HOAT, for Hybrid Organic Additive Technology) is recommended. This coolant offers the best engine cooling without corrosion when mixed with 50% Ethylene Glycol and 50% distilled water to obtain a freeze point of -37°C (-34°F). If it loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed coolant solution. Mixing of coolants other than specified (non-HOAT), will reduce the 5 year/100,000 mile corrosion protection.

OPERATION

The cooling system is designed around the coolant. The coolant must accept heat from the engine metal, in the cylinder head area near the exhaust valves and engine block. The coolant carries heat to the radiator where the tube/fin radiator can transfer the heat to the air. Properly mixed, the coolant raises the boiling point, prevents freezing in cold climates, and prevents corrosion.

WARNING: ANTIFREEZE IS AN ETHYLENE GLYCOL BASED COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT STORE IN OPENED OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL. KEEP OUT OF REACH OF CHILDREN AND PETS. DISPOSE OF GLYCOL BASED COOLANT PROPERLY, CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA. DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT OPERATING TEMPERATURE OR HOT UNDER PRESSURE, PERSONAL INJURY CAN RESULT. AVOID RADIATOR COOLING FAN WHEN ENGINE COMPARTMENT RELATED SERVICE IS PERFORMED, PERSONAL INJURY CAN RESULT.

DIAGNOSIS AND TESTING - COOLANT CONCENTRATION TESTING

Coolant concentration should be checked when any additional coolant was added to system or after a coolant drain, flush and refill. The coolant mixture offers optimum engine cooling and protection against corrosion when mixed to a freeze point of -37°C

COOLANT (Continued)

(-34°F) to -46°C (-50°F). The use of a hydrometer or a refractometer can be used to test coolant concentration.

A hydrometer will test the amount of glycol in a mixture by measuring the specific gravity of the mixture. The higher the concentration of ethylene glycol, the larger the number of balls that will float, and higher the freeze protection (up to a maximum of 60% by volume glycol).

A refractometer (Special Tool 8286)(Refer to 7 - COOLING - SPECIAL TOOLS) will test the amount of glycol in a coolant mixture by measuring the amount a beam of light bends as it passes through the fluid.

Some coolant manufactures use other types of glycols into their coolant formulations. Propylene glycol is the most common new coolant. However, propylene glycol based coolants do not provide the same freezing protection and corrosion protection and is not recommended.

CAUTION: Do not mix types of coolant—corrosion protection will be severely reduced.

STANDARD PROCEDURE

COOLANT - ADDING ADDITIONAL

NOTE: 2.0L/2.4L - The pressure cap should only be removed if the coolant recovery container is empty.

When additional coolant is needed, it should be added to the coolant recovery container (2.0L/2.4L)/ coolant pressure container (2.7L). Use only 50/50 concentration of ethylene glycol type antifreeze and distilled water.

STANDARD PROCEDURE - COOLANT SERVICE

For engine coolant recommended service schedule, (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION).

COOLANT OUTLET CONNECTOR

REMOVAL

WARNING: DO NOT REMOVE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

2.4L ENGINE

(1) Drain cooling system (Refer to 7 - COOLING/ ENGINE - STANDARD PROCEDURE).

(2) Remove pressure cap (Fig. 10).

(3) Disconnect hoses at coolant outlet connector.

(4) Remove bolts attaching coolant outlet connector.

(5) Remove coolant outlet connector.

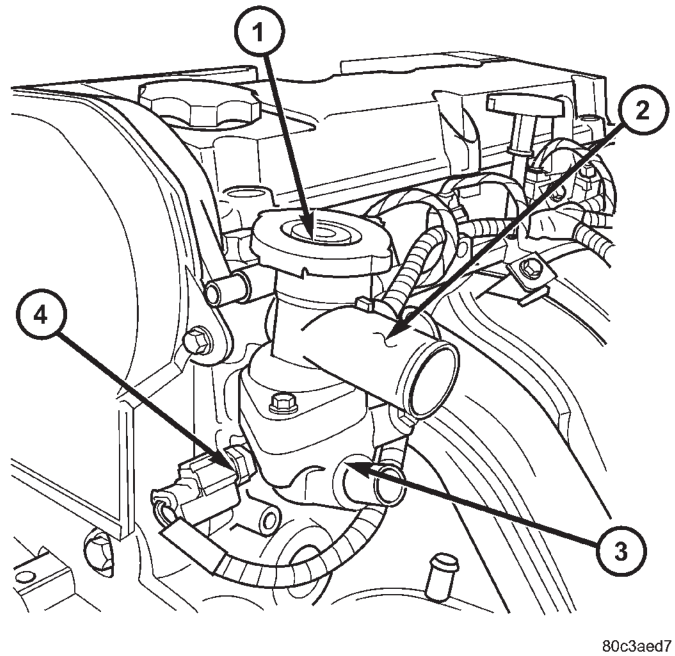

Fig. 10 Coolant Outlet Connector - 2.0L/2.4L

1 - PRESSURE CAP
2 - COOLANT OUTLET CONNECTOR
3 - THERMOSTAT HOUSING
4 - ENGINE COOLANT TEMPERATURE SENSOR

2.7L ENGINE

(1) Drain cooling system (Refer to 7 - COOLING/ ENGINE - STANDARD PROCEDURE).

(2) Remove upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(3) Disconnect engine coolant temperature (ECT) sensor connector.

(4) Disconnect hoses at coolant outlet connector. Use Special Tool 8495 Pliers to remove clamps (Fig. 11).

(5) Remove bolts attaching coolant outlet connector (Fig. 12).

(6) Remove coolant outlet connector.

COOLANT OUTLET CONNECTOR (Continued)

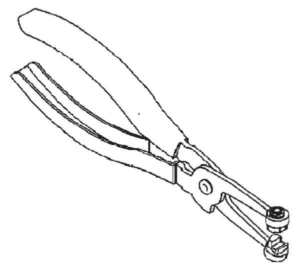

Fig. 11 Hose Clamp Pliers 8495

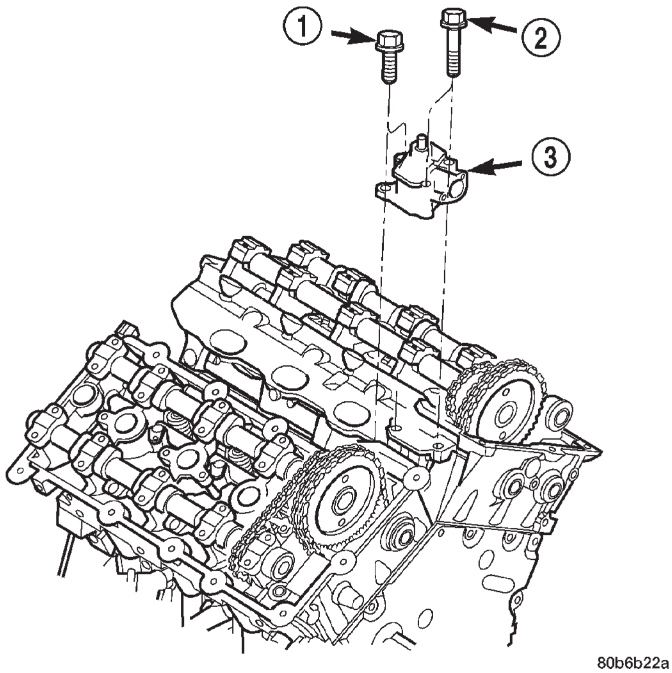

Fig. 12 Coolant Outlet Connector- 2.7L

1 - BOLT (2)
2 - BOLT (2)
3 - COOLANT OUTLET CONNECTOR

INSTALLATION

2.4L ENGINE

(1) Clean sealing surfaces. Inspect gaskets for tears and cuts. Replace as necessary.

(2) Install coolant outlet connector and tighten bolts to 12 N·m (105 in. lbs.) (Fig. 10).

(3) Connect hoses at coolant outlet connector.

(4) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

2.7L ENGINE

(1) Clean sealing surfaces. Inspect gaskets for tears and cuts. Replace as necessary.

(2) Install coolant outlet connector and tighten bolts to 12 N·m (105 in. lbs.) (Fig. 12).

(3) Connect hoses at coolant outlet connector. Use Special Tool 8495 Pliers to install clamps (Fig. 11).

(4) Connect engine coolant temperature sensor connector.

(5) Install upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(6) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

COOLANT RECOVERY CONTAINER - 2.0L/2.4L

DESCRIPTION

The coolant recovery system consists of a container and an overflow hose that is connected to the coolant outlet connector (Fig. 13). The coolant recovery container is mounted in the right side engine compartment.

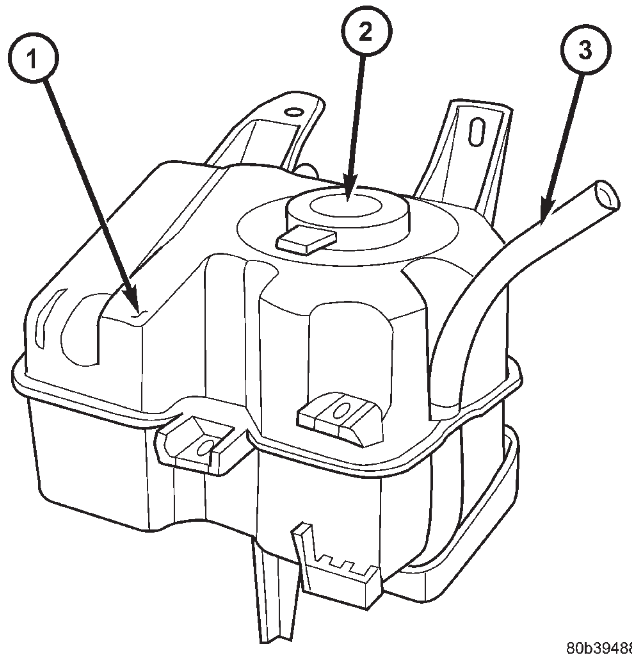

Fig. 13 Coolant Recovery Container - 2.0L/2.4L

1 - COOLANT RECOVERY CONTAINER
2 - CONTAINER FILL CAP
3 - OVERFLOW HOSE

OPERATION

This system works in conjunction with the pressure cap to utilize thermal expansion and contraction of the coolant to keep the coolant free of trapped air. It provides a volume for expansion and contraction, provides a convenient and safe method for checking coolant level, and adjusting level at atmospheric pressure without removing the pressure cap. It also provides some reserve coolant to cover minor leaks and evaporation or boiling losses.

COOLANT RECOVERY CONTAINER - 2.0L/2.4L (Continued)

REMOVAL

(1) Remove the power steering reservoir attaching screw.

(2) Remove the air conditioning receiver/dryer attaching screw.

(3) Unsnap the washer hose from the coolant recovery container.

(4) Disconnect the overflow hose from coolant outlet connector.

(5) Remove coolant recovery container screws.

(6) Remove coolant recovery container.

INSTALLATION

(1) Install container in mounting position and install attaching screws.

(2) Connect the overflow hose to the coolant outlet connector.

(3) Snap the washer hose into groove on coolant recovery container.

(4) Install the air conditioning receiver/dryer attaching screw.

(5) Install the power steering reservoir attaching screw.

(6) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

COOLANT PRESSURE CONTAINER - 2.7L

DESCRIPTION

The coolant pressure container consists of a pressure chamber and a overflow chamber (Fig. 14). The coolant pressure container is mounted in the right side engine compartment. An overflow hose connects the pressure chamber to the overflow chamber.

NOTE: Coolant will normally be in the pressure chamber side of the coolant bottle. The overflow chamber should normally be empty

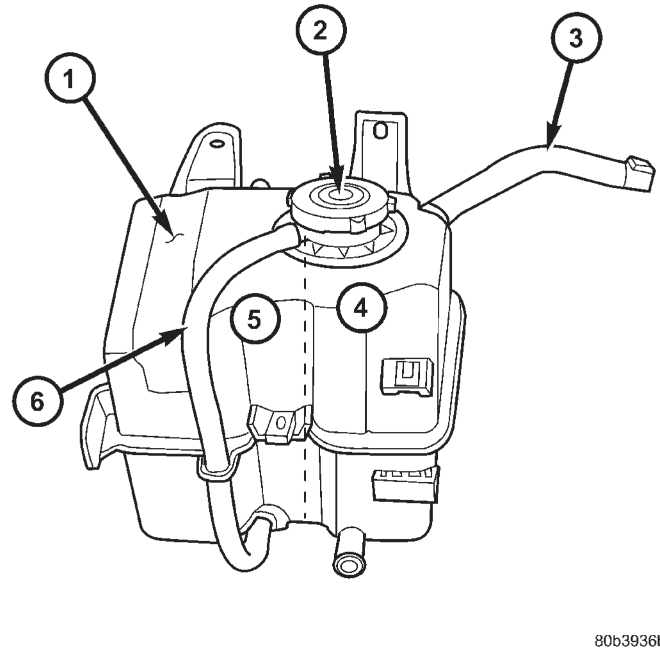

Fig. 14 Coolant Pressure Container - 2.7L

1 - COOLANT PRESSURE CONTAINER
2 - COOLANT PRESSURE CAP
3 - HOSE TO COOLANT OUTLET CONNECTOR
4 - PRESSURE CHAMBER
5 - OVERFLOW CHAMBER
6 - OVERFLOW HOSE

OPERATION

The pressure chamber keeps the coolant free of trapped air, provides a volume for expansion and contraction, and provides a convenient and safe method for checking and adjusting coolant level at atmospheric pressure. It also provides some reserve coolant to cover minor leaks, evaporation or boiling losses. The overflow chamber allows coolant recovery in case of an overheat.

REMOVAL

(1) Drain coolant below the coolant pressure container level.

(2) Remove the power steering reservoir attaching screw.

(3) Remove the air conditioning receiver/dryer attaching screw.

(4) Unsnap washer hose from the bottle.

(5) Disconnect the hose from coolant outlet connector to the bottle.

(6) Remove pressure container attaching screws.

(7) Reposition pressure container and disconnect the heater hose at the container.

(8) Remove coolant pressure container.

INSTALLATION

(1) Connect heater hose to coolant pressure container.

(2) Install container in mounting position and install attaching screws.

(3) Connect the coolant outlet connector hose to the bottle.

(4) Snap washer hose into groove on coolant pressure container.

(5) Install the air conditioning receiver/dryer attaching screw.

(6) Install the power steering reservoir attaching screw.

(7) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

ENGINE BLOCK HEATER

DESCRIPTION

DESCRIPTION - 2.0L/2.4L

The block heater is operated by ordinary house current (110 Volt A.C.) through a power cord and connector located in the engine compartment. The heater is mounted in a core hole (in place of a core hole plug) in the engine block, with the heating element immersed in coolant (Fig. 15).

CAUTION: The power cord must be secured in its retainer clips, and not positioned so it could contact linkages or exhaust manifolds and become damaged.

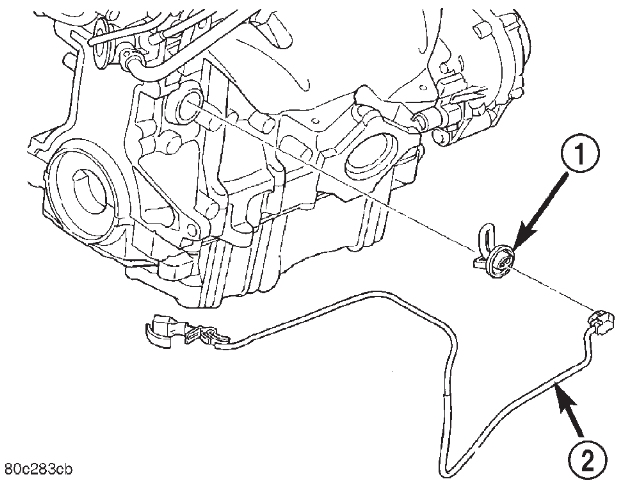

Fig. 15 Engine Block Heater

1 - BLOCK HEATER
2 - POWER CORD

DESCRIPTION - 2.7L

The engine block heater is mounted in the cylinder block, near the right rear corner (Fig. 16). The block heater is a dry cylinder type design and is powered by 110 volt AC. **The power cord must be secured in its retainer clips, and not positioned so it could contact linkages or exhaust manifolds and become damaged.**

OPERATION

OPERATION - 2.0L/2.4L

The block heater element is submerged in the cooling system's coolant. When electrical power (110 volt A.C.) is applied to the element, it creates heat. This heat is transferred to the engine coolant. This provides easier engine starting and faster warm-up when vehicle is operated in areas having extremely low temperatures.

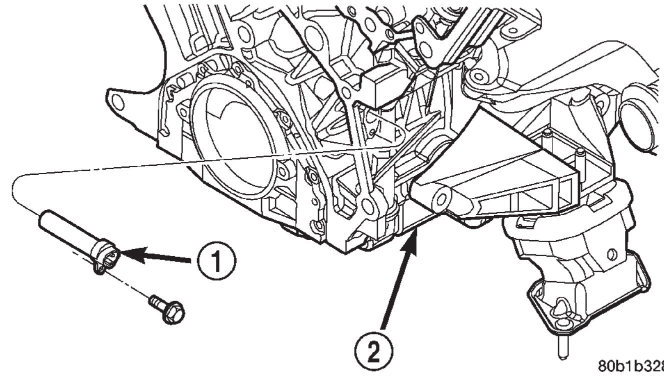

Fig. 16 Engine Block Heater

1 - BLOCK HEATER
2 - ENGINE — RIGHT SIDE

OPERATION - 2.7L

When power is applied (110 volt A.C.) to the block heater, the heating element transfers heat through the aluminum engine block and into the coolant without directly penetrating the cooling system.

DIAGNOSIS AND TESTING - ENGINE BLOCK HEATER TESTING

If unit does not operate, trouble can be in either the power cord or the heater element. Test power cord for continuity with a 110-volt voltmeter or 110-volt test light; test heater element continuity with an ohmmeter or 12-volt test light.

REMOVAL

REMOVAL - 2.0L/2.4L

(1) Drain cooling system (Refer to 7 - COOLING/ ENGINE - STANDARD PROCEDURE).
(2) Raise vehicle on hoist.
(3) Detach power cord plug from heater.
(4) Loosen screw in center of heater. Remove heater assembly (Fig. 17).

REMOVAL - 2.7L

(1) Raise vehicle on hoist.
(2) Detach power cord plug from heater (Fig. 18).
(3) Remove block heater attaching screw located below heater terminals.
(4) Remove block heater from cylinder block.

ENGINE BLOCK HEATER (Continued)

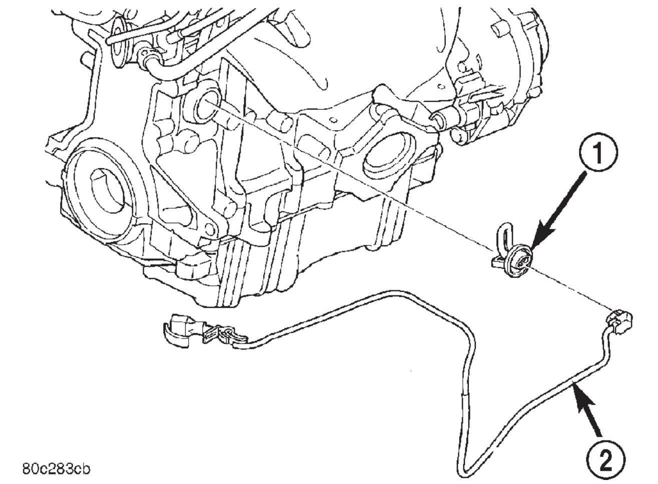

Fig. 17 Engine Block Heater

1 - BLOCK HEATER
2 - POWER CORD

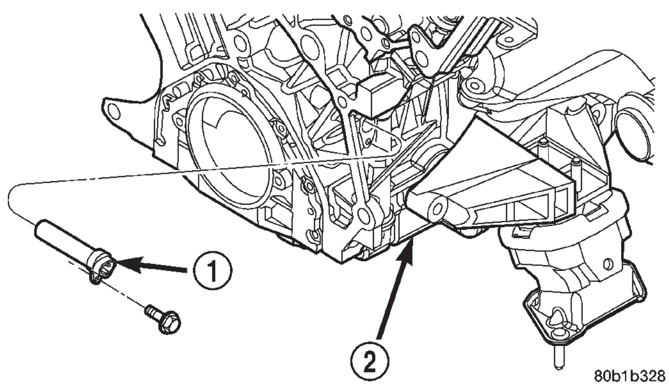

Fig. 18 ENGINE BLOCK HEATER

1 - BLOCK HEATER
2 - ENGINE — RIGHT SIDE

INSTALLATION

INSTALLATION - 2.0L/2.4L

(1) Thoroughly clean core hole and heater seat.

(2) Insert heater assembly with element loop positioned **upward** (Fig. 17).

(3) With heater seated, tighten center screw securely to assure a positive seal.

CAUTION: To prevent damage, the power cord must be secured in it's retaining clips, and not positioned so it could contact linkages or exhaust manifold.

(4) Connect power cord to heater.

(5) Lower vehicle.

(6) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

INSTALLATION - 2.7L

(1) Thoroughly clean cylinder block heater cavity.

(2) Insert heater assembly into block such that mounting hole is located below heater terminals (Fig. 18).

(3) Install mounting screw and tighten to 12 N·m (105 in. lb.).

CAUTION: To prevent damage, the power cord must be secured in its retainer clips, and not positioned so it could contact linkages or exhaust manifolds.

(4) Attach power cord to heater.

(5) Lower vehicle.

ENGINE COOLANT TEMPERATURE SENSOR

DESCRIPTION

2.0L/2.4L ENGINE

The Engine Coolant Temperature (ECT) Sensor threads into the thermostat housing just below the coolant outlet connector (Fig. 19). The ECT Sensor is a negative thermal coefficient sensor.

2.7L ENGINE

The Engine Coolant Temperature (ECT) Sensor threads into the coolant outlet connector (Fig. 20). The ECT Sensor is a negative thermal coefficient sensor.

OPERATION

The ECT sensor provides an input to the PCM. As temperature increases, resistance of the sensor decreases. As coolant temperature varies, the ECT sensor resistance changes resulting in a different voltage value at the PCM ECT sensor signal circuit. The ECT sensor provides input for various PCM operations. The PCM uses the input to control air-fuel mixture, timing, and radiator fan on/off times. The PCM uses ECT sensor input to send messages over the PCI bus to various modules for other functions such as temperature gauge and AC operation.

REMOVAL

(1) With engine cold, partially drain cooling system below level of ECT sensor.

(2) Disconnect ECT sensor electrical connector (Fig. 19) or (Fig. 20).

(3) Remove ECT sensor.

INSTALLATION

(1) Install ECT sensor. Torque sensor to 19 N·m (168 in. lbs.).

ENGINE COOLANT TEMPERATURE SENSOR (Continued)

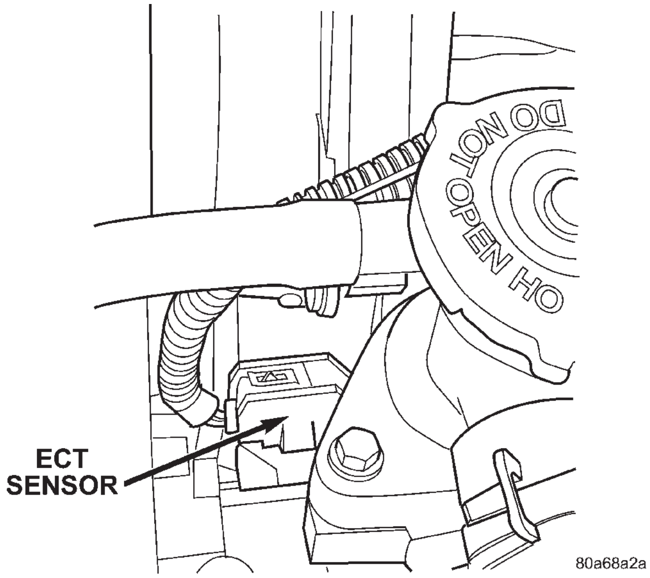

Fig. 19 ECT SENSOR 2.0L/2.4L

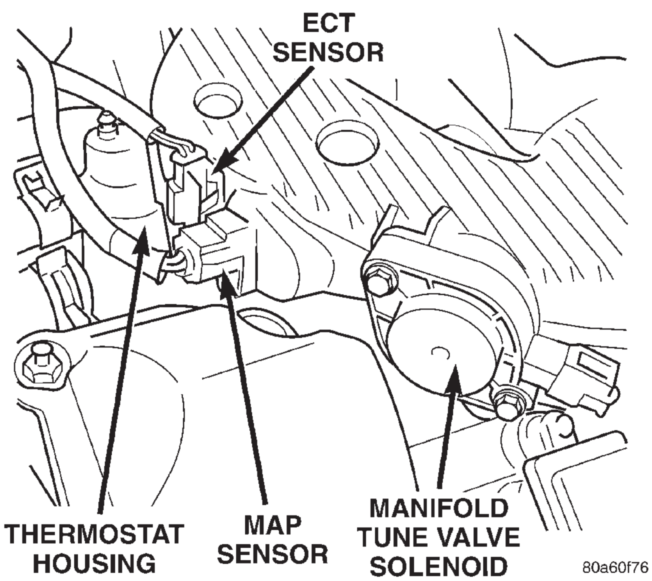

Fig. 20 ECT SENSOR 2.7L

(2) Reconnect ECT sensor electrical sensor.

(3) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

ENGINE COOLANT THERMOSTAT

DESCRIPTION

DESCRIPTION - 2.0L/2.4L

The thermostat is located on the front of the engine (radiator side) in the thermostat housing/coolant outlet connector (Fig. 21). The thermostat has a air bleed vent located in the flange and an O-ring with a locating dimple incorporated on it. There is a relief in the housing for positioning the air bleed.

DESCRIPTION - 2.7L

The thermostat is located on the lower left side of engine, near the front (Fig. 22). The thermostat is on the inlet side of the water pump. It has an air bleed located in the thermostat flange. The air bleed allows internal trapped air during cooling system filling to be released.

OPERATION

The engine cooling thermostat is a wax pellet driven, reverse poppet choke type. The thermostat is designed to provide the fastest warm up possible by preventing leakage through it and to guarantee a minimum engine operating temperature of 88 to 93°C (192 to 199°F). The thermostat also will automatically reach wide open so it will not restrict flow to the radiator as temperature of the coolant rises in hot weather to around 104°C (220°F). Above this temperature the coolant temperature is controlled by the radiator, fan, and ambient temperature, not the thermostat.

The thermostat is operated by a wax filled container (pellet) which is sealed. When heated coolant reaches a predetermined temperature, the wax expands enough to overcome the closing spring and water pump pressure, which forces the valve to open.

DIAGNOSIS AND TESTING - ENGINE COOLANT THERMOSTAT TESTING

The thermostat is operated by a wax filled container (pellet) which is sealed. When heated coolant reaches a predetermined temperature the wax pellet expands enough to overcome the closing spring and water pump pressure, which forces the valve to open. Coolant leakage into the pellet will cause a thermostat to fail open. Do not attempt to free up a thermostat with a screwdriver.

The thermostat that opens too soon type failure mode is included in the on-board diagnosis. The check engine light will not be lit by an open too soon condition. If it has failed open, a diagnostic trouble code (DTC) will be set. Do not change a thermostat for lack of heater performance or temperature gauge position, unless a DTC is present. For other probable causes, (Refer to 7 - COOLING/ENGINE - DIAGNOSIS AND TESTING). Thermostat failing shut is the normal long term mode of failure, and normally, only on high mileage vehicles. The temperature gauge will indicate this. (Refer to 7 - COOLING/ENGINE - DIAGNOSIS AND TESTING)

ENGINE COOLANT THERMOSTAT (Continued)

REMOVAL

REMOVAL - 2.0L/2.4L

WARNING: DO NOT REMOVE PRESSURE CAP OR ANY HOSE WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

(1) Partially drain cooling system below thermostat level.

(2) Disconnect hoses at coolant outlet connector.

(3) Remove bolts attaching coolant outlet connector (Fig. 21).

(4) Remove coolant outlet connector and thermostat.

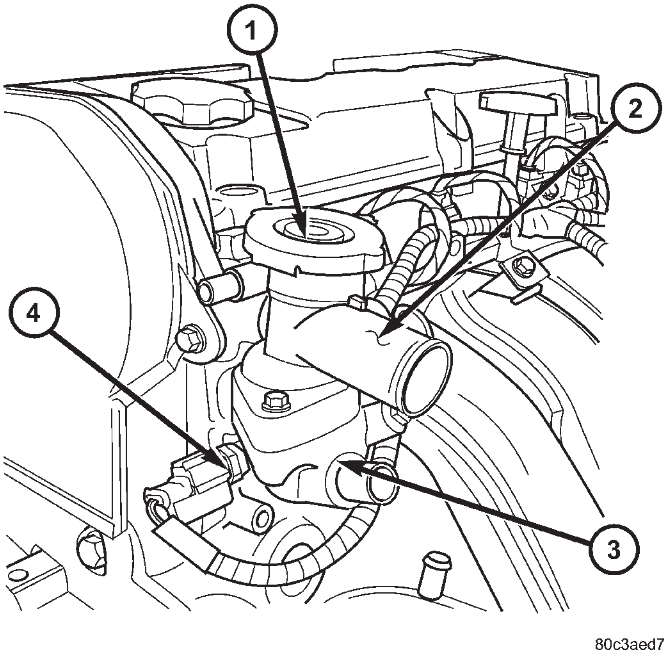

Fig. 21 Coolant Outlet Connector - 2.0L/2.4L

1 - PRESSURE CAP
2 - COOLANT OUTLET CONNECTOR
3 - THERMOSTAT HOUSING
4 - ENGINE COOLANT TEMPERATURE SENSOR

REMOVAL - 2.7L

(1) Disconnect negative cable from remote jumper terminal.

WARNING: DO NOT REMOVE PRESSURE CAP OR ANY HOSE WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

(2) Drain cooling system (Refer to 7 - COOLING/ ENGINE - STANDARD PROCEDURE).

(3) Raise vehicle on hoist.

(4) Remove right front wheel and belt splash shield.

(5) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(6) Remove lower generator mounting bolt.

(7) Lower vehicle.

(8) Disconnect generator electrical connectors.

(9) Disconnect AC clutch and AC pressure sensor electrical connectors. Reposition wiring harness.

(10) Remove oil dipstick and tube. Plug hole in oil pan where dipstick tube mounts with water tight stopper.

WARNING: IF HOLE FOR DIPSTICK TUBE IN OIL PAN IS NOT PLUGGED, COOLANT WILL ENTER OIL PAN. SERIOUS ENGINE DAMAGE CAN OCCUR.

(11) Remove remaining generator mounting bolts. Remove generator.

(12) Disconnect hoses at thermostat housing.

(13) Remove thermostat housing bolts (Fig. 22).

(14) Remove thermostat and housing.

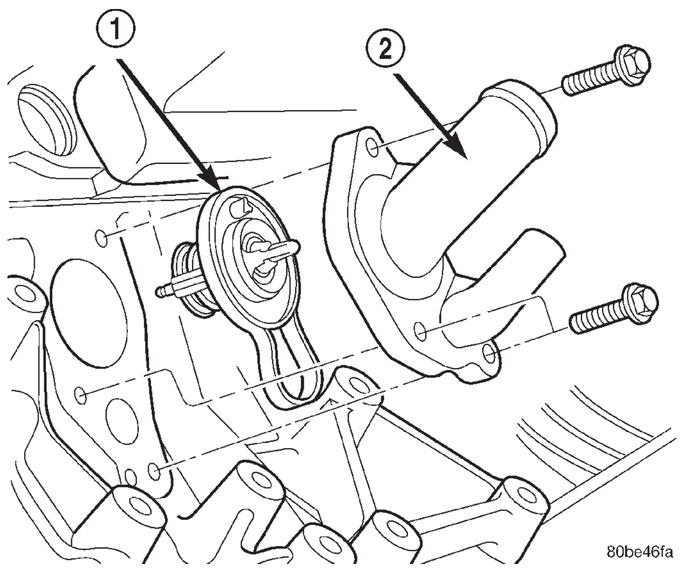

Fig. 22 Thermostat and Housing—2.7L Engine

1 - THERMOSTAT AND GASKET
2 - THERMOSTAT HOUSING/COOLANT INLET

INSTALLATION

INSTALLATION - 2.0L/2.4L

(1) Clean sealing surfaces.

(2) Place the new thermostat assembly into the coolant outlet connector. Align air bleed with notch on the coolant outlet connector (Fig. 23).

(3) Install coolant outlet connector onto thermostat housing and tighten bolts to 12.5 N·m (110 in. lbs.) (Fig. 21).

ENGINE COOLANT THERMOSTAT (Continued)

(4) Connect hoses to coolant outlet connector.

(5) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

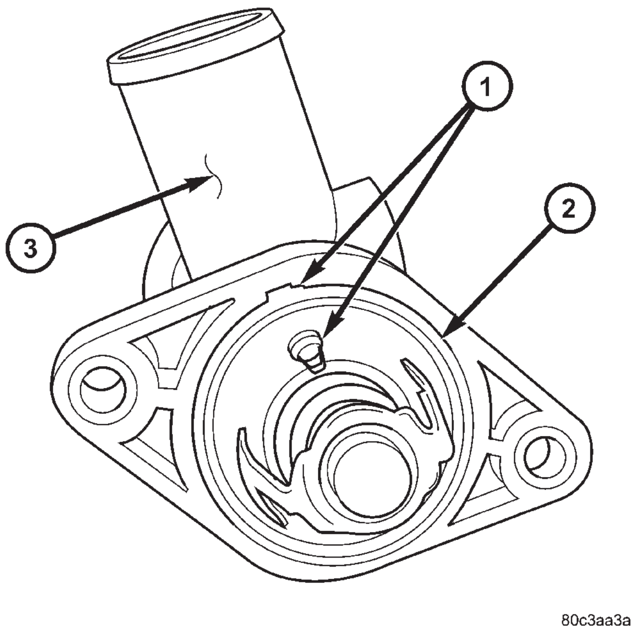

Fig. 23 Thermostat Indexing - 2.0L/2.4L

1 - ALIGN AIR BLEED WITH NOTCH IN COOLANT OUTLET CONNECTOR
2 - THERMOSTAT SEAL
3 - COOLANT OUTLET CONNECTOR

INSTALLATION - 2.7L

(1) Clean gasket sealing surfaces.

NOTE: Install thermostat with the bleed valve located at the 12 o'clock position.

(2) Install thermostat and gasket into the thermostat housing.

(3) Install thermostat and housing to cylinder block. Tighten attaching bolts to 12 N·m (105 in. lbs.) (Fig. 22).

(4) Connect hoses at thermostat housing.

(5) Install generator and attaching bolts.

CAUTION: Before removing plug in oil pan, clean residual coolant from area.

(6) Remove plug in oil pan and install engine oil dipstick tube.

(7) Reconnect AC clutch and AC pressure sensor connectors.

(8) Reconnect generator connectors.

(9) Raise vehicle on hoist.

(10) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(11) Install belt splash shield and right front wheel.

(12) Lower vehicle.

(13) Reconnect negative battery cable.

(14) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

HOSE CLAMPS

DESCRIPTION - HOSE CLAMPS

The cooling system uses constant tension spring type hose clamps. If a spring type clamp replacement is necessary, replace with the original Mopar® equipment spring type clamp.

Vehicles equipped with a 2.7L engine, use unique "Low Profile" type constant tension hose clamps at the coolant outlet connector hoses.

CAUTION: A number or letter is stamped into the tongue of constant tension clamps. If replacement is necessary, use only an original equipment clamp with matching number or letter (Fig. 24) or (Fig. 25).

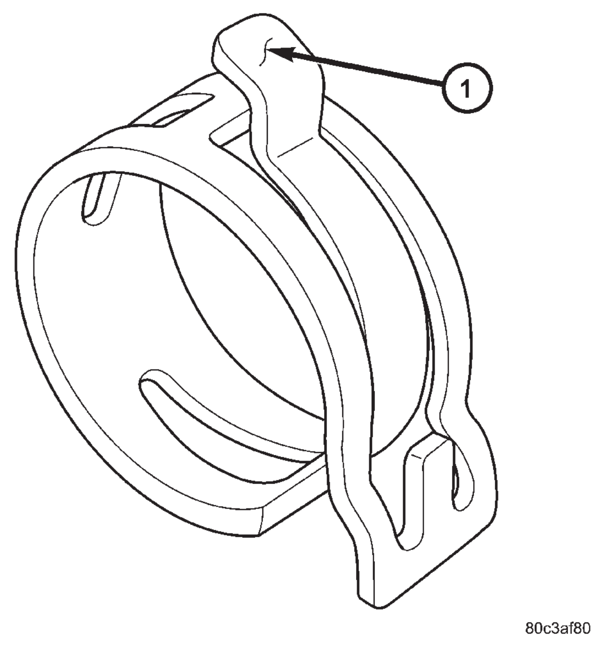

Fig. 24 "Low Profile" Spring Clamp Size Location

1 - SPRING CLAMP SIZE LOCATION

OPERATION - HOSE CLAMPS

The constant tension type hose clamps maintain constant clamping force on the hose connections as the temperature of the cooling system rises and falls. Worm gear type hose clamps may not have sufficient clamping force in colder weather conditions if installed during warm weather.

HOSE CLAMPS (Continued)

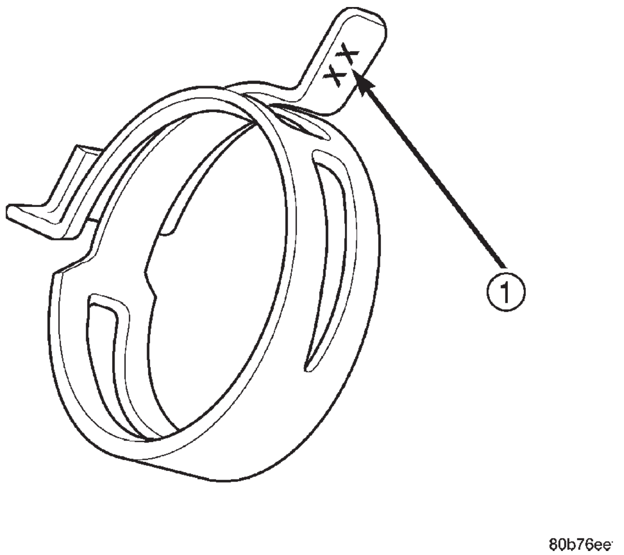

Fig. 25 Spring Clamp Size Location

1 - SPRING CLAMP SIZE LOCATION

To remove a spring type hose clamp, use Special Tool 8495 Hose Clamp Pliers, or equivalent, (Fig. 26) to compress the hose clamp.

NOTE: Special Tool 8495 was specifically designed for use on the "Low Profile" type hose clamps used at the coolant outlet connector hoses on the 2.7L engine. The pliers are also compatible with other styles of constant tension type hose clamps.

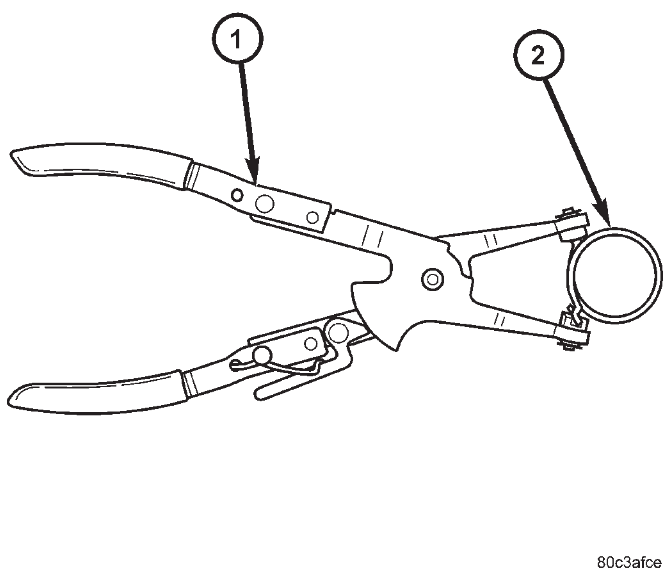

Fig. 26 Hose Clamp Pliers

1 - SPECIAL TOOL 8495 HOSE CLAMP PLIERS
2 - HOSE CLAMP

RADIATOR

DESCRIPTION

The radiator is a cross flow type (horizontal tubes) with design features that provide greater strength as well as sufficient heat transfer capabilities to keep the engine coolant within operating temperatures. The radiator cooling tubes are made of aluminum and the side tanks are plastic (Fig. 27).

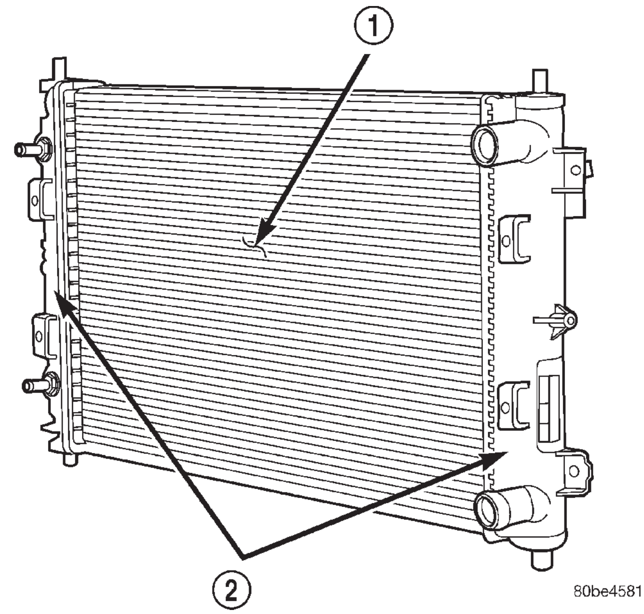

Fig. 27 Radiator - Typical

1 - COOLING TUBES
2 - TANKS

OPERATION

The radiator functions as a heat exchanger, using air flow across the exterior of the radiator tubes. This heat is then transferred from the coolant and into the passing air.

REMOVAL

(1) Disconnect negative cable from auxiliary jumper terminal.

WARNING: DO NOT REMOVE PRESSURE CAP OR ANY HOSE WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

(2) Drain cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(3) Remove upper radiator crossmember (Fig. 28).

CAUTION: Plastic tanks, while stronger than brass are subject to damage by impact, such as wrenches.

RADIATOR (Continued)

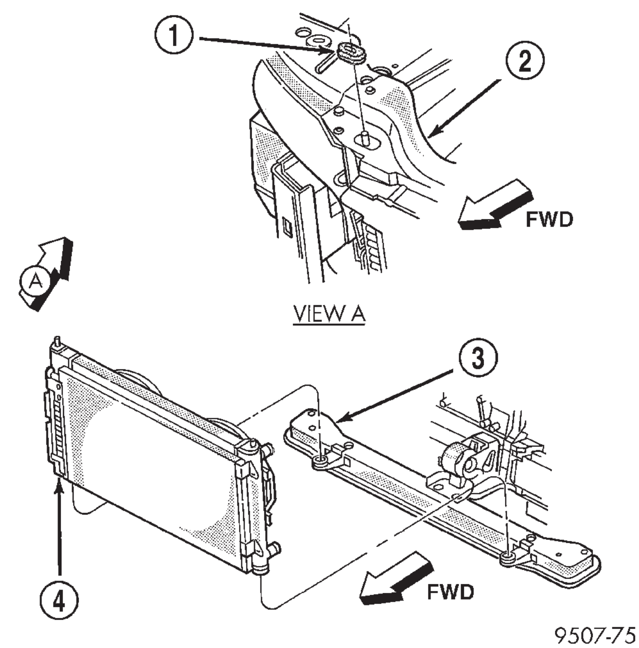

Fig. 28 Cooling Module Mounting

1 - ISOLATOR
2 - UPPER RADIATOR CROSSMEMBER
3 - LOWER RADIATOR CROSSMEMBER
4 - COOLING MODULE

(4) Disconnect the radiator fan electrical connector.

(5) Remove radiator fan.

(6) Disconnect hoses from radiator.

(7) Remove screw that holds support bracket for transmission cooler tubes at left side of radiator (if equipped).

CAUTION: Avoid bending the condenser inlet tube. Care should be taken not to damage radiator or condenser cooling fins.

(8) Remove the air conditioning condenser attaching screws located at the front of the radiator (Fig. 29). Disengage AC condenser from radiator. It is not necessary to discharge the air conditioning system to remove radiator.

(9) Radiator can now be lifted free from engine compartment. **Care should be taken not to damage radiator or condenser cooling fins during removal.**

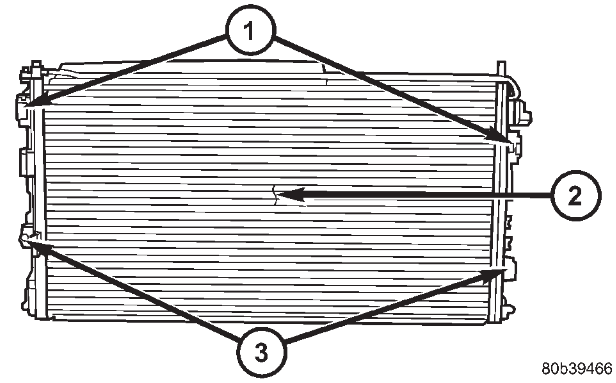

Fig. 29 A/C CONDENSER MOUNTING

1 - A/C CONDENSER LOCATING TABS
2 - COMBINATION A/C CONDENSER AND TRANSMISSION OIL COOLER
3 - A/C CONDENSER MOUNTING SCREWS

CLEANING

Clean radiator fins are necessary for good heat transfer. The radiator and air conditioning fins should be cleaned when an accumulation of debris has occurred. With the engine cold, apply cold water and compressed air to the back (engine side) of the radiator to flush the radiator and/or A/C condenser of debris.

INSPECTION

Inspect the radiator tanks for cracks, broken or missing fittings also inspect the joint where the tanks seam up to the radiator core for signs of leakage and/or deteriorating seals.

Inspect radiator core for corroded, bent or missing cooling fins. Inspect the core for bent or damaged cooling tubes.

INSTALLATION

(1) Slide radiator into position and seat the radiator assembly lower rubber isolators in the mount holes.

(2) Attach air conditioning condenser to radiator. Tighten mounting screws to 5 N·m (45 in. lbs.).

(3) Install transmission oil cooler tube support bracket and attaching screw to left side of radiator. Tighten mounting screw to 5 N·m (45 in. lbs.).

(4) Connect hoses to radiator.

(5) Install radiator fan.

(6) Connect radiator fan electrical connector.

(7) Install upper radiator crossmember.

(8) Connect negative cable to auxiliary jumper terminal.

(9) Fill cooling system(Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

RADIATOR DRAINCOCK

REMOVAL

CAUTION: Use of pliers on draincock is not recommended. Damage may occur to radiator or draincock.

NOTE: It is not necessary to remove draincock during a routine coolant drain.

(1) Drain the cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).
(2) Open the draincock by turning it counterclockwise until it stops.
(3) Turn the draincock back (clockwise) 1/8 turn.
(4) Pull the draincock (Fig. 30) from the radiator tank.

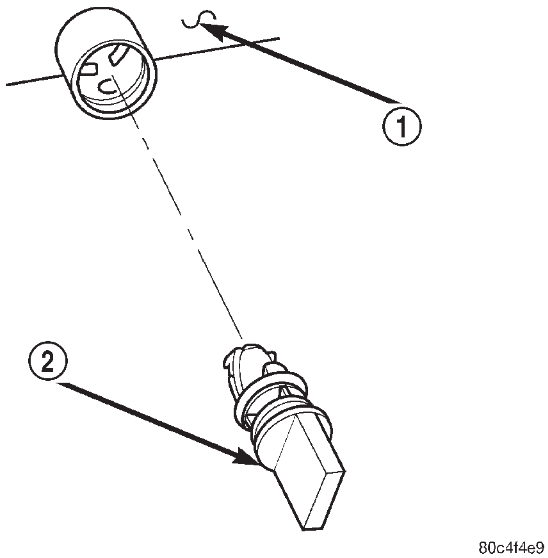

Fig. 30 Draincock

1 - RADIATOR TANK
2 - DRAINCOCK

INSTALLATION

(1) Align draincock stem to radiator tank opening.
(2) Push draincock into the radiator tank opening.
(3) Tighten the draincock by turning clockwise until it stops.
(4) Fill the cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

PRESSURE CAP

DESCRIPTION

CAUTION: Vehicles equipped with 2.0L/2.4L engines use a different pressure cap than vehicles equipped with 2.7L engines. The pressure caps are NOT interchangeable. Verify proper pressure cap part number.

The cooling system is equipped with a pressure cap that releases built up pressure, maintaining a range of 97-124 kPa (14-18 psi).

There is also a vent valve in the center of the cap. This valve also opens when coolant is cooling and contracting, allowing coolant to return to radiator from coolant reserve/recovery system container by vacuum through connecting hose. **If valve is stuck shut, the radiator hoses will be collapsed on cool down. Clean the vent valve (Fig. 31) to ensure proper sealing when boiling point is reached.**

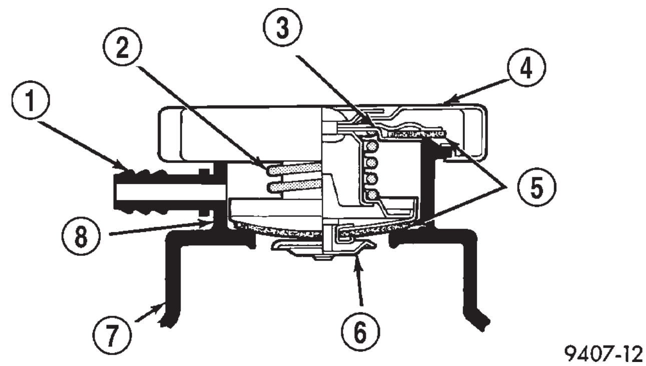

Fig. 31 Cooling System Pressure Cap

1 - OVERFLOW NIPPLE
2 - MAIN SPRING
3 - GASKET RETAINER
4 - STAINLESS-STEEL SWIVEL TOP
5 - RUBBER SEALS
6 - VENT VALVE
7 - COOLANT OUTLET CONNECTOR (2.0L/2.4L)/PRESSURE CONTAINER (2.7L)
8 - FILLER NECK

OPERATION

CAUTION: Vehicles equipped with 2.0L/2.4L engines use a different pressure cap than vehicles equipped with 2.7L engines. The pressure caps are NOT interchangeable. Verify proper pressure cap part number.

PRESSURE CAP (Continued)

The pressure cap allows the cooling system to operate at higher than atmospheric pressure. The higher pressure raises the coolant boiling point; this allows increased radiator cooling capacity.

The gasket in the cap seals the filler neck, so that vacuum can be maintained, allowing coolant to be drawn back into the cooling system from the reserve container.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - PRESSURE CAP TESTING

CAUTION: Vehicles equipped with 2.0L/2.4L engines use a different pressure cap than vehicles equipped with 2.7L engines. The pressure caps are NOT interchangeable. Verify proper pressure cap part number.

Dip the pressure cap in water. Clean any deposits off the vent valve or its seat and apply cap to end of the Pressure Cap Test Adaptor that is included with the Cooling System Tester 7700. Working the plunger, bring the pressure to 104 kPa (15 psi) on the gauge. If the pressure cap fails to hold pressure of at least 97 kPa (14 psi), replace the pressure cap.

CAUTION: The Cooling System Tester Tool is very sensitive to small air leaks that will not cause cooling system problems. A pressure cap that does not have a history of coolant loss should not be replaced just because it leaks slowly when tested with this tool. Add water to the tool. Turn tool upside down and recheck pressure cap to confirm that cap is bad.

If the pressure cap tests properly while positioned on Cooling System Tester (Fig. 32), but will not hold pressure or vacuum when positioned on the filler neck. Inspect the filler neck and cap top gasket for irregularities that may prevent the cap from sealing properly.

DIAGNOSIS AND TESTING - COOLING SYSTEM PRESSURE RELIEF TESTING

WARNING: THE WARNING WORDS "DO NOT OPEN HOT" ON THE PRESSURE CAP IS A SAFETY PRECAUTION. WHEN HOT, THE COOLING SYSTEM BUILDS UP PRESSURE. TO PREVENT SCALDING OR OTHER INJURY, THE PRESSURE CAP SHOULD NOT BE REMOVED WHILE THE SYSTEM IS HOT AND/OR UNDER PRESSURE.

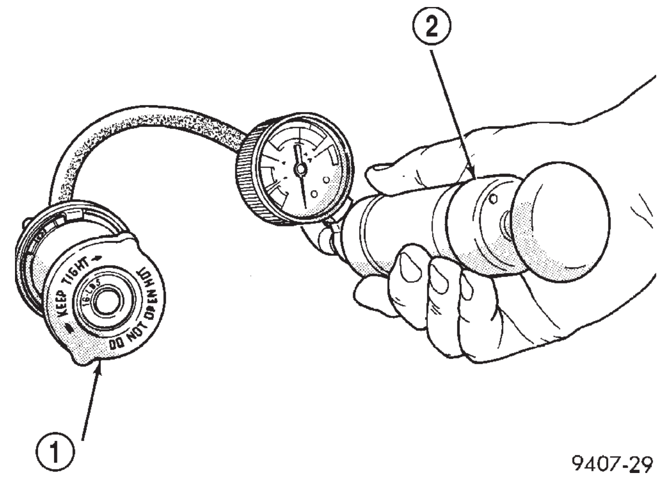

Fig. 32 Testing Cooling System Pressure Cap

1 - PRESSURE CAP
2 - PRESSURE TESTER

CAUTION: Vehicles equipped with 2.0L/2.4L engines use a different pressure cap than vehicles equipped with 2.7L engines. The pressure caps are NOT interchangeable. Verify proper pressure cap part number.

The pressure cap upper gasket to filler neck seal can be checked by removing the overflow hose at the filler neck overflow nipple (Fig. 33). Attach the radiator pressure tester to the **filler neck overflow nipple,** and pump air into the system. The pressure cap upper gasket should relieve pressure at 69-124 kPa (10-18 psi), and hold pressure at 55 kPa (8 psi) minimum.

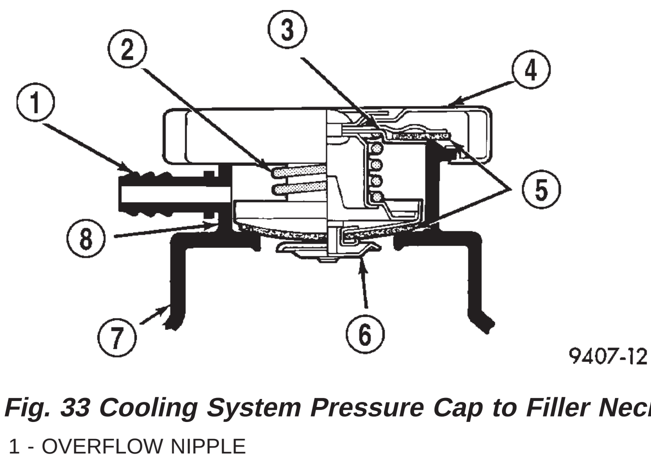

Fig. 33 Cooling System Pressure Cap to Filler Neck

1 - OVERFLOW NIPPLE
2 - MAIN SPRING
3 - GASKET RETAINER
4 - STAINLESS-STEEL SWIVEL TOP
5 - RUBBER SEALS
6 - VENT VALVE
7 - COOLANT OUTLET CONNECTOR (2.0L/2.4L)/PRESSURE CONTAINER (2.7L)
8 - FILLER NECK

PRESSURE CAP (Continued)

There is no need to remove the pressure cap at any time **except** for the following purposes:

- Check and adjust coolant freeze point
- Refill system with new coolant
- Conducting service procedures
- Checking for leaks

WARNING: IF VEHICLE HAS BEEN RUN RECENTLY, WAIT 15 MINUTES BEFORE REMOVING CAP. PLACE A SHOP TOWEL OVER THE CAP, AND WITHOUT PUSHING DOWN, ROTATE IT COUNTERCLOCKWISE TO THE FIRST STOP. ALLOW FLUIDS TO ESCAPE THROUGH THE OVERFLOW TUBE. WHEN THE SYSTEM STOPS PUSHING COOLANT AND STEAM INTO THE CRS TANK AND PRESSURE DROPS, PUSH DOWN ON THE CAP AND REMOVE IT COMPLETELY. SQUEEZING THE RADIATOR INLET HOSE WITH A SHOP TOWEL (TO CHECK PRESSURE) BEFORE AND AFTER TURNING TO THE FIRST STOP IS RECOMMENDED.

CLEANING

Use only a mild soap to clean the pressure cap.

INSPECTION

CAUTION: Vehicles equipped with 2.0L/2.4L engines use a different pressure cap than vehicles equipped with 2.7L engines. The pressure caps are NOT interchangeable. Verify proper pressure cap part number.

2.0L/2.4L

Hold the cap in your hand, **right side up** (Fig. 34). The vent valve at the bottom of the cap should fall open. Turn the cap upside down. The vent valve should close.

Replace the cap for any of the following conditions:

- Rubber gasket has swollen, preventing the valve from opening
- Any light can be seen between the vent valve and the rubber gasket (with cap upside down)
- Gasket on the bottom of the cap shows noticeable thinning
- Cap has been through more than one engine overheat.

2.7L

Hold the cap in your hand, **right side up** (Fig. 34). The vent valve at the bottom of the cap should be normally closed. The vent valve should open with a slight pull with your finger nail.

Replace the cap for any of the following conditions:

- Rubber gasket has swollen, preventing the valve from opening
- Any light can be seen between the vent valve and the rubber gasket. **Use only a replacement cap that has a spring to hold the vent shut.**
- Gasket on the bottom of the cap shows noticeable thinning
- Cap has been through more than one engine overheat.

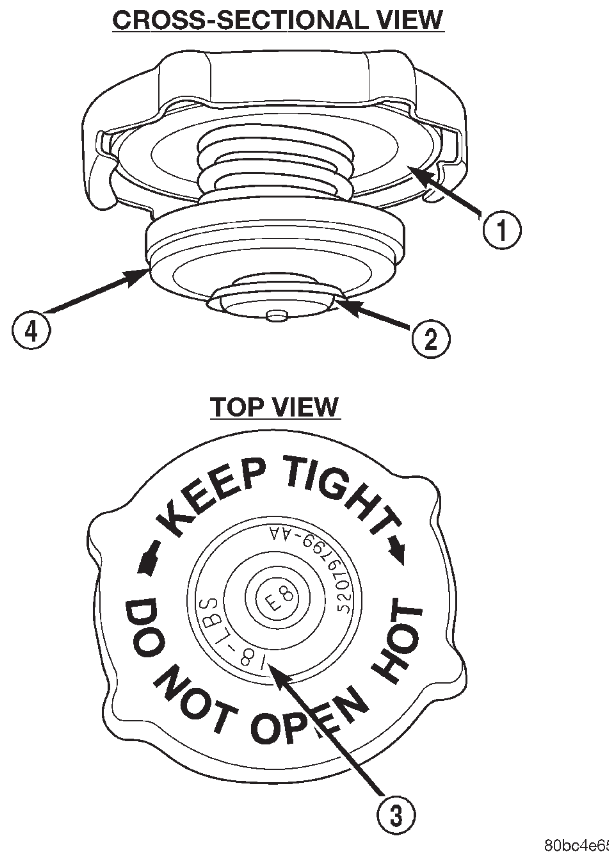

Fig. 34 Cooling System Pressure Cap - Typical

1 - FILLER NECK SEAL
2 - VACUUM VENT VALVE
3 - PRESSURE RATING
4 - PRESSURE VALVE

RADIATOR FAN(S)

DESCRIPTION

The radiator fan module includes a support shroud with two electrically driven motors with fan blades (Fig. 35). The radiator fan module is fastened to the radiator. The motors, shroud, and fan blades are serviced separately.

RADIATOR FAN(S) (Continued)

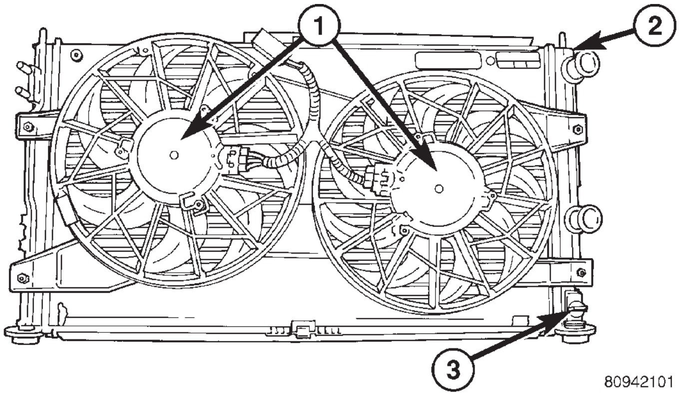

Fig. 35 Fan Module

1 - RADIATOR FAN MOTOR
2 - RADIATOR
3 - RADIATOR DRAINCOCK

OPERATION

The radiator fans are controlled by the Powertrain Control Module (PCM) which energizes a high speed or low speed fan relay. The electric motor drives the cooling fan to produce air flow across the radiator fins.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - RADIATOR FAN CONTROL

Fan control is accomplished three ways. The fan runs when the air conditioning pressure reaches a set psi see charts below. In addition to this control, the fan is turned on by the temperature of the coolant which is sensed by the coolant temperature sensor which sends the message to the Powertrain Control Module (PCM). The PCM turns on the fan through a fan relay. On models equipped with automatic transmission, a transmission fluid thermister may have some influences on fan operation. See Wiring Diagrams Manual for circuity and diagnostics provided.

The Powertrain Control Module (PCM) provides fan control for the following conditions:

- The fan will not run during cranking until the engine starts no matter what the coolant temperature is.
- Fan will run when the air conditioning clutch is engaged, low pressure cutout switch is closed and once set compressor head pressure is reached. See charts.
- Fan will run according to the following information charts.

RADIATOR FAN OPERATION—2.0L ENGINE

Radiator Fan Control			**A/C Pressure**	
A/C Off	**Low**	**High**		
Fan On:	104°C (220°F)	110°C (230°F)		
Fan Off:	99°C (210°F)	104°C (220°F)		
A/C On	Low	High	Low	High
Fan On:	99°C (210°F)	110°C (230°F)	1,466 Kpa (209 psi)	1,717 Kpa (249 psi)
Fan Off:	93°C (200°F)	104°C (220°F)	1,172 Kpa (170 psi)	1,579 Kpa (229 psi)
EATX Fluid Temperature			**Low Speed**	**High Speed**
Fan On:			109°C (228°F)	111°C (232°F)
Fan Off:			104°C (220°F)	109°C (228°F)

RADIATOR FAN OPERATION—2.4L ENGINE

Radiator Fan Control			**A/C Pressure**	
A/C Off	**Low**	**High**		
Fan On:	104°C (219°F)	110°C (230°F)		
Fan Off:	99°C (210°F)	105°C (221°F)		
A/C On	**Low**	**High**	**Low**	**High**
Fan On:	99°C (210°F)	110°C (230°F)	1,448 Kpa (210 psi)	1,718 Kpa (249 psi)
Fan Off:	93°C (199°F)	105°C (221°F)	1,207 Kpa (175 Psi)	1,585 Kpa (229 Psi)
EATX Fluid Temperature			**Low Speed**	**High Speed**
Fan On:			109°C (228°F)	111°C (232°F)
Fan Off:			104°C (220°F)	109°C (228°F)

RADIATOR FAN(S) (Continued)

RADIATOR FAN OPERATION—2.7L ENGINE

Radiator Fan Control			A/C Pressure	
A/C Off	**Low**	**High**		
Fan On:	104°C (220°F)	110°C (230°F)		
Fan Off:	98°C (208°F)	105°C (221°F)		
A/C On	Low	High	Low	High
Fan On:	99°C (210°F)	110°C (230°F)	1,448 Kpa (210 psi)	1,718 Kpa (249 psi)
Fan Off:	93°C (199°F)	105°C (221°F)	1,207 Kpa (175 psi)	1,585 kpa (229 psi)
EATX Fluid Temperature			**Low Speed**	**High Speed**
Fan On:			109°C (228°F)	111°C (232°F)
Fan Off:			104°C (220°F)	109°C (228°F)

DIAGNOSIS AND TESTING - ELECTRIC FAN MOTOR TEST

Refer to the appropriate Diagnostic Information for testing the fan motor with the DRBIII®.

For wiring diagrams of the fan motor systems refer to Wiring Diagrams.

REMOVAL

(1) Remove upper radiator crossmember.

(2) Disconnect radiator fan electrical connector (Fig. 36).

(3) Remove fasteners and upper clip attaching fan assembly to radiator (Fig. 36).

(4) Remove radiator fan assembly by lifting upward.

INSPECTION

There are no repairs to be made to the fan. If the fan is warped, cracked, or otherwise damaged, it must be replaced with **only** the recommended replacement part for adequate strength, performance and safety.

INSTALLATION

(1) Install radiator fan to radiator. Install retaining clip and tighten fasteners to 5 N·m (45 in. lbs.) (Fig. 36).

(2) Connect radiator fan electrical connector.

(3) Install upper radiator crossmember.

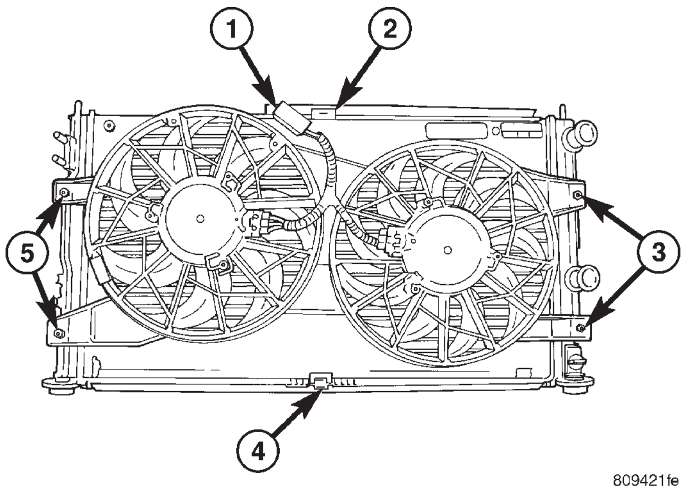

Fig. 36 RADIATOR FAN

1 - FAN MOTOR ELECTRICAL CONNECTOR
2 - CLIP - UPPER ATTACHING
3 - SCREWS - RIGHT SIDE
4 - CLIP - LOWER RETAINING (REMAINS ON RADIATOR)
5 - SCREWS - LEFT SIDE

THERMOSTAT HOUSING

REMOVAL

REMOVAL - 2.0L

(1) Disconnect negative battery cable.

(2) Partially drain cooling system below thermostat housing level.

(3) Remove accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(4) Disconnect and remove generator.

(5) Remove thermostat (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT THERMOSTAT - REMOVAL).

(6) Disconnect engine coolant temperature sensor connector.

(7) Disconnect heater supply hose.

(8) Remove housing attaching bolts (Fig. 37).

(9) Remove housing and gasket (Fig. 37).

REMOVAL - 2.4L

(1) Partially drain cooling system below thermostat housing level.

(2) Remove thermostat (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT THERMOSTAT - REMOVAL).

(3) Disconnect engine coolant temperature sensor connector.

(4) Disconnect heater supply hose.

(5) Remove housing attaching bolts (Fig. 38).

(6) Remove housing and gasket (Fig. 38).

THERMOSTAT HOUSING (Continued)

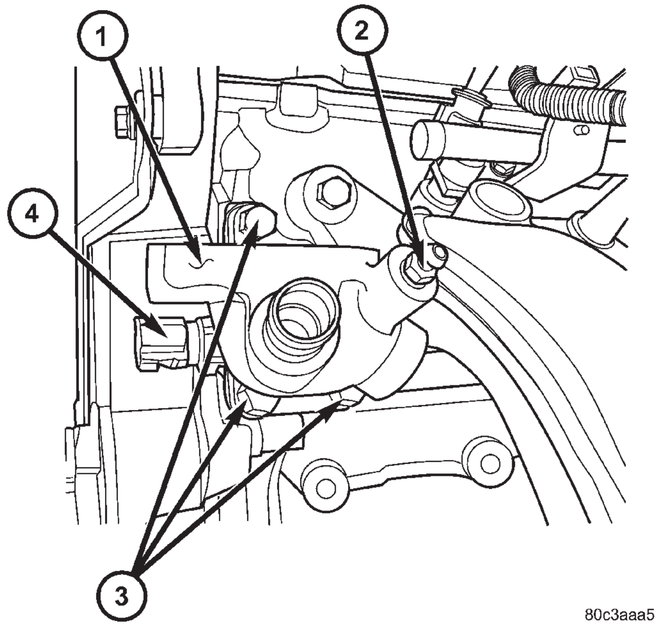

Fig. 37 Thermostat Housing

1 - THERMOSTAT HOUSING
2 - COOLING SYSTEM BLEED VALVE
3 - BOLTS
4 - ENGINE COOLANT TEMPERATURE SENSOR

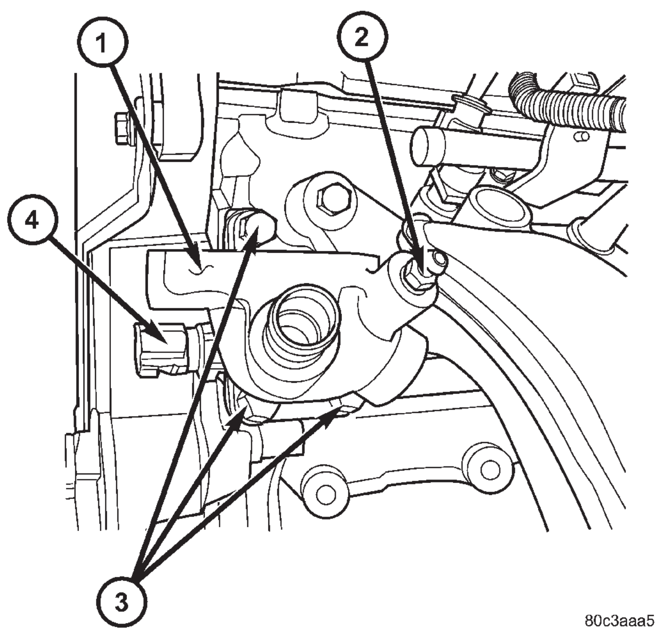

Fig. 38 Thermostat Housing

1 - THERMOSTAT HOUSING
2 - COOLING SYSTEM BLEED VALVE
3 - BOLTS
4 - ENGINE COOLANT TEMPERATURE SENSOR

INSTALLATION

INSTALLATION - 2.0L

(1) Clean all gasket sealing surfaces.

(2) Install gasket and housing (Fig. 37). Tighten bolts to 28 N·m (20 ft. lbs.).

(3) Reconnect heater supply hose.

(4) Reconnect engine coolant temperature sensor connector.

(5) Install thermostat (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT THERMOSTAT - INSTALLATION).

(6) Install generator. Reconnect generator connectors.

(7) Install accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(8) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(9) Connect negative battery cable.

INSTALLATION - 2.4L

(1) Clean all gasket sealing surfaces.

(2) Install gasket and housing (Fig. 38). Tighten bolts to 28 N·m (20 ft. lbs.).

(3) Reconnect heater supply hose.

(4) Reconnect engine coolant temperature sensor connector.

(5) Install thermostat (Refer to 7 - COOLING/ENGINE/ENGINE COOLANT THERMOSTAT - INSTALLATION).

(6) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

WATER PUMP

DESCRIPTION

DESCRIPTION - 2.0L/2.4L

The water pump has a diecast aluminum body and housing with a stamped steel impeller. The water pump bolts directly to the block (Fig. 39) and is driven by the timing belt. Cylinder block to water pump sealing is provided by a rubber O-ring.

DESCRIPTION - 2.7L

The 2.7L pump has a die cast aluminum housing and a plastic swept vane impeller. It bolts directly to the cylinder block, behind the timing chain cover (Fig. 40). The water pump is driven by the back side of the engine's primary timing chain.

WATER PUMP (Continued)

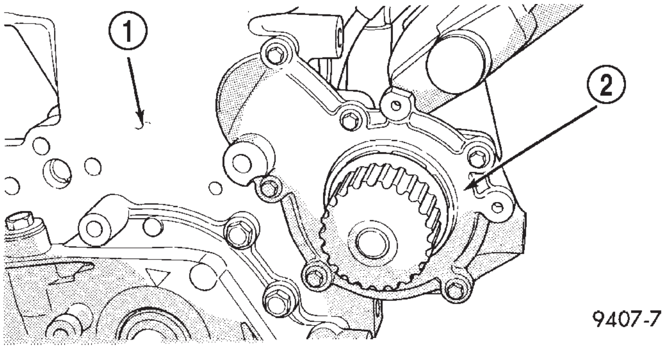

Fig. 39 Water Pump - 2.0L/2.4L

1 - CYLINDER BLOCK
2 - PUMP BODY

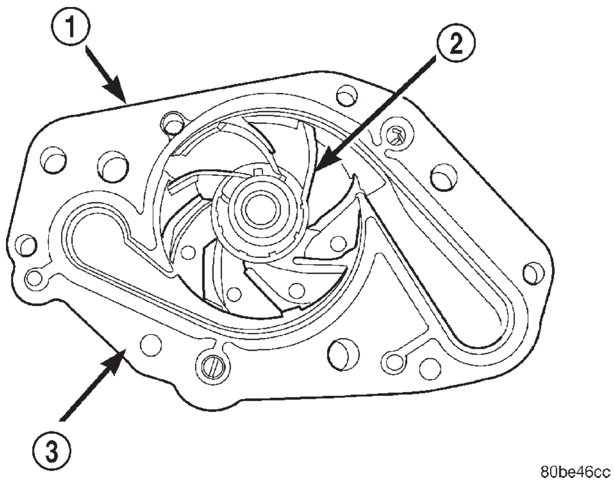

Fig. 40 Water Pump—2.7L Engine

1 - WATER PUMP BODY
2 - IMPELLER
3 - GASKET

OPERATION

The water pump is the heart of the cooling system. The coolant is pumped through the engine block, cylinder head, heater core, and radiator.

DIAGNOSIS AND TESTING - WATER PUMP

To determine whether coolant is flowing through the cooling system, use one of the following procedures:

PREFERRED METHOD

WARNING: DO NOT REMOVE THE COOLING SYSTEM PRESSURE CAP OR ANY HOSE WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

- **2.0L/2.4L:** Remove pressure cap when engine is cold. Remove small amount of coolant. Idle engine until thermostat opens. You should observe coolant flow while looking down the filler neck. Once flow is detected install the pressure cap. Replace removed coolant into coolant recovery container.
- **2.7L:** Start engine, coolant flow should be observable in coolant pressure container when revving the engine.

ALTERNATIVE METHOD

- If engine is cold, idle engine until normal operating temperature is reached. Feel the upper radiator hose. If it is hot, coolant is circulating.

REMOVAL

REMOVAL - 2.0L/2.4L

(1) Disconnect negative battery cable.

(2) Drain cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(3) Remove timing belt, camshaft sprockets, and rear timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(4) Remove water pump to engine attaching screws (Fig. 41).

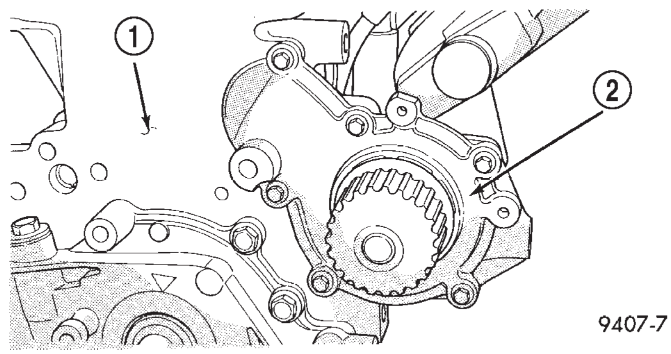

Fig. 41 Water Pump

1 - CYLINDER BLOCK
2 - PUMP BODY

REMOVAL - 2.7L

NOTE: It is normal for the water pump to weep a small amount of coolant from the weep hole (black stain at weep passage). Do not replace the water pump if this condition exists. Replace the water pump if a heavy deposit or a steady flow of engine coolant is evident on side of the cylinder block from the weep hole passage (shaft seal failure). Be sure to perform a thorough analysis before replacing water pump.

WATER PUMP (Continued)

WARNING: DO NOT REMOVE PRESSURE CAP WITH THE SYSTEM HOT AND PRESSURIZED. SERIOUS BURNS FROM COOLANT CAN RESULT.

(1) Disconnect negative battery cable.

(2) Drain cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

NOTE: The water pump is driven by the primary timing chain.

(3) Remove the timing chain cover, timing chain, and all chain guides (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(4) Remove bolts attaching water pump to block (Fig. 42).

(5) Remove water pump and gasket.

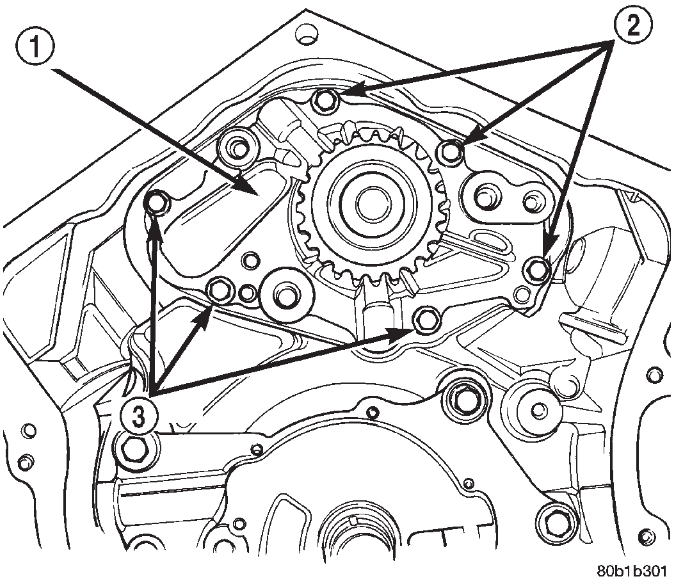

Fig. 42 WATER PUMP - 2.7L

1 - WATER PUMP
2 - BOLTS
3 - BOLTS

CLEANING

Clean gasket mating surfaces as necessary.

INSPECTION

INSPECTION - 2.0L/2.4L

Replace water pump body assembly if it has any of these defects:

(1) Cracks or damage on the body.

(2) Coolant leaks from the shaft seal, evident by wet coolant traces on the pump body.

(3) Loose or rough turning bearing.

(4) Impeller rubs either the pump body or the engine block.

(5) Impeller loose or damaged.

(6) Sprocket or sprocket flange loose or damaged.

INSPECTION - 2.7L

Inspect and replace the water pump if it has any of the following defects:

(1) Damage or cracks on the pump body.

(2) Coolant leaks; if the shaft seal is leaking, this will be evident by traces of thick deposits of dried glycol running down from the pump weep passage (Fig. 43), and components below. A thin black stain below pump weep hole/passage is considered normal operation.

(3) Impeller rubs inside of cylinder block.

(4) Excessively loose or rough turning bearing.

NOTE: It is normal for the water pump to weep a small amount of coolant from the weep hole. Do not replace the water pump if this condition exists. Replace the water pump if a heavy deposit or a steady flow of engine coolant is evident from the weep passage (Fig. 43). This indicates a shaft seal failure and pump must be replaced. Be sure to perform a thorough analysis before replacing water pump.

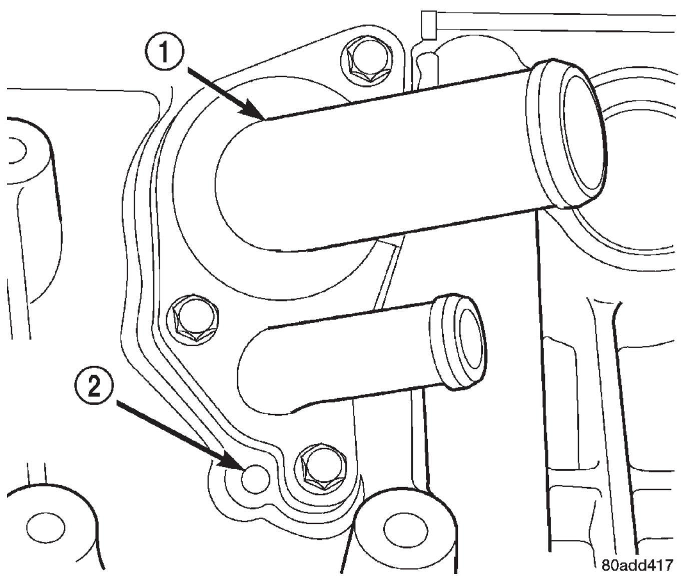

Fig. 43 Water Pump Weep Passage—2.7L Engine

1 - THERMOSTAT HOUSING/COOLANT INLET
2 - WATER PUMP WEEP PASSAGE

WATER PUMP (Continued)

INSTALLATION

INSTALLATION - 2.0L/2.4L

(1) Install new O-ring gasket in water pump body O-ring groove (Fig. 44).

CAUTION: Make sure O-ring is properly seated in water pump groove before tightening screws. An improperly located O-ring may cause damage to the O-ring and cause a coolant leak.

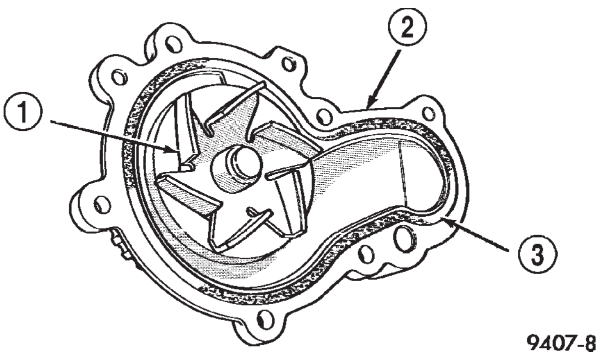

Fig. 44 Water Pump Body

1 - IMPELLER
2 - PUMP BODY
3 - O-RING

(2) Assemble pump body to block and tighten screws to 12 N·m (105 in. lbs.) (Fig. 41).

(3) Rotate pump by hand to check for freedom of movement.

(4) Install rear timing belt cover, camshaft sprockets, and timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(5) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

INSTALLATION - 2.7L

(1) Clean all sealing surfaces.

(2) Install water pump and gasket. Tighten mounting bolts to 12 N·m (105 in. lbs.).

(3) Install timing chain guides, timing chain, and timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(4) Reconnect negative battery cable.

(5) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

WATER PUMP INLET TUBE

REMOVAL

REMOVAL - 2.0L

(1) Drain cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(2) Raise vehicle on hoist.

(3) Remove Air Conditioning Compressor/Generator accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(4) Disconnect and remove generator.

(5) Remove generator bracket.

(6) Disconnect lower radiator hose and heater hose from the inlet tube (Fig. 45).

(7) Remove fasteners that hold the inlet tube to the block.

(8) Rotate inlet tube while removing from the engine block (Fig. 45).

REMOVAL - 2.4L

(1) Drain cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(2) Raise vehicle on hoist.

(3) Disconnect lower radiator hose and heater hose from the inlet tube (Fig. 45).

(4) Remove fasteners that hold the inlet tube to the block.

(5) Rotate inlet tube while removing from the engine block (Fig. 45).

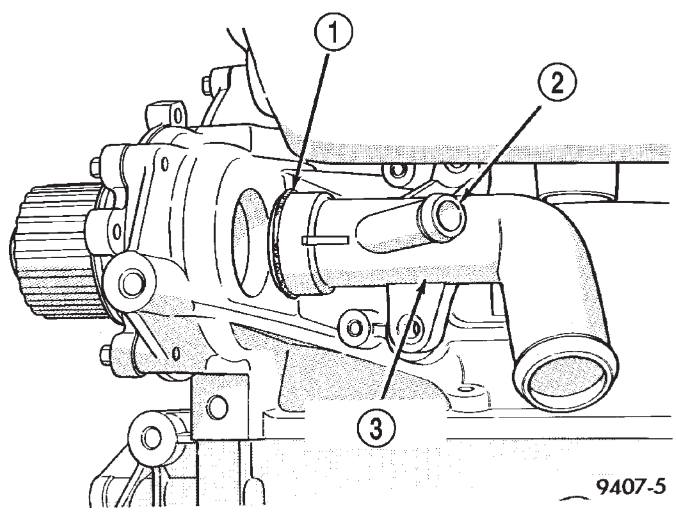

Fig. 45 Water Pump Inlet Tube - Typical

1 - O-RING
2 - TO HEATER
3 - WATER PUMP INLET TUBE

WATER PUMP INLET TUBE (Continued)

INSTALLATION

INSTALLATION - 2.0L

(1) Inspect the O-ring for damage before installing the tube into the cylinder block (Fig. 45).

(2) Lube O-ring with coolant and install tube into the cylinder block opening.

(3) Install fasteners and tighten to 12 N·m (105 in. lbs.).

(4) Reconnect lower radiator hose and heater hose to inlet tube (Fig. 45).

(5) Install generator bracket.

(6) Install generator, reconnect connectors.

(7) Install Air Conditioning Compressor/Generator accessory drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(8) Lower vehicle.

(9) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

INSTALLATION - 2.4L

(1) Inspect the O-ring for damage before installing the tube into the cylinder block (Fig. 45).

(2) Lube O-ring with coolant and install tube into the cylinder block opening.

(3) Install fasteners and tighten to 12 N·m (105 in. lbs.).

(4) Reconnect lower radiator hose and heater hose to inlet tube (Fig. 45).

(5) Lower vehicle.

(6) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

TRANSMISSION

TABLE OF CONTENTS

TRANSMISSION

STANDARD PROCEDURE - FLUSHING COOLERS AND TUBES

The recommended procedure for cooler flushing is to use Tool 6906 Cooler Flusher.

WARNING: WEAR PROTECTIVE EYEWEAR THAT MEETS THE REQUIREMENTS OF OSHA AND ANSI Z87.1–1968. WEAR STANDARD INDUSTRIAL RUBBER GLOVES. KEEP LIT CIGARETTES, SPARKS, FLAMES, AND OTHER IGNITION SOURCES AWAY FROM THE AREA TO PREVENT THE IGNITION OF COMBUSTIBLE LIQUIDS AND GASES. KEEP A CLASS (B) FIRE EXTINGUISHER IN THE AREA WHERE THE FLUSHER WILL BE USED.

WARNING: KEEP THE AREA WELL VENTILATED. DO NOT LET FLUSHING SOLVENT COME IN CONTACT WITH YOUR EYES OR SKIN: IF EYE CONTAMINATION OCCURS, FLUSH EYES WITH WATER FOR 15 TO 20 SECONDS. REMOVE CONTAMINATED CLOTHING AND WASH AFFECTED SKIN WITH SOAP AND WATER. SEEK MEDICAL ATTENTION.

(1) Remove cover plate filler plug on Tool 6906. Fill reservoir 1/2 to 3/4 full of fresh flushing solution. Use Mopar® Transmission Cooler Flush (MS-552) or equivalent solution conforming to MS-552. Flushing solvents are petroleum based solutions generally used to clean automatic transmission components. **DO NOT** use solvents containing acids, water, gasoline, or any other corrosive liquids.

(2) Reinstall filler plug on Tool 6906.

(3) Verify pump power switch is turned OFF. Connect red alligator clip to positive (+) battery post. Connect black (-) alligator clip to a good ground.

NOTE: When flushing transmission cooler and lines, ALWAYS reverse flush.

(4) Connect the BLUE pressure line to the OUTLET (From) cooler line.

(5) Connect the CLEAR return line to the INLET (To) cooler line

(6) Turn pump ON for two to three minutes to flush cooler and lines.

(7) Turn pump OFF.

(8) Disconnect CLEAR suction line from reservoir at cover plate. Disconnect CLEAR return line at cover plate, and place it in a drain pan.

(9) Turn pump ON for 30 seconds to purge flushing solution from cooler and lines. Turn pump OFF.

(10) Place CLEAR suction line into a one quart container of Mopar® ATF+4 (Automatic Transmission Fluid—Type 9602).

(11) Turn pump ON until all transmission fluid is removed from the one quart container and lines. This purges any residual cleaning solvent from the transmission cooler and lines. Turn pump OFF.

(12) Disconnect alligator clips from battery. Reconnect flusher lines to cover plate, and remove flushing adapters from cooler lines.

TRANSMISSION COOLER HOSES

DESCRIPTION

The transmission oil cooling circuit uses special aggressive fittings for the transmission oil cooler hoses. Whenever a transmission oil cooler hose is removed from a transmission fitting (at transmission), it must be cut off flush with the fitting, and a service splice kit must be used upon reassembly. Refer to instructions provided with splice kit. Whenever a transmission oil cooler hose is removed from a transmission oil cooler tube (at transmission oil cooler), it must be replaced with a new hose. Removing the hose from the aggressive fitting will scrape material from inside the hose making the hose larger. Failure to replace the hose or install a service splice kit will result in transmission oil leaks.

When hose clamp replacement is necessary, replace with the same type of hose clamp. Always use proper hose clamp pliers on clamps. Use of improper hose clamp pliers may bend hose clamps out-of-round resulting in transmission oil leaks.

TRANSMISSION OIL COOLER

DESCRIPTION

An external oil-to-air type automatic transmission oil cooler is mounted to the front of the radiator and is integral to the A/C condenser (Fig. 1). The six upper tubes are used for transaxle oil cooling, and the remaining tubes below are for the A/C system.

The cooler uses tubes and rubber hoses to feed oil to and from the automatic transaxle. The replaceable inlet and outlet tubes use an O-ring for sealing. The trans oil cooler is replaced with the A/C condenser.

OPERATION

The oil flows from the transmission to the oil-to-air cooler. Heat is then transferred into the air.

REMOVAL

(1) Remove AC condenser(Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C CONDENSER - REMOVAL).

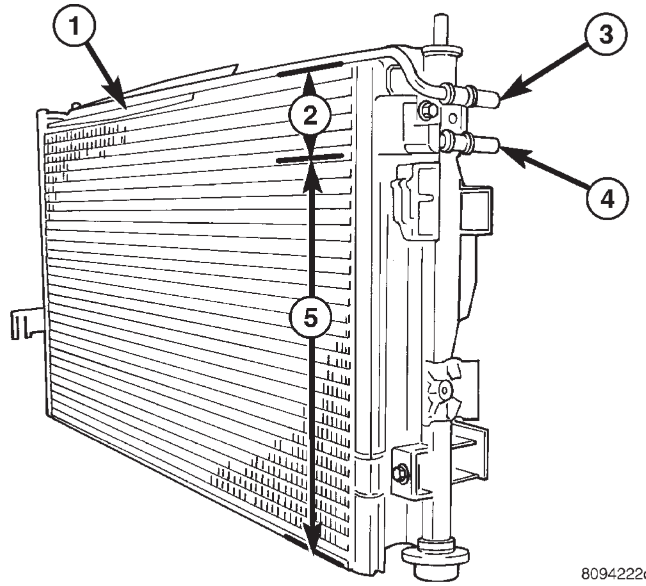

Fig. 1 Transmission Oil Cooler

1 - AIR CONDITIONING CONDENSER/TRANSMISSION OIL COOLER
2 - TRANSMISSION OIL COOLER PORTION
3 - TRANSMISSION COOLER OUTLET
4 - TRANSMISSION COOLER INLET
5 - AIR CONDITIONING CONDENSER PORTION

CLEANING

Check the AC condenser for debris on the cooling fin surfaces. Clean as necessary. For internal cleaning/flushing procedures, (Refer to 7 - COOLING/TRANSMISSION - STANDARD PROCEDURE).

INSPECTION

Inspect all hoses, tubes, clamps and connections for leaks, cracks, or damage. Replace as necessary. Use only approved transmission oil cooler hoses that are molded to fit the space available.

INSTALLATION

(1) Install AC condenser(Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C CONDENSER - INSTALLATION).

AUDIO

TABLE OF CONTENTS

AUDIO

DESCRIPTION

Several combinations of radio receivers and speaker systems are offered as optional equipment. The audio system uses an ignition switched source of battery current so that the system will only operate when the ignition switch is in the ON or Accessory positions.

The audio system includes the following components:
- Antenna
- CD Changer
- Power amplifier (with premium speaker system only)
- Radio noise suppression components
- Radio receiver
- Speakers

The vehicle has two speaker systems:

STANDARD SPEAKER SYSTEM

- Two instrument panel mounted speakers (JR 27)
- Two door speakers
- Two rear shelf panel speakers (JR 41)
- Two rear quarter trim panel speakers (JR 27)
- Separate top-up vs top-down equalization curves in the radio (JR 27)

PREMIUM GOLD AMPLIFIED SPEAKER SYSTEM

- Amplifier mounted under the front passenger seat
- 150 watt Amplifier with separate top-up vs. top-down equalization curves (JR27)
- Two instrument panel speakers
- Two door speakers
- Two rear shelf panel speakers (JR 41)
- Two rear quarter trim panel speakers (JR 27)

OPERATION

See the owner's manual in the vehicle glove box for more information on the features, use and operation of each of the available audio systems.

DIAGNOSIS AND TESTING - AUDIO

Any diagnosis of the Audio system should begin with the use of the DRB III® diagnostic tool. For information on the use of the DRB III®, refer to the appropriate Diagnostic Service Manual.

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

AUDIO (Continued)

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

AUDIO SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
NO AUDIO	1. Fuse faulty.	1. Check radio fuse and Ignition-Off Draw (IOD) fuse in Junction Block (JB). Replace fuses, if required.
	2. Radio connector faulty.	2. Check for loose or corroded radio connector. Repair, if required.
	3. Wiring faulty.	3. Check for shorted or open wires. Repair wiring, if required.
	4. Radio ground faulty.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	5. Radio faulty.	5. Refer to appropriate Diagnostic Service Manual.
	6. Speakers faulty.	6. Replace speaker as necessary.
NO RADIO DISPLAY	1. Fuse faulty.	1. Check radio fuse and Ignition-Off Draw (IOD) fuse in Junction Block (JB). Replace fuses, if required.
	2. Radio connector faulty.	2. Check for loose or corroded radio connector. Repair, if required.
	3. Wiring faulty.	3. Check for battery voltage at radio connector. Repair wiring, if required.
	4. Radio ground faulty.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	5. Radio faulty.	5. Refer to appropriate Diagnostic Service Manual..
CLOCK WILL NOT KEEP SET TIME	1. Fuse faulty.	1. Check Ignition-Off Draw (IOD) fuse in the Junction Block (JB). Replace fuse, if required.
	2. Radio connector faulty.	2. Check for loose or corroded radio connector. Repair, if required.
	3. Wiring faulty.	3. Check for battery voltage at radio connector. Repair wiring, if required.
	4. Radio ground faulty.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	5. Radio faulty.	5. Refer to appropriate Diagnostic Service Manual.

AUDIO (Continued)

AUDIO SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
POOR RADIO RECEPTION	1. Antenna faulty.	1. (Refer to 8 - ELECTRICAL/AUDIO/ ANTENNA BODY & CABLE - DIAGNOSIS AND TESTING).
	2. Radio ground faulty.	2. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	3. Radio noise suppression faulty.	3. Repair or replace ground strap as necessary.
	4. Radio faulty.	4. Refer to appropriate Diagnostic Service Manual.
NO/POOR TAPE OPERATION	1. Faulty tape.	1. Insert known good tape and test operation.
	2. Foreign objects behind tape door.	2. Remove foreign objects and test operation.
	3. Dirty cassette tape head.	3. Clean head with Mopar Cassette Head Cleaner.
	4. Faulty tape deck.	4. Exchange or replace radio, if required.
NO COMPACT DISC OPERATION	1. Faulty CD.	1. Insert known good CD and test operation.
	2. Foreign material on CD.	2. Clean CD and test operation.
	3. Condensation on CD or optics.	3. Allow temperature of vehicle interior to stabilize and test operation.
	4. Faulty CD player.	4. Refer to appropriate Diagnostic Service Manual.

ANTENNA BODY & CABLE

DIAGNOSIS AND TESTING - ANTENNA BODY AND CABLE

The following four tests are used to diagnose the antenna with an ohmmeter:

- **Test 1** - Mast to ground test
- **Test 2** - Tip-of-mast to tip-of-conductor test
- **Test 3** - Body ground to battery ground test
- **Test 4** - Body ground to antenna coaxial cable shield test.

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

The ohmmeter test lead connections for each test are shown in the illustration (Fig. 1).

NOTE: This model has a two-piece antenna coaxial cable. Tests 2 and 4 must be conducted in two steps to isolate an antenna cable problem. First, test the primary antenna cable (integral to the body wiring) from the coaxial cable connector just in front of the front seat crossmember of the passenger seat to the antenna body. Then, test the secondary antenna cable (instrument panel antenna cable) from the coaxial cable connector just in front of the front seat crossmember of the passenger seat to the coaxial cable connector at the radio.

TEST 1

Test 1 determines if the antenna mast is insulated from ground. Proceed as follows:

(1) Disconnect and isolate the antenna coaxial cable connector just in front of the front seat crossmember of the passenger seat.

(2) Touch one ohmmeter test lead to the tip of the antenna mast. Touch the other test lead to ground. Check the ohmmeter reading for continuity.

ANTENNA BODY & CABLE (Continued)

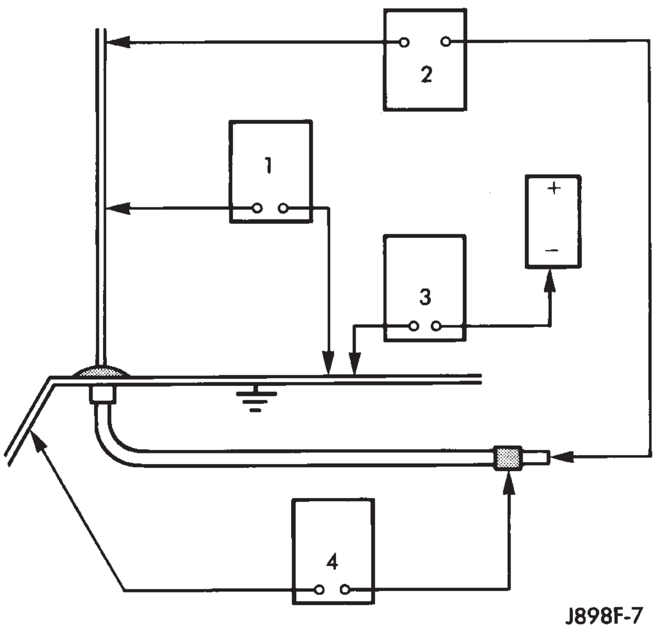

Fig. 1 Antenna Tests - Typical

(3) There should be no continuity. If OK, go to Test 2. If not OK, replace the faulty antenna body and cable.

TEST 2

Test 2 checks the antenna conductor components for an open circuit. This test should be performed first on the entire antenna circuit, from the antenna mast to the center conductor of the coaxial cable connector at the radio. If an open circuit is detected, each of the three antenna conductor components (antenna mast, antenna body and primary cable unit, instrument panel antenna secondary cable) should be isolated and tested individually to locate the exact component that is the source of the open circuit. To begin this test, proceed as follows:

(1) Disconnect the instrument panel (secondary) antenna cable coaxial connector from the back of the radio.

(2) Touch one ohmmeter test lead to the tip of the antenna mast. Touch the other test lead to the center conductor pin of the instrument panel antenna cable coaxial connector for the radio. Check the ohmmeter reading for continuity.

(3) There should be continuity. The ohmmeter should register only a fraction of an ohm resistance. High or infinite resistance indicates a damaged or open antenna conductor. If OK, go to Test 3. If not OK, isolate and test each of the individual antenna conductor components. Replace only the faulty antenna conductor component.

TEST 3

Test 3 checks the condition of the vehicle body ground connection. To begin this test, proceed as follows:

(1) This test must be performed with the battery positive cable disconnected from the battery. Disconnect and isolate both battery cables, negative cable first.

(2) Reconnect the battery negative cable.

(3) Touch one ohmmeter test lead to a good clean ground point on the vehicle fender. Touch the other test lead to the battery negative terminal post. Check the ohmmeter reading for continuity.

(4) There should be continuity. The ohmmeter should register less than one ohm resistance. High or infinite resistance indicates a loose, corroded, or damaged connection between the battery negative terminal and the vehicle body. If OK, go to Test 4. If not OK, check the battery negative cable connection to the vehicle body and the radio noise suppression ground strap connections to the engine and the vehicle body for being loose or corroded. Clean or tighten these connections as required.

TEST 4

Test 4 checks the condition of the connection between the antenna coaxial cable shield and the vehicle body ground as follows:

(1) Disconnect and isolate the antenna coaxial cable connector just in front of the front seat crossmember of the passenger seat.

(2) Touch one ohmmeter test lead to a good clean ground point on the vehicle fender. Touch the other test lead to the outer crimp on the antenna coaxial cable connector just in front of the front seat crossmember of the passenger seat. Check the ohmmeter reading for continuity.

(3) There should be continuity. The ohmmeter should register less than one ohm resistance. High or infinite resistance indicates a loose, corroded, or damaged connection between the antenna body and the vehicle body or between the antenna body and the antenna coaxial cable shield. If not OK, clean the antenna body to fender mating surfaces and tighten the antenna cap nut to specifications.

(4) Check the resistance again with an ohmmeter. If the resistance is still more then one ohm, replace the faulty antenna body and cable.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Pull the right side trunk liner aside.

(3) Remove antenna mast by unscrewing mast from antenna body.

(4) Remove screw from mounting bracket.

ANTENNA BODY & CABLE (Continued)

(5) Pull antenna body down through the rubber grommet.

(6) Unplug antenna lead from base of antenna body.

INSTALLATION

(1) Insert antenna lead to base of antenna body.

(2) Push antenna body up through the rubber grommet.

(3) Install screw into mounting bracket. Tighten screw to 12 N·m (106 in. lbs.)

(4) Install antenna mast.

(5) Install trunk liner.

(6) Connect battery negative cable.

AMPLIFIER

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the retaining fasteners. Adjust or remove the seat as necessary to gain access.

(3) Disconnect the wire harness connector.

(4) Remove the amplifier.

INSTALLATION

(1) Connect wire harness connector to amplifier.

(2) Install amplifier. Tighten the forward screw to 3 N·m (26.5 in. lbs.) and the rear nut to 2 N·m (18 in. lbs.).

(3) Connect battery negative cable.

CD CHANGER

DESCRIPTION

The 4 Disc In-Dash CD Changer (if equipped) is located in the instrument panel below the radio. The remote changer does not use a cartridge or magazine for the CD's. Up to 4 CD's can be directly loaded into this unit, one at a time.

OPERATION

Due to its compact design, the CD changer can carry out only one operation at a time. For example, you can not load a new disc while playing another at the same time. Each operation happens sequentially.

The radio unit provides control over all features of the CD changer with the exception of the CD load and eject functions, which are controlled by buttons located on the front of the CD changer. All features you would expect, such as Disc Up/Down, Track Up/Down, Random and Scan are controlled by the radio, which also displays all relevant CD changer information on the radio display.

On JR27 models, the CD changer will not operate with the ignition in the OFF position. With the ignition OFF, CD's can not be removed from the changer.

The CD changer contains a Load/Eject button and an indicator LED for each of the four disc positions as well as an illuminated disc opening. The individual LED indicates whether a CD is currently loaded or ready to load in that particular chamber of the CD changer. Pressing the individual Load/Eject button for a particular chamber will eject a disc currently present in that chamber. If the chamber is currently empty, actuating the Load/Eject button will position that chamber to receive and load a new disc in that chamber.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove lower center trim bezel.

(3) Remove screws from radio.

(4) Remove screws from CD changer (Fig. 2).

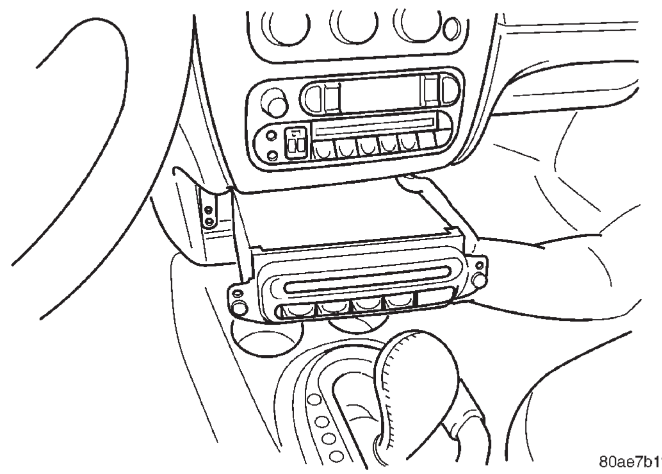

Fig. 2 CD CHANGER

(5) Remove CD changer from Instrument panel.

(6) Disconnect wire connector from CD changer.

INSTALLATION

(1) Connect wire harness connector to CD changer.

(2) Insert CD changer into instrument panel. Make sure that bumper on back of changer is inserted into instrument panel opening.

(3) Pull radio from instrument panel far enough to reach behind. Pull CD changer cable through radio opening while inserting changer into instrument panel.

(4) Install radio.

(5) Install screws to radio and CD changer.

(6) Install lower center trim bezel.

(7) Connect battery negative cable.

POWER ANTENNA - BUX

DIAGNOSIS AND TESTING - POWER ANTENNA - BUX

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

(1) Using an ohmmeter, check for continuity between the antenna body and ground. There should be no measurable resistance. If OK, go to Step 2. If not, repair or clean ground as necessary.

(2) Disconnect the wire harness connector at the antenna. Check for battery voltage at pin A1. If OK, go to Step 3. If not, check circuit fuse or check for a shorted or open wire.

(3) With the ignition in the ON or ACC position, turn radio ON and check for battery voltage at pin A2. If OK, replace power antenna (Refer to 8 - ELECTRICAL/AUDIO/ANTENNA MODULE - REMOVAL). If not, check for a shorted or open wire.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

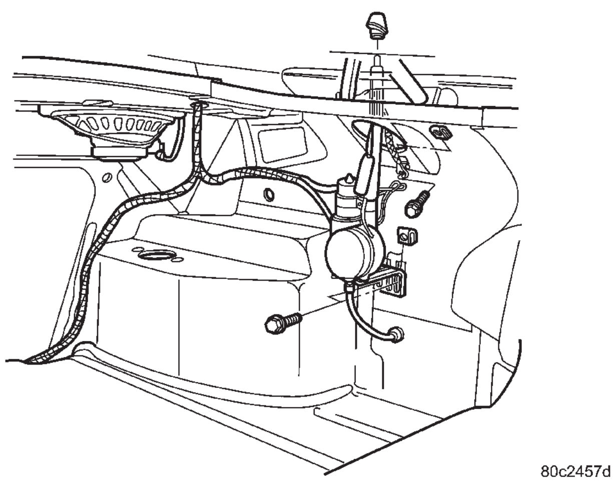

Fig. 3 POWER ANTENNA - TYPICAL

(2) Disconnect drain tube.
(3) Disconnect electrical connector.
(4) Disconnect antenna cable.
(5) Remove ground strap fastener (if equipped).
(6) Remove mounting bolts from antenna (Fig. 3).
(7) Pull antenna through grommet in quarter panel.

INSTALLATION

(1) Push antenna up through grommet in quarter panel.
(2) Install mounting bolts to antenna. Tighten to 12 N·m (110 in. lbs.).
(3) Connect antenna cable.
(4) Connect electrical connector to antenna.
(5) Connect drain tube.
(6) Install ground strap (if equipped) and fastener. Tighten to 12 N·m (110 in. lbs.).
(7) Connect battery negative cable.

RADIO

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove instrument panel center bezel trim.
(3) Remove radio mounting screws.

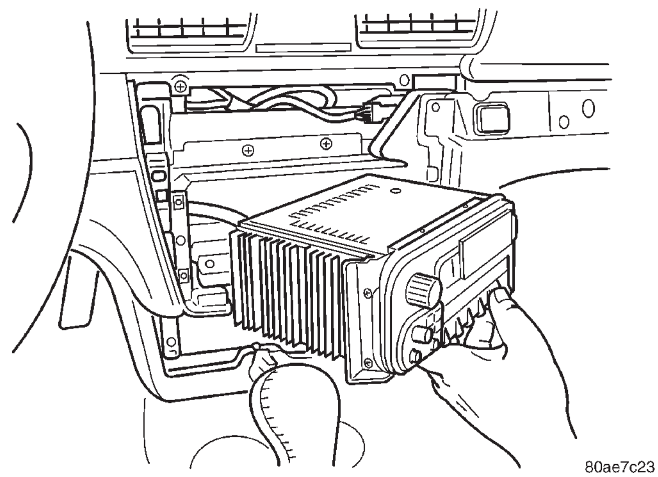

Fig. 4 RADIO

(4) Remove radio (Fig. 4).
(5) Disconnect wire harness connectors.
(6) Disconnect the antenna cable by pulling the locking antenna connector away from the radio (Fig. 5).

INSTALLATION

(1) Connect wire harness connector to radio.
(2) Connect antenna to radio.
(3) Install radio and screws. Tighten to 3 N·m (30 in. lbs.).
(4) Install instrument panel center bezel trim.
(5) Connect battery negative cable.

SPEAKER

DESCRIPTION

STANDARD - JR41

The standard equipment speaker system includes speaker in four locations: One 15.2 cm X 22.9 cm (6

SPEAKER (Continued)

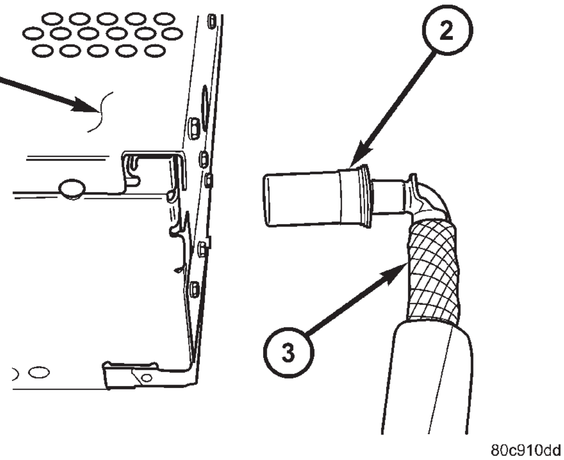

Fig. 5 ANTENNA TO RADIO

1 - RADIO
2 - LOCKING ANTENNA CONNECTOR
3 - INSTRUMENT PANEL ANTENNA CABLE

in. X 9 in.) speaker is installed in each front door and one 15.2 cm X 22.9 cm (6 in. X 9 in.) speaker is installed outboard at each end of the rear shelf panel.

STANDARD - JR27

The standard equipment speaker system includes speaker in six locations: One 15.2 cm X 22.9 cm (6 in. X 9 in.) speaker is installed in each front door, one 15.2 cm X 22.9 cm (6 in. X 9 in.) speaker is installed in each quarter trim panel and one 6.4 cm (2.5 in.) speaker installed in each end of the instrument panel.

PREMIUM

The optional premium speaker system includes speakers in six locations: One 15.2 cm X 22.9 cm (6 in. X 9 in.) speaker is installed in each front door, one 15.2 cm X 22.9 cm (6 in. X 9 in.) speaker is installed outboard at each end of the rear shelf panel and one 6.4 cm (2.5 in.) speaker installed in each end of the instrument panel. The system includes a separate 120–watt amplifier located under the front passenger seat.

OPERATION

Two wires connected to each speaker, one feed circuit (+) and one return circuit (–), allow the audio output signal electrical current to flow through the voice coil. For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

REMOVAL

FRONT DOOR - JR41

(1) Disconnect and isolate the battery negative cable.

(2) Remove door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(3) Remove speaker screws.

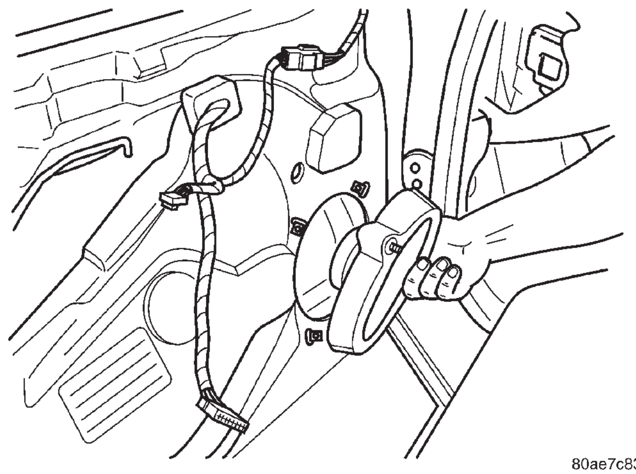

Fig. 6 DOOR SPEAKER - JR41

(4) Disconnect wire harness connector from speaker.

(5) Remove speaker from door (Fig. 6).

FRONT DOOR - JR27

(1) Disconnect and isolate the battery negative cable.

(2) Using a trim stick, pry speaker grill from door trim panel (Fig. 7).

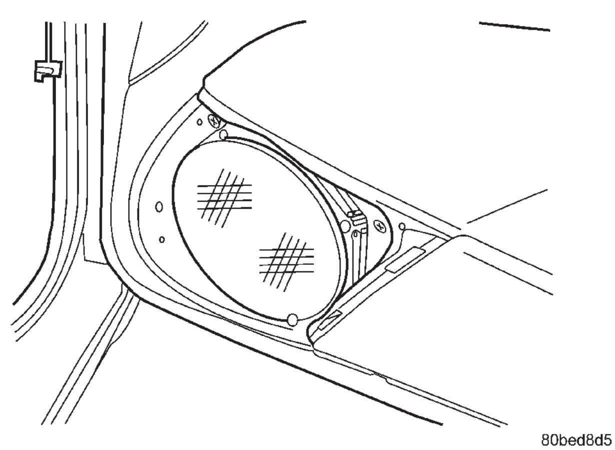

Fig. 7 DOOR SPEAKER - JR27

(3) Remove the speaker mounting fasteners.

SPEAKER (Continued)

(4) Remove speaker from door trim panel.

(5) Disconnect wire harness connector from speaker.

INSTRUMENT PANEL

(1) Disconnect and isolate battery negative cable.

(2) Remove A-pillar trim.

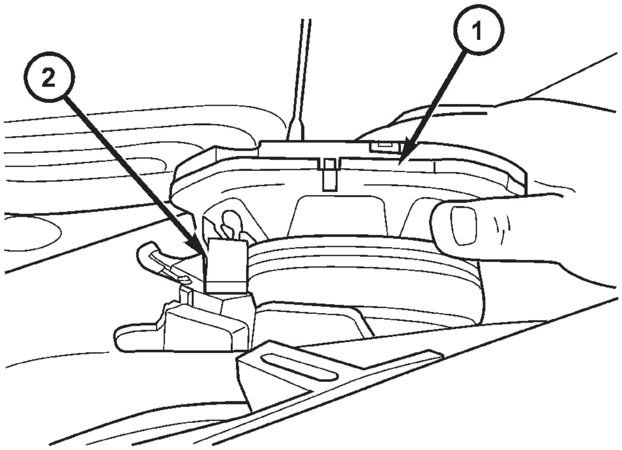

Fig. 8 DASH SPEAKER

1 - INSTRUMENT PANEL SPEAKER
2 - ELECTRICAL HARNESS CONNECTOR

(3) Remove instrument panel top pad (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP PAD - REMOVAL).

(4) Remove speaker screws.

(5) Disconnect wire harness connector from speaker.

(6) Remove speaker (Fig. 8).

REAR SPEAKER - JR41

(1) Disconnect and isolate the battery negative cable.

(2) Fold down the rear seat backs.

(3) Remove C-pillar trim.

(4) Remove lower quarter trim behind rear seat backs.

(5) Remove fasteners from rear shelf trim. Pull out trim to access speaker.

(6) Remove speaker screws.

(7) Disconnect wire harness connector.

(8) Remove speaker (Fig. 9).

REAR SPEAKER - JR27

(1) Disconnect and isolate the battery negative cable.

(2) Using a trim stick, pry the speaker grill from the trim panel.

(3) Remove speaker mounting screws (Fig. 10).

(4) Remove speaker from trim panel.

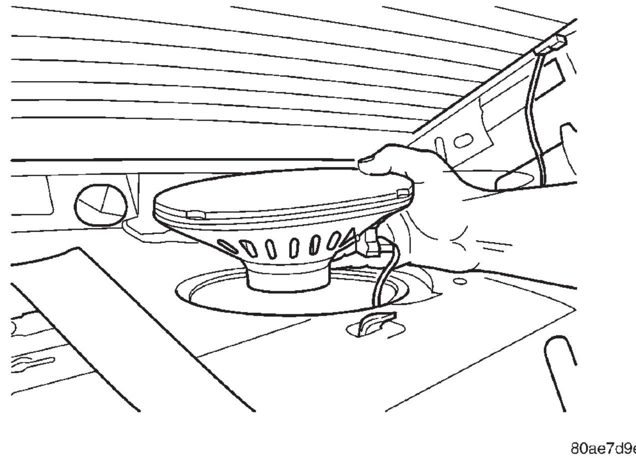

Fig. 9 REAR SPEAKER - JR41

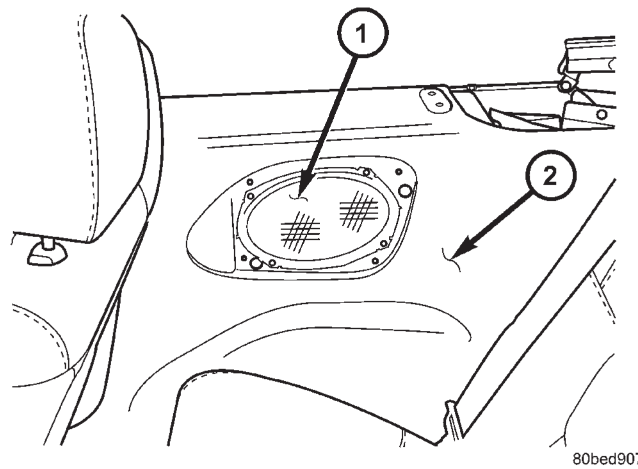

Fig. 10 REAR SPEAKER - JR27

1 - REAR SPEAKER
2 - TRIM PANEL

(5) Disconnect wire harness connector from speaker.

INSTALLATION

FRONT DOOR SPEAKER – JR41

(1) Reconnect wire harness to speaker.

(2) Align and install speaker to door.

(3) Install speaker screws. Tighten to 3 N·m (30 in. lbs.).

(4) Install door trim panel.

(5) Reconnect battery negative cable.

FRONT DOOR SPEAKER – JR27

(1) Connect the wire harness connector to speaker.

(2) Install the speaker to the door trim panel.

(3) Install the speaker mounting fasteners. Tighten to 4 N·m (35 in. lbs.).

SPEAKER (Continued)

(4) Press speaker grill onto the door panel.
(5) Connect the battery negative cable.

INSTRUMENT PANEL SPEAKER

(1) Connect wire harness connector to speaker.
(2) Install speaker screws. Tighten to 3 N·m (30 in. lbs.).
(3) Install instrument panel top cover.
(4) Install A-pillar trim.
(5) Connect battery negative cable.

REAR SPEAKER - JR41

(1) Connect wire harness connector to speaker.
(2) Position speaker into opening.
(3) Install speaker screws. Tighten to 4 N·m (35 in. lbs.).
(4) Install rear shelf trim.
(5) Install lower quarter trim panel.
(6) Install C-pillar trim.
(7) Raise seat backs.
(8) Connect battery negative cable.

REAR SPEAKER - JR27

(1) Connect wire harness connector to speaker.
(2) Position speaker into trim panel.
(3) Install speaker mounting screws. Tighten to 4 N·m (35 in. lbs.).
(4) Press speaker grill into position.
(5) Connect battery negative cable.

CHIME/BUZZER

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CHIME/BUZZER

DESCRIPTION

The chime warning/reminder system includes signals for fasten seat belts, certain warning indicators, exterior lamps left ON, key left in ignition and door ajar.

For diagnosis and testing, use the DRB lll® scan tool and the proper Body Diagnostic Procedures manual.

OPERATION

DOOR AJAR CHIME

The BCM will sound an audible chime when the key is in the ignition and the drivers door is open. This is to prevent partial closing of vehicle doors.

An audible chime will sound when the vehicle begins to move and the transmission range indicator display will indicate DOOR.

FASTEN SEAT BELTS

At power up, a seat belt lamp bulb check will be conducted by the instrument cluster. If the driver side seat belt buckle is unbuckled during the bulb check, an accompanying chime will sound within the duration of the bulb check.

SINGLE WARNING CHIME

After bulb check at power-up, if any of the following indicators are still activated, the cluster will request a single chime from the BCM. ABS, Air Bag, Check Engine, Charging System, Engine Temperature, Low Fuel (after 10 sec. for accurate fuel info), and BRAKE (if speed is greater than 2 mph).

EXTERIOR LAMPS LEFT ON

An audible chime tone that indicates the exterior lamps were left on.

KEY LEFT IN IGNITION

An audible chime tone that indicates the key was left in ignition.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - CHIME CONDITIONS

For Removal and Installation of Junction Block (JB) (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/JUNCTION BLOCK - REMOVAL).

For Removal and Installation of Body Control Module (BCM), refer to Electrical, Electronic Control Modules, Body Control Modules, Removal, and Installation.

NO TONE WHEN IGNITION SWITCH IS TURNED ON AND DRIVERS SEAT BELT IS UNBUCKLED AND FULLY RETRACTED

(1) Check driver's seat belt retractor switch for a ground when belt is retracted.

(2) Use DRB III® scan tool to perform PCI data bus diagnostics on the BCM for battery, ignition and seat belt switch inputs.

(3) Use DRB III® scan tool to perform actuator diagnostics on BCM Chime.

(4) Check for tone in any other function.

(5) Remove BCM from Junction Block. Check for battery voltage at terminal JB-12 and ignition feed at terminal JB-6 of BCM (Fig. 1). Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

(6) If voltage not OK, repair as necessary.

CHIME/BUZZER (Continued)

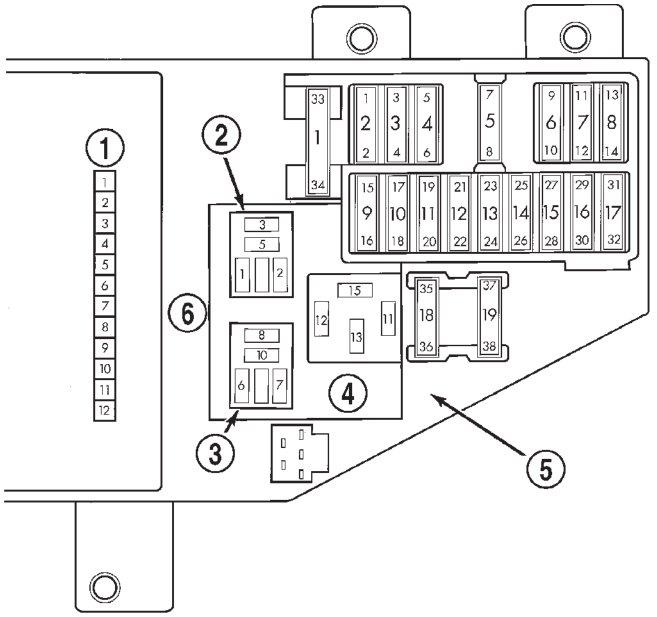

Fig. 1 JUNCTION BLOCK CONNECTOR TO THE BCM

1 - BODY CONTROL MODULE
2 - H/LP RELAY
3 - HORN RELAY
4 - EBL
5 - CIRCUIT BREAKERS
6 - HORN

NO FASTEN SEAT BELT LAMP WHEN IGNITION SWITCH IS TURNED ON

(1) At power-up, the cluster will turn ON the seat belt warning indicator for 6 ± 1 seconds as required regardless of the driver side seat belt buckle status. If the warning indicator does not turn ON, verify if the socketted red LED is seated properly and good contact with the PC-board is present. If not seated properly, then seat the LED properly by twisting the socket counterclockwise. If seated properly, replace the LED.

SEAT BELT LAMP ON FOR MORE THAN 7 SECONDS AFTER DRIVER SEAT BELT BUCKLE SWITCH IS FASTENED AND IGNITION ON

(1) Use a DRB III® scan tool to verify status of the driver seat belt buckle switch as received by the instrument cluster. Compare to the actual seat belt buckle status: If buckled, lamp is OFF or if unbuckled, lamp is ON. If the status received by the instrument cluster does match the actual buckle seat belt switch status (buckled/unbuckled), then check the driver seat belt switch and wiring for proper connection.

NO TONE OR DOOR INDICATED IN PLACE OF ODOMETER WHEN A DOOR IS AJAR AND VEHICLE BEGINS MOVING

The vehicle must be moving for the chime to occur. However the door indicator will come ON regardless of the vehicle movement. The PCI data bus, Transmission Control Module (TCM) and Powertrain Control Module (PCM) must be operational.

(1) Check all door jamb switches.

(2) Use DRB III® scan tool to perform PCI data bus diagnostics on BCM for battery and ignition switch input

(3) Inspect BCM connectors and wires for proper connection.

(4) Remove BCM from Junction Block. Check for battery voltage at terminal JB-12 and ignition feed at terminal JB-6 of BCM. Refer to the appropriate wiring information.

(5) If voltage not OK, repair as necessary.

NO TONE WHEN HEADLAMPS ARE ON, IGNITION SWITCH IS OFF AND DRIVER'S DOOR IS OPEN.

(1) Check left door jamb switch for good ground when driver's door is open.

(2) Use DRB III® scan tool to perform PCI data bus diagnostics on BCM for battery, ignition switch input, headlamp and driver's door input and Chime Output Test.

(3) Check headlamp switch.

(4) Inspect BCM connectors and wires for proper connection.

(5) Remove BCM from Junction Block. Check for battery voltage at terminal JB-12 and ignition feed at terminal JB-6 of BCM. Refer to the appropriate wiring information.

(6) If voltage not OK, repair as necessary.

NO TONE WHEN IGNITION KEY IS LEFT IN IGNITION SWITCH AND IT IS IN THE OFF POSITION WITH DRIVER'S DOOR IS OPEN

(1) Check left door jamb switch for good ground when drivers door is open.

(2) Use DRB III® scan tool to perform PCI data bus diagnostics on BCM for battery, ignition switch input, key-in-switch and driver's door input and Chime Output Test.

(3) Check key-in switch.

(4) Inspect BCM connectors and wires for proper connection.

(5) Remove BCM from Junction Block. Check for battery voltage at terminal JB-12 and ignition feed at terminal JB-6 of BCM. Refer to the appropriate wiring information.

(6) If voltage not OK, repair as necessary.

CHIME/BUZZER (Continued)

CHIMES CONTINUE WHEN HEADLAMPS ARE TURNED OFF AND/OR KEY IS REMOVED FROM IGNITION

(1) Use DRB III® scan tool to perform PCI data bus diagnostics on BCM for headlamp or key-in-ignition inputs.

(2) Check wiring for a grounded condition between key-in switch and BCM. Check headlamp switch to BCM wiring for short to battery.

(3) Inspect BCM connectors and wires for proper connection.

DIAGNOSIS AND TESTING - EXTERIOR LAMPS LEFT ON

To test the headlamps left on function, turn ignition off, turn exterior lamps on with driver's door open. Chime should sound until headlamps are turned off or drivers door is closed.

DIAGNOSIS AND TESTING - KEY LEFT IN IGNITION SWITCH

To test the key left in ignition function:

- The ignition switch must be in the OFF position with key in ignition.
- Driver's door open.
- Chime should sound until key is removed from ignition or drivers door is closed.

DIAGNOSIS AND TESTING - FASTEN SEAT BELTS

To test, the ignition switch must be in the OFF position before testing the fasten seat belts. Turn the ignition switch to the ON position with the driver's seat belt unbuckled. The seat belt warning lamp should light for 5 to 7 seconds and the chime should sound 5 to 7 seconds.

ELECTRONIC CONTROL MODULES

TABLE OF CONTENTS

ELECTRONIC CONTROL MODULES

STANDARD PROCEDURE - PCM/SKIM PROGRAMMING

NOTE: Before replacing the PCM for a failed driver, control circuit or ground circuit, be sure to check the related component/circuit integrity for failures not detected due to a double fault in the circuit. Most PCM driver/control circuit failures are caused by internal component failures (i.e. relay and solenoids) and shorted circuits (i.e. pull-ups, drivers and switched circuits). These failures are difficult to detect when a double fault has occurred and only one DTC has set.

When a PCM (SBEC) and the SKIM are replaced at the same time perform the following steps in order:

(1) Program the new PCM (SBEC)

(2) Program the new SKIM

(3) Replace all ignition keys and program them to the new SKIM.

PROGRAMMING THE PCM (SBEC)

The SKIS Secret Key is an ID code that is unique to each SKIM. This code is programmed and stored in the SKIM, PCM and transponder chip (ignition keys). When replacing the PCM it is necessary to program the secret key into the new PCM using the DRB III. Perform the following steps to program the secret key into the PCM.

(1) Turn the ignition switch on (transmission in park/neutral).

(2) Use the DRB III and select THEFT ALARM, SKIM then MISCELLANEOUS.

(3) Select PCM REPLACED (GAS ENGINE).

(4) Enter secured access mode by entering the vehicle four-digit PIN.

(5) Select ENTER to update PCM VIN.

ELECTRONIC CONTROL MODULES (Continued)

NOTE: If three attempts are made to enter secure access mode using an incorrect PIN, secured access mode will be locked out for one hour. To exit this lockout mode, turn the ignition to the RUN position for one hour then enter the correct PIN. (Ensure all accessories are turned off. Also monitor the battery state and connect a battery charger if necessary).

(6) Press ENTER to transfer the secret key (the SKIM will send the secret key to the PCM).

(7) Press Page Back to get to the Select System menu and select ENGINE, MISCELLANEOUS, and SRI MEMORY CHECK.

(8) The DRB III will ask, Is odometer reading between XX and XX? Select the YES or NO button on the DRB III. If NO is selected, the DRB III will read, Enter odometer Reading<From I.P. odometer>. Enter the odometer reading from the Instrument Panel and press ENTER.

PROGRAMMING THE SKIM

(1) Turn the ignition switch on (transmission in park/neutral).

(2) Use the DRB III and select THEFT ALARM, SKIM then MISCELLANEOUS.

(3) Select PCM REPLACED (GAS ENGINE).

(4) Program the vehicle four-digit PIN into SKIM.

(5) Select COUNTRY CODE and enter the correct country.

NOTE: Be sure to enter the correct country code. If the incorrect country code is programmed into SKIM, the SKIM must be replaced.

(6) Select YES to update VIN (the SKIM will learn the VIN from the PCM).

(7) Press ENTER to transfer the secret key (the PCM will send the secret key to the SKIM).

(8) Program ignition keys to SKIM.

NOTE: If the PCM and the SKIM are replaced at the same time, all vehicle keys will need to be replaced and programmed to the new SKIM.

PROGRAMMING IGNITION KEYS TO THE SKIM

(1) Turn the ignition switch on (transmission in park/neutral).

(2) Use the DRB III and select THEFT ALARM, SKIM then MISCELLANEOUS.

(3) Select PROGRAM IGNITION KEY'S.

(4) Enter secured access mode by entering the vehicle four-digit PIN.

NOTE: A maximum of eight keys can be learned to each SKIM. Once a key is learned to a SKIM it (the key) cannot be transferred to another vehicle.

If ignition key programming is unsuccessful, the DRB III will display one of the following messages:

Programming Not Attempted - The DRB III attempts to read the programmed key status and there are no keys programmed into SKIM memory.

Programming Key Failed (Possible Used Key From Wrong Vehicle) - SKIM is unable to program key due to one of the following:

- faulty ignition key transponder
- ignition key is programmed to another vehicle.

8 Keys Already Learned, Programming Not Done - SKIM transponder ID memory is full.

(5) Obtain ignition keys to be programmed from customer (8 keys maximum).

(6) Using the DRB III, erase all ignition keys by selecting MISCELLANEOUS and ERASE ALL CURRENT IGN. KEYS.

(7) Program all ignition keys.

Learned Key In Ignition - Ignition key transponder ID is currently programmed in SKIM memory.

BODY CONTROL MODULE

DESCRIPTION

The Body Control Module (BCM) is concealed below the driver side end of the instrument panel in the passenger compartment, where it is secured to the dash panel side of the Junction Block (JB).

The BCM utilizes integrated circuitry and information carried on the Programmable Communications Interface (PCI) data bus network along with many hard wired inputs to monitor many sensor and switch inputs throughout the vehicle. In response to those inputs, the internal circuitry and programming of the BCM allow it to control and integrate many electronic functions and features of the vehicle through both hard wired outputs and the transmission of electronic message outputs to other electronic modules in the vehicle over the PCI data bus.

OPERATION

The Body Control Module (BCM) is designed to control and integrate many of the electronic features and functions of the vehicle. The microprocessor-based BCM hardware and software monitors many hard wired switch and sensor inputs as well as those resources it shares with other electronic modules in the vehicle through its communication over the PCI data bus network. The internal programming and all of these inputs allow the BCM microprocessor to determine the tasks it needs to perform and their priorities, as well as both

BODY CONTROL MODULE (Continued)

the standard and optional features that it should provide. The BCM programming then performs those tasks and provides those features through both PCI data bus communication with other electronic modules and through hard wired low current outputs to a number of relays. These relays provide the BCM with the ability to control numerous high current accessory systems in the vehicle.

The BCM monitors its own internal circuitry as well as many of its input and output circuits, and will store a Diagnostic Trouble Code (DTC) in electronic memory for any failure it detects. These DTCs can be retrieved and diagnosed using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

REMOVAL

The Junction Block and Body Control Module (BCM) are attached to each other. After removal they can be separated.

(1) Disconnect and isolate the remote battery negative cable from the terminal on the shock tower.

(2) Open the front driver's door and remove end cap.

(3) Remove power mirror switch bezel, radio bezel, and small bezel on the right side of the steering column.

(4) Remove the left lower instrument panel trim.

(5) Remove silencer.

(6) Remove wire harness connectors from Junction Block.

(7) Remove Junction Block three mounting screws.

(8) Remove Junction Block/BCM by pulling straight down from the mounting bayonet.

(9) Disconnect BCM wire connectors and remove the assembly.

(10) Remove Junction Block/BCM from vehicle.

(11) With the Junction Block/BCM removed from the vehicle, separate the BCM from the Junction Block by removing the four screws.

(12) Disconnect BCM from the Junction Block.

(13) Unsnap the remote keyless entry module from the BCM.

NOTE: The Remote Keyless Entry (RKE) module is attached to the BCM. This must be transferred (if equipped) to the new BCM if being replaced.

NOTE: If BCM is replaced, the VTSS must be enabled in the new BCM via the DRB III® in order to start the vehicle.

INSTALLATION

(1) Snap the remote keyless entry module onto the BCM.

(2) Connect BCM to the Junction Block.

(3) Connect the BCM and junction block together with the four screws.

(4) Install the Junction Block/BCM into vehicle.

(5) Connect BCM wire connectors and install the assembly onto instrument panel.

(6) Install the Junction Block/BCM by pushing straight up.

(7) Install the Junction Block three mounting screws.

(8) Install the wire harness connectors to the Junction Block.

(9) Install the silencer.

(10) Install the left lower instrument panel trim.

(11) Install the power mirror switch bezel, radio bezel, and small bezel to the right of the steering column.

(12) Install the left end cover.

(13) Connect the remote battery negative cable to the remote terminal on the shock tower.

CONTROLLER ANTILOCK BRAKE

DESCRIPTION

The controller antilock brake (CAB) is a microprocessor-based device which monitors the antilock brake system (ABS) during normal braking and controls it when the vehicle is in an ABS stop. The CAB is mounted to the HCU as part of the integrated control unit (ICU) (Fig. 1). The CAB uses a 24-way electrical connector on the vehicle wiring harness. The power source for the CAB is through the ignition switch in the RUN or ON position. The CAB is on the PCI bus.

OPERATION

The primary functions of the controller antilock brake (CAB) are to:

- Monitor the antilock brake system for proper operation.
- Detect wheel locking or wheel slipping tendencies by monitoring the speed of all four wheels of the vehicle.
- Control fluid modulation to the wheel brakes while the system is in an ABS mode.
- Store diagnostic information.
- Provide communication to the DRBIII® scan tool while in diagnostic mode.
- Illuminate the amber ABS warning indicator lamp.

The CAB constantly monitors the antilock brake system for proper operation. If the CAB detects a fault, it will turn on the amber ABS warning indicator lamp and disable the antilock braking system. The normal base braking system will remain operational.

CONTROLLER ANTILOCK BRAKE (Continued)

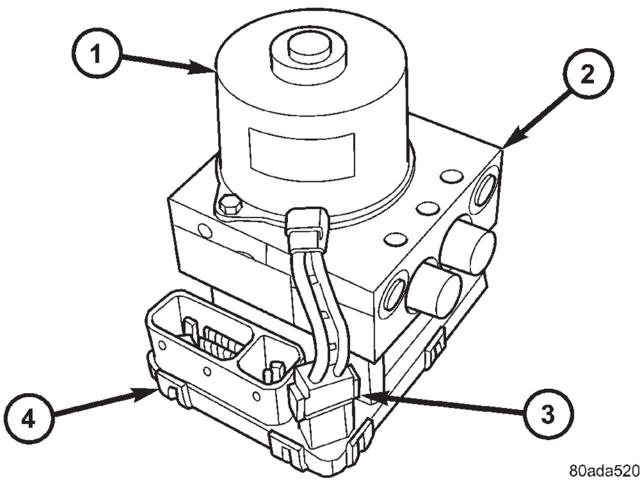

Fig. 1 INTEGRATED CONTROL UNIT (TYPICAL)

1 - PUMP/MOTOR
2 - HCU
3 - PUMP/MOTOR CONNECTOR
4 - CAB

The CAB continuously monitors the speed of each wheel through the signals generated by the wheel speed sensors to determine if any wheel is beginning to lock. When a wheel locking tendency is detected, the CAB commands the CAB command coils to actuate. The coils then open and close the valves in the HCU that modulate brake fluid pressure in some or all of the hydraulic circuits. The CAB continues to control pressure in individual hydraulic circuits until a locking tendency is no longer present.

The CAB contains a self-diagnostic program that monitors the antilock brake system for system faults. When a fault is detected, the amber ABS warning indicator lamp is turned on and the fault diagnostic trouble code (DTC) is then stored in a diagnostic program memory. These DTC's will remain in the CAB memory even after the ignition has been turned off. The DTC's can be read and cleared from the CAB memory by a technician using the DRBIII® scan tool. If not cleared with a DRBIII® scan tool, the fault occurrence and DTC will be automatically cleared from the CAB memory after the identical fault has not been seen during the next 3,500 miles.

CAB INPUTS

- Wheel speed sensors (four)
- Brake lamp switch
- Ignition switch
- System and pump voltage
- Ground
- Diagnostic communication (PCI)

CAB OUTPUTS

- Amber ABS warning indicator lamp actuation (via BUS)
- Instrument cluster (MIC) communication (PCI)
- Diagnostic communication (PCI, via BUS)

REMOVAL

(1) Disconnect the battery negative cable.

(2) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(3) Pull up on the CAB connector lock and disconnect the 24–way electrical connector and the pump/motor connector from the CAB.

(4) Remove the bolts securing the integrated control unit's (ICU's) mounting bracket to the lower radiator support.

(5) Carefully move the ICU toward the right side of the car. Move the ICU far enough to access the CAB mounting screws. **Be careful not to bend the brake tubes connected to the ICU.**

(6) Remove the screws securing the CAB to the HCU half of the ICU. Remove the CAB.

INSTALLATION

(1) Install screws to secure the CAB to the HCU half of the ICU. Tighten the mounting screws to 2 N·m (17 in. lbs.) torque.

(2) Remount the ICU mounting bracket to the lower radiator support. Tighten the mounting bolts to 28 N·m (21 ft. lbs.) torque.

(3) Reconnect the 24–way electrical and the pump/motor connector.

(4) Lower vehicle.

(5) Connect negative battery cable.

(6) Connect a DRBIII® to the vehicle and initialize the system.

POWERTRAIN CONTROL MODULE

DESCRIPTION

OPERATION

The Powertrain Control Module (PCM) is a digital computer containing a microprocessor (Fig. 2). The PCM receives input signals from various switches and sensors referred to as Powertrain Control Module Inputs. Based on these inputs, the PCM adjusts various engine and vehicle operations through devices referred to as Powertrain Control Module Outputs.

POWERTRAIN CONTROL MODULE (Continued)

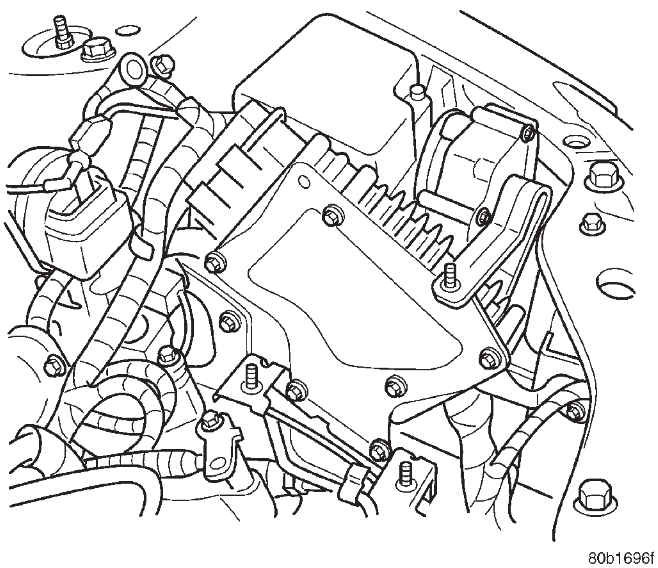

Fig. 2 Powertrain Control Module (PCM)

NOTE: PCM Inputs:

- Air Conditioning Pressure Transducer
- ASD Relay
- Battery Voltage
- Brake Switch
- Camshaft Position Sensor
- Crankshaft Position Sensor
- Distance Sensor (from transmission control module)
- EGR Position Feedback
- Engine Coolant Temperature Sensor
- Heated Oxygen Sensors
- Ignition sense
- Intake Air Temperature Sensor
- Knock Sensor
- Leak Detection Pump Feedback
- Manifold Absolute Pressure (MAP) Sensor
- Park/Neutral (from transmission control module)
- PCI Bus
- Power Steering Pressure Switch
- Proportional Purge Sense
- SCI Receive
- Speed Control
- Throttle Position Sensor
- Torque Management Input (From TCM)
- Transaxle Control Module (TCM)
- Transaxle Gear Engagement (From TCM)
- Vehicle Speed (from transmission control module)

NOTE: PCM Outputs:

- Air Conditioning Clutch Relay
- Automatic Shut Down (ASD) and Fuel Pump Relays
- Data Link Connector (PCI and SCI Transmit)
- Double Start Override
- EGR Solenoid
- Fuel Injectors
- Generator Field
- High Speed Fan Relay
- Idle Air Control Motor
- Ignition Coils
- Leak Detection Pump
- Low Speed Fan Relay
- MTV Actuator
- Proportional Purge Solenoid
- SRV Valve
- Speed Control Relay
- Speed Control Vent Relay
- Speed Control Vacuum Relay
- 8 Volt Output
- 5 Volt Output

Based on inputs it receives, the powertrain control module (PCM) adjusts fuel injector pulse width, idle speed, ignition timing, and canister purge operation and EGR if equipped. The PCM regulates the cooling fans, air conditioning and speed control systems. The PCM changes generator charge rate by adjusting the generator field.

The PCM adjusts injector pulse width (air-fuel ratio) based on the following inputs.

- Manifold Absolute Pressure
- Engine Speed (crankshaft position sensor)
- Battery Voltage
- Intake Air Temperature Sensor
- Engine Coolant Temperature
- Exhaust Gas Oxygen Content (heated oxygen sensors)
- Throttle Position

The PCM adjusts engine idle speed through the idle air control motor based on the following inputs.

- Brake Switch
- Engine Coolant Temperature
- Engine Speed (crankshaft position sensor)
- Park/Neutral (transmission gear selection)
- Transaxle Gear Engagement
- Throttle Position
- Vehicle Speed (from Transmission Control Module)

The PCM adjusts ignition timing based on the following inputs.

- Intake Air Temperature
- Engine Coolant Temperature
- Engine Speed (crankshaft position sensor)
- Knock Sensor
- Manifold Absolute Pressure
- Park/Neutral (transmission gear selection)
- Transaxle Gear Engagement
- Throttle Position

The automatic shut down (ASD) and fuel pump relays are mounted externally, but turned on and off by the powertrain control module through the same circuit.

POWERTRAIN CONTROL MODULE (Continued)

The camshaft and crankshaft signals are sent to the powertrain control module. If the PCM does not receive both signals within approximately one second of engine cranking, it deactivates the ASD and fuel pump relays. When these relays are deactivated, power is shut off to the fuel injectors, ignition coils, fuel pump and the heating element in each oxygen sensor.

The PCM contains a voltage converter that changes battery voltage to a regulated 8.0 volts. The 8.0 volts power the camshaft position sensor, crankshaft position sensor and vehicle speed sensor. The PCM also provides a 5.0 volts supply for the engine coolant temperature sensor, intake air temperature sensor, manifold absolute pressure sensor and throttle position sensor EGR (if equipped).

The PCM engine control strategy prevents reduced idle speeds until after the engine operates for 320 km (200 miles). If the PCM is replaced after 320 km (200 miles) of usage, update the mileage in new PCM. Use the DRB scan tool to change the mileage in the PCM. Refer to the appropriate Powertrain Diagnostic Manual and the DRB scan tool. If equipped with SKIM, must use SKIM function to reprogram VIN number in new PCM.

DIAGNOSTIC TROUBLE CODE

DESCRIPTION

A Diagnostic Trouble Code (DTC) indicates the PCM has recognized an abnormal condition in the system.

Remember that DTC's are the results of a system or circuit failure, but do not directly identify the failed component or components.

NOTE: For a list of DTC's, refer to the charts in this section.

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0016	Crankshaft/Camshaft Timing Misalignment	A rationality error has been detected for camshaft position out of phase with crankshaft
P0030	O2 sensor 1/1 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0031	O2 sensor 1/1 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0036	O2 sensor 1/2 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0037	O2 sensor 1/2 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0038	O2 sensor 1/2 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0043	O2 sensor 1/3 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0044	O2 sensor 1/3 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0050	O2 sensor 2/1 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0051	O2 sensor 2/1 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0052	O2 sensor 2/1 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0056	O2 sensor 2/1 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.

POWERTRAIN CONTROL MODULE (Continued)

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.

(G) Generator Lamp Illuminated

GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0057	O2 sensor 2/2 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0058	O2 sensor 2/2 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0068	Manifold Pressure/Throttle Position Correlation	MAP sensor signal does not correlate to throttle position sensor signal. Possible vacuum leak.
P0070	Ambient Temp Sensor Stuck	A rationality error has been detected in the ambient temp. sensor test.
P0071 (M)	Ambient Temp Sensor Performance	Ambient change less than 3° C in 200 Miles
P0072	Ambient Temp Sensor Low	Ambient temp. sensor input below the minimum acceptable voltage
P0073	Ambient Temp Sensor High	Ambient temp. sensor input above the maximum acceptable voltage
P0106 (M)	Barometric Pressure Out of Range	MAP sensor input voltage out of an acceptable range detected during reading of barometric pressure at key-on.
P0107 (M)	Map Sensor Voltage Too Low	MAP sensor input below minimum acceptable voltage.
P0108 (M)	Map Sensor Voltage Too High	MAP sensor input above maximum acceptable voltage.
P0110	Intake Air Temp Sensor Stuck	A rationality error has been detected for the intake air temp. sensor.
P0111 (M)	Intake Air Temp Sensor Performance	Intake Air change less than 3° C in 200 Miles
P0112 (M)	Intake Air Temp Sensor Voltage Low	Intake air (charge) temperature sensor input below the minimum acceptable voltage.
P0113 (M)	Intake Air Temp Sensor Voltage High	Intake air (charge) temperature sensor input above the maximum acceptable voltage.
P0116	Engine Coolant Temp Performance	A rationality error has been detected in the coolant temp sensor.
P0117 (M)	ECT Sensor Voltage Too Low	Engine coolant temperature sensor input below the minimum acceptable voltage.
P0118 (M)	ECT Sensor Voltage Too High	Engine coolant temperature sensor input above the maximum acceptable voltage.
P0121 (M)	TPS Voltage Does Not Agree With MAP	TPS signal does not correlate to MAP sensor signal.
P0122 (M)	Throttle Position Sensor Voltage Low	Throttle position sensor input below the acceptable voltage range.
P0123 (M)	Throttle Position Sensor Voltage High	Throttle position sensor input above the maximum acceptable voltage.
P0125 (M)	Engine Coolant Temp Not Reached	Time to enter Closed Loop Operation (Fuel Control) is excessive.
P0128	Thermostat Rationality	A rationality error has been detected for the thermostat
P0129	Barometic Pressure Out-of-Range low	MAP sensor input voltage out of an acceptable range detected during reading of barometric pressure.

POWERTRAIN CONTROL MODULE (Continued)

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0130	1/1 O2 Sensor Heater Relay Circuit	An open or shorted condition detected in the ASD or CNG shutoff relay control ckt.
P0131 (M)	1/1 O2 Sensor Shorted To Ground	Oxygen sensor input voltage maintained below normal operating range.
P0132 (M)	1/1 O2 Sensor Shorted To Voltage	Oxygen sensor input voltage maintained above normal operating range.
P0133 (M)	1/1 O2 Sensor Slow Response	Oxygen sensor response slower than minimum required switching frequency.
P0134 (M)	1/1 O2 Sensor Stays at Center	Neither rich or lean condition is detected from the oxygen sensor input.
P0135 (M)	1/1 O2 Sensor Heater Failure	Oxygen sensor heater element malfunction.
P0136	1/2 O2 Sensor Heater Relay Circuit	An open or shorted condition detected in the ASD or CNG shutoff relay control ckt.
P0137 (M)	1/2 O2 Sensor Shorted To Ground	Oxygen sensor input voltage maintained below normal operating range.
P0138 (M)	1/2 O2 Sensor Shorted To Voltage	Oxygen sensor input voltage maintained above normal operating range.
P0139 (M)	1/2 O2 Sensor Slow Response	Oxygen sensor response not as expected.
P0140 (M)	1/2 O2 Sensor Stays at Center	Neither rich or lean condition is detected from the oxygen sensor.
P0141 (M)	1/2 O2 Sensor Heater Failure	Oxygen sensor heater element malfunction.
P0143	1/3 O2 Sensor Shorted To Ground	Oxygen sensor input voltage maintained below normal operating range.
P0144	1/3 O2 Sensor Shorted To Voltage	Oxygen sensor input voltage maintained above normal operating range.
P0145	1/3 O2 Sensor Slow Response	Oxygen sensor response slower than minimum required switching frequency.
P0146	1/3 O2 Sensor Stays at Center	Neither rich or lean condition is detected from the oxygen sensor.
P0147	1/3 O2 Sensor Heater Failure	Oxygen sensor heater element malfunction.
P0151 (M)	2/1 O2 Sensor Shorted To Ground	Oxygen sensor input voltage maintained below normal operating range.
P0152 (M)	2/1 O2 Sensor Shorted To Voltage	Oxygen sensor input voltage sustained above normal operating range.
P0153 (M)	2/1 O2 Sensor Slow Response	Oxygen sensor response slower than minimum required switching frequency.
P0154 (M)	2/1 O2 Sensor Stays at Center	Neither rich or lean condition is detected from the oxygen sensor.
P0155 (M)	2/1 O2 Sensor Heater Failure	Oxygen sensor heater element malfunction.
P0157 (M)	2/2 O2 Sensor Shorted To Ground	Oxygen sensor input voltage maintained below normal operating range.

POWERTRAIN CONTROL MODULE (Continued)

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0158 (M)	2/2 O2 Sensor Shorted To Voltage	Oxygen sensor input voltage maintained above normal operating range.
P0159	2/2 O2 Sensor Slow Response	Oxygen sensor response slower than minimum required switching frequency.
P0160 (M)	2/2 O2 Sensor Stays at Center	Neither rich or lean condition is detected from the oxygen sensor.
P0161 (M)	2/2 O2 Sensor Heater Failure	Oxygen sensor heater element malfunction.
P0165	Starter Relay Circuit	
P0171 (M)	1/1 Fuel System Lean	A lean air/fuel mixture has been indicated by an abnormally rich correction factor.
P0172 (M)	1/1 Fuel System Rich	A rich air/fuel mixture has been indicated by an abnormally lean correction factor.
P0174 (M)	2/1 Fuel System Lean	A lean air/fuel mixture has been indicated by an abnormally rich correction factor.
P0175 (M)	2/1 Fuel System Rich	A rich air/fuel mixture has been indicated by an abnormally lean correction factor.
P0176	Flex Fuel Calibration Signal	No calibration voltage present from flex fuel sensor.
P0178	Flex Fuel Sensor Volts Too Low	Flex fuel sensor input below minimum acceptable voltage.
P0179	Flex Fuel Sensor Volts Too High	Flex fuel sensor input above maximum acceptable voltage.
P0201 (M)	Injector #1 Control Circuit	An open or shorted condition detected in control circuit for injector #1 or the INJ 1 injector bank.
P0202 (M)	Injector #2 Control Circuit	An open or shorted condition detected in control circuit for injector #2 or the INJ 2 injector bank.
P0203 (M)	Injector #3 Control Circuit	An open or shorted condition detected in control circuit for injector #3 or the INJ 3 injector bank.
P0204 (M)	Injector #4 Control Circuit	Injector #4 or INJ 4 injector bank output driver stage does not respond properly to the control signal.
P0205 (M)	Injector #5 Control Circuit	Injector #5 output driver stage does not respond properly to the control signal.
P0206 (M)	Injector #6 Control Circuit	Injector #6 output driver stage does not respond properly to the control signal.
P0207	Injector #7 Control Circuit	Injector #7 output driver stage does not respond properly to the control signal.
P0208	Injector #8 Control Circuit	Injector #8 output driver stage does not respond properly to the control signal.
P0209	Injector #9 Control Circuit	Injector #9 output driver stage does not respond properly to the control signal.
P0210	Injector #10 Control Circuit	Injector #10 output driver stage does not respond properly to the control signal.
P0234	Boost Limit Exceeded	
P0243	Wastegate Solenoid Circuit	

POWERTRAIN CONTROL MODULE (Continued)

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0300 (M)	Multiple Cylinder Mis-fire	Misfire detected in multiple cylinders.
P0301 (M)	CYLINDER #1 MISFIRE	Misfire detected in cylinder #1.
P0302 (M)	CYLINDER #2 MISFIRE	Misfire detected in cylinder #2.
P0303 (M)	CYLINDER #3 MISFIRE	Misfire detected in cylinder #3.
P0304 (M)	CYLINDER #4 MISFIRE	Misfire detected in cylinder #4.
P0305 (M)	CYLINDER #5 MISFIRE	Misfire detected in cylinder #5.
P0306 (M)	CYLINDER #6 MISFIRE	Misfire detected in cylinder #6.
P0307 (M)	CYLINDER #7 MISFIRE	Misfire detected in cylinder #7
P0308 (M)	CYLINDER #8 MISFIRE	Misfire detected in cylinder #8.
P0309 (M)	CYLINDER #9 MISFIRE	Misfire detected in cylinder #9.
P0310 (M)	CYLINDER #10 MISFIRE	Misfire detected in cylinder #10.
P0315	No Crank Sensor Learned	Unable to learn the crank senor's signal in preparation for misfire diagnostics.
P0320	No Crank Reference Signal at PCM	No reference signal (crankshaft position sensor) detected during engine cranking.
P0325	Knock Sensor #1 Circuit	Knock sensor (#1) signal above or below minimum acceptable threshold voltage at particular engine speeds.
P0330	Knock Sensor #2 Circuit	Knock sensor (#2) signal above or below minimum acceptable threshold voltage at particular engine speeds.
P0335	Crankshaft Position Sensor Circuit	A rationality error has been detected for loss of crankshaft position sensor.
P0339	Crankshaft Position Sensor Circuit Intermittent	A rationality error has been detected for intermittent loss of crankshaft position sensor.
P0340 (M)	Camshaft Position Sensor Circuit	A rationality error has been detected for loss of camshaft position sensor.
P0344	Camshaft Position Sensor Circuit Intermittent	A rationality error has been detected for intermittent loss of camshaft position sensor.
P0350	Ignition Coil Draws Too Much Current	A coil (1-5) is drawing too much current.
P0351 (M)	Ignition Coil Primary # 1 Circuit	Peak primary circuit current not achieved with maximum dwell time.
P0352 (M)	Ignition Coil Primary # 2 Circuit	Peak primary circuit current not achieved with maximum dwell time.
P0353 (M)	Ignition Coil Primary # 3 Circuit	Peak primary circuit current not achieved with maximum dwell time.
P0354 (M)	Ignition Coil Primary# 4 Circuit	Peak primary circuit current not achieved with maximum dwell time (High Impedance).
P0355 (M)	Ignition Coil Primary # 5 Circuit	Peak primary circuit current not achieved with maximum dwell time (High Impedance).
P0356 (M)	Ignition Coil Primary # 6 Circuit	Peak primary circuit current not achieved with maximum dwell time (high impedance).

POWERTRAIN CONTROL MODULE (Continued)

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0357	Ignition Coil Primary # 7 Circuit	Peak primary circuit current not achieved with maximum dwell time (high impedance).
P0358	Ignition Coil Primary # 8 Circuit	Peak primary circuit current not achieved with maximum dwell time (high impedance).
P0400	Diesel EGR System Failure	
P0401 (M)	EGR System Failure	Required change in air/fuel ration not detected during diagnostic test.
P0403 (M)	EGR Solenoid Circuit	An open or shorted condition detected in the EGR solenoid control circuit.
P0404 (M)	EGR Position Sensor Rationality	EGR position sensor signal does not correlate to EGR duty cycle.
P0405 (M)	EGR Position Sensor Volts Too Low	EGR position sensor input below the acceptable voltage range.
P0406 (M)	EGR Position Sensor Volts Too High	EGR position sensor input above the acceptable voltage range.
P0412	Secondary Air Solenoid Circuit	An open or shorted condition detected in the secondary air (air switching/aspirator) solenoid control circuit.
P0420 (M)	1/1 Catalytic Converter Efficiency	Catalyst 1/1 efficiency below required level.
P0432 (M)	1/2 Catalytic Converter Efficiency	Catalyst 2/1 efficiency below required level.
P0440	General EVAP System Failure	General system failure.
P0441 (M)	Evap Purge Flow Monitor	Insufficient or excessive vapor flow detected during evaporative emission system operation.
P0442 (M)	Evap Leak Monitor 0.040 Leak Detected	A 0.040 leak has been detected in the evaporative system.
P0443 (M)	Evap Purge Solenoid Circuit	An open or shorted condition detected in the EVAP purge solenoid control circuit.
P0452	NVLD Pressure Switch Stuck Closed	NVLD pressure switch stuck closed.
P0453	NVLD Pressure Switch Stuck Open	NVLD pressure switch stuck open.
P0455 (M)	Evap Leak Monitor Large Leak Detected	A large leak has been detected in the evaporative system.
P0456 (M)	Evap Leak Monitor 0.020 Leak Detected	A 0.020 leak has been detected in the evaporative system.
P0460	Fuel Level Unit No Change Over Miles	No movement of fuel level sender detected.
P0461	Fuel Level Unit No Changeover Time	No level of fuel level sender detected.
P0462	Fuel Level Sending Unit Volts Too Low	Fuel level sensor input below acceptable voltage.
P0463	Fuel Level Sending Unit Volts Too High	Fuel level sensor input above acceptable voltage.
P0480	Low Speed Fan Relay Control Circuit	An open or shorted condition detected in the low speed rad. fan relay control circuit.

POWERTRAIN CONTROL MODULE (Continued)

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0481	High Speed Fan Relay Control Circuit	An open or shorted condition detected in the high speed rad. fan relay control circuit.
P0498	NVLD Canister Vent Valve Solenoid Circuit Low	A shorted low condition detected in NVLD solenoid circuit.
P0499	NVLD Canister Vent Valve Solenoid Circuit High	A shorted high condition detected in NVLD solenoid circuit.
P0500 (M)	No Vehicle Speed Sensor Signal	No vehicle speed sensor signal detected during road load conditions.
P0501	Vehicle Speed Sensor #1 Performance	A rationality error has been detected for no vehicle speed sensor signal detected during road load conditions.
P0505 (M)	Idle Air Control Motor Circuits	Replace idle air control motor.
P0508 (M)	Idle Air Control Motor Circuit Low	Idle Air Control Motor Circuit input below acceptable current
P0509 (M)	Idle Air Control Motor Circuit High	Idle Air Control Motor Circuit input above acceptable current
P0511	Idle Air Control Valve Solenoid Circuit	An open or shorted condition detected in the IAC control circuit.
P0513	Invalid SKIM Key	The engine controller has received an invalid key from the Smart Key Immobilizer Module.
P0516	Battery Temperature Sensor Low	Battery Temp. sensor input below minimum acceptable voltage.
P0517	Battery Temperature Sensor High	Battery Temp. sensor input above maximum acceptable voltage.
P0519	Idle Speed Performance	A rationality error has been detected for target RPM not met during drive idle condition. Possible Vacuum leak or IAC lost steps.
P0522	Oil Pressure Sens Low	Oil pressure sensor input below acceptable voltage.
P0523	Oil Pressure Sens High	Oil pressure sensor input above acceptable voltage.
P0532	A/C Pressure Sensor Low	A/C pressure sensor input below the minimum acceptable voltage.
P0533	A/C Pressure Sensor High	A/C pressure sensor input above the maximum acceptable voltage.
P0551 (M)	Power Steering Switch Failure	Incorrect input state detected for the power steering switch circuit. PL: High pressure seen at high speed.
P0562	Battery Voltage Low	Battery voltage sense input below the minimum acceptable voltage.
P0563	Battery Voltage High	Battery voltage sense input above the maximum acceptable voltage.
P0579	Speed Control Switch #1 Performance	Cruise switch stuck in a valid voltage range.
P0580	Speed Control Switch #1 Low	Speed control switch input below minimum acceptable voltage.

POWERTRAIN CONTROL MODULE (Continued)

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0581	Speed Control Switch #1 High	Speed control switch input above maximum acceptable voltage.
P0582	Speed Control Vacuum Solenoid Circuit	An open or shorted condition detected in speed control Vacuum solenoid control circuit.
P0586	Speed Control Vent Solenoid Circuit	An open or shorted condition detected in speed control vent solenoid control circuit.
P0594	Speed Control Servo Power Circuit	An open or shorted condition open/short condition detected in the speed control servo power control circuit.
P0600 (M)	PCM Failure SPI Communications	No communication detected between co-processors in the control module.
P0601 (M)	Internal Controller Failure	Internal control module fault condition (check sum) detected.
P0604	Internal Trans Controller	Transmission control module RAM self test fault detected. -Aisin transmission.
P0605	Internal Trans Controller	Transmission control module ROM self test fault detected -Asian transmission.
P0615	Starter Relay Circuit	Open or shorted condition detected in the starter relay control circuit.
P0622 (G)	Generator Field Not Switching Properly	An open or shorted condition detected in the generator field control circuit.
P0627	Fuel Pump Relay Circuit	An open or shorted condition detected in the fuel pump relay control circuit.
P0630	VIN Not Programmed In PCM	VIN is not programmed in the control module EEPROM.
P0632	Odometer Not Programmed In PCM	Odometer is not programmed in the control module EEPROM.
P0633	SKIM Key Not Programmed In PCM	SKIM secert key is not programmed in the control module EEPROM.
P0645	A/C Clutch Relay Circuit	An open or shorted condition detected in the A/C clutch relay control circuit.
P0660	Manifold Tune Valve Solenoid Circuit	An open or shorted condition detected in the manifold tuning valve solenoid control circuit.
P0685	ASD Relay Control Circuit	An open or shorted condition detected in the ASD relay control circuit.
P0688	ASD Relay Sense Circuit Low	ASD voltage sensed when ASD relay is energized or ASD voltage not sensed when ASD relay is not energized.
P0700 (M)	Check Transmission DTC's	This SBEC III or JTEC DTC indicates that the EATX has an active fault and has requested illuminated the MIL via a BUS message. The specific fault must be acquired from the EATX.
P0703 (M)	Brake Switch Stuck Pressed or Released	Incorrect input state detected in the brake switch circuit. (Changed from P1595).

POWERTRAIN CONTROL MODULE (Continued)

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0711	Trans Temp Sensor, No Temp Rise After Start	Relationship between the transmission temperature and overdrive operation and/or TCC operation indicates a failure of the Transmission Temperature Sensor. OBD II Rationality.
P0712	Trans Temp Sensor Voltage Too Low	Transmission fluid temperature sensor input below acceptable voltage.
P0713	Trans Temp Sensor Voltage Too High	Transmission fluid temperature sensor input above acceptable voltage.
P0720	Low Output SPD Sensor RPM, Above 15 MPH	The relationship between the Output Shaft Speed Sensor and vehicle speed is not within acceptable limits.
P0740 (M)	Torque Con Clu, No RPM Drop at Lockup	Relationship between engine and vehicle speeds indicated failure of torque convertor clutch lock-up system (TCC/PTU sol).
P0743	Torque Converter Clutch Solenoid/ Trans Relay Circuits	An open or shorted condition detected in the torque converter clutch (part throttle unlock) solenoid control circuit. Shift solenoid C electrical fault - Asian transmission
P0748	Governor Pressure Sol Control/Trans Relay Circuits	An open or shorted condition detected in the Governor Pressure Solenoid circuit or Trans Relay Circuit in JTEC RE transmissions.
P0751	O/D Switch Pressed (Lo) More Than 5 Minutes	Overdrive override switch input is in a prolonged depressed state.
P0753	Trans 3-4 Shift Sol/Trans Relay Circuits	An open or shorted condition detected in the overdrive solenoid control circuit or Trans Relay Circuit in JTEC RE transmissions.
P0756	AW4 Shift Sol B (2-3) Functional Failure	Shift solenoid B (2-3) functional fault - Asian transmission
P0783	3-4 Shift Sol, No RPM Drop at Lockup	The overdrive solenoid is unable to engage the gear change from 3rd gear to the overdrive gear.
P0801	Reverse Gear Lockout Circuit Open or Short	An open or shorted condition detected in the transmission reverse gear lock-out solenoid control circuit.
P0833	Clutch Upstop Switch Performance	Rationality error detected for clutch upstop switch performance
P0850	Park/Natural Switch Performance	A rationality error has been detected for park/neutral switch performance.
P1105	Baro Read Solenoid Circuit	Open or shorted condition detected in the baro read solenoid control circuit.
P1115	General Temperature Rationality	General temperature sensor rationality error.
P1192 (M)	Inlet Air Temp. Circuit Low	Inlet Air Temp. sensor input below acceptable voltage
P1193 (M)	Inlet Air Temp. Circuit High	Inlet Air Temp. sensor input above acceptable voltage.
P1194	PWM O2 Heater Performance	Incorrect or irrational performance has been detected for the PWM O2 heater circuit.

POWERTRAIN CONTROL MODULE (Continued)

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P1195 (M)	1/1 O2 Sensor Slow During Catalyst Monitor	A slow switching oxygen sensor has been detected in bank 1/1 during catalyst monitor test. (was P0133)
P1196 (M)	2/1 O2 Sensor Slow During Catalyst Monitor	A slow switching oxygen sensor has been detected in bank 2/1 during catalyst monitor test. (was P0153)
P1197	1/2 O2 Sensor Slow During Catalyst Monitor	A slow switching oxygen sensor has been detected in bank 1/2 during catalyst monitor test. (was P0139)
P1198	Radiator Temperature Sensor Volts Too High	Radiator coolant temperature sensor input above the maximum acceptable voltage.
P1199	Radiator Temperature Sensor Volts Too Low	Radiator coolant temperature sensor input below the minimum acceptable voltage.
P1281	Engine is Cold Too Long	Engine coolant temperature remains below normal operating temperatures during vehicle travel (Thermostat).
P1282	Fuel Pump Relay Control Circuit	An open or shorted condition detected in the fuel pump relay control circuit.
P1288	Intake Manifold Short Runner Solenoid Circuit	An open or shorted condition detected in the short runner tuning valve circuit.
P1289	Manifold Tune Valve Solenoid Circuit	An open or shorted condition detected in the manifold tuning valve solenoid control circuit.
P1290	CNG Fuel System Pressure Too High	Compressed natural gas system pressure above normal operating range.
P1291	No Temp Rise Seen From Intake Heaters	Energizing Heated Air Intake does not change intake air temperature sensor an acceptable amount.
P1292	CNG Pressure Sensor Voltage Too High	Compressed natural gas pressure sensor reading above acceptable voltage.
P1293	CNG Pressure Sensor Voltage Too Low	Compressed natural gas pressure sensor reading below acceptable voltage.
P1294 (M)	Target Idle Not Reached	Target RPM not achieved during drive idle condition. Possible vacuum leak or IAC (AIS) lost steps.
P1295	No 5 Volts to TP Sensor	Loss of a 5 volt feed to the Throttle Position Sensor has been detected.
P1296	No 5 Volts to MAP Sensor	Loss of a 5 volt feed to the MAP Sensor has been detected.
P1297 (M)	No Change in MAP From Start To Run	No difference is recognized between the MAP reading at engine idle and the stored barometric pressure reading.
P1298	Lean Operation at Wide Open Throttle	A prolonged lean condition is detected during Wide Open Throttle.
P1299 (M)	Vacuum Leak Found (IAC Fully Seated)	MAP Sensor signal does not correlate to Throttle Position Sensor signal. Possible vacuum leak.
P1388	Auto Shutdown Relay Control Circuit	An open or shorted condition detected in the ASD or CNG shutoff relay control ckt.
P1389	No ASD Relay Output Voltage At PCM	No Z1 or Z2 voltage sensed when the auto shutdown relay is energized.
P1390 (M)	Timing Belt Skipped 1 Tooth or More	Relationship between Cam and Crank signals not correct.

POWERTRAIN CONTROL MODULE (Continued)

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P1391 (M)	Intermittent Loss of CMP or CKP	Loss of the Cam Position Sensor or Crank Position sensor has occurred. For PL 2.0L
P1398 (M)	Mis-Fire Adaptive Numerator at Limit	PCM is unable to learn the Crank Sensor's signal in preparation for Misfire Diagnostics. Probable defective Crank Sensor.
P1399	Wait To Start Lamp Circuit	An open or shorted condition detected in the Wait to Start Lamp circuit.
P1403	No 5 Volts to EGR Sensor	Loss of 5v feed to the EGR position sensor.
P1476	Too Little Secondary Air	Insufficient flow of secondary air injection detected during aspirator test.(was P0411)
P1477	Too Much Secondary Air	Excessive flow of secondary air injection detected during aspirator test (was P0411).
P1478 (M)	Battery Temp Sensor Volts Out of Limit	Internal temperature sensor input voltage out of an acceptable range.
P1479	Transmission Fan Relay Circuit	An open or shorted condition detected in the transmission fan relay circuit.
P1480	PCV Solenoid Circuit	An open or shorted condition detected in the PCV solenoid circuit.
P1481	EATX RPM Pulse Performance	ETAX RPM pulse generator signal for misfire detection does not correlate with expected value.
P1482	Catalyst Temperature Sensor Circuit Shorted Low	Catalyst temperature sensor circuit shorted low.
P1483	Catalyst Temperature Sensor Circuit Shorted High.	Catalyst temperature sensor circuit shorted high.
P1484	Catalytic Converter Overheat Detected	A catalyst overheat condition has been detected by the catalyst temperature sensor.
P1485	Air Injection Solenoid Circuit	An open or shorted condition detected in the air assist solenoid circuit.
P1486 (M)	Evap Leak Monitor Pinched Hose Found	LDP has detected a pinched hose in the evaporative hose system.
P1487	Hi Speed Rad Fan CTRL Relay Circuit	An open or shorted condition detected in the control circuit of the #2 high speed radiator fan control relay.
P1488	Auxiliary 5 Volt Supply Output Too Low	Auxiliary 5 volt sensor feed is sensed to be below an acceptable limit.
P1489 (M)	High Speed Fan CTRL Relay Circuit	An open or shorted condition detected in the control circuit of the high speed radiator fan control relay.
P1490 (M)	Low Speed Fan CTRL Relay Circuit	An open or shorted condition detected in control circuit of the low speed radiator fan control relay.
P1491	Rad Fan Control Relay Circuit	An open or shorted condition detected in the radiator fan control relay control circuit. This includes PWM solid state relays.
P1492 (M,G)	Ambient/Batt Temp Sen Volts Too High	External temperature sensor input above acceptable voltage.

POWERTRAIN CONTROL MODULE (Continued)

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P1493 (M,G)	Ambient/Batt Temp Sen Volts Too Low	External temperature sensor input below acceptable voltage.
P1494 (M)	Leak Detection Pump Sw or Mechanical Fault	Incorrect input state detected for the Leak Detection Pump (LDP) pressure switch.
P1495 (M)	Leak Detection Pump Solenoid Circuit	An open or shorted condition detected in the Leak Detection Pump (LDP) solenoid circuit.
P1496 (M)	5 Volt Supply, Output Too Low	5 volt sensor feed is sensed to be below an acceptable limit. (< 4v for 4 sec).
P1498	High Speed Rad Fan Ground CTRL Rly Circuit	An open or shorted condition detected in the control circuit of the #3 high speed radiator fan control relay.
P1594 (G)	Charging System Voltage Too High	Battery voltage sense input above target charging voltage during engine operation.
P1595	Speed Control Solenoid Circuits	An open or shorted condition detected in either of the speed control vacuum or vent solenoid control circuits.
P1596	Speed Control Switch Always High	Speed control switch input above maximum acceptable voltage.
P1597	Speed Control Switch Always Low	Speed control switch input below minimum acceptable voltage.
P1598	A/C Pressure Sensor Volts Too High	A/C pressure sensor input above maximum acceptable voltage.
P1599	A/C Pressure Sensor Volts Too Low	A/C pressure sensor input below minimum acceptable voltage.
P1602 (M)	PCM not Programmed	PCM not programmed (generic controller fault).
P1603	PCM Internal Dual Port Ram Communication	Dual port RAM communication link error.
P1604	PCM Internal Dual Port Ram Read/Write Integrity Failure	Dual port RAM read/write error.
P1607	PCM internal Shutdown Timer Rationality	A rationality error has been detected for the shutdown timer.
P1680	Clutch Released Switch Circuit	
P1681	No I/P Cluster CCD/J1850 Messages Received	No CCD/J1850 messages received from the cluster control module.
P1682 (G)	Charging System Voltage Too Low	Battery voltage sense input below target charging voltage during engine operation and no significant change in voltage detected during active test of generator output circuit.
P1683	SPD CTRL PWR Relay; or S/C 12v Driver CKT	An open or shorted condition detected in the speed control servo power control circuit. (SBECII: ext relay).
P1684	Battery Loss In The Last 50 Starts	The battery has been disconnected within the last 50 starts.
P1685	Skim Invalid Key	The engine controller has received an invalid key from the SKIM.

POWERTRAIN CONTROL MODULE (Continued)

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P1686	No SKIM BUS Messages Received	No CCD/J1850 messages received from the Smart Key Immobilizer Module (SKIM).
P1687	No MIC BUS Message	No CCD/J1850 messages received from the Mechanical Instrument Cluster (MIC) module.
P1693	DTC Detected in Companion Module	A fault has been generated in the companion engine control module.
P1694	Fault In Companion Module	No CCD/J1850 messages received from the powertrain control module-Aisin transmission.
P1695	No CCD/J1850 Message From Body Control Module	No CCD/J1850 messages received from the body control module.
P1696 (M)	PCM Failure EEPROM Write Denied	Unsuccessful attempt to write to an EEPROM location by the control module.
P1697 (M)	PCM Failure SRI Mile Not Stored	Unsuccessful attempt to update Service Reminder Indicator (SRI or EMR) mileage in the control module EEPROM.
P1698 (M)	No CCD/J1850 Message From TCM	No CCD/J1850 messages received from the electronic transmission control module (EATX) or the Aisin transmission controller.
P1719	Skip Shift Solenoid Circuit	An open or shorted condition detected in the transmission 2-3 gear lock-out solenoid control circuit.
P1740	TCC or O/D Solenoid Performance	Rationality error detected in either the torque convertor clutch or solenoid or overdrive solenoid system.
P1756	GOV Press Not Equal to Target @ 15-20 PSI	The requested pressure and the actual pressure are not within a tolerance band for the Governor Control System which is used to regulate governor pressure to control shifts for 1st, 2nd, and 3rd gear. (Mid Pressure Malfunction)
P1757	GOV Press Not Equal to Target @ 15-20 PSI	The requested pressure and the actual pressure are not within a tolerance band for the Governor Control System which is used to regulate governor pressure to control shifts for 1st, 2nd, and 3rd gear (Zero Pressure Malfunction)
P1762	Gov Press Sen Offset Volts Too Low or High	The Governor Pressure Sensor input is greater than a calibration limit or is less than a calibration limit for 3 consecutive park/neutral calibrations.
P1763	Governor Pressure Sensor Volts Too Hi	The Governor Pressure Sensor input is above an acceptable voltage level.
P1764	Governor Pressure Sensor Volts Too Low	The Governor Pressure Sensor input is below an acceptable voltage level.
P1765	Trans 12 Volt Supply Relay CTRL Circuit	An open or shorted condition is detected in the Transmission Relay control circuit. This relay supplies power to the TCC
P1899 (M)	P/N Switch Stuck in Park or in Gear	Incorrect input state detected for the Park/Neutral switch.

POWERTRAIN CONTROL MODULE (Continued)

(M) Check Engine Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P2008	Short Runner Valve Solenoid Circuit	An open or shorted condition detected in the short runner tuning valve control circuit.
P2302	Ignition Coil Secondary #1 Circuit	
P2305	Ignition Coil Secondary #2 Circuit	
P2308	Ignition Coil Secondary #3 Circuit	
P2311	Ignition Coil Secondary #4 Circuit	
P2314	Ignition Coil Secondary #5 Circuit	
P2317	Ignition Coil Secondary #6 Circuit	
P2320	Ignition Coil Secondary #7 Circuit	
P2323	Ignition Coil Secondary #8 Circuit	
P2503	Charging System Voltage Low	Charging system voltage below minimum acceptable voltage.

OPERATION - SENSOR RETURN - PCM INPUT

The sensor return circuit provides a low electrical noise ground reference for all of the systems sensors. The sensor return circuit connects to internal ground circuits within the Powertrain Control Module (PCM).

OPERATION - SCI RECEIVE - PCM INPUT

SCI Receive is the serial data communication receive circuit for the DRB scan tool. The Powertrain Control Module (PCM) receives data from the DRB through the SCI Receive circuit.

OPERATION - IGNITION SENSE - PCM INPUT

The ignition sense input informs the Powertrain Control Module (PCM) that the ignition switch is in the crank or run position.

PCM REPLACEMENT

DESCRIPTION

USE THE DRB SCAN TOOL TO REPROGRAM THE NEW PCM WITH THE VEHICLES ORIGINAL IDENTIFICATION NUMBER (VIN) AND THE VEHICLES ORIGINAL MILEAGE. IF THIS STEP IS NOT DONE A DIAGNOSTIC TROUBLE CODE (DTC) MAY BE SET.

OPERATION - PCM GROUND

Ground is provided through multiple pins of the PCM connector. Depending on the vehicle there may be as many as three different ground pins. There are power grounds and sensor grounds.

The power grounds are used to control the ground side of any relay, solenoid, ignition coil or injector. The signal ground is used for any input that uses sensor return for ground, and the ground side of any internal processing component.

The SBEC III case is shielded to prevent RFI and EMI. The PCM case is grounded and must be firmly attached to a good, clean body ground.

Internally all grounds are connected together, however there is noise suppression on the sensor ground. For EMI and RFI protection the case is also grounded separately from the ground pins.

OPERATION

OPERATION - 8-VOLT SUPPLY - PCM OUTPUT

The PCM supplies 8 volts to the crankshaft position sensor, camshaft position sensor.

OPERATION - 5 VOLT SUPPLY - PCM OUTPUT

The PCM supplies 5 volts to the following sensors:

- A/C pressure transducer
- Engine coolant temperature sensor
- Manifold absolute pressure sensor
- Throttle position sensor
- Linear EGR solenoid
- Battery temperature
- Knock sensor

POWERTRAIN CONTROL MODULE (Continued)

STANDARD PROCEDURE - OBTAINING DIAGNOSTIC TROUBLE CODES

BULB CHECK

Key on: Bulb illuminated until vehicle starts, as long as all once per trip (readiness) monitors completed. If monitors have **not** been completed, then: Key on: bulb check for about 8 seconds, lamp then flashes if once per trip (readiness) monitors have **not** been completed until vehicle is started, then MIL is extinguished.

OBTAINING DTC'S USING DRB SCAN TOOL

(1) Connect the DRB scan tool to the data link (diagnostic) connector. This connector is located in the passenger compartment; at the lower edge of instrument panel; near the steering column.

(2) Turn the ignition switch on and access the "Read Fault" screen.

(3) Record all the DTC's and "freeze frame" information shown on the DRB scan tool.

(4) To erase DTC's, use the "Erase Trouble Code" data screen on the DRB scan tool. **Do not erase any DTC's until problems have been investigated and repairs have been performed.**

OBTAINING DTC'S USING IGNITION KEY

(1) Cycle the ignition key On - Off - On - Off - On within 5 seconds.

(2) The Odometer will show the P-code for the DTC code number. Refer to the Emission section for the DTC chart for a detailed explanation of the DTC codes.

(3) If no DTC's are present, the cluster will display one of two texts: "P1684" and "done" or only "done".

• P1684 is only a status and indicates that the PCM memory has been cleared within the last 50 ignition cycles and does not indicate a problem.

• done indicates that NO DTCs are present and the procedure is complete.

REMOVAL

USE THE DRBIII® SCAN TOOL TO REPROGRAM THE NEW PCM WITH THE VEHICLES ORIGINAL IDENTIFICATION NUMBER (VIN) AND THE VEHICLES ORIGINAL MILEAGE. IF THIS STEP IS NOT DONE A DIAGNOSTIC TROUBLE CODE (DTC) MAY BE SET.

The PCM engine control strategy prevents reduced idle speeds until after the engine operates for 320 km (200 miles). If the PCM is replaced after 320 km (200 miles) of usage, update the mileage and vehicle identification number (VIN) in the new PCM. Use the DRBIII® scan tool to change the milage and VIN in the PCM. If this step is not done a diagnostic trouble code (DTC) may be set and SKIM must be done or car will not start if it is a SKIM equipped car. If a SKIM car you must do a secret key transfer also. Refer to the appropriate Powertrain Diagnostic Manual and the DRBIII® scan tool.

To avoid possible voltage spike damage to PCM, ignition key must be off, and the negative battery cable must be disconnected before unplugging the PCM connectors. Note radio programs.

(1) Disconnect the negative battery cable.

(2) Remove the air cleaner box.

(3) Disconnect PCM 2 40-way connector (Fig. 3).

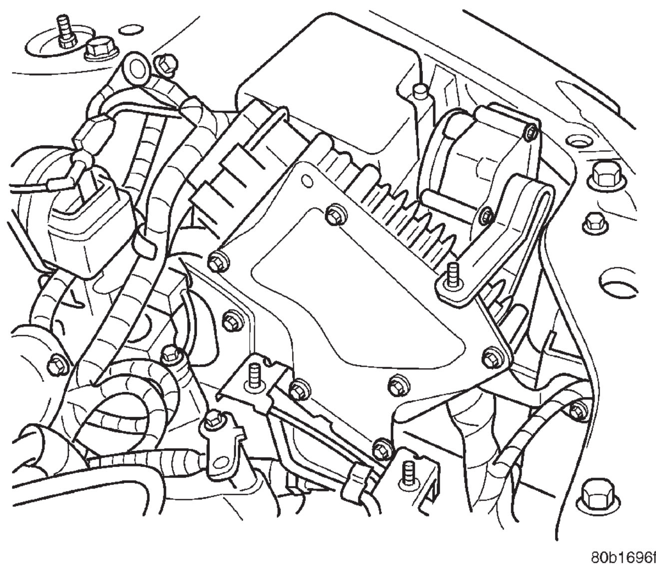

Fig. 3 PCM LOCATION

(4) Reposition wiring harness out of the way.

(5) Remove the 2 bolts and 1 nut and remove PCM and bracket (Fig. 4).

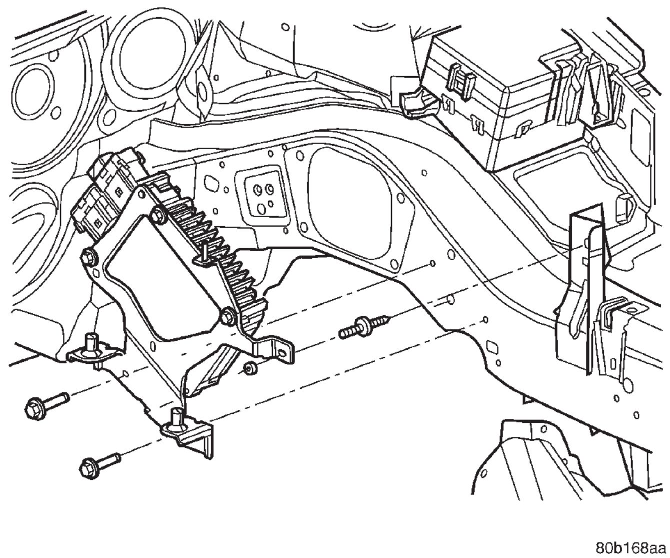

Fig. 4 PCM MOUNTING

POWERTRAIN CONTROL MODULE (Continued)

(6) Remove PCM from bracket (Fig. 5).

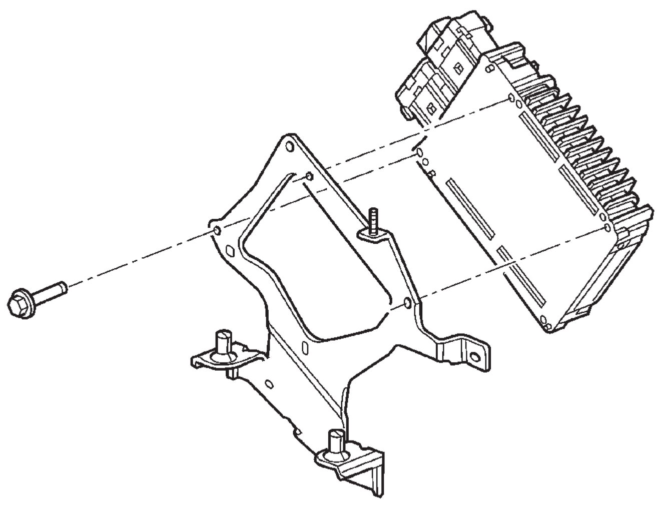

Fig. 5 PCM BRACKET

(7) Remove PCM.

INSTALLATION

The PCM engine control strategy prevents reduced idle speeds until after the engine operates for 320 km (200 miles). If the PCM is replaced after 320 km (200 miles) of usage, update the mileage and vehicle identification number (VIN) in the new PCM. Use the DRB® scan tool to change the millage and VIN in the PCM. If this step is not done a diagnostic trouble code (DTC) may be set and SKIM must be done or car will not start if it is a SKIM equipped car. If a SKIM car you must do a secret key transfer also. Refer to the appropriate Powertrain Diagnostic Manual and the DRB® scan tool.

(1) Install PCM to bracket (Fig. 5).

(2) Install PCM and bracket (Fig. 4). Tighten bolt to 4 N·m (35 in. lbs.) torque.

(3) Reposition wiring harness.

(4) Attach 2 40-way connector to PCM (Fig. 3).

(5) Connect negative battery cable and reprogram radio and clock.

(6) Using DRBIII® scan tool, program mileage and vehicle identification number (VIN) into PCM. Refer to the DRBIII® scan tool and the appropriate Powertrain Diagnostic Manual.

SENTRY KEY IMMOBILIZER MODULE

DESCRIPTION

The Sentry Key Immobilizer Module (SKIM) contains a Radio Frequency (RF) transceiver and a microprocessor. The SKIM retains in memory the ID numbers of any Sentry Key that is programmed to it. The maximum number of keys that may be programmed to each module is eight (8). The SKIM also communicates over the PCI bus with the Powertrain Control Module (PCM), the Body Control Module (BCM), and the DRB III® scan tool. The SKIM transmits and receives RF signals through a tuned antenna enclosed within a molded plastic ring formation that is integral to the SKIM housing. When the SKIM is properly installed on the steering column, the antenna ring fits snugly around the circumference of the ignition lock cylinder housing. If this ring is not mounted properly, communication problems may arise in the form of transponder-related faults.

For added system security, each SKIM is programmed with a unique ″Secret Key″ code. This code is stored in memory and is sent over the PCI bus to the PCM and to each key that is programmed to work with the vehicle. The ″Secret Key″ code is therefore a common element found in all components of the Sentry Key Immobilizer System (SKIS). In the event that a SKIM replacement is required, the ″Secret Key″ code can be restored from the PCM by following the SKIM replacement procedure found in the DRB III® scan tool. Proper completion of this task will allow the existing ignition keys to be reprogrammed. Therefore, new keys will NOT be needed. In the event that the original ″Secret Key″ code can not be recovered, new ignition keys will be required. The DRB III® scan tool will alert the technician if key replacement is necessary. Another security code, called a PIN, is used to gain secured access to the SKIM for service. The SKIM also stores in its memory the Vehicle Identification Number (VIN), which it learns through a bus message from the assembly plant tester. The SKIS scrambles the information that is communicated between its components in order to reduce the possibility of unauthorized SKIM access and/or disabling.

SENTRY KEY IMMOBILIZER MODULE (Continued)

OPERATION

When the ignition switch is moved to the RUN position, the SKIM transmits an RF signal to the transponder in the ignition key. The SKIM then waits for a response RF signal from the transponder in the key. If the response received identifies the key as valid, the SKIM sends a ″valid key″ message to the PCM over the PCI bus. If the response received identifies the key as invalid or no response is received from the transponder in the ignition key, the SKIM sends an ″invalid key″ message to the PCM. The PCM will enable or disable engine operation based upon the status of the SKIM messages. It is important to note that the default condition in the PCM is ″invalid key.″ Therefore, if no response is received by the PCM, the engine will be immobilized after two (2) seconds of running.

The SKIM also sends indicator light status messages to the BCM to operate the light. This is the method used to turn the light ON solid or to flash it after the indicator light test is complete to signify a fault in the SKIS. If the light comes ON and stays ON solid after the indicator light test, this signifies that the SKIM has detected a system malfunction and/or that the SKIS has become inoperative. If the SKIM detects an invalid key **OR** a key-related fault exists, the indicator light will flash following the indicator light test. The SKIM may also request an audible chime if the customer key programming feature is available and the procedure is being utilized. Refer to Electrical, Vehicle Theft Security, Transponder Key, Standard Procedure - Transponder Programming.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative remote cable.

(2) Remove knee bolster (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).

(3) Remove the steering column upper and lower shrouds (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).

(4) Disengage the steering column wire harness from the Sentry Key Immobilizer Module (SKIM).

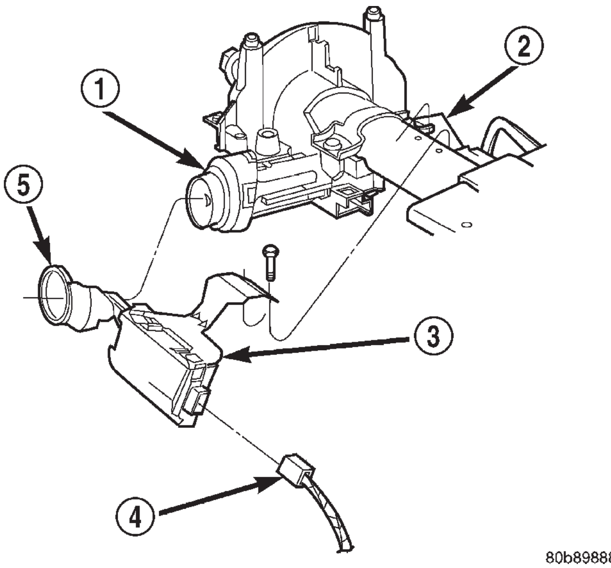

Fig. 6 SKIM Remove/Install

1 - IGNITION KEY CYLINDER
2 - STEERING COLUMN
3 - SENTRY KEY IMMOBILIZER MODULE (SKIM)
4 - SKIM CONNECTOR
5 - SKIM ANTENNA

(5) Remove the two screws securing the SKIM module to the top of the steering column.

(6) Rotate the SKIM and its mounting bracket upwards and then to the side away from the steering column to slide the SKIM antenna ring from around the ignition switch lock cylinder housing.

(7) Remove the SKIM from the vehicle.

INSTALLATION

(1) If the SKIM is replaced with a new unit, a DRB lll® scan tool MUST be used to initialize the new SKIM and to program at least two Sentry Key transponders. (Refer to 8 - ELECTRICAL/VEHICLE THEFT SECURITY - STANDARD PROCEDURE) Sentry Key Immobilizer Module Initialization.

(2) Carefully position the SKIM, the mounting bracket and the antenna ring onto the steering column.

(3) Install the two retaining screws (Fig. 6).

(4) Connect the wire harness connector.

(5) Install the steering column upper and lower shrouds (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - INSTALLATION).

(6) Install the knee bolster (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).

(7) Connect the battery negative remote cable.

TRANSMISSION CONTROL MODULE

DESCRIPTION

The Transmission Control Module (TCM) is located between the Power Distribution Center (PDC) and the left headlamp assembly, in the left side of the engine compartment (Fig. 7).

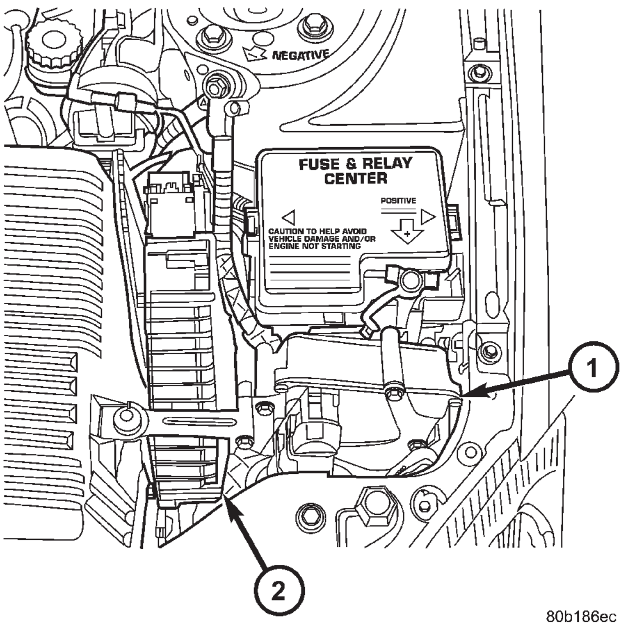

Fig. 7 Transmission Control Module Location

1 - TRANSMISSION CONTROL MODULE (TCM)
2 - POWERTRAIN CONTROL MODULE (PCM)

OPERATION

The TCM is the controlling unit for all electronic operations of the transaxle. The TCM receives information regarding vehicle operation from both direct and indirect inputs, and selects the operational mode of the transaxle. Direct inputs are hardwired to, and used specifically by the TCM. Indirect inputs originate from other components/modules, and are shared with the TCM via the J1850 communication bus.

Some examples of **direct inputs** to the TCM are:

- Battery (B+) voltage
- Ignition “ON” voltage
- Transmission Control Relay (Switched B+)
- Throttle Position Sensor
- Crankshaft Position Sensor (CKP)
- Transmission Range Sensor (TRS)
- Pressure Switches (L/R, 2/4, OD)
- Transmission Temperature Sensor (Integral to TRS)
- Input Shaft Speed Sensor
- Output Shaft Speed Sensor

Some examples of **indirect inputs** to the TCM are:

- Engine/Body Identification
- Manifold Pressure
- Target Idle
- Torque Reduction Confirmation
- Speed Control ON/OFF Switch
- Engine Coolant Temperature
- Ambient/Battery Temperature
- Brake Switch Status
- DRB Communication

Based on the information received from these various inputs, the TCM determines the appropriate shift schedule and shift points, depending on the present operating conditions and driver demand. This is possible through the control of various direct and indirect outputs.

Some examples of TCM **direct outputs** are:

- Transmission Control Relay
- Solenoids (LR/CC, 2/4, OD and UD)
- Vehicle Speed (to PCM)
- Torque Reduction Request (to PCM)

An example of a TCM **indirect output** is:

- Transmission Temperature (to PCM)

In addition to monitoring inputs and controlling outputs, the TCM has other important responsibilities and functions:

- Storing and maintaining Clutch Volume Indices (CVI)
- Storing and selecting appropriate Shift Schedules
- System self-diagnostics
- Diagnostic capabilities (with DRB scan tool)

CLUTCH VOLUME INDEX (CVI)

An important function of the TCM is to monitor Clutch Volume Index (CVI). CVIs represent the volume of fluid needed to compress a clutch pack.

The TCM monitors gear ratio changes by monitoring the Input and Output Speed Sensors. The Input, or Turbine Speed Sensor sends an electrical signal to the TCM that represents input shaft rpm. The Output Speed Sensor provides the TCM with output shaft speed information.

By comparing the two inputs, the TCM can determine transaxle gear ratio. This is important to the CVI calculation because the TCM determines CVIs by monitoring how long it takes for a gear change to occur (Fig. 8).

TRANSMISSION CONTROL MODULE (Continued)

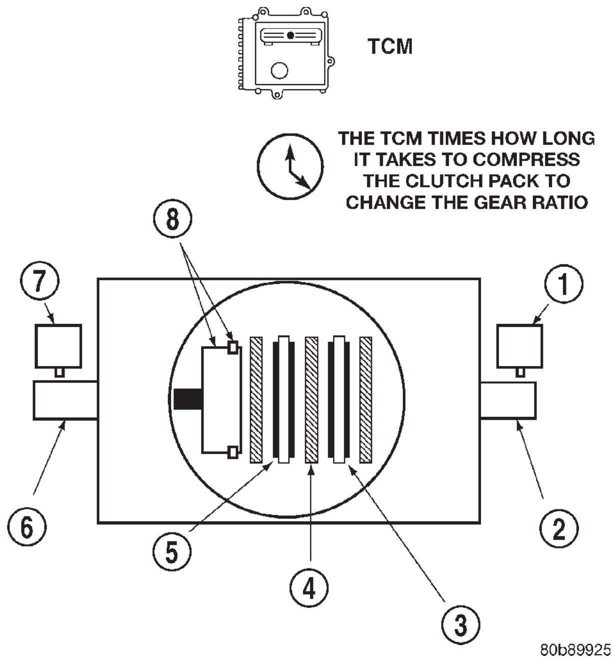

Fig. 8 Example of CVI Calculation

1 - OUTPUT SPEED SENSOR
2 - OUTPUT SHAFT
3 - CLUTCH PACK
4 - SEPARATOR PLATE
5 - FRICTION DISCS
6 - INPUT SHAFT
7 - INPUT SPEED SENSOR
8 - PISTON AND SEAL

Gear ratios can be determined by using the DRB Scan Tool and reading the Input/Output Speed Sensor values in the “Monitors” display. Gear ratio can be obtained by dividing the Input Speed Sensor value by the Output Speed Sensor value.

For example, if the input shaft is rotating at 1000 rpm and the output shaft is rotating at 500 rpm, then the TCM can determine that the gear ratio is 2:1. In direct drive (3rd gear), the gear ratio changes to 1:1. The gear ratio changes as clutches are applied and released. By monitoring the length of time it takes for the gear ratio to change following a shift request, the TCM can determine the volume of fluid used to apply or release a friction element.

The volume of transmission fluid needed to apply the friction elements are continuously updated for adaptive controls. As friction material wears, the volume of fluid need to apply the element increases.

Certain mechanical problems within the clutch assemblies (broken return springs, out of position snap rings, excessive clutch pack clearance, improper assembly, etc.) can cause inadequate or out-of-range clutch volumes. Also, defective Input/Output Speed Sensors and wiring can cause these conditions. The following chart identifies the appropriate clutch volumes and when they are monitored/updated:

CLUTCH VOLUMES				
Clutch	When Updated			Proper Clutch Volume
	Shift Sequence	Oil Temperature	Throttle Angle	
L/R	2-1 or 3-1 coast downshift	> 70°	< 5°	35 to 83
2/4	1-2 shift	> 110°	5 - 54°	20 to 77
OD	2-3 shift			48 to 150
UD	4-3 or 4-2 shift		> 5°	24 to 70

TRANSMISSION CONTROL MODULE (Continued)

SHIFT SCHEDULES

As mentioned earlier, the TCM has programming that allows it to select a variety of shift schedules. Shift schedule selection is dependent on the following:

- Shift lever position
- Throttle position
- Engine load
- Fluid temperature
- Software level

As driving conditions change, the TCM appropriately adjusts the shift schedule. Refer to the following chart to determine the appropriate operation expected, depending on driving conditions.

Schedule	Condition	Expected Operation
Extreme Cold	Oil temperature at start-up below -16° F	Park, Reverse, Neutral and 2nd gear only (prevents shifting which may fail a clutch with frequent shifts)
Cold	Oil temperature at start-up above -12° F and below 36° F	– Delayed 2-3 upshift (approximately 22-31 mph) – Delayed 3-4 upshift (45-53 mph) – Early 4-3 costdown shift (approximately 30 mph) – Early 3-2 coastdown shift (approximately 17 mph) – High speed 4-2, 3-2, 2-1 kickdown shifts are prevented – No EMCC
Warm	Oil temperature at start-up above 36° F and below 80 degree F	– Normal operation (upshift, kickdowns, and coastdowns) – No EMCC
Hot	Oil temperature at start-up above 80° F	– Normal operation (upshift, kickdowns, and coastdowns) – Full EMCC, no PEMCC except to engage FEMCC (except at closed throttle at speeds above 70-83 mph)
Overheat	Oil temperature above 240° F or engine coolant temperature above 244° F	– Delayed 2-3 upshift (25-32 mph) – Delayed 3-4 upshift (41-48 mph) – 3rd gear FEMCC from 30-48 mph – 3rd gear PEMCC from 27-31 mph
Super Overheat	Oil temperature above 260° F	– All ″Overheat″ shift schedule features apply – 2nd gear PEMCC above 22 mph – Above 22 mph the torque converter will not unlock unless the throttle is closed or if a wide open throttle 2nd PEMCC to 1 kickdown is made

STANDARD PROCEDURE

STANDARD PROCEDURE - PINION FACTOR SETTING

NOTE: This procedure must be performed if the Transmission Control Module (TCM) has been replaced with a NEW or replacement unit. Failure to perform this procedure will result in an inoperative or improperly calibrated speedometer.

The vehicle speed readings for the speedometer are taken from the output speed sensor. The TCM must be calibrated to the different combinations of equipment (final drive and tires) available. Pinion Factor allows the technician to set the Transmission Control Module initial setting so that the speedometer readings will be correct. To properly read and/or reset the Pinion Factor, it is necessary to use a DRBIII® scan tool.

(1) Plug the DRBIII® scan tool into the diagnostic connector located under the instrument panel.

(2) Select the Transmission menu.

(3) Select the Miscellaneous menu.

(4) Select Pinion Factor. Then follow the instructions on the DRBIII® scan tool screen.

STANDARD PROCEDURE - QUICK LEARN PROCEDURE

The quick learn procedure requires the use of the DRBIII® scan tool. This program allows the electronic transaxle system to recalibrate itself. This will provide the best possible transaxle operation.

NOTE: The quick learn procedure should be performed if any of the following procedures are performed:

- Transaxle Assembly Replacement
- Transmission Control Module Replacement
- Solenoid/Pressure Switch Assembly Replacement
- Clutch Plate and/or Seal Replacement
- Valve Body Replacement or Recondition

To perform the Quick Learn Procedure, the following conditions must be met:

- The brakes must be applied
- The engine speed must be above 500 rpm
- The throttle angle (TPS) must be less than 3 degrees
- The shift lever position must stay until prompted to shift to overdrive
- The shift lever position must stay in overdrive after the Shift to Overdrive prompt until the DRBIII® indicates the procedure is complete
- The calculated oil temperature must be above 60° and below 200°

(1) Plug the DRBIII® scan tool into the diagnostic connector. The connector is located under the instrument panel.

(2) Go to the Transmission screen.

(3) Go to the Miscellaneous screen.

(4) Select Quick Learn Procedure. Follow the instructions of the DRBIII® to perform the Quick Learn Procedure.

REMOVAL

NOTE: If the transmission control module (TCM) is being replaced with a new or replacement unit, the Pinion Factor and Quick Learn procedures must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE) (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Disconnect battery negative cable at strut tower.

(2) Remove air cleaner assembly and transmission control module (TCM)-to-powertrain control module (PCM) bracket nut.

(3) Partially remove air cleaner assembly to clear PCM bracket stud.

(4) Remove TCM-to-PDC bracket screw (Fig. 9).

(5) Partially remove TCM/mounting bracket assembly and disconnect TCM 60-way connector.

(6) Remove TCM/mounting bracket assembly (Fig. 9).

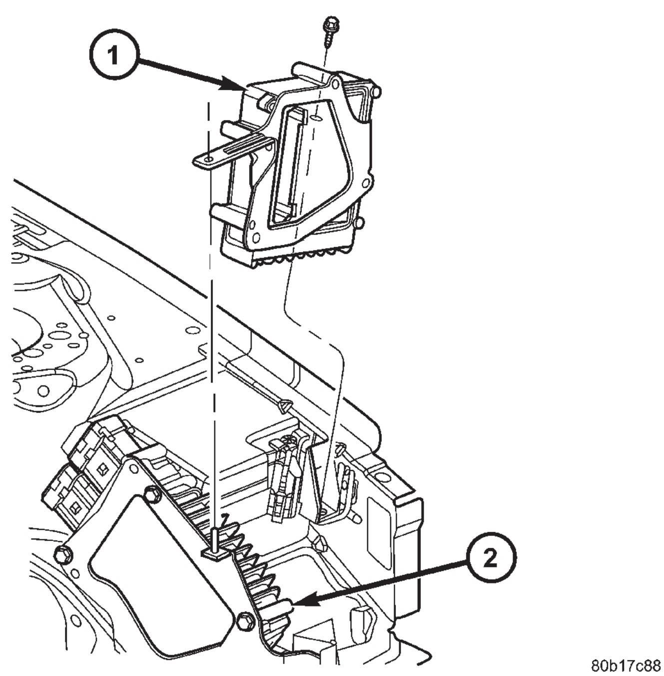

Fig. 9 TCM/Bracket Assembly

1 - TCM/MOUNTING BRACKET
2 - POWERTRAIN CONTROL MODULE (PCM)

TRANSMISSION CONTROL MODULE (Continued)

(7) Remove TCM mounting bracket from TCM (Fig. 10).

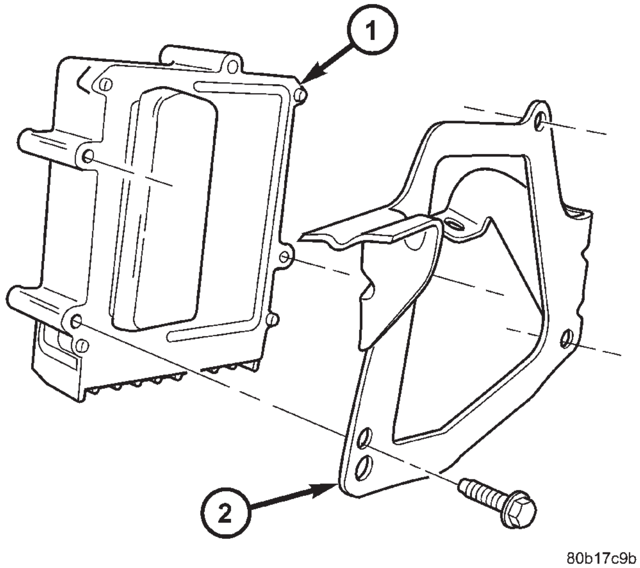

Fig. 10 TCM and Mounting Bracket

1 - TRANSMISSION CONTROL MODULE (TCM)
2 - MOUNTING BRACKET

INSTALLATION

NOTE: If transmission control module is being replaced with a new or replacement unit, the Pinion Factor and Quick Learn procedures must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE) (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Install TCM mounting bracket to TCM (Fig. 10) and torque screws to 11 N·m (72 in. lbs.).

(2) Install TCM 60-way connector and torque to 4 N·m (35 in. lbs.).

(3) Install TCM/bracket into position (Fig. 9).

(4) Install and torque TCM bracket-to-PDC bracket mounting screw to 5 N·m (40 in. lbs.).

(5) Install air cleaner assembly into position.

(6) Install and torque air cleaner-to-PCM stud nut to 5 N·m (40 in. lbs.).

(7) Connect battery negative cable.

ENGINE SYSTEMS

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BATTERY SYSTEM

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BATTERY SYSTEM

DESCRIPTION

A single 12-volt battery system is standard factory-installed equipment on this model. All of the components of the battery system are located in the front of the vehicle, just ahead of the left front wheel and tire assembly. The service information for the battery system in this vehicle covers the following related components, which are covered in further detail later in this section:

- **Battery** - The storage battery provides a reliable means of storing a renewable source of electrical energy within the vehicle.
- **Battery Cables** - The battery cables connect the batteries positive and negative terminals to the vehicle electrical system.
- **Battery Hold-down** - The battery hold-down hardware secures the battery in the battery tray.

BATTERY SYSTEM (Continued)

- **Battery Heater Blanket** - The battery heater blanket is used to improve battery cold start ability.
- **Battery Tray** - The battery tray provides a secure mounting location in the vehicle for the battery and in some applications, an anchor point for the battery hold-down hardware.

For battery system maintenance schedules and jump starting procedures, refer to the owner's manual in the vehicle glove box. Optionally, refer to the Lubrication and Maintenance section of the service manual for the proper battery jump starting procedures. While battery charging can be considered a maintenance procedure, the battery charging procedures and related information are located in the standard procedures section of this service manual. Refer to Standard Procedures for the proper battery charging procedures.

OPERATION

The battery system is designed to provide a safe, efficient, reliable and mobile means of delivering and storing electrical energy. This electrical energy is required to operate the engine starting system, as well as to operate many of the other vehicle accessory systems for limited durations while the engine and/or the charging system are not operating. The battery system is also designed to provide a reserve of electrical energy to supplement the charging system for short durations while the engine is running and the electrical current demands of the vehicle exceed the output of the charging system. In addition to delivering, and storing electrical energy for the vehicle, the battery system serves as a capacitor and voltage stabilizer for the vehicle electrical system. It absorbs most abnormal or transient voltages caused by the switching of any of the electrical components or circuits in the vehicle.

DIAGNOSIS AND TESTING - BATTERY SYSTEM

The battery, starting, and charging systems in the vehicle operate with one another and must be tested as a single complete system. In order for the engine to start and the battery to charge properly, all of the components that are used in these systems must perform within specifications. It is important that the battery, starting, and charging systems be thoroughly tested and inspected any time a battery needs to be charged or replaced. The cause of abnormal battery discharge, overcharging or early battery failure must be diagnosed and corrected before a battery is replaced and before a vehicle is returned to service. The service information for these systems has been separated within this service manual to make it easier to locate the specific information you are seeking. However, when attempting to diagnose any of these systems, it is important that you keep their interdependency in mind.

The diagnostic procedures used for the battery, starting, and charging systems include the most basic conventional diagnostic methods, to the more sophisticated On-Board Diagnostics (OBD) built into the Powertrain Control Module (PCM). Use of an induction-type milliampere ammeter, a volt/ohmmeter, a battery charger, a carbon pile rheostat (load tester) and a 12-volt test lamp may be required. All OBD-sensed systems are monitored by the PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC). The PCM will store a DTC in electronic memory for any failure it detects. Refer to Charging System for the proper charging system on-board diagnostic test procedures.

MICRO 420 ELECTRICAL SYSTEM TESTER

The Micro420 automotive battery and charging system tester is designed to help the dealership technicians diagnose the cause of a defective battery. Follow the instruction manual supplied with the tester to properly diagnose a vehicle. If the instruction manual is not available refer to the standard procedure in this section, which includes the directions for using the Micro420 electrical system tester.

BATTERY SYSTEM (Continued)

BATTERY SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
THE BATTERY SEEMS WEAK OR DEAD WHEN ATTEMPTING TO START THE ENGINE.	1. The battery has an incorrect size or rating for this vehicle.	1. Refer to Battery Specifications for the proper size and rating. Replace an incorrect battery, as required.
	2. The battery is physically damaged.	2. Inspect the battery for loose terminal posts or a cracked and leaking case. Replace the damaged battery, as required.
	3. The battery terminal connections are loose or corroded.	3. Refer to Battery Cable for the proper cable diagnosis and testing procedures. Clean and tighten the battery terminal connections, as required.
	4. The battery is discharged.	4. Determine the battery state-of-charge. Refer to Standard Procedures for the proper test procedures. Charge the faulty battery, as required.
	5. The electrical system ignition-off draw is excessive.	5. Refer to Standard Procedures for the proper test procedures. Repair the faulty electrical system, as required.
	6. The battery is faulty.	6. Determine the battery cranking capacity. Refer to Standard Procedures for the test procedures. Replace the faulty battery, as required.
	7. The starting system is faulty.	7. Determine if the starting system is performing to specifications. Refer to Starting System for the proper starting system diagnosis and testing procedures. Repair the faulty starting system, as required.
	8. The charging system is faulty.	8. Determine if the charging system is performing to specifications. Refer to Charging System for the proper charging system diagnosis and testing procedures. Repair the faulty charging system, as required.

BATTERY SYSTEM (Continued)

BATTERY SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
THE BATTERY STATE OF CHARGE CANNOT BE MAINTAINED.	1. The battery has an incorrect size or rating for this vehicle.	1. Refer to Battery Specifications for the proper specifications. Replace an incorrect battery, as required.
	2. The battery terminal connections are loose or corroded.	2. Refer to Battery Cable for the proper cable diagnosis and testing procedures. Clean and tighten the battery terminal connections, as required.
	3. The generator drive belt is slipping.	3. Refer to Cooling System for the proper accessory drive belt diagnosis and testing procedures. Replace or adjust the faulty generator drive belt, as required.
	4. The electrical system ignition-off draw is excessive.	4. Refer to Standard Procedures for the proper test procedures. Repair the faulty electrical system, as required.
	5. The battery is faulty.	5. Determine the battery cranking capacity. Refer to Standard Procedures for the proper test procedures. Replace the faulty battery, as required.
	6. The starting system is faulty.	6. Determine if the starting system is performing to specifications. Refer to Starting System for the proper starting system diagnosis and testing procedures. Repair the faulty starting system, as required.
	7. The charging system is faulty.	7. Determine if the charging system is performing to specifications. Refer to Charging System for the proper charging system diagnosis and testing procedures. Repair the faulty charging system, as required.
	8. Electrical loads exceed the output of the charging system.	8. Inspect the vehicle for aftermarket electrical equipment which might cause excessive electrical loads.
	9. Slow driving or prolonged idling with high-amperage draw systems in use.	9. Advise the vehicle operator, as required.
THE BATTERY WILL NOT ACCEPT A CHARGE.	1. The battery is faulty.	1. Refer to Standard Procedures for the proper battery charging procedures. Charge or replace the faulty battery, as required.

ABNORMAL BATTERY DISCHARGING

Any of the following conditions can result in abnormal battery discharging:

- Corroded or loose battery posts and terminal clamps.
- A loose or worn generator drive belt.
- Electrical loads that exceed the output of the charging system. This can be due to equipment installed after manufacture, or repeated short trip use.
- Slow driving speeds (heavy traffic conditions) or prolonged idling, with high-amperage draw systems in use.
- A faulty circuit or component causing excessive ignition-off draw.
- A faulty or incorrect charging system component. Refer to Charging System for the proper charging system diagnosis and testing procedures.

BATTERY SYSTEM (Continued)

• A faulty or incorrect starting system component. Refer to Starting System for the proper starting system diagnosis and testing procedures.
• A faulty or incorrect battery. Refer to Standard Procedures for the proper battery diagnosis and testing procedures. Refer to Battery System Specifications for the proper specifications.

CLEANING

The following information details the recommended cleaning procedures for the battery and related components. In addition to the maintenance schedules found in this service manual and the owner's manual, it is recommended that these procedures be performed any time the battery or related components must be removed for vehicle service.

(1) Clean the battery cable terminals of all corrosion. Remove any corrosion using a wire brush or cleaning tool, and a sodium bicarbonate (baking soda) and warm water cleaning solution.

(2) Clean the battery tray and battery holddown hardware of all corrosion. Remove any corrosion using a wire brush and a sodium bicarbonate (baking soda) and warm water cleaning solution. Paint any exposed bare metal.

(3) If the removed battery is to be reinstalled, clean the outside of the battery case and the top cover with a sodium bicarbonate (baking soda) and warm water cleaning solution using a stiff bristle parts cleaning brush to remove any acid film (Fig. 1). Rinse the battery with clean water. Ensure that the cleaning solution does not enter the battery cells through the vent holes. If the battery is being replaced, refer to Battery System Specifications for the factory-installed battery specifications. Confirm that the replacement battery is the correct size and has the correct ratings for the vehicle.

(4) If equipped, clean the battery heater blanket with a sodium bicarbonate (baking soda) and warm water cleaning solution using a stiff bristle parts cleaning brush to remove any acid film.

(5) Clean any corrosion from the battery terminals with a wire brush or terminal cleaner, and a sodium bicarbonate (baking soda) and warm water cleaning solution.

INSPECTION

The following information details the recommended inspection procedures for the battery and related components. In addition to the maintenance schedules found in this service manual and the owner's manual, it is recommended that these procedures be performed any time the battery or related components must be removed for vehicle service.

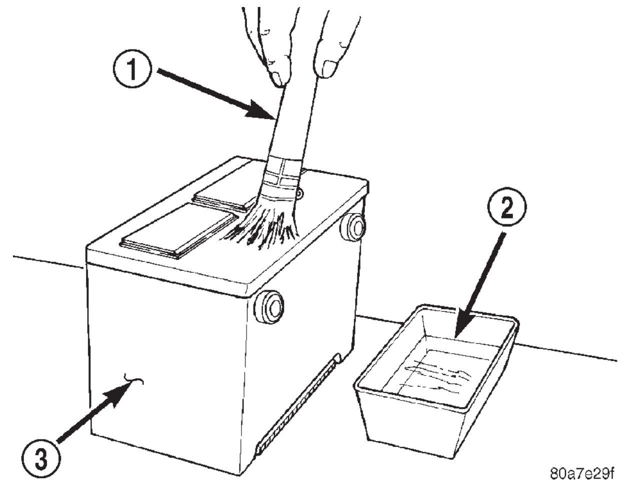


Fig. 1 CLEANING BATTERY

1 - CLEANING BRUSH
2 - WARM WATER AND BAKING SODA SOLUTION
3 - BATTERY

(1) Inspect the battery cable terminals for damage. Replace any battery cable that has a damaged or deformed terminal.

(2) Inspect the battery tray and battery hold down hardware for damage. Replace any damaged parts.

(3) If equipped, slide the battery heater blanket off of the battery case. Inspect the battery case for cracks or other damage that could result in electrolyte leaks. Also, check the battery terminals for looseness. Batteries with damaged cases or loose terminals must be replaced.

(4) If equipped, inspect the battery heater blanket for tears, cracks, deformation or other damage. Replace any battery heater blanket that has been damaged.

(5) If equipped, inspect the battery built-in test indicator sight glass for an indication of the battery condition. If the battery is discharged, charge as required. Refer to Standard Procedures for the proper battery built-in indicator test procedures. Also refer to Standard Procedures for the proper battery charging procedures.

SPECIFICATIONS - BATTERY SYSTEM

The battery Group Size number, the Cold Cranking Amperage (CCA) rating, and the Reserve Capacity (RC) rating or Ampere-Hours (AH) rating can be found on the original equipment battery label. Be certain that a replacement battery has the correct Group Size number, as well as CCA, and RC or AH ratings that equal or exceed the original equipment specification for the vehicle being serviced. Battery sizes and ratings are discussed in more detail below.

• **Group Size** - The outside dimensions and terminal placement of the battery conform to standards

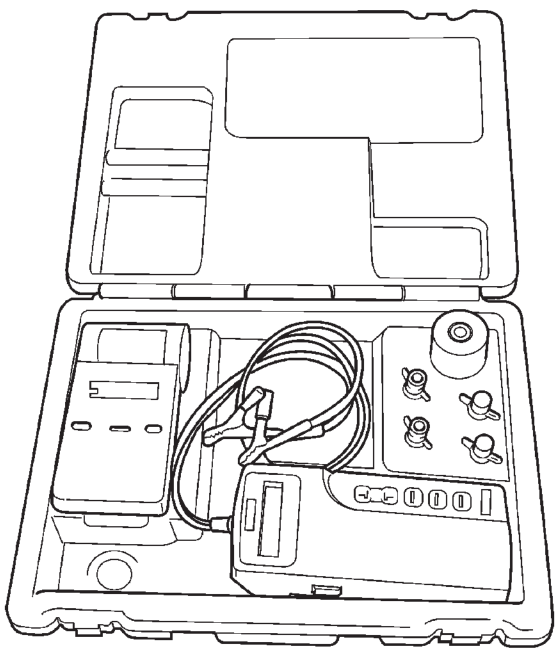
BATTERY SYSTEM (Continued)

established by the Battery Council International (BCI). Each battery is assigned a BCI Group Size number to help identify a correctly-sized replacement.

- **Cold Cranking Amperage** - The Cold Cranking Amperage (CCA) rating specifies how much current (in amperes) the battery can deliver for thirty seconds at -18° C (0° F). Terminal voltage must not fall below 7.2 volts during or after the thirty second discharge period. The CCA required is generally higher as engine displacement increases, depending also upon the starter current draw requirements.
- **Reserve Capacity** - The Reserve Capacity (RC) rating specifies the time (in minutes) it takes for battery terminal voltage to fall below 10.5 volts, at a discharge rate of 25 amperes. RC is determined with the battery fully-charged at 26.7° C (80° F). This rating estimates how long the battery might last after a charging system failure, under minimum electrical load.
- **Ampere-Hours** - The Ampere-Hours (AH) rating specifies the current (in amperes) that a battery can deliver steadily for twenty hours, with the voltage in the battery not falling below 10.5 volts. This rating is also sometimes identified as the twenty-hour discharge rating.

BATTERY CLASSIFICATIONS & RATINGS					
Part Number	BCI Group Size Classification	Cold Cranking Amperage	Reserve Capacity	Ampere - Hours	Load Test Amperage
N/A	75	510	110 Minutes	60	260

SPECIAL TOOLS



MICRO 420 BATTERY AND CHARGING SYSTEM TESTER

BATTERY

DESCRIPTION

Maintenance-free batteries have non-removable battery vent caps (Fig. 2). Water cannot be added to this battery. Under normal service the composition of this battery reduces gassing and water loss at normal charge rates. If the battery electrolyte level becomes low, this battery must be replaced.

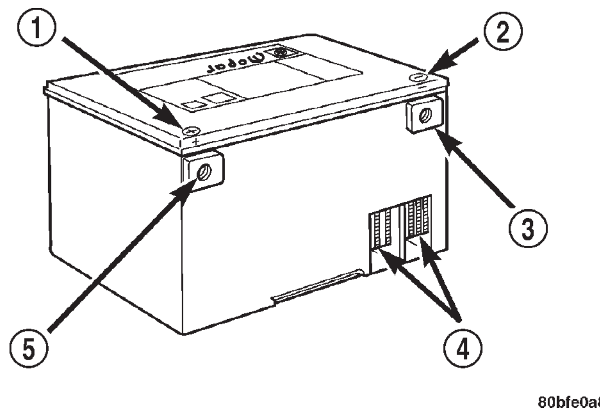


Fig. 2 JR BATTERY

1 - (+) POLARITY SYMBOL
2 - (–) POLARITY SYMBOL
3 - NEGATIVE TERMINAL
4 - INTERNAL BATTERY PLATES
5 - POSITIVE TERMINAL

The battery is a device used to store electrical energy potential in a chemical form. When an electrical load is applied to the battery terminals, an electrochemical reaction occurs within the battery. This reaction causes the battery to discharge electrical current.

The battery is made up of six individual cells that are connected in series. Each cell contains positive charged plate groups made of lead oxide, and negatively charged plate groups made of sponge lead. The dissimilar metal plates are submerged in a sulfuric acid and water solution called an electrolyte.

BATTERY (Continued)

OPERATION

The battery is designed to store electrical energy in a chemical form. When an electrical load is applied to the terminals of the battery, an electrochemical reaction occurs. This reaction causes the battery to discharge electrical current from its terminals. As the battery discharges, a gradual chemical change takes place within each cell. The sulfuric acid in the electrolyte combines with the plate materials, causing both plates to slowly change to lead sulfate. At the same time, oxygen from the positive plate material combines with hydrogen from the sulfuric acid, causing the electrolyte to become mainly water. The chemical changes within the battery are caused by the movement of excess or free electrons between the positive and negative plate groups. This movement of electrons produces a flow of electrical current through the load device attached to the battery terminals.

As the plate materials become more similar chemically, and the electrolyte becomes less acid, the voltage potential of each cell is reduced. However, by charging the battery with a voltage higher than that of the battery itself, the battery discharging process is reversed. Charging the battery gradually changes the sulfated lead plates back into sponge lead and lead dioxide, and the water back into sulfuric acid. This action restores the difference in the electron charges deposited on the plates, and the voltage potential of the battery cells. For a battery to remain useful, it must be able to produce high-amperage current over an extended period. A battery must also be able to accept a charge, so that its voltage potential may be restored.

The battery is vented to release excess hydrogen gas that is created when the battery is being charged or discharged. However, even with these vents, hydrogen gas can collect in or around the battery. If hydrogen gas is exposed to flame or sparks, it may ignite. If the electrolyte level is low, the battery may arc internally and explode. If the battery is equipped with removable cell caps, add distilled water whenever the electrolyte level is below the top of the plates. If the battery cell caps cannot be removed, the battery must be replaced if the electrolyte level becomes low.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - BATTERY

The battery must be completely charged and the terminals should be properly cleaned and inspected before diagnostic procedures are performed. Refer to Battery System Cleaning for the proper cleaning procedures, and Battery System Inspection for the proper battery inspection procedures. Refer to Standard Procedures for the proper battery charging procedures.

MICRO 420 ELECTRICAL SYSTEM TESTER

The Micro420 automotive battery tester is designed to help the dealership technicians diagnose the cause of a defective battery. Follow the instruction manual supplied with the tester to properly diagnose a vehicle. If the instruction manual is not available refer to the standard procedure in this section, which includes the directions for using the Micro420 electrical system tester.

WARNING: IF THE BATTERY SHOWS SIGNS OF FREEZING, LEAKING OR LOOSE POSTS, DO NOT TEST, ASSIST-BOOST, OR CHARGE. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: EXPLOSIVE HYDROGEN GAS FORMS IN AND AROUND THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR THE BATTERY. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: THE BATTERY CONTAINS SULFURIC ACID, WHICH IS POISONOUS AND CAUSTIC. AVOID CONTACT WITH THE SKIN, EYES, OR CLOTHING. IN THE EVENT OF CONTACT, FLUSH WITH WATER AND CALL A PHYSICIAN IMMEDIATELY. KEEP OUT OF THE REACH OF CHILDREN.

A battery that will not accept a charge is faulty, and must be replaced. Further testing is not required. A fully-charged battery must be load tested to determine its cranking capacity. A battery that is fully-charged, but does not pass the load test, is faulty and must be replaced.

NOTE: Completely discharged batteries may take several hours to accept a charge. Refer to Standard Procedures for the proper battery charging procedures.

BATTERY (Continued)

DIAGNOSIS AND TESTING - BATTERY

The battery must be completely charged and the top, posts and terminal clamps should be properly cleaned and inspected before diagnostic procedures are performed. Refer to Battery System Cleaning for the proper cleaning procedures, and Battery System Inspection for the proper battery inspection procedures. Refer to Standard Procedures for the proper battery charging procedures.

WARNING: IF THE BATTERY SHOWS SIGNS OF FREEZING, LEAKING OR LOOSE POSTS, DO NOT TEST, ASSIST-BOOST, OR CHARGE. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: EXPLOSIVE HYDROGEN GAS FORMS IN AND AROUND THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR THE BATTERY. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

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WARNING: IF THE BATTERY IS EQUIPPED WITH REMOVABLE CELL CAPS, BE CERTAIN THAT EACH OF THE CELL CAPS ARE IN PLACE AND TIGHT BEFORE THE BATTERY IS RETURNED TO SERVICE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT FROM LOOSE OR MISSING CELL CAPS.

The condition of a battery is determined by two criteria:

- **State-Of-Charge** - This can be determined by checking the specific gravity of the battery electrolyte (built-in indicator test or hydrometer test), or by checking the battery voltage (open-circuit voltage test).
- **Cranking Capacity** - This can be determined by performing a battery load test, which measures the ability of the battery to supply high-amperage current.

First, determine the battery state-of-charge. This can be done in one of three ways. If the battery has a built-in test indicator, perform the built-in indicator test to determine the state-of-charge. If the battery has no built-in test indicator but does have removable cell caps, perform the hydrometer test to determine the state-of-charge. If the battery cell caps are not removable, or a hydrometer is not available, perform the open-circuit voltage test to determine the state-of-charge. Refer to open-circuit voltage test in the Standard Procedures section of this group.

Second, determine the battery cranking capacity by performing a load test. The battery must be charged before proceeding with a load test if:

- The battery built-in test indicator has a black or dark color visible.
- The temperature corrected specific gravity of the battery electrolyte is less than 1.235.
- The battery open-circuit voltage is less than 12.4 volts.

A battery that will not accept a charge is faulty, and must be replaced. Further testing is not required. A fully-charged battery must be load tested to determine its cranking capacity. A battery that is fully-charged, but does not pass the load test, is faulty and must be replaced.

NOTE: Completely discharged batteries may take several hours to accept a charge. Refer to Standard Procedures for the proper battery charging procedures.

A battery is fully-charged when:

- All battery cells are gassing freely during charging.
- A green color is visible in the sight glass of the battery built-in test indicator.
- Three corrected specific gravity tests, taken at one-hour intervals, indicate no increase in the specific gravity of the battery electrolyte.
- Open-circuit voltage of the battery is 12.4 volts or greater.

STANDARD PROCEDURE

STANDARD PROCEDURE - USING MICRO 420 ELECTRICAL TESTER

Always use the Micro 420 Instruction Manual that was supplied with the tester as a reference. If the Instruction Manual is not available the following procedure can be used:

WARNING: ALWAYS WEAR APPROPRIATE EYE PROTECTION AND USE EXTREME CAUTION WHEN WORKING WITH BATTERIES.

BATTERY TESTING

(1) If testing the battery OUT-OF-VEHICLE, clean the battery terminals with a wire brush before testing. If the battery is equipped with side post terminals, install and tighten the supplied lead terminal

BATTERY (Continued)

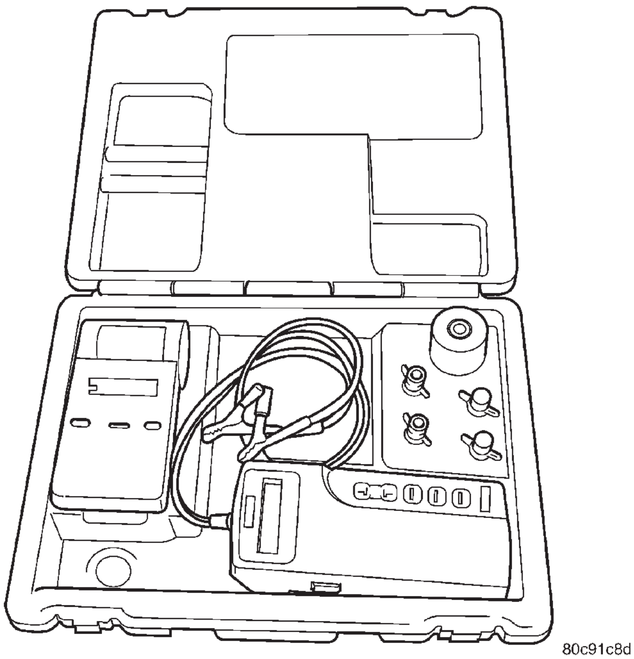

Fig. 3 MICRO 420 BATTERY TESTER

stud adapters. Do not use steel bolts. Failure to properly install the stud adapters, or using stud adapters that are dirty or worn-out may result in false test readings.

(2) If testing the battery IN-THE-VEHICLE, make certain all of the vehicle accessory loads are OFF, including the ignition. **The preferred test position is at the battery terminal**. If the battery is not accessible, you may test using both the positive and negative jumper posts. Select TESTING AT JUMPER POST when connecting to that location.

(3) Connect the tester (Fig. 3) to the battery or jumper posts, the red clamp to positive (+) and the black clamp to negative (–).

NOTE: Multiple batteries connected in parallel must have the ground cable disconnected to perform a battery test. Failure to disconnect may result in false battery test readings.

(4) Using the ARROW key select **in** or **out** of vehicle testing and press ENTER to make a selection.

(5) If not selected, choose the Cold Cranking Amp (CCA) battery rating. Or select the appropriate battery rating for your area (see menu). The tester will then run its self programmed test of the battery and display the results. Refer to the test result table noted below.

CAUTION: If REPLACE BATTERY is the result of the test, this may mean a poor connection between the vehicle's cables and battery exists. After disconnecting the vehicle's battery cables from the battery, retest the battery using the OUT-OF-VEHICLE test before replacing.

(6) While viewing the battery test result, press the CODE button and the tester will prompt you for the last 4 digits of the VIN. Use the UP/DOWN arrow buttons to scroll to the correct character; then press ENTER to select and move to the next digit. Then press the ENTER button to view the SERVICE CODE. Pressing the CODE button a second time will return you to the test results.

BATTERY TEST RESULTS	
GOOD BATTERY	Return to service
GOOD - RECHARGE	Fully charge battery and return to service
CHARGE & RETEST	Fully charge battery and retest battery
REPLACE BATTERY	Replace the battery and retest complete system
BAD-CELL REPLACE	Replace the battery and retest complete system

NOTE: The SERVICE CODE is required on every warranty claim submitted for battery replacement.

STANDARD PROCEDURE - BATTERY CHARGING

Battery charging is the means by which the battery can be restored to its full voltage potential. A battery is fully-charged when:

- Micro 420 tester shows Good Battery.
- Three hydrometer tests, taken at one-hour intervals, indicate no increase in the temperature-corrected specific gravity of the battery electrolyte.
- Open-circuit voltage of the battery is 12.4 volts or above.

WARNING: NEVER EXCEED TWENTY AMPERES WHEN CHARGING A COLD (-1° C [30° F] OR LOWER) BATTERY. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: IF THE BATTERY SHOWS SIGNS OF FREEZING, LEAKING, LOOSE POSTS, DO NOT TEST, ASSIST-BOOST, OR CHARGE. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

BATTERY (Continued)

WARNING: EXPLOSIVE HYDROGEN GAS FORMS IN AND AROUND THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR THE BATTERY. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: THE BATTERY CONTAINS SULFURIC ACID, WHICH IS POISONOUS AND CAUSTIC. AVOID CONTACT WITH THE SKIN, EYES, OR CLOTHING. IN THE EVENT OF CONTACT, FLUSH WITH WATER AND CALL A PHYSICIAN IMMEDIATELY. KEEP OUT OF THE REACH OF CHILDREN.

WARNING: IF THE BATTERY IS EQUIPPED WITH REMOVABLE CELL CAPS, BE CERTAIN THAT EACH OF THE CELL CAPS IS IN PLACE AND TIGHT BEFORE THE BATTERY IS RETURNED TO SERVICE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT FROM LOOSE OR MISSING CELL CAPS.

CAUTION: Always disconnect and isolate the battery negative cable before charging a battery. Do not exceed sixteen volts while charging a battery. Damage to the vehicle electrical system components may result.

CAUTION: Battery electrolyte will bubble inside the battery case during normal battery charging. Electrolyte boiling or being discharged from the battery vents indicates a battery overcharging condition. Immediately reduce the charging rate or turn off the charger to evaluate the battery condition. Damage to the battery may result from overcharging.

CAUTION: The battery should not be hot to the touch. If the battery feels hot to the touch, turn off the charger and let the battery cool before continuing the charging operation. Damage to the battery may result.

After the battery has been charged to 12.4 volts or greater, perform a test using the Micro 420 tester to determine the battery cranking capacity.

Clean and inspect the battery hold downs, tray, terminals, posts, and top before completing battery service. Refer to Battery System Cleaning for the proper battery system cleaning procedures, and Battery System Inspection for the proper battery system inspection procedures.

CHARGING A COMPLETELY DISCHARGED BATTERY

The following procedure should be used to recharge a completely discharged battery. Unless this procedure is properly followed, a good battery may be needlessly replaced.

(1) Measure the voltage at the battery posts with a voltmeter, accurate to 1/10 (0.10) volt (Fig. 4). If the reading is below ten volts, the battery charging current will be low. It could take some time before the battery accepts a current greater than a few milliamperes. Such low current may not be detectable on the ammeters built into many battery chargers.

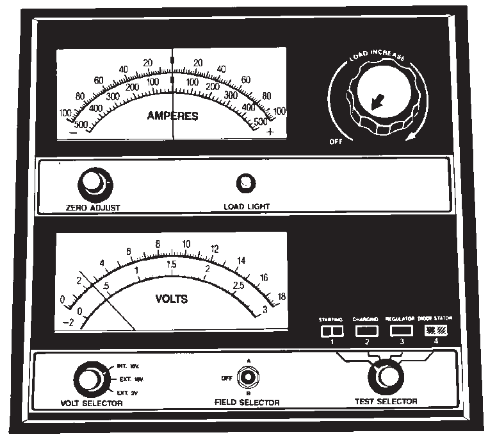

Fig. 4 Voltmeter

(2) Disconnect and isolate the battery negative cable. Connect the battery charger leads. Some battery chargers are equipped with polarity-sensing circuitry. This circuitry protects the battery charger and the battery from being damaged if they are improperly connected. If the battery state-of-charge is too low for the polarity-sensing circuitry to detect, the battery charger will not operate. This makes it appear that the battery will not accept charging current. See the instructions provided by the manufacturer of the battery charger for details on how to bypass the polarity-sensing circuitry.

(3) Battery chargers vary in the amount of voltage and current they provide. The amount of time required for a battery to accept measurable charging current at various voltages is shown in the Charge Rate Table. If the charging current is still not measurable at the end of the charging time, the battery is faulty and must be replaced. If the charging current is measurable during the charging time, the battery may be good and the charging should be completed in the normal manner.

BATTERY (Continued)

CHARGE RATE TABLE	
Voltage	Hours
16.0 volts maximum	up to 4 hours
14.0 to 15.9 volts	up to 8 hours
13.9 volts or less	up to 16 hours

CHARGING TIME REQUIRED

The time required to charge a battery will vary, depending upon the following factors:

• **Battery Capacity** - A completely discharged heavy-duty battery requires twice the charging time of a small capacity battery.

• **Temperature** - A longer time will be needed to charge a battery at -18° C (0° F) than at 27° C (80° F). When a fast battery charger is connected to a cold battery, the current accepted by the battery will be very low at first. As the battery warms, it will accept a higher charging current rate (amperage).

• **Charger Capacity** - A battery charger that supplies only five amperes will require a longer charging time. A battery charger that supplies twenty amperes or more will require a shorter charging time.

• **State-Of-Charge** - A completely discharged battery requires more charging time than a partially discharged battery. Electrolyte is nearly pure water in a completely discharged battery. At first, the charging current (amperage) will be low. As the battery charges, the specific gravity of the electrolyte will gradually rise.

The Battery Charging Time Table gives an indication of the time required to charge a typical battery at room temperature based upon the battery state-of-charge and the charger capacity.

BATTERY CHARGING TIME TABLE			
Charging Amperage	5 Amps	10 Amps	20 Amps
Open Circuit Voltage	Hours Charging @ 21° C (70° F)		
12.25 to 12.49	6 hours	3 hours	1.5 hours
12.00 to 12.24	10 hours	5 hours	2.5 hours
10.00 to 11.99	14 hours	7 hours	3.5 hours
Below 10.00	18 hours	9 hours	4.5 hours

STANDARD PROCEDURE - OPEN-CIRCUIT VOLTAGE TEST

A battery open-circuit voltage (no load) test will show the approximate state-of-charge of a battery. This test can be used in place of the hydrometer test when a hydrometer is not available, or for maintenance-free batteries with non-removable cell caps.

Before proceeding with this test, completely charge the battery. Refer to Standard Procedures for the proper battery charging procedures.

(1) Before measuring the open-circuit voltage, the surface charge must be removed from the battery. Turn on the headlamps for fifteen seconds, then allow up to five minutes for the battery voltage to stabilize.

(2) Disconnect and isolate both battery cables, negative cable first.

(3) Using a voltmeter connected to the battery posts (see the instructions provided by the manufacturer of the voltmeter), measure the open-circuit voltage (Fig. 5).

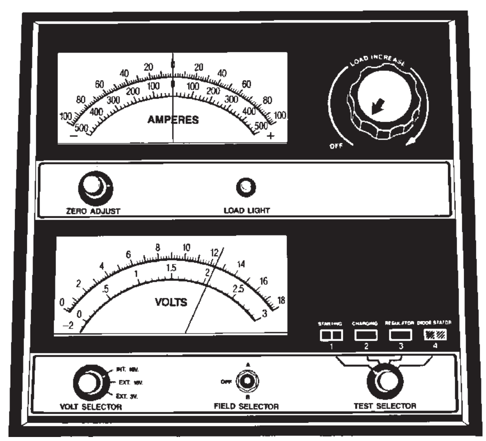

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Fig. 5 Testing Open-Circuit Voltage

See the Open-Circuit Voltage Table. This voltage reading will indicate the battery state-of-charge, but will not reveal its cranking capacity. If a battery has an open-circuit voltage reading of 12.4 volts or greater, it may be load tested to reveal its cranking capacity. Refer to Standard Procedures for the proper battery load test procedures.

OPEN CIRCUIT VOLTAGE TABLE	
Open Circuit Voltage	Charge Percentage
11.7 volts or less	0%
12.0 volts	25%
12.2 volts	50%
12.4 volts	75%
12.6 volts or more	100%

BATTERY (Continued)

STANDARD PROCEDURE - IGNITION-OFF DRAW TEST

The term Ignition-Off Draw (IOD) identifies a normal condition where power is being drained from the battery with the ignition switch in the Off position. A normal vehicle electrical system will draw from five to thirty-five milliamperes (0.005 to 0.035 ampere) with the ignition switch in the Off position, and all non-ignition controlled circuits in proper working order. Up to thirty-five milliamperes are needed to enable the memory functions for the Powertrain Control Module (PCM), digital clock, electronically tuned radio, and other modules which may vary with the vehicle equipment.

A vehicle that has not been operated for approximately twenty days, may discharge the battery to an inadequate level. When a vehicle will not be used for twenty days or more (stored), remove the IOD fuse from the Power Distribution Center (PDC). This will reduce battery discharging.

Excessive IOD can be caused by:

- Electrical items left on.
- Faulty or improperly adjusted switches.
- Faulty or shorted electronic modules and components.
- An internally shorted generator.
- Intermittent shorts in the wiring.

If the IOD is over thirty-five milliamperes, the problem must be found and corrected before replacing a battery. In most cases, the battery can be charged and returned to service after the excessive IOD condition has been corrected.

(1) Verify that all electrical accessories are off. Turn off all lamps, remove the ignition key, and close all doors. If the vehicle is equipped with an illuminated entry system or an electronically tuned radio, allow the electronic timer function of these systems to automatically shut off (time out). This may take up to three minutes. See the Electronic Module Ignition-Off Draw Table for more information.

ELECTRONIC MODULE IGNITION-OFF DRAW (IOD) TABLE			
Module	Time Out? (If Yes, Interval And Wake-Up Input)	IOD	IOD After Time Out
EATX	Yes, 20 min, Ignition Key	60 milliamperes	N/A
Audio Power Amplifier	No	up to 1 milliampere	N/A
Powertrain Control Module (PCM)	Yes, 1 min, Ignition Key	Up To 4.0 amps	N/A
Body Control Module	Yes, 1 min, Ignition Key	Up To 3.0 amps	N/A

(2) If equipped, determine that the underhood lamp is operating properly, then disconnect the lamp wire harness connector or remove the lamp bulb.

(3) Disconnect the battery negative cable.

(4) Set an electronic digital multi-meter to its highest amperage scale. Connect the multi-meter between the disconnected battery negative cable terminal clamp and the battery negative terminal post. Make sure that the doors remain closed so that the illuminated entry system is not activated. The multi-meter amperage reading may remain high for up to three minutes, or may not give any reading at all while set in the highest amperage scale, depending upon the electrical equipment in the vehicle. The multi-meter leads must be securely clamped to the battery negative cable terminal clamp and the battery negative terminal post. If continuity between the battery negative terminal post and the negative cable terminal clamp is lost during any part of the IOD test, the electronic timer function will be activated and all of the tests will have to be repeated.

(5) After about three minutes, the high-amperage IOD reading on the multi-meter should become very low or nonexistent, depending upon the electrical equipment in the vehicle. If the amperage reading remains high, remove and replace each fuse or circuit breaker in the Power Distribution Center (PDC) and then in the Junction Block (JB), one at a time until the amperage reading becomes very low, or nonexistent. Refer to the appropriate wiring information in this service manual for complete PDC and JB fuse, circuit breaker, and circuit identification. This will isolate each circuit and identify the circuit that is the source of the high-amperage IOD. If the amperage reading remains high after removing and replacing each fuse and circuit breaker, disconnect the wire harness from the generator. If the amperage reading now becomes very low or nonexistent, refer to Charging System for the proper charging system diagnosis and testing procedures. After the high-amperage IOD has been corrected, switch the multi-meter to progressively lower amperage scales and, if necessary, repeat the fuse and circuit breaker remove-and-re-

BATTERY (Continued)

place process to identify and correct all sources of excessive IOD. It is now safe to select the lowest milliampere scale of the multi-meter to check the low-amperage IOD.

CAUTION: Do not open any doors, or turn on any electrical accessories with the lowest milliampere scale selected, or the multi-meter may be damaged.

(6) Observe the multi-meter reading. The low-amperage IOD should not exceed thirty-five milliamperes (0.035 ampere). If the current draw exceeds thirty-five milliamperes, isolate each circuit using the fuse and circuit breaker remove-and-replace process in Step 5. The multi-meter reading will drop to within the acceptable limit when the source of the excessive current draw is disconnected. Repair this circuit as required; whether a wiring short, incorrect switch adjustment, or a component failure is at fault.

REMOVAL

The battery is accessible without removing the left front wheel and tire assembly..

(1) Verify that the ignition switch and all accessories are OFF.

(2) Turn the steering wheel to the full left position.

(3) Disconnect and isolate the negative battery cable remote terminal from the remote battery post.

WARNING: NEVER GET UNDER A LIFTED VEHICLE IF NOT SUPPORTED PROPERLY ON SAFETY STANDS.

(4) Remove battery splash shield. Refer to the Body section of the service manual for the procedure.

(5) Disconnect the heater blanket cord, if equipped.

(6) Remove the short bolt from the battery hold down and remove the hold down (Fig. 6).

(7) Disconnect the negative and positive battery cables from the battery.

(8) Slide the battery toward rear of vehicle and lift out of the battery tray.

(9) Remove battery from vehicle.

INSTALLATION

(1) Position the battery in the battery tray.

(2) Connect the positive and negative battery cables. Torque to 16 N·m (150 in. lbs.).

(3) Connect the heater blanket cord, if equipped.

(4) Install the battery hold down and install the hold down bolt. Torque to 16 N·m (150 in. lbs.).

(5) Install battery splash shield. Refer to the Body section for the procedure.

(6) Connect the negative battery cable.

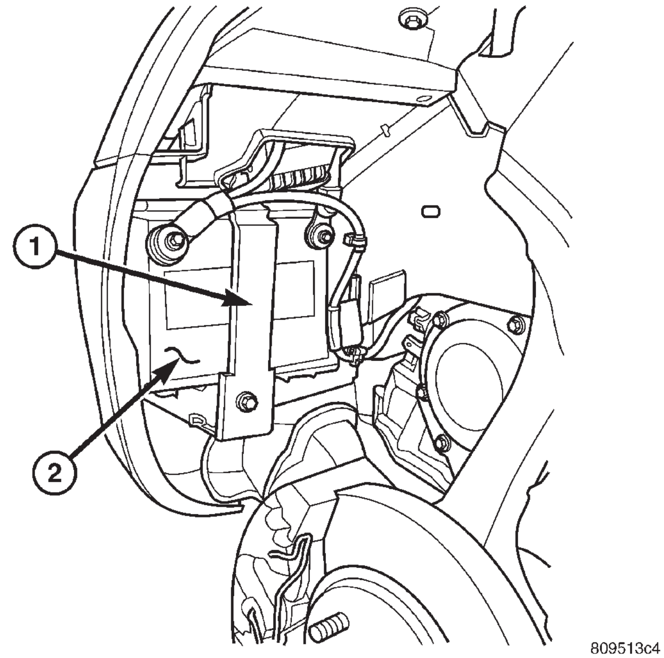


Fig. 6 BATTERY LOCATION

1 - BATTERY HOLD DOWN
2 - BATTERY

BATTERY HOLDDOWN

DESCRIPTION

The battery hold down includes three bolts and two hold down brackets (Fig. 7). The battery hold down brackets are formed steel brackets with holes on both ends.

When installing a battery into the battery tray, it is important that the hold down hardware is properly installed and that the fasteners are tightened to the proper specifications. Improper hold down fastener tightness, whether too loose or too tight, can result in damage to the battery, the vehicle, or both.

OPERATION

The battery hold down secures the battery in the battery tray. This hold down is designed to prevent battery movement during the most extreme vehicle operation conditions. Periodic removal and lubrication of the battery hold down hardware is recommended to prevent hardware seizure at a later date.

REMOVAL

(1) Disconnect and isolate the negative battery cable remote terminal from the remote battery post.

(2) Raise and support the vehicle.

(3) Remove the left front wheel and tire assembly from the vehicle.

BATTERY HOLDDOWN (Continued)

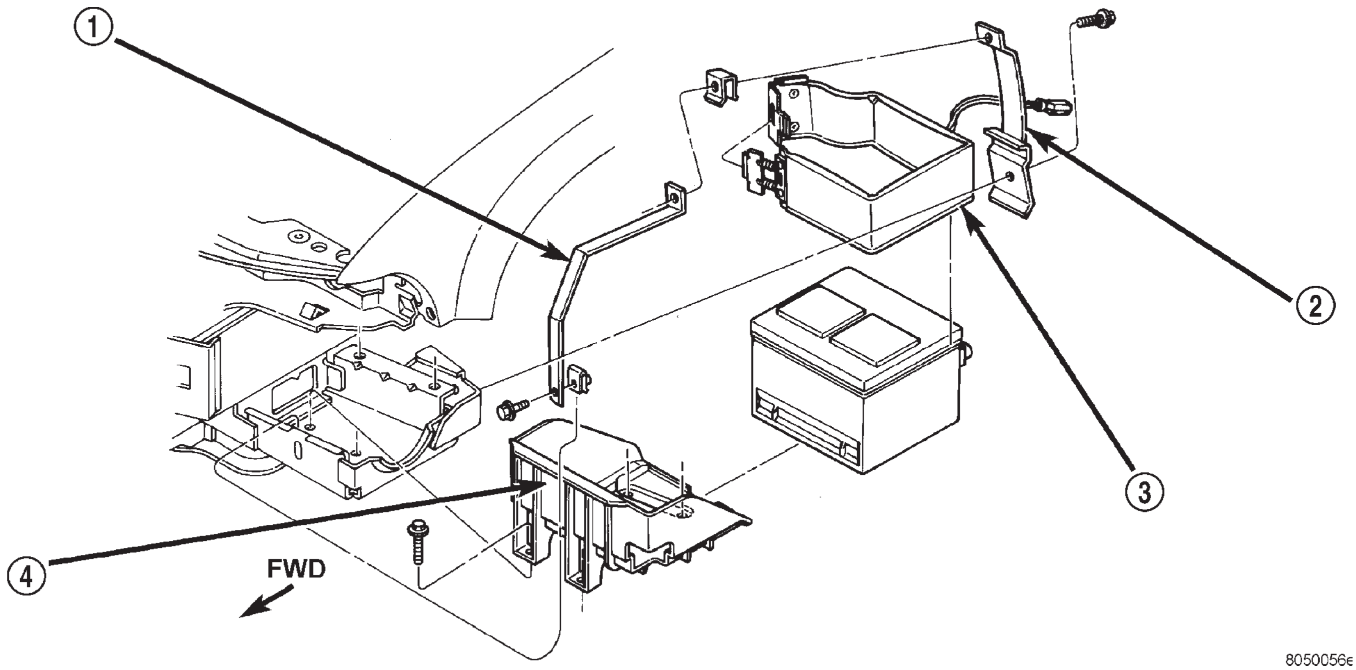


Fig. 7 BATTERY TRAY/HOLDDOWN HARDWARE

1 - BATTERY HOLDOWN STRAP
2 - BATTERY HOLDOWN STRAP
3 - BATTERY HEATER BLANKET
4 - BATTERY TRAY

(4) Remove battery splash shield. Refer to the Body section for the procedure.

(5) Remove the short bolt from the battery hold down and remove the hold down.

INSTALLATION

(1) Install the battery hold down and install the hold down bolt. Torque to 14 N·m (150 in. lbs.).

(2) Install battery splash shield. Refer to the Body section for the procedure.

(3) Connect the negative battery cable.

BATTERY CABLES

DESCRIPTION

The battery cables are large gauge, stranded copper wires sheathed within a heavy plastic or synthetic rubber insulating jacket. The wire used in the battery cables combines excellent flexibility and reliability with high electrical current carrying capacity. The battery cables feature a clamping type female battery terminal made of soft lead that is die cast onto one end of the battery cable wire. A square headed pinch-bolt and hex nut are installed at the open end of the female battery terminal clamp. Large eyelet type terminals are crimped onto the opposite end of the battery cable wire and then solder-dipped. The battery positive cable wires have a red insulating jacket to provide visual identification and feature a larger female battery terminal clamp to allow connection to the larger battery positive terminal post. The battery negative cable wires have a black insulating jacket and a smaller female battery terminal clamp.

The battery cables cannot be repaired and, if damaged or faulty they must be replaced. Both the battery positive and negative cables are available for service replacement only as a unit with the battery wire harness, which may include portions of the wiring circuits for the generator and other components on some models. Refer to the appropriate wiring information in this service manual for the location of the proper battery cable wire harness diagrams. The wiring information also includes proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

OPERATION

The battery cables connect the battery terminal posts to the vehicle electrical system. These cables also provide a path back to the battery for electrical current generated by the charging system for restoring the voltage potential of the battery. The female battery terminal clamps on the ends of the battery cable wires provide a strong and reliable connection

BATTERY CABLES (Continued)

of the battery cable to the battery terminal posts. The terminal pinch bolts allow the female terminal clamps to be tightened around the male terminal posts on the top of the battery. The eyelet terminals secured to the opposite ends of the battery cable wires from the female battery terminal clamps provide secure and reliable connection of the battery cables to the vehicle electrical system.

The battery positive cable terminal clamp is die cast onto the ends of two wires. One wire has an eyelet terminal that connects the battery positive cable to the B(+) terminal stud of the Power Distribution Center (PDC), and the other wire has an eyelet terminal that connects the battery positive cable to the B(+) terminal stud of the engine starter motor solenoid. The battery negative cable terminal clamp is also die cast onto the ends of two wires. One wire has an eyelet terminal that connects the battery negative cable to the vehicle powertrain through a stud on the right side of the engine cylinder block. The other wire has an eyelet terminal that connects the battery negative cable to the vehicle body through a ground screw on the right front fender inner shield, near the battery.

DIAGNOSIS AND TESTING - BATTERY CABLES

A voltage drop test will determine if there is excessive resistance in the battery cable terminal connections or the battery cable. If excessive resistance is found in the battery cable connections, the connection point should be disassembled, cleaned of all corrosion or foreign material, then reassembled. Following reassembly, check the voltage drop for the battery cable connection and the battery cable again to confirm repair.

When performing the voltage drop test, it is important to remember that the voltage drop is giving an indication of the resistance between the two points at which the voltmeter probes are attached. **EXAMPLE:** When testing the resistance of the battery positive cable, touch the voltmeter leads to the battery positive cable terminal clamp and to the battery positive cable eyelet terminal at the starter solenoid B(+) terminal stud. If you probe the battery positive terminal post and the battery positive cable eyelet terminal at the starter solenoid B(+) terminal stud, you are reading the combined voltage drop in the battery positive cable terminal clamp-to-terminal post connection and the battery positive cable.

VOLTAGE DROP TEST

The following operation will require a voltmeter accurate to 1/10 (0.10) volt. Before performing this test, be certain that the following procedures are accomplished:

- The battery is fully-charged and load tested. Refer to Standard Procedures for the proper battery charging and load test procedures.
- Fully engage the parking brake.
- If the vehicle is equipped with an automatic transmission, place the gearshift selector lever in the Park position. If the vehicle is equipped with a manual transmission, place the gearshift selector lever in the Neutral position and block the clutch pedal in the fully depressed position.
- Verify that all lamps and accessories are turned off.
- To prevent the engine from starting, remove the Automatic Shut Down (ASD) relay. The ASD relay is located in the Power Distribution Center (PDC), in the engine compartment. See the fuse and relay layout label affixed to the underside of the PDC cover for ASD relay identification and location.

(1) Connect the positive lead of the voltmeter to the battery negative terminal post. Connect the negative lead of the voltmeter to the battery negative cable terminal clamp (Fig. 8). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If voltage is detected, correct the poor connection between the battery negative cable terminal clamp and the battery negative terminal post.

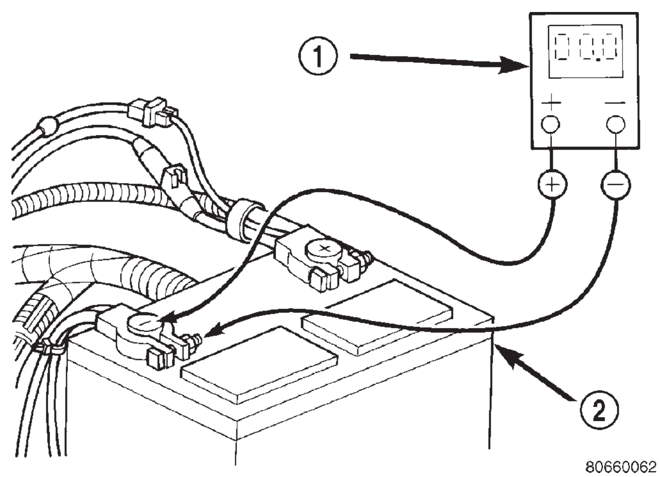


Fig. 8 TEST BATTERY NEGATIVE CONNECTION RESISTANCE - TYPICAL

1 - VOLTMETER
2 - BATTERY

(2) Connect the positive lead of the voltmeter to the battery positive terminal post. Connect the negative lead of the voltmeter to the battery positive cable terminal clamp (Fig. 9). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If voltage is detected, correct the poor connection between the battery positive cable terminal clamp and the battery positive terminal post.

BATTERY CABLES (Continued)

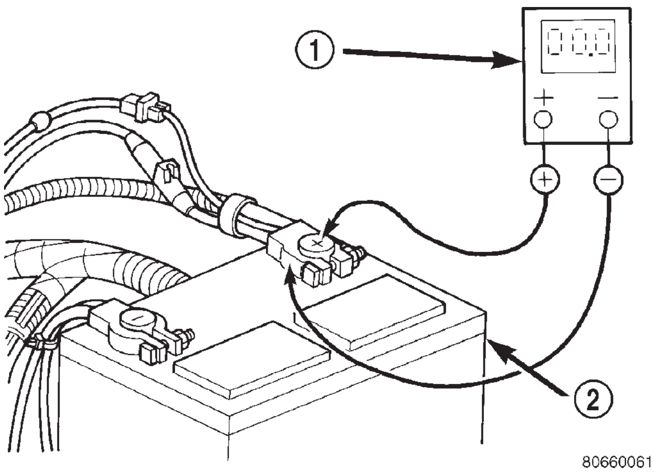


Fig. 9 TEST BATTERY POSITIVE CONNECTION RESISTANCE - TYPICAL

1 - VOLTMETER
2 - BATTERY

(3) Connect the voltmeter to measure between the battery positive cable terminal clamp and the starter solenoid B(+) terminal stud (Fig. 10). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If the reading is above 0.2 volt, clean and tighten the battery positive cable eyelet terminal connection at the starter solenoid B(+) terminal stud. Repeat the test. If the reading is still above 0.2 volt, replace the faulty battery positive cable.

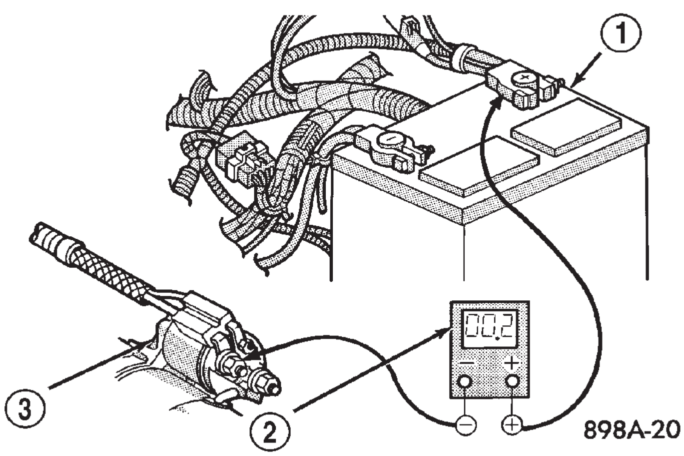


Fig. 10 TEST BATTERY POSITIVE CABLE RESISTANCE - TYPICAL

1 - BATTERY
2 - VOLTMETER
3 - STARTER MOTOR

(4) Connect the voltmeter to measure between the battery negative cable terminal clamp and a good clean ground on the engine block (Fig. 11). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If the reading is above 0.2 volt, clean and tighten the battery negative cable eyelet terminal connection to the engine block. Repeat the test. If the reading is still above 0.2 volt, replace the faulty battery negative cable.

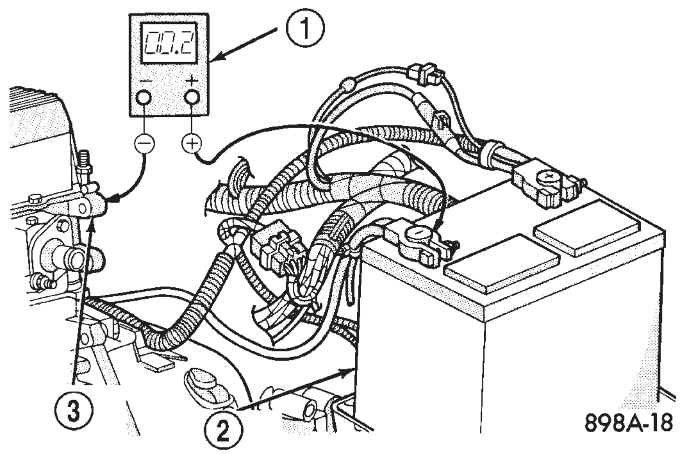


Fig. 11 TEST GROUND CIRCUIT RESISTANCE - TYPICAL

1 - VOLTMETER
2 - BATTERY
3 - ENGINE GROUND

REMOVAL

(1) Turn the ignition switch to the Off position. Be certain that all electrical accessories are turned off.

(2) Disconnect and isolate the remote battery negative cable terminal.

(3) One at a time, trace and disconnect the battery cable retaining pushpins, fasteners and routing clips until the cables are free from the vehicle.

(4) Feed the battery cable assembly out of the vehicle.

INSTALLATION

(1) Position the battery cable in the vehicle.

(2) One at a time, install the battery cable retaining pushpins, fasteners and routing clips until the cable is installed exactly in the factory installed location in the vehicle. Refer to the Wiring Diagram section of the service manual for reference.

(3) Connect the battery negative cable terminal.

BATTERY TRAY

DESCRIPTION

The battery is placed in a steel tray located in the left front corner of the vehicle (Fig. 12). A hole in the bottom of the battery tray is fitted with a battery temperature sensor. Refer to Charging System for more information on the battery temperature sensor. Refer to Battery Hold down for more information on hold down hardware.

BATTERY TRAY (Continued)

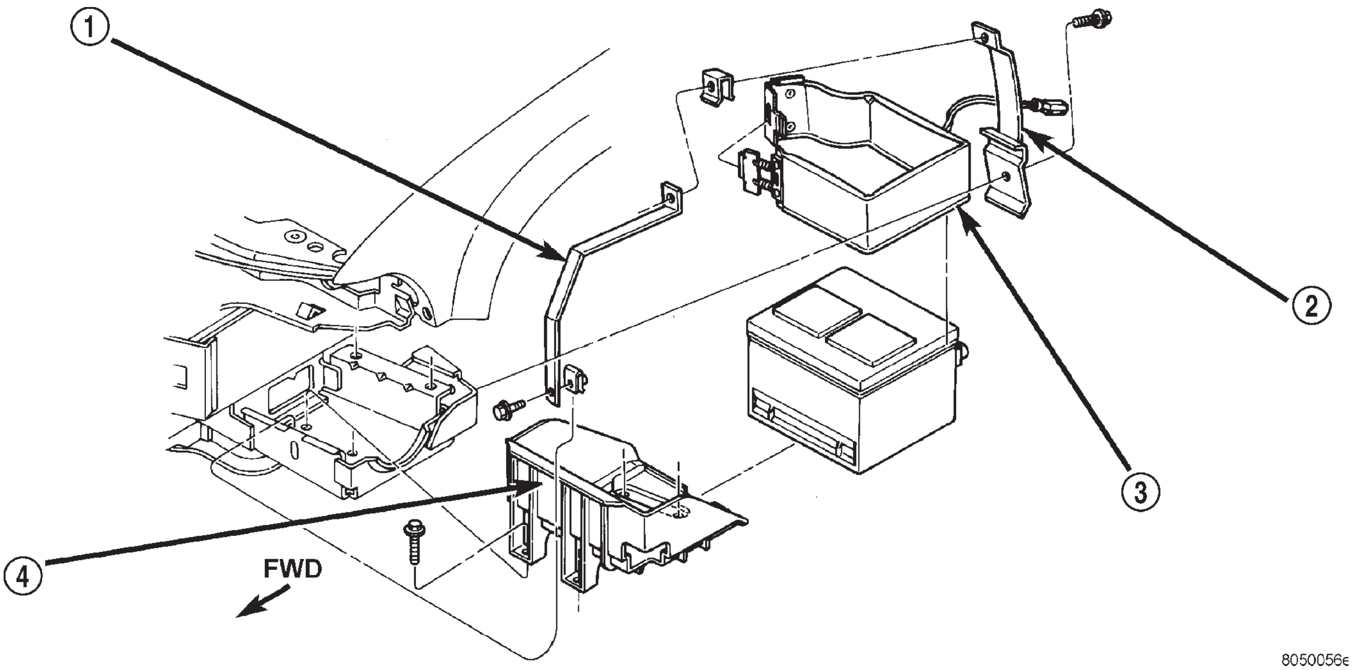


Fig. 12 BATTERY TRAY/HOLDDOWN HARDWARE

1 - BATTERY HOLDOWN STRAP
2 - BATTERY HOLDOWN STRAP
3 - BATTERY HEATER BLANKET
4 - BATTERY TRAY

OPERATION

The battery tray provides a secure mounting location and supports the battery. On some vehicles, the battery tray also provides the anchor point/s for the battery holddown hardware. The battery tray and the battery holddown hardware combine to secure and stabilize the battery in the engine compartment, which prevents battery movement during vehicle operation. Unrestrained battery movement during vehicle operation could result in damage to the vehicle, the battery, or both.

REMOVAL

(1) Disconnect and isolate the remote negative battery cable.

(2) Remove the battery from the vehicle (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - REMOVAL).

(3) Remove the left headlamp assembly from the vehicle (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

(4) Remove the battery tray retaining bolts (Fig. 13) and remove the battery tray from the vehicle.

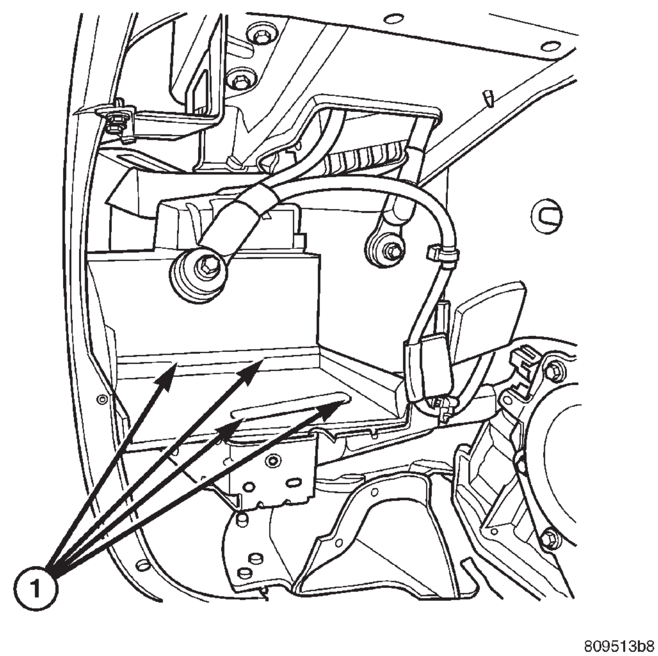


Fig. 13 JR BATTERY TRAY

1 - BATTERY TRAY RETAINING FASTENER LOCATIONS

INSTALLATION

(1) Install the battery tray and retaining bolts. Torque the bolts to 14 N·m (160 in. lbs.).

(2) Install the battery in the vehicle (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - INSTALLATION).

(3) Install the left headlamp assembly in the vehicle (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

(4) Connect the remote negative battery cable.

BATTERY HEATER BLANKET

DESCRIPTION

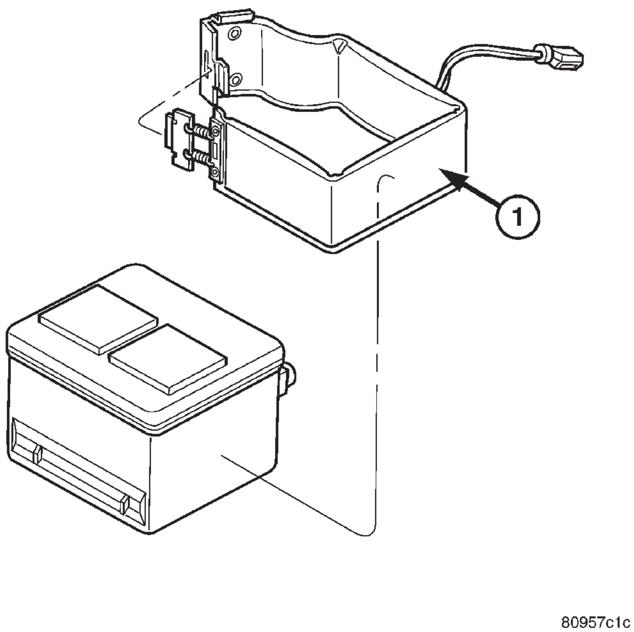


Fig. 14 BATTERY HEATER BLANKET

1 - BATTERY HEATER BLANKET

A heater blanket (Fig. 14) is used to improve the battery cold-start ability. This blanket operates on 110 volt AC current and is used with Alaska and Canada cold weather packages.

The heater blanket cannot be adjusted or repaired. If the blanket is faulty or damaged it must be replaced.

OPERATION

The temperature of the battery can affect battery performance. Only DAIMLERCHRYSLER approved battery blanket/block heater combination should be used. The battery blanket heater is designed to provide optimum charging system performance in very cold ambient temperatures below -17.8°C (0°F).

DIAGNOSIS AND TESTING - BATTERY HEATER BLANKET

(1) Remove the battery heater blanket from the battery (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/THERMAL GUARD - REMOVAL).

(2) Clean the battery heater blanket with baking soda solution and wipe dry.

(3) Inspect blanket for cuts, abrasion or other damage. If heater is damaged replace.

(4) Position the heater flat and re-connect the blanket heater to the vehicles electrical system.

(5) Connect the 110 volt AC power cord to 110 volt source for a maximum of 3 minutes.

(6) Disconnect the 110 volt power cord.

(7) Immediately feel the heater blanket on the inside, it should be warm to the touch. If warm the heater is OK, if not OK proceed.

(8) Disconnect the heater blanket from the vehicles electrical system. Using an Ohmmeter, connect the leads across the two wire terminals coming from the heater blanket. A resistance value of 220 to 280 ohms should be present. If not replace the blanket. If OK proceed.

(9) Ensure that the 110 volt AC power cord is suppling voltage to the heater blanket. If OK replace the heater blanket. If not verify the 110 volt AC power from another source. Inspect the power cord for damage and replace if necessary.

REMOVAL

(1) Remove the battery and the battery heater blanket from the battery tray as a unit (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - REMOVAL).

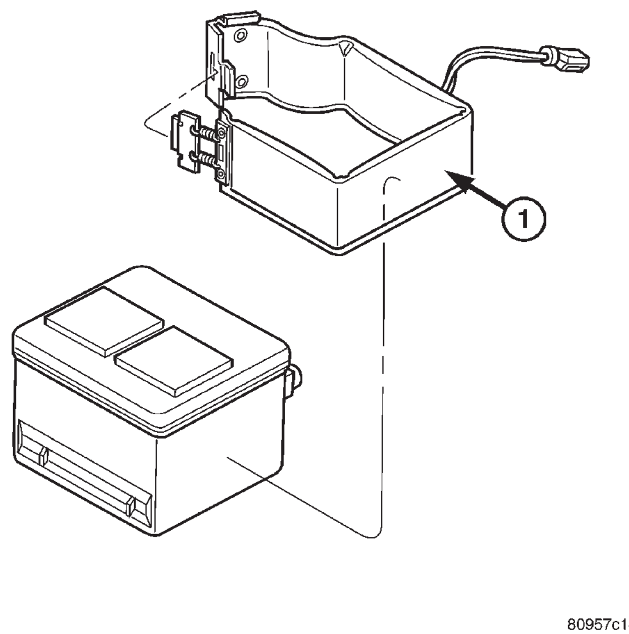


Fig. 15 BATTERY HEATER BLANKET

1 - BATTERY HEATER BLANKET

(2) Carefully slide the heater blanket straight off the battery case (Fig. 15).

INSTALLATION

(1) Clean and inspect the battery heater blanket.

(2) Install the battery heater blanket on the battery case.

(3) Install the battery and the battery heater blanket into the battery tray as a unit (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - INSTALLATION).

CHARGING

TABLE OF CONTENTS

CHARGING

DESCRIPTION - CHARGING SYSTEM

The charging system consists of:

- Generator
- Decoupler Pulley (If equipped)
- Electronic Voltage Regulator (EVR) circuitry within the Powertrain Control Module (PCM)
- Ignition switch (refer to the Ignition System section for information)
- Battery (refer to the Battery section for information)
- Battery temperature sensor (calculated battery temperature if equipped)
- Voltmeter (refer to the Instrument Cluster section for information if equipped)
- Wiring harness and connections (refer to the Wiring section for information)
- Accessory drive belt (refer to the Cooling section for more information)

OPERATION - CHARGING SYSTEM

The charging system is turned on and off with the ignition switch. The system is on when the engine is running and the ASD relay is energized. The ASD relay is energized when the PCM grounds the ASD control circuit. This voltage is connected through the PCM or IPM (intelligent power module)(if equipped) and supplied to one of the generator field terminals (Gen. Source +) at the back of the generator.

The generator is driven by the engine through a serpentine belt and pulley or decoupler pulley arrangement.

The amount of DC current produced by the generator is controlled by the EVR (field control) circuitry contained within the PCM. This circuitry is connected in series with the second rotor field terminal and ground.

An Inlet air temperature sensor is used to calculate the temperature near the battery. This temperature data, along with data from monitored line voltage (battery voltage sense circuit), is used by the PCM to vary the battery charging rate. This is done by cycling the ground path to control the strength of the rotor magnetic field. The PCM then compensates and regulates generator current output accordingly to maintain system voltage at the targeted system voltage based on battery temperature.

All vehicles are equipped with On-Board Diagnostics (OBD). All OBD-sensed systems, including EVR (field control) circuitry, are monitored by the PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC). The PCM will store a DTC in electronic memory for certain failures it detects and illuminate the lamp. Refer to On-Board Diagnostics in the Electronic Control Modules(Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - DESCRIPTION) section for more DTC information.

The Check Gauges Lamp (if equipped) monitors: **charging system voltage,** engine coolant temperature and engine oil pressure. If an extreme condition is indicated, the lamp will be illuminated. This is done as reminder to check the three gauges. The signal to activate the lamp is sent via the PCI bus circuits. The lamp is located on the instrument panel. Refer to the Instrument Cluster section for additional information.

DIAGNOSIS AND TESTING - ON-BOARD DIAGNOSTIC SYSTEM

The Powertrain Control Module (PCM) monitors critical input and output circuits of the charging system, making sure they are operational. A Diagnostic Trouble Code (DTC) is assigned to each input and output circuit monitored by the OBD system. Some circuits are checked continuously and some are checked only under certain conditions.

If the OBD system senses that a monitored circuit is bad, it will put a DTC into electronic memory. The DTC will stay in electronic memory as long as the circuit continues to be bad. The PCM is programmed to clear the memory after 50 engine starts if the problem does not occur again.

DIAGNOSTIC TROUBLE CODES

A DTC description can be read using the DRBIII® scan tool. Refer to the appropriate Powertrain Diagnostic Procedures manual for information.

A DTC does not identify which component in a circuit is bad. Thus, a DTC should be treated as a symptom, not as the cause for the problem. In some cases, because of the design of the diagnostic test procedure, a DTC can be the reason for another DTC to be set. Therefore, it is important that the test procedures be followed in sequence, to understand what caused a DTC to be set.

ERASING DIAGNOSTIC TROUBLE CODES

The DRBIII® Scan Tool must be used to erase a DTC.

The following procedures may be used to diagnose the charging system if:

- the check gauges lamp or battery lamp is illuminated with the engine running
- the voltmeter (if equipped) does not register properly
- an undercharged or overcharged battery condition occurs.

Remember that an undercharged battery is often caused by:

- accessories being left on with the engine not running
- a faulty or improperly adjusted switch that allows a lamp to stay on. Refer to Ignition-Off Draw Test (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/ BATTERY - STANDARD PROCEDURE)

INSPECTION

The Powertrain Control Module (PCM) monitors critical input and output circuits of the charging system, making sure they are operational. A Diagnostic Trouble Code (DTC) is assigned to each input and output circuit monitored by the On-Board Diagnostic (OBD) system. Some charging system circuits are checked continuously, and some are checked only under certain conditions.

Refer to Diagnostic Trouble Codes in; Powertrain Control Module; Electronic Control Modules for more DTC information. This will include a complete list of DTC's including DTC's for the charging system.

To perform a complete test of the charging system, refer to the appropriate Powertrain Diagnostic Procedures service manual and the DRBIII® scan tool. Perform the following inspections before attaching the scan tool.

(1) Inspect the battery condition. Refer to the Battery section (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - DIAGNOSIS AND TESTING) for procedures.

(2) Inspect condition of battery cable terminals, battery posts, connections at engine block, starter solenoid and relay. They should be clean and tight. Repair as required.

(3) Inspect all fuses in both the fuseblock and Power Distribution Center (PDC) for tightness in receptacles. They should be properly installed and tight. Repair or replace as required.

(4) Inspect generator mounting bolts for tightness. Replace or tighten bolts if required. Refer to the Generator Removal/Installation section of this group for torque specifications (Refer to 8 - ELECTRICAL/ CHARGING - SPECIFICATIONS).

(5) Inspect generator drive belt condition and tension. Tighten or replace belt as required. Refer to Belt Tension Specifications(Refer to 7 - COOLING/ ACCESSORY DRIVE - SPECIFICATIONS).

(6) Inspect decoupler pulley (if equipped). Ensure decoupler pulley is driving the alternator rotor.

(7) Inspect automatic belt tensioner (if equipped). Refer to the Cooling System for more information.

(8) Inspect generator electrical connections at generator field, battery output, and ground terminal (if equipped). Also check generator ground wire connection at engine (if equipped). They should all be clean and tight. Repair as required.

SPECIFICATIONS

GENERATOR

<table>
<tr><td>Type</td><td>Engine</td><td>Minimun Test Amperage</td></tr>
<tr><td>DENSO</td><td>2.0L</td><td>135 Amp</td></tr>
<tr><td>DENSO</td><td>2.4L</td><td>135 Amp</td></tr>
<tr><td>DENSO</td><td>2.7L</td><td>135 Amp</td></tr>
<tr><td colspan="3">Test Specification:
1. Engine RPM : 2500 RPM ±20 RPM
2. Voltage Output : 14.0 V ± 0.5 V
3. Field Current : 5 amps ± 0.1 amps</td></tr>
</table>

Part number is located on the side of the generator.

CHARGING (Continued)

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Battery Hold Down Clamp Bolt	22.6	16.7	200
Generator B+ Nut	11	8.1	97.4
Battery Terminal Nut	15.8	11.7	140
Generator Mounting Bolts 2.4L	28.2	20.8	250
Generator Mounting Bolts 2.7L	28.2	20.8	250

BATTERY TEMPERATURE SENSOR

OPERATION

The PCM uses the temperature of the battery area to control the charge system voltage. This temperature, along with data from monitored line voltage, is used by the PCM to vary the battery charging rate. The system voltage is higher at cold temperatures and is gradually reduced as temperature around the battery increases.

The ambient temperature sensor is used to control the battery voltage based upon ambient temperature (approximation of battery temperature). The PCM maintains the optimal output of the generator by monitoring battery voltage and controlling it to a range of 13.5 - 14.7 volts based on battery temperature.

The battery temperature sensor is also used for OBD II diagnostics. Certain faults and OBD II monitors are either enabled or disabled depending upon the battery temperature sensor input (example: disable purge and EGR, enable LDP). Most OBD II monitors are disabled below 20°F.

REMOVAL

The battery temperature sensor is not serviced separately. If replacement is necessary, the PCM must be replaced.

GENERATOR

DESCRIPTION

The generator is belt-driven by the engine. It is serviced only as a complete assembly. If the generator fails for any reason, the entire assembly must be replaced. The generator produces DC voltage.

OPERATION

As the energized rotor begins to rotate within the generator, the spinning magnetic field induces a current into the windings of the stator coil.

The Y type stator winding connections deliver the induced AC current to 3 positive and 3 negative diodes for rectification. From the diodes, rectified DC current is delivered to the vehicles electrical system through the generator, battery, and ground terminals.

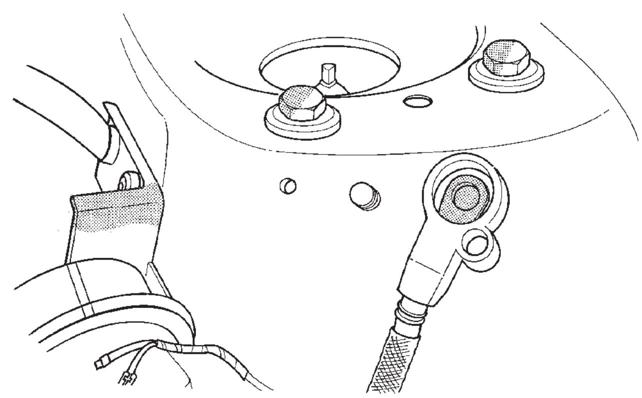
Noise emitting from the generator may be caused by:

- Worn, loose or defective bearings
- Loose or defective drive pulley
- Incorrect, worn, damaged or misadjusted drive belt
- Loose mounting bolts
- Misaligned drive pulley
- Defective stator or diode
- Damaged internal fins

REMOVAL

REMOVAL - 4 CYLINDER

(1) Disconnect battery negative cable from remote negative terminal on shock tower (Fig. 1).



958A-18

Fig. 1 Remove Battery Cable at Shock Tower

(2) Remove belt cover.

(3) Unplug field circuit from generator.

(4) Remove B+ terminal cover by spreading the cover with a small flat blade tool.

(5) Remove the B+ terminal wire and nut (Fig. 2).

(6) Raise vehicle and support.

(7) Remove the accessory drive splash shield.

(8) Remove the accessory drive belt, refer to the Cooling section for more information.

GENERATOR (Continued)

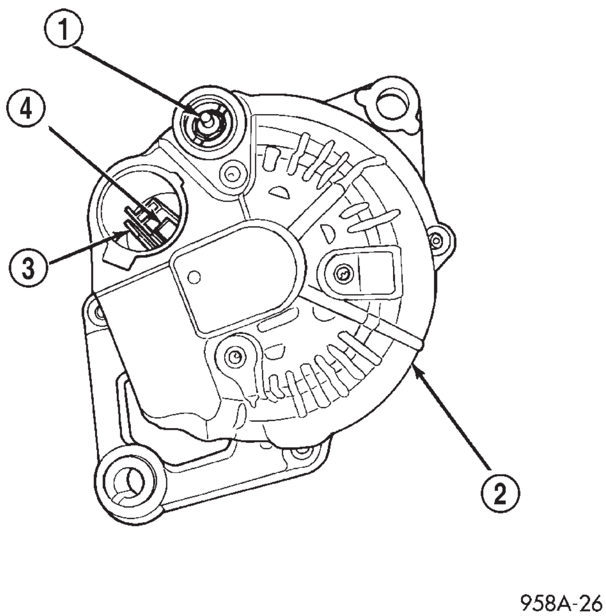


Fig. 2 Wiring Connections

1 - B+ TERMINAL
2 - CASE GROUND
3 - FEED
4 - TO PCM

(9) Lower vehicle.
(10) Remove the MAP sensor from the intake manifold (Fig. 3).

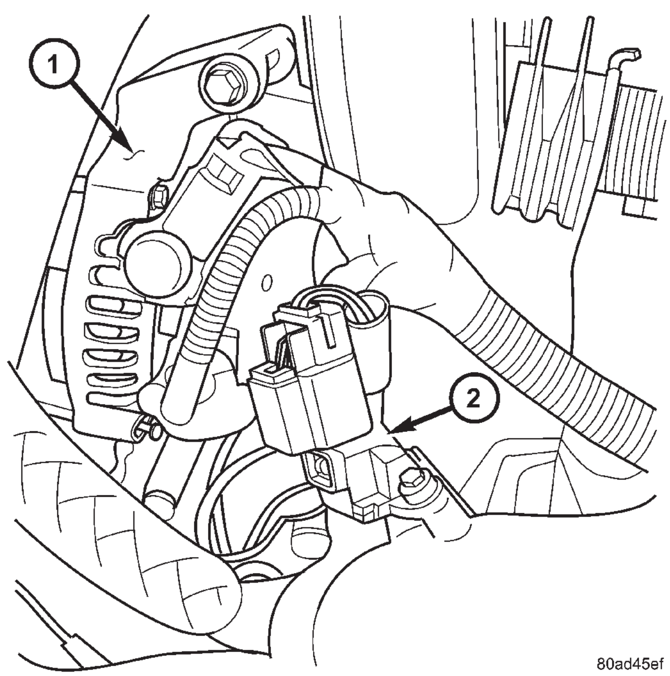


Fig. 3 GENERATOR AND MAP SENSOR

1 - Generator
2 - MAP Sensor

(11) Remove the generator bolts.
(12) Remove the generator from vehicle (Fig. 4).

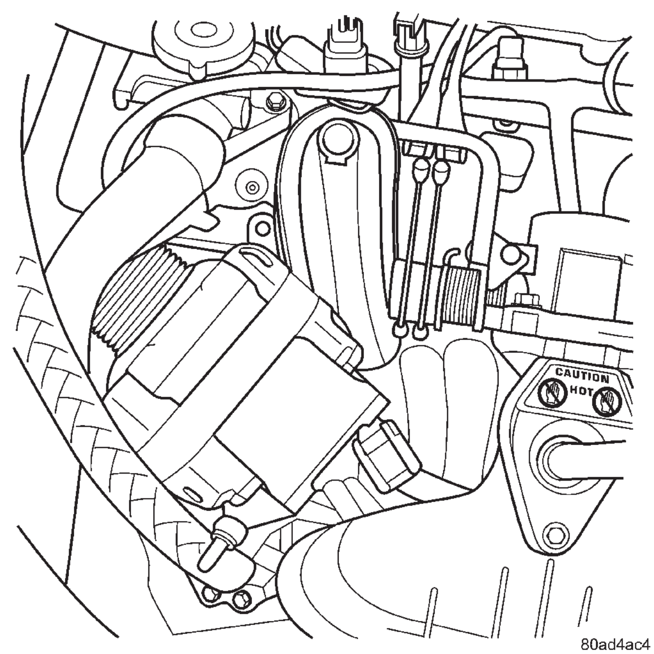


Fig. 4 GENERATOR

REMOVAL - 2.7L

(1) Open Hood.
(2) Disconnect the negative battery cable.
(3) Raise vehicle and support.
(4) Remove the accessory drive belt splash shield.
(5) Loosen the accessory drive belt refer to the cooling section.
(6) Remove the lower mounting bolt.
(7) Lower the vehicle.
(8) Remove the B+ terminal and field connection (Fig. 5).
(9) Disconnect the electrical connector to the A/C pressure switch and A/C clutch.
(10) Remove the engine oil dip stick.
(11) Remove the 2 upper mounting bolts.
(12) Remove the generator (Fig. 6).

INSTALLATION

INSTALLATION - 4 CYLINDER

(1) Install generator.
(2) Install bolts and tighten.
(3) Install MAP sensor and tighten bolts.
(4) Raise vehicle and support.
(5) Install the accessory drive belt, refer to the Cooling section for more information.
(6) Install the accessory drive splash shield.
(7) Lower vehicle.
(8) Install the B+ terminal wire and nut (Fig. 2).
(9) Install B+ terminal cover.

GENERATOR (Continued)

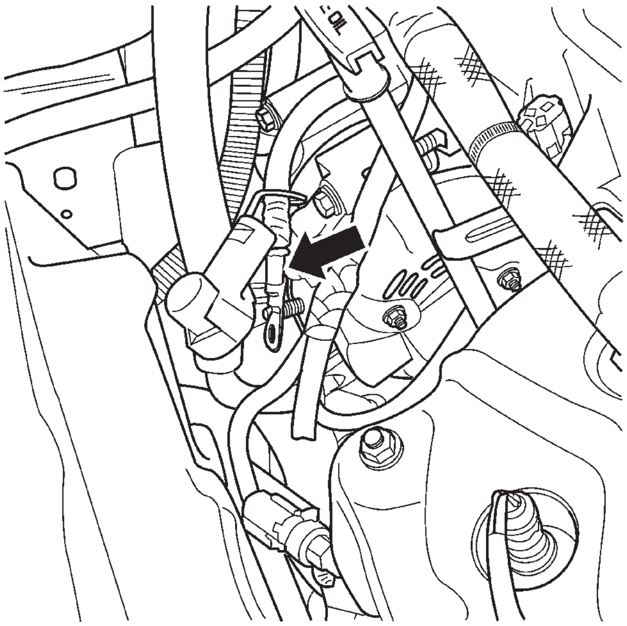


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Fig. 5 GENERATOR BATTERY CABLE

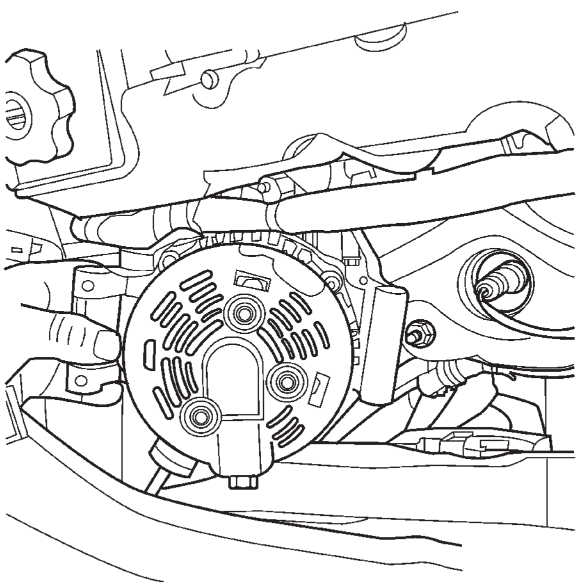

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Fig. 6 GENERATOR

(10) Plug in the field circuit to generator.
(11) Install belt cover.
(12) Install the negative battery cable.

INSTALLATION - 2.7L

(1) Install generator (Fig. 6).
(2) Install the 2 upper bolts but do not tighten.
(3) Install the engine dip stick tube.
(4) Connect the A/C pressure switch and A/C clutch electrical connectors.
(5) Connect the B+ terminal and field connectors (Fig. 5).
(6) Raise vehicle and support.
(7) Install the lower bolt and tighten.
(8) Install the accessory drive belt, refer to the cooling section.
(9) Install the accessory drive splash shield.
(10) Lower the vehicle.
(11) Tighten the 2 upper mounting bolts.
(12) Connect the negative battery cable.

VOLTAGE REGULATOR

DESCRIPTION

The Electronic Voltage Regulator (EVR) is not a separate component. It is actually a voltage regulating circuit located within the Powertrain Control Module (PCM). The EVR is not serviced separately. If replacement is necessary, the PCM must be replaced.

OPERATION

The amount of DC current produced by the generator is controlled by EVR circuitry contained within the PCM. This circuitry is connected in series with the generators second rotor field terminal and its ground.

Voltage is regulated by cycling the ground path to control the strength of the rotor magnetic field. The EVR circuitry monitors system line voltage (B+) and calculated battery temperature or inlet air temperature sensor (refer to Battery Temperature Sensor or Inlet Air Temperature Sensor, if equipped, for more information). It then determines a target charging voltage. If sensed battery voltage is lower than the target voltage, the PCM grounds the field winding until sensed battery voltage is at the target voltage. A circuit in the PCM cycles the ground side of the generator field at 250 times per second (250Hz), but has the capability to ground the field control wire 100% of the time (full field) to achieve the target voltage. If the charging rate cannot be monitored (limp-in), a duty cycle of 25% is used by the PCM in order to have some generator output. Also refer to Charging System Operation for additional information.

STARTING

TABLE OF CONTENTS

STARTING

DESCRIPTION

The starting system has (Fig. 1):

- Ignition switch
- Starter relay
- Transmission Range Sensor or Park/Neutral Switch
- Wiring harness
- Battery
- Starter motor with an integral solenoid
- Powertrain Control Module (PCM)

OPERATION

These components form two separate circuits. A high amperage circuit that feeds the starter motor up to 300+ amps, and a control circuit that operates on less than 20 amps.

The PCM controls a double start over-ride safety that does not allow the starter to be engaged if the engine is already running.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - CONTROL CIRCUIT TEST

The starter control circuit has:

- Starter motor with integral solenoid
- Starter relay
- Transmission range sensor, or Park/Neutral Position switch with automatic transmissions
- Ignition switch
- Battery
- All related wiring and connections
- Powertrain Control Module (PCM)

CAUTION: Before performing any starter tests, the ignition and fuel systems must be disabled.

- To disable ignition and fuel systems, disconnect the Automatic Shutdown Relay (ASD). The ASD relay is located in the Power Distribution Center (PDC). Refer to the PDC cover for the proper relay location.

STARTER SOLENOID

WARNING: CHECK TO ENSURE THAT THE TRANSMISSION IS IN THE PARK POSITION WITH THE PARKING BRAKE APPLIED.

(1) Verify battery condition. Battery must be in good condition with a full charge before performing any starter tests. Refer to Battery Tests.

(2) Perform Starter Solenoid test BEFORE performing the starter relay test.

(3) Perform a visual inspection of the starter/starter solenoid for corrosion, loose connections or faulty wiring.

(4) Locate and remove the starter relay from the Power Distribution Center (PDC). Refer to the PDC label for relay identification and location.

(5) Connect a remote starter switch or a jumper wire between the remote battery positive post and terminal 87 of the starter relay connector.

(a) If engine cranks, starter/starter solenoid is good. Go to the Starter Relay Test.

(b) If engine does not crank or solenoid chatters, check wiring and connectors from starter relay to

STARTING (Continued)

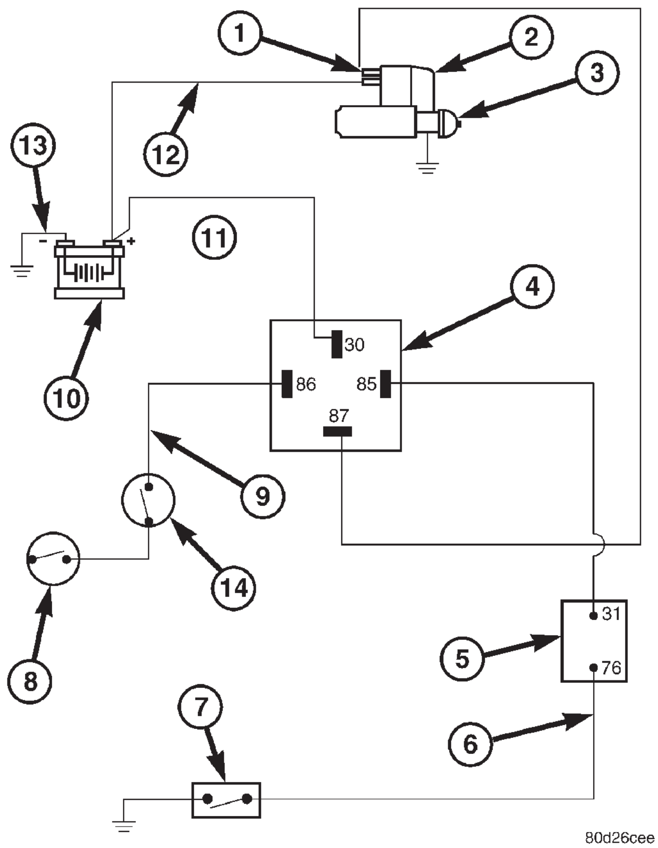


Fig. 1 STARTING SYSTEM SCHEMATIC

1 - SOLENOID TERMINAL
2 - STARTER SOLENOID
3 - STARTER MOTOR
4 - STARTER RELAY CONNECTOR
5 - PCM
6 - GROUND CIRCUIT
7 - TRANSMISSION RANGE SENSOR/PARK/NEUTRAL SENSE
8 - IGNITION SWITCH
9 - IGNITION FEED
10 - BATTERY
11 - BATTERY RELAY FEED
12 - POSITIVE CABLE
13 - NEGATIVE CABLE
14 - CLUTCH INTERLOCK SWITCH (MTX ONLY)

starter solenoid for loose or corroded connections. Particularly at starter terminals.

(c) Repeat test. If engine still fails to crank properly, trouble is within starter or starter mounted solenoid, and replace starter. Inspect the ring gear teeth.

STARTER RELAY

WARNING: CHECK TO ENSURE THAT THE TRANSMISSION IS IN THE PARK/NEUTRAL POSITION WITH THE PARKING BRAKE APPLIED.

RELAY TEST

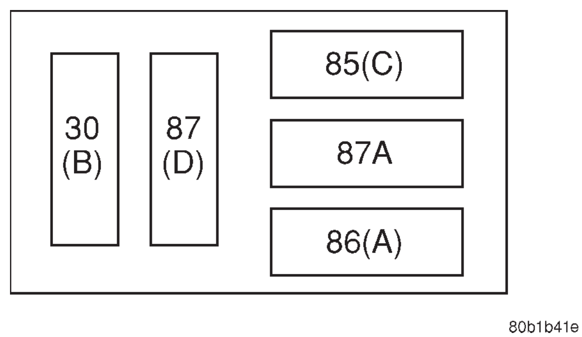
The starter relay is located in the Power Distribution Center (PDC) in the engine compartment. Refer to the PDC label for relay identification and location.

Remove the starter relay from the PDC as described in this group to perform the following tests:

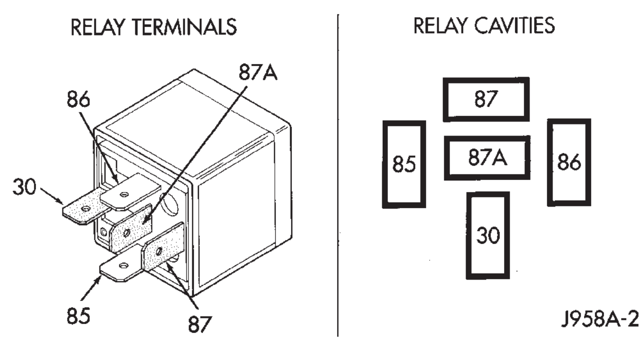
(1) A relay in the de-energized position should have continuity between terminals 87A and 30, and no continuity between terminals 87 and 30. If OK, go to Step 2. If not OK, replace the faulty relay.

(2) Resistance between terminals 85 and 86 (electromagnet) should be 75 ±5 ohms. If OK, go to Step 3. If not OK, replace the faulty relay.

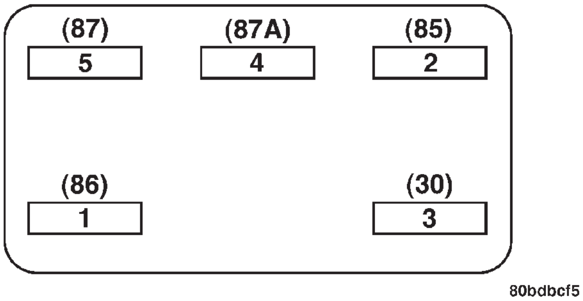
(3) Connect a battery B+ lead to terminals 86 and a ground lead to terminal 85 to energize the relay. The relay should click. Also test for continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, refer to Relay Circuit Test procedure. If not OK, replace the faulty relay.



Starter Relay Pinout



STARTING (Continued)



Starter Relay Pinout

CAV	FUNCTION
30	B (+)
85	P/N POSITION SW.SENSE
86	IGNITION SWITCH OUTPUT
87	STARTER RELAY OUTPUT
87A	NO CONNECT

RELAY CIRCUIT TEST

(1) The relay common feed terminal cavity (30) is connected to battery voltage and should be hot at all times. If OK, go to Step 2. If not OK, repair the open circuit to the PDC fuse as required.

(2) The relay normally closed terminal (87A) is connected to terminal 30 in the de-energized position, but is not used for this application. Go to Step 3.

(3) The relay normally open terminal (87) is connected to the common feed terminal (30) in the energized position. This terminal supplies battery voltage to the starter solenoid field coils. There should be continuity between the cavity for relay terminal 87 and the starter solenoid terminal at all times. If OK, go to Step 4. If not OK, repair the open circuit to the starter solenoid as required.

(4) The coil battery terminal (86) is connected to the electromagnet in the relay. It is energized when the ignition switch is held in the Start position and the clutch pedal is depressed (manual trans). Check for battery voltage at the cavity for relay terminal 86 with the ignition switch in the Start position and the clutch pedal is depressed (manual trans), and no voltage when the ignition switch is released to the On position. If OK, go to Step 5. If not OK, check for an open or short circuit to the ignition switch and repair, if required. If the circuit to the ignition switch is OK, see the Ignition Switch Test procedure in this group.

(5) The coil ground terminal (85) is connected to the electromagnet in the relay. It is grounded through the transmission range sensor only when the gearshift selector lever is in the Park or Neutral positions. Check for continuity to ground at the cavity for relay terminal 85. If not OK with an automatic transmission, check for an open or short circuit to the transmission range sensor and repair. It is grounded by the PCM if the conditions are right to start the car. For automatic trans. cars the PCM must see Park Neutral switch and near zero engine rpm. For manual trans. cars the PCM only needs to see near zero engine rpm. To diagnose the Park Neutral switch of the trans range sensor refer to the transaxle section for more information. Check for continuity to ground while the ignition switch is in the start position. If not OK and the vehicle has an automatic trans. verify Park Neutral switch operation. If that checks OK check for continuity between PCM and the terminal 85. Repair open circuit as required. If OK, the PCM may be defective.

SAFETY SWITCHES

For diagnostics of the Transmission Range Sensor, refer to the Transaxle section for more information.

If equipped with Clutch Interlock/Upstop Switch, refer to Diagnosis and Testing in the Clutch section.

IGNITION SWITCH

After testing starter solenoid and relay, test ignition switch and wiring. Refer to the Ignition Section or Wiring Diagrams for more information. Check all wiring for opens or shorts, and all connectors for being loose or corroded.

BATTERY

For battery diagnosis and testing, refer to the Battery section for procedures.

ALL RELATED WIRING AND CONNECTORS

Refer to Wiring Diagrams for more information.

DIAGNOSIS AND TESTING - STARTING SYSTEM TEST

For circuit descriptions and diagrams, refer to the Wiring Diagrams.

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO THE PASSIVE RESTRAINT SYSTEMS BEFORE ATTEMPTING STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

INSPECTION

Before removing any unit from the starting system for repair or diagnosis, perform the following inspections:

STARTING (Continued)

• **Battery** - Visually inspect the battery for indications of physical damage and loose or corroded cable connections. Determine the state-of-charge and cranking capacity of the battery. Charge or replace the battery, if required. Refer to the Battery section for more information.

• **Ignition Switch** - Visually inspect the ignition switch for indications of physical damage and loose or corroded wire harness connections.

• **Transmission Range Sensor** - Visually inspect the transmission range sensor for indications of physical damage and loose or corroded wire harness connections.

• **Starter Relay** - Visually inspect the starter relay for indications of physical damage and loose or corroded wire harness connections.

• **Starter** - Visually inspect the starter for indications of physical damage and loose or corroded wire harness connections.

• **Starter Solenoid** - Visually inspect the starter solenoid for indications of physical damage and loose or corroded wire harness connections.

• **Wiring** - Visually inspect the wire harness for damage. Repair or replace any faulty wiring, as required. Check for loose or corroded wire harness connections at main engine ground and remote jump post.

• **Power Distribution Center (PDC)** - Visually inspect the B+ connections at the PDC for physical damage and loose or corroded harness connections.

STARTING SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
STARTER FAILS TO ENGAGE.	1. BATTERY DISCHARGED OR FAULTY.	1. REFER TO THE BATTERY SECTION FOR MORE INFORMATION. CHARGE OR REPLACE BATTERY, IF REQUIRED.
	2. STARTING CIRCUIT WIRING FAULTY.	2. REFER TO FEED CIRCUIT RESISTANCE TEST AND FEED CIRCUIT TEST IN THIS SECTION.
	3. STARTER RELAY FAULTY.	3. REFER TO RELAY TEST, IN THIS SECTION. REPLACE RELAY, IF NECESSARY.
	4. IGNITION SWITCH FAULTY.	4. REFER TO IGNITION SWITCH TEST, IN THE STEERING SECTION OR 8 WIRING DIAGRAMS. REPLACE SWITCH, IF NECESSARY.
	5. PARK/NEUTRAL POSITION SWITCH (AUTO TRANS) FAULTY OR MIS-ADJUSTED.	5. REFER PARK/NEUTRAL POSITION SWITCH TEST, IN THE TRANSAXLE. SECTION FOR MORE INFORMATION. REPLACE SWITCH, IF NECESSARY.
	6. CLUTCH PEDAL POSITION SWITCH (MAN TRANS) FAULTY.	6. REFER TO CLUTCH PEDAL POSITION SWITCH TEST, IN THE CLUTCH. SECTION. REPLACE SWITCH, IF NECESSARY.
	7. STARTER SOLENOID FAULTY.	7. REFER TO SOLENOID TEST, IN THIS SECTION. REPLACE STARTER ASSEMBLY, IF NECESSARY.
	8. STARTER ASSEMBLY FAULTY.	8. IF ALL OTHER STARTING SYSTEM COMPONENTS AND CIRCUITS CHECK OK, REPLACE STARTER ASSEMBLY.
	9. FAULTY TEETH ON RING GEAR.	9. ROTATE FLYWHEEL 360°, AND INSPECT TEETH AND RING GEAR REPLACED IF DAMAGED.
	10. PCM DOUBLE START OVERRIDE OUTPUT FAILURE.	REFER TO PCM DIAGNOSTIC. CHECK FOR CONTINUITY BETWEEN PCM AND TERMINAL 85. REPAIR OPEN CIRCUIT AS REQUIRED. IF OK, PCM MAY BE DEFECTIVE.
STARTER ENGAGES, FAILS TO TURN ENGINE.	1. BATTERY DISCHARGED OR FAULTY.	1. REFER TO THE BATTERY SECTION FOR MORE INFORMATION. CHARGE OR REPLACE BATTERY AS NECESSARY.

STARTING (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
	2. STARTING CIRCUIT WIRING FAULTY.	2. REFER TO THE FEED CIRCUIT RESISTANCE TEST AND THE FEED CIRCUIT TEST IN THIS SECTION. REPAIR AS NECESSARY.
	3. STARTER ASSEMBLY FAULTY.	3. IF ALL OTHER STARTING SYSTEM COMPONENTS AND CIRCUITS CHECK OK, REPLACE STARTER ASSEMBLY.
	4. ENGINE SEIZED.	4. REFER TO THE ENGINE SECTION, FOR DIAGNOSTIC AND SERVICE PROCEDURES.
	5. LOOSE CONNECTION AT BATTERY, PDC, STARTER, OR ENGINE GROUND.	5. INSPECT FOR LOOSE CONNECTIONS.
	6. FAULTY TEETH ON RING GEAR.	6. ROTATE FLYWHEEL 360°, AND INSPECT TEETH AND RING GEAR REPLACED IF DAMAGED.
STARTER ENGAGES, SPINS OUT BEFORE ENGINE STARTS.	1. BROKEN TEETH ON STARTER RING GEAR.	1. REMOVE STARTER. INSPECT RING GEAR AND REPLACE IF NECESSARY.
	2. STARTER ASSEMBLY FAULTY.	2. IF ALL OTHER STARTING SYSTEM COMPONENTS AND CIRCUITS CHECK OK, REPLACE STARTER ASSEMBLY.
STARTER DOES NOT DISENGAGE.	1. STARTER IMPROPERLY INSTALLED.	1. INSTALL STARTER. TIGHTEN STARTER MOUNTING HARDWARE TO CORRECT TORQUE SPECIFICATIONS.
	2. STARTER RELAY FAULTY.	2. REFER TO RELAY TEST, IN THIS SECTION. REPLACE RELAY, IF NECESSARY.
	3. IGNITION SWITCH FAULTY.	3. REFER TO IGNITION SWITCH TEST, IN THE STEERING SECTION. REPLACE SWITCH, IF NECESSARY.
	4. STARTER ASSEMBLY FAULTY.	4. IF ALL OTHER STARTING SYSTEM COMPONENTS AND CIRCUITS CHECK OK, REPLACE STARTER ASSEMBLY.
	5. FAULTY TEETH ON RING GEAR.	5. ROTATE FLYWHEEL 360°, AND INSPECT TEETH AND RING GEAR REPLACED IF DAMAGED.

DIAGNOSIS AND TESTING - FEED CIRCUIT RESISTANCE TEST

Before proceeding with this operation, review Diagnostic Preparation and Starter Feed Circuit Tests. The following operation will require a voltmeter, accurate to 1/10 of a volt.

CAUTION: Ignition and Fuel systems must be disabled to prevent engine start while performing the following tests.

(1) To disable the Ignition and Fuel systems, disconnect the Automatic Shutdown Relay (ASD). The ASD relay is located in the Power Distribution Center (PDC). Refer to the PDC cover for proper relay location.

(2) Gain access to battery terminals.

(3) With all wiring harnesses and components properly connected, perform the following:

(a) Connect the negative lead of the voltmeter to the battery negative post, and positive lead to the battery negative cable clamp. Rotate and hold the ignition switch in the START position. Observe the voltmeter. If voltage is detected, correct poor contact between cable clamp and post.

STARTING (Continued)

(b) Connect positive lead of the voltmeter to the battery positive post, and negative lead to the battery positive cable clamp. Rotate and hold the ignition switch key in the START position. Observe the voltmeter. If voltage is detected, correct poor contact between the cable clamp and post.

(c) Connect negative lead of voltmeter to battery negative terminal, and positive lead to engine block near the battery cable attaching point. Rotate and hold the ignition switch in the START position. If voltage reads above 0.2 volt, correct poor contact at ground cable attaching point. If voltage reading is still above 0.2 volt after correcting poor contacts, replace ground cable.

(4) Connect positive voltmeter lead to the starter motor housing and the negative lead to the battery negative terminal. Hold the ignition switch key in the START position. If voltage reads above 0.2 volt, correct poor starter to engine ground.

(a) Connect the positive voltmeter lead to the battery positive terminal, and negative lead to battery cable terminal on starter solenoid. Rotate and hold the ignition switch in the START position. If voltage reads above 0.2 volt, correct poor contact at battery cable to solenoid connection. If reading is still above 0.2 volt after correcting poor contacts, replace battery positive cable.

(b) If resistance tests do not detect feed circuit failures, replace the starter motor.

DIAGNOSIS AND TESTING - FEED CIRCUIT TEST

NOTE: The following results are based upon the vehicle being at room temperature.

The following procedure will require a suitable volt-ampere tester (Fig. 3).

CAUTION: Before performing any starter tests, the ignition and fuel systems must be disabled.

(1) Check battery before performing this test. Battery must be fully charged.

(2) Connect a volt-ampere tester to the battery terminals. Refer to the operating instructions provided with the tester being used.

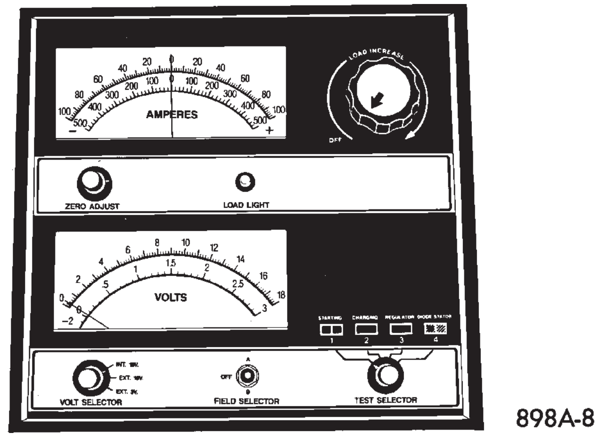


Fig. 3 Volt Ampere Tester

(3) To disable the ignition and fuel systems, disconnect the Automatic Shutdown Relay (ASD). The ASD relay is located in the Power Distribution Center (PDC). Refer to the PDC cover for proper relay location.

(4) Verify that all lights and accessories are OFF, and the transmission shift selector is in the PARK and SET parking brake.

CAUTION: Do not overheat the starter motor or draw the battery voltage below 9.6 volts during cranking operations.

(5) Rotate and hold the ignition switch in the START position. Observe the volt-ampere tester (Fig. 3).

- If voltage reads above 9.6 volts, and amperage draw reads above 280 amps, check for engine seizing or faulty starter.
- If voltage reads 12.4 volts or greater and amperage reads 0 to 10 amps, check for corroded cables and/or bad connections.
- Voltage below 9.6 volts and amperage draw above 300 amps, the problem is the starter. Replace the starter refer to starter removal.

(6) After the starting system problems have been corrected, verify the battery state-of-charge and charge battery if necessary. Disconnect all testing equipment and connect ASD relay. Start the vehicle several times to assure the problem has been corrected.

SPECIFICATIONS - TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Starter Mounting Bolts	54	40	—
Starter Solenoid Battery Nut	10	—	90

STARTER MOTOR

REMOVAL

REMOVAL - 4 CYLINDER

(1) Release hood latch and open hood (Fig. 4).

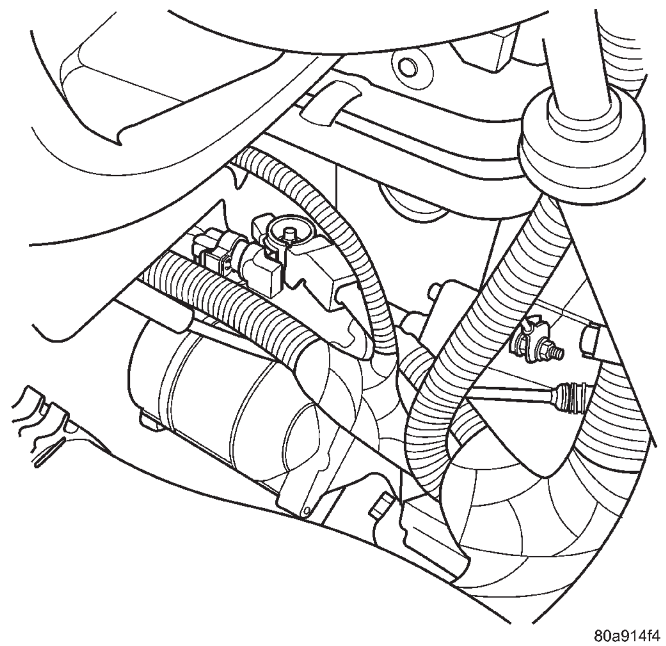


Fig. 4 STARTER - 4 CYLINDER

(2) Disconnect and isolate the battery negative cable.
(3) Remove the air cleaner box.
(4) Remove the lower bolt.
(5) Remove the upper bolt and ground wire
(6) Remove starter (Fig. 5).
(7) Disconnect solenoid wire connector from terminal
(8) Remove nut holding B+ wire to terminal.
(9) Disconnect solenoid and B+ wires from starter terminals.

REMOVAL - 2.7L

(1) Open Hood.
(2) Disconnect the negative battery cable.
(3) Raise vehicle and support.
(4) Disconnect the electrical connector from the O2 sensor.
(5) Remove the O2 sensor from the exhaust manifold (Fig. 6).
(6) Remove the front mount through bolt.
(7) Remove the front mount bracket from engine block.
(8) Remove the battery cable from starter (Fig. 7).

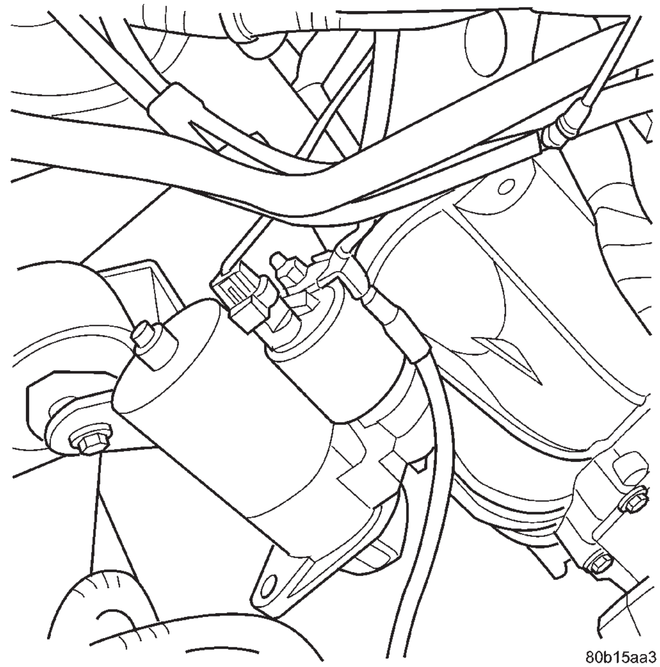


Fig. 5 STARTER REMOVAL - 4 CYLINDER

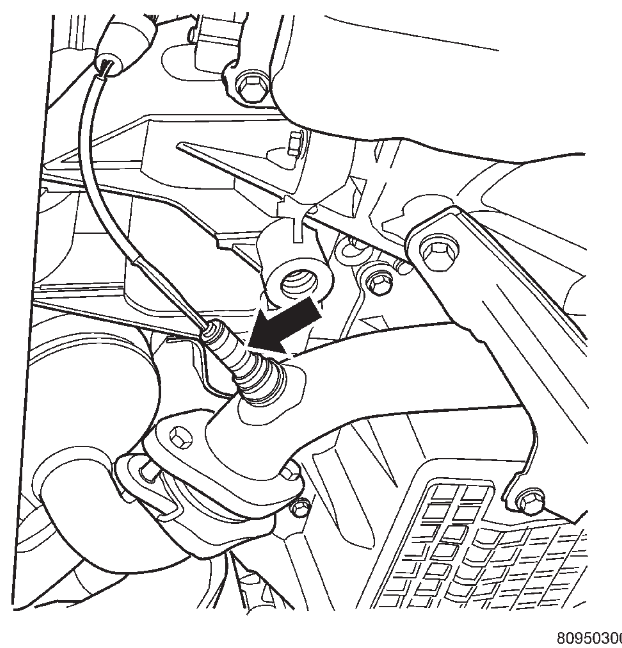


Fig. 6 O2 SENSOR

(9) Remove the lower starter bolt and remove starter (Fig. 8).

INSTALLATION

INSTALLATION - 4 CYLINDER

(1) Connect solenoid and B+ wires to starter terminals.
(2) Install nut holding B+ wire to terminal.

STARTER MOTOR (Continued)

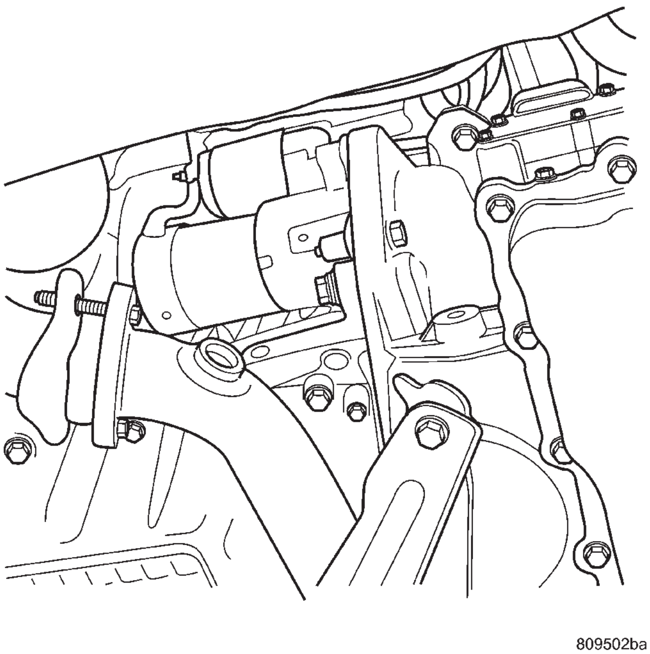


Fig. 7 STARTER MOTOR

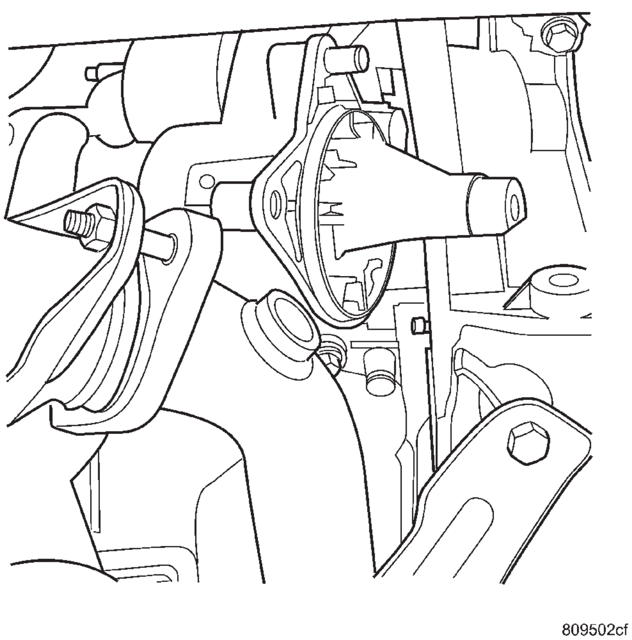


Fig. 8 STARTER MOTOR REMOVAL

(3) Connect solenoid wire connector to terminal
(4) Install starter (Fig. 5).
(5) Install the upper bolt.
(6) Install the lower bolt.
(7) Install the air cleaner box.
(8) Connect the battery negative cable.

INSTALLATION - 2.7L

(1) Install starter to transmission.
(2) Start the upper starter bolt.
(3) Start the lower bolt and snug it so that the starter will not move.
(4) Remove the upper bolt.
(5) Connect the battery cable and torque nut to 8.5 N·m (75 in. lbs.).
(6) Install the front mount bracket and check heat shield location.
(7) Install bolt the upper bolt and torque bolt to 54 N·m (40 ft. lbs.)
(8) Install the lower and torque bolt to 54 N·m (40 ft. lbs.)
(9) Install the front mount through bolt and torque bolt to 61 N·m (45 ft.. lbs.)
(10) Install the O2 sensor and torque to 27 N·m (20 ft. lbs.)
(11) Lower vehicle.
(12) Connect the negative battery cable.

STARTER MOTOR RELAY

DESCRIPTION

The Starter Relay is a micro relay located in the Power Distribution Center (PDC), positioned in the left front corner of the engine compartment.

OPERATION

As battery power is applied to the relay from the ignition switch, battery power is applied to the starter motor through the relay to the starter solenoid.

REMOVAL

The relay is located in the Power Distribution Center (PDC). Refer to the PDC cover for relay location.

STARTER SOLENOID

OPERATION

The Starter Solenoid is a switching device used to activate the high amperage starter motor circuit from a low amperage control circuit.

HEATED SYSTEMS

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HEATED GLASS SYSTEM

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HEATED GLASS SYSTEM

DESCRIPTION

The rear window defogger system is used to defog and deice the rear window in cases of freeze up and humid conditions. The rear window defogger switch is located to the right of the mode select knob on the HVAC control module on this model.

The Rear Window Defogger electrical system involves the operation of the Manual Temperature Control (MTC) head, the Body Control Module (BCM), and the rear window defogger relay and wiring. The system consists of a rear glass with two vertical bus bars and a series of electrically connected grid lines fired on the inside surface. The Body Control Module (BCM) operates a relay located in the right side trunk area on all models.

OPERATION

The system consists of a rear glass with two vertical bus bars and a series of electrically connected grid lines on the inside surface. The control switch is located in the HVAC Control Module. The relay is located in the junction block. The timer is located in the Body Control Module (BCM).

Circuit protection for heated grid is provided by:

- A 40 amp EBL fuse located in the power distribution center
- Rear window defogger relay (EBL) located in the Junction Block

When the button is depress to the ON position, current is directed to the rear defogger grid lines. A yellow indicator above the button will illuminate while the defogger is ON. The heated grid lines will heat the rear glass and clear the window surface of fog or frost.

CAUTION: Grid lines can be damaged or scraped off with sharp instruments, care should be taken in cleaning glass or removing foreign materials, decals or stickers. Normal glass cleaning solvents or hot water used with rags or toweling is recommended.

HEATED GLASS SYSTEM (Continued)

DIAGNOSIS AND TESTING - HEATED GLASS SYSTEM

Electrically heated rear window defogger operation can be checked in vehicle in the following manner:

(1) Turn ignition switch to the ON position.

(2) Make sure defogger switch is OFF.

(3) Remove the battery negative remote cable from the terminal. Using a ammeter (capable of a 30 AMP range), connect the ammeter is series between the battery cable and the remote terminal. Turn the Defogger control switch ON, a distinct increase in amperage draw should be noted.

(4) The rear window defogger operation can be checked by feeling the glass. A distinct difference in temperature between the grid lines and adjacent clear glass can be detected in 3 to 4 minutes of operation.

(5) Using a DC voltmeter (Fig. 1) contact terminal B with the negative lead, and terminal A with the positive lead. The voltmeter should read 10-14 volts.

(6) Step 3, Step 4, and Step 5 above will confirm system operation. Indicator light illumination means that there is power available at the output of the relay only, and does not necessarily verify system operation.

(7) If the indicator light is not on, then check fuse #6 in the junction block.

(8) If turning the switch ON produced no distinct current draw on the ammeter the problem should be isolated in the following manner:

(a) Confirm the ignition switch is ON.

(b) Ensure that the heated rear glass feed wire is connected to the terminal or pigtail and that the ground wire is in fact grounded.

(c) Ensure that the 40 amp EBL fuse in the Power Distribution Center is OK.

(9) When the above steps have been completed and the system is still inoperative, one or more of the following is defective:

(a) Control switch in the HVAC control module

(b) Rear window defogger relay (EBL) in the Junction Block

(c) Timer circuit in the Body Control Module

(d) Rear window grid lines, all grid lines would have to be broken or one of the feed wires are not connected for the system to be inoperative.

(10) If depressing the switch button ON produces severe voltmeter deflection, the circuit should be closely checked for a shorting condition.

(11) If the system operation has been verified but indicator bulb does not light, check fuse 6 in the junction block. If not OK, replace as necessary. If OK, test the HVAC control module.

(12) For detailed wiring information, refer to **Wiring Diagrams**.

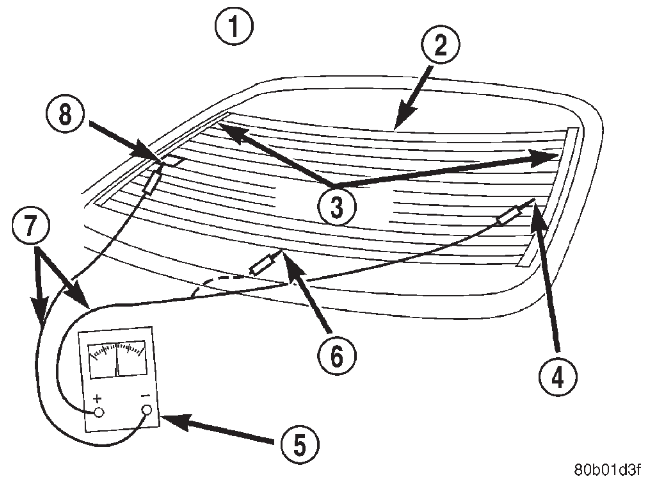

Fig. 1 Grid Line Test

1 - VIEW FROM INSIDE VEHICLE
2 - REAR WINDOW DEFOGGER
3 - BUS BARS
4 - VOLTAGE FEED (A)
5 - VOLTMETER
6 - MID-POINT (C)
7 - PICK-UP LEADS
8 - GROUND (B)

REAR WINDOW DEFOGGER RELAY

DESCRIPTION

The rear window defogger relay is an electromechanical device that switches fused battery current to the rear glass heating grid and the Light-Emitting Diode (LED) indicator of the rear window defogger switch, when the Body Control Module (BCM) rear window defogger timer and logic circuitry grounds the relay coil.

The rear window defogger relay is a International Standards Organization (ISO) relay. Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions.

The rear window defogger relay cannot be repaired or adjusted and, if faulty or damaged, it must be replaced.

OPERATION

The ISO relay consists of an electromagnetic coil, a resistor or diode, and three (two fixed and one movable) electrical contacts. The movable (common feed) relay contact is held against one of the fixed contacts (normally closed) by spring pressure. When the electromagnetic coil is energized, it draws the movable contact away from the normally closed fixed contact, and holds it against the other (normally open) fixed contact.

REAR WINDOW DEFOGGER RELAY (Continued)

When the electromagnetic coil is de-energized, spring pressure returns the movable contact to the normally closed position. The resistor or diode is connected in parallel with the electromagnetic coil in the relay, and helps to dissipate voltage spikes that are produced when the coil is de-energized.

DIAGNOSIS AND TESTING - REAR WINDOW DEFOGGER RELAY

(1) Check fuses.

(a) Fuse 15 in the Junction Block

(b) 40 amp EBL fuse in the Power Distribution Center.

(2) Remove the rear window defogger relay (EBL) from the Junction Block (Fig. 2).

(3) Using voltmeter, test battery voltage:

(a) Test rear window defogger relay terminals 13 for battery voltage. If voltage is OK, go to Step b. If voltage is not OK, repair A4 circuit.

(b) Test the rear window defogger relay terminal for battery voltage with the key in the run position. If voltage is OK, go to Step c. If voltage is not OK, repair A31circuit.

(c) Use a known good relay. If not OK, repair circuits as necessary. Refer to Wiring Diagrams. If OK, replace relay.

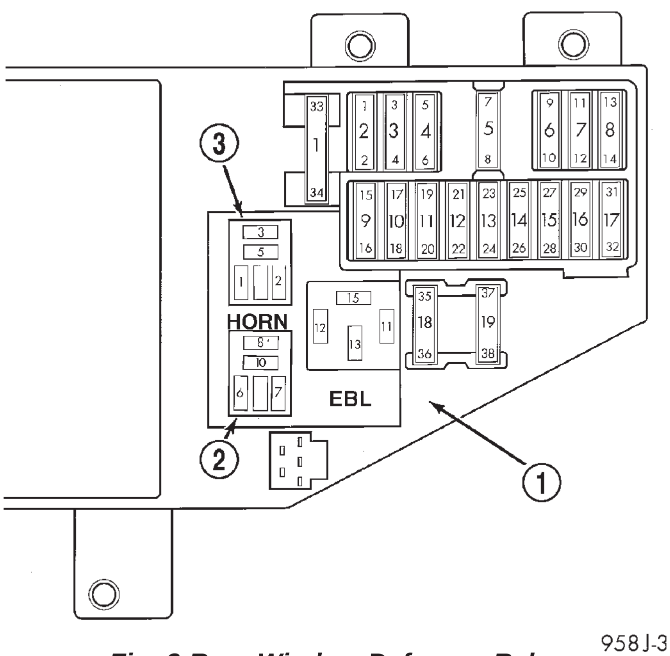

Fig. 2 Rear Window Defogger Relay

1 - CIRCUIT BREAKERS
2 - HORN RELAY
3 - HEADLAMP RELAY

REMOVAL

(1) Disconnect and isolate the battery negative remote cable.

(2) Open the driver's door and remove instrument panel end cover.

(3) Remove Rear Window Defogger (EBL) relay from the Junction Block.

INSTALLATION

(1) Install Rear Window Defogger (EBL) relay in the Junction Block.

(2) Install the instrument panel end cover.

(3) Connect the battery negative remote cable.

REAR WINDOW DEFOGGER SWITCH

DESCRIPTION

The rear window defogger control switch and circuit are integrated into the HVAC control assembly. Refer to the HVAC control assembly for additional information.

OPERATION

When actuating the switch it sends a ground signal to the Body Control Module (BCM). The BCM actuates the relay allowing current to flow through the grid lines for fifteen minutes upon initial actuation. Then ten minutes with each subsequent actuation or until either the switch or ignition is turned off. An indicating lamp illuminates the rear window defogger switch.

DIAGNOSIS AND TESTING - REAR WINDOW DEFOGGER SWITCH

The rear window defogger control switch and timer circuit may be tested in the vehicle with or without a scan tool, such as the DRB III®.

TESTING WITH SCAN TOOL

Using a scan tool, refer to the proper Body Diagnostic Procedures Manual.

TESTING WITHOUT SCAN TOOL

(1) Remove the HVAC control head from the instrument panel however, do not disconnect any of the electrical connectors if possible.

(2) Using a ohmmeter, check leads between Pins 5 and 1 of the HVAC electrical connector. Depress the rear window defogger button and the resistance reading should be 360 ohms (± 10%). If not OK, replace HVAC. If OK, check for the following possible causes:

- Rear window relay (EBL)
- Blown fuse
- Cut wire
- Poor ground
- Poor connection
- Defective BCM
- Bulkhead connector inoperative

Refer to **Wiring Diagrams** for complete circuit diagrams.

REAR WINDOW DEFOGGER GRID LINES

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING – REAR WINDOW DEFOGGER GRID LINES

The horizontal grid lines and vertical bus bar lines printed and fired on inside surface of rear window glass comprise an electrical parallel circuit. The electrically conductive lines are composed of a silver-ceramic material which when fired on glass becomes bonded to the glass and is highly resistant to abrasion. It is possible, however, that a break may occur in an individual grid line resulting in no current flow through the line. To detect breaks in grid lines the following procedure is required:

(1) Turn ignition switch to the ON position. Depress the control switch button to ON position. The indicator light should come on.

(2) Using a DC voltmeter with 0-15 volt range, contact the ground terminal with negative lead of voltmeter. With positive lead of voltmeter, contact feed terminal. The voltmeter should read 10-14 volts. A lower voltage reading indicates a poor ground connection.

(3) Connect the negative lead of voltmeter to a good body ground point. The voltage reading should not be more than two tenth of a volt difference. If more than two tenth of a volt repair the ground circuit.

(4) Connect negative lead of voltmeter to ground terminal and touch each grid line at Mid-Point with Positive lead. A reading of approximately 6 volts indicates a line is good. A reading of 0 volts indicates a break in line between Mid-Point and feed terminal. A reading of 10-14 volts indicates a break between Mid-Point and ground terminal. Move toward break and voltage will change as soon as break is crossed. Refer to **Wiring Diagrams** for circuit information.

STANDARD PROCEDURE - REAR WINDOW DEFOGGER GRID LINE REPAIR

WARNING: THE REPAIR KIT MAY CAUSE SKIN OR EYE IRRITATION. THE KIT CONTAINS EPOXY RESIN AND AMINE TYPE HARDENER AND HARMFUL:

- **DO NOT TAKE INTERNALLY, IF SWALLOWED INDUCE VOMITING AND CALL A PHYSICIAN IMMEDIATELY.**
- **IF SKIN CONTACT OCCURS, WASH AFFECTED AREAS WITH SOAP AND WATER.**
- **IF EYE CONTACT OCCURS, FLUSH WITH PLENTY OF WATER.**

USE WITH ADEQUATE VENTILATION. DO NOT USE NEAR FIRE OR OPEN FLAME THE CONTENTS CONTAIN FLAMMABLE SOLVENTS. KEEP OUT OF REACH OF CHILDREN.

The repair of the grid lines or the terminal is possible using the Mopar® Grid Line Repair Package or equivalent.

(1) Mask repair area so conductive epoxy can be extended onto the line or the bus bar (Fig. 3).

(2) Follow instructions in repair kit for preparing damaged area.

(3) Remove package separator clamp and mix plastic conductive epoxy thoroughly. Fold in half and cut center corner to dispense epoxy.

(4) Apply conductive epoxy through slit in masking tape. Overlap both ends of the break by 19 mm (3/4 inch).

(5) For a terminal or pigtail replacement, mask adjacent areas so epoxy can be extended onto line as well as bus bar. Apply a thin layer of epoxy to area where terminal was fastened and to adjacent line.

(6) Apply a thin layer of conductive epoxy on terminal and place terminal on desired location. To prevent terminal from moving while the epoxy is curing, it must be wedged or clamped.

(7) Carefully remove masking tape from grid line.

CAUTION: Do not allow the glass surface to exceed 204°C (400°F), glass may fracture.

(8) Allow epoxy to cure 24 hours at room temperature or use heat gun with a 260° to 371°C (500° to 700°F) range for 15 minutes. Hold gun approximately 254 mm (10 inches) from repaired area.

(9) After conductive epoxy is properly cured remove wedge from terminal and check out operation of rear window defogger. Do not attach connectors until curing is complete.

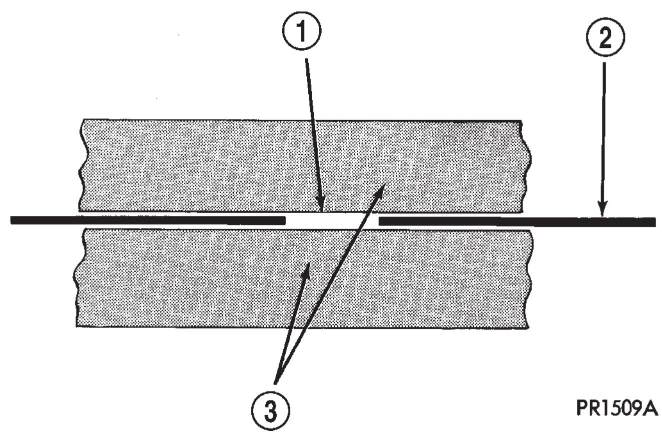

Fig. 3 Grid Line Repair

1 - BREAK
2 - GRID LINE
3 - MASKING TAPE

HEATED SEAT SYSTEM

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HEATED SEAT SYSTEM

DESCRIPTION

Individually controlled electrically heated front seats are available factory-installed optional equipment on this model. Vehicles with this option can be visually identified by the heated seat switch mounted in the center console. The heated seat system allows the front seat driver to select from six different levels of supplemental electrical seat heating, or no seat heating to suit their individual comfort requirements. The heated seat system for this vehicle includes the following major components, which are explained in detail later in this section:

- **Heated seat switch -** One heated seat switch is used per vehicle. The switch is mounted in the center console, behind the gear selector and has two rotary knobs, one for the driver and one for the passenger front seats. There are three Light Emitting Diodes (LED's) in the heated seat switch. The first LED illuminates the heated seat symbol on the switch anytime the ignition switch is in the ON position. The remaining LED's illuminate the numbers on the switch, indicating that the heated seat system is on.
- **Heated seat module -** One heated seat module is used per vehicle, this module contains the solid state electronic control and diagnostic logic circuitry for the heated seat system. One heated seat module is used per vehicle and is mounted under the drivers front seat cushion. Refer to the Electronic Control Modules section of the service manual for heated seat module information.
- **Heated seat elements -** Three heated seat elements are used per vehicle, two in the seat cushion and one in the seat back. These three elements, which are integral to the individual front seat cushion and front seat back trim covers are connected in series with the heated seat module.
- **Heated seat sensor -** One heated seat sensor is used per vehicle, one for the single heated seat and is integrated into the seat cushion heating element. The temperature sensor is a negative temperature coefficient thermistor.

Following are general descriptions of the major components in the heated seat system. See the owner's manual in the vehicle glove box for more information on the features, use and operation of the heated seat system. Refer to **Wiring Diagrams** in the index of this service manual for the location of complete heated seat system wiring diagrams.

OPERATION

The heated seat module receives fused battery current through Junction Block (JB) only when the ignition switch is in the run position. The heated seat switches receive battery current through a fused ignition switch output (run) circuit only when the ignition switch is in the Run position. The heated seat module shares a common ground circuit with each of the heated seat elements. The heated seat elements will only operate when the surface temperature of the seat cushion cover at the heated seat sensors is below the designed temperature set points of the system.

The heated seat module will automatically turn off the heated seat elements if it detects a short in the heated seat element circuit or a heated seat sensor value that is out of range. The heated seat system will remain ON anytime the ignition switch is turned to the ON position and the heated seat switch is at any of the #1 through #6 positions.

HEATED SEAT SYSTEM (Continued)

The heated seat module monitors inputs from the heated seat sensors and the heated seat switches. In response to these inputs the heated seat module uses its internal programming to control outputs to the heated seat elements in both front seats and to control the heated seat LED indicator lamps located in both of the heated seat switches.

DIAGNOSIS AND TESTING - HEATED SEAT SYSTEM

Refer to **Wiring Diagrams** in the index of this service manual for the location of complete heated seat system wiring diagrams. Before testing the individual components in the heated seat system, perform the following preliminary checks:

- If the heated seat switch numerals (1-6) do not illuminate with the ignition switch in the ON position and the heated seat switch in 1-6 positions, check the fuse in the junction block. If the fuse checks OK, test the heated seat switch as described in this section.
- If the heated seat switch numerals (1-6) illuminate, but the heating elements do not heat, check the fuse located in the power distribution center. If the fuse checks OK, test the seat heating elements as described in this section.

HEATED SEAT ELEMENT

DESCRIPTION

Vehicles equipped with the optional heated seat system have two sets of electrically operated heating element grids located in each outboard seating position of the front seat, one set for the seat cushion and the other set for the seat back. Each of the heated seat element grids consists of a single length of resistor wire that is routed in a zigzag pattern and captured between the leather trim cover and the foam rubber backing on the underside of its respective seat cushion trim cover and seat back trim cover assembly. Short pigtail wires with connectors are soldered to each end of each resistor wire element grid, which connect all of the element grids for each seating position to each other in series with the heated seat module through the seat wire harness.

One temperature sensor is used for each outboard seating position of the front seat, and it is located in the center insert area of the seat cushion cover. The heated seat sensors and their pigtail wires are also captured between the leather trim cover and the foam rubber backing on the underside of their respective seat cushion trim cover assemblies. The heated seat sensors are Negative Thermal Coefficient (NTC) thermistors. The sensors for both front seats receive a voltage feed from a single output of the heated seat module, but the module receives individual sensor inputs from the driver side and passenger side sensors.

The heated seat elements and sensors cannot be repaired. If damaged or faulty, the front seat cushion trim cover or front seat back trim cover assembly must be replaced.

OPERATION

One end of the heated seat element resistor wire is connected to a ground feed at all times through a splice in the heated seat module ground circuit. Battery current is directed to the other end of the heated seat element resistor wire by the energized N-channel Field Effect Transistor (N-FET) located within the heated seat module. The heated seat module will energize the N-FET only when the heated seat switch is in the Low or High position and the heated seat sensor indicates that the seat cushion surface temperature is below the selected (Low or High) temperature set point. As electrical current passes through the heating element grid, the resistance of the wire used in the element disperses some of that electrical current in the form of heat. The heat produced by the heated seat element grid then radiates through the underside of the seat cushion and seat back trim covers, warming the seat cover and its occupant.

The resistance of the heated seat sensor increases and decreases as the surface temperature of the seat cushion cover changes. The heated seat module supplies each sensor with a voltage feed, then detects the sensor resistance by monitoring the voltage of the separate sensor return circuits. The heated seat module compares the heated seat sensor resistance (seat cushion surface temperature) with the heated seat switch resistance (Low or High set point) to determine when the heated seat element grids need to be cycled on or off in order to maintain the selected temperature set point.

DIAGNOSIS AND TESTING - HEATED SEAT ELEMENT

Refer to **Heated Seat System** in this section for the location of the proper heated seat system diagnosis and testing procedures. To check the heated seat element and sensor circuits, proceed as follows. The wire harness connectors for the seat cushion heated seat element and sensor and for the seat back heated seat element are located under the seat, near the rear edge of the seat cushion frame. Refer to **Wiring Diagrams** for the location of complete heated seat system wiring diagrams.

HEATED SEAT ELEMENT (Continued)

SEAT CUSHION

(1) Disconnect and isolate the battery negative cable. Disconnect the green 4-way heated seat wire harness connector. Using an ohmmeter, check for continuity between pins A and B of the seat cushion wire harness connector (Fig. 1). There should be continuity. If OK, test the seat back element as described below. If not OK, check the green 2-way seat cushion connector. If OK, replace the faulty seat cushion cover and element assembly.

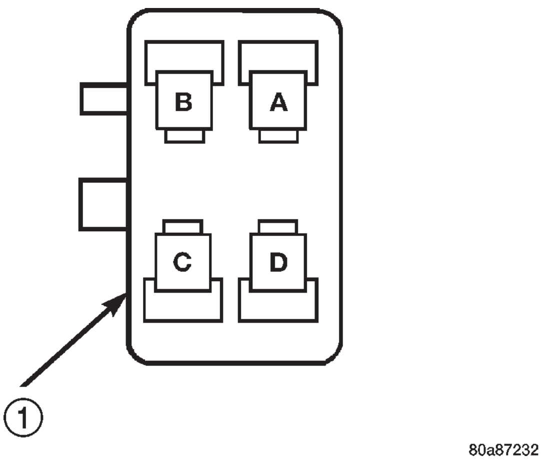

Fig. 1 Seat Cushion Element Connector

1 - HEATED SEAT SWITCH HOUSING

SEAT BACK

(1) Disconnect and isolate the battery negative cable. Disconnect the green 2-way heated seat back wire harness connector. Using an ohmmeter, check the resistance between the two pins. There should be continuity. If OK, test the heated seat control module as described in this section. If not OK, replace the faulty seat back cover and element assembly.

HEATED SEAT SWITCH

DESCRIPTION

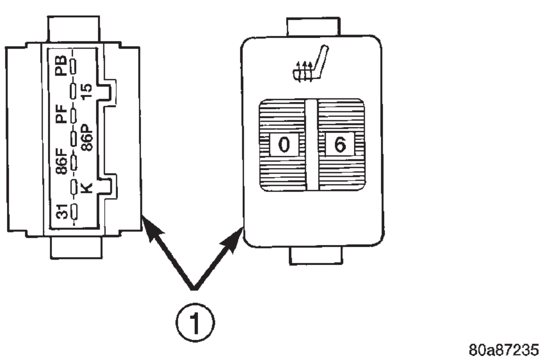

Fig. 2 Heated Seat Switch

1 - HEATED SEAT SWITCH

The heated seat switch used on vehicles with this option is mounted in the center console. The switch is snapped into a mounting hole in the center console. The heated seat switch incorporates two rotary knobs, one for the driver and one for the front seat passenger (Fig. 2). These knobs have numerals 1-6 to indicate the desired rate of supplemental seat heating. The instrument panel wire harness connectors for the heated seat switch is keyed to match the connector receptacle on the switch so that the heated seat switch can only be connected in the proper orientation.

The heated seat switch cannot be repaired. If the indicator or back lighting lamps are faulty or damaged, the individual heated seat switch unit must be replaced.

OPERATION

The heated seat switches receive battery current through a fused ignition switch output (run) circuit when the ignition switch is in the On position. The two six-position rotating-type switches provide a hard-wired voltage signal to the heated seat module to power the heated seat element of the selected seat and maintain the requested temperature setting.

There are three Light Emitting Diodes (LED's) in the heated seat switch. The first LED illuminates the heated seat symbol on the switch anytime the ignition switch is in the On position. The remaining LED's illuminate the numbers on the switch, indicating that the system is on..

DIAGNOSIS AND TESTING - HEATED SEAT SWITCH

Refer to **Wiring Diagrams** for the location of complete heated seat system wiring diagrams.

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Remove the heated seat switch as described in this group and inspect the connector for damage.

(2) Unplug the 7-way connector from the switch and check the harness terminals for proper ignition voltage and ground. Refer to **Wiring Diagrams** for complete heated seat system wiring diagrams.

HEATED SEAT SWITCH (Continued)

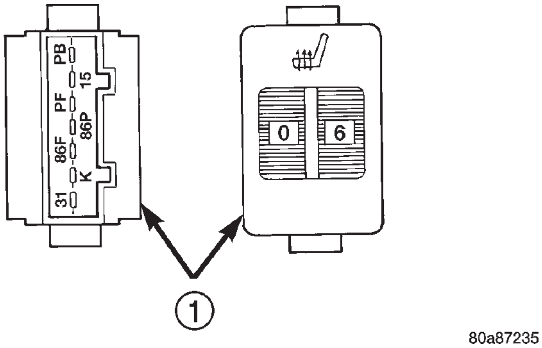

Fig. 3 Heated Seat Switch

1 - HEATED SEAT SWITCH

(3) Check the drivers switch for resistance between pin terminals PB and 86B (Fig. 3). Resistance should vary from 0-500 ohms, as the switch is rotated from #1 – #6. If not OK, replace the heated seat switch.

(4) Check the passenger switch for resistance between pin terminals PF and 86F (Fig. 3). Resistance should vary from 0-500 ohms, as the switch is rotated from #1 – #6. If OK, test the heated seat module. If not OK, replace the heated seat switch.

(5) If the switch is still suspected of possible malfunction, replace the inoperative heated seat switch with a known good unit and test the operation of the heated seat system. If OK, discard the faulty heated seat switch. If not OK, refer to **Heated Seat Module** in Electronic Control Modules for the location of the proper heated seat module diagnosis and testing procedures. Also refer to the Body Diagnostic Manual for additional diagnosis and testing procedures.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the center console. Refer to the Body section of this manual for the procedure.

(3) Disconnect the center console wire harness connector from the connector receptacle on the back of the heated seat switch.

(4) Remove the heated seat switch by depressing the retaining tabs and pushing straight out of the center console.

INSTALLATION

CAUTION: Be certain to install the switch in the correct position. The “UP” labeling on the switch must face “UP” upon installation.

(1) Connect the center console wire harness connector on the connector receptacle on the back of the heated seat switch.

(2) Verify switch/system operation.

(3) Install the center console. Refer to the Body section of this manual for the procedure.

(4) Install the heated seat switch in the center console mounting hole.

(5) Reconnect the battery negative cable.

HEATED SEAT MODULE

DESCRIPTION

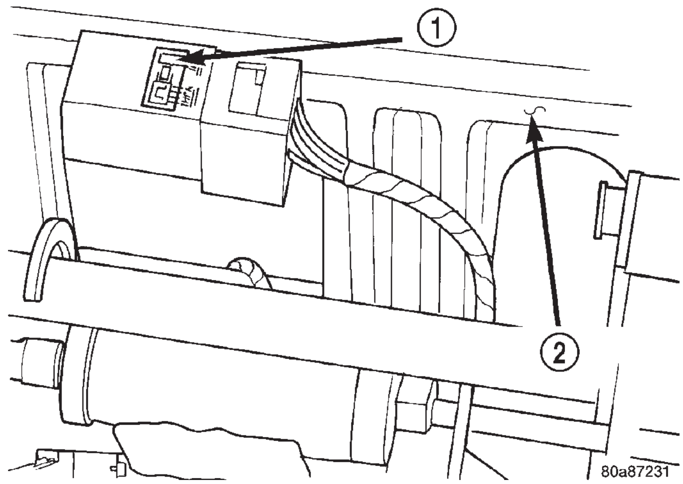

Fig. 4 Heated Seat Control Module

1 - HEATED SEAT CONTROL MODULE
2 - SEAT CUSHION FRAME

Two heated seat modules are used on this vehicle, one for each front seat. The heated seat modules are located under each front seat (Fig. 4). The heated seat module has a single connector receptacle that allows the module to be connected to all of the required inputs and outputs through the body wire harness.

The heated seat module is an electronic microprocessor controlled device designed and programmed to use inputs from the ignition switch, the two heated seat switches and the two heated seat sensors to operate and control the heated seat elements in both front seats.

The heated seat module cannot be repaired. If the heated seat module is damaged or faulty, the entire module must be replaced.

OPERATION

The heated seat module operates on fused battery current received from the ignition switch. The module is grounded at all times through the body harness. Inputs to the module include a resistor multiplexed heated seat switch request circuit for each of the two heated seat switches and the heated seat sensor inputs from the seat cushions of each front seat. In response to those inputs the heated seat module controls battery current feeds to the heated seat elements and sensors.

HEATED SEAT MODULE (Continued)

When a heated seat switch (Driver or Passenger) request signal is received by the heated seat module, the module energizes the selected heated seat sensor circuit and the sensor provides the module with an input indicating the surface temperature of the selected seat cushion.

The Low heat set point is about 38° C (100.4° F), and the High heat set point is about 42° C (107.6° F). If the seat cushion surface temperature input is below the temperature set point for the selected temperature setting, the heated seat module energizes an N-channel Field Effect Transistor (N-FET) within the module which energizes the heated seat elements in the selected seat cushion and back. When the sensor input to the module indicates the correct temperature set point has been achieved, the module de-energizes the N-FET which de-energizes the heated seat elements. The heated seat module will continue to cycle the N-FET as needed to maintain the selected temperature set point.

DIAGNOSIS AND TESTING - HEATED SEAT MODULE

Refer to **Wiring Diagrams** for the location of complete heated seat system wiring diagrams.

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

Before testing the heated seat control module, test the heated seat switch 6-way connector located under each front seat for proper voltage supply and ground path. If testing of the heated seat elements and switch reveals no problems, remove the module as described in this section. Turn the ignition switch ON:

(1) Check for battery voltage at the red wire of the heated seat control module connector. If OK go to Step 2. If not OK, check the 20 amp MAXI fuse located in the Power Distribution Center.

(2) Turn the heated seat switch ON and check for 9 - 16.5 volts at the white / black wire of the heated seat control module connector. If OK go to Step 3. If not OK, check the 10 amp fuse in cavity #11 of the junction block and the 20 amp fuse in cavity #8 of the power distribution center.

(3) Check for 7 - 16.5 volts at the purple wire of the heated seat control module connector. If OK go to Step 4. If not OK, test the heated seat switch and harness as described in this section.

(4) Check for 9 - 16.5 volts at the red / white wire of the heated seat control module connector. The surface temperature at the front seat heating element sensor must be below the temperature setting (1-6) on the heated seat switch, for the red / white wire to indicate battery voltage. If OK go to Step 5. If not OK, test the heated seat switch and harness as described in this section.

(5) Check for continuity between a known good ground and the black wire of the heated seat control module connector. If OK replace the heated seat control module. If not OK, carefully inspect the harness for an open or short.

REMOVAL

(1) Move the appropriate power seat track to its upper-most and rearward-most stop position.

(2) Disconnect and isolate the negative battery cable.

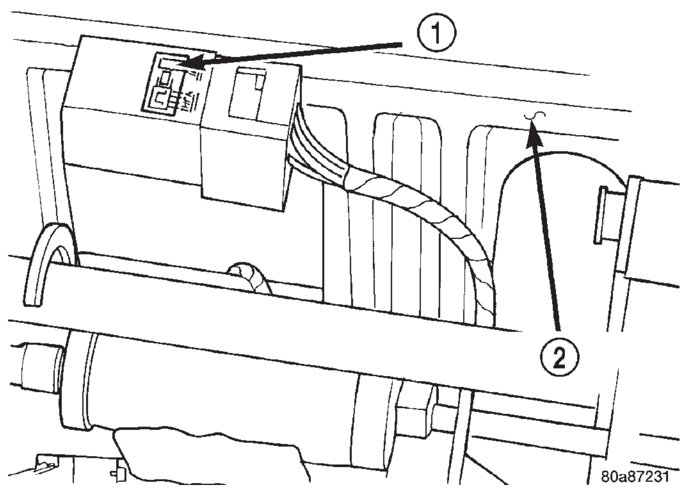

Fig. 5 Heated Seat Control Module

1 - HEATED SEAT CONTROL MODULE
2 - SEAT CUSHION FRAME

(3) Reach under the front of the seat cushion and separate the heated seat module from the seat cushion frame (Fig. 5).

(4) Disconnect the wire harness connector from the connector receptacle on the back of the heated seat module.

(5) Remove the heated seat module from the vehicle.

INSTALLATION

(1) Position the heated seat module under the seat.

(2) Connect the wire harness connector on the back of the heated seat module.

(3) Reposition the drivers power seat track.

(4) Connect the negative battery cable.

HORN

TABLE OF CONTENTS

HORN SYSTEM

DESCRIPTION

WARNING: ON VEHICLES EQUIPPED WITH AIRBAG, REFER TO ELECTRICAL, RESTRAINTS FOR SAFETY PRECAUTIONS. DISCONNECT THE NEGATIVE CABLE FROM THE BATTERY BEFORE SERVICING COMPONENTS INVOLVING THE AIRBAG SYSTEM. ACCIDENTAL DEPLOYMENT OF AIRBAG AND PERSONAL INJURY CAN RESULT.

The horn circuit consists of a horn switch, clock spring, wiring, horn relay, and horns. The horn switch is a membrane switch located in the airbag trim cover. One horn is located below each headlamp.

OPERATION

The horn circuit feed is from the fuse to the horn relay in the Junction Block. When the horn contact is depressed, it completes the ground circuit. Then the horn relay coil closes a set of contacts which allows current to flow to the horns. The horn(s) are grounded at the shock tower through the headlamp and dash harness. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

DIAGNOSIS AND TESTING - HORN SYSTEM

CAUTION: Continuous sounding of horns will cause horn relay to fail.

Check fuse 8 in the Junction Block, and refer to Horn System Test table.

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

HORN SYSTEM TEST

CONDITION	POSSIBLE CAUSE	CORRECTION
HORN SOUNDS CONTINUOUSLY. NOTE: IMMEDIATELY UNPLUG HORN RELAY IN THE JUNCTION BLOCK	(1) FAULTY HORN RELAY.	(1) REFER TO HORN RELAY TEST.
	(2) HORN CONTROL CIRCUIT TO RELAY SHORTED TO GROUND.	(2) CHECK HORN RELAY TERMINAL 8 IN THE JUNCTION BLOCK FOR CONTINUITY TO GROUND INDICATES: (A) WIRING HARNESS SHORTED TO GROUND. (B) FIND THE SHORT AND REPAIR AS NECESSARY.

HORN SYSTEM (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
	(3) PINCHED HORN SWITCH WIRE UNDER DRIVER AIRBAG MODULE.	(3) REMOVE DRIVER AIRBAG MODULE AND CHECK FOR RUBBING, SHORTED OR LOOSE WIRE CONNECTOR AND REPAIR AS NECESSARY.
	(4) FAULTY HORN SWITCH	(4) REPLACE DRIVER AIRBAG MODULE TRIM.
HORN SOUND INTERMITTENTLY AS THE STEERING WHEEL IS TURNED.	(1) HORN RELAY CONTROL CIRCUIT X3 IS SHORTED TO GROUND INSIDE STEERING COLUMN OR THE WHEEL.	(1) REMOVE DRIVER AIRBAG MODULE AND/OR STEERING WHEEL AS NEEDED. CHECK FOR RUBBING OR LOOSE WIRE/ CONNECTOR, REPAIR AS NECESSARY.
	(2) PINCHED HORN SWITCH WIRE UNDER DRIVER AIRBAG MODULE	(2) REPLACE DRIVER AIRBAG MODULE.
	(3) FAULTY HORN SWITCH	(3) REPLACE DRIVER AIRBAG MODULE TRIM.
	(4) FAULTY CLOCKSPRING	(4) REPLACE CLOCKSPRING
HORN DOES NOT SOUND	(1) CHECK FUSE 8 IN THE JUNCTION BLOCK.	(1) REPLACE FUSE IF BLOWN AS REPAIR AS NECESSARY.
	(2) NO VOLTAGE AT HORN RELAY TERMINALS 6 & 8, AND FUSE IS OK.	(2) NO VOLTAGE, REPAIR OR REPLACE JUNCTION BLOCK AS NECESSARY.
	(3) FAULTY OR DAMAGED HORN.	(3) VOLTAGE AT HORN WHEN HORN SWITCH IS PRESSED, REPLACE HORN.
	(4) FAULTY HORN SWITCH	(4) REPLACE DRIVER AIRBAG MODULE TRIM.
FUSE BLOWS WHEN HORN IS BLOWN	(1) SHORT CIRCUIT IN HORN OR HORN WIRING OR FAULTY RELAY	(1) REMOVE HORN RELAY, CHECK FOR SHORTED HORN OR HORN WIRING. DISCONNECT HORN WIRE HARNESS TO ISOLATE SHORT AND REPAIR AS NECESSARY.
FUSE BLOWS WITHOUT BLOWING HORN	(1) SHORT CIRCUIT IN CIRCUIT FROM STEERING COLUMN SWITCH TO HORN RELAY	(1) REMOVE RELAY, INSTALL NEW FUSE, IF FUSE DOES NOT BLOW REPLACE HORN RELAY. IF FUSE BLOWS WITH RELAY REMOVED, CHECK FOR SHORT TO GROUND WITH OHMMETER ON CIRCUIT BETWEEN TERMINALS 6 & 8 AND THE FUSE TERMINAL. REPAIR AS NECESSARY.
	(2) FAULTY RELAY	(2) REPLACE RELAY
	(3) FAULTY BODY CONTROLLER	(3) REPLACE BODY CONTROLLER

HORN

DIAGNOSIS AND TESTING - HORN

Check horn fuse 16 in the Power Distribution Center and fuse 8 in the Junction Block. If fuse is blown refer to FUSE BLOWN section. If fuse is OK, refer to FUSE OK section.

FUSE BLOWN

(1) Verify condition of battery terminals and voltage, (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - DESCRIPTION). If battery connections and battery charge is OK, go to Step 2.

(2) Using a voltmeter, test for battery voltage at both sides of horn fuse 8. If voltage is OK, on both sides of fuse, go to Fuse OK. If voltage is OK, on one side of fuse, the fuse is blown, go to Step 3.

(3) Using a suitable ammeter in place of the fuse, test amperage draw of the horn circuit. If amperage draw is greater than 20 amps without the horn switch depressed, a grounded circuit exists between the fuse and the horn relay. Go to Step 4. If amperage draw is greater than 20 amps with the horn switch depressed, a grounded circuit exists between the horn relay and the horn. Go to Step 6.

(4) Remove the horn relay from the Junction Block. If the amperage draw drops to 0 amps, the horn switch or circuit is shorted. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds. If amperage does not drop go to Step 5.

(5) Disconnect both horns. If amperage does not drop with both horns disconnected and the horn switch depressed, go to Step 7. If the amperage draw drops go to Step 6.

(6) Disconnect the wire connector from one of the horns. If amperage drops and the connected horn sounds, reverse the procedure, and replace the faulty horn.

(7) Using a continuity tester, with the horns disconnected test continuity of the X2 cavity of the horn relay to ground. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds. If continuity is detected, the circuit is grounded between the Junction Block and the horns. Locate and repair pinched harness. If the amperage draw does not drop to 0 amps, repair short at the Junction Block.

FUSE OK

(1) Remove the horn relay from the Junction Block.

(2) Using a continuity tester, Depress horn switch and test continuity from the X3 cavity of the horn relay to ground. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

(a) If continuity is detected, go to Step 3.

(b) If NO continuity, go to Step 4.

(3) Using a suitable jumper wire, jump across the fuse F62 cavity and the X2 cavity of the horn relay in the Junction Block.

(a) If the horn sounds, replace the horn relay.

(b) If the horn does not sound, go to Step 4.

(4) Remove airbag/horn pad from steering wheel. Refer to ELECTRICAL/RESTRAINTS.

(5) Test continuity across horn switch connectors with horn switch depressed.

(a) If continuity is detected, repair open circuit between the relay and the horn switch.

(b) If NO continuity, replace airbag cover.

(6) Install horn relay into Junction Block.

(7) Disconnect the wire connectors from horns.

(8) Using a voltmeter, with the horn switch depressed test voltage across horn connector terminals of the wire harness.

(a) If voltage is detected, replace horns.

(b) If NO voltage, go to Step 9.

(9) With the horn switch depressed, test for voltage between the X2 circuit and ground.

(a) If voltage OK, repair system ground at right cowl area. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

(b) If NO voltage, repair open X2 circuit between the relay and the horns.

REMOVAL

LEFT SIDE

(1) Disconnect and isolate the battery negative cable.

(2) Remove left side headlamp unit. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

HORN (Continued)

(3) Remove left side fog lamp. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/FOG LAMP UNIT - REMOVAL).

(4) Remove vacuum tank.

(5) Remove horn mounting bolt (Fig. 1).

(6) Disconnect wire harness connector.

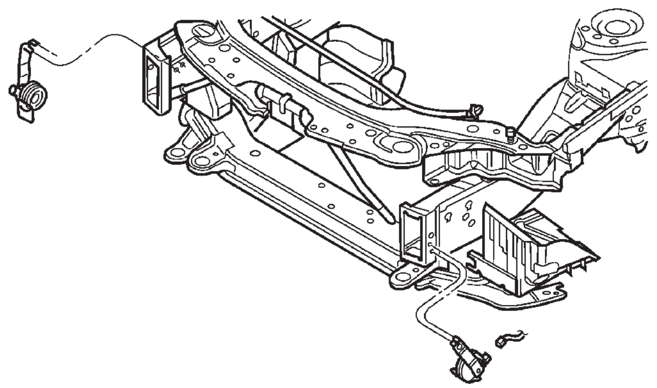

Fig. 1 HORN MOUNTING LOCATION

RIGHT SIDE

(1) Disconnect and isolate the battery negative cable.

(2) Remove right side headlamp unit. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

(3) Remove horn mounting bolt.

(4) Disconnect wire harness connector.

INSTALLATION

LEFT SIDE

(1) Connect wire harness connector.

(2) Install horn mounting bolt.

(3) Install vacuum tank.

(4) Install left side fog lamp unit. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/FOG LAMP UNIT - INSTALLATION).

(5) Install left side headlamp unit. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

(6) Connect battery negative cable.

RIGHT SIDE

(1) Connect wire harness connector.

(2) Install horn mounting bolt.

(3) Install right side headlamp unit. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

(4) Connect battery negative cable.

HORN RELAY

DESCRIPTION

The horn relay is a International Standards Organization (ISO) micro-relay. The terminal designations and functions are the same as a conventional ISO relay. However, the micro-relay terminal orientation (or footprint) is different, current capacity is lower, and the relay case dimensions are smaller than on the conventional ISO relay.

OPERATION

The horn relay is a electromechanical device that switches current to the horn when the Driver Airbag Module is depressed.

The horn relay is located in the Junction Block. Refer to the Junction Block label for horn relay identification and location.

If a problem is encountered with a continuously sounding horn, it can usually be quickly resolved by removing the horn relay from the Junction Block until further diagnosis is completed. The horn relay cannot be repaired and, if faulty, it must be replaced.

DIAGNOSIS AND TESTING - HORN RELAY

(1) Remove horn relay from the Junction Block.

(2) Using ohmmeter, test between the Junction Block relay terminal 7 and ground for continuity.

(a) When the horn contact is not depressed, no continuity.

(b) Continuity to ground when horn contact is depressed.

(c) If continuity is not correct, repair horn contact or wiring as necessary. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

(3) Insert a jumper wire between terminals 8 and 10 of the horn relay in the Junction Block.

(a) If horns sound replace relay.

(b) If the horns do not sound, install horn relay and refer to Horn Test.

(4) Using voltmeter, test battery voltage:

(a) Test Junction Block horn relay terminals 6 and 8 for voltage from fuse 8.

(b) If not OK, repair as necessary. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

HORN SWITCH

DESCRIPTION

The horn switch is molded into the airbag trim cover. The horn switch can not be serviced separately. For service procedures, refer to ELECTRICAL/RESTRAINTS.

IGNITION CONTROL

TABLE OF CONTENTS

IGNITION CONTROL

DESCRIPTION - IGNITION SYSTEM

NOTE: All engines use a fixed ignition timing system. Basic ignition timing is not adjustable. All spark advance is determined by the Powertrain Control Module (PCM).

The distributorless ignition system used on these engines is referred to as the Direct Ignition System (DIS). The system's three main components are the coils, crankshaft position sensor, and camshaft position sensor. The coil on plug ignition system utilizes an ignition coil for every cylinder, it is mounted directly over the each spark plug.

OPERATION - IGNITION SYSTEM

The crankshaft position sensor and camshaft position sensor are hall effect devices. The camshaft position sensor and crankshaft position sensor generate pulses that are inputs to the PCM. The PCM determines engine position from these sensors. The PCM calculates injector sequence and ignition timing from crankshaft & camshaft position. For a description of both sensors, refer to Camshaft Position Sensor and Crankshaft Position Sensor.

IGNITION CONTROL (Continued)

SPECIFICATIONS

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
2.0/2.4L Target Magnet Screw	3		30
2.4L Camshaft Sensor Screw	12.9		115
2.0L Camshaft Sensor Screw	9		80
2.7L Camshaft Sensor Screw	12		105
2.0/2.4L Ignition coil bolts	11.9		105
2.7L Ignition coil bolts	6.2		55
2.0L Spark Plugs	28	20	
2.4L Spark Plugs (Torque Critical)	17.6 ±2	13 ±2	
2.7L Spark Plugs	17.6	13	
Knock Sensor	10	7	
Ignition Coil Capacitor Nut	12	8.8	106

SPARK PLUG CABLE RESISTANCE

2.4L

CABLE	Maximum Resistance
1, 2, 3, & 4	10.8K ohms

SPARK PLUG

Engine	Spark Plug	Gap	Thread Size
2.0L	RC9YC	0.033 TO 0.038	14mm (3/4 in.) reach

Engine	Spark Plug	Gap	Thread Size
2.4L	RE14MCC5	0.048 TO 0.053	14mm (1 in.) reach

Engine	Spark Plug	Gap	Thread Size
2.7L	RE10PMC5	0.048 TO 0.053	14mm (1 in.) reach

AUTO SHUT DOWN RELAY

DESCRIPTION

The relay is located in the Power Distribution Center (PDC). For the location of the relay within the PDC, refer to the PDC cover for location. Check electrical terminals for corrosion and repair as necessary

OPERATION

The ASD sense circuit informs the PCM when the ASD relay energizes. A 12 volt signal at this input indicates to the PCM that the ASD has been activated. This input is used only to sense that the ASD relay is energized.

When energized, the ASD relay supplies battery voltage to the fuel injectors, ignition coils and the heating element in each oxygen sensor.

When energized, the ASD relay provides power to operate the injectors, ignition coil, generator field, O2 sensor heaters (both upstream and downstream), (EGR solenoid and PCV heater if equipped) and also provides a sense circuit to the PCM for diagnostic purposes. If the PCM does not receive 12 volts from this input after grounding the ASD relay, it sets a Diagnostic Trouble Code (DTC). The PCM energizes the ASD any time there is a Crankshaft Position sensor signal that exceeds a predetermined value. The ASD relay can also be energized after the engine has been turned off to perform an O2 sensor heater test, if vehicle is equipped with OBD II diagnostics.

As mentioned earlier, the PCM energizes the ASD relay during an O2 sensor heater test. This test is performed only after the engine has been shut off. The PCM still operates internally to perform several checks, including monitoring the O2 sensor heaters.

CAMSHAFT POSITION SENSOR

DESCRIPTION

The camshaft position sensor for the 4 cylinder engine is mounted on the end of the cylinder head (Fig. 1).

OPERATION

The CMP sensor contains a hall effect device that provide cylinder identification to the Powertrain Control Module (PCM). The sensor generates pulses as groups of notches on the camshaft sprocket pass underneath it. The PCM keeps track of crankshaft rotation and identifies each cylinder by the pulses generated by the notches on the camshaft sprocket. Crankshaft pulses follow each group of camshaft pulses.

When metal aligns with the sensor, voltage goes low (less than 0.3 volts). When a notch aligns with the sensor, voltage spikes high (5.0 volts). As a group of notches pass under the sensor, the voltage switches from low (metal) to high (notch) then back to low. The number of notches determine the amount of pulses. If available, an oscilloscope or DRBIII® PEP Module can display the square wave patterns of each timing event.

REMOVAL

REMOVAL - 4 CYLINDER

The camshaft position sensor is mounted to the rear of the cylinder head.

(1) Remove the negative battery cable.

(2) Disconnect the PCV hose and reposition.

(3) Disconnect electrical connectors from the camshaft position sensor (Fig. 1).

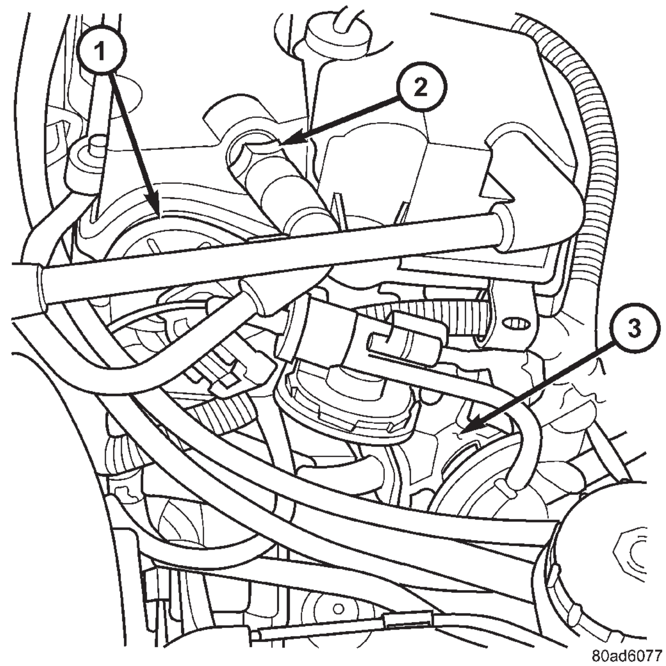

Fig. 1 CAM SENSOR/EGR VALVE/PCV VALVE

1 - Camshaft Position Sensor
2 - PCV Valve
3 - EGR Valve and Transducer

CAMSHAFT POSITION SENSOR (Continued)

(4) Remove camshaft position sensor mounting screws. Remove sensor.

(5) Loosen screw attaching target magnet to rear of camshaft and remove magnet (Fig. 2).

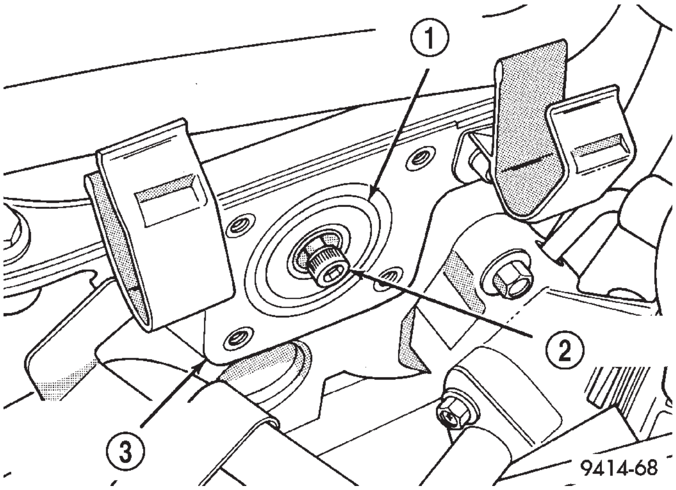

Fig. 2 Target Magnet Removal/Installation

1 - TARGET MAGNET
2 - MOUNTING BOLT
3 - REAR OF CYLINDER HEAD

REMOVAL - 2.7L

The camshaft position sensor is mounted in the front of the head.

(1) Disconnect electrical connector from sensor.

(2) Remove camshaft position sensor screw.

(3) Without pulling on the connector, pull the sensor out of the chain case cover (Fig. 3).

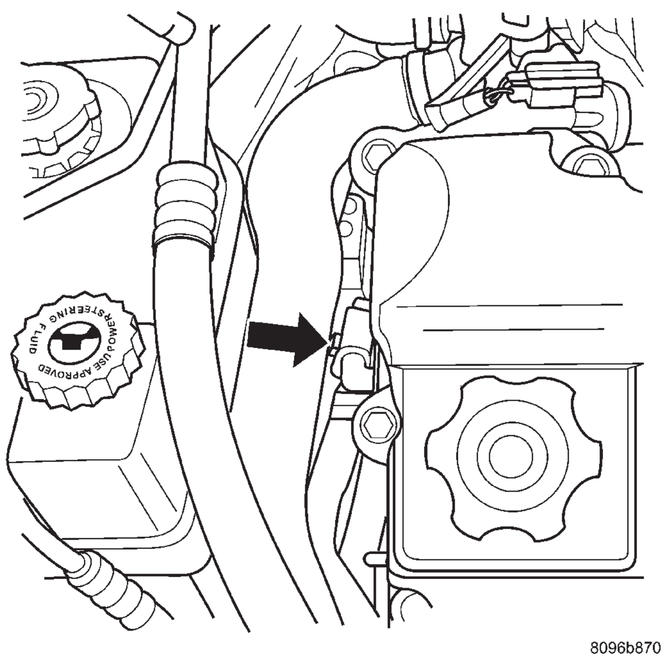

Fig. 3 CAM SENSOR LOCATION 2.7L

INSTALLATION

INSTALLATION - 4 CYLINDER

The target magnet has locating dowels that fit into machined locating holes in the end of the camshaft (Fig. 4).

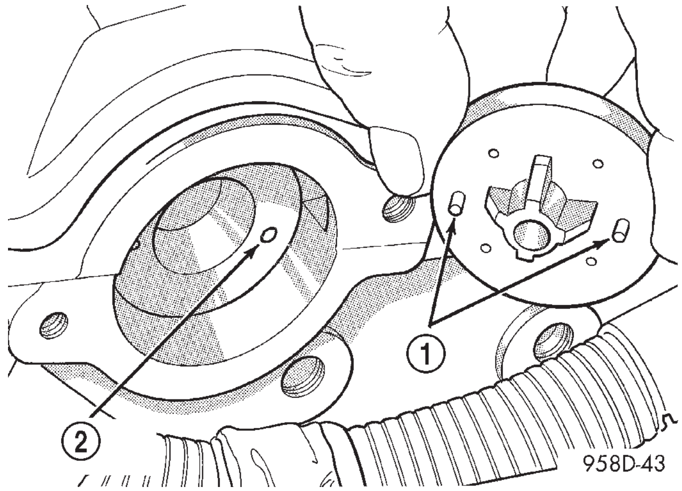

Fig. 4 Target Magnet Installation

1 - LOCATING DOWELS
2 - LOCATING HOLES (2)

(1) Install target magnet in end of camshaft. Tighten mounting screw to 3 N·m (30 in. lbs.) torque. Over torqueing could cause cracks in magnet. If magnet cracks replace it.

(2) Install camshaft position sensor. Tighten sensor mounting screws to 12.9 N·m (115 in. lbs.) torque.

(3) Carefully attach electrical connector to camshaft position sensor. Installation at an angle may damage the sensor pins.

(4) Connect the PCV Valve hose.

(5) Connect the negative battery cable.

INSTALLATION - 2.7L

The camshaft position sensor is mounted in the front of the head.

(1) Install sensor in the chain case cover and push sensor in until contact is made with the boss on the head. While holding the sensor in this position, install and tighten the retaining bolt to 12 N·m (105 in. lbs.) torque.

(2) Attach electrical connector to sensor.

IGNITION COIL

DESCRIPTION

The ignition coil assembly for the 4 cylinder engines consists of 2 or 3 independent coils molded together. The coil assembly for the 4 cylinder engines

IGNITION COIL (Continued)

is mounted on the cylinder head cover. Spark plug cables route to each cylinder from the coil. The coil assemblies for the 2.7L are mounted on the intake manifold. It is a coil on plug assembly and each cylinder has an ignition coil assembly.

OPERATION

The coil for the 4 cylinder engines fires two spark plugs every power stroke. One plug is the cylinder under compression, the other cylinder fires on the exhaust stroke. The Powertrain Control Module (PCM) determines which of the coils to charge and fire at the correct time.

The Auto Shutdown (ASD) relay provides battery voltage to the ignition coil. The PCM provides a ground contact (circuit) for energizing the coil. When the PCM breaks the contact, the magnetic energy in the coil transfers to the secondary causing the spark. The PCM will de-energize the ASD relay if it does not receive the crankshaft position sensor and camshaft position sensor inputs. Refer to Auto Shutdown (ASD) Relay—PCM Output, in this section for relay operation.

REMOVAL

REMOVAL - 4 Cylinder

The electronic ignition coil pack attaches directly to the valve cover (Fig. 5).

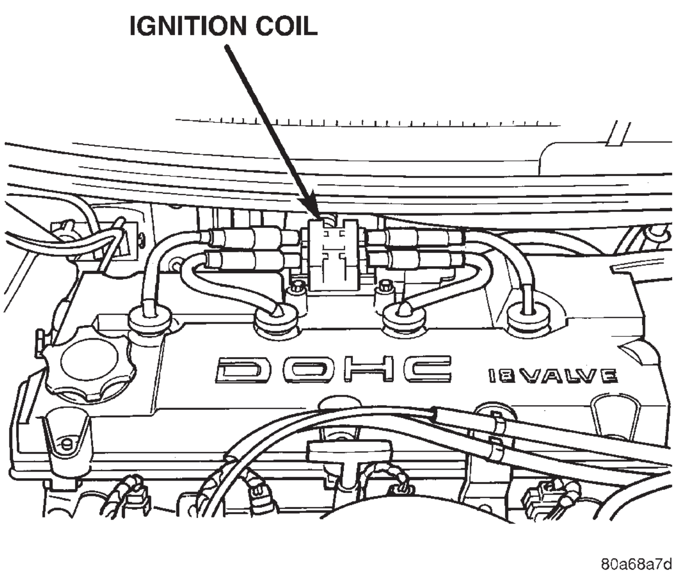

Fig. 5 IGNITION COIL 4 CYLINDER

(1) Diconnect the negative battery cable.

(2) Disconnect electrical connector from coil pack (Fig. 6).

(3) Remove spark plug cables, twist and pull cables to remove.

(4) Remove coil pack mounting bolts.

(5) Remove coil pack.

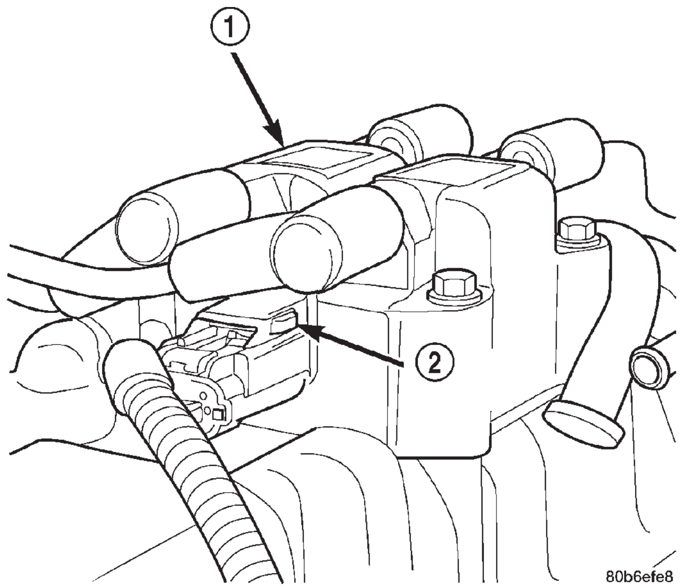

Fig. 6 Ignition Coil Connector

1 - COIL
2 - LOCKING TAB

REMOVAL - 2.7L

(1) Prior to removing the ignition coils, spray compressed air around the coil area and spark plug (Fig. 7).

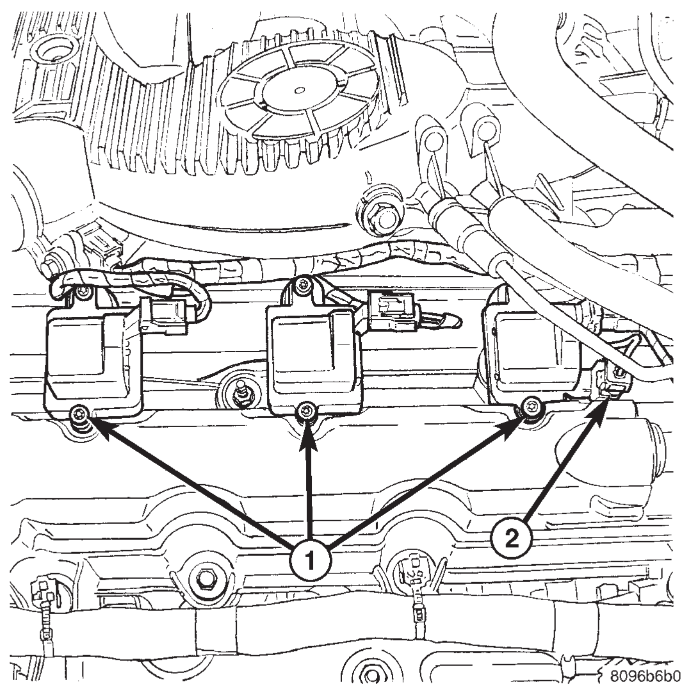

Fig. 7 IGNITION COILS, COIL CAPACITOR

1 - Ignition Coils
2 - Ignition Capacitor

IGNITION COIL (Continued)

(2) Remove electrical connector from ignition coil.
(3) Remove 2 fasteners from ignition coil assembly.
(4) Remove ignition coil assembly (Fig. 8).

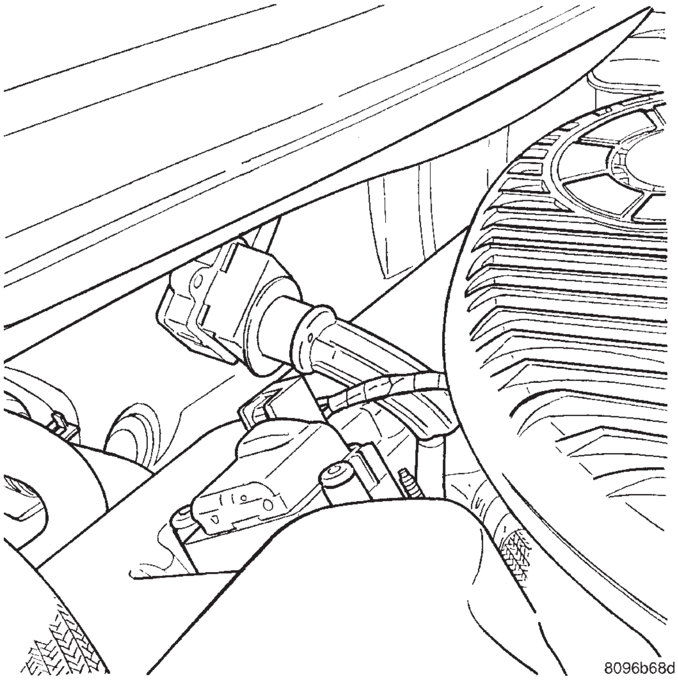

Fig. 8 IGNITION COIL REMOVAL

INSTALLATION

INSTALLATION - 4 CYLINDER

The electronic ignition coil pack attaches directly to the valve cover (Fig. 5).

(1) Install coil pack on valve cover.
(2) Install bolts and tighten bolts to N·m 11.8 (105 in. lbs.).
(3) Connect the electrical connector (Fig. 6).
(4) Transfer spark plug cables to new coil pack. The coil pack towers are numbered with the cylinder identification. Be sure the ignition cables snap onto the towers.

INSTALLATION - 2.7L

(1) Install ignition coil assembly for spark plug (Fig. 8).
(2) Install coil screws and tighten to 6.2 N·m (55 in. lbs.).
(3) Connect the electrical connector.

IGNITION COIL CAPACITOR

DESCRIPTION

There is a coil capacitor added to each bank of cylinders for radio noise suppression.

REMOVAL

(1) Remove the negative battery cable.
(2) Disconnect the electrical connector (Fig. 9).
(3) Remove nut and capacitor.

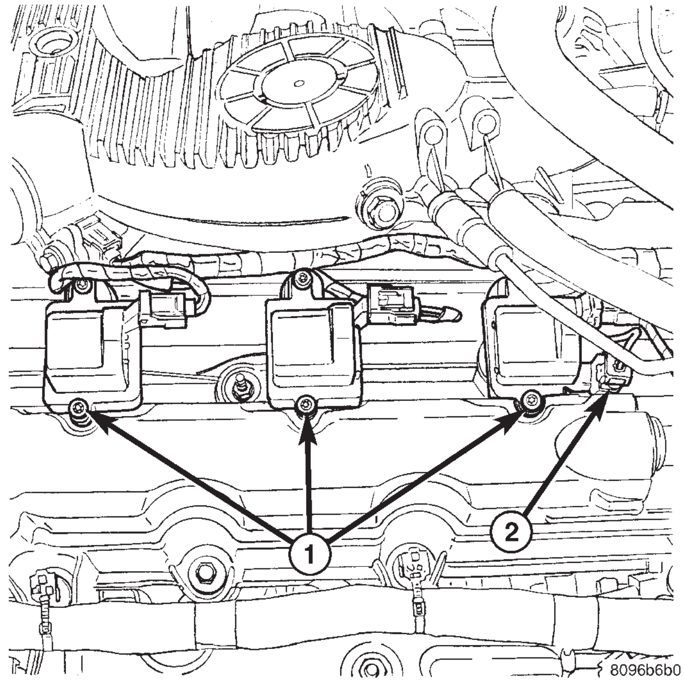

Fig. 9 Ignition Coil Capacitor

1 - Ignition Coils
2 - Ignition Capacitor

INSTALLATION

(1) Install capacitor and tighten nut (Fig. 9).
(2) Attach electrical connector to capacitor.
(3) Install the negative battery cable.

KNOCK SENSOR

DESCRIPTION

The knock sensor threads into the cylinder block. The knock sensor is designed to detect engine vibration that is caused by detonation.

OPERATION

When the knock sensor detects a knock in one of the cylinders, it sends an input signal to the PCM. In response, the PCM retards ignition timing for all cylinders by a scheduled amount.

Knock sensors contain a piezoelectric material which constantly vibrates and sends an input voltage (signal) to the PCM while the engine operates. As the intensity of the crystal's vibration increases, the knock sensor output voltage also increases.

The voltage signal produced by the knock sensor increases with the amplitude of vibration. The PCM

KNOCK SENSOR (Continued)

receives as an input the knock sensor voltage signal. If the signal rises above a predetermined level, the PCM will store that value in memory and retard ignition timing to reduce engine knock. If the knock sensor voltage exceeds a preset value, the PCM retards ignition timing for all cylinders. It is not a selective cylinder retard.

The PCM ignores knock sensor input during engine idle conditions. Once the engine speed exceeds a specified value, knock retard is allowed.

Knock retard uses its own short term and long term memory program.

Long term memory stores previous detonation information in its battery-backed RAM. The maximum authority that long term memory has over timing retard can be calibrated.

Short term memory is allowed to retard timing up to a preset amount under all operating conditions (as long as rpm is above the minimum rpm) except WOT. The PCM, using short term memory, can respond quickly to retard timing when engine knock is detected. Short term memory is lost any time the ignition key is turned off.

NOTE: Over or under tightening affects knock sensor performance, possibly causing improper spark control.

REMOVAL

REMOVAL - 4 CYLINDER

The knock sensor threads into the side of the cylinder block (Fig. 10).

(1) Disconnect electrical connector from knock sensor.

(2) Use a crow foot socket to remove the knock sensors.

REMOVAL - 2.7L

The sensors screws into the cylinder block, directly below the intake manifold.

(1) Remove intake manifold plenum refer to the Engine section.

(2) Remove the passenger side cylinder head, refer to the Engine section.

(3) Disconnect electrical connector from knock sensor (Fig. 11).

(4) Use a crows foot socket to remove the knock sensors.

INSTALLATION

INSTALLATION - 4 CYLINDER

The knock sensor threads into the side of the cylinder block in front of the starter (Fig. 10).

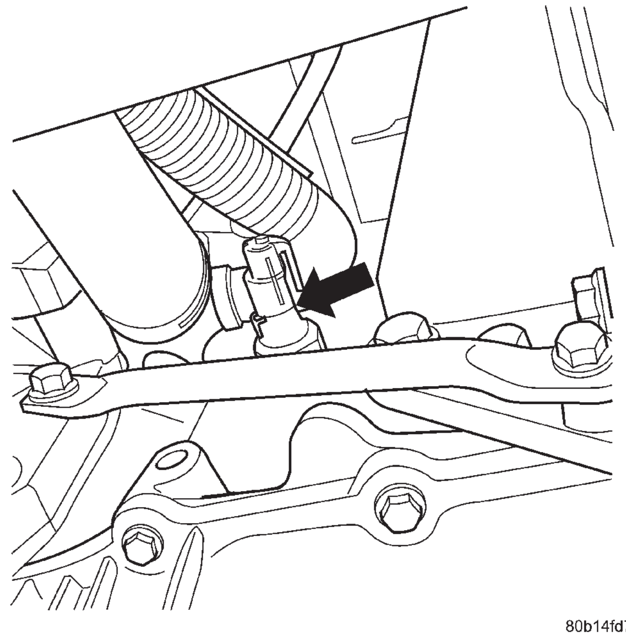

Fig. 10 KNOCK SENSOR - 4 CYLINDER

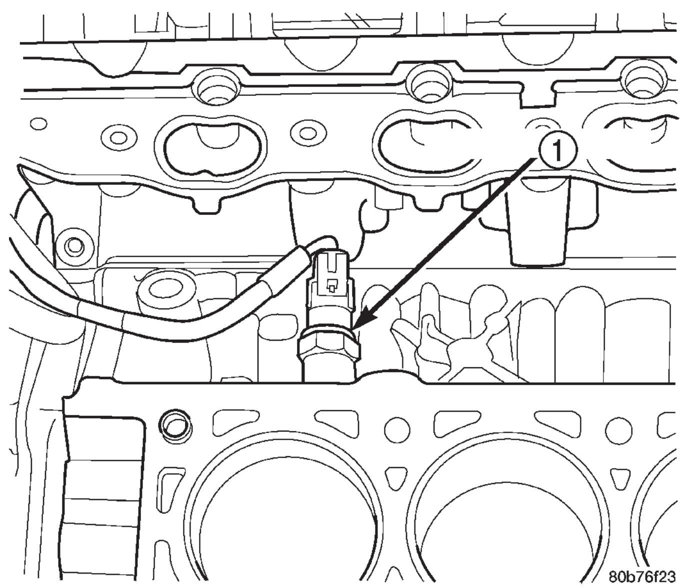

Fig. 11 KNOCK SENSOR 2.7 L

1 - KNOCK SENSOR

(1) Install knock sensor. Tighten knock sensor to 10 N·m (7 ft. lbs.) torque. **Over or under tightening effects knock sensor performance, possibly causing improper spark control.**

(2) Attach electrical connector to knock sensor.

INSTALLATION - 2.7L

The sensors screws into the cylinder block, directly below the intake manifold.

KNOCK SENSOR (Continued)

(1) Install knock sensor (Fig. 11). Tighten knock sensor to 10 N·m (7 ft. lbs.) torque. **Over or under tightening effects knock sensor performance resulting in possible improper spark control.**

(2) Install the passenger side cylinder head, refer to the Engine section.

(3) Attach electrical connector to knock sensor.

(4) Install intake manifold plenum. Refer to the Engine section.

SPARK PLUG

DESCRIPTION

DESCRIPTION - STANDARD 4 CYLINDER

All engines use resistor spark plugs. They have resistance values ranging from 6,000 to 20,000 ohms when checked with at least a 1000 volt spark plug tester.

Do not use an ohm meter to check the resistance of the spark plugs. This will give an inaccurate reading.

Refer to the Specifications section for gap and type of spark plug.

DESCRIPTION - PLATINUM PLUGS

The V6 engines use platinum resistor spark plugs. They have resistance values of 6,000 to 20,000 ohms when checked with at least a 1000 volt tester. For spark plug identification and specifications, Refer to the Specifications section.

Do not use an ohm meter to check the resistance of the spark plugs. This will give an inaccurate reading.

When the spark plugs use a single or double platinum tips and they have a recommended service life of 100,000 miles for normal driving conditions per schedule A in this manual. The spark plugs have a recommended service life of 75,000 miles for severe driving conditions per schedule B in this manual. A thin platinum pad is welded to both or center electrode end(s) as show in (Fig. 12). Extreme care must be used to prevent spark plug cross threading, misgaping (Fig. 13) and ceramic insulator damage during plug removal and installation.

CAUTION: Cleaning of the platinum plug may damage the platinum tip.

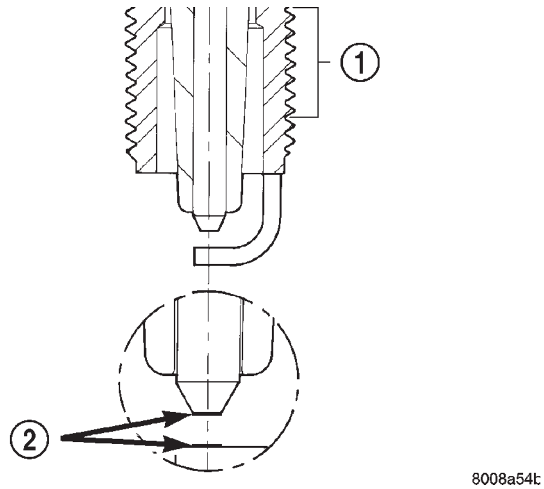

Fig. 12 Platinum Pads

1 - APPLY ANTI-SEIZE COMPOUND HERE ONLY
2 - PLATINUM SPARK SURFACE

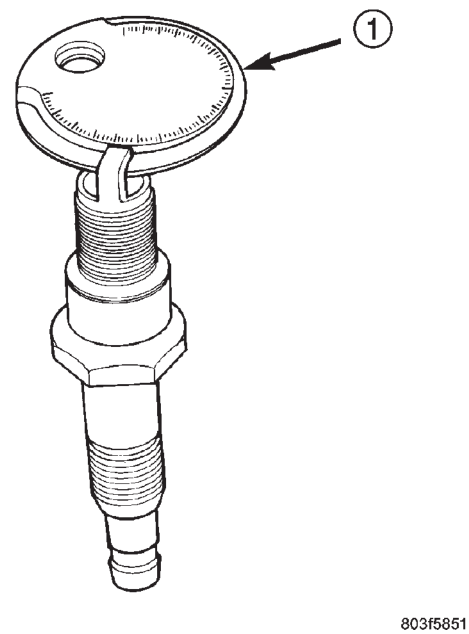

Fig. 13 Setting Spark Plug Electrode Gap

1 - TAPER GAUGE

SPARK PLUG CABLE

DESCRIPTION

Spark Plug cables are sometimes referred to as secondary ignition wires. The wires transfer electrical current from the ignition coil pack to individual spark plugs at each cylinder. The resistive spark plug cables are of nonmetallic construction. The cables provide suppression of radio frequency emissions from the ignition system.

Check the spark plug cable connections for good contact at the coil, and spark plugs. Terminals should be fully seated. The insulators should be in good condition and should fit tightly on the coil, and spark plugs. Spark plug cables with insulators that are cracked or torn must be replaced.

Clean Spark Plug cables with a cloth moistened with a non-flammable solvent. Wipe the cables dry. Check for brittle or cracked insulation. The spark plug cables and spark plug boots are made from high temperature silicone materials. All spark plug cable leads are properly identified with cylinder numbers. The inside of most the spark plug boot is coated with a special high temperature silicone grease for greater sealing and to minimize boot bonding to the spark plug insulator.

REMOVAL

Failure to route the cables properly could cause the radio to reproduce ignition noise, cross ignition of the spark plugs or short circuit the cables to ground.

Remove spark plug cable from coil first.

Always remove the spark plug cable by grasping the top of the spark plug insulator, turning the boot 1/2 turn and pulling straight up in a steady motion.

INSTALLATION

Failure to route the cables properly could cause the radio to reproduce ignition noise, cross ignition of the spark plugs or short circuit the cables to ground.

Install spark plug insulators over spark plugs. Ensure the top of the spark plug insulator covers the upper end of the spark plug tube, then connect the other end to coil pack.

INSTRUMENT CLUSTER

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INSTRUMENT CLUSTER

DESCRIPTION

The mechanical instrument cluster is an electro-mechanical module which receives most of its information directly from the various control modules, via the PCI data bus.

The cluster includes:

- Speedometer
- Tachometer
- Vacuum Fluorescent Display (VF) odometer/trip odometer and transmission range indicator with automatic transmission
- Fuel gauge
- Temperature gauge

The warning and information indicators include the following:

- Check Engine
- Airbag
- Charging system
- Low oil pressure
- High temperature
- Low fuel
- Seat belt
- Cruise (optional)
- Brake/park brake
- Anti-lock brake system (optional)
- High beam
- Front and Rear Fog lamps (optional)
- Vehicle Theft Security System alarm LED indicator (optional)
- Turn signals

VF display warnings:

- Door
- Deck

OPERATION

The gauges are the magnetic air-core type. Pointers should rest at or below the low graduation.

It receives its information from the Body Control Module (BCM), Powertrain Control Module (PCM), Transmission Control Module (TCM), Controller Anti-Lock Brakes (CAB), and Occupant Restraint Controller (ORC), via the PCI data bus. Upon receipt of information, the cluster will determine the gauge position and whether the PCI bus controlled warnings should be turned ON or OFF.

- The **ABS** is a learned feature by receiving an ABS message on the bus. Once learned, the ABS must be unlearned manually by sending a diagnostic message using a DRB III® scan tool.
- The **AIRBAG** light is always supported, but can be unlearned automatically by using the VIN information and the non-receipt of AIRBAG messages. Receipt of AIRBAG messages will override non-airbag VIN information.
- The cluster provides the **Auto-Stick (A/S)** or **Non Auto-Stick** information via the PCI bus. The TCM will learn A/S or non A/S vehicle configuration per cluster information on the bus.
- The cluster is set to support vehicles equipped with a TCM (automatic transmission). In MTX (manual transmission) vehicles, the cluster will turn OFF gear information upon receipt of vehicle configuration from the PCM. At initial power-up, you might be able to potentially see the ATX gear letters. Once the MTX information is received, the gear letters will be turned off.

DIAGNOSIS AND TESTING - INSTRUMENT CLUSTER

As a quick diagnosis, the cluster will perform a functional check of the odometer display, transmission range display and warning indicators after the ignition is switched to RUN/START. If the cluster is not receiving any PCI bus messages, the cluster will appear non functional and "no bus" will appear in the odometer display.

INSTRUMENT CLUSTER (Continued)

A self-test of the cluster can also be initiated by pressing and holding the odometer reset button and switching the ignition from lock to unlock. The cluster will then step through several displays for functional verification. By pressing the trip odometer reset button while going through the self-test, you can temporarily freeze the test. Pressing the bottom again will continue sequence. The cluster will store bus communication faults with other modules. It will also store faults for the AIRBAG and ABS lamps. During the self-diagnostics, the AIRBAG and ABS lamps are tested.

If the cluster is not functioning properly, refer to the proper Body Diagnostic Procedures manual.

If the cluster is not receiving PCI bus messages, refer to the pre-diagnostic test described in Body Diagnostic Procedures manual.

In order to diagnose the instrument cluster functions, a DRB lll® scan tool and the proper Body Diagnostic Procedures Manual are required.

If the diagnostic procedure determines that a replacement of an instrument cluster component is required, refer to Electrical, Instrument Cluster, Removal, and Installation.

REMOVAL

(1) Disconnect and isolate the battery negative remote cable.

(2) Remove left end cover.

(3) Using a trim stick (special tool #C-4755) or equivalent, gently pry up on the power mirror switch. Disconnect the switch and remove.

(4) Using a trim stick or equivalent, gently pry up on instrument panel center trim bezel.

(5) Disconnect the HVAC control connector.

Remove the one screw to the inboard passenger trim bezel on the right of the steering column and remove by unsnapping clips.

(6) Remove the one screw from the passenger side trim bezel and remove trim by unsnapping clips.

(7) Remove 4 screws to left lower instrument panel trim.

(8) Remove the five screws to the cluster bezel. Using a trim stick or equivalent, gently pry out the cluster bezel.

(9) If the vehicle is equipped with a Compass Mini-Trip Computer (CMTC/Traveler), disconnect the module and then remove the cluster bezel assembly.

(10) For better access and prevention of scratching the cluster lens, tilt the steering column to its lowest position and depress the hazard switch.

(11) Remove the cluster attaching screws.

(12) Pull the cluster rearward to disconnect the 26–way self docking connector and then carefully tilt cluster downward slightly and slide cluster sideways to remove cluster assembly.

NOTE: When replacing a cluster, the original optional bulbs (ABS, rear fog, front fog, and security LED) must be transferred to the new cluster if so equipped.

INSTALLATION

(1) Carefully slide the cluster into its location and push the cluster forward to connect it to the mating half of its mating connector on the instrument panel.

(2) Install the four cluster attaching screws.

(3) Position the cluster bezel and if so equipped, connect the traveler connector, then snap the cluster bezel into position.

(4) Install the five screws to the cluster bezel.

(5) Install the four screws to the left lower instrument panel trim.

(6) Connect the mirror switch connector and firmly snap it into place.

(7) Install the one screw to the trim bezel to the right side of the steering column.

(8) Firmly snap into place and then install one screw to the passenger side trim bezel.

(9) Connect the HVAC control connectors.

(10) Position the center bezel over the retaining slots and firmly snap instrument panel center bezel into place.

(11) Install the left end cover.

(12) Connect the battery negative cable.

INSTRUMENT CLUSTER MASK/LENS

REMOVAL

(1) Remove instrument cluster from vehicle. Refer to Electrical, Instrument Cluster, Removal.

(2) Remove six screws to mask/lens.

(3) Separate mask/lens from instrument cluster and remove.

INSTALLATION

(1) Align mask/lens with instrument cluster dial assembly and housing and install the six retaining screws.

(2) Install the instrument cluster into vehicle. Refer to Electrical, Instrument Cluster, Installation.

(3) Connect the negative battery cable remote terminal to the remote battery post.

VACUUM FLUORESCENT DISPLAY

REMOVAL

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Remove instrument cluster from vehicle. Refer to Electrical, Instrument Cluster, Removal.

(3) Remove six cluster back cover retaining screws and remove the cover.

(4) Carefully unplug the connector from printed circuit board.

(5) Remove six attachment screws and then remove cluster mask/lens from the instrument cluster.

(6) Carefully pull the dial assembly from the housing to separate connection with the PC-board.

(7) Remove two screws from the back of the dial assembly to remove the VF-display.

(8) Remove the VF-display from the cluster.

INSTALLATION

(1) Position the VF-display onto the dial assembly and install the two screws.

(2) Carefully push the dial assembly into the housing to make the connection with the PC-board.

(3) Install the six attachment screws and then install cluster mask/lens to the instrument cluster.

(4) Carefully plug the connector into the printed circuit board.

(5) Install the cover and the six cluster back cover retaining screws.

(6) Install the instrument cluster into vehicle. Refer to Electrical, Instrument Cluster, Installation.

(7) Connect the negative battery cable remote terminal to the remote battery post.

LAMPS

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LAMPS/LIGHTING - EXTERIOR

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LAMPS/LIGHTING - EXTERIOR

DESCRIPTION

LAMP SYSTEMS

Lighting circuits are protected by fuses or circuit breakers. Lighting circuits require an overload protected power source, on/off device, lamps and body ground to operate properly. Plastic lamps require a wire in the harness to supply body ground to the lamp socket. If a socket has become corroded, clean socket and bulb base with abrasive fiber sanding pad or metallic bristle brush. Replace sockets and bulbs that are deformed from corrosion that could prevent continuous body ground.

Wire connectors can make intermittent contact or become corroded. Before coupling wire connectors, inspect the terminals inside the connector. Male terminals should not be bent or disengaged from the insulator. Female terminals should not be sprung open or disengaged from the insulator. Bent and sprung terminals can be repaired using needle nose pliers and pick tool. Corroded terminals appear chalky or green. Corroded terminals should be replaced to avoid recurrence of the problem symptoms.

Begin electrical system failure diagnosis by testing related fuses and circuit breakers in the fuse block and engine compartment. Verify that bulbs are in good condition and test continuity of the circuit ground. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

DAYTIME RUNNING LAMP (CANADA ONLY)

JR vehicles built for use in Canada are equipped with a Daytime Running Lamp (DRL) system. The DRL system operates the high beam filaments at a lower intensity when the engine is operating and the exterior lamp switch is in either the OFF or parking lamp ON position and the parking brake is not applied. The DRL system is controlled by the Daytime Running Lamp Module located on the back of the junction block, behind the instrument panel (Fig. 1). The DRL module overrides the headlamp switch when the headlamps are turned OFF. The headlamps operate normally when the headlamps are turned ON. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

HEADLAMP TIME DELAY SYSTEM

The optional Headlamp Time Delay system is controlled by the Body Controller (BC) and a relay located in the junction block. The headlamp time delay system can be activated by turning ON the headlamps when the engine is running, turn OFF the ignition switch, then turn OFF the headlamp switch. The BC will allow the headlamps to remain ON for 90 seconds before they automatically turn off. Refer to the Owner's Manual for more information.

LAMPS/LIGHTING - EXTERIOR (Continued)

OPERATION

DAYTIME RUNNING LAMP (CANADA ONLY)

The DRL system is controlled by the Daytime Running Lamp Module located on the back of the junction block, behind the instrument panel (Fig. 1). The DRL module overrides the headlamp switch when the headlamps are turned OFF. The headlamps operate normally when the headlamps are turned ON. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

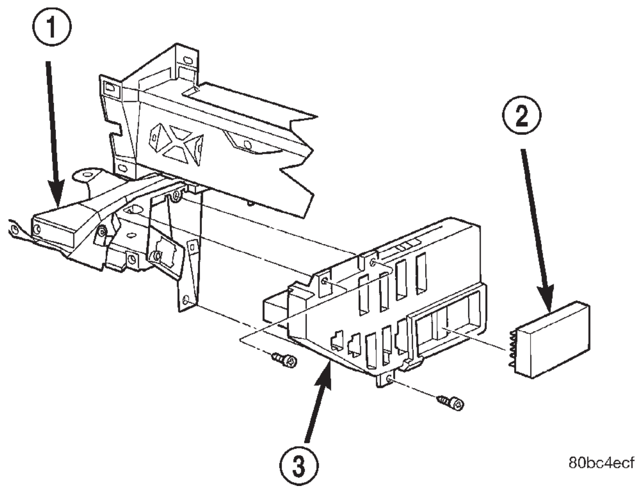

Fig. 1 DAYTIME RUNNING LAMP MODULE LOCATION

1 - FUSE BLOCK BRACKET
2 - DAYTIME RUNNING LAMP MODULE
3 - JUNCTION BLOCK

DIAGNOSIS AND TESTING - LAMPS/LIGHTING - EXTERIOR

WARNING: EYE PROTECTION SHOULD BE USED WHEN SERVICING GLASS COMPONENTS. PERSONAL INJURY CAN RESULT.

CAUTION: Do not touch the glass of halogen bulbs with fingers or other possibly oily surface, reduced bulb life will result. Do not use bulbs other than those indicated in the Bulb Application table. Damage to lamp and/or Daytime Running Lamp Module can result. Do not use fuses, circuit breakers or relays having greater amperage value than indicated on the fuse panel or in the Owners Manual.

When a vehicle experiences problems with the headlamp system, verify the condition of the battery connections, fuses, charging system, headlamp bulbs, wire connectors, relay, high beam switch, dimmer switch, and headlamp switch. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

Each vehicle is equipped with various lamp assemblies. A good ground is necessary for proper lighting operation. Grounding is provided by the lamp socket when it comes in contact with the metal body, or through a separate ground wire.

When changing lamp bulbs check the socket for corrosion. If corrosion is present, clean it with a wire brush.

When it is necessary to remove components to service another, it should not be necessary to apply excessive force or bend a component to remove it. Before damaging a trim component, verify hidden fasteners or captured edges are not holding the component in place.

LAMPS/LIGHTING - EXTERIOR (Continued)

HEADLAMP DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
HEADLAMPS ARE DIM WITH ENGINE IDLING OR IGNITION TURNED OFF.	1. Loose or corroded battery cables.	1. Clean and secure battery cable clamps and posts.
	2. Loose or worn generator drive belt.	2. Adjust or replace generator drive belt.
	3. Charging system output too low.	3. Test and repair charging system, refer to Electrical, Wiring Information.
	4. Battery has insufficient charge.	4. Test battery state-of -charge , refer to Electrical, Wiring Information.
	5. Battery is sulfated or shorted.	5. Load test battery, refer to Electrical, Wiring Information.
	6. Poor lighting circuit Z1-ground.	6. Test for voltage drop across Z1-ground locations, refer to Electrical, Wiring Information.
	7. Both headlamp bulbs defective.	7. Replace both headlamp bulbs.
HEADLAMP BULBS BURN OUT FREQUENTLY.	1. Charging system output too high.	1. Test and repair charging system, refer to Electrical, Wiring Information.
	2. Loose or corroded terminals or splices in circuit.	2. Inspect and repair all connectors and splices, refer to Electrical, Wiring Information.
HEADLAMPS ARE DIM WITH ENGINE RUNNING ABOVE IDLE.	1. Charging system output too low.	1. Test and repair charging system, refer to Electrical, Wiring Information.
	2. Poor lighting circuit Z1-ground.	2. Test for voltage drop across Z1-ground locations, refer to Electrical, Wiring Information.
	3. High resistance in headlamp circuit.	3. Test amperage draw of headlamp circuit.
	4. Both headlamp bulbs defective.	4. Replace both headlamp bulbs.
HEADLAMPS FLASH RANDOMLY.	1. Poor lighting circuit Z1-ground.	1. Test for voltage drop across Z1-ground locations, refer to Electrical, Wiring Information.
	2. High resistance in headlamp circuit.	2. Test amperage draw of headlamp circuit.
	3. Faulty headlamps switch circuit breaker.	3. Replace headlamp switch.
	4. Loose or corroded terminals or splices in circuit.	4. Inspect and repair all connectors and splices, refer to Electrical, Wiring Information.
HEADLAMPS DO NOT ILLUMINATE.	1. No voltage to headlamps.	1. Repair open headlamp circuit, refer to Electrical, Wiring Information.
	2. No Z1-ground at headlamps.	2. Repair circuit ground, refer to Electrical, Wiring Information.
	3. Faulty headlamp switch.	3. Replace headlamp switch.
	4. Faulty headlamp dimmer (multi-function) switch.	4. Replace multi-function switch.
	5. Broken connector terminal or wire splice in headlamp circuit.	5. Repair connector terminal or wire splice.

LAMPS/LIGHTING - EXTERIOR (Continued)

FOG LAMP DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
FOG LAMPS ARE DIM WITH ENGINE IDLING OR IGNITION TURNED OFF.	1. Loose or corroded battery cables.	1. Clean and secure battery cable clamps and posts.
	2. Loose or worn generator drive belt.	2. Adjust or replace generator drive belt.
	3. Charging system output too low.	3. Test and repair charging system, refer to Electrical, Wiring Information.
	4. Battery has insufficient charge.	4. Test battery state-of -charge, refer to Electrical, Wiring Information.
	5. Battery is sulfated or shorted.	5. Load test battery, refer to Electrical, Wiring Information.
	6. Poor lighting circuit Z1-ground.	6. Test for voltage drop across Z1-ground locations, refer to Electrical, Wiring Information.
	7. Both fog lamp bulbs faulty.	7. Replace both fog lamp bulbs.
FOG LAMP BULBS BURN OUT FREQUENTLY.	1. Charging system output too high.	1. Test and repair charging system, refer to Electrical, Wiring Information.
	2. Loose or corroded terminals or splices in circuit.	2. Inspect and repair all connectors and splices, refer to Electrical, Wiring Information.
FOG LAMPS ARE DIM WITH ENGINE RUNNING ABOVE IDLE.	1. Charging system output too low.	1. Test and repair charging system, refer to Electrical, Wiring Information.
	2. Poor lighting circuit Z1-ground.	2. Test for voltage drop across Z1-ground locations, refer to Electrical, Wiring Information.
	3. High resistance in fog lamp circuit.	3. Test amperage draw of fog lamp circuit.
	4. Both fog lamp bulbs faulty.	4. Replace both fog lamp bulbs.
FOG LAMPS FLASH RANDOMLY.	1. Poor lighting circuit Z1-ground.	1. Test for voltage drop across Z1-ground locations, refer to Electrical, Wiring Information.
	2. High resistance in fog lamp circuit.	2. Test amperage draw of fog lamp circuit.
	3. Faulty fog lamp switch.	3. Replace fog lamp switch.
	4. Loose or corroded terminals or splices in circuit.	4. Inspect and repair all connectors and splices, refer to Electrical, Wiring Information.
FOG LAMPS DO NOT ILLUMINATE.	1. Blown fuse for fog lamps.	1. Replace fuse, refer to Electrical, Wiring Information.
	2. No Z1-ground at fog lamps.	2. Repair circuit ground, refer to Electrical, Wiring Information.
	3. Faulty fog lamp switch.	3. Replace fog lamp switch.
	4. Broken connector terminal or wire splice in fog lamp circuit.	4. Repair connector terminal or wire splice.

LAMPS/LIGHTING - EXTERIOR (Continued)

SPECIFICATIONS

EXTERIOR LAMPS

CAUTION: Do not use bulbs that have a higher candle power than the bulb listed in the Bulb Application Table. Damage to lamp can result.

CAUTION: Do not touch halogen bulbs with fingers or other oily surfaces. Bulb life will be reduced.

BULB APPLICATION TABLE

LAMP	BULB
BACK-UP	921 (W16W)
BRAKE	3157K
CHMSL	JR41 - W16W JR27 - LED
FRONT FOG LAMP	JR41 - 880 JR27 - 9006
HEADLAMP	9007
LICENSE PLATE	2825 (W5W)
PARK/TURN SIGNAL (FRONT)	3157NA
TAIL LAMP	2821 (W3W)
TAIL/SIDE MARKER (JR27 ONLY)	2821 (W3W)
TURN SIGNAL (REAR)	3757A
TAIL/STOP	3157

BULB APPLICATION TABLE - EXPORT

LAMP	BULB
FRONT POSITION PARK LAMP	W5W
FRONT TURN SIGNAL	PY27/7W
HEADLAMP	H4
REAR FOG	P27/7W
REAR TURN SIGNAL	PY27/7W
SIDE REPEATER	W5W
TAIL	W3W
TAIL/STOP	P27/7W

BRAKE LAMP SWITCH

DESCRIPTION

The brake lamp switch is located under the instrument panel at the brake pedal arm (Fig. 2). It controls operation of the vehicle's brake lamps. Also, if the vehicle is equipped with speed control, the brake lamp switch will deactivate speed control when the brake pedal is depressed.

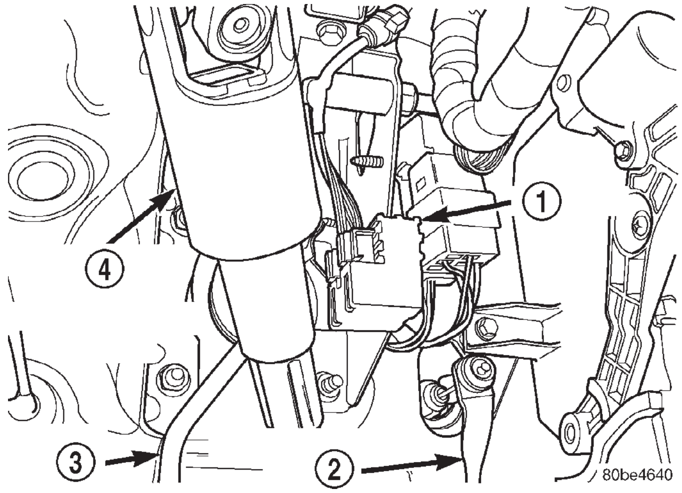

Fig. 2 Brake Lamp Switch

1 - SWITCH
2 - ACCELERATOR PEDAL
3 - BRAKE PEDAL
4 - STEERING COLUMN INTERMEDIATE SHAFT

OPERATION

When the brake pedal is depressed, the plunger on the outside of the switch extends outward. This action closes the electrical contacts within the switch, completing the circuit to the brake lamps at the rear of the vehicle, thus illuminating the brake lamps and the center-high-mounted stop lamp (CHMSL).

DIAGNOSIS AND TESTING - BRAKE LAMP SWITCH

NOTE: Before proceeding with this diagnostic test, verify the adjustment of the brake lamp switch to rule out misadjustment. Refer to ADJUSTMENTS.

If the electrical circuit has been tested and the brake lamp switch is suspected of being faulty, it can be tested using the following method.

(1) Remove the switch from the vehicle. Refer to REMOVAL for the proper procedure.

(2) With the switch in the released position (plunger extended), use an ohmmeter to test each of the three internal switches as shown (Fig. 3). You should achieve the results as listed in the figure.

BRAKE LAMP SWITCH (Continued)

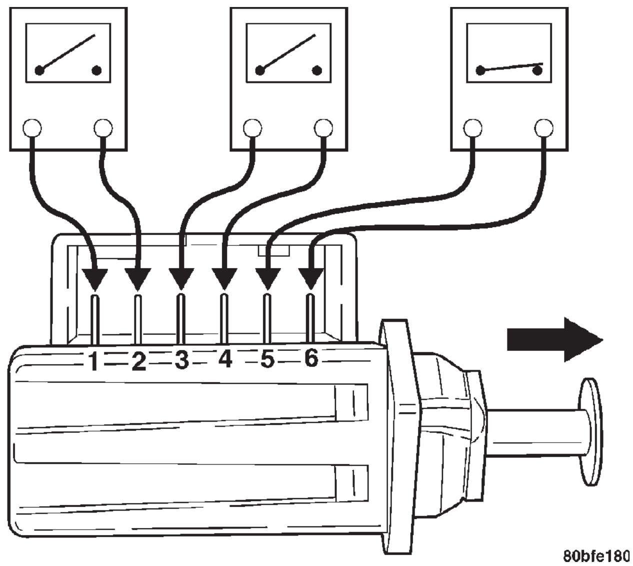

Fig. 3 Switch Test - Released Position

(3) Gently push the plunger on the brake lamp switch in until it stops.

(4) With the switch in the depressed position (plunger pushed in), use an ohmmeter to test each of the three internal switches as shown (Fig. 4). You should achieve the results as listed in the figure.

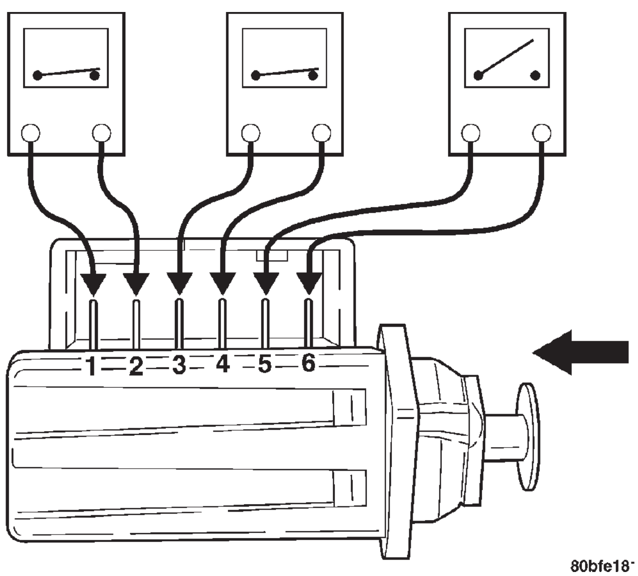

Fig. 4 Switch Test - Depressed Position

If you do not achieve the results as listed in both figures, the switch is faulty and must be replaced.

(5) Install the switch in the vehicle. Refer to INSTALLATION for the proper procedure.

REMOVAL

(1) Remove the brake lamp switch from its bracket (Fig. 5). The brake lamp switch is removed by depressing and holding the brake pedal while rotating brake lamp switch in a counter-clockwise direction approximately 30 degrees. Pull the switch rearward and remove it from its mounting bracket.

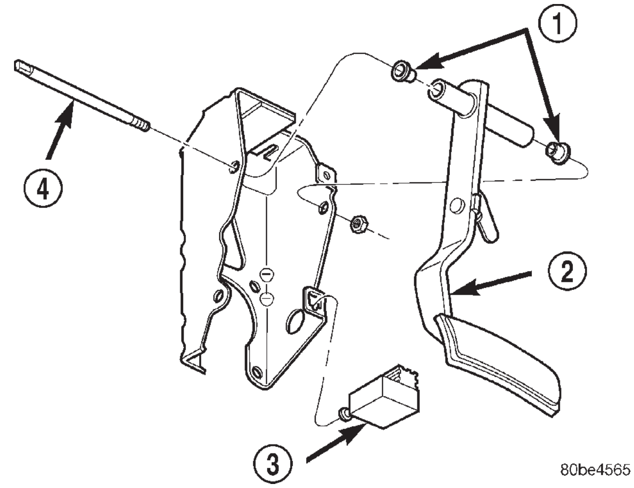

Fig. 5 Switch And Bracket

1 - BUSHINGS
2 - BRAKE PEDAL
3 - BRAKE LAMP SWITCH
4 - PIVOT SHAFT

(2) Disconnect the wiring harness connector from the switch.

INSTALLATION

NOTE: Prior to installing brake lamp switch into the mounting bracket, the plunger must be moved to its fully extended position using the procedure in Step 1.

(1) Hold the brake lamp switch firmly in one hand. Using the other hand, pull outward on the plunger of the switch until it has ratcheted out to its fully extended position.

(2) Connect the wiring harness connector to the brake lamp switch.

(3) Install the brake lamp switch in the brake pedal bracket (Fig. 5). Install it using the following procedure:

- Depress the brake pedal as far down as possible.
- Install the switch in its bracket by aligning the index tab on the switch with the slot in the mounting bracket.
- When the switch is fully seated in its bracket, rotate the switch clockwise approximately 30° to lock the switch into place. It should be aligned straight up and down (Fig. 6).

CAUTION: Do not use excessive force when pulling back on the brake pedal to adjust the brake lamp switch. If too much force is used, the switch or striker can be damaged.

BRAKE LAMP SWITCH (Continued)

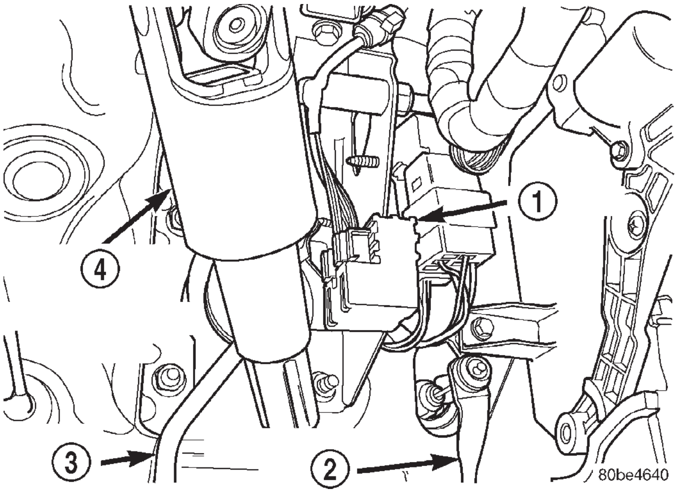

Fig. 6 Brake Lamp Switch

1 - SWITCH
2 - ACCELERATOR PEDAL
3 - BRAKE PEDAL
4 - STEERING COLUMN INTERMEDIATE SHAFT

(4) Gently release/pull back on the brake pedal until the pedal stops moving. This will ratchet the switch plunger backward to the correct adjustment position.

(5) Check the brake lamps to verify they are operating properly and not staying on when the pedal is in the released position.

ADJUSTMENTS

ADJUSTMENT - BRAKE LAMP SWITCH

(1) Remove the brake lamp switch from its bracket (Fig. 7). The brake lamp switch is removed by depressing and holding the brake pedal while rotating brake lamp switch in a counter-clockwise direction approximately 30 degrees. Pull the switch rearward and remove it from its mounting bracket.

(2) Disconnect the wiring harness connector from the switch if necessary.

(3) Hold the brake lamp switch firmly in one hand. Using the other hand, pull outward on the plunger of the switch until it has ratcheted out to its fully extended position.

(4) Connect the wiring harness connector to the brake lamp switch if previously disconnected.

(5) Install the brake lamp switch in the brake pedal bracket (Fig. 7). Install it using the following procedure:

- Depress the brake pedal as far down as possible.
- Install the switch in its bracket by aligning the index tab on the switch with the slot in the mounting bracket.

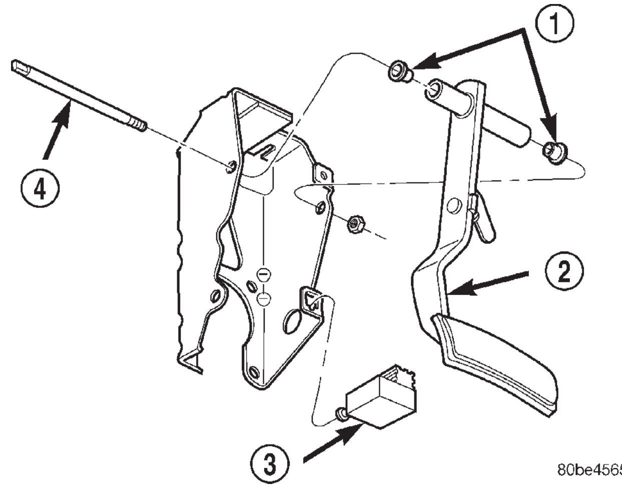

Fig. 7 Switch And Bracket

1 - BUSHINGS
2 - BRAKE PEDAL
3 - BRAKE LAMP SWITCH
4 - PIVOT SHAFT

- When the switch is fully seated in its bracket, rotate the switch clockwise approximately 30° to lock the switch into place. It should be aligned straight up and down (Fig. 8).

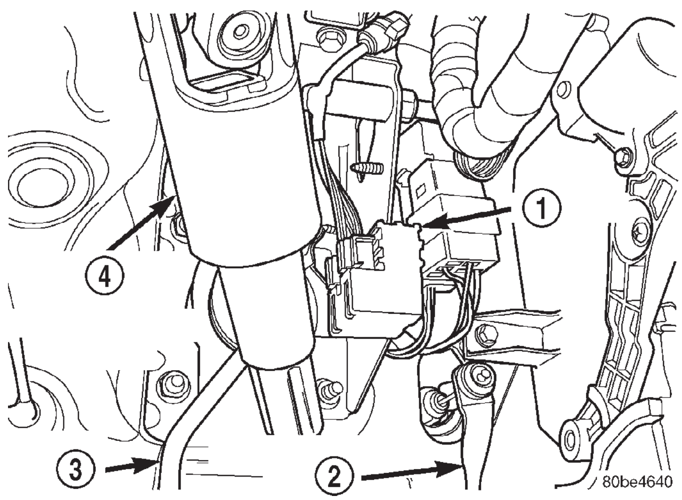

Fig. 8 Brake Lamp Switch

1 - SWITCH
2 - ACCELERATOR PEDAL
3 - BRAKE PEDAL
4 - STEERING COLUMN INTERMEDIATE SHAFT

CAUTION: Do not use excessive force when pulling back on the brake pedal to adjust the brake lamp switch. If too much force is used, the switch or striker can be damaged.

BRAKE LAMP SWITCH (Continued)

(6) Gently release/pull back on the brake pedal until the pedal stops moving. This will ratchet the switch plunger backward to the correct adjustment position.

(7) Check the brake lamps to verify they are operating properly and not staying on when the pedal is in the released position.

CENTER HIGH MOUNTED STOP LAMP

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove fasteners from trunk latch cover by prying under the head of the fastener with a flat bladed tool.

(3) Remove trunk latch cover.

(4) Rotate socket counterclockwise one quarter turn.

(5) Pull socket from back of lamp.

(6) Pull bulb from socket.

INSTALLATION

(1) Push bulb into socket.

(2) Push socket into back of lamp.

(3) Rotate socket clockwise one quarter turn.

(4) Install trunk latch cover. Insert fasteners and press into place.

(5) Connect battery negative cable.

CENTER HIGH MOUNTED STOP LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove fasteners from trunk latch cover by prying under the head of the fastener with a flat bladed tool.

(3) Remove trunk latch cover.

(4) Remove socket from CHMSL.

(5) Remove screws attaching CHMSL to decklid (Fig. 9).

(6) Remove CHMSL from decklid.

INSTALLATION

(1) Install CHMSL to decklid.

(2) Install screws attaching CHMSL to decklid.

(3) Install socket into CHMSL.

(4) Install trunk latch cover. Insert fasteners and press into place.

(5) Connect battery negative cable.

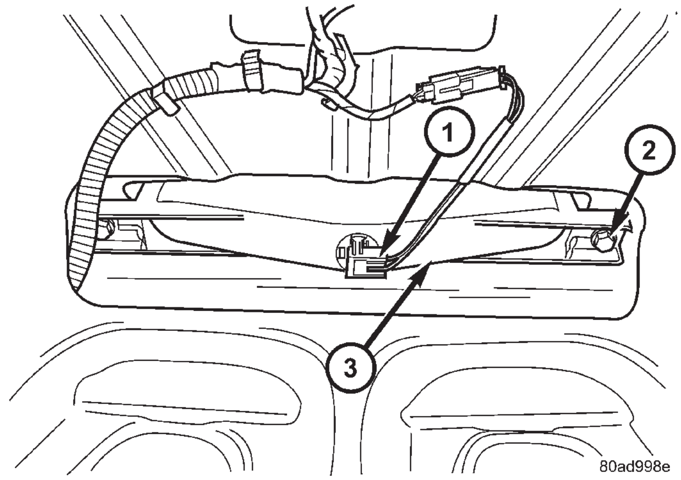

Fig. 9 CENTER HIGH MOUNTED STOP LAMP

1 - BULB
2 - FASTENER
3 - LAMP UNIT

CENTER HIGH MOUNTED STOP LAMP UNIT - JR27 ONLY

REMOVAL

(1) Lower the convertible top.

(2) Disconnect and isolate the battery negative cable.

(3) Open trunk lid, and remove deck upper panel molding fasteners.

(4) Pull back trunk liner to access wire harness.

(5) Disconnect wire harness connector.

(6) Remove molding from vehicle.

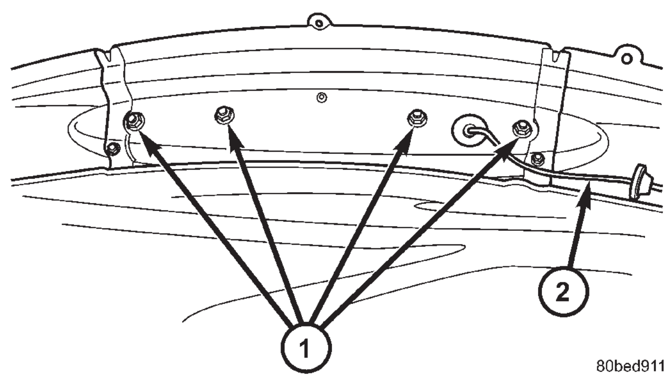

Fig. 10 CENTER HIGH MOUNTED STOP LAMP

1 - MOUNTING FASTENERS
2 - WIRE HARNESS

CENTER HIGH MOUNTED STOP LAMP UNIT - JR27 ONLY (Continued)

(7) Remove CHMSL mounting fasteners (Fig. 10).
(8) Remove CHMSL from molding.

INSTALLATION

(1) Install CHMSL to molding.
(2) Tighten mounting fasteners.
(3) Install molding to vehicle.
(4) Connect wire harness connector.
(5) Place trunk liner into position.
(6) Install deck upper panel molding fasteners.
(7) Connect the battery negative cable.

COMBINATION FLASHER

DESCRIPTION

The turn signal flasher and the hazard warning flasher are combined into one unit called a combination flasher (combo-flasher) (Fig. 11).

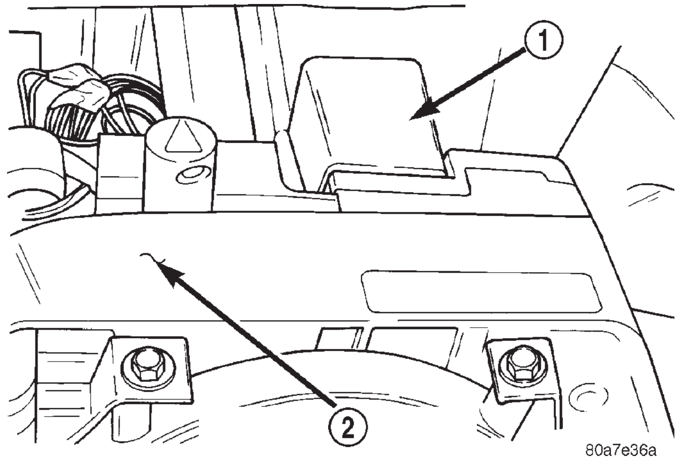

Fig. 11 COMBINATION FLASHER LOCATION

1 - COMBINATION FLASHER
2 - MULTI-FUNCTION SWITCH

OPERATION

An inoperative or incomplete turn signal circuit will result in an increase in flasher speed.

The flasher is mounted to the back side of the multi-function switch.

DIAGNOSIS AND TESTING - COMBINATION FLASHER

COMBINATION FLASHER DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
SYSTEM DOES NOT FLASH ON ONE SIDE, INDICATOR LAMP FLASHES AT DOUBLE NORMAL RATE.	1) FAULTY EXTERNAL LAMP.	1) REPLACE LAMP.
	2) POOR GROUND AT LAMP.	2) CHECK AND/OR REPLACE WIRING.
	3) OPEN CIRCUIT IN WIRING TO EXTERNAL LAMP.	3) REPLACE WIRING HARNESS. CHECK CONNECTORS.
	4) FAULTY CONTACT ON SWITCH.	4) REPLACE MULTIFUNCTION SWITCH.
INDICATOR LAMP FLASHES AT DOUBLE THE NORNAL RATE. EXTERNAL LAMP-DIM AND FLASHES RAPIDLY OR NO FLASH	1) LOOSE OR CORRODED EXTERNAL LAMP CONNECTION.	1) REPLACE SOCKET/HARNESS.
	2) POOR GROUND CIRCUIT OR EXTERNAL LAMP.	2) REPLACE WIRING/HARNESS. CHECK CONNECTORS.

COMBINATION FLASHER (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
HAZARD WARNING MALFUNCTION/SYSTEM DOES NOT FLASH	1) FAULTY FUSE.	1) REPLACE FUSE.
	2) FAULTY FLASHER.	2) REPLACE FLASHER.
	3) OPEN CIRCUIT IN FEED WIRE TO SWITCH.	3) REPLACE WIRING/HARNESS. CHECK CONNECTORS.
	4) FAULTY CONTACT IN SWITCH.	4) REPLACE MULTIFUNCTION SWITCH.
	5) OPEN OR GROUNDED CIRCUIT IN WIRING TO EXTERNAL LAMPS.	5) REPLACE WIRING/HARNESS.
INDICATOR LAMP FLASHES AT DOUBLE NORMAL RATE, EXTERNAL LAMP DOES NOT LIGHT	1) OPEN CIRCUIT IN WIRE TO EXTERNAL LAMP.	1) REPLACE WIRING/HARNESS.
	2) BURNED OUT LAMP.	2) REPLACE LAMP.
SYSTEM DOES NOT FLASH ON EITHER SIDE	1) FAULTY FUSE.	1)REPLACE FUSE.
	2) FAULTY FLASHER UNIT.	2) REPLACE FLASHER.
	3) LOOSE BULKHEAD CONNECTOR.	3) TIGHTEN CONNECTOR.
	4) LOOSE OR FAULTY REAR WIRING/HARNESS OR TERMINALS.	4) REPLACE WIRING/HARNESS.
	5) OPEN CIRCUIT TO FLASHER UNIT.	5) CHECK CONNECTORS, REPLACE WIRING/ HARNESS.
	6) OPEN CIRCUIT IN FEED WIRE TO TURN SIGNAL SWITCH.	6) CHECK CONNECTORS, REPLACE WIRING/ HARNESS.
	7) FAULTY SWITCH CONNECTION.	7) REPLACE SWITCH.
	8) OPEN OR GROUNDED CIRCUIT IN WIRING TO EXTERNAL LAMPS.	8) REPLACE WIRING/HARNESS.
	9) BURNED OUT LAMPS.	9) REPLACE LAMPS.
SYSTEM DOES NOT CANCEL AFTER COMPLETION OF TURN	1) BROKEN CANCELLING FINGER ON SWITCH.	1) REPLACE MULTIFUNCTION SWITCH.
	2) BROKEN OR MISSING CANCELLING CAM ON CLOCKSPRING.	2) REPLACE CLOCKSPRING.
	3) STICKING CANCELLING FINGER ON MULTIFUNCTION SWITCH.	3) REPLACE MULTIFUNCTION SWITCH.
EXTERNAL LAMPS OPERATE PROPERLY, NO INDICATOR LAMP OPERATION	1) FAULTY INDICATOR LAMP IN INSTRUMENT CLUSTER.	1) REPLACE LAMP.

COMBINATION FLASHER (Continued)

REMOVAL

The flasher is mounted to the back side of the multi-function switch. To gain access, the upper steering column cover must be removed (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL). The flasher can be removed by pulling it forward. The flasher is serviced separately from the multi-function switch. The flasher is black in color for ease of identification (Fig. 12).

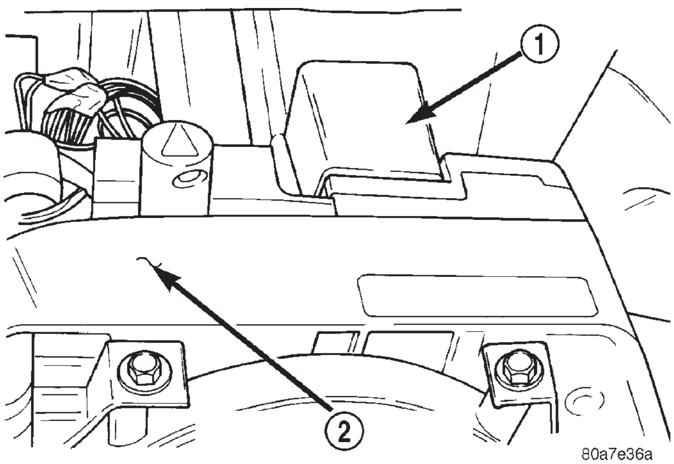

Fig. 12 COMBINATION FLASHER LOCATION

1 - COMBINATION FLASHER
2 - MULTI-FUNCTION SWITCH

INSTALLATION

The flasher is mounted to the back side of the multi-function switch. To gain access, the upper steering column cover must be removed (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL). Push the flasher toward the rear of the vehicle. The flasher is black in color for ease of identification.

TRUNK LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Using a flat bladed tool, pry lamp housing from rear shelf.
(3) Disconnect wire harness connector.
(4) Remove bulb.

INSTALLATION

(1) Install bulb.
(2) Connect wire harness connector to the lamp.
(3) Install housing into rear shelf.
(4) Connect battery negative cable.

FOG LAMP

REMOVAL

(1) Disconnect and isolate battery negative cable.
(2) Remove fog lamp unit. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/FOG LAMP UNIT - REMOVAL).
(3) Disconnect wire connector from back of fog lamp.
(4) Rotate bulb base counterclockwise one quarter turn.
(5) Pull bulb from back of lamp.

INSTALLATION

(1) Install bulb and twist clockwise.
(2) Connect the fog lamp harness connector.
(3) Install foglamp unit. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/FOG LAMP UNIT - INSTALLATION).
(4) Connect battery negative cable.

FOG LAMP UNIT

STANDARD PROCEDURE

STANDARD PROCEDURE - FOG LAMP UNIT ALIGNMENT

Prepare a alignment screen (Fig. 13) (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - ADJUSTMENTS). A properly aligned fog lamp unit will project a pattern on the alignment screen 100 mm (4 in.) below the fog lamp center line and straight ahead.

To adjust fog lamp unit alignment, rotate alignment screw to achieve the specified low beam hot spot pattern (Fig. 14).

STANDARD PROCEDURE - FOG LAMP UNIT ALIGNMENT - EXPORT

Prepare an alignment screen (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - ADJUSTMENTS). A properly aligned fog lamp will project a pattern on the alignment screen 200 mm (8 in.) below the fog lamp centerline and straight ahead (Fig. 15). To adjust fog lamp alignment, rotate alignment screw to achieve the specified low beam hot spot pattern.

FOG LAMP UNIT (Continued)

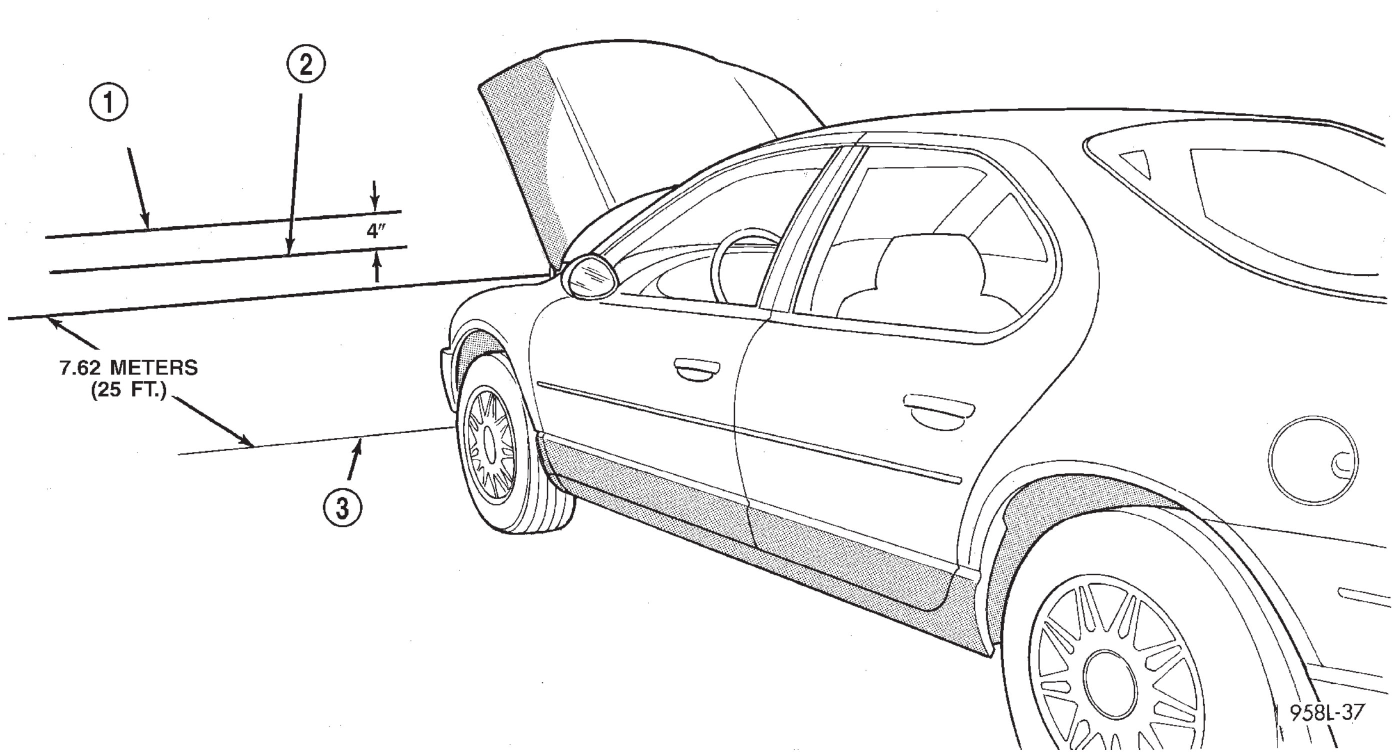

Fig. 13 FOG LAMP UNIT ALIGNMENT

1 - CENTER OF FOG LAMP UNIT
2 - TOP OF BEAM PATTERN
3 - FRONT OF FOG LAMP UNIT

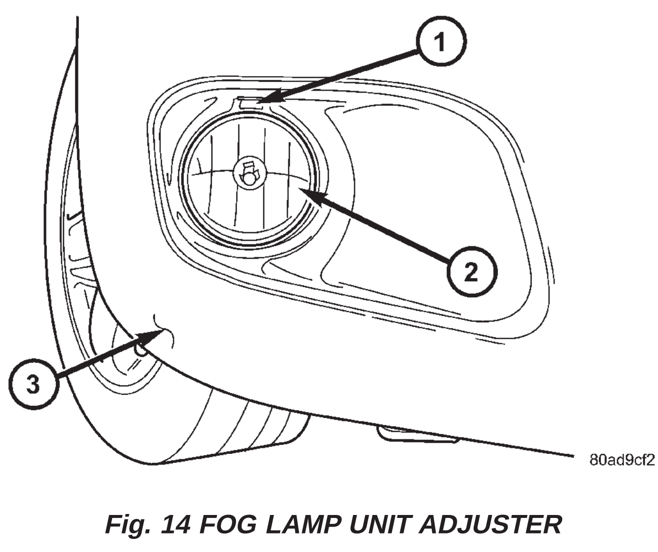

Fig. 14 FOG LAMP UNIT ADJUSTER

1 - FOG LAMP UNIT ADJUSTMENT SCREW
2 - FOG LAMP UNIT
3 - FRONT FASCIA

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove screw attaching fog lamp to front bumper fascia.

(3) Remove fog lamp from fascia.

(4) Disconnect wire connector from fog lamp bulb.

(5) Remove fog lamp from vehicle (Fig. 16).

INSTALLATION

(1) Place fog lamp into position.

(2) Connect wire connector to fog lamp bulb.

(3) Install fog lamp to fascia.

(4) Install screw attaching fog lamp to front bumper fascia.

(5) Connect battery negative cable.

FOG LAMP UNIT (Continued)

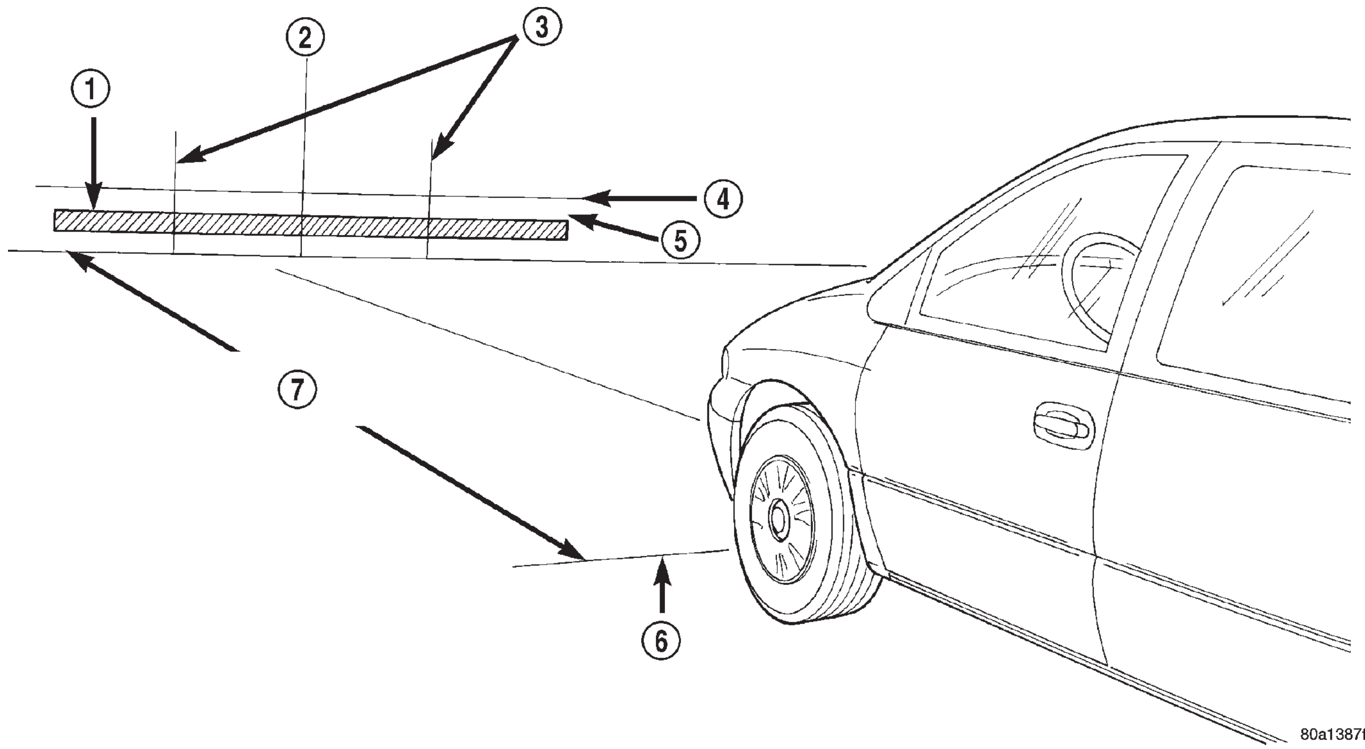

Fig. 15 FOG LAMP ALIGNMENT - EXPORT

1 - HIGH INTENSITY AREA
2 - CENTER OF VEHICLE
3 - VERTICAL CENTER OF FOG LAMP
4 - HORIZONTAL CENTER OF FOG LAMP
5 - 200mm (8 in.)
6 - FRONT OF FOG LAMP
7 - 10 METERS (32.8 ft.)

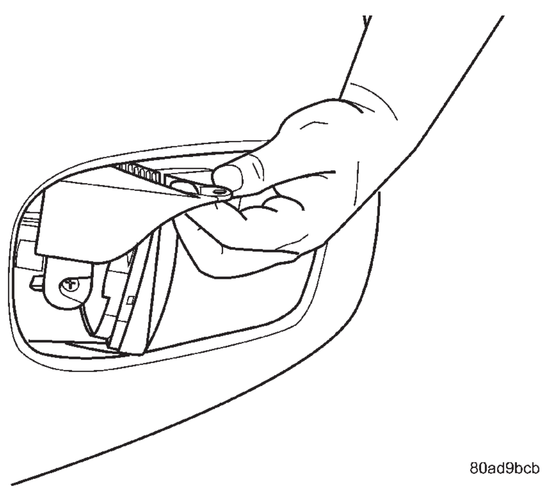

Fig. 16 FOG LAMP UNIT

FRONT POSITION LAMP - EXPORT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove headlamp unit (Fig. 17) (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ HEADLAMP UNIT - REMOVAL).

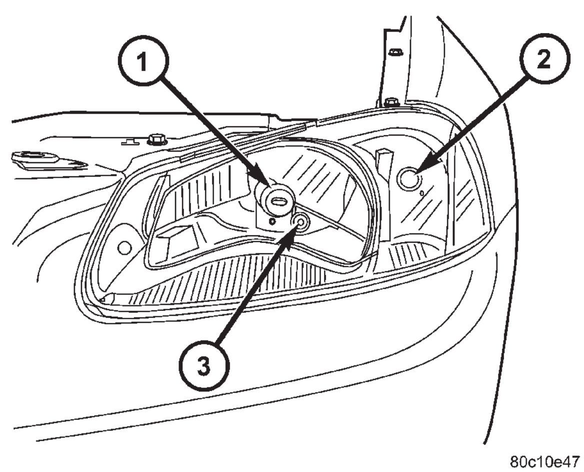

Fig. 17 FRONT POSITION LAMP LOCATION

1 - HEADLAMP
2 - PARK, TURN SIGNAL LAMP
3 - FRONT POSITION LAMP

FRONT POSITION LAMP - EXPORT (Continued)

(3) Pull back rubber boot seal to expose lamp (Fig. 18).

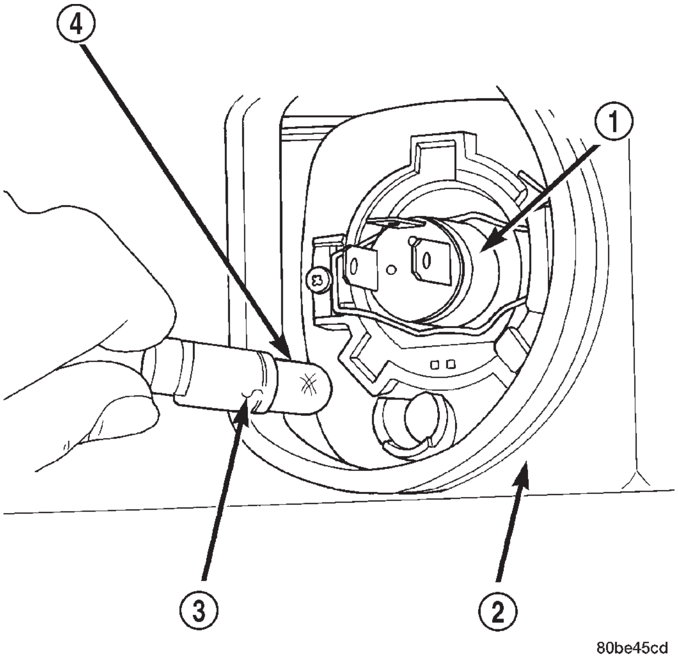

Fig. 18 FRONT POSITION LAMP

1 - HEADLAMP
2 - HEADLAMP UNIT
3 - FRONT POSITION LAMP SOCKET
4 - FRONT POSITION LAMP

(4) Pull front position lamp socket straight from the headlamp unit.
(5) Remove bulb from socket.

INSTALLATION

(1) Insert bulb to socket.
(2) Install front position lamp socket to headlamp unit.
(3) Place rubber boot into position.
(4) Install headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).
(5) Connect battery negative cable.

HAZARD WARNING SWITCH

DESCRIPTION

The hazard warning switch push button protrudes from the top of the steering column (Fig. 19). The hazard warning switch push button is identified with a double triangle, which is the international control symbol for hazard warning.

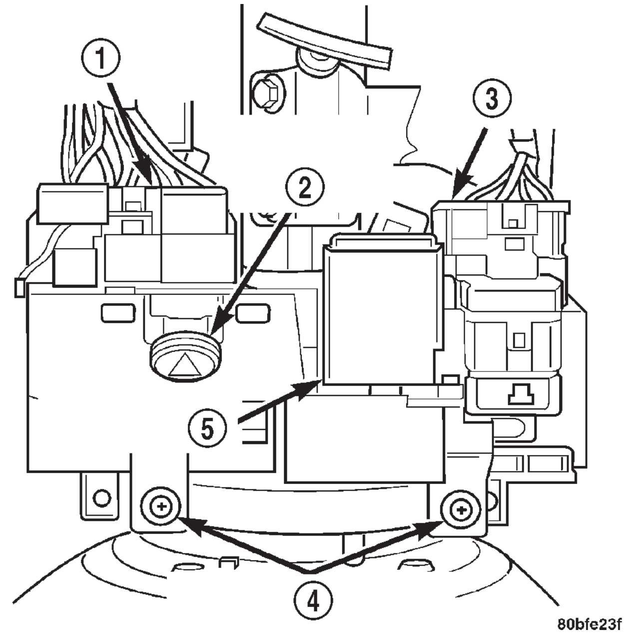

Fig. 19 HAZARD WARNING SWITCH

1 - MULTI-FUNCTION SWITCH CONNECTOR
2 - HAZARD WARNING SWITCH
3 - FLASHER AND WINDSHIELD WIPER/WASHER SWITCH CONNECTOR
4 - MOUNTING SCREWS
5 - COMBINATION FLASHER

OPERATION

The hazard warning system is actuated by a push button located on the top of the steering column between the steering wheel and the instrument panel. The hazard switch is identified with a double triangle on top of the button. Push and release the button to turn the hazard function ON or OFF. The button will move out from the steering column in the ON position and will remain in toward the column in the OFF position.

HEADLAMP

REMOVAL

CAUTION: Do not touch the glass of halogen bulbs with fingers or other possibly oily surface, reduced bulb life will result.

(1) Disconnect and isolate battery negative cable.
(2) Remove headlamp unit retaining screws.
(3) Remove headlamp unit to expose back of unit.
(4) Disconnect wire connector from back of headlamp bulb.
(5) Rotate retaining ring counterclockwise.
(6) Remove retaining ring.
(7) Pull headlamp bulb and remove from headlamp unit.

HEADLAMP (Continued)

INSTALLATION

(1) Install headlamp bulb to the headlamp unit.
(2) Install headlamp bulb retaining ring.
(3) Rotate retaining ring clockwise.
(4) Connect wire connector to bulb.
(5) Install the headlamp unit.
(6) Install headlamp unit retaining screws.
(7) Connect the battery negative cable.

HEADLAMP - EXPORT

REMOVAL

CAUTION: Do not touch the glass of halogen bulbs with fingers or other possibly oily surface, reduced bulb life will result.

(1) Disconnect and isolate battery negative cable.
(2) Remove headlamp unit retaining screws.
(3) Remove headlamp unit to expose back of unit.
(4) Disconnect wire connector from back of headlamp.
(5) Pull back protective rubber seal.
(6) Disengage headlamp bulb retaining clip (Fig. 20).
(7) Pull headlamp bulb and remove from headlamp unit.

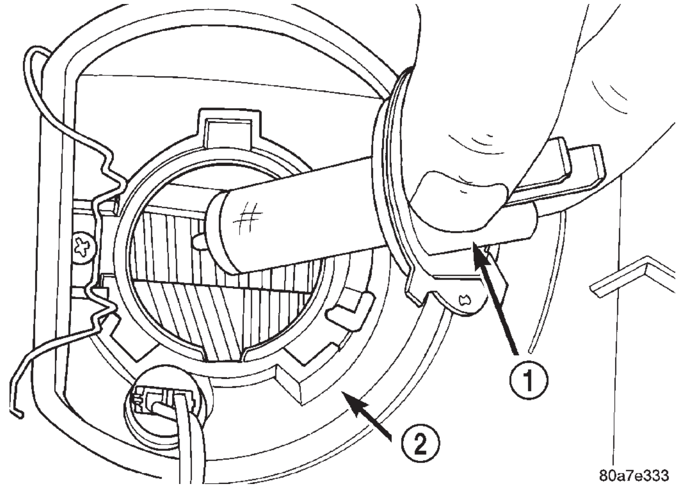

Fig. 20 HEADLAMP

1 - HEADLAMP
2 - HEADLAMP UNIT

INSTALLATION

CAUTION: Do not touch the glass of halogen bulbs with fingers or other possibly oily surface, reduced bulb life will result.

(1) Install headlamp to the headlamp unit and secure with retaining clip.
(2) Position protective rubber boot.
(3) Connect wire connector to headlamp.
(4) Install the headlamp unit.
(5) Install headlamp unit retaining screws.
(6) Connect the battery negative cable.

HEADLAMP LEVELING MOTOR

DIAGNOSIS AND TESTING - HEADLAMP LEVELING MOTOR

HEADLAMP LEVELING MOTOR DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
ONE MOTOR DOES NOT OPERATE	1. Poor connection at motor.	1. Secure connector on motor.
	2. No voltage at motor.	2. Repair circuit. Refer to Group 8W, Wiring.
	3. Defective motor.	3. Replace motor.
BOTH MOTORS DO NOT OPERATE	1. No voltage at headlamp leveling switch.	1. Repair circuit or replace fuse. Refer to Group 8W, Wiring.
	2. No voltage at both motors.	2. Repair circuit or replace fuse. Refer to Group 8W, Wiring.
	3. Poor connection at motors.	3. Secure connectors on motors.
	4. Both motors defective.	4. Replace motors.

HEADLAMP LEVELING MOTOR (Continued)

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

(3) Rotate motor clock-wise and pull straight from headlamp unit. (Fig. 21).

NOTE: Significant force will be required to disconnect the leveling motor pushrod from the headlamp assembly.

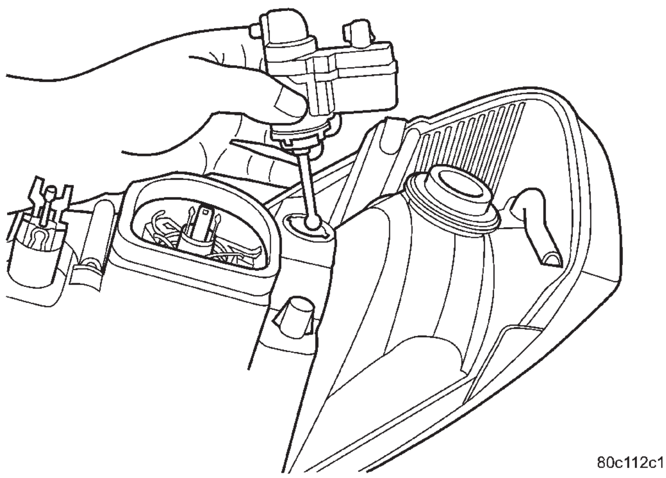

Fig. 21 HEADLAMP LEVELING MOTOR

INSTALLATION

(1) Insert and rotate the leveling motor into the headlamp unit.

NOTE: Be certain the leveling motor ball stud is fully inserted in headlamp leveling socket assembly.

(2) Install headlamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

(3) Connect battery negative cable.

HEADLAMP LEVELING SWITCH

DIAGNOSIS AND TESTING - HEADLAMP LEVELING SWITCH

(1) Remove the headlamp leveling switch (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP LEVELING SWITCH - REMOVAL).

(2) Using an ohmmeter, check the resistance readings between headlamp leveling switch pins. Refer to the headlamp leveling switch resistance table (Fig. 22).

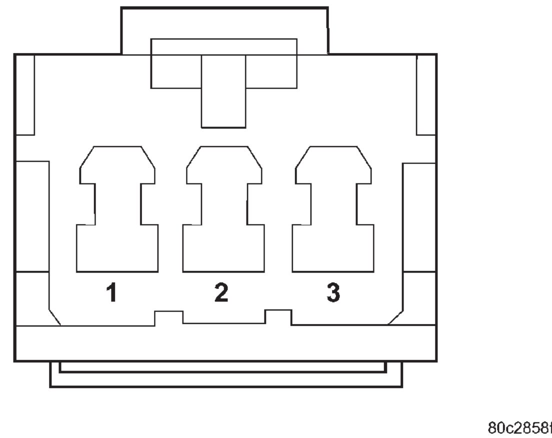

Fig. 22 HEADLAMP LEVELING SWITCH CONNECTOR

HEADLAMP LEVELING SWITCH RESISTANCE

SWITCH POSITION	PIN	RESISTANCE
0	1 AND 3	492 Ω
1	1 AND 3	546 Ω
2	1 AND 3	599 Ω
3	1 AND 3	653 Ω

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Using a trim stick, pry the trim bezel from the instrument panel (Fig. 23).

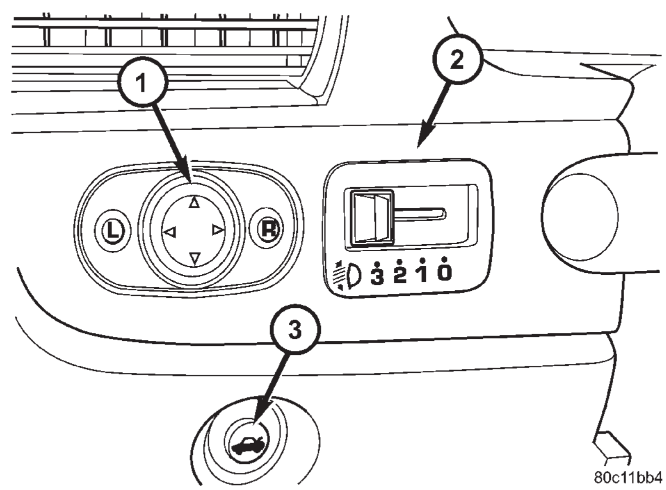

Fig. 23 HEADLAMP LEVELING SWITCH

1 - POWER MIRROR SWITCH
2 - HEADLAMP LEVELING SWITCH
3 - DECKLID RELEASE SWITCH

HEADLAMP LEVELING SWITCH (Continued)

(3) Disconnect wire harness connector from switch.
(4) Remove switch from bezel.

INSTALLATION

(1) Install switch to trim bezel.
(2) Connect wire harness connector to switch.
(3) Install trim bezel to instrument panel.
(4) Connect battery negative cable.

HEADLAMP SWITCH

DESCRIPTION

HEADLAMP DIMMER SWITCH

The headlamp dimmer switch is incorporated into the turn signal switch. Proper procedures can be found in Group 8J, Turn Signal and Flashers. More information can be found in Group 8W, Wiring Diagrams.

HEADLAMP SWITCH

Service procedures for the headlamp switch can be found in Group 8E, Instrument Panel and Gauges. More information can be found in Group 8W, Wiring Diagrams.

HEADLAMP UNIT

STANDARD PROCEDURE - HEADLAMP UNIT ALIGNMENT

HEADLAMP ALIGNMENT PREPARATION

(1) Verify headlamp dimmer switch and high beam indicator operation.
(2) Inspect and correct damaged or defective components that could interfere with proper headlamp alignment.
(3) Verify proper tire inflation.
(4) Clean headlamp lenses.
(5) Verify that luggage area is not heavily loaded.
(6) Fuel tank should be FULL. Add 2.94 kg (6.5 lbs.) of weight over the fuel tank for each estimated gallon of missing fuel.

ALIGNMENT SCREEN PREPARATION

(1) Position vehicle on a level surface perpendicular to a flat wall 7.62 meters (25 ft.) away from front of headlamp lens (Fig. 24).
(2) If necessary, tape a line on the floor 7.62 meters (25 ft.) away from and parallel to the wall.
(3) From the ground up 1.27 meters (5 ft.), tape a line on the wall at the center line of the vehicle. Sight along the center line of the vehicle (from rear of vehicle forward) to verify accuracy of the line placement.
(4) Rock vehicle side-to-side three times to allow suspension to stabilize.
(5) Jounce front suspension three times by pushing downward on front bumper and releasing.
(6) Measure the distance from the center of headlamp lens to the ground. Transfer measurement to the alignment screen (with tape). Use this line for up/down adjustment reference.
(7) Measure distance from the center line of the vehicle to the center of each headlamp being aligned. Transfer measurements to screen (with tape) to each side of vehicle center line. Use these lines for left/right adjustment reference.

HEADLAMP ADJUSTMENT

A properly aimed left and right low beam headlamp will project the center of the low beam hot spot on the alignment screen below the horizontal center line and 6 in. (152 mm) right of headlamp center line (Fig. 24). The high beam headlamps cannot be aligned. The high beam pattern should be correct when the low beams are aligned properly.

To adjust headlamp alignment, rotate alignment screws to achieve the specified low beam hot spot pattern (Fig. 25).

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove the two retaining screws.
(3) Remove upper fascia retainers by prying under the head of the fasteners with a flat bladed tool.
(4) Remove headlamp unit from fender side first, then pull headlamp unit out (Fig. 26).
(5) Disconnect the wiring harness from the bulbs.
(6) Remove the headlamp unit.

INSTALLATION

(1) Connect wire harness to the bulbs.
(2) Install headlamp unit.
(3) Install the retaining screws.
(4) Install upper fascia retainers.
(5) Connect the battery negative cable.

HEADLAMP UNIT (Continued)

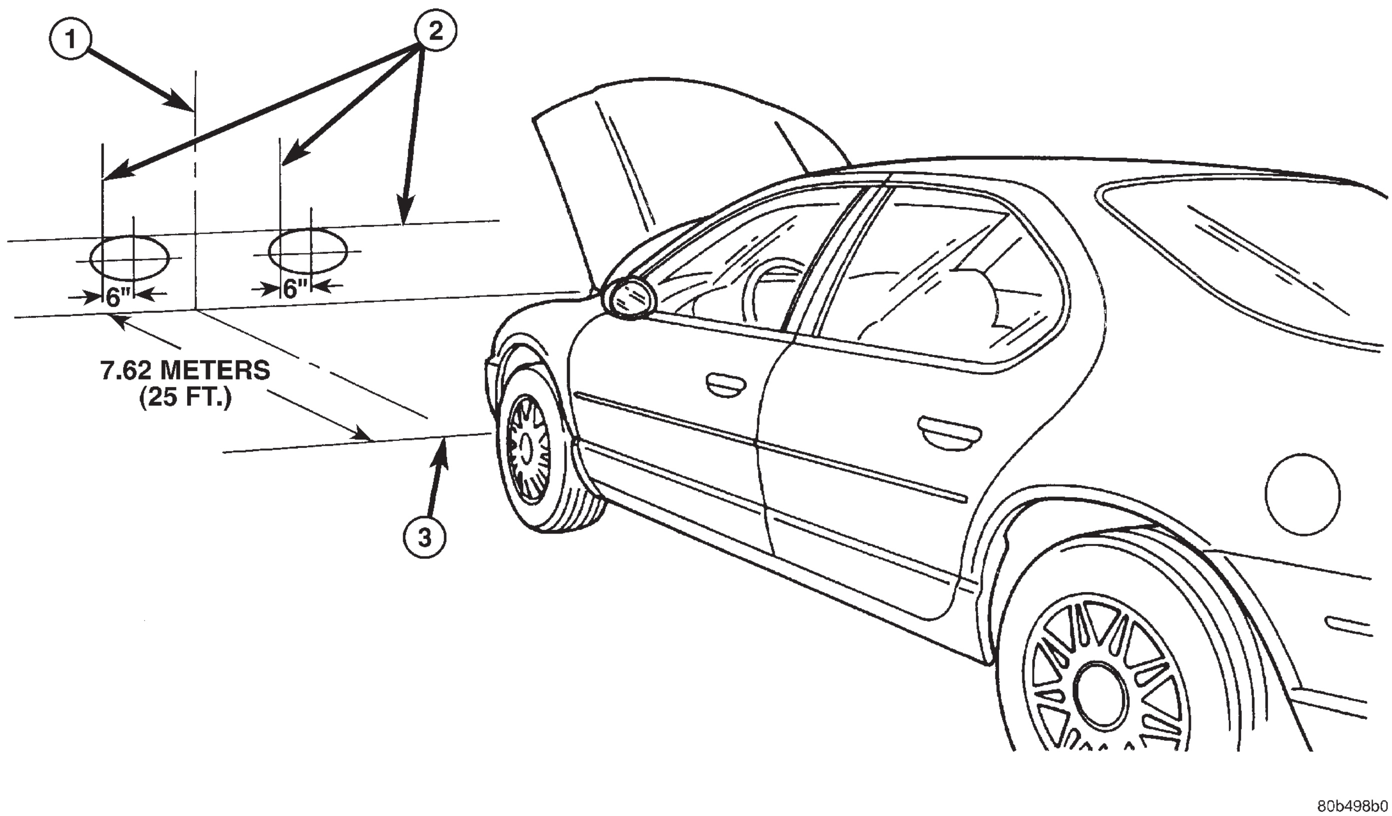

Fig. 24 HEADLAMP ALIGNMENT SCREEN

1 - CENTER OF VEHICLE
2 - CENTER OF HEADLAMPS
3 - FRONT OF HEADLAMP

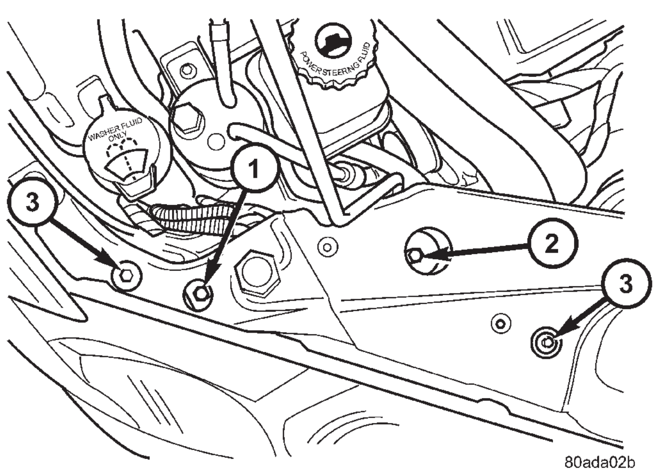

Fig. 25 HEADLAMP ALIGNMENT SCREWS

1 - HEADLAMP ADJUSTER - VERTICAL
2 - HEADLAMP ADJUSTER - HORIZONTAL
3 - HEADLAMP RETAINING BOLTS

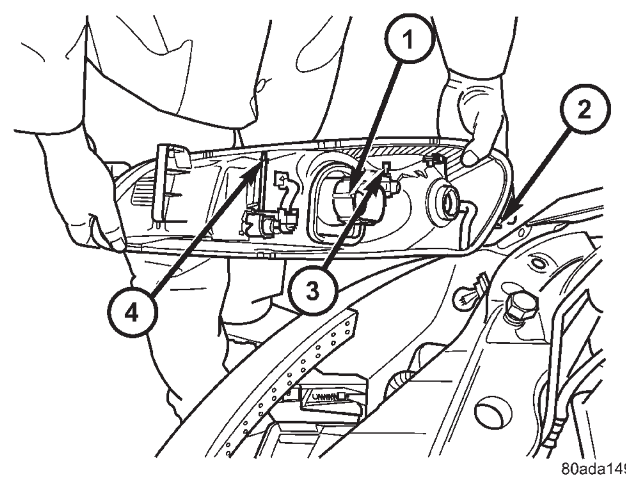

Fig. 26 Headlamp Unit

1 - HEADLAMP BULB
2 - LOCATING TAB
3 - HEADLAMP ADJUSTER
4 - HEADLAMP ADJUSTER

HEADLAMP UNIT - EXPORT

STANDARD PROCEDURE - HEADLAMP UNIT ALIGNMENT - EXPORT

HEADLAMP ALIGNMENT PREPARATION

(1) Verify headlamps are on low setting.

(2) Verify that the headlamp leveling switch is in the “0” position.

(3) Inspect and correct damaged or defective components that could interfere with proper headlamp alignment.

(4) Verify proper tire inflation.

(5) Clean headlamp lenses.

(6) Verify that luggage area is loaded as the vehicle is routinely used.

(7) Fuel tank should be FULL. Add 2.94 kg (6.5 lbs.) of weight over the fuel tank for each estimated gallon of missing fuel.

ALIGNMENT SCREEN PREPARATION

(1) Position vehicle on a level surface perpendicular to a flat wall 10 meters (32.8 ft.) away from front of headlamp lens (Fig. 27).

(2) Place 75 kg in the driver's seat to simulate the ride height of the vehicle when driven.

(3) If necessary, tape a line on the floor 10 meters (32.8 ft.) away from and parallel to the wall.

(4) From the floor up 1.27 meters (5 ft.), tape a line on the wall at the centerline of the vehicle. Sight along the centerline of the vehicle (from rear of vehicle forward) to verify accuracy of the line placement.

(5) Rock vehicle side-to-side three times and allow suspension to stabilize.

(6) Jounce front suspension three times by pushing downward on front bumper and releasing.

(7) Measure the distance from the center of headlamp lens to the floor. Transfer measurement to the alignment screen (with tape). Use this line for up/down adjustment reference.

(8) Place a tape line 130 mm below and parallel to the center of headlamp line.

(9) Measure distance from the centerline of the vehicle to the center of each headlamp being aligned. Transfer measurements to screen (with tape) to each side of vehicle centerline. Use these lines for left/right adjustment reference.

HEADLAMP ALIGNMENT

A properly aimed low beam headlamp will project a high intensity light pattern on the screen with the horizontal cut-off line aligned with the tape line 130 mm (5.12 in.) below the headlamp centerline (Fig. 27). The intersection of the horizontal and 15 degree cut-off lines in the projected pattern should align to the intersection of the headlamp centerline vertical tape line and the tape line 130 mm (5.12 in.) below the headlamp horizontal centerline. The high beam pattern should be correct when the low beams are aligned properly.

To adjust headlamp alignment, rotate alignment screws to achieve the specified low beam hot spot pattern (Fig. 28).

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the two retaining screws.

(3) Remove upper fascia retainers by prying under the head of the fasteners with a flat bladed tool.

(4) Remove headlamp unit from fender side first, then pull headlamp unit out (Fig. 29).

(5) Disconnect the wiring harness from the bulbs.

(6) Disconnect electrical connector from headlamp leveling motor.

(7) Remove the headlamp unit.

INSTALLATION

(1) Connect wire harness.

(2) Connect wire harness to headlamp leveling motor.

(3) Install headlamp unit.

(4) Install the retaining screws.

(5) Install upper fascia retainers.

(6) Connect the battery negative cable.

HEADLAMP UNIT - EXPORT (Continued)

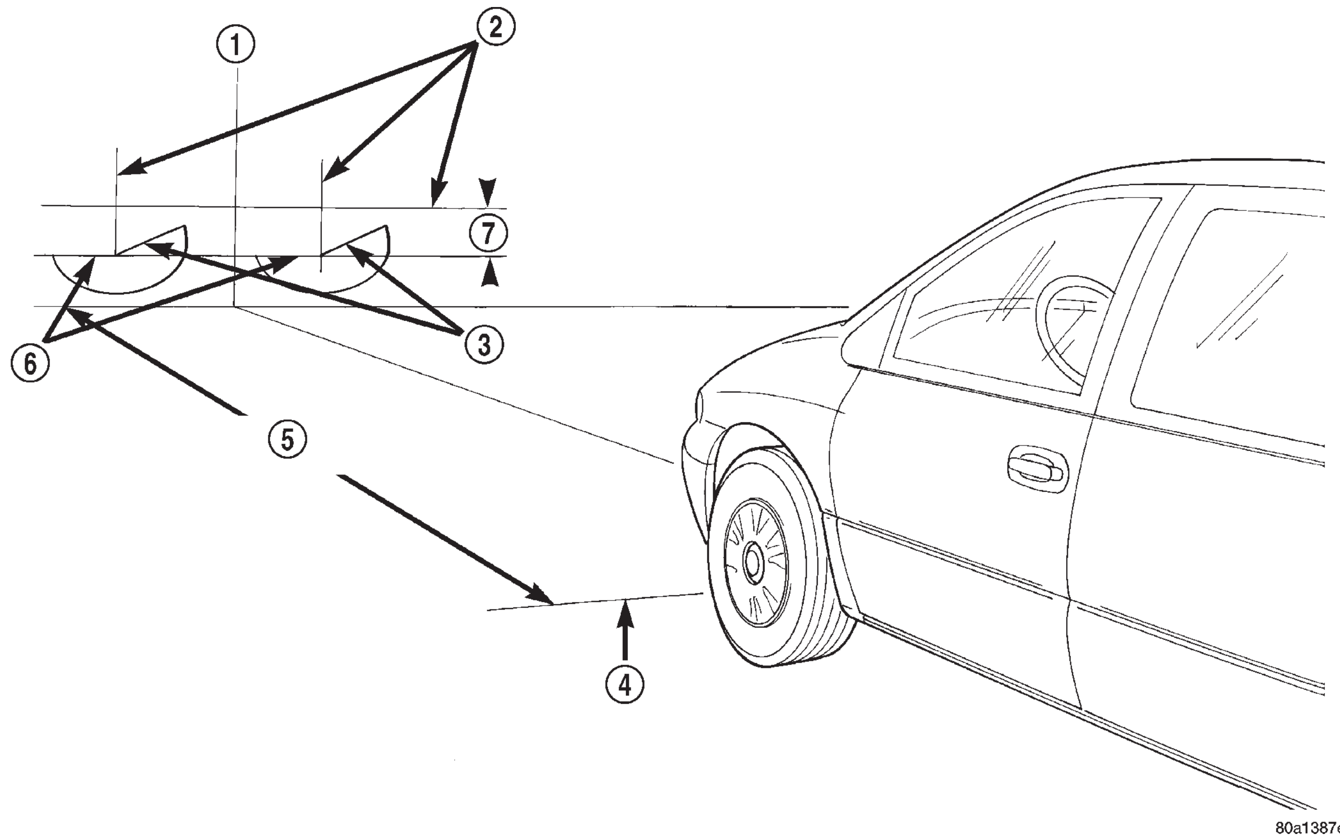

Fig. 27 HEADLAMP ALIGNMENT SCREEN - EXPORT

1 - CENTER OF VEHICLE
2 - CENTER OF HEADLAMPS
3 - 15° CUT-OFF LINE
4 - FRONT OF HEADLAMP
5 - 10 METERS (32.8 ft.)
6 - HORIZONTAL CUT-OFF LINE
7 - 130mm

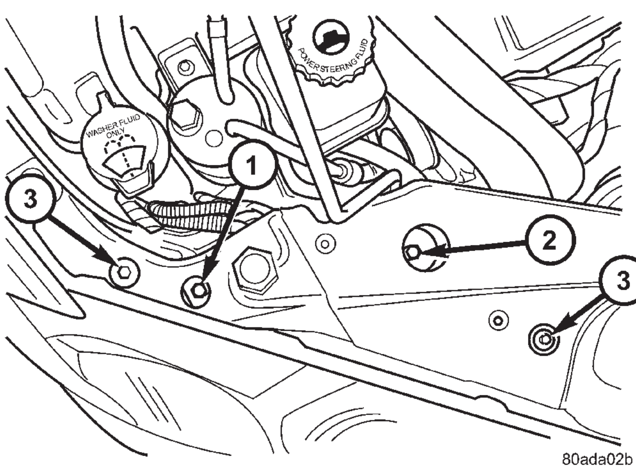

Fig. 28 HEADLAMP ALIGNMENT SCREWS

1 - HEADLAMP ADJUSTER - VERTICAL
2 - HEADLAMP ADJUSTER - HORIZONTAL
3 - HEADLAMP RETAINING BOLTS

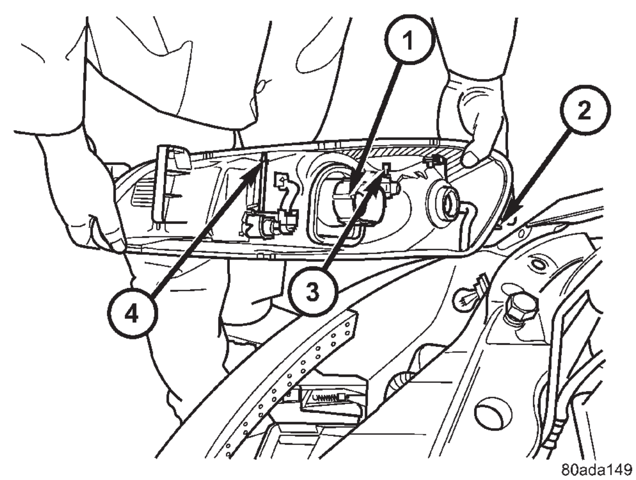

Fig. 29 HEADLAMP UNIT

1 - HEADLAMP
2 - LOCATING TAB
3 - HEADLAMP ADJUSTER
4 - HEADLAMP ADJUSTER

LICENSE PLATE LAMP

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove screws attaching license plate lamp to rear bumper fascia.
(3) Remove license plate lamp (Fig. 30).
(4) Rotate socket counterclockwise one quarter turn.
(5) Pull socket from back of lamp.
(6) Pull bulb from socket.

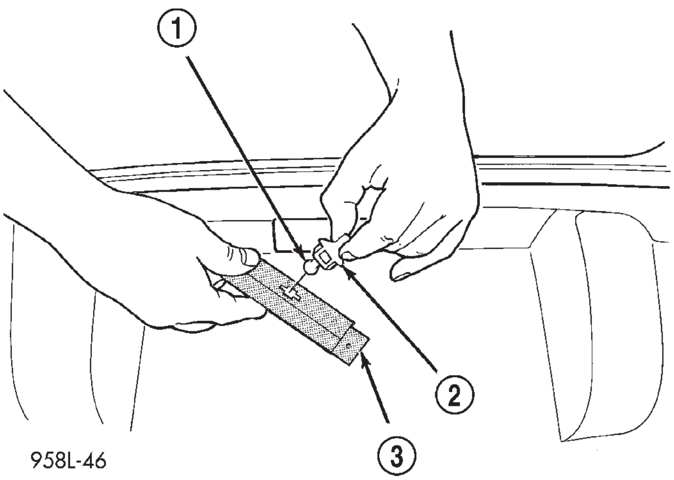

Fig. 30 License Plate Lamp Bulb

1 - BULB
2 - SOCKET
3 - LICENSE PLATE LAMP

INSTALLATION

(1) Place bulb into socket.
(2) Push socket into back of lamp.
(3) Rotate socket clockwise one quarter turn.
(4) Install license plate lamp.
(5) Install screws attaching license plate lamp.
(6) Connect battery negative cable.

LICENSE PLATE LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove screws attaching license plate lamp (Fig. 31).
(3) Remove license plate lamp from fascia.
(4) Remove socket from lamp.

INSTALLATION

(1) Install socket to lamp.
(2) Install license plate lamp to fascia.

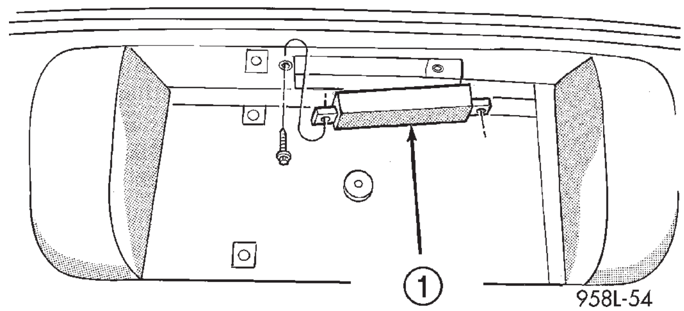

Fig. 31 License Plate Lamp

1 - LICENSE PLATE LAMP

(3) Install screws attaching license plate lamp.
(4) Connect the battery negative cable.

LICENSE PLATE LAMP UNIT - JR27 ONLY

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Using a flat bladed tool, gently pry the lamp from the license plate opening.
(3) Disconnect the wire harness connector.
(4) Remove bulb.

INSTALLATION

(1) Install bulb.
(2) Connect the wire harness connector.
(3) Press lamp into position.
(4) Connect the battery negative cable.

MULTI-FUNCTION SWITCH

DESCRIPTION

The multi-function switch (Fig. 32) contains:

- Turn signals
- Hazard warning
- Headlamps
- Headlamp beam select
- Parking lamps
- Panel dimmer
- Fog Lamp
- Headlamp optical horn
- Windshield wiper
- Pulse wipe
- Mist wipe
- Windshield washer switches.

The multi-function switch is mounted center of the steering column. There are two levers, one on each side of the steering column.

MULTI-FUNCTION SWITCH (Continued)

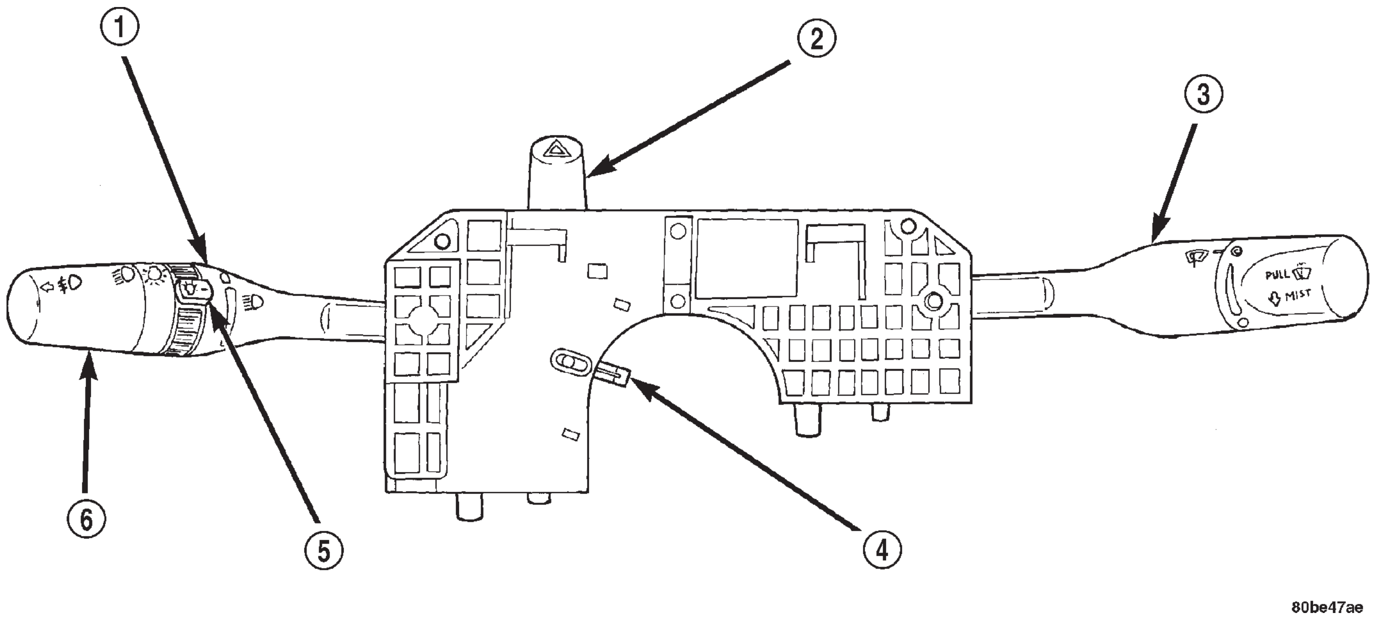

Fig. 32 MULTI-FUNCTION SWITCH

1 - TURN SIGNAL CONTROL STALK
2 - HAZARD WARNING BUTTON
3 - WINDSHIELD WIPER/WASHER CONTROL
4 - CANCELING ACTUATOR
5 - PANEL DIMMER SWITCH
6 - EXTERIOR LIGHTING CONTROL

OPERATION

The left side controls the signaling and lighting. The right side controls the windshield wiper and washer system. When the driver wishes to signal his intentions to change direction of travel, he moves the left lever upward to cause the right signals to flash and downward to cause the left signals to flash. After completion of a turn the system is deactivated automatically. As the steering wheel returns to the straight ahead position the turn signals are canceled. A canceling cam is molded to the clock spring mechanism which comes in contact with the cancel actuator on the multi-function switch. The canceling cam lobe pushes on the cancel actuator and returns the switch to the off position.

If only momentary signaling such as indication of a lane change is desired, the switch is actuated to a left or right intermediate detent position. In this position the signal lamps flash as described above, but the switch returns to the OFF position as soon as the lever is released.

When the system is activated, one of two indicator lamps mounted in the instrument cluster flashes in unison with the turn signal lamps, indicating to the driver that the system is operating. The windshield wiper and wash system is covered in Wipers/Washers.

DIAGNOSIS AND TESTING - MULTI-FUNCTION SWITCH

(1) Remove multi-function switch, refer to Electrical, Lamps/Lighting - Exterior, Multi-function Switch, Removal and Installation.

(2) Using an ohmmeter, test for continuity (no resistance) between the terminals of the switch as shown in the MULTI-FUNCTION SWITCH CONTINUITY/RESISTANCE table and (Fig. 33).

The switch assembly is mounted over the center of the steering column. Should any function of the switch fail, the entire switch assembly must be replaced.

MULTI-FUNCTION SWITCH (Continued)

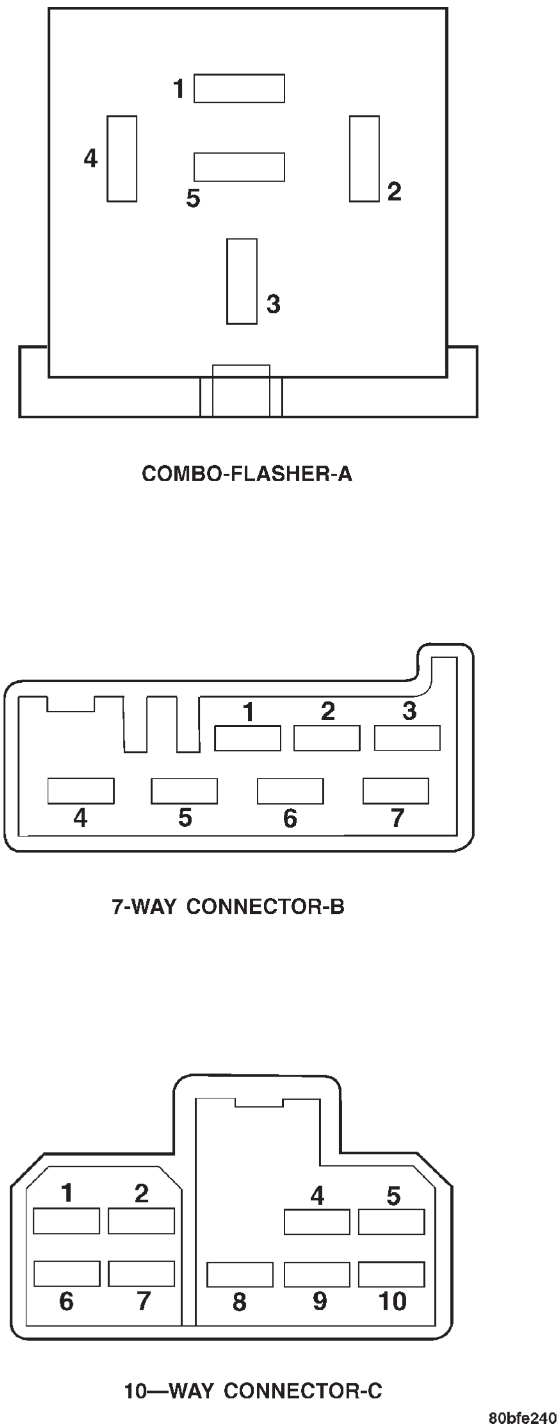

Fig. 33 MULTI-FUNCTION SWITCH CONNECTORS

MULTI-FUNCTION SWITCH CONTINUITY/ RESISTANCE

SWITCH POSITION	MODE	CONTINUITY/ RESISTANCE
TURN SIGNAL WITH HAZARD SWITCH OFF	RIGHT	A-1 AND B-6
	LEFT	A-1 AND B-7
TURN SIGNAL WITH HAZARD WARNING SWITCH ON	RIGHT, OFF, OR LEFT	A-1 AND B-6
		A-2 AND A-5
		A-1 AND B-7
		B-6 AND B-7
HEADLAMP BEAM ON	PARK	C-2 AND C-1
	LOW	C-2 AND C-1
		C-4 AND C-7
	HIGH	C-2 AND C-1
		C-4 AND C-8
PANEL DIMMER DETENT	1	A-2 AND C-6
	2	<100Ω
	3 TO 8	300 TO 2630 Ω
	9	LINEAR
		4.99K TO 10.5K Ω
OPTICAL HORN	ON	C-4 AND C-8
FRONT FOG	ON	C-9 AND C-10
WIPER	INT.	B-3 AND B-2
	DETENT	11.87K Ω
	1	9.87K Ω
	2	7.87K Ω
	3	5.87K Ω
	4	3.87K Ω
	5	1.87K Ω
	6	
	LOW	B-3 AND B-2
		1.25K Ω
	HIGH	B-3 AND B-2
		0.82K Ω
MIST	ON	B-3 AND B-2
		1.25K Ω
WASHER	ON	B-3 AND B-1

MULTI-FUNCTION SWITCH (Continued)

REMOVAL

(1) Disconnect and isolate the battery negative remote cable.

(2) Remove the upper steering column shroud. Refer to Steering, Column, Shroud, Removal.

(3) Remove multi-function switch mounting screws (Fig. 34).

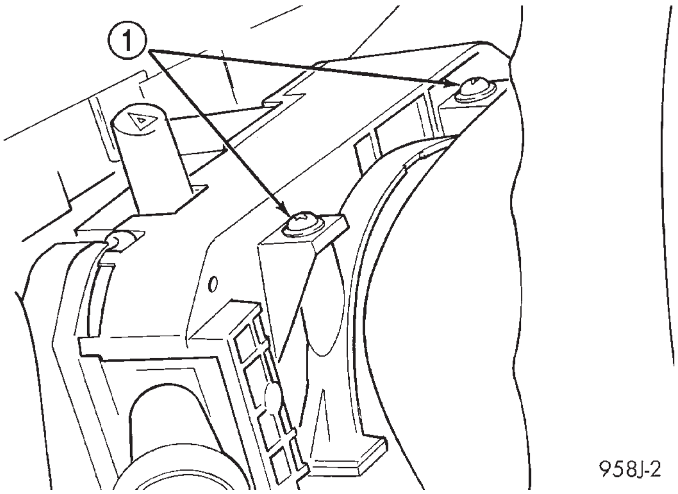

Fig. 34 MULTI-FUNCTION SWITCH MOUNTING

1 - MOUNTING SCREWS

(4) Disconnect wire connectors. Lift the switch straight up to remove.

INSTALLATION

Position the switch on the steering column and install the retaining screws.

(1) Tighten multi-function switch to column retaining screws to 2.3 N·m (20 in. lbs.) torque.

(2) Install the steering shrouds and screws. Refer to Steering, Column, Shroud, Installation.

(3) Tighten steering column cover retaining screws to 2 N·m (17 in. lbs.) torque.

(4) Connect the battery negative cable.

PARK/TURN SIGNAL LAMP

REMOVAL

(1) Disconnect and isolate battery negative cable.

(2) Remove headlamp retaining screws.

(3) Remove headlamp to expose back of unit.

(4) Rotate socket counterclockwise one quarter turn.

(5) Pull socket from back of lamp (Fig. 35).

(6) Pull bulb from socket.

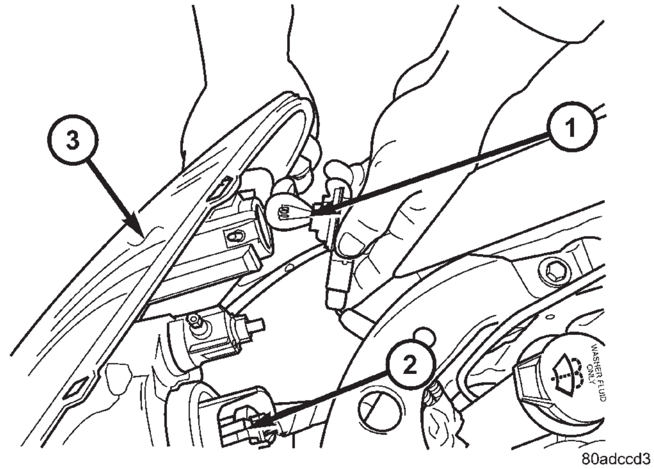

Fig. 35 Park and Turn Signal Lamp Bulb

1 - PARK/TURN SIGNAL BULB
2 - HEADLAMP BULB
3 - HEADLAMP UNIT

INSTALLATION

(1) Push bulb into socket.

(2) Twist socket into headlamp.

(3) Install headlamp retaining screws.

(4) Connect battery negative cable.

REAR FOG LAMP - EXPORT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the rear fog lamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ REAR FOG LAMP UNIT - REMOVAL).

(3) Rotate lamp counterclockwise and pull from socket.

INSTALLATION

(1) Install bulb to socket.

(2) Install rear fog lamp unit to fascia (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ REAR FOG LAMP UNIT - INSTALLATION).

(3) Connect battery negative cable.

REAR FOG LAMP UNIT - EXPORT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the appropriate rear fog lamp retaining screws and pull from rear fascia (Fig. 36).

(3) Rotate the rear fog lamp socket counterclockwise one quarter turn and pull straight out of lamp housing.

(4) Remove the rear fog lamp unit from the vehicle.

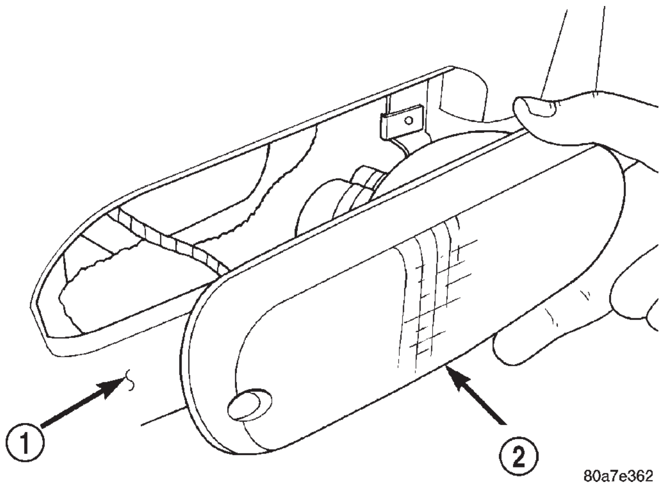

Fig. 36 REAR FOG LAMP UNIT

1 - REAR FASCIA
2 - REAR FOG LAMP UNIT

INSTALLATION

(1) Install the rear fog lamp socket in the lamp housing.

(2) Position and install the rear fog lamp unit to the rear fascia.

(3) Connect the battery negative cable.

SIDE REPEATER LAMP UNIT

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Open door to gain access to the rear of side repeater lamp (Fig. 37).

(3) Depress upper and lower tabs on repeater lamp to release lamp from fender.

(4) Rotate side repeater lamp socket counter clockwise and pull from lamp (Fig. 38).

(5) Remove bulb from socket.

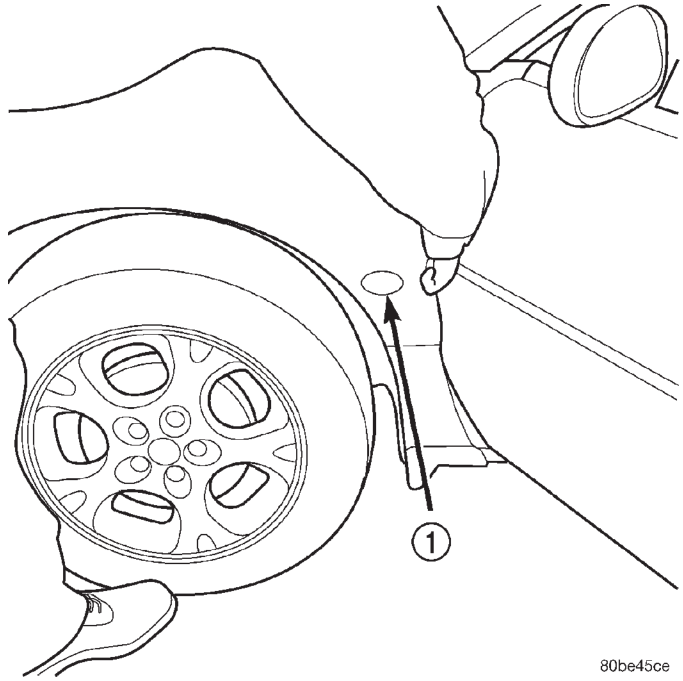

Fig. 37 ACCESS TO SIDE REPEATER LAMP

1 - SIDE REPEATER LAMP

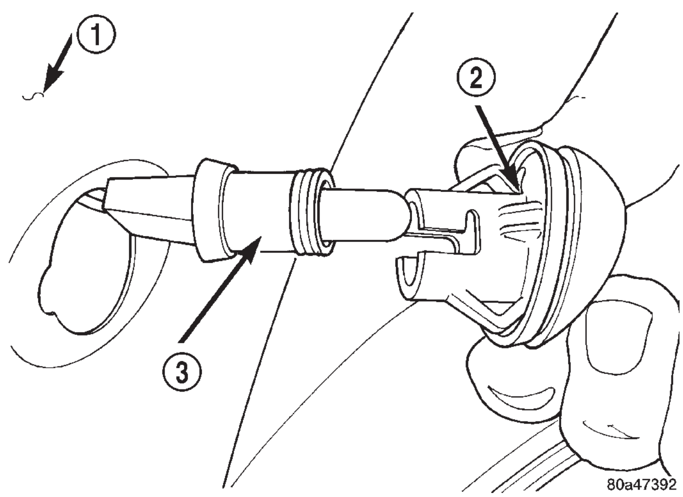

Fig. 38 SIDE REPEATER LAMP

1 - FRONT FENDER
2 - SIDE REPEATER LAMP
3 - SIDE REPEATER LAMP SOCKET

INSTALLATION

(1) Install lamp in socket.

(2) Install side repeater lamp in lamp socket.

(3) Install lamp into front fender opening.

(4) Connect battery negative cable.

TAIL LAMP

REMOVAL

(1) Disconnect and isolate battery negative cable.

(2) Remove the tail lamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TAIL LAMP UNIT - REMOVAL).

(3) Rotate socket counterclockwise one quarter turn.

(4) Pull socket from back of lamp.

(5) Pull bulb from socket.

INSTALLATION

(1) Push bulb into socket.

(2) Push socket into back of lamp.

(3) Rotate socket counterclockwise one quarter turn.

(4) Install the tail lamp unit (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TAIL LAMP UNIT - INSTALLATION).

(5) Connect battery negative cable.

TAIL LAMP UNIT

REMOVAL

(1) Disconnect and isolate battery negative cable.

(2) Disconnect wire harness connector from tail lamp unit by sliding the red lock, then pressing release tab.

(3) Remove wing-nuts attaching tail lamp.

(4) Remove lamp from opening in quarter panel (Fig. 39).

(5) Disconnect wire connector from back of tail lamp (left side).

(6) Remove tail lamp from vehicle.

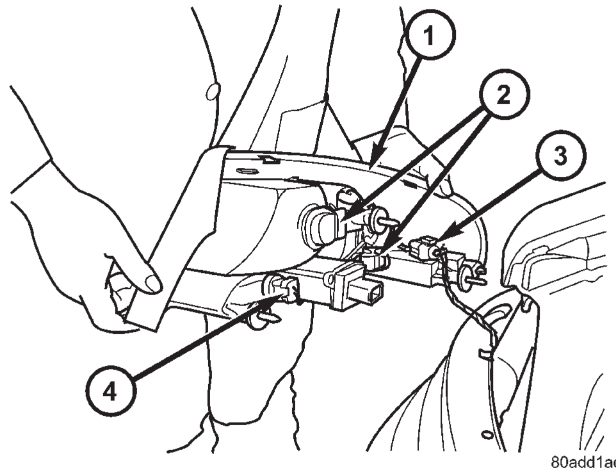

Fig. 39 Tail Lamp

1 - TAIL LAMP UNIT
2 - TAIL LAMP BULB
3 - WIRE HARNESS CONNECTOR
4 - BACK-UP BULB

INSTALLATION

(1) Place tail lamp into position.

(2) Connect wire connector to back of tail lamp (left side).

(3) Install lamp to opening in quarter panel.

(4) Install wing-nuts attaching tail lamp to rear closure panel.

(5) Reconnect wire harness connector to the tail lamp. Slide lock into position.

(6) Connect battery negative cable.

LAMPS/LIGHTING - INTERIOR

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LAMPS/LIGHTING - INTERIOR

SPECIFICATIONS

INTERIOR LAMPS

CAUTION: Do not use bulbs that have a higher candle power than the bulb listed in the Bulb Application Table. Damage to lamp can result.

CAUTION: Do not touch halogen bulbs with fingers or other oily surfaces. Bulb life will be reduced.

BULB APPLICATION TABLE

LAMP	BULB
AIRBAG	PC194
A/C HEATER CONTROL	PC37
ABS	PC161
BRAKE	PC194
CHARGING	PC194
CHECK ENGINE	PC194
CMTC/TRAVELER	04798364
CRUISE	PC194
CUP HOLDER/ASH RECEIVER	PC37
DOOR COURTESY LAMP	168
ENGINE TEMPERATURE	RED LED
FLOOR CONSOLE COURTESY LAMP	906
FRONT FOG LAMPS	PC161
HIGH BEAM	PC194
INSTRUMENT CLUSTER ILLUMINATION	PC194
LEFT TURN SIGNAL	PC194
LOW FUEL	AMBER LED
OIL PRESSURE	PC194
MAP LIGHT	212
READING LAMP	906
RIGHT TURN SIGNAL	PC194
SEAT BELT	RED LED
SECURITY	RED LED
TRUNK LAMP	912

LAMPS/LIGHTING - INTERIOR (Continued)

BULB APPLICATION TABLE - EXPORT

LAMP	BULB
CLIMATE CONTROL LAMP	203
GLOW PLUG	PC161
MAP LIGHT	TS214-2
REAR FOG LAMPS	PC161
TRUNK LAMP	912
WATER IN TANK	PC161

CLUSTER ILLUMINATION AND WARNING LAMPS

REMOVAL

(1) Remove the Instrument Cluster. Refer to Electrical, Instrument Cluster, Removal.

(2) Turn over cluster and expose the illumination bulbs or warning indicator bulbs/socketed LEDs by removing the cluster cardboard back cover. For accurate identification of the defective bulb or LED, see the labels on the PC board.

(3) After Identifying the defective bulb or LED, twist it out of the cluster using a counterclockwise motion.

INSTALLATION

(1) Install the new bulb/LED socket into the cluster using a clockwise motion.

(2) Install the cluster cardboard back cover.

(3) Install the Instrument Cluster. Refer to Electrical, Instrument Cluster, Installation.

COMPAPSS MINI TRIP COMPUTER/TRAVELER ILLUMINATION LAMP

REMOVAL

(1) Remove the CMTC/Traveler from the instrument panel. Refer to Body, Instrument Panel, Compass Mini-Trip Computer, Removal.

(2) With the CMTC removed from the cluster bezel, remove the tape from the lamp access opening at the bottom of the CMTC/Traveler.

(3) With a screwdriver, twist the bulb assembly 1/4 turn counterclockwise. Remove bulb and replace.

INSTALLATION

(1) With a screwdriver, twist the bulb 1/4 turn clockwise.

(2) Install the tape to the access opening at the bottom of the CMTC/Traveler to prevent any light leaking.

(3) Install the CMTC/Traveler. Refer to Body, Instrument Panel, Compass Mini-Trip Computer, Installation.

CONSOLE COURTESY LAMP - JR27 ONLY

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Using a flat bladed tool, gently pry lamp from console (Fig. 1).

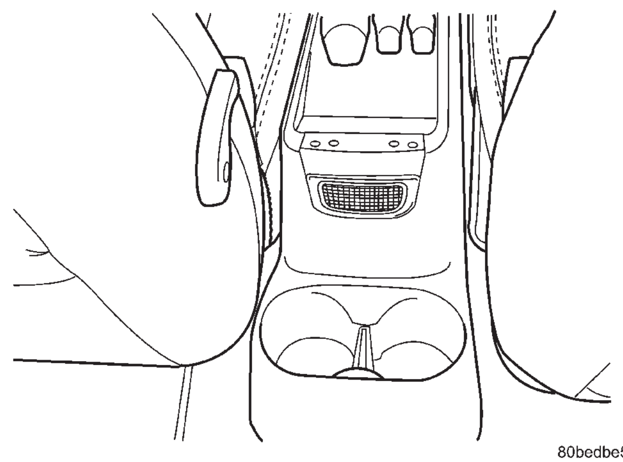

Fig. 1 CONSOLE COURTESY LAMP

(3) Disconnect wire harness connector.

(4) Remove bulb from lamp.

INSTALLATION

(1) Install bulb to lamp.

(2) Connect the wire harness connector.

(3) Press lamp into the center console.

(4) Connect the battery negative cable.

DOME LAMP

REMOVAL

(1) Disconnect and isolate battery negative cable.

(2) From the left side of the vehicle insert a flat bladed pry tool under the lens (Fig. 2).

(3) Separate lamp from headliner.

(4) Disconnect wire harness connector.

DOME LAMP (Continued)

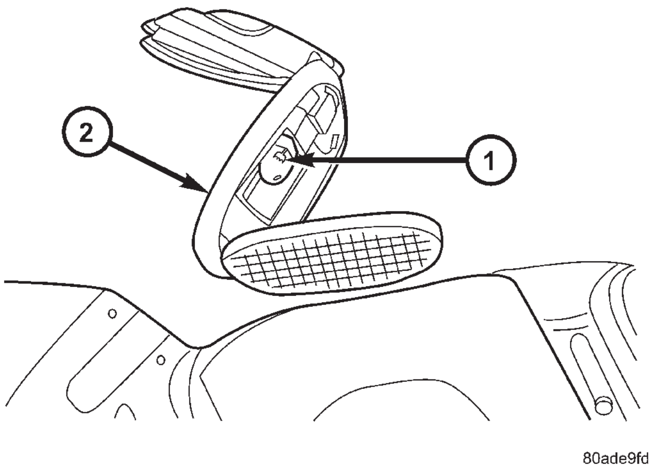

Fig. 2 DOME LAMP

1 - DOME LAMP BULB
2 - DOME LAMP

INSTALLATION

(1) Connect wire connector to dome lamp.
(2) Center dome lamp in headlining opening.
(3) Push upward on dome lamp to engage it to the headliner.
(4) Connect battery negative cable.

DOME LAMP BULB

REMOVAL

(1) Disconnect and isolate battery negative cable.
(2) From the left side of the vehicle, insert a flat bladed pry tool under the lens.
(3) Remove bulb.

INSTALLATION

(1) Insert bulb into lamp.
(2) Push lens into place.
(3) Connect battery negative cable.

DOOR COURTESY LAMP - JR27 ONLY

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Using a flat bladed tool, gently pry the lamp from the door trim panel.
(3) Disconnect the wire harness connector.
(4) Remove bulb.

INSTALLATION

(1) Install bulb to the lamp.
(2) Connect the wire harness connector.
(3) Press the lamp into the door trim panel.
(4) Connect the battery negative cable.

ILLUMINATED ENTRY

DESCRIPTION

The Illuminated Entry System is available on vehicles equipped with the Remote Keyless Entry system. The Illuminated Entry System turns ON the courtesy lamps when the remote keyless entry system is activated. The Remote Keyless Entry Module and the Body Controller are used to control the system. Courtesy lamps will turn on for 30 seconds (±1 second) and fade to OFF over a five second period.

The Illuminated Entry System also turns ON the courtesy lamps (and ignition switch lamp) when door is opened. The courtesy lamps will remain ON while the door is open, then fade to OFF 30 seconds (±1 second) after the last door is closed.

The courtesy and ignition switch lamps will fade to OFF immediately when the ignition is switched to ON.

The Illuminated Entry System cannot be activated during the 30 second (±1 second) period after the ignition switch is turned OFF. After a door is opened and closed during this 30 second period, the system will function as previously described.

When the battery voltage has been interrupted to the Illuminated Entry System, the system will not function until the remote keyless entry UNLOCK is actuated.

DIAGNOSIS AND TESTING - ILLUMINATED ENTRY

When testing the system, all doors must be closed to prevent courtesy lamps from lighting. Verify that remote keyless entry system is operating properly before testing illuminated entry circuits. The body controller uses input from the remote keyless entry system to switch ON the courtesy lamps.

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

READING LAMP

REMOVAL

(1) Disconnect and isolate battery negative cable.
(2) Using a trim stick, pry lamp from headliner (Fig. 3).

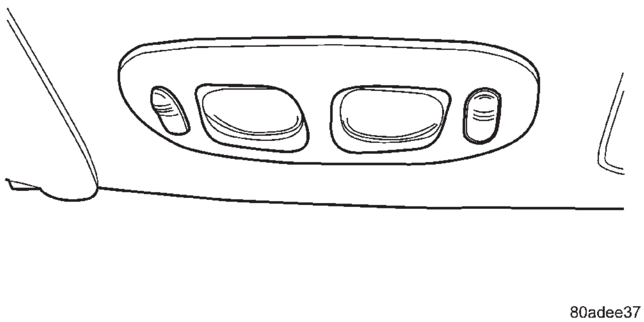

Fig. 3 READING LAMP

(3) Disconnect wire harness connector.
(4) Pull bulb socket from lamp.
(5) Pull bulb from socket.

INSTALLATION

(1) Push bulb into socket.
(2) Install bulb socket to lamp.
(3) Install wire harness connector.
(4) Install reading lamp to headliner.
(5) Connect battery negative cable.

TRANSMISSION RANGE INDICATOR ILLUMINATION

REMOVAL

(1) Remove gear shift knob.
(2) Using a plastic trim stick, Special Tool C-4755, disengage the forward or rear edge of transmission range indicator bezel from floor console.
(3) Pull upward carefully on transmission range indicator bezel and disengage tabs from rear floor console bezel.
(4) Disconnect wire connector to lamp assembly.
(5) Remove transmission range indicator bezel and lamp assembly from vehicle.

INSTALLATION

(1) Position transmission range indicator bezel and lamp assembly to vehicle.
(2) Connect wire connector to lamp assembly.
(3) Engage tabs on transmission range indicator bezel to slots in rear floor console bezel.
(4) Push downward on transmission range indicator bezel to engage to bezel to floor console.

VANITY LAMP

REMOVAL

The vanity lamp is incorporated into the visor assembly. If the vanity lamp needs to be replaced, the entire visor must be replaced. The bulbs are serviced separately.
(1) Disconnect and isolate the battery negative cable.

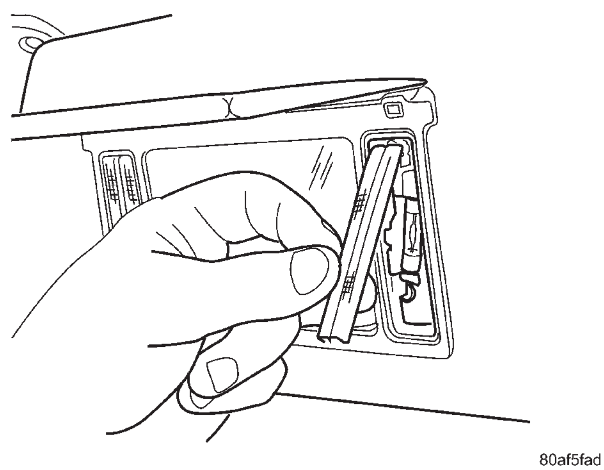

Fig. 4 VANITY LAMP

(2) Using a pick or other suitable tool, pry the lens from the lamp (Fig. 4).
(3) Remove bulb.

INSTALLATION

(1) Install bulb.
(2) Snap lamp lens into position.
(3) Connect the battery negative cable.

COMPASS/MINI-TRIP COMPUTER

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COMPASS/MINI-TRIP COMPUTER

DESCRIPTION

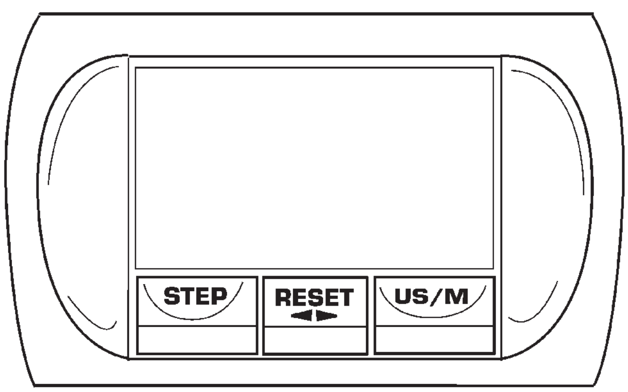

Fig. 1 COMPASS/MINI-TRIP COMPUTER

The Compass Mini-Trip Computer (CMTC) system is located in the center of the instrument panel, between the HVAC outlets. The Compass Mini-Trip Computer is an electronic control module with a vacuum fluorescent display and two function buttons (Fig. 1). The Compass Mini-Trip Computer communicates on the J1850 Programmable Communication Interface Data Bus Circuit.

The functions that are available via activation of the STEP button are as follows:

- Compass and Temperature
- Average Fuel Economy
- Distance to Empty
- Instantaneous Fuel Economy
- Trip Odometer
- Elapsed Time
- Blank Screen

The Compass Mini-Trip Computer cannot be repaired and, if faulty or damaged it must be replaced. The incandescent lamp for the STEP and US/METRIC button illumination is serviceable. Consult your Mopar® Parts Catalog for a specific part number.

OPERATION

Actuation of the STEP button will cause the Compass Mini-Trip Computer to change mode of operation and actuation of the US/M button will toggle between English and Metric unit of measurement. A reset of the trip computer information is accomplished by actuating the Step and US/M buttons simultaneously. To reset only the trip condition currently displayed, press and release the STEP and US/M buttons simultaneously for one second until a chime sounds. To reset all trip conditions, hold down the STEP and US/M buttons simultaneously (about 2 seconds) until a second chime sounds and then release the buttons.

The Compass Mini-Trip Computer is active only when the ignition switch is in the ON position. When the ignition switch is turned ON, the Compass Mini-Trip Computer will return to the last function screen that was displayed prior to the ignition being turned OFF.

COMPASS MINI-TRIP COMPUTER MESSAGES

The Compass Mini-Trip Computer will not display information for any of the screens for which it did not receive the proper data over the J1850 PCI bus for that particular screen. Refer to Mini Trip Computer Diagnosis and Testing in this section for more information.

The Compass Mini-Trip Computer receives the following messages from the Body Control Module (BCM):

- Verification of US/M Status
- Display Brightness (Dimming) and Lamp Status

COMPASS/MINI-TRIP COMPUTER (Continued)

- Trip Odometer Data
- Elapsed Ignition On Time Data
- Fuel Efficiency (Average and Instantaneous)
- Distance to Empty
- Outside Temperature

The Compass Mini-Trip Computer transmits the following messages to the Body Control Module (BCM):

- Status Request : Beep, Reset, US/M Toggle
- Current Display
- Compass Heading

The Compass Mini-Trip Computer receives the following message from the Single Board Engine Controller (SBEC):

- Vehicle Speed

DIAGNOSIS AND TESTING - COMPASS MINI-TRIP COMPUTER

The Compass Mini-Trip Computer is capable of performing a diagnostic self check on many of its internal functions. Compass Mini-Trip Computer diagnostics may be performed using a DRB lll® scan tool and the proper Body Diagnostic Procedures Manual or by the following procedure.

(1) With the ignition switch in the OFF position, press both the US/M and STEP button.

(2) Turn ignition switch to the ON position.

The Compass Mini-Trip Computer will perform internal checks while lighting all segments of the vacuum florescent display. Upon completion of the internal check, the Compass Mini-Trip Computer will display one of five messages;

- **PASS** - Passed Self Test
- **FAIL** - Failed Self Test
- **BUS** - Not receiving J1850 messages from Single Board Engine Controller (SBEC) and Body Control Module (BCM)
- **bus1** - Not receiving J1850 messages from Single Board Engine Controller (SBEC)
- **bus2** - Not receiving J1850 messages from Body Control Module (BCM)

If any segment of the Compass Mini-Trip Computer fails to light replace the computer.

If FAIL is displayed, repeat the test. If it still fails, replace the Compass Mini-Trip Computer module.

If a BUS(X) message is displayed, check the corresponding J1850 PCI Data Bus Circuit for proper operation. Refer to the appropriate diagnostic manual for additional diagnostics.

COMPASS CALIBRATION

If the “CAL” indicator is lit, the compass should be calibrated. The vehicle will be shipped with the “CAL” light on. If during normal driving, the compass appears to be inaccurate, calibration may be required.

To Calibrate the Compass

(1) Put the CMTC into COMPASS/TEMP mode using the STEP button.

(2) Depress the STEP and US/M buttons simultaneously until CAL appears in the display.

(3) Drive the vehicle in about two circles (Fig. 2) on a level surface in an area free of large metal objects, such as other vehicles, large buildings, bridges, underground cables, railroad tracks, etc.

NOTE: The compass will usually calibrate after the vehicle has been driven in a circle comprising five quadrants or one and a quarter turns.

When the “CAL” indicator goes off, the compass is calibrated and should display correct headings (for all conditions). Verify proper calibration by checking North (N), South (S), East (E), and West (W). If the compass does not appear accurate, repeat the calibration procedure in another area.

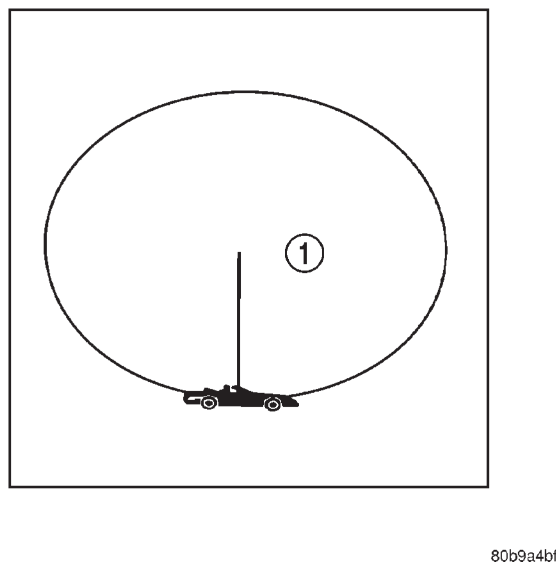

Fig. 2 Compass Calibration

1 - radius = 15' — 45'
speed = 7–10 mph

VARIANCE SETTING PROCEDURE

Variance is the difference between magnetic North and geographic North.

(1) Depress the STEP and US/M buttons simultaneously until VAR appears in the display, then release the buttons.

(2) The CMTC will display the current variance zone (1-15). If the variance needs to be changed use the STEP button to select the correct zone number from the figure below (Fig. 3). After selecting the desired variance zone, the CMTC will return to normal operation after 5 seconds or by pressing the STEP and US/M buttons simultaneously.

COMPASS/MINI-TRIP COMPUTER (Continued)

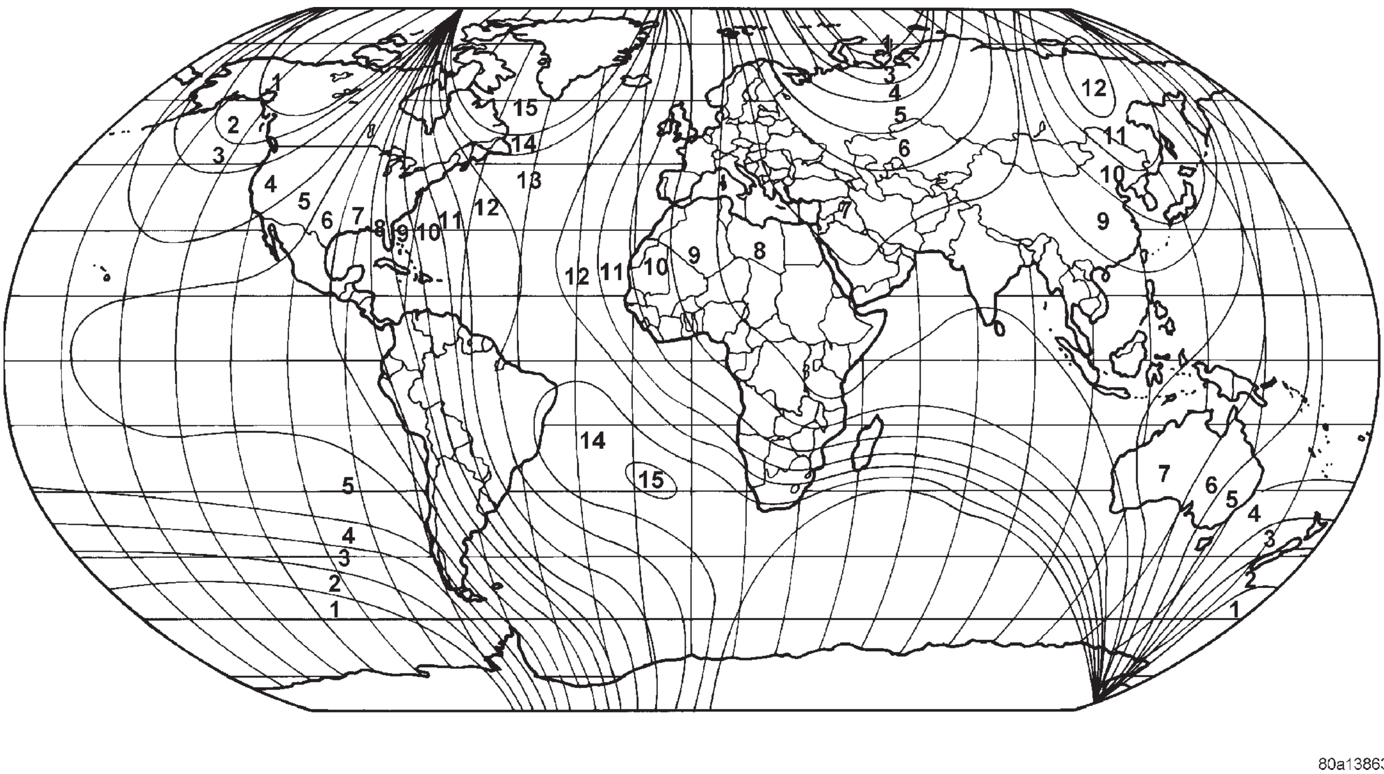

Fig. 3 Variance Settings

REMOVAL

(1) Disconnect and isolate the battery negative remote cable.

(2) Remove the Instrument Cluster Bezel from the vehicle (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - REMOVAL).

(3) With the cluster bezel removed, remove the two screws attaching the Compass Mini-Trip Computer (Traveler) Module to the cluster bezel (Fig. 4).

(4) Unsnap the retaining clip (Fig. 4) and remove Compass Mini-Trip Computer (Traveler) from the cluster bezel.

INSTALLATION

(1) Snap the Compass Mini-Trip Computer on the cluster bezel and install the retaining screws.

(2) Install the Instrument Cluster Bezel (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - INSTALLATION).

(3) Connect the battery negative remote cable.

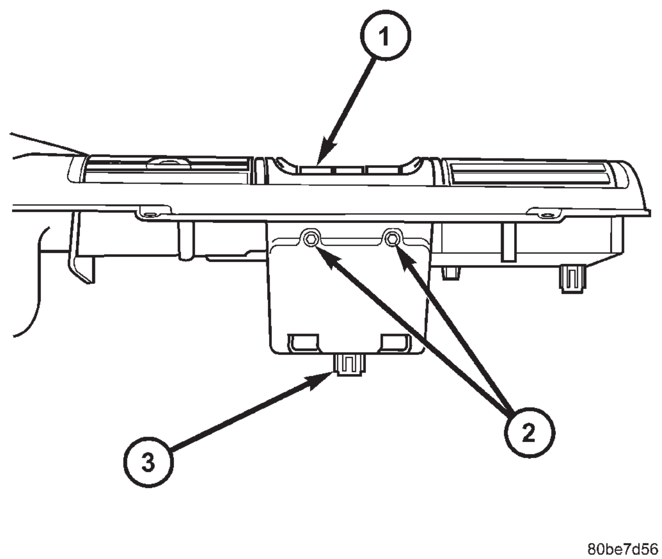

Fig. 4 COMPASS/MINI-TRIP COMPUTER RETAINING FASTENERS

1 - COMPASS MINI-TRIP COMPUTER (TRAVELER)
2 - RETAINING SCREWS
3 - RETAINING CLIP

POWER SYSTEMS

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POWER LOCKS

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POWER LOCKS

DESCRIPTION

POWER DOOR LOCKS

The power lock system allows all doors to be locked or unlocked electrically by operating the switch on either front door trim panel. The power lock system operates on non-switched battery current supplied through a fuse in the junction block so that the system remains functional, regardless of the ignition switch position.

AUTOMATIC DOOR LOCKS

The system includes an automatic door locking feature actuated by the Body Control Module (BCM). **The vehicle is built with the system enabled.** The system can be enabled/disabled by the customer. Refer to the owner's manual for information.

The BCM will automatically lock all doors when all of the conditions below are met:

- All doors are closed
- The vehicle speed exceeds 15 ± 1 M.P.H.
- The throttle position sensor tip-in is greater than 10 ± 2 degrees

When the system is disabled the door locks will work by use of the door lock switches only. When this system is enabled the automatic door locks will work automatically.

Auto unlock on exit is a feature which, when enabled, automatically unlocks all doors upon the ignition switch being turned off and the opening of the driver's door. Auto unlock on exit is only operable when the automatic door locks are enabled.

POWER LOCKS (Continued)

CENTRAL LOCKING

The central locking system is part of the Vehicle Theft Security System. This feature allows the doors to be locked/unlocked all at once with the turn of the key in the drivers or passengers side door.

CHILD PROTECTION LOCK

The child protection locks are on the rear doors only. When enabled, they render the inside remote door release handles inoperative.

DOOR LOCK INHIBIT

The door lock inhibit feature is designed to prevent the locking of keys in a vehicle. The drivers door cannot be locked unless the keys are removed from the ignition switch.

REMOTE KEYLESS ENTRY

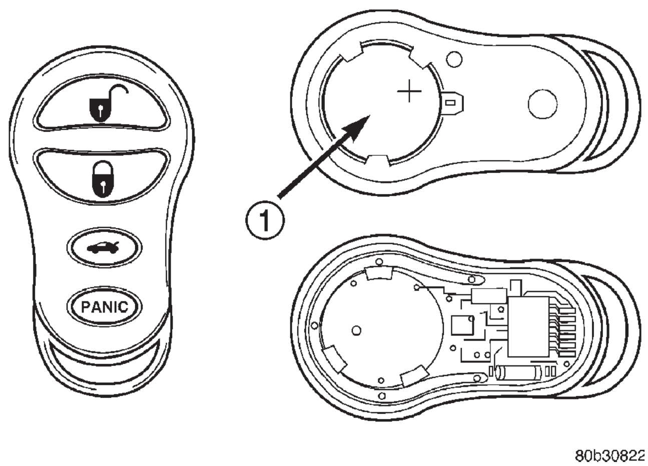

Fig. 1 REMOTE KEYLESS ENTRY TRANSMITTER

1 - BATTERIES

The system allows locking and unlocking of vehicle door(s), deck lid release, and panic by remote control using a hand held radio frequency transmitter (Fig. 1). The vehicle must be in PARK before the trunk lid can be unlatched with the transmitter.

The receiver may receive signals from up to four transmitters. Each transmitter has its own code, and the code is programmed and stored into receiver memory. If a transmitter is replaced or additional transmitters are added, the codes for all units have to be reprogrammed into the receiver memory. If a receiver module is replaced, the transmitter codes must be stored in the new receiver memory.

HORN CHIRP TOGGLE

Once the transmitters have been programmed, the horn chirp can be enabled/disabled by sending the horn chirp toggle operation code to the Body Control Module (BCM).

OPERATION

POWER DOOR LOCKS

All doors can be locked or unlocked electrically by operating the switch on either front door panel.

The rear doors can be locked or unlocked by actuation of the front door switch, or can be locked or unlocked mechanically and independently with their respective locking knobs.

The front doors can be locked or unlocked mechanically with the locking knob regardless of electrical locking and unlocking actuation with the front door knobs.

The right and left front door on all vehicles can be locked or unlocked mechanically from the outside with the key or electrically as described above. The left and right front doors can also be unlocked by actuation of the inside remote door handle.

AUTOMATIC DOOR LOCKS

The BCM controls the power locks when the door lock switch is activated. If the door lock switch is pressed for longer than eight consecutive seconds, the BCM will de-energize the door lock relay.

The automatic door lock system can be enabled/disabled either by the customer or with the DRB lll® scan tool. Refer to the DRB lll® or the vehicle owners manual for enabling/disabling procedures.

The BCM will automatically re-lock all doors if the above conditions are met and if any of the doors become ajar and then closes again.

The power latches are also equipped with a thermal protection system which prevents the latches from burning out.

CENTRAL LOCKING

Using the key, turn the driver's or passenger door cylinder lock to the lock position, all doors will lock. This feature operates differently on each door. Turn key in the driver's door to the unlock position once will unlock driver's door only. Turning the key a second time to the unlock position within five seconds of the first time will unlock all doors. Turn key once in the passenger's door to the unlock position will unlock all doors.

The lock/unlock operation will arm/disarm the Vehicle Theft Security System and will also activate/cancel the illuminated entry feature.

CHILD PROTECTION LOCK

The lock when engaged, will disable the inside door handle from opening the door. The lock is part of the latch/lock assembly. The lock is engaged by moving a lever that is located on the rearward inside edge of the door.

POWER LOCKS (Continued)

DOOR LOCK INHIBIT

With the key in the ignition switch in the ON or OFF position and the driver's door open the BCM will ignore the command to lock the power door locks. Once the key is removed, or the driver's door is closed, the body control module will allow the power door locks to lock.

REMOTE KEYLESS ENTRY

The transmitter has four buttons for operation. They are LOCK, UNLOCK, DECK LID RELEASE, and PANIC.

- The **UNLOCK** button will unlock the driver's door and enable illuminated entry. Pushing and releasing the button once will unlock the driver's door. Pushing and releasing the button two times, within a five second interval, will unlock all doors.The unlock sequence can be toggled between driver door first and all door unlock functions.
- Upon pressing the **LOCK** button, the horn will sound a short CHIRP (if enabled) and flash the park lamps to notify that the all door lock signal was received and set. Illuminated entry is cancelled and the interior lamps are faded to off.
- **DECK LID RELEASE** - The Deck Lid release button changes from a default "press twice" actuation to a "press and hold" (for approximately one third of a second) default. Note that this is customer programmable to "no delay" if so desired.
- Pushing and holding the **PANIC** button will cause the panic alarm to sound for three minutes, until the panic button is pressed and held a second time, or the vehicle reaches a speed of 15 mph.

The receiver is capable of retaining a Vehicle Access Code (VAC) even when power is removed.

Each Remote Keyless Entry (RKE) module must have at least one and no more than four transmitters.

HORN CHIRP TOGGLE

This can be done using a DRB III® scan tool or by the customer. The horn chirp will enter the opposite state of its current programmed state by receiving this operation code. The BCM is responsible for keeping track of the horn chirp status.

DIAGNOSIS AND TESTING - REMOTE KEYLESS ENTRY

When trouble shooting problems with the Remote Keyless Entry System, always verify that the power door lock/unlock switches are functional. If the doors do not lock/unlock with the power switches, the following components should be analyzed:

- Door Lock Switches
- Body Control Module
- Lock and unlock relays
- Door lock/unlock motors
- Remote keyless entry system
- Radio/clock

A blown fuse is the probable cause. The remote keyless entry fuse 13 is located in the Junction Block. If neither terminal measures battery voltage, check for an open or shorted circuit to the Junction Block, repair as needed. If battery voltage is still not available, check the high current fuse G in the Power Distribution Center, located in the engine compartment.

To diagnose the Remote Keyless Entry (RKE) System, use a DRB III® scan tool and refer to Power Door Lock System in the proper Body Diagnostic Procedures manual.

DOOR CYLINDER LOCK SWITCH

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(3) Disconnect the wiring clip and pigtail wire connector (Fig. 2).

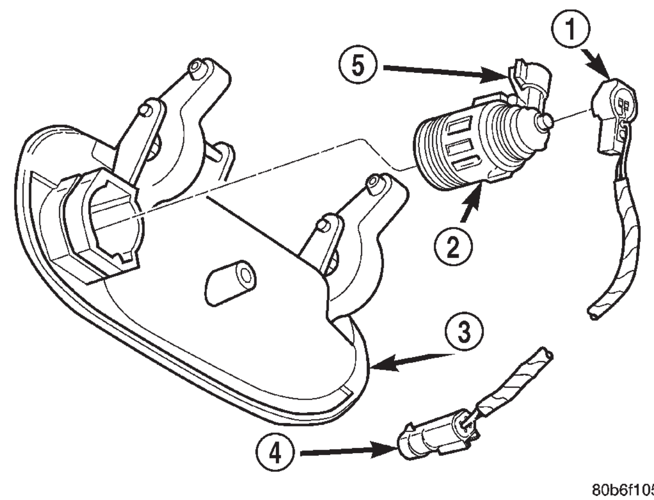

Fig. 2 DOOR CYLINDER LOCK SWITCH

1 - DOOR CYLINDER LOCK SWITCH
2 - LOCK CYLINDER
3 - DOOR HANDLE
4 - PIGTAIL CONNECTOR
5 - CLIP

(4) Remove the Door Cylinder Lock Switch from door lock cylinder.

DOOR CYLINDER LOCK SWITCH (Continued)

INSTALLATION

(1) Install the Door Cylinder Lock Switch onto the door lock cylinder.

(2) Connect the wiring clip and pigtail wire connector.

(3) Install door trim panel (Refer to 23 - BODY/ DOOR - FRONT/TRIM PANEL - INSTALLATION).

(4) Connect the battery negative cable.

DOOR LOCK MOTOR

DIAGNOSIS AND TESTING - DOOR LOCK MOTOR

Make certain battery is in normal condition before circuits are tested.

To determine which motor is faulty, check each individual door for electrical lock and unlock or disconnect the motor connectors one at a time, while operating the door lock switch. In the event that none of the motors work, the problem maybe caused by a shorted motor, a bad switch, or a bad relay. Disconnecting a defective motor will allow the others to work.

To test an individual door lock motor, disconnect the electrical connector from the motor. To lock the door, connect a 12 volt power source to the positive pin of the lock motor and a ground wire to the other pin (Fig. 3). To unlock the door reverse the wire connections at the motor pin terminals. If these results are NOT obtained, replace the motor.

The door lock motor is integral to the door latch. If found defective, the entire door latch must be replaced.

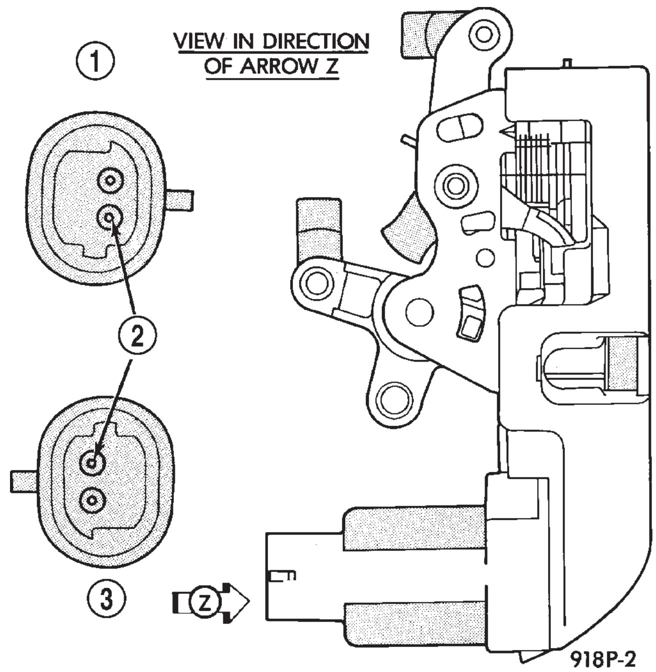

Fig. 3 DOOR LOCK MOTOR - TYPICAL

1 - PASSENGER SIDE CONNECTOR
2 - + TO LOCK
3 - DRIVER SIDE CONNECTOR

DOOR LOCK / UNLOCK SWITCH

DIAGNOSIS AND TESTING - DOOR LOCK / UNLOCK SWITCH

VOLTAGE

The following wiring test sequence determines whether or not voltage is continuous through the body harness to switch.

(1) Remove switch from door trim panel.

(2) Carefully separate multiple terminal block on wiring harness from switch body.

(3) Connect one lead of test light to a ground terminal:

• Touch other test light lead to battery feed B+ terminal.

• If test light comes on, the wiring circuit between the battery and switch is functional.

• If test light does not come on, check fuse 13 in the Junction Block for a blown fuse. Refer to Wiring Diagrams for circuit information.

DOOR LOCK SWITCH

Remove the switch from its mounting location. Using an ohmmeter, refer to the DOOR LOCK SWITCH CONTINUITY table to determine if the continuity is correct in the LOCK and UNLOCK switch positions. If these results are not obtained, replace the switch.

DOOR LOCK SWITCH CONTINUITY

SWITCH POSITION	CONTINUITY BETWEEN	RESISTANCE VALUE
LOCK	1 AND 4	2700 Ω ± 10%
UNLOCK	1 AND 4	620 Ω ± 10%

REMOVAL

(1) Disconnect and isolate the battery negative remote cable.

(2) Remove door trim panel (Refer to 23 - BODY/ DOOR - FRONT/TRIM PANEL - REMOVAL).

(3) Disconnect switch wire connector.

(4) Remove switch using a trim stick (special tool #C-4755) or equivalent.

DOOR LOCK / UNLOCK SWITCH (Continued)

INSTALLATION

(1) Install the switch by snapping into place.
(2) Connect switch wire connector.
(3) Install the door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).
(4) Connect the battery negative remote cable.

DECKLID RELEASE SOLENOID

DIAGNOSIS AND TESTING - DECKLID RELEASE SOLENOID

(1) Confirm motor lead wire is connected and 10 volts or more are available at solenoid.
(2) Provide proper ground through latch mounting screws.
(3) Remove latch and examine plunger. Plunger should spring back when pressed.
(4) Insure that solenoid plunger travel is adequate approximately 16 mm (5/8 inch).

REMOVAL

(1) Disconnect and isolate the negative battery cable remote terminal from the remote battery post.
(2) Raise deck lid to the full up position.
(3) Remove latch cover push pins then remove cover.
(4) Remove two retaining nuts to latch and motor, then remove latch and motor assembly.

INSTALLATION

(1) Install the latch and motor assembly. Install the two retaining nuts.
(2) Install latch cover and push pins.
(3) Close the deck lid.
(4) Connect the negative battery cable remote terminal to the remote battery post.

DECKLID RELEASE SWITCH

REMOVAL

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
(2) Remove left lower instrument panel cover. Refer to Body, Instrument Panel, Left Lower Instrument Panel Trim, Removal.
(3) Disconnect the wire connector.
(4) Pinch four tabs around side of decklid release switch on the rear side of the left lower instrument panel trim, and push switch through opening.

INSTALLATION

(1) Position the decklid release switch over opening of the left lower instrument panel trim, and push switch through opening.
(2) Connect the wire connector.
(3) Install the left lower instrument panel cover. Refer to Body, Instrument Panel, Left Lower Instrument Panel Trim, Installation.
(4) Connect the negative battery cable remote terminal to the remote battery post.

KEYLESS ENTRY TRANSMITTER

STANDARD PROCEDURE - TRANSMITTER PROGRAMMING

The Remote Keyless Entry (RKE) Transmitter(s) can be programmed with the use of the DRB III® scan tool, or by the customer.

PROGRAMMING TRANSMITTER WITH THE DRB III® SCAN TOOL

For procedures on programming the transmitter(s) with the DRB III® scan tool, refer to the proper Body Diagnostic Procedures Manual.

PROGRAMMING BY CUSTOMER

For a customer to be able to program RKE transmitters themselves, at least one RKE transmitter must be programmed already. This procedure is to add additional transmitters. If all transmitters are lost, the DRB III® scan tool must be used to program the new transmitter(s).

(1) With ignition ON, press and hold the RKE UNLOCK button for at least 4 seconds. While holding the UNLOCK button, press the PANIC button.
(2) Verify that the Body Control Module (BCM) chimes to indicate that you have entered RKE transmitter programming mode.
(3) To program the RKE transmitters, press and hold the LOCK and UNLOCK buttons simultaneously for at least 3 seconds, and then press the UNLOCK button.
(4) Verify that the BCM chimes after each transmitter is programmed.
(5) To exit program mode, turn off ignition or wait 32 seconds. The BCM will chime again.

KEYLESS ENTRY TRANSMITTER (Continued)

SPECIFICATIONS

TRANSMITTER

BATTERY

The transmitter has two 3 volt batteries, which can be removed and replaced without special tools. Insert a dime in the side slot of the transmitter and twist. the halves should separate and the batteries are stacked on top of each other. The batteries are available at local retail stores. Recommended batteries are Panasonic CR 2016 or equivalent. Battery life is about two years.

RANGE

Operation range is within 12 meters (40 ft.) of the module/receiver.

REMOTE KEYLESS ENTRY MODULE

REMOVAL

(1) Disconnect the remote battery negative cable from the terminal on the shock tower.

The Junction Block and Body Control Module (BCM) are attached to each other. After removal they can be separated.

(2) Open the front driver's door and remove end cap.

(3) Remove instrument panel outboard bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TRIM - REMOVAL).

(4) Remove instrument panel center bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).

(5) Remove instrument panel inboard bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TRIM - REMOVAL).

(6) Remove the left lower instrument panel trim.

(7) Remove silencer.

(8) Remove wire harness connectors from Junction Block.

(9) Remove Junction Block three mounting screws.

(10) Remove Junction Block/BCM by pulling straight down from the mounting bayonet.

(11) Disconnect BCM wire connectors and remove the assembly.

(12) Remove Junction Block/BCM from vehicle.

(13) With the Junction Block/BCM removed from the vehicle, separate the BCM from the Junction Block.

(14) Disconnect BCM from the Junction Block.

(15) Unsnap the remote keyless entry module from the BCM.

NOTE: The Remote Keyless Entry (RKE) module is attached to the BCM. This must be transferred (if equipped) to the new BCM if being replaced.

NOTE: If BCM is replaced, the VTSS must be enabled in the new BCM via the DRB III® in order to start the vehicle.

INSTALLATION

(1) Snap the remote keyless entry module onto the BCM.

(2) Connect BCM to the Junction Block.

(3) Connect the BCM and junction block together.

(4) Install the Junction Block/BCM into vehicle.

(5) Connect BCM wire connectors and install the assembly onto instrument panel.

(6) Install the Junction Block/BCM by pushing straight up.

(7) Install the Junction Block three mounting screws.

(8) Install the wire harness connectors to the Junction Block.

(9) Install the silencer.

(10) Install the left lower instrument panel trim.

(11) Install the instrument panel inboard bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TRIM - INSTALLATION).

(12) Install the instrument panel center bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).

(13) Install the instrument panel outboard bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TRIM - INSTALLATION).

(14) Install the left end cover.

(15) Connect the remote battery negative cable to the remote terminal on the shock tower.

POWER MIRRORS

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POWER MIRRORS

DESCRIPTION

Power mirrors are controlled by a single switch located on the instrument panel to the left of the steering column.

OPERATION

The power mirrors are connected to battery feed at all times. Each mirror head contains two electric motors and two drive mechanisms. One motor and drive controls mirror up-and-down movement, and the other controls right-and-left movement.

The vehicle is equipped with an Ignition Off Draw Fuse which is used when it is originally shipped from the factory. This fuse is located in the Junction Block and helps prevent battery discharge during storage when disconnected. This fuse is included in the power mirror circuitry and should be checked if the mirrors are inoperative.

DIAGNOSIS AND TESTING - POWER MIRRORS

(1) Disconnect and isolate the battery negative cable.

(2) Remove the power mirror switch. (Refer to 8 - ELECTRICAL/POWER MIRRORS/POWER MIRROR SWITCH - REMOVAL).

(3) Disconnect wire connector from the switch.

(4) Using two jumper wires, one connected to a 12 volt battery source, and the other connected to a good body ground. Refer to the Mirror Motor Test table for appropriate mirror response, using the mirror switch wiring harness connector (Fig. 1).

(5) If test results are not obtained as shown in the Mirror Motor Test table, check for open or shorted circuit, or replace mirror assembly as necessary.

If mirror motor tests OK, go to Mirror Switch Test.

MIRROR MOTOR TEST

		MIRROR REACTION	
12 VOLT	**GROUND**	**LEFT**	**RIGHT**
9	10		UP
4	1	UP	
10	9		DOWN
1	4	DOWN	
10	2		RIGHT
1	8	RIGHT	
2	10		LEFT
8	1	LEFT	

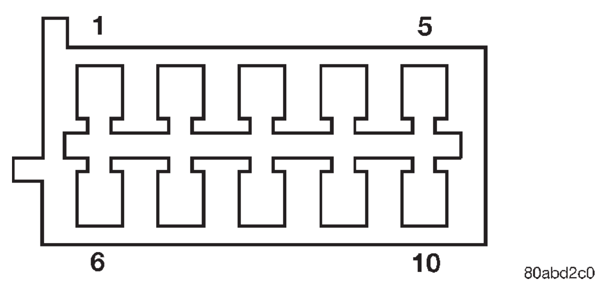

Fig. 1 Mirror Switch Harness Connector

POWER MIRROR SWITCH

DIAGNOSIS AND TESTING - POWER MIRROR SWITCH

(1) Remove power mirror switch (Refer to 8 - ELECTRICAL/POWER MIRRORS/POWER MIRROR SWITCH - REMOVAL).

(2) Disconnect wiring harness connector from switch.

(3) Using a ohmmeter, test for continuity between the terminals of the switch (Fig. 2).

POWER MIRROR SWITCH (Continued)

(4) If results shown in the table are not obtained, replace the switch.

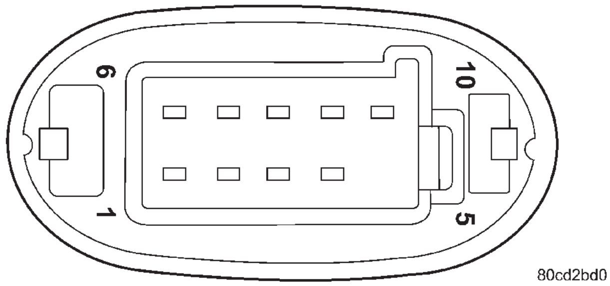

Fig. 2 POWER MIRROR SWITCH

POWER MIRROR SWITCH TEST

SWITCH POSITION	CONTINUITY BETWEEN
MIRROR SELECT SWITCH IN ″LEFT″ POSITION	
UP	3 AND 1
	9 AND 7
	7 AND 4
DOWN	7 AND 1
	9 AND 3
	4 AND 3
LEFT	3 AND 1
	7 AND 2
	8 AND 7
RIGHT	7 AND 1
	3 AND 2
	8 AND 3
MIRROR SELECT SWITCH IN ″RIGHT″ POSITION	
UP	10 AND 3
	9 AND 7
	7 AND 4
DOWN	10 AND 7
	9 AND3
	4 AND 3
LEFT	10AND 3
	7 AND 2
	8 AND 7
RIGHT	10 AND 7
	3 AND 2
	8 AND 3

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Using a trim stick, pry the trim bezel from the instrument panel.

(3) Disconnect wire harness connector from switch.

(4) Remove switch from bezel.

INSTALLATION

(1) Install switch to trim bezel.

(2) Connect wire harness connector to switch.

(3) Install trim bezel to instrument panel.

(4) Connect battery negative cable.

SIDEVIEW MIRROR

REMOVAL

For service procedures, (Refer to 23 - BODY/EXTERIOR/SIDE VIEW MIRROR - REMOVAL).

POWER SEAT SYSTEM

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POWER SEAT SYSTEM

DESCRIPTION

The power seat system on this model allows the driver to electrically adjust their seating positions in eight directions for optimum control and comfort, using the power seat switch located on the outboard seat cushion side shield (Fig. 1). The power seat system receives battery current through a 40 amp fuse in the Power Distribution Center (PDC) and a 20 amp circuit breaker in the junction block so that the power seats remain operational, regardless of the ignition switch position.

WARNING: SOME VEHICLES ARE EQUIPPED WITH SIDE AIRBAGS. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY SEAT OR POWER SEAT SYSTEM COMPONENT YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE. THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

The power seat system allows the seating position to be adjusted forward, rearward, up, down, front up, front down, rear up, or rear down. A eight-way power seat is standard on premium models and optional on others. This option includes a six-way adjustable seat cushion track and a two-way power seat back. The eight-way power seat is also available with the heated seat system (Export Only). Refer to **Heated Seat System** for more information on the heated seat option. The power seat system includes the following components:

- Power seat switch
- Power seat track.
- Power seat system fuse and circuit breaker

Refer to Wiring Diagrams for complete circuit diagrams. Following are component descriptions, theory of operation and removal and installation procedures for the power seat system components.

Fig. 1 Driver Power Seat - Convertible

POWER SEAT SYSTEM (Continued)

OPERATION

When a power seat switch control knob or knobs are actuated, a battery feed and a ground path are applied through the switch contacts to the power seat track or recliner adjuster motor. The selected adjuster motor operates to move the seat track or recliner through its drive unit in the selected direction until the switch is released, or until the travel limit of the adjuster is reached. When the switch is moved in the opposite direction, the battery feed and ground path to the motor are reversed through the switch contacts. This causes the adjuster motor to run in the opposite direction.

See the owner's manual in the vehicle glove box for more information on the features, use and operation of the power seat system.

DIAGNOSIS AND TESTING - POWER SEAT SYSTEM

WARNING: SOME VEHICLES ARE EQUIPPED WITH SEAT MOUNTED, SIDE AIRBAGS. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY SEAT OR POWER SEAT SYSTEM COMPONENT YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE. THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

Before any testing of the power seat system is attempted, the battery should be fully-charged and all of the power seat system wire harness, connections and pins checked for damage. For complete circuit diagrams, refer to **Wiring Diagrams**.

With the dome lamp on, apply the power seat switch in the direction of the failure. If the dome lamp dims, the seat may be jamming. Check under and behind the seat for binding or obstructions. If the dome lamp does not dim, proceed with testing of the individual components and circuits in the power seat system.

VOLTAGE TEST

The following test will determine whether or not voltage is continuous through the body harness and to the seat switch.

(1) Remove the front seat cushion side shield from the seat to be tested. Refer to the Body section of the service manual for the procedure.

(2) Using a voltmeter, connect the ground lead to Pin 5 and positive lead to Pin 1 of the seat switch connector. If battery voltage is present circuit is OK. If no voltage is present check circuit breaker and repair as necessary.

CIRCUIT BREAKER TEST

Find correct circuit breaker on fuse block. Pull out slightly but be sure that circuit breaker terminals still contact terminals in fuse block. Connect ground wire of voltmeter to a good ground. With probe of voltmeter positive wire, check both terminals of circuit breaker for battery voltage. If only one terminal checks at battery voltage, circuit breaker is defective and must be replaced. If neither terminal shows battery voltage, check for open or shorted circuit to circuit breaker.

DRIVER SEAT SWITCH

DESCRIPTION

Vehicles equipped with power seats utilize a eight-way power seat switch. Hard-top models utilize an power seat switch with two knobs ganged together on the outboard seat cushion side shield. Convertible models utilize an power seat switch with three knobs ganged together. The switches are secured to the back of the seat cushion side shield with two screws. However, the control knobs for the hard-top eight-way power seat switch unit must be removed before the seat switch can be removed from the side shield.

The power seat can be adjusted in eight different ways using either of the power seat switches. The power seat can be adjusted up, down, forward, rearward, front up, front down, rear up and rear down, using either of the power seat switches.

The individual switches in the power seat switch module cannot be repaired. If one switch is damaged or faulty, the entire power seat switch module must be replaced. Refer to the owner's manual in the vehicle glove box for more information on the power seat switch functions and the seat adjusting procedures.

OPERATION

When a power seat switch control knob or knobs are actuated, a battery feed and a ground path are applied through the switch contacts to the power seat track or recliner adjuster motor. The selected adjuster motor operates to move the seat track or recliner through its drive unit in the selected direction until the switch is released, or until the travel limit of the adjuster is reached. When the switch is moved in the opposite direction, the battery feed and ground path to the motor are reversed through the switch contacts. This causes the adjuster motor to run in the opposite direction.

No power seat switch should be held applied in any direction after the adjuster has reached its travel

DRIVER SEAT SWITCH (Continued)

limit. The power seat adjuster motors each contain a self-resetting circuit breaker to protect them from overload. However, consecutive or frequent resetting of the circuit breaker must not be allowed to continue, or the motor may be damaged. See the owner's manual in the vehicle glove box for more information on the power seat switch functions and the seat adjusting procedures.

DIAGNOSIS AND TESTING - DRIVER SEAT SWITCH

(1) Remove the power seat switch from its mounting position. Refer to the procedure in this section.

(2) Using an ohmmeter, perform the switch continuity tests. Refer to the appropriate Switch Continuity Test table and the seat switch connector (Fig. 2) or (Fig. 3)below. If there is no continuity in any of the switch positions, replace switch.

HARD-TOP POWER SEAT SWITCH CONTINUITY TEST

SWITCH POSITION	CONTINUITY BETWEEN
OFF	1-2, 1-3, 1-4, 1-6, 1-7, 1-8, 1-9, 1-10
SEATBACK RECLINER UP	5-2, 1-4
SEATBACK RECLINER DOWN	5-4, 1-2
SEAT BACKWARD	5-3, 1-6
SEAT FORWARD	5-6, 1-3
FRONT RISER UP	7-5, 1-10
FRONT RISER DOWN	5-10, 1-7
REAR RISER UP	5-8, 1-9
REAR RISER DOWN	5-9, 1-8

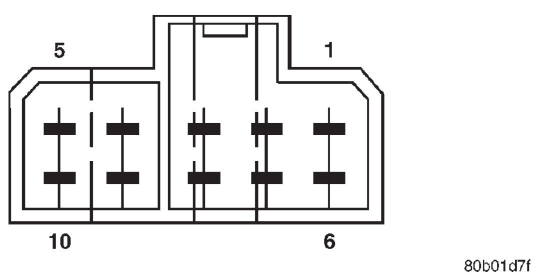

Fig. 2 Rear View Of Hard-top Power Seat Switch

DRIVER SEAT SWITCH (Continued)

CONVERTIBLE POWER SEAT SWITCH CONTINUITY TEST

SWITCH POSITION	CONTINUITY BETWEEN
OFF	ALL TERMINALS EXCEPT ″A″
VERTICAL UP	B-M, B-E, A-N, A-J
VERTICAL DOWN	B-N, B-J, A-M, A-E
HORIZONTAL REARWARD	B-K, A-L
HORIZONTAL FORWARD	B-L, A-K
FRONT TILT UP	A-J, B-E
FRONT TILT DOWN	A-E, B-J
REAR TILT UP	A-N, B-M
REAR TILT DOWN	A-M, B-N

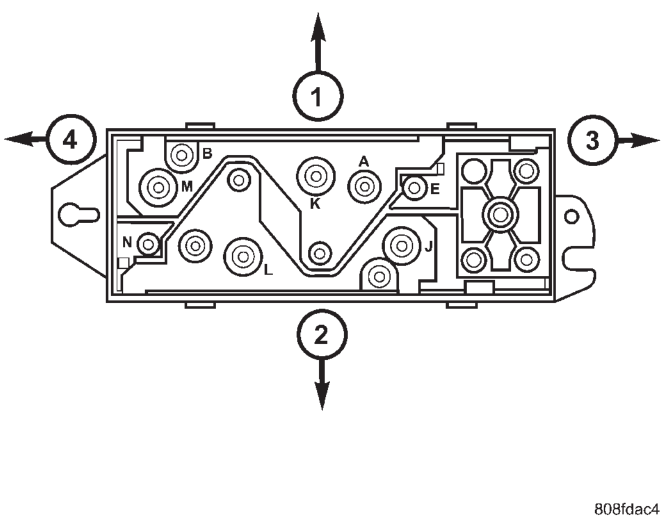

Fig. 3 Rear View Of Convertible Power Seat Switch

1 - UP
2 - DOWN
3 - FRONT
4 - REAR

REMOVAL

(1) Open hood, disconnect and isolate the negative battery cable remote terminal from the remote battery post.

WARNING: SOME VEHICLES ARE EQUIPPED WITH SIDE AIRBAGS. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY SEAT OR POWER SEAT SYSTEM COMPONENT YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE. THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(2) Remove the seat cushion side shield from the front seat (Fig. 4). Refer to the Body section of the service manual for the procedure.

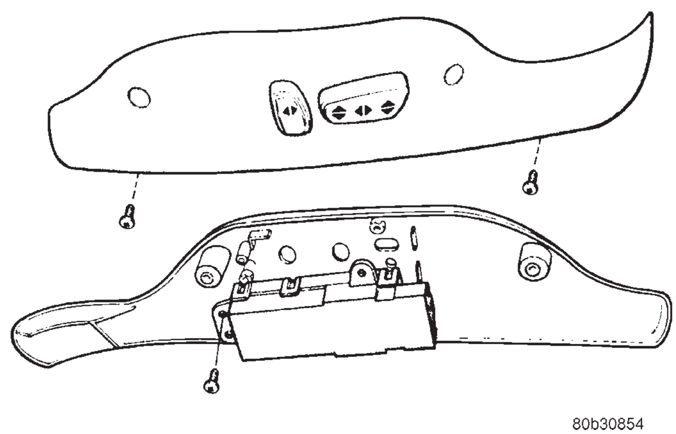

Fig. 4 Power Seat Switch - Hardtop Only

(3) On hardtop models, remove the knobs from the seat switch by gently prying straight off.
(4) Remove the switch attaching screws.
(5) Remove switch from cushion side shield

INSTALLATION

(1) Position the switch and install the switch attaching screws.
(2) Install the knobs on the switch (if required).
(3) Connect wiring electrical connector on switch.
(4) Install the seat cushion side shield. Refer to the Body section of the service manual for the procedure.
(5) Connect the negative battery cable remote terminal on the remote battery post.

POWER SEAT TRACK

DESCRIPTION

The eight-way power seat options include a single electrically operated power seat track unit located under the drivers seat. The power seat track unit replaces the standard equipment manual seat track. There are three reversible motors that operate the power seat adjuster. The motors are connected to worm-drive gearboxes that move the seat adjuster through a combination of screw-type drive units. The lower half of the power seat track is secured at the front with two bolts to the floor panel seat cross member, and at the rear with two bolts to the floor panel. Four fasteners secure the bottom of the seat cushion frame to four studs on the upper half of the power seat track unit.

The front and rear of a seat are operated by different motors. They can be raised or lowered independently of each other. When the center seat switch is pushed in the Up or Down direction, both the front and rear motors operate in unison. The forward-rearward motor is operated by pushing the center seat switch in the Forward or Rearward direction, which moves the entire seat in the selected direction on all models.

Each motor contains a self-resetting circuit breaker to protect it from overload. Consecutive or frequent resetting of the circuit breakers must not be allowed to continue, or the motors may be damaged. Make the necessary repairs.

The power seat adjuster and motors cannot be repaired, and are serviced only as a complete unit. If any component in this unit is faulty or damaged, the entire power seat adjuster and motors assembly must be replaced.

OPERATION

The power seat track unit includes three reversible electric motors that are secured to the upper half of the track unit. Each motor moves the seat adjuster through a combination of worm-drive gearboxes and screw-type drive units.

The front and rear of the seat are operated by two separate vertical adjustment motors. These motors can be operated independently of each other, tilting the entire seat assembly forward or rearward; or, they can be operated in unison by selecting the proper power seat switch functions, which will raise or lower the entire seat assembly. The third motor is the horizontal adjustment motor, which moves the seat track in the forward and rearward directions.

DIAGNOSIS AND TESTING - POWER SEAT TRACK

(1) Remove power seat switch from seat.

(2) Disconnect wire harness connector.

(3) Check Pin 1 for battery voltage and Pin 5 for ground. On convertible models refer to step 5.

(4) To test the seat motors, refer to the, and verify proper seat responses. Using two jumper wires, connect one to a battery supply and the second to a ground. Connect the other ends to the seat wire harness connector as described in the Switch Harness Connector Circuit Test table (Fig. 5).

SWITCH HARNESS CONNECTOR CIRCUIT TEST

CAVITY	TEST		FUNCTION
	(+)	(–)	
1			FUSED B(+)
2	2	4	SEATBACK RECLINER DOWN
3	10	3	SEAT FORWARD
4	4	2	SEATBACK RECLINER UP
5			GROUND
6	6	9	FRONT RISER DOWN
7	7	8	REAR RISER DOWN
8	8	7	REAR RISER UP
9	9	6	FRONT RISER UP
10	3	10	SEAT REARWARD

POWER SEAT TRACK (Continued)

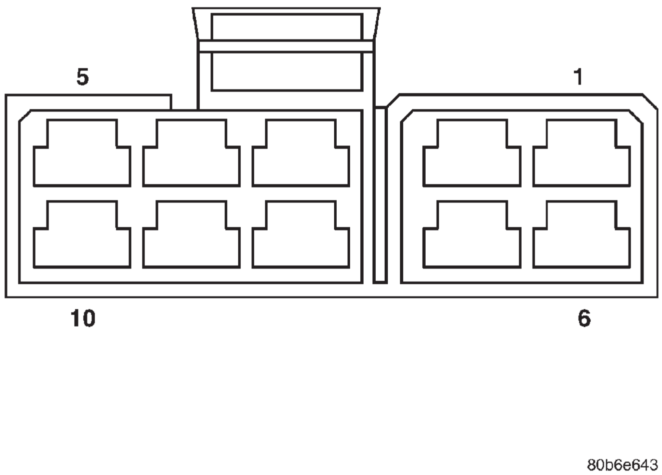

Fig. 5 Seat Switch Electrical Connector - Hardtop

(5) Using a voltmeter, connect the ground lead to PIN B of the switch harness connector. Connect the positive lead to PIN A (Fig. 6). If battery voltage is present, the ground and voltage circuits to the power seat switch are OK. Check the power seat switch for proper operation (Refer to 8 - ELECTRICAL/POWER SEATS/DRIVER SEAT SWITCH - DIAGNOSIS AND TESTING). If the seat switch checks out OK, remove the seat assembly and check the circuits from the power seat switch to the power seat track adjuster motors for proper continuity. If the circuits appear to be OK, replace the power seat track and adjuster motors as an assembly.

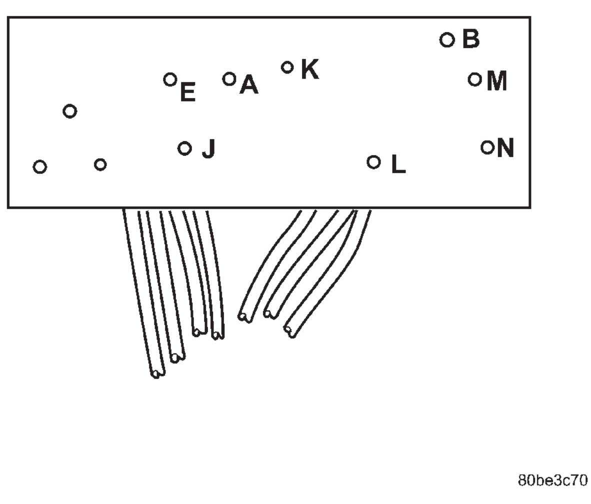

Fig. 6 Seat Switch Electrical Connector - Convertible

REMOVAL

Before the seat track can be removed, the front seat assembly must be removed from the vehicle. Refer to the Body section of this manual for the Front Seat Removal and Installation procedure.

(1) Disconnect and isolate the battery negative remote cable.

(2) Remove the appropriate front seat from the vehicle. Once the front seat is removed, lay it on a clean surface upside down to expose the underside of the seat assembly.

(3) Remove the seat cushion side shields from the seat assembly. Refer to the Body section of this manual for the Seat Cushion Side Shield Removal and Installation procedure.

(4) Disconnect the necessary power seat electrical connectors.

(5) Remove the bolts retaining the power seat track to the seat assembly and remove.

INSTALLATION

(1) Position the seat track and install the retaining bolts. Torque the bolts to 12 N·m (108 in. lbs.).

(2) Connect the necessary power seat electrical connectors.

(3) Install the seat cushion side shields on the seat assembly. Refer to the Body section of this manual for the Seat Cushion Side Shield Installation procedure.

(4) Install the appropriate front seat in the vehicle. Refer to the Body section of this manual for the Seat Installation procedure.

(5) Connect the battery negative remote cable.

POWER WINDOWS

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POWER WINDOWS

DESCRIPTION

The power window system allows each of the door windows to be raised and lowered electrically by actuating a switch on the trim panel of each respective door. A master switch on the driver side front door trim panel allows the driver to raise or lower each of the passenger door windows, and to lock out the individual switches on the passenger doors from operation. The power window system receives battery feed through a 30 amp circuit breaker in the junction block, only when the ignition switch is in the RUN position.

The power top switch (JR27 only) has three distinct functions:

- **Top Down -** This is the first detent on the down side of the switch. Holding the switch in this position will lower the top only.
- **Top Down/4 window down -** This is the second detent on the switch. Holding the switch in this position lowers the convertible top and all 4 windows down simultaneously only if held in this position.
- **Top Up -** Holding the switch in this position raises the convertible top to the closed position. It will also lower all 4 windows approximately 3 inches to prevent seal damage.

The power window system includes the power window switches on each door trim panel, the circuit breaker in the junction block, and the power window motors inside each door. For service of mechanical components, such as the regulator, lift plate, window tracks, or glass refer to Group 23 - Body.

OPERATION

Front and rear door window lift motors are of the permanent magnet type. A battery positive and negative connection to either of the two motor terminals will cause the motor to rotate in one direction. Reversing current through these same two connections will cause the motor to rotate in the opposite direction.

Each individual motor is grounded through the master switch.

DIAGNOSIS AND TESTING - POWER WINDOWS

CIRCUIT TEST

The following circuit test sequence determines whether or not voltage is continuous through the body harness to switch.

(1) Remove the driver door trim panel.

(2) Carefully separate wiring harness connector from switch body.

(3) Using a voltmeter, connect the ground lead to the Pin 10 of the wiring harness connector.

(4) Using the positive lead, check Pin 1 of the harness connector for battery voltage. If OK, refer to Window Switch Test. If not OK, check 30 amp circuit breaker in the Junction Block. If the circuit breaker is OK, repair wire as necessary. For wiring, specific connector type and location, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

POWER WINDOWS (Continued)

WINDOW DROP RELAY TEST - JR27 ONLY

The following test should be performed if all windows do not lower when the top switch is in the down position.

(1)
Check for battery voltage at pins 5, 11 and 12 of the window drop relay wire connector. If OK, go to Step 2. If not OK, check the circuit breaker and fuse or check for a shorted or open wire. Repair as necessary.

(2) Check pin 6 of the window drop relay wire connector for ground while pressing the top down switch. If not OK, check the power top up/down relay wiring. If OK, replace the window drop relay.

WINDOW DROP RELAY

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove door trim panel.

(3) Peel back the waterdam to expose the window drop relay.

(4) Disconnect the wire harness connector.

(5) Remove the window drop relay from the door panel.

INSTALLATION

(1) Install the window drop relay to the door panel.

(2) Connect the wire harness connector.

(3) Place the waterdam into position on the door panel,

(4) Install door trim panel.

(5) Connect the battery negative cable.

WINDOW MOTOR

DIAGNOSIS AND TESTING - WINDOW MOTOR

(1) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(2) Connect positive (+) lead from a test battery to either of the two motor terminals.

(3) Connect negative (-) lead from test battery to remaining motor terminal.

(4) The motor should now rotate in one direction to either move window up or down.

(a) If window happens to already be in full UP position and motor is connected so as to move it in UP direction no movement will be observed.

(b) Likewise, motor connected to move window in DOWN direction no movement will be observed if window is already in full DOWN position.

(c) Reverse battery leads in Step 1 and Step 2 and window should now move. If window does not move, replace motor.

(5) If window moved completely up or down, the test leads should be reversed one more time to complete a full window travel inspection.

(6) If window does not move, check to make sure that it is free.

(7) It is necessary that the window be free to slide up and down in the glass channels. If the window is not free to move up and down, the window lift motor will not be able to move the glass.

(8) To determine if the glass is free, disconnect the regulator from the glass lift plate. Remove the two attaching screws, and slide the window up and down by hand.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the window regulator. (Refer to 23 - BODY/DOOR - FRONT/WINDOW REGULATOR - REMOVAL).

WARNING: FAILURE TO CLAMP THE SECTOR GEAR TO THE MOUNTING PLATE WHEN REMOVING THE MOTOR CAN RESULT IN INJURY.

(3) Secure the sector and mounting plate with a C clamp or similar clamping tool. This will prevent a sudden and forceful movement of the regulator when the motor is removed.

(4) Remove the motor from the regulator.

INSTALLATION

(1) Install motor on regulator by positioning motor gearbox so that it engages regulator sector teeth. A slight rotational or rocking movement may be necessary to bring the motor gearbox mounting holes into proper position.

(2) Install the motor fasteners. Tighten to 8 N·m (70 in. lbs.).

(3) Install regulator. (Refer to 23 - BODY/DOOR - FRONT/WINDOW REGULATOR - INSTALLATION).

WINDOW SWITCH

DIAGNOSIS AND TESTING - WINDOW SWITCH

For switch testing, remove the switch. (Refer to 8 - ELECTRICAL/POWER WINDOWS/POWER WINDOW SWITCH - REMOVAL). Using an ohmmeter, refer to Window Switch Continuity Charts to determine if continuity is correct (Fig. 1) and (Fig. 2). If the results are not obtained, replace the switch.

The master window switch has an Auto-Down feature. Actuation of the master switch to the second down position will move the drivers side window completely down. The electronic switch will automatically disconnect the motor approximately 1 second after the window bottoms out. Failure of the electronic switch to detect stall current, will cause the switch to disconnect after approximately 13 seconds. The auto down function can be canceled by any movement of that switch.

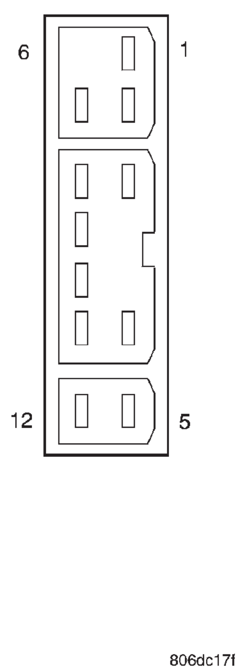

Fig. 1 Master Window Switch Connector

MASTER WINDOW SWITCH TEST

SWITCH POSITION	CONTINUITY BETWEEN
OFF	10 AND 2
	10 AND 3
	10 AND 4
	10 AND 7
	10 AND 8
	10 AND 9
	10 AND 11
	10 AND 12
LEFT FRONT UP	1 AND 7
	8 AND 10
LEFT FRONT DOWN	1 AND 8
	7 AND 10
RIGHT FRONT UP	1 AND 12
	10 AND 11
RIGHT FRONT DOWN	1 AND 11
	10 AND 12
LEFT REAR UP	3 AND 10
	1 AND 2
LEFT REAR DOWN	3 AND 1
	2 AND 10
RIGHT REAR UP	1 AND 4
	9 AND 10
RIGHT REAR DOWN	1 AND 9
	4 AND 10
LOCKOUT SWITCH (SWITCH NOT DEPRESSED)	1 AND 5

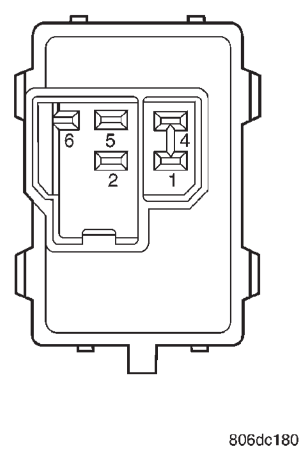

Fig. 2 Passenger Window Switch

WINDOW SWITCH (Continued)

PASSENGER WINDOW SWITCH TEST

SWITCH POSITION	CONTINUITY BETWEEN
OFF	2 AND 5
	1 AND 4
UP	1 AND 4
	5 AND 6
DOWN	2 AND 5
	1 AND 6

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(3) Remove the switch mounting fasteners.

INSTALLATION

(1) Install switch and mounting fasteners.

(2) Install door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

(3) Connect battery negative cable.

RESTRAINTS

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RESTRAINTS

WARNING

WARNINGS

WARNING: THIS SYSTEM IS A SENSITIVE, COMPLEX UNIT. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE BEFORE BEGINNING AIRBAG SYSTEM COMPONENT REMOVAL OR INSTALLATION PROCEDURES. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.
ALLOW SYSTEM CAPACITOR TO DISCHARGE FOR TWO MINUTES BEFORE REMOVING AIRBAG COMPONENTS.
DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A SOLID SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED AND COULD RESULT IN PERSONAL INJURY. WHEN CARRYING OR HANDLING AN UNDEPLOYED AIRBAG, THE TRIM SIDE OF THE AIRBAG SHOULD BE POINTING TOWARDS THE BODY TO MINIMIZE POSSIBILITY OF INJURY IF ACCIDENTAL DEPLOYMENT OCCURS.
REPLACE AIRBAG SYSTEM COMPONENTS WITH MOPAR® REPLACEMENT PARTS. SUBSTITUTE PARTS MAY APPEAR INTERCHANGEABLE, BUT INTERNAL DIFFERENCES MAY RESULT IN INFERIOR OCCUPANT PROTECTION.
WEAR SAFETY GLASSES, RUBBER GLOVES, AND LONG SLEEVED CLOTHING WHEN CLEANING POWDER RESIDUE FROM VEHICLE AFTER AIRBAG DEPLOYMENT. POWDER RESIDUE EMITTED FROM A DEPLOYED AIRBAG CAN CAUSE SKIN IRRITATION. FLUSH AFFECTED AREA WITH COOL WATER IF IRRITATION IS EXPERIENCED. IF NASAL OR THROAT IRRITATION IS EXPERIENCED, EXIT THE VEHICLE FOR FRESH AIR UNTIL THE IRRITATION CEASES. IF IRRITATION CONTINUES, SEE A PHYSICIAN.
DO NOT USE A REPLACEMENT AIRBAG THAT IS NOT IN THE ORIGINAL PACKAGING. IMPROPER DEPLOYMENT AND PERSONAL INJURY CAN RESULT.
THE FACTORY INSTALLED FASTENERS, SCREWS AND BOLTS USED TO FASTEN AIRBAG COMPONENTS ARE SPECIFICALLY DESIGNED FOR THE AIRBAG SYSTEM. DO NOT USE SUBSTITUTE FASTENERS, USE ONLY ORIGINAL EQUIPMENT FASTENERS LISTED IN THE PARTS CATALOG WHEN FASTENER REPLACEMENT IS REQUIRED.
AIRBAGS SHOULD BE STORED IN A COOL DRY LOCATION AWAY FROM EXCESSIVE HEAT AND STATIC ELECTRICAL ACTIVITY WITH THE FABRIC AIRBAG FACING UP, A PREMATURE DEPLOYMENT CAN RESULT.

CAUTION:
Deployed and Nondeployed Air Bags may or may not have live pyrotechnic material within the air bag inflator. Do not dispose of Driver and Passenger Airbags unless you are sure of complete deployment. Please refer to the Hazardous Substance Control System for Proper Disposal. Dispose of deployed air bags in a manner consistent with state, provincial, local, and federal regulations.

DIAGNOSIS AND TESTING - AIRBAG SYSTEM

(1) With the battery negative remote cable disconnected, connect the DRB III® scan tool to the Data Link connector.
(2) Turn the ignition key to the ON position. Exit vehicle with the scan tool.
(3) After checking that no one is inside the vehicle, connect the battery negative remote terminal.
(4) Read and record the **ACTIVE** Diagnostic Trouble Code (DTC) data.
(5) Read and record any **STORED** DTC's.
(6) Refer to the proper Body Diagnostic Procedures manual if any DTC's are found in Step 4 and Step 5.
(7) Erase stored DTC's if there are no active codes. If problems remain, DTC's will not erase. Refer to the proper Body Diagnostic Procedures manual to diagnose the problem. If the airbag warning lamp either fails to light, or goes on and stays on, there is a system malfunction. Refer to the proper Body Diagnostic Procedures manual to diagnose the problem. To test the airbag warning lamp operation in the cluster only, refer to Electrical, Instrument Cluster, Diagnosis and Testing - Instrument Cluster.

STANDARD PROCEDURE - CLEAN UP

Roll or fold the Airbag towards the instrument panel surface or steering wheel and tape the door shut or the bag to the steering wheel.

Use a vacuum cleaner to remove any residual powder from the vehicle interior. Work from the outside in to avoid kneeling or sitting in a contaminated area. Vacuum the heater and A/C outlets as well. If the heater or air conditioner was in RECIRC mode at time of airbag deployment, operate blower motor on low speed and vacuum powder residue expelled from the heater and A/C outlets. Multiple vacuum cleaning may to necessary to clean the interior of the vehicle.

RESTRAINTS (Continued)

SERVICE OF DEPLOYED AIRBAG

DRIVER AIRBAG

After a Driver Airbag has been deployed:
- Driver Airbag
- Steering Wheel
- Clock Spring
- Steering Column assembly

The component above must be replaced because they cannot be reused. Replace any other components if damaged.

PASSENGER AIRBAG

After a Passenger Airbag has been deployed:
- Passenger Airbag
- Instrument Panel and Pad Assembly

The components above must be replaced. Inspect and replace others if damaged.

INSPECTION - AIRBAG SYSTEM MAINTENANCE

Check the airbag warning lamp for proper operation as follows:

(1) Turn the ignition switch to the ON position. The airbag warning lamp should illuminate. If it does not, test the system using a DRB III® scan tool and Body Diagnostic Procedures Manual. Repair as required. Erase stored DTC's.

(2) The airbag warning lamp lights, but fails to go out after ten seconds. Test the system using a DRB III® scan tool and the proper Body Diagnostic Procedures manual. Repair as required. Erasing stored Diagnostic Trouble Codes (DTC's) is not required.

CHILD TETHER CUP

REMOVAL

(1) Remove the rear shelf trim panel from vehicle.

(2) Turn the shelf panel over so that the bottom side is upward to access the Child Tether Cup locks.

(3) With a trim stick (special tool #C-4733) or equivelant, push attachment locks toward the center of the cup to release the Child Tether Cup from the rear shelf panel.

(4) Remove the Child Tether Cup.

INSTALLATION

(1) Place the Child Tether Cup into position on top of the rear shelf trim panel.

(2) Press rearward until cup engages into the rear shelf trim panel.

(3) Push the front of cup down into the rear shelf trim panel.

(4) Install the rear shelf panel.

CHILD TETHER CUP COVER

REMOVAL

(1) Open the Child Tether Cup Cover to the full open position.

(2) Push cover towards the rear of the vehicle until the cover detaches from the cup.

INSTALLATION

(1) Place the Child Tether Cup cover into position on top of the rear shelf trim panel.

(2) Push downward on the Child Tether Cup Cover until it locks into position (you will hear it click into place).

CLOCK SPRING

DESCRIPTION

The clock spring assembly is mounted near the top of the steering column behind the steering wheel. The clock spring is used to maintain a continuous electrical circuit between the fixed instrument panel wire harness connector on the steering column and several electrical components that rotate with the steering wheel. The rotating components include the driver airbag, the horn switch, and the vehicle speed control switches.

The clock spring cannot be repaired. If the clock spring is faulty, damaged, or if the driver airbag has been deployed, the clock spring must be replaced.

OPERATION

The clock spring assembly consists of a plastic case which contains a flat, ribbon-like, electrically conductive tape that winds and unwinds like a clock spring with the steering wheel rotation. The electrically conductive tape consists of several fine gauge copper wire leads sandwiched between two narrow strips of plastic film.

Like the clock spring in a timepiece, the clock spring tape has travel limits and can be damaged by being wound too tightly. To prevent this from occurring, the clock spring is centered when it is installed on the steering column. Centering the clock spring indexes the clock spring tape to other steering components so that it can operate within its designed travel limits. However, if the clock spring is removed for service or if the steering column is disconnected from the steering gear allowing the clock spring tape to change position relative to the other steering components, it must be re-centered following completion of the service or it may be damaged. Refer to Electrical, Restraints, Clock Spring, Standard Procedure - Clock Spring Centering.

CLOCK SPRING (Continued)

STANDARD PROCEDURE - CLOCK SPRING CENTERING

WARNING: IF THE ROTATING TAPE WITHIN THE CLOCK SPRING IS NOT POSITIONED PROPERLY WITH THE STEERING WHEEL AND THE FRONT WHEELS, THE CLOCK SPRING MAY FAIL DURING USE. THE CLOCK SPRING IS CENTERED WHEN YELLOW APPEARS IN THE CENTERING WINDOW AND THE ARROW ON THE LABEL POINTS TO THE DRIVE PIN. IF THE CLOCK SPRING IS NOT CENTERED, THIS PROCEDURE MUST BE USED TO CENTER THE CLOCK SPRING.

(1) Adjust the steering wheel so that the tires are in a straight ahead position.

(2) Remove driver airbag from steering wheel.

(3) Disconnect wire connectors from back of airbag.

(4) Remove steering wheel.

(5) Depress the plastic locking pin to disengage lock mechanism.

(6) With lock mechanism disengaged, rotate the clock spring rotor clockwise until the rotor stops. Do not apply excessive force.

(7) From the end of travel, rotate the rotor three turns counterclockwise. The wires should end up at the top. Release the plastic locking pin to engage clock spring lock mechanism.

(8) Install steering wheel and airbag.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

REMOVAL

(1) Disconnect and isolate the battery negative remote cable. Wait two minutes for the capasitor to discharge.

(2) Remove the steering wheel. Refer to Steering, Column, Steering Wheel, Removal. Carefully feed all wires through the steering wheel armature to avoid damaging wires. When replacing a deployed Driver Airbag, a new clock spring must be installed.

(3) Remove multi-function switch. Refer to Electrical, Lamps/Lighting - Exterior, Multi-Function Switch, Removal.

(4) Remove the clock spring by lifting the top lock housing latches up slightly to guide it over the lock housing. The clock spring cannot be serviced and must be replaced if defective, damaged, or the vehicle has sustained an impact where the front airbags were deployed.

INSTALLATION

If reinstalling a clock spring, make sure the clock spring is centered by performing the clock spring centering procedure. Refer to Electrical, Restraints, Clock Spring, Standard Procedure - Clock Spring Centering.

(1) Align the top locking tab with the slot on the lock housing. Gently push into place.

(2) Install the multi-function switch and tighten to 1.5 to 2.5 N·m (14 to 22 in. lbs.) torque. Refer to Electrical, Lamps/Lighting - Exterior, Multi-Function Switch, Installation.

(3) Carefully route the wires through the hole in the steering wheel armature and install the steering wheel.

(4) Route the speed control wires through guides located inside the steering wheel back cover. Connect the speed control wires to switches and install switches.

(5) Connect horn lead to the airbag mounting bracket.

(6) Connect the two yellow airbag leads (black and grey connectors) to the Driver Airbag and push secondary latch into place. Ensure the wires do not get pinched during installation.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

CURTAIN AIRBAG

DESCRIPTION

Vehicles equipped with the Side Impact Airbag System utilize two Curtain Airbags mounted in each respective side of the headliner, stretching from the middle of the A-pillar at the instrument panel along the roof line to the C-pillar at the rear shelf panel. This system is designed to provide supplemental restraint to driver or outboard passengers in the event of a side impact collision.

OPERATION

The Side Impact Airbag Control Module (SIACM) controls the curtain airbags. If the SIACM determines the impact is severe enough, the appropriate SIACM will send a message to inflate the respective curtain airbag. The appropriate airbag will inflate, dropping down from the ceiling between the headliner and windows/pillars, to provide supplemental restraint to driver or outboard passengers in the event of a side impact collision. Once a curtain airbag has been deployed, the complete curtain airbag, headliner, upper A, B, and C-pillar trim panel, and all damaged parts must be replaced on the deployed side.

CURTAIN AIRBAG (Continued)

REMOVAL

(1) Disconnect and isolate the battery negative remote cable. Wait two minutes for the capacitor to discharge.

(2) Remove the Headliner. Refer to Body, Interior, Headliner, Removal.

(3) Disconnect the wire harness connector from the rear of the inflator.

(4) Remove the retaining bolt to the front tether at the instrument panel on the A-pillar.

(5) Remove the five short retaining bolts along the roof line.

(6) Remove the four long retaining bolts to the rear along the roof line and at the C-pillar.

(7) Remove all push fasteners and discard. Make sure they are completely removed.

(8) Remove the curtain airbag from the vehicle.

INSTALLATION

If replacing curtain airbag because of an airbag deployment, the inflator pan (quarter trim upper support at C-pillar) must be inspected, especially if the vehicle is equipped with a sunroof. The sunroof drain is connected to the inflator pan, and if cracked, could result in leaks. Also, the headliner must be replaced due to crease lines occurring during the airbag deployment.

(1) Install the curtain airbag into the vehicle. Make sure the airbag is not twisted upon installation.

(2) Install all push fasteners.

(3) Install the two long retaining bolts at the C-pillar to attach inflator. Torque bolts to 11 ± 1 N·m (97.36 ± 10 in. lbs.).

(4) Install the remaining two long retaining bolts to attach the curtain airbag. Torgue bolts to 6 ± 1 N·m (97.36 ± 10 in. lbs.).

(5) Install the five short retaining bolts along the roof line. Torque bolts to 6 ± 1 N·m (53.11 ± 10 in. lbs.).

(6) Install the short retaining bolt to the front tether at the instrument panel on the A-pillar. Torque bolts to 6 ± 1 N·m (53.11 ± 10 in. lbs.). Make sure the tether is not twisted.

(7) Connect the wire harness connector to the rear of the inflator.

(8) Install the Headliner. Refer to Body, Interior, Headliner, Installation. Use a new headliner if curtain airbag was deployed on either side of the vehicle.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

DRIVER AIRBAG

DESCRIPTION

WARNING: THE DRIVER AIRBAG TRIM COVER AND HORN SWITCH ASSEMBLY ARE THE ONLY SERVICEABLE PARTS OF THE DRIVER AIRBAG. DO NOT DISASSEMBLE OTHER PARTS WITHIN AS THEY ARE NOT SERVICEABLE.

The Driver Airbag located in the center of the steering wheel is the most visible part of the system. I contains the airbag inflator, cushion, cover assembly, and their supporting components. The airbag utilizes a dual stage inflator and two initiator wire connections. the trim cover assembly, consisting of cover and horn switch in the only serviceable part of the airbag. The cushion, inflator, and inflator adaptor are covered with a wrap so the cushion does not unfold when servicing the trim cover and horn switch assembly

OPERATION

When supplied with the proper electrical signal from the ORC, the inflator produces gas and discharges it directly into the pillow. The airbag will deploy and the pillow will fully inflate.

REMOVAL

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post. Wait two minutes for the capacitor to discharge.

(2) Remove speed control switch screws from steering wheel back cover, remove switches and disconnect the wires.

(3) Remove two bolts retaining Driver Airbag.

(4) Lift airbag and disconnect the two Connector Positive Assurance (CPA) airbag initiators (Fig. 1), and horn switch wire connectors.

(5) Remove Driver Airbag from vehicle.

WARNING: WHEN REPLACING A DEPLOYED DRIVER AIRBAG, THE CLOCK SPRING MUST ALSO BE REPLACED. REFER TO ELECTRICAL, RESTRAINTS, CLOCK SPRING, REMOVAL, AND INSTALLATION.

DRIVER AIRBAG (Continued)

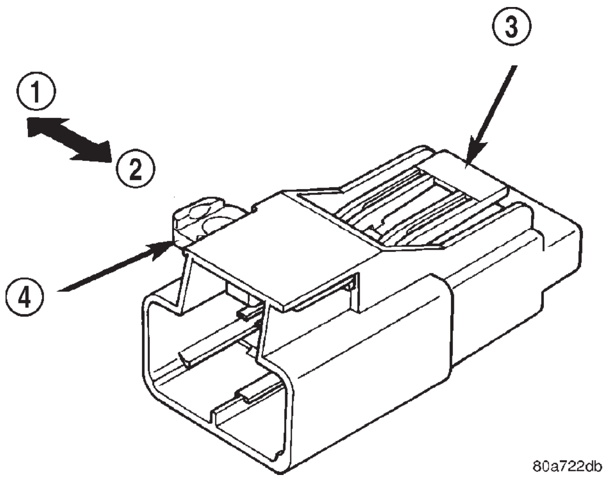

Fig. 1 CONNECTOR POSITIVE ASSURANCE (CPA) CONNECTOR

1 - UNLOCK
2 - LOCK
3 - PRESS LOCK
4 - RED LOCKING TAB

INSTALLATION

(1) With the battery disconnected, connect the lead wire from the clock spring to the horn switch and both airbag initiator connectors. The airbag initiator connectors are color-coded. The grey connector from the clock spring goes to the grey connector on the airbag, and the black connector goes to the black connector on the airbag.

(2) Install the two torx bolts holding the driver airbag. torque to 9.6 ± 1 N·m (85 ±10 in. lbs.).

(3) Connect the wire connectors to the speed control switches and install switches. Torque the speed control switch mounting screws to 1.5 N·m (13 in. lbs).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

DRIVER AIRBAG TRIM COVER

REMOVAL

The horn switch is integral to the driver airbag trim cover. If the horn switch is faulty or the driver airbag cover is scratched or distorted, the driver airbag trim cover and horn switch unit must be replaced.

(1) Disconnect and isolate the battery negative remote cable. If either of the airbags has not been deployed, wait two minutes for the system capacitor to discharge before further service.

(2) Remove the driver airbag. Refer to Electrical, Restraints, Driver Airbag, Removal.

(3) Disconnect the horn switch ground wire (black) connector from the airbag mounting plate tab.

(4) Disconnect the horn switch feed wire (red) connector from the airbag mounting plate tab.

(5) Remove the four hex nuts that secure the airbag mounting plate to the airbag.

(6) Remove the airbag mounting plate form the airbag.

(7) Remove the airbag trim cover from the airbag inflator adaptor by rotating the trim cover mounting flaps off of the mounting studs and disengaging the three tab and slot details.

NOTE: The folded cushion will remain intact by the bag wrap. Do not remove the bag wrap when servicing the airbag trim cover.

INSTALLATION

WARNING: USE EXTREME CARE TO PREVENT ANY FOREIGN MATERIAL FROM ENTERING THE DRIVER AIRBAG, OR BECOMING ENTRAPPED BETWEEN THE AIRBAG CUSHION AND THE DRIVER AIRBAG TRIM COVER. FAILURE TO OBSERVE THIS COULD RESULT IN OCCUPANT INJURIES UPON AIRBAG DEPLOYMENT.
THE DRIVER AIRBAG TRIM COVER MUST NEVER BE PAINTED. REPLACEMENT TRIM COVERS ARE SERVICED IN THE ORIGINAL COLORS. PAINT MAY CHANGE THE WAY IN WHICH THE MATERIAL OF THE TRIM COVER RESPONDS TO AN AIRBAG DEPLOYMENT. FAILURE TO OBSERVE THIS COULD RESULT IN OCCUPANT INJURIES UPON AIRBAG DEPLOYMENT.

(1) Carefully position the driver airbag in the trim cover. Be certain that the horn switch wires are routed properly in the notches adjacent to the trim cover upper mounting flap. Rotate the upper and lower trim cover mounting flaps over the four airbag studs. Ensure that the airbag inflator adapter tabs pass through the mating trim cover slots.

(2) Install the airbag mounting plate to the airbag. Be certain that the four studs pass through the mounting plate holes. Ensure that the mounting plate side flanges are positioned outside the trim cover ribbing.

(3) Install the four nuts on the airbag. Torque nuts to 9 ± 1 N·m (80 ± 10 in. lbs.).

(4) Secure the horn switch feed wire (red) connector to the airbag mounting plate.

(5) Secure the horn switch ground (black) connector to the airbag mounting plate tab.

DRIVER AIRBAG TRIM COVER (Continued)

(6) Install the driver airbag. Refer to Electrical, Restraints, Driver Airbag, Installation.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

FRONT SEAT BELT BUCKLE - JR27 ONLY

REMOVAL

NOTE: The torque prevailing nut holding the front seat belt buckle to the seat adjuster is not reusable. Verify availability prior to proceeding.

(1) Move seat to the rear most position.
(2) Disconnect and isolate the battery negative cable.
(3) Disconnect the electrical connectors to the seat belt buckle.
(4) Remove nut holding seat belt buckle to seat adjuster. Discard nut.
(5) Remove seat belt buckle from seat.

INSTALLATION

(1) Verify that the black spacer washer is properly installed over the shoulder of the weld nut on the seat adjuster.
(2) Install seat belt buckle to bolt on seat adjuster.
(3) Verify that the seat belt buckle is sitting on the shoulder of the weld nut on the seat adjuster.
(4) Install nut to hold seat belt buckle to seat adjuster. Tighten the seat belt buckle nut to 45 N·m (33 ft. lbs.) torque.

NOTE: Verify that a minimum of three threads extend beyond the seat belt buckle nut. If not, check that the bolt is fully engaged to the seat adjuster.

(5) Connect the electrical connectors to the seat belt buckle.
(6) Connect the battery negative cable.
(7) Readjust the seat.

FRONT SEAT BELT & RETRACTOR - JR27 ONLY

REMOVAL

Inspect the condition of the shoulder belt and lap belt. Replace any belt that is cut, frayed, torn, or damaged in any way. Also, replace the shoulder belt if the retractor is either damaged or inoperative.

(1) Disconnect and isolate the battery negative cable.
(2) Remove the front seat from vehicle. Refer to Body, Seats, Front Seat, Removal.

NOTE: The torque prevailing nut used to secure the lower seat belt anchor is not reusable. Verify availability prior to proceeding.

(3) Remove seat back cover to gain access to seat belt retractor. Refer to Body, Seats, Front Seat Cover, Removal.
(4) Remove seat belt retractor cover.
(5) Remove and discard bolts attaching seat belt retractor to seat frame (Fig. 2).

CAUTION: Do not reuse the bolts attaching the seat belt retractor to the seat frame.

(6) Remove seat belt retractor from seat frame.
(7) Disconnect wire connector from seat belt retractor.

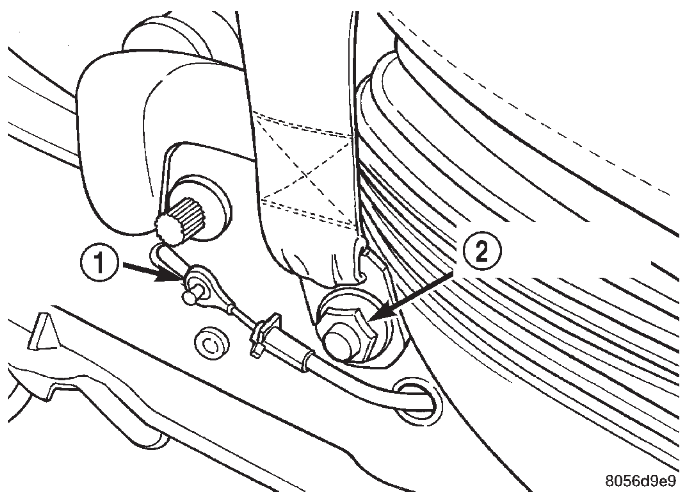

Fig. 2 LOWER SEAT BELT ANCHOR AND RECLINER CABLE

1 - RECLINER CABLE
2 - LOWER SEAT BELT ANCHOR

FRONT SEAT BELT & RETRACTOR - JR27 ONLY (Continued)

INSTALLATION

Inspect the condition of the shoulder and lap belt. Replace any belt that is cut, frayed, torn, or damaged in any way. Also, replace the shoulder belt if the retractor is either damaged or inoperative.

(1) Position seat belt retractor to seat frame.

(2) Connect wire connector to seat belt retractor.

(3) Install new bolts to hold seat belt retractor to seat frame. Tighten the retractor bolts to 16.2 N·m (12 ft. lbs.) torque.

(4) Install seat belt retractor cover.

(5) Install seat cover. Refer to Body, Seats, Front Seat Cover, Installation.

(6) Attach lower seat belt anchor to bolt on seat adjuster.

(7) Verify that seat belt is routed such that it will not be twisted when engaged to the seat belt buckle.

(8) Verify that a minimum of three threads extend beyond the lower seat belt anchor nut and that the lower seat belt anchor swivels freely. If both conditions are not found, check that the bolt is fully engaged to the seat adjuster.

(9) Install seat in vehicle. Refer to Body, Seats, Front Seat, Installation.

CAUTION: Failure to follow proper installation procedure may result in the seat track latch pins not being synchronized.

(10) Connect the battery negative cable.

OCCUPANT RESTRAINT CONTROLLER

DESCRIPTION

The Occupant Restraint Controller (ORC) contains the impact sensor and energy reserve capacitor. The sensor is calibrated for the specific vehicle and reacts to the severity and direction of the impact.

OPERATION

The ORC monitors the system to determine the system readiness. The ORC stores sufficient energy to deploy the airbags in case battery power is lost prior to impact. The ORC contains on-board diagnostics, and illuminates the AIRBAG warning lamp in the cluster when a diagnostic trouble code occurs. The warning equipment is tested for a few seconds every time the vehicle is started.

REMOVAL

(1) Disconnect and isolate the battery negative remote cable. Wait two minutes for the capacitor to discharge.

(2) For a manual transmission, remove shifter knob and boot.

(3) For automatic transmission models, remove shifter knob and unsnap shift indicator bezel.

(4) Remove the four attaching screws to floor console.

(5) Remove parking brake lever. Refer to Brakes, Parking Brake, Parking Brake Lever, Removal.

(6) Remove three mounting nuts to ORC.

(7) Disconnect wire harness connectors and remove ORC from mounting studs.

INSTALLATION

CAUTION: Use supplied nuts only.

(1) With the battery disconnected, position the ORC (arrow pointing forward) on center tunnel area mounting studs.

(2) Connect wire harness connector.

(3) Attach the three mounting nuts and tighten to 10 to 14 N·m (85 to 125 in. lbs.) torque.

(4) Install the parking brake lever. Refer to Brakes, Parking Brake, Parking Brake Lever, Installation.

(5) Install the floor console.

(6) Install the four attaching screws to floor console.

(7) For automatic transmission models, install the shift indicator bezel and shifter knob.

(8) For a manual transmission, install the shifter boot and knob.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

PASSENGER AIRBAG

DESCRIPTION

WARNING: NEVER DISASSEMBLE THE PASSENGER AIRBAG, THERE ARE NO SERVICEABLE PARTS WITHIN.

The most visible part of the Passenger Airbag is the passenger airbag decorative cover located just above the front right side of the instrument panel.

The passenger airbag is mounted to the instrument panel assembly. The passenger inflator assembly is within the airbag housing. The airbag is mounted to the instrument panel retainer and support structure.

The Passenger Airbag consists of:

- Dual Initiator Inflator Assembly

PASSENGER AIRBAG (Continued)

- Reaction Canister
- Airbag Pillow
- Passenger Airbag Cover/Door

OPERATION

When supplied with the proper electrical signal from the ORC, the inflator produces gas and discharges it directly into the pillow. The airbag will deploy and the pillow will fully inflate.

REMOVAL

If the airbag has been deployed, the instrument panel and pad assembly must be replaced.

(1) Disconnect and isolate the battery negative remote cable. Wait two minutes for the capacitor to discharge.

(2) Open and lower glove box fully to gain access to Passenger Airbag attaching screws inside of the glove box. Glove box removal not required.

(3) Disconnect wire connector from the Passenger Airbag.

(4) Remove the two nuts and two screws attaching airbag assembly to the instrument panel collar. The two nuts are on the outer sides of the passenger airbag, underneath up near the top of the instrument panel. The two screws are mounted straight through the tabs at the bottom front of the airbag, in the instrument panel reinforcement.

(5) Disengage airbag door tabs from the instrument panel retainer and lift the Passenger Airbag up and out of panel cavity.

INSTALLATION

If replacing Passenger Airbag due to a deployment, use a new instrument panel and pad assembly. Transfer all of the components.

(1) With the battery disconnected, place the Passenger Airbag into the panel cavity. Press the airbag door tabs down to engage on the instrument panel retainer.

(2) Install the two nuts and two screws attaching airbag assembly to the instrument panel collar and torque nuts and screws to 7.5 ± 1 N·m (66 in. lbs.). The two nuts are on the outer sides of the passenger airbag, underneath up near the top of the instrument panel. The two screws are mounted straight through the tabs at the bottom front of the airbag, in the instrument panel reinforcement.

(3) Connect Passenger Airbag wire connector.

(4) Pinch in on sides of the glove box and raise it up into the instrument panel opening.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

REAR SEAT BELT BUCKLE - JR27 ONLY

REMOVAL

(1) Remove rear seat cushion. Refer to Body, Seats, Rear Seat Cushion, Removal.

(2) Remove nuts holding seat belt buckle assembly to floor pan.

(3) Remove rear seat belt buckle assembly (Fig. 3).

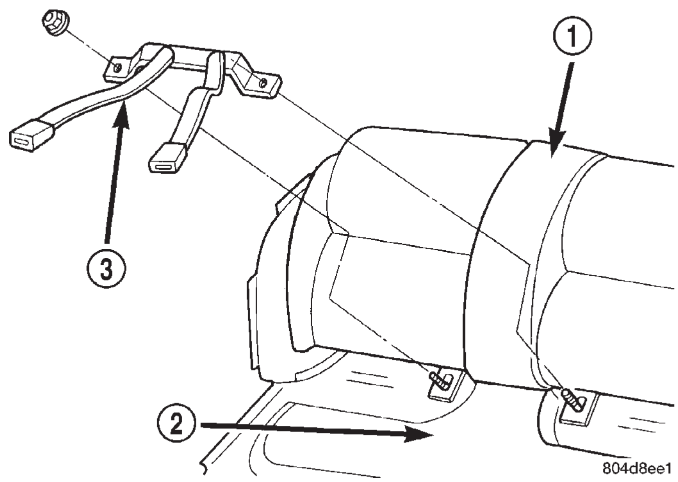

Fig. 3 REAR SEAT BELT BUCKLE ASSEMBLY

1 - REAR SEAT BACK
2 - FLOOR PAN
3 - REAR SEAT BELT BUCKLE ASSEMBLY

INSTALLATION

(1) Position rear seat belt buckle assembly onto studs on floor pan (Fig. 3).

(2) Install nuts holding rear seat belt buckle assembly to floor pan. Torque rear seat belt buckle assembly nuts to 40 N·m (350 in. lbs.).

(3) Install rear seat cushion. Refer to Body, Seats, Rear Seat Cushion, Installation.

REAR SEAT BELT & RETRACTOR - JR27 ONLY

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove rear seat cushion. Refer to Body, Seats, Rear Seat Cushion, Removal.

(3) Remove rear seat back. Refer to Body, Seats, Rear Seat Back, Removal.

(4) Remove quarter trim panel. Refer to Body, Interior, Lower Quarter Trim Panel, Removal.

(5) Remove bolt attaching seat belt anchor to floor pan (Fig. 4).

REAR SEAT BELT & RETRACTOR - JR27 ONLY (Continued)

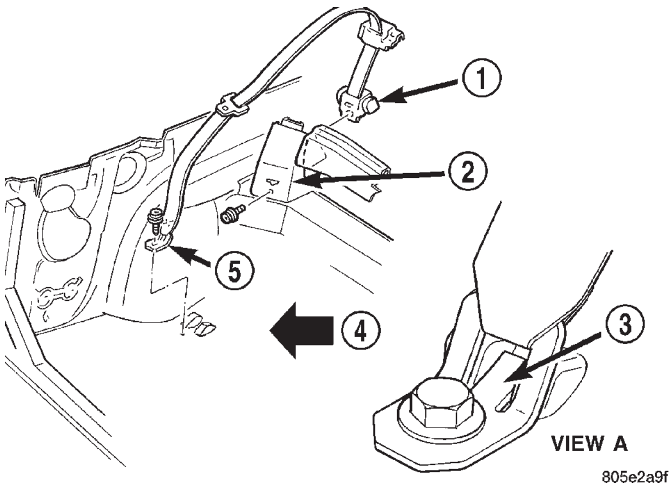

Fig. 4 REAR SEAT BELT AND RETRACTOR

1 - SEAT BELT RETRACTOR
2 - REAR SEAT BELT SUPPORT
3 - TAB
4 - A
5 - LOWER ANCHOR

(6) Remove bolt attaching seat belt retractor to rear seat support assembly.

(7) Remove rear seat belt and retractor assembly from vehicle.

INSTALLATION

(1) Position rear seat belt and retractor assembly to rear seat support assembly.

(2) Engage hook on seat belt retractor to slot in rear seat support assembly.

(3) Install bolt attaching seat belt retractor to rear seat support assembly. Tighten seat belt fastener to 40 N·m (350 in. lbs.) torque.

(4) Route seat belt through channel and snap bezel onto top of channel.

(5) Install bolt attaching seat belt anchor to floor pan. Tighten seat belt fastener to 40 N·m (350 in. lbs.) torque.

(6) Verify that seat belt is not twisted when engaged to seat belt buckle and that the tab on the lower seat belt anchor is between the formations on the floor pan (Fig. 4).

(7) Install quarter trim panel. Refer to Body, Interior, Lower Quarter Trim Panel, Installation.

(8) Install rear seat back. Refer to Body, Seats, Rear Seat Back, Installation.

(9) Install rear seat cushion. Refer to Body, Seats, Rear Seat Cushion, Installation.

(10) Connect the battery negative cable.

SEAT BELT HEIGHT ADJUSTER

REMOVAL

(1) Remove adjuster knob and turning loop cover.

(2) Remove bolt attaching turning loop to belt height adjuster.

(3) Remove upper B-pillar trim panel.

(4) Remove bolt attaching seat belt height adjuster to B-pillar.

(5) Remove seat belt height adjuster from vehicle.

INSTALLATION

(1) Place seat belt height adjuster into position.

(2) Install two bolts attaching seat belt height adjuster to B-pillar. Torque bolts to 55 ± 5 N·m (40.5 ± 5 ft. lbs.).

(3) Install upper B-pillar trim panel.

(4) Install the bolt attaching the turning loop to the height adjuster. Torque bolt to 55 ± 5 N·m (40.5 ± 5 ft. lbs.).

(5) Install turning loop cover and adjuster knob.

TAPPING PLATE REPAIR

The Tapping Plate used to mount the seat belt height adjuster is designed to deform outboard during certain significant vehicle crash events. Should a deformed tapping plate be found on a damaged vehicle that is to be repaired, the following procedure can be used to reposition the tapping plate relative to the B-pillar, thus enabling replacement of the seat belt height adjuster.

(1) Using a large diameter screw socket as a spacer, hand start a three inch 7/16–20 bolt and washer into the threaded tapping plate hole.

(2) Continue to apply blt torque and deform the tapping plate back flush with the B-pillar inner.

SEAT BELT - REAR INBOARD

REMOVAL

(1) Remove rear seat cushion.

(2) Remove nut attaching seat belt to floor (Fig. 5).

(3) Remove seat belt from vehicle.

SEAT BELT - REAR INBOARD (Continued)

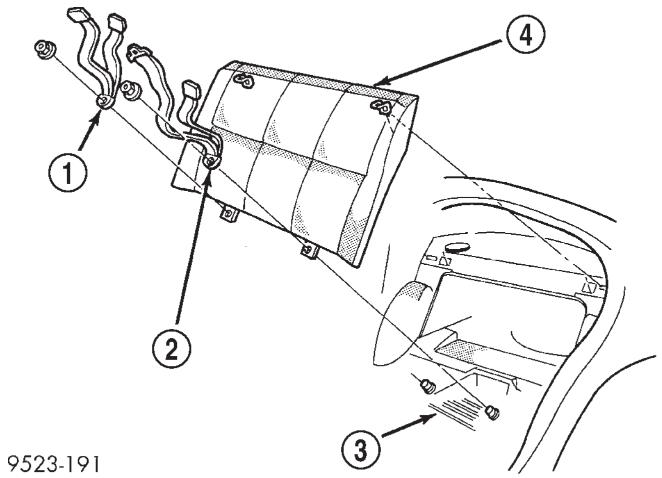

Fig. 5 SEAT BELT - REAR INBOARD

1 - RIGHT REAR SEAT BELT
2 - LEFT REAR SEAT BELT
3 - FLOOR PAN
4 - REAR SEAT BACK

INSTALLATION

(1) Place seat belt in position.

(2) Install nut attaching seat belt to floor. Tighten nut to 61 ± 5 N·m (83 ± 5 ft. lbs.) torque.

(3) Install rear seat cushion.

SEAT BELT - REAR OUTBOARD

REMOVAL

(1) Remove rear seat cushion.

(2) Remove bolt attaching seat belt anchor to floor pan.

(3) Remove upper and lower quarter trim panel.

(4) Remove bolt attaching rear D-ring to quarter upper panel.

(5) Remove bolt attaching rear seat belt retractor to inner quarter panel.

(6) Remove retractor and belt from vehicle.

INSTALLATION

(1) Place retractor and belt into position.

(2) Install bolt attaching rear seat belt retractor to inner quarter panel. Torque bolt to 40 N·m (29.5 ft. lbs.).

(3) Route seat belt webbing and D-ring through upper trim panel. Install bolt attaching D-ring to quarter panel. Torque bolt to 40 N·m (29.5 ft. lbs.).

(4) Install upper quarter trim panel.

(5) Install bolt attaching seat belt anchor to floor pan. Torque bolt to 40 N·m (29.5 ft. lbs.).

(6) Install rear seat cushion.

SEAT BELT & RETRACTOR - FRONT OUTBOARD

DESCRIPTION

The seat belt system incorporates Tensioner Modules. They are integral to the front seat belt retractors and cannot be serviced. If found defective they must be replaced. In the event of an impact, the retractor assembly must be replaced regardless of belt condition. The tensioner is a one time pyrotechnic device.

OPERATION

At the onset of an impact event, each tensioner uses a pyrotechnic device which is triggered simultaneously with the front airbags to rapidly retract the seat belts. With the slack removed, the occupant's forward motion in an impact will be reduced as will the likelihood of contacting interior components. After an impact that deploys the airbags, the seat belt tensioner assembly must be replaced.

The Occupant Restraint Controller (ORC) monitors the seat belt tensioner circuit resistance and reports active and stored Diagnostic Trouble Codes (DTC's) if any problem is found.

WARNING: WHEN THE FRONT AIRBAG IS DEPLOYED, THE TENSIONER WILL HAVE DEPLOYED ALSO AND MUST BE REPLACED.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove adjuster knob and turning loop cover.

(3) Remove bolt that attaches the turning loop to the height adjuster.

(4) Remove upper B-pilllar trim panel.

(5) Remove the lower B-pillar trim panel.

(6) Disconnect the wire harness connector from the B-pillar retractor.

(7) Remove the bolt attaching the seat belt retractor (and lower anchor) to the base of the B-pillar.

(8) Remove retractor and belt from vehicle.

INSTALLATION

(1) Place retractor and belt into position.

(2) Install bolt attaching seat belt retractor and lower anchor to the base of the B-pillar. Torque bolt to 55 ± 5 N·m (40.5 ft. lbs.).

(3) Connect retractor wire harness connector to the B-pillar.

(4) Route belt and install the lower B-pillar trim panel.

(5) Install the upper B-pillar trim and bolt that attaches the turning loop to the height adjuster. Torque bolt to 55 ± 5 N·m (40.5 ft. lbs.).

(6) Install the turning loop cover and adjuster knob.

(7) Connect the battery negative remote cable.

SEAT BELT & RETRACTOR - REAR CENTER

REMOVAL

(1) Remove the rear shelf trim panel. Refer to Body, Interior, Rear Shelf Trim Panel, Removal.

(2) Remove the nut attaching the center rear seat belt retractor to the rear shelf.

(3) Remove rear seat cushion.

(4) Remove nut attaching center rearr seat belt anchor to floor pan.

(5) Remove the center rear seat belt retractor assembly from the vehicle.

INSTALLATION

WARNING: INSPECT THE CONDITION OF THE SHOULDER/LAP BELT. REPLACE THE RETRACTOR IF THE BELT IS CUT, FRAYED, TORN, OR DAMAGED IN ANY WAY.

(1) Install the center rear seat belt retractor assembly on the rear shelf. Torque the bolt to 40 N·m (30 ft. lbs.).

(2) Route webbing and bezel through rear shelf trim panel.

(3) Install the rear shelf trim panel. Refer to Body, Interior, Rear Shelf Trim Panel, Installation.

(4) Install the nut attaching the center rear seat belt anchor to the floor pan stud. Be certain the rear seat belts are properly routed to avoid twisted or tangled belts and/or buckles. Torque nut to 40 N·m (30 ft. lbs.).

(5) Install the rear seat cushion.

WARNING: THE REAR SEAT BACK RETAINING NUT ALSO SERVES AS THE CENTER SEAT BELT ANCHOR (Fig. 3). BE CERTAIN TO TORQUE THIS NUT TO 40 N·m (30 ft. lbs.).

SEAT BELT TENSIONER - JR27 ONLY

DESCRIPTION

The seat belt system incorporates Seat Belt Tensioners. The tensioner is designed to hold the occupant in their respective seat by retracting the seat belt up to four inches. They are integral to the front seat belt buckles and cannot be serviced. If found defective they must be replaced. After an airbag deployment, the tensioner must be replaced.

OPERATION

At the onset of an impact event, each tensioner uses a pyrotechnic device which is triggered simultaneously with the airbags to rapidly retract the seat belts. With the slack removed, the occupant's forward motion in an impact will be reduced as will the likelihood of contacting interior components. After an impact that deploys the airbags, the seat belt tensioner assembly must be replaced.

The Occupant Restraint Controller (ORC) monitors the seat belt tensioner circuit resistance and reports active and stored Diagnostic Trouble Codes (DTC's) if any problem is found.

Once a vehicle has been in an accident, the tensioner must be replaced along with any deployed airbags and broken or damaged parts. Refer to the proper Body Diagnostic Procedures manual for diagnosis and testing.

WARNING: WHEN THE FRONT AIRBAG IS DEPLOYED, THE TENSIONER WILL HAVE DEPLOYED ALSO AND SHOULD BE REPLACED.

SIDE IMPACT AIRBAG CONTROL MODULE

DESCRIPTION

Vehicles equipped with side impact airbags use two Side Impact Airbag Control Modules (SIACM). One is located on each respective side body B-pillar.

SIDE IMPACT AIRBAG CONTROL MODULE (Continued)

OPERATION

The impact sensor provides verification of the direction and severity of the side impact. The right side SIACM controls the right seat airbag. The left side SIACM controls the left seat airbag. In the event of a side impact the appropriate SIACM will send an electronic signal to its airbag, deploying the airbag. The SIACM communicates with the Occupant Restraint Controller (ORC) via the PCI bus circuit.

The accelerometer pulses are sent to a microprocessor, which contains a decision algorithm. When an impact is severe enough to require airbag protection, the SIACM microprocessor sends a signal to deploy the side airbag that completes the electrical circuits to the right or left side airbag. The sensor is calibrated for the specific vehicle and reacts to the severity and direction of the impact.

Each SIACM has its own energy reserve capacitor. This is to insure that the airbag may be fired even if the battery power is lost at time of impact.

REMOVAL

(1) Disconnect and isolate the battery negative cable remote terminal.

(2) Remove the lower B-pillar trim from the appropriate side of the vehicle. Refer to Body, Interior, B-Pillar Lower Trim, Removal.

(3) Disconnect the side impact airbag control module electrical connector.

(4) Remove the SIACM retaining screws and remove the module from the vehicle.

INSTALLATION

(1) Position the SIACM in B-pillar and install the retaining screws. Torque the screws to 10 N·m (85 in. lbs.).

(2) Connect the SIACM electrical connector.

(3) Install the lower B-pillar trim. Refer to Body, Interior, B-Pillar Lower Trim, Installation.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

SPEED CONTROL

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SPEED CONTROL

DESCRIPTION

DESCRIPTION

The speed control system is electronically controlled and vacuum operated. The electronic control is integrated into the Powertrain Control Module. The controls are located on the steering wheel. The ON/OFF, and SET buttons are located on the left side of the airbag module. The RESUME/ACCEL, CANCEL and COAST buttons are located on the right side of the airbag module (Fig. 1).

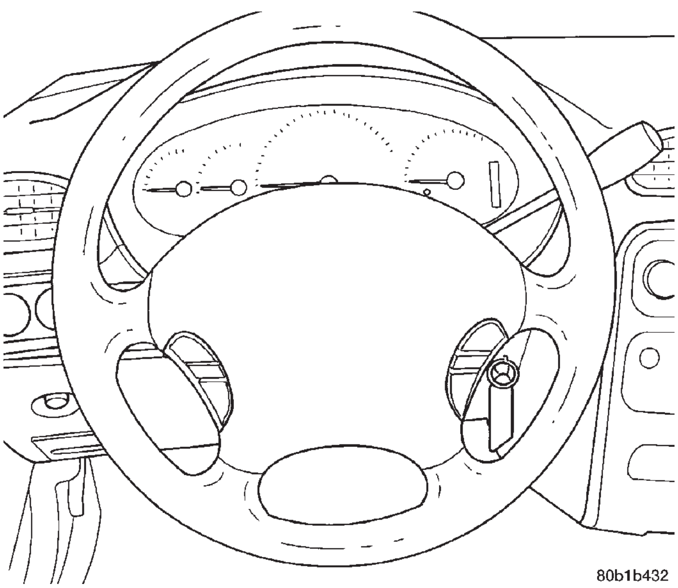

Fig. 1 SPEED CONTROL SWITCHES - Typical

The system is designed to operate at speeds above 30 mph (48 km/h).

WARNING: THE USE OF SPEED CONTROL IS NOT RECOMMENDED WHEN DRIVING CONDITIONS DO NOT PERMIT MAINTAINING A CONSTANT SPEED, SUCH AS IN HEAVY TRAFFIC OR ON ROADS THAT ARE WINDING, ICY, SNOW COVERED, OR SLIPPERY.

INTERACTIVE SPEED CONTROL

DESCRIPTION

Interactive means that communication between the PCM and the TCM is taking place. Interactive speed control avoids unnecessary shifting for smoother, quieter operation and when downshifts are required, makes the shifts smoother.

CLIMBING A GRADE

DESCRIPTION

When climbing a grade the interactive speed control tries to maintain the set speed by increasing the throttle opening, while inability/delaying downshifts.

OPERATION

If opening the throttle alone cannot maintain the set speed and the vehicle speed drops more than three mph below the set speed, the transmission will downshift to third gear. If the vehicle continues to lose speed, by more than 6 mph, the transmission will downshift again maintain the set speed. After the vehicle encounters a less-steep grade, or has crested the grade (reduced the load on the powertrain) and can maintain the set speed at a reduced throttle position, the transmission will upshift, as appropriate, until the set speed can be maintained in Overdrive.

SPEED CONTROL (Continued)

DOWNSHIFT DELAY

DESCRIPTION

Downshift delay features have been added to reduce the number and frequency of downshifts when operating in hilly or mountainous country.

OPERATION

While operating, interactive speed control delays or avoids downshifts by allowing up to nearly wide open throttle without the TCM scheduling a downshift. If the interactive speed control is not engaged or the throttle is manually overridden by the driver while interactive speed control is engaged, the downshift delay feature is not activated.

Torque converter lock and unlock shifts are not affected by the downshift delay feature and will occur at the same throttle angle at a given speed regardless of whether interactive speed control operates or not.

GRADE HUNTING

DESCRIPTION

All vehicles equipped with a four speed automatic transmission have a grade hunting feature for the 2nd to 3rd gear upshift and the 3rd to Overdrive upshift.

OPERATION

The TCM identifies the powertrain loading conditions and selects the proper gear to maintain the current vehicle speed. Under moderate loading conditions the transaxle will stay in 3rd gear until the top of the grade is reached or the powertrain loading is reduced.

If powertrain loading is severe, the transaxle may shift into 2nd gear and remain there until powertrain loading is reduced, then a 2nd to 3rd gear upshift will be scheduled. Grade hunting features always operate regardless of whether or not the interactive speed control is engaged. **If the interactive speed control is not engaged and powertrain loading is not reduced, the driver may have to completely lift off of the throttle before an upshift will occur**. If the driver does lift off the throttle to induce an upshift under these conditions, vehicle speed will reduce and the Overdrive to 3rd and 3rd to 2nd gear downshifts will reoccur when the throttle is reapplied. If grade hunting is repeatedly induced by the driver, transaxle damage may result.

AUTOMATIC SPEED CONTROL OVERSPEED REDUCTION

DESCRIPTION

Transmission control software includes an automatic speed control overspeed reduction feature. This maintains vehicle speed at the selected set point when descending a grade.

OPERATION

The Transmission Control Module (TCM) first senses that the speed control is set. If the set speed is exceeded by more than 4 mph (6.5 km/hr) and the throttle is closed, the TCM causes the transaxle to downshift to THIRD gear. After downshifting, the automatic speed control resumes normal operation. To ensure that an upshift is appropriate after the set speed is reached, the TCM waits until the speed control system opens the throttle at least 6 degrees before upshifting to OVERDRIVE again.

If the driver applies the brakes, canceling automatic speed control operation with the transaxle still in THIRD gear, the TCM maintains this gear until the driver opens the throttle at least 6 degrees to avoid an inappropriate upshift. The upshift is also delayed for 2.5 seconds after reaching the 6 degrees throttle opening in anticipation that the driver might open the throttle enough to require THIRD gear. This will avoid unnecessary and disturbing transmission cycling. If the automatic speed control RESUME feature is used after braking, the upshift is delayed until the set speed is achieved to reduce cycling and provide better response.

OPERATION

When speed control is activated by depressing the ON switch, the PCM allows a set speed to be stored in RAM for speed control. To store a set speed, depress and release the SET switch while the vehicle is moving at a speed between 25 and 85 mph. In order for the speed control to engage, the brakes cannot be applied, nor can the gear selector be indicating the transmission is in Park or Neutral. The speed control can be disengaged manually by:

- Stepping on the brake pedal
- Depressing the OFF switch
- Depressing the CANCEL switch.
- Depressing the clutch pedal
- Operating in 1st or 2nd gear (autostick, if equipped)

NOTE: Turning the system off by depressing the OFF switch or turning off the ignition switch will erase the set speed stored in the PCM.

SPEED CONTROL (Continued)

For added safety, the speed control system is programmed to disengage for any of the following conditions:

- An indication of Park or Neutral
- A rapid increase rpm (indicates that the clutch has been disengaged)
- Excessive engine rpm (indicates that the transmission may be in a low gear)
- The speed signal increases at a rate of 10 mph per second (indicates that the co-efficient of friction between the road surface and tires is extremely low)
- The speed signal decreases at a rate of 10 mph per second (indicates that the vehicle may have decelerated at an extremely high rate)
- If the actual speed is greater than 20 mph over the set speed.
- Autostick shifts into 1st or 2nd gear (autostick, if equipped)

Once the speed control has been disengaged, depressing the RESUME switch when speed is greater than 25 mph allows the vehicle to resume control to the target speed that was stored in the PCM.

While the speed control is engaged, the driver can increase the vehicle speed by depressing the ACCEL switch. The new target speed is stored in the PCM when the ACCEL switch is released. The PCM also has a ″tap-up″ feature in which target speed increases by 2 mph for each momentary switch activation of the ACCEL switch. The PCM also provides a means to decelerate to a new lower target speed without disengaging speed control. Depress and hold the COAST switch until the desired speed is reached, then release the switch.

The PCM also has a “Tap Down” feature in which target speed decreases at 1 mph for each momentary switch activation of the coast switch.

SPECIFICATIONS - TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Servo Mounting Bracket Nuts	5.1		45
Servo Mounting Nuts	6.7		60
Vacuum Reservoir Screws	10.2		90

SERVO

DESCRIPTION

The servo unit consists of a solenoid valve body, and a vacuum chamber. The solenoid valve body contains three solenoids:

- Vacuum
- Vent
- Dump

The vacuum chamber contains a diaphragm with a cable attached to control the throttle linkage.

OPERATION

The PCM controls the solenoid valve body. The solenoid valve body controls the application and release of vacuum to the diaphragm of the vacuum servo. The servo unit cannot be repaired and is serviced only as a complete assembly.

Power is supplied to the servo by the PCM through the brake switch. The PCM controls the ground path for the vacuum and vent solenoids.

The dump solenoid is energized anytime it receives power. If power to the dump solenoid is interrupted, the solenoid dumps vacuum in the servo. This provides a safety backup to the vent and vacuum solenoids.

The vacuum and vent solenoids must be grounded by the PCM to operate. When the PCM grounds the vacuum servo solenoid, the solenoid allows vacuum to enter the servo and pull open the throttle plate using the cable. When the PCM breaks the ground, the solenoid closes and no more vacuum is allowed to enter the servo. The PCM also operates the vent solenoid via ground. The vent solenoid opens and closes a passage to bleed or hold vacuum in the servo as required.

The PCM cycles the vacuum and vent solenoids to maintain the set speed, or to accelerate and decelerate the vehicle. To increase throttle opening, the PCM grounds the vacuum and vent solenoids. To decrease throttle opening, the PCM removes the grounds from the vacuum and vent solenoids.

REMOVAL

(1) Disconnect the negative battery cable (Fig. 2).

(2) Remove 2 nuts attaching servo bracket to shocktower.

(3) Disconnect electrical connectors and vacuum hose.

(4) Remove two nuts attaching speed control cable and mounting bracket to servo.

(5) Pull cable away from servo to expose retaining clip and remove clip attaching cable to servo (Fig. 3).

(6) Remove servo mounting bracket.

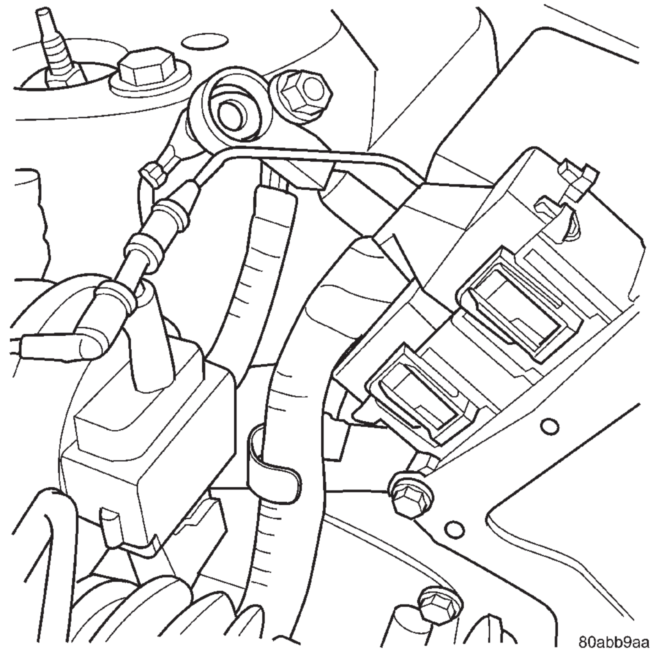

Fig. 2 NEGATIVE BATTERY CABLE

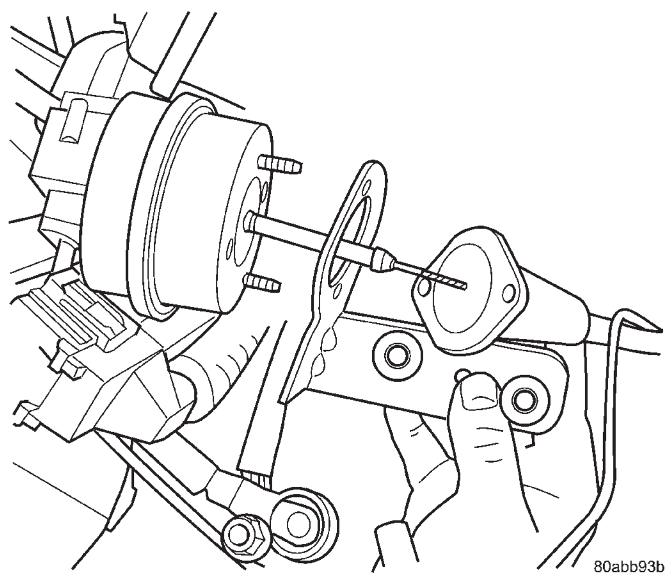

Fig. 3 SPEED CONTROL CABLE AND BRACKET

INSTALLATION

(1) With throttle in full open position feed cable sleeve through hole in bracket, then align hole in speed control cable sleeve with hole in servo pin and install retaining clip (Fig. 3).

(2) Connect vacuum hose to servo.

(3) Connect electrical connector.

(4) Insert servo studs through holes in speed control cable and mounting bracket (Fig. 3).

(5) Install nuts, tighten to 6.7 N·m (60 in. lbs.).

(6) Install servo and bracket to stud plate in shocktower and tighten nuts.

(7) Connect negative battery cable (Fig. 2).

SWITCH

DESCRIPTION

There are two separate switch pods that operate the speed control system and are located on the steering wheel.

OPERATION

The speed control system has five separate resistive switches that provide a single multiplexed (MUX) voltage inputs to the PCM.The switch names are: ON, OFF, SET, COAST, RESUME, ACCEL, TAP-UP, COAST, and CANCEL. Based on conditions when the buttons are pushed (and released), the five voltages ranges provided to the PCM result in the following functions: ON, OFF, SET, COAST, RESUME, ACCEL, TAP-UP, TAP-DOWN, COAST, and CANCEL. Refer to the Speed Control Section for more information

Also the PCM receives an input from the brake switch to sense whether the brake pedal has been depressed. When the PCM receives the brake depressed input, it turns off power to the speed control servo and disengages speed control. Also the power to the servo is supplied through the brake switch, which opens the circuit when the brake pedal is depressed.

The individual switches cannot be repaired. If one switch fails, the entire switch module must be replaced.

REMOVAL

The speed control switches are mounted in the steering wheel and wired through the clock spring device under the airbag module.

WARNING: IF REMOVAL OF AIRBAG MODULE IS NECESSARY, REFER TO the RESTRAINT SYSTEMS section for more information.

(1) Remove the negative battery cable.
(2) Turn off ignition.
(3) Remove screw from back of the switch (Fig. 4).

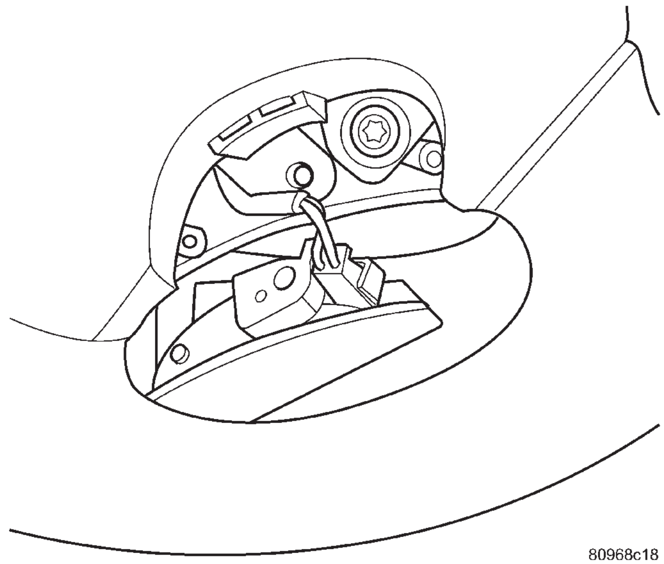

Fig. 4 SPEED CONTROL SWITCH

(4) Rock switch away from airbag and steering wheel.
(5) Disconnect two-way electrical connector.
(6) Repeat for the other switch.

INSTALLATION

(1) Connect two-way electrical connector.
(2) Install switch.
(3) Install screw into the back of the switch.
(4) Repeat for the other switch.
(5) Install the negative battery cable.

VACUUM RESERVOIR

DESCRIPTION

The vacuum reservoir is located under the left front headlamp, in front of the battery. It is made of plastic and does not contain any other parts, such as a check valve.

OPERATION

The reservoir stores engine vacuum. Manifold vacuum is supplied from the brake booster check valve. The speed control vacuum supply hose has a check valve at the source (brake booster) to maintain the highest available vacuum level in the servo, reservoir and vacuum hoses. When engine vacuum drops, as in climbing a grade while driving, the reservoir supplies the vacuum needed to maintain proper speed control operation. The vacuum reservoir cannot be repaired and must be replaced if faulty.

REMOVAL

The vacuum reservoir is located below the left front headlamp (Fig. 5).

(1) Remove the front fascia, refer to the Frames and Bumper/Front Fascia section for more information.

(2) Remove bolt from reservoir.

(3) Disconnect vacuum hose from reservoir.

(4) Remove the vacuum reservoir by sliding it up slightly and seperating the nail head pegs (molded into the reservoir) from the frame rail..

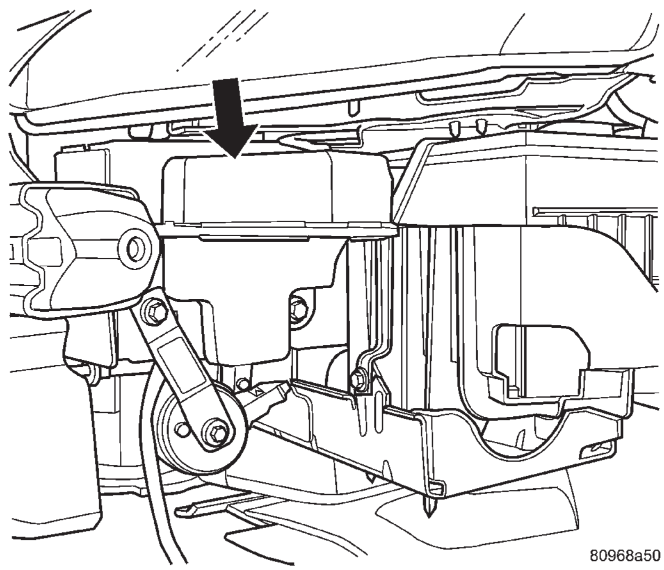

Fig. 5 VACUUM RESERVOIR

INSTALLATION

(1) Connect vacuum hose to reservoir by inserting nail head pegs on reservoir into the keyhole slots in the frame rail and slide down to lock it into place.

(2) Install the vacuum reservoir (Fig. 5).

(3) Install bolt through to reservoir to frame rail.

(4) Install the front fascia, refer to the Frames and Bumper/Front Fascia section for more information.

VEHICLE THEFT SECURITY

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VEHICLE THEFT SECURITY

DESCRIPTION

VEHICLE THEFT SECURITY SYSTEM

The Vehicle Theft Security System (VTSS) is designed to protect against whole vehicle theft. The system monitors vehicle doors, decklid, and ignition action for unauthorized operation. The alarm activates:

- Sounding of the horn
- Flashing of the park and tail lamps
- Flashing of the headlamps

SENTRY KEY IMMOBILIZER SYSTEM

The Sentry Key Immobilizer System (SKIS) is available as a factory-installed option on this vehicle. It is designed to provide passive protection against unauthorized vehicle use by disabling the engine, after two (2) seconds of running, whenever an invalid key is used to start the vehicle. The SKIS is active whenever the ignition is on and does not require any customer intervention. The primary components of the system are the Sentry Key Immobilizer Module (SKIM), Sentry Key (ignition key w/ a transponder molded into the head), indicator light, Body Control Module (BCM), and the Powertrain Control Module (PCM). The SKIM is mounted to the steering column with the molded, integral antenna mounted on the light halo surrounding the ignition lock cylinder. The indicator light, is located in the message center.

OPERATION

VEHICLE THEFT SECURITY SYSTEM

Upon failure of proper SKIM communication to the PCM, the PCM will shut off fuel after two seconds of run time. The engine will not re-crank on the key cycle that the failure occurred, a full key down sequence must be performed for the engine to crank again. After six consecutive fuel shut-offs, the engine will no longer crank on subsequent key cycles. The failure must be corrected and a valid communication process between the SKIM and the PCM must occur for the engine to crank and start again.

The electronics for the VTSS are part of the Body Control Module (BCM). The system is armed when the vehicle is locked using the:

- Power door lock switches (with any door ajar)
- Remote Keyless Entry transmitter.
- Door Cylinder Lock Switches.

For vehicles equipped with SKIS, the doors do not have to be locked to enable the fuel shut off feature.

After the vehicle is locked and the last door is closed, the set LED indicator in the top cover will flash quickly for 16 seconds, indicating that arming is in progress. If no monitored systems are activated during this period, the system will arm. The LED will extinguish unless the decklid is open. If the decklid is open, the LED will flash at a slower rate. This indicates that the system is armed.

If fault is detected on any key cylinder input, the indicator LED will remain solid during the arming process, although the system will still arm. If the indicator LED does not illuminate at all upon door closing it indicates that the system is not arming.

Passive disarming occurs upon normal vehicle entry by unlocking either door with the ignition key/ remote transmitter. This disarming will also halt the alarm once it has been activated.

A tamper alert exists to notify the driver that the VTSS had been activated. This alert consists of 3 horn pulses when the vehicle is disarmed.

NOTE: The VTSS will not arm by pushing down the door lock mechanism. This will manually override the system.

VEHICLE THEFT SECURITY (Continued)

For Door Cylinder Lock Switch Removal and Installation, refer to Electrical, Power Locks, Door Cylinder Lock Switch, Removal, and Installation.

If the VTSS is triggered, the horn will pulse, headlamps/marker lamps will flash, and the VTSS warning lamp will flash. If the BCM determines the threat to be false and the VTSS is not triggered again, the system will shut down and rearm itself after three minutes. If a trigger is still active, the alarm will continue for an additional 15 minutes without the horn. The VTSS monitoring portion of the system is split into two sections.

ARMING THE VTSS

(1) With the key removed from the ignition lock and any door open (excluding decklid), actuate one of the following:

- Power door lock button to LOCK,
- Key fob LOCK button
- Door lock key cylinder to locked position.

(2) Close all opened doors. decklid can remain open.

NOTE: If the decklid is open, it will not be secure. Once the decklid is closed, a separate 16 second counter will start. Once 16 seconds has been reached, the decklid will then be secure, providing a VTSS disarm request has not been received during the 16 second decklid arming period.

(3) After the last door is closed, an arming timeout period of sixteen seconds will start, then the VTSS will become armed.

(4) If a 16 second time-out sequence was in process and a new arm signal was actuated, the 16 second timeout will restart from the time of the second actuation.

If the security lamp does not illuminate at all upon final door closure, it indicates that the system is not arming.

The current VTSS status armed or disarmed shall be maintained in memory to prevent battery disconnects from disarming the system.

TRIGGERING THE VTSS

After the VTSS is armed, the following actions will trigger the alarm:

- Opening any door.
- Turning the ignition to the ON, ACC, or UNLOCK position.
- Opening decklid without first receiving a RKE input or decklid key input.

CAUTION: The VTSS indicator LED will trigger and engine will continue to run if the vehicle is equipped with SKIS and the proper key is used to start the vehicle. This condition will occur if the VTSS has been triggered. If valid key is used, VTSS will disarm

SENTRY KEY IMMOBILIZER SYSTEM

The SKIS includes keys from the factory which are pre-programmed. Each SKIM will recognize a maximum of eight Sentry Keys. If the customer would like to own additional keys other than those provided with the vehicle, they can be purchased from any authorized dealer. These keys must be programmed to the SKIM on the vehicle in order for the system to recognize them as valid keys. This can be done by the dealer with a DRB III® scan tool or by a customer if this feature is available in their market and they have two (2) valid keys already available to them. Refer to the Service Procedures portion of this system for additional details. The SKIS performs a self-test each time the ignition switch is turned to the ON position and will store Diagnostic Trouble Codes (DTC's) if a system malfunction is detected. The SKIS can be diagnosed and any stored DTC's can be retrieved using a DRB III® scan tool as described in the appropriate Body Diagnostic Procedures manual.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - SENTRY KEY IMMOBILIZER SYSTEM

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO ELECTRICAL, RESTRAINTS, WARNINGS, BEFORE ATTEMPTING COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

NOTE: The following tests may not prove conclusive in the diagnosis of this system. The most reliable, efficient, and accurate means to diagnose the Sentry Key Immobilizer System involves the use of a DRB III® scan tool. Refer to the proper Body Diagnostic Procedures Manual.

The Sentry Key Immobilizer System (SKIS) and the Programmable Communication Interface (PCI) bus network should be diagnosed using a DRB III® scan tool. The DRB III® will allow confirmation that the PCI bus is functional, that the Sentry Key Immobilizer Module (SKIM) is placing the proper messages on the PCI bus, and that the Powertrain Control Module (PCM) is receiving the PCI bus messages. Refer to the proper Body Diagnostic Procedures manual, and Wiring Diagrams for complete circuit descriptions and diagrams.

(1) Check the fuses in the Integrated Power Module (IPM). If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

VEHICLE THEFT SECURITY (Continued)

(2) Disconnect and isolate the battery negative remote cable from the remote terminal. Unplug the wire harness connector at the SKIM. Check for continuity between the ground circuit cavity of the SKIM wire harness connector and a good ground. There should be continuity. If OK, go to Step 3. If not OK, repair the open circuit to ground as required.

(3) Connect the battery negative cable. Check for battery voltage at the fused B(+) circuit cavity of the SKIM wire harness connector. If OK, go to Step 4. If not OK, repair the open circuit to the fuse in the IPM as required.

(4) Turn the ignition switch to the ON position. Check for battery voltage at the fused ignition switch output (run/start) circuit cavity of the SKIM wire harness connector. If OK, use a DRB III® scan tool and the proper Body Diagnostic Procedures manual to complete the diagnosis of the SKIS. If not OK, repair the open circuit to the fuse in the IPM as required.

DIAGNOSIS AND TESTING - VEHICLE THEFT SECURITY SYSTEM

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds. Using a DRB III® scan tool. Refer to the proper Body Diagnostic Procedures Manual for test procedures.

TRANSPONDER KEY

DESCRIPTION

The Sentry Key Immobilizer System (SKIS) uses a transponder chip that is integral to each ignition key (Fig. 1) to communicate with the Sentry Key Immobilizer Module (SKIM). Ignition keys are supplied with the vehicle when it is shipped from the factory. The transponder chip is undermolded within the head of the key. This undermold is hidden beneath an overmolded rubber cap.

OPERATION

Each Sentry Key has a unique transponder identification code permanently programmed into it by the manufacturer. Likewise, the SKIM has a unique "Secret Key" code programmed into it by the manufacturer as well. When a Sentry Key is programmed into the memory of the SKIM, the SKIM stores the transponder identification code from the Sentry Key, and the Sentry Key learns the "Secret Key" code from the SKIM. Once the Sentry Key learns the "Secret Key" code of the SKIM, it is also permanently pro-

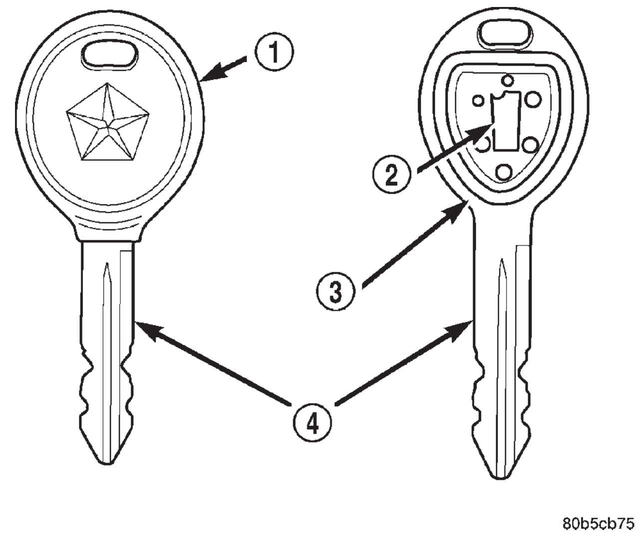

Fig. 1 TRANSPONDER KEY - TYPICAL

1 - MOLDED CAP
2 - TRANSPONDER
3 - MOLDED CAP REMOVED
4 - SENTRY KEY

grammed into the transponder's memory. Therefore, blank keys for the SKIS must be programmed by the SKIM in addition to being cut to match the mechanical coding of the ignition lock cylinder. Refer to Electrical, Vehicle Theft Security, Transponder Key, Standard Procedure - Transponder Programming.

The Sentry Key's transponder is within the range of the SKIM's transceiver antenna ring when it is inserted into the ignition lock cylinder. When the ignition switch is turned to the ON position, the SKIM communicates with the Sentry Key via a radio frequency (RF) signal. The SKIM determines if a valid key is present based on the information it receives from the Sentry Key. If a valid key is detected, that fact is communicated to the PCM via the PCI bus and the vehicle is allowed to continue running. If an invalid key is received by the PCM or no status at all is communicated, the vehicle will stall after two (2) seconds of running. The indicator light will be flashing at this point. The Sentry Key's transponder can not be repaired. If it is faulty or damaged, it must be replaced.

Common communication problems:

- Two transponder keys too close together.
- Speed Pass too close to transponder key.

Solid indicator that there is a system failure.

- Loss of PCM communication.
- Failed antenna circuit.

TRANSPONDER KEY (Continued)

STANDARD PROCEDURE - TRANSPONDER PROGRAMMING

USING A DRB III® SCAN TOOL

All Sentry Keys included with the vehicle are pre-programmed to work with the Sentry Key Immobilizer System (SKIS) when it is shipped from the factory. The Sentry Key Immobilizer Module (SKIM) can be programmed to recognize up to a total of eight Sentry Keys. When programming a blank Sentry Key transponder, the key must first be cut to match the ignition lock cylinder of the vehicle for which it will be used. The vehicle's four digit PIN code will be required to complete this task since you will need it to enter the Secured Access Mode in the SKIM. The following steps must be completed using a DRB III® scan tool:

(1) Insert the blank key into the ignition and turn it to the RUN position.

(2) Using a DRB III® scan tool, select ″Theft Alarm,″ ″SKIM,″ ″Miscellaneous,″ and then ″Program New Key.″

(3) Enter the four digit PIN code using the DRB III® scan tool. When programming is completed, the SKIM will exit Secured Access Mode and the DRB III® scan tool will display the results of your attempt to program the key. One of five distinct results may be displayed. All five are listed below:

- ″**Programming Successful**″ is displayed if the Sentry Key programming is successful.
- ″**Learned Key in Ignition**″ is displayed if the key in the ignition has already been programmed into that vehicle's SKIM.
- ″**Eight Keys Already Learned (At The Maximum) Programming Not Done**″ is displayed if eight keys have already been programmed into the SKIM. In this case, if a new key needs to be added due to a lost or defective key, the ″Erase All Keys″ command (which requires entering the Secured Access Mode) has to be performed. Following the ″Erase All Keys″ command, all keys that will be used to operate the vehicle **MUST** be reprogrammed to the SKIM.
- ″**Programming Not Attempted**″ is displayed after an ″Erase All Keys″ function is executed.
- ″**Programming Key Failed**″ is displayed if further diagnosis is required.

To learn additional keys, turn the ignition OFF, remove the learned key, insert the next new blank key, and repeat the steps from the beginning.

"CUSTOMER LEARN" MODE

This feature is only available on domestic vehicles or those which have a U.S. country code designator. This procedure requires access to at least two valid Sentry Keys. If two valid Sentry Keys are not available, Sentry Key programming will require the use of a DRB III® scan tool.

The steps required to program Sentry Keys with two valid Sentry Keys follows:

(1) Obtain the blank Sentry Key(s) that need to be programmed. Cut the keys to match the ignition lock cylinder mechanical key codes.

(2) Insert one of the two valid Sentry Keys into the ignition switch and turn the ignition switch to the ON position.

(3) After the ignition switch has been in the ON position for longer than three seconds, but no more than fifteen seconds, cycle the ignition switch back to the OFF position. Replace the first valid Sentry Key in the ignition lock cylinder with the second valid Sentry Key and turn the ignition switch back to the ON position. The second valid Sentry Key must be inserted within 15 seconds of removing the first valid Sentry key.

(4) About ten seconds after the completion of Step 3, the indicator light will start to flash and a single audible chime tone will sound to indicate that the system has entered the ″Customer Learn″ programming mode.

(5) Within sixty seconds of entering the ″Customer Learn″ programming mode, turn the ignition switch to the OFF position, replace the valid Sentry Key with a blank Sentry Key transponder, and turn the ignition switch back to the ON position.

(6) About ten seconds after the completion of Step 5, a single audible chime tone will sound and the indicator light will stop flashing and stay on solid for three seconds and then turn off to indicate that the blank Sentry Key has been successfully programmed. The SKIS will immediately exit the ″Customer Learn″ programming mode and the vehicle may be started using the newly programmed Sentry Key.

These steps must be completed in their entirety for each additional Sentry Key to be programmed. If any of the above steps are not completed in the given sequence, or within the allotted time, the SKIS will exit the ″Customer Learn″ programming mode and the programming will be unsuccessful. The SKIS will also automatically exit the ″Customer Learn″ programming mode if:

- It sees a non-blank Sentry Key when it should see a blank.
- If it has already programmed eight (8) valid Sentry Keys.
- If the ignition switch is turned to the OFF position for more than about fifty (50) seconds.

NOTE: If you attempt to start the vehicle while in "Customer Learn" mode (LED flashing), the vehicle will behave as though an invalid key is being used (i.e. the engine will stall after two (2) seconds of running). No faults will be logged.

TRANSPONDER KEY (Continued)

NOTE: Once a Sentry Key has been programmed to a particular vehicle, it cannot be used on any other vehicle.

VTSS/SKIS INDICATOR LAMP

DESCRIPTION

The Sentry Key Immobilizer System (SKIS) uses an indicator light to convey information on the status of the system to the customer. This light is shared with the Vehicle Theft Security System (VTSS). The light is located in the Instrument Cluster. The indicator light is controlled by the Body Control Module (BCM) based upon messages it receives from the Sentry Key Immobilizer Module (SKIM) on the PCI bus.

OPERATION

When the ignition is turned ON, the BCM performs a four second bulb check, regardless of SKIM messages. After the bulb check, the lamp is controlled according to SKIM messages. Then, the SKIM sends messages to the BCM to operate the light based upon the results of the SKIS self tests. The light may be actuated in two possible ways, flashing or on solid. If the light comes on and stays on solid after a power-up test, this indicates that the SKIM has detected a system malfunction. If the SKIM detects an invalid key when the ignition switch is moved to the ON position, it sends a message on the PCI bus to the BCM, to flash the light. The SKIM can also send a message to flash the light and generate a single audible chime at the same time. These two events occurring simultaneously indicate that the SKIS has been placed into the ″Customer Learn″ mode. Refer to Electrical, Vehicle Theft Security, Transponder Key, Standard Procedure - Transponder Programming for more information on the ″Customer Learn″ mode. If the light comes on and stays on after the power-up test, diagnosis of the SKIS should be performed using a DRB III® scan tool and the appropriate Body Diagnostic Procedures manual. The light is not a serviceable component.

WIPERS/WASHERS

TABLE OF CONTENTS

WIPERS/WASHERS

DESCRIPTION

WIPER SYSTEM

The wiper/washer switch is mounted on the right side of the multi-function switch (Fig. 1) on the steering column, behind the steering wheel.

The wiper system has LOW, HIGH, and INTERMITTENT switch positions. The intermittent wiper

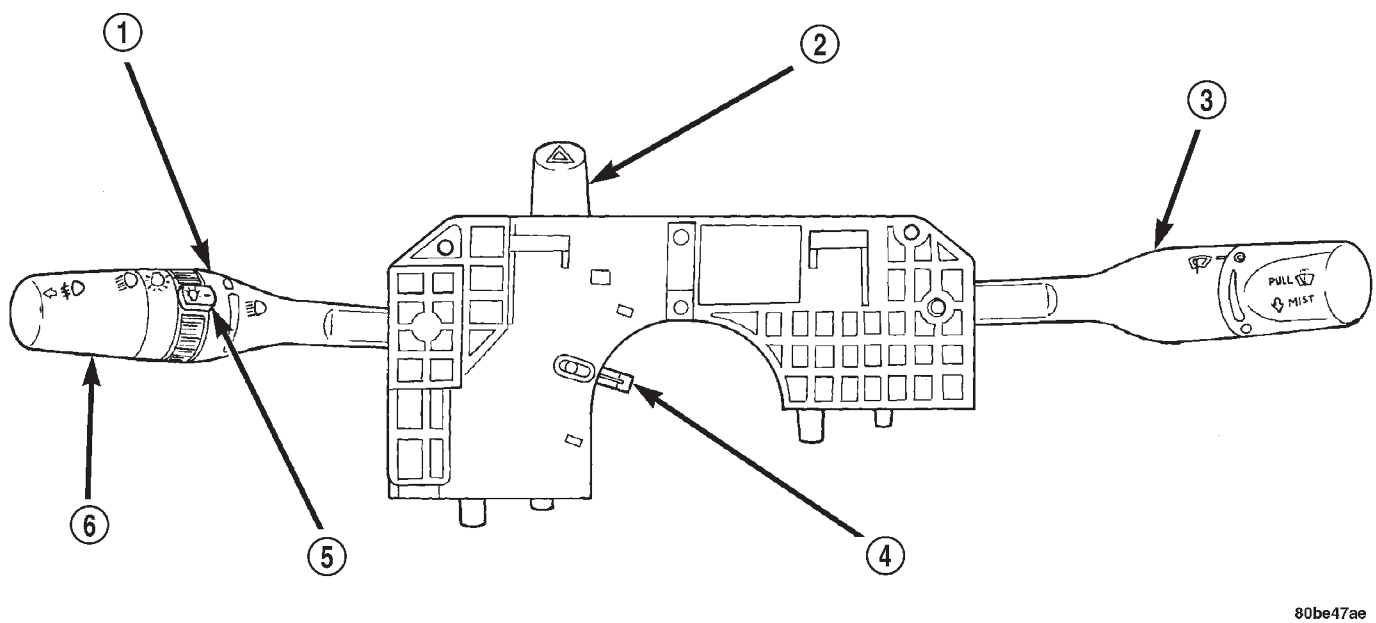

Fig. 1 MULTI-FUNCTION SWITCH

1 - TURN SIGNAL CONTROL STALK
2 - HAZARD WARNING BUTTON
3 - WINDSHIELD WIPER/WASHER CONTROL
4 - CANCELING ACTUATOR
5 - PANEL DIMMER SWITCH
6 - EXTERIOR LIGHTING CONTROL

WIPERS/WASHERS (Continued)

system, in addition to low and high speed, has a delay mode and a pulse wipe mode.

The intermittent wiper function is integral to the wiper switch. All electronics and relay are inside the switch assembly. The wiper switch also includes the MIST feature which provides a single wipe when actuated.

The wiper motor is not serviced separately from the motor assembly. The wiper linkage is crimped onto the motor and cannot be detached. If the motor is found faulty, the entire motor assembly must be replaced.

WASHER SYSTEM

This vehicle is equipped with an electrically operated windshield washer pump. The washers are operated by a switch in the multi-function switch control lever (Fig. 1). The lever is located on the right side of the steering column.

The electric pump assembly is mounted directly to the reservoir. A permanently lubricated motor is coupled to an impeller type pump. The pump and reservoir are serviced as separate assemblies.

OPERATION

WIPER SYSTEM

Move the control lever up to select the desired wiper speed. Move the lever upward to the second detent for Low speed wiper operation, or to the third detent for High speed operation.

Use the intermittent wiper when weather conditions make a single wiping cycle, with a variable pause between cycles, desirable. Move the lever to the DEL position, then select the delay interval by turning the end of the lever. The delay can be regulated from a maximum of approximately 18 ± 0.5 seconds between cycles, to a cycle every second ± 0.5 second.

The windshield wipers will only operate with the ignition switch in the ACCESSORY or IGNITION RUN position. The wiper circuit is protected against over loads by a fuse in the fuse block and a circuit breaker within the wiper motor. This protects the circuitry of the wiper system and the vehicle. The wiper motor has permanent magnet fields.

The intermittent wiper delay mode has a range of 1 ± 0.5 to 18 ± 0.5 seconds. Pulse wipe is accomplished by holding stalk lever in the WASH position momentarily. The wiper blades then sweep once or twice after the WASH at low speed and then return to the previous wiper switch mode.

The wiper system completes the wipe cycle when the switch is turned OFF. The blades park in the lowest portion of the wipe pattern.

Push down on the wiper lever to activate a single wipe to clear off road mist or spray from a passing vehicle. As long as the lever is held down, the wipers will continue to operate.

WASHER SYSTEM

To use the washer, pull the stalk lever toward you and hold while spray is desired. If the stalk lever is pulled while in the delay range, the wiper will operate for two wipe cycles (± 1) after the stalk lever is released, and then resume the intermittent interval previously selected.

The wash function can be accessed in the OFF position of the wiper control switch. Pulling the washer stalk lever rearward when the switch is in the OFF position will operate the wipers and washer motor pump continuously until the stalk lever is released. Releasing the stalk lever will stop the washer pump but the wipers will complete the current wipe cycle followed by an average of two more wipe cycles (± 1) before the wipers park and the module turns off.

If the stalk lever is pulled while in the OFF position, the wipers will operate for two wipe cycles, then turn OFF.

Fluid, gravity fed from the reservoir, is forced by the pump through rubber hoses to the hood mounted nozzles which direct the fluid streams to the windshield.

DIAGNOSIS AND TESTING - WINDSHIELD WASHERS

Whenever a windshield washer malfunction occurs, first verify that the windshield washer wire harness is properly connected to all connectors before starting normal diagnosis and repair procedures. Refer to the WINDSHIELD WASHER DIAGNOSIS table.

WIPERS/WASHERS (Continued)

WINDSHIELD WASHER DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
PUMP RUNS NO FLUID FLOWING.	1. NO FLUID IN THE RESERVOIR.	1. FILL RESERVOIR.
	2. NOZZLE PLUGGED OR FROZEN.	2. THAW AND CHECK FLOW IF BLOCKED
	3. BROKEN, LOOSE OR PINCHED HOSE.	3. CHECK FLOW THROUGH HOSE CONNECTIONS.
	4. FAULTY PUMP.	4. APPLY BATTERY VOLTAGE TO MOTOR TERMINALS, REPLACE IF PUMP DOES NOT RUN.
SYSTEM OPERATES INTERMITTENTLY.	1. LOOSE WIRE CONNECTION.	1. CHECK WIRE CONNECTIONS.
	2. FAULTY SWITCH.	2. DISCONNECT WIRE HARNESS USE VOLTMETER TO CHECK SWITCH.
SYSTEM OUTPUT IS LOW.	1. PINCHED HOSE.	1. CHECK FLOW THROUGH HOSE CONNECTION.
	2. HOSE BLOCKED.	2. DISCONNECT HOSE AT NOZZLE AND Y CONNECTOR. CHECK FOR FLOW. REPLACE AS NECESSARY.

WASHER NOZZLE

REMOVAL

To replace nozzle, disconnect washer fluid hose. Using needle nose pliers, squeeze together the locking tabs on the nozzle and remove.

INSTALLATION

For installing make sure that both locking tabs are securely snapped into position. Connect washer fluid hose. If no washer spray, check fluid hoses for kinks or leaks.

WASHER RESERVOIR

REMOVAL

(1) Disconnect and isolate the battery negative remote cable.

(2) Disconnect washer fluid hose at in-line connector on top of the right shock tower.

(3) Partially remove bumper fascia as needed to gain access to the reservoir. Refer to Frame & Bumpers, Bumpers, Front Fascia, Removal.

(4) Disconnect wire connector from washer pump and harness mounting tab (Fig. 2).

(5) Remove washer reservoir mounting bolts.

(6) Slide rearward and drop down and away from vehicle.

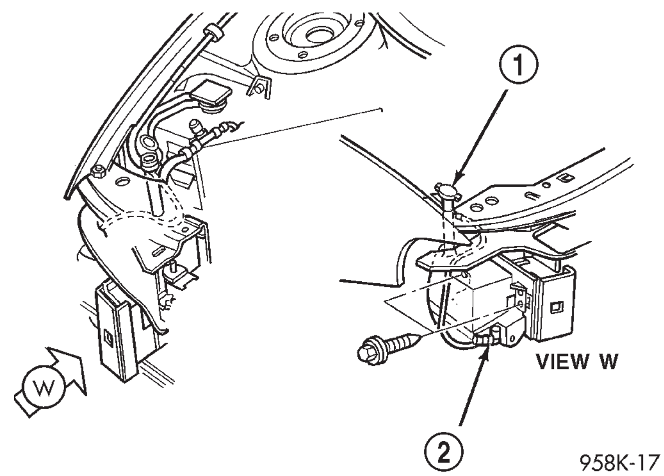

Fig. 2 RESERVOIR REMOVAL

1 - RESERVOIR
2 - WASHER PUMP

(7) Drain washer fluid from reservoir into an appropriate container.

(8) Disconnect the washer hose from the reservoir.

INSTALLATION

(1) Connect the washer hose to the reservoir.

(2) Install the washer fluid reservoir.

(3) Connect wire connector to washer pump and harness mounting tab (Fig. 2).

WASHER RESERVOIR (Continued)

(4) If fascia was partially removed, reinstall bumper fascia as needed. Refer to Frame & Bumpers, Bumpers, Front Fascia, Installation.

(5) Connect washer fluid hose at in-line connector on top of the right shock tower.

(6) Fill washer fluid.

(7) Connect the battery negative remote cable.

WASHER RESERVOIR PUMP

REMOVAL

(1) Disconnect and isolate the battery negative remote cable.

(2) Partially remove the bumper fascia as needed to gain access to the reservoir pump. Refer to Frame & Bumpers, Bumpers, Front Fascia, Removal.

(3) Place a drain bucket below the reservoir to catch any washer solvent that may leak out.

(4) Firmly grasping pump by hand twist and pull away from reservoir and out of grommet. Care must be taken not to puncture reservoir.

(5) Remover rubber grommet from reservoir and throw away.

INSTALLATION

(1) A new grommet is required for installation.

(2) Firmly grasping pump by hand twist and push into reservoir. Care must be taken not to tear grommet or puncture reservoir.

(3) If fascia was partially removed, reinstall bumper fascia as needed. Refer to Frame & Bumpers, Bumpers, Front Fascia, Installation.

(4) Refill reservoir with the washer solvent.

(5) Connect the battery negative remote cable.

WIPER ARMS

REMOVAL

(1) Place the wiper arm/blades in the PARK position and turn ignition OFF.

(2) Unsnap arm cover. By hand rock gently side to side and slide away from arm pivot. To remove the left side raise hood for clearance

(3) Loosen retention nut.

(4) Remove the arm from the pivot by using a universal claw puller or by hand rock gently side to side and slide. Raise blade and arm off glass and rock side to side while applying pressure with the puller till loose. Ensure that the puller is not on the collar below the arm.

(5) Remove arm retention nut and arm.

INSTALLATION

(1) Place arm on pivot shaft, align blade with wiper location made on windshield

(2) Start retention nut.

(3) Raise arm and blade off windshield while tightening retention nut. Tighten nut to 33 to 40 N·m (23 to 29 ft. lbs.).

(4) Install arm head cover.

ADJUSTMENTS

High speed, wet windshield operation, the right blade tip may override the cowl screen slightly. This is normal and should not affect wiper system performance.

(1) Lift arms and blade assemble to a over centered position.

(2) Turn ignition switch to ON or ACC position.

(3) Use LOW speed setting and cycle the wiper motor to the PARK position.

(4) Turn ignition OFF.

(5) Carefully lower arm and blades to the windshield.

(6) Measure the distance from the blade tip to the cowl screen edge. The blade should be 18 to 42 mm (.75 to 1.60 inches.).

(7) If not OK, check for worn parts.

(8) In the event the blade tip strikes the cowl screen or molding remove arm. Position arm on windshield and tighten to 33 to 40 N·m (23 to 29 ft. lbs.) torque (Fig. 3).

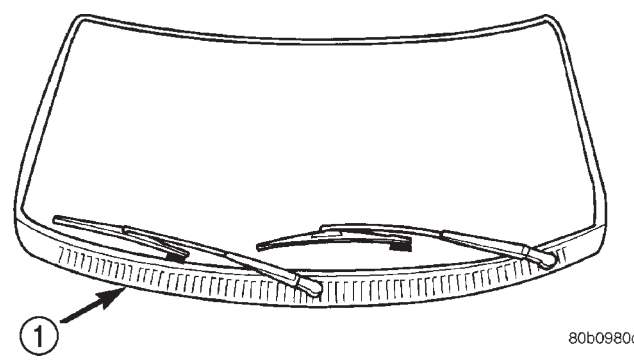

Fig. 3 ARM ADJUSTMENT

1 - COWL SCREEN

WIPER BLADES

DESCRIPTION

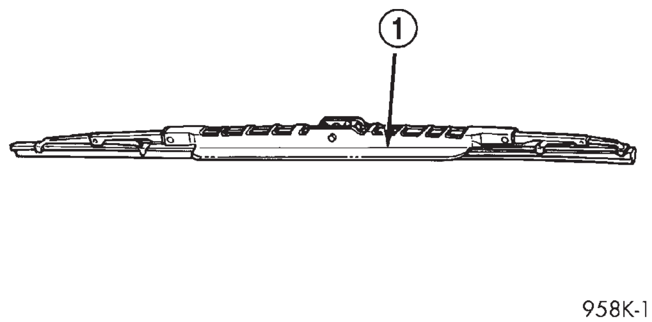

Fig. 4 WIPER BLADE-TYPICAL

1 - AIR FOIL

The wiper blades are a rubber element with a steel vertebrae that are mounted on the end of the windshield wiper arm and sweep across the front windshield to clear it of water, snow, and debris (Fig. 4).

OPERATION

When the wiper blade rubber element is exposed to the weather for a long period of time, it tends to lose wiping ability. Periodic cleaning of the wiper blade element is suggested to remove the accumulation of salt and road film. The wiper blades, arms, and windshield should be cleaned with a sponge or cloth and a mild detergent or non-abrasive cleaner. If the blades continue to streak or smear, they should be replaced. The driver and the passenger blade elements are 550 mm (21.65 in.) in length.

REMOVAL

(1) Turn wiper switch ON, position blades to a convenient place on the windshield by turning the ignition switch ON and OFF. Turn ignition switch OFF, when blade is in the desirable position.

(2) Lift wiper arm to raise blade off glass.

(3) Remove blade assembly from arm by pushing release tab under arm tip and slide blade away from arm tip (Fig. 5) and (Fig. 6).

(4) The driver's side wiper blade has a air foil on it and the air foil points downward as in (Fig. 4).

(5) Gently place wiper arm tip on windshield.

CLEANING

Wiper blades exposed to the weather for a long period of time tend to lose their wiping effectiveness. Periodic cleaning of the wiper blade is recommended to remove the accumulation of salt and road grime. The wiper blades, arms and windshield should be cleaned with a sponge or cloth and a mild detergent or nonabrasive cleaner. If the wiper blades continue to streak or smear, they should be replaced. The wiper blade should run smoothly across the windshield in both directions. The wiper blade should slightly roll over center when the blade reverses direction. A wiper blade insert that has lost flexibility or a wiper arm that has lost spring tension, will cause the blade to skip or chatter across the windshield. If the wiper blades are new and the wiper arm spring tension is OK and a chattering sound is emitted from the wiper(s), the wiper blade is not rolling over center. If this condition exists, refer to the Wiper Arm Alignment paragraph of this group.

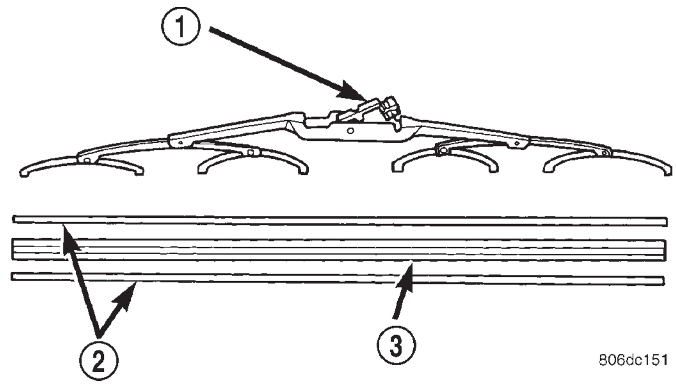

Fig. 5 WIPER BLADE AND ELEMENT

1 - ARM RELEASE TAB
2 - VERTEBRA
3 - RUBBER ELEMENT

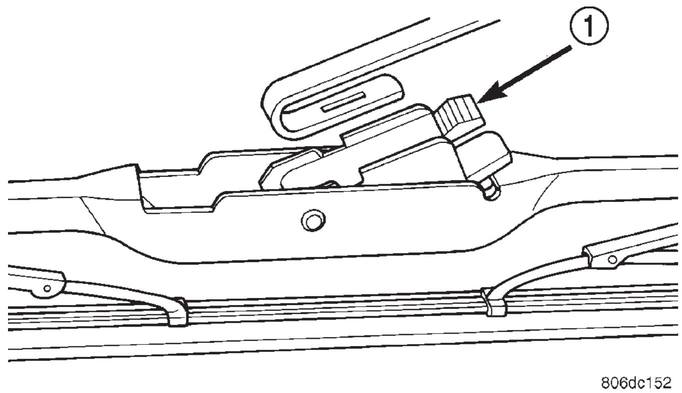

Fig. 6 REMOVE BLADE FROM ARM

1 - RELEASE TAB

INSTALLATION

(1) Gently lift the wiper arm tip off windshield.

(2) The driver's side wiper blade has a air foil on it and the air foil points downward (Fig. 4).

(3) Install teh blade assembly onto the wiper arm by firmly snapping it onto the the arm tip (Fig. 5) and (Fig. 6).

(4) Lower blade to glass

WIPER BLADES (Continued)

(5) When complete turn ignition switch ON. Turn wiper switch OFF allowing the wiper blades to PARK. Then turn ignition switch OFF.

WIPER BLADE ELEMENT

REMOVAL

(1) Lift wiper arm to raise blade off the windshield.

(2) Remove blade assembly from arm by pushing release tab under arm tip and slide blade away from arm tip (Fig. 5) and (Fig. 6). Gently place wiper arm tip on windshield.

(3) Remove wiping rubber element by pulling stopper of the rubber element, out of the claws of blade assemble (Fig. 7). The wiper rubber element and two vertebra will be removed.

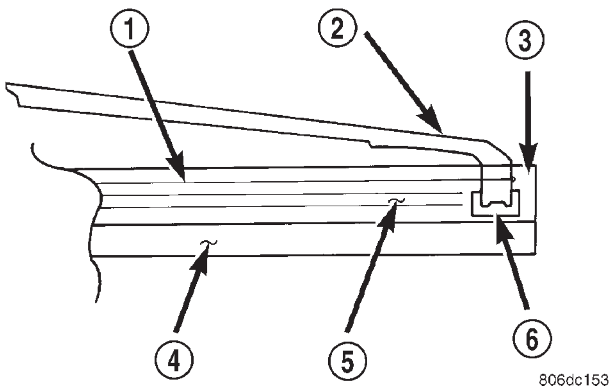

Fig. 7 WIPER BLADE AND ELEMENT

1 - VERTEBRA
2 - CLAW
3 - TO GRASP AND PULL
4 - RUBBER ELEMENT
5 - CHANNEL
6 - SLOT

INSTALLATION

(1) Slide the rubber element into the blade assembly through the claws.

(2) Slide the metal vertebra into the top element slot, with the vertebra curved to match the windshield

(3) Ensure that the final blade claw is locked into the slot at the end of the rubber element (Fig. 7).

WIPER LINKAGE

REMOVAL

(1) Remove wiper arms and blades.

(2) Remove the cowl screen.

(3) Remove wiper motor assembly.

(4) Disconnect wiper arm linkage by using an ball joint/tie rod separator. Separate the right and left ball cap from the ball.

(5) Disconnect drive link from the motor crank. Using an ball joint/tie rod separator and separate the ball cap from the ball.

INSTALLATION

(1) Connect the drive link to the motor crank. If motor output crank nut was removed, tighten nut to 25 to 30 N·m (19 to 23 ft. lbs.).

(2) Align link ball cap over ball and gently press fit against shoulder of cap to lock cap into position.

(3) Install the wiper motor assembly.

(4) Install the cowl screen.

(5) Install the wiper arms.

WIPER MOTOR ASSEMBLY

REMOVAL

(1) Disconnect and isolate the battery negative remote cable.

(2) Remove wiper arms and blades.

(3) Remove the cowl screen.

(4) Remove the four wiper motor assembly mounting screws then lift assembly to gain access to wire harness clip.

(5) Disconnect harness clip from the forward mounting leg.

(6) Disconnect wire connector at motor and remove assembly.

INSTALLATION

(1) Connect wire connector at motor and remove assembly.

(2) Connect harness clip to the forward mounting leg.

(3) Place assembly into position, install the mounting bolts, and tighten the mounting bolts to 10 to 12 N·m (89 to 106 in. lbs.) torque.

(4) Install the cowl screen.

(5) Install the wiper arms and blades.

(6) Connect the battery negative remote cable.

WIRING

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8W-01 WIRING DIAGRAM INFORMATION

TABLE OF CONTENTS

WIRING DIAGRAM INFORMATION

DESCRIPTION

DESCRIPTION - HOW TO USE WIRING DIAGRAMS

DaimlerChrysler Corporation wiring diagrams are designed to provide information regarding the vehicles wiring content. In order to effectively use the wiring diagrams to diagnose and repair DaimlerChrysler Corporation vehicles, it is important to understand all of their features and characteristics.

Diagrams are arranged such that the power (B+) side of the circuit is placed near the top of the page, and the ground (B-) side of the circuit is placed near the bottom of the page (Fig. 1).

All switches, components, and modules are shown in the at rest position with the doors closed and the key removed from the ignition (Fig. 2).

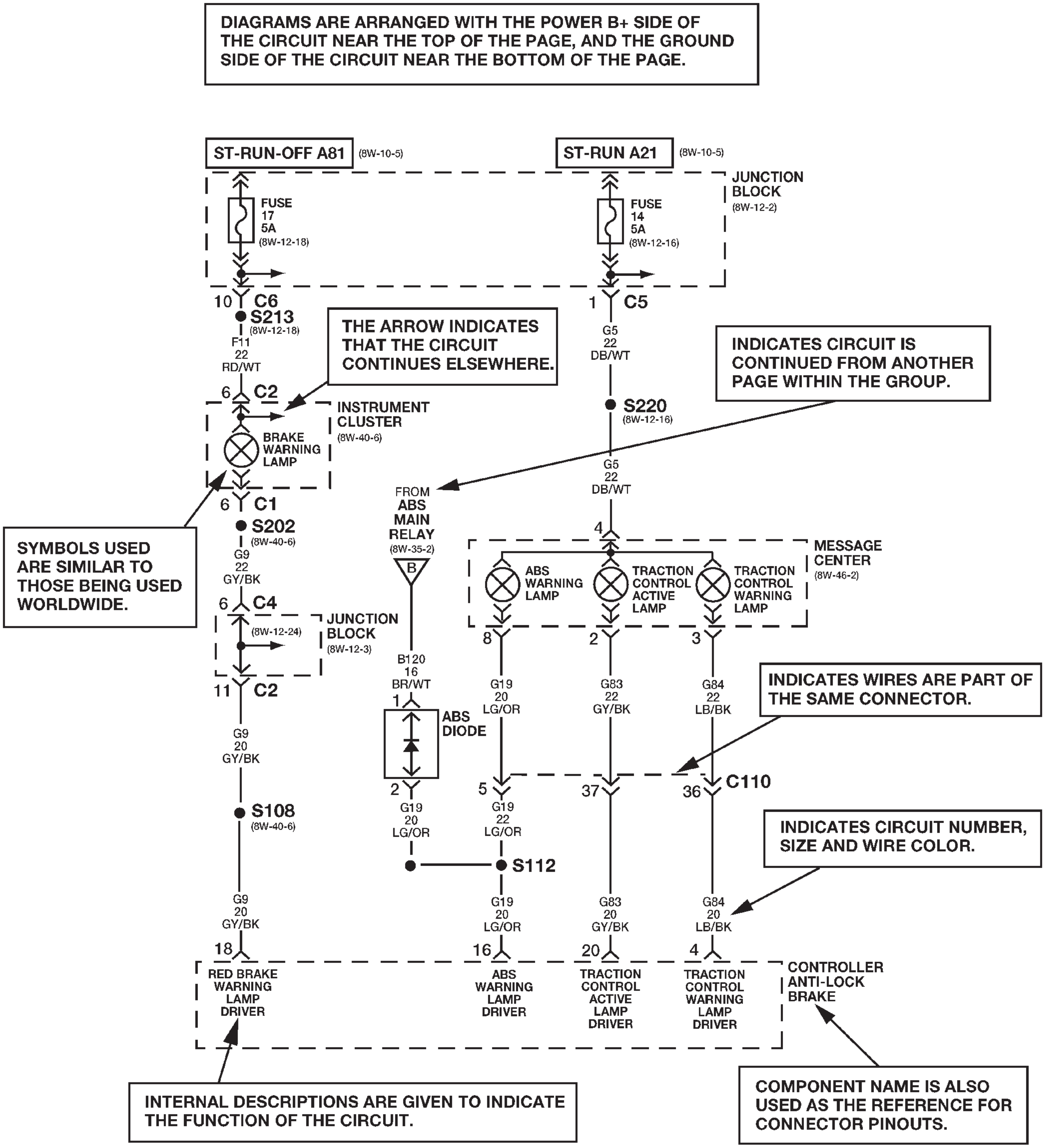
Components are shown two ways. A solid line around a component indicates that the component is complete. A dashed line around the component indicates that the component is being shown is not complete. Incomplete components have a reference number to indicate the page where the component is shown complete.

It is important to realize that no attempt is made on the diagrams to represent components and wiring as they appear on the vehicle. For example, a short piece of wire is treated the same as a long one. In addition, switches and other components are shown as simply as possible, with regard to function only.

SYMBOLS

International symbols are used throughout the wiring diagrams. These symbols are consistent with those being used around the world (Fig. 3).

WIRING DIAGRAM INFORMATION (Continued)



The System shown here is an EXAMPLE ONLY. It does not represent the actual circuit shown in the WIRING DIAGRAM SECTION.

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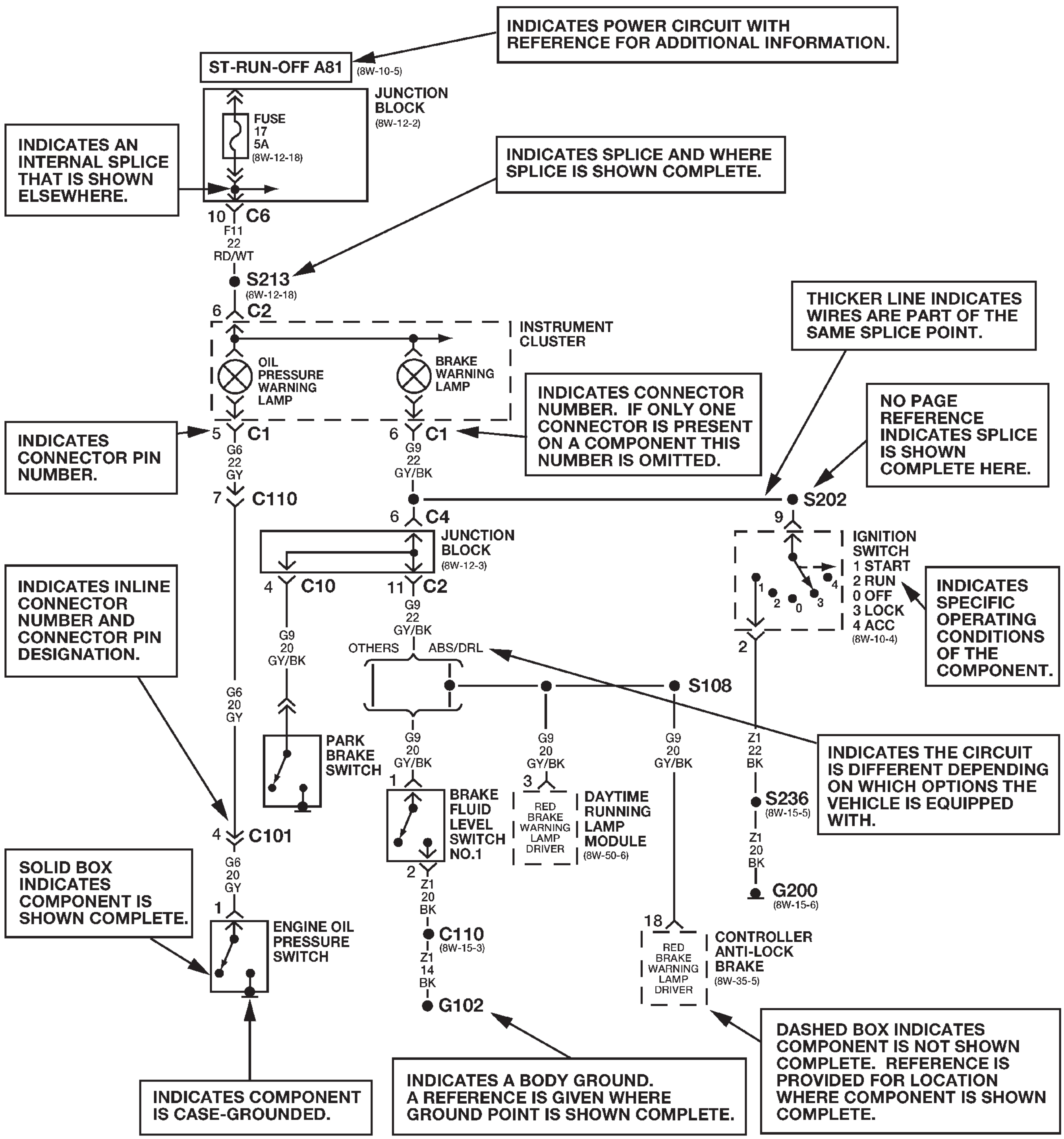
Fig. 1 WIRING DIAGRAM EXAMPLE 1

WIRING DIAGRAM INFORMATION (Continued)



The System shown here is an EXAMPLE ONLY. It does not represent the actual circuit shown in the WIRING DIAGRAM SECTION.

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Fig. 2 WIRING DIAGRAM EXAMPLE 2

WIRING DIAGRAM INFORMATION (Continued)

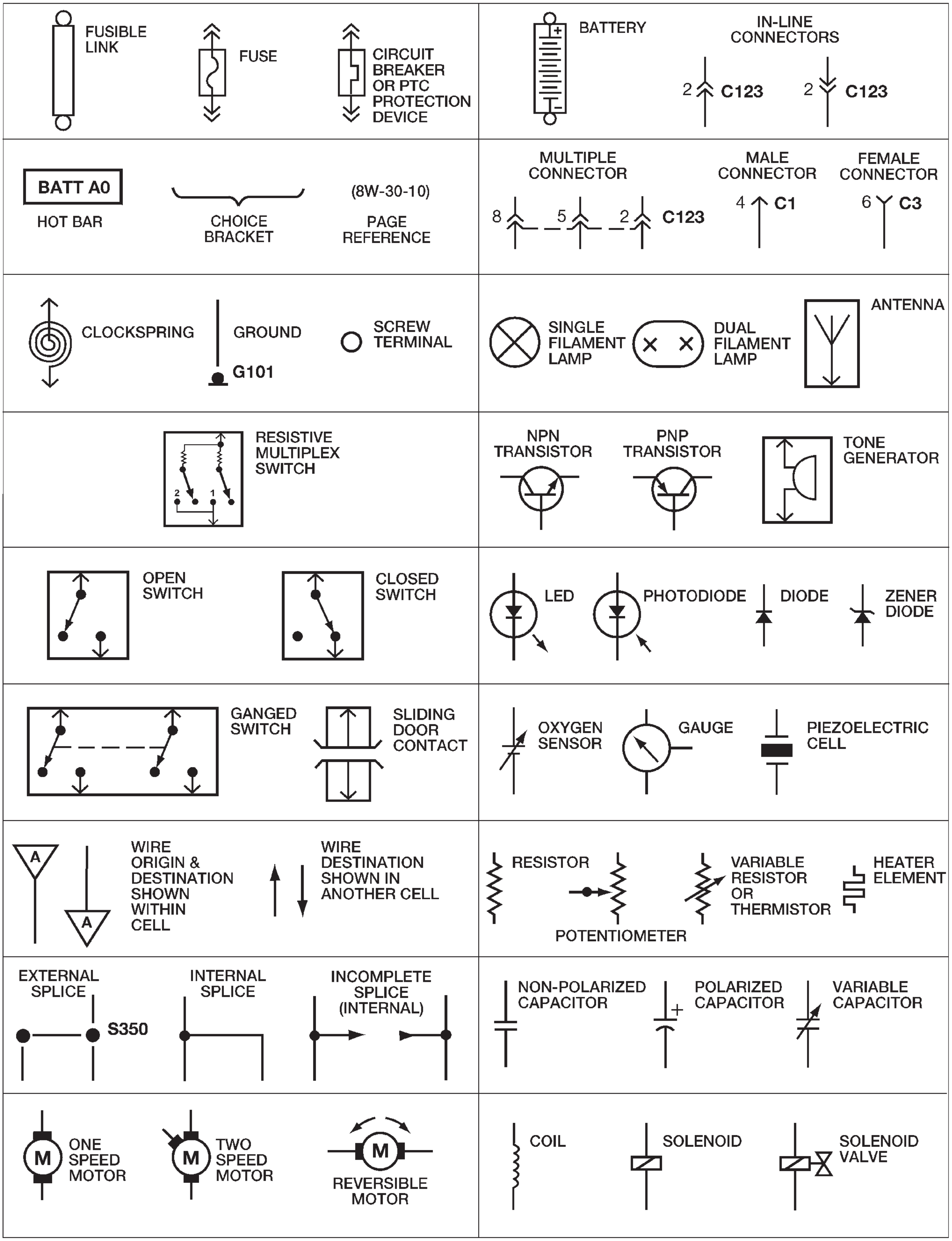

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Fig. 3 WIRING DIAGRAM SYMBOLS

WIRING DIAGRAM INFORMATION (Continued)

TERMINOLOGY

This is a list of terms and definitions used in the wiring diagrams.

LHD . . . . Left Hand Drive Vehicles
RHD . . . . Right Hand Drive Vehicles
ATX . . Automatic Transmissions-Front Wheel Drive
MTX . . . . Manual Transmissions-Front Wheel Drive
AT . . . . Automatic Transmissions-Rear Wheel Drive
MT . . . . . Manual Transmissions-Rear Wheel Drive
SOHC . . . . Single Over Head Cam Engine
DOHC . . . . Double Over Head Cam Engine
Built-Up-Export . . . . Vehicles Built For Sale In Markets Other Than North America
Except Built-Up-Export . . Vehicles Built For Sale In North America

DESCRIPTION - CIRCUIT INFORMATION

Each wire shown in the diagrams contains a code which identifies the main circuit, part of the main circuit, gage of wire, and color (Fig. 4).

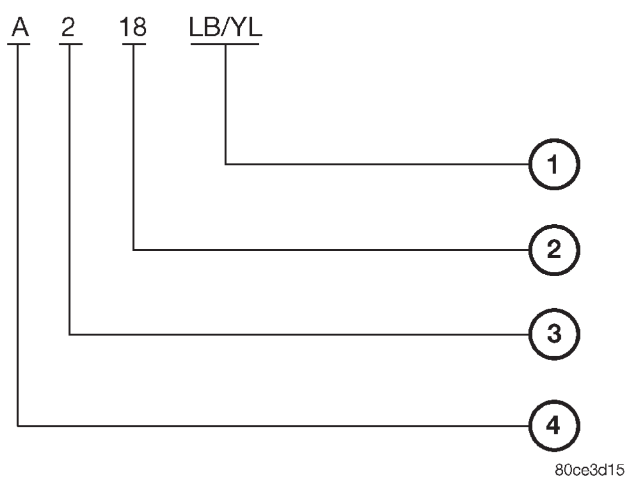


Fig. 4 WIRE CODE IDENTIFICATION

1 - COLOR OF WIRE (LIGHT BLUE WITH YELLOW TRACER
2 - GAGE OF WIRE (18 GAGE)
3 - PART OF MAIN CIRCUIT (VARIES DEPENDING ON EQUIPMENT)
4 - MAIN CIRCUIT IDENTIFICATION

WIRE COLOR CODE CHART

COLOR CODE	COLOR
BL	BLUE
BK	BLACK
BR	BROWN
DB	DARK BLUE
DG	DARK GREEN
GY	GRAY
LB	LIGHT BLUE
LG	LIGHT GREEN
OR	ORANGE
PK	PINK
RD	RED
TN	TAN
VT	VIOLET
WT	WHITE
YL	YELLOW
*	WITH TRACER

WIRING DIAGRAM INFORMATION (Continued)

DESCRIPTION - CIRCUIT FUNCTIONS

All circuits in the diagrams use an alpha/numeric code to identify the wire and it's function. To identify which circuit code applies to a system, refer to the Circuit Identification Code Chart. This chart shows the main circuits only and does not show the secondary codes that may apply to some models.

CIRCUIT IDENTIFICATION CODE CHART

CIRCUIT	FUNCTION
A	BATTERY FEED
B	BRAKE CONTROLS
C	CLIMATE CONTROLS
D	DIAGNOSTIC CIRCUITS
E	DIMMING ILLUMINATION CIRCUITS
F	FUSED CIRCUITS
G	MONITORING CIRCUITS (GAUGES)
H	OPEN
I	NOT USED
J	OPEN
K	POWERTRAIN CONTROL MODULE
L	EXTERIOR LIGHTING
M	INTERIOR LIGHTING
N	NOT USED
O	NOT USED
P	POWER OPTION (BATTERY FEED)
Q	POWER OPTIONS (IGNITION FEED)
R	PASSIVE RESTRAINT
S	SUSPENSION/STEERING
T	TRANSMISSION/TRANSAXLE/ TRANSFER CASE
U	OPEN
V	SPEED CONTROL, WIPER/ WASHER
W	OPEN
X	AUDIO SYSTEMS
Y	OPEN
Z	GROUNDS

DESCRIPTION - SECTION IDENTIFICATION AND INFORMATION

The wiring diagrams are grouped into individual sections. If a component is most likely found in a particular group, it will be shown complete (all wires, connectors, and pins) within that group. For example, the Auto Shutdown Relay is most likely to be found in Group 30, so it is shown there complete. It can, however, be shown partially in another group if it contains some associated wiring.

Splice diagrams in Section 8W-70 show the entire splice and provide references to other sections the splices serves. Section 8W-70 only contains splice diagrams that are not shown in their entirety somewhere else in the wiring diagrams.

Section 8W-80 shows each connector and the circuits involved with that connector. The connectors are identified using the name/number on the diagram pages.

WIRING SECTION CHART

GROUP	TOPIC
8W-01 thru 8W-09	General information and Diagram Overview
8W-10 thru 8W-19	Main Sources of Power and Vehicle Grounding
8W-20 thru 8W-29	Starting and Charging
8W-30 thru 8W-39	Powertrain/Drivetrain Systems
8W-40 thru 8W-49	Body Electrical items and A/C
8W-50 thru 8W-59	Exterior Lighting, Wipers and Trailer Tow
8W-60 thru 8W-69	Power Accessories
8W-70	Splice Information
8W-80	Connector Pin Outs
8W-91	Connector, Ground and Splice Locations

WIRING DIAGRAM INFORMATION (Continued)

DESCRIPTION - CONNECTOR, GROUND AND SPLICE INFORMATION

CAUTION: Not all connectors are serviced. Some connectors are serviced only with a harness. A typical example might be the Supplemental Restraint System connectors. Always check parts availability before attempting a repair.

IDENTIFICATION

In-line connectors are identified by a number, as follows:

- In-line connectors located in the engine compartment are C100 series numbers
- In-line connectors located in the Instrument Panel area are C200 series numbers.
- In-line connectors located in the body are C300 series numbers.
- Jumper harness connectors are C400 series numbers.
- Grounds and ground connectors are identified with a “G” and follow the same series numbering as the in-line connectors.
- Splices are identified with an “S” and follow the same series numbering as the in-line connectors.
- Component connectors are identified by the component name instead of a number. Multiple connectors on a component use a C1, C2, etc. identifier.

LOCATIONS

Section 8W-91 contains connector/ground/splice location illustrations. The illustrations contain the connector name (or number)/ground number/splice number and component identification. Connector/ground/splice location charts in section 8W-91 reference the figure numbers of the illustrations.

The abbreviation T/O is used in the component location section to indicate a point in which the wiring harness branches out to a component. The abbreviation N/S means Not Shown in the illustrations

WARNING

WARNINGS - GENERAL

WARNINGS provide information to prevent personal injury and vehicle damage. Below is a list of general warnings that should be followed any time a vehicle is being serviced.

WARNING: ALWAYS WEAR SAFETY GLASSES FOR EYE PROTECTION.

WARNING: USE SAFETY STANDS ANYTIME A PROCEDURE REQUIRES BEING UNDER A VEHICLE.

WARNING: BE SURE THAT THE IGNITION SWITCH ALWAYS IS IN THE OFF POSITION, UNLESS THE PROCEDURE REQUIRES IT TO BE ON.

WARNING: SET THE PARKING BRAKE WHEN WORKING ON ANY VEHICLE. AN AUTOMATIC TRANSMISSION SHOULD BE IN PARK. A MANUAL TRANSMISSION SHOULD BE IN NEUTRAL.

WARNING: OPERATE THE ENGINE ONLY IN A WELL-VENTILATED AREA.

WARNING: KEEP AWAY FROM MOVING PARTS WHEN THE ENGINE IS RUNNING, ESPECIALLY THE FAN AND BELTS.

WARNING: TO PREVENT SERIOUS BURNS, AVOID CONTACT WITH HOT PARTS SUCH AS THE RADIATOR, EXHAUST MANIFOLD(S), TAIL PIPE, CATALYTIC CONVERTER AND MUFFLER.

WARNING: DO NOT ALLOW FLAME OR SPARKS NEAR THE BATTERY. GASES ARE ALWAYS PRESENT IN AND AROUND THE BATTERY.

WARNING: ALWAYS REMOVE RINGS, WATCHES, LOOSE HANGING JEWELRY AND AVOID LOOSE CLOTHING.

DIAGNOSIS AND TESTING - WIRING HARNESS

TROUBLESHOOTING TOOLS

When diagnosing a problem in an electrical circuit there are several common tools necessary. These tools are listed and explained below.

- Jumper Wire - This is a test wire used to connect two points of a circuit. It can be used to bypass an open in a circuit.

WARNING: NEVER USE A JUMPER WIRE ACROSS A LOAD, SUCH AS A MOTOR, CONNECTED BETWEEN A BATTERY FEED AND GROUND.

- Voltmeter - Used to check for voltage on a circuit. Always connect the black lead to a known good ground and the red lead to the positive side of the circuit.

CAUTION: Most of the electrical components used in today’s vehicles are Solid State. When checking voltages in these circuits, use a meter with a 10 - megohm or greater impedance rating.

WIRING DIAGRAM INFORMATION (Continued)

• Ohmmeter - Used to check the resistance between two points of a circuit. Low or no resistance in a circuit means good continuity.

CAUTION: Most of the electrical components used in today's vehicles are Solid State. When checking resistance in these circuits use a meter with a 10 - megohm or greater impedance rating. In addition, make sure the power is disconnected from the circuit. Circuits that are powered up by the vehicle's electrical system can cause damage to the equipment and provide false readings.

• Probing Tools - These tools are used for probing terminals in connectors (Fig. 5). Select the proper size tool from Special Tool Package 6807, and insert it into the terminal being tested. Use the other end of the tool to insert the meter probe.

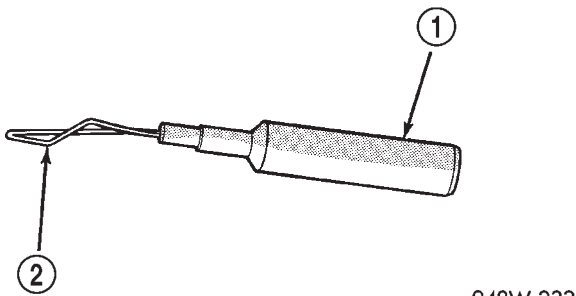


Fig. 5 PROBING TOOL

1 - SPECIAL TOOL 6801
2 - PROBING END

INTERMITTENT AND POOR CONNECTIONS

Most intermittent electrical problems are caused by faulty electrical connections or wiring. It is also possible for a sticking component or relay to cause a problem. Before condemning a component or wiring assembly, check the following items.

• Connectors are fully seated
• Spread terminals, or terminal push out
• Terminals in the wiring assembly are fully seated into the connector/component and locked into position
• Dirt or corrosion on the terminals. Any amount of corrosion or dirt could cause an intermittent problem
• Damaged connector/component casing exposing the item to dirt or moisture
• Wire insulation that has rubbed through causing a short to ground
• Some or all of the wiring strands broken inside of the insulation
• Wiring broken inside of the insulation

TROUBLESHOOTING WIRING PROBLEMS

When troubleshooting wiring problems there are six steps which can aid in the procedure. The steps are listed and explained below. Always check for non-factory items added to the vehicle before doing any diagnosis. If the vehicle is equipped with these items, disconnect them to verify these add-on items are not the cause of the problem.

(1) Verify the problem.

(2) Verify any related symptoms. Do this by performing operational checks on components that are in the same circuit. Refer to the wiring diagrams.

(3) Analyze the symptoms. Use the wiring diagrams to determine what the circuit is doing, where the problem most likely is occurring and where the diagnosis will continue.

(4) Isolate the problem area.

(5) Repair the problem area.

(6) Verify the proper operation. For this step, check for proper operation of all items on the repaired circuit. Refer to the wiring diagrams.

STANDARD PROCEDURE

STANDARD PROCEDURE - ELECTROSTATIC DISCHARGE (ESD) SENSITIVE DEVICES

All ESD sensitive components are solid state and a symbol (Fig. 6) is used to indicate this. When handling any component with this symbol, comply with the following procedures to reduce the possibility of electrostatic charge build up on the body and inadvertent discharge into the component. If it is not known whether the part is ESD sensitive, assume that it is.

(1) Always touch a known good ground before handling the part. This should be repeated while handling the part and more frequently after sliding across a seat, sitting down from a standing position, or walking a distance.

(2) Avoid touching electrical terminals of the part, unless instructed to do so by a written procedure.

(3) When using a voltmeter, be sure to connect the ground lead first.

(4) Do not remove the part form it's protective packing until it is time to install the part.

(5) Before removing the part from it's pakage, ground the pakage to a known good ground on the vehicle.

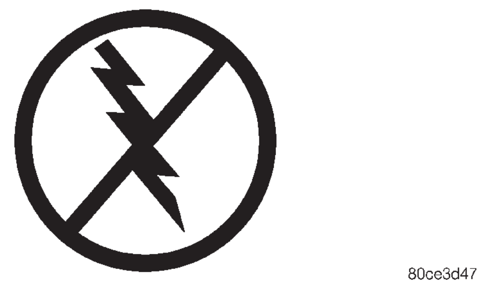


Fig. 6 ELECTROSTATIC DISCHARGE SYMBOL

WIRING DIAGRAM INFORMATION (Continued)

STANDARD PROCEDURE - TESTING OF VOLTAGE POTENTIAL

(1) Connect the ground lead of a voltmeter to a known good ground (Fig. 7).

(2) Connect the other lead of the voltmeter to the selected test point. The vehicle ignition may need to be turned ON to check voltage. Refer to the appropriate test procedure.

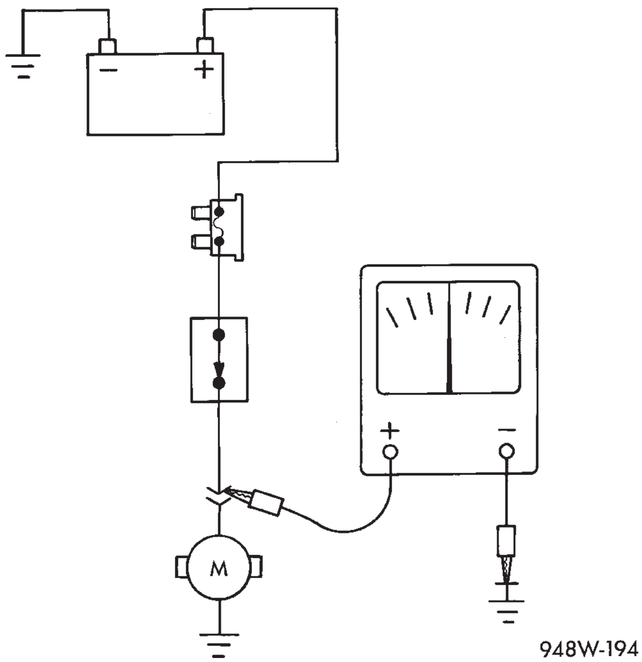


Fig. 7 TESTING FOR VOLTAGE POTENTIAL

STANDARD PROCEDURE - TESTING FOR CONTINUITY

(1) Remove the fuse for the circuit being checked or, disconnect the battery.

(2) Connect one lead of the ohmmeter to one side of the circuit being tested (Fig. 8).

(3) Connect the other lead to the other end of the circuit being tested. Low or no resistance means good continuity.

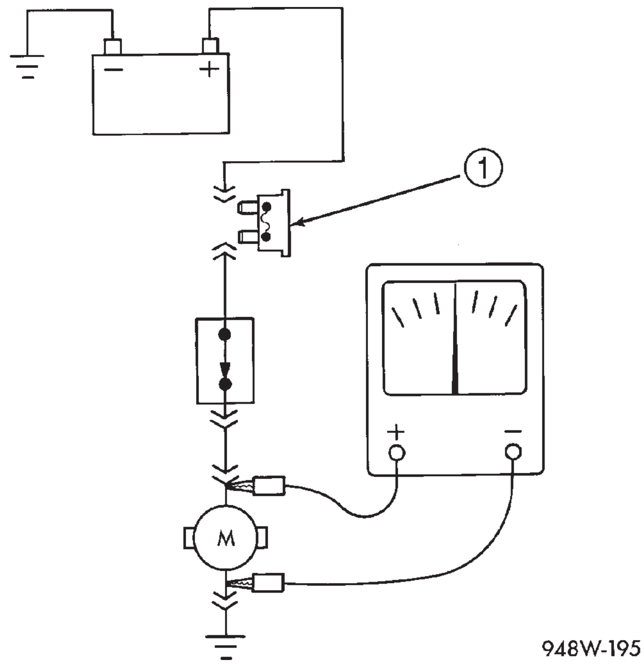


Fig. 8 TESTING FOR CONTINUITY

1 - FUSE REMOVED FROM CIRCUIT

STANDARD PROCEDURE - TESTING FOR A SHORT TO GROUND

(1) Remove the fuse and disconnect all items involved with the fuse.

(2) Connect a test light or a voltmeter across the terminals of the fuse.

(3) Starting at the fuse block, wiggle the wiring harness about six to eight inches apart and watch the voltmeter/test lamp.

(4) If the voltmeter registers voltage or the test lamp glows, there is a short to ground in that general area of the wiring harness.

STANDARD PROCEDURE - TESTING FOR A SHORT TO GROUND ON FUSES POWERING SEVERAL LOADS

(1) Refer to the wiring diagrams and disconnect or isolate all items on the suspected fused circuits.

(2) Replace the blown fuse.

(3) Supply power to the fuse by turning ON the ignition switch or re-connecting the battery.

(4) Start connecting or energizing the items in the fuse circuit one at a time. When the fuse blows the circuit with the short to ground has been isolated.

WIRING DIAGRAM INFORMATION (Continued)

STANDARD PROCEDURE - TESTING FOR A VOLTAGE DROP

(1) Connect the positive lead of the voltmeter to the side of the circuit closest to the battery (Fig. 9).

(2) Connect the other lead of the voltmeter to the other side of the switch, component or circuit.

(3) Operate the item.

(4) The voltmeter will show the difference in voltage between the two points.

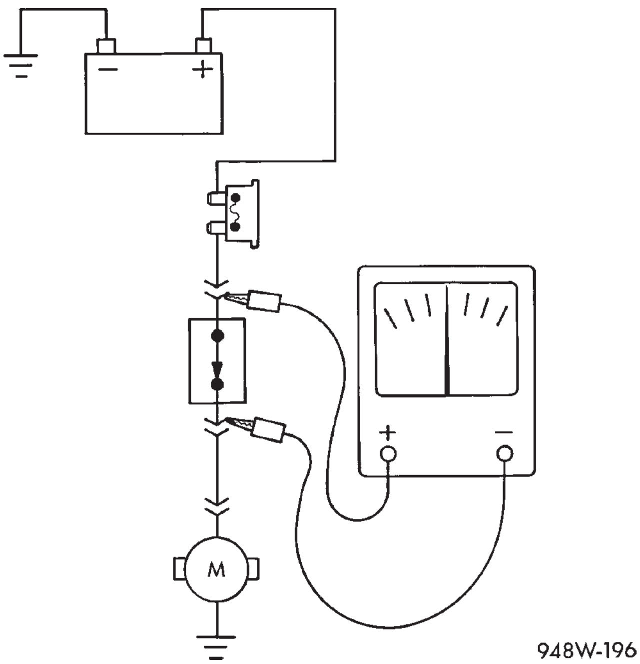
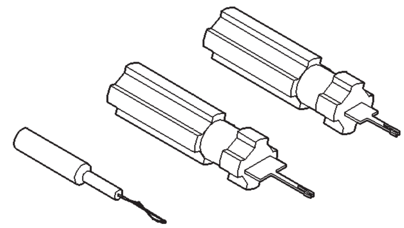


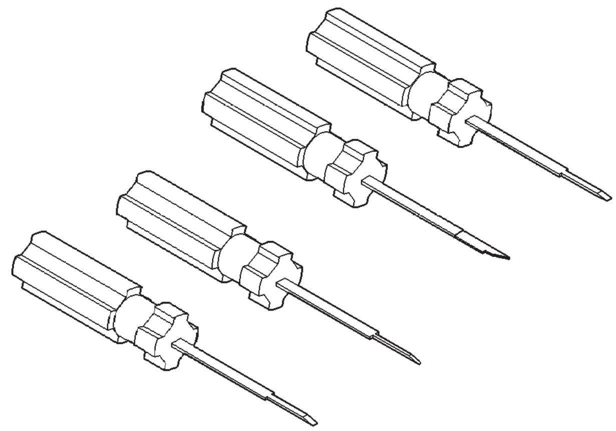
Fig. 9 TESTING FOR VOLTAGE DROP

SPECIAL TOOLS

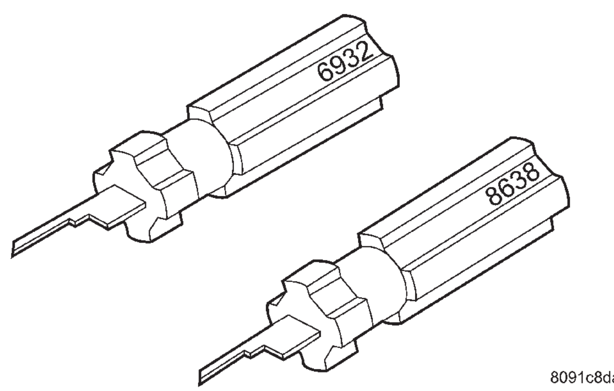
WIRING/TERMINAL



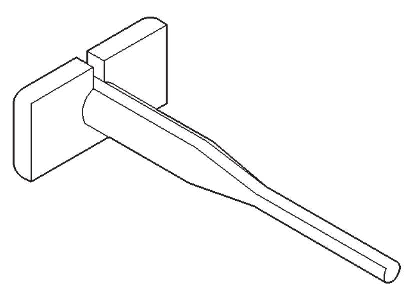
PROBING TOOL PACKAGE 6807



TERMINAL PICK TOOL SET 6680



TERMINAL REMOVING TOOLS 6932 AND 8638



TERMINAL REMOVING TOOL 6934

CONNECTOR

REMOVAL

(1) Disconnect battery.
(2) Release Connector Lock (Fig. 10).
(3) Disconnect the connector being repaired from its mating half/component.
(4) Remove the dress cover (if applicable) (Fig. 10).
(5) Release the Secondary Terminal Lock, if required (Fig. 11).
(6) Position the connector locking finger away from the terminal using the proper special tool. Pull on the wire to remove the terminal from the connector (Fig. 12).

INSTALLATION

(1) Insert the removed terminal in the same cavity on the repair connector.
(2) Repeat steps for each terminal in the connector, being sure that all wires are inserted into the proper cavities. For additional connector pin-out identification, refer to the wiring diagrams.
(3) When the connector is re-assembled, the secondary terminal lock must be placed in the locked position to prevent terminal push out.

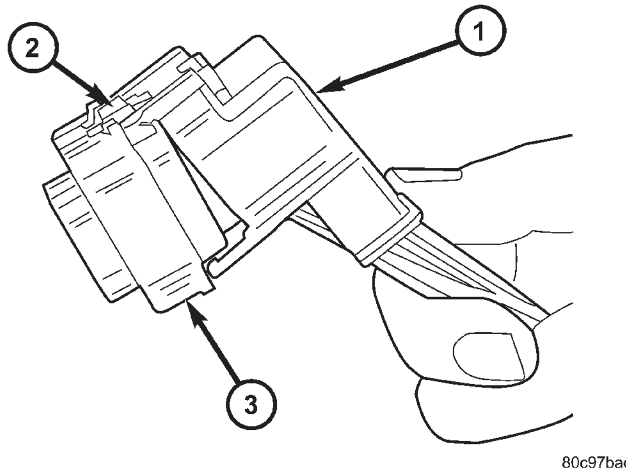


Fig. 10 REMOVAL OF DRESS COVER

1 - DRESS COVER
2 - CONNECTOR LOCK
3 - CONNECTOR

(4) Replace dress cover (if applicable).
(5) Connect connector to its mating half/component.
(6) Connect battery and test all affected systems.

CONNECTOR (Continued)

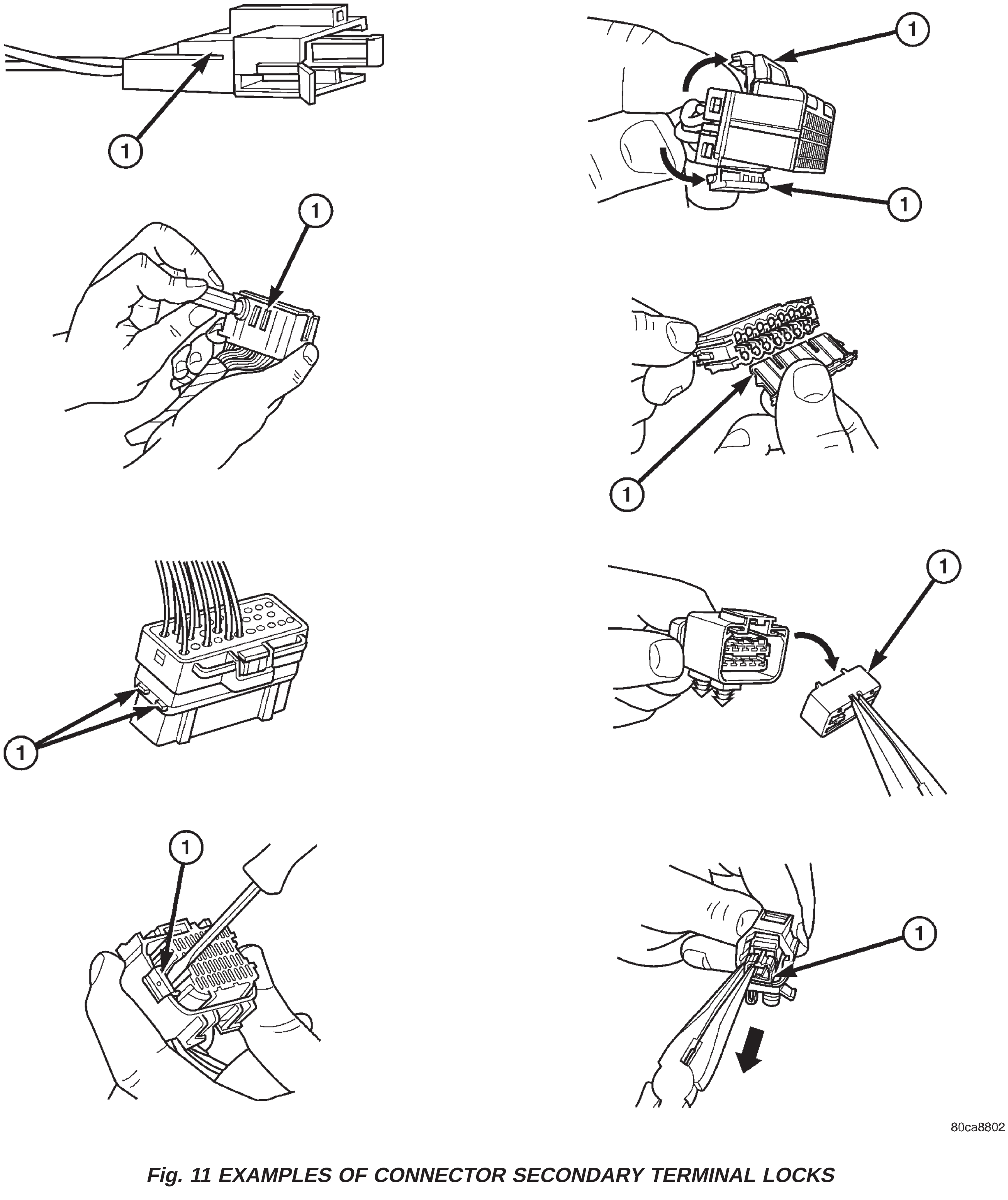


Fig. 11 EXAMPLES OF CONNECTOR SECONDARY TERMINAL LOCKS

1 - Secondary Terminal Lock

CONNECTOR (Continued)

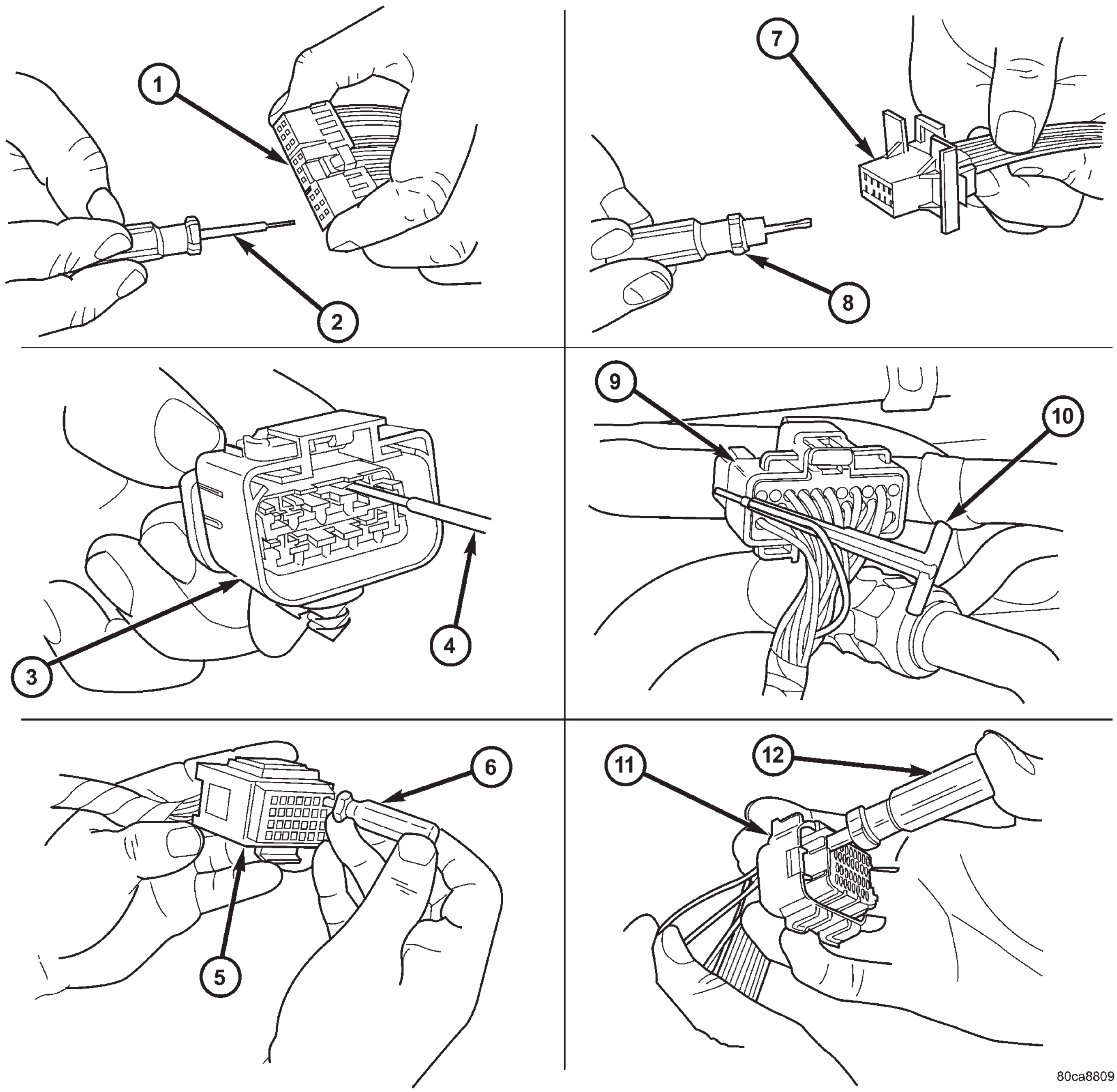


Fig. 12 TERMINAL REMOVAL

1 - TYPICAL CONNECTOR
2 - PICK FROM SPECIAL TOOL KIT 6680
3 - APEX CONNECTOR
4 - PICK FROM SPECIAL TOOL KIT 6680
5 - AUGAT CONNECTOR
6 - SPECIAL TOOL 6932
7 - MOLEX CONNECTOR
8 - SPECIAL TOOL 6742
9 - THOMAS AND BETTS CONNECTOR
10 - SPECIAL TOOL 6934
11 - TYCO CONNECTOR
12 - SPECIAL TOOL 8638

DIODE

REMOVAL

(1) Disconnect the battery.

(2) Locate the diode in the harness, and remove the protective covering.

(3) Remove the diode from the harness, pay attention to the current flow direction (Fig. 13).

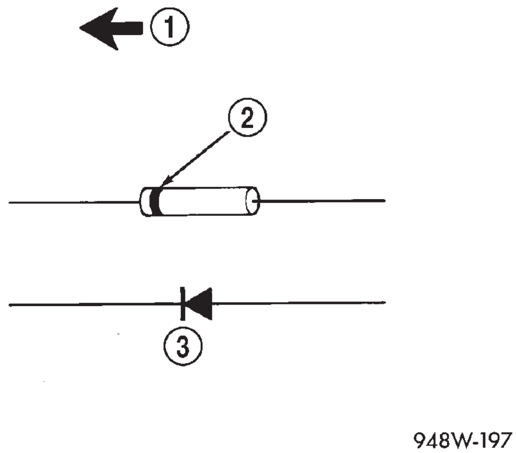


Fig. 13 DIODE IDENTIFICATION

1 - CURRENT FLOW
2 - BAND AROUND DIODE INDICATES CURRENT FLOW
3 - DIODE AS SHOWN IN THE DIAGRAMS

INSTALLATION

(1) Remove the insulation from the wires in the harness. Only remove enough insulation to solder in the new diode.

(2) Install the new diode in the harness, making sure current flow is correct. If necessary, refer to the appropriate wiring diagram for current flow (Fig. 13).

(3) Solder the connection together using rosin core type solder only. **Do not use acid core solder.**

(4) Tape the diode to the harness using electrical tape. Make sure the diode is completely sealed from the elements.

(5) Re-connect the battery and test affected systems.

TERMINAL

REMOVAL

(1) Follow steps for removing terminals described in the connector removal section.

(2) Cut the wire 6 inches from the back of the connector.

INSTALLATION

(1) Select a wire from the terminal repair kit that best matches the color and gage of the wire being repaired.

(2) Cut the repair wire to the proper length and remove one–half (1/2) inch of insulation.

(3) Splice the repair wire to the wire harness (see wire splicing procedure).

(4) Insert the repaired wire into the connector.

(5) Install the connector locking wedge, if required, and reconnect the connector to its mating half/component.

(6) Re-tape the wire harness starting at 1–1/2 inches behind the connector and 2 inches past the repair.

(7) Connect battery and test all affected systems.

WIRE

STANDARD PROCEDURE - WIRE SPLICING

When splicing a wire, it is important that the correct gage be used as shown in the wiring diagrams.

(1) Remove one-half (1/2) inch of insulation from each wire that needs to be spliced.

(2) Place a piece of adhesive lined heat shrink tubing on one side of the wire. Make sure the tubing will be long enough to cover and seal the entire repair area.

(3) Place the strands of wire overlapping each other inside of the splice clip (Fig. 14).

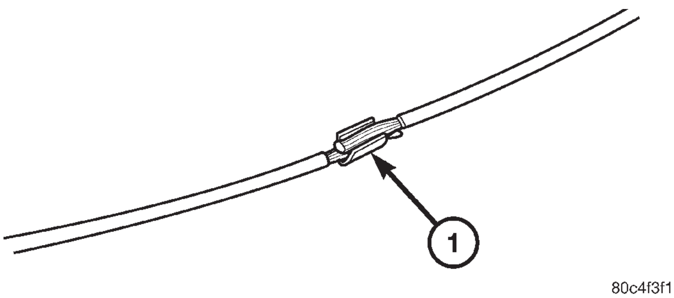


Fig. 14 SPLICE BAND

1 - SPLICE BAND

(4) Using crimping tool, Mopar p/n 05019912AA, crimp the splice clip and wires together (Fig. 15).

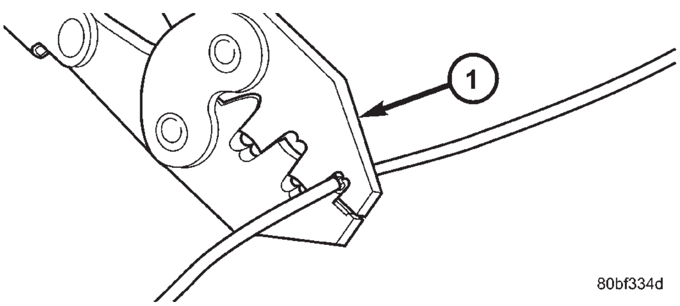


Fig. 15 CRIMPING TOOL

1 - CRIMPING TOOL

(5) Solder the connection together using rosin core type solder only (Fig. 16).

CAUTION: DO NOT USE ACID CORE SOLDER.

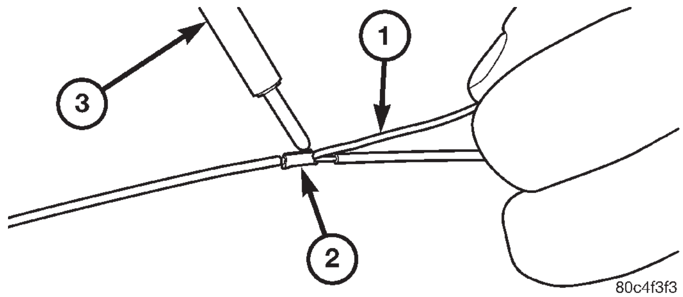


Fig. 16 SOLDER SPLICE

1 - SOLDER
2 - SPLICE BAND
3 - SOLDERING IRON

(6) Center the heat shrink tubing over the joint and heat using a heat gun. Heat the joint until the tubing is tightly sealed and sealant comes out of both ends of the tubing (Fig. 17).

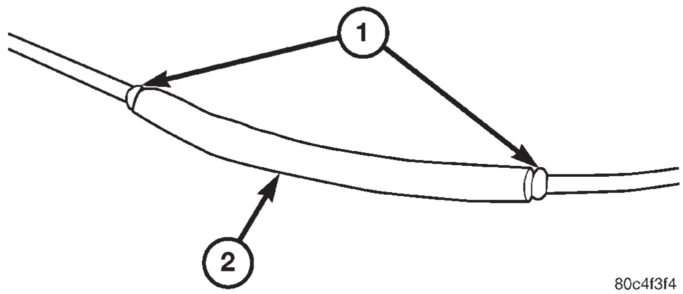


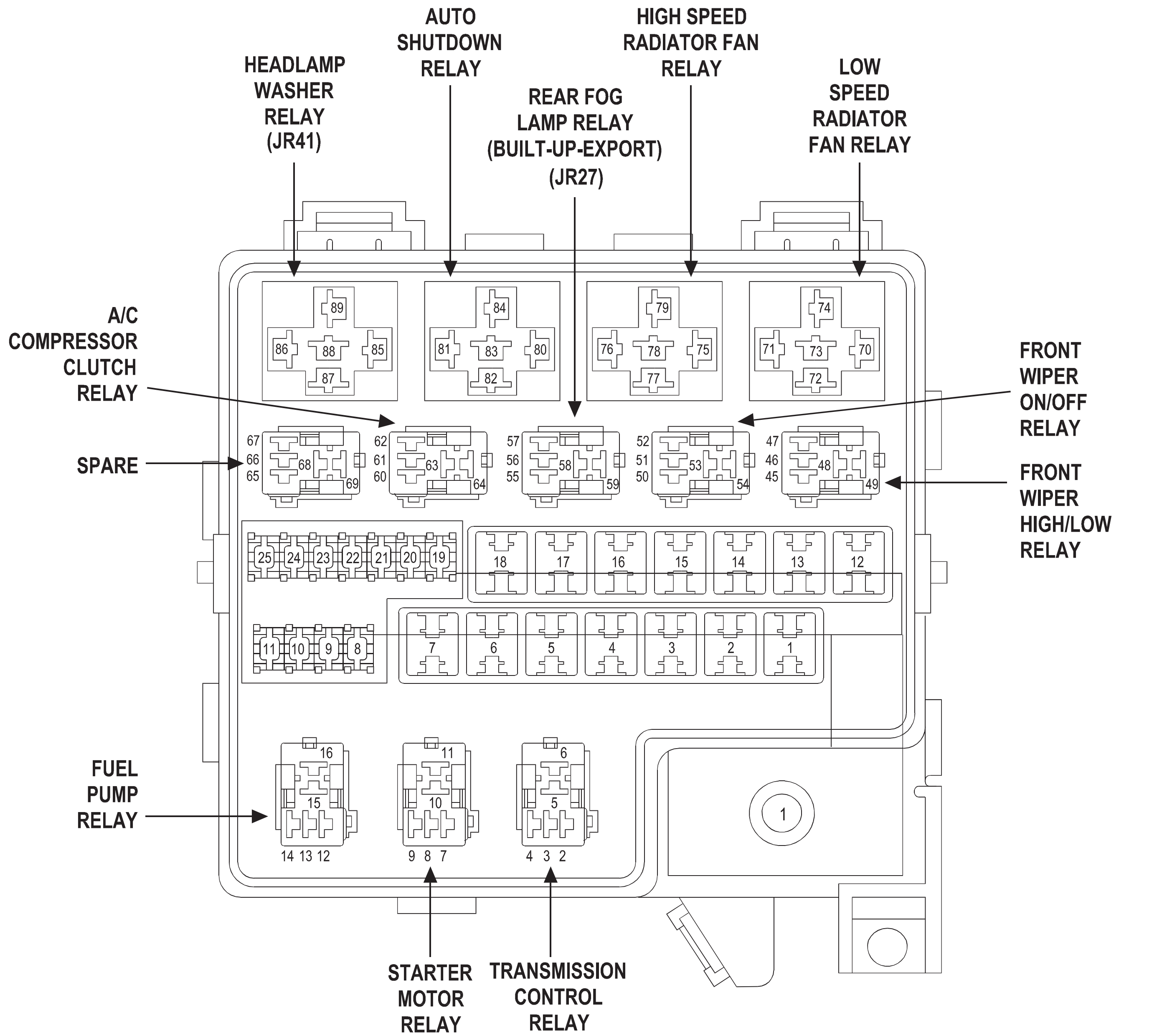
Fig. 17 HEAT SHRINK TUBE

1 - SEALANT
2 - HEAT SHRINK TUBE

8W-02 COMPONENT INDEX

8W-10 POWER DISTRIBUTION

POWER DISTRIBUTION CENTER



FUSES

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	40A	A2 12PK/BK	FUSED B(+)
2	20A	F30 16RD	FUSED B(+)
3	30A	A53 14RD/YL □□ ▲▲	FUSED B(+)
4	40A	A3 12RD/WT	FUSED B(+)
5	-	SPARE	FUSED B(+)
6	40A	A4 12BK/PK	FUSED B(+)
7	-	SPARE	FUSED B(+)
8	20A	A1 16RD	FUSED B(+)
9	20A	A24 16BK	FUSED B(+)
10	10A	A51 20RD/WT	FUSED B(+)
11	20A	A7 16RD/BK	FUSED B(+)
12	40A	A16 12RD/LG	FUSED B(+)
13	20A	P86 16PK/BK □□ ▲▲	FUSED B(+)
14	30A	A14 14RD/TN	FUSED B(+)
15	40A	A10 12RD/DG	FUSED B(+)
16	40A	A13 12PK/WT	FUSED B(+)
17	40A	A25 12DB □	FUSED B(+)
18	40A	A5 12RD/GY	FUSED B(+)
19	20A	A45 18BR □	FUSED B(+)
20	20A	A15 16PK	FUSED B(+)
21	-	SPARE	FUSED B(+)
22	20A	A20 12RD/DB	FUSED B(+)
23	20A	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
24	20A	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
25	20A	F142 16OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT

□ JR27
□□ JR41
▲▲ BUILT-UP-EXPORT

A/C COMPRESSOR CLUTCH RELAY

CAVITY	CIRCUIT	FUNCTION
60	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
61	-	-
62	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
63	C3 14DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
64	A16 12RD/LG	FUSED B(+)

AUTO SHUT DOWN RELAY

CAVITY	CIRCUIT	FUNCTION
80	K51 20DB/VT	AUTOMATIC SHUTDOWN RELAY CONTROL
81	A14 14RD/TN	FUSED B(+)
82	A142 14DG/OR	AUTOMATIC SHUTDOWN RELAY OUTPUT
83	-	-
84	A14 14RD/TN	FUSED B(+)

FRONT WIPER HIGH/LOW RELAY

CAVITY	CIRCUIT	FUNCTION
45	V16 20VT/PK	FRONT WIPER HIGH/LOW RELAY CONTROL
46	V3 14BR/WT	FRONT WIPER HIGH/LOW RELAY LOW SPEED OUTPUT
47	F13 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
48	V4 14RD/YL	FRONT WIPER HIGH/LOW RELAY HIGH SPEED OUTPUT
49	V5 14DG/VT	FRONT WIPER RELAY COMMON

FRONT WIPER ON/OFF RELAY

CAVITY	CIRCUIT	FUNCTION
50	V14 20RD/VT	FRONT WIPER ON/OFF RELAY CONTROL
51	Z247 16BK	GROUND
52	A5 14RD/GY	FUSED B(+)
53	A5 12RD/GY	FUSED B(+)
54	V5 14DG/VT	FRONT WIPER RELAY COMMON

FUEL PUMP RELAY

CAVITY	CIRCUIT	FUNCTION
12	K31 20BR/LG	FUEL PUMP RELAY CONTROL
13	-	-
14	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
15	A141 14DG/WT	FUEL PUMP RELAY OUTPUT
16	A1 16RD	FUSED B(+)

HEADLAMP WASHER RELAY (JR41)

CAVITY	CIRCUIT	FUNCTION
85	V58 18BR/YL	HEADLAMP WASHER RELAY CONTROL
86	A53 16RD/YL	FUSED B(+)
87	V53 14RD/YL	HEADLAMP WASHER RELAY OUTPUT
88	-	-
89	A53 14RD/YL	FUSED B(+)

HIGH SPEED RADIATOR FAN RELAY

CAVITY	CIRCUIT	FUNCTION
75	C27 20DB/PK	HIGH SPEED RADIATOR FAN RELAY CONTROL
76	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
77	C25 12YL	HIGH SPEED RADIATOR FAN RELAY OUTPUT
78	-	-
79	A16 12RD/LG	FUSED B(+)

LOW SPEED RADIATOR FAN RELAY

CAVITY	CIRCUIT	FUNCTION
70	C24 20DB/TN	LOW SPEED RADIATOR FAN RELAY CONTROL
71	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
72	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
73	-	-
74	A16 12RD/LG	FUSED B(+)

REAR FOG LAMP RELAY (JR27) (BUILT-UP-EXPORT)

CAVITY	CIRCUIT	FUNCTION
55	L36 18LG	REAR FOG LAMP RELAY CONTROL
56	-	-
57	Z247 18BK	GROUND
58	L95 18DG/YL	REAR FOG LAMP RELAY OUTPUT
59	A7 16RD/BK	FUSED B(+)

STARTER MOTOR RELAY

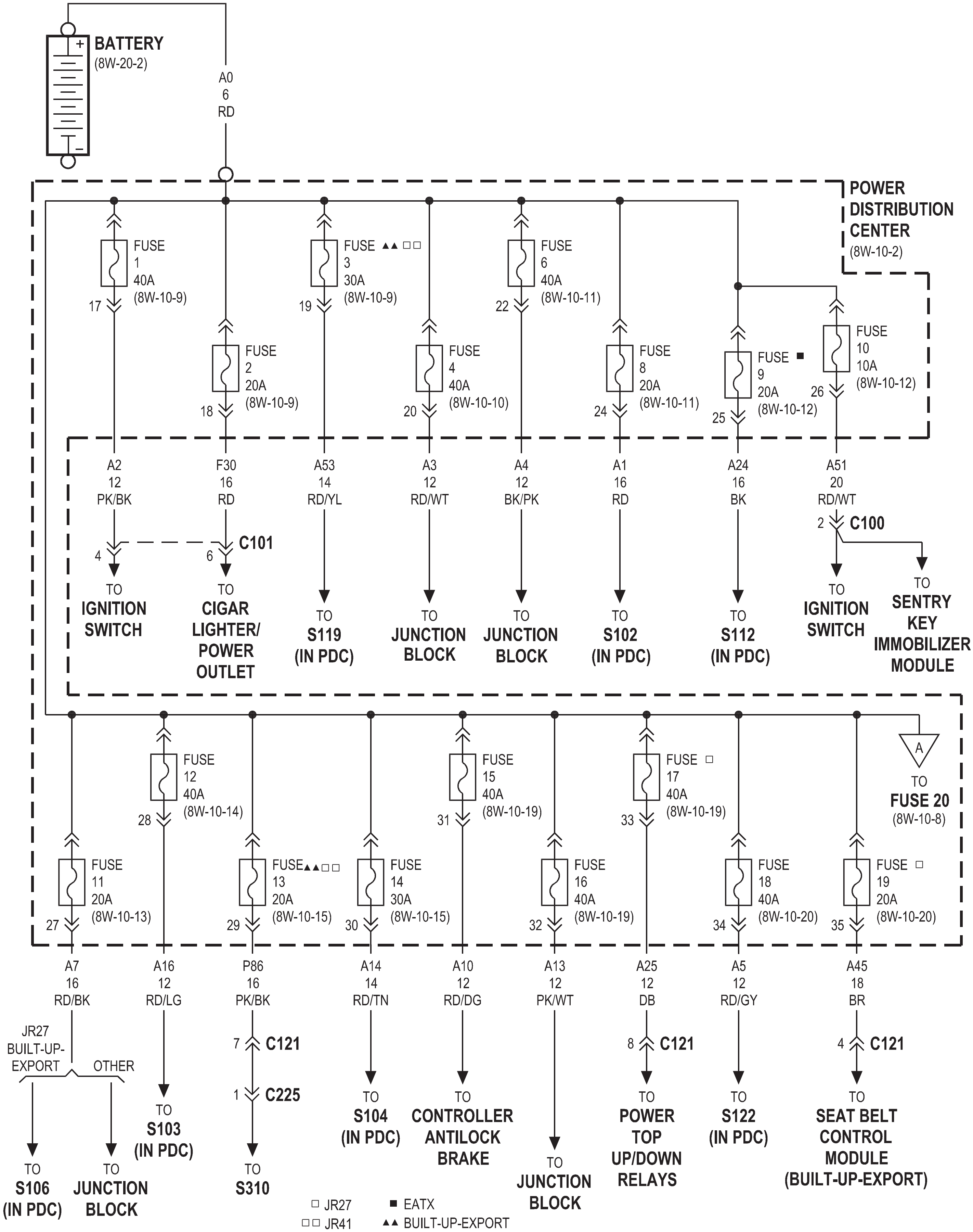
CAVITY	CIRCUIT	FUNCTION
7	K90 20TN	ENGINE STARTER MOTOR RELAY CONTROL
8	-	-
9	A41 16YL ■■	FUSED IGNITION SWITCH OUTPUT (START)
9	T141 16YL/RD ■	FUSED IGNITION SWITCH OUTPUT (START)
10	T40 14BR	ENGINE STARTER MOTOR RELAY OUTPUT
11	A1 16RD	FUSED B(+)

TRANSMISSION CONTROL RELAY

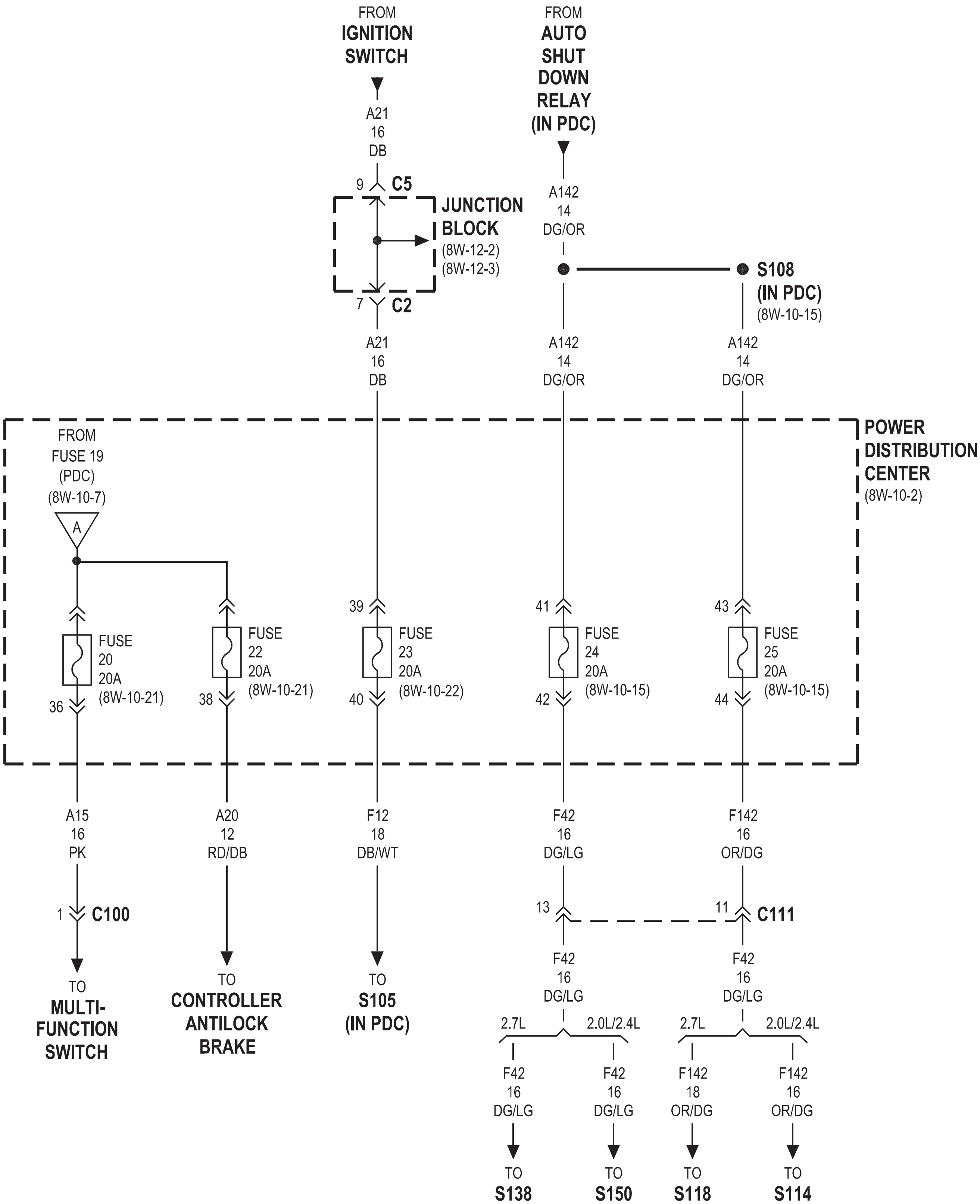
CAVITY	CIRCUIT	FUNCTION
2	Z246 20BK/RD	GROUND
3	-	-
4	T15 20LG	TRANSMISSION CONTROL RELAY CONTROL
5	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
6	A24 16BK	FUSED B(+)

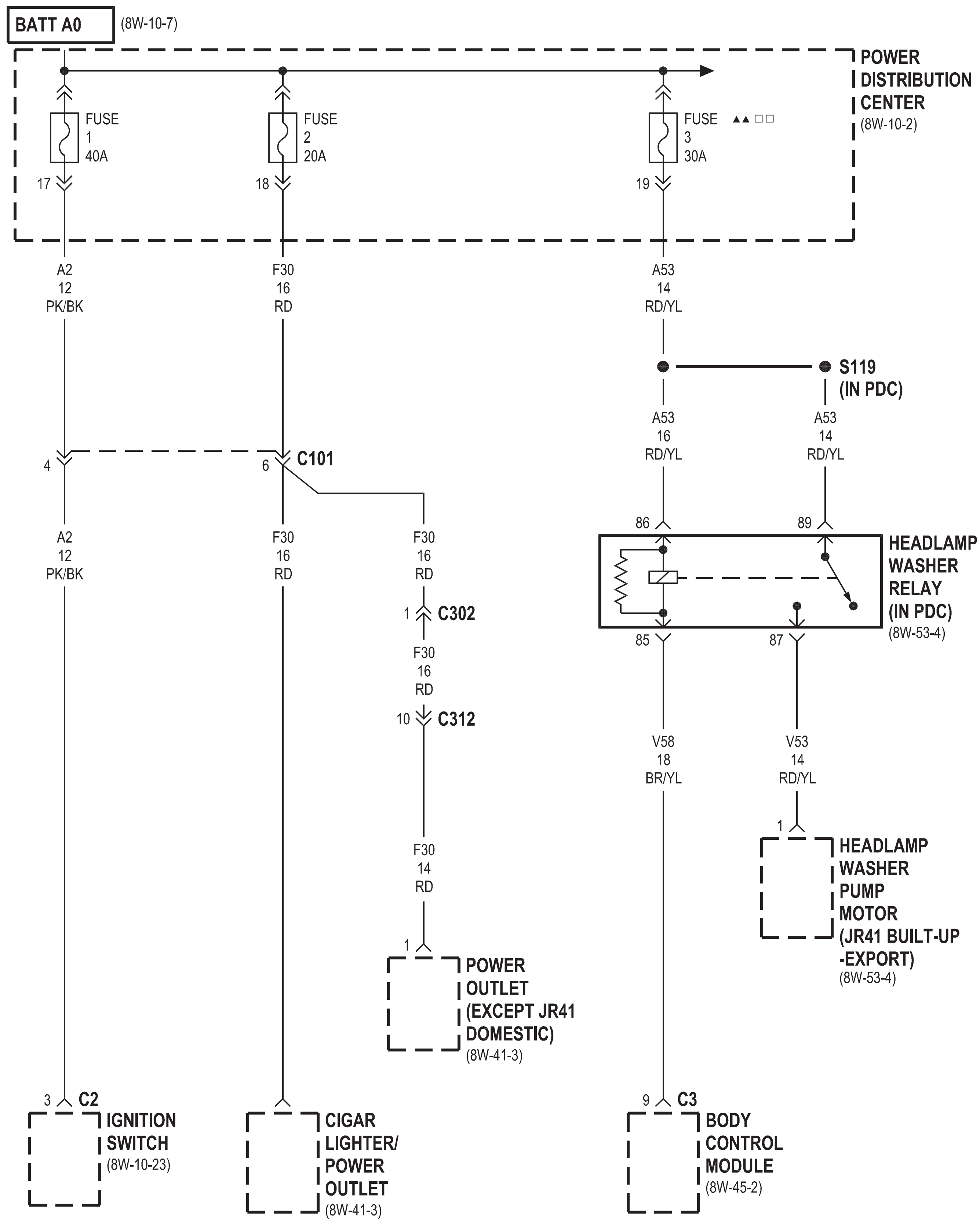
■ MTX
■■ EATX

028W-16 JRI01006

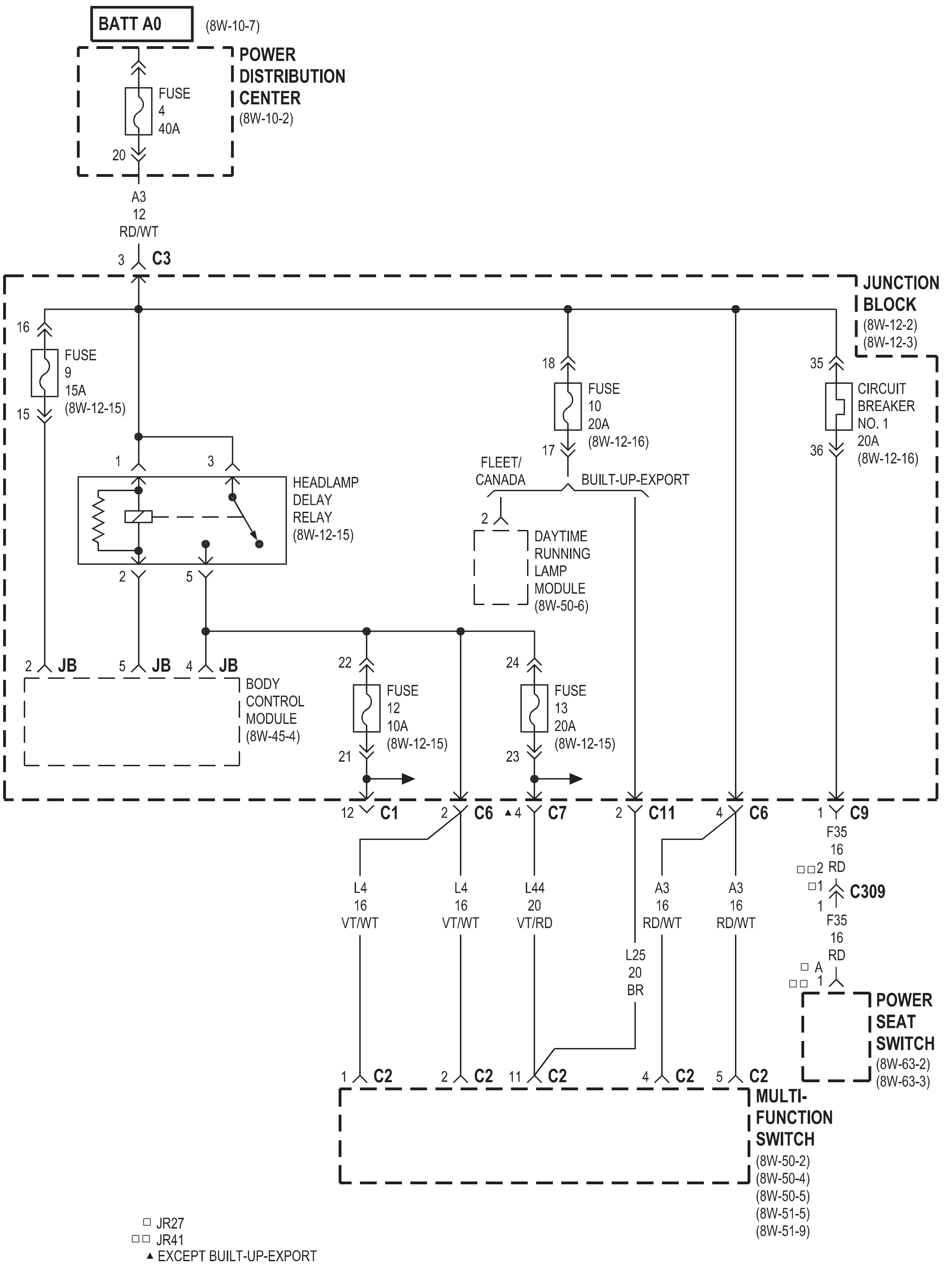


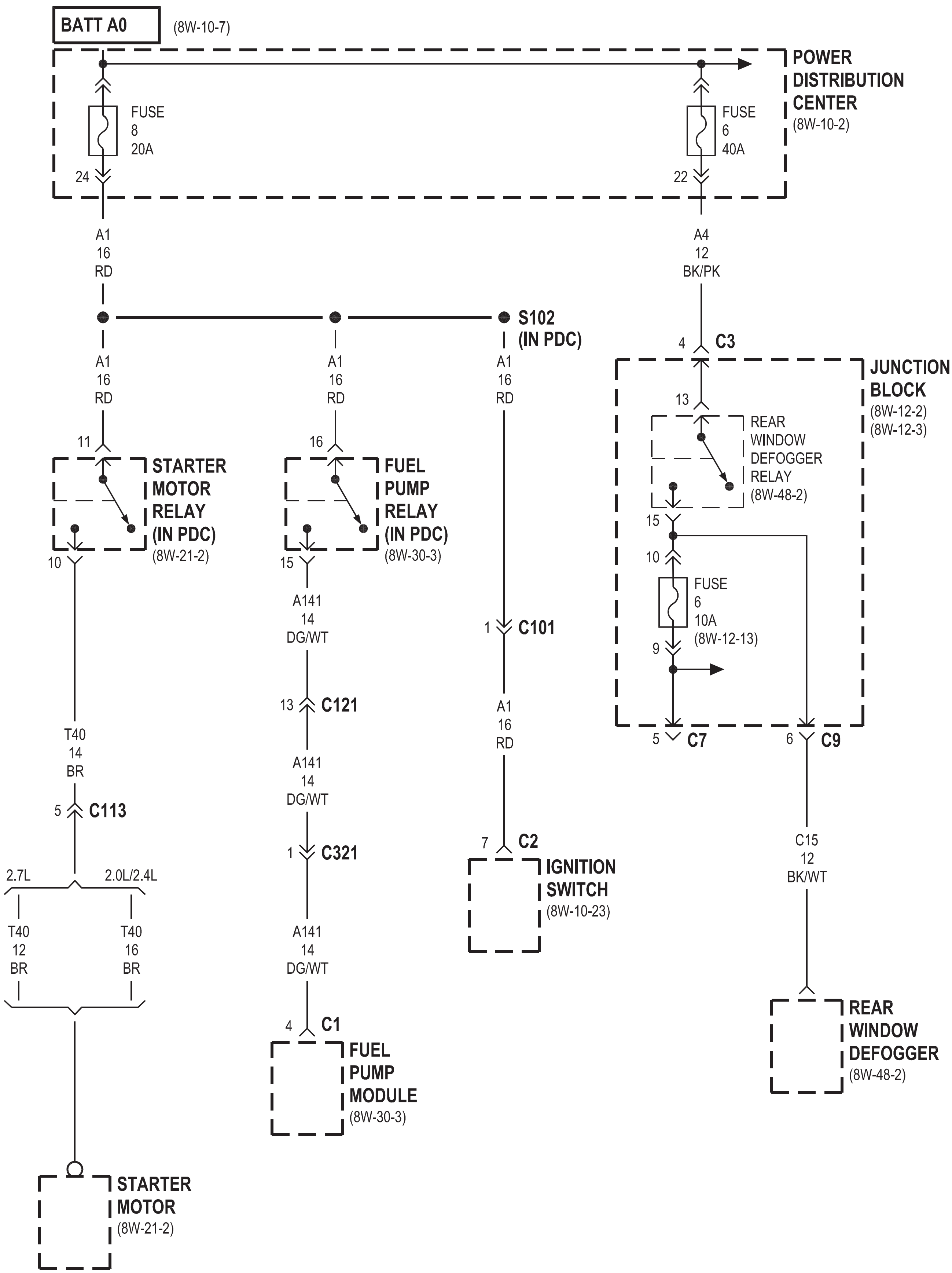
BATTERY
(8W-20-2)
A0
6
RD
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FUSE
1
40A
(8W-10-9)
17
FUSE
2
20A
(8W-10-9)
18
FUSE ▲▲ □□
3
30A
(8W-10-9)
19
FUSE
4
40A
(8W-10-10)
20
FUSE
6
40A
(8W-10-11)
22
FUSE
8
20A
(8W-10-11)
24
FUSE ■
9
20A
(8W-10-12)
25
FUSE
10
10A
(8W-10-12)
26
A2
12
PK/BK
F30
16
RD
A53
14
RD/YL
A3
12
RD/WT
A4
12
BK/PK
A1
16
RD
A24
16
BK
A51
20
RD/WT
2
C100
4
6
C101
TO
IGNITION
SWITCH
TO
CIGAR
LIGHTER/
POWER
OUTLET
TO
S119
(IN PDC)
TO
JUNCTION
BLOCK
TO
JUNCTION
BLOCK
TO
S102
(IN PDC)
TO
S112
(IN PDC)
TO
IGNITION
SWITCH
TO
SENTRY
KEY
IMMOBILIZER
MODULE
FUSE
12
40A
(8W-10-14)
28
FUSE
15
40A
(8W-10-19)
31
FUSE □
17
40A
(8W-10-19)
33
A
TO
FUSE 20
(8W-10-8)
FUSE
11
20A
(8W-10-13)
27
FUSE▲▲□□
13
20A
(8W-10-15)
29
FUSE
14
30A
(8W-10-15)
30
FUSE
16
40A
(8W-10-19)
32
FUSE
18
40A
(8W-10-20)
34
FUSE □
19
20A
(8W-10-20)
35
A7
16
RD/BK
A16
12
RD/LG
P86
16
PK/BK
A14
14
RD/TN
A10
12
RD/DG
A13
12
PK/WT
A25
12
DB
A5
12
RD/GY
A45
18
BR
JR27
BUILT-UP-
EXPORT
OTHER
7
C121
1
C225
8
C121
4
C121
TO
S106
(IN PDC)
TO
JUNCTION
BLOCK
TO
S103
(IN PDC)
TO
S310
TO
S104
(IN PDC)
TO
CONTROLLER
ANTILOCK
BRAKE
TO
JUNCTION
BLOCK
TO
POWER
TOP
UP/DOWN
RELAYS
TO
S122
(IN PDC)
TO
SEAT BELT
CONTROL
MODULE
(BUILT-UP-EXPORT)
□ JR27
□□ JR41
■ EATX
▲▲ BUILT-UP-EXPORT


FROM
IGNITION
SWITCH
A21
16
DB
9
C5
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
7
C2
A21
16
DB
FROM
AUTO
SHUT
DOWN
RELAY
(IN PDC)
A142
14
DG/OR
S108
(IN PDC)
(8W-10-15)
A142
14
DG/OR
A142
14
DG/OR
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FROM
FUSE 19
(PDC)
(8W-10-7)
A
FUSE
20
20A
(8W-10-21)
36
FUSE
22
20A
(8W-10-21)
38
39
FUSE
23
20A
(8W-10-22)
40
41
FUSE
24
20A
(8W-10-15)
42
43
FUSE
25
20A
(8W-10-15)
44
A15
16
PK
1
C100
TO
MULTI-
FUNCTION
SWITCH
A20
12
RD/DB
TO
CONTROLLER
ANTILOCK
BRAKE
F12
18
DB/WT
TO
S105
(IN PDC)
F42
16
DG/LG
13
F142
16
OR/DG
11
C111
F42
16
DG/LG
F42
16
DG/LG
2.7L
2.0L/2.4L
2.7L
2.0L/2.4L
F42
16
DG/LG
TO
S138
F42
16
DG/LG
TO
S150
F142
18
OR/DG
TO
S118
F142
16
OR/DG
TO
S114

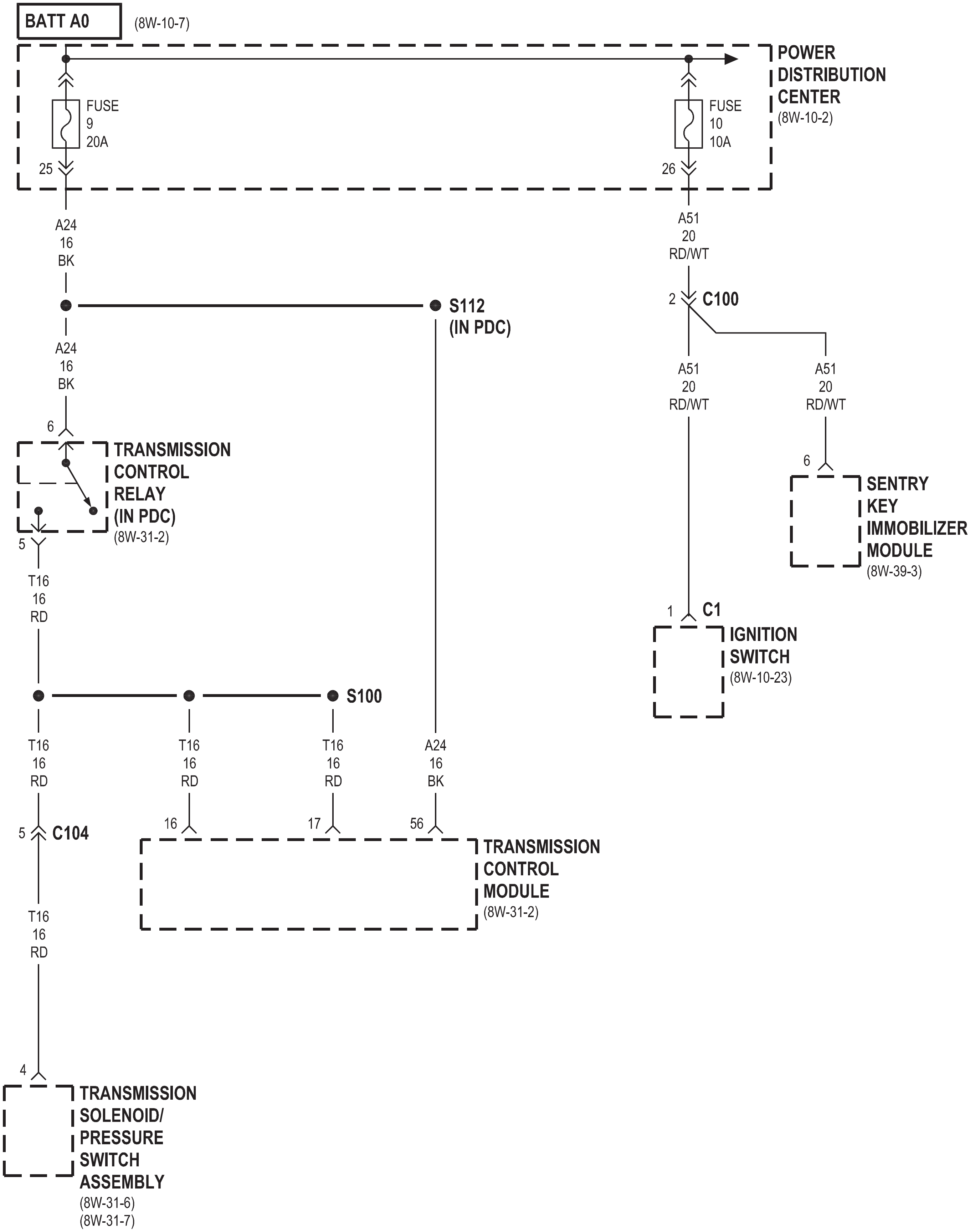


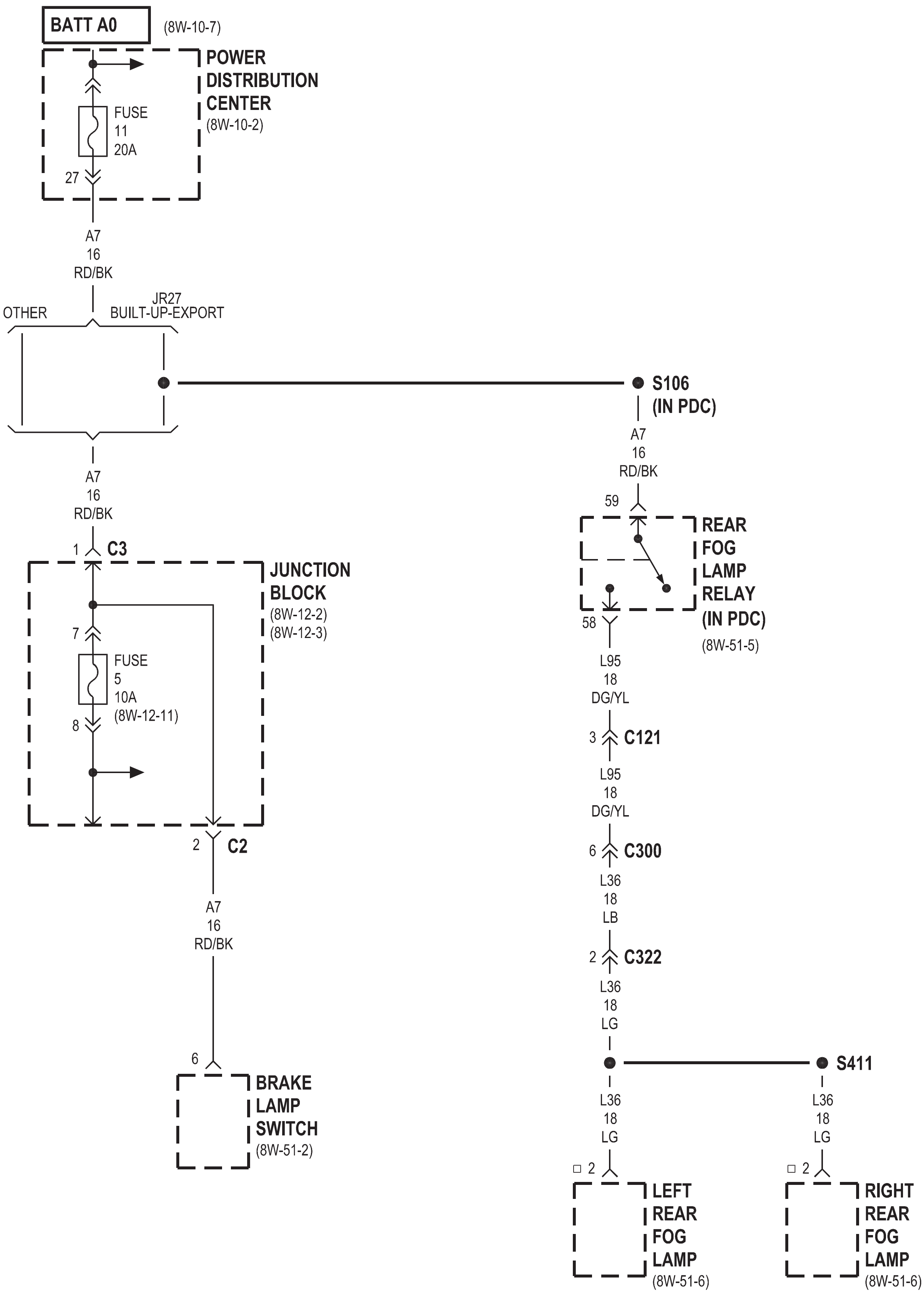
□□ JR41
▲▲ BUILT-UP-EXPORT

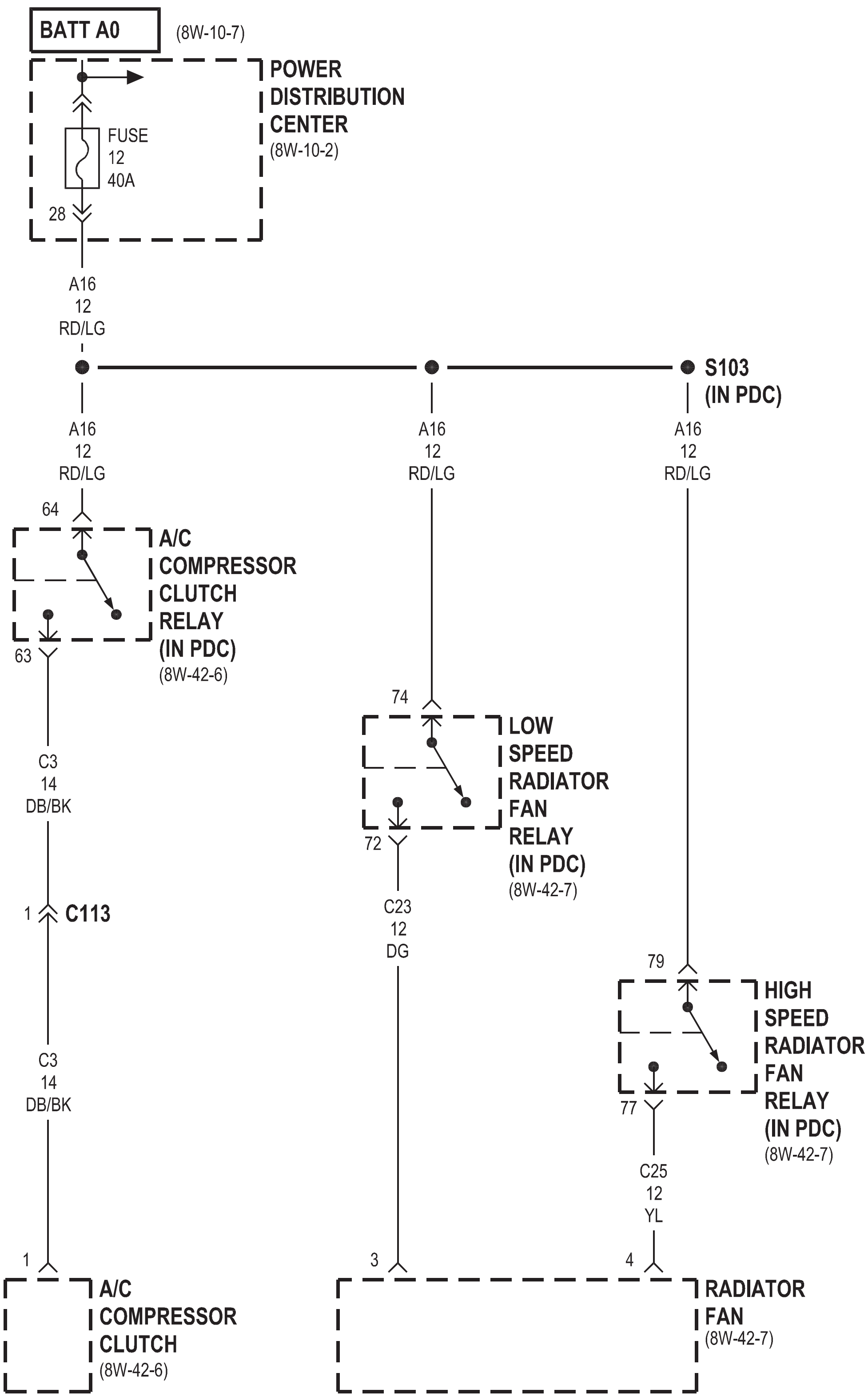

BATT A0
(8W-10-7)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 4 40A
20
A3 12 RD/WT
3 C3
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
16
FUSE 9 15A (8W-12-15)
15
1
3
HEADLAMP DELAY RELAY (8W-12-15)
2
5
2 JB
5 JB
4 JB
BODY CONTROL MODULE (8W-45-4)
18
FUSE 10 20A (8W-12-16)
17
FLEET/ CANADA
BUILT-UP-EXPORT
2
DAYTIME RUNNING LAMP MODULE (8W-50-6)
35
CIRCUIT BREAKER NO. 1 20A (8W-12-16)
36
22
FUSE 12 10A (8W-12-15)
21
24
FUSE 13 20A (8W-12-15)
23
12 C1
2 C6
▲4 C7
2 C11
4 C6
1 C9
F35 16 RD
□□2
□1
C309
1
F35 16 RD
□ A
□□ 1
POWER SEAT SWITCH (8W-63-2) (8W-63-3)
L4 16 VT/WT
L4 16 VT/WT
L44 20 VT/RD
L25 20 BR
A3 16 RD/WT
A3 16 RD/WT
1 C2
2 C2
11 C2
4 C2
5 C2
MULTI-FUNCTION SWITCH
(8W-50-2)
(8W-50-4)
(8W-50-5)
(8W-51-5)
(8W-51-9)
□ JR27
□□ JR41
▲ EXCEPT BUILT-UP-EXPORT

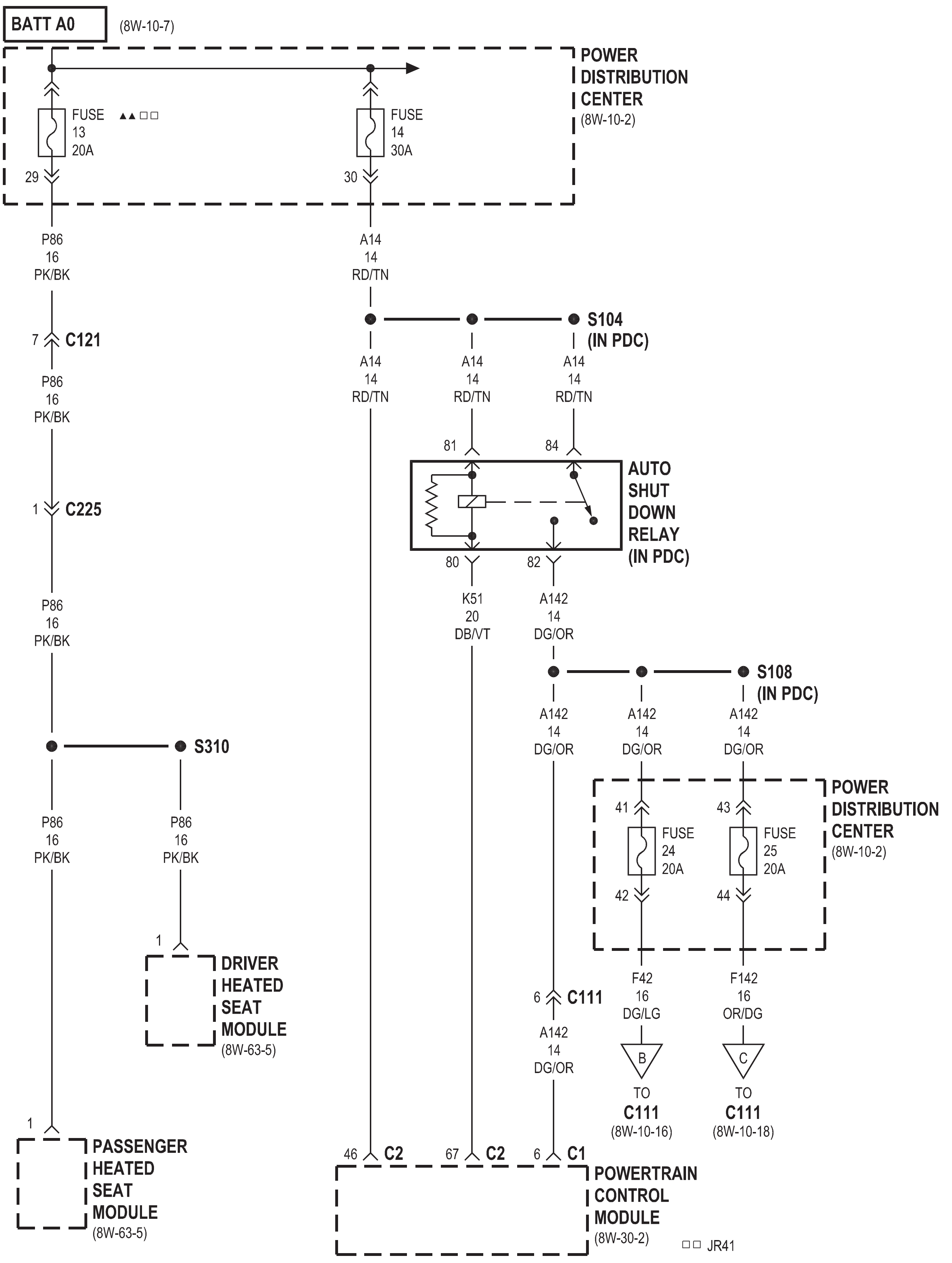


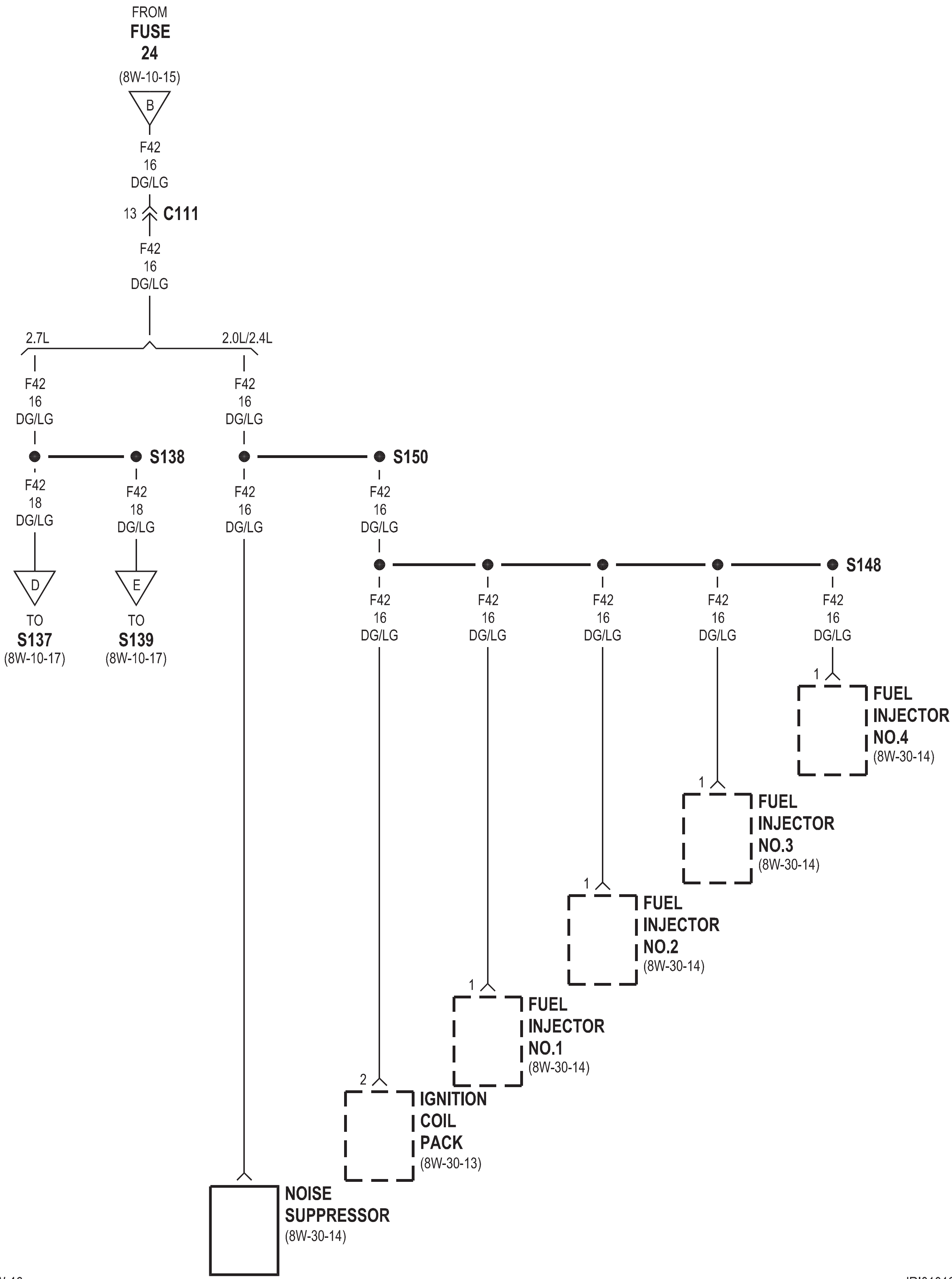
BATT A0
(8W-10-7)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FUSE
8
20A
FUSE
6
40A
24
22
A1
16
RD
A4
12
BK/PK
S102
(IN PDC)
4
C3
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
13
REAR
WINDOW
DEFOGGER
RELAY
(8W-48-2)
11
STARTER
MOTOR
RELAY
(IN PDC)
(8W-21-2)
10
16
FUEL
PUMP
RELAY
(IN PDC)
(8W-30-3)
15
A141
14
DG/WT
15
10
FUSE
6
10A
(8W-12-13)
9
1
C101
13
C121
T40
14
BR
5
C113
5
C7
6
C9
C15
12
BK/WT
1
C321
7
C2
IGNITION
SWITCH
(8W-10-23)
2.7L
2.0L/2.4L
T40
12
BR
T40
16
BR
4
C1
FUEL
PUMP
MODULE
(8W-30-3)
REAR
WINDOW
DEFOGGER
(8W-48-2)
STARTER
MOTOR
(8W-21-2)

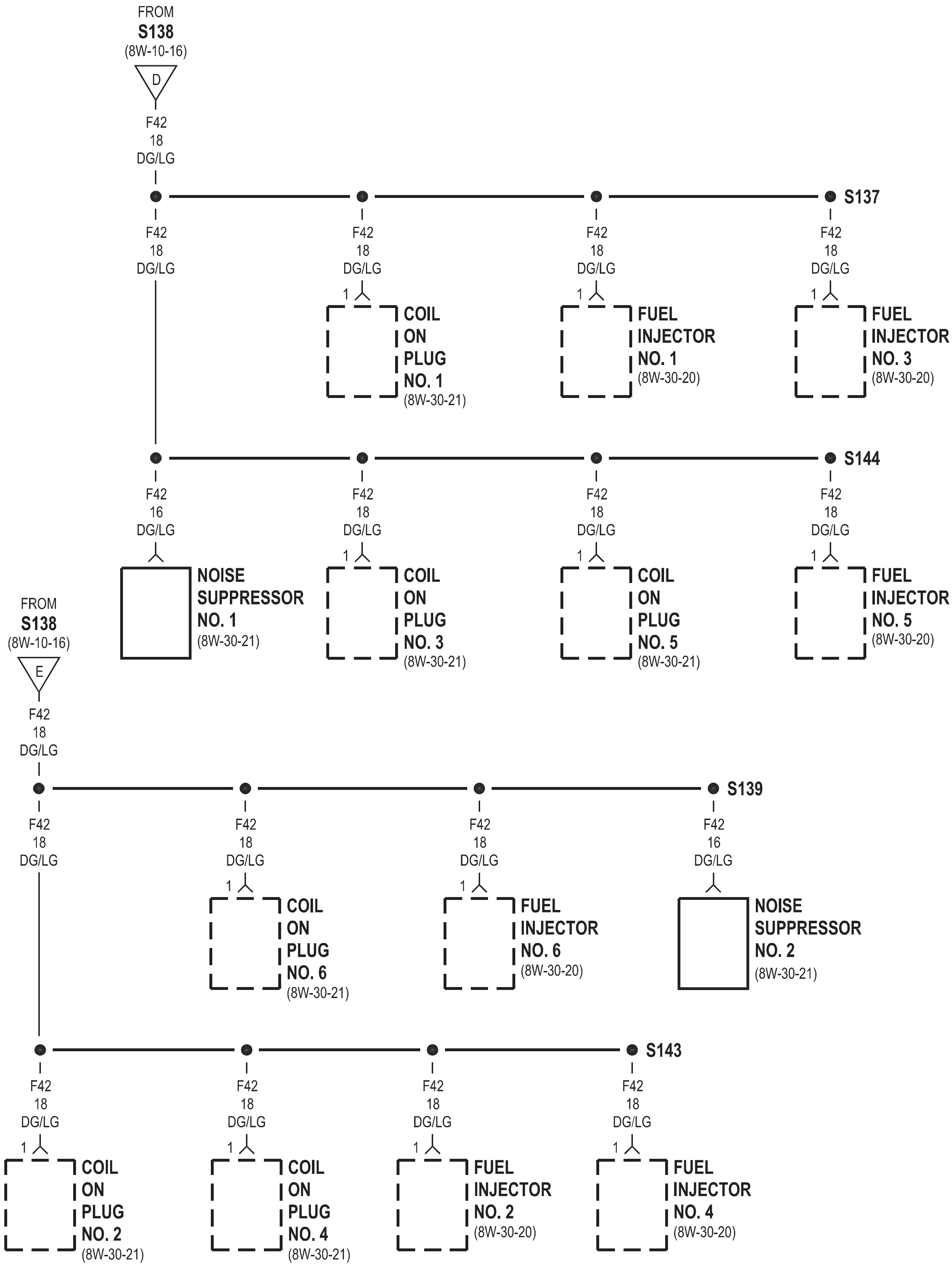

BATT A0
(8W-10-7)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FUSE
9
20A
FUSE
10
10A
25
26
A24
16
BK
A51
20
RD/WT
2
C100
S112
(IN PDC)
A24
16
BK
A51
20
RD/WT
A51
20
RD/WT
6
TRANSMISSION
CONTROL
RELAY
(IN PDC)
(8W-31-2)
6
SENTRY
KEY
IMMOBILIZER
MODULE
(8W-39-3)
5
T16
16
RD
1
C1
IGNITION
SWITCH
(8W-10-23)
S100
T16
16
RD
T16
16
RD
T16
16
RD
A24
16
BK
5
C104
16
17
56
TRANSMISSION
CONTROL
MODULE
(8W-31-2)
T16
16
RD
4
TRANSMISSION
SOLENOID/
PRESSURE
SWITCH
ASSEMBLY
(8W-31-6)
(8W-31-7)

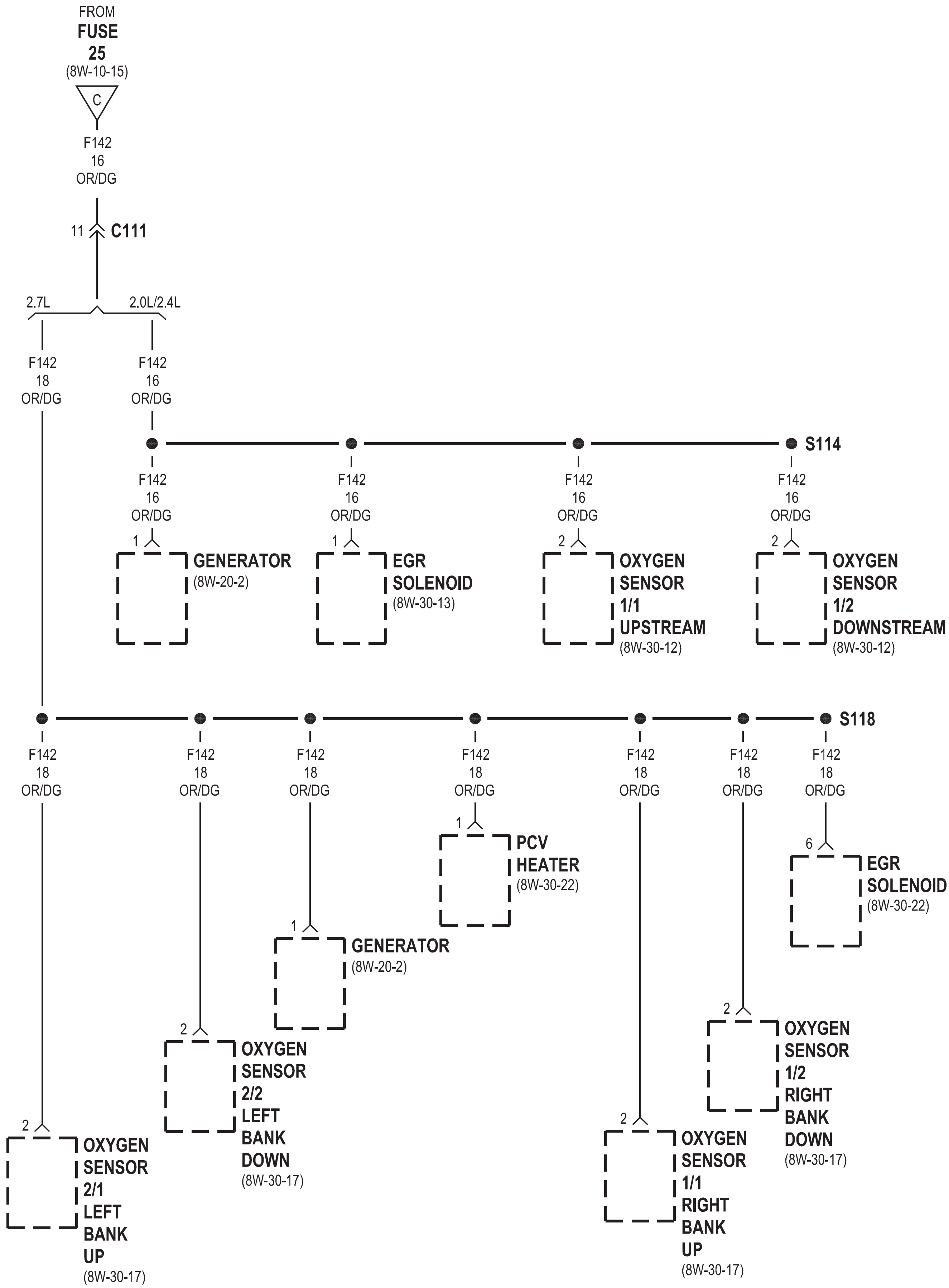

BATT A0
(8W-10-7)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
11
20A
27
A7
16
RD/BK
OTHER
JR27
BUILT-UP-EXPORT
S106
(IN PDC)
A7
16
RD/BK
59
REAR FOG LAMP RELAY (IN PDC)
(8W-51-5)
58
L95
18
DG/YL
3
C121
L95
18
DG/YL
6
C300
L36
18
LB
2
C322
L36
18
LG
S411
L36
18
LG
A7
16
RD/BK
1
C3
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
7
FUSE
5
10A
(8W-12-11)
8
2
C2
A7
16
RD/BK
6
BRAKE LAMP SWITCH
(8W-51-2)
2
LEFT REAR FOG LAMP
(8W-51-6)
2
RIGHT REAR FOG LAMP
(8W-51-6)


BATT A0
(8W-10-7)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
12
40A
28
A16
12
RD/LG
S103
(IN PDC)
A16
12
RD/LG
A16
12
RD/LG
A16
12
RD/LG
64
A/C COMPRESSOR CLUTCH RELAY (IN PDC)
(8W-42-6)
63
C3
14
DB/BK
1
C113
C3
14
DB/BK
1
A/C COMPRESSOR CLUTCH
(8W-42-6)
74
LOW SPEED RADIATOR FAN RELAY (IN PDC)
(8W-42-7)
72
C23
12
DG
3
79
HIGH SPEED RADIATOR FAN RELAY (IN PDC)
(8W-42-7)
77
C25
12
YL
4
RADIATOR FAN
(8W-42-7)


BATT A0
(8W-10-7)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 13 20A ▲▲ □□
FUSE 14 30A
29
30
P86 16 PK/BK
A14 14 RD/TN
7 C121
1 C225
S104 (IN PDC)
81
84
AUTO SHUT DOWN RELAY (IN PDC)
80
82
K51 20 DB/VT
A142 14 DG/OR
S108 (IN PDC)
S310
41
43
FUSE 24 20A
FUSE 25 20A
42
44
F42 16 DG/LG
F142 16 OR/DG
6 C111
B
C
TO C111 (8W-10-16)
TO C111 (8W-10-18)
1
DRIVER HEATED SEAT MODULE
(8W-63-5)
PASSENGER HEATED SEAT MODULE
(8W-63-5)
46 C2
67 C2
6 C1
POWERTRAIN CONTROL MODULE
(8W-30-2)
□□ JR41
▲▲ BUILT-UP-EXPORT

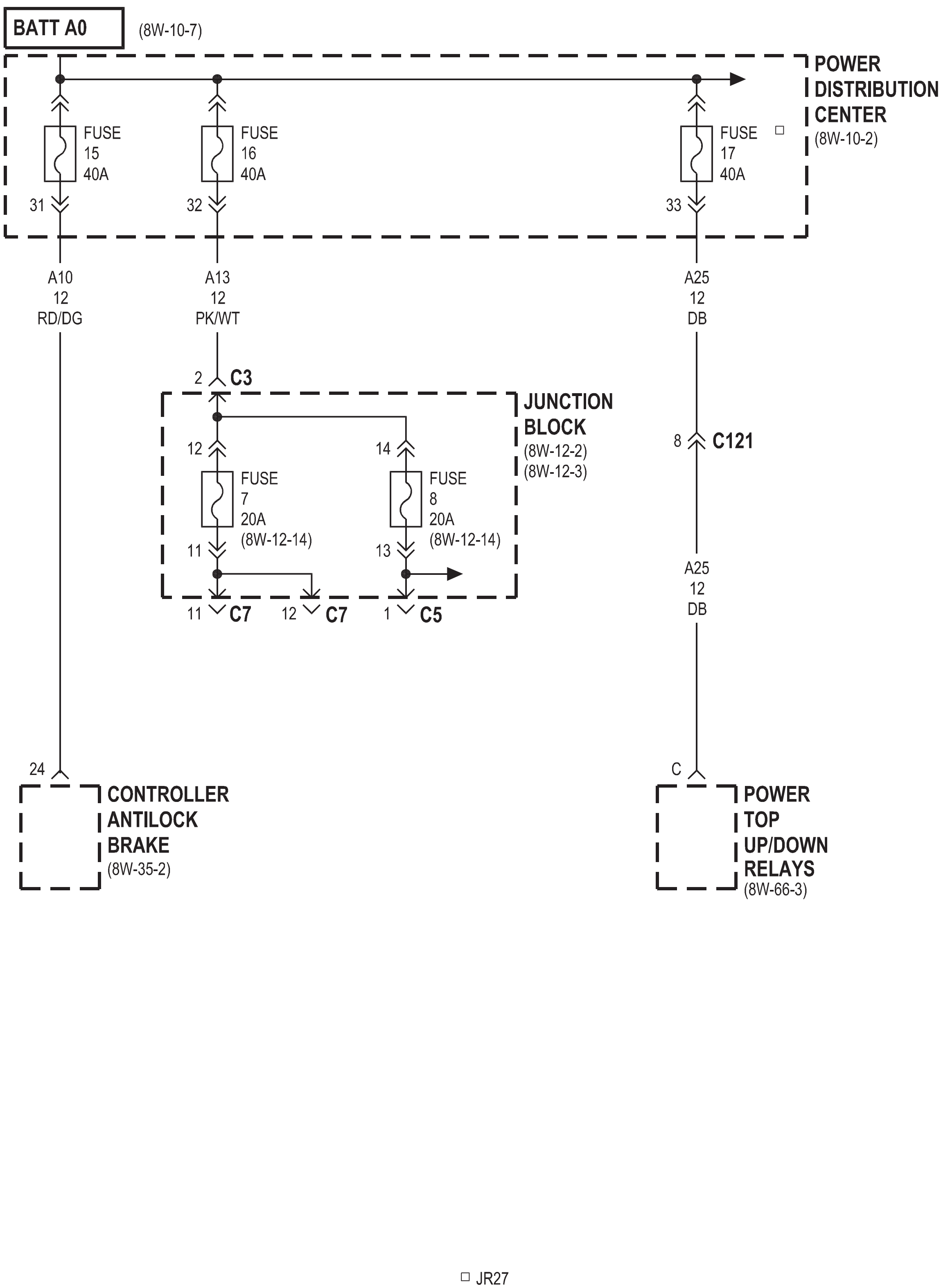

FROM
FUSE
24
(8W-10-15)
B
F42
16
DG/LG
13
C111
F42
16
DG/LG
2.7L
2.0L/2.4L
F42
16
DG/LG
F42
16
DG/LG
S138
S150
F42
18
DG/LG
F42
18
DG/LG
F42
16
DG/LG
F42
16
DG/LG
D
E
TO
S137
(8W-10-17)
TO
S139
(8W-10-17)
S148
F42
16
DG/LG
F42
16
DG/LG
F42
16
DG/LG
F42
16
DG/LG
F42
16
DG/LG
1
FUEL
INJECTOR
NO.4
(8W-30-14)
1
FUEL
INJECTOR
NO.3
(8W-30-14)
1
FUEL
INJECTOR
NO.2
(8W-30-14)
1
FUEL
INJECTOR
NO.1
(8W-30-14)
2
IGNITION
COIL
PACK
(8W-30-13)
NOISE
SUPPRESSOR
(8W-30-14)


FROM
S138
(8W-10-16)
D
F42
18
DG/LG
S137
F42
18
DG/LG
1
COIL
ON
PLUG
NO. 1
(8W-30-21)
FUEL
INJECTOR
NO. 1
(8W-30-20)
FUEL
INJECTOR
NO. 3
(8W-30-20)
S144
F42
16
DG/LG
NOISE
SUPPRESSOR
NO. 1
(8W-30-21)
COIL
ON
PLUG
NO. 3
(8W-30-21)
COIL
ON
PLUG
NO. 5
(8W-30-21)
FUEL
INJECTOR
NO. 5
(8W-30-20)
FROM
S138
(8W-10-16)
E
S139
COIL
ON
PLUG
NO. 6
(8W-30-21)
FUEL
INJECTOR
NO. 6
(8W-30-20)
NOISE
SUPPRESSOR
NO. 2
(8W-30-21)
S143
COIL
ON
PLUG
NO. 2
(8W-30-21)
COIL
ON
PLUG
NO. 4
(8W-30-21)
FUEL
INJECTOR
NO. 2
(8W-30-20)
FUEL
INJECTOR
NO. 4
(8W-30-20)

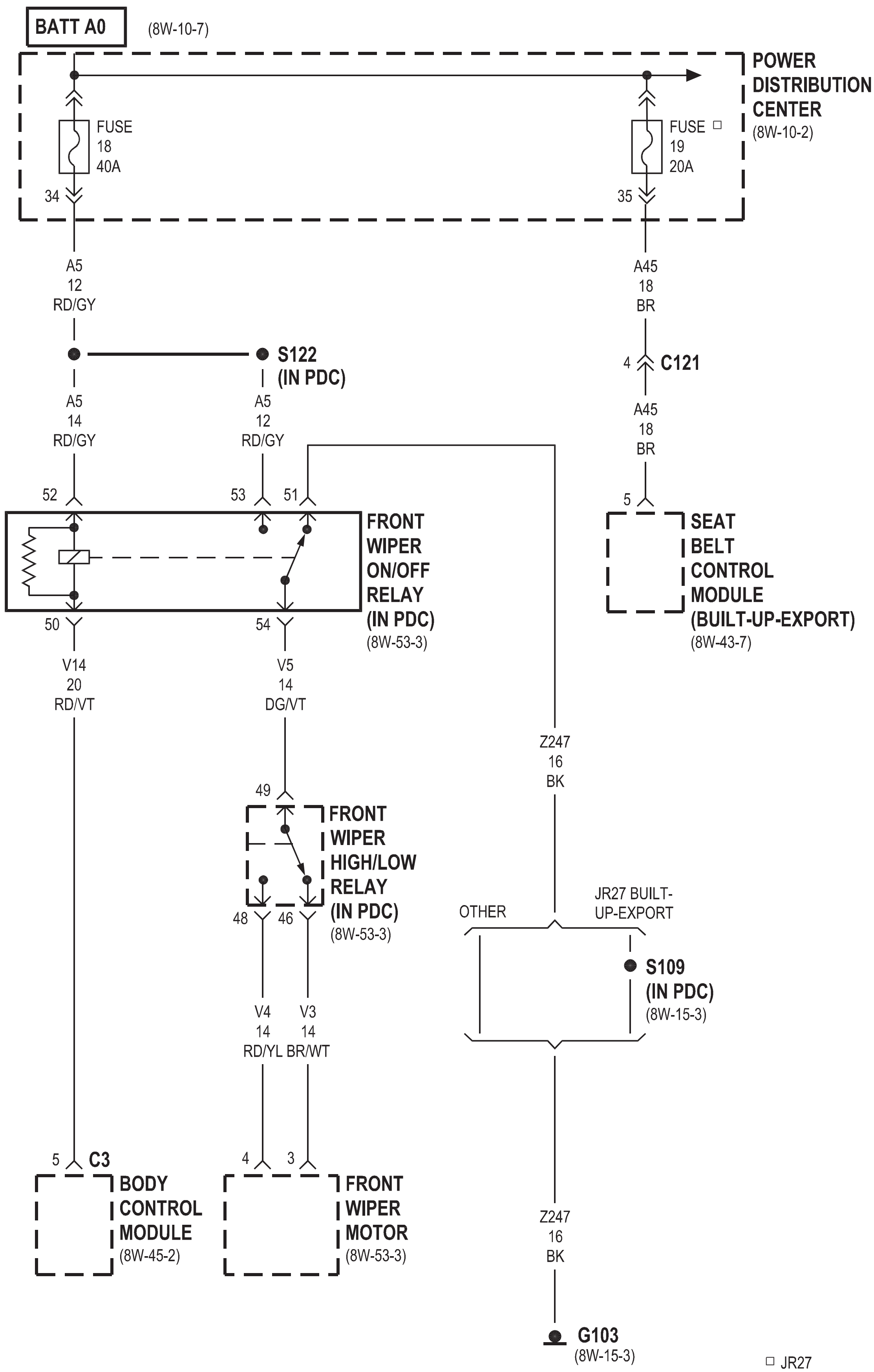


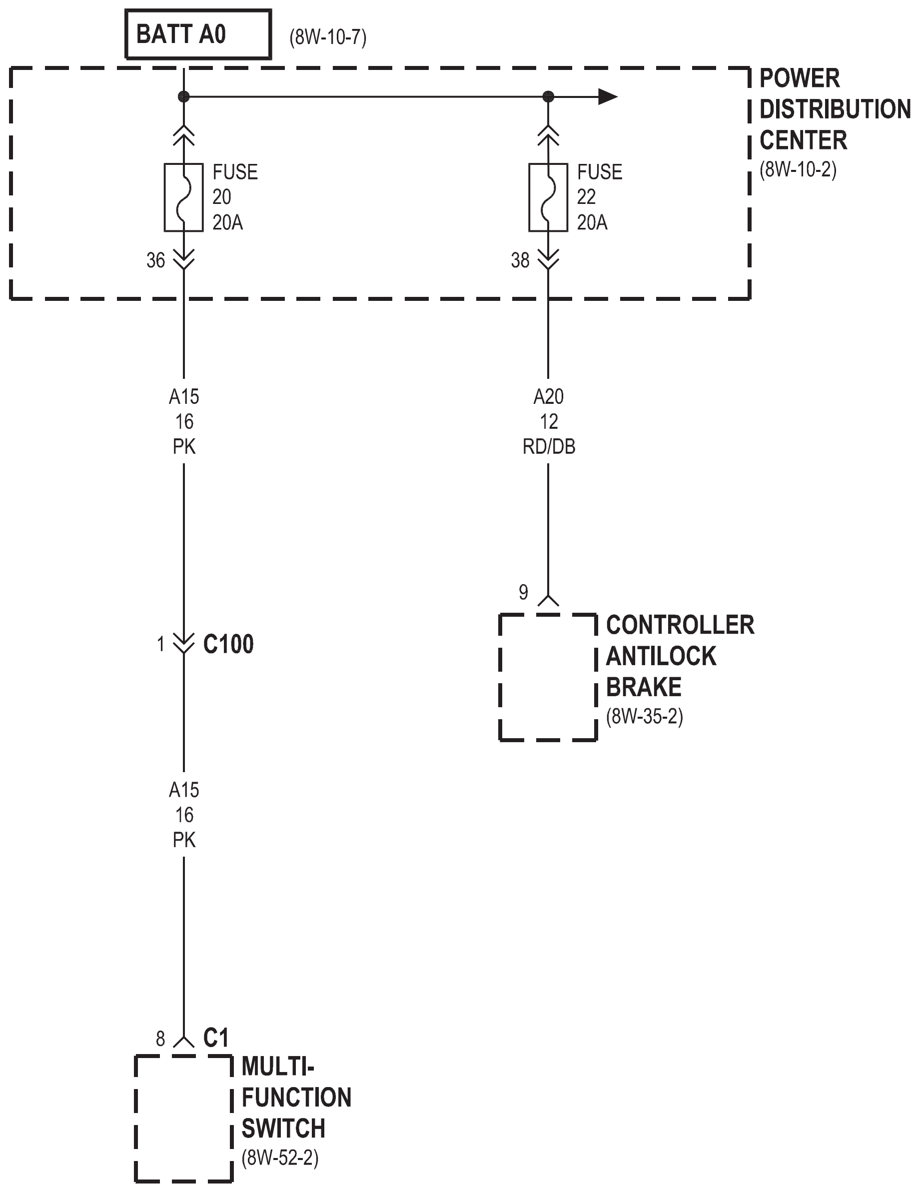
028W-16

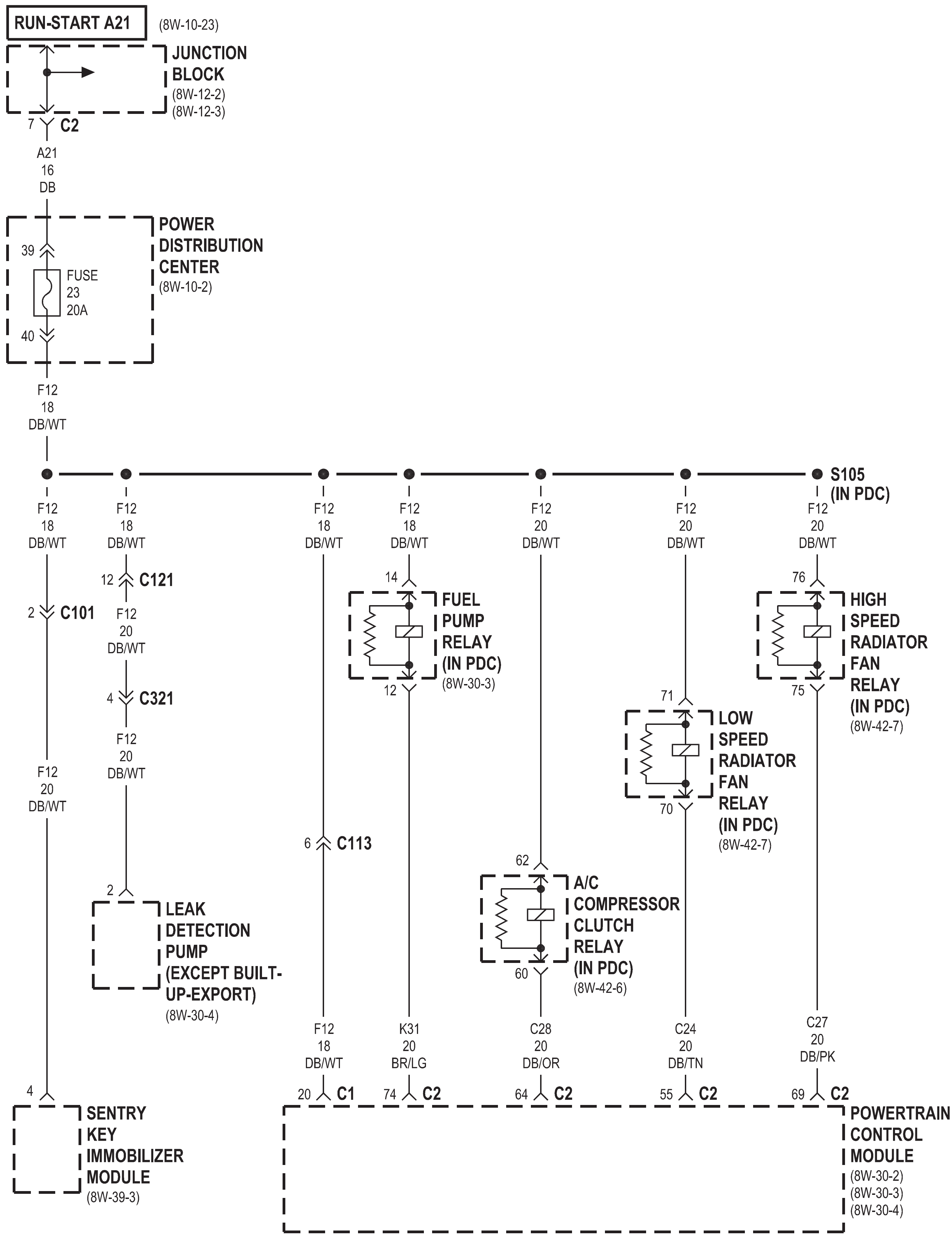
JRI01018



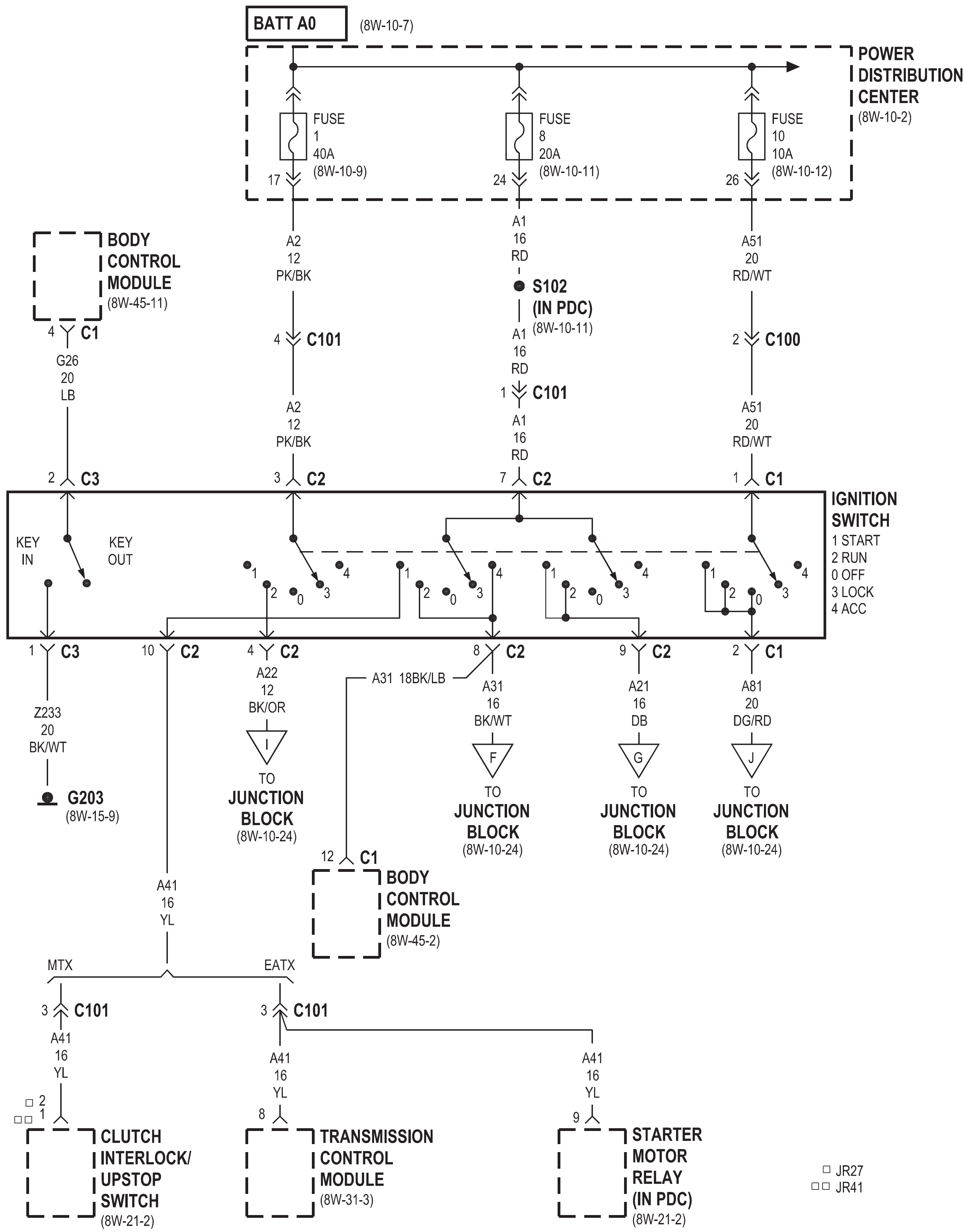
BATT A0
(8W-10-7)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FUSE
15
40A
FUSE
16
40A
FUSE
17
40A
31
32
33
A10
12
RD/DG
A13
12
PK/WT
A25
12
DB
2
C3
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
12
14
FUSE
7
20A
(8W-12-14)
FUSE
8
20A
(8W-12-14)
11
13
11
C7
12
C7
1
C5
8
C121
A25
12
DB
24
CONTROLLER
ANTILOCK
BRAKE
(8W-35-2)
C
POWER
TOP
UP/DOWN
RELAYS
(8W-66-3)
JR27

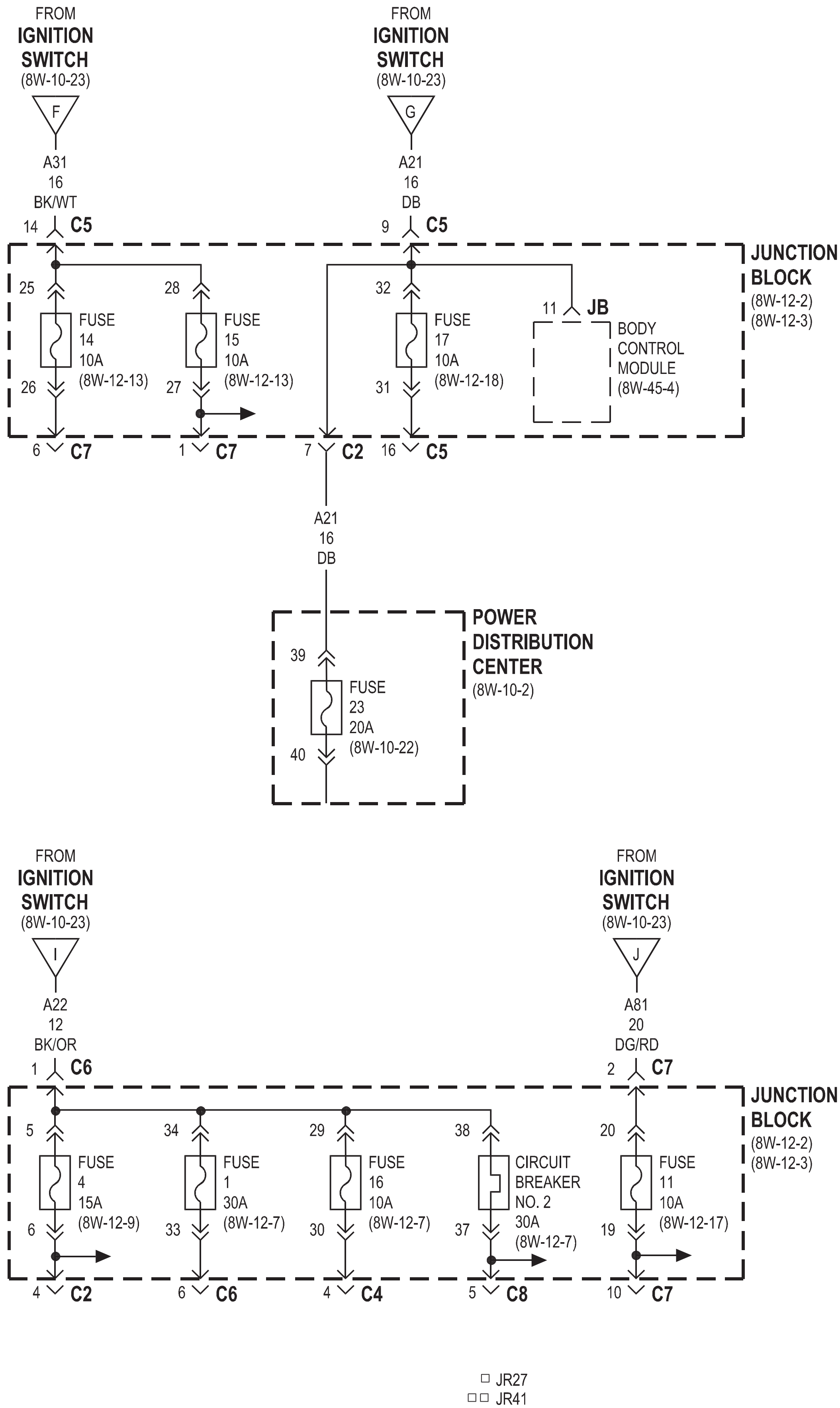

BATT A0
(8W-10-7)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 18 40A
FUSE 19 20A
34
35
A5 12 RD/GY
A45 18 BR
S122 (IN PDC)
4 C121
A5 14 RD/GY
A5 12 RD/GY
A45 18 BR
52
53
51
5
FRONT WIPER ON/OFF RELAY (IN PDC)
(8W-53-3)
SEAT BELT CONTROL MODULE (BUILT-UP-EXPORT)
(8W-43-7)
50
54
V14 20 RD/VT
V5 14 DG/VT
Z247 16 BK
49
FRONT WIPER HIGH/LOW RELAY (IN PDC)
(8W-53-3)
48
46
OTHER
JR27 BUILT-UP-EXPORT
S109 (IN PDC)
(8W-15-3)
V4 14 RD/YL
V3 14 BR/WT
5 C3
4
3
BODY CONTROL MODULE
(8W-45-2)
FRONT WIPER MOTOR
(8W-53-3)
Z247 16 BK
G103
(8W-15-3)
□ JR27


BATT A0
(8W-10-7)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 20 20A
FUSE 22 20A
36
38
A15 16 PK
A20 12 RD/DB
9
CONTROLLER ANTILOCK BRAKE
(8W-35-2)
1
C100
A15 16 PK
8
C1
MULTI-FUNCTION SWITCH
(8W-52-2)

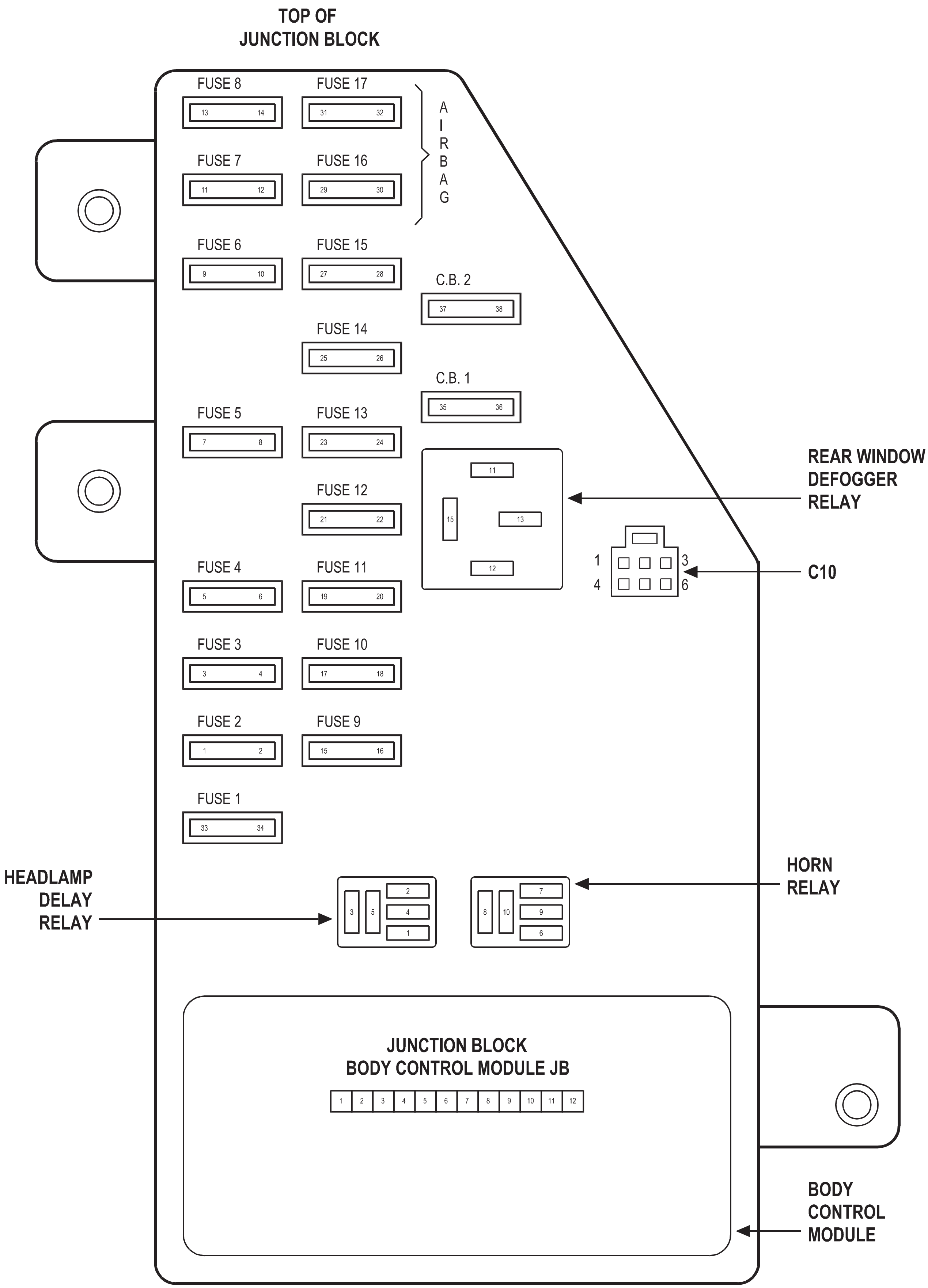


028W-16 JRI01022

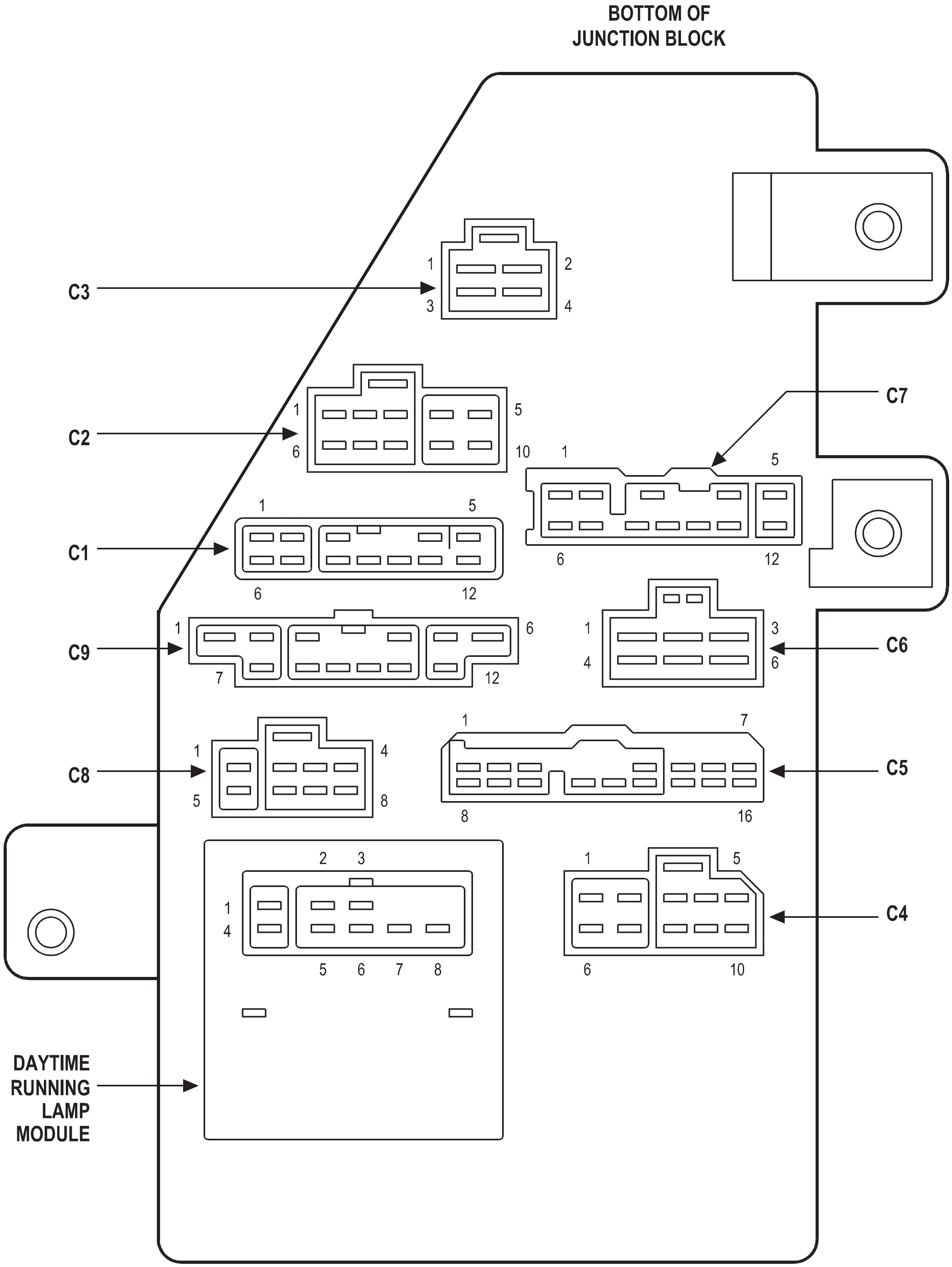

BATT A0
(8W-10-7)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 1 40A (8W-10-9)
FUSE 8 20A (8W-10-11)
FUSE 10 10A (8W-10-12)
17
24
26
BODY CONTROL MODULE
(8W-45-11)
4 C1
G26 20 LB
A2 12 PK/BK
4 C101
A2 12 PK/BK
A1 16 RD
S102 (IN PDC)
(8W-10-11)
A1 16 RD
1 C101
A1 16 RD
A51 20 RD/WT
2 C100
A51 20 RD/WT
2 C3
3 C2
7 C2
1 C1
IGNITION SWITCH
1 START
2 RUN
0 OFF
3 LOCK
4 ACC
KEY IN
KEY OUT
1 C3
10 C2
4 C2
8 C2
9 C2
2 C1
Z233 20 BK/WT
G203
(8W-15-9)
A22 12 BK/OR
I
TO JUNCTION BLOCK
(8W-10-24)
A31 18BK/LB
A31 16 BK/WT
F
TO JUNCTION BLOCK
(8W-10-24)
A21 16 DB
G
TO JUNCTION BLOCK
(8W-10-24)
A81 20 DG/RD
J
TO JUNCTION BLOCK
(8W-10-24)
12 C1
BODY CONTROL MODULE
(8W-45-2)
A41 16 YL
MTX
EATX
3 C101
3 C101
A41 16 YL
A41 16 YL
A41 16 YL
□ 2
□□ 1
8
9
CLUTCH INTERLOCK/ UPSTOP SWITCH
(8W-21-2)
TRANSMISSION CONTROL MODULE
(8W-31-3)
STARTER MOTOR RELAY (IN PDC)
(8W-21-2)
□ JR27
□□ JR41


FROM
IGNITION SWITCH
(8W-10-23)
F
A31
16
BK/WT
14 C5
FROM
IGNITION SWITCH
(8W-10-23)
G
A21
16
DB
9 C5
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
25
FUSE 14 10A (8W-12-13)
26
28
FUSE 15 10A (8W-12-13)
27
32
FUSE 17 10A (8W-12-18)
31
11 JB
BODY CONTROL MODULE (8W-45-4)
6 C7
1 C7
7 C2
16 C5
A21
16
DB
POWER DISTRIBUTION CENTER
(8W-10-2)
39
FUSE 23 20A (8W-10-22)
40
FROM
IGNITION SWITCH
(8W-10-23)
I
A22
12
BK/OR
1 C6
FROM
IGNITION SWITCH
(8W-10-23)
J
A81
20
DG/RD
2 C7
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
5
FUSE 4 15A (8W-12-9)
6
34
FUSE 1 30A (8W-12-7)
33
29
FUSE 16 10A (8W-12-7)
30
38
CIRCUIT BREAKER NO. 2 30A (8W-12-7)
37
20
FUSE 11 10A (8W-12-17)
19
4 C2
6 C6
4 C4
5 C8
10 C7
□ JR27
□□ JR41

8W-12 JUNCTION BLOCK


TOP OF
JUNCTION BLOCK
FUSE 8
13 14
FUSE 17
31 32
FUSE 7
11 12
FUSE 16
29 30
AIRBAG
FUSE 6
9 10
FUSE 15
27 28
C.B. 2
37 38
FUSE 14
25 26
C.B. 1
35 36
FUSE 5
7 8
FUSE 13
23 24
FUSE 12
21 22
REAR WINDOW
DEFOGGER
RELAY
11
15
13
12
C10
1 3
4 6
FUSE 4
5 6
FUSE 11
19 20
FUSE 3
3 4
FUSE 10
17 18
FUSE 2
1 2
FUSE 9
15 16
FUSE 1
33 34
HEADLAMP
DELAY
RELAY
3 5 2 4 1
HORN
RELAY
8 10 7 9 6
JUNCTION BLOCK
BODY CONTROL MODULE JB
1 2 3 4 5 6 7 8 9 10 11 12
BODY
CONTROL
MODULE

JRI01202


BOTTOM OF
JUNCTION BLOCK
C3
1
2
3
4
C2
1
5
6
10
C7
1
5
6
12
C1
1
5
6
12
C9
1
6
7
12
C6
1
3
4
6
C8
1
4
5
8
C5
1
7
8
16
2
3
1
4
5
6
7
8
C4
1
5
6
10
DAYTIME
RUNNING
LAMP
MODULE

FUSES

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	30A	C1 14DG	FUSED IGNITION SWITCH OUTPUT (RUN)
2	10A	L34 18RD/OR	FUSED RIGHT HIGH BEAM OUTPUT
3	10A	L33 18LG/BR	FUSED LEFT HIGH BEAM OUTPUT
4	15A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN)
5	10A	INTERNAL	FUSED B(+)
6	10A	INTERNAL	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
7	20A	INTERNAL	FUSED B(+)
8	20A	INTERNAL	FUSED B(+)
9	15A	INTERNAL	FUSED B(+)
10	20A	L25 20BR ▲▲	FUSED B(+)
10	20A	INTERNAL ▲	FUSED B(+)
11	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
12	10A	INTERNAL	FUSED LEFT LOW BEAM OUTPUT
13	20A	INTERNAL	FUSED RIGHT LOW BEAM OUTPUT
14	10A	X12 18RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
15	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
16	10A	F23 20DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
17	10A	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
		F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)

▲ EXCEPT BUILT-UP-EXPORT
▲▲ BUILT-UP-EXPORT

CIRCUIT BREAKERS

C.B. NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	20A	F35 16RD	FUSED B(+)
2	30A	F21 14TN □	FUSED IGNITION SWITCH OUTPUT(RUN)
2	30A	INTERNAL □□	FUSED IGNITION SWITCH OUTPUT(RUN)

JUNCTION BLOCK
BODY CONTROL MODULE JB

CAV	CIRCUIT	FUNCTION
1	L3 14RD/OR	DIMMER SWITCH HIGH BEAM OUTPUT
2	INTERNAL	FUSED B(+)
3	INTERNAL	REAR WINDOW DEFOGGER RELAY CONTROL
4	INTERNAL	HEADLAMP DELAY RELAY OUTPUT
5	INTERNAL	HEADLAMP DELAY RELAY CONTROL
6	INTERNAL	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
7	INTERNAL	HORN RELAY CONTROL
8	INTERNAL	HEADLAMP SWITCH OUTPUT
9	M2 18YL □	COURTESY LAMPS DRIVER
9	M2 20YL □□	COURTESY LAMPS DRIVER
10	INTERNAL	GROUND
11	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	INTERNAL	FUSED B(+)

□ JR27
□□ JR41

DAYTIME RUNNING LAMP MODULE

CAVITY	CIRCUIT	FUNCTION
1	INTERNAL	FUSED LEFT LOW BEAM OUTPUT
2	INTERNAL	FUSED B(+)
3	-	-
4	INTERNAL	FUSED RIGHT HIGH BEAM OUTPUT
5	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN)
6	INTERNAL	RED BRAKE WARNING INDICATOR DRIVER
7	-	-
8	INTERNAL	GROUND

HEADLAMP DELAY RELAY

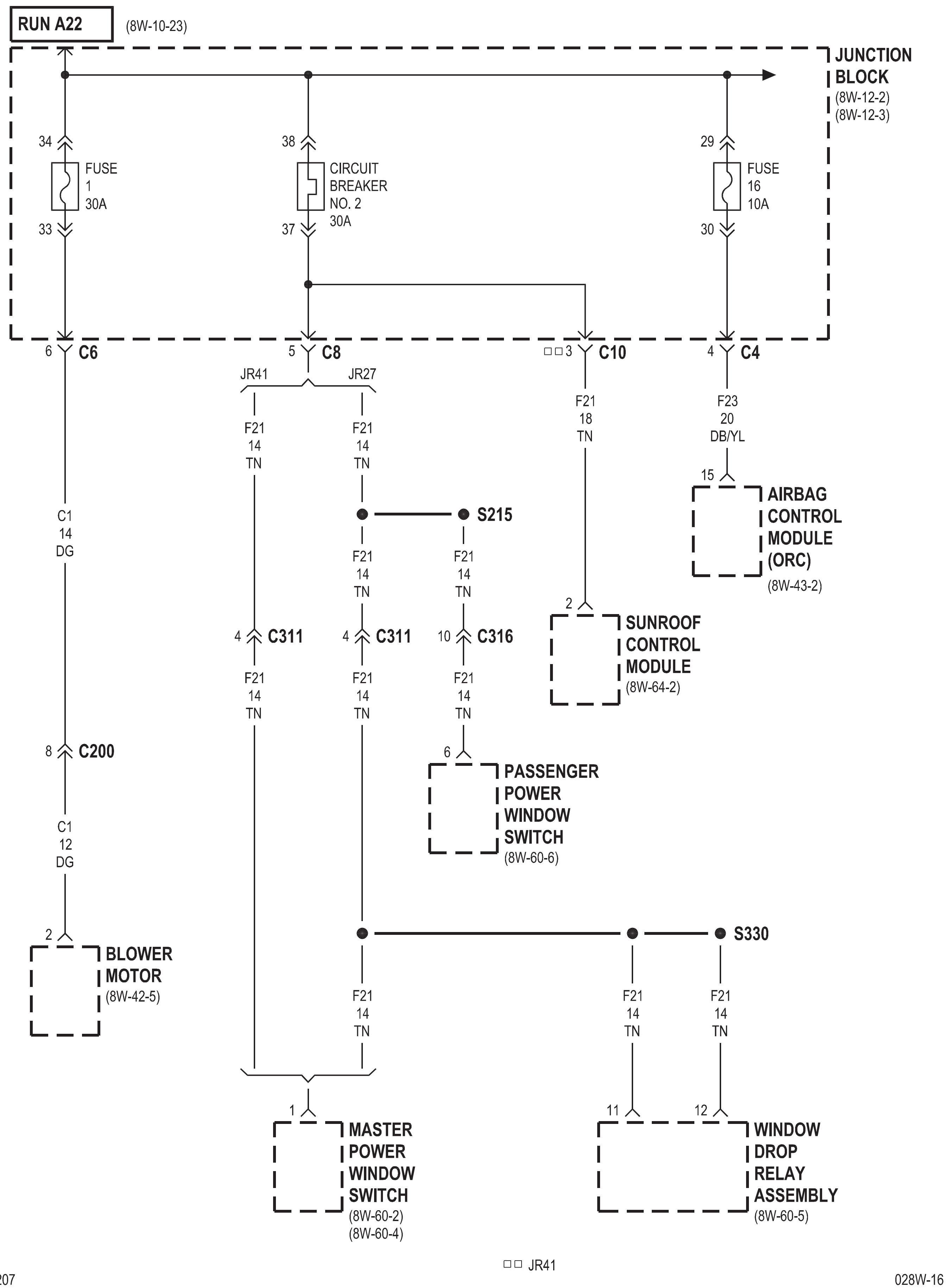
CAVITY	CIRCUIT	FUNCTION
1	INTERNAL	FUSED B(+)
2	INTERNAL	HEADLAMP DELAY RELAY CONTROL
3	INTERNAL	FUSED B(+)
4	-	-
5	INTERNAL	HEADLAMP DELAY RELAY OUTPUT

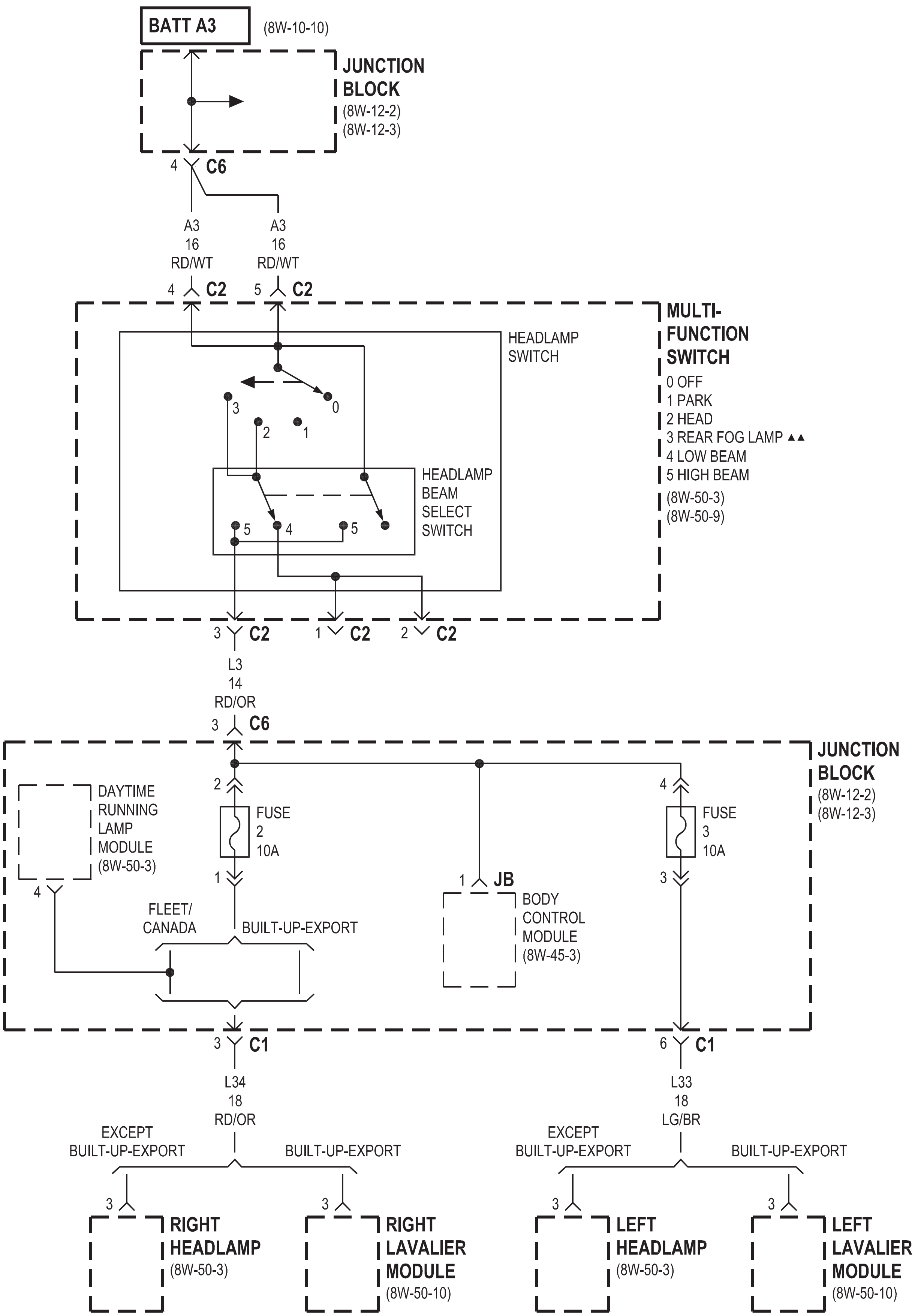
HORN RELAY

CAVITY	CIRCUIT	FUNCTION
6	INTERNAL	FUSED B(+)
7	INTERNAL	HORN RELAY CONTROL
8	INTERNAL	FUSED B(+)
9	-	-
10	X2 18DG/RD	HORN RELAY OUTPUT

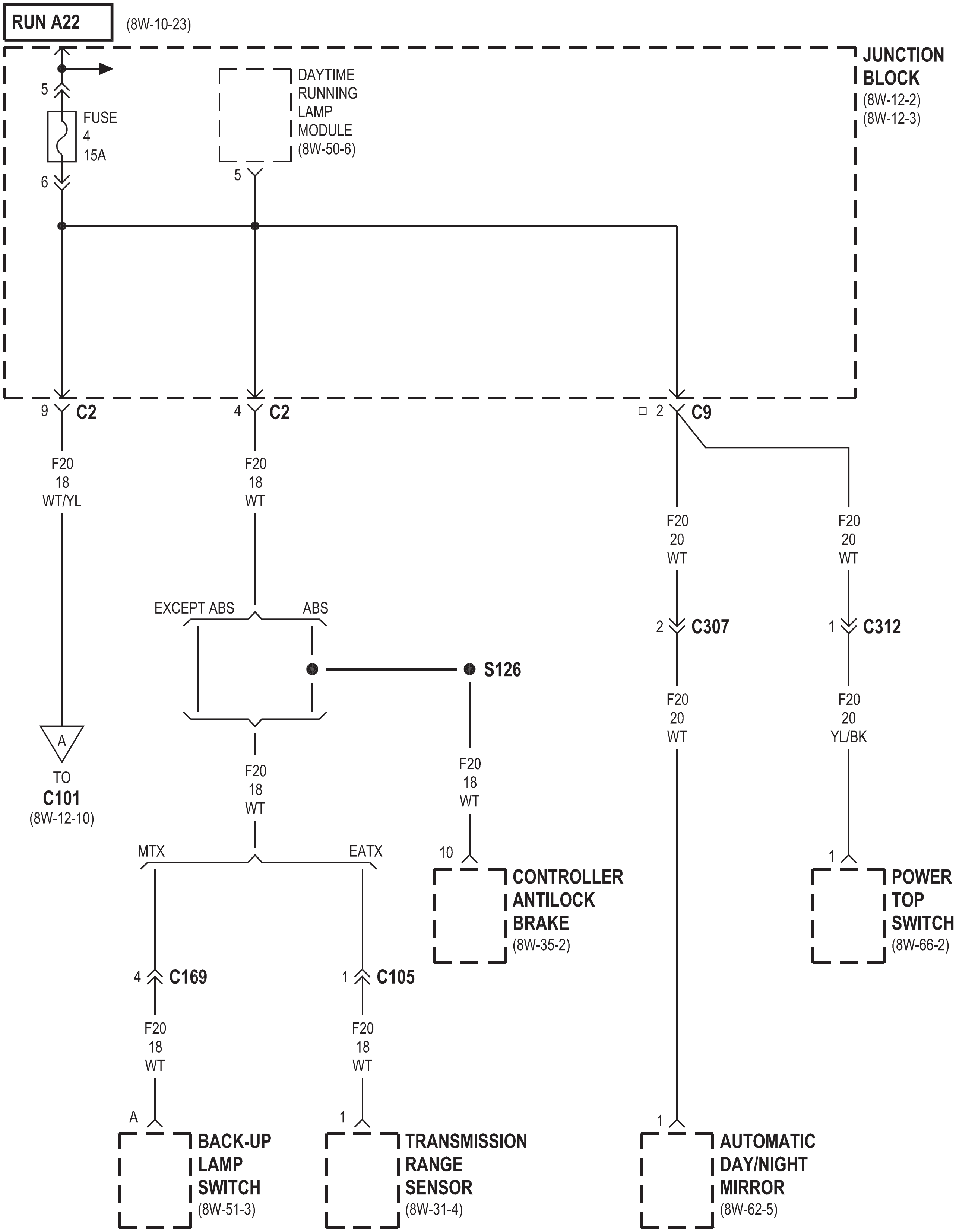
REAR WINDOW DEFOGGER RELAY

CAVITY	CIRCUIT	FUNCTION
11	INTERNAL	REAR WINDOW DEFOGGER RELAY CONTROL
12	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
13	INTERNAL	FUSED B(+)
15	INTERNAL	REAR WINDOW DEFOGGER RELAY OUTPUT

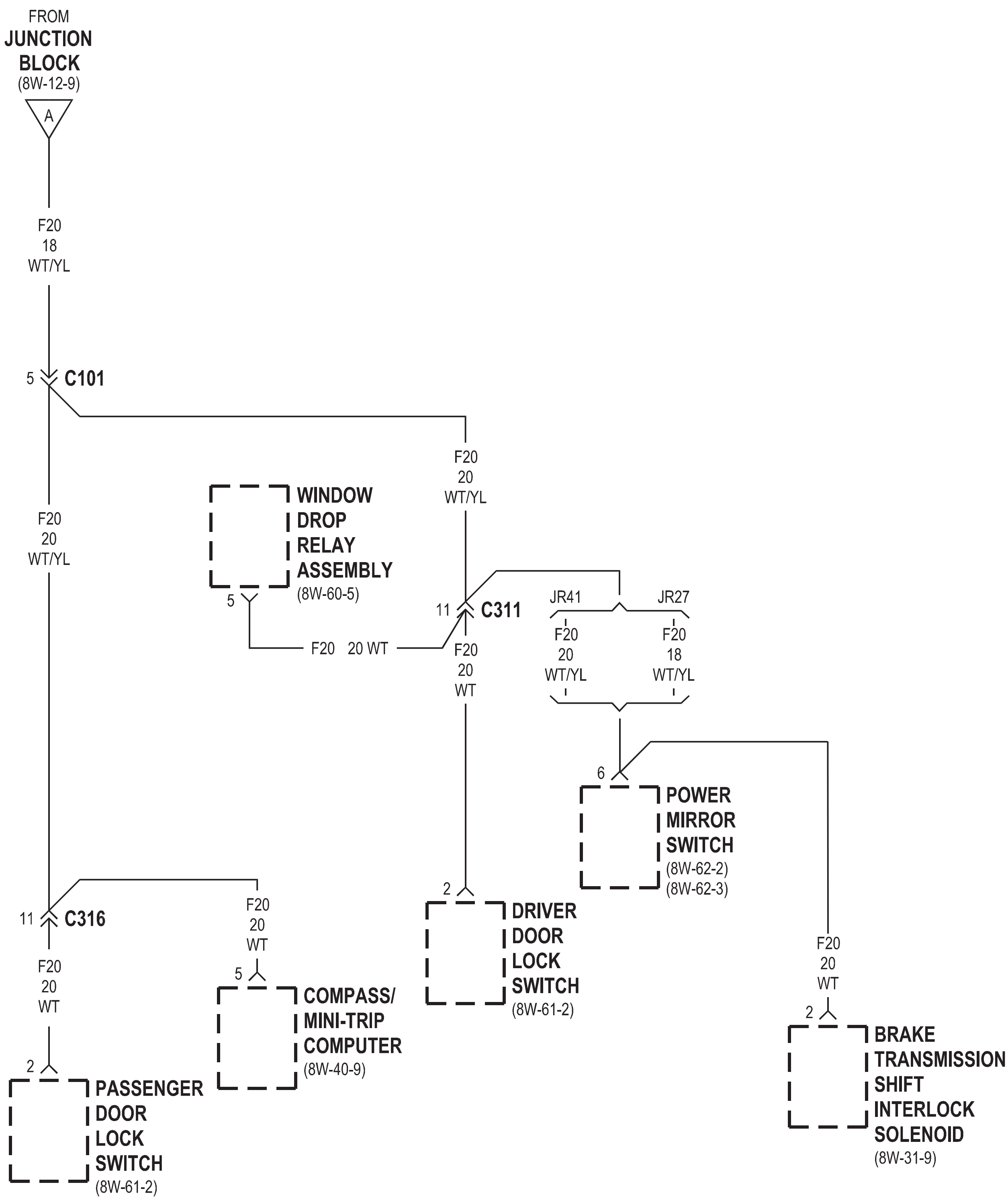

RUN A22
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
34
FUSE
1
30A
33
38
CIRCUIT BREAKER NO. 2
30A
37
29
FUSE
16
10A
30
6 C6
5 C8
3 C10
4 C4
JR41
JR27
C1
14
DG
F21
14
TN
F21
18
TN
F23
20
DB/YL
15
AIRBAG CONTROL MODULE (ORC)
(8W-43-2)
S215
2
SUNROOF CONTROL MODULE
(8W-64-2)
4 C311
4 C311
10 C316
8 C200
C1
12
DG
6
PASSENGER POWER WINDOW SWITCH
(8W-60-6)
2
BLOWER MOTOR
(8W-42-5)
S330
1
MASTER POWER WINDOW SWITCH
(8W-60-2)
(8W-60-4)
11
12
WINDOW DROP RELAY ASSEMBLY
(8W-60-5)
JR41

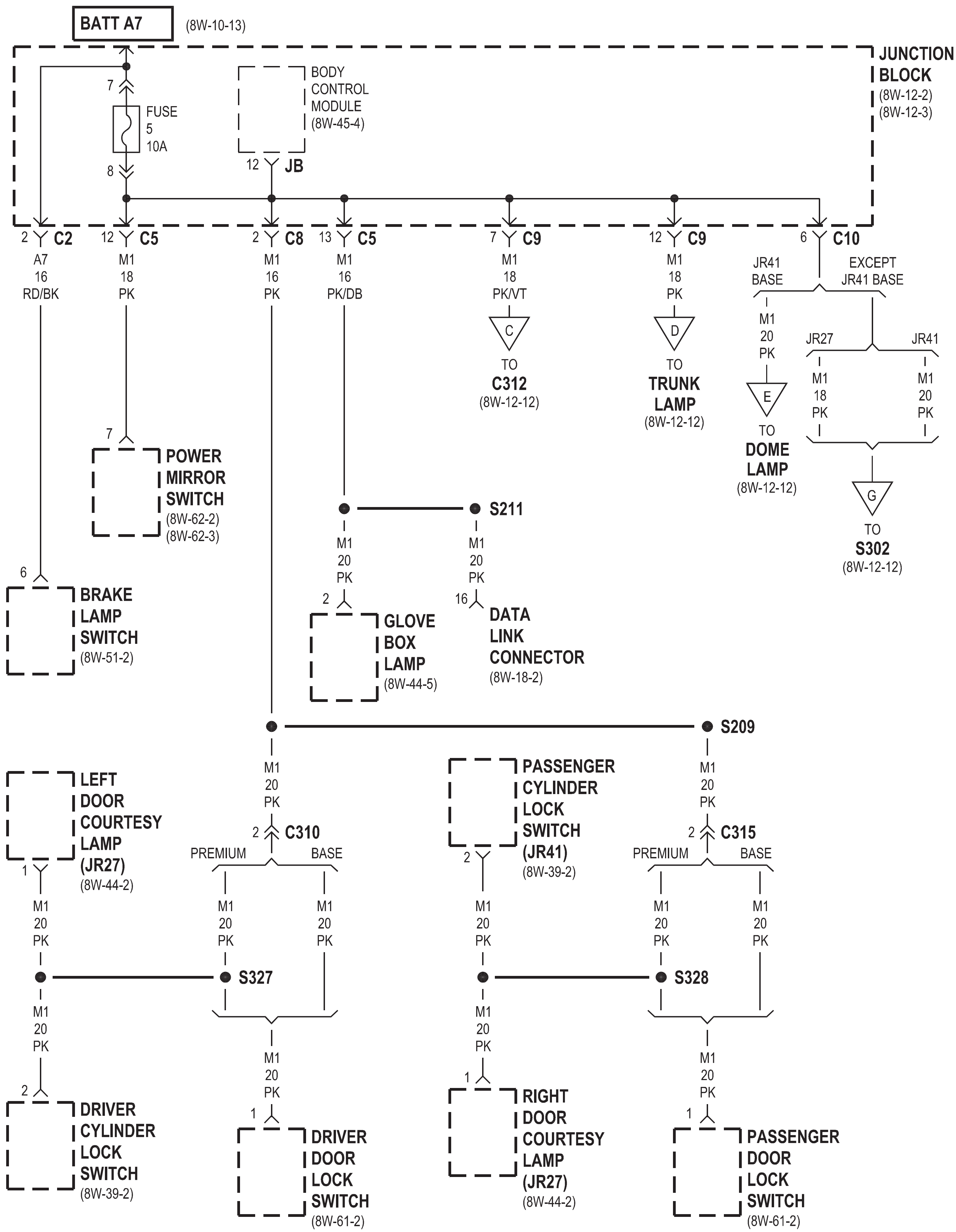


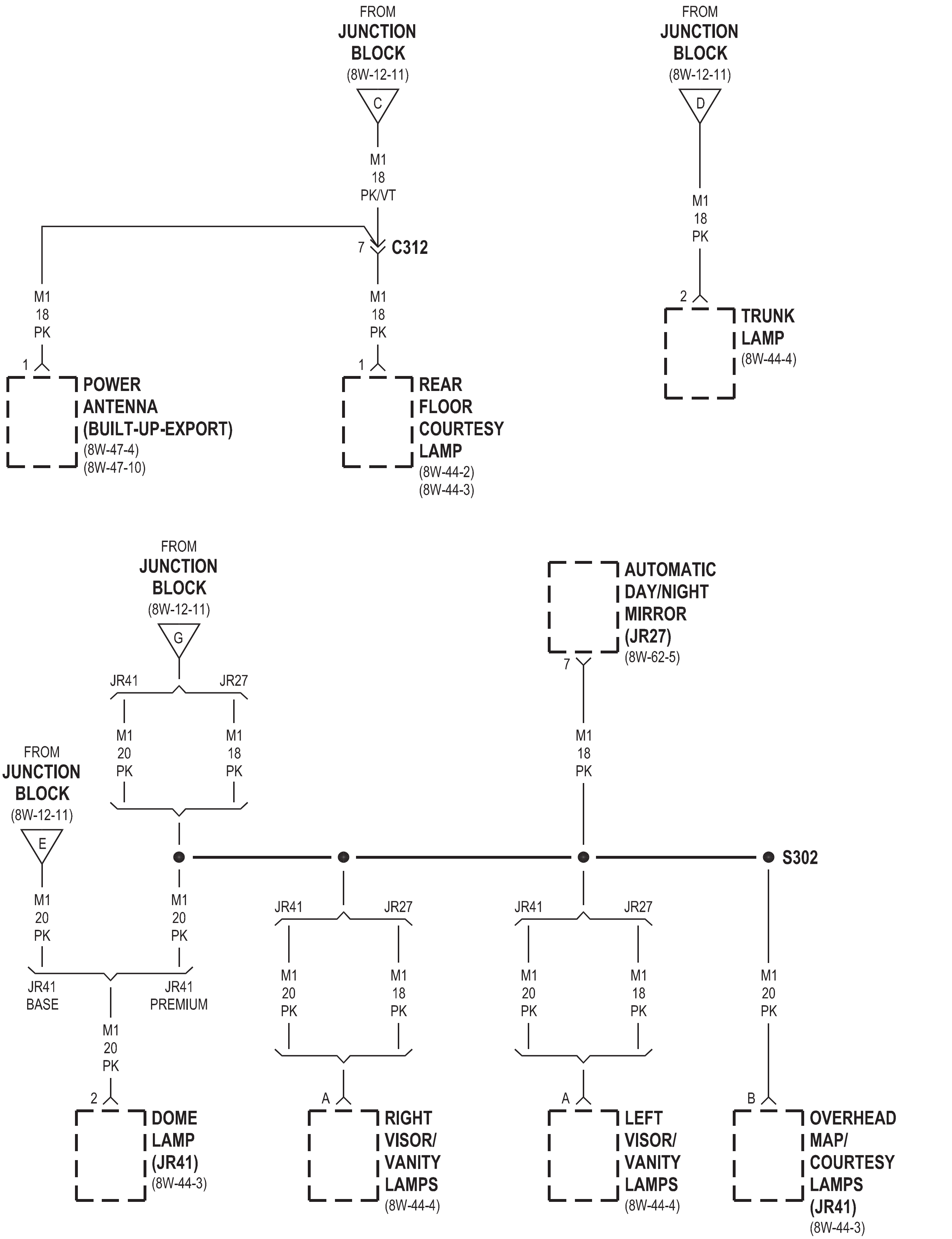
▲▲ BUILT-UP-EXPORT

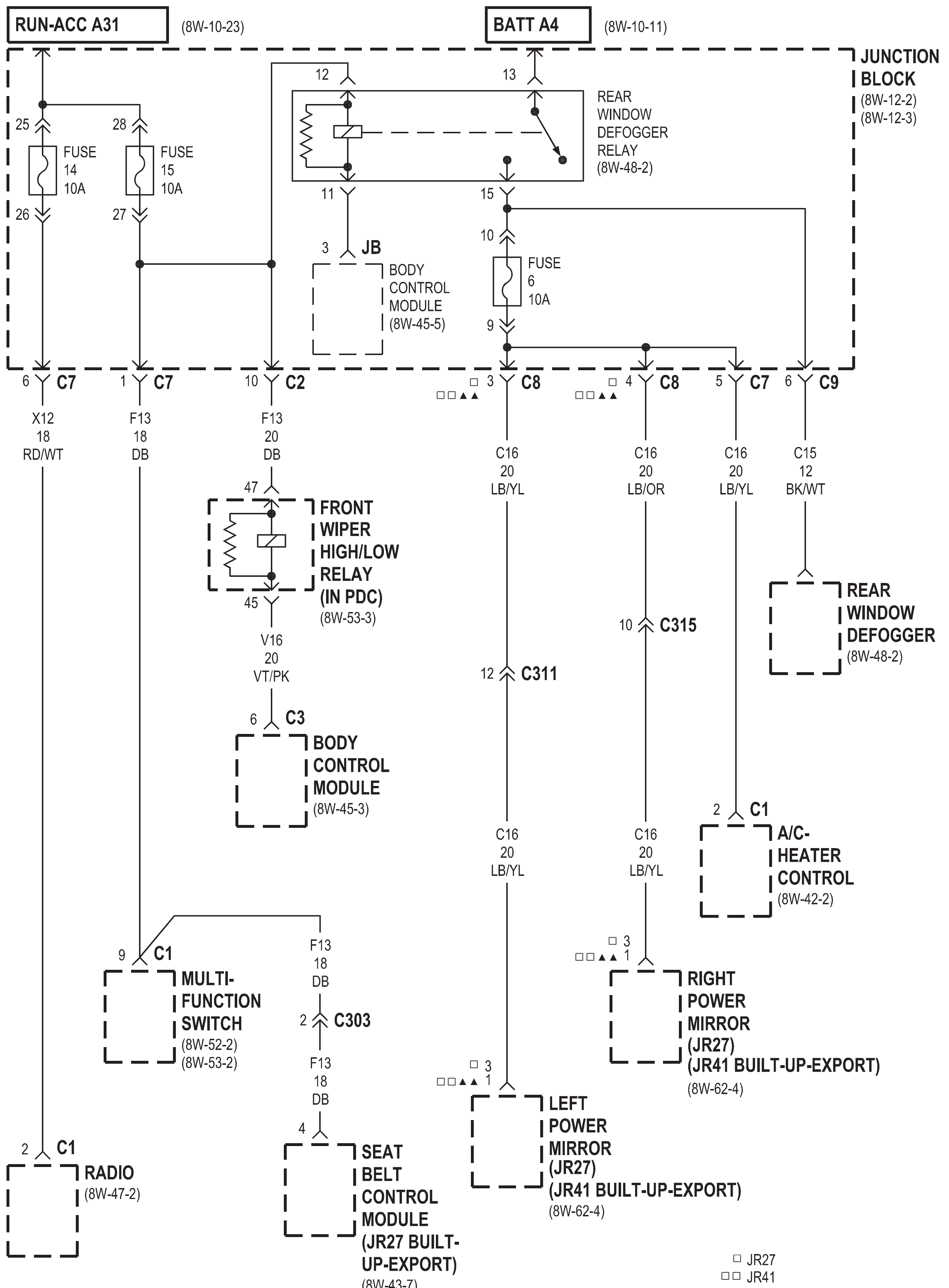

RUN A22
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
5
FUSE
4
15A
6
DAYTIME RUNNING LAMP MODULE
(8W-50-6)
5
9 C2
4 C2
2 C9
F20
18
WT/YL
F20
18
WT
F20
20
WT
F20
20
WT
EXCEPT ABS
ABS
2 C307
1 C312
S126
F20
20
WT
F20
20
YL/BK
A
TO
C101
(8W-12-10)
F20
18
WT
F20
18
WT
MTX
EATX
10
CONTROLLER ANTILOCK BRAKE
(8W-35-2)
1
POWER TOP SWITCH
(8W-66-2)
4 C169
1 C105
F20
18
WT
F20
18
WT
A
1
1
BACK-UP LAMP SWITCH
(8W-51-3)
TRANSMISSION RANGE SENSOR
(8W-31-4)
AUTOMATIC DAY/NIGHT MIRROR
(8W-62-5)

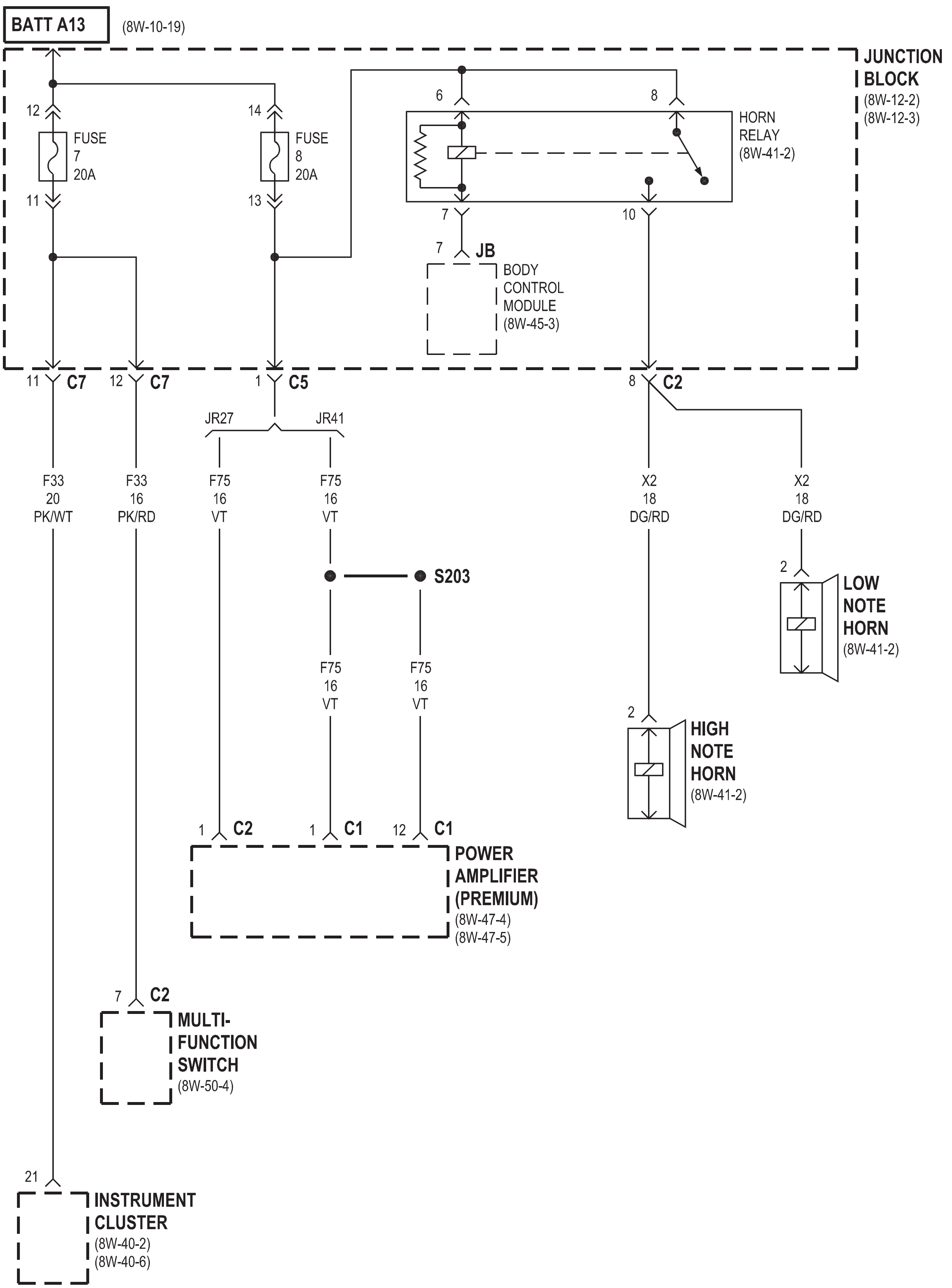
□ JR27

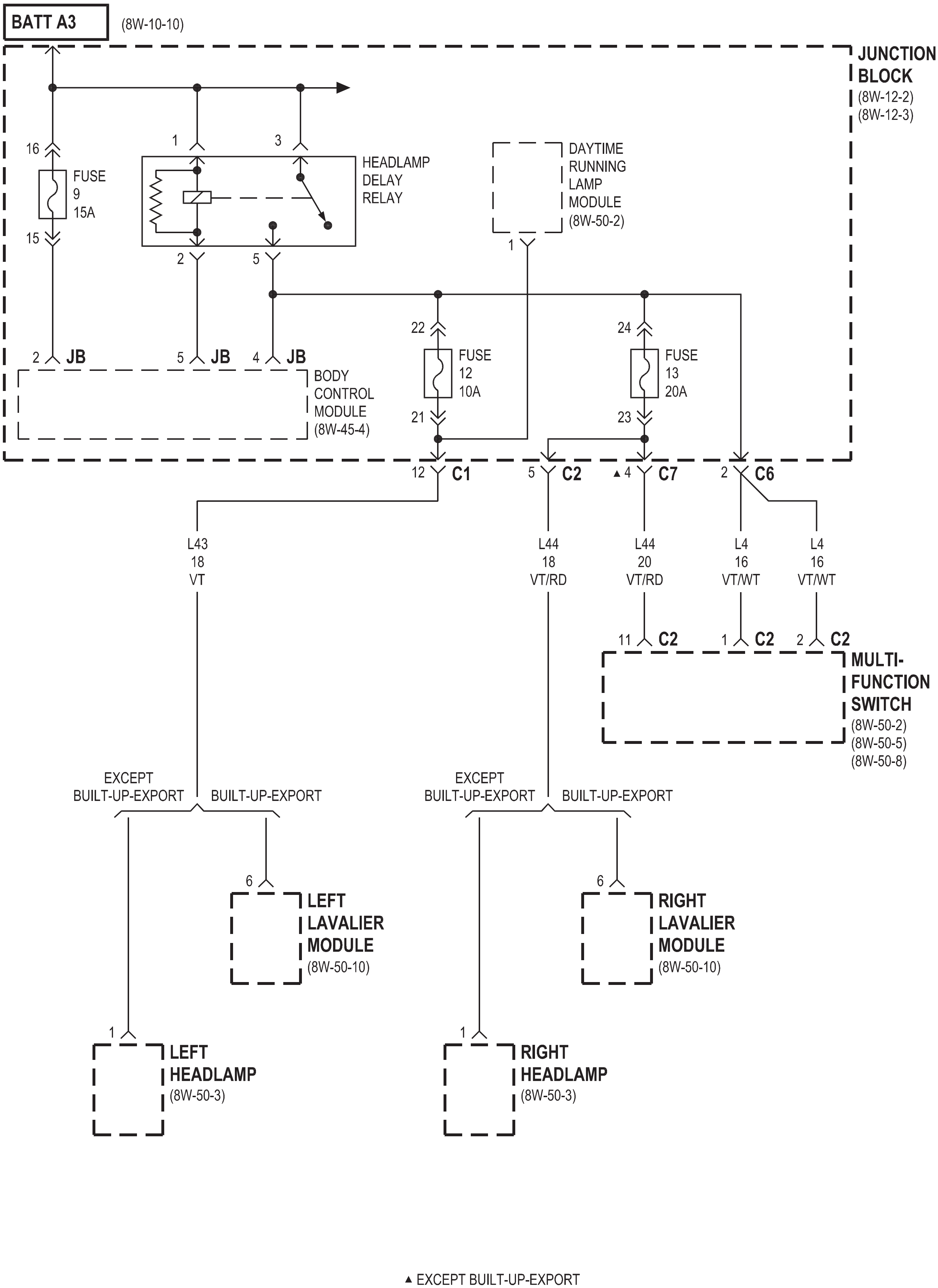

FROM
JUNCTION
BLOCK
(8W-12-9)
A
F20
18
WT/YL
5
C101
F20
20
WT/YL
F20
20
WT/YL
WINDOW
DROP
RELAY
ASSEMBLY
(8W-60-5)
5
F20 20 WT
11
C311
JR41
JR27
F20
20
WT/YL
F20
18
WT/YL
F20
20
WT
6
POWER
MIRROR
SWITCH
(8W-62-2)
(8W-62-3)
11
C316
F20
20
WT
F20
20
WT
5
COMPASS/
MINI-TRIP
COMPUTER
(8W-40-9)
2
DRIVER
DOOR
LOCK
SWITCH
(8W-61-2)
F20
20
WT
2
BRAKE
TRANSMISSION
SHIFT
INTERLOCK
SOLENOID
(8W-31-9)
2
PASSENGER
DOOR
LOCK
SWITCH
(8W-61-2)

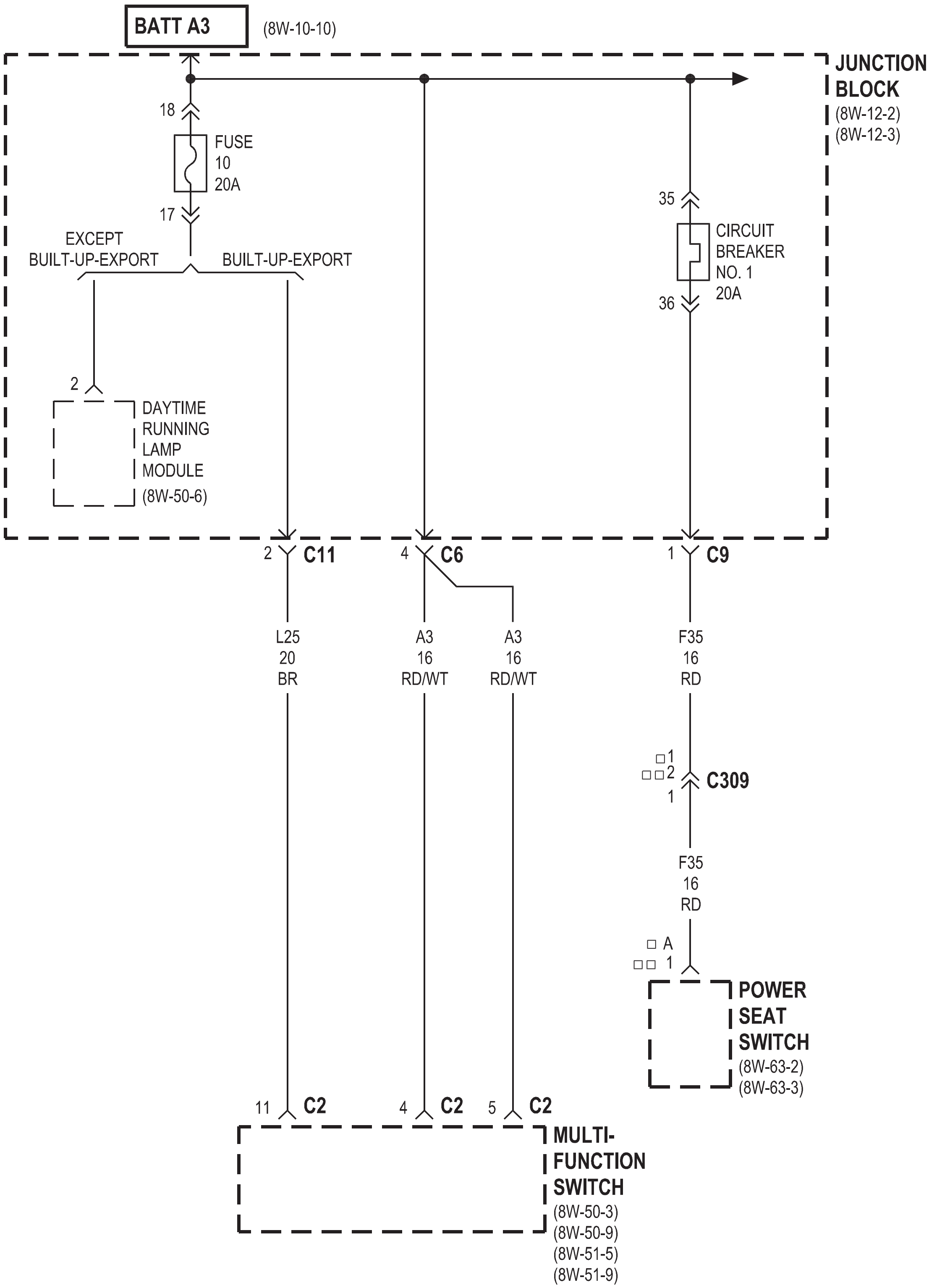

BATT A7
(8W-10-13)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
FUSE 5 10A
BODY CONTROL MODULE
(8W-45-4)
JB
C2
C5
C8
C9
C10
A7 16 RD/BK
M1 18 PK
M1 16 PK
M1 16 PK/DB
M1 18 PK/VT
JR41 BASE
EXCEPT JR41 BASE
M1 20 PK
JR27
JR41
M1 18 PK
TO C312
(8W-12-12)
TO TRUNK LAMP
(8W-12-12)
TO DOME LAMP
(8W-12-12)
TO S302
(8W-12-12)
POWER MIRROR SWITCH
(8W-62-2)
(8W-62-3)
S211
BRAKE LAMP SWITCH
(8W-51-2)
GLOVE BOX LAMP
(8W-44-5)
DATA LINK CONNECTOR
(8W-18-2)
S209
LEFT DOOR COURTESY LAMP (JR27)
(8W-44-2)
C310
PREMIUM
BASE
PASSENGER CYLINDER LOCK SWITCH (JR41)
(8W-39-2)
C315
S327
S328
DRIVER CYLINDER LOCK SWITCH
(8W-39-2)
DRIVER DOOR LOCK SWITCH
(8W-61-2)
RIGHT DOOR COURTESY LAMP (JR27)
(8W-44-2)
PASSENGER DOOR LOCK SWITCH
(8W-61-2)

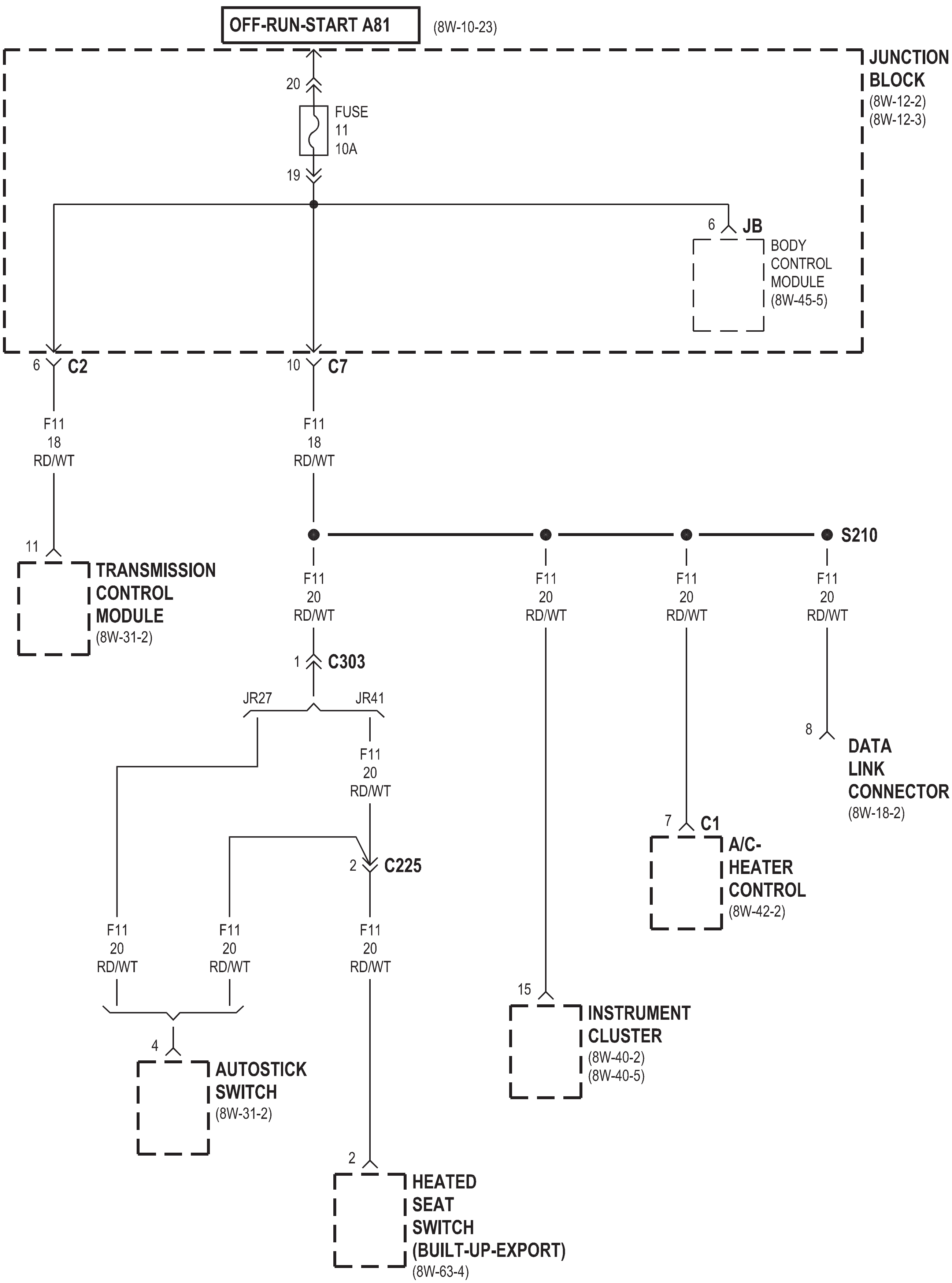

FROM
JUNCTION BLOCK
(8W-12-11)
C
M1
18
PK/VT
7
C312
M1
18
PK
1
POWER ANTENNA (BUILT-UP-EXPORT)
(8W-47-4)
(8W-47-10)
M1
18
PK
1
REAR FLOOR COURTESY LAMP
(8W-44-2)
(8W-44-3)
FROM
JUNCTION BLOCK
(8W-12-11)
D
M1
18
PK
2
TRUNK LAMP
(8W-44-4)
FROM
JUNCTION BLOCK
(8W-12-11)
G
JR41
JR27
M1
20
PK
M1
18
PK
AUTOMATIC DAY/NIGHT MIRROR (JR27)
(8W-62-5)
7
M1
18
PK
FROM
JUNCTION BLOCK
(8W-12-11)
E
M1
20
PK
M1
20
PK
S302
JR41 BASE
JR41 PREMIUM
M1
20
PK
2
DOME LAMP (JR41)
(8W-44-3)
JR41
JR27
M1
20
PK
M1
18
PK
A
RIGHT VISOR/ VANITY LAMPS
(8W-44-4)
JR41
JR27
M1
20
PK
M1
18
PK
A
LEFT VISOR/ VANITY LAMPS
(8W-44-4)
M1
20
PK
B
OVERHEAD MAP/ COURTESY LAMPS (JR41)
(8W-44-3)

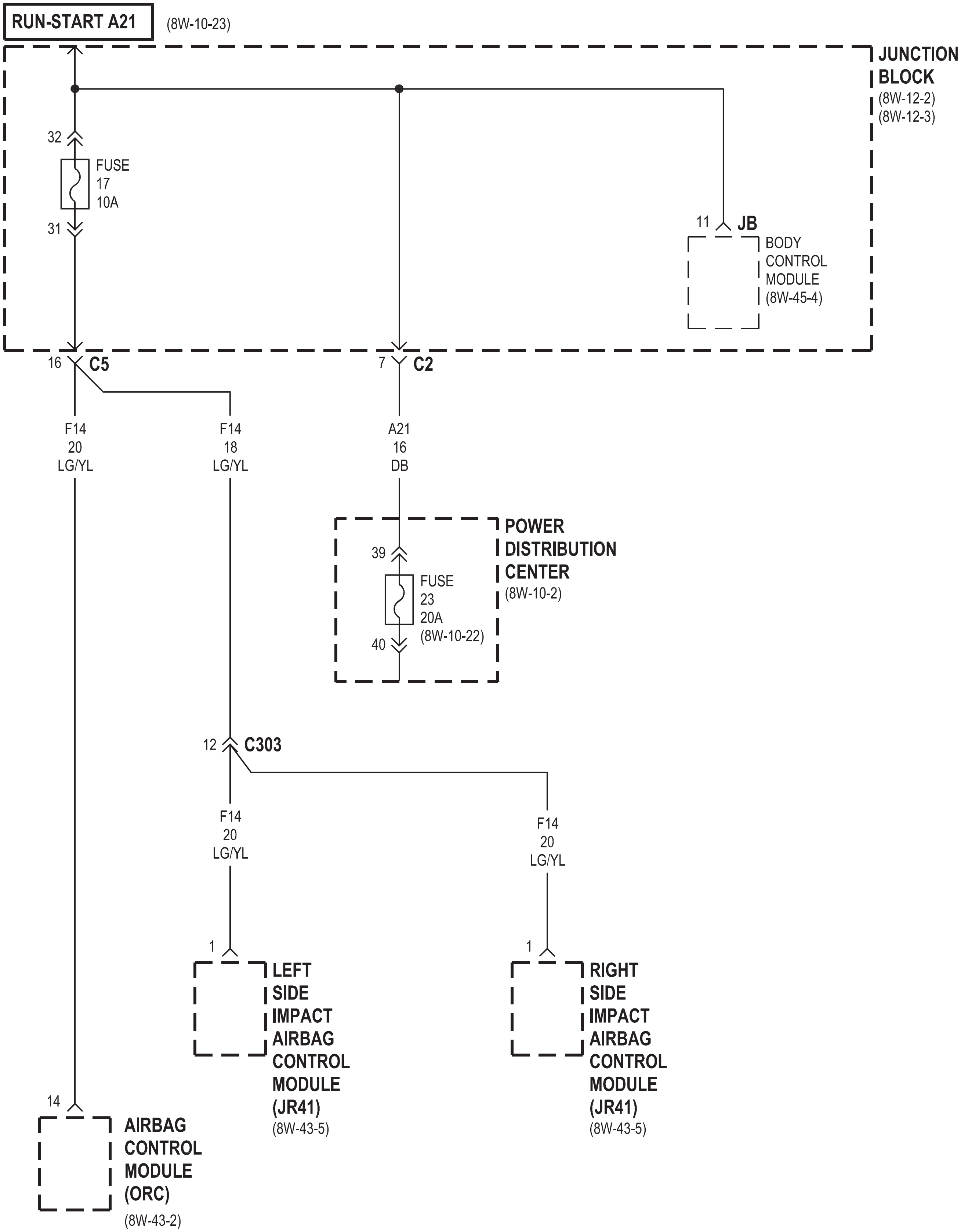

RUN-ACC A31
(8W-10-23)
BATT A4
(8W-10-11)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
FUSE
14
10A
FUSE
15
10A
REAR
WINDOW
DEFOGGER
RELAY
(8W-48-2)
JB
BODY
CONTROL
MODULE
(8W-45-5)
FUSE
6
10A
C7
C7
C2
C8
C8
C7
C9
X12
18
RD/WT
F13
18
DB
F13
20
DB
C16
20
LB/YL
C16
20
LB/OR
C16
20
LB/YL
C15
12
BK/WT
FRONT
WIPER
HIGH/LOW
RELAY
(IN PDC)
(8W-53-3)
V16
20
VT/PK
C3
BODY
CONTROL
MODULE
(8W-45-3)
REAR
WINDOW
DEFOGGER
(8W-48-2)
C315
C311
C1
A/C-
HEATER
CONTROL
(8W-42-2)
C16
20
LB/YL
C16
20
LB/YL
C1
MULTI-
FUNCTION
SWITCH
(8W-52-2)
(8W-53-2)
F13
18
DB
C303
F13
18
DB
RIGHT
POWER
MIRROR
(JR27)
(JR41 BUILT-UP-EXPORT)
(8W-62-4)
LEFT
POWER
MIRROR
(JR27)
(JR41 BUILT-UP-EXPORT)
(8W-62-4)
C1
RADIO
(8W-47-2)
SEAT
BELT
CONTROL
MODULE
(JR27 BUILT-
UP-EXPORT)
(8W-43-7)
□ JR27
□□ JR41
▲▲ BUILT-UP-EXPORT

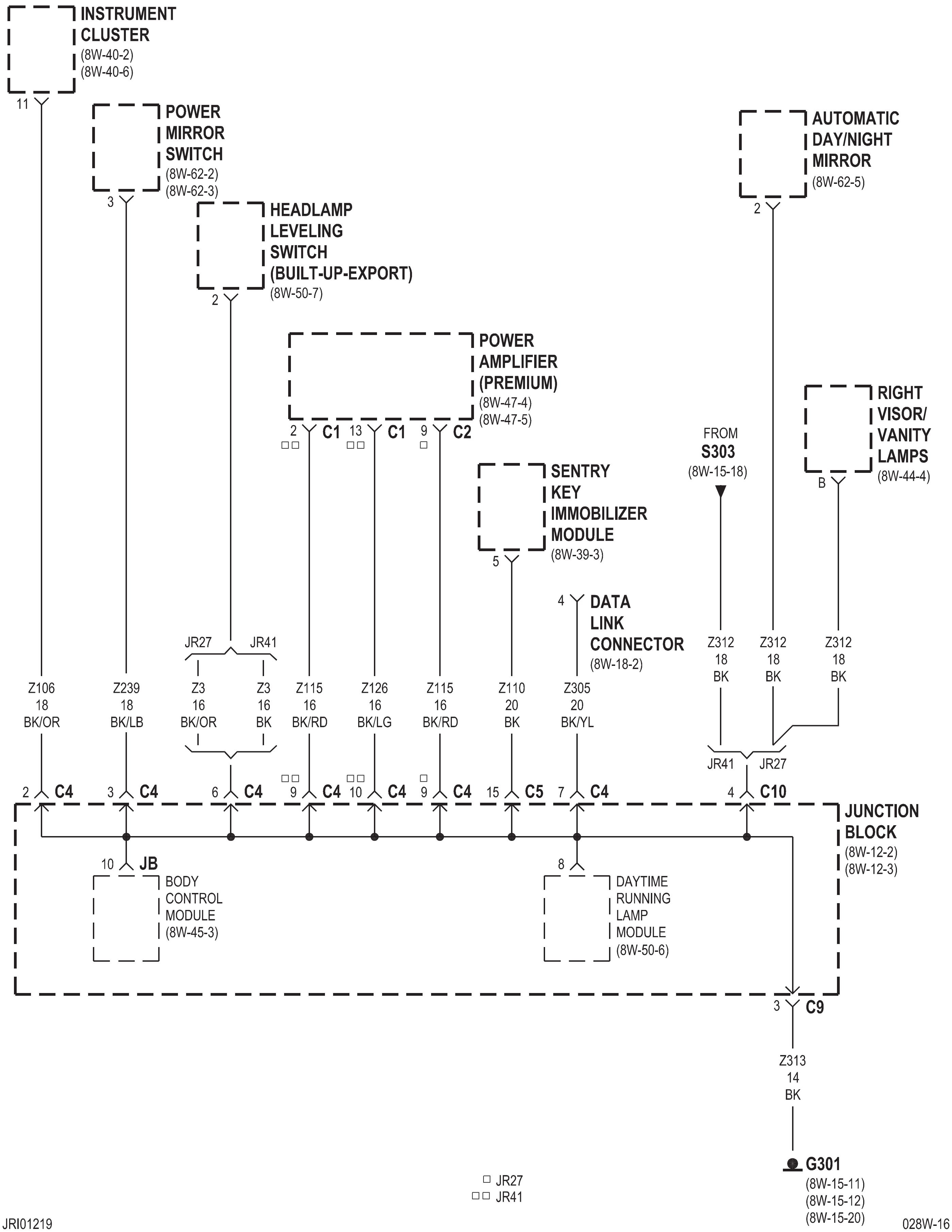

BATT A13
(8W-10-19)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
FUSE 7 20A
FUSE 8 20A
HORN RELAY
(8W-41-2)
JB
BODY CONTROL MODULE
(8W-45-3)
C7
C7
C5
C2
JR27
JR41
F33 20 PK/WT
F33 16 PK/RD
F75 16 VT
F75 16 VT
X2 18 DG/RD
X2 18 DG/RD
S203
F75 16 VT
F75 16 VT
LOW NOTE HORN
(8W-41-2)
HIGH NOTE HORN
(8W-41-2)
C2
C1
C1
POWER AMPLIFIER (PREMIUM)
(8W-47-4)
(8W-47-5)
C2
MULTI-FUNCTION SWITCH
(8W-50-4)
INSTRUMENT CLUSTER
(8W-40-2)
(8W-40-6)

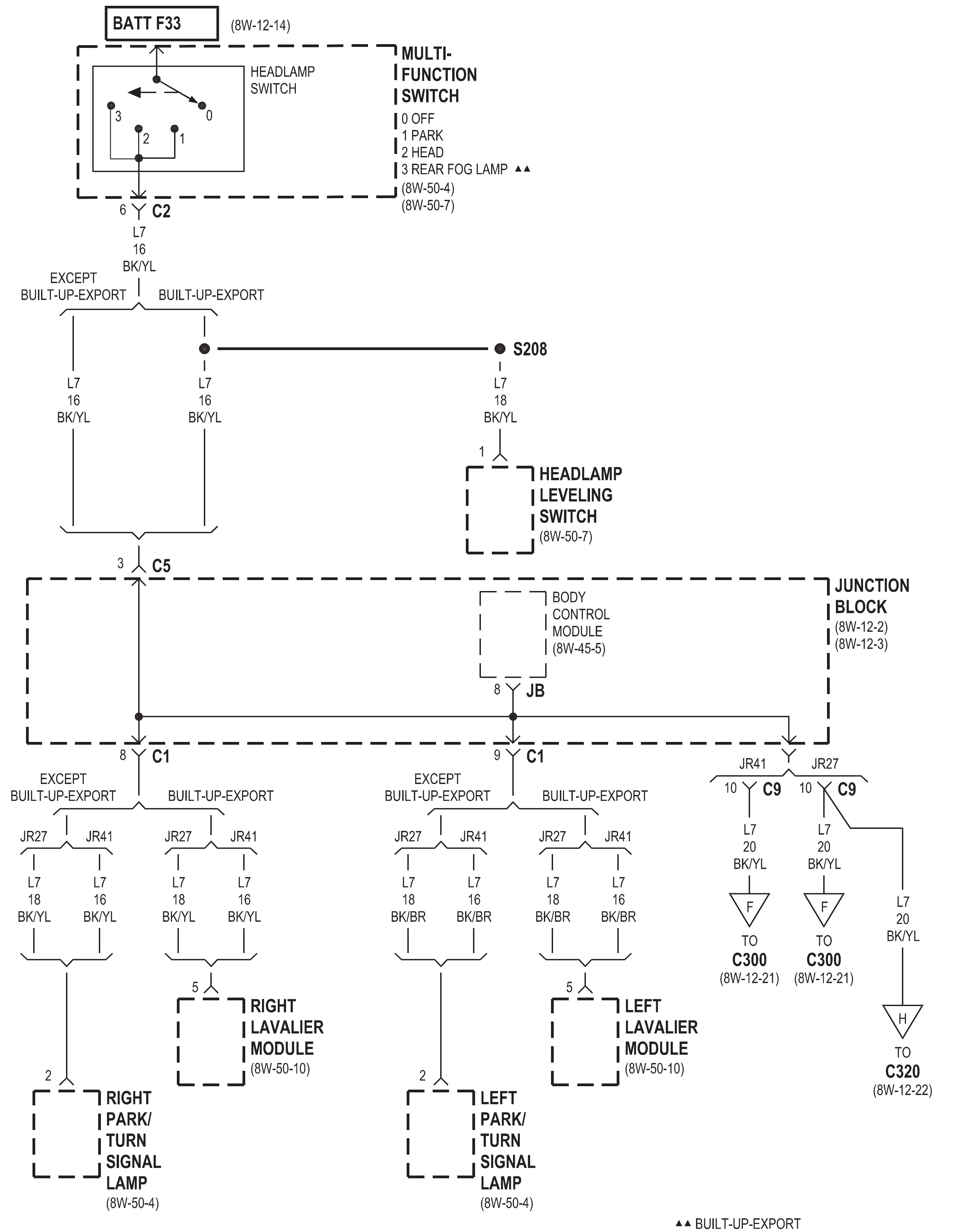

BATT A3
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
16
FUSE
9
15A
15
1
3
HEADLAMP DELAY RELAY
2
5
DAYTIME RUNNING LAMP MODULE
(8W-50-2)
1
22
FUSE
12
10A
21
24
FUSE
13
20A
23
2 JB
5 JB
4 JB
BODY CONTROL MODULE
(8W-45-4)
12 C1
5 C2
▲4 C7
2 C6
L43
18
VT
L44
18
VT/RD
L44
20
VT/RD
L4
16
VT/WT
L4
16
VT/WT
11 C2
1 C2
2 C2
MULTI-FUNCTION SWITCH
(8W-50-2)
(8W-50-5)
(8W-50-8)
EXCEPT BUILT-UP-EXPORT
BUILT-UP-EXPORT
EXCEPT BUILT-UP-EXPORT
BUILT-UP-EXPORT
6
LEFT LAVALIER MODULE
(8W-50-10)
6
RIGHT LAVALIER MODULE
(8W-50-10)
1
LEFT HEADLAMP
(8W-50-3)
1
RIGHT HEADLAMP
(8W-50-3)
▲ EXCEPT BUILT-UP-EXPORT

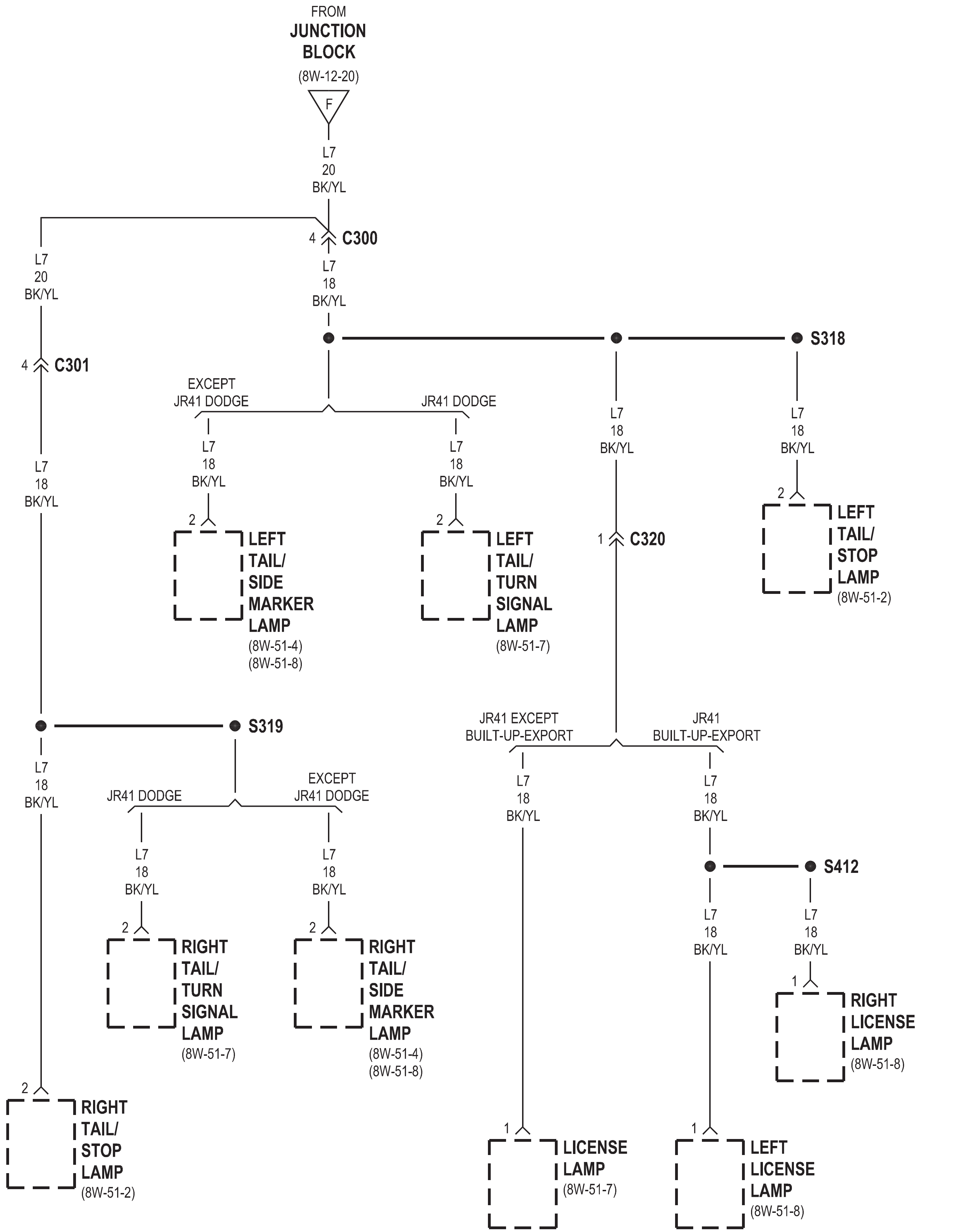

BATT A3
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
18
FUSE
10
20A
17
EXCEPT BUILT-UP-EXPORT
BUILT-UP-EXPORT
35
CIRCUIT BREAKER NO. 1
20A
36
2
DAYTIME RUNNING LAMP MODULE
(8W-50-6)
2 C11
4 C6
1 C9
L25
20
BR
A3
16
RD/WT
A3
16
RD/WT
F35
16
RD
1
2
C309
1
F35
16
RD
A
1
POWER SEAT SWITCH
(8W-63-2)
(8W-63-3)
11 C2
4 C2
5 C2
MULTI-FUNCTION SWITCH
(8W-50-3)
(8W-50-9)
(8W-51-5)
(8W-51-9)
JR27
JR41


OFF-RUN-START A81
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
20
FUSE
11
10A
19
6
JB
BODY CONTROL MODULE
(8W-45-5)
6
C2
10
C7
F11
18
RD/WT
F11
18
RD/WT
11
TRANSMISSION CONTROL MODULE
(8W-31-2)
S210
F11
20
RD/WT
1
C303
JR27
JR41
2
C225
8
DATA LINK CONNECTOR
(8W-18-2)
7
C1
A/C-HEATER CONTROL
(8W-42-2)
15
INSTRUMENT CLUSTER
(8W-40-2)
(8W-40-5)
4
AUTOSTICK SWITCH
(8W-31-2)
2
HEATED SEAT SWITCH (BUILT-UP-EXPORT)
(8W-63-4)

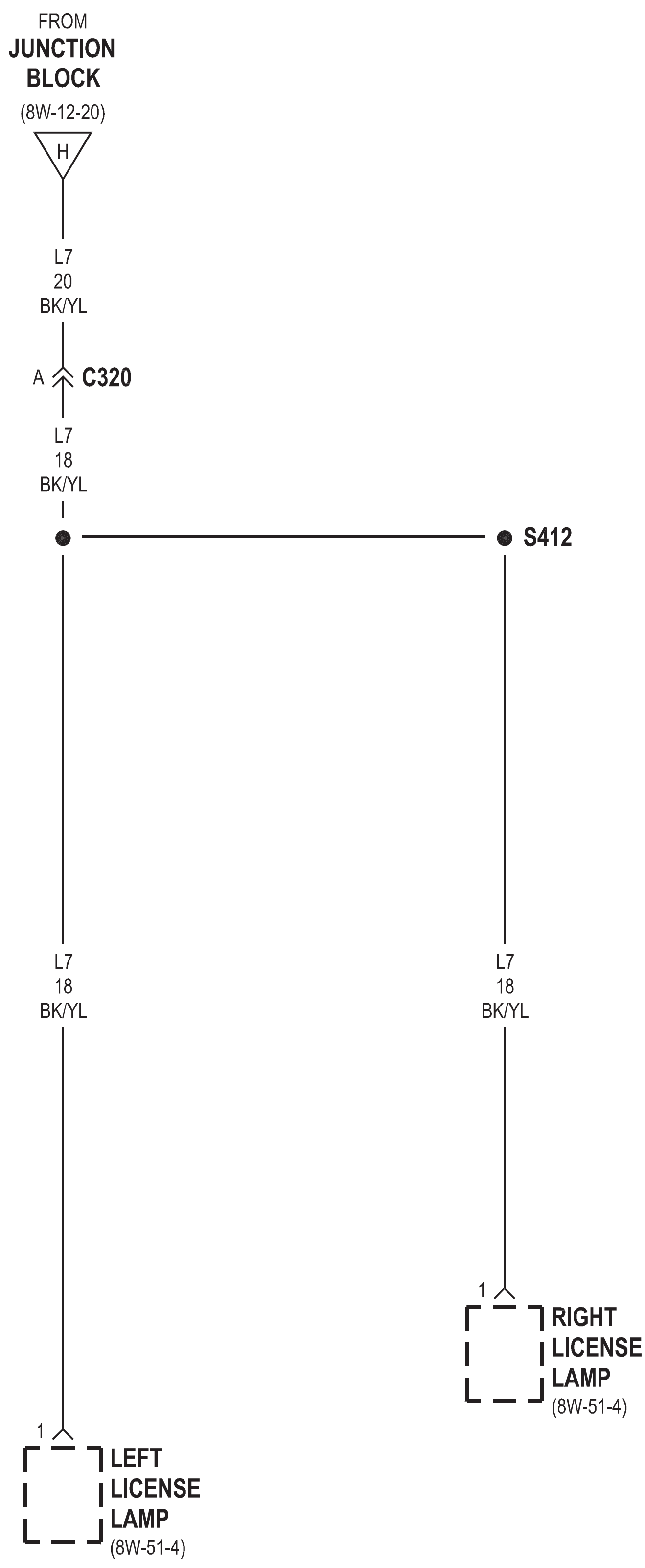

RUN-START A21
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
32
FUSE
17
10A
31
11
JB
BODY CONTROL MODULE
(8W-45-4)
16
C5
7
C2
F14
20
LG/YL
F14
18
LG/YL
A21
16
DB
POWER DISTRIBUTION CENTER
(8W-10-2)
39
FUSE
23
20A
(8W-10-22)
40
12
C303
F14
20
LG/YL
F14
20
LG/YL
1
LEFT SIDE IMPACT AIRBAG CONTROL MODULE (JR41)
(8W-43-5)
1
RIGHT SIDE IMPACT AIRBAG CONTROL MODULE (JR41)
(8W-43-5)
14
AIRBAG CONTROL MODULE (ORC)
(8W-43-2)

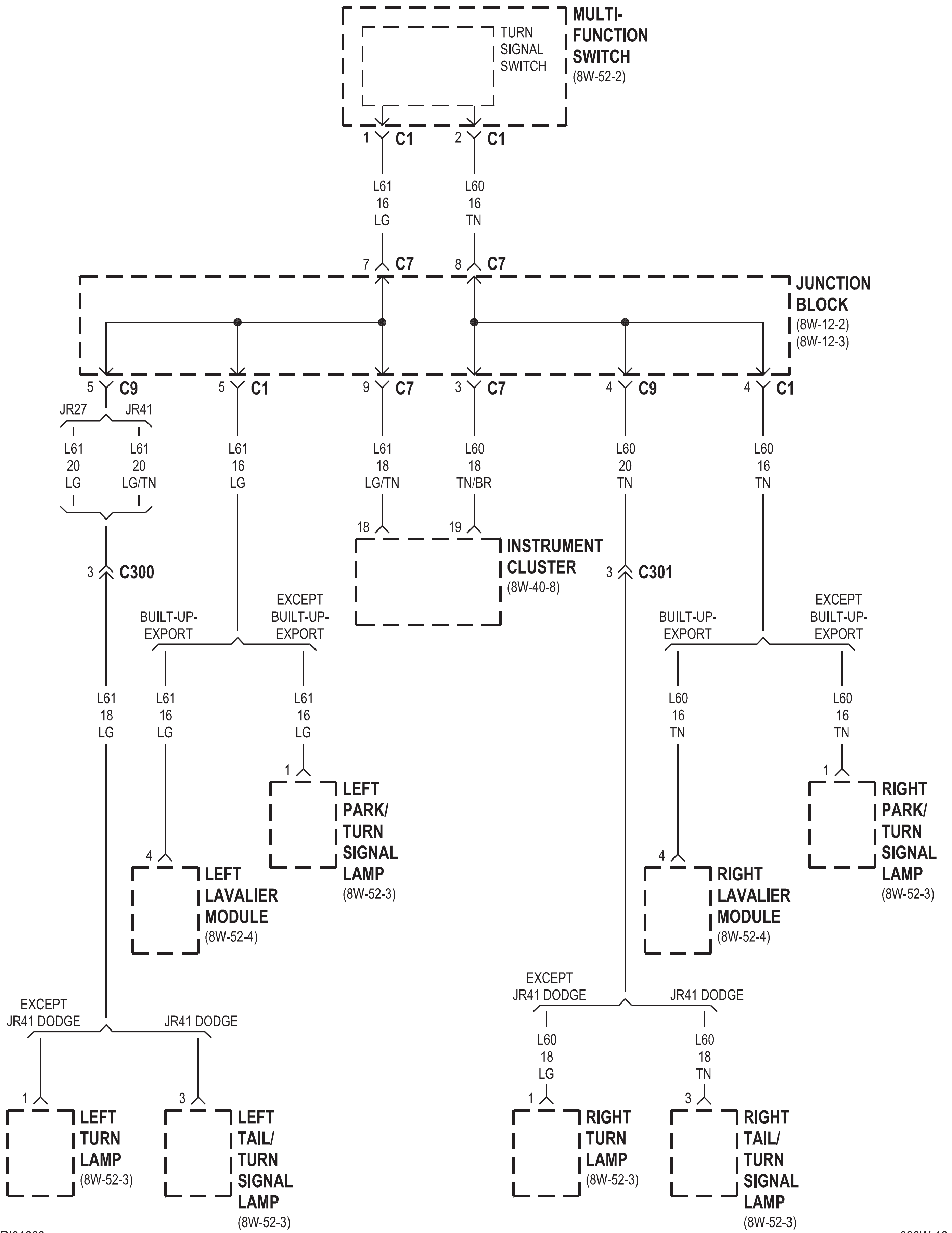

INSTRUMENT CLUSTER
(8W-40-2)
(8W-40-6)
POWER MIRROR SWITCH
(8W-62-2)
(8W-62-3)
HEADLAMP LEVELING SWITCH (BUILT-UP-EXPORT)
(8W-50-7)
POWER AMPLIFIER (PREMIUM)
(8W-47-4)
(8W-47-5)
AUTOMATIC DAY/NIGHT MIRROR
(8W-62-5)
RIGHT VISOR/ VANITY LAMPS
(8W-44-4)
SENTRY KEY IMMOBILIZER MODULE
(8W-39-3)
FROM S303
(8W-15-18)
DATA LINK CONNECTOR
(8W-18-2)
Z106 18 BK/OR
Z239 18 BK/LB
Z3 16 BK/OR
Z3 16 BK
Z115 16 BK/RD
Z126 16 BK/LG
Z115 16 BK/RD
Z110 20 BK
Z305 20 BK/YL
Z312 18 BK
Z312 18 BK
Z312 18 BK
JR27
JR41
C1
C2
C4
C5
C10
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
JB
BODY CONTROL MODULE
(8W-45-3)
DAYTIME RUNNING LAMP MODULE
(8W-50-6)
C9
Z313 14 BK
G301
(8W-15-11)
(8W-15-12)
(8W-15-20)
□ JR27
□□ JR41

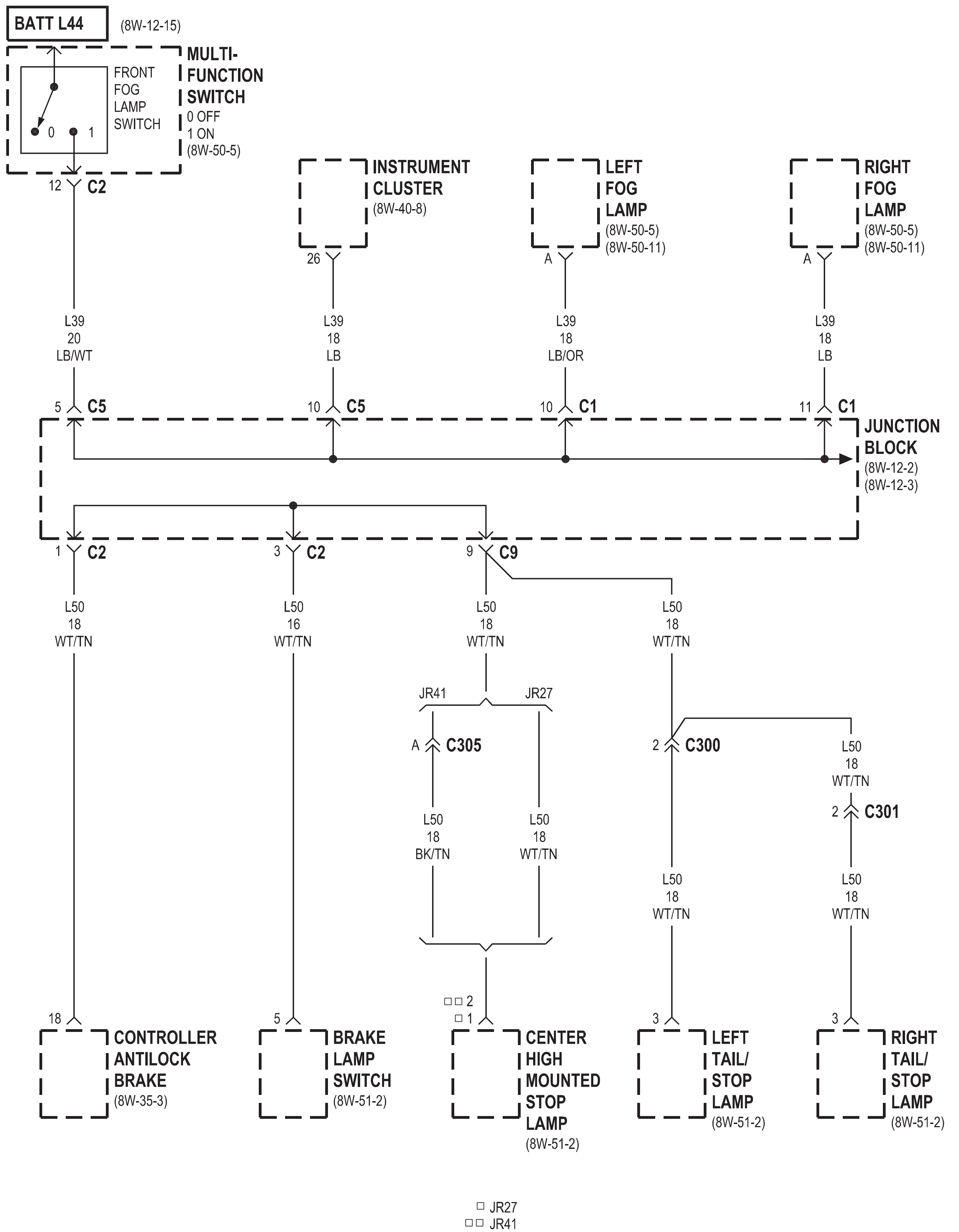

BATT F33
(8W-12-14)
HEADLAMP SWITCH
MULTI-FUNCTION SWITCH
0 OFF
1 PARK
2 HEAD
3 REAR FOG LAMP ▲▲
(8W-50-4)
(8W-50-7)
C2
L7 16 BK/YL
EXCEPT BUILT-UP-EXPORT
BUILT-UP-EXPORT
S208
L7 18 BK/YL
HEADLAMP LEVELING SWITCH
(8W-50-7)
C5
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
BODY CONTROL MODULE
(8W-45-5)
JB
C1
C9
JR27
JR41
L7 18 BK/YL
L7 16 BK/YL
L7 18 BK/BR
L7 16 BK/BR
L7 20 BK/YL
RIGHT LAVALIER MODULE
(8W-50-10)
LEFT LAVALIER MODULE
(8W-50-10)
RIGHT PARK/ TURN SIGNAL LAMP
(8W-50-4)
LEFT PARK/ TURN SIGNAL LAMP
(8W-50-4)
TO C300
(8W-12-21)
TO C320
(8W-12-22)
▲▲ BUILT-UP-EXPORT


FROM
JUNCTION BLOCK
(8W-12-20)
F
L7
20
BK/YL
4
C300
L7
18
BK/YL
L7
20
BK/YL
4
C301
L7
18
BK/YL
S318
EXCEPT JR41 DODGE
JR41 DODGE
L7
18
BK/YL
2
LEFT TAIL/ SIDE MARKER LAMP
(8W-51-4)
(8W-51-8)
2
LEFT TAIL/ TURN SIGNAL LAMP
(8W-51-7)
1
C320
2
LEFT TAIL/ STOP LAMP
(8W-51-2)
S319
JR41 DODGE
EXCEPT JR41 DODGE
2
RIGHT TAIL/ TURN SIGNAL LAMP
(8W-51-7)
2
RIGHT TAIL/ SIDE MARKER LAMP
(8W-51-4)
(8W-51-8)
2
RIGHT TAIL/ STOP LAMP
(8W-51-2)
JR41 EXCEPT BUILT-UP-EXPORT
JR41 BUILT-UP-EXPORT
S412
1
RIGHT LICENSE LAMP
(8W-51-8)
1
LICENSE LAMP
(8W-51-7)
1
LEFT LICENSE LAMP
(8W-51-8)

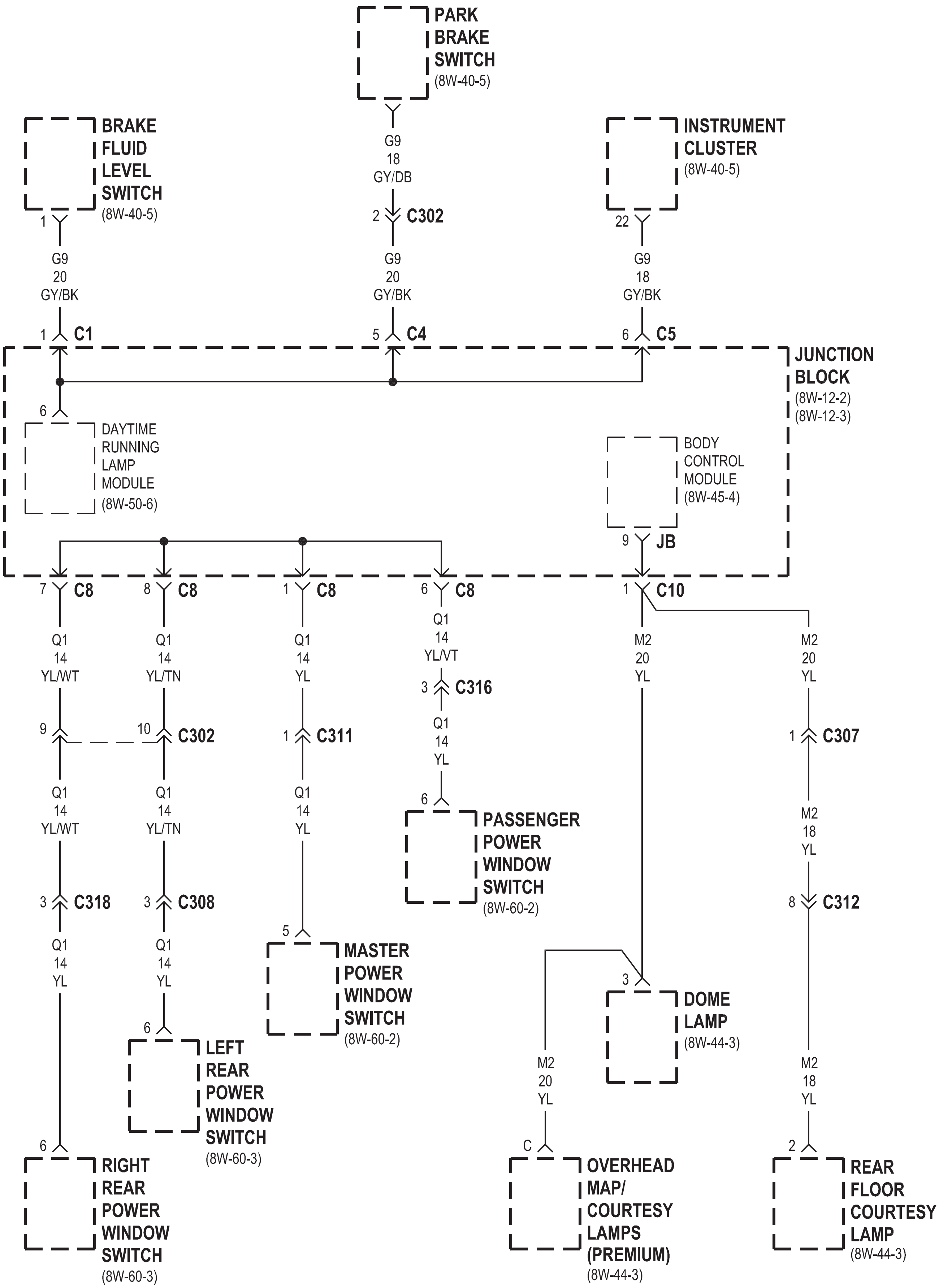
JR27


FROM
JUNCTION
BLOCK
(8W-12-20)
H
L7
20
BK/YL
A
C320
L7
18
BK/YL
S412
L7
18
BK/YL
L7
18
BK/YL
1
RIGHT
LICENSE
LAMP
(8W-51-4)
1
LEFT
LICENSE
LAMP
(8W-51-4)

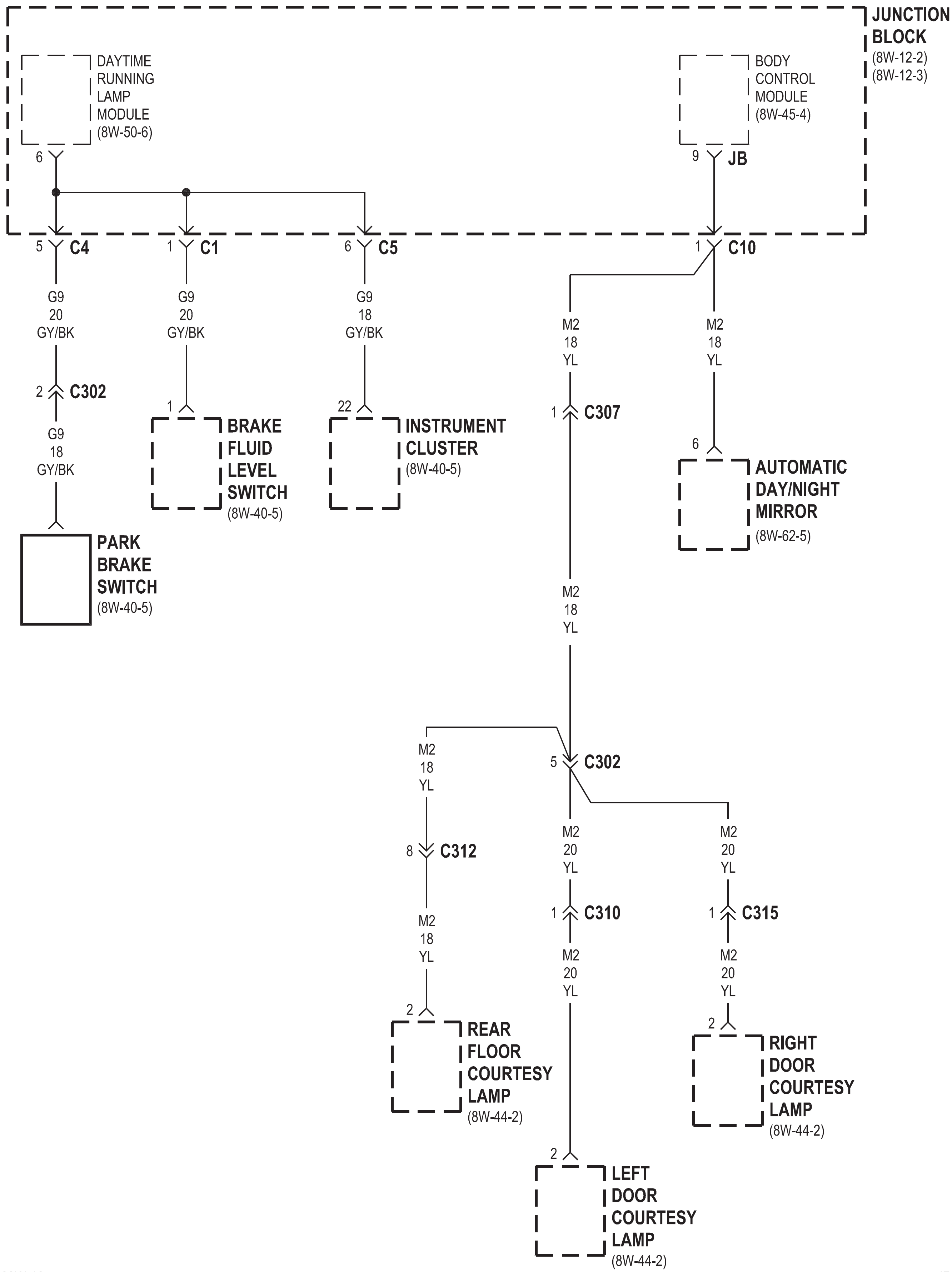

MULTI-
FUNCTION
SWITCH
(8W-52-2)
TURN
SIGNAL
SWITCH
1 C1
2 C1
L61
16
LG
L60
16
TN
7 C7
8 C7
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
5 C9
5 C1
9 C7
3 C7
4 C9
4 C1
JR27
JR41
L61
20
LG
L61
20
LG/TN
L61
16
LG
L61
18
LG/TN
L60
18
TN/BR
L60
20
TN
L60
16
TN
18
19
INSTRUMENT
CLUSTER
(8W-40-8)
3 C300
3 C301
BUILT-UP-
EXPORT
EXCEPT
BUILT-UP-
EXPORT
L61
18
LG
L61
16
LG
L61
16
LG
L60
16
TN
L60
16
TN
1
LEFT
PARK/
TURN
SIGNAL
LAMP
(8W-52-3)
4
LEFT
LAVALIER
MODULE
(8W-52-4)
4
RIGHT
LAVALIER
MODULE
(8W-52-4)
1
RIGHT
PARK/
TURN
SIGNAL
LAMP
(8W-52-3)
EXCEPT
JR41 DODGE
JR41 DODGE
L60
18
LG
L60
18
TN
1
LEFT
TURN
LAMP
(8W-52-3)
3
LEFT
TAIL/
TURN
SIGNAL
LAMP
(8W-52-3)
1
RIGHT
TURN
LAMP
(8W-52-3)
3
RIGHT
TAIL/
TURN
SIGNAL
LAMP
(8W-52-3)


BATT L44
(8W-12-15)
MULTI-FUNCTION SWITCH
FRONT FOG LAMP SWITCH
0
1
0 OFF
1 ON
(8W-50-5)
12 C2
L39
20
LB/WT
5 C5
INSTRUMENT CLUSTER
(8W-40-8)
26
L39
18
LB
10 C5
LEFT FOG LAMP
(8W-50-5)
(8W-50-11)
A
L39
18
LB/OR
10 C1
RIGHT FOG LAMP
(8W-50-5)
(8W-50-11)
A
L39
18
LB
11 C1
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1 C2
3 C2
9 C9
L50
18
WT/TN
L50
16
WT/TN
L50
18
WT/TN
L50
18
WT/TN
JR41
JR27
A C305
L50
18
BK/TN
L50
18
WT/TN
2 C300
L50
18
WT/TN
2 C301
L50
18
WT/TN
L50
18
WT/TN
18
CONTROLLER ANTILOCK BRAKE
(8W-35-3)
5
BRAKE LAMP SWITCH
(8W-51-2)
□□ 2
□ 1
CENTER HIGH MOUNTED STOP LAMP
(8W-51-2)
3
LEFT TAIL/ STOP LAMP
(8W-51-2)
3
RIGHT TAIL/ STOP LAMP
(8W-51-2)
□ JR27
□□ JR41

JR41

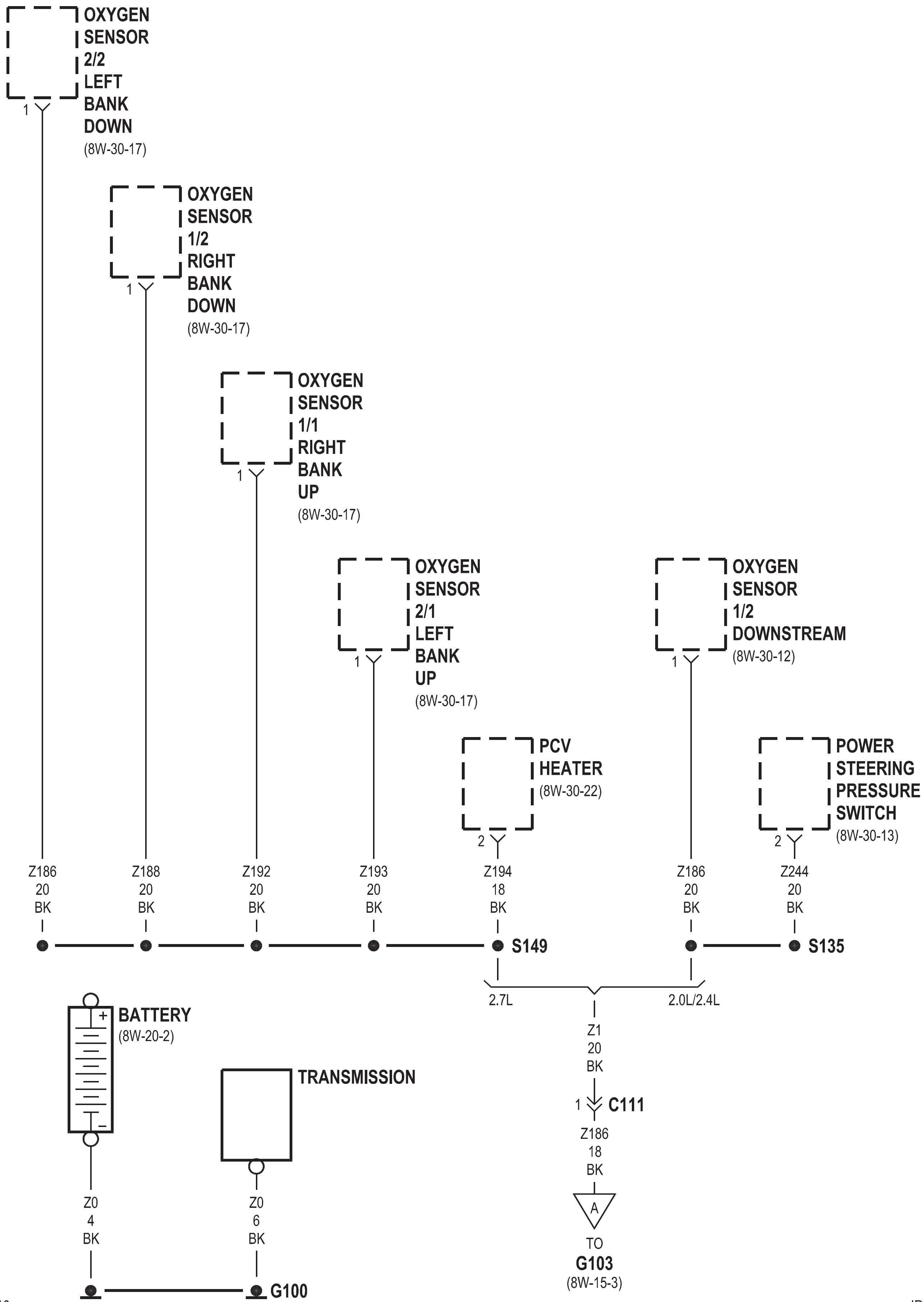

PARK
BRAKE
SWITCH
(8W-40-5)
G9
18
GY/DB
2 C302
G9
20
GY/BK
5 C4
BRAKE
FLUID
LEVEL
SWITCH
(8W-40-5)
1
G9
20
GY/BK
1 C1
INSTRUMENT
CLUSTER
(8W-40-5)
22
G9
18
GY/BK
6 C5
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
6
DAYTIME
RUNNING
LAMP
MODULE
(8W-50-6)
BODY
CONTROL
MODULE
(8W-45-4)
9 JB
7 C8
8 C8
1 C8
6 C8
1 C10
Q1
14
YL/WT
9
Q1
14
YL/TN
10 C302
Q1
14
YL
1 C311
Q1
14
YL/VT
3 C316
Q1
14
YL
6
PASSENGER
POWER
WINDOW
SWITCH
(8W-60-2)
M2
20
YL
M2
20
YL
1 C307
M2
18
YL
8 C312
Q1
14
YL/WT
3 C318
Q1
14
YL
Q1
14
YL/TN
3 C308
Q1
14
YL
Q1
14
YL
5
MASTER
POWER
WINDOW
SWITCH
(8W-60-2)
3
DOME
LAMP
(8W-44-3)
M2
20
YL
M2
18
YL
6
LEFT
REAR
POWER
WINDOW
SWITCH
(8W-60-3)
6
RIGHT
REAR
POWER
WINDOW
SWITCH
(8W-60-3)
C
OVERHEAD
MAP/
COURTESY
LAMPS
(PREMIUM)
(8W-44-3)
2
REAR
FLOOR
COURTESY
LAMP
(8W-44-3)

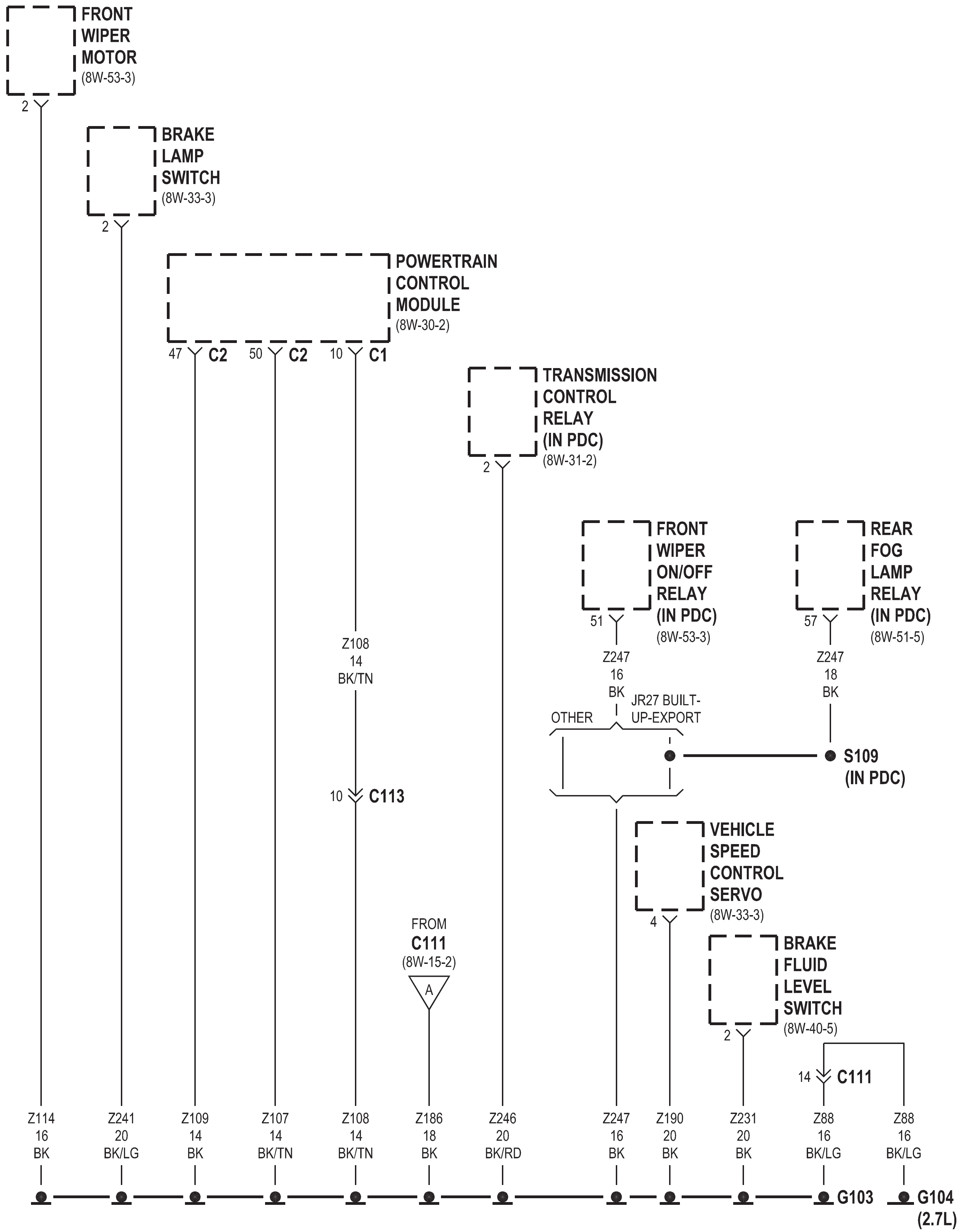
JR27

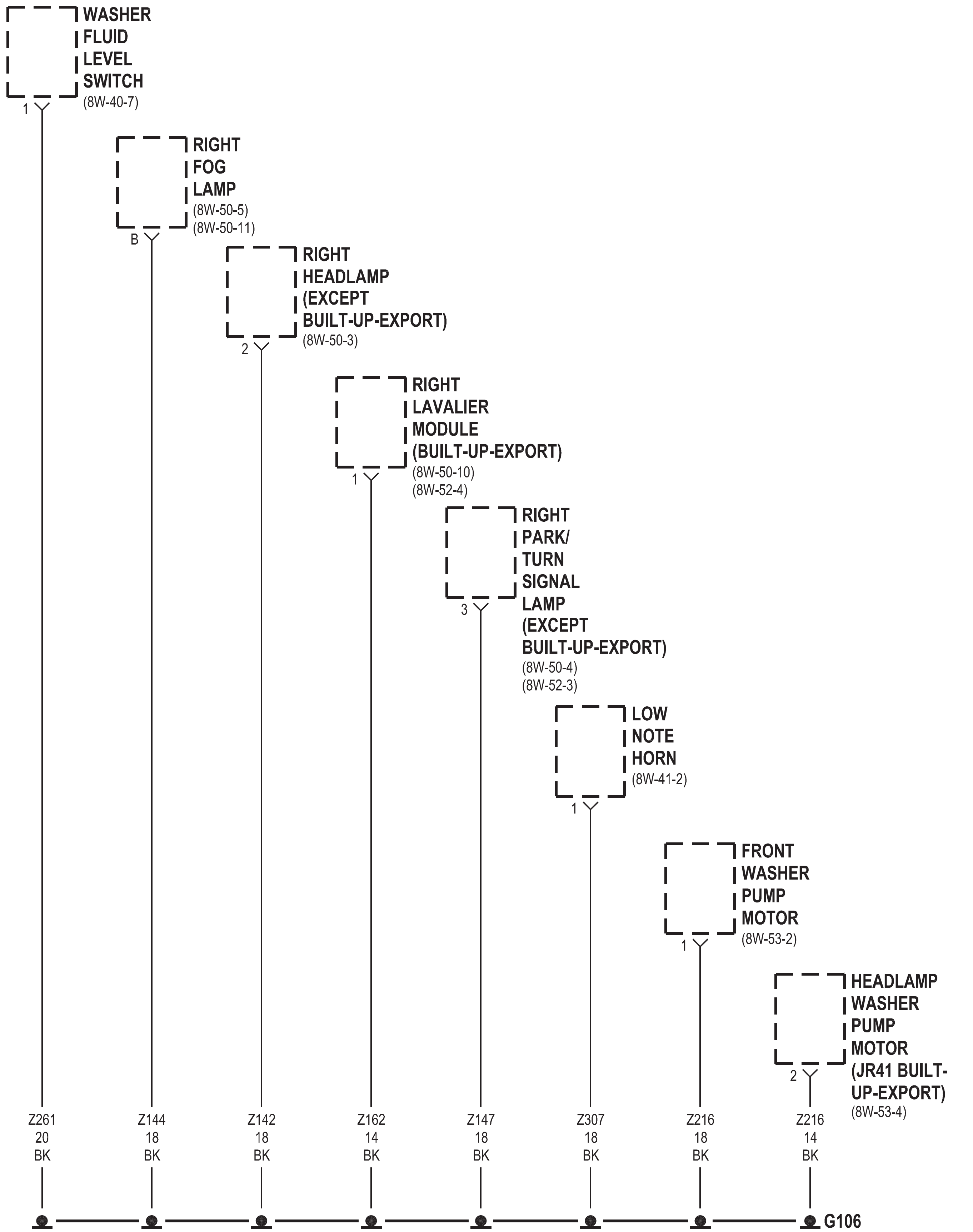


JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
DAYTIME RUNNING LAMP MODULE
(8W-50-6)
BODY CONTROL MODULE
(8W-45-4)
6
9
JB
5
C4
1
C1
6
C5
1
C10
G9
20
GY/BK
G9
20
GY/BK
G9
18
GY/BK
M2
18
YL
M2
18
YL
2
C302
G9
18
GY/BK
1
BRAKE FLUID LEVEL SWITCH
(8W-40-5)
22
INSTRUMENT CLUSTER
(8W-40-5)
1
C307
6
AUTOMATIC DAY/NIGHT MIRROR
(8W-62-5)
PARK BRAKE SWITCH
(8W-40-5)
M2
18
YL
M2
18
YL
5
C302
M2
20
YL
M2
20
YL
8
C312
1
C310
1
C315
M2
18
YL
M2
20
YL
M2
20
YL
2
REAR FLOOR COURTESY LAMP
(8W-44-2)
2
RIGHT DOOR COURTESY LAMP
(8W-44-2)
2
LEFT DOOR COURTESY LAMP
(8W-44-2)

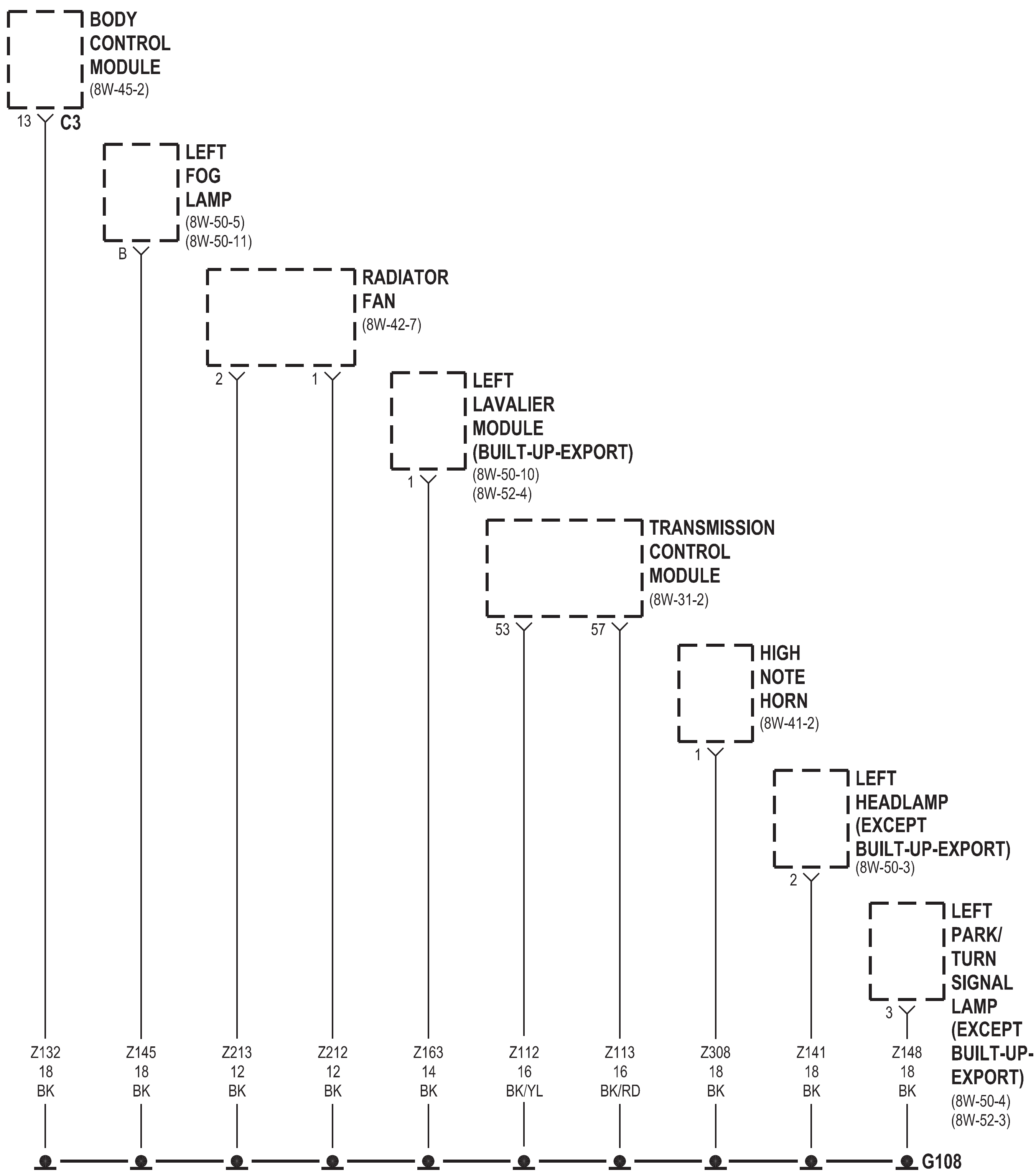
8W-15 GROUND DISTRIBUTION


OXYGEN SENSOR 2/2 LEFT BANK DOWN
(8W-30-17)
OXYGEN SENSOR 1/2 RIGHT BANK DOWN
(8W-30-17)
OXYGEN SENSOR 1/1 RIGHT BANK UP
(8W-30-17)
OXYGEN SENSOR 2/1 LEFT BANK UP
(8W-30-17)
OXYGEN SENSOR 1/2 DOWNSTREAM
(8W-30-12)
PCV HEATER
(8W-30-22)
POWER STEERING PRESSURE SWITCH
(8W-30-13)
1
1
1
1
1
2
2
Z186 20 BK
Z188 20 BK
Z192 20 BK
Z193 20 BK
Z194 18 BK
Z186 20 BK
Z244 20 BK
S149
S135
2.7L
2.0L/2.4L
Z1 20 BK
1
C111
Z186 18 BK
A
TO
G103
(8W-15-3)
BATTERY
(8W-20-2)
+
–
TRANSMISSION
Z0 4 BK
Z0 6 BK
G100

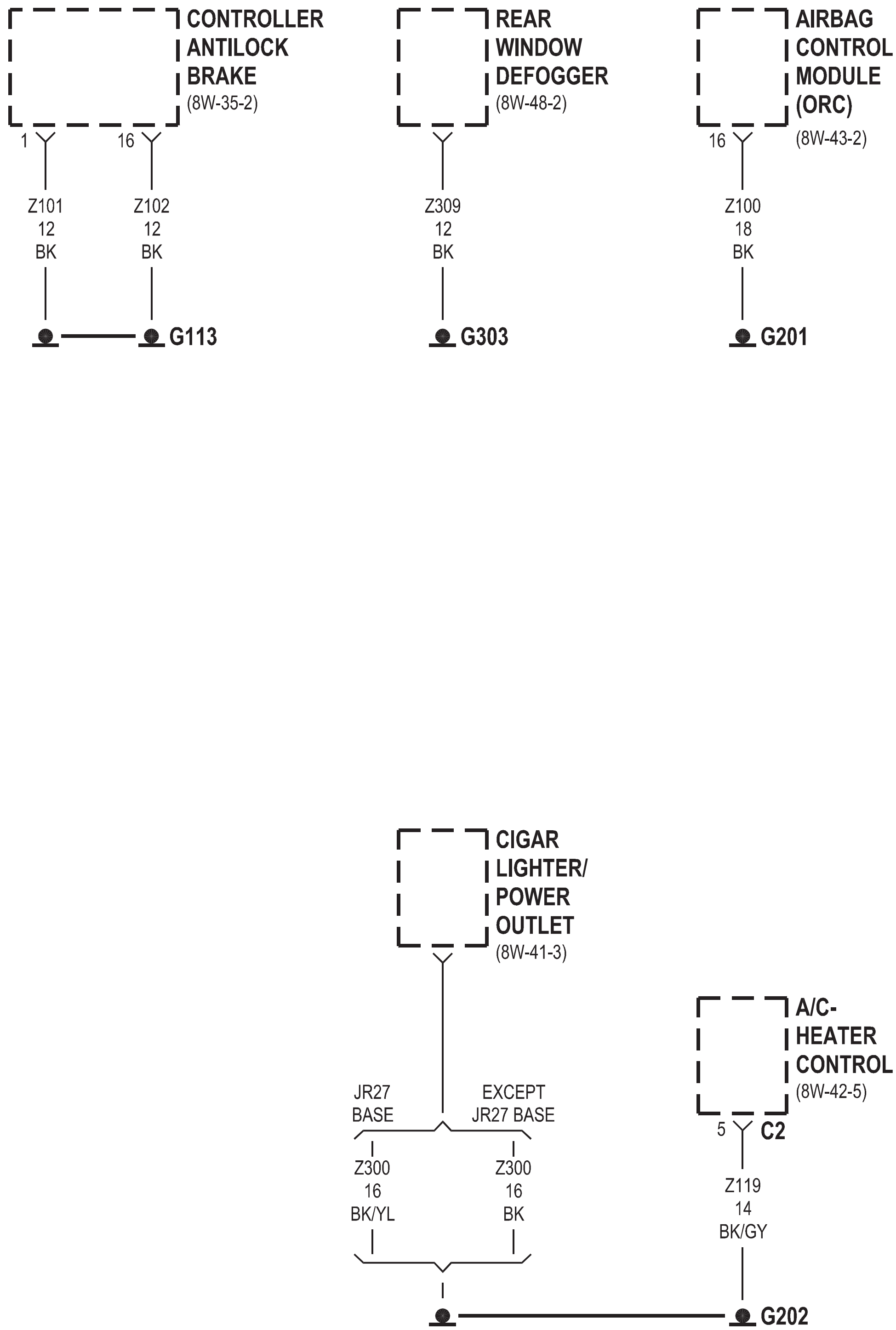

FRONT WIPER MOTOR (8W-53-3)
2
BRAKE LAMP SWITCH (8W-33-3)
2
POWERTRAIN CONTROL MODULE (8W-30-2)
47 C2
50 C2
10 C1
TRANSMISSION CONTROL RELAY (IN PDC) (8W-31-2)
2
FRONT WIPER ON/OFF RELAY (IN PDC) (8W-53-3)
51
REAR FOG LAMP RELAY (IN PDC) (8W-51-5)
57
Z108 14 BK/TN
Z247 16 BK
Z247 18 BK
OTHER
JR27 BUILT-UP-EXPORT
S109 (IN PDC)
10 C113
VEHICLE SPEED CONTROL SERVO (8W-33-3)
4
FROM C111 (8W-15-2)
A
BRAKE FLUID LEVEL SWITCH (8W-40-5)
2
14 C111
Z114 16 BK
Z241 20 BK/LG
Z109 14 BK
Z107 14 BK/TN
Z108 14 BK/TN
Z186 18 BK
Z246 20 BK/RD
Z247 16 BK
Z190 20 BK
Z231 20 BK
Z88 16 BK/LG
Z88 16 BK/LG
G103
G104 (2.7L)

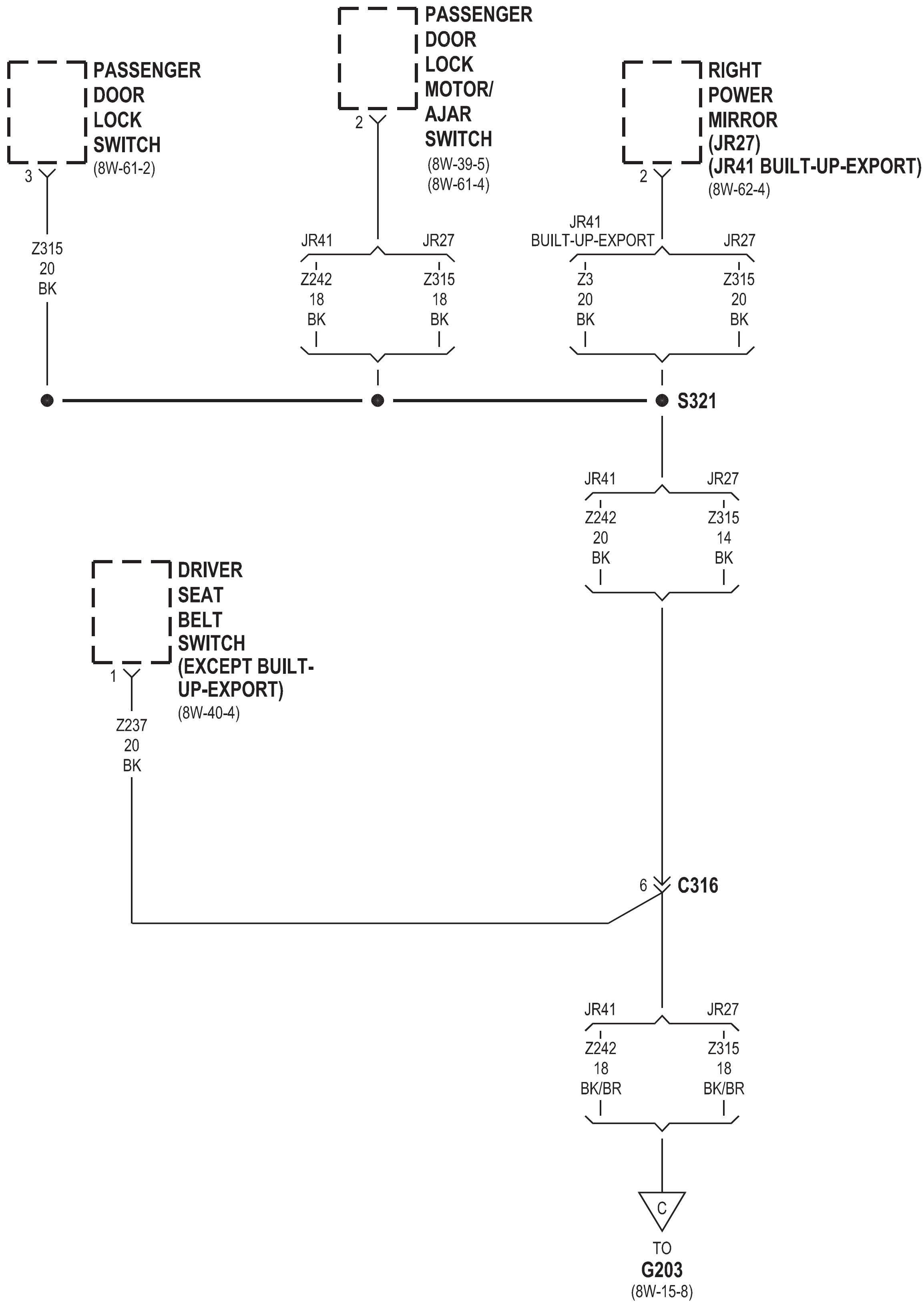

WASHER FLUID LEVEL SWITCH
(8W-40-7)
1
RIGHT FOG LAMP
(8W-50-5)
(8W-50-11)
B
RIGHT HEADLAMP (EXCEPT BUILT-UP-EXPORT)
(8W-50-3)
2
RIGHT LAVALIER MODULE (BUILT-UP-EXPORT)
(8W-50-10)
(8W-52-4)
1
RIGHT PARK/ TURN SIGNAL LAMP (EXCEPT BUILT-UP-EXPORT)
(8W-50-4)
(8W-52-3)
3
LOW NOTE HORN
(8W-41-2)
1
FRONT WASHER PUMP MOTOR
(8W-53-2)
1
HEADLAMP WASHER PUMP MOTOR (JR41 BUILT-UP-EXPORT)
(8W-53-4)
2
Z261 20 BK
Z144 18 BK
Z142 18 BK
Z162 14 BK
Z147 18 BK
Z307 18 BK
Z216 18 BK
Z216 14 BK
G106

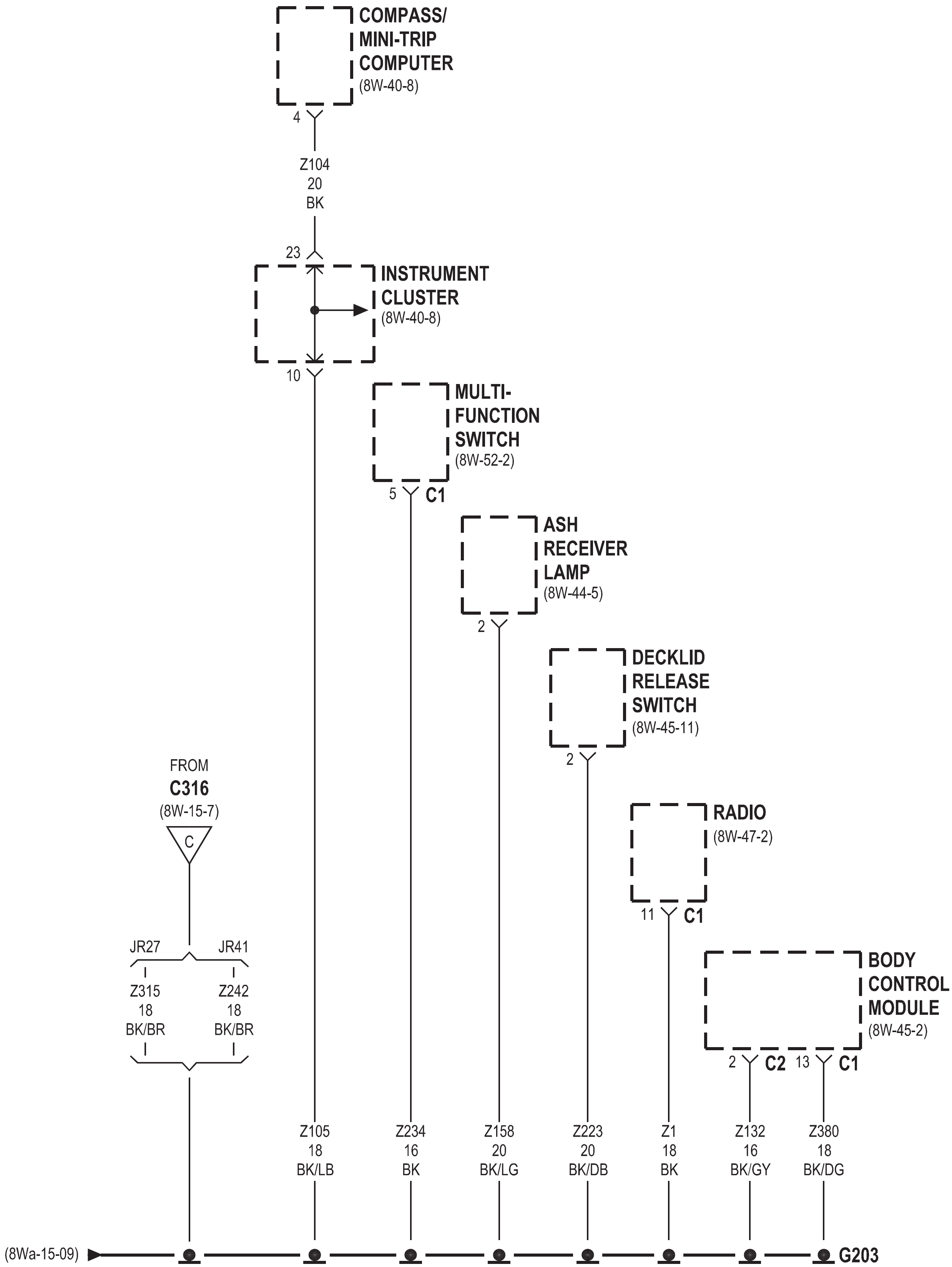
JRI01504

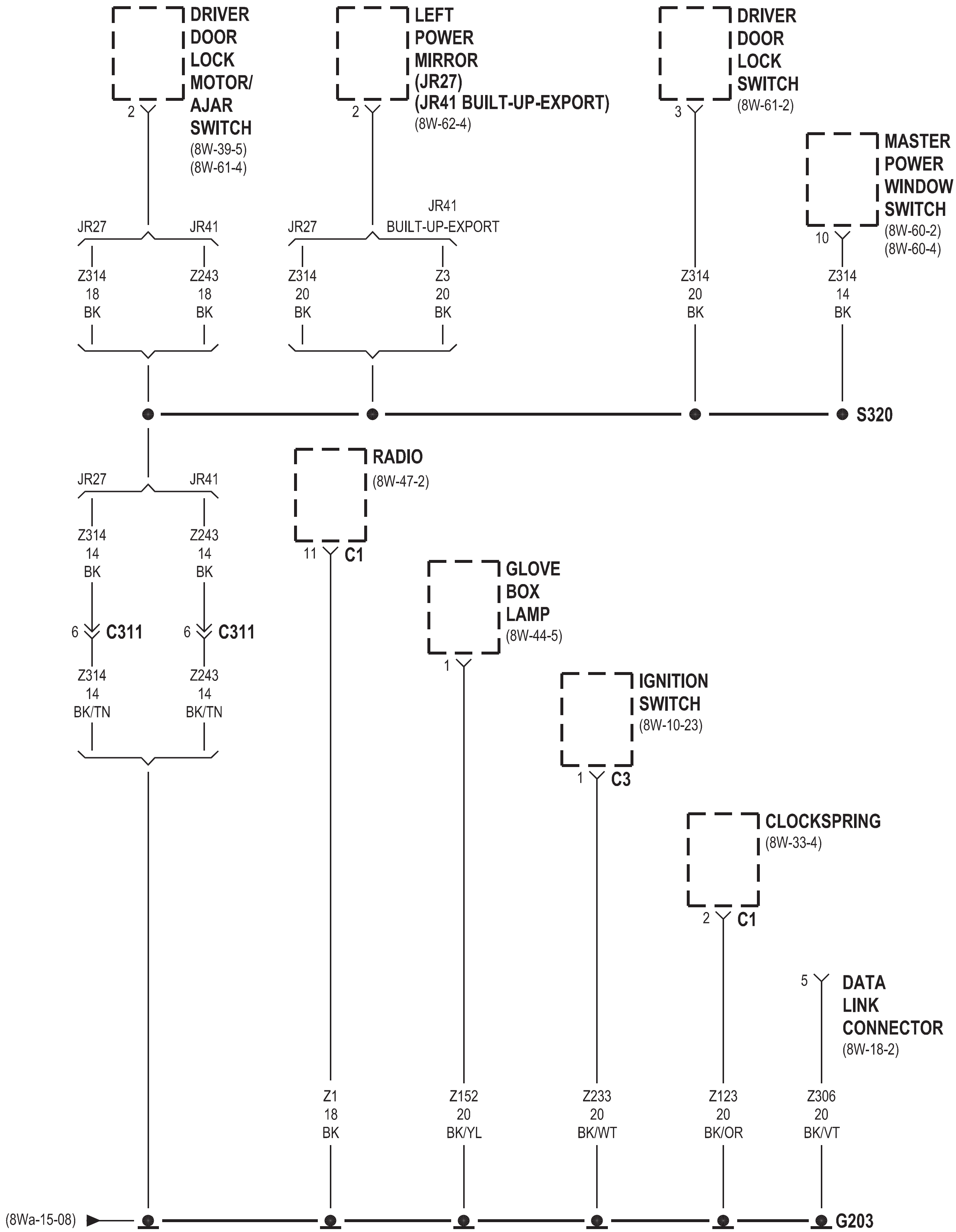

BODY CONTROL MODULE
(8W-45-2)
13
C3
LEFT FOG LAMP
(8W-50-5)
(8W-50-11)
B
RADIATOR FAN
(8W-42-7)
2
1
LEFT LAVALIER MODULE (BUILT-UP-EXPORT)
(8W-50-10)
(8W-52-4)
1
TRANSMISSION CONTROL MODULE
(8W-31-2)
53
57
HIGH NOTE HORN
(8W-41-2)
1
LEFT HEADLAMP (EXCEPT BUILT-UP-EXPORT)
(8W-50-3)
2
LEFT PARK/ TURN SIGNAL LAMP (EXCEPT BUILT-UP-EXPORT)
(8W-50-4)
(8W-52-3)
3
Z132 18 BK
Z145 18 BK
Z213 12 BK
Z212 12 BK
Z163 14 BK
Z112 16 BK/YL
Z113 16 BK/RD
Z308 18 BK
Z141 18 BK
Z148 18 BK
G108

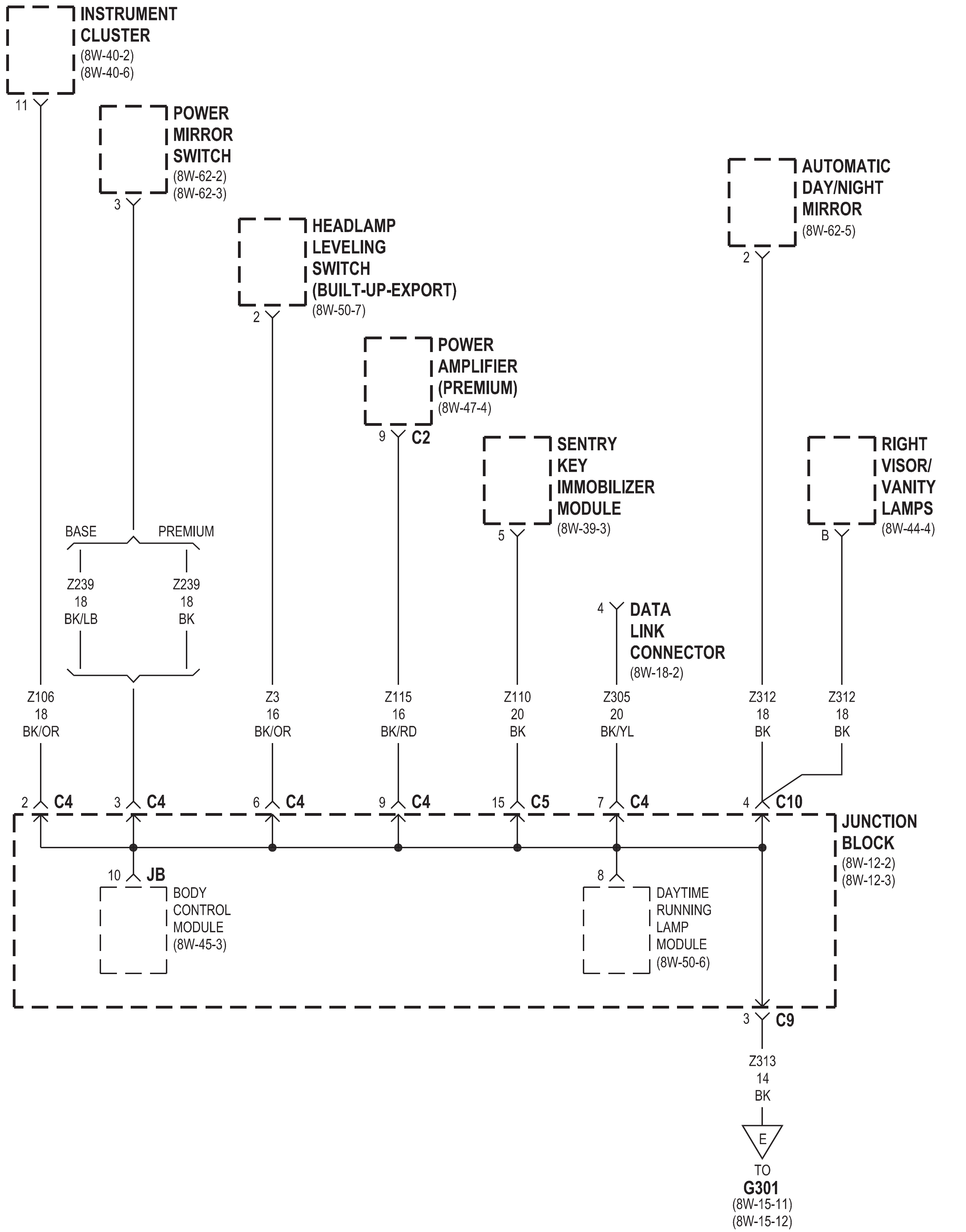
JRI01505


CONTROLLER ANTILOCK BRAKE
(8W-35-2)
1
16
Z101
12
BK
Z102
12
BK
G113
REAR WINDOW DEFOGGER
(8W-48-2)
Z309
12
BK
G303
AIRBAG CONTROL MODULE (ORC)
(8W-43-2)
16
Z100
18
BK
G201
CIGAR LIGHTER/ POWER OUTLET
(8W-41-3)
JR27 BASE
EXCEPT JR27 BASE
Z300
16
BK/YL
Z300
16
BK
A/C-HEATER CONTROL
(8W-42-5)
5
C2
Z119
14
BK/GY
G202

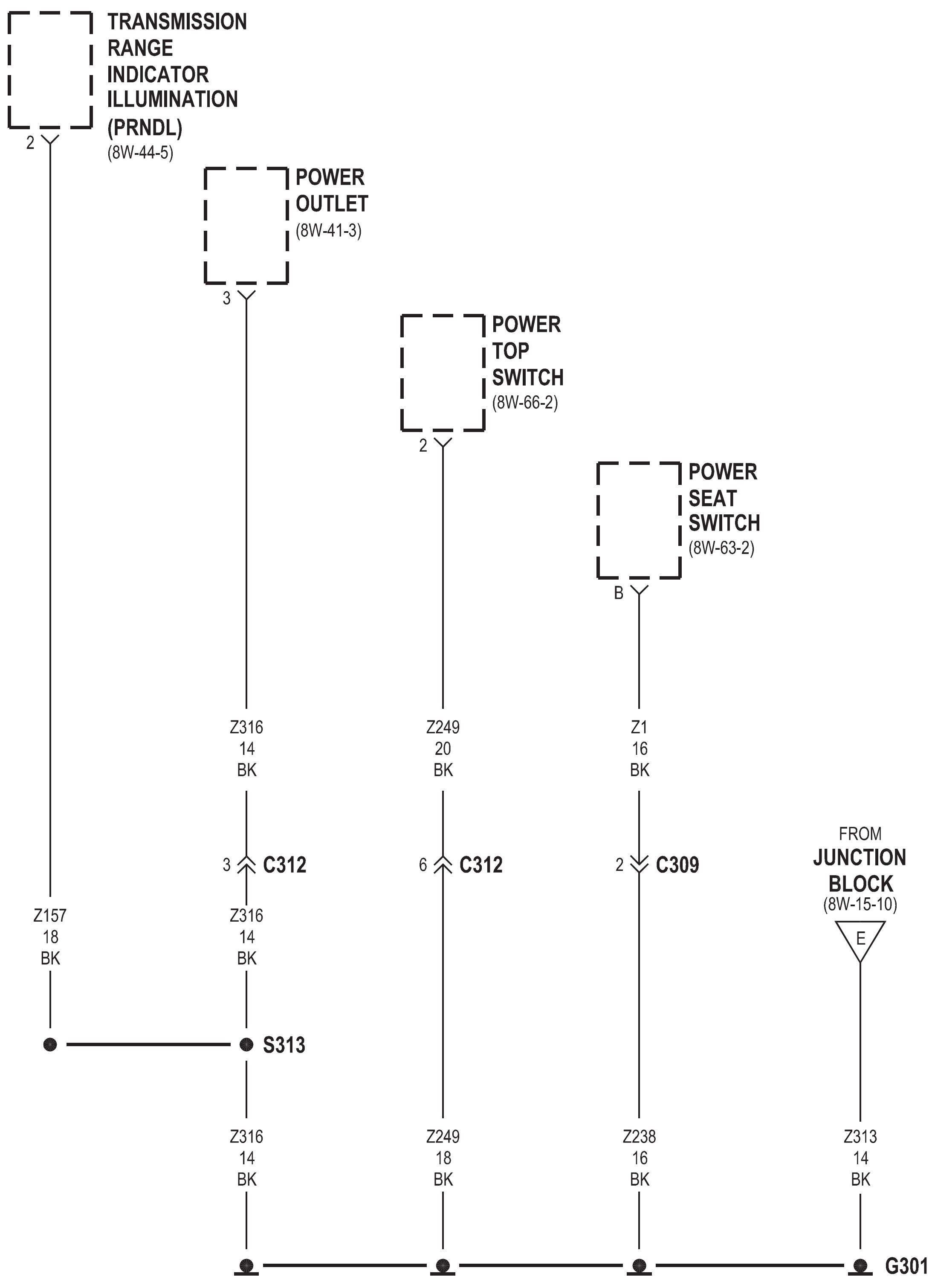

PASSENGER
DOOR
LOCK
SWITCH
(8W-61-2)
3
Z315
20
BK
PASSENGER
DOOR
LOCK
MOTOR/
AJAR
SWITCH
(8W-39-5)
(8W-61-4)
2
JR41
JR27
Z242
18
BK
Z315
18
BK
RIGHT
POWER
MIRROR
(JR27)
(JR41 BUILT-UP-EXPORT)
(8W-62-4)
2
JR41
BUILT-UP-EXPORT
JR27
Z3
20
BK
Z315
20
BK
S321
JR41
JR27
Z242
20
BK
Z315
14
BK
DRIVER
SEAT
BELT
SWITCH
(EXCEPT BUILT-
UP-EXPORT)
(8W-40-4)
1
Z237
20
BK
6
C316
JR41
JR27
Z242
18
BK/BR
Z315
18
BK/BR
C
TO
G203
(8W-15-8)


COMPASS/
MINI-TRIP
COMPUTER
(8W-40-8)
4
Z104
20
BK
23
INSTRUMENT
CLUSTER
(8W-40-8)
10
MULTI-
FUNCTION
SWITCH
(8W-52-2)
5
C1
ASH
RECEIVER
LAMP
(8W-44-5)
2
DECKLID
RELEASE
SWITCH
(8W-45-11)
2
RADIO
(8W-47-2)
11
C1
BODY
CONTROL
MODULE
(8W-45-2)
2
C2
13
C1
FROM
C316
(8W-15-7)
C
JR27
JR41
Z315
18
BK/BR
Z242
18
BK/BR
Z105
18
BK/LB
Z234
16
BK
Z158
20
BK/LG
Z223
20
BK/DB
Z1
18
BK
Z132
16
BK/GY
Z380
18
BK/DG
(8Wa-15-09)
G203

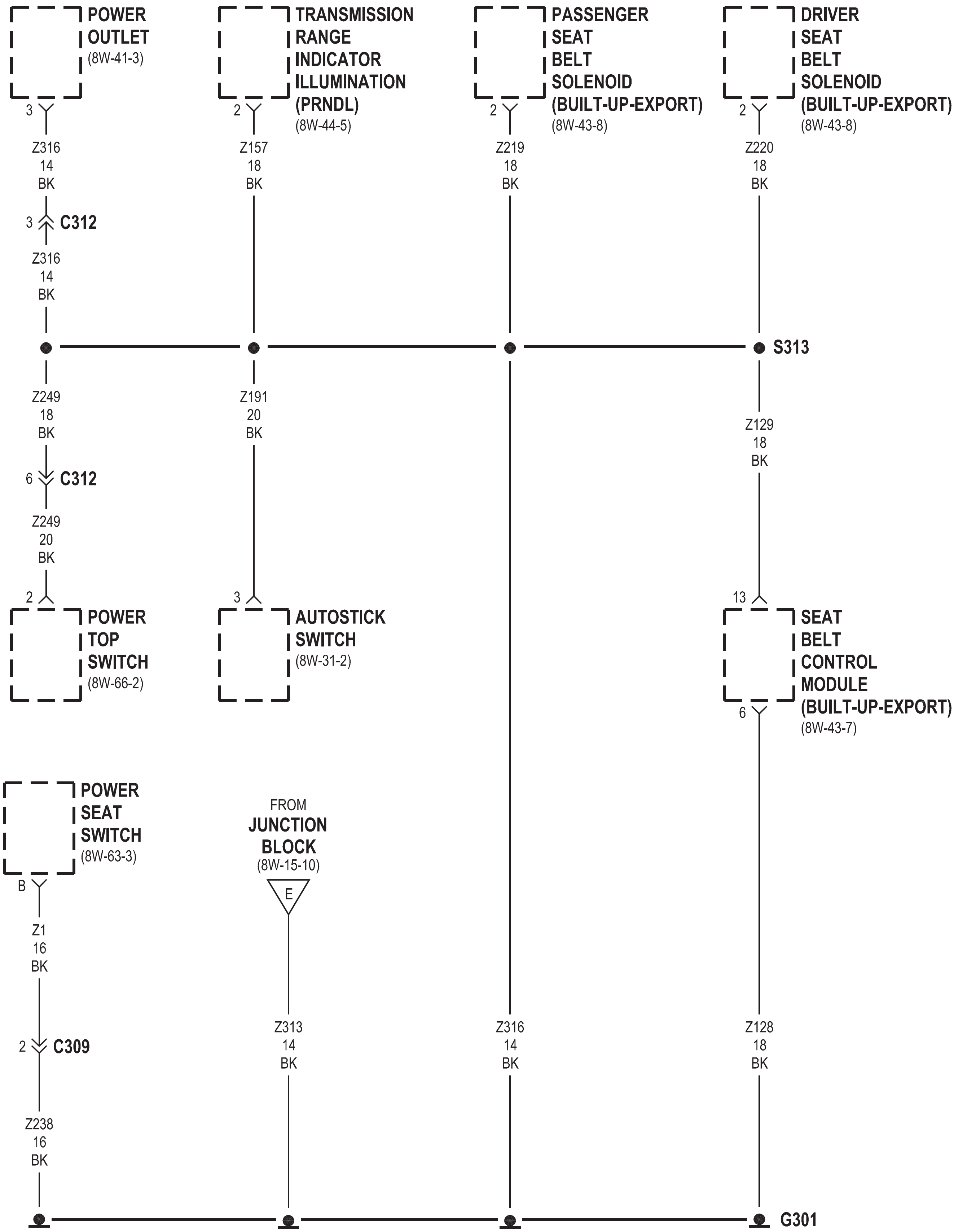

DRIVER DOOR LOCK MOTOR/ AJAR SWITCH
(8W-39-5)
(8W-61-4)
2
LEFT POWER MIRROR (JR27) (JR41 BUILT-UP-EXPORT)
(8W-62-4)
2
DRIVER DOOR LOCK SWITCH
(8W-61-2)
3
MASTER POWER WINDOW SWITCH
(8W-60-2)
(8W-60-4)
10
JR27
JR41
JR41 BUILT-UP-EXPORT
Z314 18 BK
Z243 18 BK
Z314 20 BK
Z3 20 BK
Z314 20 BK
Z314 14 BK
S320
RADIO
(8W-47-2)
11 C1
Z314 14 BK
Z243 14 BK
6 C311
6 C311
Z314 14 BK/TN
Z243 14 BK/TN
GLOVE BOX LAMP
(8W-44-5)
1
IGNITION SWITCH
(8W-10-23)
1 C3
CLOCKSPRING
(8W-33-4)
2 C1
5
DATA LINK CONNECTOR
(8W-18-2)
Z1 18 BK
Z152 20 BK/YL
Z233 20 BK/WT
Z123 20 BK/OR
Z306 20 BK/VT
(8Wa-15-08)
G203


INSTRUMENT CLUSTER
(8W-40-2)
(8W-40-6)
11
POWER MIRROR SWITCH
(8W-62-2)
(8W-62-3)
3
HEADLAMP LEVELING SWITCH (BUILT-UP-EXPORT)
(8W-50-7)
2
POWER AMPLIFIER (PREMIUM)
(8W-47-4)
9 C2
SENTRY KEY IMMOBILIZER MODULE
(8W-39-3)
5
AUTOMATIC DAY/NIGHT MIRROR
(8W-62-5)
2
RIGHT VISOR/ VANITY LAMPS
(8W-44-4)
B
BASE
PREMIUM
Z239
18
BK/LB
Z239
18
BK
4
DATA LINK CONNECTOR
(8W-18-2)
Z106
18
BK/OR
Z3
16
BK/OR
Z115
16
BK/RD
Z110
20
BK
Z305
20
BK/YL
Z312
18
BK
Z312
18
BK
2 C4
3 C4
6 C4
9 C4
15 C5
7 C4
4 C10
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
10 JB
BODY CONTROL MODULE
(8W-45-3)
8
DAYTIME RUNNING LAMP MODULE
(8W-50-6)
3 C9
Z313
14
BK
E
TO
G301
(8W-15-11)
(8W-15-12)

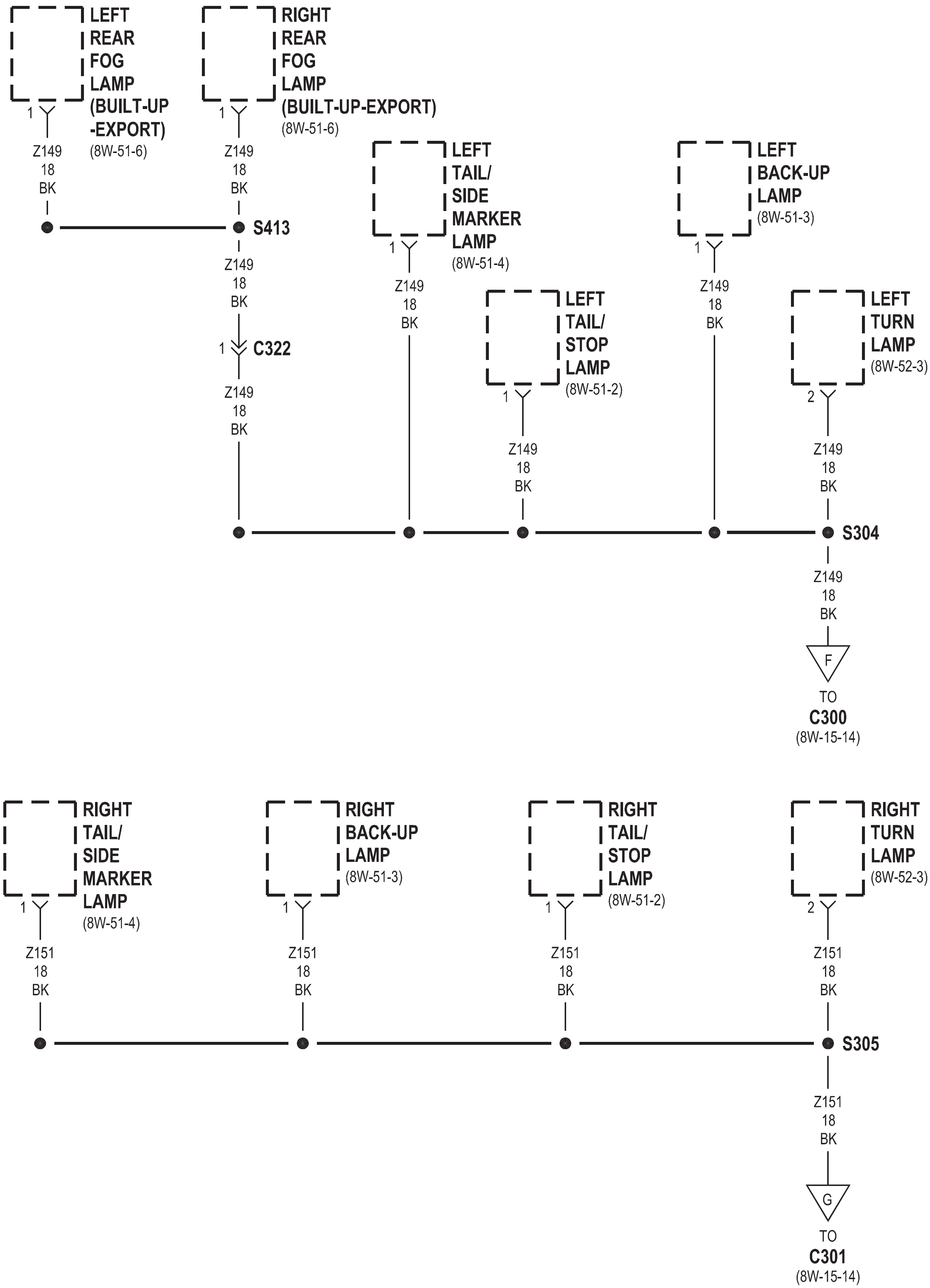
JR27 BASE


TRANSMISSION RANGE INDICATOR ILLUMINATION (PRNDL)
(8W-44-5)
2
POWER OUTLET
(8W-41-3)
3
POWER TOP SWITCH
(8W-66-2)
2
POWER SEAT SWITCH
(8W-63-2)
B
Z316 14 BK
Z249 20 BK
Z1 16 BK
3 C312
6 C312
2 C309
FROM JUNCTION BLOCK
(8W-15-10)
E
Z157 18 BK
Z316 14 BK
S313
Z316 14 BK
Z249 18 BK
Z238 16 BK
Z313 14 BK
G301

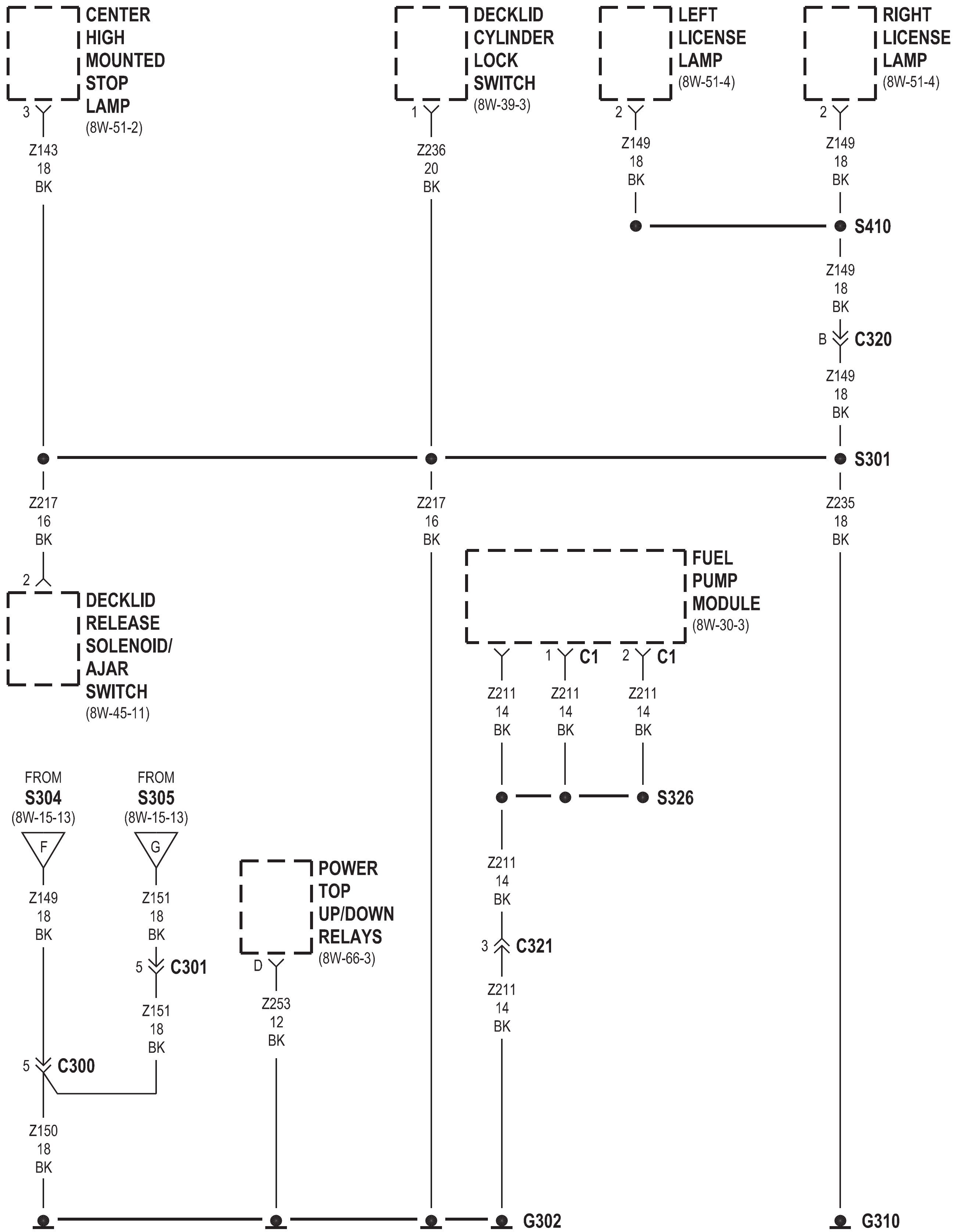
JR27 PREMIUM



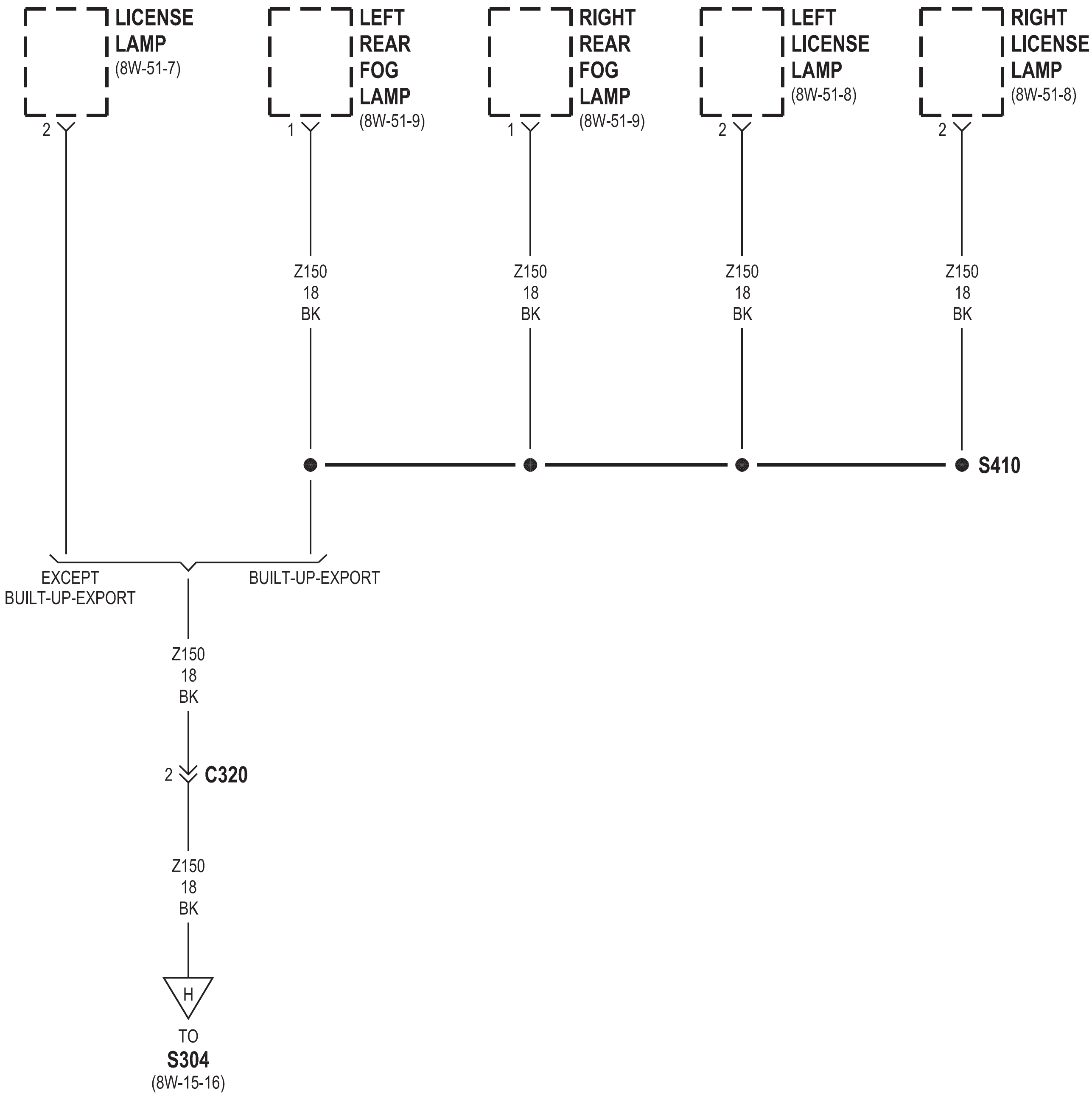
JR27

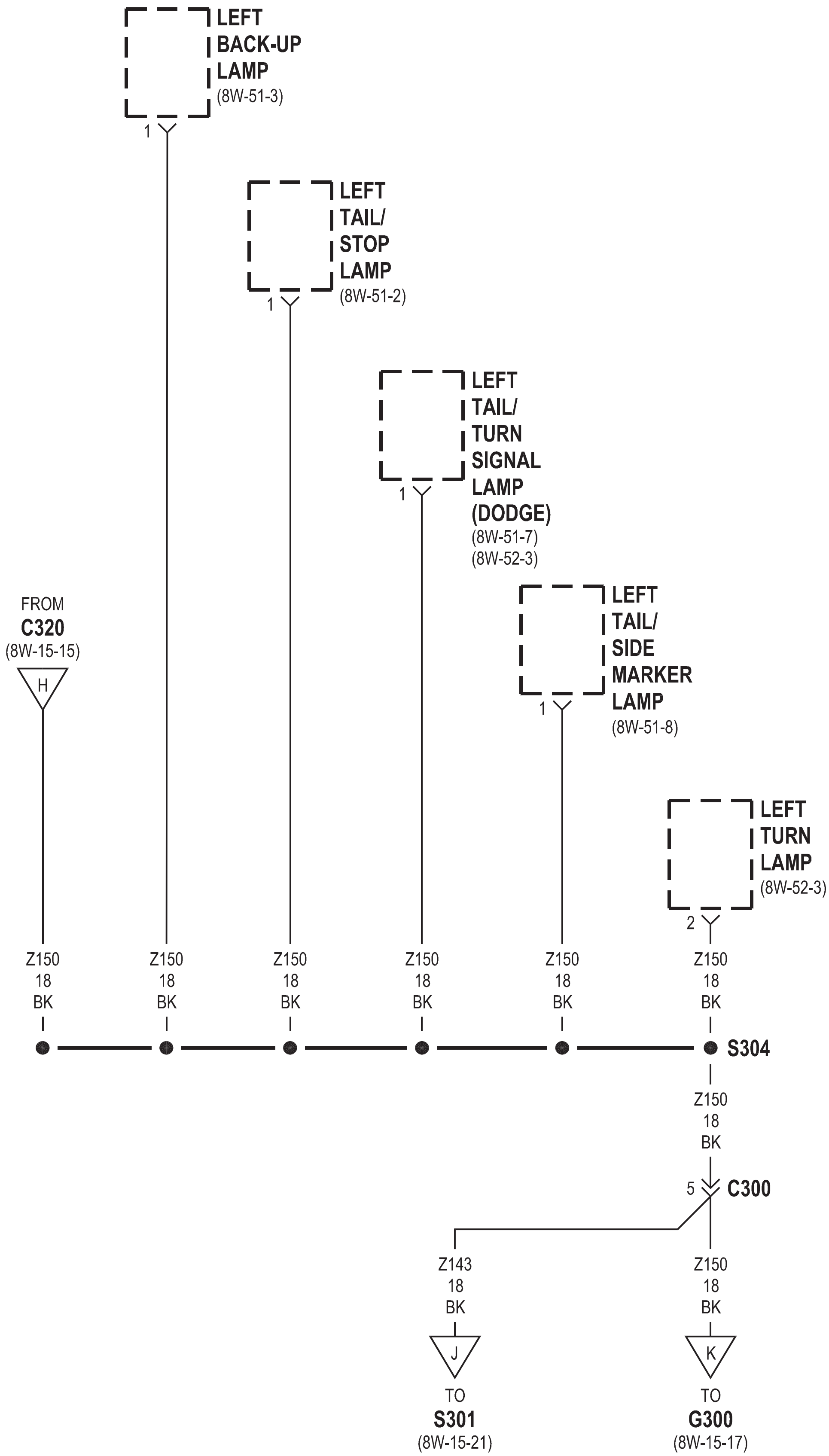

LEFT REAR FOG LAMP (BUILT-UP -EXPORT) (8W-51-6)
RIGHT REAR FOG LAMP (BUILT-UP-EXPORT) (8W-51-6)
1
Z149 18 BK
S413
C322
LEFT TAIL/ SIDE MARKER LAMP (8W-51-4)
LEFT TAIL/ STOP LAMP (8W-51-2)
LEFT BACK-UP LAMP (8W-51-3)
LEFT TURN LAMP (8W-52-3)
2
S304
F
TO C300 (8W-15-14)
RIGHT TAIL/ SIDE MARKER LAMP (8W-51-4)
RIGHT BACK-UP LAMP (8W-51-3)
RIGHT TAIL/ STOP LAMP (8W-51-2)
RIGHT TURN LAMP (8W-52-3)
Z151 18 BK
S305
G
TO C301 (8W-15-14)

JR27

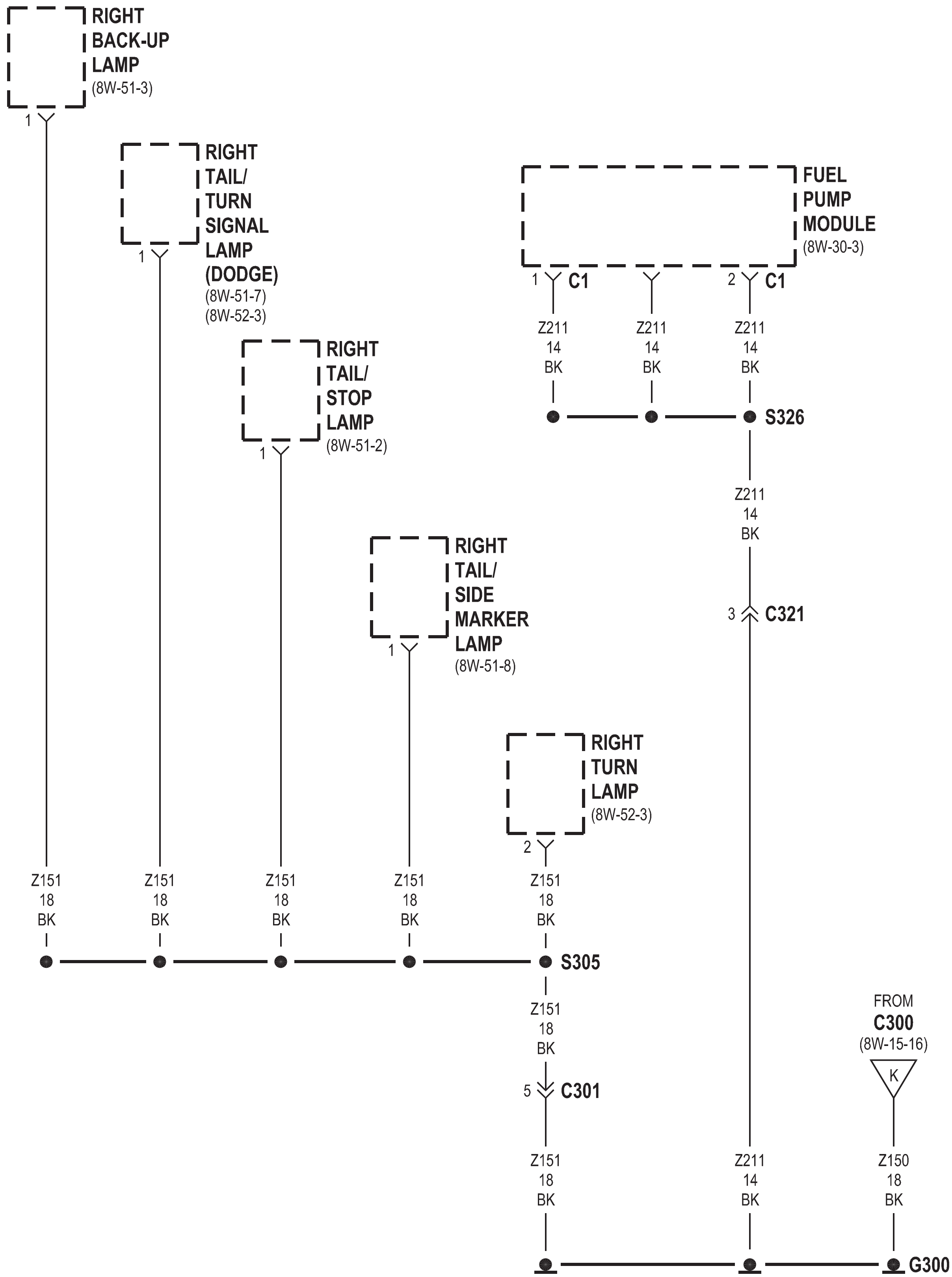

CENTER HIGH MOUNTED STOP LAMP
(8W-51-2)
3
Z143
18
BK
DECKLID CYLINDER LOCK SWITCH
(8W-39-3)
1
Z236
20
BK
LEFT LICENSE LAMP
(8W-51-4)
2
Z149
18
BK
RIGHT LICENSE LAMP
(8W-51-4)
2
Z149
18
BK
S410
Z149
18
BK
B
C320
Z149
18
BK
S301
Z217
16
BK
Z217
16
BK
Z235
18
BK
2
DECKLID RELEASE SOLENOID/ AJAR SWITCH
(8W-45-11)
FUEL PUMP MODULE
(8W-30-3)
1
C1
2
C1
Z211
14
BK
Z211
14
BK
Z211
14
BK
S326
Z211
14
BK
3
C321
Z211
14
BK
FROM
S304
(8W-15-13)
F
FROM
S305
(8W-15-13)
G
Z149
18
BK
Z151
18
BK
5
C301
Z151
18
BK
POWER TOP UP/DOWN RELAYS
(8W-66-3)
D
Z253
12
BK
5
C300
Z150
18
BK
G302
G310

JR41

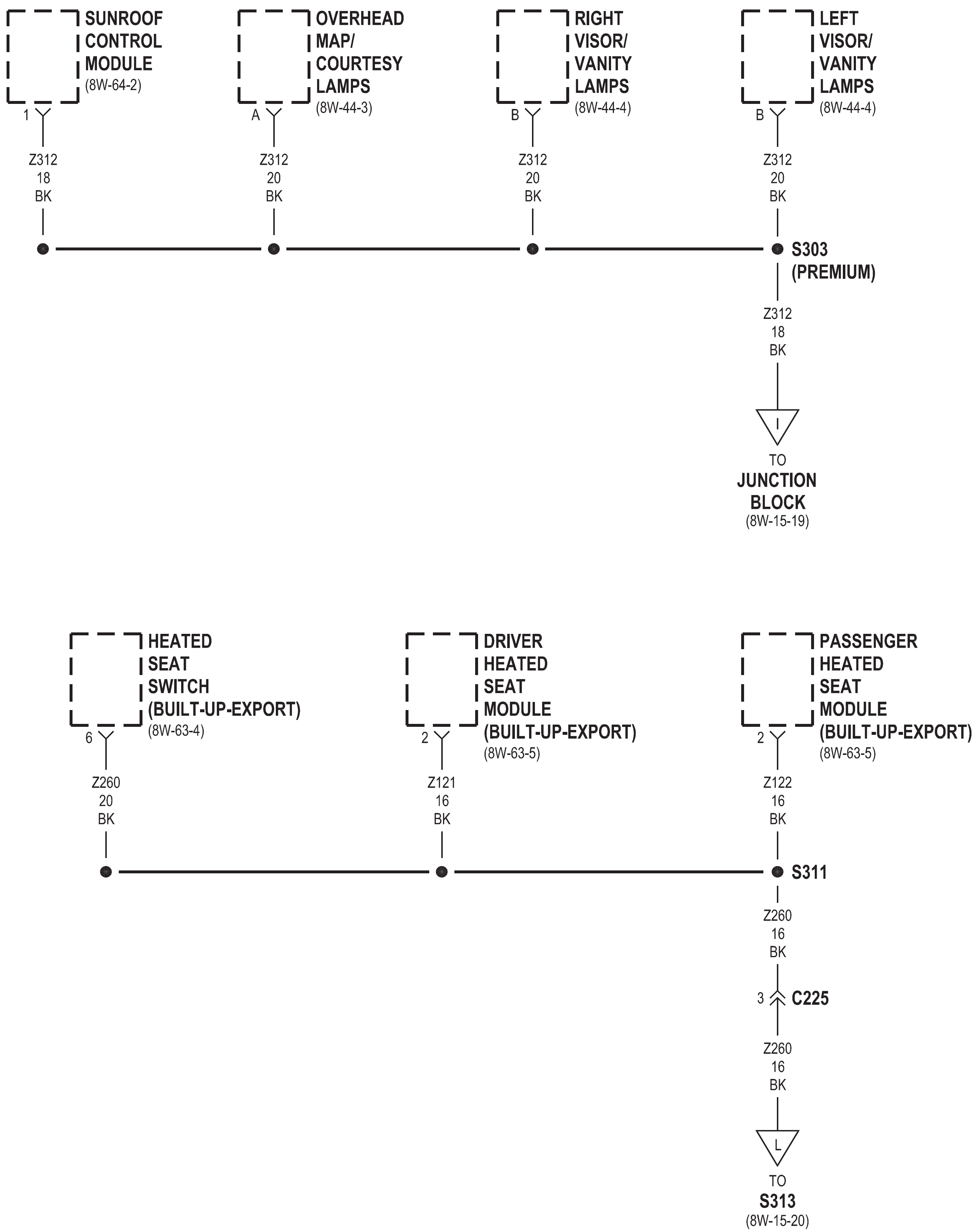

LICENSE LAMP (8W-51-7)
LEFT REAR FOG LAMP (8W-51-9)
RIGHT REAR FOG LAMP (8W-51-9)
LEFT LICENSE LAMP (8W-51-8)
RIGHT LICENSE LAMP (8W-51-8)
2
1
1
2
2
Z150 18 BK
Z150 18 BK
Z150 18 BK
Z150 18 BK
S410
EXCEPT BUILT-UP-EXPORT
BUILT-UP-EXPORT
Z150 18 BK
2 C320
Z150 18 BK
H
TO S304 (8W-15-16)


LEFT
BACK-UP
LAMP
(8W-51-3)
1
LEFT
TAIL/
STOP
LAMP
(8W-51-2)
1
LEFT
TAIL/
TURN
SIGNAL
LAMP
(DODGE)
(8W-51-7)
(8W-52-3)
1
FROM
C320
(8W-15-15)
H
LEFT
TAIL/
SIDE
MARKER
LAMP
(8W-51-8)
1
LEFT
TURN
LAMP
(8W-52-3)
2
Z150
18
BK
S304
5
C300
Z143
18
BK
J
TO
S301
(8W-15-21)
Z150
18
BK
K
TO
G300
(8W-15-17)

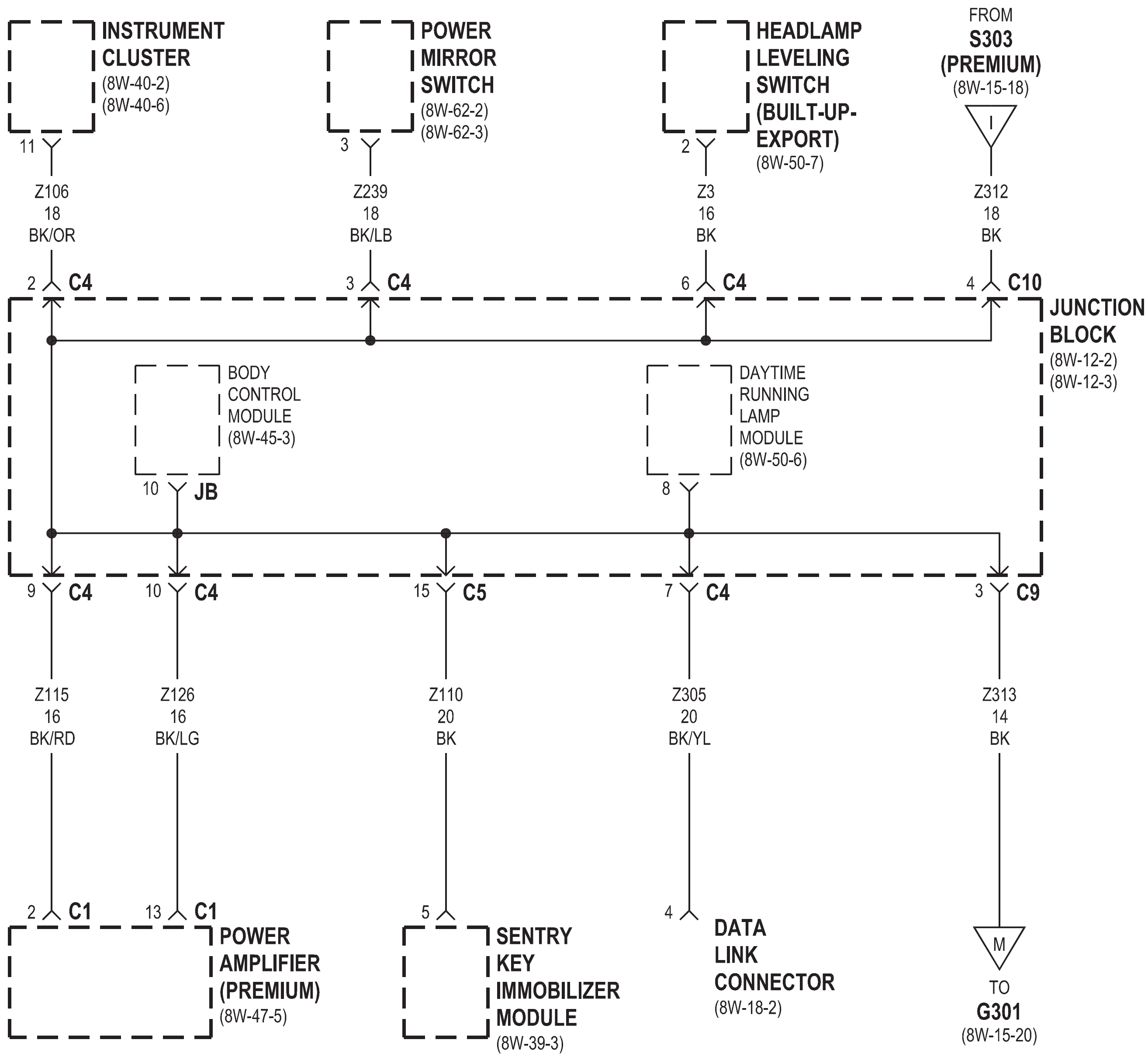
JR41



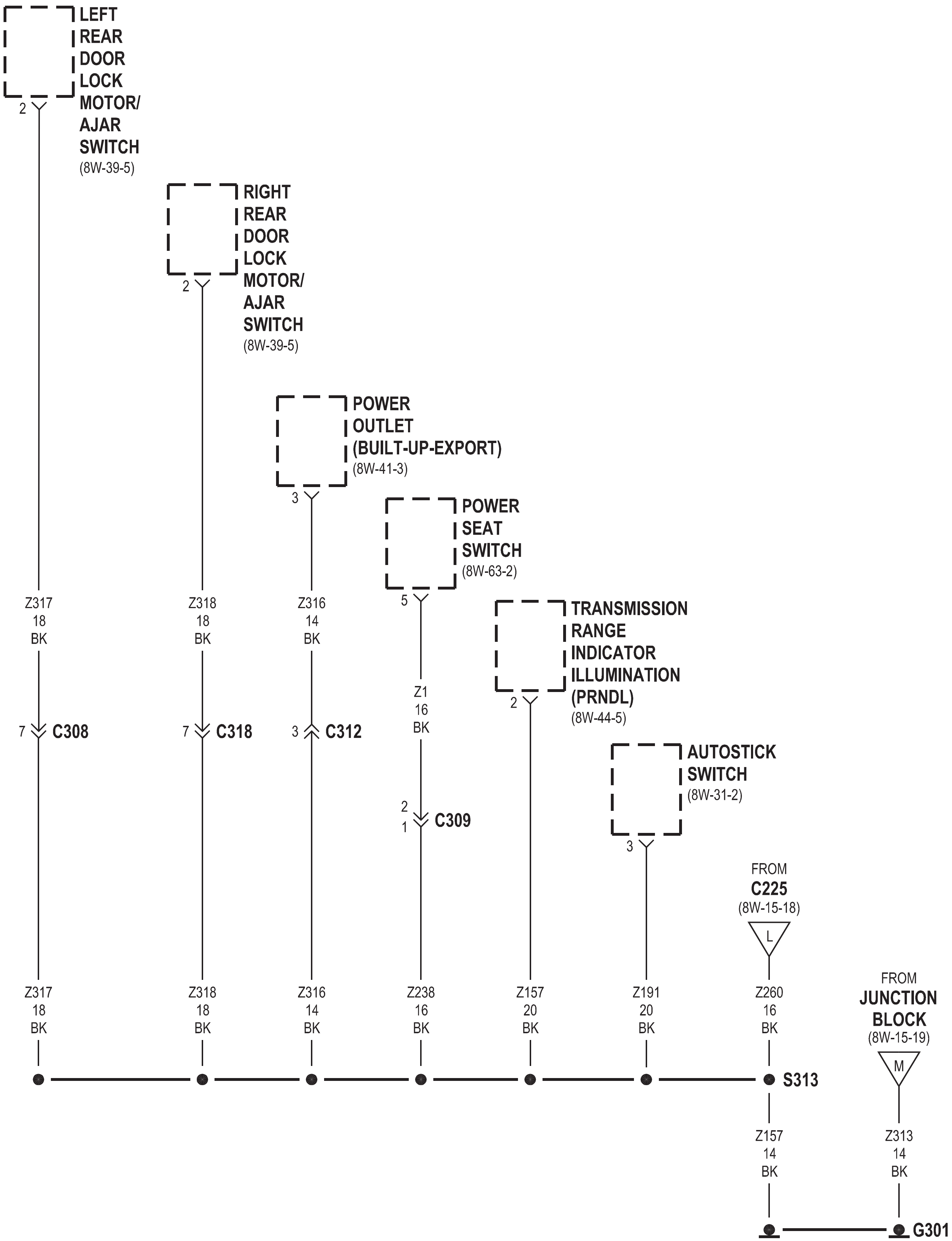
RIGHT BACK-UP LAMP (8W-51-3)
1
RIGHT TAIL/ TURN SIGNAL LAMP (DODGE) (8W-51-7) (8W-52-3)
1
RIGHT TAIL/ STOP LAMP (8W-51-2)
1
RIGHT TAIL/ SIDE MARKER LAMP (8W-51-8)
1
RIGHT TURN LAMP (8W-52-3)
2
FUEL PUMP MODULE (8W-30-3)
1 C1
2 C1
Z211 14 BK
Z211 14 BK
Z211 14 BK
S326
Z211 14 BK
3 C321
Z151 18 BK
Z151 18 BK
Z151 18 BK
Z151 18 BK
Z151 18 BK
S305
Z151 18 BK
5 C301
Z151 18 BK
Z211 14 BK
FROM C300 (8W-15-16)
K
Z150 18 BK
G300


SUNROOF
CONTROL
MODULE
(8W-64-2)
1
Z312
18
BK
OVERHEAD
MAP/
COURTESY
LAMPS
(8W-44-3)
A
Z312
20
BK
RIGHT
VISOR/
VANITY
LAMPS
(8W-44-4)
B
Z312
20
BK
LEFT
VISOR/
VANITY
LAMPS
(8W-44-4)
B
Z312
20
BK
S303
(PREMIUM)
Z312
18
BK
I
TO
JUNCTION
BLOCK
(8W-15-19)
HEATED
SEAT
SWITCH
(BUILT-UP-EXPORT)
(8W-63-4)
6
Z260
20
BK
DRIVER
HEATED
SEAT
MODULE
(BUILT-UP-EXPORT)
(8W-63-5)
2
Z121
16
BK
PASSENGER
HEATED
SEAT
MODULE
(BUILT-UP-EXPORT)
(8W-63-5)
2
Z122
16
BK
S311
Z260
16
BK
3
C225
Z260
16
BK
L
TO
S313
(8W-15-20)

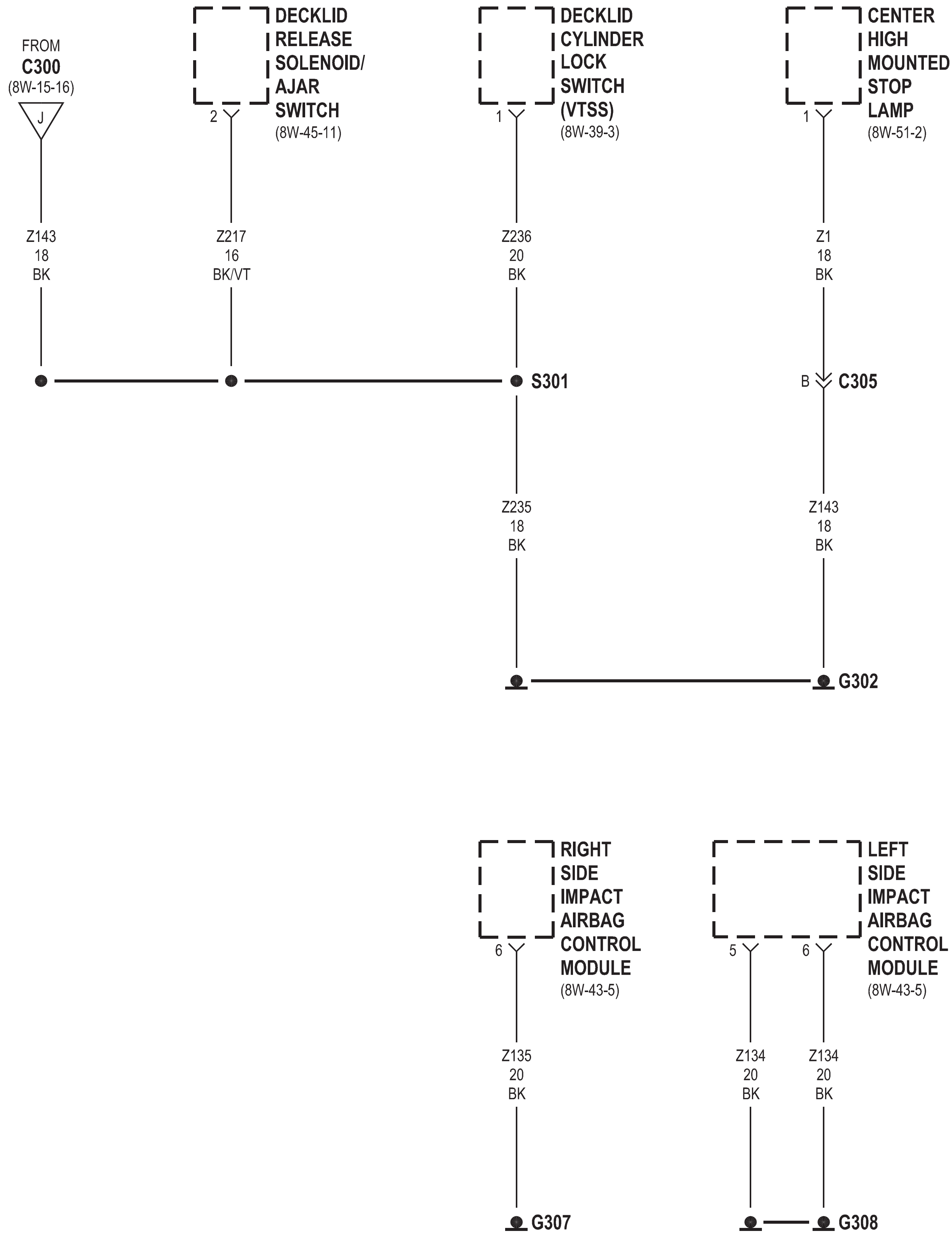
JR41


INSTRUMENT CLUSTER
(8W-40-2)
(8W-40-6)
11
Z106
18
BK/OR
2 C4
POWER MIRROR SWITCH
(8W-62-2)
(8W-62-3)
3
Z239
18
BK/LB
3 C4
HEADLAMP LEVELING SWITCH (BUILT-UP-EXPORT)
(8W-50-7)
2
Z3
16
BK
6 C4
FROM
S303
(PREMIUM)
(8W-15-18)
I
Z312
18
BK
4 C10
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
BODY CONTROL MODULE
(8W-45-3)
10 JB
DAYTIME RUNNING LAMP MODULE
(8W-50-6)
8
9 C4
10 C4
15 C5
7 C4
3 C9
Z115
16
BK/RD
Z126
16
BK/LG
Z110
20
BK
Z305
20
BK/YL
Z313
14
BK
2 C1
13 C1
POWER AMPLIFIER (PREMIUM)
(8W-47-5)
5
SENTRY KEY IMMOBILIZER MODULE
(8W-39-3)
4
DATA LINK CONNECTOR
(8W-18-2)
M
TO
G301
(8W-15-20)

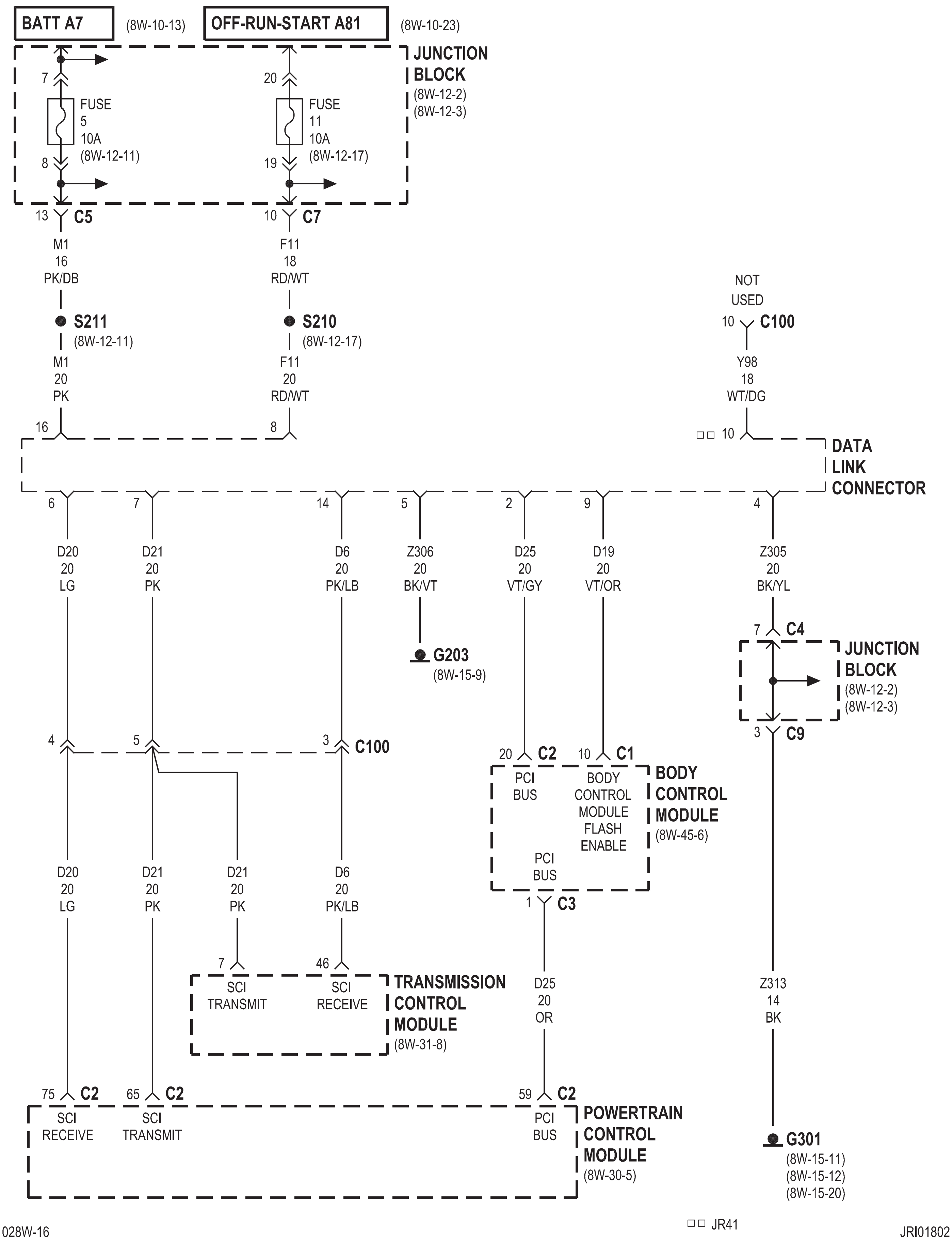
JR41

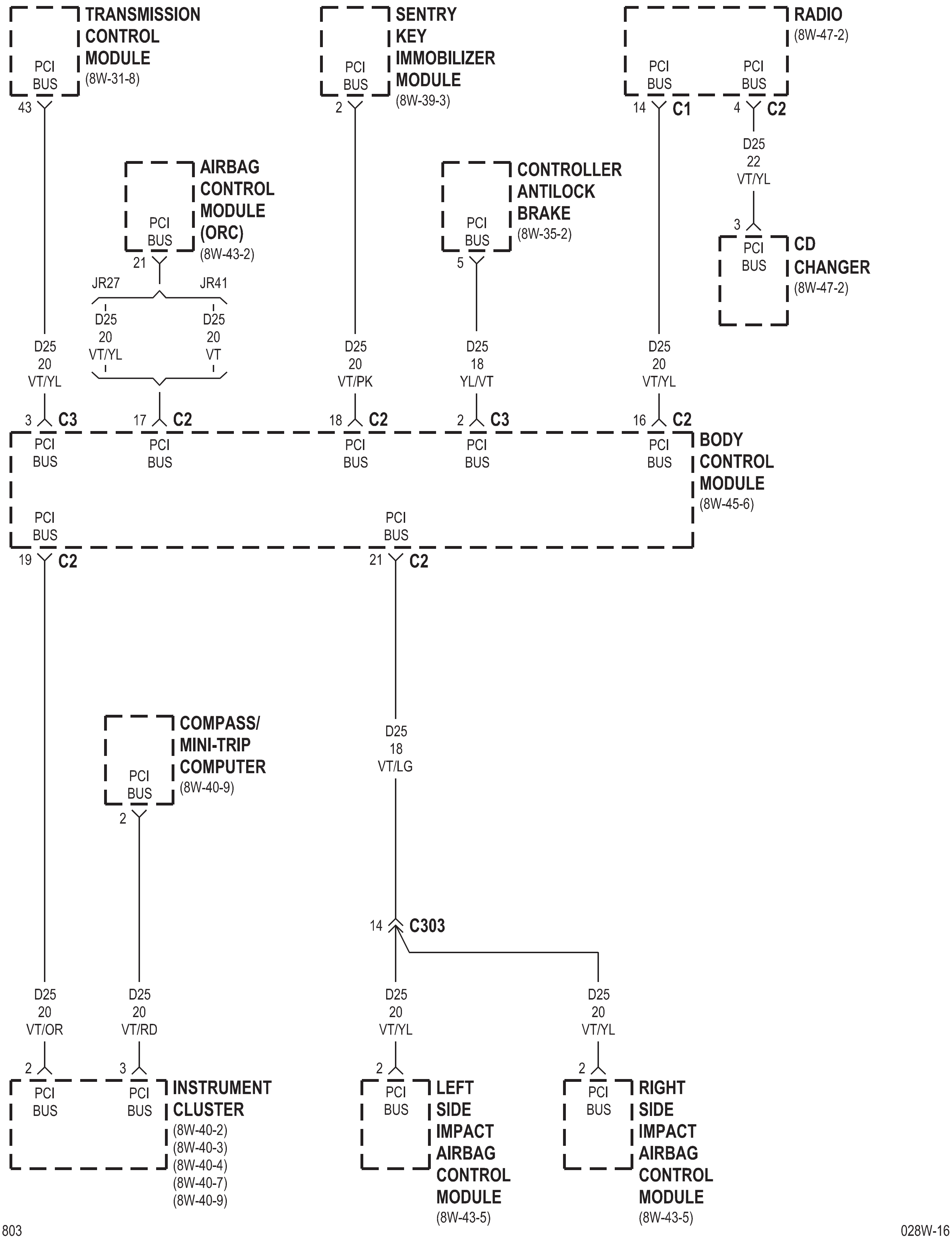

LEFT REAR DOOR LOCK MOTOR/ AJAR SWITCH
(8W-39-5)
2
RIGHT REAR DOOR LOCK MOTOR/ AJAR SWITCH
(8W-39-5)
2
POWER OUTLET (BUILT-UP-EXPORT)
(8W-41-3)
3
POWER SEAT SWITCH
(8W-63-2)
5
TRANSMISSION RANGE INDICATOR ILLUMINATION (PRNDL)
(8W-44-5)
2
AUTOSTICK SWITCH
(8W-31-2)
3
Z317 18 BK
Z318 18 BK
Z316 14 BK
Z1 16 BK
7 C308
7 C318
3 C312
2 1 C309
FROM C225 (8W-15-18)
L
FROM JUNCTION BLOCK (8W-15-19)
M
Z317 18 BK
Z318 18 BK
Z316 14 BK
Z238 16 BK
Z157 20 BK
Z191 20 BK
Z260 16 BK
S313
Z157 14 BK
Z313 14 BK
G301

JR41

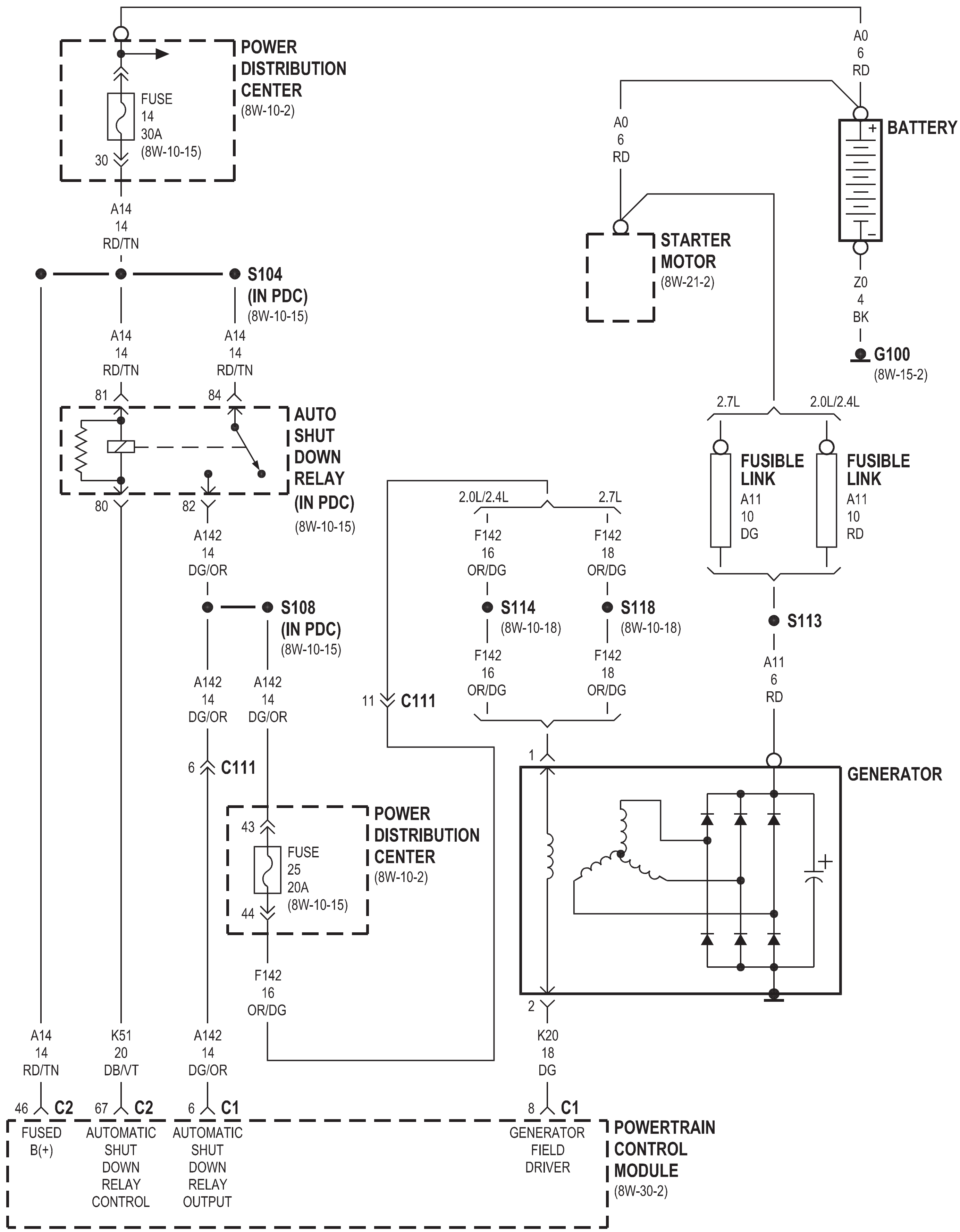

FROM
C300
(8W-15-16)
J
DECKLID RELEASE SOLENOID/ AJAR SWITCH
(8W-45-11)
2
DECKLID CYLINDER LOCK SWITCH (VTSS)
(8W-39-3)
1
CENTER HIGH MOUNTED STOP LAMP
(8W-51-2)
1
Z143
18
BK
Z217
16
BK/VT
Z236
20
BK
Z1
18
BK
S301
B
C305
Z235
18
BK
Z143
18
BK
G302
RIGHT SIDE IMPACT AIRBAG CONTROL MODULE
(8W-43-5)
6
LEFT SIDE IMPACT AIRBAG CONTROL MODULE
(8W-43-5)
5
6
Z135
20
BK
Z134
20
BK
Z134
20
BK
G307
G308

8W-18 BUS COMMUNICATIONS

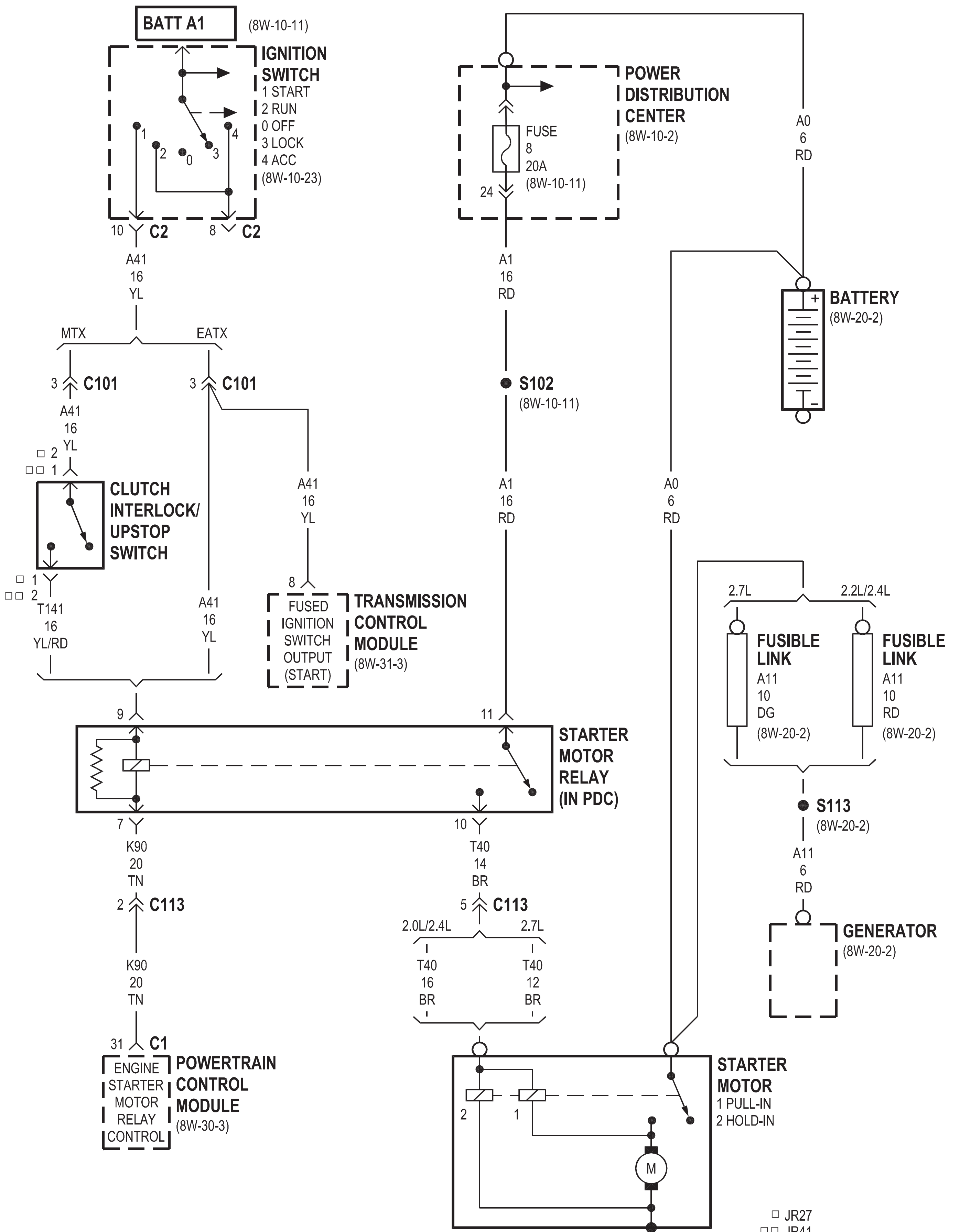

BATT A7
(8W-10-13)
OFF-RUN-START A81
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
FUSE 5 10A (8W-12-11)
FUSE 11 10A (8W-12-17)
C5
C7
M1 16 PK/DB
F11 18 RD/WT
S211 (8W-12-11)
S210 (8W-12-17)
M1 20 PK
F11 20 RD/WT
NOT USED
C100
Y98 18 WT/DG
DATA LINK CONNECTOR
D20 20 LG
D21 20 PK
D6 20 PK/LB
Z306 20 BK/VT
D25 20 VT/GY
D19 20 VT/OR
Z305 20 BK/YL
G203 (8W-15-9)
C4
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
C9
C100
C2
C1
PCI BUS
BODY CONTROL MODULE FLASH ENABLE
PCI BUS
BODY CONTROL MODULE
(8W-45-6)
C3
D20 20 LG
D21 20 PK
D21 20 PK
D6 20 PK/LB
D25 20 OR
Z313 14 BK
SCI TRANSMIT
SCI RECEIVE
TRANSMISSION CONTROL MODULE
(8W-31-8)
C2
SCI RECEIVE
SCI TRANSMIT
PCI BUS
POWERTRAIN CONTROL MODULE
(8W-30-5)
G301
(8W-15-11)
(8W-15-12)
(8W-15-20)
JR41


TRANSMISSION CONTROL MODULE (8W-31-8)
PCI BUS
43
SENTRY KEY IMMOBILIZER MODULE (8W-39-3)
PCI BUS
2
RADIO (8W-47-2)
PCI BUS
14 C1
PCI BUS
4 C2
D25 22 VT/YL
3
CD CHANGER (8W-47-2)
PCI BUS
AIRBAG CONTROL MODULE (ORC) (8W-43-2)
PCI BUS
21
JR27
JR41
D25 20 VT/YL
D25 20 VT
CONTROLLER ANTILOCK BRAKE (8W-35-2)
PCI BUS
5
D25 20 VT/YL
D25 20 VT/PK
D25 18 YL/VT
D25 20 VT/YL
3 C3
17 C2
18 C2
2 C3
16 C2
BODY CONTROL MODULE (8W-45-6)
PCI BUS
19 C2
21 C2
COMPASS/ MINI-TRIP COMPUTER (8W-40-9)
PCI BUS
2
D25 18 VT/LG
14 C303
D25 20 VT/OR
D25 20 VT/RD
D25 20 VT/YL
D25 20 VT/YL
2
3
INSTRUMENT CLUSTER (8W-40-2) (8W-40-3) (8W-40-4) (8W-40-7) (8W-40-9)
LEFT SIDE IMPACT AIRBAG CONTROL MODULE (8W-43-5)
RIGHT SIDE IMPACT AIRBAG CONTROL MODULE (8W-43-5)
JRI01803
028W-16

8W-20 CHARGING SYSTEM

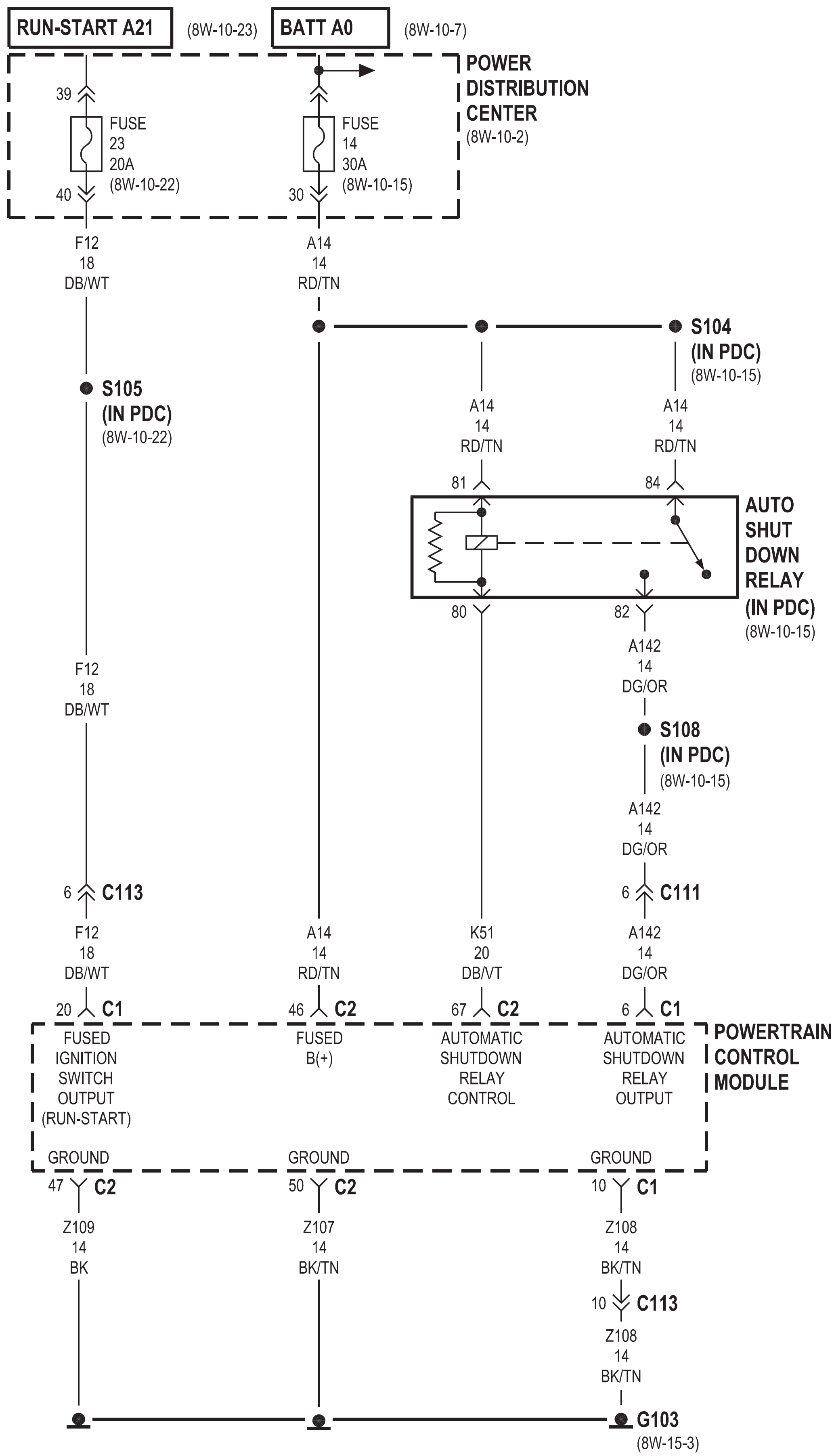

POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
14
30A
(8W-10-15)
30
A0
6
RD
BATTERY
A0
6
RD
A14
14
RD/TN
STARTER MOTOR
(8W-21-2)
S104 (IN PDC)
(8W-10-15)
Z0
4
BK
G100
(8W-15-2)
A14
14
RD/TN
A14
14
RD/TN
81
84
2.7L
2.0L/2.4L
AUTO SHUT DOWN RELAY (IN PDC)
(8W-10-15)
FUSIBLE LINK
A11
10
DG
FUSIBLE LINK
A11
10
RD
80
82
2.0L/2.4L
2.7L
A142
14
DG/OR
F142
16
OR/DG
F142
18
OR/DG
S108 (IN PDC)
(8W-10-15)
S114
(8W-10-18)
S118
(8W-10-18)
S113
A142
14
DG/OR
A142
14
DG/OR
F142
16
OR/DG
F142
18
OR/DG
A11
6
RD
11 C111
6 C111
1
GENERATOR
POWER DISTRIBUTION CENTER
(8W-10-2)
43
FUSE
25
20A
(8W-10-15)
44
F142
16
OR/DG
2
A14
14
RD/TN
K51
20
DB/VT
A142
14
DG/OR
K20
18
DG
46 C2
67 C2
6 C1
8 C1
FUSED B(+)
AUTOMATIC SHUT DOWN RELAY CONTROL
AUTOMATIC SHUT DOWN RELAY OUTPUT
GENERATOR FIELD DRIVER
POWERTRAIN CONTROL MODULE
(8W-30-2)

8W-21 STARTING SYSTEM

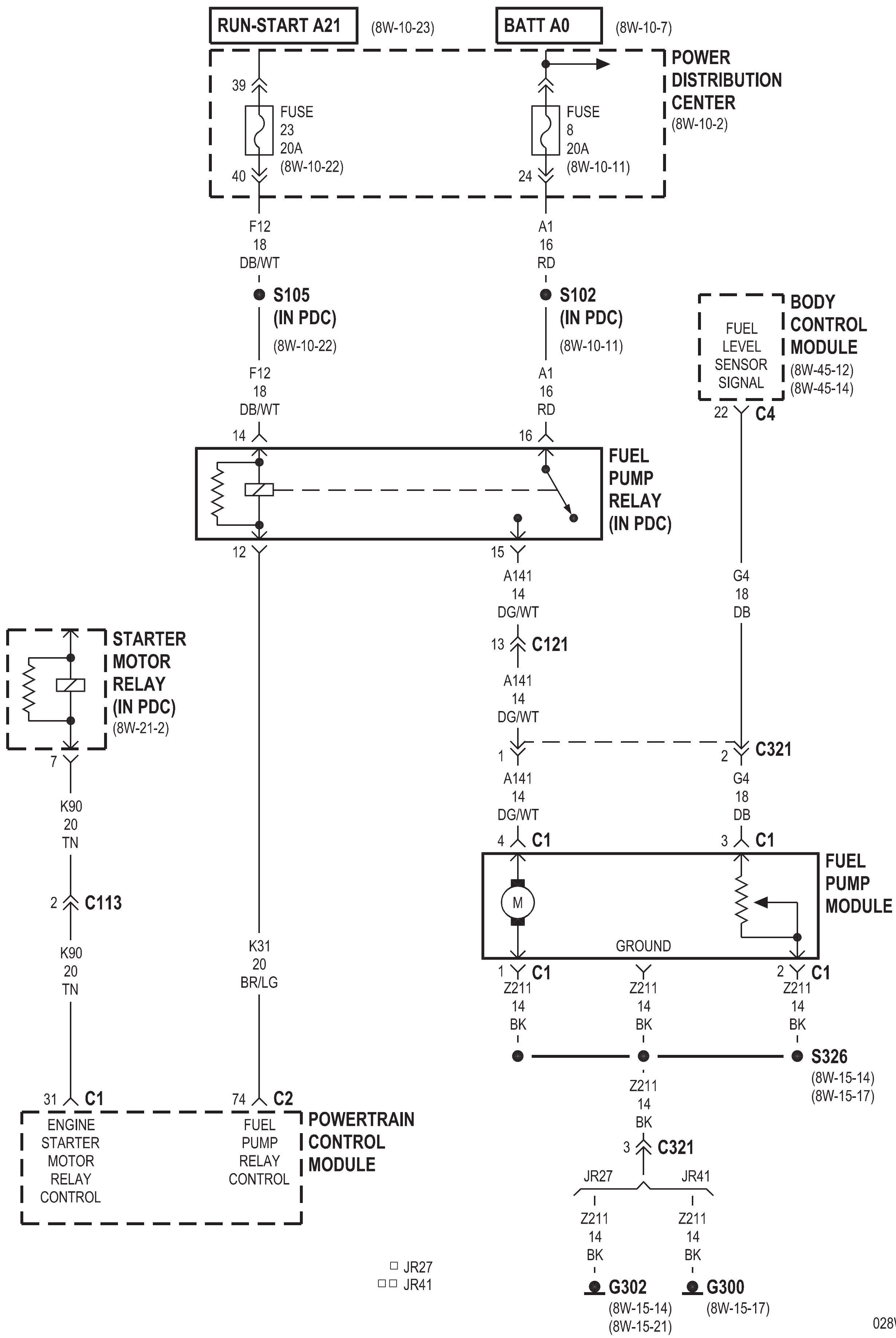


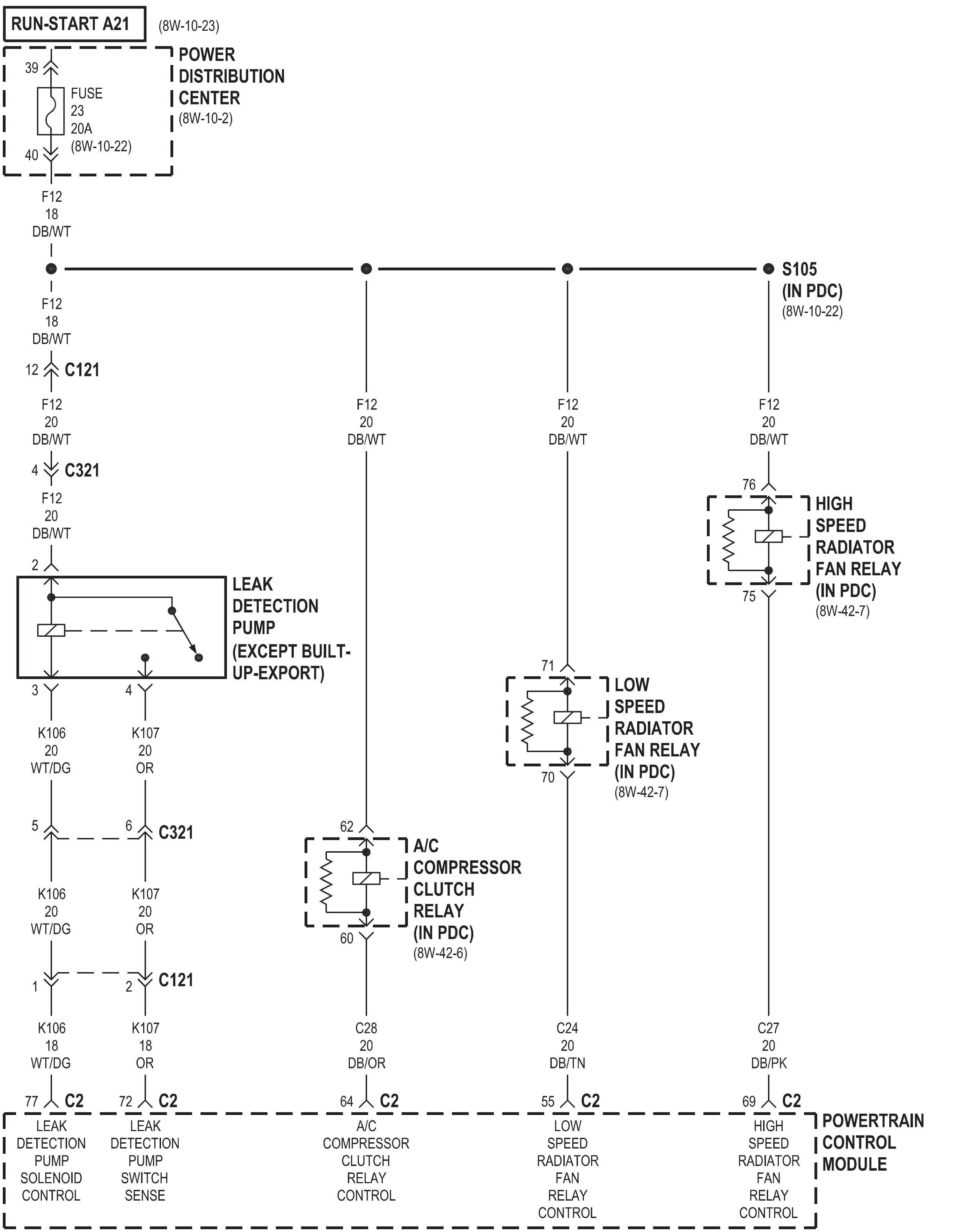
BATT A1
(8W-10-11)
IGNITION SWITCH
1 START
2 RUN
0 OFF
3 LOCK
4 ACC
(8W-10-23)
C2
C2
A41 16 YL
MTX
EATX
C101
C101
A41 16 YL
CLUTCH INTERLOCK/ UPSTOP SWITCH
T141 16 YL/RD
A41 16 YL
A41 16 YL
FUSED IGNITION SWITCH OUTPUT (START)
TRANSMISSION CONTROL MODULE
(8W-31-3)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 8 20A (8W-10-11)
A1 16 RD
S102
(8W-10-11)
A1 16 RD
A0 6 RD
BATTERY
(8W-20-2)
A0 6 RD
2.7L
2.2L/2.4L
FUSIBLE LINK
A11 10 DG
(8W-20-2)
FUSIBLE LINK
A11 10 RD
(8W-20-2)
S113
(8W-20-2)
A11 6 RD
GENERATOR
(8W-20-2)
STARTER MOTOR RELAY (IN PDC)
K90 20 TN
C113
K90 20 TN
C1
ENGINE STARTER MOTOR RELAY CONTROL
POWERTRAIN CONTROL MODULE
(8W-30-3)
T40 14 BR
C113
2.0L/2.4L
2.7L
T40 16 BR
T40 12 BR
STARTER MOTOR
1 PULL-IN
2 HOLD-IN
M
□ JR27
□□ JR41

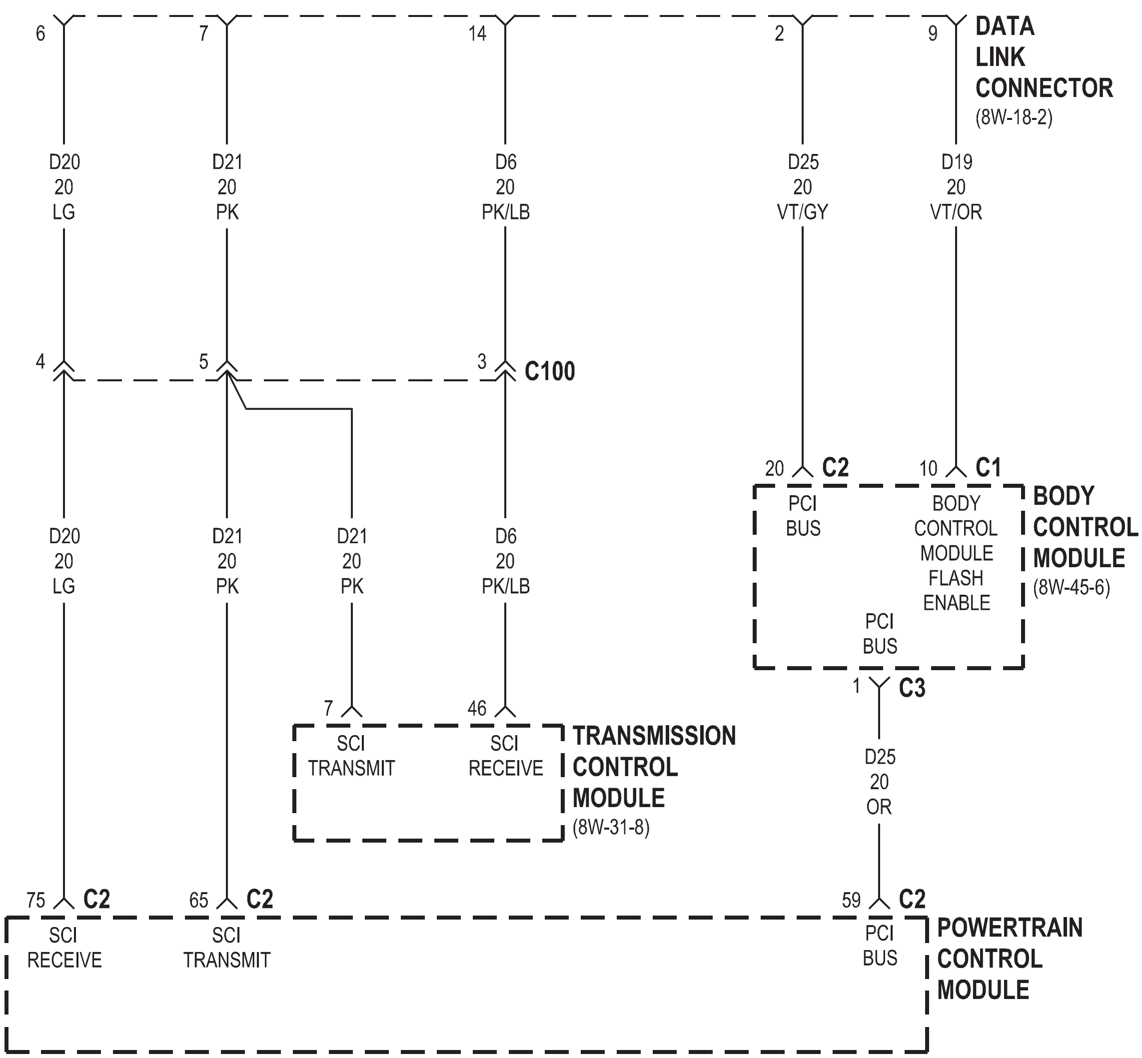
8W-30 FUEL/IGNITION SYSTEM

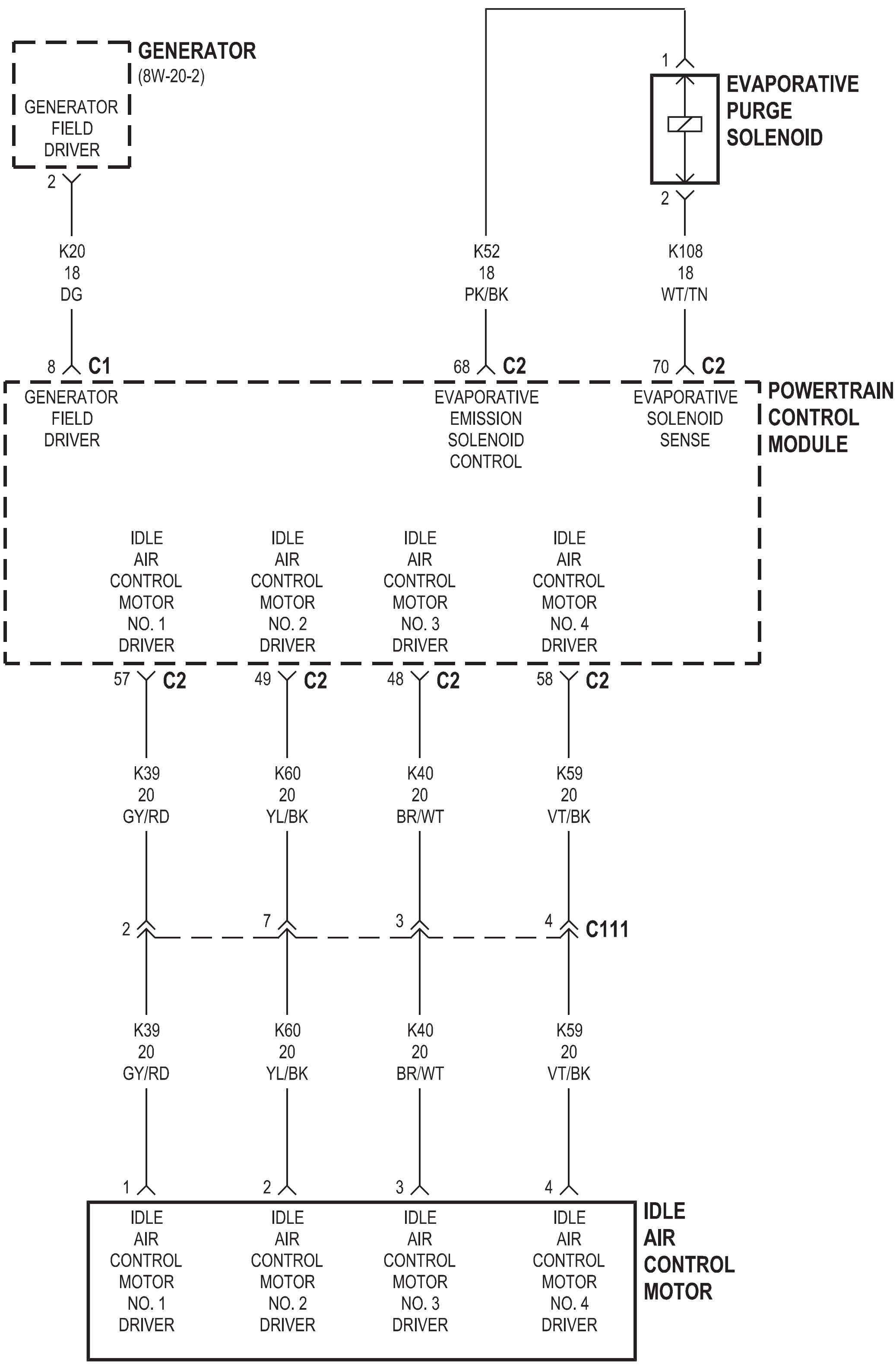


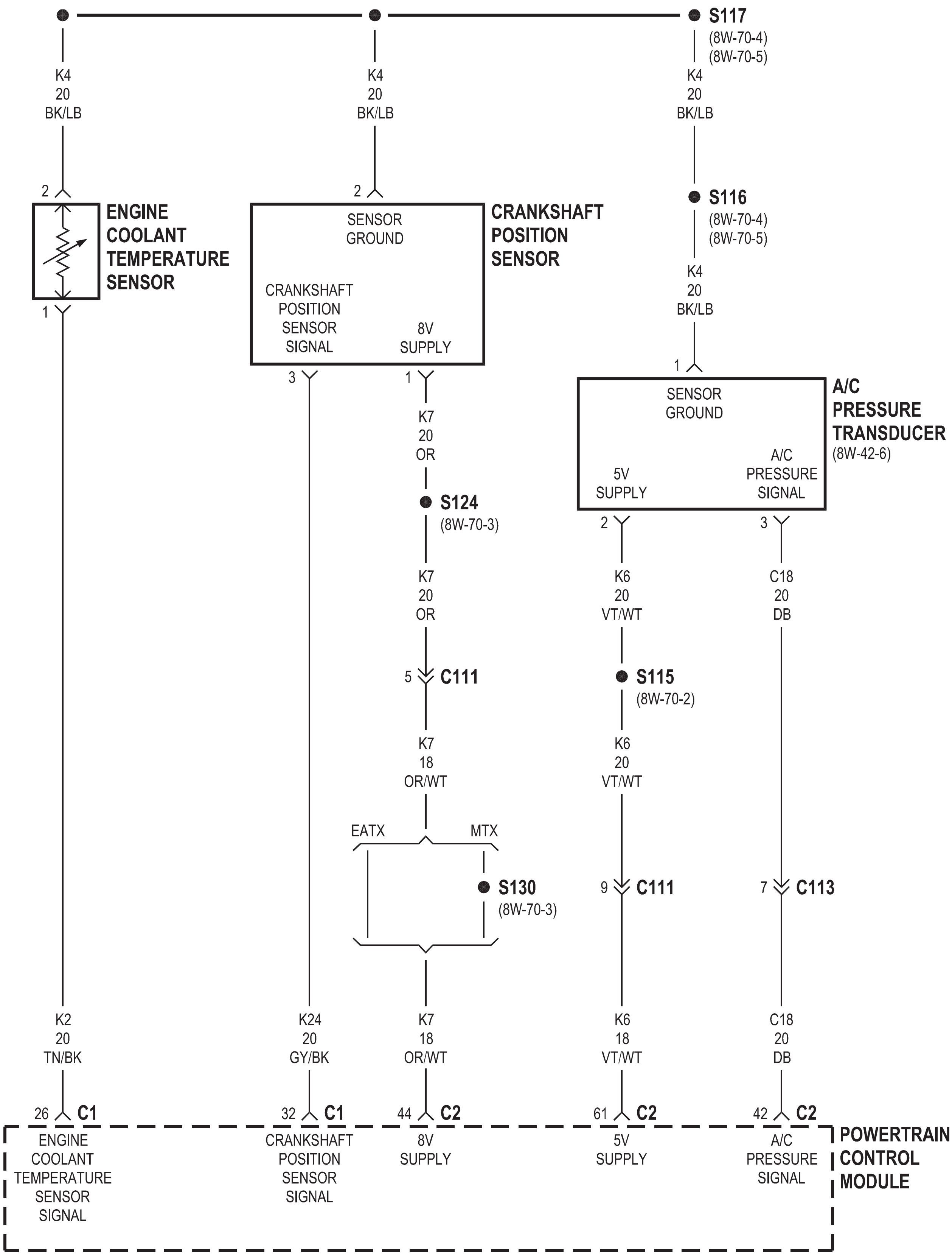
RUN-START A21
(8W-10-23)
BATT A0
(8W-10-7)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
39
FUSE
23
20A
(8W-10-22)
40
FUSE
14
30A
(8W-10-15)
30
F12
18
DB/WT
A14
14
RD/TN
S104
(IN PDC)
(8W-10-15)
S105
(IN PDC)
(8W-10-22)
A14
14
RD/TN
A14
14
RD/TN
81
84
AUTO
SHUT
DOWN
RELAY
(IN PDC)
(8W-10-15)
80
82
A142
14
DG/OR
F12
18
DB/WT
S108
(IN PDC)
(8W-10-15)
A142
14
DG/OR
6 C113
6 C111
F12
18
DB/WT
A14
14
RD/TN
K51
20
DB/VT
A142
14
DG/OR
20 C1
46 C2
67 C2
6 C1
POWERTRAIN
CONTROL
MODULE
FUSED
IGNITION
SWITCH
OUTPUT
(RUN-START)
FUSED
B(+)
AUTOMATIC
SHUTDOWN
RELAY
CONTROL
AUTOMATIC
SHUTDOWN
RELAY
OUTPUT
GROUND
GROUND
GROUND
47 C2
50 C2
10 C1
Z109
14
BK
Z107
14
BK/TN
Z108
14
BK/TN
10 C113
Z108
14
BK/TN
G103
(8W-15-3)

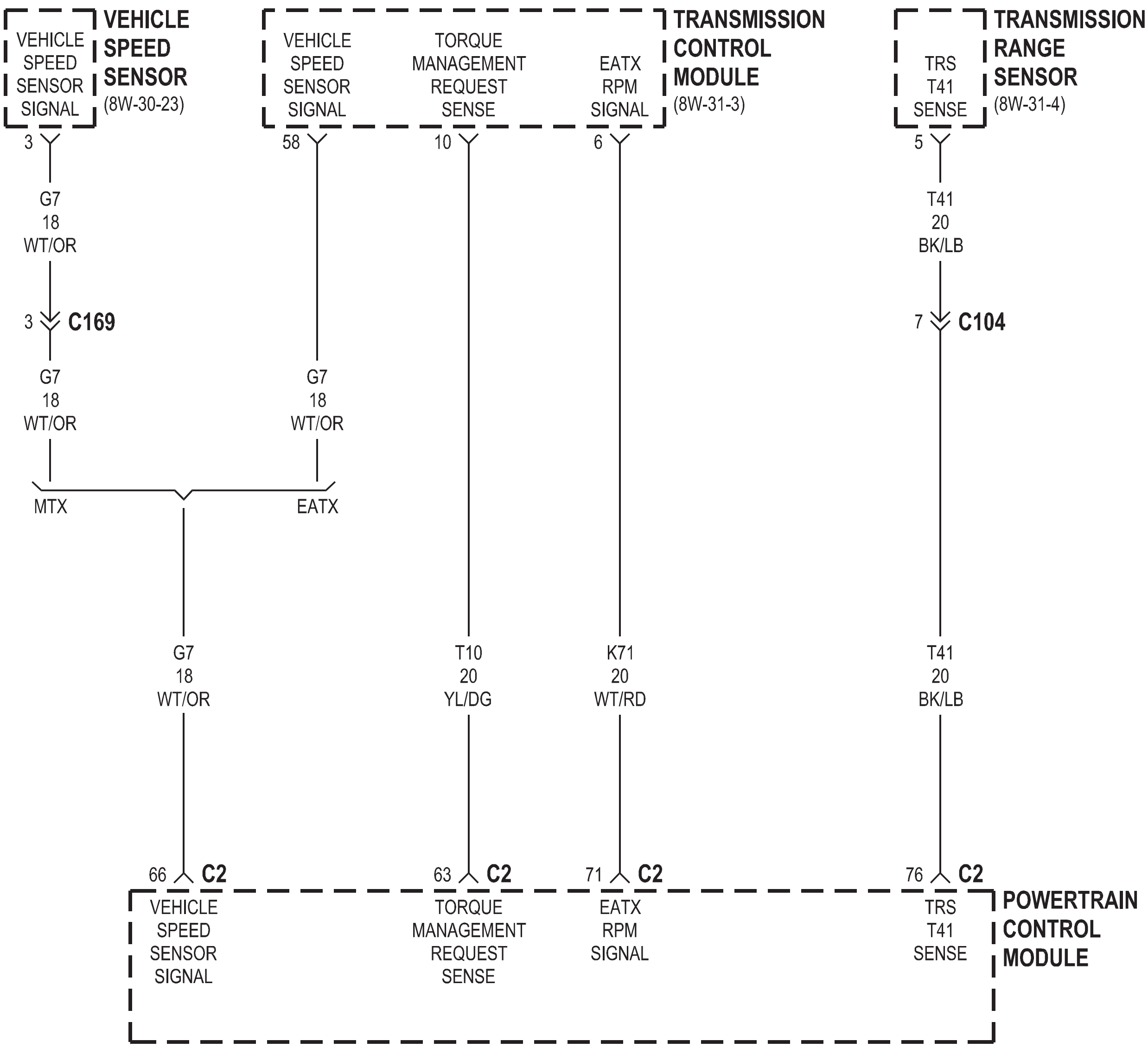

RUN-START A21
(8W-10-23)
BATT A0
(8W-10-7)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
39
FUSE
23
20A
(8W-10-22)
40
FUSE
8
20A
(8W-10-11)
24
F12
18
DB/WT
A1
16
RD
S105
(IN PDC)
(8W-10-22)
S102
(IN PDC)
(8W-10-11)
FUEL
LEVEL
SENSOR
SIGNAL
BODY
CONTROL
MODULE
(8W-45-12)
(8W-45-14)
22 C4
14
16
FUEL
PUMP
RELAY
(IN PDC)
12
15
A141
14
DG/WT
G4
18
DB
STARTER
MOTOR
RELAY
(IN PDC)
(8W-21-2)
13 C121
1
2 C321
7
K90
20
TN
4 C1
3 C1
FUEL
PUMP
MODULE
M
GROUND
2 C113
K31
20
BR/LG
1 C1
2 C1
Z211
14
BK
S326
(8W-15-14)
(8W-15-17)
31 C1
74 C2
ENGINE
STARTER
MOTOR
RELAY
CONTROL
FUEL
PUMP
RELAY
CONTROL
POWERTRAIN
CONTROL
MODULE
3 C321
JR27
JR41
G302
(8W-15-14)
(8W-15-21)
G300
(8W-15-17)
□ JR27
□□ JR41

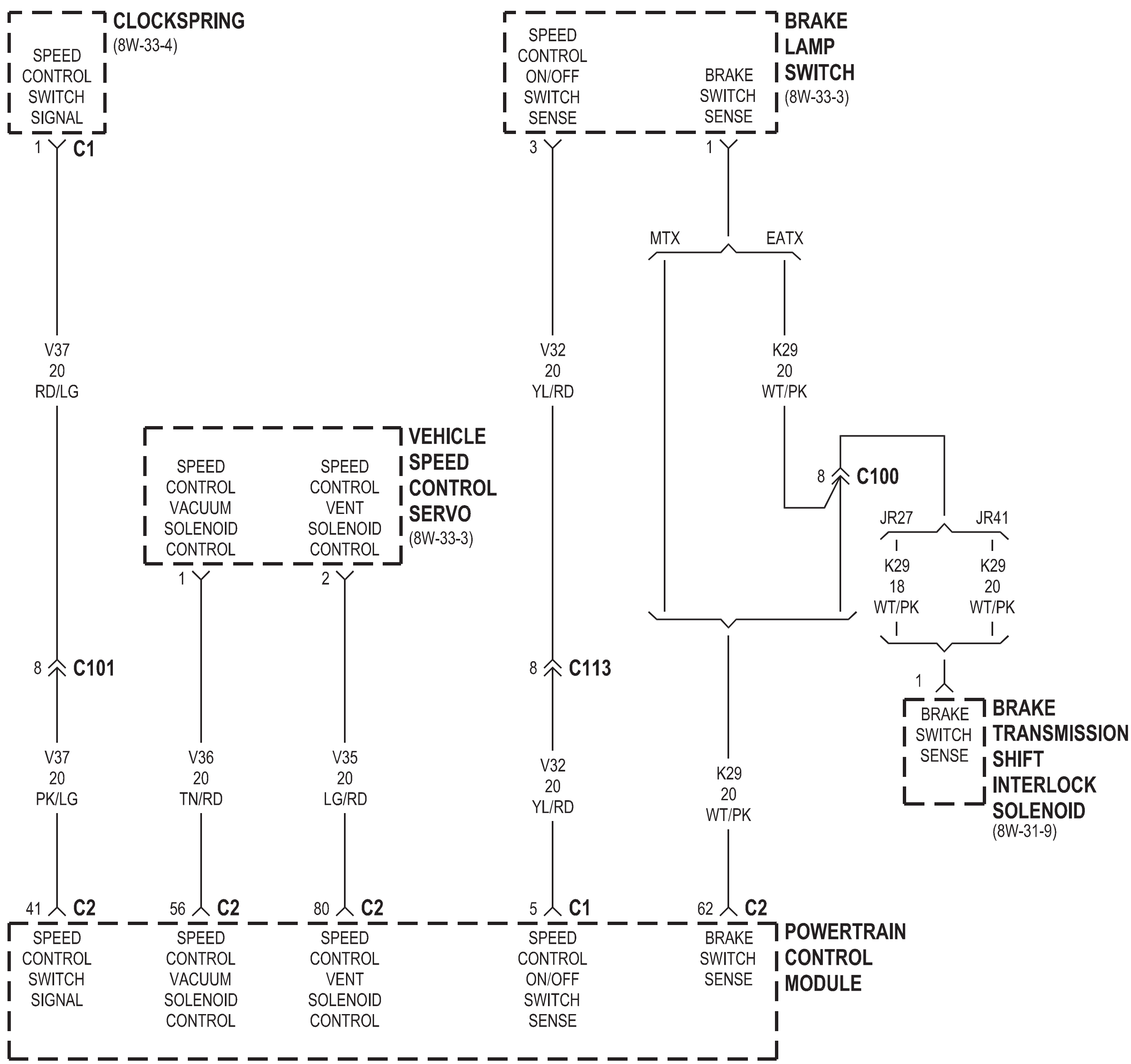

RUN-START A21
(8W-10-23)
POWER DISTRIBUTION CENTER
(8W-10-2)
39
FUSE
23
20A
(8W-10-22)
40
F12
18
DB/WT
S105
(IN PDC)
(8W-10-22)
12
C121
F12
20
DB/WT
4
C321
2
LEAK DETECTION PUMP
(EXCEPT BUILT-UP-EXPORT)
3
4
K106
20
WT/DG
K107
20
OR
5
6
C321
1
2
C121
K106
18
WT/DG
K107
18
OR
76
HIGH SPEED RADIATOR FAN RELAY
(IN PDC)
(8W-42-7)
75
71
LOW SPEED RADIATOR FAN RELAY
(IN PDC)
(8W-42-7)
70
62
A/C COMPRESSOR CLUTCH RELAY
(IN PDC)
(8W-42-6)
60
C28
20
DB/OR
C24
20
DB/TN
C27
20
DB/PK
77 C2
72 C2
64 C2
55 C2
69 C2
LEAK DETECTION PUMP SOLENOID CONTROL
LEAK DETECTION PUMP SWITCH SENSE
A/C COMPRESSOR CLUTCH RELAY CONTROL
LOW SPEED RADIATOR FAN RELAY CONTROL
HIGH SPEED RADIATOR FAN RELAY CONTROL
POWERTRAIN CONTROL MODULE

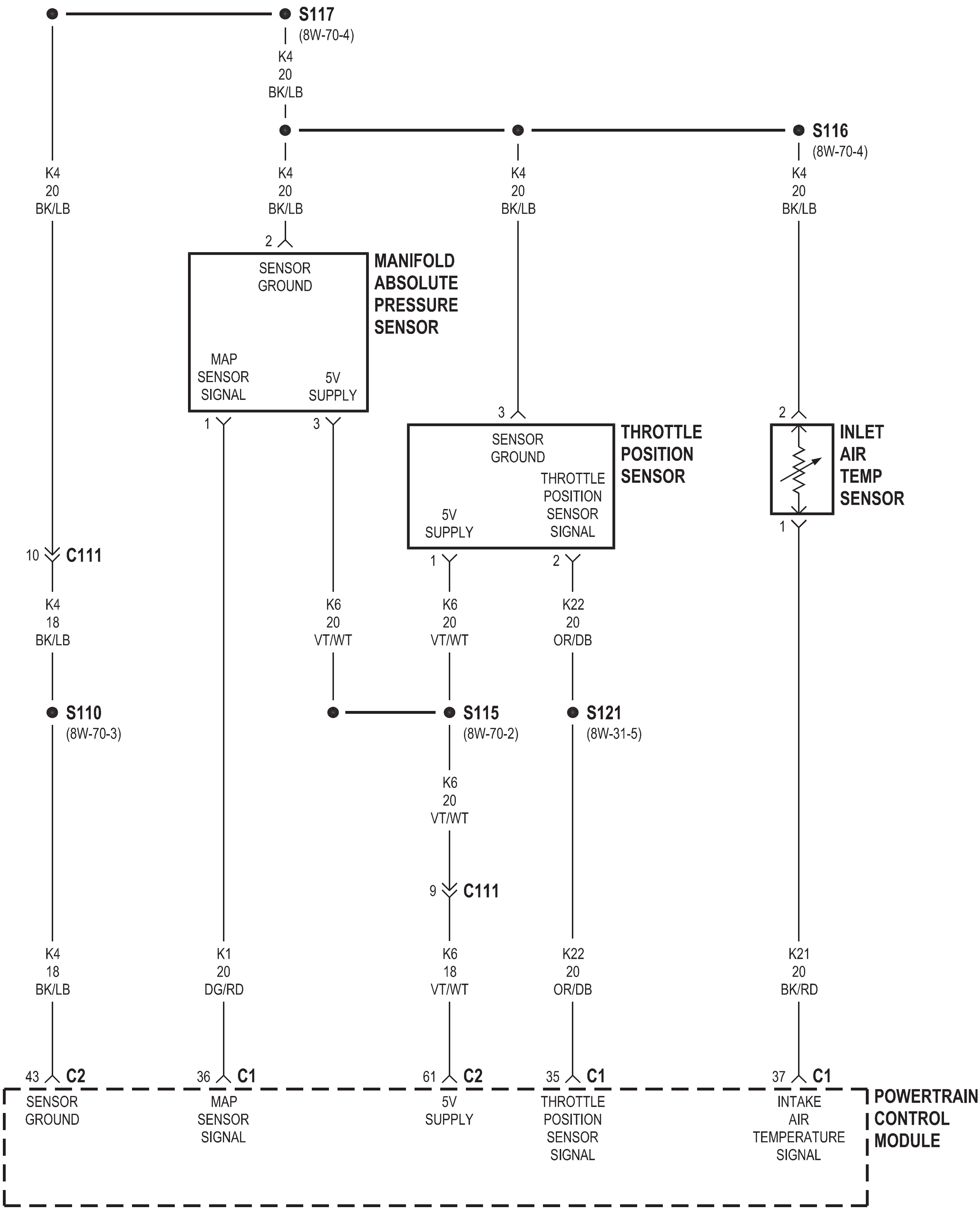

6
7
14
2
9
DATA
LINK
CONNECTOR
(8W-18-2)
D20
20
LG
D21
20
PK
D6
20
PK/LB
D25
20
VT/GY
D19
20
VT/OR
4
5
3
C100
20
C2
10
C1
PCI
BUS
BODY
CONTROL
MODULE
FLASH
ENABLE
BODY
CONTROL
MODULE
(8W-45-6)
D20
20
LG
D21
20
PK
D21
20
PK
D6
20
PK/LB
PCI
BUS
1
C3
7
46
SCI
TRANSMIT
SCI
RECEIVE
TRANSMISSION
CONTROL
MODULE
(8W-31-8)
D25
20
OR
75
C2
65
C2
59
C2
SCI
RECEIVE
SCI
TRANSMIT
PCI
BUS
POWERTRAIN
CONTROL
MODULE

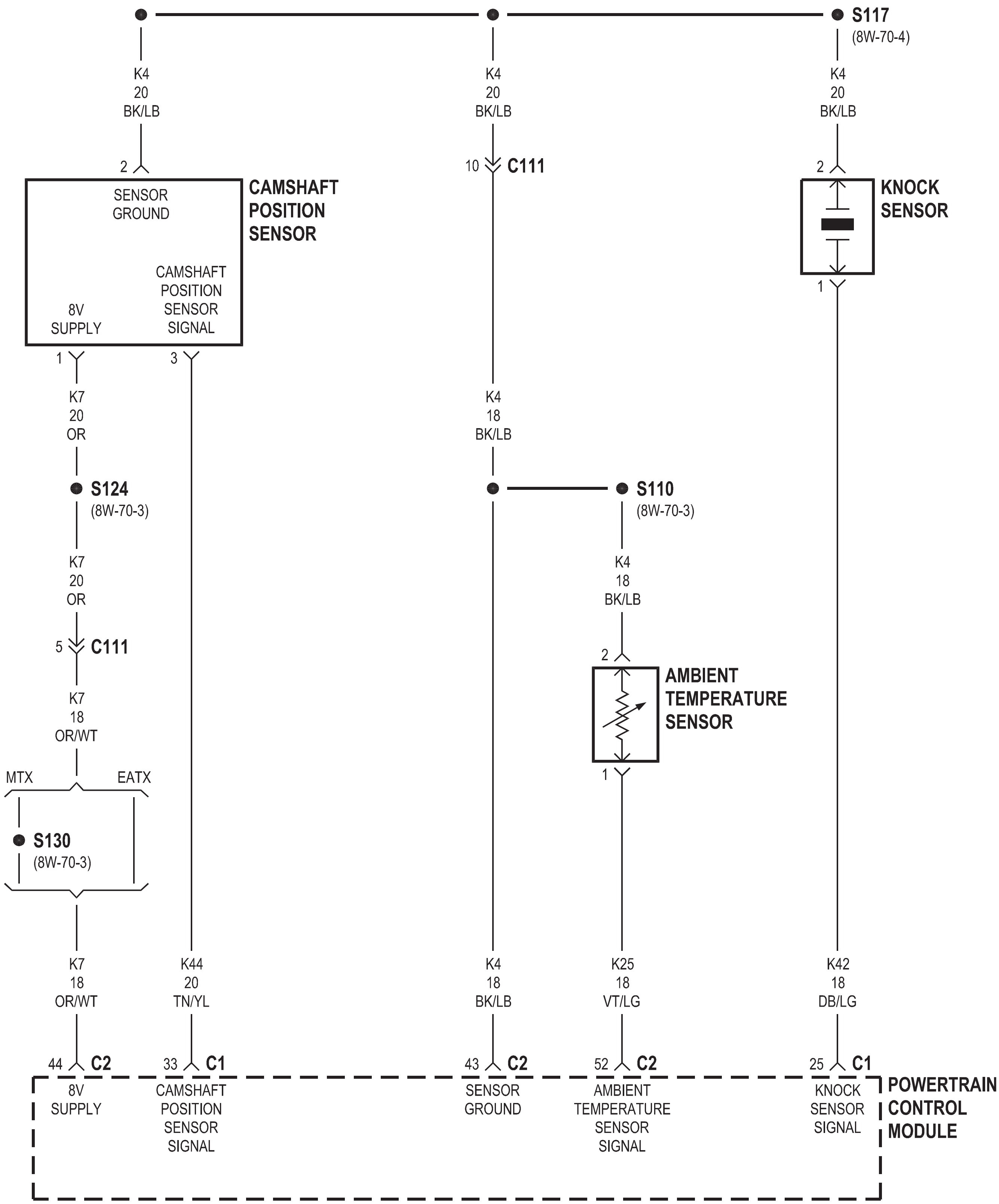

GENERATOR
(8W-20-2)
GENERATOR FIELD DRIVER
2
K20 18 DG
8 C1
GENERATOR FIELD DRIVER
1
EVAPORATIVE PURGE SOLENOID
2
K52 18 PK/BK
K108 18 WT/TN
68 C2
70 C2
EVAPORATIVE EMISSION SOLENOID CONTROL
EVAPORATIVE SOLENOID SENSE
POWERTRAIN CONTROL MODULE
IDLE AIR CONTROL MOTOR NO. 1 DRIVER
IDLE AIR CONTROL MOTOR NO. 2 DRIVER
IDLE AIR CONTROL MOTOR NO. 3 DRIVER
IDLE AIR CONTROL MOTOR NO. 4 DRIVER
57 C2
49 C2
48 C2
58 C2
K39 20 GY/RD
K60 20 YL/BK
K40 20 BR/WT
K59 20 VT/BK
2
7
3
4
C111
K39 20 GY/RD
K60 20 YL/BK
K40 20 BR/WT
K59 20 VT/BK
1
2
3
4
IDLE AIR CONTROL MOTOR NO. 1 DRIVER
IDLE AIR CONTROL MOTOR NO. 2 DRIVER
IDLE AIR CONTROL MOTOR NO. 3 DRIVER
IDLE AIR CONTROL MOTOR NO. 4 DRIVER
IDLE AIR CONTROL MOTOR


S117
(8W-70-4)
(8W-70-5)
K4
20
BK/LB
2
1
ENGINE
COOLANT
TEMPERATURE
SENSOR
SENSOR
GROUND
CRANKSHAFT
POSITION
SENSOR
SIGNAL
8V
SUPPLY
CRANKSHAFT
POSITION
SENSOR
3
S116
(8W-70-4)
(8W-70-5)
A/C
PRESSURE
TRANSDUCER
(8W-42-6)
5V
SUPPLY
A/C
PRESSURE
SIGNAL
K7
20
OR
S124
(8W-70-3)
5
C111
K7
18
OR/WT
EATX
MTX
S130
(8W-70-3)
K6
20
VT/WT
S115
(8W-70-2)
9
C111
C18
20
DB
7
C113
K2
20
TN/BK
K24
20
GY/BK
K6
18
VT/WT
26 C1
32 C1
44 C2
61 C2
42 C2
POWERTRAIN
CONTROL
MODULE
ENGINE
COOLANT
TEMPERATURE
SENSOR
SIGNAL
CRANKSHAFT
POSITION
SENSOR
SIGNAL
8V
SUPPLY
5V
SUPPLY
A/C
PRESSURE
SIGNAL

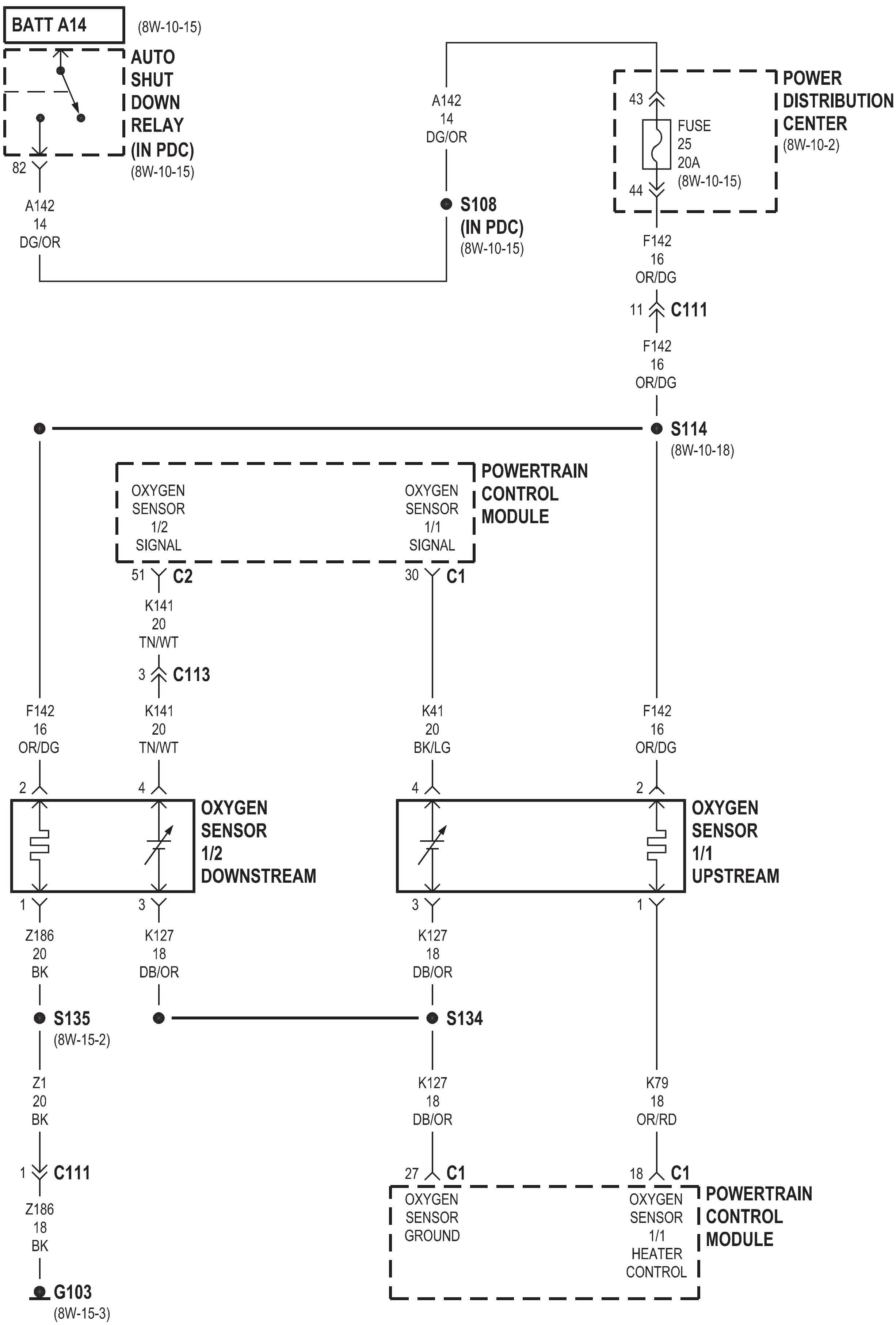

VEHICLE SPEED SENSOR SIGNAL
VEHICLE SPEED SENSOR
(8W-30-23)
VEHICLE SPEED SENSOR SIGNAL
TORQUE MANAGEMENT REQUEST SENSE
EATX RPM SIGNAL
TRANSMISSION CONTROL MODULE
(8W-31-3)
TRS T41 SENSE
TRANSMISSION RANGE SENSOR
(8W-31-4)
3
58
10
6
5
G7 18 WT/OR
T41 20 BK/LB
3 C169
7 C104
G7 18 WT/OR
G7 18 WT/OR
MTX
EATX
G7 18 WT/OR
T10 20 YL/DG
K71 20 WT/RD
T41 20 BK/LB
66 C2
63 C2
71 C2
76 C2
VEHICLE SPEED SENSOR SIGNAL
TORQUE MANAGEMENT REQUEST SENSE
EATX RPM SIGNAL
TRS T41 SENSE
POWERTRAIN CONTROL MODULE

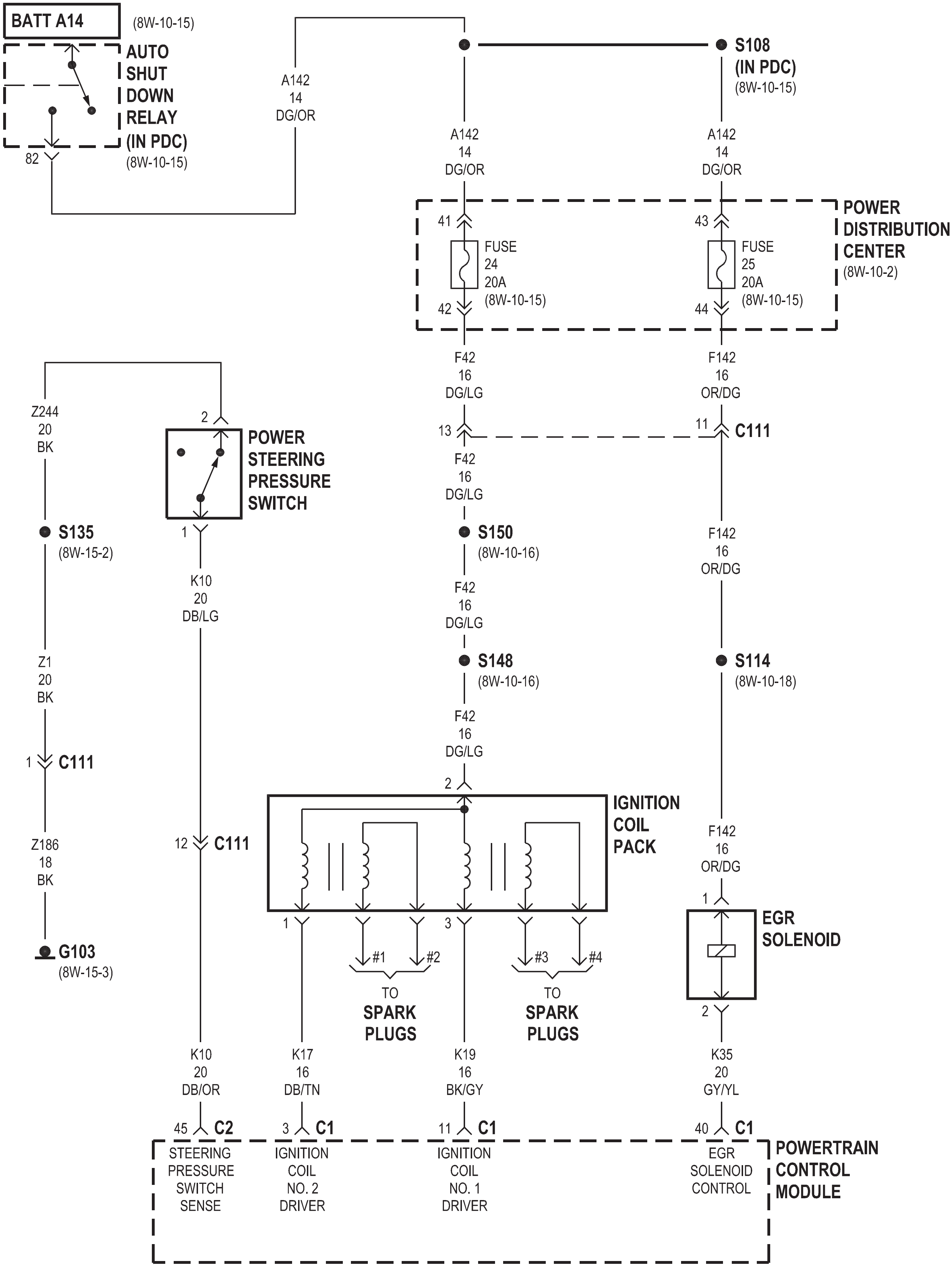

CLOCKSPRING
(8W-33-4)
SPEED CONTROL SWITCH SIGNAL
1 C1
V37 20 RD/LG
8 C101
V37 20 PK/LG
41 C2
BRAKE LAMP SWITCH
(8W-33-3)
SPEED CONTROL ON/OFF SWITCH SENSE
BRAKE SWITCH SENSE
3
1
MTX
EATX
V32 20 YL/RD
K29 20 WT/PK
8 C100
JR27
JR41
K29 18 WT/PK
K29 20 WT/PK
1
BRAKE SWITCH SENSE
BRAKE TRANSMISSION SHIFT INTERLOCK SOLENOID
(8W-31-9)
VEHICLE SPEED CONTROL SERVO
(8W-33-3)
SPEED CONTROL VACUUM SOLENOID CONTROL
SPEED CONTROL VENT SOLENOID CONTROL
1
2
V36 20 TN/RD
V35 20 LG/RD
8 C113
V32 20 YL/RD
K29 20 WT/PK
56 C2
80 C2
5 C1
62 C2
POWERTRAIN CONTROL MODULE
SPEED CONTROL SWITCH SIGNAL
SPEED CONTROL VACUUM SOLENOID CONTROL
SPEED CONTROL VENT SOLENOID CONTROL
SPEED CONTROL ON/OFF SWITCH SENSE
BRAKE SWITCH SENSE

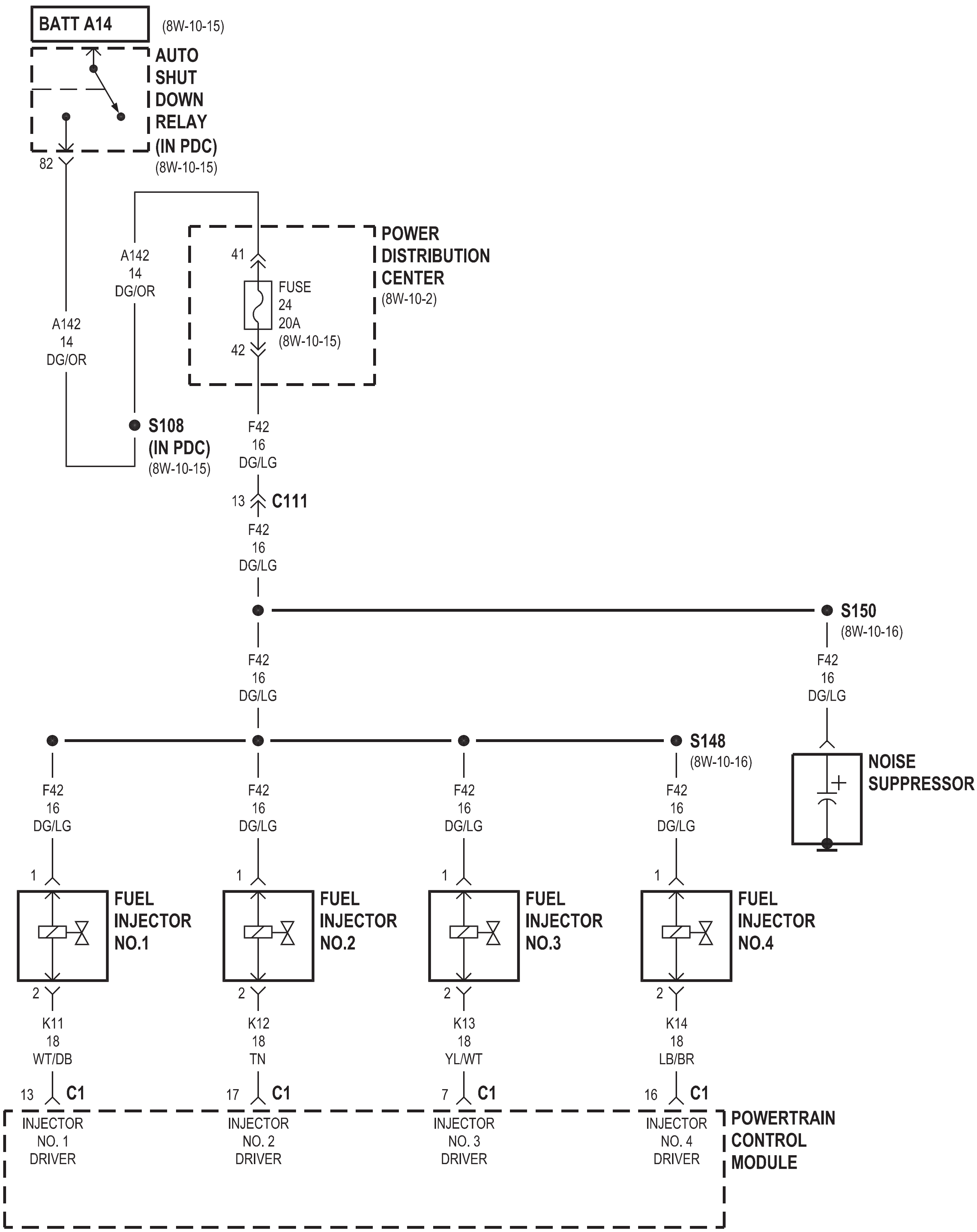

S117
(8W-70-4)
K4
20
BK/LB
S116
(8W-70-4)
K4
20
BK/LB
2
SENSOR
GROUND
MANIFOLD
ABSOLUTE
PRESSURE
SENSOR
MAP
SENSOR
SIGNAL
5V
SUPPLY
1
3
3
SENSOR
GROUND
THROTTLE
POSITION
SENSOR
THROTTLE
POSITION
SENSOR
SIGNAL
5V
SUPPLY
1
2
2
INLET
AIR
TEMP
SENSOR
1
10
C111
K4
18
BK/LB
K6
20
VT/WT
K22
20
OR/DB
S110
(8W-70-3)
S115
(8W-70-2)
S121
(8W-31-5)
9
C111
K1
20
DG/RD
K6
18
VT/WT
K21
20
BK/RD
43
C2
36
C1
61
C2
35
C1
37
C1
SENSOR
GROUND
MAP
SENSOR
SIGNAL
5V
SUPPLY
THROTTLE
POSITION
SENSOR
SIGNAL
INTAKE
AIR
TEMPERATURE
SIGNAL
POWERTRAIN
CONTROL
MODULE

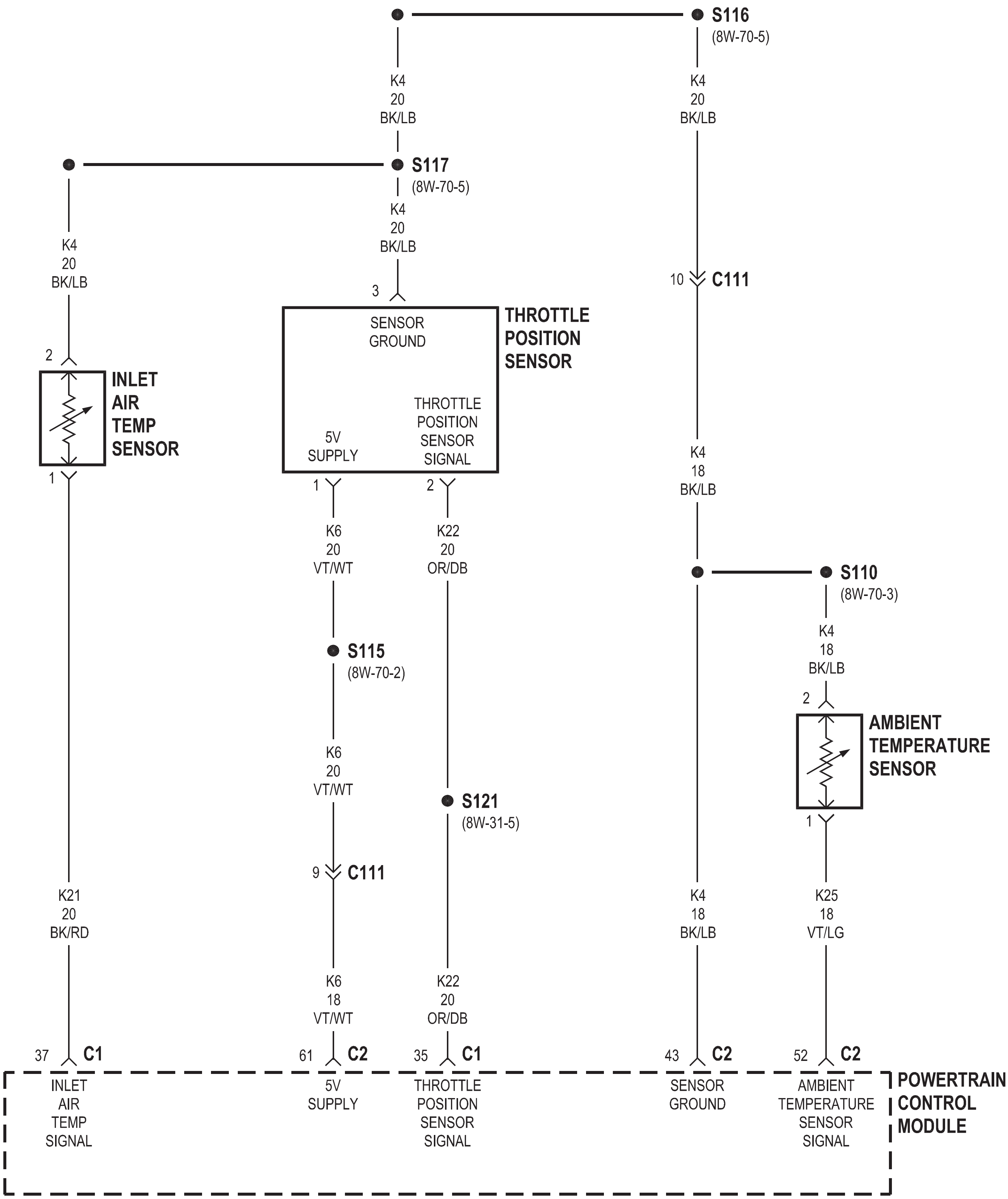


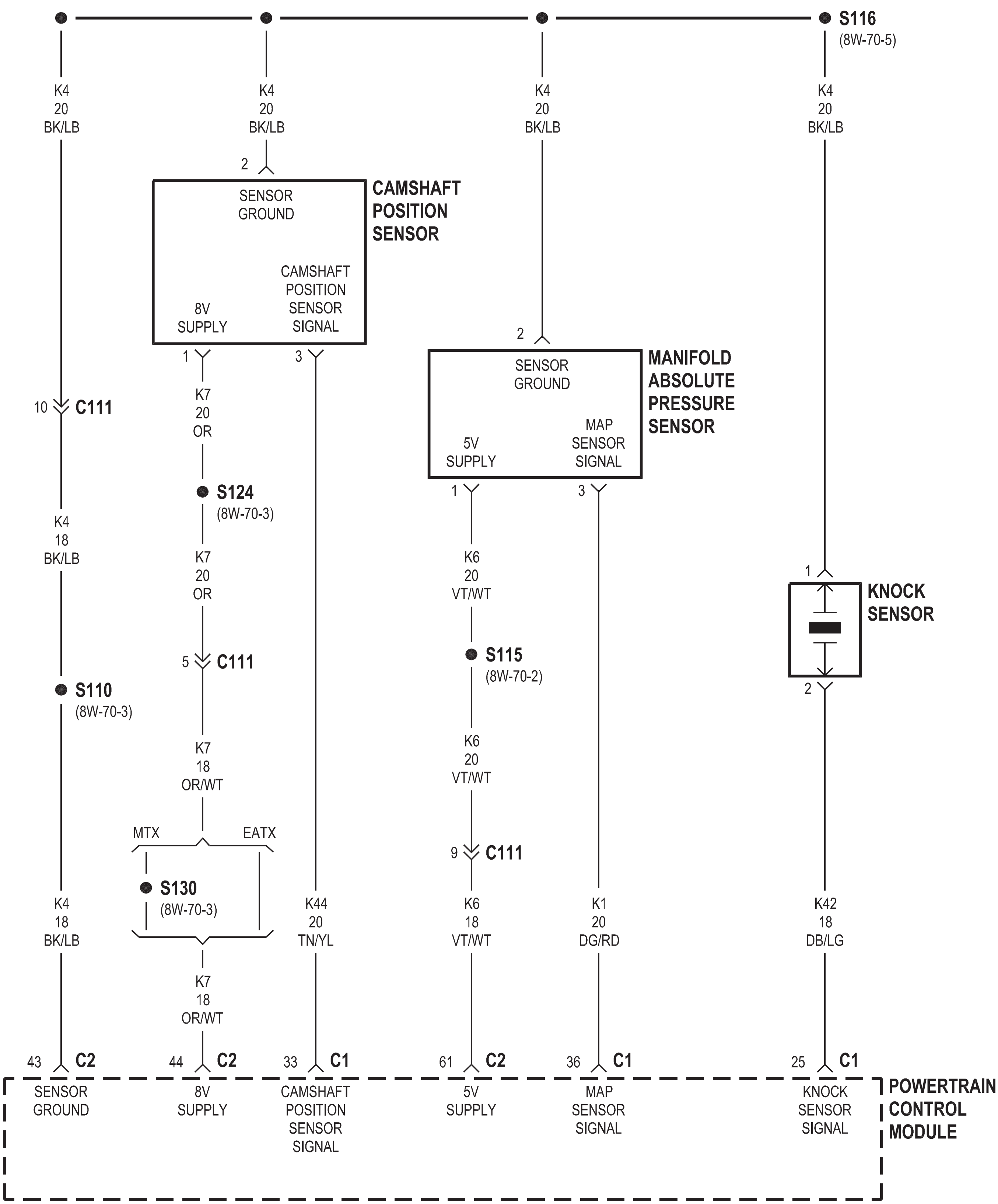
S117
(8W-70-4)
K4
20
BK/LB
K4
20
BK/LB
K4
20
BK/LB
2
SENSOR
GROUND
CAMSHAFT
POSITION
SENSOR
CAMSHAFT
POSITION
SENSOR
SIGNAL
8V
SUPPLY
1
3
10
C111
2
KNOCK
SENSOR
1
K7
20
OR
S124
(8W-70-3)
K7
20
OR
5
C111
K7
18
OR/WT
MTX
EATX
S130
(8W-70-3)
K4
18
BK/LB
S110
(8W-70-3)
K4
18
BK/LB
2
AMBIENT
TEMPERATURE
SENSOR
1
K7
18
OR/WT
K44
20
TN/YL
K4
18
BK/LB
K25
18
VT/LG
K42
18
DB/LG
44
C2
33
C1
43
C2
52
C2
25
C1
8V
SUPPLY
CAMSHAFT
POSITION
SENSOR
SIGNAL
SENSOR
GROUND
AMBIENT
TEMPERATURE
SENSOR
SIGNAL
KNOCK
SENSOR
SIGNAL
POWERTRAIN
CONTROL
MODULE

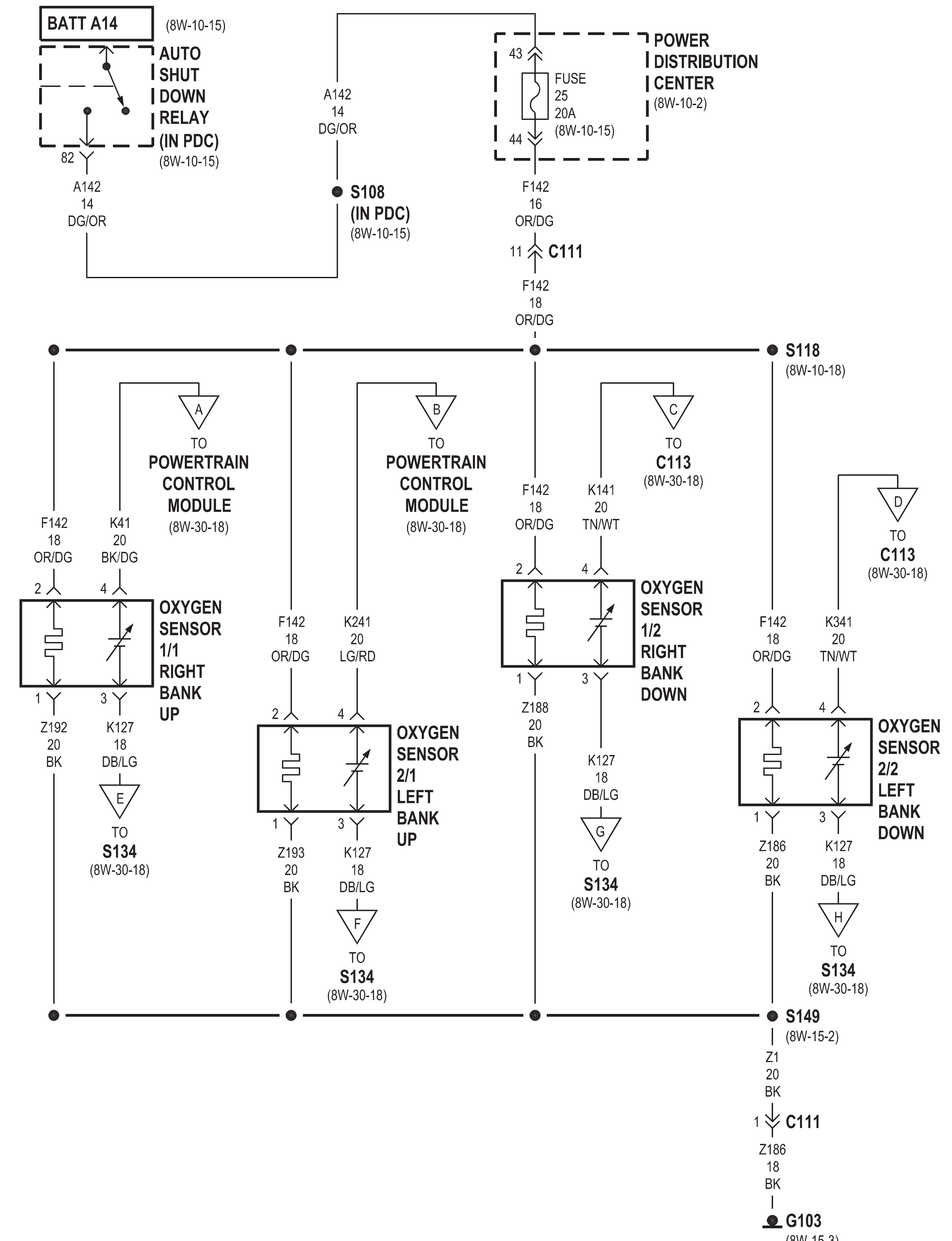

BATT A14
(8W-10-15)
AUTO SHUT DOWN RELAY (IN PDC)
(8W-10-15)
82
A142 14 DG/OR
A142 14 DG/OR
S108 (IN PDC)
(8W-10-15)
43
FUSE 25 20A (8W-10-15)
44
POWER DISTRIBUTION CENTER
(8W-10-2)
F142 16 OR/DG
11 C111
F142 16 OR/DG
S114
(8W-10-18)
POWERTRAIN CONTROL MODULE
OXYGEN SENSOR 1/2 SIGNAL
OXYGEN SENSOR 1/1 SIGNAL
51 C2
30 C1
K141 20 TN/WT
3 C113
F142 16 OR/DG
K141 20 TN/WT
K41 20 BK/LG
F142 16 OR/DG
2
4
4
2
OXYGEN SENSOR 1/2 DOWNSTREAM
OXYGEN SENSOR 1/1 UPSTREAM
1
3
3
1
Z186 20 BK
K127 18 DB/OR
K127 18 DB/OR
S135
(8W-15-2)
S134
Z1 20 BK
K127 18 DB/OR
K79 18 OR/RD
1 C111
Z186 18 BK
G103
(8W-15-3)
27 C1
18 C1
OXYGEN SENSOR GROUND
OXYGEN SENSOR 1/1 HEATER CONTROL
POWERTRAIN CONTROL MODULE

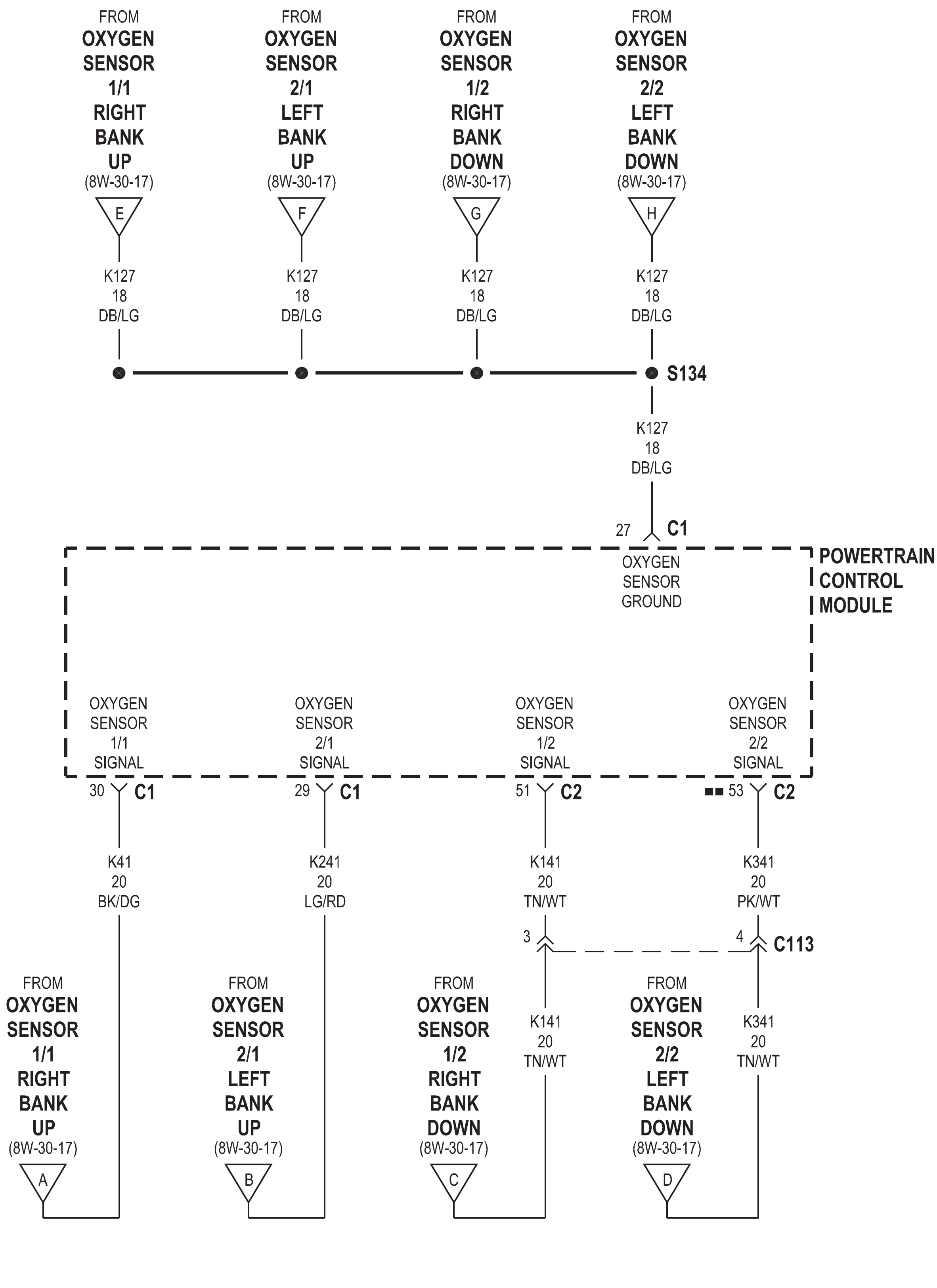

BATT A14
(8W-10-15)
AUTO SHUT DOWN RELAY (IN PDC)
(8W-10-15)
82
A142 14 DG/OR
S108 (IN PDC)
(8W-10-15)
A142 14 DG/OR
A142 14 DG/OR
41
43
FUSE 24 20A (8W-10-15)
FUSE 25 20A (8W-10-15)
42
44
POWER DISTRIBUTION CENTER
(8W-10-2)
F42 16 DG/LG
F142 16 OR/DG
13
11
C111
Z244 20 BK
2
POWER STEERING PRESSURE SWITCH
1
F42 16 DG/LG
S135
(8W-15-2)
S150
(8W-10-16)
F142 16 OR/DG
K10 20 DB/LG
F42 16 DG/LG
Z1 20 BK
S148
(8W-10-16)
S114
(8W-10-18)
F42 16 DG/LG
1 C111
2
IGNITION COIL PACK
12 C111
Z186 18 BK
F142 16 OR/DG
1
EGR SOLENOID
1
3
#1
#2
#3
#4
G103
(8W-15-3)
TO SPARK PLUGS
TO SPARK PLUGS
2
K10 20 DB/OR
K17 16 DB/TN
K19 16 BK/GY
K35 20 GY/YL
45 C2
3 C1
11 C1
40 C1
STEERING PRESSURE SWITCH SENSE
IGNITION COIL NO. 2 DRIVER
IGNITION COIL NO. 1 DRIVER
EGR SOLENOID CONTROL
POWERTRAIN CONTROL MODULE


BATT A14
(8W-10-15)
AUTO SHUT DOWN RELAY (IN PDC)
(8W-10-15)
82
A142
14
DG/OR
A142
14
DG/OR
41
FUSE
24
20A
(8W-10-15)
42
POWER DISTRIBUTION CENTER
(8W-10-2)
S108 (IN PDC)
(8W-10-15)
F42
16
DG/LG
13
C111
F42
16
DG/LG
S150
(8W-10-16)
F42
16
DG/LG
F42
16
DG/LG
S148
(8W-10-16)
NOISE SUPPRESSOR
F42
16
DG/LG
F42
16
DG/LG
F42
16
DG/LG
F42
16
DG/LG
1
FUEL INJECTOR NO.1
2
FUEL INJECTOR NO.2
FUEL INJECTOR NO.3
FUEL INJECTOR NO.4
K11
18
WT/DB
K12
18
TN
K13
18
YL/WT
K14
18
LB/BR
13 C1
17 C1
7 C1
16 C1
INJECTOR NO. 1 DRIVER
INJECTOR NO. 2 DRIVER
INJECTOR NO. 3 DRIVER
INJECTOR NO. 4 DRIVER
POWERTRAIN CONTROL MODULE

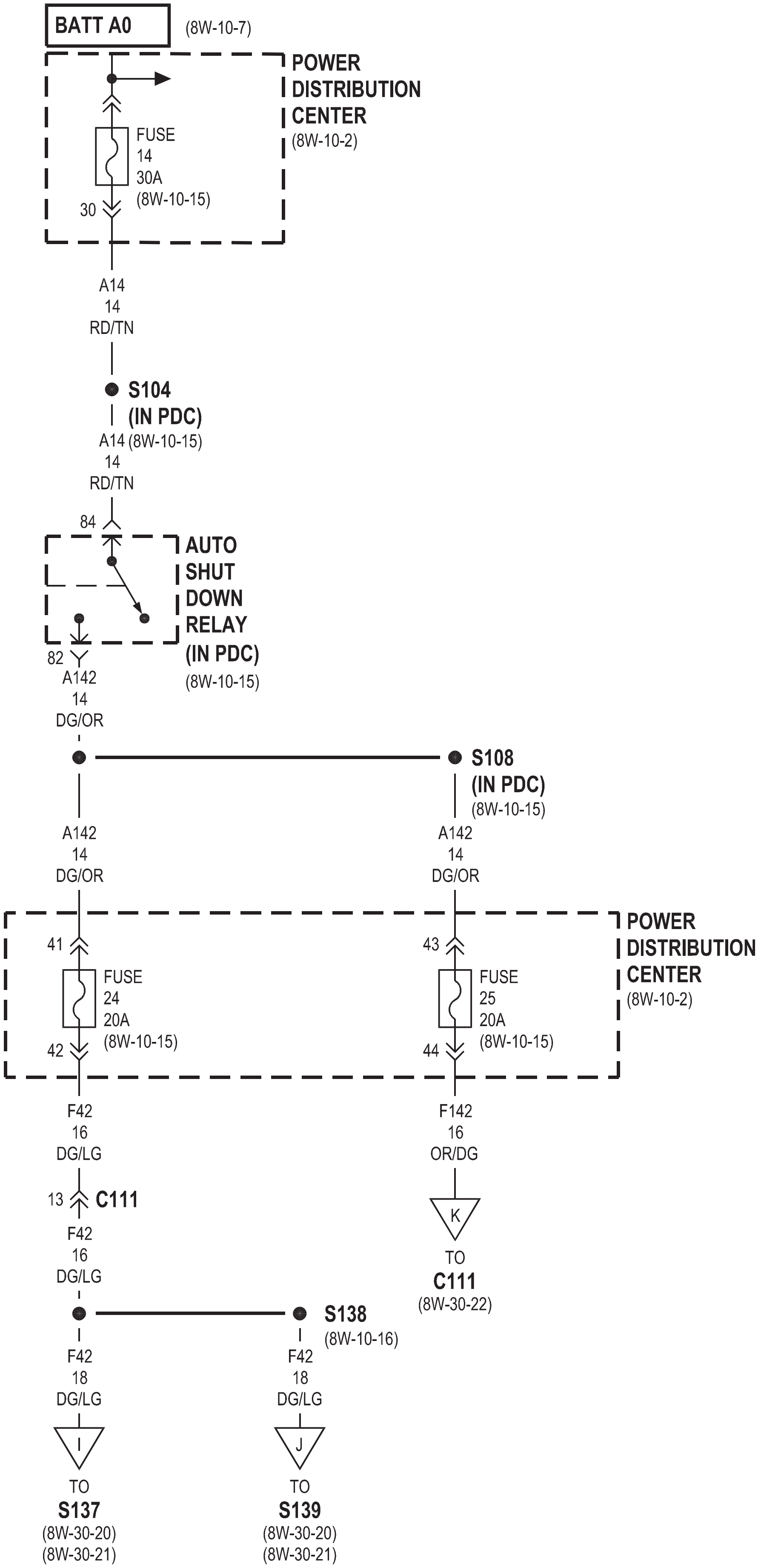

S116
(8W-70-5)
K4
20
BK/LB
K4
20
BK/LB
S117
(8W-70-5)
K4
20
BK/LB
K4
20
BK/LB
10
C111
3
SENSOR
GROUND
THROTTLE
POSITION
SENSOR
2
INLET
AIR
TEMP
SENSOR
THROTTLE
POSITION
SENSOR
SIGNAL
5V
SUPPLY
1
1
2
K4
18
BK/LB
K6
20
VT/WT
K22
20
OR/DB
S110
(8W-70-3)
S115
(8W-70-2)
K4
18
BK/LB
2
AMBIENT
TEMPERATURE
SENSOR
K6
20
VT/WT
S121
(8W-31-5)
1
9
C111
K21
20
BK/RD
K4
18
BK/LB
K25
18
VT/LG
K6
18
VT/WT
K22
20
OR/DB
37
C1
61
C2
35
C1
43
C2
52
C2
INLET
AIR
TEMP
SIGNAL
5V
SUPPLY
THROTTLE
POSITION
SENSOR
SIGNAL
SENSOR
GROUND
AMBIENT
TEMPERATURE
SENSOR
SIGNAL
POWERTRAIN
CONTROL
MODULE

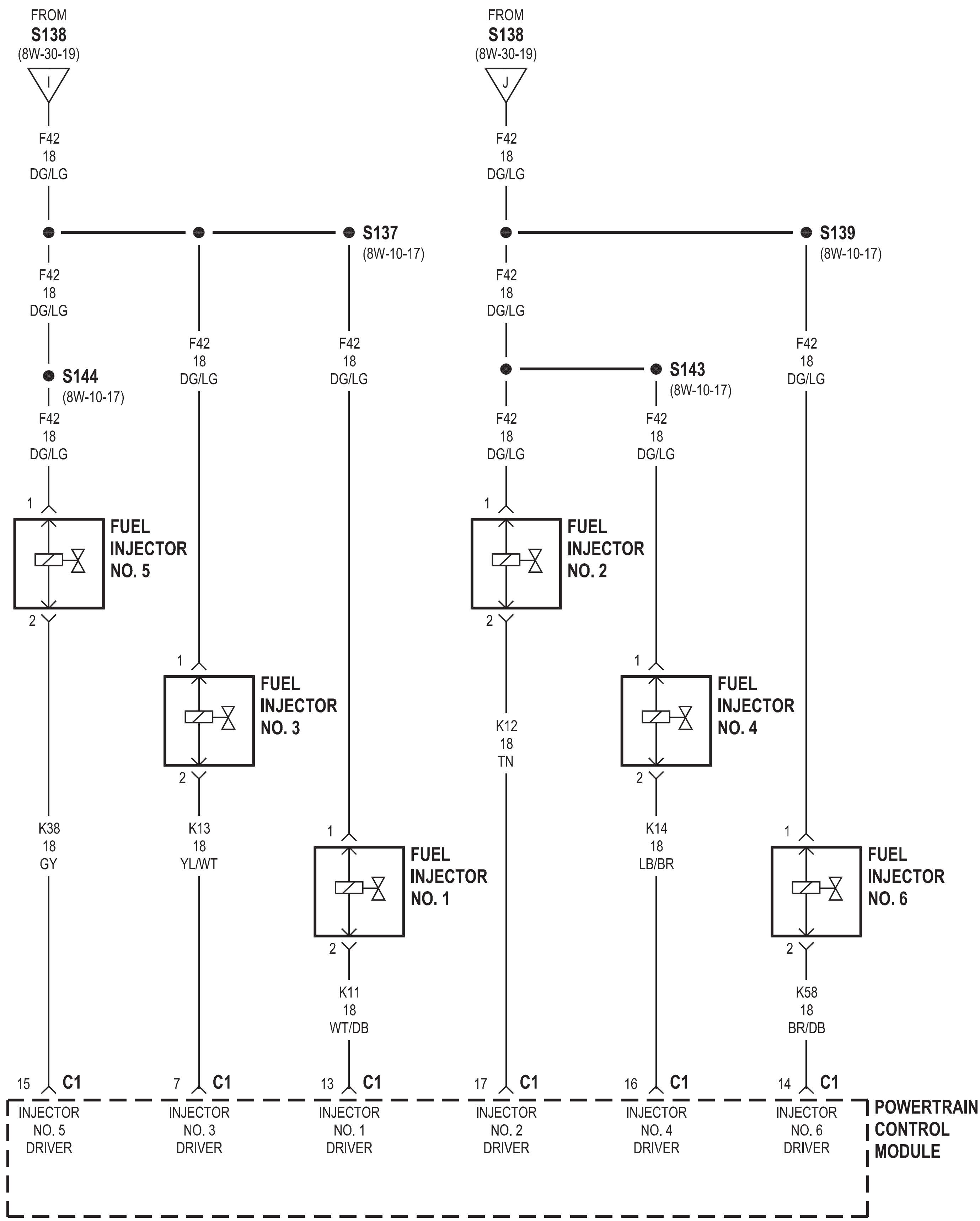

S116
(8W-70-5)
K4
20
BK/LB
K4
20
BK/LB
K4
20
BK/LB
K4
20
BK/LB
2
SENSOR GROUND
CAMSHAFT POSITION SENSOR
8V SUPPLY
CAMSHAFT POSITION SENSOR SIGNAL
1
3
10
C111
K7
20
OR
S124
(8W-70-3)
K4
18
BK/LB
K7
20
OR
5
C111
S110
(8W-70-3)
K7
18
OR/WT
MTX
EATX
S130
(8W-70-3)
K7
18
OR/WT
K4
18
BK/LB
K44
20
TN/YL
2
SENSOR GROUND
MANIFOLD ABSOLUTE PRESSURE SENSOR
5V SUPPLY
MAP SENSOR SIGNAL
1
3
K6
20
VT/WT
S115
(8W-70-2)
K6
20
VT/WT
9
C111
K6
18
VT/WT
K1
20
DG/RD
1
KNOCK SENSOR
2
K42
18
DB/LG
43 C2
44 C2
33 C1
61 C2
36 C1
25 C1
SENSOR GROUND
8V SUPPLY
CAMSHAFT POSITION SENSOR SIGNAL
5V SUPPLY
MAP SENSOR SIGNAL
KNOCK SENSOR SIGNAL
POWERTRAIN CONTROL MODULE

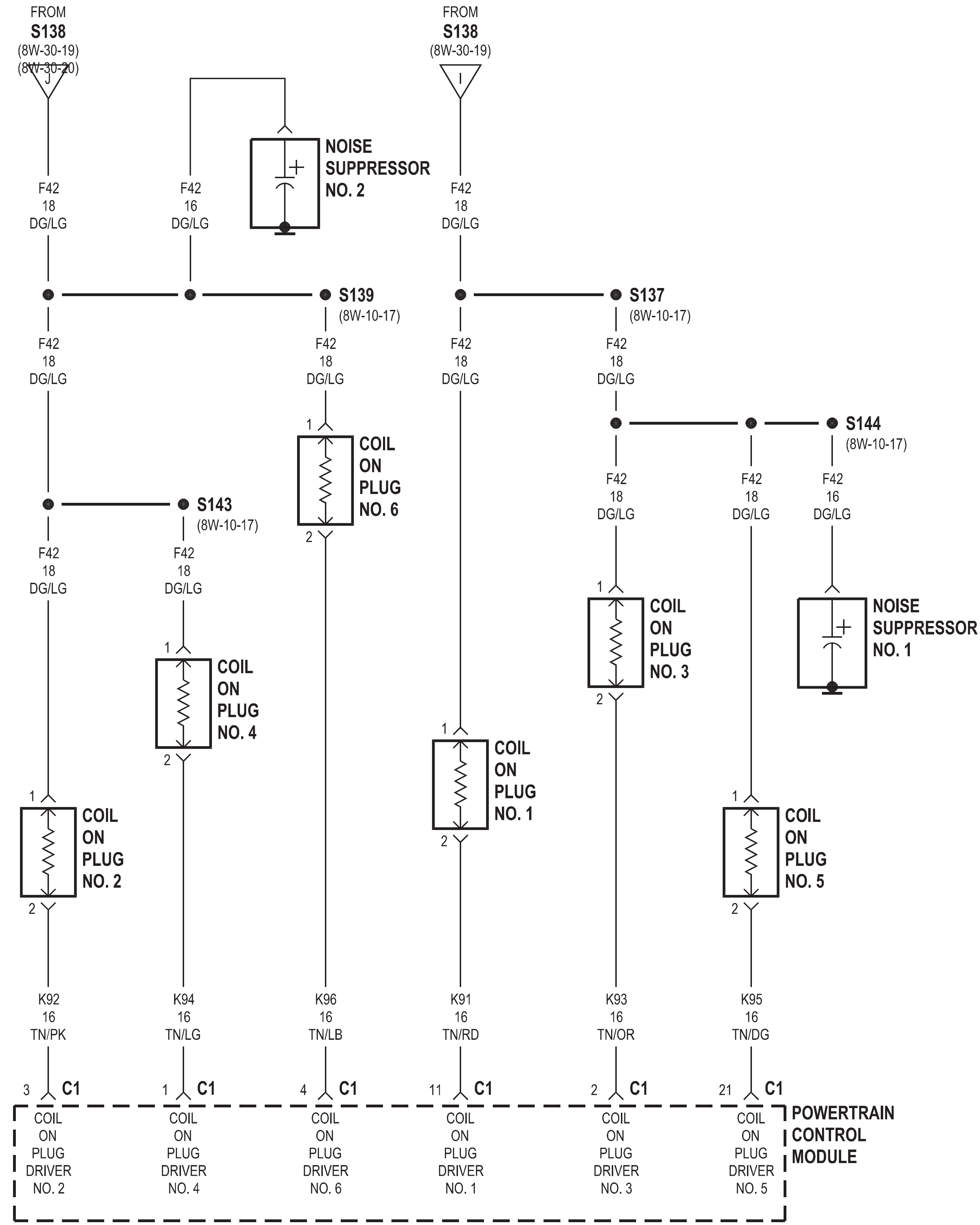

BATT A14
(8W-10-15)
AUTO SHUT DOWN RELAY (IN PDC)
(8W-10-15)
82
A142
14
DG/OR
A142
14
DG/OR
S108
(IN PDC)
(8W-10-15)
43
FUSE
25
20A
(8W-10-15)
44
POWER DISTRIBUTION CENTER
(8W-10-2)
F142
16
OR/DG
11
C111
F142
18
OR/DG
S118
(8W-10-18)
A
TO
POWERTRAIN CONTROL MODULE
(8W-30-18)
B
TO
POWERTRAIN CONTROL MODULE
(8W-30-18)
C
TO
C113
(8W-30-18)
D
TO
C113
(8W-30-18)
F142
18
OR/DG
K41
20
BK/DG
2
4
OXYGEN SENSOR 1/1 RIGHT BANK UP
1
3
Z192
20
BK
K127
18
DB/LG
E
TO
S134
(8W-30-18)
F142
18
OR/DG
K241
20
LG/RD
2
4
OXYGEN SENSOR 2/1 LEFT BANK UP
1
3
Z193
20
BK
K127
18
DB/LG
F
TO
S134
(8W-30-18)
F142
18
OR/DG
K141
20
TN/WT
2
4
OXYGEN SENSOR 1/2 RIGHT BANK DOWN
1
3
Z188
20
BK
K127
18
DB/LG
G
TO
S134
(8W-30-18)
F142
18
OR/DG
K341
20
TN/WT
2
4
OXYGEN SENSOR 2/2 LEFT BANK DOWN
1
3
Z186
20
BK
K127
18
DB/LG
H
TO
S134
(8W-30-18)
S149
(8W-15-2)
Z1
20
BK
1
C111
Z186
18
BK
G103
(8W-15-3)

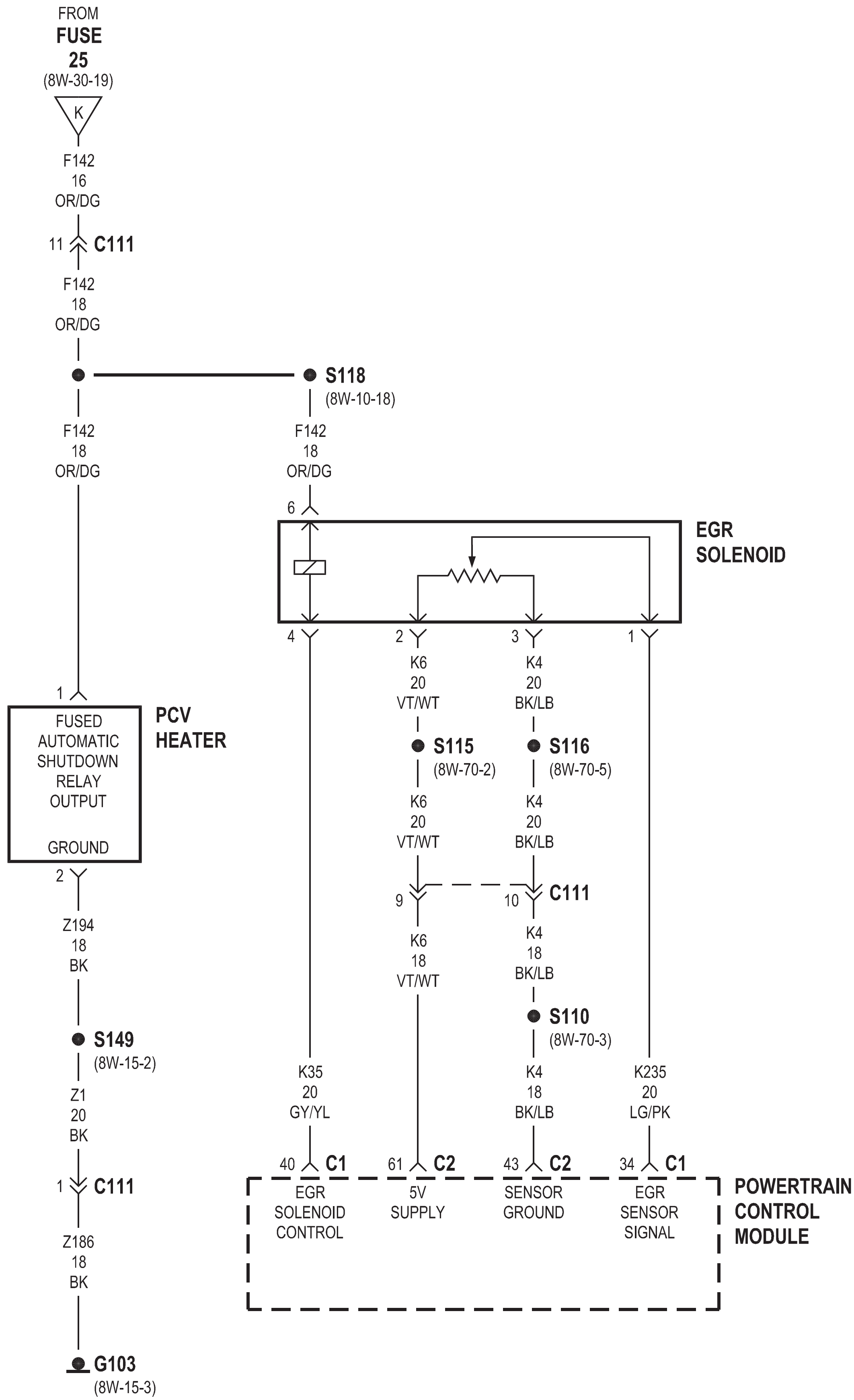

FROM OXYGEN SENSOR 1/1 RIGHT BANK UP (8W-30-17)
E
FROM OXYGEN SENSOR 2/1 LEFT BANK UP (8W-30-17)
F
FROM OXYGEN SENSOR 1/2 RIGHT BANK DOWN (8W-30-17)
G
FROM OXYGEN SENSOR 2/2 LEFT BANK DOWN (8W-30-17)
H
K127 18 DB/LG
S134
27 C1
OXYGEN SENSOR GROUND
POWERTRAIN CONTROL MODULE
OXYGEN SENSOR 1/1 SIGNAL
OXYGEN SENSOR 2/1 SIGNAL
OXYGEN SENSOR 1/2 SIGNAL
OXYGEN SENSOR 2/2 SIGNAL
30 C1
29 C1
51 C2
■■ 53 C2
K41 20 BK/DG
K241 20 LG/RD
K141 20 TN/WT
K341 20 PK/WT
3
4 C113
K141 20 TN/WT
K341 20 TN/WT
FROM OXYGEN SENSOR 1/1 RIGHT BANK UP (8W-30-17)
A
FROM OXYGEN SENSOR 2/1 LEFT BANK UP (8W-30-17)
B
FROM OXYGEN SENSOR 1/2 RIGHT BANK DOWN (8W-30-17)
C
FROM OXYGEN SENSOR 2/2 LEFT BANK DOWN (8W-30-17)
D

■■ EATX JR41

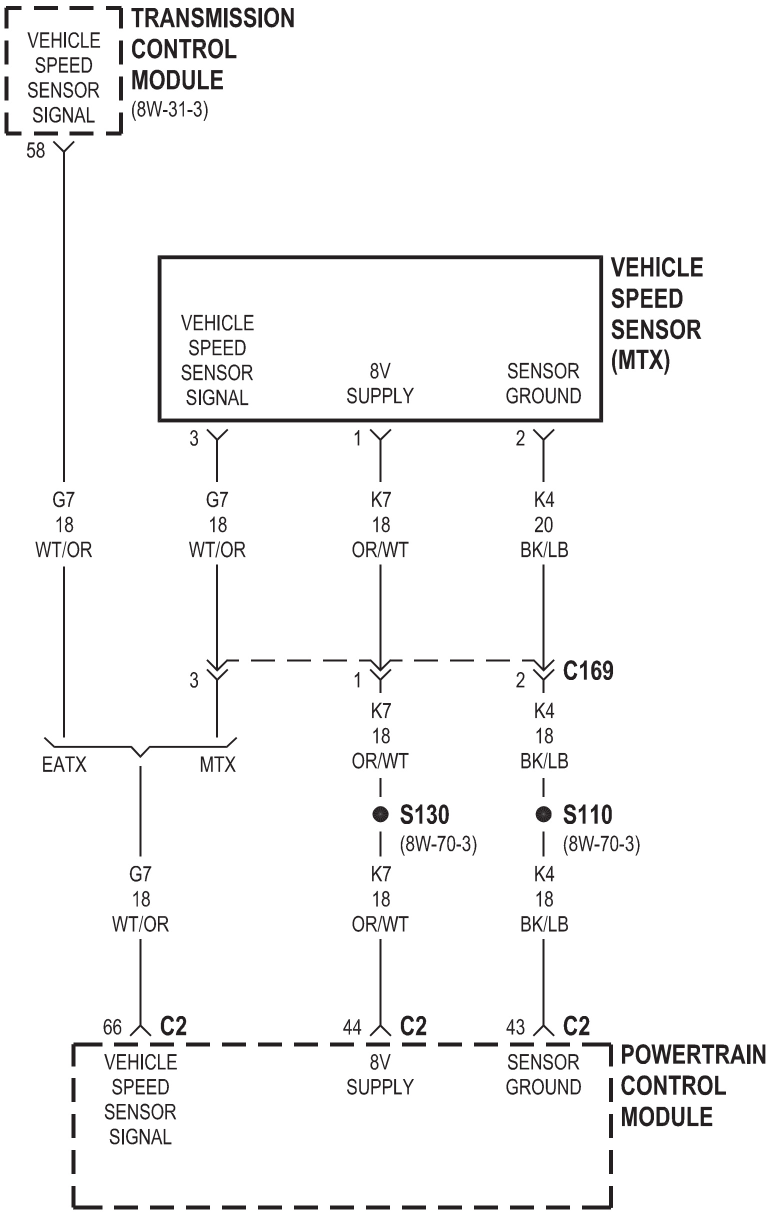

BATT A0
(8W-10-7)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 14 30A
(8W-10-15)
30
A14 14 RD/TN
S104 (IN PDC)
A14 (8W-10-15)
14 RD/TN
84
AUTO SHUT DOWN RELAY (IN PDC)
(8W-10-15)
82
A142 14 DG/OR
S108 (IN PDC)
(8W-10-15)
A142 14 DG/OR
A142 14 DG/OR
POWER DISTRIBUTION CENTER
(8W-10-2)
41
43
FUSE 24 20A
(8W-10-15)
FUSE 25 20A
(8W-10-15)
42
44
F42 16 DG/LG
F142 16 OR/DG
13 C111
F42 16 DG/LG
K
TO C111
(8W-30-22)
S138
(8W-10-16)
F42 18 DG/LG
F42 18 DG/LG
I
J
TO S137
(8W-30-20)
(8W-30-21)
TO S139
(8W-30-20)
(8W-30-21)


FROM
S138
(8W-30-19)
I
FROM
S138
(8W-30-19)
J
F42
18
DG/LG
S137
(8W-10-17)
S139
(8W-10-17)
S144
(8W-10-17)
S143
(8W-10-17)
FUEL
INJECTOR
NO. 5
FUEL
INJECTOR
NO. 3
FUEL
INJECTOR
NO. 1
FUEL
INJECTOR
NO. 2
FUEL
INJECTOR
NO. 4
FUEL
INJECTOR
NO. 6
K38
18
GY
K13
18
YL/WT
K11
18
WT/DB
K12
18
TN
K14
18
LB/BR
K58
18
BR/DB
15 C1
7 C1
13 C1
17 C1
16 C1
14 C1
INJECTOR
NO. 5
DRIVER
INJECTOR
NO. 3
DRIVER
INJECTOR
NO. 1
DRIVER
INJECTOR
NO. 2
DRIVER
INJECTOR
NO. 4
DRIVER
INJECTOR
NO. 6
DRIVER
POWERTRAIN
CONTROL
MODULE

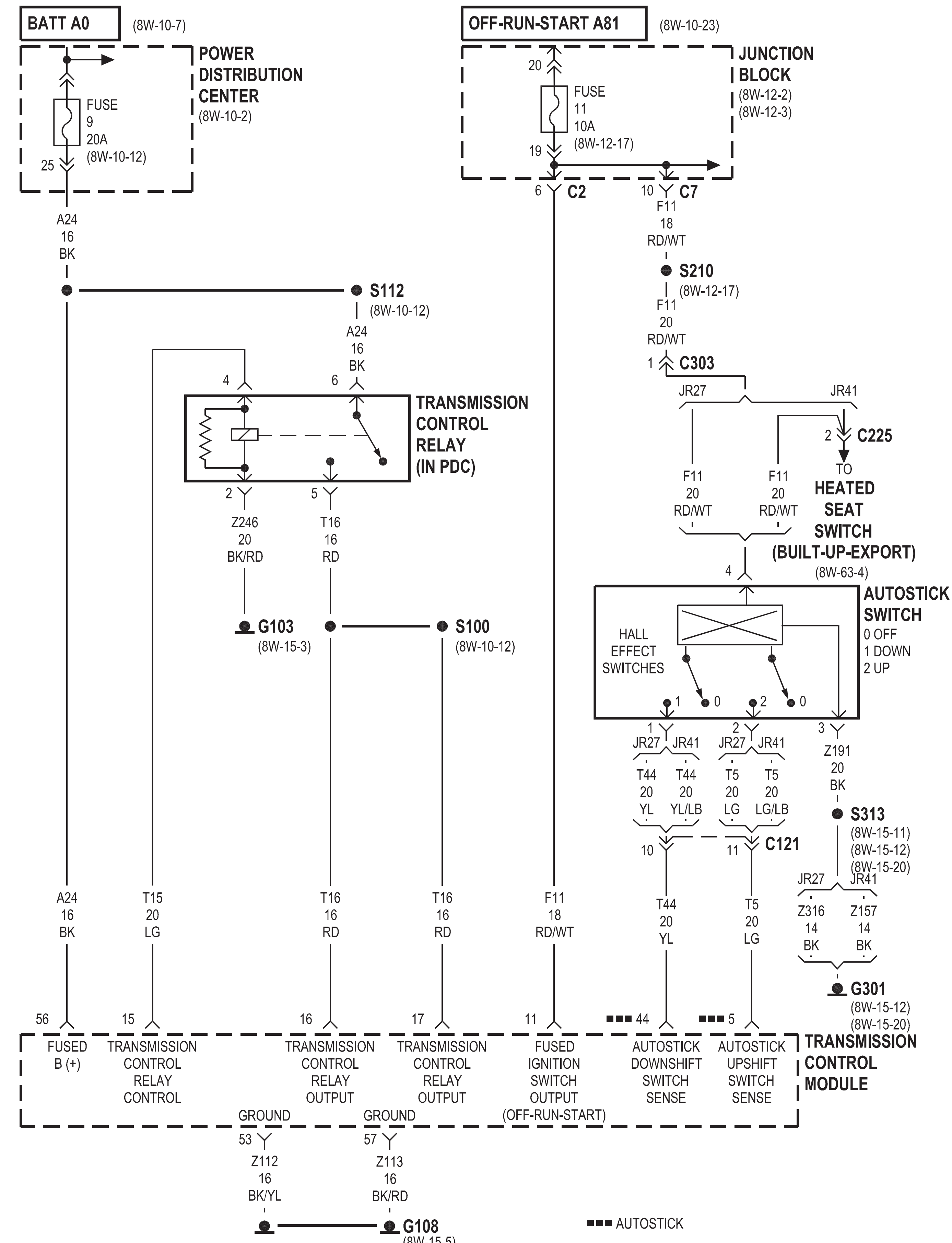

FROM
S138
(8W-30-19)
(8W-30-20)
J
FROM
S138
(8W-30-19)
I
NOISE SUPPRESSOR NO. 2
F42
18
DG/LG
F42
16
DG/LG
S139
(8W-10-17)
S137
(8W-10-17)
S144
(8W-10-17)
S143
(8W-10-17)
COIL ON PLUG NO. 6
COIL ON PLUG NO. 4
COIL ON PLUG NO. 2
COIL ON PLUG NO. 1
COIL ON PLUG NO. 3
COIL ON PLUG NO. 5
NOISE SUPPRESSOR NO. 1
K92
16
TN/PK
K94
16
TN/LG
K96
16
TN/LB
K91
16
TN/RD
K93
16
TN/OR
K95
16
TN/DG
C1
POWERTRAIN CONTROL MODULE
COIL ON PLUG DRIVER NO. 2
COIL ON PLUG DRIVER NO. 4
COIL ON PLUG DRIVER NO. 6
COIL ON PLUG DRIVER NO. 1
COIL ON PLUG DRIVER NO. 3
COIL ON PLUG DRIVER NO. 5



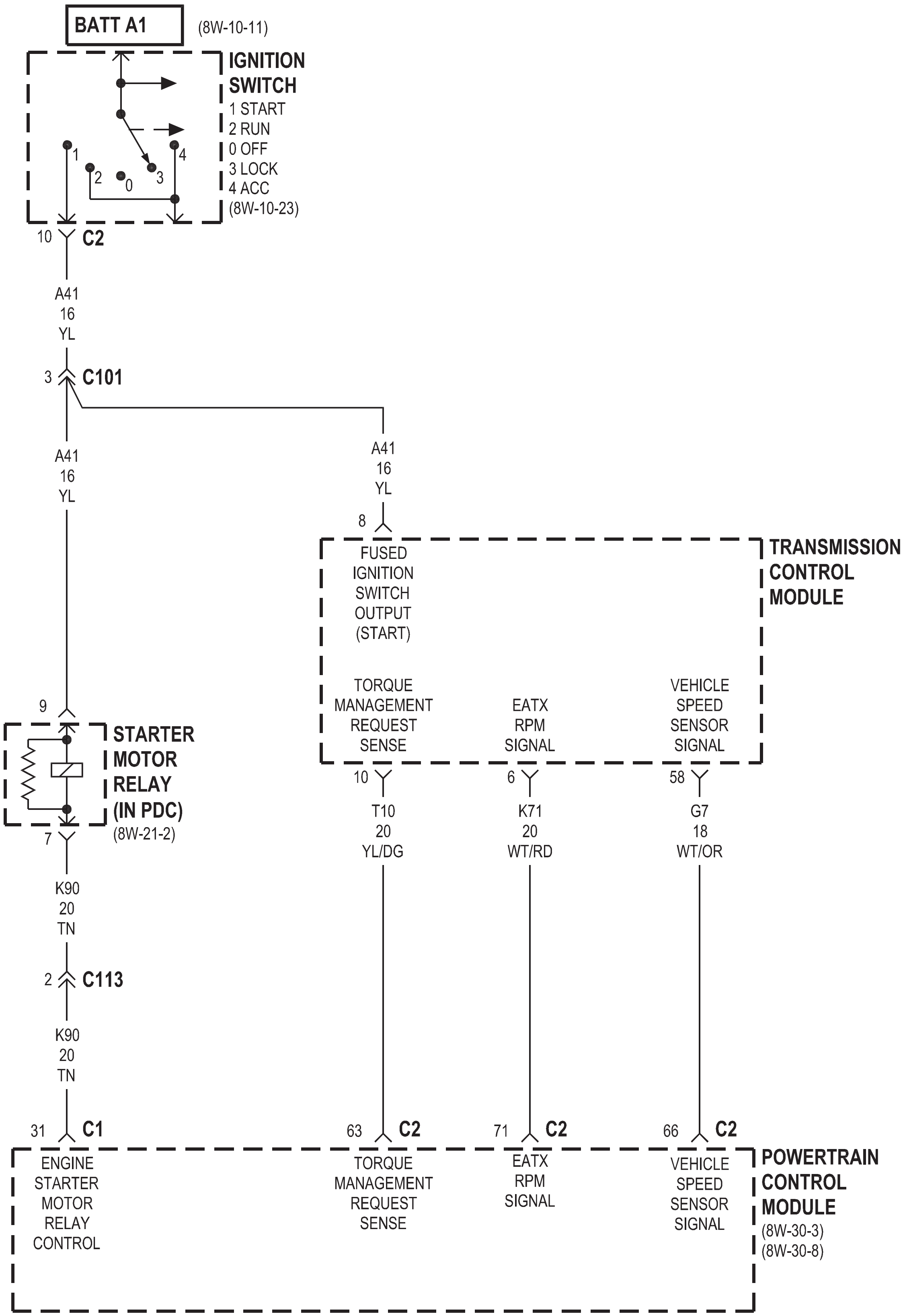
FROM
FUSE
25
(8W-30-19)
K
F142
16
OR/DG
11
C111
F142
18
OR/DG
S118
(8W-10-18)
F142
18
OR/DG
F142
18
OR/DG
6
EGR
SOLENOID
4
2
3
1
K6
20
VT/WT
K4
20
BK/LB
1
PCV
HEATER
FUSED
AUTOMATIC
SHUTDOWN
RELAY
OUTPUT
GROUND
2
S115
(8W-70-2)
S116
(8W-70-5)
K6
20
VT/WT
K4
20
BK/LB
9
10
C111
Z194
18
BK
K6
18
VT/WT
K4
18
BK/LB
S110
(8W-70-3)
S149
(8W-15-2)
K35
20
GY/YL
K4
18
BK/LB
K235
20
LG/PK
Z1
20
BK
40
C1
61
C2
43
C2
34
C1
1
C111
EGR
SOLENOID
CONTROL
5V
SUPPLY
SENSOR
GROUND
EGR
SENSOR
SIGNAL
POWERTRAIN
CONTROL
MODULE
Z186
18
BK
G103
(8W-15-3)


VEHICLE SPEED SENSOR SIGNAL
TRANSMISSION CONTROL MODULE
(8W-31-3)
58
VEHICLE SPEED SENSOR (MTX)
VEHICLE SPEED SENSOR SIGNAL
8V SUPPLY
SENSOR GROUND
3
1
2
G7 18 WT/OR
G7 18 WT/OR
K7 18 OR/WT
K4 20 BK/LB
C169
3
1
2
K7 18 OR/WT
K4 18 BK/LB
EATX
MTX
S130
(8W-70-3)
S110
(8W-70-3)
G7 18 WT/OR
K7 18 OR/WT
K4 18 BK/LB
66 C2
44 C2
43 C2
VEHICLE SPEED SENSOR SIGNAL
8V SUPPLY
SENSOR GROUND
POWERTRAIN CONTROL MODULE

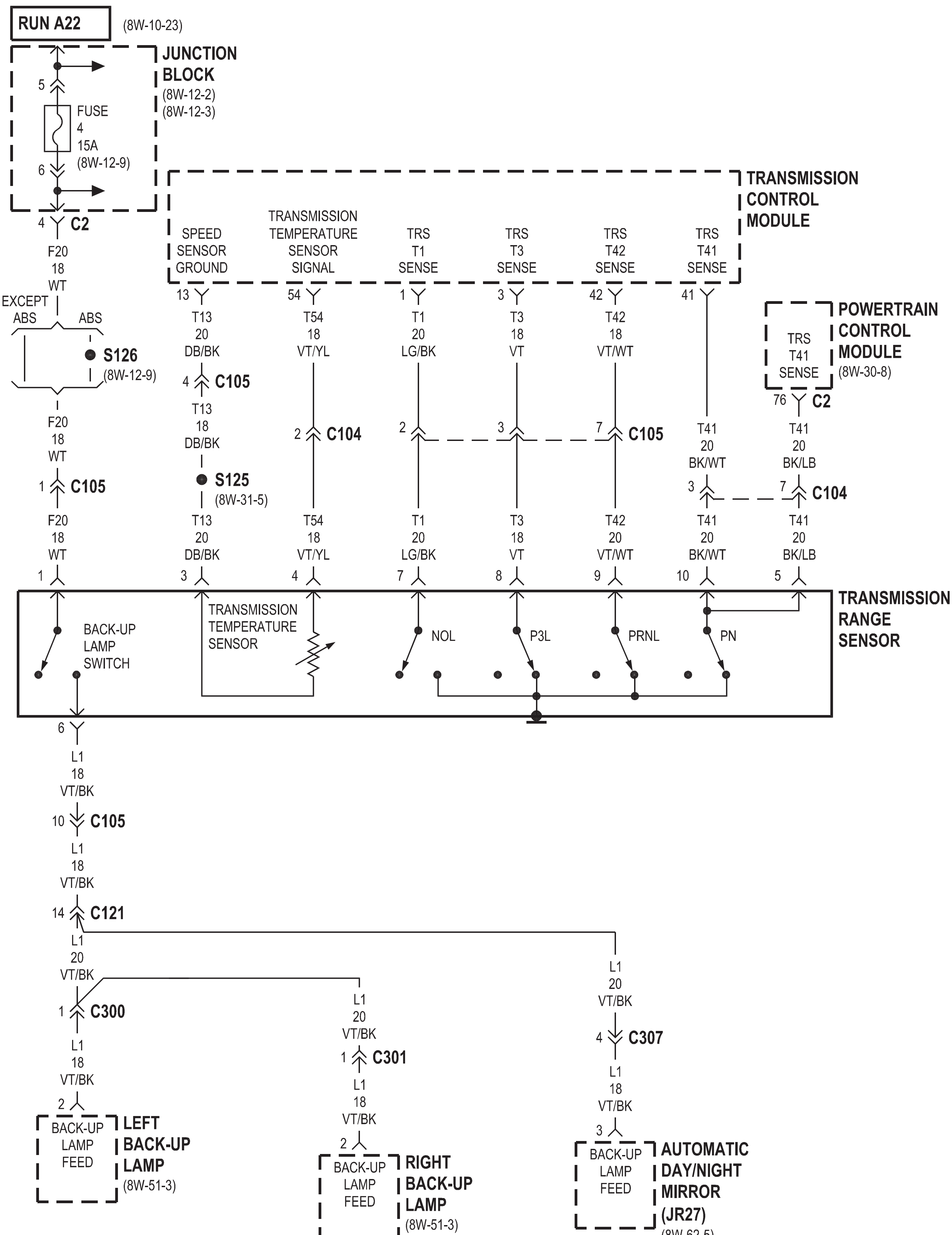
8W-31 TRANSMISSION CONTROL SYSTEM

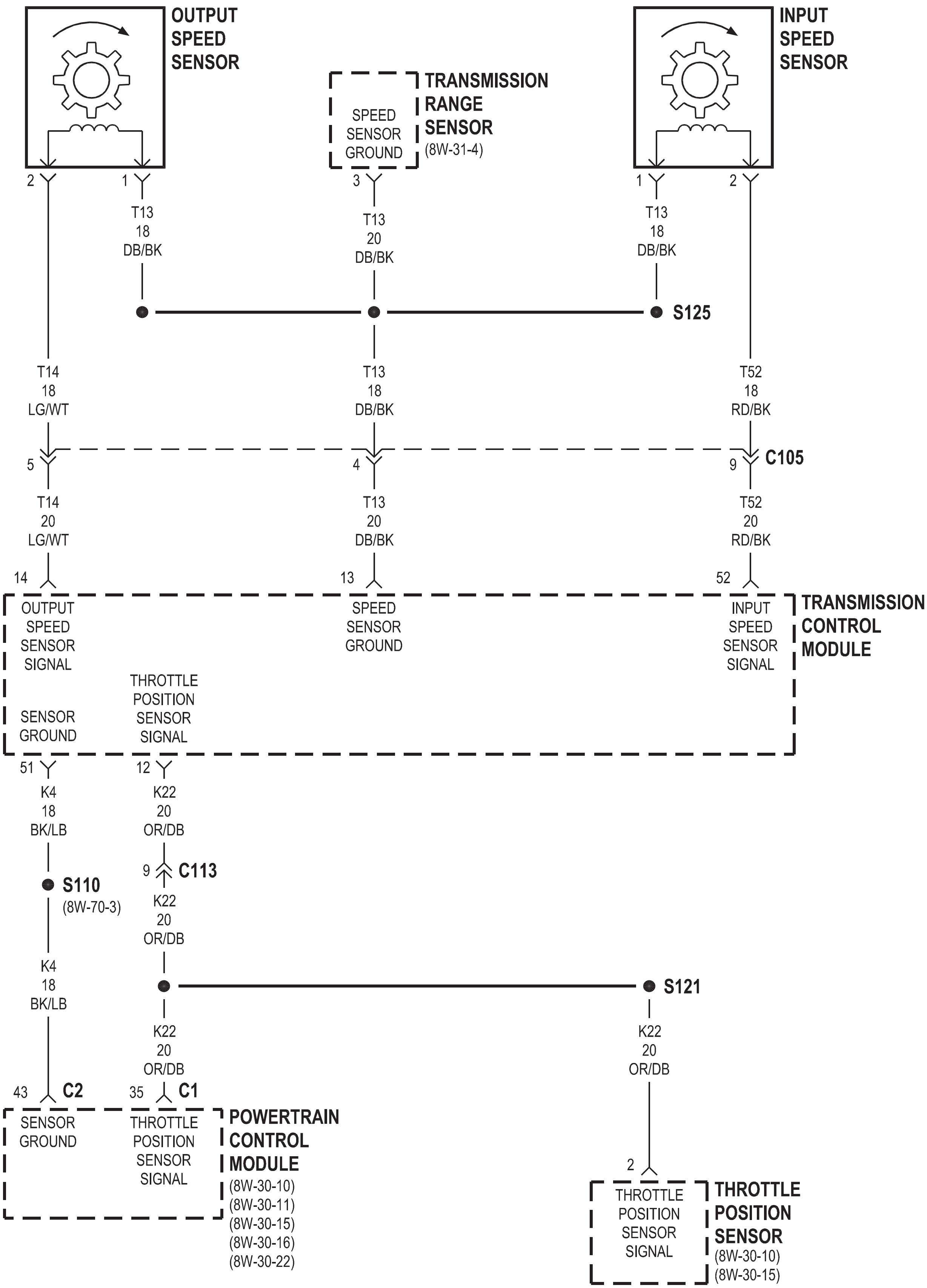


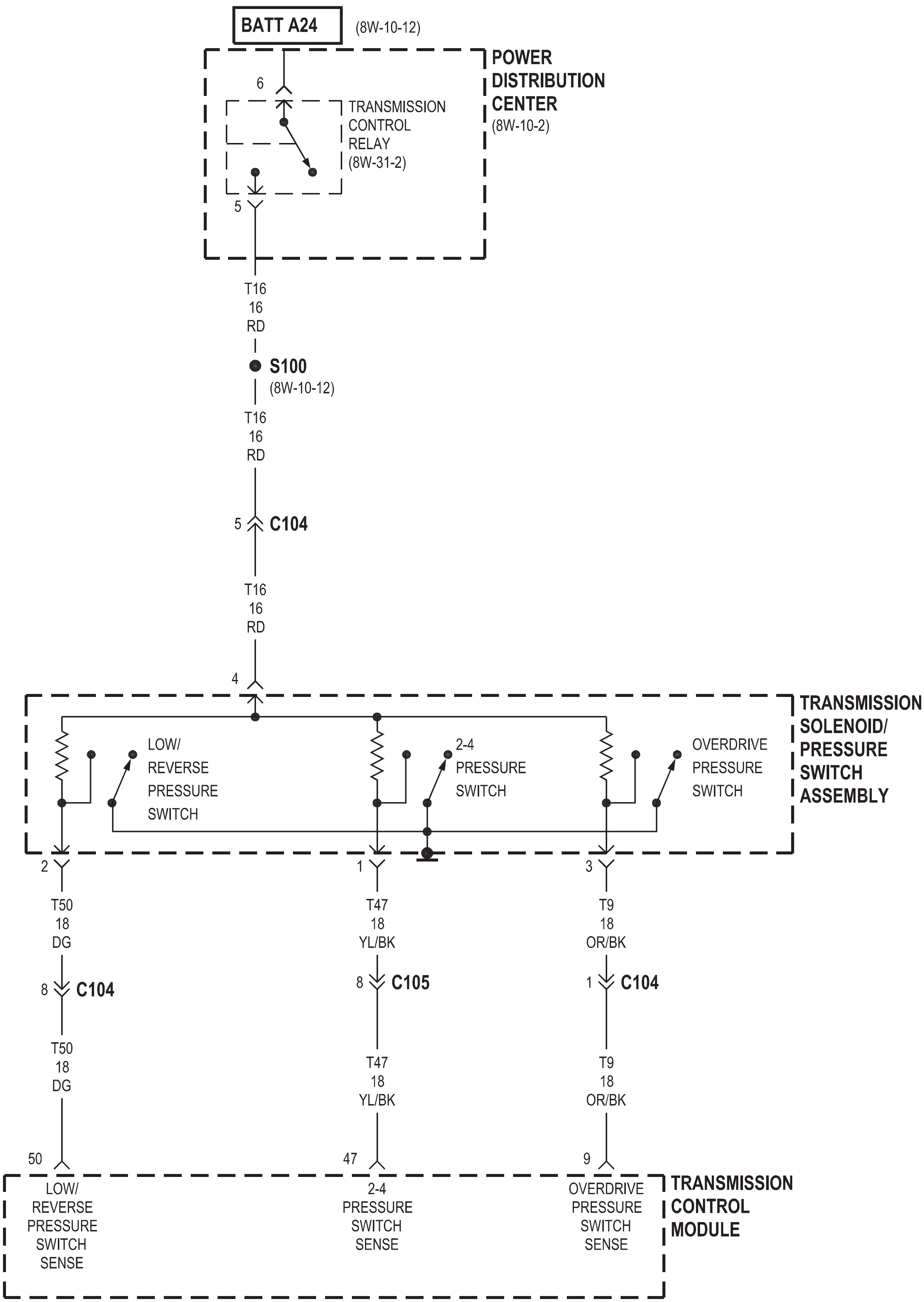
028W-16 JRI03102

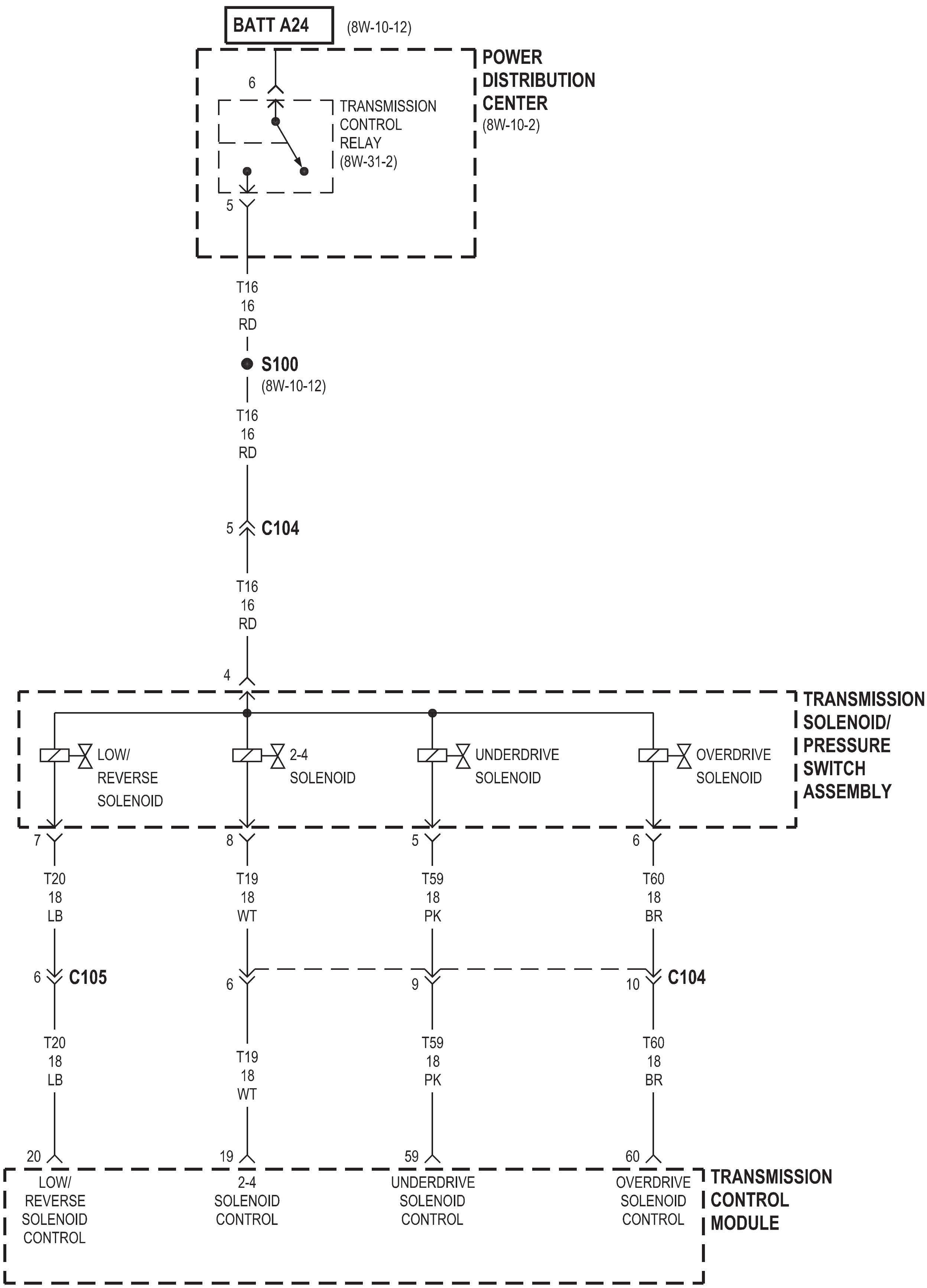


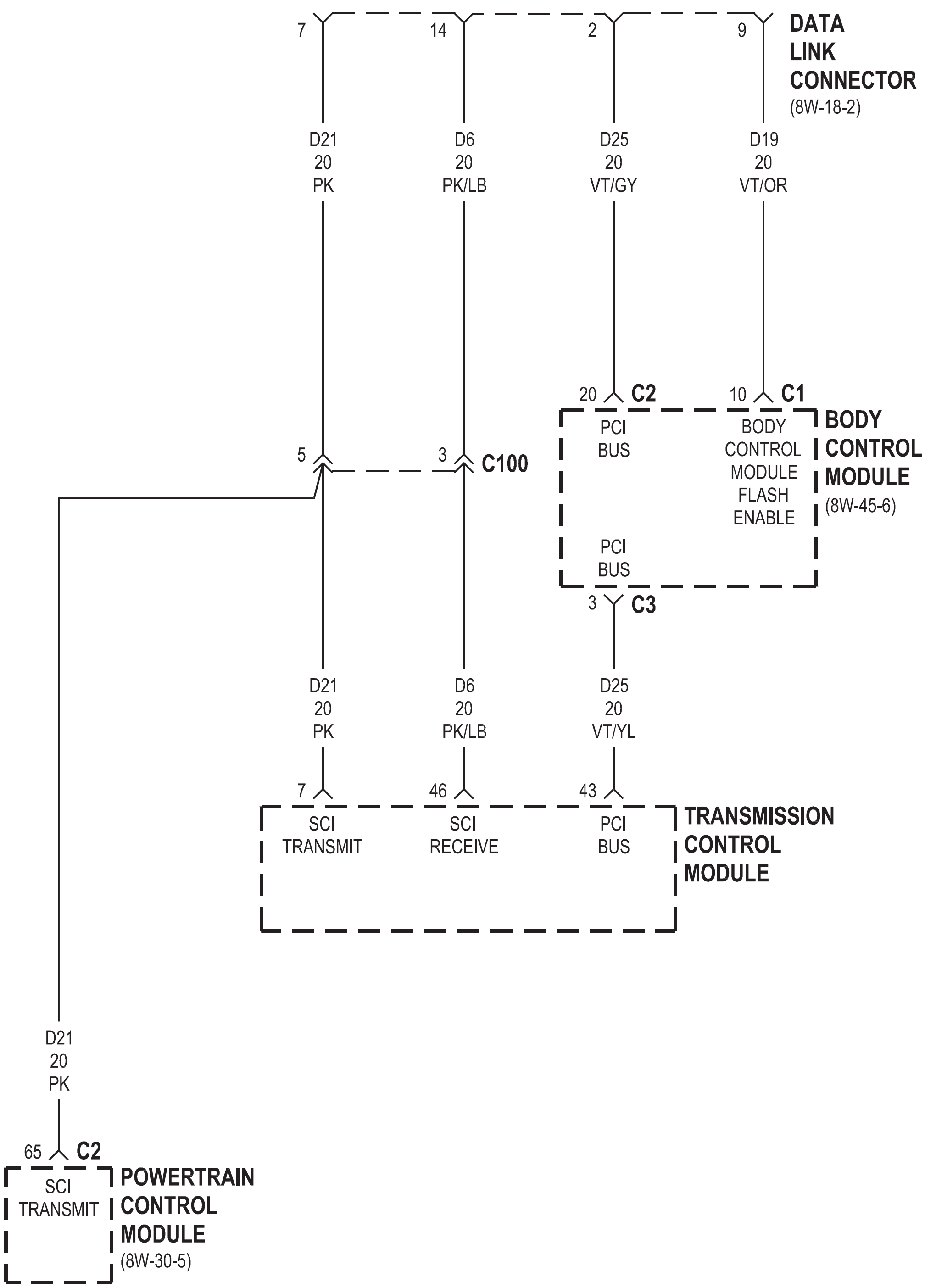
BATT A1
(8W-10-11)
IGNITION SWITCH
1 START
2 RUN
0 OFF
3 LOCK
4 ACC
(8W-10-23)
1
2
0
3
4
10
C2
A41
16
YL
3
C101
A41
16
YL
A41
16
YL
8
FUSED IGNITION SWITCH OUTPUT (START)
TRANSMISSION CONTROL MODULE
TORQUE MANAGEMENT REQUEST SENSE
EATX RPM SIGNAL
VEHICLE SPEED SENSOR SIGNAL
9
STARTER MOTOR RELAY (IN PDC)
(8W-21-2)
7
10
6
58
T10
20
YL/DG
K71
20
WT/RD
G7
18
WT/OR
K90
20
TN
2
C113
K90
20
TN
31
C1
63
C2
71
C2
66
C2
ENGINE STARTER MOTOR RELAY CONTROL
TORQUE MANAGEMENT REQUEST SENSE
EATX RPM SIGNAL
VEHICLE SPEED SENSOR SIGNAL
POWERTRAIN CONTROL MODULE
(8W-30-3)
(8W-30-8)


RUN A22
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
FUSE 4 15A (8W-12-9)
5
6
4 C2
F20 18 WT
EXCEPT ABS
ABS
S126
(8W-12-9)
F20 18 WT
1 C105
F20 18 WT
TRANSMISSION CONTROL MODULE
SPEED SENSOR GROUND
TRANSMISSION TEMPERATURE SENSOR SIGNAL
TRS T1 SENSE
TRS T3 SENSE
TRS T42 SENSE
TRS T41 SENSE
13
54
1
3
42
41
T13 20 DB/BK
4 C105
T13 18 DB/BK
S125
(8W-31-5)
T13 20 DB/BK
T54 18 VT/YL
2 C104
T54 18 VT/YL
T1 20 LG/BK
T3 18 VT
T42 18 VT/WT
2
3
7 C105
T1 20 LG/BK
T3 18 VT
T42 20 VT/WT
POWERTRAIN CONTROL MODULE
TRS T41 SENSE
(8W-30-8)
76 C2
T41 20 BK/WT
T41 20 BK/LB
3
7 C104
T41 20 BK/WT
T41 20 BK/LB
1
3
4
7
8
9
10
5
TRANSMISSION RANGE SENSOR
BACK-UP LAMP SWITCH
TRANSMISSION TEMPERATURE SENSOR
NOL
P3L
PRNL
PN
6
L1 18 VT/BK
10 C105
L1 18 VT/BK
14 C121
L1 20 VT/BK
1 C300
L1 18 VT/BK
2
BACK-UP LAMP FEED
LEFT BACK-UP LAMP
(8W-51-3)
L1 20 VT/BK
1 C301
L1 18 VT/BK
2
BACK-UP LAMP FEED
RIGHT BACK-UP LAMP
(8W-51-3)
L1 20 VT/BK
4 C307
L1 18 VT/BK
3
BACK-UP LAMP FEED
AUTOMATIC DAY/NIGHT MIRROR (JR27)
(8W-62-5)

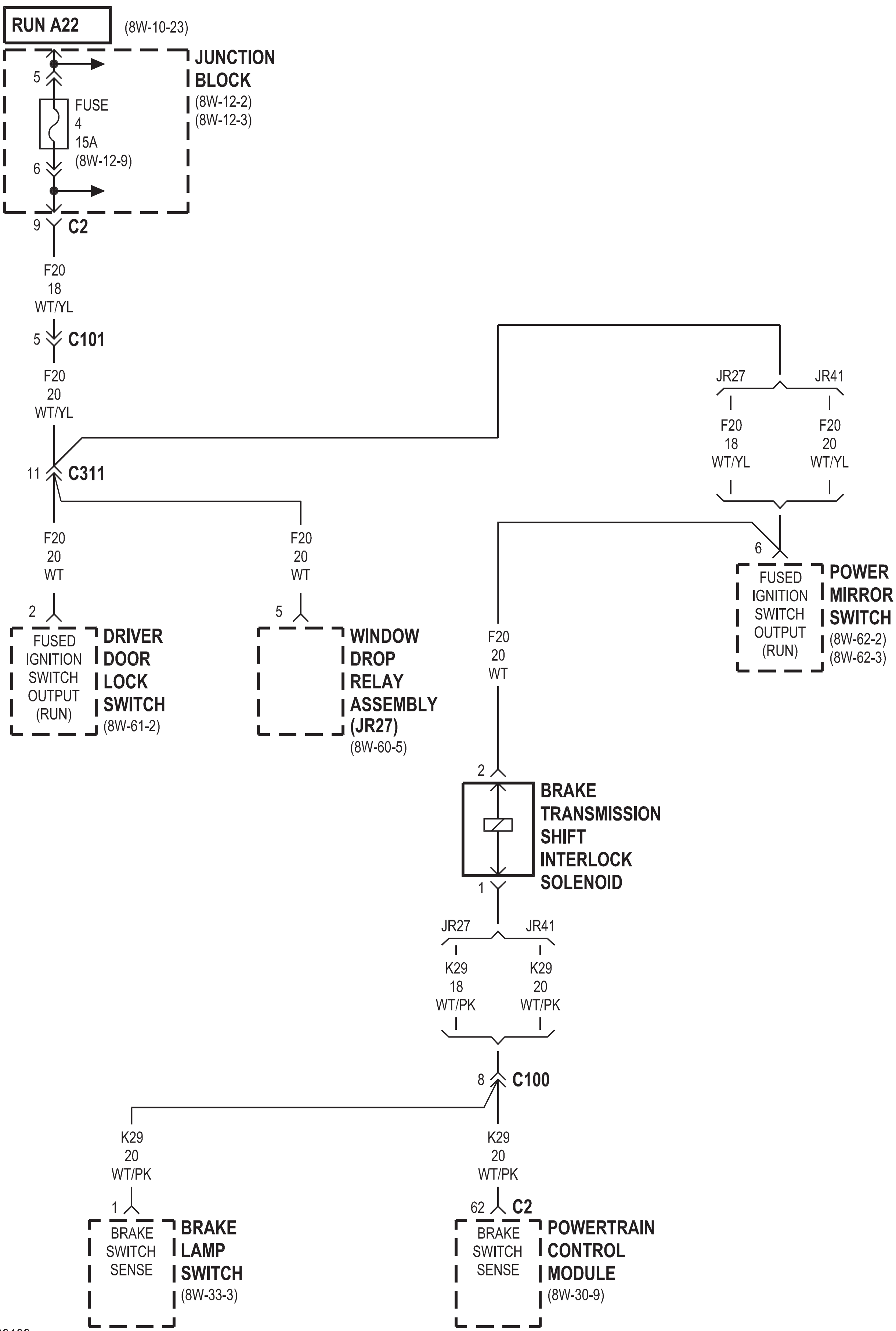

OUTPUT SPEED SENSOR
TRANSMISSION RANGE SENSOR
SPEED SENSOR GROUND
(8W-31-4)
INPUT SPEED SENSOR
2
1
3
1
2
T13 18 DB/BK
T13 20 DB/BK
T13 18 DB/BK
S125
T14 18 LG/WT
T13 18 DB/BK
T52 18 RD/BK
5
4
9
C105
T14 20 LG/WT
T13 20 DB/BK
T52 20 RD/BK
14
13
52
TRANSMISSION CONTROL MODULE
OUTPUT SPEED SENSOR SIGNAL
SPEED SENSOR GROUND
INPUT SPEED SENSOR SIGNAL
THROTTLE POSITION SENSOR SIGNAL
SENSOR GROUND
51
12
K4 18 BK/LB
K22 20 OR/DB
S110
(8W-70-3)
9
C113
K22 20 OR/DB
K4 18 BK/LB
S121
K22 20 OR/DB
K22 20 OR/DB
43
C2
35
C1
SENSOR GROUND
THROTTLE POSITION SENSOR SIGNAL
POWERTRAIN CONTROL MODULE
(8W-30-10)
(8W-30-11)
(8W-30-15)
(8W-30-16)
(8W-30-22)
2
THROTTLE POSITION SENSOR SIGNAL
THROTTLE POSITION SENSOR
(8W-30-10)
(8W-30-15)


BATT A24
(8W-10-12)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
6
TRANSMISSION
CONTROL
RELAY
(8W-31-2)
5
T16
16
RD
S100
(8W-10-12)
T16
16
RD
5
C104
T16
16
RD
4
TRANSMISSION
SOLENOID/
PRESSURE
SWITCH
ASSEMBLY
LOW/
REVERSE
PRESSURE
SWITCH
2-4
PRESSURE
SWITCH
OVERDRIVE
PRESSURE
SWITCH
2
1
3
T50
18
DG
T47
18
YL/BK
T9
18
OR/BK
8
C104
8
C105
1
C104
T50
18
DG
T47
18
YL/BK
T9
18
OR/BK
50
47
9
TRANSMISSION
CONTROL
MODULE
LOW/
REVERSE
PRESSURE
SWITCH
SENSE
2-4
PRESSURE
SWITCH
SENSE
OVERDRIVE
PRESSURE
SWITCH
SENSE

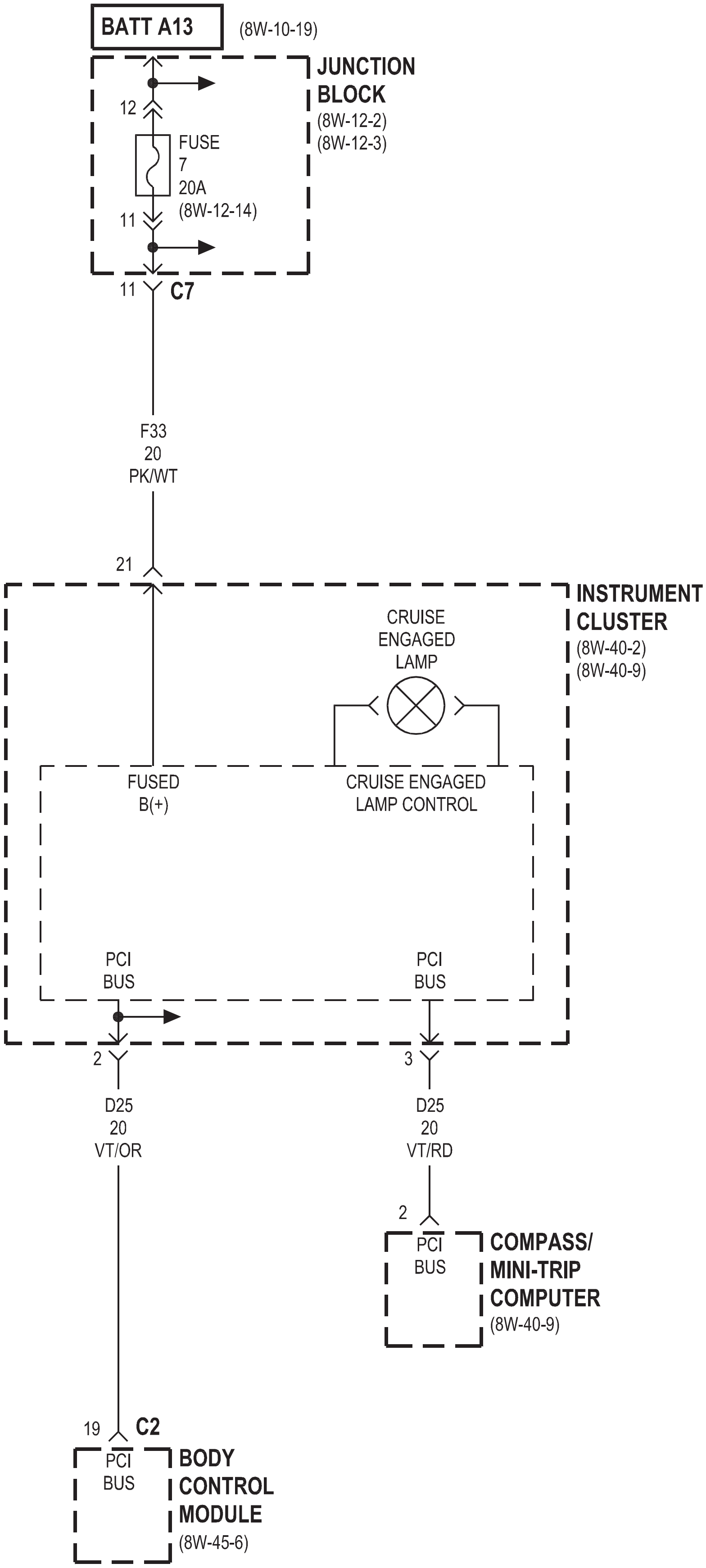

BATT A24
(8W-10-12)
POWER DISTRIBUTION CENTER
(8W-10-2)
6
TRANSMISSION CONTROL RELAY
(8W-31-2)
5
T16
16
RD
S100
(8W-10-12)
T16
16
RD
5
C104
T16
16
RD
4
TRANSMISSION SOLENOID/ PRESSURE SWITCH ASSEMBLY
LOW/ REVERSE SOLENOID
2-4 SOLENOID
UNDERDRIVE SOLENOID
OVERDRIVE SOLENOID
7
8
5
6
T20
18
LB
T19
18
WT
T59
18
PK
T60
18
BR
6
C105
6
9
10
C104
T20
18
LB
T19
18
WT
T59
18
PK
T60
18
BR
20
19
59
60
LOW/ REVERSE SOLENOID CONTROL
2-4 SOLENOID CONTROL
UNDERDRIVE SOLENOID CONTROL
OVERDRIVE SOLENOID CONTROL
TRANSMISSION CONTROL MODULE

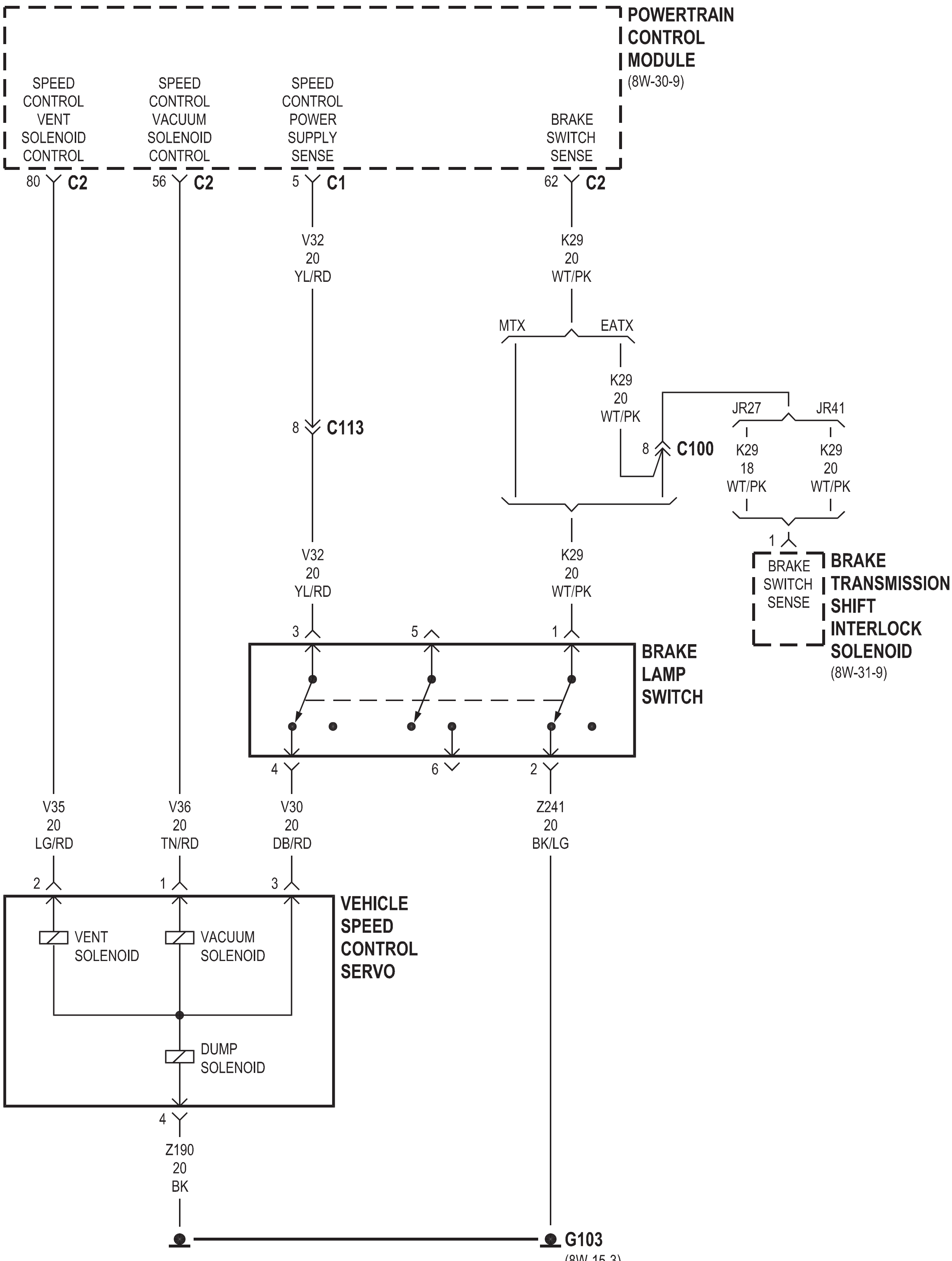


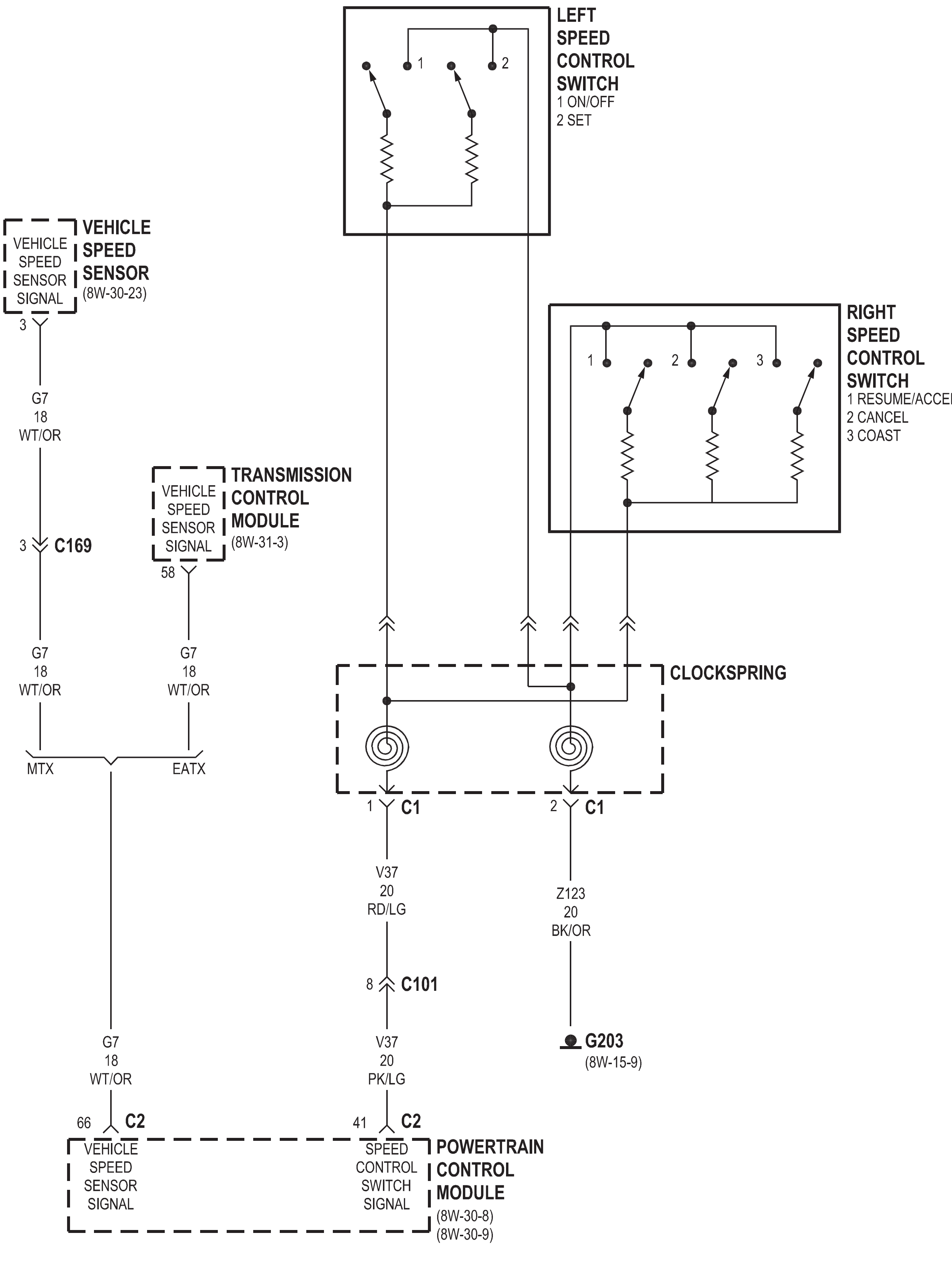
7
14
2
9
DATA LINK CONNECTOR
(8W-18-2)
D21 20 PK
D6 20 PK/LB
D25 20 VT/GY
D19 20 VT/OR
20 C2
10 C1
PCI BUS
BODY CONTROL MODULE FLASH ENABLE
BODY CONTROL MODULE
(8W-45-6)
5
3 C100
PCI BUS
3 C3
D21 20 PK
D6 20 PK/LB
D25 20 VT/YL
7
46
43
SCI TRANSMIT
SCI RECEIVE
PCI BUS
TRANSMISSION CONTROL MODULE
D21 20 PK
65 C2
SCI TRANSMIT
POWERTRAIN CONTROL MODULE
(8W-30-5)


RUN A22
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
5
FUSE 4 15A (8W-12-9)
6
9 C2
F20 18 WT/YL
5 C101
F20 20 WT/YL
11 C311
F20 20 WT
F20 20 WT
2
FUSED IGNITION SWITCH OUTPUT (RUN)
DRIVER DOOR LOCK SWITCH
(8W-61-2)
5
WINDOW DROP RELAY ASSEMBLY (JR27)
(8W-60-5)
JR27
JR41
F20 18 WT/YL
F20 20 WT/YL
6
FUSED IGNITION SWITCH OUTPUT (RUN)
POWER MIRROR SWITCH
(8W-62-2)
(8W-62-3)
F20 20 WT
2
BRAKE TRANSMISSION SHIFT INTERLOCK SOLENOID
1
JR27
JR41
K29 18 WT/PK
K29 20 WT/PK
8 C100
K29 20 WT/PK
K29 20 WT/PK
1
BRAKE SWITCH SENSE
BRAKE LAMP SWITCH
(8W-33-3)
62 C2
BRAKE SWITCH SENSE
POWERTRAIN CONTROL MODULE
(8W-30-9)

8W-33 VEHICLE SPEED CONTROL


BATT A13
(8W-10-19)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
12
FUSE
7
20A
(8W-12-14)
11
11
C7
F33
20
PK/WT
21
INSTRUMENT CLUSTER
(8W-40-2)
(8W-40-9)
CRUISE ENGAGED LAMP
FUSED B(+)
CRUISE ENGAGED LAMP CONTROL
PCI BUS
PCI BUS
2
3
D25
20
VT/OR
D25
20
VT/RD
2
PCI BUS
COMPASS/ MINI-TRIP COMPUTER
(8W-40-9)
19
C2
PCI BUS
BODY CONTROL MODULE
(8W-45-6)

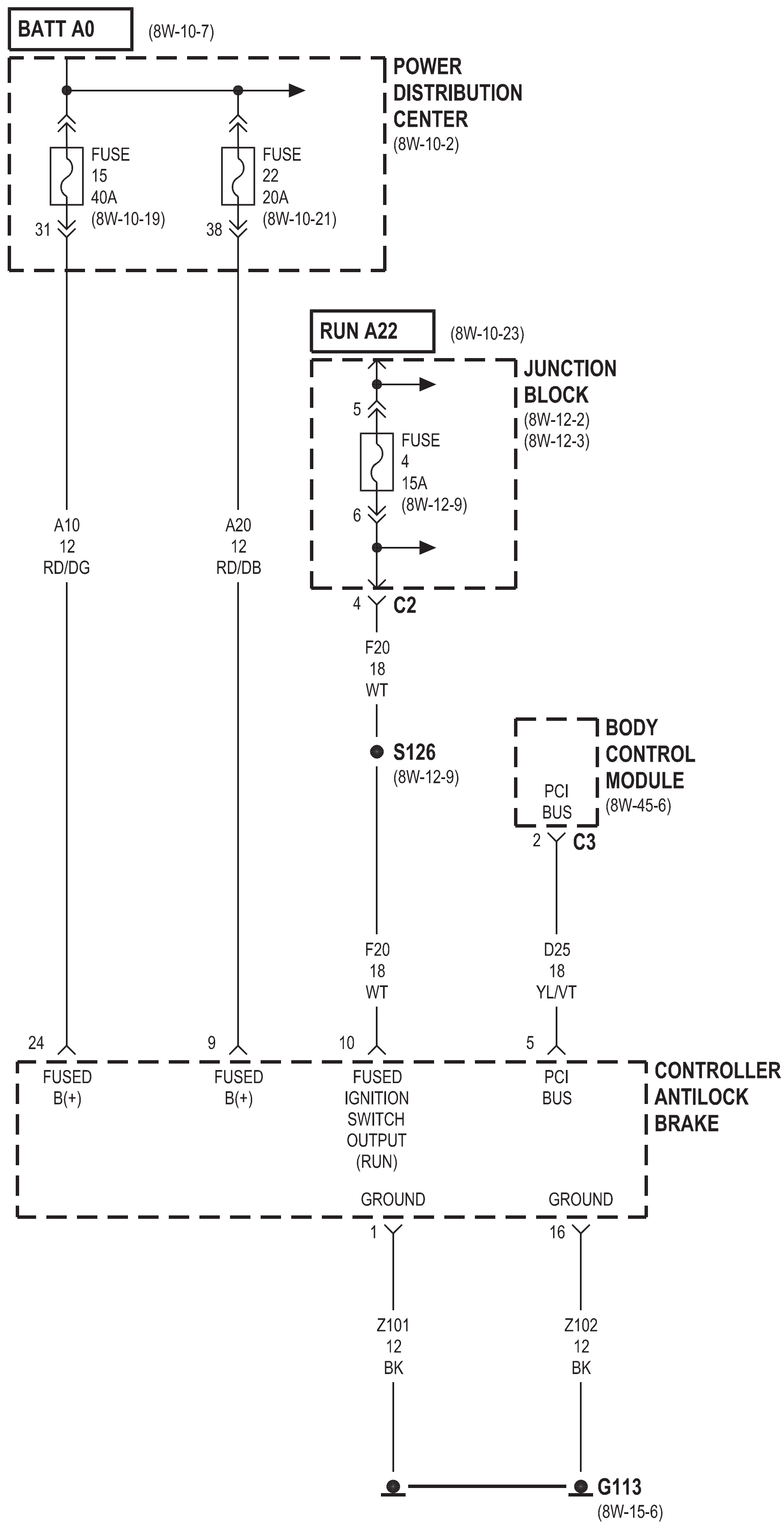

POWERTRAIN CONTROL MODULE
(8W-30-9)
SPEED CONTROL VENT SOLENOID CONTROL
SPEED CONTROL VACUUM SOLENOID CONTROL
SPEED CONTROL POWER SUPPLY SENSE
BRAKE SWITCH SENSE
80 C2
56 C2
5 C1
62 C2
V32 20 YL/RD
K29 20 WT/PK
MTX
EATX
K29 20 WT/PK
JR27
JR41
8 C113
8 C100
K29 18 WT/PK
K29 20 WT/PK
1
BRAKE SWITCH SENSE
BRAKE TRANSMISSION SHIFT INTERLOCK SOLENOID
(8W-31-9)
V32 20 YL/RD
K29 20 WT/PK
3
5
1
BRAKE LAMP SWITCH
4
6
2
V35 20 LG/RD
V36 20 TN/RD
V30 20 DB/RD
Z241 20 BK/LG
2
1
3
VENT SOLENOID
VACUUM SOLENOID
VEHICLE SPEED CONTROL SERVO
DUMP SOLENOID
4
Z190 20 BK
G103
(8W-15-3)

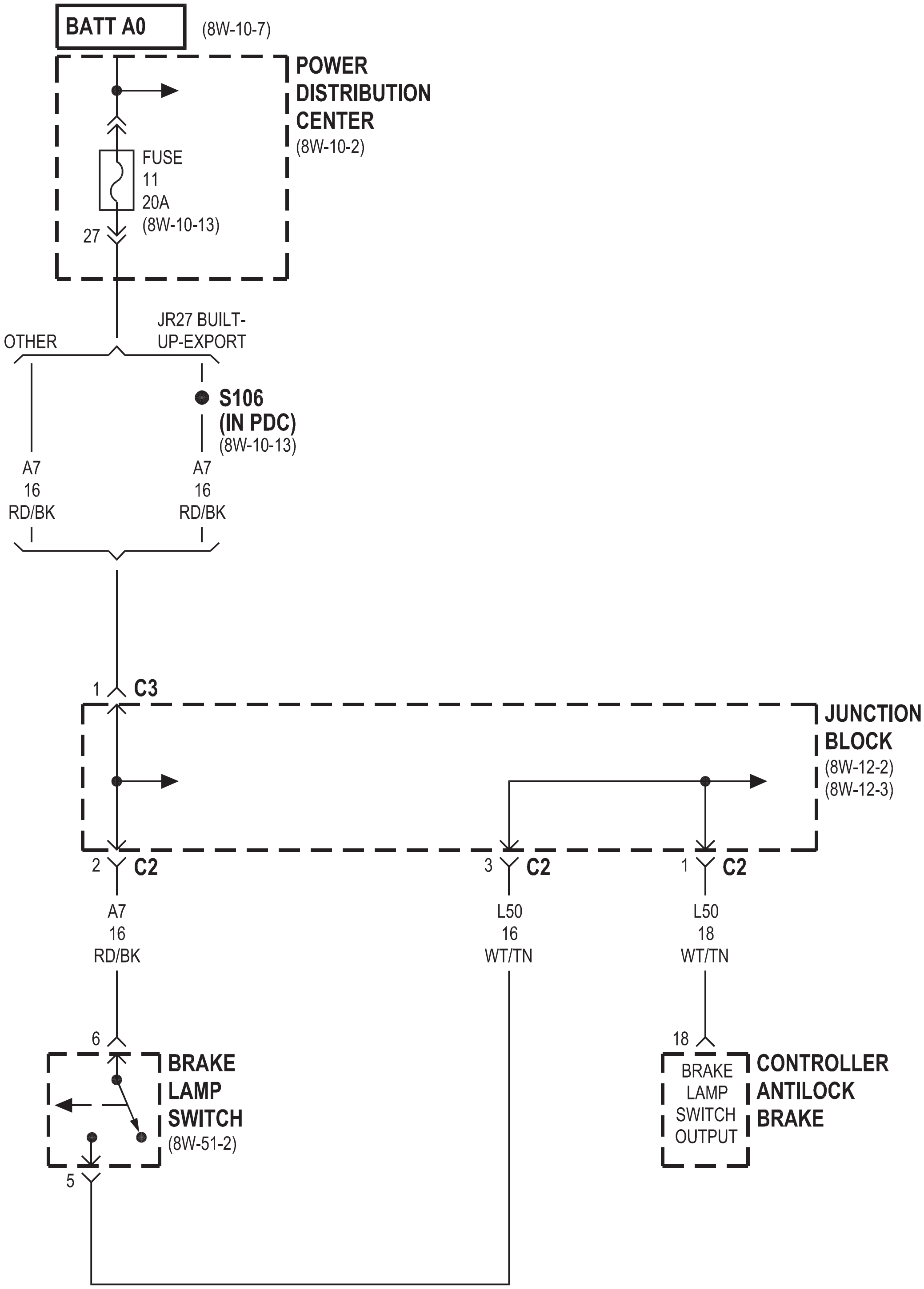

LEFT SPEED CONTROL SWITCH
1 ON/OFF
2 SET
1
2
VEHICLE SPEED SENSOR
VEHICLE SPEED SENSOR SIGNAL
(8W-30-23)
3
G7
18
WT/OR
RIGHT SPEED CONTROL SWITCH
1 RESUME/ACCEL
2 CANCEL
3 COAST
1
2
3
TRANSMISSION CONTROL MODULE
VEHICLE SPEED SENSOR SIGNAL
(8W-31-3)
58
3
C169
G7
18
WT/OR
G7
18
WT/OR
CLOCKSPRING
MTX
EATX
1
C1
2
C1
V37
20
RD/LG
Z123
20
BK/OR
8
C101
G7
18
WT/OR
V37
20
PK/LG
G203
(8W-15-9)
66
C2
41
C2
POWERTRAIN CONTROL MODULE
VEHICLE SPEED SENSOR SIGNAL
SPEED CONTROL SWITCH SIGNAL
(8W-30-8)
(8W-30-9)

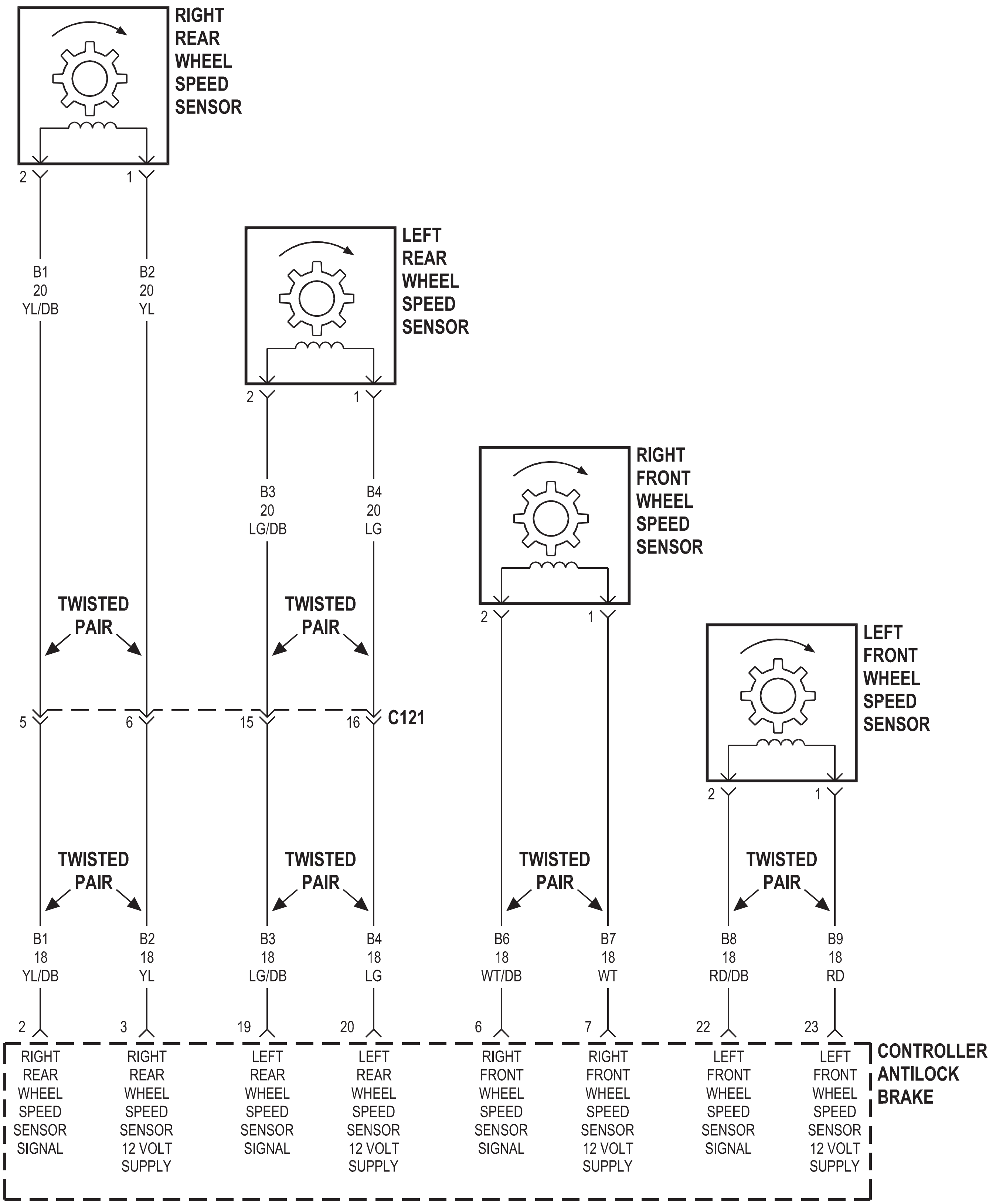
8W-35 ANTILOCK BRAKES

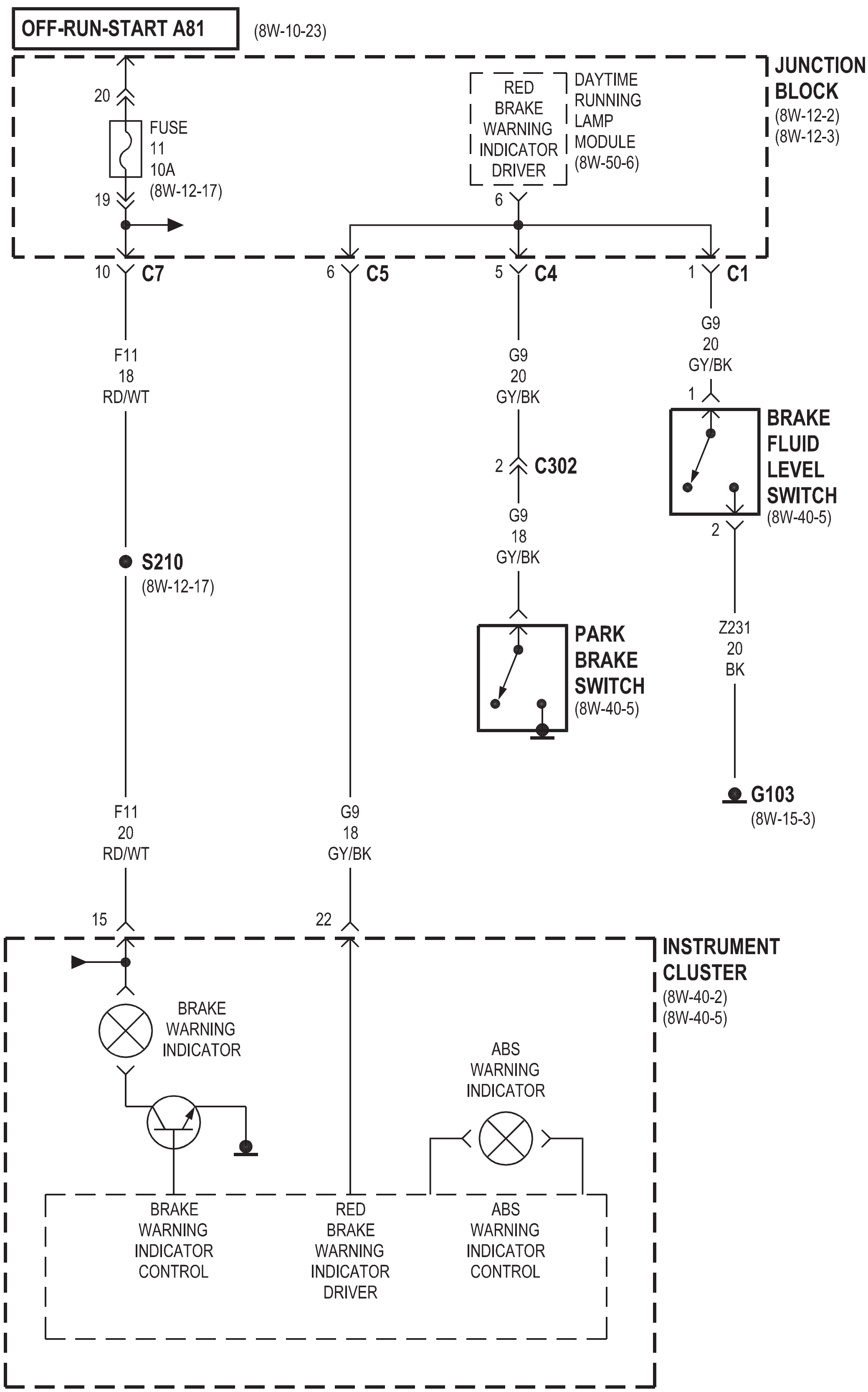
Component **Page**

Component **Page**

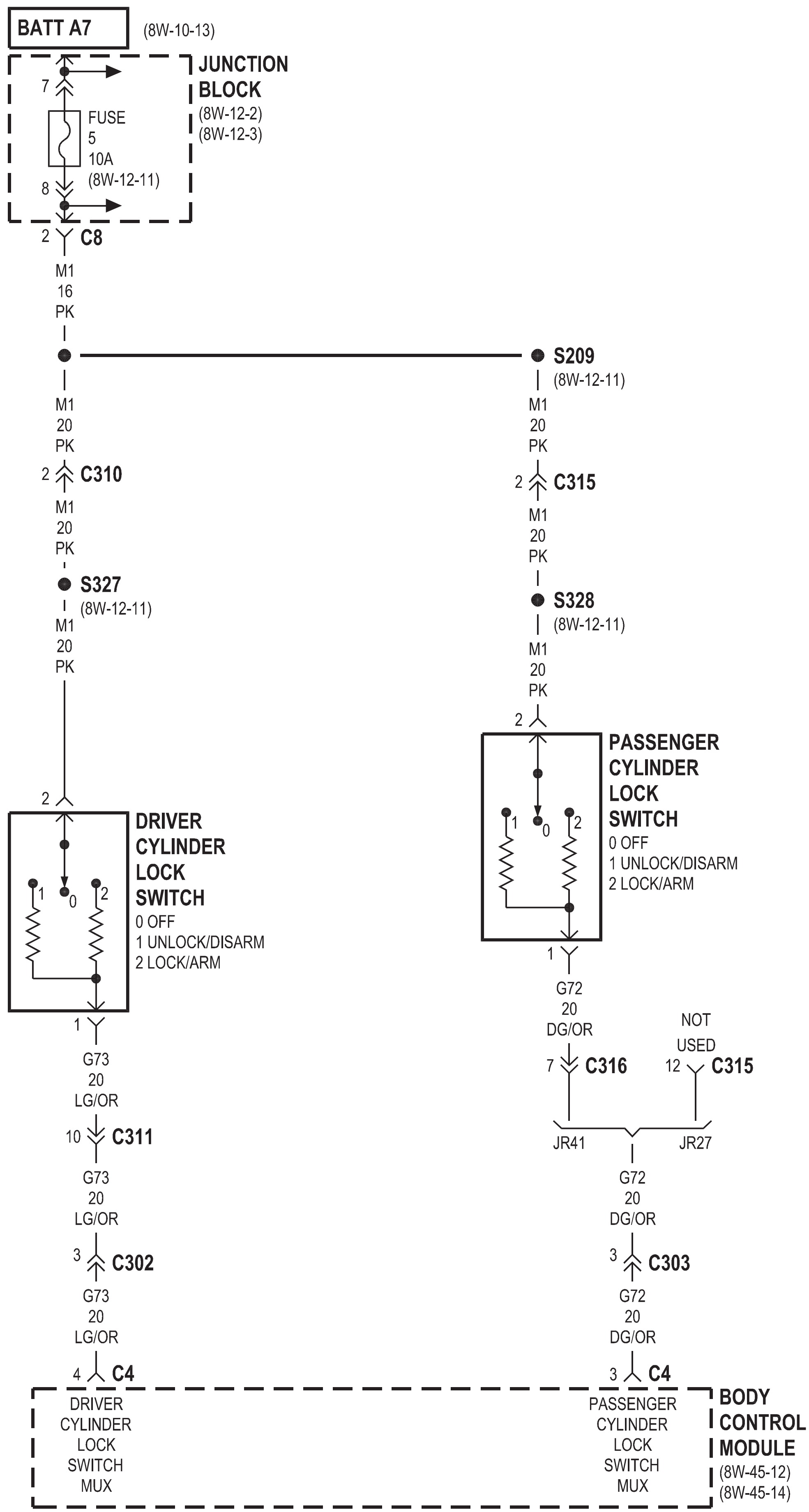

BATT A0
(8W-10-7)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FUSE
15
40A
(8W-10-19)
FUSE
22
20A
(8W-10-21)
31
38
A10
12
RD/DG
A20
12
RD/DB
RUN A22
(8W-10-23)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
5
FUSE
4
15A
(8W-12-9)
6
4
C2
F20
18
WT
S126
(8W-12-9)
BODY
CONTROL
MODULE
(8W-45-6)
PCI
BUS
2
C3
F20
18
WT
D25
18
YL/VT
24
9
10
5
FUSED
B(+)
FUSED
B(+)
FUSED
IGNITION
SWITCH
OUTPUT
(RUN)
PCI
BUS
CONTROLLER
ANTILOCK
BRAKE
GROUND
GROUND
1
16
Z101
12
BK
Z102
12
BK
G113
(8W-15-6)

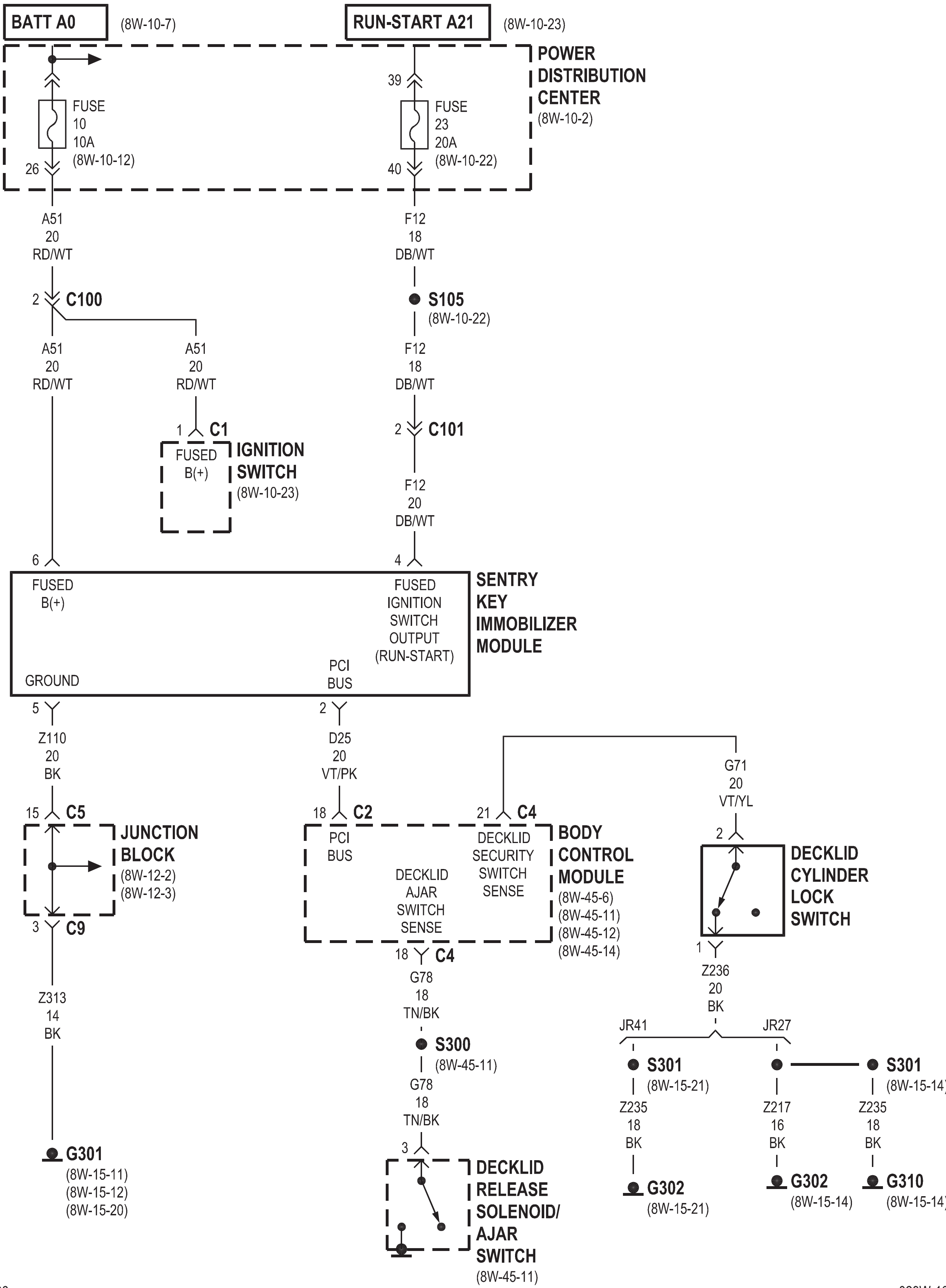

BATT A0
(8W-10-7)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FUSE
11
20A
(8W-10-13)
27
OTHER
JR27 BUILT-
UP-EXPORT
S106
(IN PDC)
(8W-10-13)
A7
16
RD/BK
A7
16
RD/BK
1
C3
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
2
C2
3
C2
1
C2
A7
16
RD/BK
L50
16
WT/TN
L50
18
WT/TN
6
BRAKE
LAMP
SWITCH
(8W-51-2)
5
18
BRAKE
LAMP
SWITCH
OUTPUT
CONTROLLER
ANTILOCK
BRAKE


RIGHT REAR WHEEL SPEED SENSOR
2
1
B1 20 YL/DB
B2 20 YL
LEFT REAR WHEEL SPEED SENSOR
2
1
B3 20 LG/DB
B4 20 LG
RIGHT FRONT WHEEL SPEED SENSOR
2
1
TWISTED PAIR
TWISTED PAIR
5
6
15
16
C121
LEFT FRONT WHEEL SPEED SENSOR
2
1
TWISTED PAIR
TWISTED PAIR
TWISTED PAIR
TWISTED PAIR
B1 18 YL/DB
B2 18 YL
B3 18 LG/DB
B4 18 LG
B6 18 WT/DB
B7 18 WT
B8 18 RD/DB
B9 18 RD
2
3
19
20
6
7
22
23
RIGHT REAR WHEEL SPEED SENSOR SIGNAL
RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
LEFT REAR WHEEL SPEED SENSOR SIGNAL
LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
LEFT FRONT WHEEL SPEED SENSOR SIGNAL
LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
CONTROLLER ANTILOCK BRAKE


OFF-RUN-START A81
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
20
FUSE
11
10A
(8W-12-17)
19
RED BRAKE WARNING INDICATOR DRIVER
DAYTIME RUNNING LAMP MODULE
(8W-50-6)
6
10 C7
6 C5
5 C4
1 C1
F11
18
RD/WT
G9
20
GY/BK
G9
20
GY/BK
1
BRAKE FLUID LEVEL SWITCH
(8W-40-5)
2
2 C302
G9
18
GY/BK
S210
(8W-12-17)
PARK BRAKE SWITCH
(8W-40-5)
Z231
20
BK
G103
(8W-15-3)
F11
20
RD/WT
G9
18
GY/BK
15
22
INSTRUMENT CLUSTER
(8W-40-2)
(8W-40-5)
BRAKE WARNING INDICATOR
ABS WARNING INDICATOR
BRAKE WARNING INDICATOR CONTROL
RED BRAKE WARNING INDICATOR DRIVER
ABS WARNING INDICATOR CONTROL

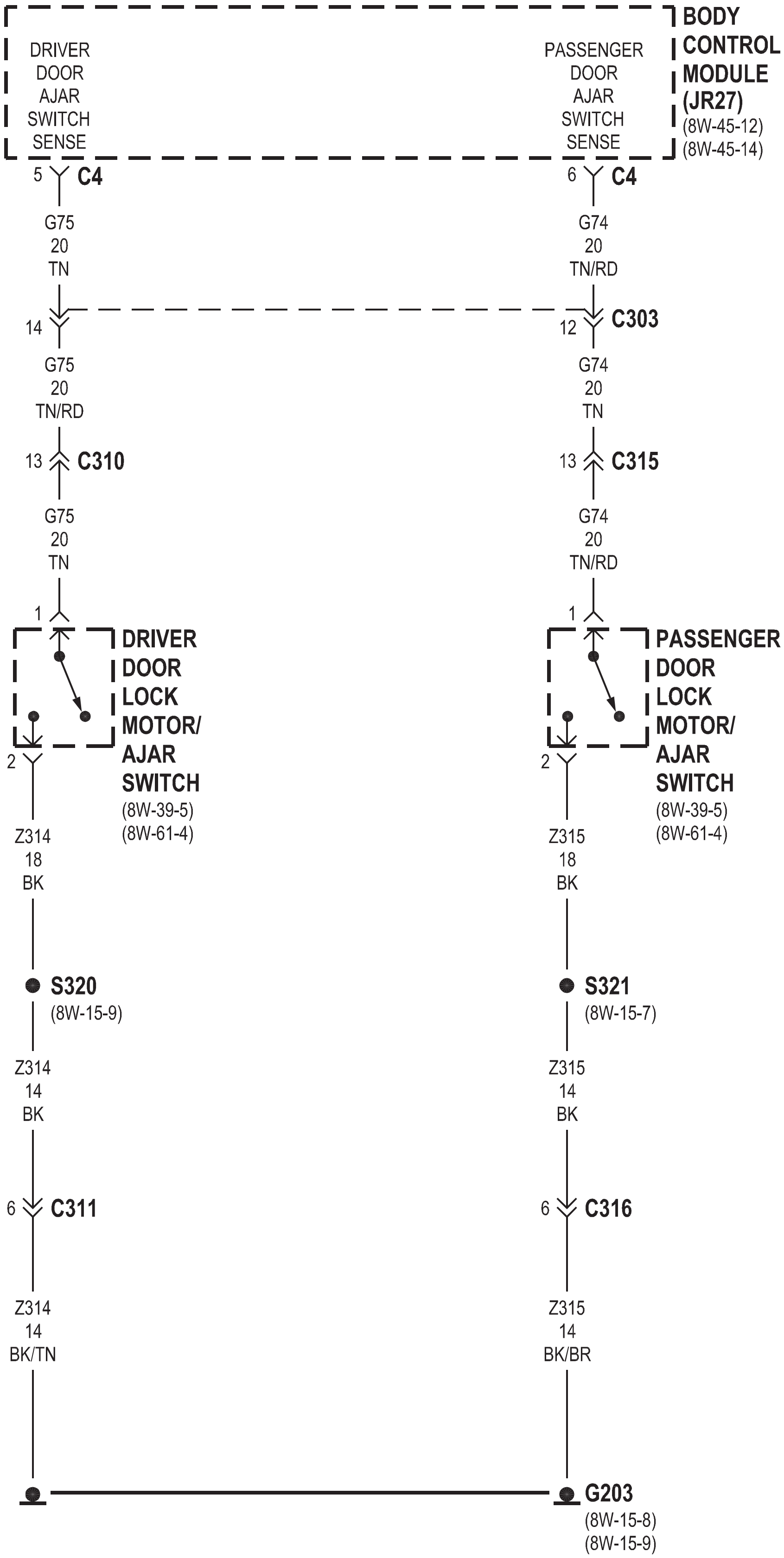
8W-39 VEHICLE THEFT SECURITY SYSTEM


BATT A7
(8W-10-13)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
7
FUSE
5
10A
(8W-12-11)
8
2 C8
M1
16
PK
S209
(8W-12-11)
M1
20
PK
2 C310
2 C315
S327
(8W-12-11)
S328
(8W-12-11)
2
PASSENGER CYLINDER LOCK SWITCH
0 OFF
1 UNLOCK/DISARM
2 LOCK/ARM
DRIVER CYLINDER LOCK SWITCH
0 OFF
1 UNLOCK/DISARM
2 LOCK/ARM
1
G72
20
DG/OR
NOT USED
7 C316
12 C315
JR41
JR27
G73
20
LG/OR
10 C311
3 C302
3 C303
4 C4
3 C4
DRIVER CYLINDER LOCK SWITCH MUX
PASSENGER CYLINDER LOCK SWITCH MUX
BODY CONTROL MODULE
(8W-45-12)
(8W-45-14)

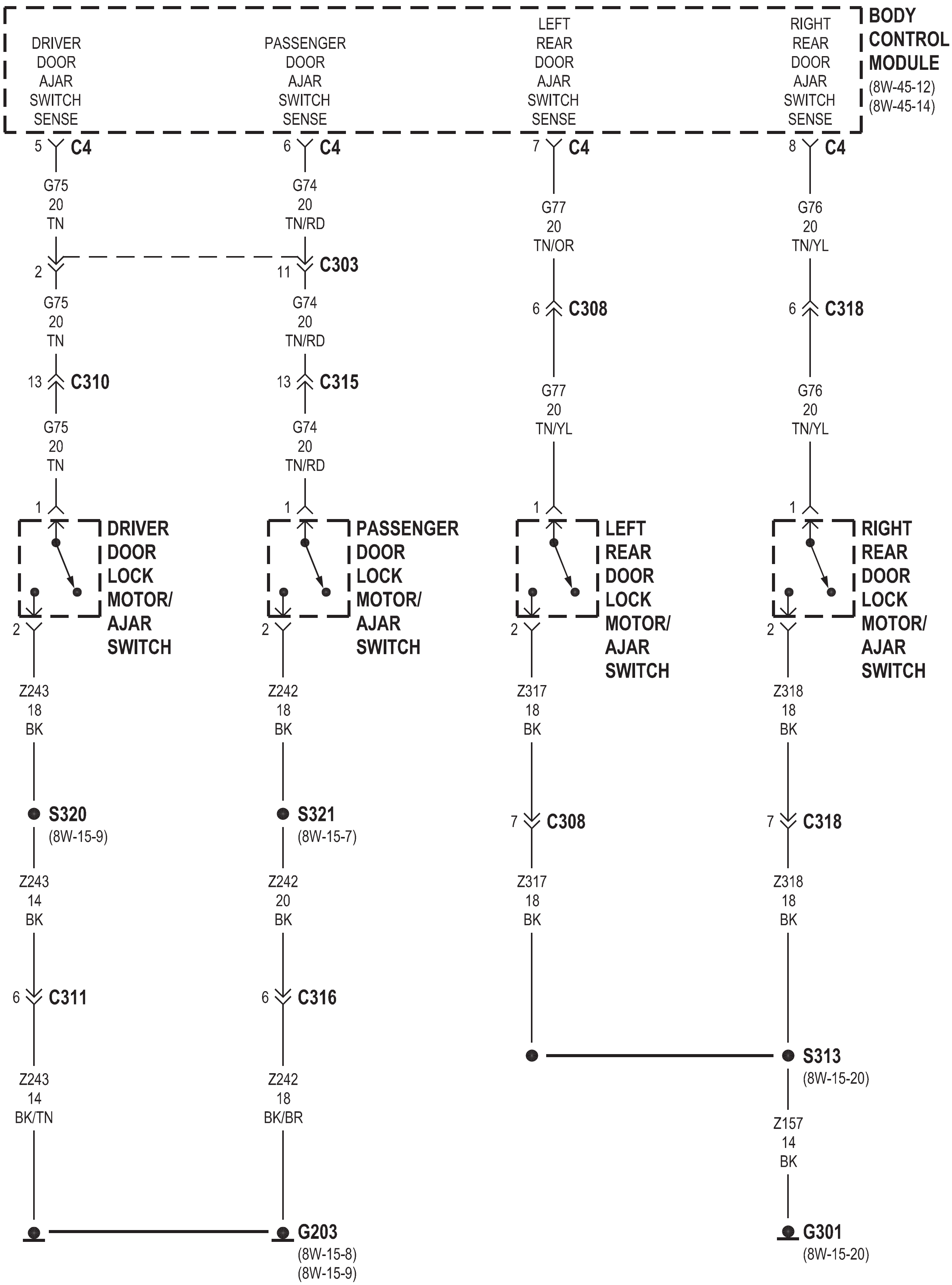

BATT A0
(8W-10-7)
RUN-START A21
(8W-10-23)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 10 10A
(8W-10-12)
FUSE 23 20A
(8W-10-22)
39
26
40
A51 20 RD/WT
F12 18 DB/WT
2 C100
S105
(8W-10-22)
A51 20 RD/WT
A51 20 RD/WT
F12 18 DB/WT
1 C1
IGNITION SWITCH
FUSED B(+)
(8W-10-23)
2 C101
F12 20 DB/WT
6
4
SENTRY KEY IMMOBILIZER MODULE
FUSED B(+)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
GROUND
PCI BUS
5
2
Z110 20 BK
D25 20 VT/PK
G71 20 VT/YL
15 C5
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
3 C9
18 C2
21 C4
BODY CONTROL MODULE
PCI BUS
DECKLID SECURITY SWITCH SENSE
DECKLID AJAR SWITCH SENSE
(8W-45-6)
(8W-45-11)
(8W-45-12)
(8W-45-14)
2
DECKLID CYLINDER LOCK SWITCH
1
18 C4
G78 18 TN/BK
Z313 14 BK
Z236 20 BK
JR41
JR27
S300
(8W-45-11)
S301
(8W-15-21)
S301
(8W-15-14)
G78 18 TN/BK
Z235 18 BK
Z217 16 BK
Z235 18 BK
3
G301
(8W-15-11)
(8W-15-12)
(8W-15-20)
DECKLID RELEASE SOLENOID/ AJAR SWITCH
(8W-45-11)
G302
(8W-15-21)
G302
(8W-15-14)
G310
(8W-15-14)

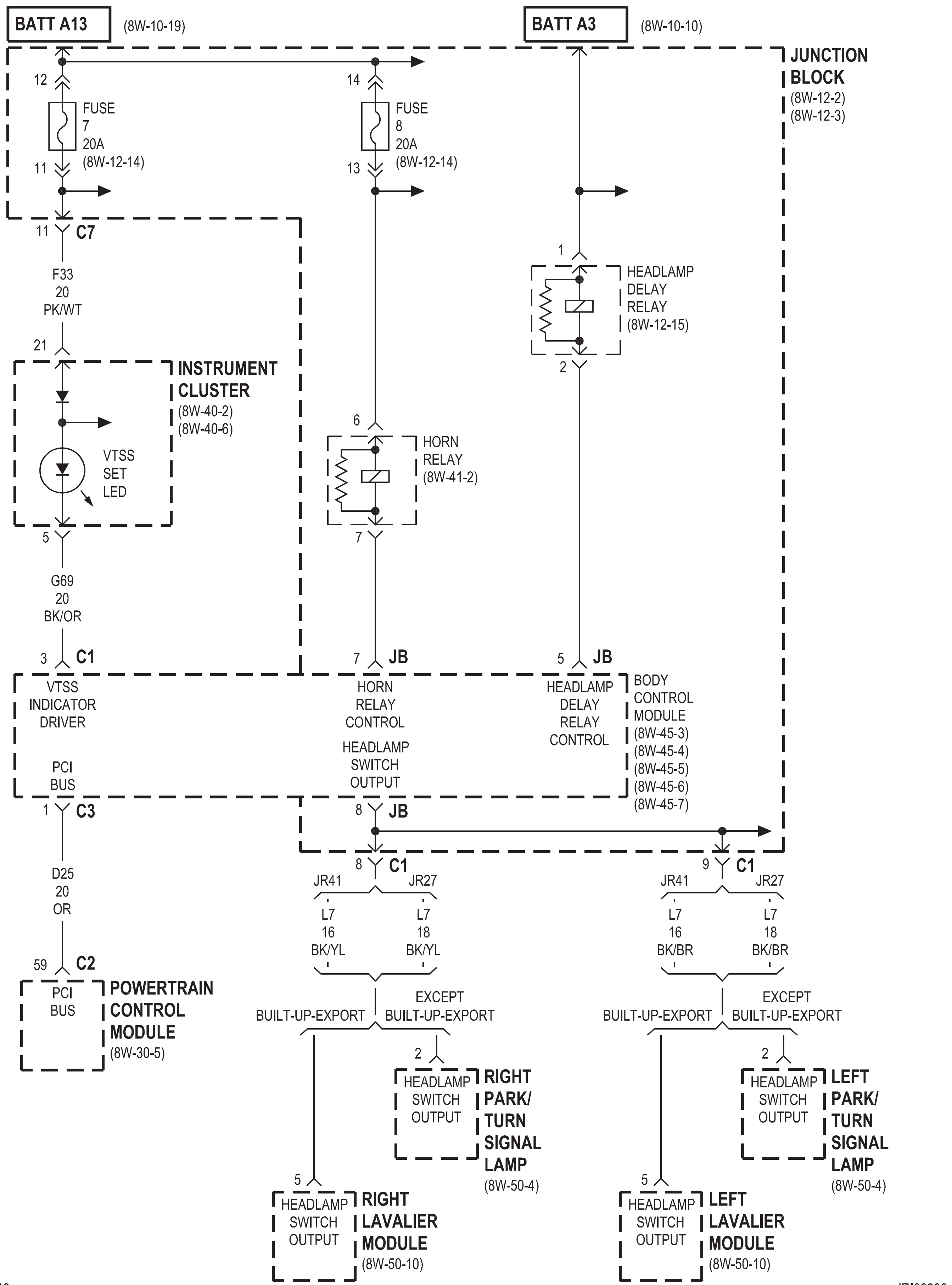
JRI03903

JR27

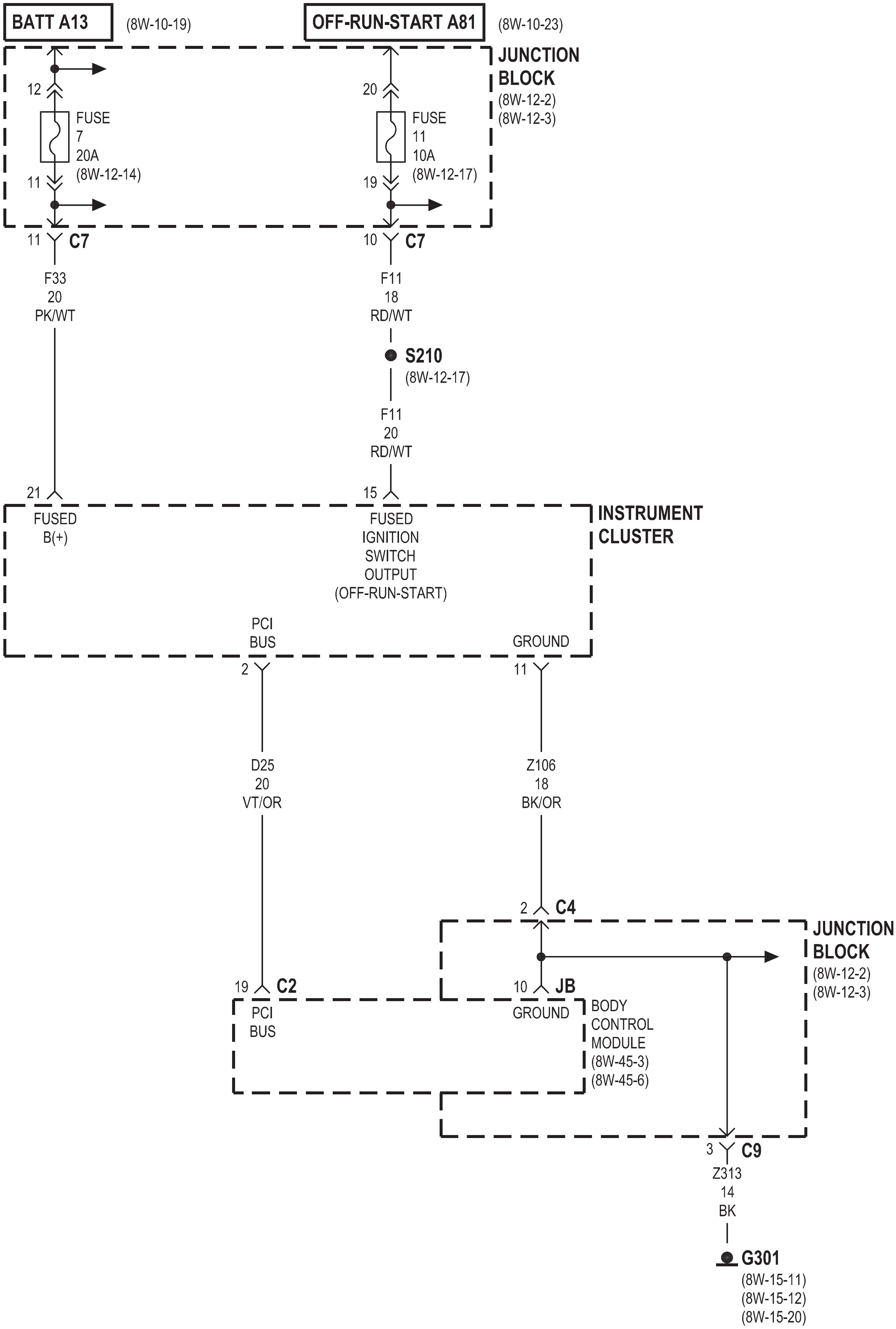


BODY CONTROL MODULE (JR27)
(8W-45-12)
(8W-45-14)
DRIVER DOOR AJAR SWITCH SENSE
PASSENGER DOOR AJAR SWITCH SENSE
5
C4
6
C4
G75
20
TN
G74
20
TN/RD
14
12
C303
G75
20
TN/RD
G74
20
TN
13
C310
13
C315
G75
20
TN
G74
20
TN/RD
1
1
2
2
DRIVER DOOR LOCK MOTOR/ AJAR SWITCH
(8W-39-5)
(8W-61-4)
PASSENGER DOOR LOCK MOTOR/ AJAR SWITCH
(8W-39-5)
(8W-61-4)
Z314
18
BK
Z315
18
BK
S320
(8W-15-9)
S321
(8W-15-7)
Z314
14
BK
Z315
14
BK
6
C311
6
C316
Z314
14
BK/TN
Z315
14
BK/BR
G203
(8W-15-8)
(8W-15-9)

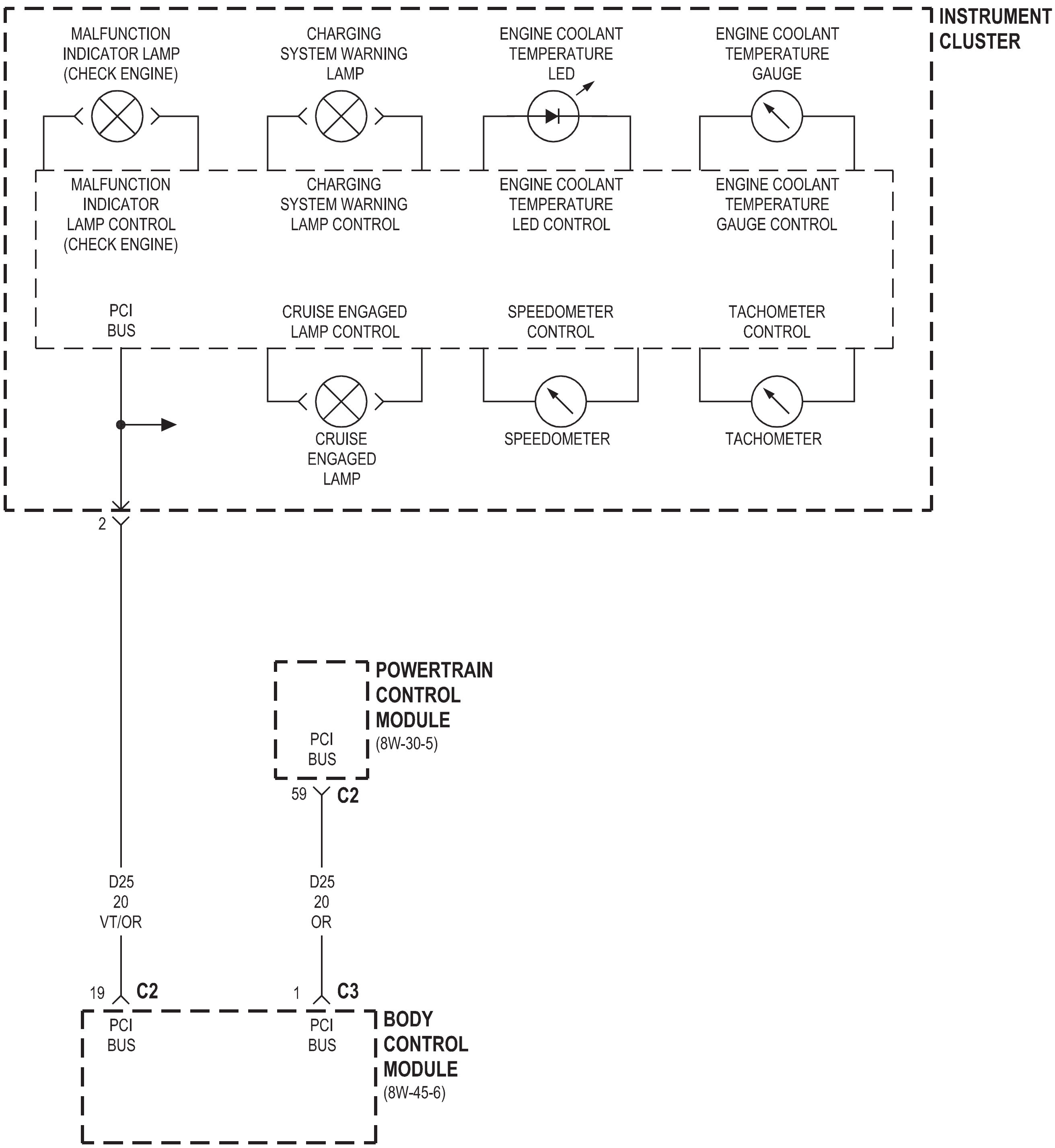

BODY CONTROL MODULE
(8W-45-12)
(8W-45-14)
DRIVER DOOR AJAR SWITCH SENSE
PASSENGER DOOR AJAR SWITCH SENSE
LEFT REAR DOOR AJAR SWITCH SENSE
RIGHT REAR DOOR AJAR SWITCH SENSE
5 C4
6 C4
7 C4
8 C4
G75 20 TN
G74 20 TN/RD
G77 20 TN/OR
G76 20 TN/YL
2 C303 11
G75 20 TN
G74 20 TN/RD
6 C308
6 C318
13 C310
13 C315
G75 20 TN
G74 20 TN/RD
G77 20 TN/YL
G76 20 TN/YL
1
DRIVER DOOR LOCK MOTOR/ AJAR SWITCH
PASSENGER DOOR LOCK MOTOR/ AJAR SWITCH
LEFT REAR DOOR LOCK MOTOR/ AJAR SWITCH
RIGHT REAR DOOR LOCK MOTOR/ AJAR SWITCH
2
Z243 18 BK
Z242 18 BK
Z317 18 BK
Z318 18 BK
S320 (8W-15-9)
S321 (8W-15-7)
7 C308
7 C318
Z243 14 BK
Z242 20 BK
Z317 18 BK
Z318 18 BK
6 C311
6 C316
S313 (8W-15-20)
Z243 14 BK/TN
Z242 18 BK/BR
Z157 14 BK
G203 (8W-15-8) (8W-15-9)
G301 (8W-15-20)

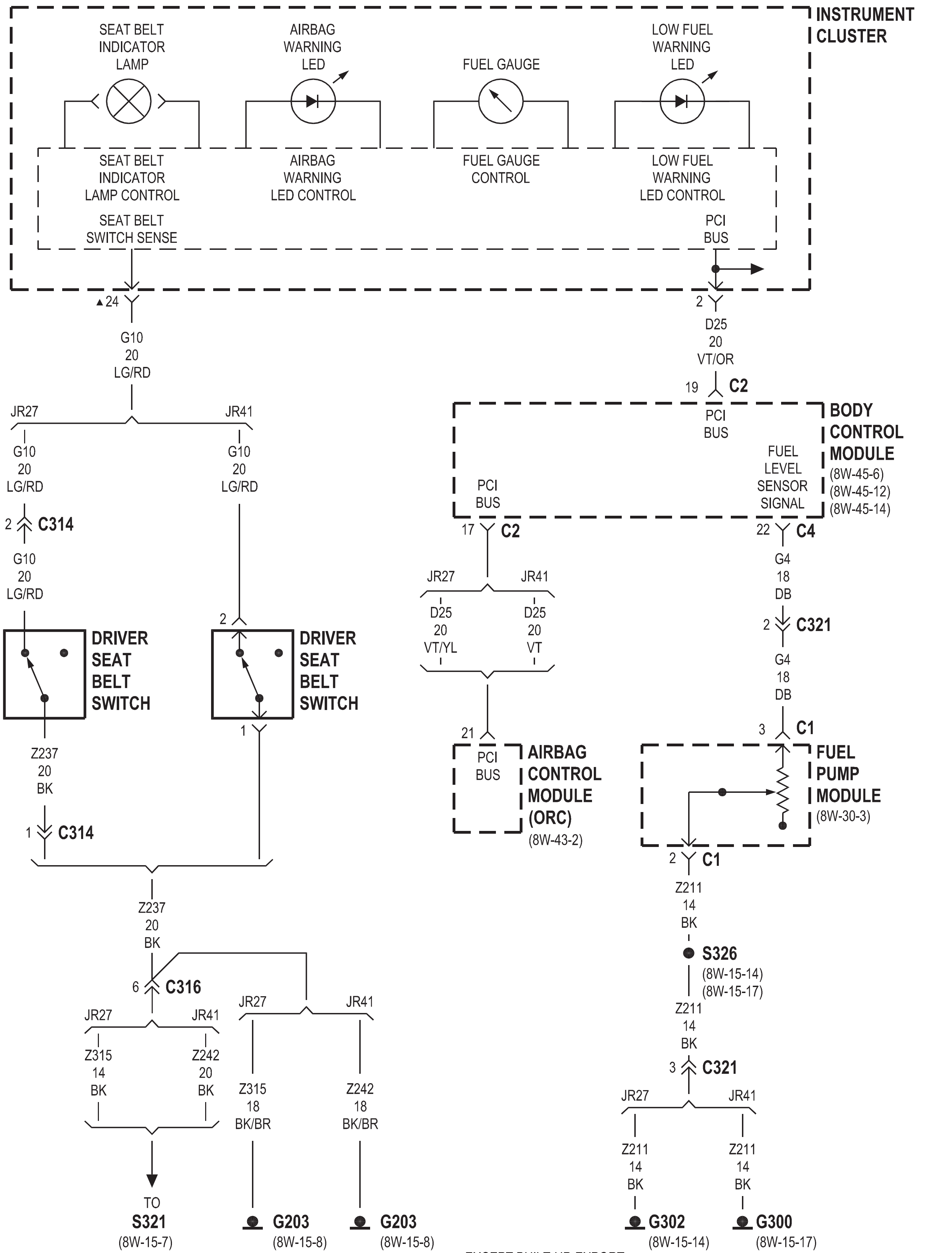

BATT A13
(8W-10-19)
BATT A3
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
12
11
FUSE 7 20A (8W-12-14)
14
13
FUSE 8 20A (8W-12-14)
11 C7
F33 20 PK/WT
21
INSTRUMENT CLUSTER
(8W-40-2)
(8W-40-6)
VTSS SET LED
5
G69 20 BK/OR
3 C1
1
HEADLAMP DELAY RELAY
(8W-12-15)
2
6
HORN RELAY
(8W-41-2)
7
7 JB
5 JB
VTSS INDICATOR DRIVER
HORN RELAY CONTROL
HEADLAMP DELAY RELAY CONTROL
BODY CONTROL MODULE
(8W-45-3)
(8W-45-4)
(8W-45-5)
(8W-45-6)
(8W-45-7)
HEADLAMP SWITCH OUTPUT
PCI BUS
1 C3
8 JB
D25 20 OR
59 C2
PCI BUS
POWERTRAIN CONTROL MODULE
(8W-30-5)
8 C1
9 C1
JR41
JR27
L7 16 BK/YL
L7 18 BK/YL
L7 16 BK/BR
L7 18 BK/BR
BUILT-UP-EXPORT
EXCEPT BUILT-UP-EXPORT
2
HEADLAMP SWITCH OUTPUT
RIGHT PARK/ TURN SIGNAL LAMP
(8W-50-4)
LEFT PARK/ TURN SIGNAL LAMP
(8W-50-4)
5
RIGHT LAVALIER MODULE
(8W-50-10)
LEFT LAVALIER MODULE
(8W-50-10)

8W-40 INSTRUMENT CLUSTER

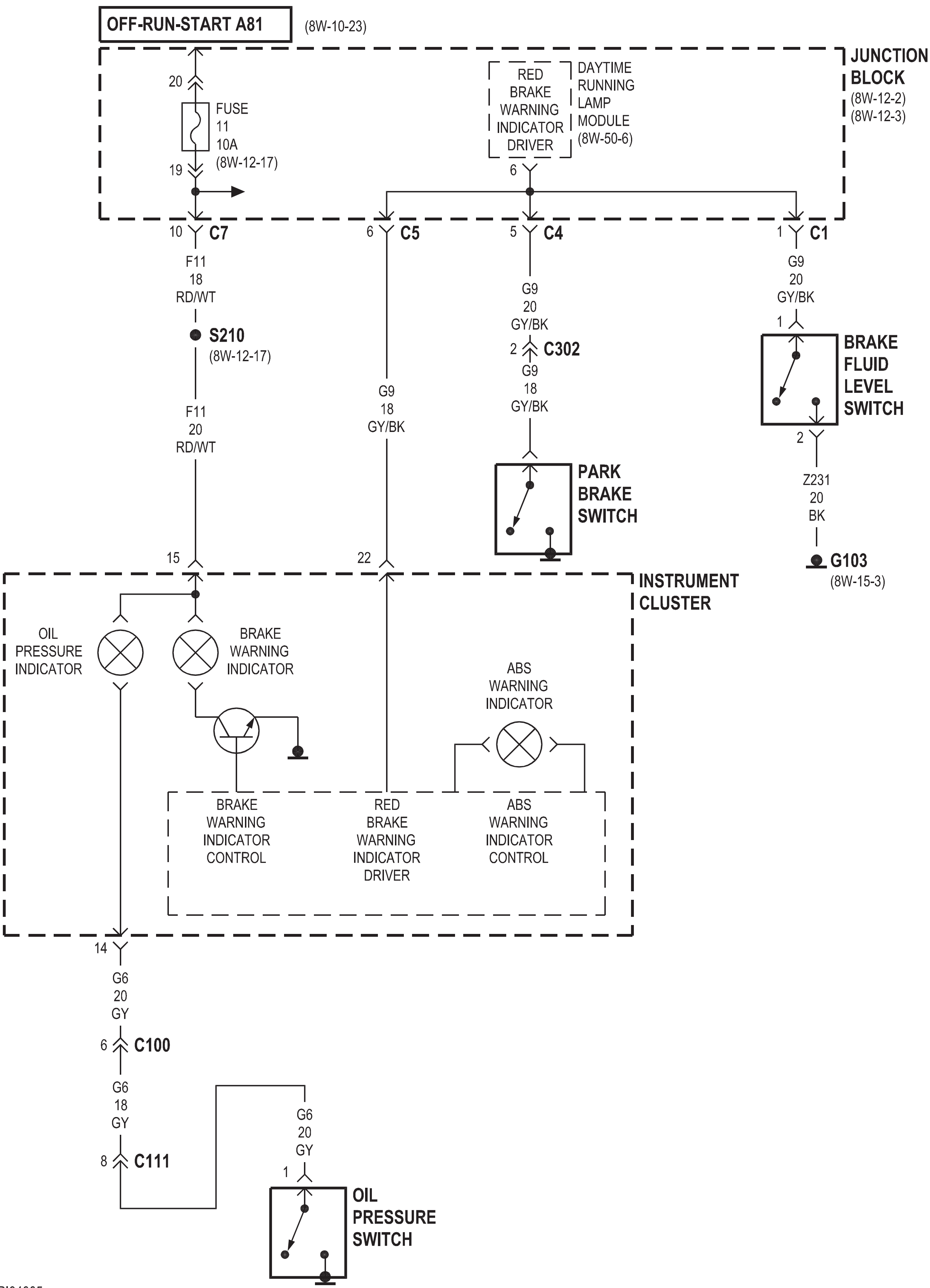


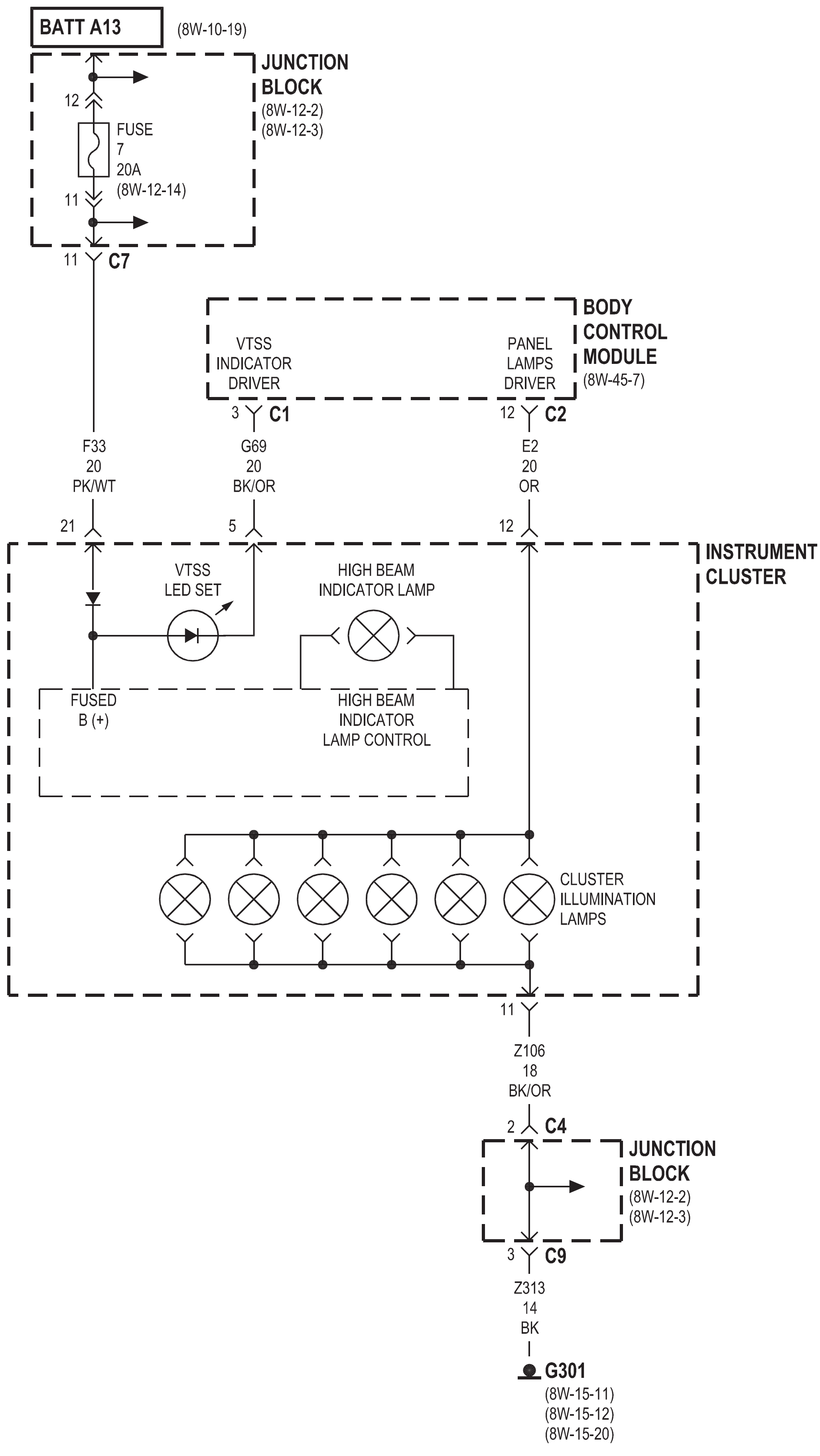
BATT A13
(8W-10-19)
OFF-RUN-START A81
(8W-10-23)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
12
FUSE
7
20A
(8W-12-14)
11
20
FUSE
11
10A
(8W-12-17)
19
11
C7
10
C7
F33
20
PK/WT
F11
18
RD/WT
S210
(8W-12-17)
F11
20
RD/WT
21
15
FUSED
B(+)
FUSED
IGNITION
SWITCH
OUTPUT
(OFF-RUN-START)
INSTRUMENT
CLUSTER
PCI
BUS
GROUND
2
11
D25
20
VT/OR
Z106
18
BK/OR
2
C4
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
19
C2
10
JB
PCI
BUS
GROUND
BODY
CONTROL
MODULE
(8W-45-3)
(8W-45-6)
3
C9
Z313
14
BK
G301
(8W-15-11)
(8W-15-12)
(8W-15-20)

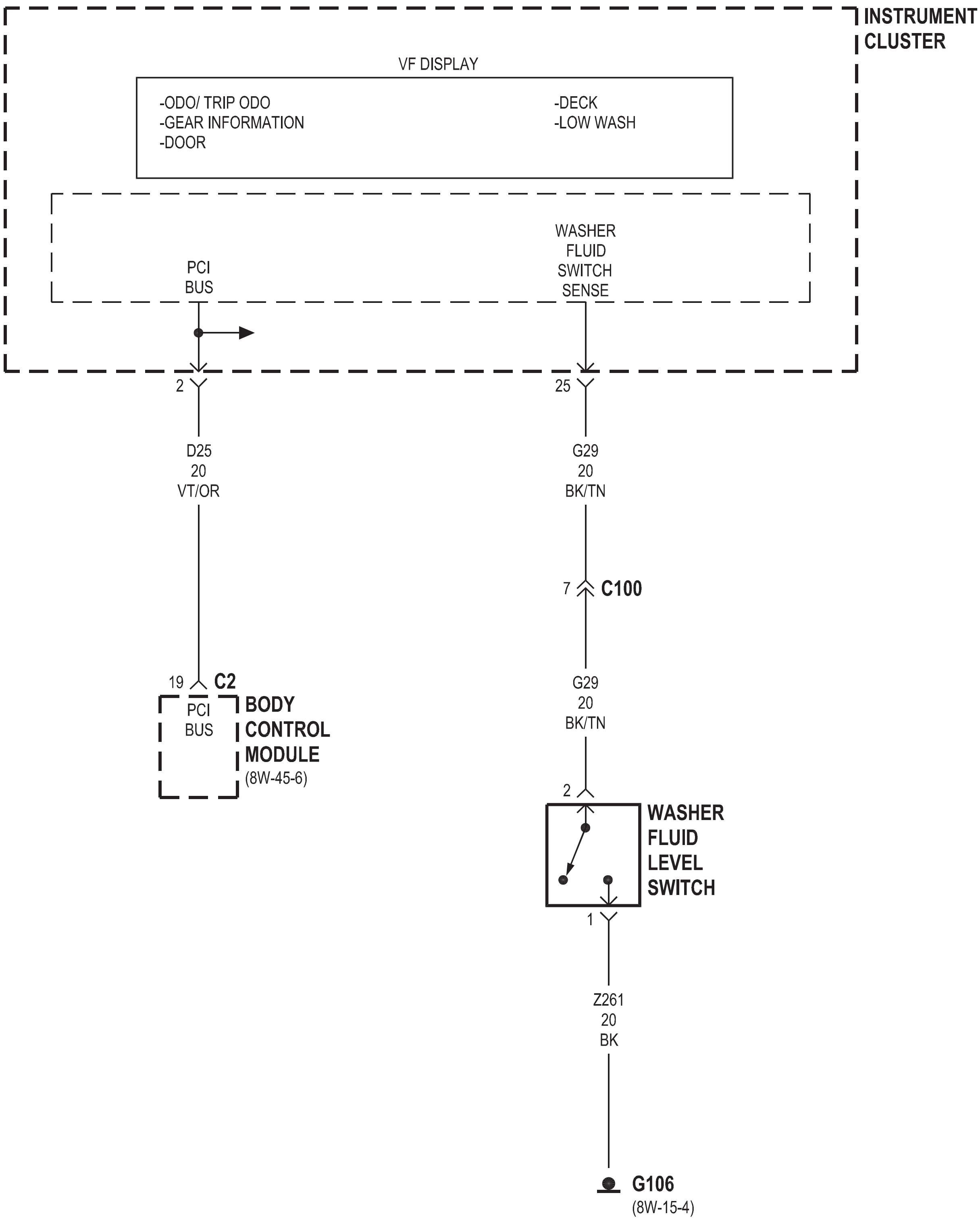

INSTRUMENT CLUSTER
MALFUNCTION INDICATOR LAMP (CHECK ENGINE)
CHARGING SYSTEM WARNING LAMP
ENGINE COOLANT TEMPERATURE LED
ENGINE COOLANT TEMPERATURE GAUGE
MALFUNCTION INDICATOR LAMP CONTROL (CHECK ENGINE)
CHARGING SYSTEM WARNING LAMP CONTROL
ENGINE COOLANT TEMPERATURE LED CONTROL
ENGINE COOLANT TEMPERATURE GAUGE CONTROL
PCI BUS
CRUISE ENGAGED LAMP CONTROL
SPEEDOMETER CONTROL
TACHOMETER CONTROL
CRUISE ENGAGED LAMP
SPEEDOMETER
TACHOMETER
2
POWERTRAIN CONTROL MODULE
(8W-30-5)
PCI BUS
59
C2
D25
20
VT/OR
D25
20
OR
19
C2
1
C3
PCI BUS
PCI BUS
BODY CONTROL MODULE
(8W-45-6)

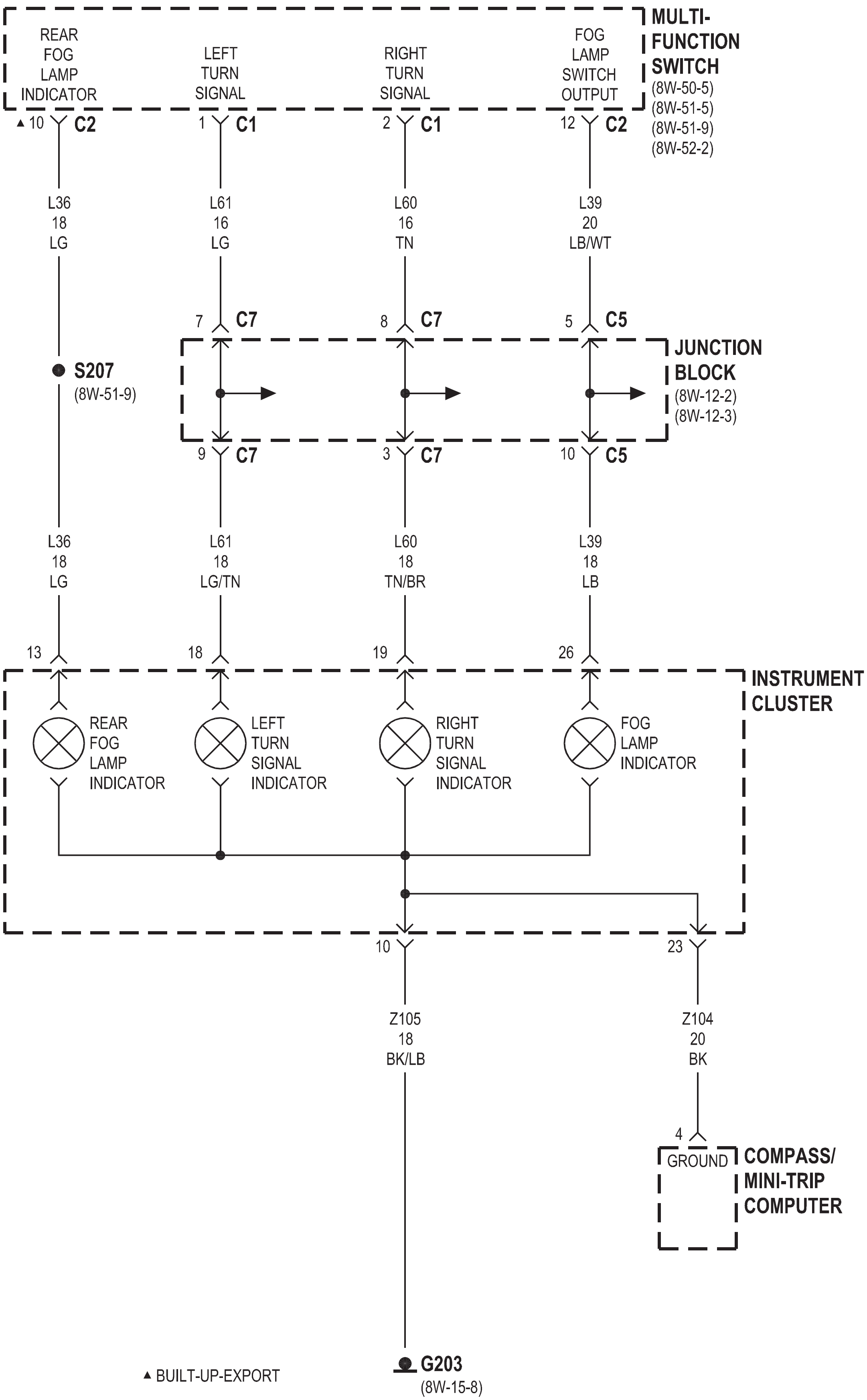


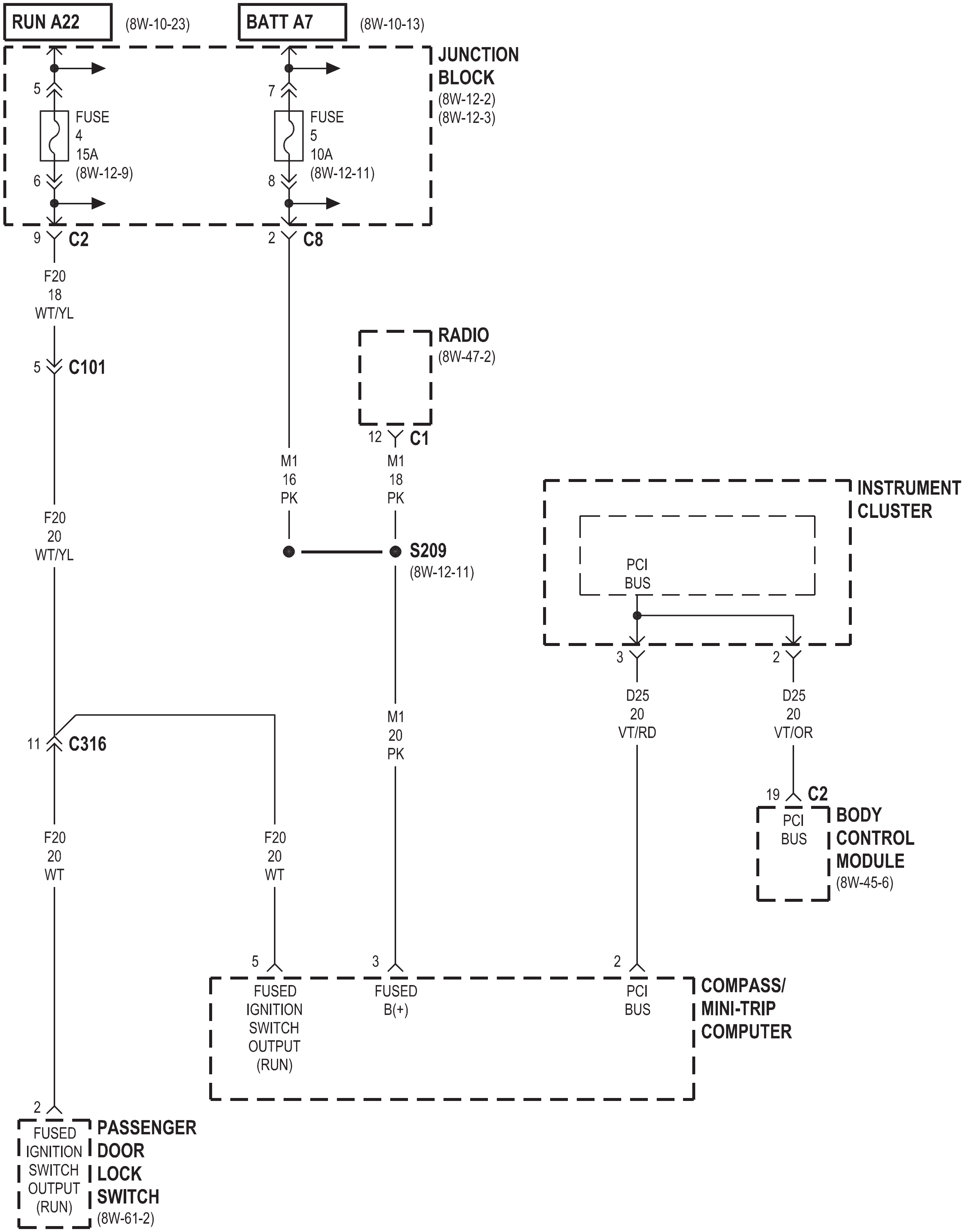
▲ EXCEPT BUILT-UP-EXPORT


OFF-RUN-START A81
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
20
FUSE
11
10A
(8W-12-17)
19
RED BRAKE WARNING INDICATOR DRIVER
DAYTIME RUNNING LAMP MODULE
(8W-50-6)
6
10 C7
6 C5
5 C4
1 C1
F11
18
RD/WT
S210
(8W-12-17)
F11
20
RD/WT
G9
18
GY/BK
G9
20
GY/BK
2 C302
G9
18
GY/BK
PARK BRAKE SWITCH
G9
20
GY/BK
1
BRAKE FLUID LEVEL SWITCH
2
Z231
20
BK
G103
(8W-15-3)
15
22
INSTRUMENT CLUSTER
OIL PRESSURE INDICATOR
BRAKE WARNING INDICATOR
ABS WARNING INDICATOR
BRAKE WARNING INDICATOR CONTROL
RED BRAKE WARNING INDICATOR DRIVER
ABS WARNING INDICATOR CONTROL
14
G6
20
GY
6 C100
G6
18
GY
8 C111
G6
20
GY
1
OIL PRESSURE SWITCH

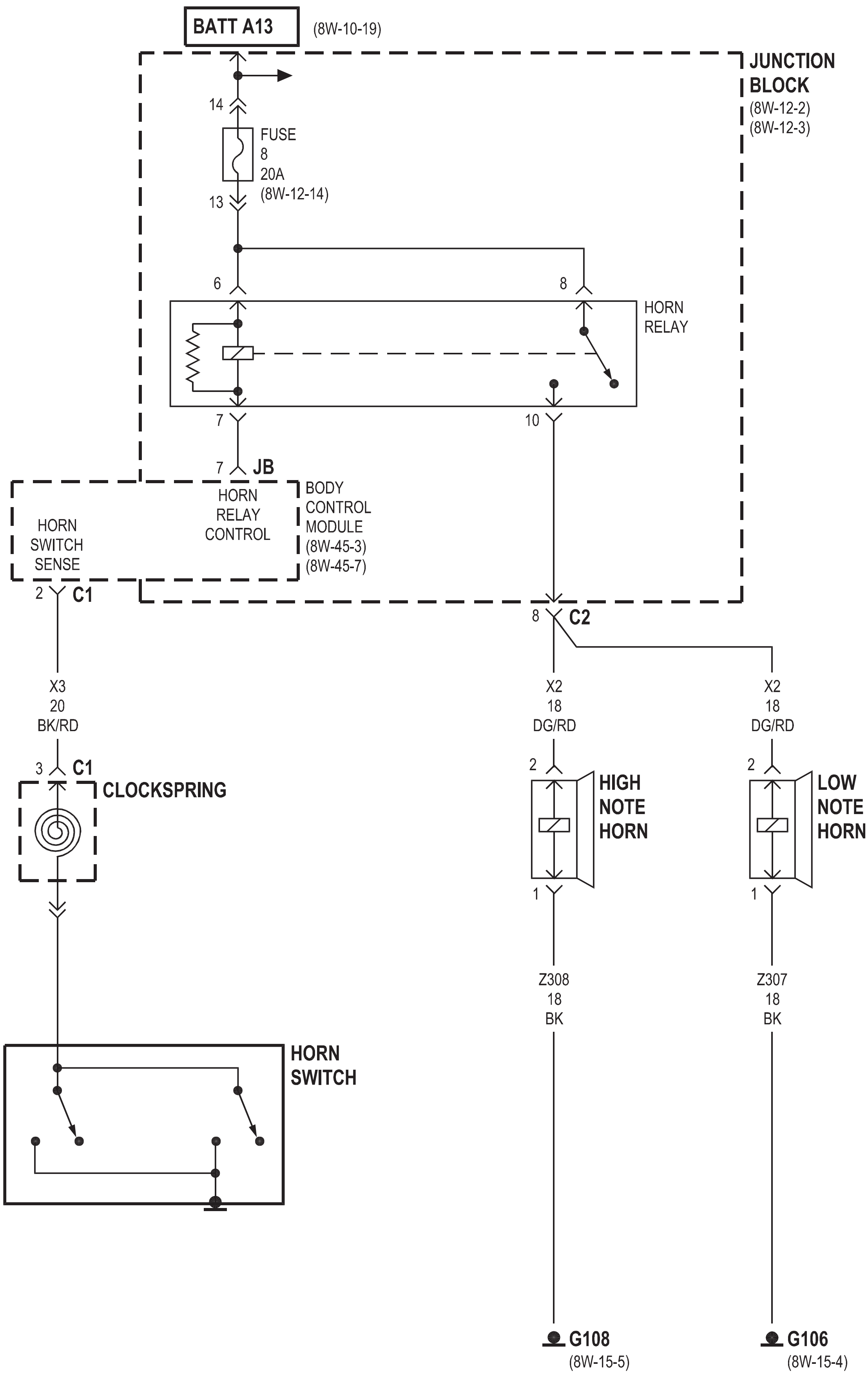

BATT A13
(8W-10-19)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
12
FUSE
7
20A
(8W-12-14)
11
11
C7
BODY CONTROL MODULE
(8W-45-7)
VTSS INDICATOR DRIVER
PANEL LAMPS DRIVER
3
C1
12
C2
F33
20
PK/WT
G69
20
BK/OR
E2
20
OR
21
5
12
INSTRUMENT CLUSTER
VTSS LED SET
HIGH BEAM INDICATOR LAMP
FUSED B (+)
HIGH BEAM INDICATOR LAMP CONTROL
CLUSTER ILLUMINATION LAMPS
11
Z106
18
BK/OR
2
C4
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
3
C9
Z313
14
BK
G301
(8W-15-11)
(8W-15-12)
(8W-15-20)

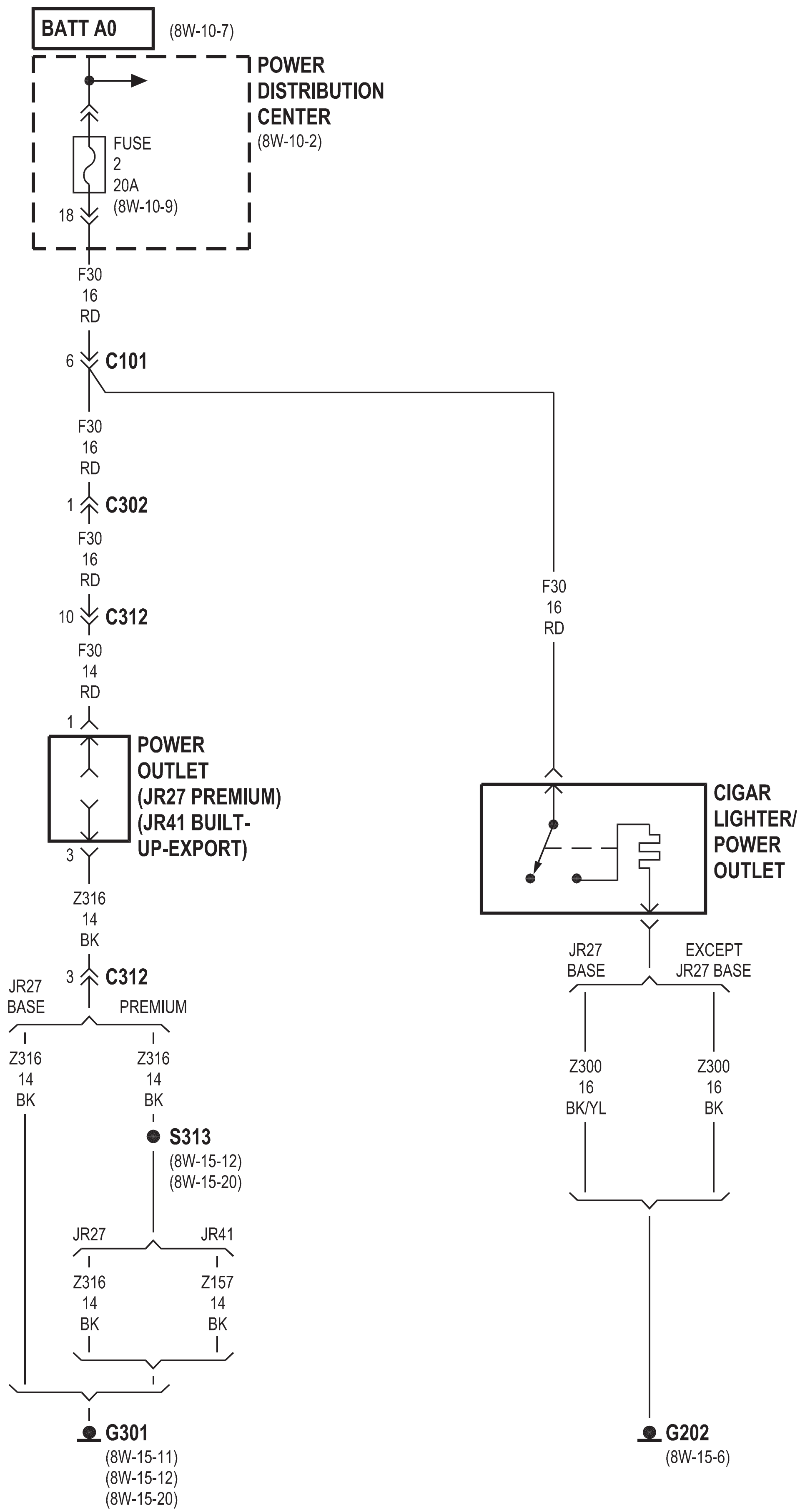

INSTRUMENT
CLUSTER
VF DISPLAY
-ODO/ TRIP ODO
-GEAR INFORMATION
-DOOR
-DECK
-LOW WASH
PCI
BUS
WASHER
FLUID
SWITCH
SENSE
2
25
D25
20
VT/OR
G29
20
BK/TN
7
C100
G29
20
BK/TN
19
C2
PCI
BUS
BODY
CONTROL
MODULE
(8W-45-6)
2
WASHER
FLUID
LEVEL
SWITCH
1
Z261
20
BK
G106
(8W-15-4)


MULTI-FUNCTION SWITCH
(8W-50-5)
(8W-51-5)
(8W-51-9)
(8W-52-2)
REAR FOG LAMP INDICATOR
LEFT TURN SIGNAL
RIGHT TURN SIGNAL
FOG LAMP SWITCH OUTPUT
▲ 10 C2
1 C1
2 C1
12 C2
L36 18 LG
L61 16 LG
L60 16 TN
L39 20 LB/WT
7 C7
8 C7
5 C5
S207
(8W-51-9)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
9 C7
3 C7
10 C5
L36 18 LG
L61 18 LG/TN
L60 18 TN/BR
L39 18 LB
13
18
19
26
INSTRUMENT CLUSTER
REAR FOG LAMP INDICATOR
LEFT TURN SIGNAL INDICATOR
RIGHT TURN SIGNAL INDICATOR
FOG LAMP INDICATOR
10
23
Z105 18 BK/LB
Z104 20 BK
4
GROUND
COMPASS/ MINI-TRIP COMPUTER
G203
(8W-15-8)
▲ BUILT-UP-EXPORT

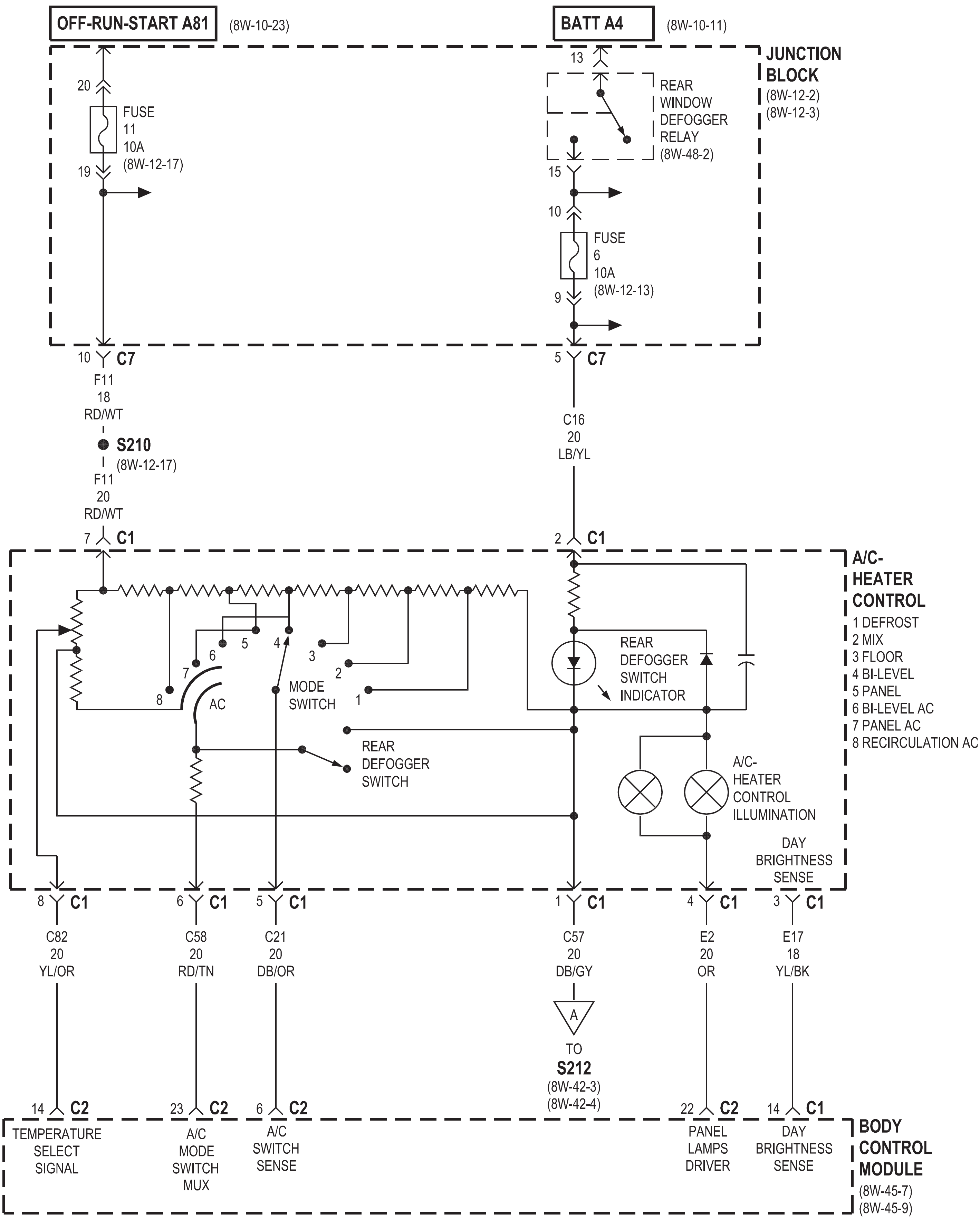

RUN A22
(8W-10-23)
BATT A7
(8W-10-13)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
5
FUSE 4 15A (8W-12-9)
6
7
FUSE 5 10A (8W-12-11)
8
9 C2
2 C8
F20 18 WT/YL
5 C101
F20 20 WT/YL
RADIO
(8W-47-2)
12 C1
M1 16 PK
M1 18 PK
S209
(8W-12-11)
INSTRUMENT CLUSTER
PCI BUS
3
2
D25 20 VT/RD
D25 20 VT/OR
11 C316
M1 20 PK
19 C2
PCI BUS
BODY CONTROL MODULE
(8W-45-6)
F20 20 WT
F20 20 WT
5
3
2
FUSED IGNITION SWITCH OUTPUT (RUN)
FUSED B(+)
PCI BUS
COMPASS/ MINI-TRIP COMPUTER
2
FUSED IGNITION SWITCH OUTPUT (RUN)
PASSENGER DOOR LOCK SWITCH
(8W-61-2)

8W-41 HORN/CIGAR LIGHTER/POWER OUTLET

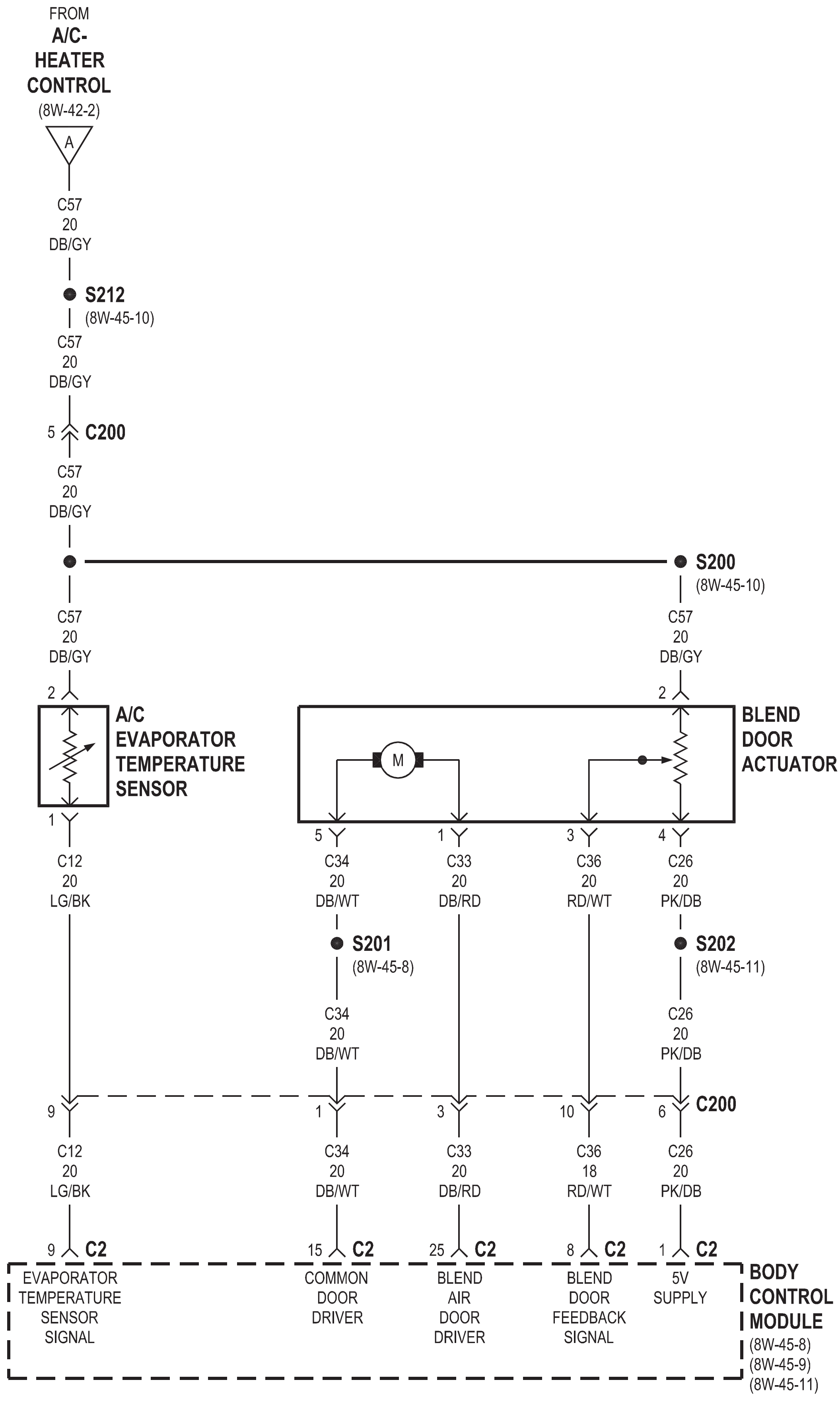

BATT A13
(8W-10-19)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
14
FUSE
8
20A
(8W-12-14)
13
6
8
HORN
RELAY
7
10
7
JB
HORN
RELAY
CONTROL
BODY
CONTROL
MODULE
(8W-45-3)
(8W-45-7)
HORN
SWITCH
SENSE
2
C1
8
C2
X3
20
BK/RD
X2
18
DG/RD
X2
18
DG/RD
3
C1
CLOCKSPRING
2
HIGH
NOTE
HORN
2
LOW
NOTE
HORN
1
1
Z308
18
BK
Z307
18
BK
HORN
SWITCH
G108
(8W-15-5)
G106
(8W-15-4)

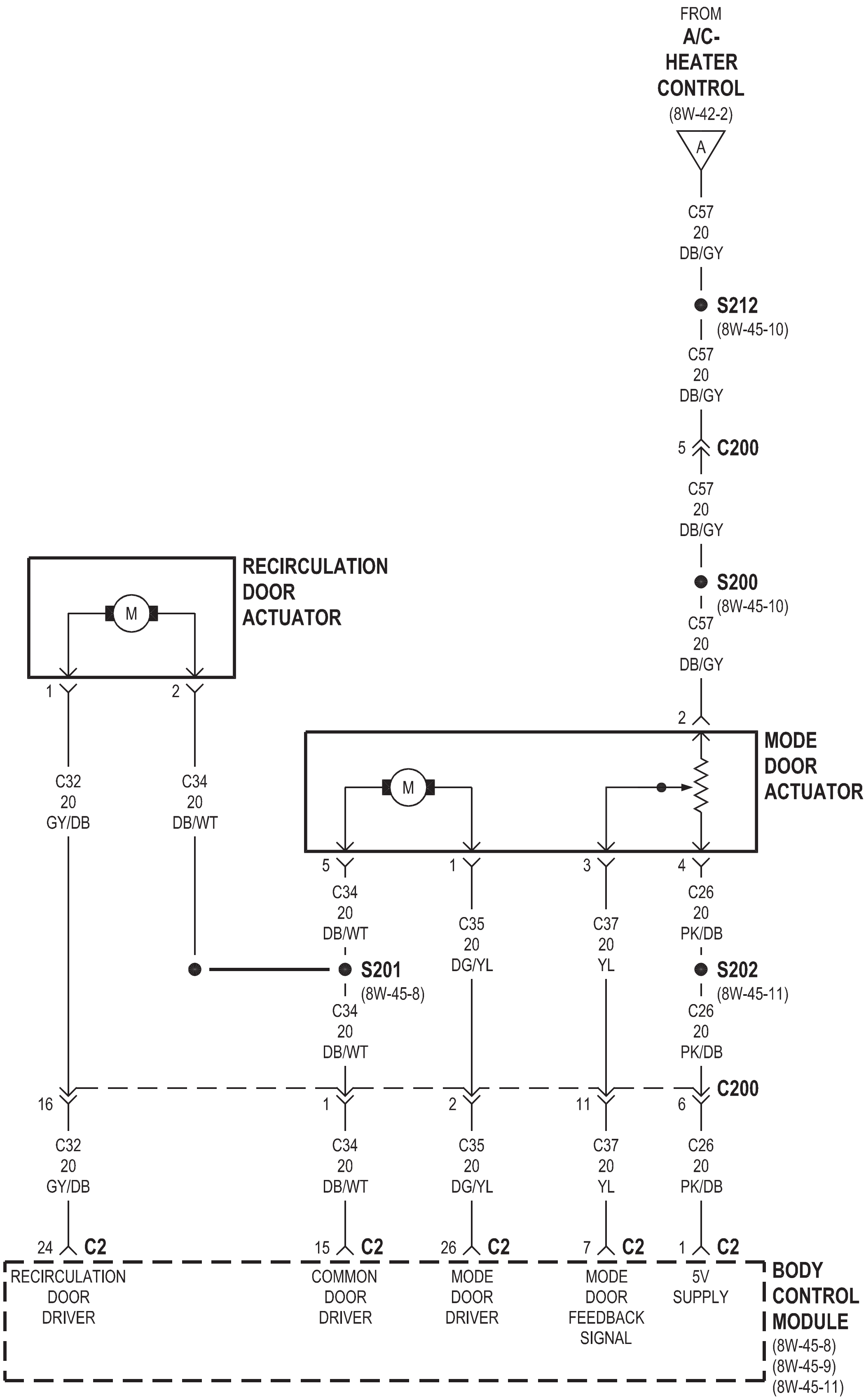

BATT A0
(8W-10-7)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
2
20A
(8W-10-9)
18
F30
16
RD
6
C101
F30
16
RD
1
C302
F30
16
RD
10
C312
F30
14
RD
1
POWER OUTLET (JR27 PREMIUM) (JR41 BUILT-UP-EXPORT)
3
Z316
14
BK
3
C312
JR27 BASE
PREMIUM
Z316
14
BK
Z316
14
BK
S313
(8W-15-12)
(8W-15-20)
JR27
JR41
Z316
14
BK
Z157
14
BK
G301
(8W-15-11)
(8W-15-12)
(8W-15-20)
F30
16
RD
CIGAR LIGHTER/ POWER OUTLET
JR27 BASE
EXCEPT JR27 BASE
Z300
16
BK/YL
Z300
16
BK
G202
(8W-15-6)

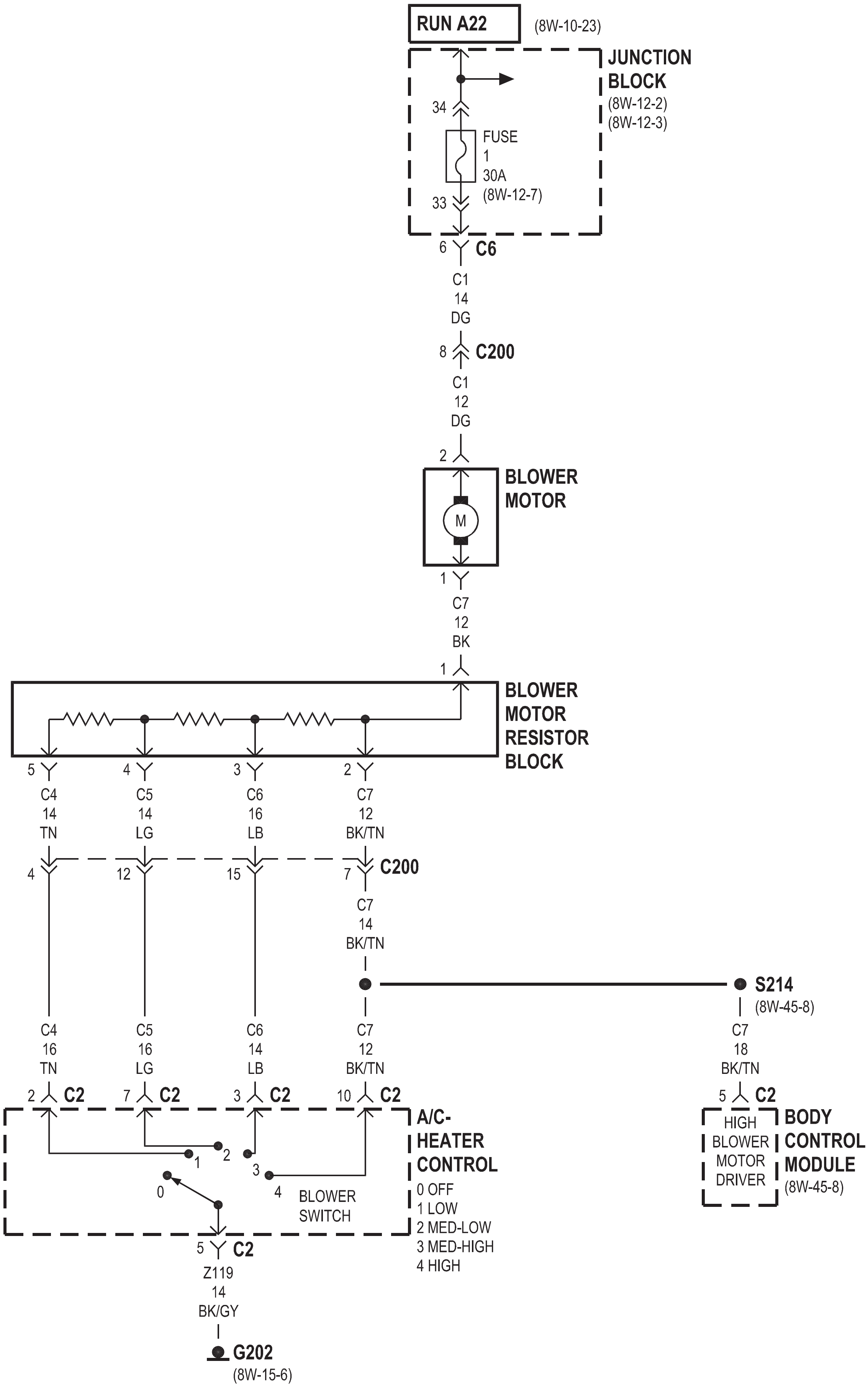
8W-42 AIR CONDITIONING-HEATER

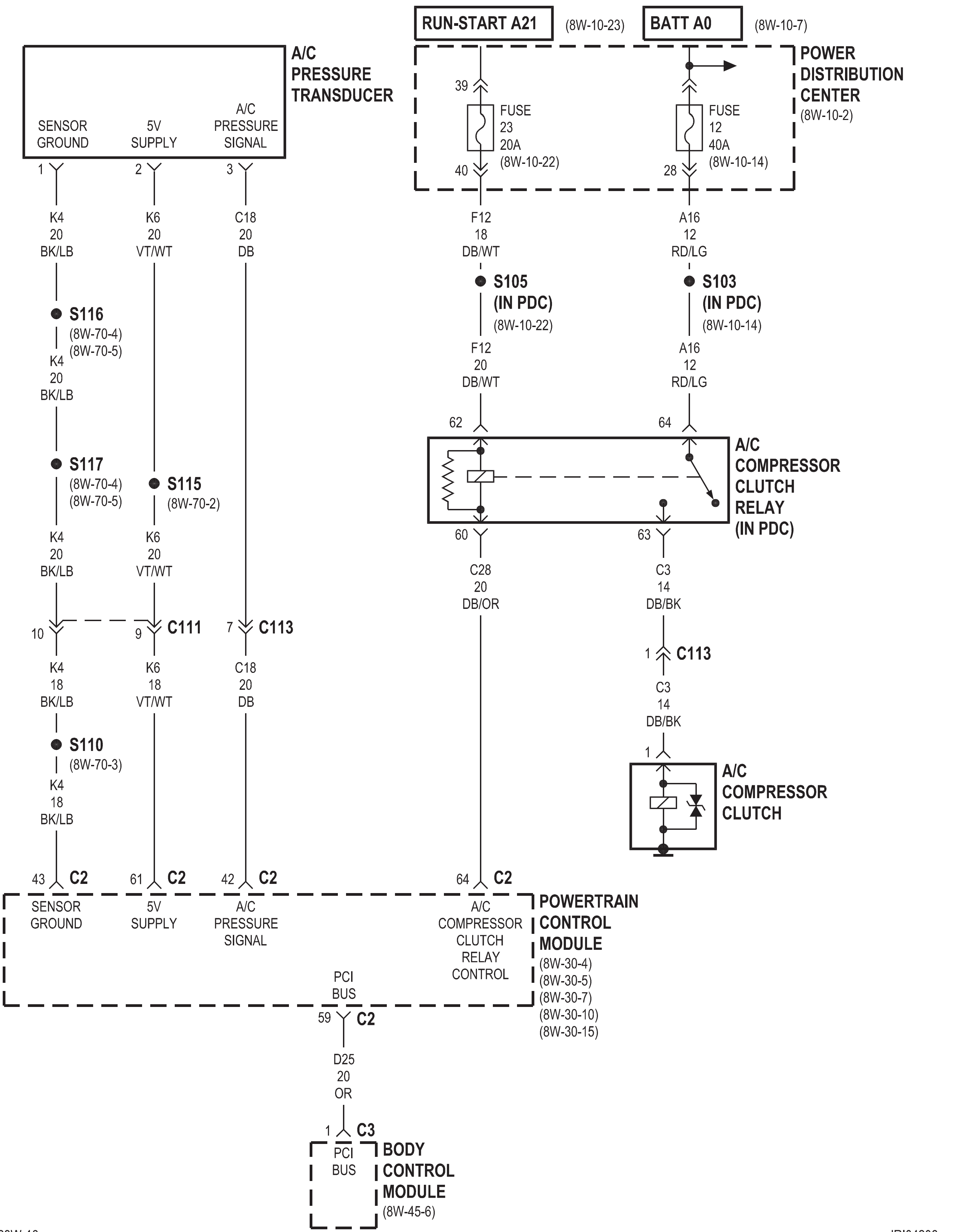


028W-16 JRI04202

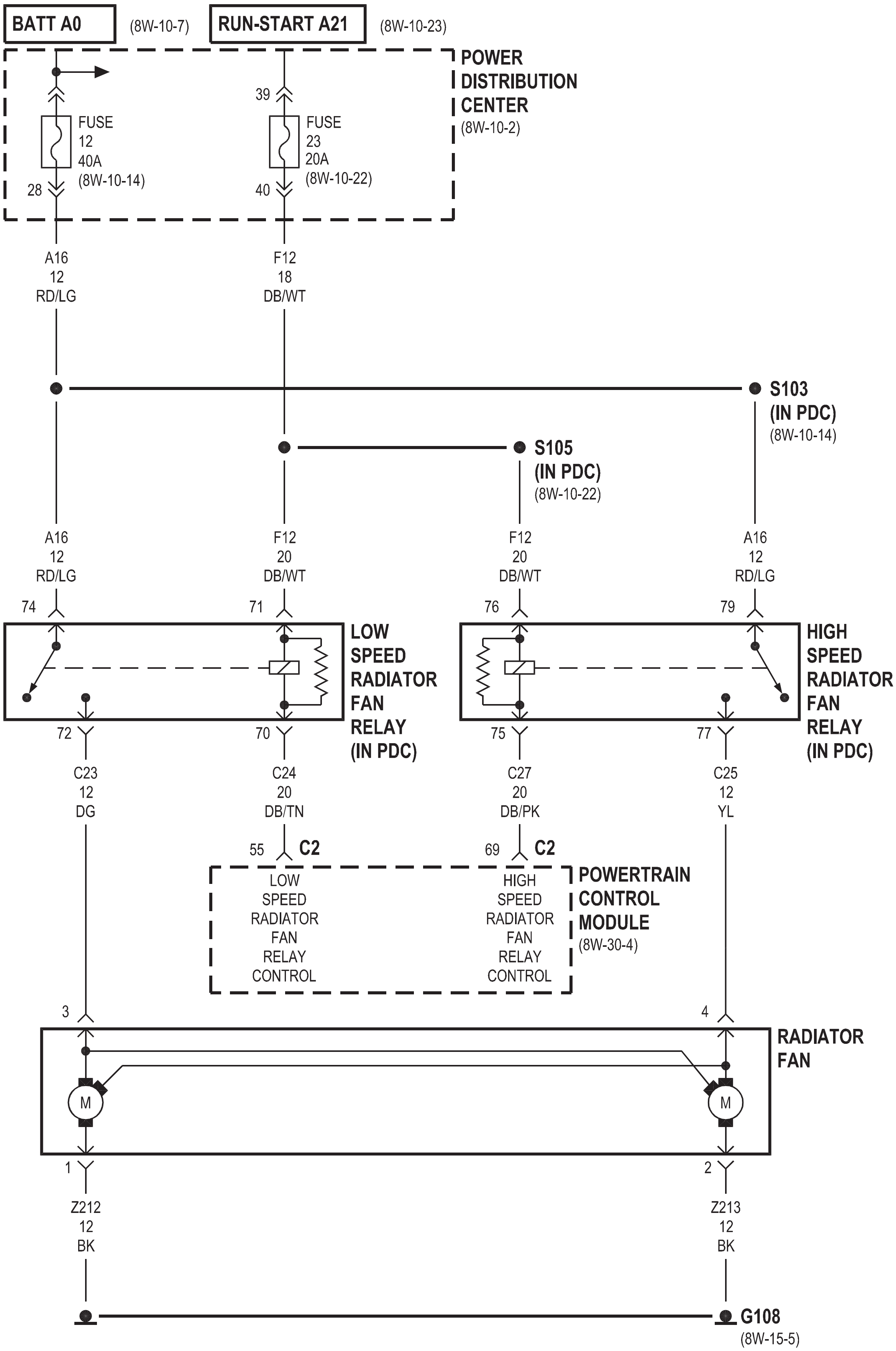

FROM
A/C-HEATER CONTROL
(8W-42-2)
A
C57
20
DB/GY
S212
(8W-45-10)
5
C200
S200
(8W-45-10)
2
A/C EVAPORATOR TEMPERATURE SENSOR
1
BLEND DOOR ACTUATOR
M
5
1
3
4
C12
20
LG/BK
C34
20
DB/WT
C33
20
DB/RD
C36
20
RD/WT
C26
20
PK/DB
S201
(8W-45-8)
S202
(8W-45-11)
9
1
3
10
6
C36
18
RD/WT
9 C2
15 C2
25 C2
8 C2
1 C2
EVAPORATOR TEMPERATURE SENSOR SIGNAL
COMMON DOOR DRIVER
BLEND AIR DOOR DRIVER
BLEND DOOR FEEDBACK SIGNAL
5V SUPPLY
BODY CONTROL MODULE
(8W-45-8)
(8W-45-9)
(8W-45-11)


FROM
A/C-
HEATER
CONTROL
(8W-42-2)
A
C57
20
DB/GY
S212
(8W-45-10)
C57
20
DB/GY
5
C200
C57
20
DB/GY
S200
(8W-45-10)
C57
20
DB/GY
RECIRCULATION
DOOR
ACTUATOR
M
1
2
C32
20
GY/DB
C34
20
DB/WT
2
MODE
DOOR
ACTUATOR
M
5
1
3
4
C34
20
DB/WT
C35
20
DG/YL
C37
20
YL
C26
20
PK/DB
S201
(8W-45-8)
S202
(8W-45-11)
C34
20
DB/WT
C26
20
PK/DB
C200
16
1
2
11
6
C32
20
GY/DB
C34
20
DB/WT
C35
20
DG/YL
C37
20
YL
C26
20
PK/DB
24 C2
15 C2
26 C2
7 C2
1 C2
RECIRCULATION
DOOR
DRIVER
COMMON
DOOR
DRIVER
MODE
DOOR
DRIVER
MODE
DOOR
FEEDBACK
SIGNAL
5V
SUPPLY
BODY
CONTROL
MODULE
(8W-45-8)
(8W-45-9)
(8W-45-11)

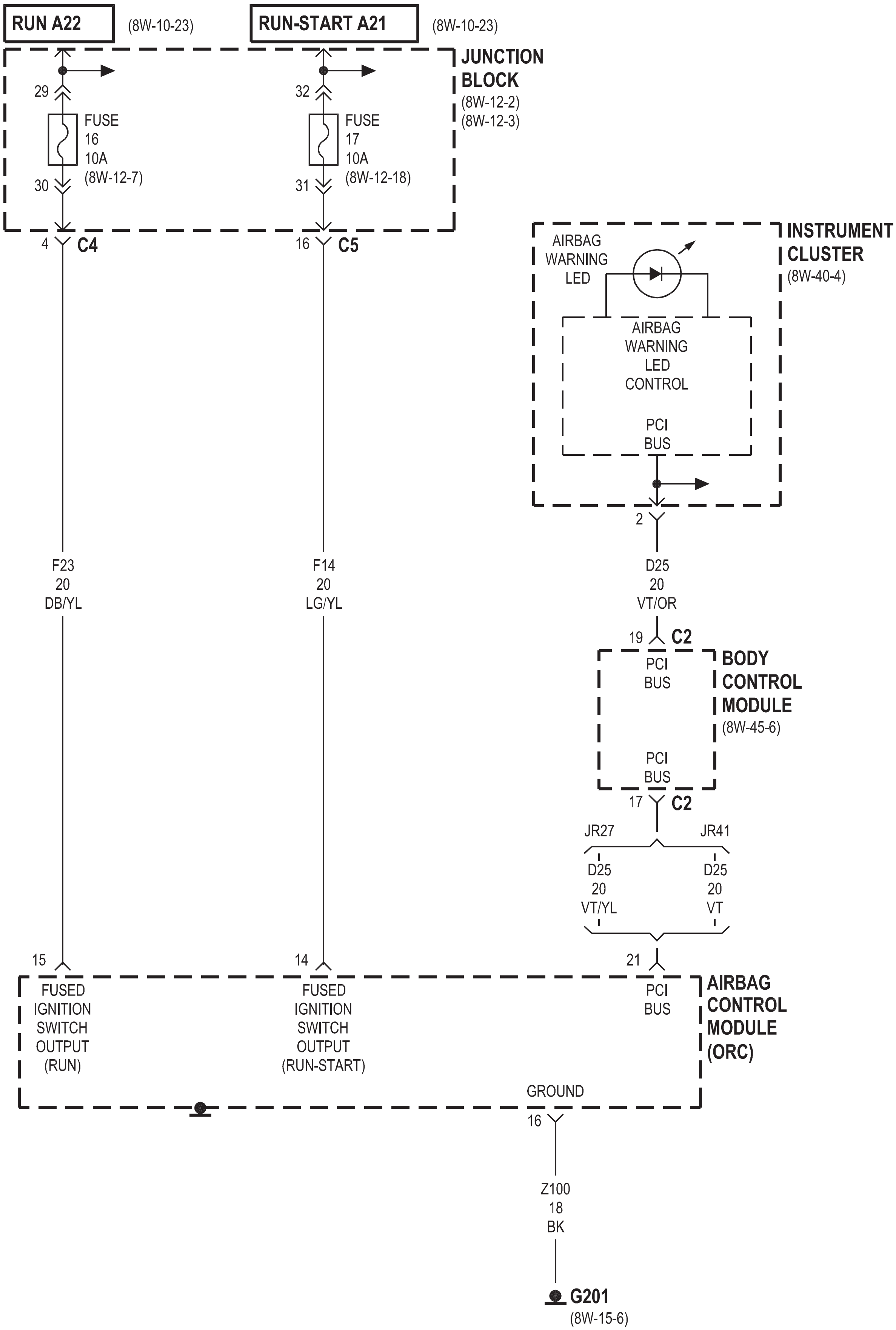

RUN A22
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
34
FUSE
1
30A
(8W-12-7)
33
6 C6
C1
14
DG
8 C200
C1
12
DG
2
BLOWER MOTOR
M
1
C7
12
BK
1
BLOWER MOTOR RESISTOR BLOCK
5 4 3 2
C4 14 TN
C5 14 LG
C6 16 LB
C7 12 BK/TN
4 12 15 7 C200
C7
14
BK/TN
S214
(8W-45-8)
C4 16 TN
C5 16 LG
C6 14 LB
C7 12 BK/TN
C7 18 BK/TN
2 C2 7 C2 3 C2 10 C2
5 C2
A/C-HEATER CONTROL
0 OFF
1 LOW
2 MED-LOW
3 MED-HIGH
4 HIGH
0 1 2 3 4
BLOWER SWITCH
HIGH BLOWER MOTOR DRIVER
BODY CONTROL MODULE
(8W-45-8)
5 C2
Z119
14
BK/GY
G202
(8W-15-6)

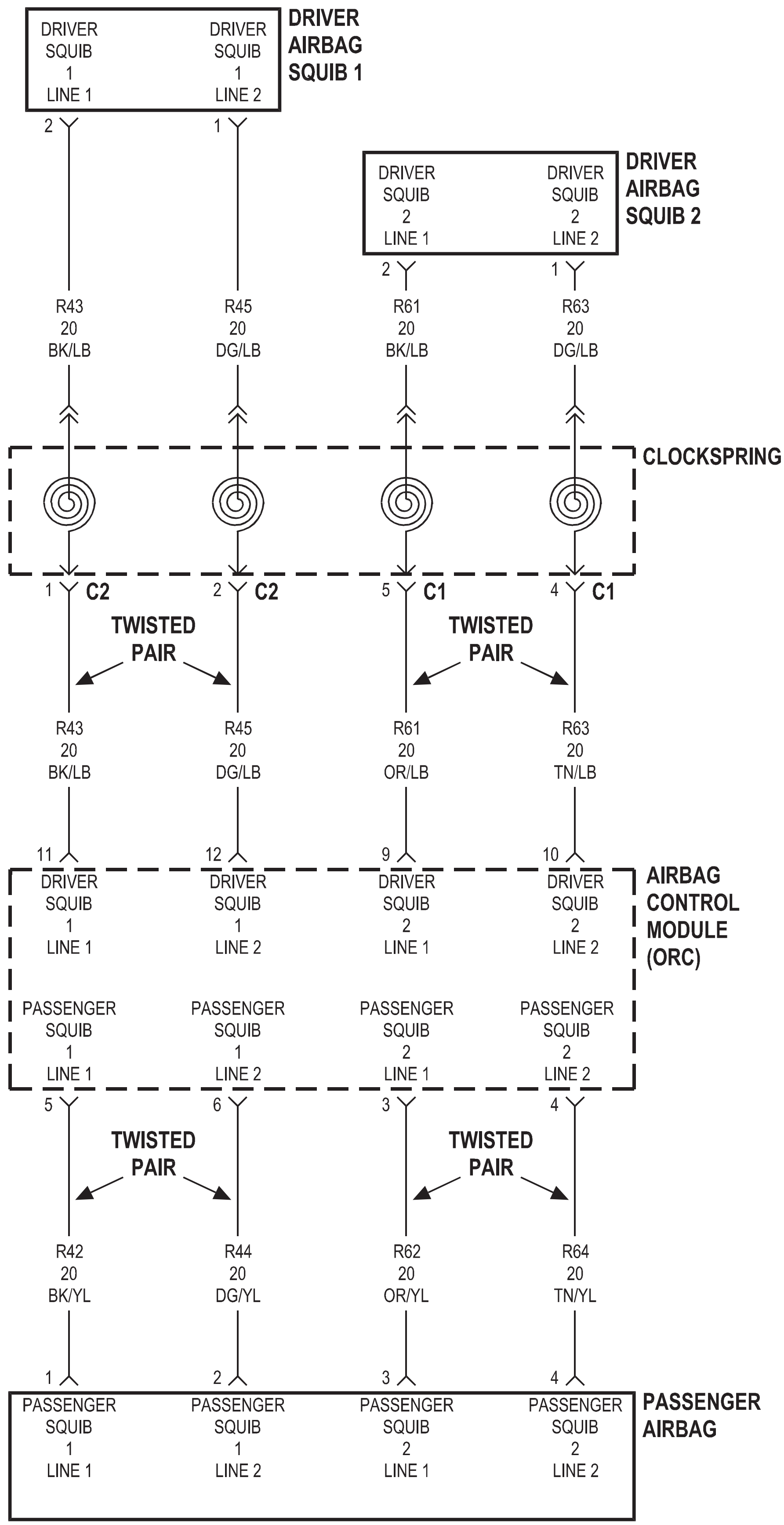


RUN-START A21
(8W-10-23)
BATT A0
(8W-10-7)
A/C PRESSURE TRANSDUCER
SENSOR GROUND
5V SUPPLY
A/C PRESSURE SIGNAL
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 23 20A (8W-10-22)
FUSE 12 40A (8W-10-14)
K4 20 BK/LB
K6 20 VT/WT
C18 20 DB
F12 18 DB/WT
A16 12 RD/LG
S105 (IN PDC) (8W-10-22)
S103 (IN PDC) (8W-10-14)
S116 (8W-70-4) (8W-70-5)
F12 20 DB/WT
A16 12 RD/LG
A/C COMPRESSOR CLUTCH RELAY (IN PDC)
S117 (8W-70-4) (8W-70-5)
S115 (8W-70-2)
C28 20 DB/OR
C3 14 DB/BK
C111
C113
K4 18 BK/LB
K6 18 VT/WT
C18 20 DB
S110 (8W-70-3)
A/C COMPRESSOR CLUTCH
C2
POWERTRAIN CONTROL MODULE
(8W-30-4) (8W-30-5) (8W-30-7) (8W-30-10) (8W-30-15)
A/C COMPRESSOR CLUTCH RELAY CONTROL
PCI BUS
D25 20 OR
C3
BODY CONTROL MODULE
(8W-45-6)

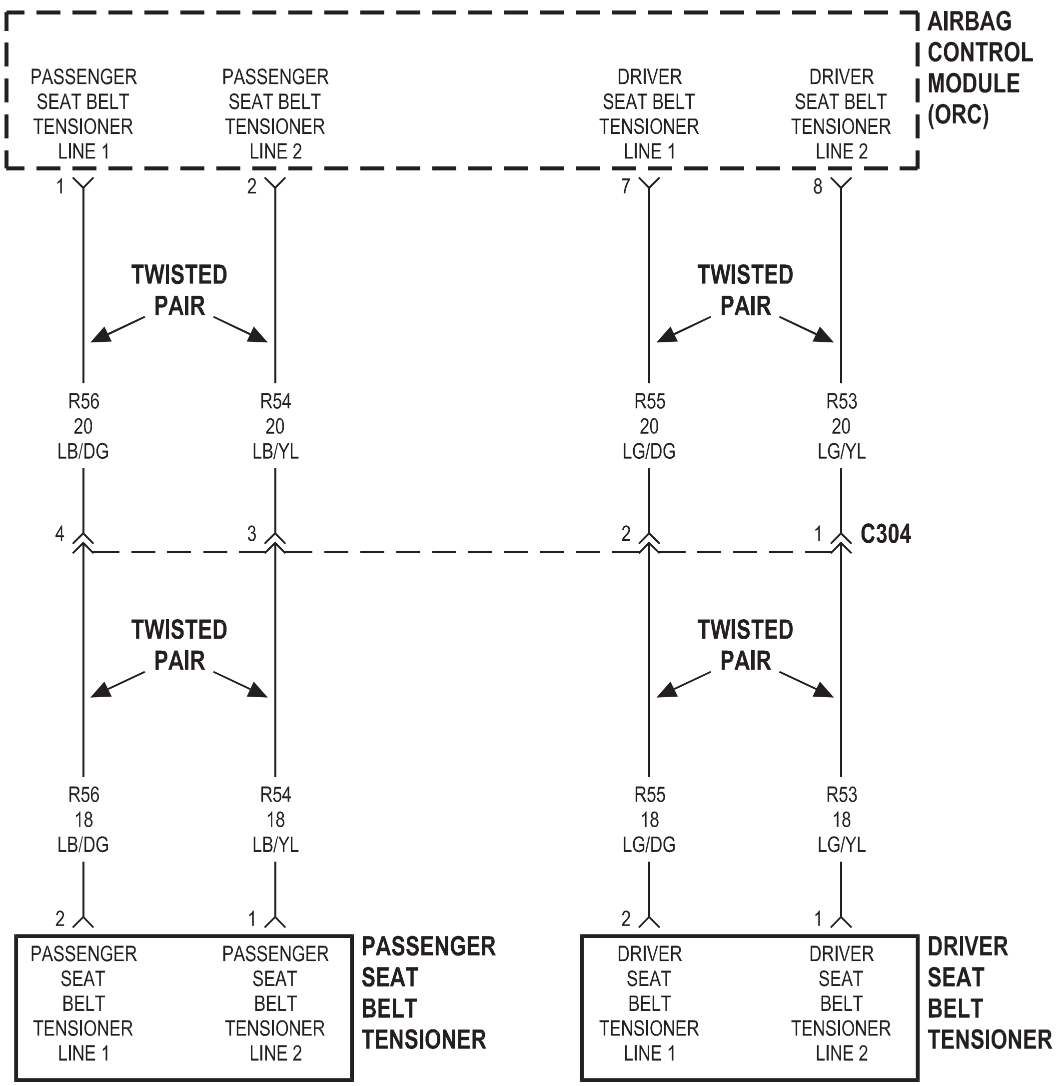

BATT A0
(8W-10-7)
RUN-START A21
(8W-10-23)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FUSE
12
40A
(8W-10-14)
28
39
FUSE
23
20A
(8W-10-22)
40
A16
12
RD/LG
F12
18
DB/WT
S103
(IN PDC)
(8W-10-14)
S105
(IN PDC)
(8W-10-22)
A16
12
RD/LG
F12
20
DB/WT
F12
20
DB/WT
A16
12
RD/LG
74
71
76
79
LOW
SPEED
RADIATOR
FAN
RELAY
(IN PDC)
HIGH
SPEED
RADIATOR
FAN
RELAY
(IN PDC)
72
70
75
77
C23
12
DG
C24
20
DB/TN
C27
20
DB/PK
C25
12
YL
55
C2
69
C2
LOW
SPEED
RADIATOR
FAN
RELAY
CONTROL
HIGH
SPEED
RADIATOR
FAN
RELAY
CONTROL
POWERTRAIN
CONTROL
MODULE
(8W-30-4)
3
4
RADIATOR
FAN
M
M
1
2
Z212
12
BK
Z213
12
BK
G108
(8W-15-5)

8W-43 OCCUPANT RESTRAINT SYSTEM

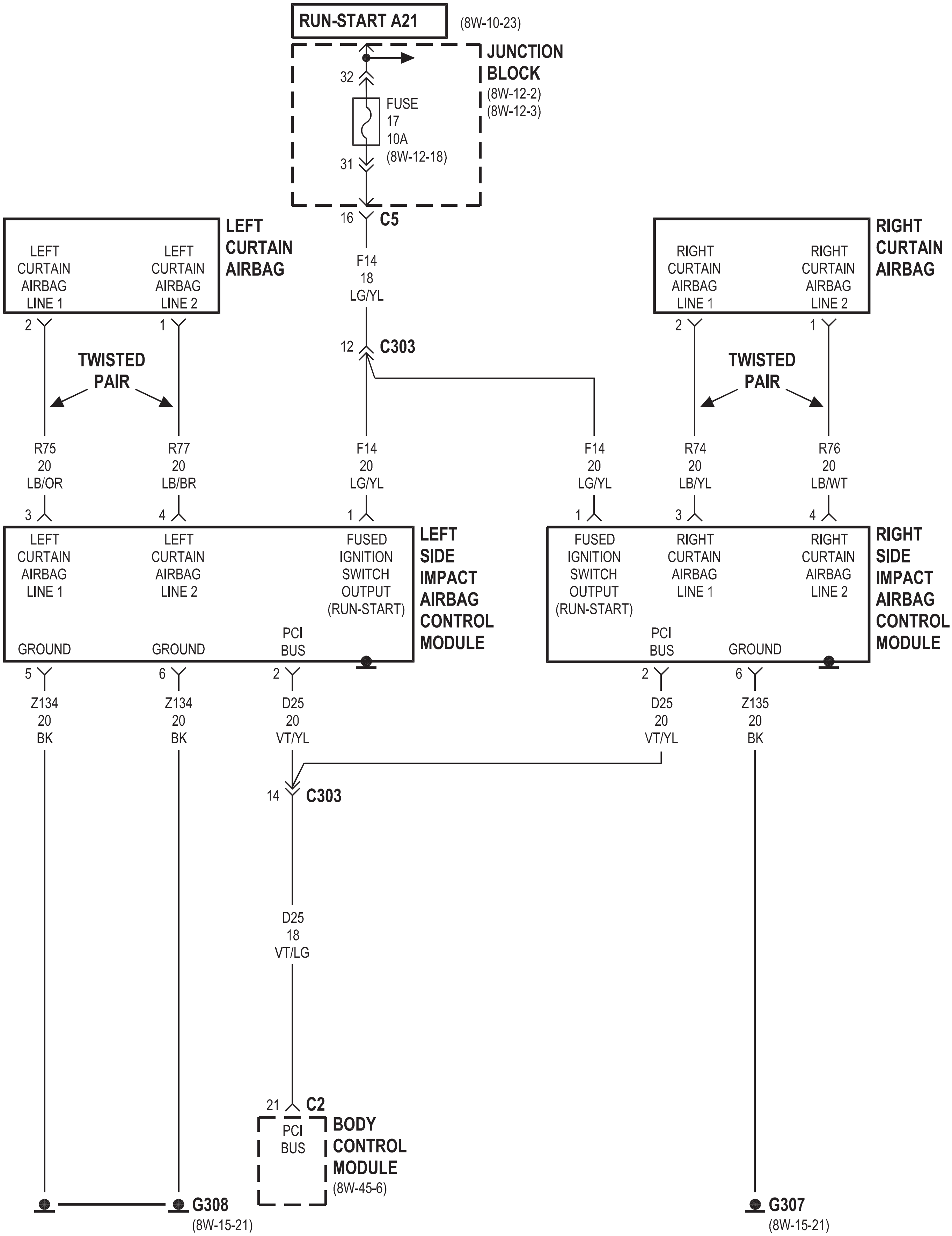

RUN A22
(8W-10-23)
RUN-START A21
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
29
FUSE 16 10A (8W-12-7)
30
32
FUSE 17 10A (8W-12-18)
31
4 C4
16 C5
INSTRUMENT CLUSTER
(8W-40-4)
AIRBAG WARNING LED
AIRBAG WARNING LED CONTROL
PCI BUS
2
F23 20 DB/YL
F14 20 LG/YL
D25 20 VT/OR
19 C2
BODY CONTROL MODULE
(8W-45-6)
PCI BUS
PCI BUS
17 C2
JR27
JR41
D25 20 VT/YL
D25 20 VT
15
14
21
FUSED IGNITION SWITCH OUTPUT (RUN)
FUSED IGNITION SWITCH OUTPUT (RUN-START)
PCI BUS
AIRBAG CONTROL MODULE (ORC)
GROUND
16
Z100 18 BK
G201
(8W-15-6)


DRIVER SQUIB 1 LINE 1
DRIVER SQUIB 1 LINE 2
DRIVER AIRBAG SQUIB 1
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
DRIVER AIRBAG SQUIB 2
R43 20 BK/LB
R45 20 DG/LB
R61 20 BK/LB
R63 20 DG/LB
CLOCKSPRING
C2
C1
TWISTED PAIR
R43 20 BK/LB
R45 20 DG/LB
R61 20 OR/LB
R63 20 TN/LB
AIRBAG CONTROL MODULE (ORC)
DRIVER SQUIB 1 LINE 1
DRIVER SQUIB 1 LINE 2
DRIVER SQUIB 2 LINE 1
DRIVER SQUIB 2 LINE 2
PASSENGER SQUIB 1 LINE 1
PASSENGER SQUIB 1 LINE 2
PASSENGER SQUIB 2 LINE 1
PASSENGER SQUIB 2 LINE 2
R42 20 BK/YL
R44 20 DG/YL
R62 20 OR/YL
R64 20 TN/YL
PASSENGER AIRBAG

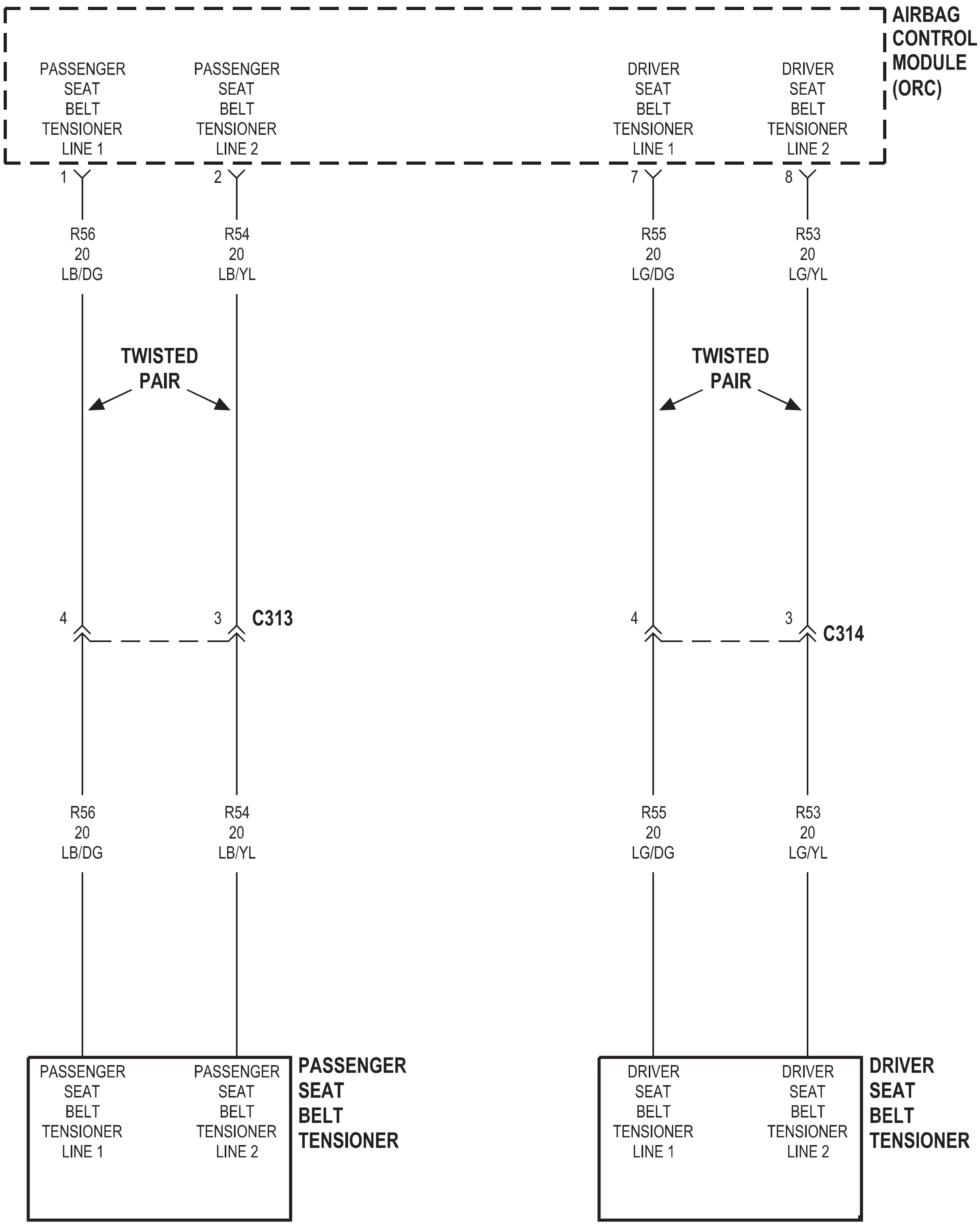
JR41


AIRBAG CONTROL MODULE (ORC)
PASSENGER SEAT BELT TENSIONER LINE 1
PASSENGER SEAT BELT TENSIONER LINE 2
DRIVER SEAT BELT TENSIONER LINE 1
DRIVER SEAT BELT TENSIONER LINE 2
1
2
7
8
TWISTED PAIR
TWISTED PAIR
R56 20 LB/DG
R54 20 LB/YL
R55 20 LG/DG
R53 20 LG/YL
4
3
2
1
C304
TWISTED PAIR
TWISTED PAIR
R56 18 LB/DG
R54 18 LB/YL
R55 18 LG/DG
R53 18 LG/YL
2
1
2
1
PASSENGER SEAT BELT TENSIONER LINE 1
PASSENGER SEAT BELT TENSIONER LINE 2
PASSENGER SEAT BELT TENSIONER
DRIVER SEAT BELT TENSIONER LINE 1
DRIVER SEAT BELT TENSIONER LINE 2
DRIVER SEAT BELT TENSIONER

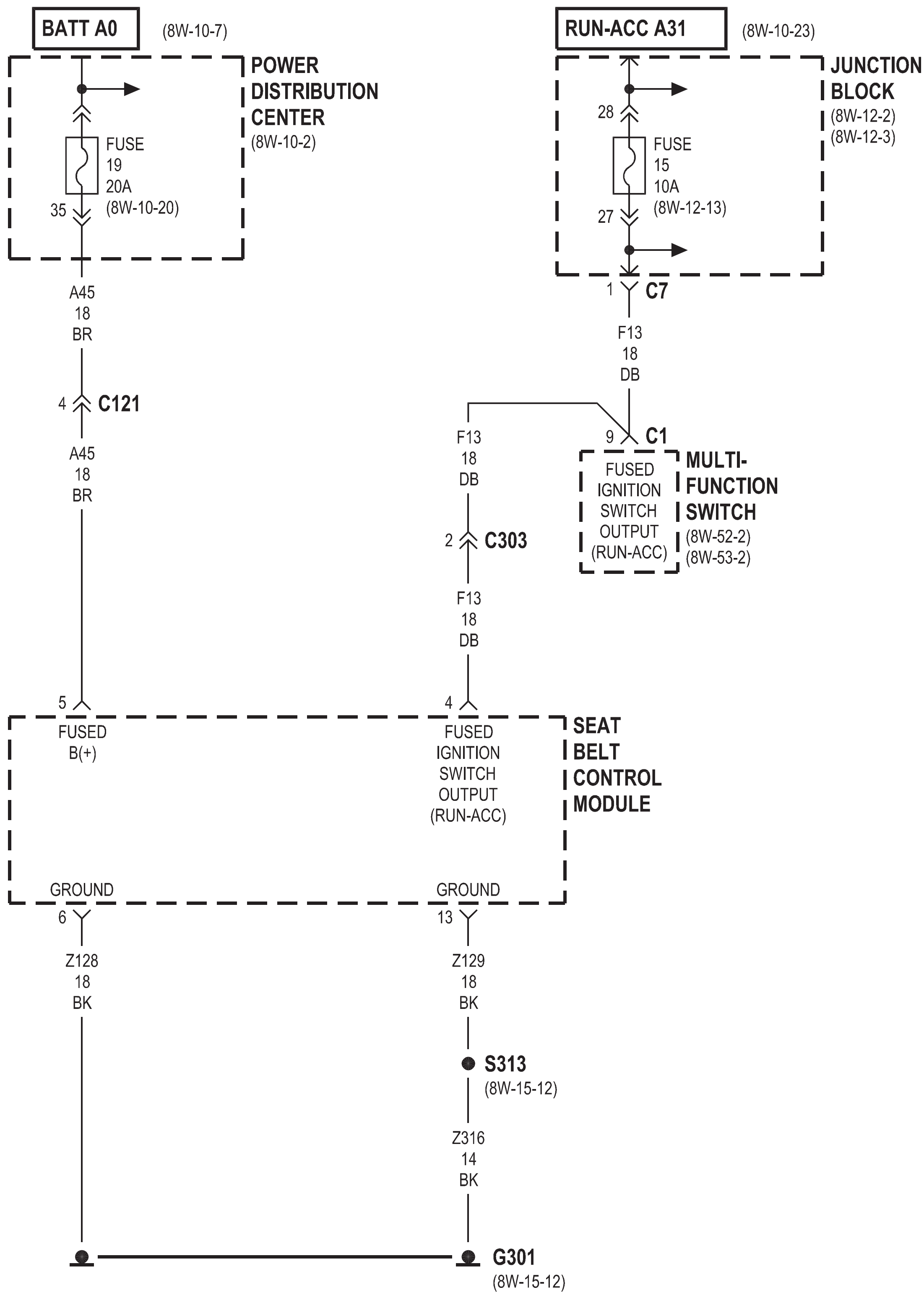
JR41

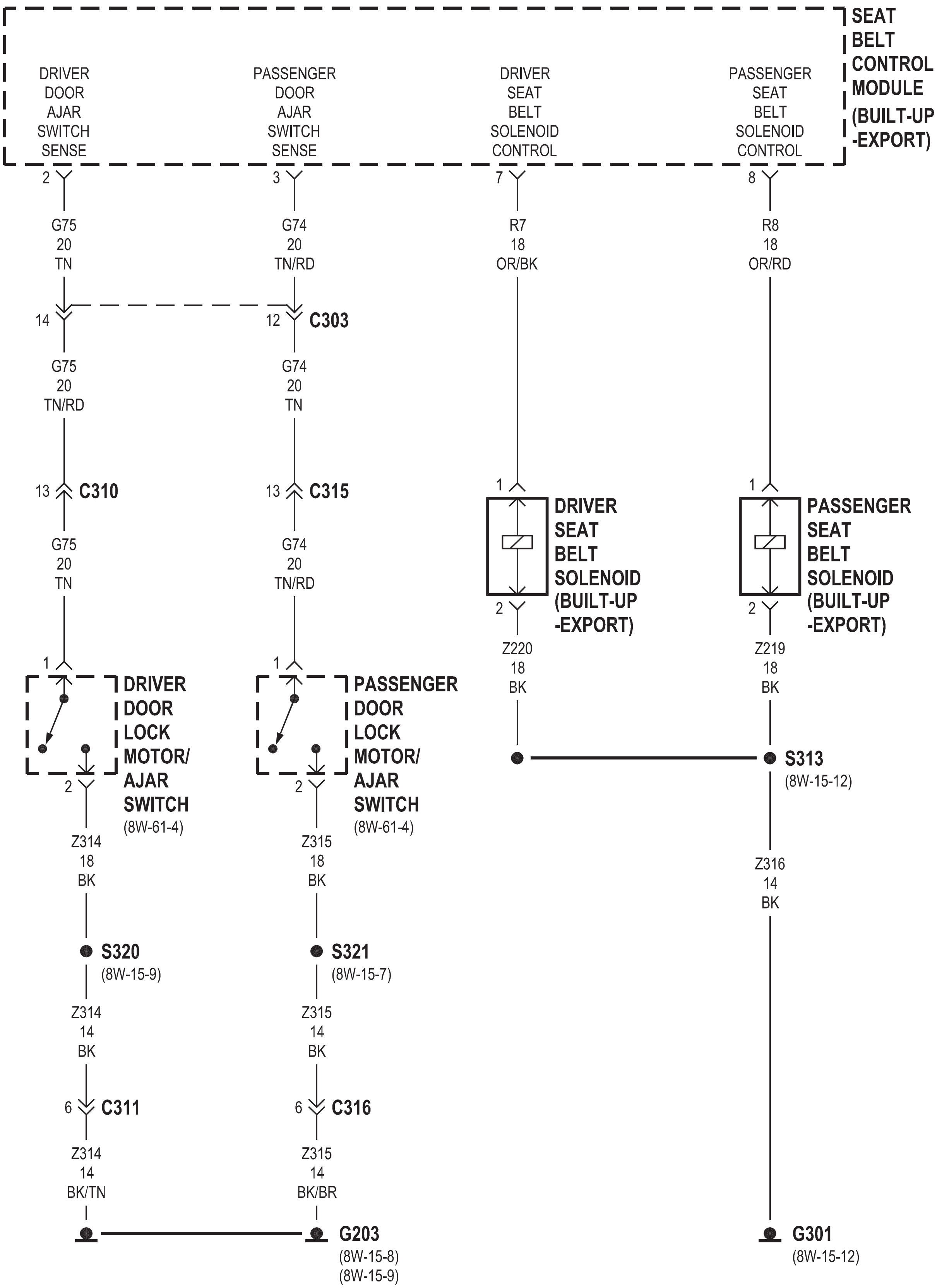

RUN-START A21
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
32
FUSE
17
10A
(8W-12-18)
31
16
C5
F14
18
LG/YL
12
C303
LEFT CURTAIN AIRBAG
LEFT CURTAIN AIRBAG LINE 1
LEFT CURTAIN AIRBAG LINE 2
2
1
TWISTED PAIR
R75
20
LB/OR
R77
20
LB/BR
F14
20
LG/YL
F14
20
LG/YL
RIGHT CURTAIN AIRBAG
RIGHT CURTAIN AIRBAG LINE 1
RIGHT CURTAIN AIRBAG LINE 2
2
1
TWISTED PAIR
R74
20
LB/YL
R76
20
LB/WT
3
4
1
LEFT SIDE IMPACT AIRBAG CONTROL MODULE
LEFT CURTAIN AIRBAG LINE 1
LEFT CURTAIN AIRBAG LINE 2
FUSED IGNITION SWITCH OUTPUT (RUN-START)
GROUND
GROUND
PCI BUS
5
6
2
1
3
4
RIGHT SIDE IMPACT AIRBAG CONTROL MODULE
FUSED IGNITION SWITCH OUTPUT (RUN-START)
RIGHT CURTAIN AIRBAG LINE 1
RIGHT CURTAIN AIRBAG LINE 2
PCI BUS
GROUND
2
6
Z134
20
BK
Z134
20
BK
D25
20
VT/YL
D25
20
VT/YL
Z135
20
BK
14
C303
D25
18
VT/LG
21
C2
PCI BUS
BODY CONTROL MODULE
(8W-45-6)
G308
(8W-15-21)
G307
(8W-15-21)

JR27



AIRBAG CONTROL MODULE (ORC)
PASSENGER SEAT BELT TENSIONER LINE 1
PASSENGER SEAT BELT TENSIONER LINE 2
DRIVER SEAT BELT TENSIONER LINE 1
DRIVER SEAT BELT TENSIONER LINE 2
1
2
7
8
R56 20 LB/DG
R54 20 LB/YL
R55 20 LG/DG
R53 20 LG/YL
TWISTED PAIR
TWISTED PAIR
4
3
C313
4
3
C314
R56 20 LB/DG
R54 20 LB/YL
R55 20 LG/DG
R53 20 LG/YL
PASSENGER SEAT BELT TENSIONER LINE 1
PASSENGER SEAT BELT TENSIONER LINE 2
PASSENGER SEAT BELT TENSIONER
DRIVER SEAT BELT TENSIONER LINE 1
DRIVER SEAT BELT TENSIONER LINE 2
DRIVER SEAT BELT TENSIONER

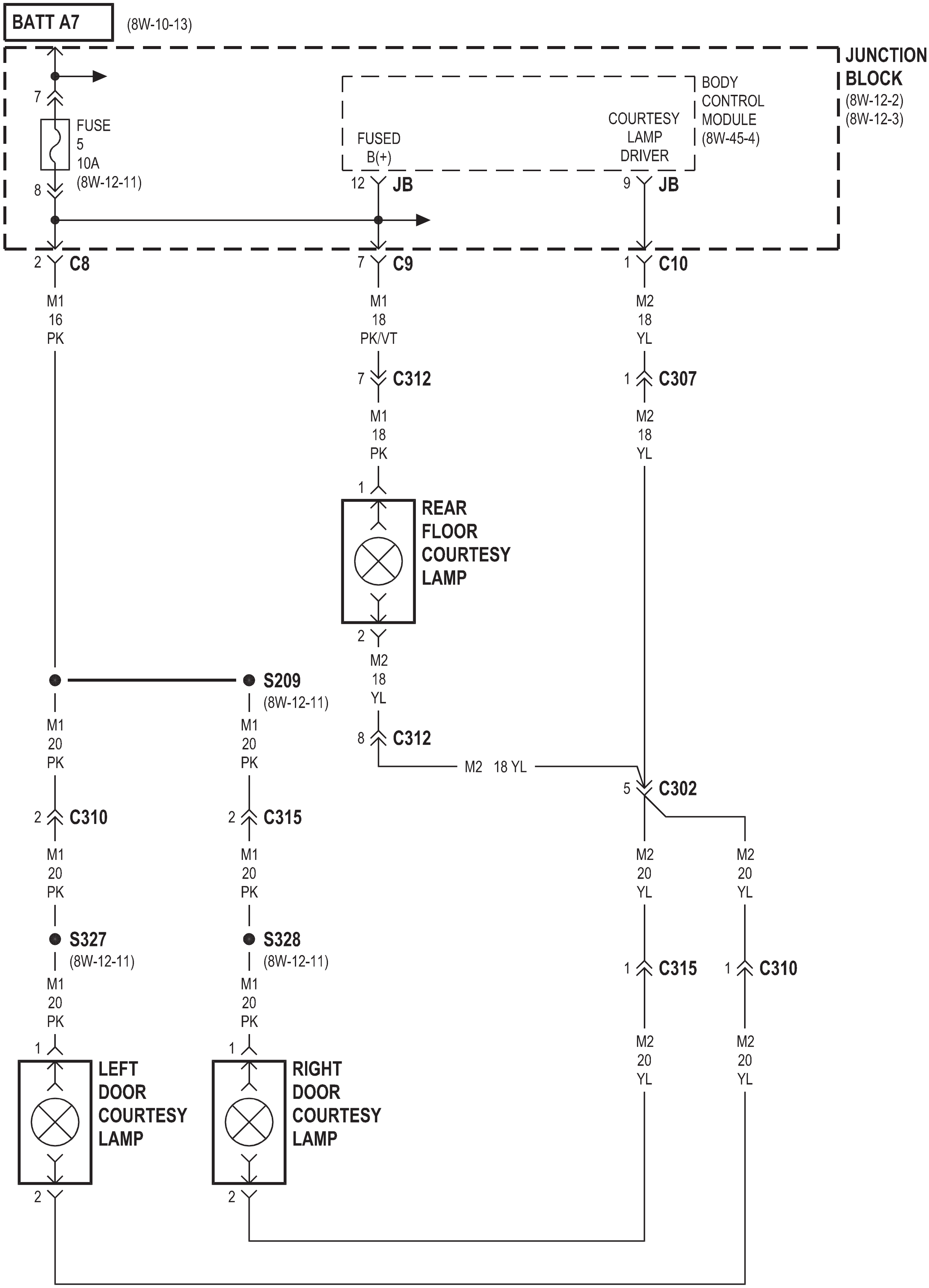

BATT A0
(8W-10-7)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
19
20A
(8W-10-20)
35
A45
18
BR
4
C121
A45
18
BR
RUN-ACC A31
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
28
FUSE
15
10A
(8W-12-13)
27
1
C7
F13
18
DB
9
C1
FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
MULTI-FUNCTION SWITCH
(8W-52-2)
(8W-53-2)
F13
18
DB
2
C303
F13
18
DB
5
FUSED B(+)
4
FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
SEAT BELT CONTROL MODULE
GROUND
6
GROUND
13
Z128
18
BK
Z129
18
BK
S313
(8W-15-12)
Z316
14
BK
G301
(8W-15-12)

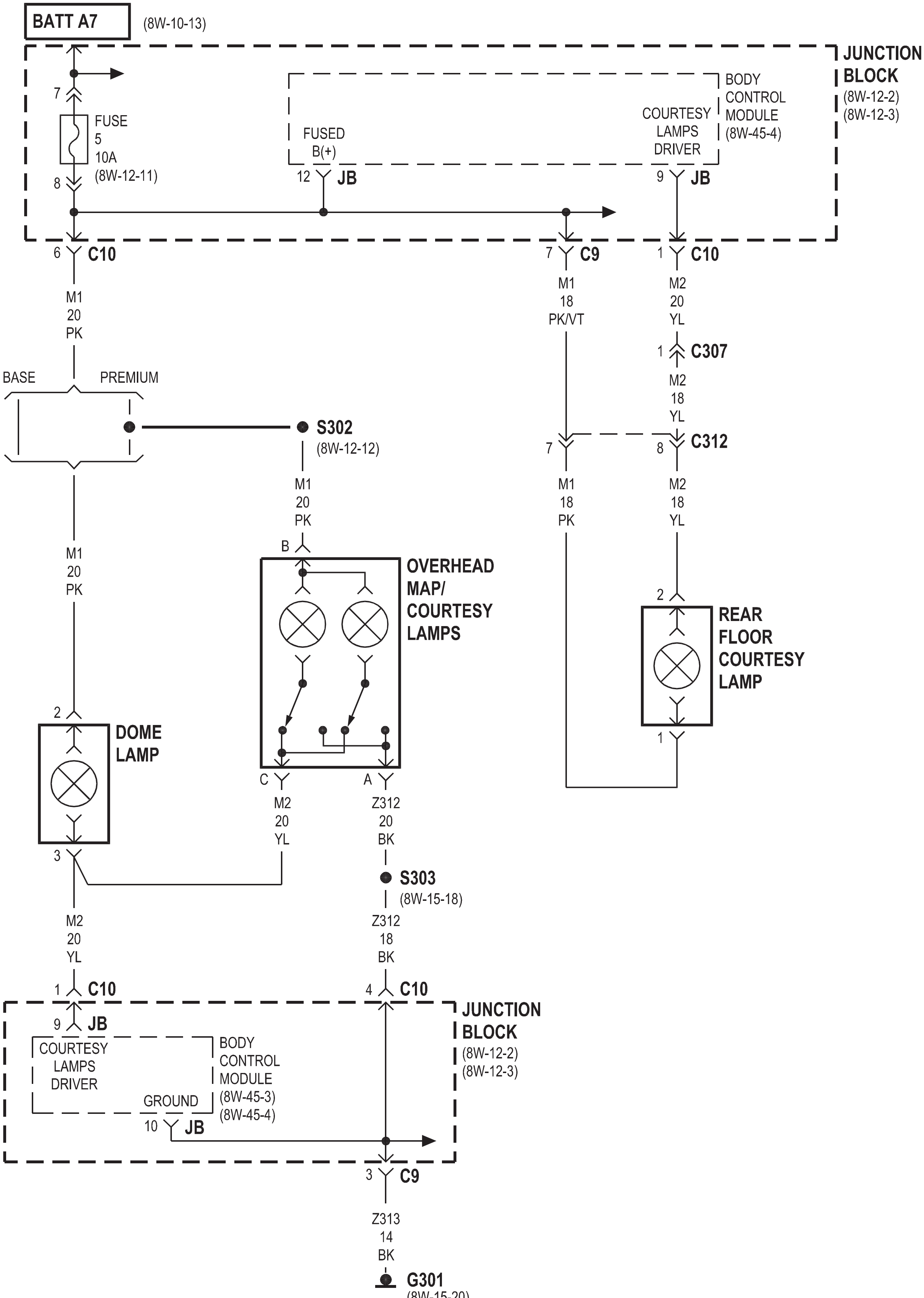

SEAT BELT CONTROL MODULE (BUILT-UP -EXPORT)
DRIVER DOOR AJAR SWITCH SENSE
PASSENGER DOOR AJAR SWITCH SENSE
DRIVER SEAT BELT SOLENOID CONTROL
PASSENGER SEAT BELT SOLENOID CONTROL
2
3
7
8
G75 20 TN
G74 20 TN/RD
R7 18 OR/BK
R8 18 OR/RD
14
12
C303
G75 20 TN/RD
G74 20 TN
13
C310
13
C315
G75 20 TN
G74 20 TN/RD
1
DRIVER SEAT BELT SOLENOID (BUILT-UP -EXPORT)
2
1
PASSENGER SEAT BELT SOLENOID (BUILT-UP -EXPORT)
2
Z220 18 BK
Z219 18 BK
1
DRIVER DOOR LOCK MOTOR/ AJAR SWITCH
(8W-61-4)
2
1
PASSENGER DOOR LOCK MOTOR/ AJAR SWITCH
(8W-61-4)
2
S313
(8W-15-12)
Z314 18 BK
Z315 18 BK
Z316 14 BK
S320
(8W-15-9)
S321
(8W-15-7)
Z314 14 BK
Z315 14 BK
6
C311
6
C316
Z314 14 BK/TN
Z315 14 BK/BR
G203
(8W-15-8)
(8W-15-9)
G301
(8W-15-12)

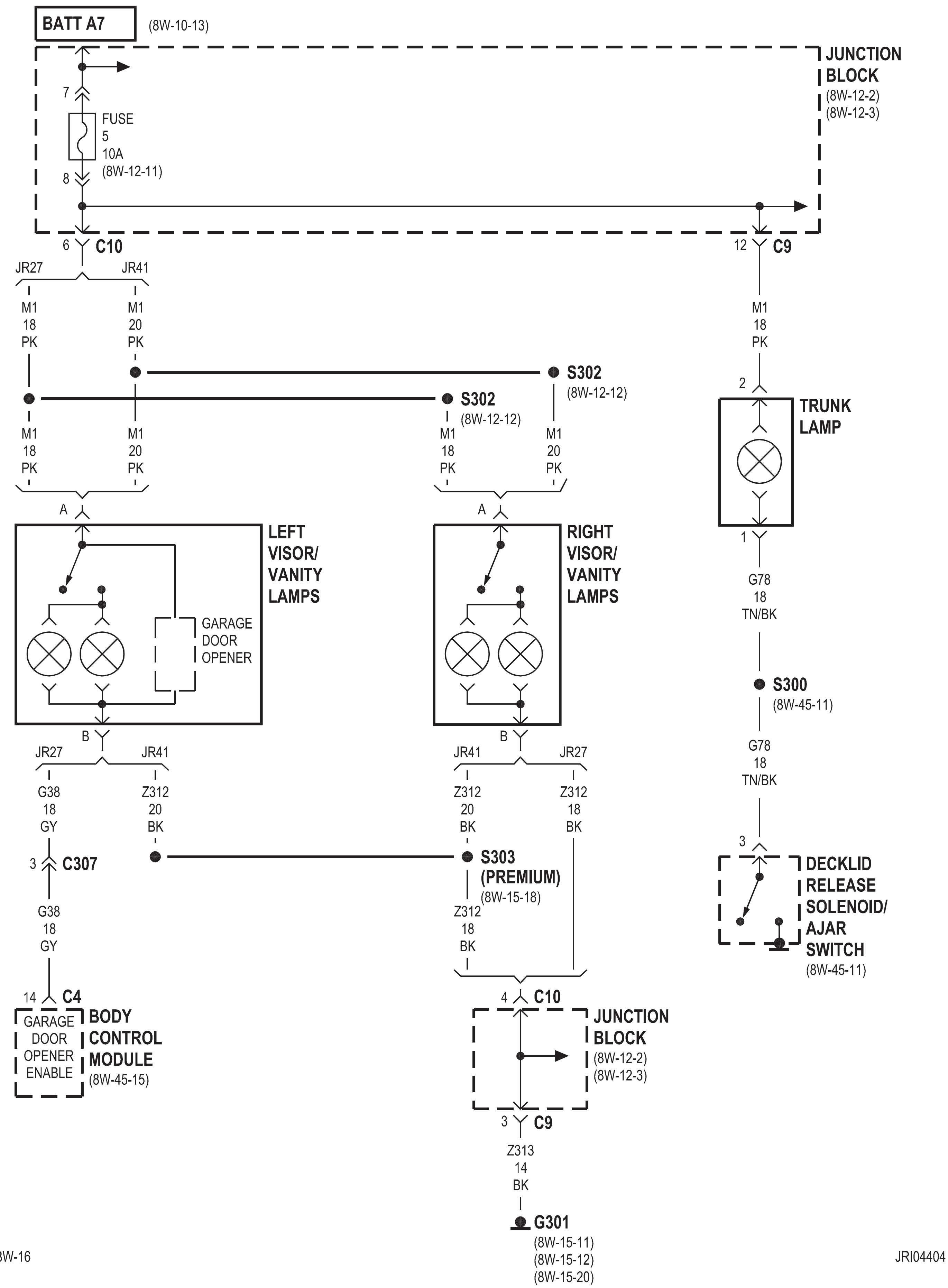
8W-44 INTERIOR LIGHTING

Component **Page**

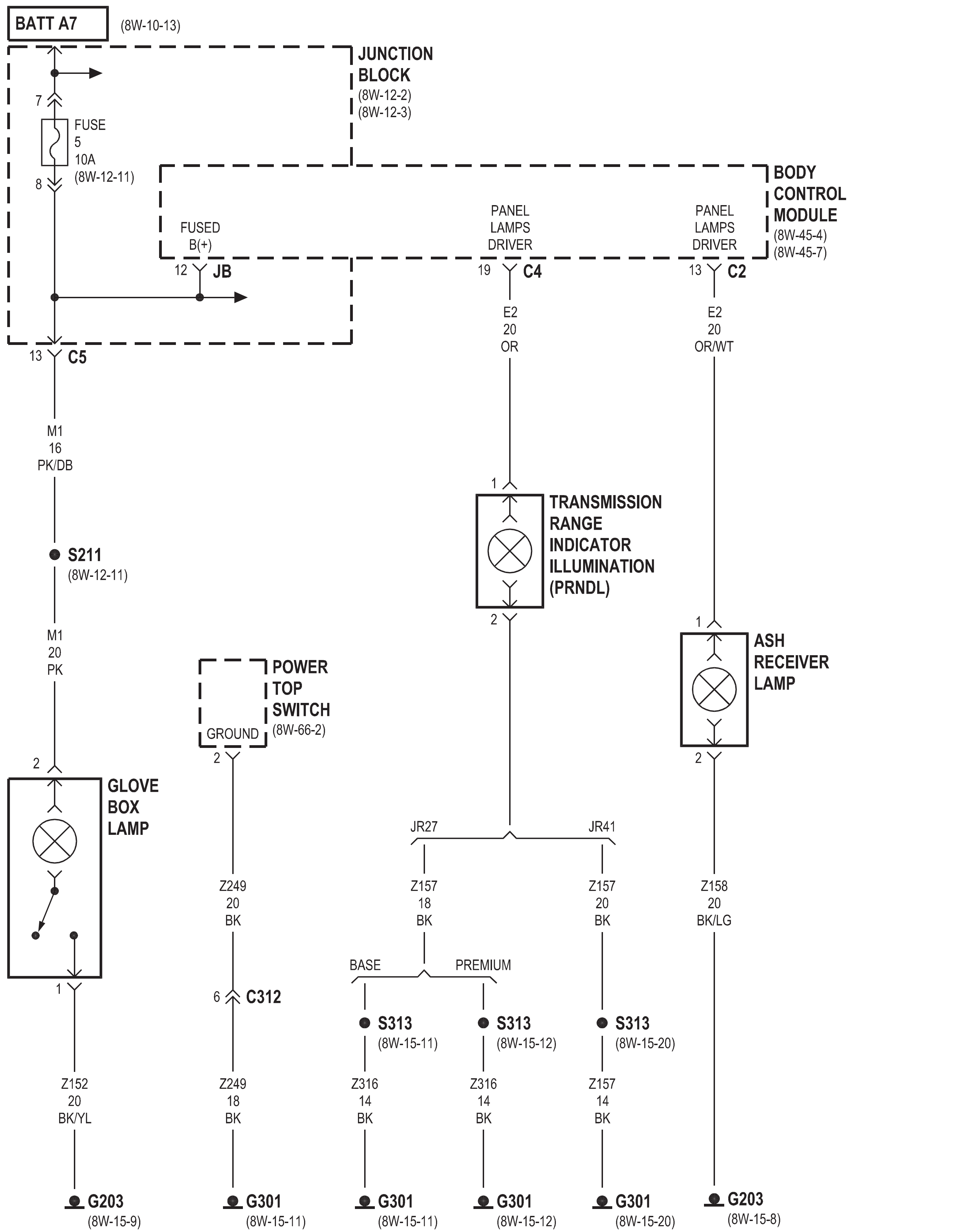
Component **Page**


BATT A7
(8W-10-13)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
BODY CONTROL MODULE
(8W-45-4)
COURTESY LAMP DRIVER
FUSED B(+)
FUSE 5 10A
(8W-12-11)
7
8
12 JB
9 JB
2 C8
7 C9
1 C10
M1 16 PK
M1 18 PK/VT
M2 18 YL
7 C312
1 C307
M1 18 PK
M2 18 YL
REAR FLOOR COURTESY LAMP
1
2
M2 18 YL
S209
(8W-12-11)
8 C312
M2 18 YL
5 C302
M1 20 PK
2 C310
2 C315
M2 20 YL
S327
(8W-12-11)
S328
(8W-12-11)
1 C315
1 C310
LEFT DOOR COURTESY LAMP
RIGHT DOOR COURTESY LAMP

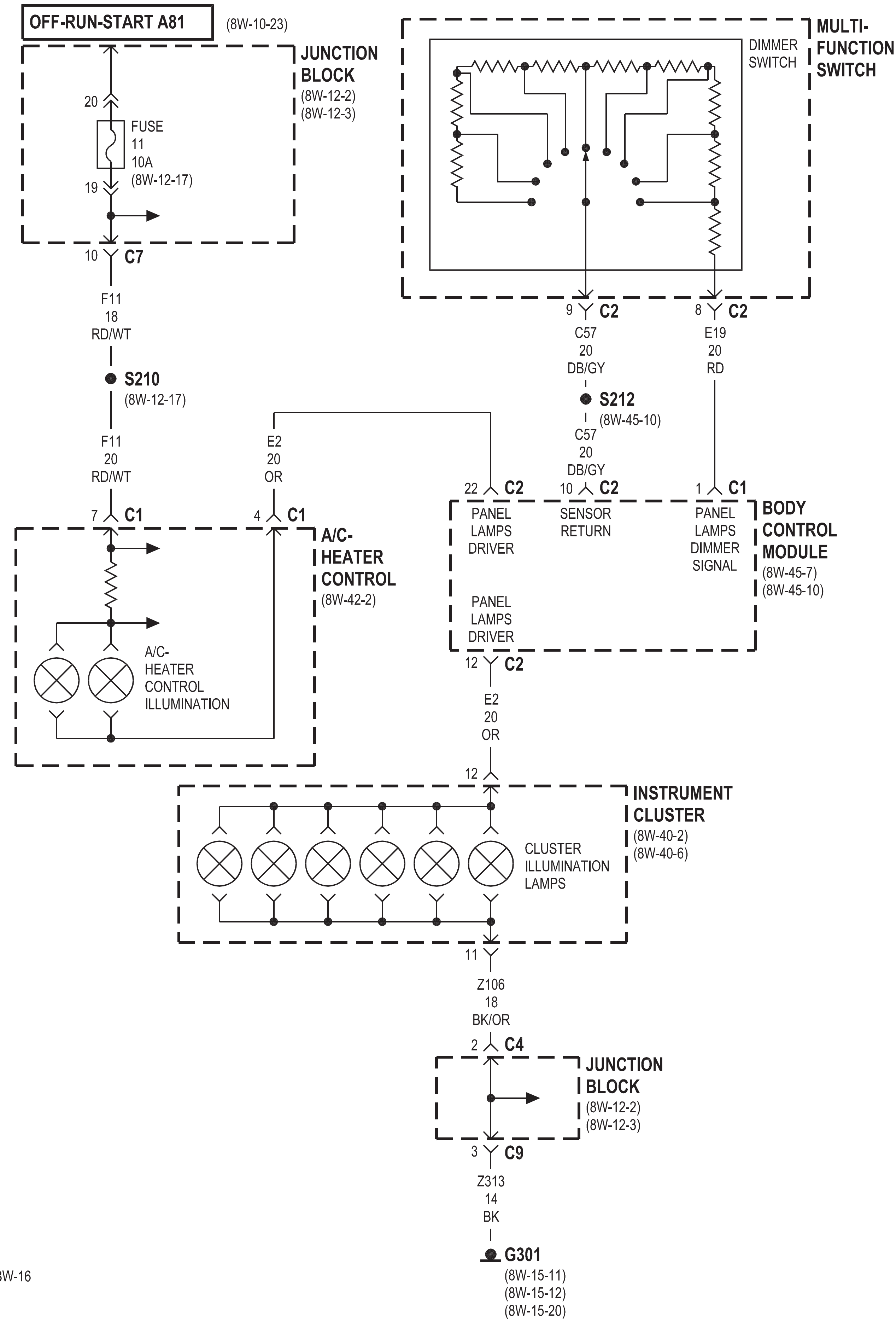

BATT A7
(8W-10-13)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
BODY CONTROL MODULE
(8W-45-4)
COURTESY LAMPS DRIVER
FUSED B(+)
FUSE 5 10A
(8W-12-11)
7
8
12 JB
9 JB
6 C10
7 C9
1 C10
M1 20 PK
M1 18 PK/VT
M2 20 YL
1 C307
M2 18 YL
7
8 C312
M1 18 PK
M2 18 YL
BASE
PREMIUM
S302
(8W-12-12)
M1 20 PK
B
OVERHEAD MAP/ COURTESY LAMPS
2
REAR FLOOR COURTESY LAMP
1
M1 20 PK
2
DOME LAMP
3
C
A
M2 20 YL
Z312 20 BK
S303
(8W-15-18)
Z312 18 BK
M2 20 YL
1 C10
4 C10
9 JB
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
COURTESY LAMPS DRIVER
BODY CONTROL MODULE
(8W-45-3)
(8W-45-4)
GROUND
10 JB
3 C9
Z313 14 BK
G301
(8W-15-20)



BATT A7
(8W-10-13)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
7
FUSE
5
10A
(8W-12-11)
8
6
C10
12
C9
JR27
JR41
M1
18
PK
M1
20
PK
S302
(8W-12-12)
S302
(8W-12-12)
M1
18
PK
M1
20
PK
M1
18
PK
M1
20
PK
2
TRUNK LAMP
1
G78
18
TN/BK
S300
(8W-45-11)
G78
18
TN/BK
3
DECKLID RELEASE SOLENOID/ AJAR SWITCH
(8W-45-11)
A
LEFT VISOR/ VANITY LAMPS
GARAGE DOOR OPENER
B
A
RIGHT VISOR/ VANITY LAMPS
B
JR27
JR41
G38
18
GY
Z312
20
BK
JR41
JR27
Z312
20
BK
Z312
18
BK
3
C307
S303 (PREMIUM)
(8W-15-18)
G38
18
GY
Z312
18
BK
14
C4
GARAGE DOOR OPENER ENABLE
BODY CONTROL MODULE
(8W-45-15)
4
C10
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
3
C9
Z313
14
BK
G301
(8W-15-11)
(8W-15-12)
(8W-15-20)



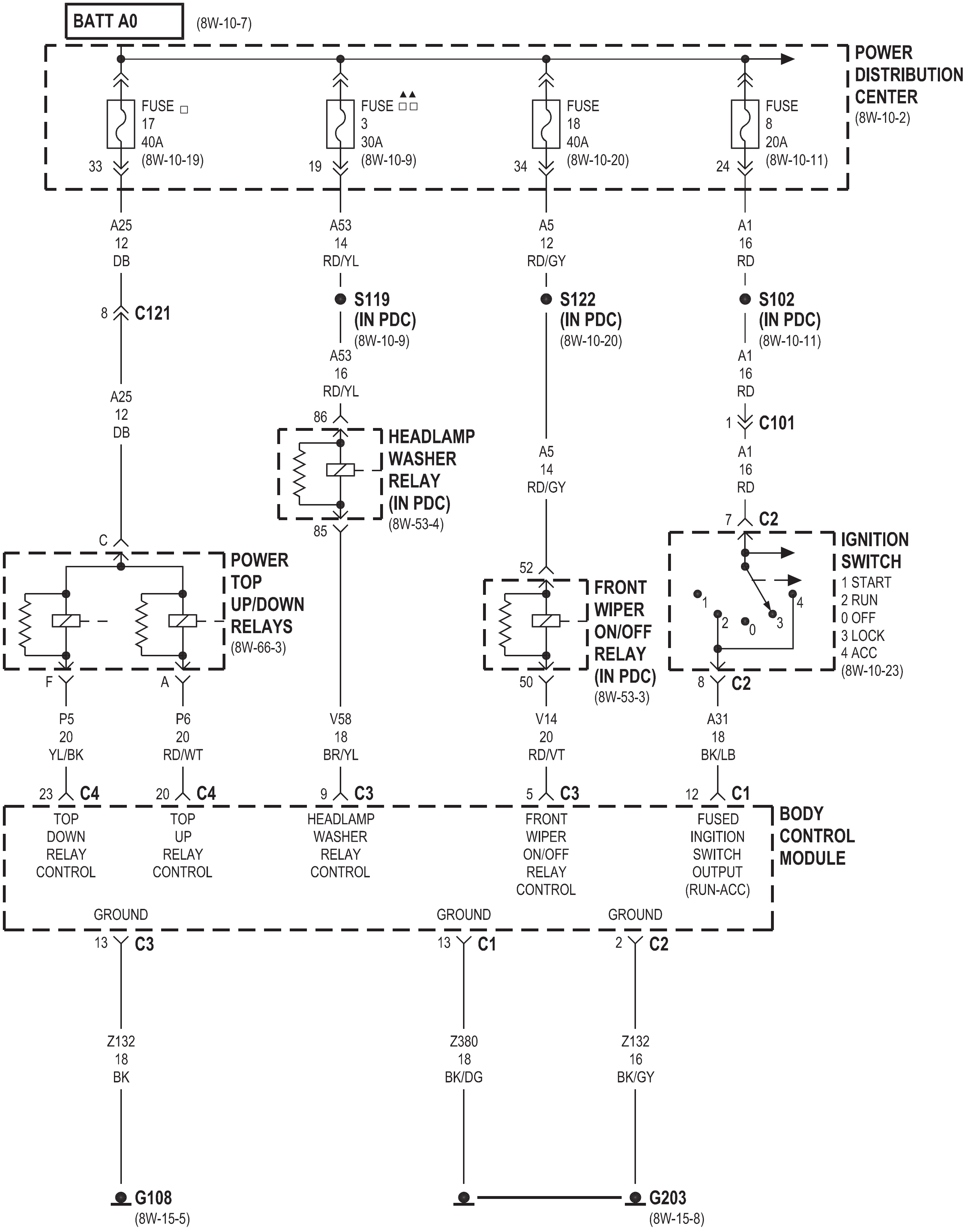
BATT A7
(8W-10-13)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
7
FUSE 5 10A (8W-12-11)
8
BODY CONTROL MODULE
(8W-45-4)
(8W-45-7)
FUSED B(+)
PANEL LAMPS DRIVER
PANEL LAMPS DRIVER
12 JB
19 C4
13 C2
E2 20 OR
E2 20 OR/WT
13 C5
M1 16 PK/DB
S211
(8W-12-11)
M1 20 PK
TRANSMISSION RANGE INDICATOR ILLUMINATION (PRNDL)
1
2
ASH RECEIVER LAMP
1
2
POWER TOP SWITCH
(8W-66-2)
GROUND
2
GLOVE BOX LAMP
2
1
JR27
JR41
Z249 20 BK
Z157 18 BK
Z157 20 BK
Z158 20 BK/LG
BASE
PREMIUM
6 C312
S313 (8W-15-11)
S313 (8W-15-12)
S313 (8W-15-20)
Z152 20 BK/YL
Z249 18 BK
Z316 14 BK
Z316 14 BK
Z157 14 BK
G203 (8W-15-9)
G301 (8W-15-11)
G301 (8W-15-11)
G301 (8W-15-12)
G301 (8W-15-20)
G203 (8W-15-8)


OFF-RUN-START A81
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
20
FUSE
11
10A
(8W-12-17)
19
10 C7
F11
18
RD/WT
S210
(8W-12-17)
F11
20
RD/WT
7 C1
E2
20
OR
4 C1
A/C-HEATER CONTROL
(8W-42-2)
A/C-HEATER CONTROL ILLUMINATION
MULTI-FUNCTION SWITCH
DIMMER SWITCH
9 C2
C57
20
DB/GY
S212
(8W-45-10)
C57
20
DB/GY
8 C2
E19
20
RD
22 C2
10 C2
1 C1
PANEL LAMPS DRIVER
SENSOR RETURN
PANEL LAMPS DIMMER SIGNAL
BODY CONTROL MODULE
(8W-45-7)
(8W-45-10)
PANEL LAMPS DRIVER
12 C2
E2
20
OR
12
INSTRUMENT CLUSTER
(8W-40-2)
(8W-40-6)
CLUSTER ILLUMINATION LAMPS
11
Z106
18
BK/OR
2 C4
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
3 C9
Z313
14
BK
G301
(8W-15-11)
(8W-15-12)
(8W-15-20)

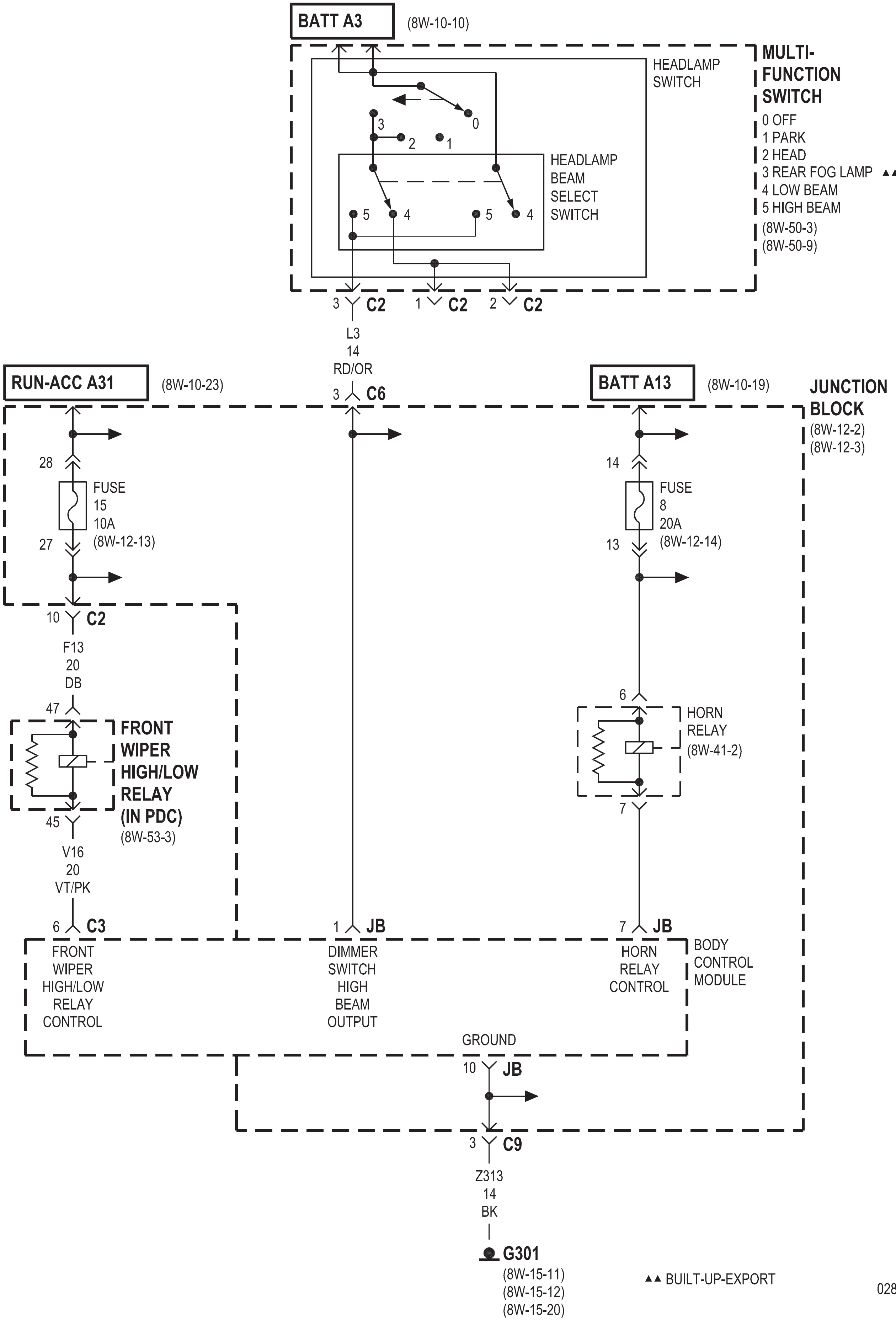
8W-45 BODY CONTROL MODULE

Component **Page**

Component **Page**



□ JR27
□□ JR41
▲▲ BUILT-UP-EXPORT



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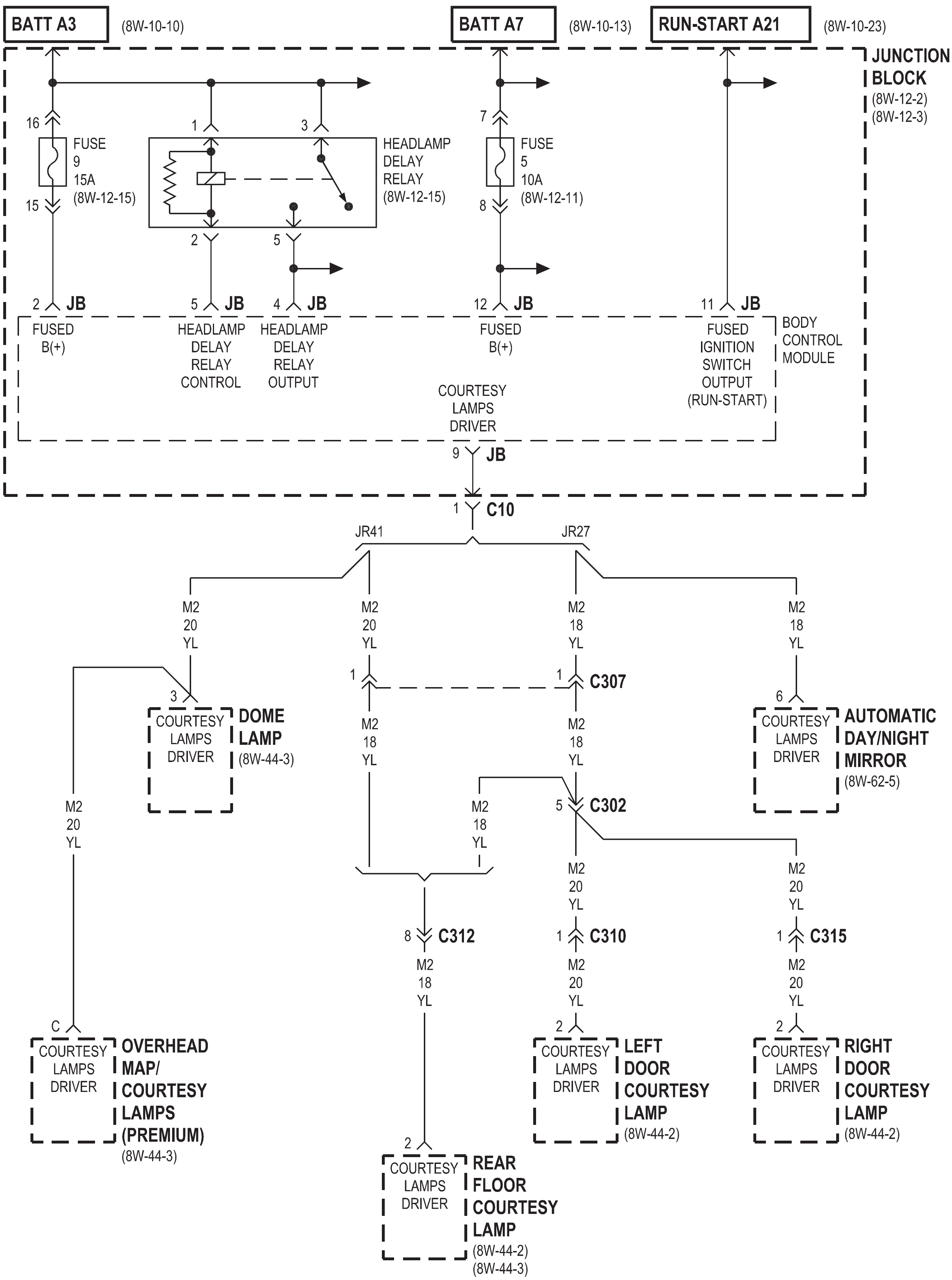
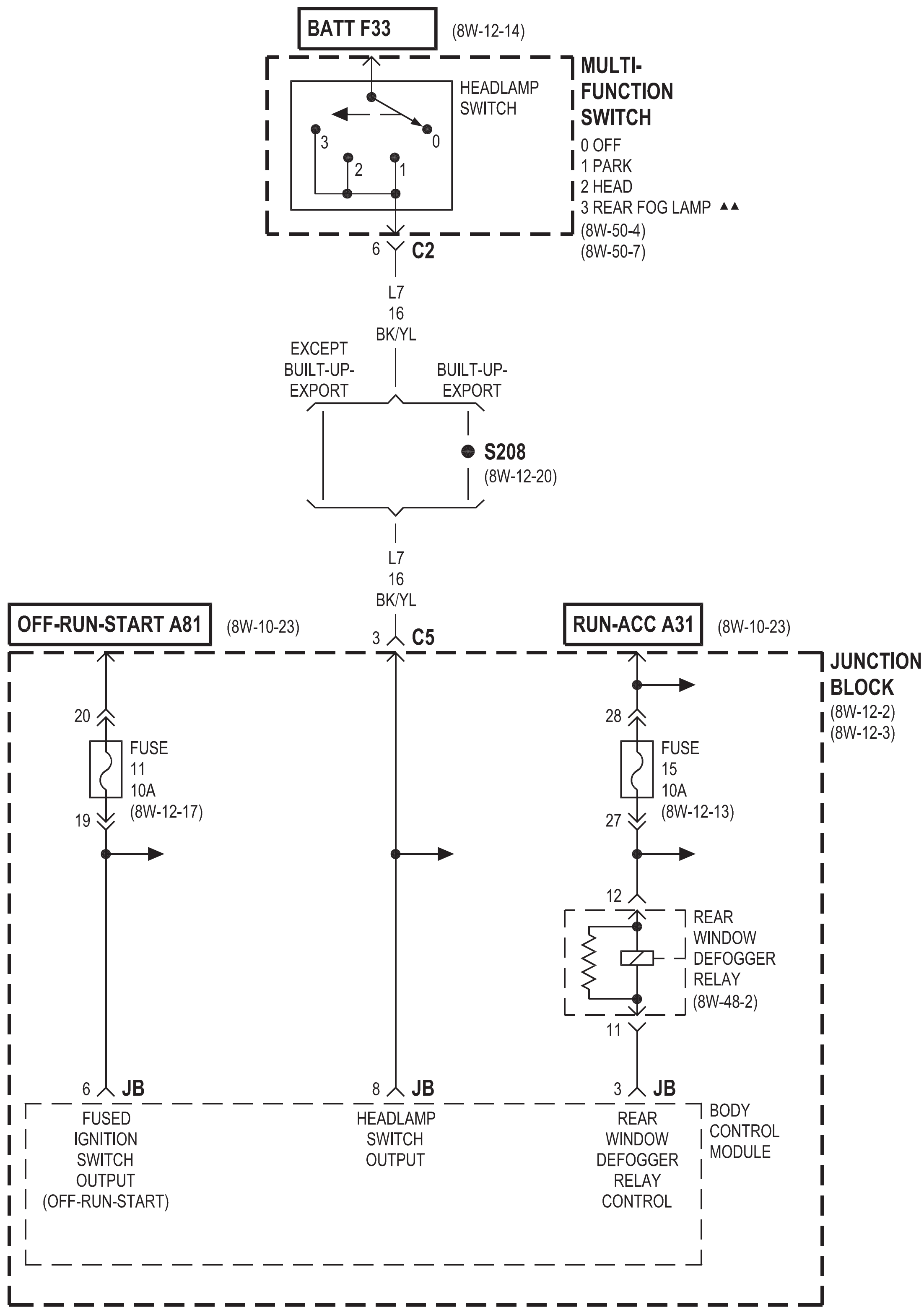
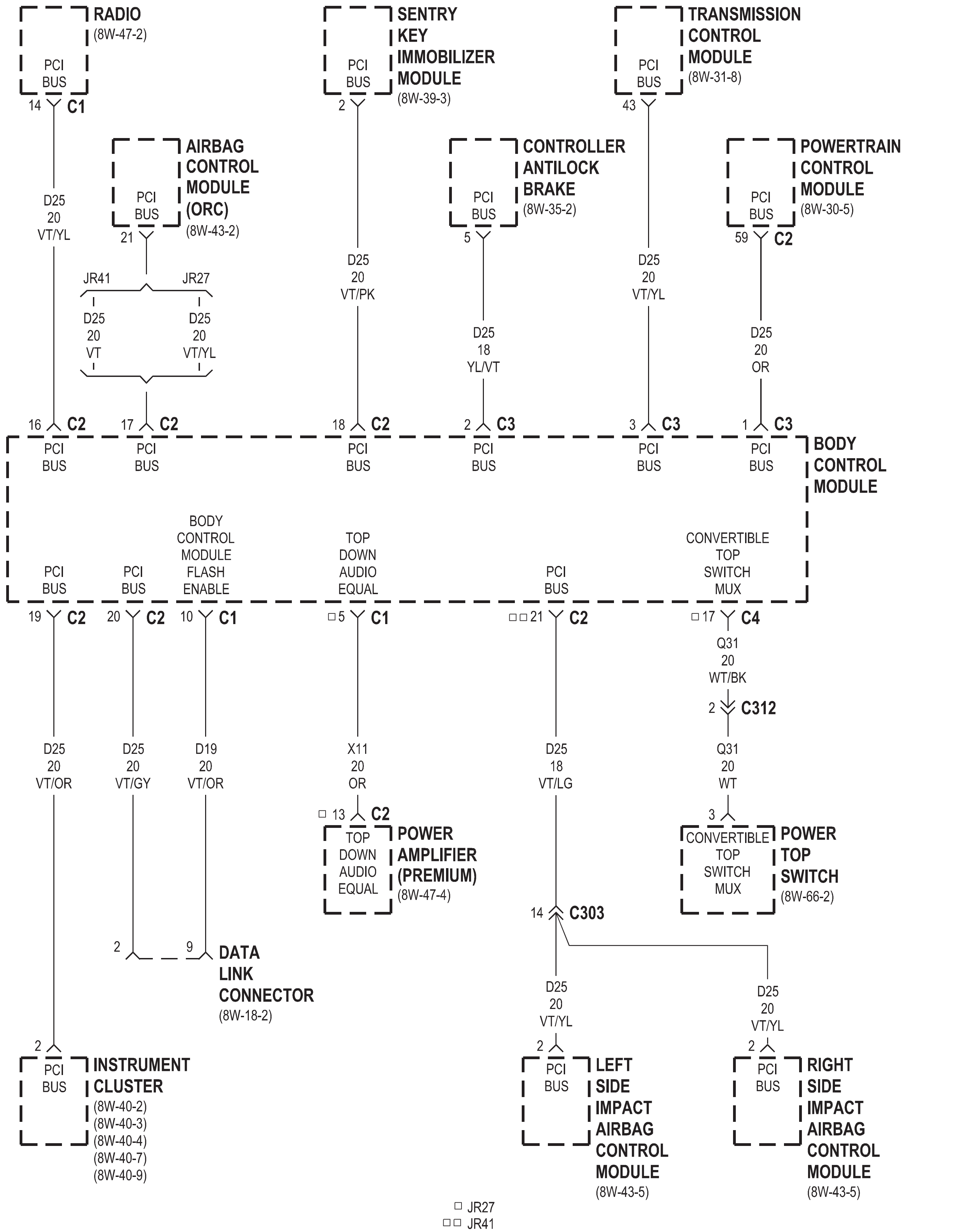
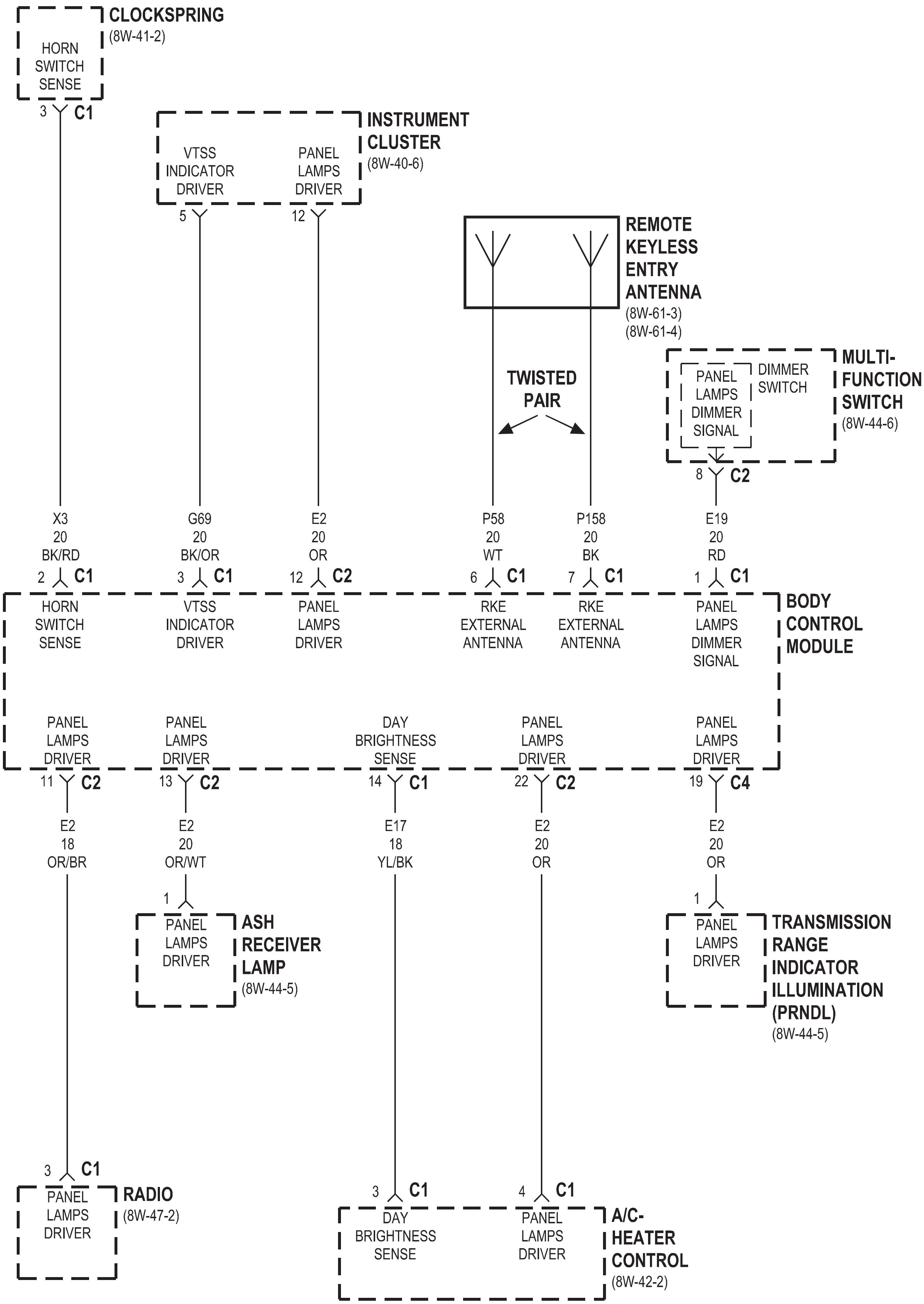


028W-16 JRI04504

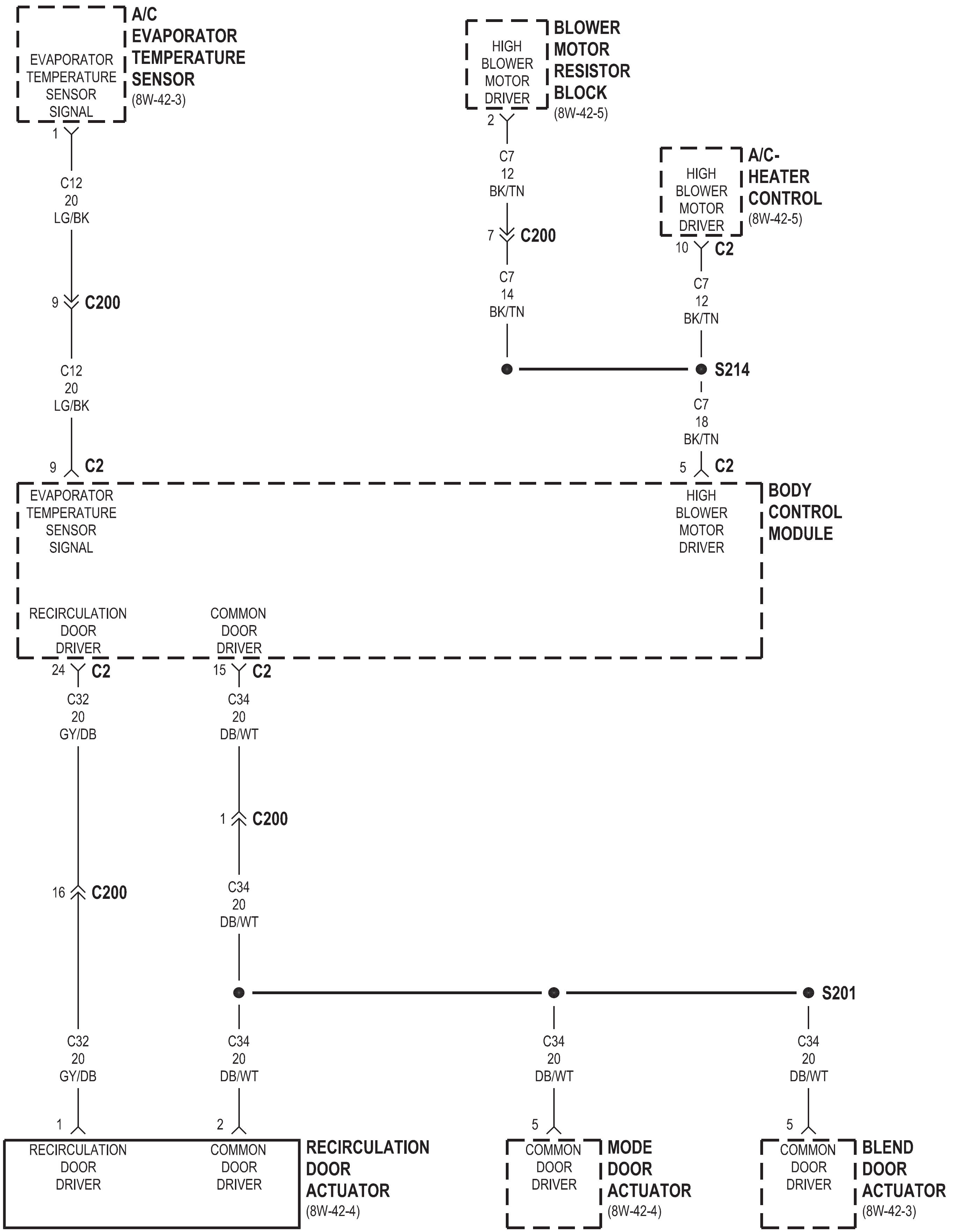


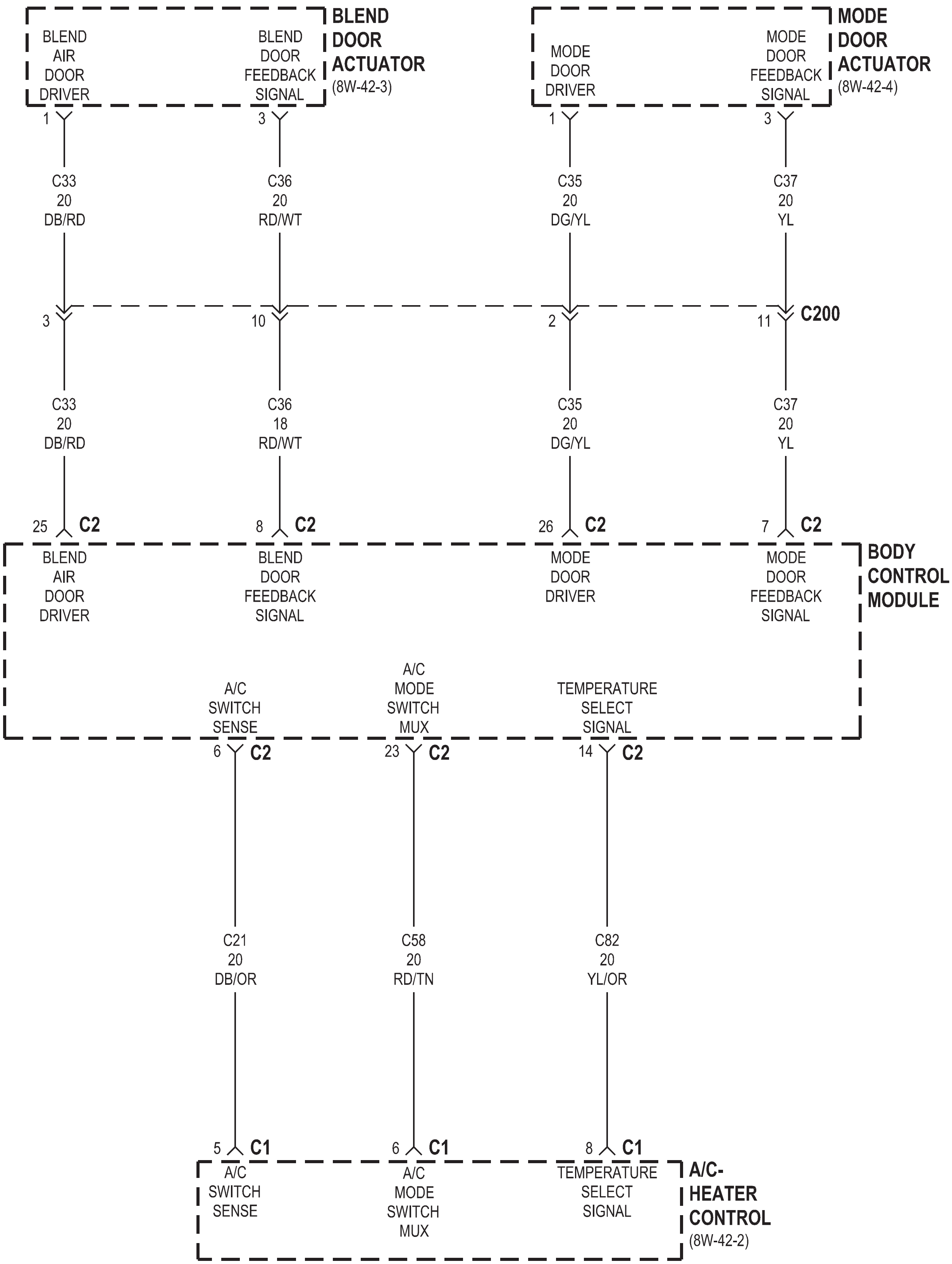
▲▲ BUILT-UP-EXPORT

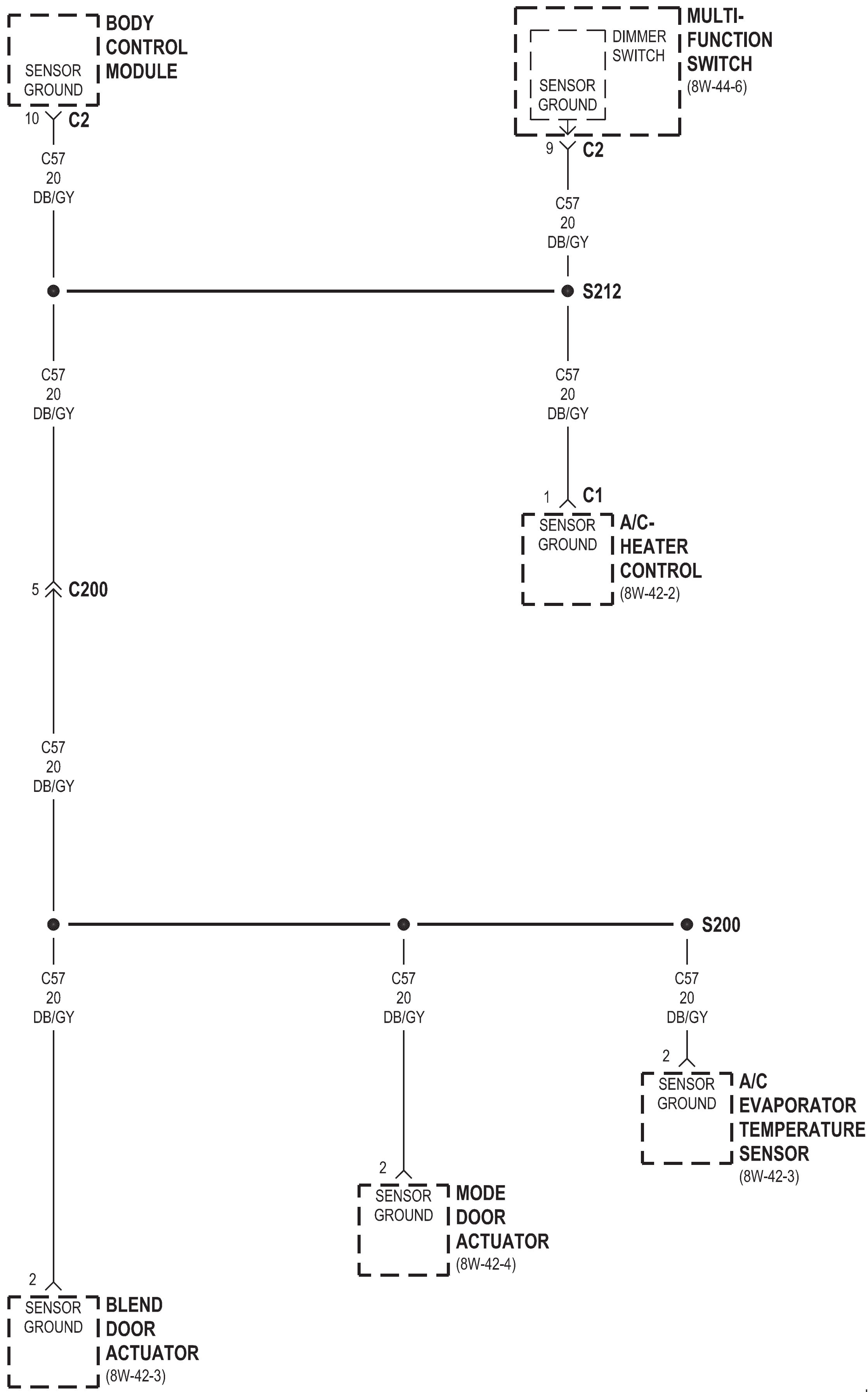

RADIO
(8W-47-2)
PCI BUS
14 C1
D25 20 VT/YL
AIRBAG CONTROL MODULE (ORC)
(8W-43-2)
PCI BUS
21
JR41
JR27
D25 20 VT
D25 20 VT/YL
SENTRY KEY IMMOBILIZER MODULE
(8W-39-3)
PCI BUS
2
D25 20 VT/PK
CONTROLLER ANTILOCK BRAKE
(8W-35-2)
PCI BUS
5
D25 18 YL/VT
TRANSMISSION CONTROL MODULE
(8W-31-8)
PCI BUS
43
D25 20 VT/YL
POWERTRAIN CONTROL MODULE
(8W-30-5)
PCI BUS
59 C2
D25 20 OR
16 C2
17 C2
18 C2
2 C3
3 C3
1 C3
BODY CONTROL MODULE
PCI BUS
BODY CONTROL MODULE FLASH ENABLE
TOP DOWN AUDIO EQUAL
CONVERTIBLE TOP SWITCH MUX
19 C2
20 C2
10 C1
□ 5 C1
□□ 21 C2
□ 17 C4
Q31 20 WT/BK
2 C312
Q31 20 WT
D25 20 VT/OR
D25 20 VT/GY
D19 20 VT/OR
X11 20 OR
D25 18 VT/LG
□ 13 C2
POWER AMPLIFIER (PREMIUM)
(8W-47-4)
3
POWER TOP SWITCH
(8W-66-2)
14 C303
2
9
DATA LINK CONNECTOR
(8W-18-2)
D25 20 VT/YL
D25 20 VT/YL
2
INSTRUMENT CLUSTER
(8W-40-2)
(8W-40-3)
(8W-40-4)
(8W-40-7)
(8W-40-9)
LEFT SIDE IMPACT AIRBAG CONTROL MODULE
(8W-43-5)
RIGHT SIDE IMPACT AIRBAG CONTROL MODULE
(8W-43-5)
□ JR27
□□ JR41

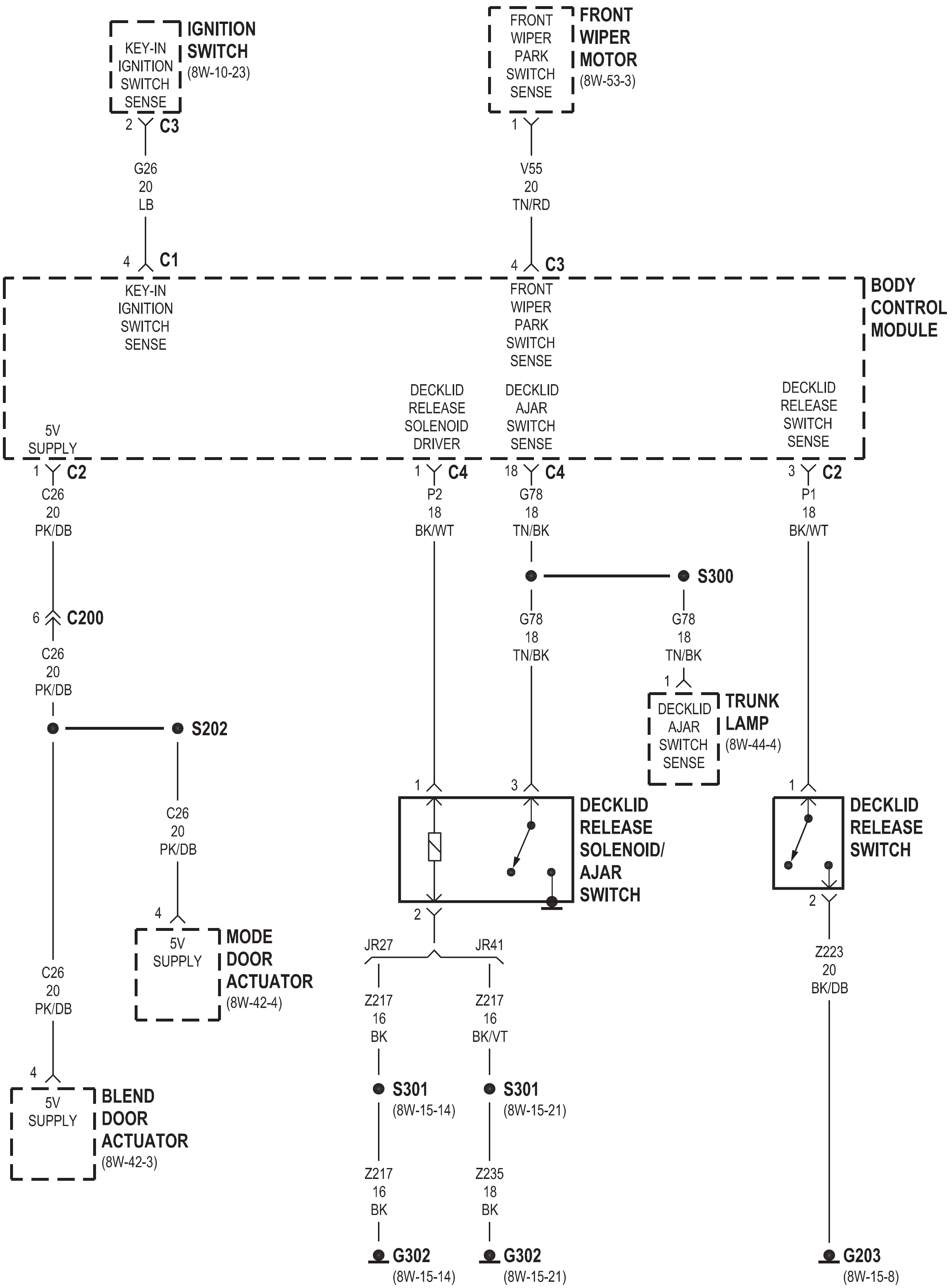

CLOCKSPRING
(8W-41-2)
HORN SWITCH SENSE
3 C1
INSTRUMENT CLUSTER
(8W-40-6)
VTSS INDICATOR DRIVER
PANEL LAMPS DRIVER
5
12
REMOTE KEYLESS ENTRY ANTENNA
(8W-61-3)
(8W-61-4)
TWISTED PAIR
MULTI-FUNCTION SWITCH
(8W-44-6)
PANEL LAMPS DIMMER SIGNAL
DIMMER SWITCH
8 C2
X3 20 BK/RD
G69 20 BK/OR
E2 20 OR
P58 20 WT
P158 20 BK
E19 20 RD
2 C1
3 C1
12 C2
6 C1
7 C1
1 C1
BODY CONTROL MODULE
HORN SWITCH SENSE
VTSS INDICATOR DRIVER
PANEL LAMPS DRIVER
RKE EXTERNAL ANTENNA
RKE EXTERNAL ANTENNA
PANEL LAMPS DIMMER SIGNAL
PANEL LAMPS DRIVER
PANEL LAMPS DRIVER
DAY BRIGHTNESS SENSE
PANEL LAMPS DRIVER
PANEL LAMPS DRIVER
11 C2
13 C2
14 C1
22 C2
19 C4
E2 18 OR/BR
E2 20 OR/WT
E17 18 YL/BK
E2 20 OR
E2 20 OR
1
PANEL LAMPS DRIVER
ASH RECEIVER LAMP
(8W-44-5)
1
PANEL LAMPS DRIVER
TRANSMISSION RANGE INDICATOR ILLUMINATION (PRNDL)
(8W-44-5)
3 C1
PANEL LAMPS DRIVER
RADIO
(8W-47-2)
3 C1
4 C1
DAY BRIGHTNESS SENSE
PANEL LAMPS DRIVER
A/C-HEATER CONTROL
(8W-42-2)

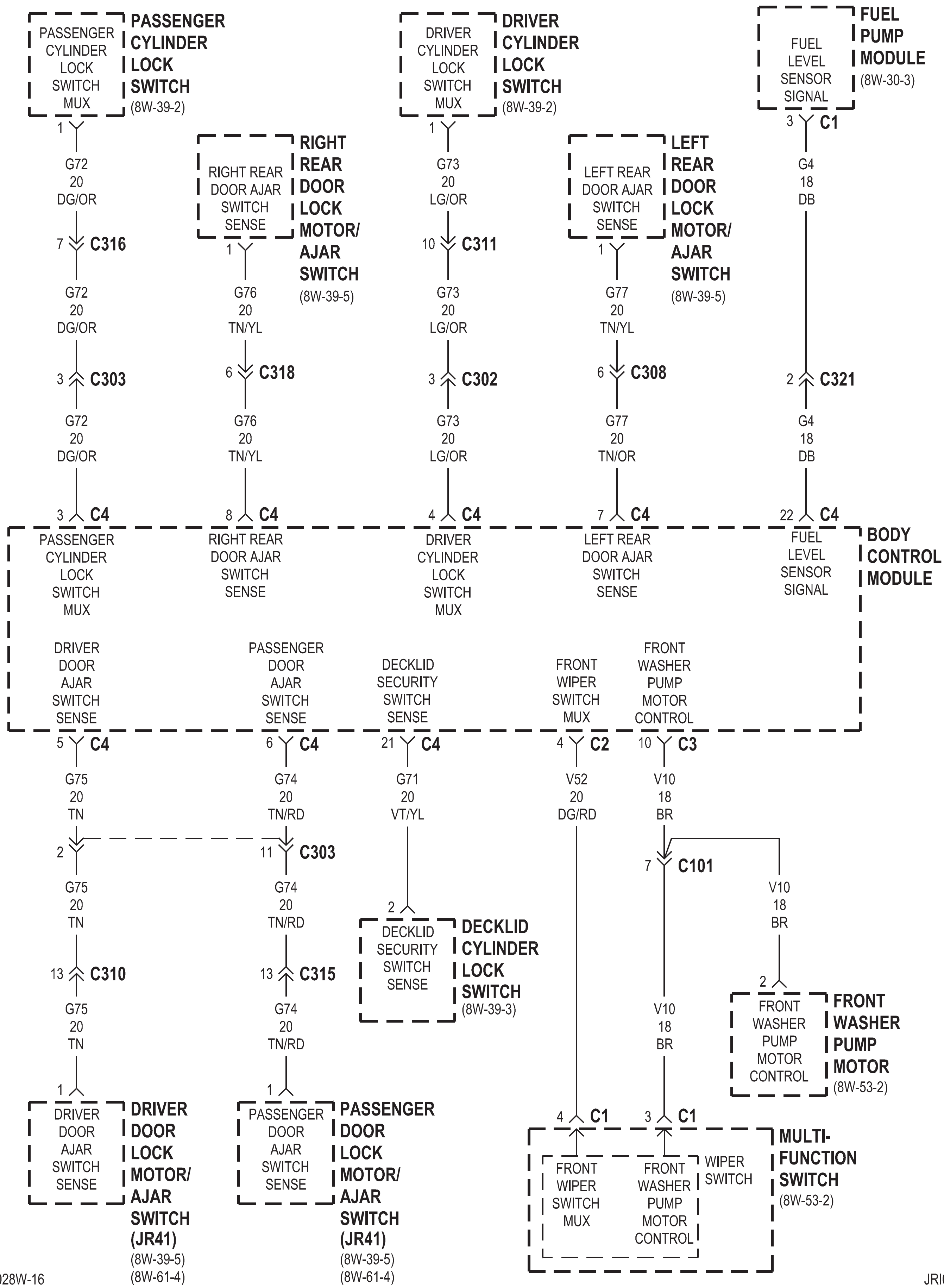
JRI04507


A/C EVAPORATOR TEMPERATURE SENSOR
(8W-42-3)
EVAPORATOR TEMPERATURE SENSOR SIGNAL
1
C12 20 LG/BK
9 C200
C12 20 LG/BK
9 C2
BLOWER MOTOR RESISTOR BLOCK
(8W-42-5)
HIGH BLOWER MOTOR DRIVER
2
C7 12 BK/TN
7 C200
C7 14 BK/TN
A/C-HEATER CONTROL
(8W-42-5)
HIGH BLOWER MOTOR DRIVER
10 C2
C7 12 BK/TN
S214
C7 18 BK/TN
5 C2
BODY CONTROL MODULE
EVAPORATOR TEMPERATURE SENSOR SIGNAL
HIGH BLOWER MOTOR DRIVER
RECIRCULATION DOOR DRIVER
COMMON DOOR DRIVER
24 C2
15 C2
C32 20 GY/DB
C34 20 DB/WT
1 C200
16 C200
C34 20 DB/WT
S201
C32 20 GY/DB
C34 20 DB/WT
C34 20 DB/WT
C34 20 DB/WT
1
2
5
5
RECIRCULATION DOOR DRIVER
COMMON DOOR DRIVER
RECIRCULATION DOOR ACTUATOR
(8W-42-4)
COMMON DOOR DRIVER
MODE DOOR ACTUATOR
(8W-42-4)
COMMON DOOR DRIVER
BLEND DOOR ACTUATOR
(8W-42-3)

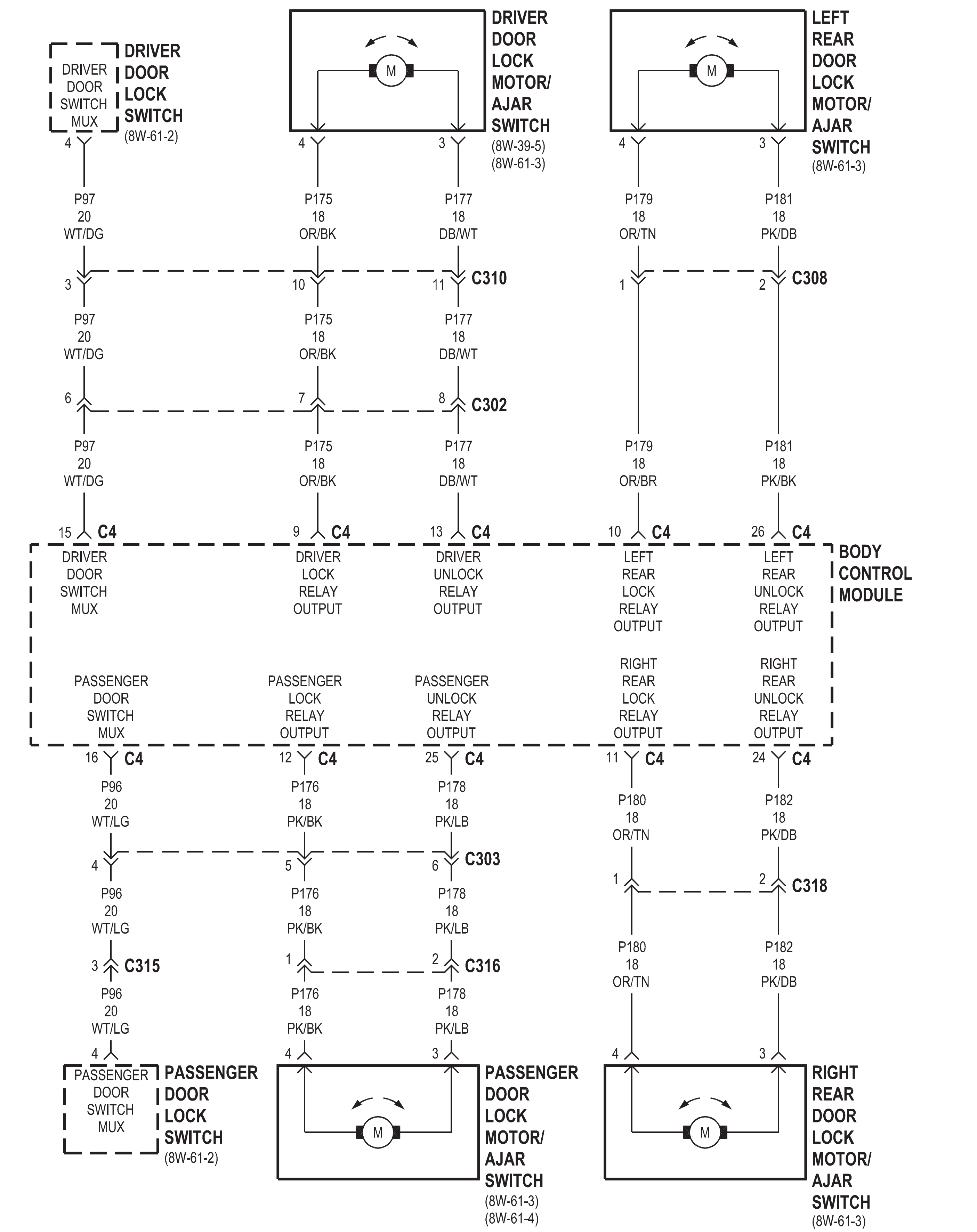

BLEND DOOR ACTUATOR
(8W-42-3)
BLEND AIR DOOR DRIVER
BLEND DOOR FEEDBACK SIGNAL
MODE DOOR ACTUATOR
(8W-42-4)
MODE DOOR DRIVER
MODE DOOR FEEDBACK SIGNAL
1
3
1
3
C33 20 DB/RD
C36 20 RD/WT
C35 20 DG/YL
C37 20 YL
3
10
2
11
C200
C33 20 DB/RD
C36 18 RD/WT
C35 20 DG/YL
C37 20 YL
25 C2
8 C2
26 C2
7 C2
BODY CONTROL MODULE
BLEND AIR DOOR DRIVER
BLEND DOOR FEEDBACK SIGNAL
MODE DOOR DRIVER
MODE DOOR FEEDBACK SIGNAL
A/C SWITCH SENSE
A/C MODE SWITCH MUX
TEMPERATURE SELECT SIGNAL
6 C2
23 C2
14 C2
C21 20 DB/OR
C58 20 RD/TN
C82 20 YL/OR
5 C1
6 C1
8 C1
A/C SWITCH SENSE
A/C MODE SWITCH MUX
TEMPERATURE SELECT SIGNAL
A/C-HEATER CONTROL
(8W-42-2)


BODY
CONTROL
MODULE
SENSOR
GROUND
10
C2
C57
20
DB/GY
MULTI-
FUNCTION
SWITCH
(8W-44-6)
DIMMER
SWITCH
SENSOR
GROUND
9
C2
C57
20
DB/GY
S212
C57
20
DB/GY
C57
20
DB/GY
1
C1
SENSOR
GROUND
A/C-
HEATER
CONTROL
(8W-42-2)
5
C200
C57
20
DB/GY
S200
C57
20
DB/GY
C57
20
DB/GY
C57
20
DB/GY
2
SENSOR
GROUND
A/C
EVAPORATOR
TEMPERATURE
SENSOR
(8W-42-3)
2
SENSOR
GROUND
MODE
DOOR
ACTUATOR
(8W-42-4)
2
SENSOR
GROUND
BLEND
DOOR
ACTUATOR
(8W-42-3)


KEY-IN IGNITION SWITCH SENSE
IGNITION SWITCH
(8W-10-23)
2 C3
G26 20 LB
4 C1
FRONT WIPER PARK SWITCH SENSE
FRONT WIPER MOTOR
(8W-53-3)
1
V55 20 TN/RD
4 C3
BODY CONTROL MODULE
KEY-IN IGNITION SWITCH SENSE
FRONT WIPER PARK SWITCH SENSE
5V SUPPLY
DECKLID RELEASE SOLENOID DRIVER
DECKLID AJAR SWITCH SENSE
DECKLID RELEASE SWITCH SENSE
1 C2
1 C4
18 C4
3 C2
C26 20 PK/DB
P2 18 BK/WT
G78 18 TN/BK
P1 18 BK/WT
S300
6 C200
G78 18 TN/BK
G78 18 TN/BK
C26 20 PK/DB
1
DECKLID AJAR SWITCH SENSE
TRUNK LAMP
(8W-44-4)
S202
C26 20 PK/DB
1
3
1
DECKLID RELEASE SOLENOID/ AJAR SWITCH
DECKLID RELEASE SWITCH
2
2
4
5V SUPPLY
MODE DOOR ACTUATOR
(8W-42-4)
JR27
JR41
Z223 20 BK/DB
C26 20 PK/DB
Z217 16 BK
Z217 16 BK/VT
4
5V SUPPLY
BLEND DOOR ACTUATOR
(8W-42-3)
S301
(8W-15-14)
S301
(8W-15-21)
Z217 16 BK
Z235 18 BK
G302
(8W-15-14)
G302
(8W-15-21)
G203
(8W-15-8)

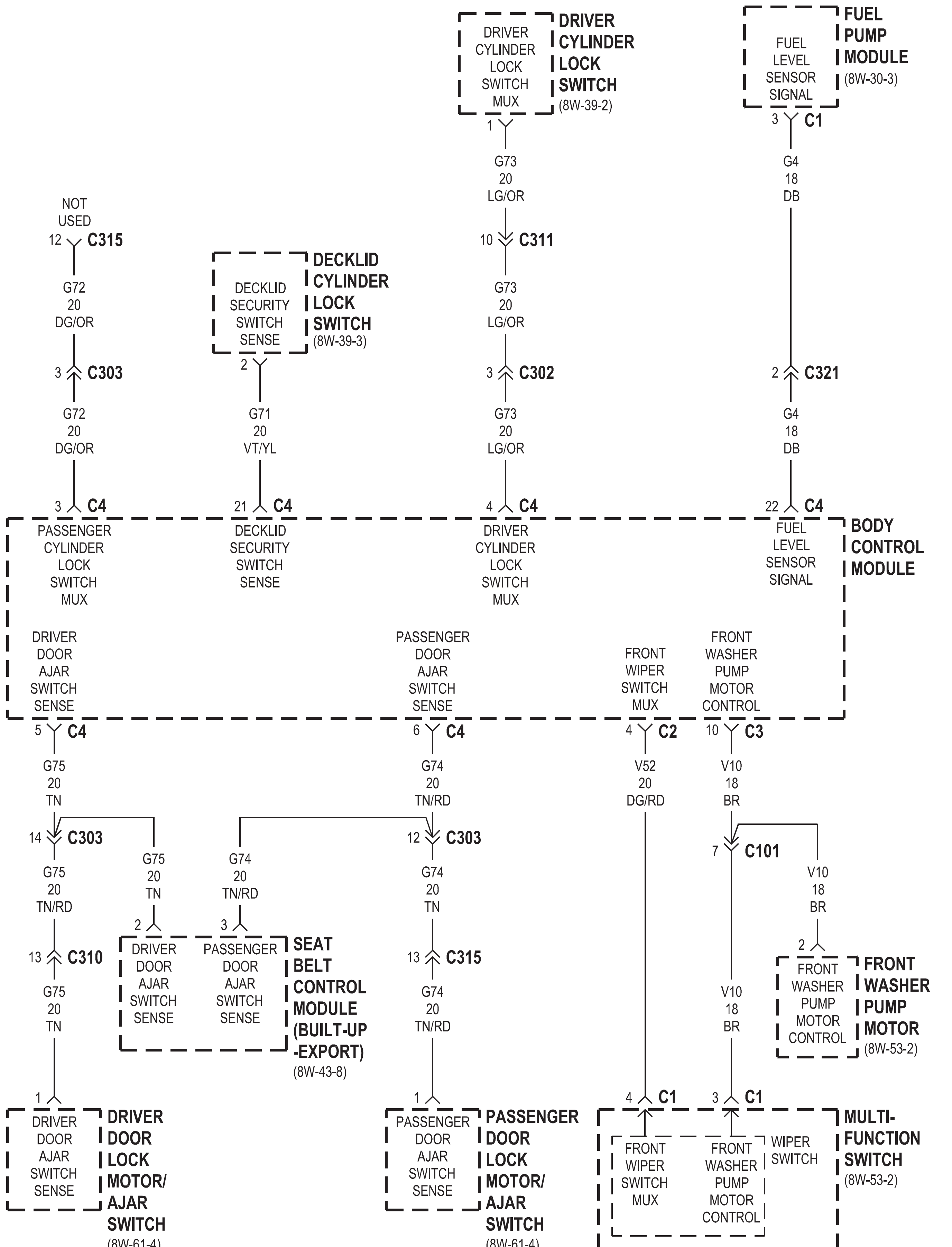

PASSENGER CYLINDER LOCK SWITCH MUX
PASSENGER CYLINDER LOCK SWITCH (8W-39-2)
RIGHT REAR DOOR AJAR SWITCH SENSE
RIGHT REAR DOOR LOCK MOTOR/ AJAR SWITCH (8W-39-5)
DRIVER CYLINDER LOCK SWITCH MUX
DRIVER CYLINDER LOCK SWITCH (8W-39-2)
LEFT REAR DOOR AJAR SWITCH SENSE
LEFT REAR DOOR LOCK MOTOR/ AJAR SWITCH (8W-39-5)
FUEL LEVEL SENSOR SIGNAL
FUEL PUMP MODULE (8W-30-3)
C1
G72 20 DG/OR
G76 20 TN/YL
G73 20 LG/OR
G77 20 TN/YL
G77 20 TN/OR
G4 18 DB
C316
C318
C311
C308
C303
C302
C321
C4
BODY CONTROL MODULE
PASSENGER CYLINDER LOCK SWITCH MUX
RIGHT REAR DOOR AJAR SWITCH SENSE
DRIVER CYLINDER LOCK SWITCH MUX
LEFT REAR DOOR AJAR SWITCH SENSE
FUEL LEVEL SENSOR SIGNAL
DRIVER DOOR AJAR SWITCH SENSE
PASSENGER DOOR AJAR SWITCH SENSE
DECKLID SECURITY SWITCH SENSE
FRONT WIPER SWITCH MUX
FRONT WASHER PUMP MOTOR CONTROL
C2
C3
G75 20 TN
G74 20 TN/RD
G71 20 VT/YL
V52 20 DG/RD
V10 18 BR
C101
C310
C315
DECKLID SECURITY SWITCH SENSE
DECKLID CYLINDER LOCK SWITCH (8W-39-3)
FRONT WASHER PUMP MOTOR CONTROL
FRONT WASHER PUMP MOTOR (8W-53-2)
DRIVER DOOR AJAR SWITCH SENSE
DRIVER DOOR LOCK MOTOR/ AJAR SWITCH (JR41) (8W-39-5) (8W-61-4)
PASSENGER DOOR AJAR SWITCH SENSE
PASSENGER DOOR LOCK MOTOR/ AJAR SWITCH (JR41) (8W-39-5) (8W-61-4)
FRONT WIPER SWITCH MUX
FRONT WASHER PUMP MOTOR CONTROL
WIPER SWITCH
MULTI-FUNCTION SWITCH (8W-53-2)

JR41



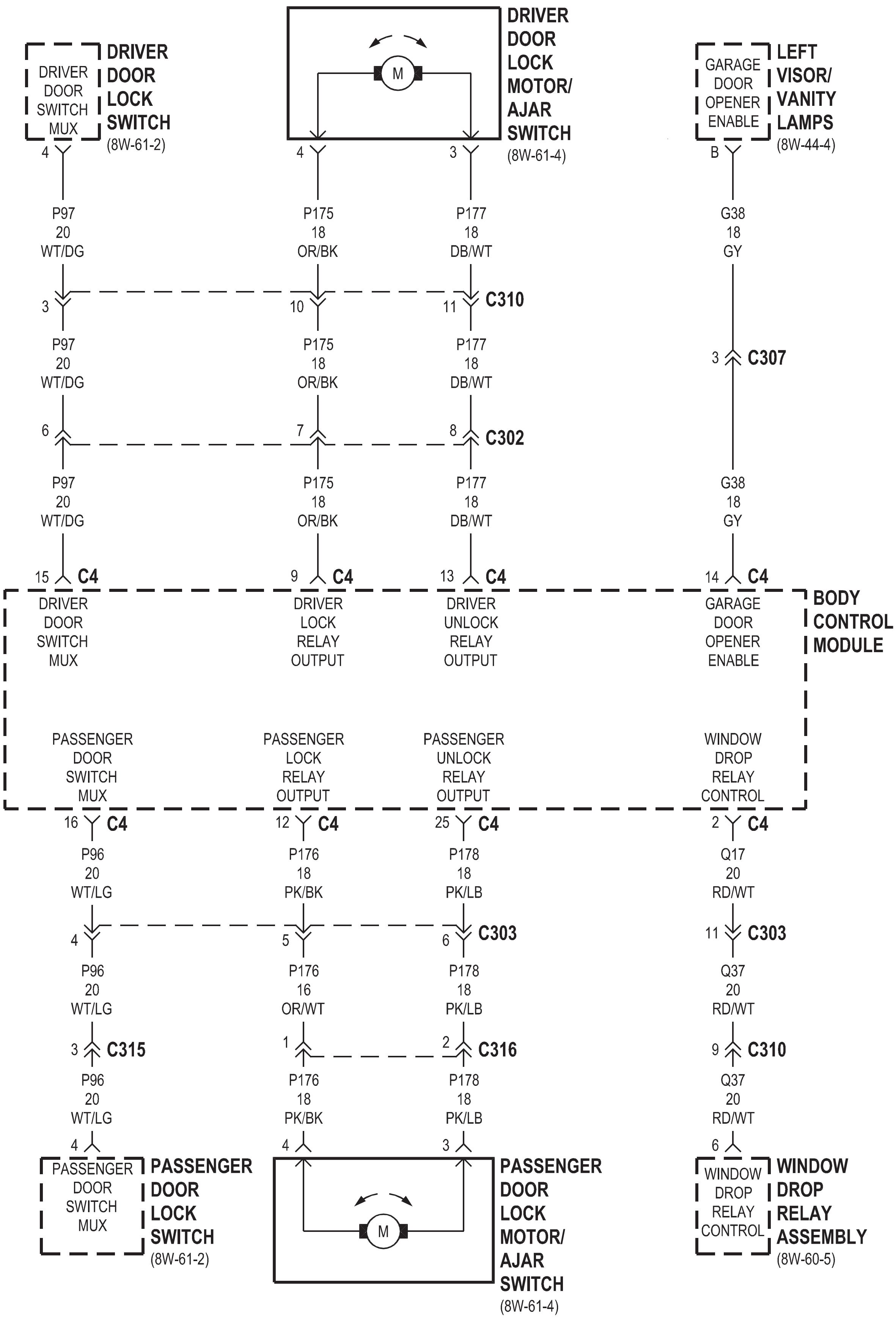
JRI04513

JR27

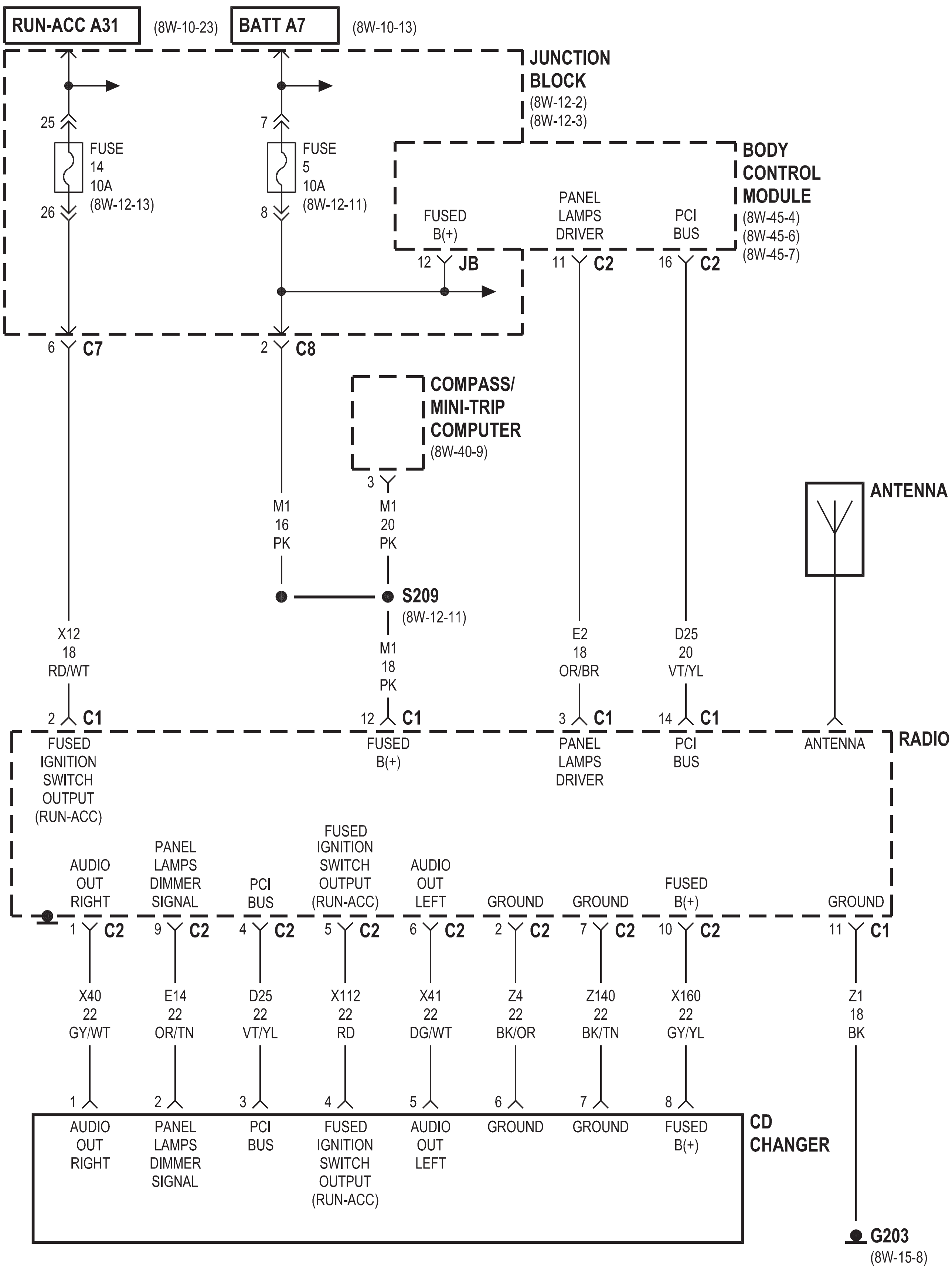


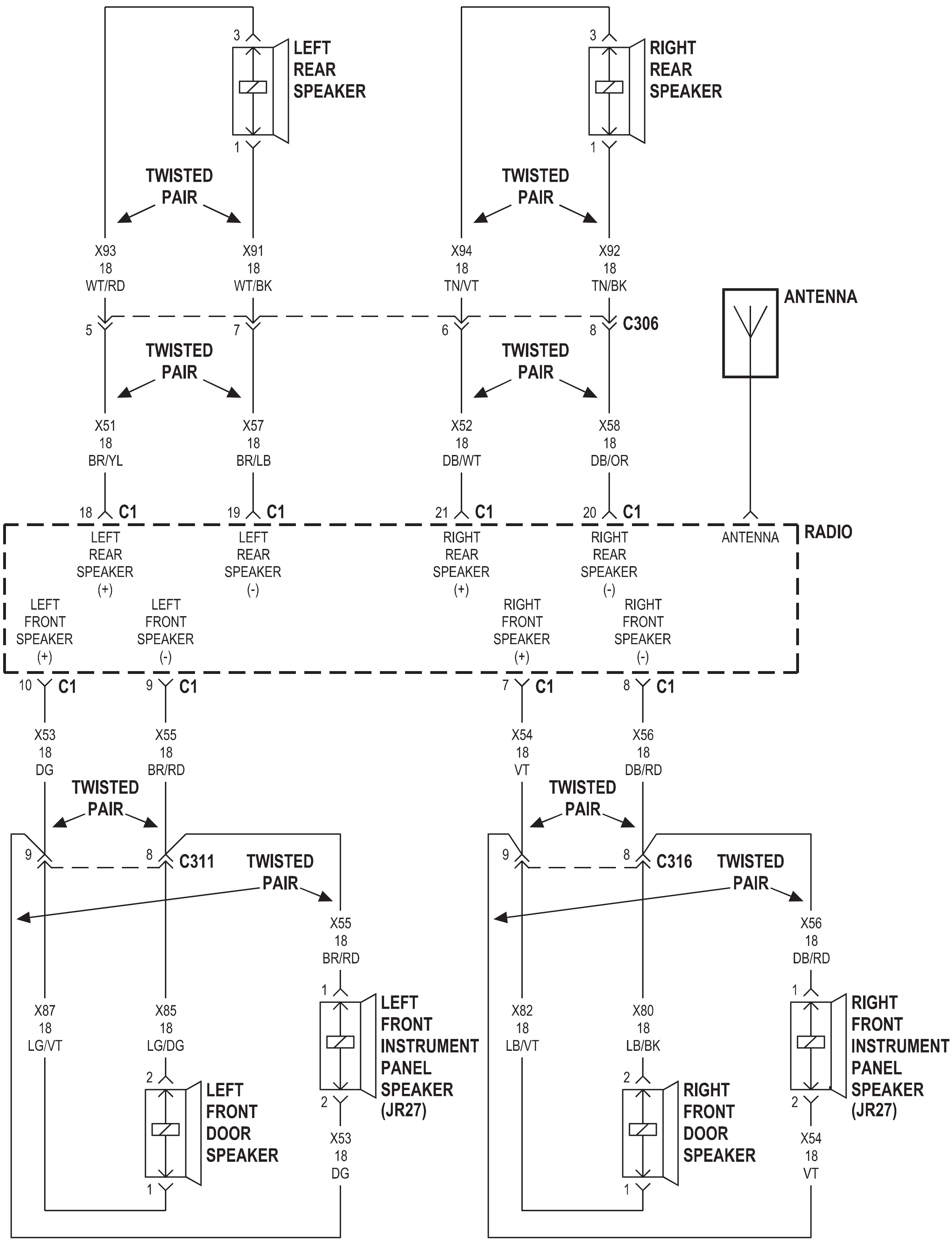
028W-16 JRI04514

JR27

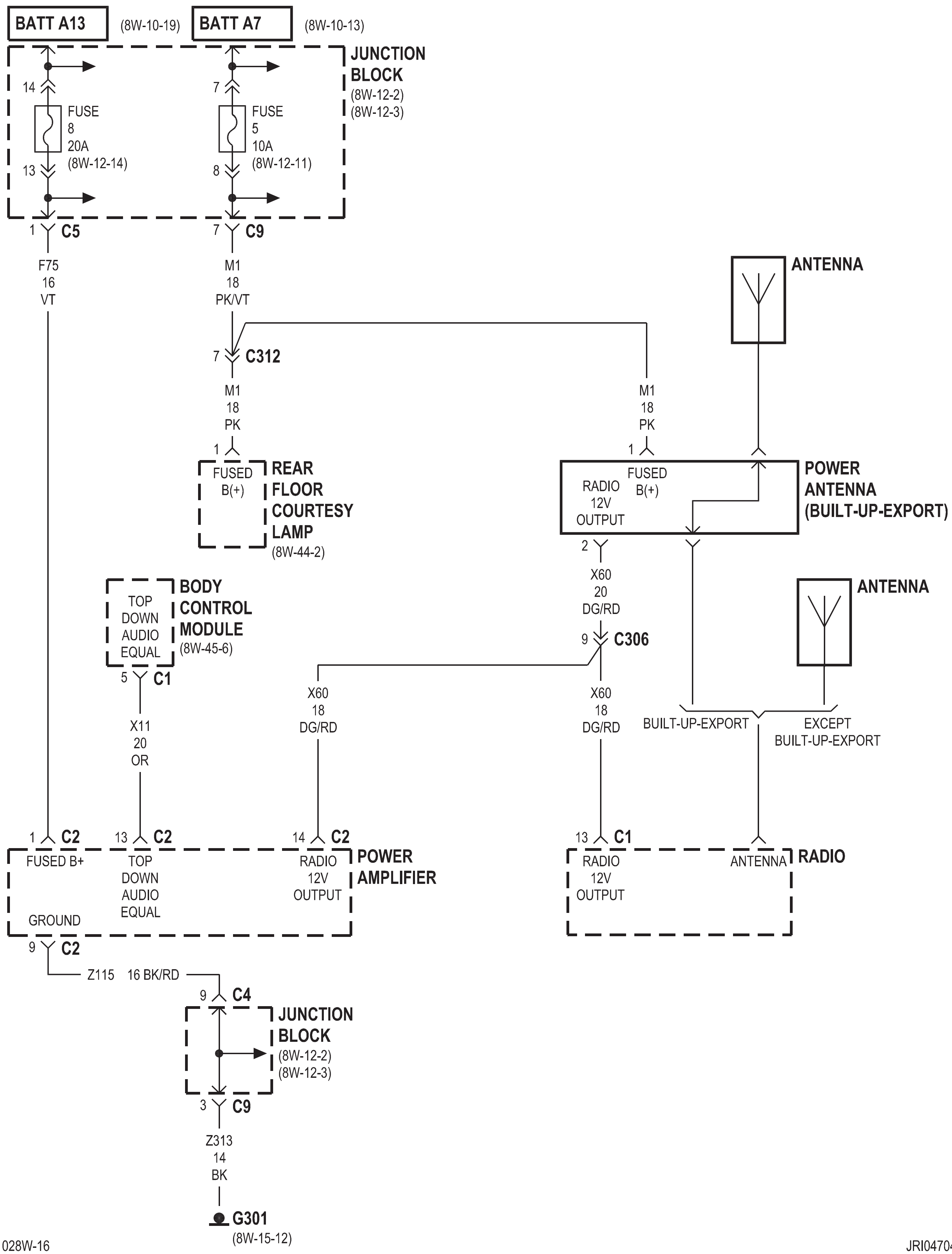

DRIVER DOOR SWITCH MUX
DRIVER DOOR LOCK SWITCH
(8W-61-2)
DRIVER DOOR LOCK MOTOR/ AJAR SWITCH
(8W-61-4)
M
GARAGE DOOR OPENER ENABLE
LEFT VISOR/ VANITY LAMPS
(8W-44-4)
4
3
B
P97 20 WT/DG
P175 18 OR/BK
P177 18 DB/WT
G38 18 GY
3
10
11
C310
C307
6
7
8
C302
15 C4
9 C4
13 C4
14 C4
BODY CONTROL MODULE
DRIVER DOOR SWITCH MUX
DRIVER LOCK RELAY OUTPUT
DRIVER UNLOCK RELAY OUTPUT
GARAGE DOOR OPENER ENABLE
PASSENGER DOOR SWITCH MUX
PASSENGER LOCK RELAY OUTPUT
PASSENGER UNLOCK RELAY OUTPUT
WINDOW DROP RELAY CONTROL
16 C4
12 C4
25 C4
2 C4
P96 20 WT/LG
P176 18 PK/BK
P178 18 PK/LB
Q17 20 RD/WT
C303
11 C303
P176 16 OR/WT
Q37 20 RD/WT
C315
1
2
C316
9 C310
PASSENGER DOOR SWITCH MUX
PASSENGER DOOR LOCK SWITCH
(8W-61-2)
PASSENGER DOOR LOCK MOTOR/ AJAR SWITCH
(8W-61-4)
WINDOW DROP RELAY CONTROL
WINDOW DROP RELAY ASSEMBLY
(8W-60-5)

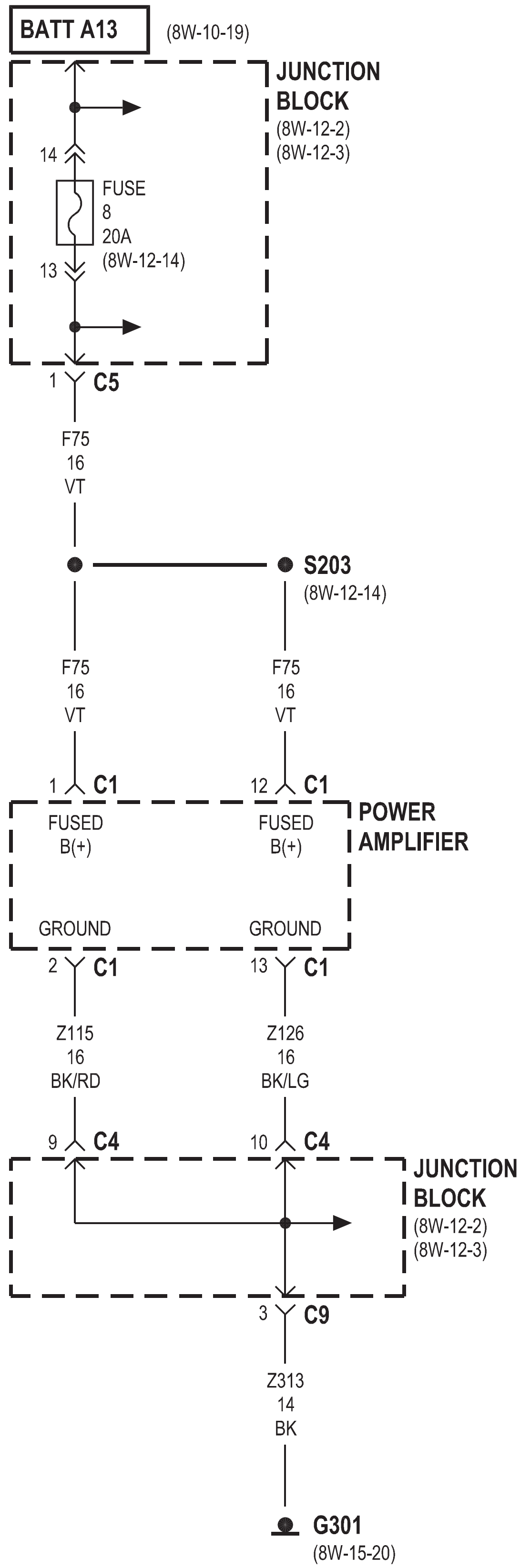
8W-47 AUDIO SYSTEM

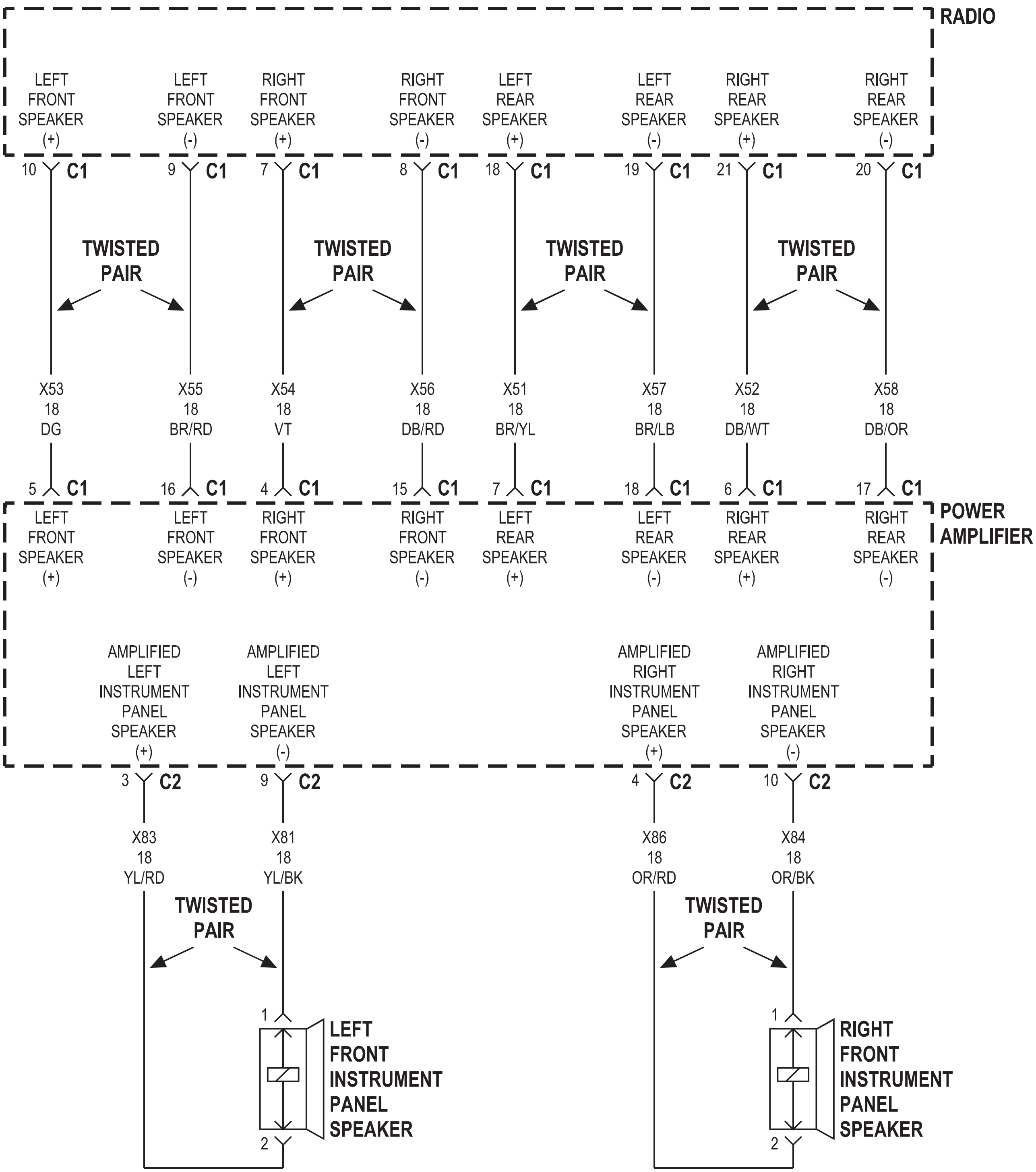

RUN-ACC A31
(8W-10-23)
BATT A7
(8W-10-13)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
25
FUSE 14 10A (8W-12-13)
26
7
FUSE 5 10A (8W-12-11)
8
BODY CONTROL MODULE
(8W-45-4)
(8W-45-6)
(8W-45-7)
FUSED B(+)
PANEL LAMPS DRIVER
PCI BUS
12 JB
11 C2
16 C2
6 C7
2 C8
COMPASS/ MINI-TRIP COMPUTER
(8W-40-9)
3
M1 16 PK
M1 20 PK
ANTENNA
S209
(8W-12-11)
X12 18 RD/WT
M1 18 PK
E2 18 OR/BR
D25 20 VT/YL
2 C1
12 C1
3 C1
14 C1
RADIO
FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
FUSED B(+)
PANEL LAMPS DRIVER
PCI BUS
ANTENNA
AUDIO OUT RIGHT
PANEL LAMPS DIMMER SIGNAL
PCI BUS
FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
AUDIO OUT LEFT
GROUND
GROUND
FUSED B(+)
GROUND
1 C2
9 C2
4 C2
5 C2
6 C2
2 C2
7 C2
10 C2
11 C1
X40 22 GY/WT
E14 22 OR/TN
D25 22 VT/YL
X112 22 RD
X41 22 DG/WT
Z4 22 BK/OR
Z140 22 BK/TN
X160 22 GY/YL
Z1 18 BK
1
2
3
4
5
6
7
8
CD CHANGER
AUDIO OUT RIGHT
PANEL LAMPS DIMMER SIGNAL
PCI BUS
FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
AUDIO OUT LEFT
GROUND
GROUND
FUSED B(+)
G203
(8W-15-8)

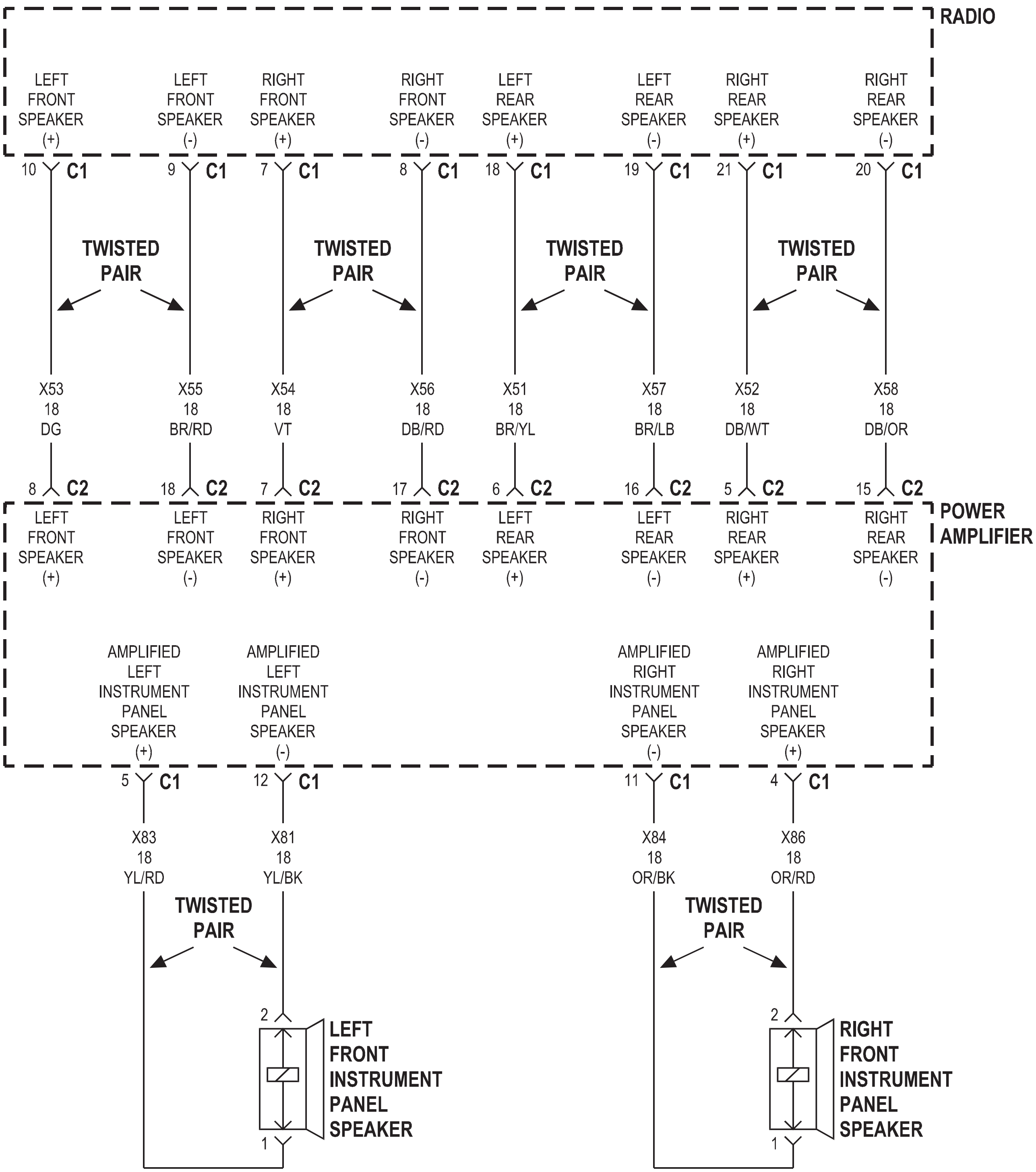

LEFT REAR SPEAKER
RIGHT REAR SPEAKER
TWISTED PAIR
X93 18 WT/RD
X91 18 WT/BK
X94 18 TN/VT
X92 18 TN/BK
C306
ANTENNA
X51 18 BR/YL
X57 18 BR/LB
X52 18 DB/WT
X58 18 DB/OR
C1
RADIO
LEFT REAR SPEAKER (+)
LEFT REAR SPEAKER (-)
RIGHT REAR SPEAKER (+)
RIGHT REAR SPEAKER (-)
ANTENNA
LEFT FRONT SPEAKER (+)
LEFT FRONT SPEAKER (-)
RIGHT FRONT SPEAKER (+)
RIGHT FRONT SPEAKER (-)
X53 18 DG
X55 18 BR/RD
X54 18 VT
X56 18 DB/RD
C311
C316
X55 18 BR/RD
X56 18 DB/RD
X87 18 LG/VT
X85 18 LG/DG
X82 18 LB/VT
X80 18 LB/BK
LEFT FRONT INSTRUMENT PANEL SPEAKER (JR27)
RIGHT FRONT INSTRUMENT PANEL SPEAKER (JR27)
LEFT FRONT DOOR SPEAKER
RIGHT FRONT DOOR SPEAKER
X53 18 DG
X54 18 VT

JR27 PREMIUM

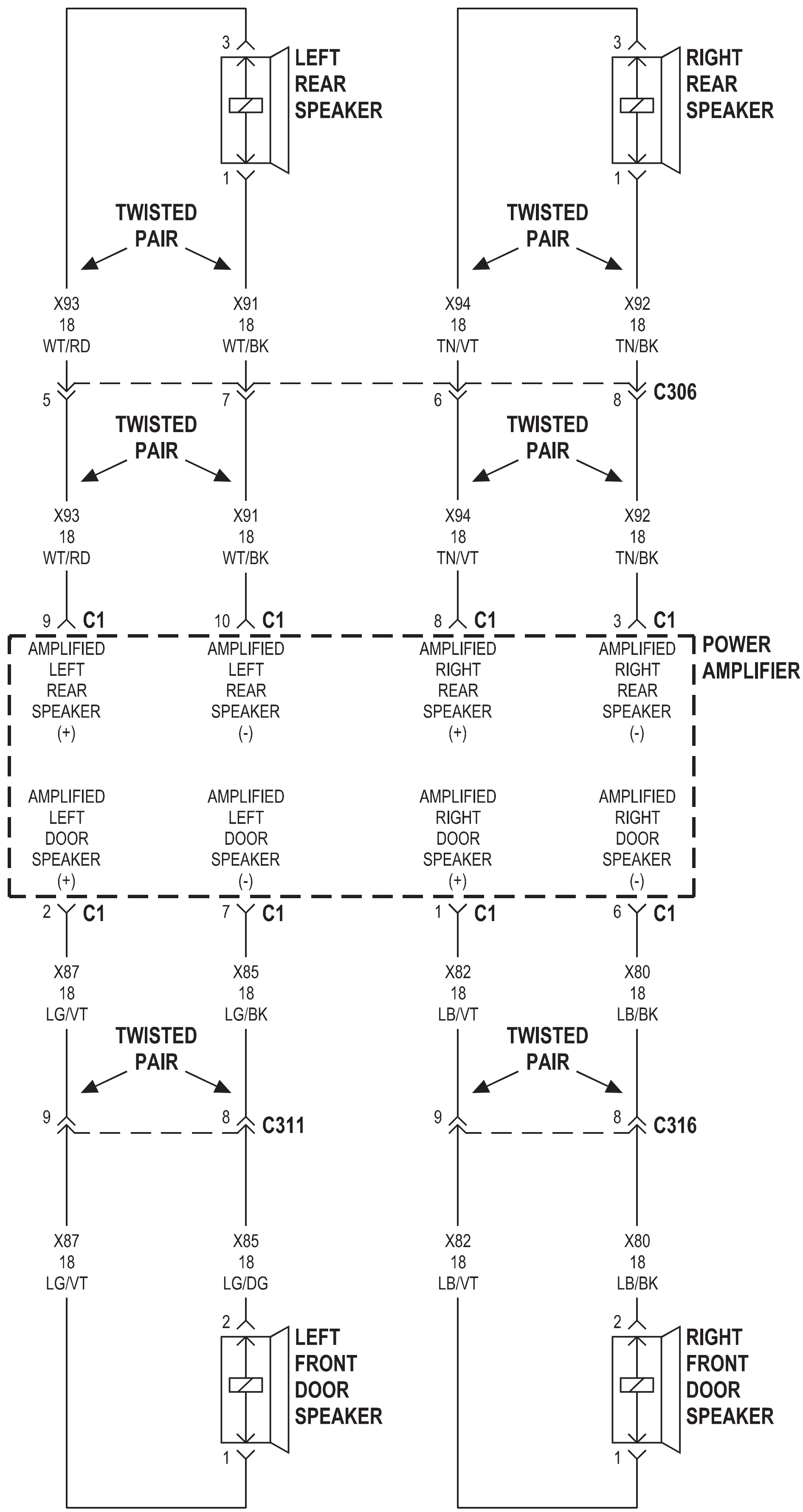



BATT A13
(8W-10-19)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
14
FUSE
8
20A
(8W-12-14)
13
1
C5
F75
16
VT
S203
(8W-12-14)
F75
16
VT
F75
16
VT
1
C1
12
C1
POWER
AMPLIFIER
FUSED
B(+)
FUSED
B(+)
GROUND
GROUND
2
C1
13
C1
Z115
16
BK/RD
Z126
16
BK/LG
9
C4
10
C4
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
3
C9
Z313
14
BK
G301
(8W-15-20)

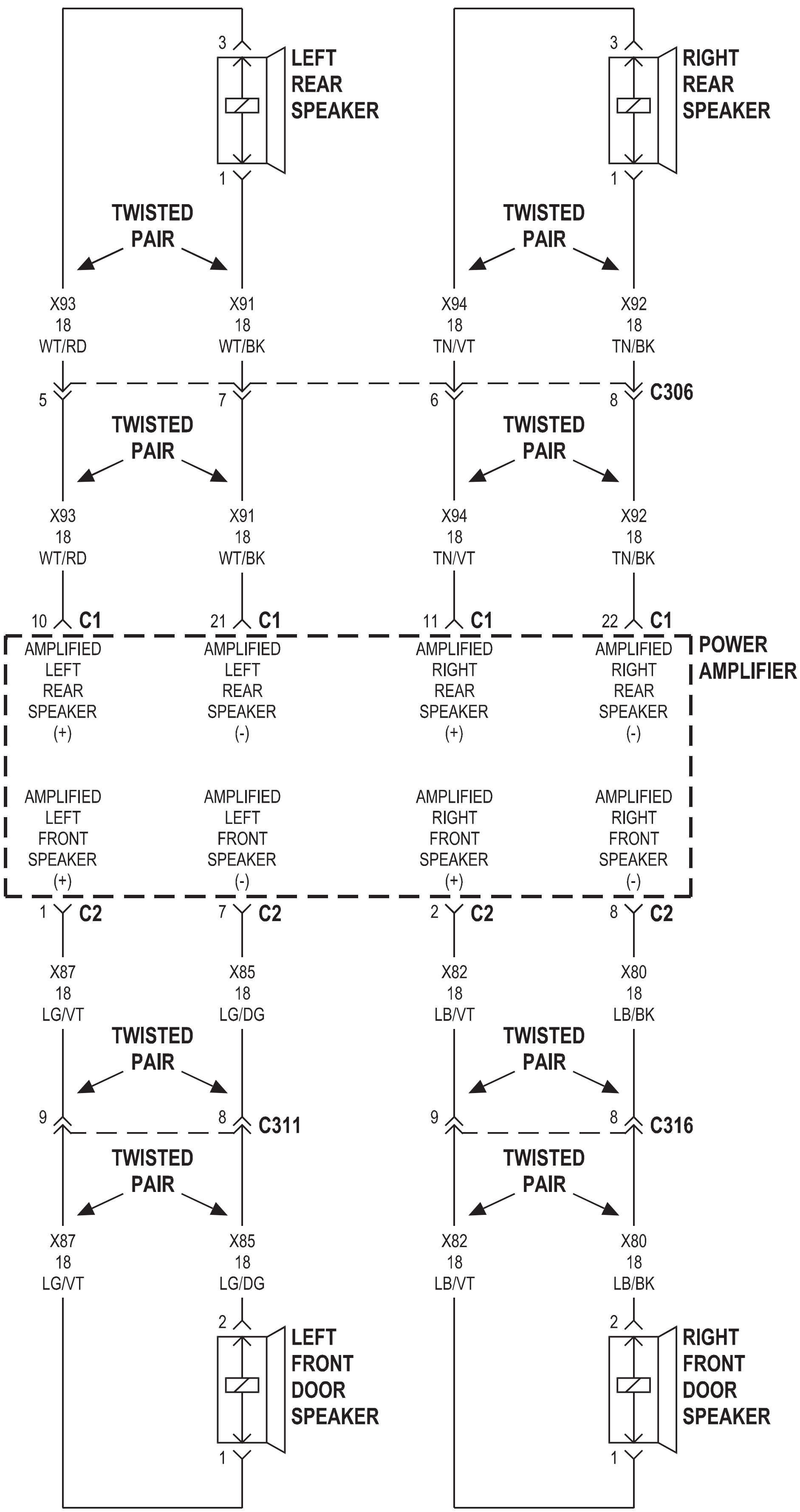

RADIO
LEFT FRONT SPEAKER (+)
LEFT FRONT SPEAKER (-)
RIGHT FRONT SPEAKER (+)
RIGHT FRONT SPEAKER (-)
LEFT REAR SPEAKER (+)
LEFT REAR SPEAKER (-)
RIGHT REAR SPEAKER (+)
RIGHT REAR SPEAKER (-)
10 C1
9 C1
7 C1
8 C1
18 C1
19 C1
21 C1
20 C1
TWISTED PAIR
TWISTED PAIR
TWISTED PAIR
TWISTED PAIR
X53 18 DG
X55 18 BR/RD
X54 18 VT
X56 18 DB/RD
X51 18 BR/YL
X57 18 BR/LB
X52 18 DB/WT
X58 18 DB/OR
5 C1
16 C1
4 C1
15 C1
7 C1
18 C1
6 C1
17 C1
POWER AMPLIFIER
LEFT FRONT SPEAKER (+)
LEFT FRONT SPEAKER (-)
RIGHT FRONT SPEAKER (+)
RIGHT FRONT SPEAKER (-)
LEFT REAR SPEAKER (+)
LEFT REAR SPEAKER (-)
RIGHT REAR SPEAKER (+)
RIGHT REAR SPEAKER (-)
AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (+)
AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (-)
AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (+)
AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (-)
3 C2
9 C2
4 C2
10 C2
X83 18 YL/RD
X81 18 YL/BK
X86 18 OR/RD
X84 18 OR/BK
TWISTED PAIR
TWISTED PAIR
1
2
LEFT FRONT INSTRUMENT PANEL SPEAKER
1
2
RIGHT FRONT INSTRUMENT PANEL SPEAKER

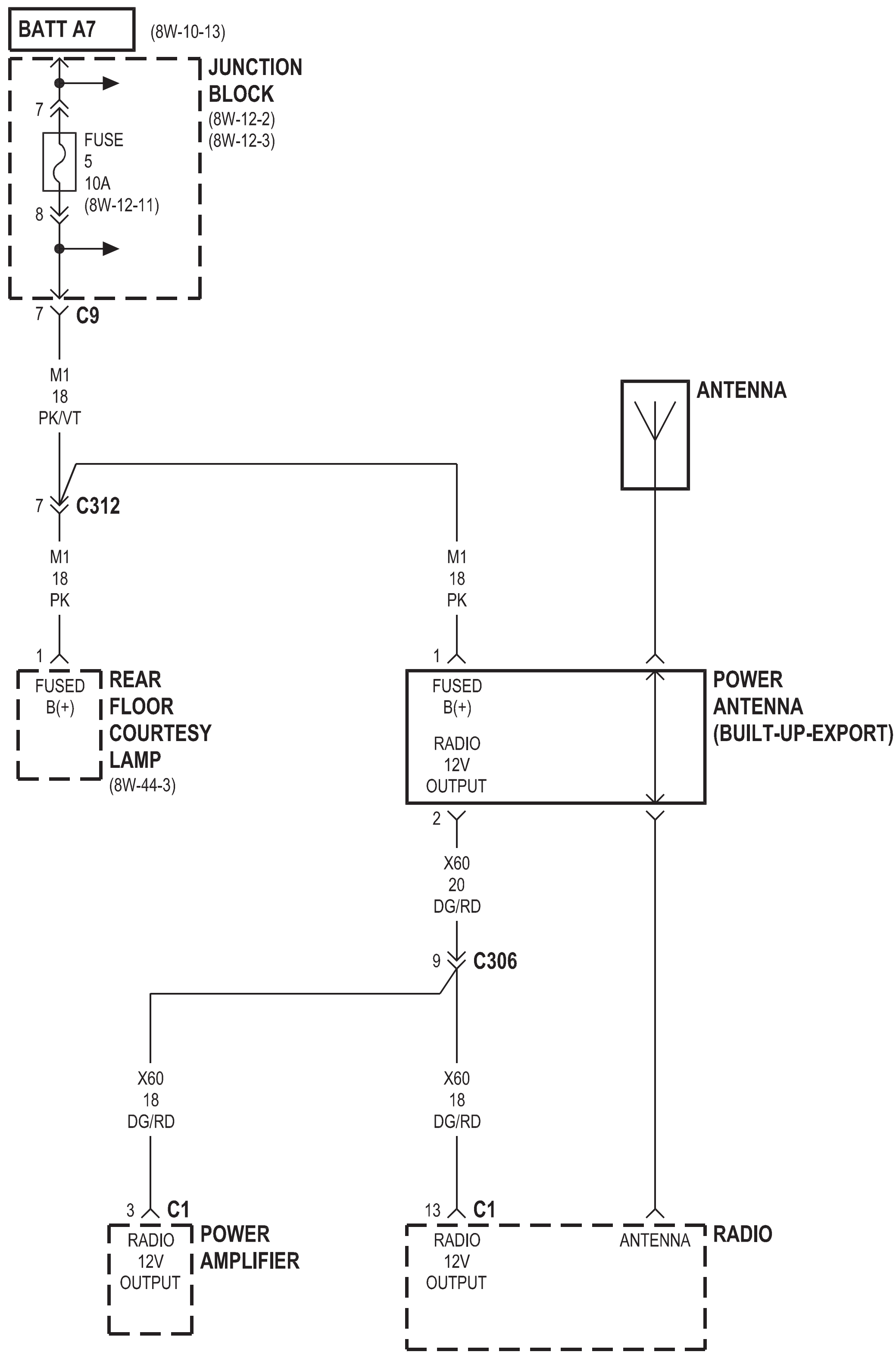

RADIO
LEFT FRONT SPEAKER (+)
LEFT FRONT SPEAKER (-)
RIGHT FRONT SPEAKER (+)
RIGHT FRONT SPEAKER (-)
LEFT REAR SPEAKER (+)
LEFT REAR SPEAKER (-)
RIGHT REAR SPEAKER (+)
RIGHT REAR SPEAKER (-)
10 C1
9 C1
7 C1
8 C1
18 C1
19 C1
21 C1
20 C1
TWISTED PAIR
TWISTED PAIR
TWISTED PAIR
TWISTED PAIR
X53 18 DG
X55 18 BR/RD
X54 18 VT
X56 18 DB/RD
X51 18 BR/YL
X57 18 BR/LB
X52 18 DB/WT
X58 18 DB/OR
8 C2
18 C2
7 C2
17 C2
6 C2
16 C2
5 C2
15 C2
POWER AMPLIFIER
LEFT FRONT SPEAKER (+)
LEFT FRONT SPEAKER (-)
RIGHT FRONT SPEAKER (+)
RIGHT FRONT SPEAKER (-)
LEFT REAR SPEAKER (+)
LEFT REAR SPEAKER (-)
RIGHT REAR SPEAKER (+)
RIGHT REAR SPEAKER (-)
AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (+)
AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (-)
AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (-)
AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (+)
5 C1
12 C1
11 C1
4 C1
X83 18 YL/RD
X81 18 YL/BK
X84 18 OR/BK
X86 18 OR/RD
TWISTED PAIR
TWISTED PAIR
2
1
LEFT FRONT INSTRUMENT PANEL SPEAKER
2
1
RIGHT FRONT INSTRUMENT PANEL SPEAKER

JR27 PREMIUM

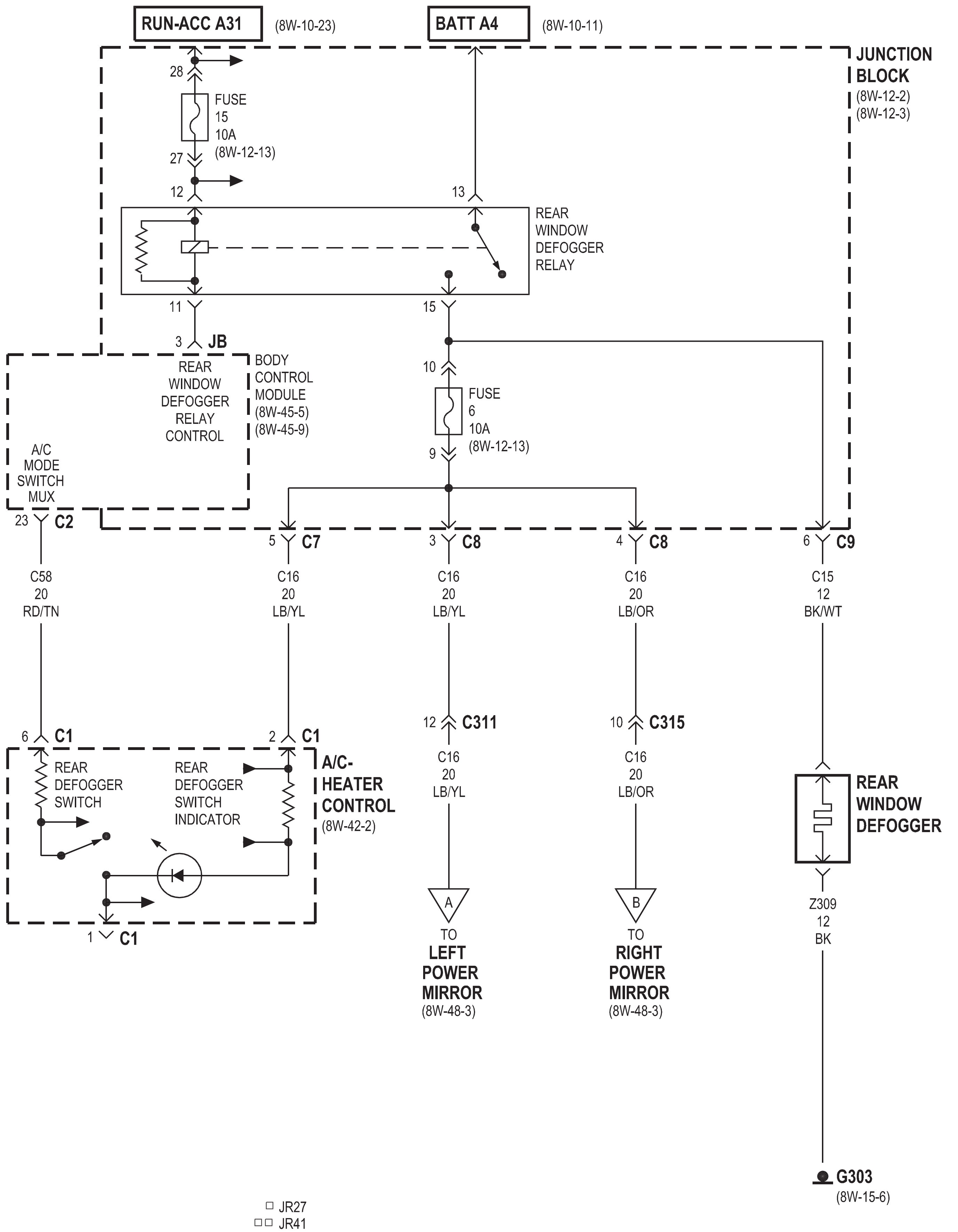


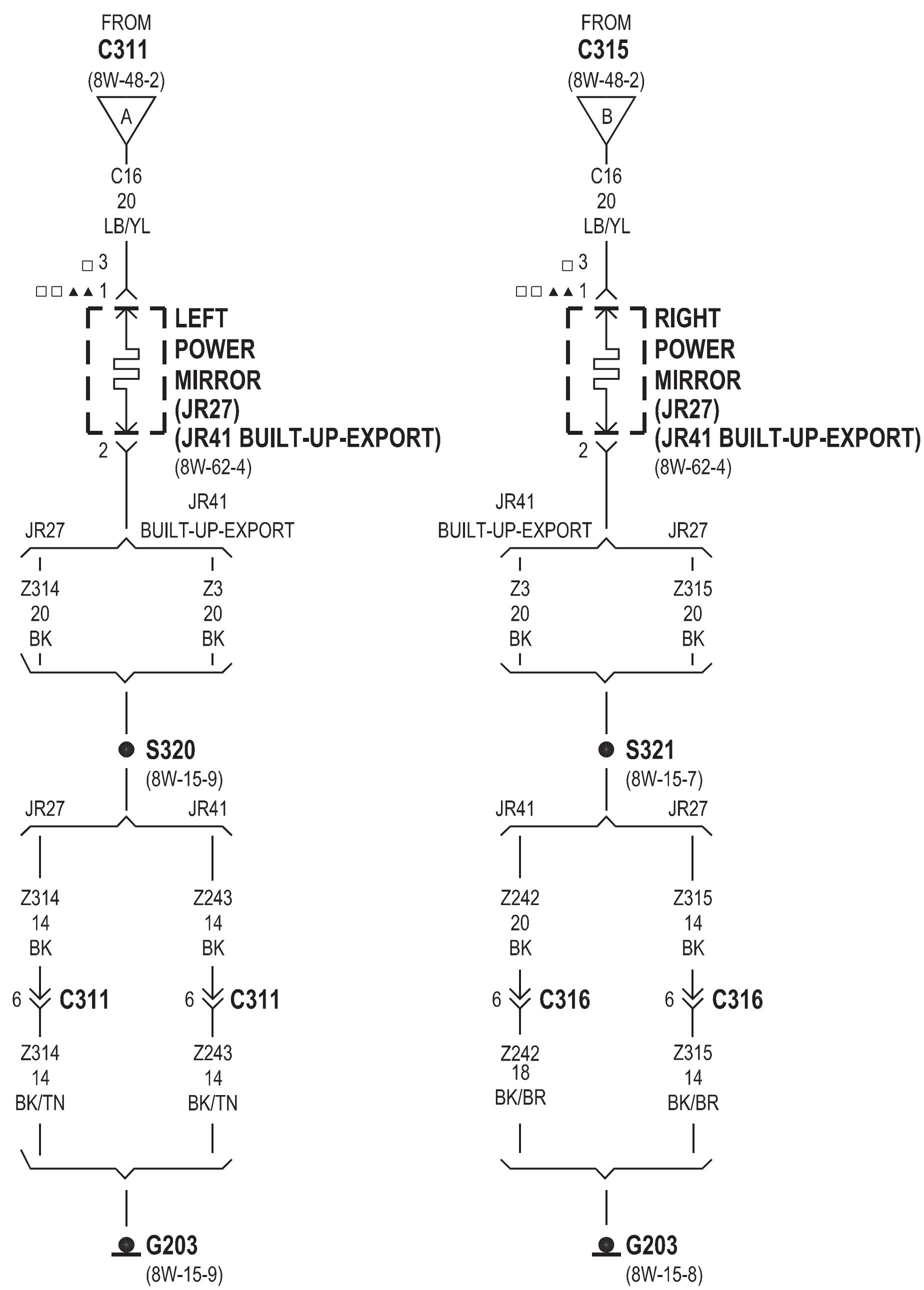
JR41 PREMIUM




BATT A7
(8W-10-13)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
7
FUSE
5
10A
(8W-12-11)
8
7
C9
M1
18
PK/VT
ANTENNA
7
C312
M1
18
PK
M1
18
PK
1
FUSED B(+)
REAR FLOOR COURTESY LAMP
(8W-44-3)
1
FUSED B(+)
RADIO 12V OUTPUT
POWER ANTENNA (BUILT-UP-EXPORT)
2
X60
20
DG/RD
9
C306
X60
18
DG/RD
X60
18
DG/RD
3
C1
RADIO 12V OUTPUT
POWER AMPLIFIER
13
C1
RADIO 12V OUTPUT
ANTENNA
RADIO

8W-48 REAR WINDOW DEFOGGER


RUN-ACC A31
(8W-10-23)
BATT A4
(8W-10-11)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
28
FUSE
15
10A
(8W-12-13)
27
12
13
REAR WINDOW DEFOGGER RELAY
11
15
3 JB
REAR WINDOW DEFOGGER RELAY CONTROL
BODY CONTROL MODULE
(8W-45-5)
(8W-45-9)
A/C MODE SWITCH MUX
10
FUSE
6
10A
(8W-12-13)
9
23 C2
5 C7
3 C8
4 C8
6 C9
C58
20
RD/TN
C16
20
LB/YL
C16
20
LB/YL
C16
20
LB/OR
C15
12
BK/WT
12 C311
10 C315
6 C1
2 C1
REAR DEFOGGER SWITCH
REAR DEFOGGER SWITCH INDICATOR
A/C-HEATER CONTROL
(8W-42-2)
1 C1
C16
20
LB/YL
C16
20
LB/OR
A
TO LEFT POWER MIRROR
(8W-48-3)
B
TO RIGHT POWER MIRROR
(8W-48-3)
REAR WINDOW DEFOGGER
Z309
12
BK
G303
(8W-15-6)
JR27
JR41

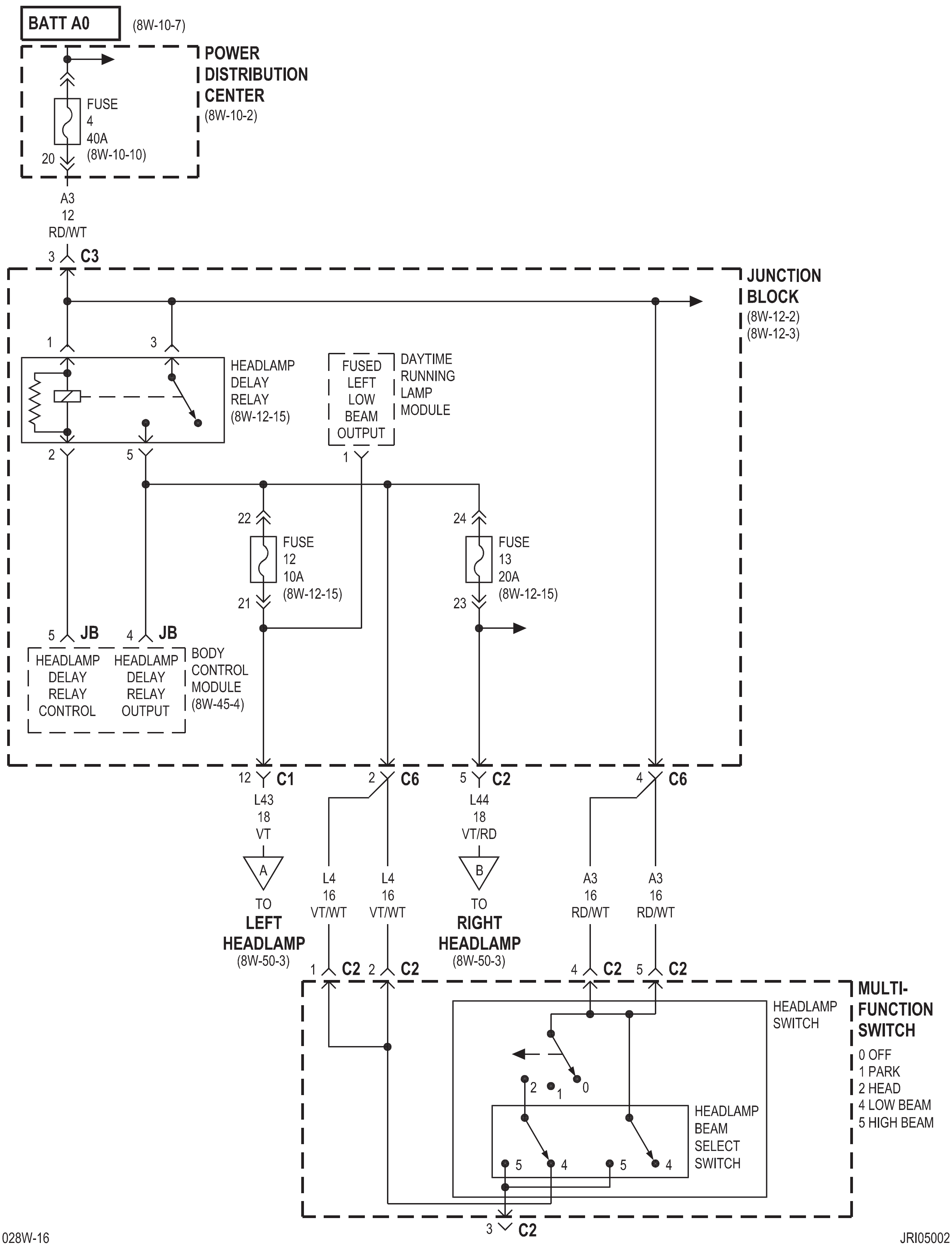


□ JR27
□□ JR41
▲▲ BUILT-UP-EXPORT

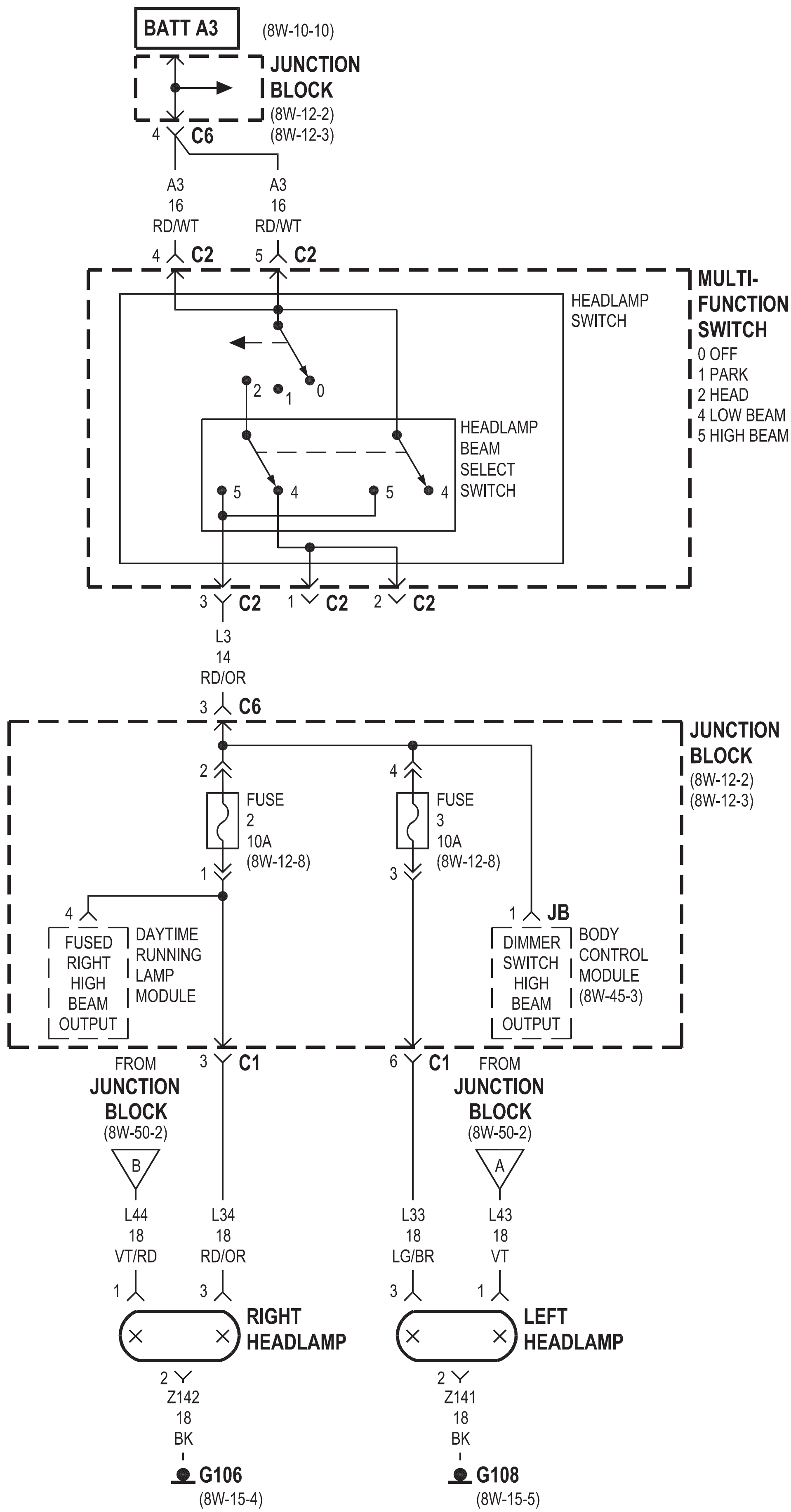
8W-50 FRONT LIGHTING

Component **Page**

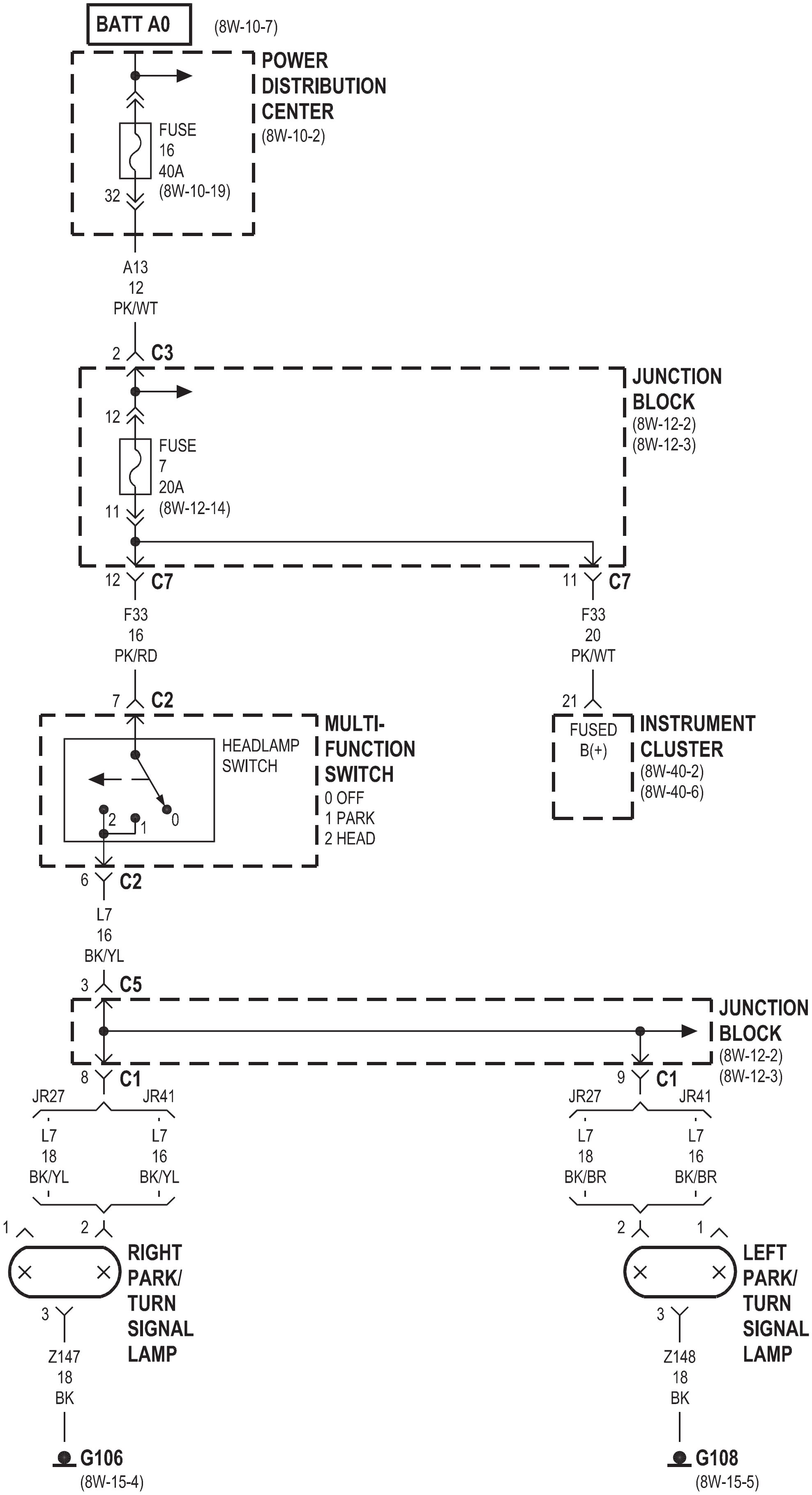
Component **Page**

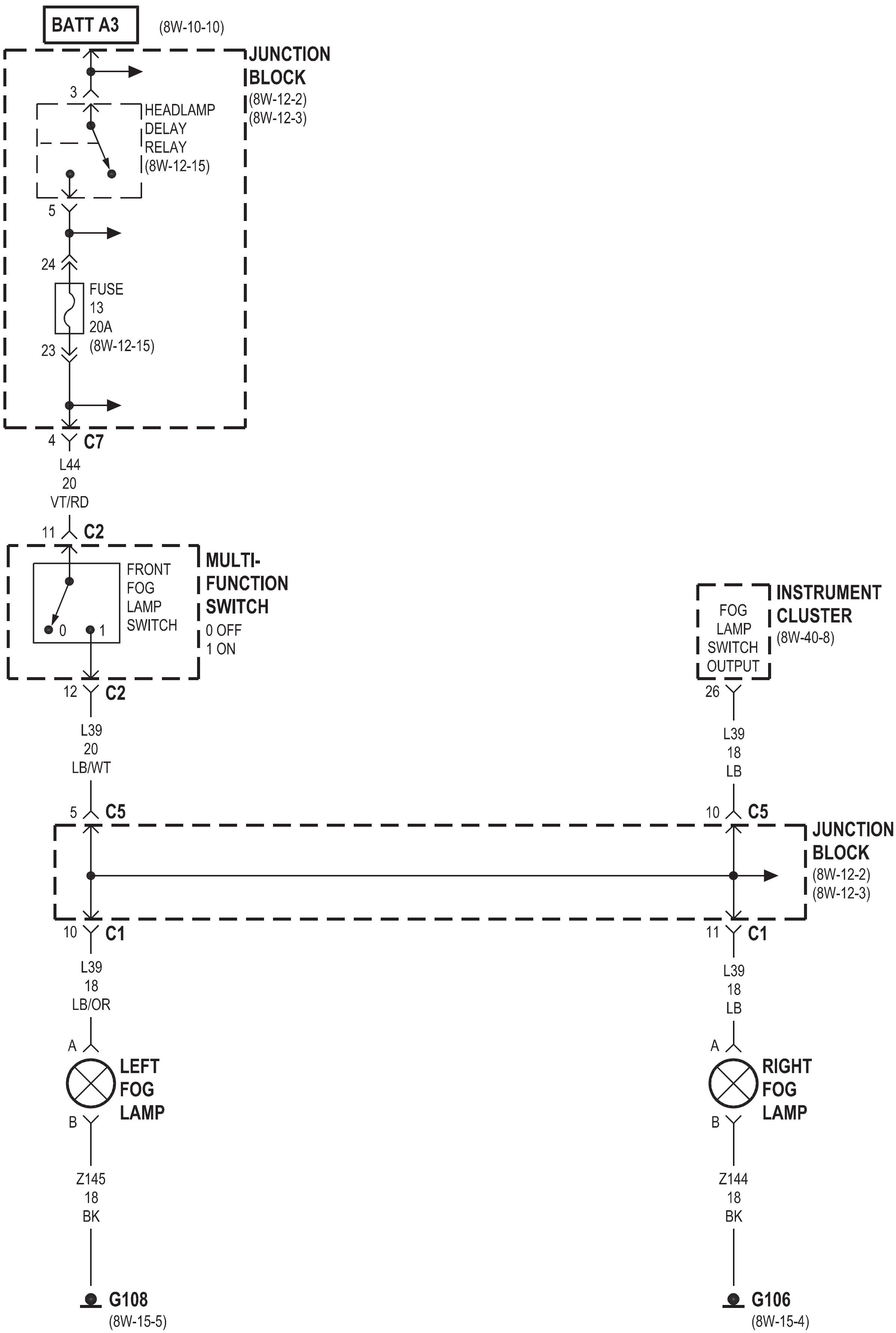

BATT A0
(8W-10-7)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
4
40A
(8W-10-10)
20
A3
12
RD/WT
3 C3
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
1
3
HEADLAMP DELAY RELAY
(8W-12-15)
2
5
FUSED LEFT LOW BEAM OUTPUT
DAYTIME RUNNING LAMP MODULE
1
22
FUSE
12
10A
(8W-12-15)
21
24
FUSE
13
20A
(8W-12-15)
23
5 JB
4 JB
HEADLAMP DELAY RELAY CONTROL
HEADLAMP DELAY RELAY OUTPUT
BODY CONTROL MODULE
(8W-45-4)
12 C1
2 C6
5 C2
4 C6
L43
18
VT
A
TO LEFT HEADLAMP
(8W-50-3)
L4
16
VT/WT
L4
16
VT/WT
L44
18
VT/RD
B
TO RIGHT HEADLAMP
(8W-50-3)
A3
16
RD/WT
A3
16
RD/WT
1 C2
2 C2
4 C2
5 C2
HEADLAMP SWITCH
MULTI-FUNCTION SWITCH
0 OFF
1 PARK
2 HEAD
4 LOW BEAM
5 HIGH BEAM
2
1
0
HEADLAMP BEAM SELECT SWITCH
5
4
5
4
3 C2

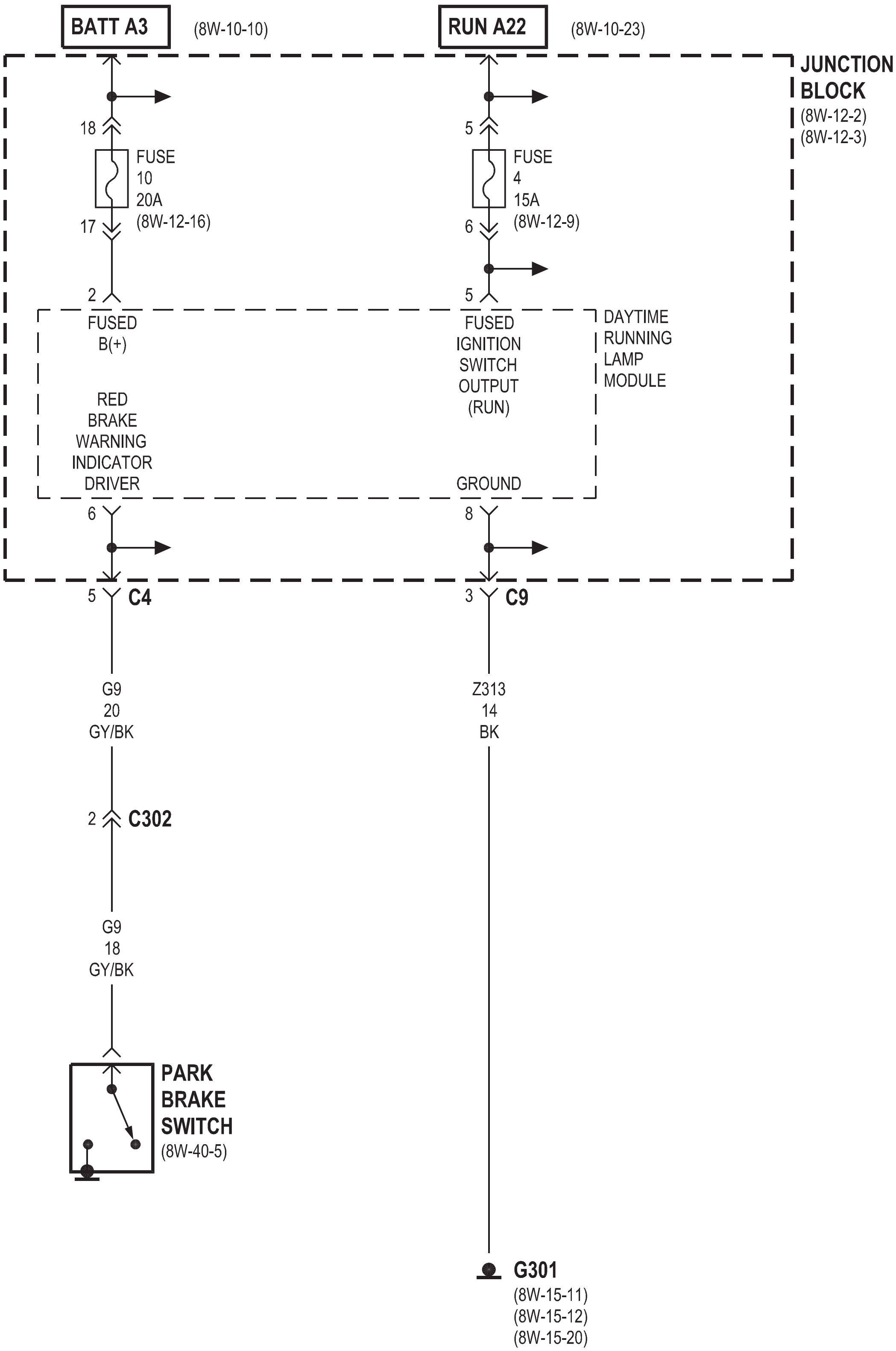
EXCEPT BUILT-UP-EXPORT

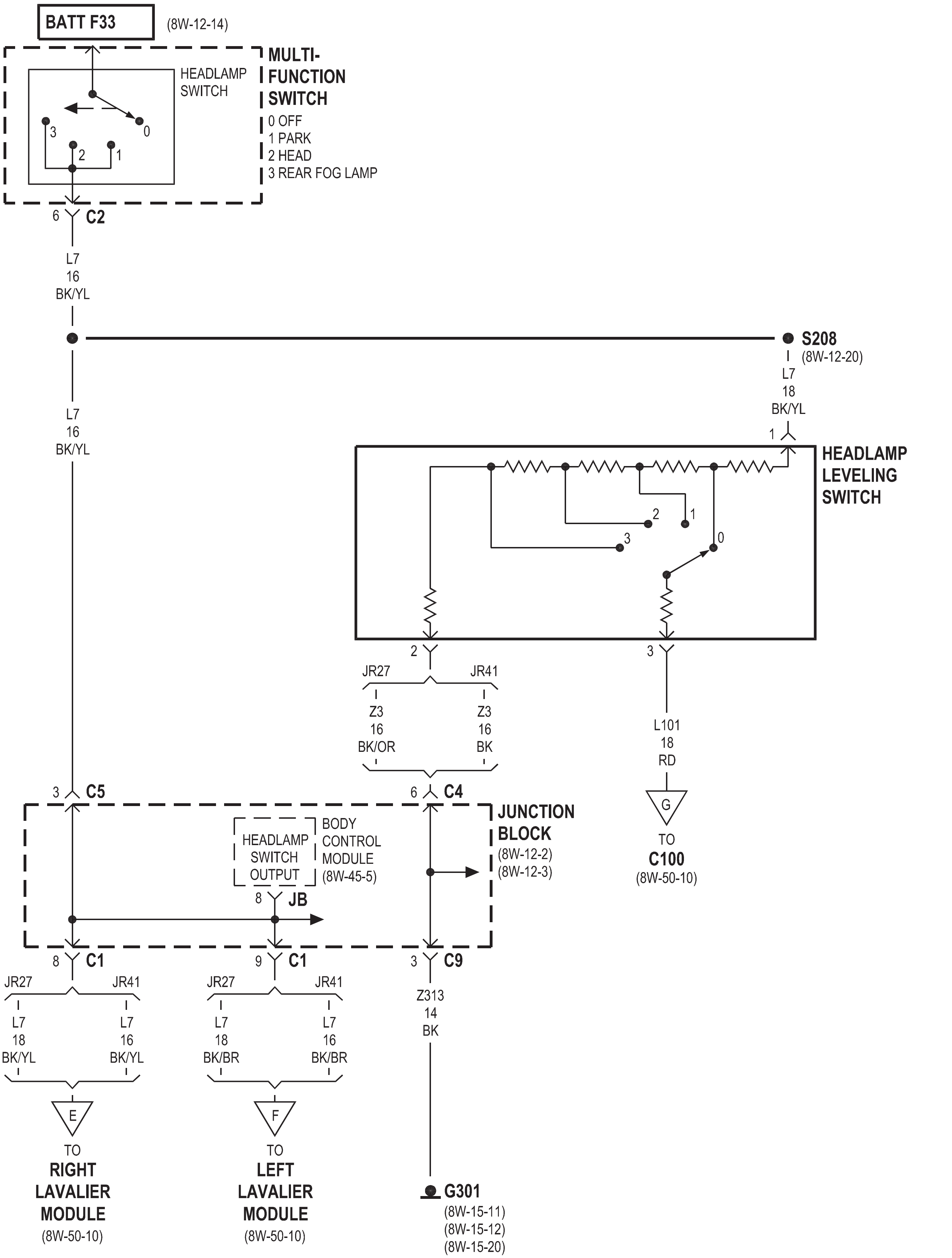


EXCEPT BUILT-UP-EXPORT

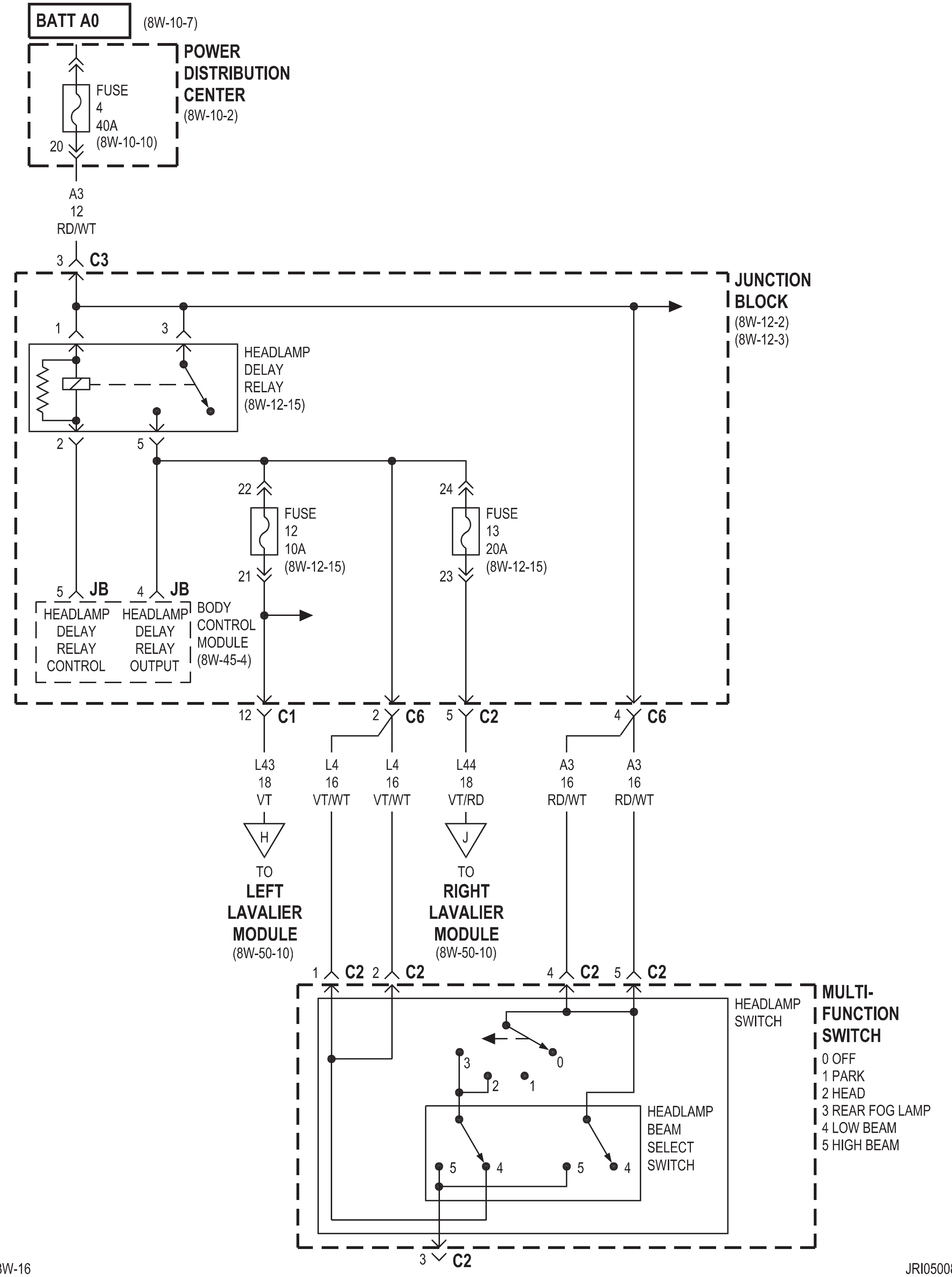


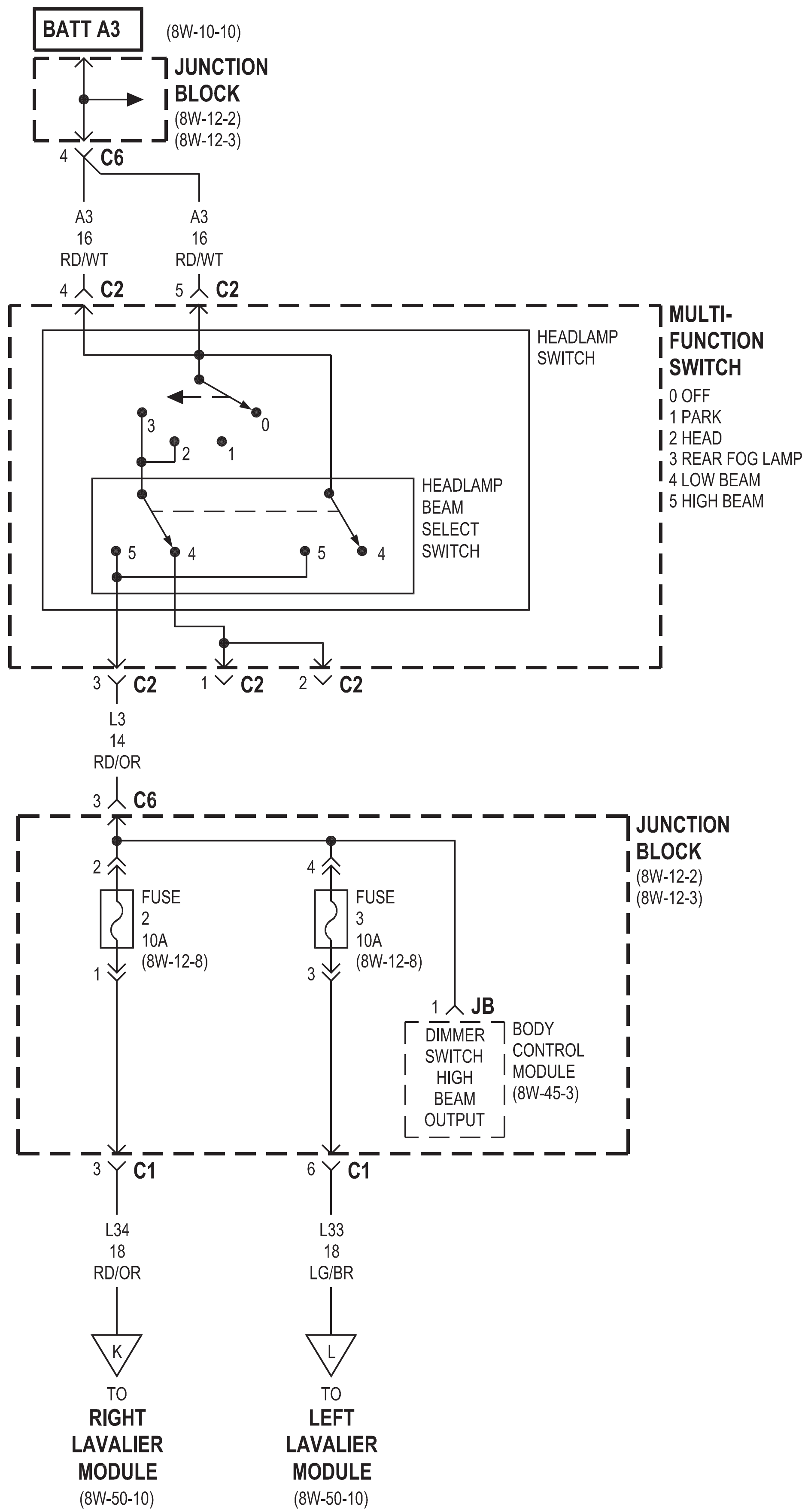

BATT A3
(8W-10-10)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
3
HEADLAMP
DELAY
RELAY
(8W-12-15)
5
24
FUSE
13
20A
(8W-12-15)
23
4
C7
L44
20
VT/RD
11
C2
MULTI-
FUNCTION
SWITCH
FRONT
FOG
LAMP
SWITCH
0
1
0 OFF
1 ON
12
C2
L39
20
LB/WT
INSTRUMENT
CLUSTER
(8W-40-8)
FOG
LAMP
SWITCH
OUTPUT
26
L39
18
LB
5
C5
10
C5
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
10
C1
11
C1
L39
18
LB/OR
L39
18
LB
A
LEFT
FOG
LAMP
B
A
RIGHT
FOG
LAMP
B
Z145
18
BK
Z144
18
BK
G108
(8W-15-5)
G106
(8W-15-4)

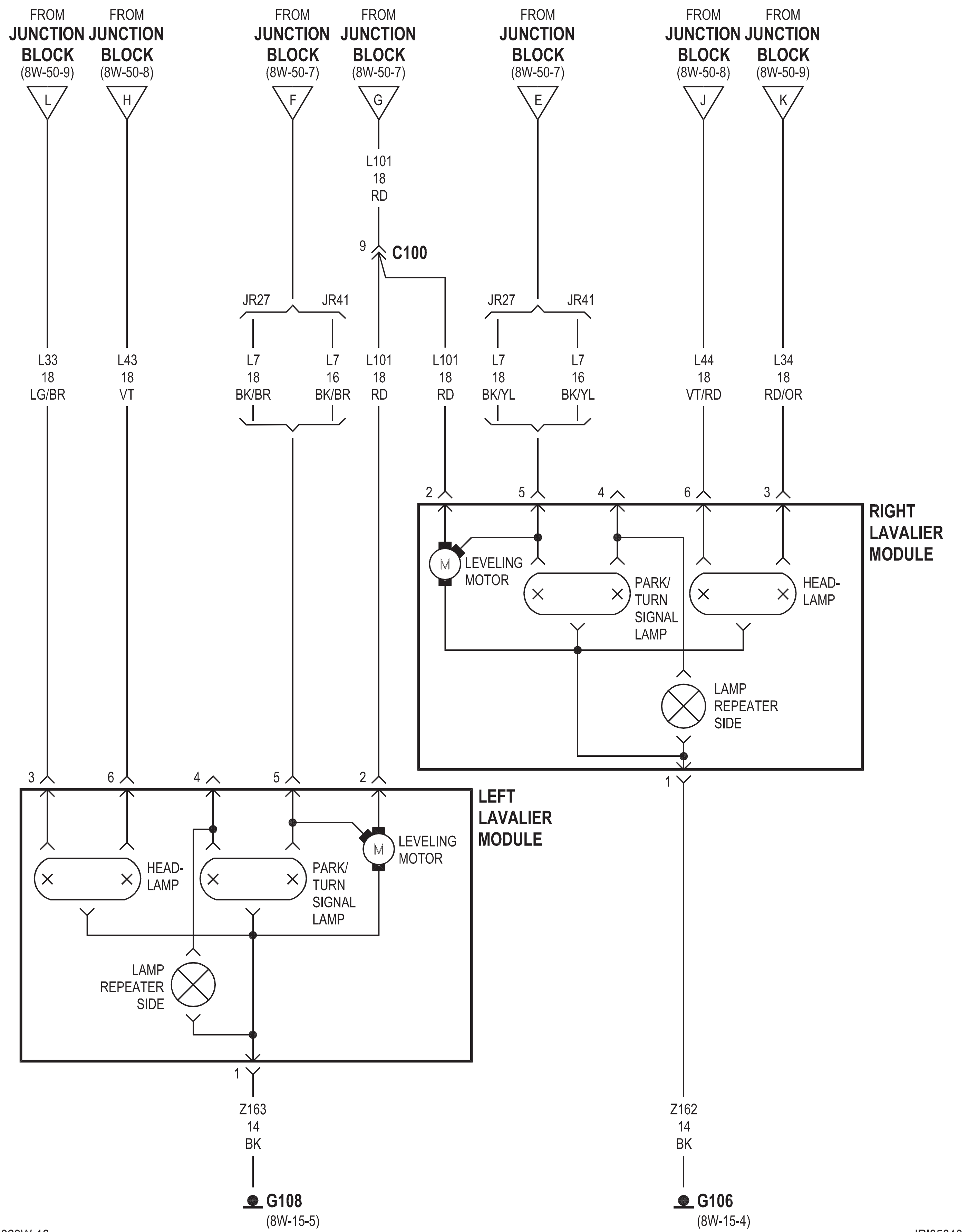

BATT A3
(8W-10-10)
RUN A22
(8W-10-23)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
18
FUSE
10
20A
(8W-12-16)
17
5
FUSE
4
15A
(8W-12-9)
6
2
FUSED
B(+)
5
FUSED
IGNITION
SWITCH
OUTPUT
(RUN)
DAYTIME
RUNNING
LAMP
MODULE
RED
BRAKE
WARNING
INDICATOR
DRIVER
GROUND
6
8
5
C4
3
C9
G9
20
GY/BK
Z313
14
BK
2
C302
G9
18
GY/BK
PARK
BRAKE
SWITCH
(8W-40-5)
G301
(8W-15-11)
(8W-15-12)
(8W-15-20)

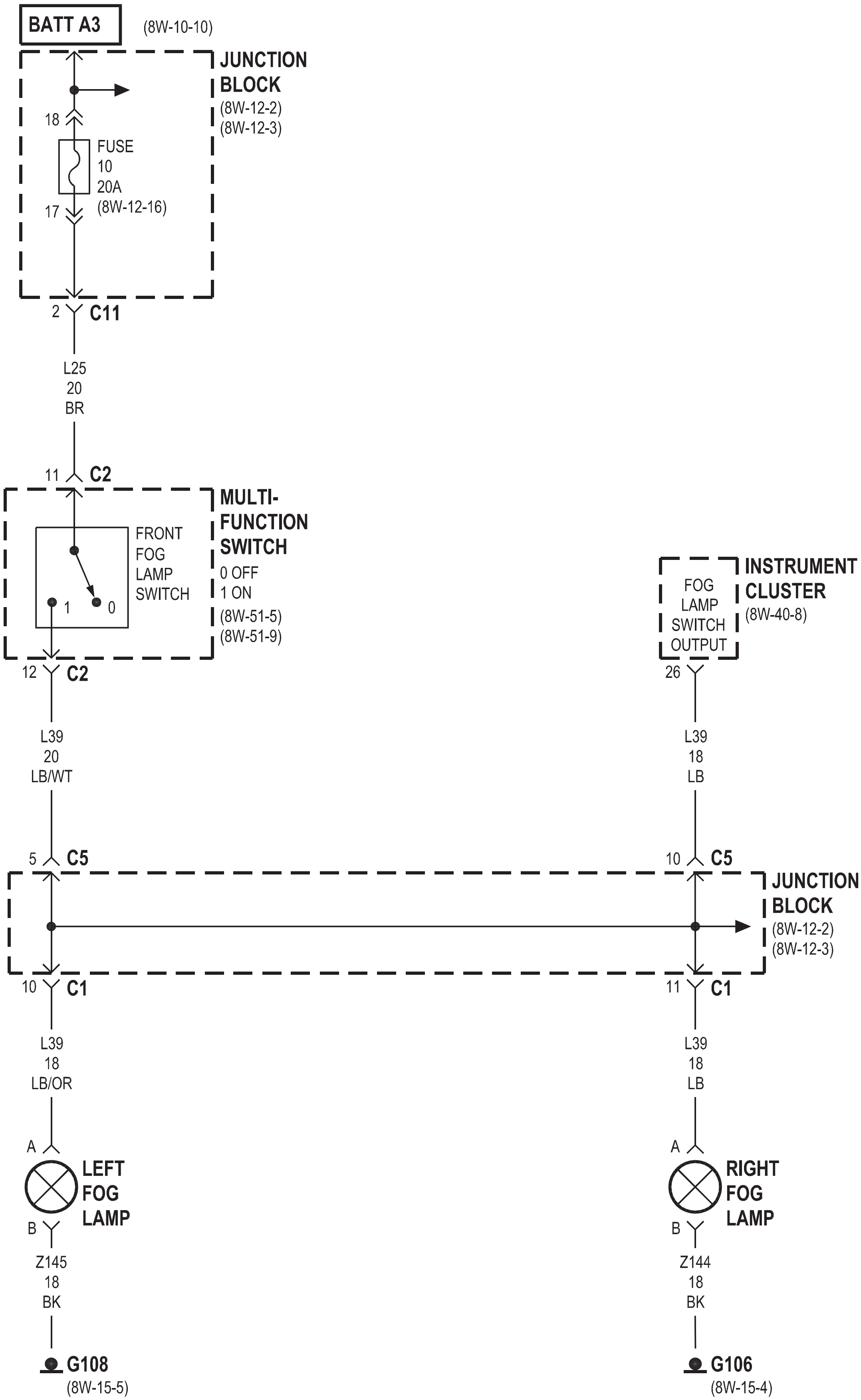

BATT F33
(8W-12-14)
HEADLAMP SWITCH
MULTI-FUNCTION SWITCH
0 OFF
1 PARK
2 HEAD
3 REAR FOG LAMP
3
2
1
0
6
C2
L7
16
BK/YL
S208
(8W-12-20)
L7
18
BK/YL
1
HEADLAMP LEVELING SWITCH
2
1
3
0
2
3
JR27
JR41
Z3
16
BK/OR
Z3
16
BK
L101
18
RD
G
TO
C100
(8W-50-10)
3
C5
6
C4
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
HEADLAMP SWITCH OUTPUT
BODY CONTROL MODULE
(8W-45-5)
8
JB
8
C1
9
C1
3
C9
JR27
JR41
L7
18
BK/YL
L7
16
BK/YL
L7
18
BK/BR
L7
16
BK/BR
Z313
14
BK
E
TO
RIGHT LAVALIER MODULE
(8W-50-10)
F
TO
LEFT LAVALIER MODULE
(8W-50-10)
G301
(8W-15-11)
(8W-15-12)
(8W-15-20)

BUILT-UP-EXPORT

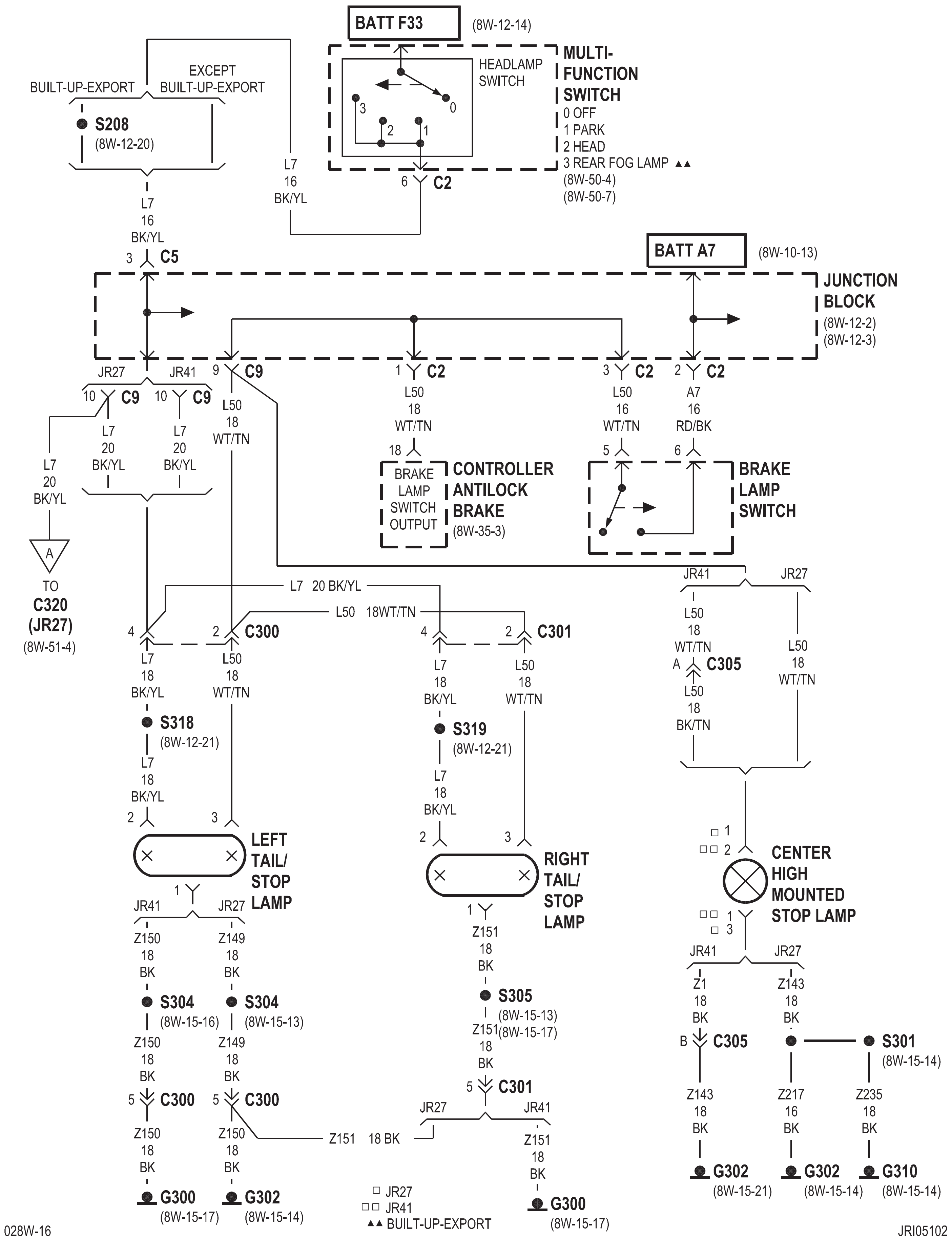


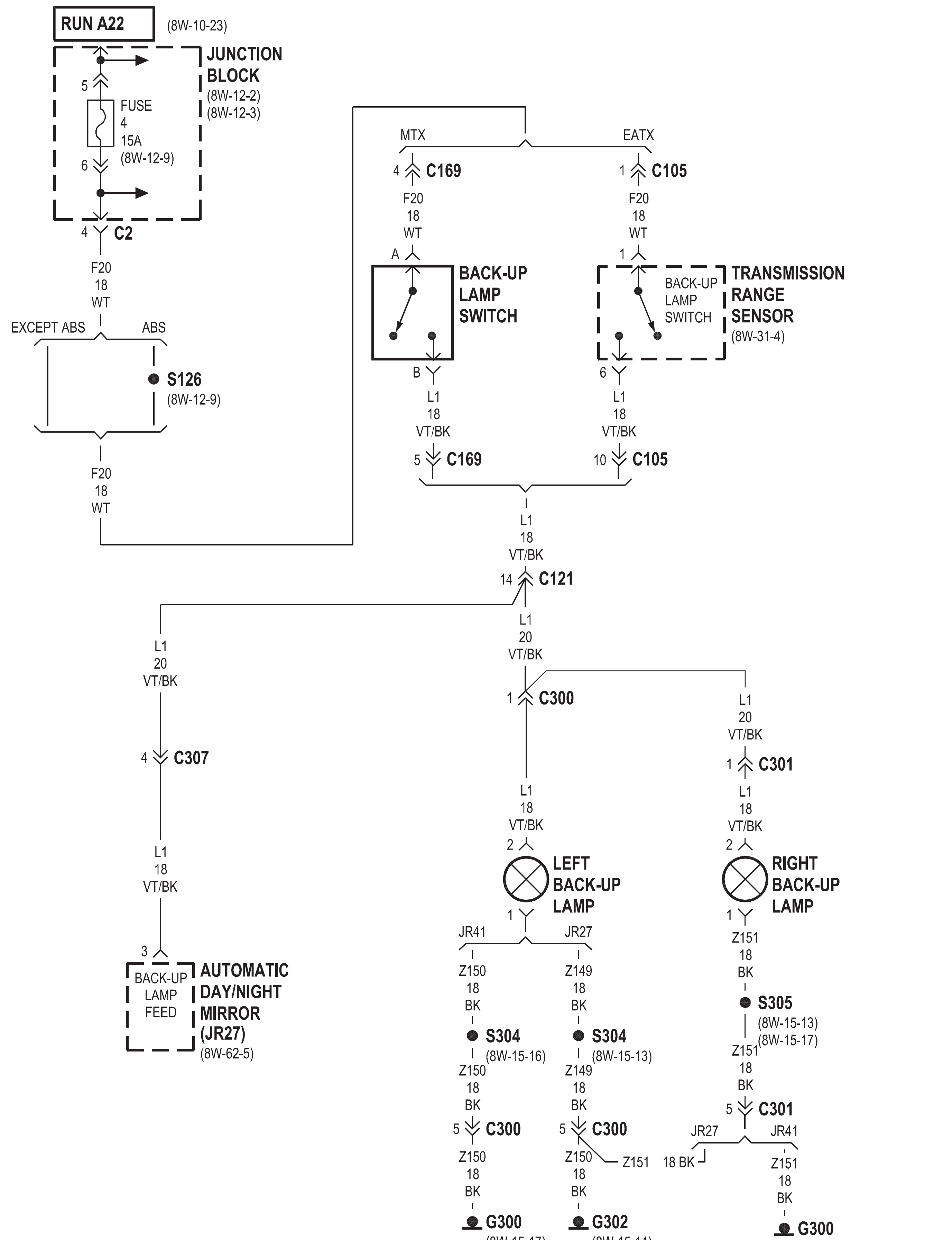

BATT A3
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
4 C6
A3
16
RD/WT
A3
16
RD/WT
4 C2
5 C2
MULTI-FUNCTION SWITCH
0 OFF
1 PARK
2 HEAD
3 REAR FOG LAMP
4 LOW BEAM
5 HIGH BEAM
HEADLAMP SWITCH
HEADLAMP BEAM SELECT SWITCH
3 C2
1 C2
2 C2
L3
14
RD/OR
3 C6
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
FUSE
2
10A
(8W-12-8)
FUSE
3
10A
(8W-12-8)
1 JB
DIMMER SWITCH HIGH BEAM OUTPUT
BODY CONTROL MODULE
(8W-45-3)
3 C1
6 C1
L34
18
RD/OR
L33
18
LG/BR
K
L
TO RIGHT LAVALIER MODULE
(8W-50-10)
TO LEFT LAVALIER MODULE
(8W-50-10)


FROM JUNCTION BLOCK (8W-50-9)
L
FROM JUNCTION BLOCK (8W-50-8)
H
FROM JUNCTION BLOCK (8W-50-7)
F
FROM JUNCTION BLOCK (8W-50-7)
G
FROM JUNCTION BLOCK (8W-50-7)
E
FROM JUNCTION BLOCK (8W-50-8)
J
FROM JUNCTION BLOCK (8W-50-9)
K
L101 18 RD
9
C100
JR27
JR41
JR27
JR41
L33 18 LG/BR
L43 18 VT
L7 18 BK/BR
L7 16 BK/BR
L101 18 RD
L101 18 RD
L7 18 BK/YL
L7 16 BK/YL
L44 18 VT/RD
L34 18 RD/OR
2
5
4
6
3
RIGHT LAVALIER MODULE
M
LEVELING MOTOR
PARK/ TURN SIGNAL LAMP
HEAD- LAMP
LAMP REPEATER SIDE
1
3
6
4
5
2
LEFT LAVALIER MODULE
HEAD- LAMP
PARK/ TURN SIGNAL LAMP
M
LEVELING MOTOR
LAMP REPEATER SIDE
1
Z163 14 BK
Z162 14 BK
G108 (8W-15-5)
G106 (8W-15-4)


BATT A3
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
18
FUSE
10
20A
(8W-12-16)
17
2
C11
L25
20
BR
11
C2
MULTI-FUNCTION SWITCH
FRONT FOG LAMP SWITCH
0 OFF
1 ON
(8W-51-5)
(8W-51-9)
1
0
12
C2
INSTRUMENT CLUSTER
FOG LAMP SWITCH OUTPUT
(8W-40-8)
26
L39
20
LB/WT
L39
18
LB
5
C5
10
C5
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
10
C1
11
C1
L39
18
LB/OR
L39
18
LB
A
LEFT FOG LAMP
B
A
RIGHT FOG LAMP
B
Z145
18
BK
Z144
18
BK
G108
(8W-15-5)
G106
(8W-15-4)

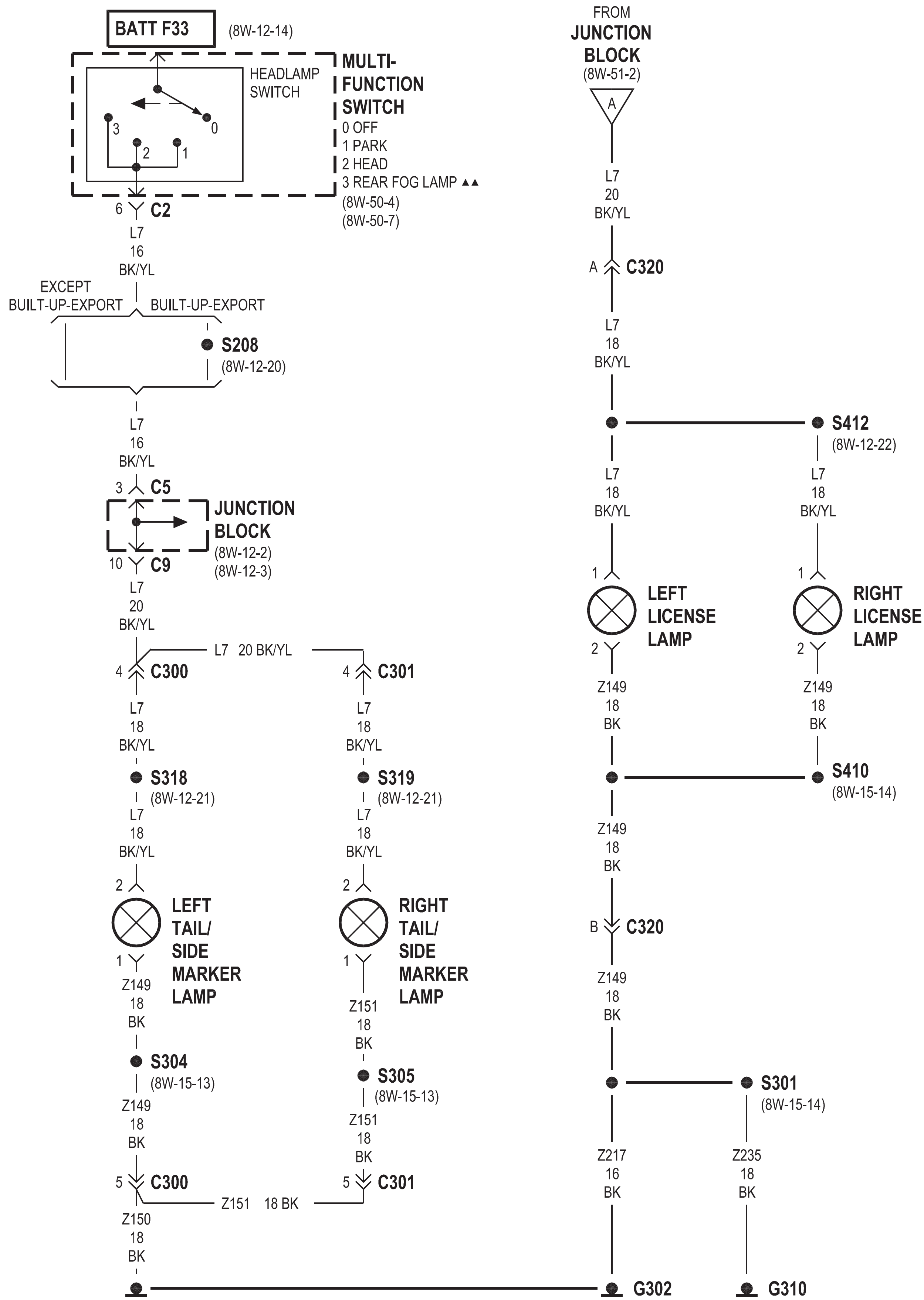
8W-51 REAR LIGHTING


BATT F33
(8W-12-14)
MULTI-FUNCTION SWITCH
HEADLAMP SWITCH
0 OFF
1 PARK
2 HEAD
3 REAR FOG LAMP ▲▲
(8W-50-4)
(8W-50-7)
C2
BUILT-UP-EXPORT
EXCEPT BUILT-UP-EXPORT
S208
(8W-12-20)
L7 16 BK/YL
C5
BATT A7
(8W-10-13)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
C9
C2
L50 18 WT/TN
L50 16 WT/TN
A7 16 RD/BK
L7 20 BK/YL
CONTROLLER ANTILOCK BRAKE
BRAKE LAMP SWITCH OUTPUT
(8W-35-3)
BRAKE LAMP SWITCH
TO C320 (JR27)
(8W-51-4)
L7 20 BK/YL
L50 18WT/TN
C300
C301
C305
L50 18 BK/TN
L7 18 BK/YL
S318
(8W-12-21)
S319
(8W-12-21)
LEFT TAIL/ STOP LAMP
RIGHT TAIL/ STOP LAMP
CENTER HIGH MOUNTED STOP LAMP
Z150 18 BK
Z149 18 BK
Z151 18 BK
S304
(8W-15-16)
(8W-15-13)
S305
(8W-15-13)
(8W-15-17)
Z1 18 BK
Z143 18 BK
Z217 16 BK
Z235 18 BK
S301
(8W-15-14)
G300
(8W-15-17)
G302
(8W-15-14)
G302
(8W-15-21)
G310
(8W-15-14)
□ JR27
□□ JR41
▲▲ BUILT-UP-EXPORT



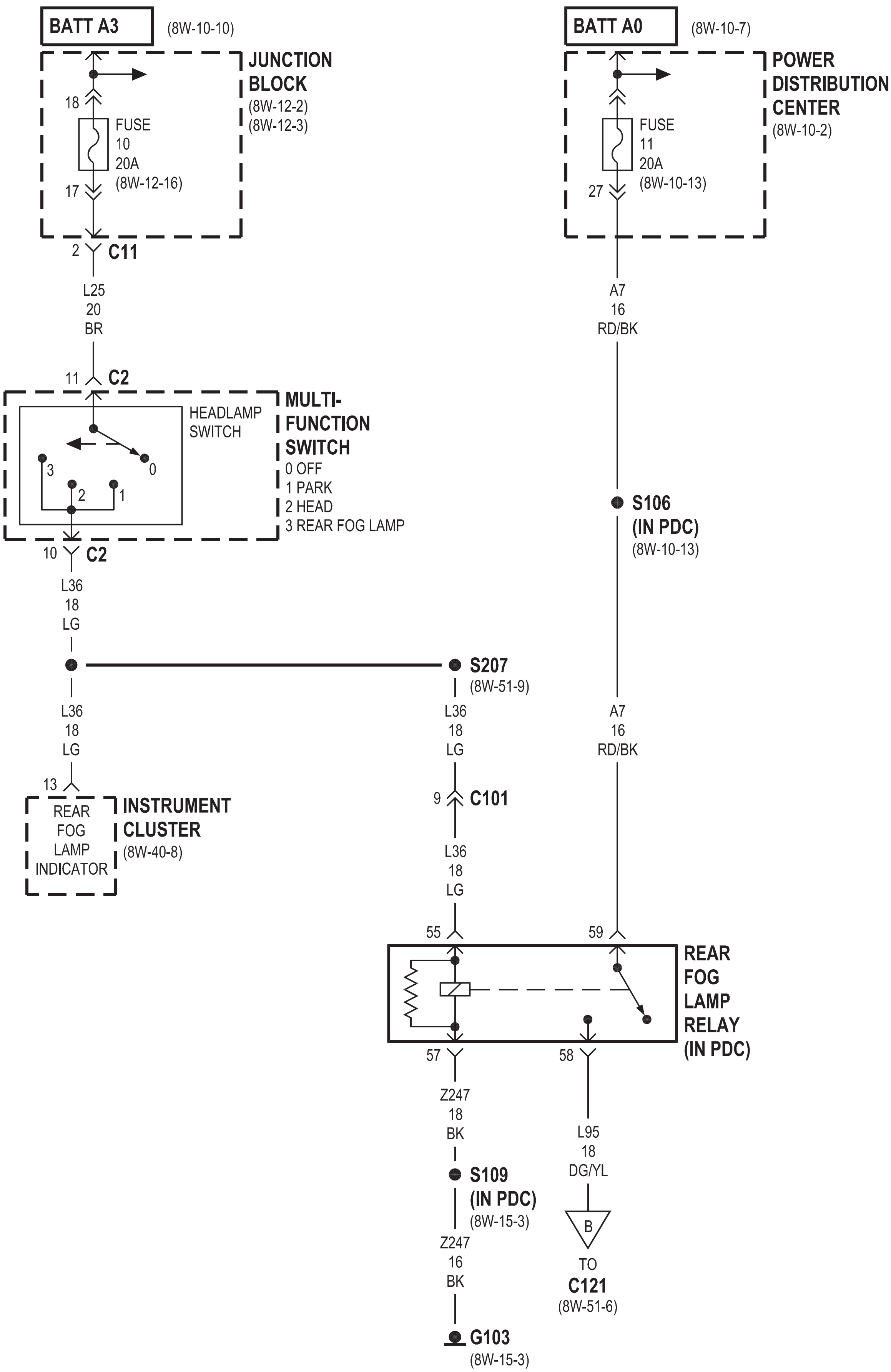
JRI05103 028W-16

JR27

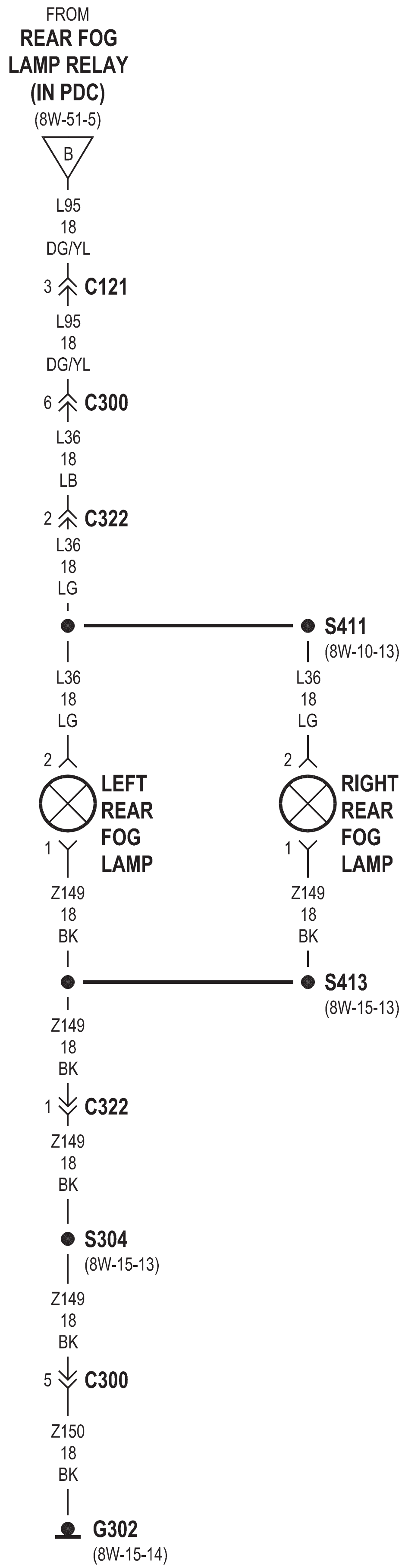


▲▲ BUILT-UP-EXPORT

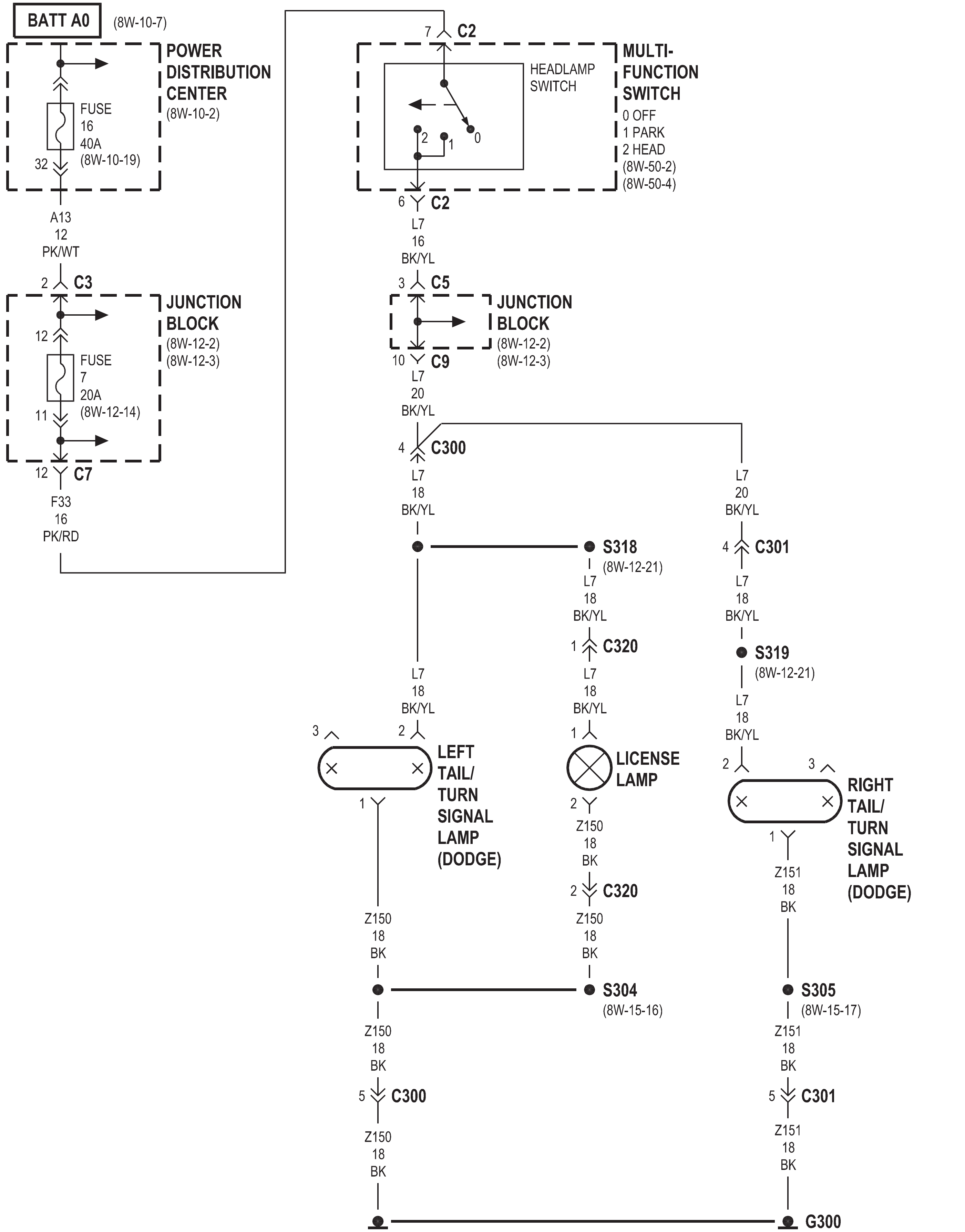
JR27 BUILT-UP-EXPORT



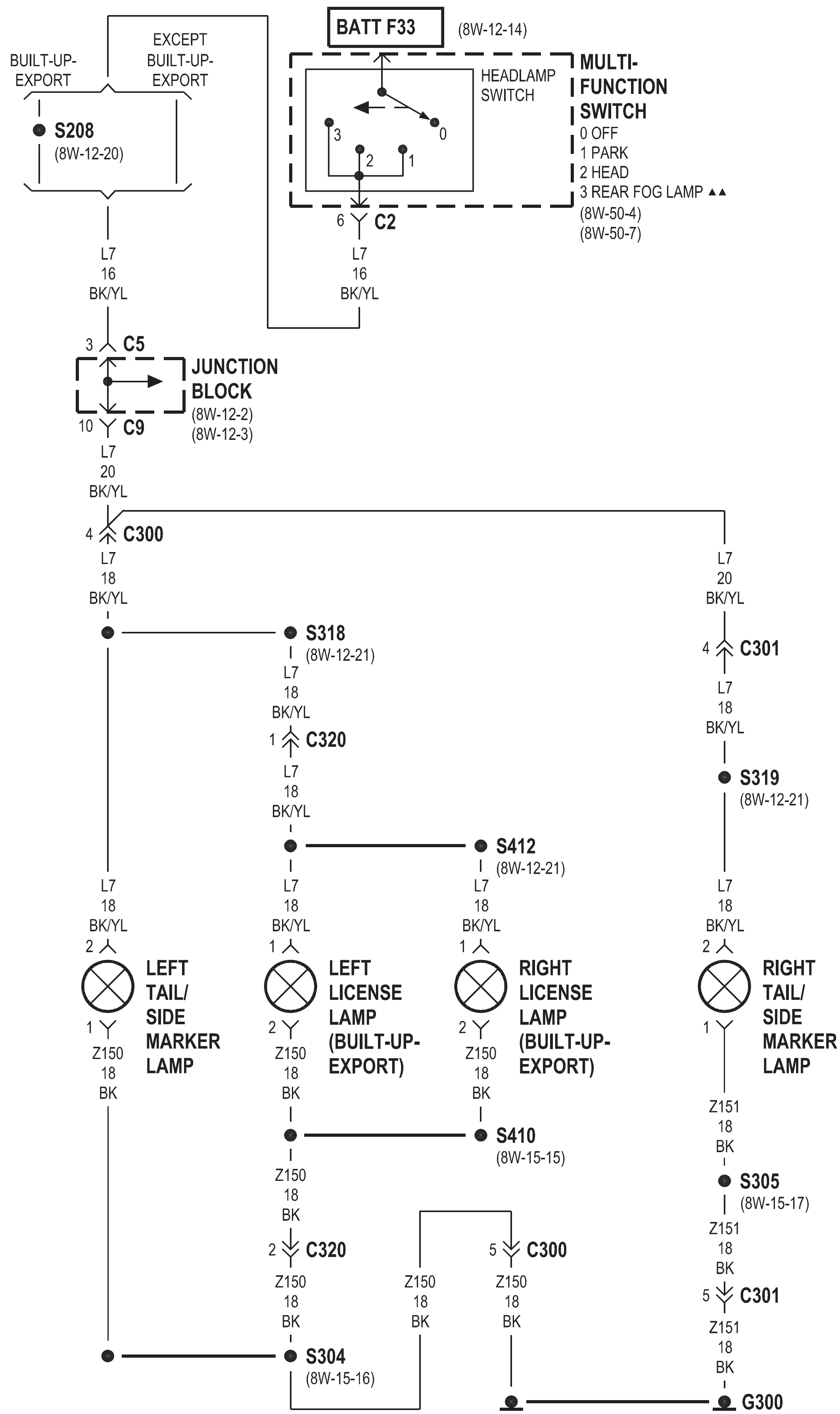
JR27 BUILT-UP-EXPORT



JR41 EXCEPT BUILT-UP-EXPORT

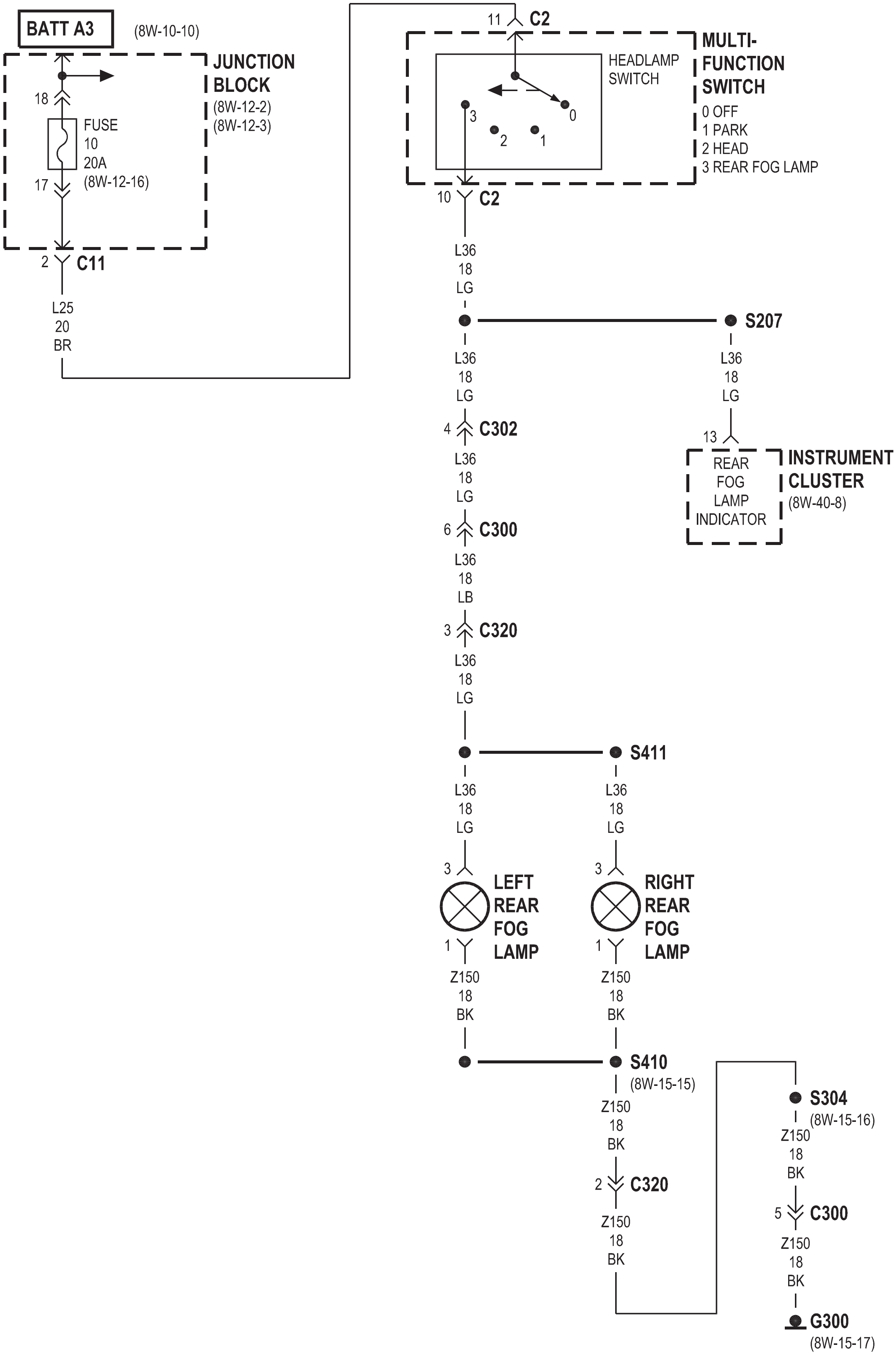


JR41 CHRYSLER/BUILT-UP-EXPORT

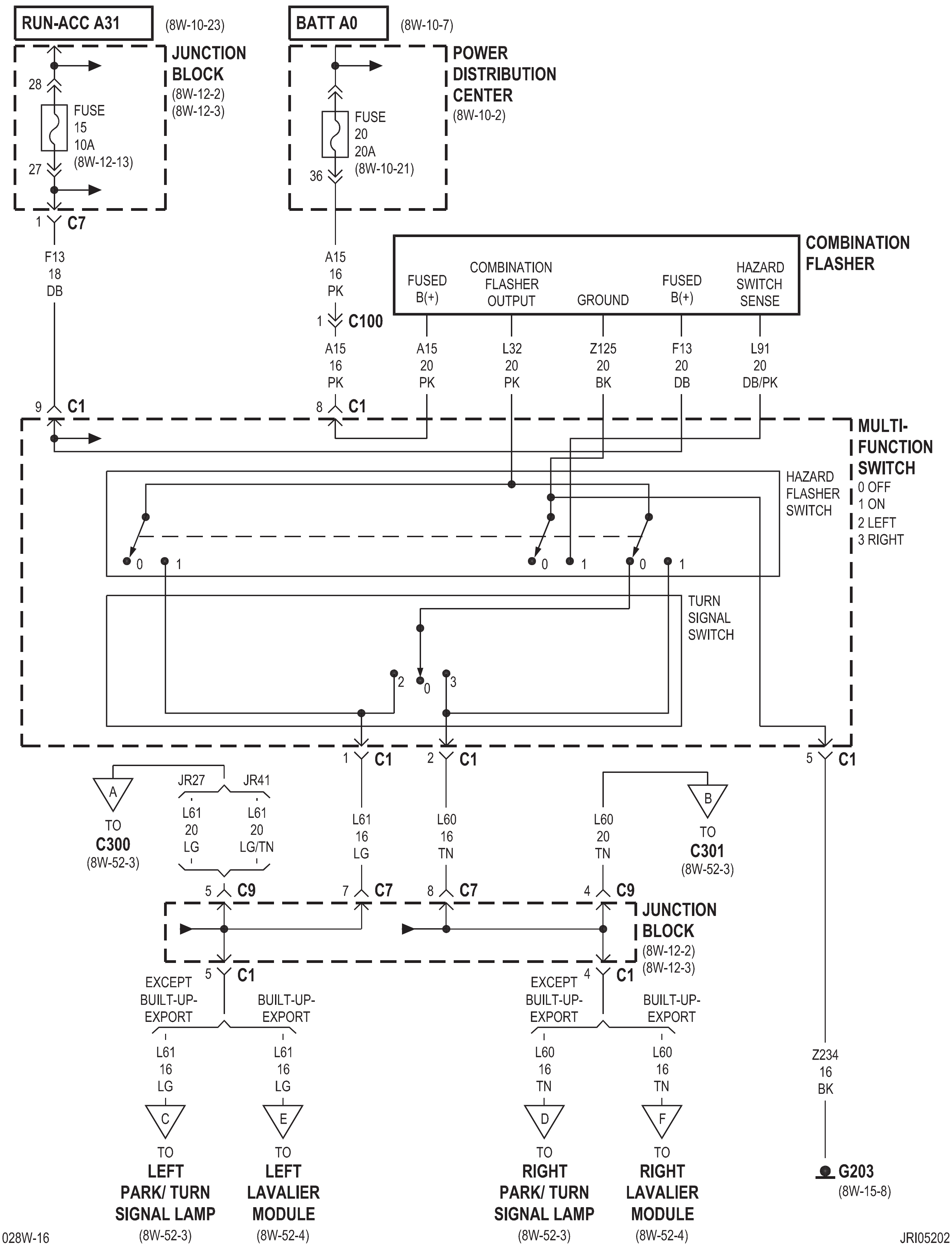


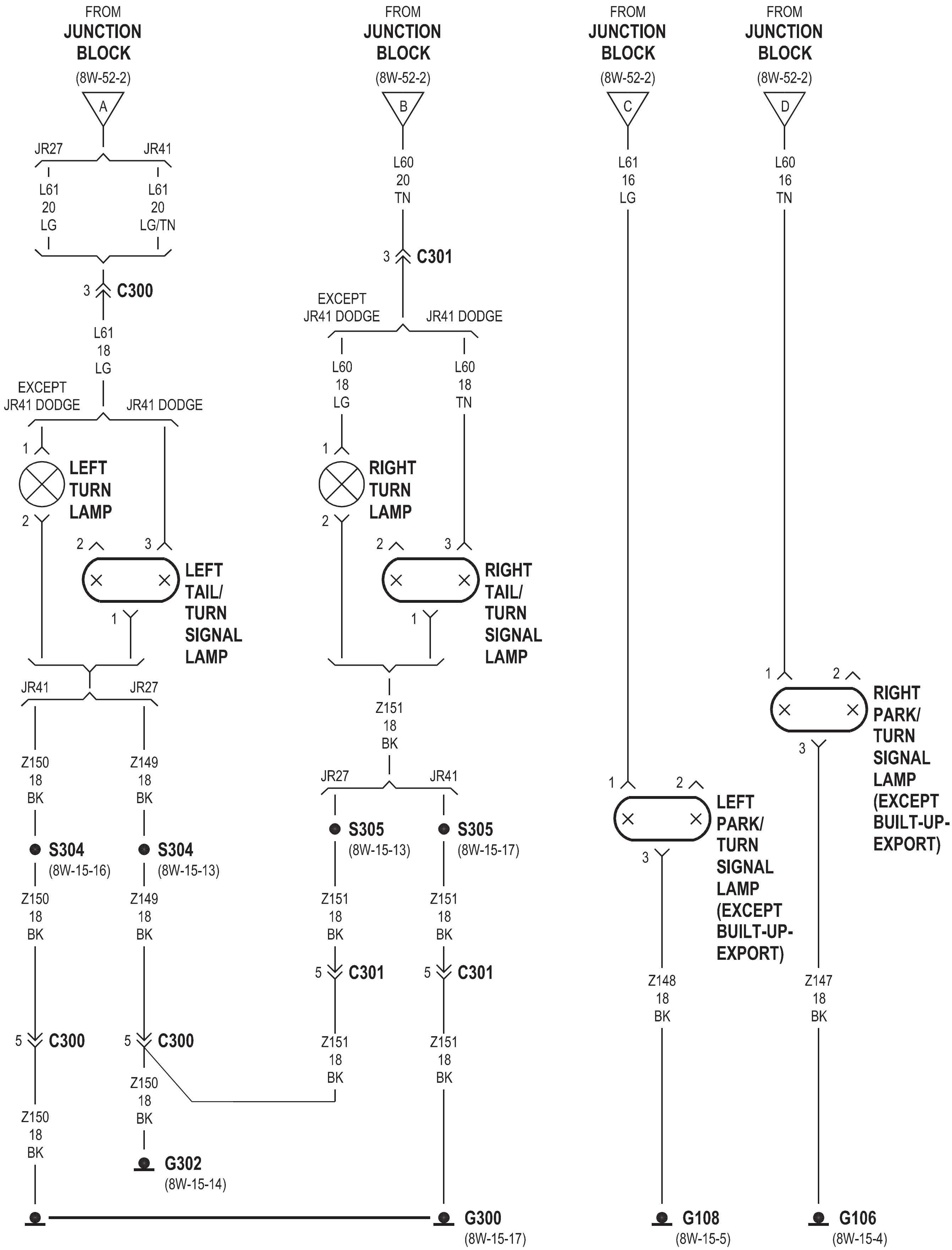
▲▲ BUILT-UP-EXPORT

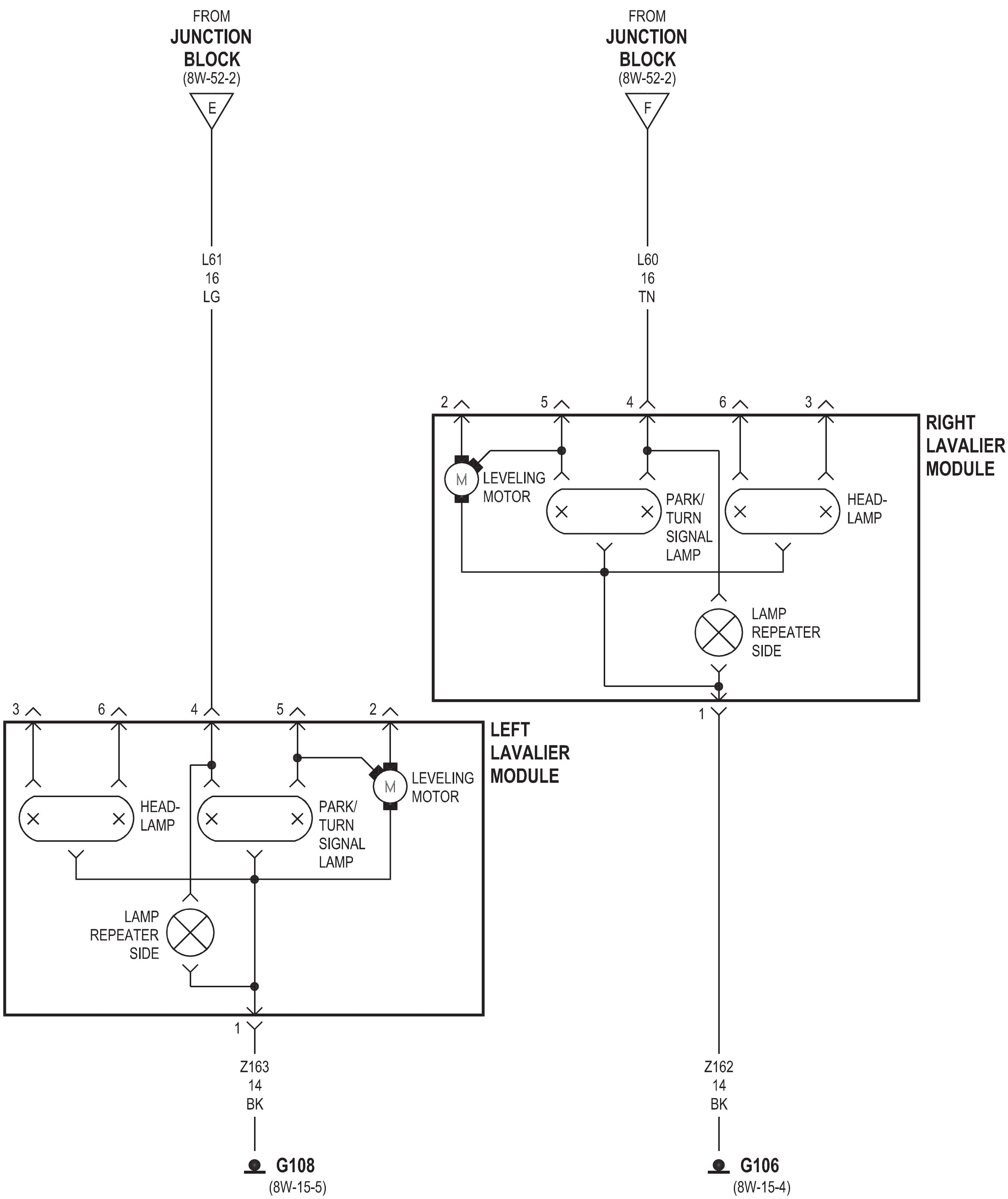
JR41 BUILT-UP-EXPORT



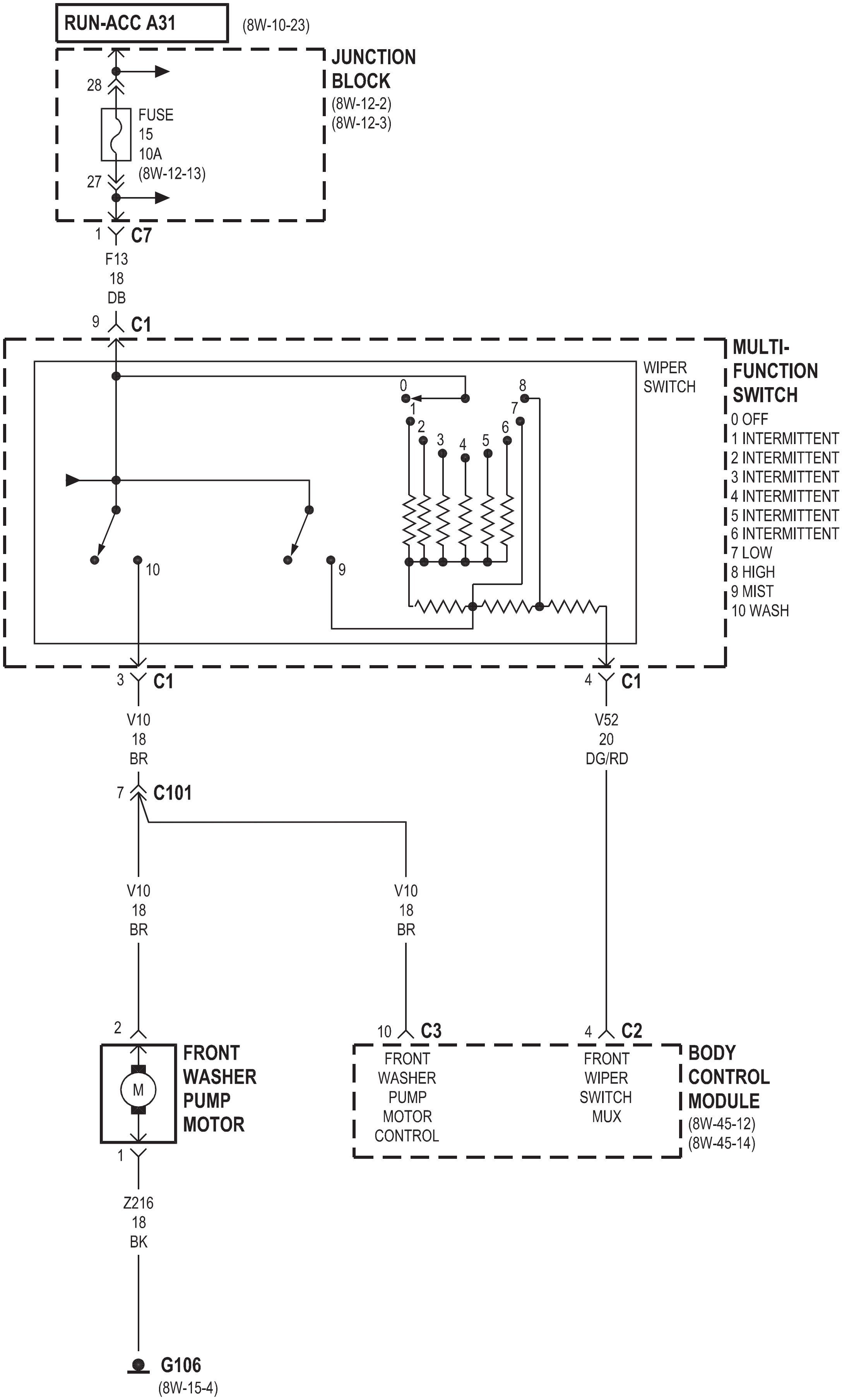
8W-52 TURN SIGNALS

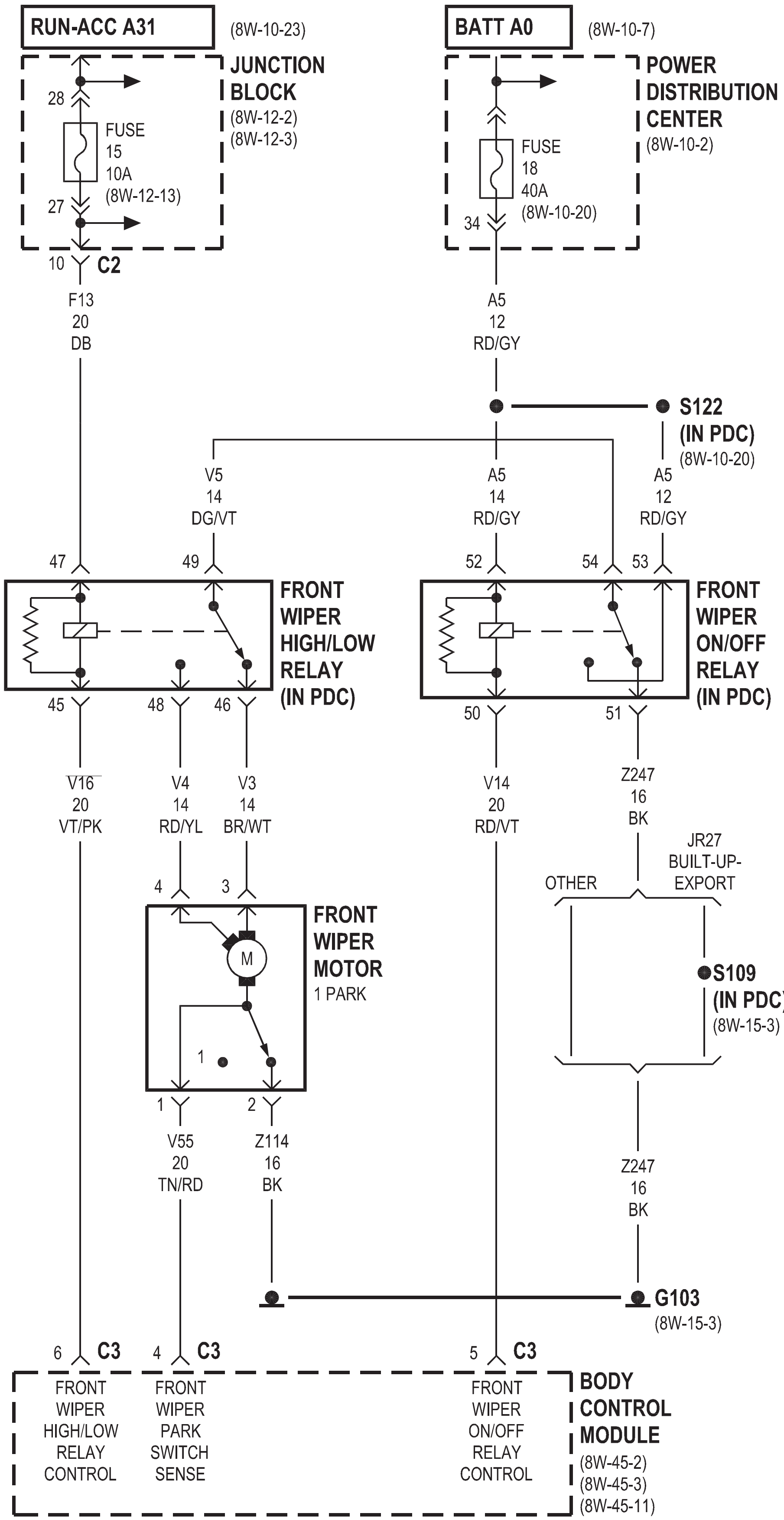

RUN-ACC A31
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
28
FUSE 15 10A (8W-12-13)
27
1 C7
F13 18 DB
BATT A0
(8W-10-7)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE 20 20A (8W-10-21)
36
A15 16 PK
1 C100
A15 16 PK
COMBINATION FLASHER
FUSED B(+)
COMBINATION FLASHER OUTPUT
GROUND
FUSED B(+)
HAZARD SWITCH SENSE
A15 20 PK
L32 20 PK
Z125 20 BK
F13 20 DB
L91 20 DB/PK
9 C1
8 C1
MULTI-FUNCTION SWITCH
0 OFF
1 ON
2 LEFT
3 RIGHT
HAZARD FLASHER SWITCH
0 1
0 1
0 1
TURN SIGNAL SWITCH
2 0 3
1 C1
2 C1
5 C1
A
TO C300 (8W-52-3)
JR27
JR41
L61 20 LG
L61 20 LG/TN
L61 16 LG
L60 16 TN
L60 20 TN
B
TO C301 (8W-52-3)
5 C9
7 C7
8 C7
4 C9
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
5 C1
4 C1
EXCEPT BUILT-UP-EXPORT
BUILT-UP-EXPORT
EXCEPT BUILT-UP-EXPORT
BUILT-UP-EXPORT
L61 16 LG
L61 16 LG
L60 16 TN
L60 16 TN
Z234 16 BK
C
E
D
F
TO LEFT PARK/ TURN SIGNAL LAMP (8W-52-3)
TO LEFT LAVALIER MODULE (8W-52-4)
TO RIGHT PARK/ TURN SIGNAL LAMP (8W-52-3)
TO RIGHT LAVALIER MODULE (8W-52-4)
G203 (8W-15-8)


FROM
JUNCTION
BLOCK
(8W-52-2)
A
JR27
JR41
L61
20
LG
L61
20
LG/TN
3
C300
L61
18
LG
EXCEPT
JR41 DODGE
JR41 DODGE
1
LEFT
TURN
LAMP
2
2
3
LEFT
TAIL/
TURN
SIGNAL
LAMP
1
JR41
JR27
Z150
18
BK
Z149
18
BK
S304
(8W-15-16)
S304
(8W-15-13)
Z150
18
BK
Z149
18
BK
5
C300
5
C300
Z150
18
BK
Z150
18
BK
G302
(8W-15-14)
FROM
JUNCTION
BLOCK
(8W-52-2)
B
L60
20
TN
3
C301
EXCEPT
JR41 DODGE
JR41 DODGE
L60
18
LG
L60
18
TN
1
RIGHT
TURN
LAMP
2
2
3
RIGHT
TAIL/
TURN
SIGNAL
LAMP
1
Z151
18
BK
JR27
JR41
S305
(8W-15-13)
S305
(8W-15-17)
Z151
18
BK
Z151
18
BK
5
C301
5
C301
Z151
18
BK
Z151
18
BK
G300
(8W-15-17)
FROM
JUNCTION
BLOCK
(8W-52-2)
C
L61
16
LG
1
2
LEFT
PARK/
TURN
SIGNAL
LAMP
(EXCEPT
BUILT-UP-
EXPORT)
3
Z148
18
BK
G108
(8W-15-5)
FROM
JUNCTION
BLOCK
(8W-52-2)
D
L60
16
TN
1
2
RIGHT
PARK/
TURN
SIGNAL
LAMP
(EXCEPT
BUILT-UP-
EXPORT)
3
Z147
18
BK
G106
(8W-15-4)

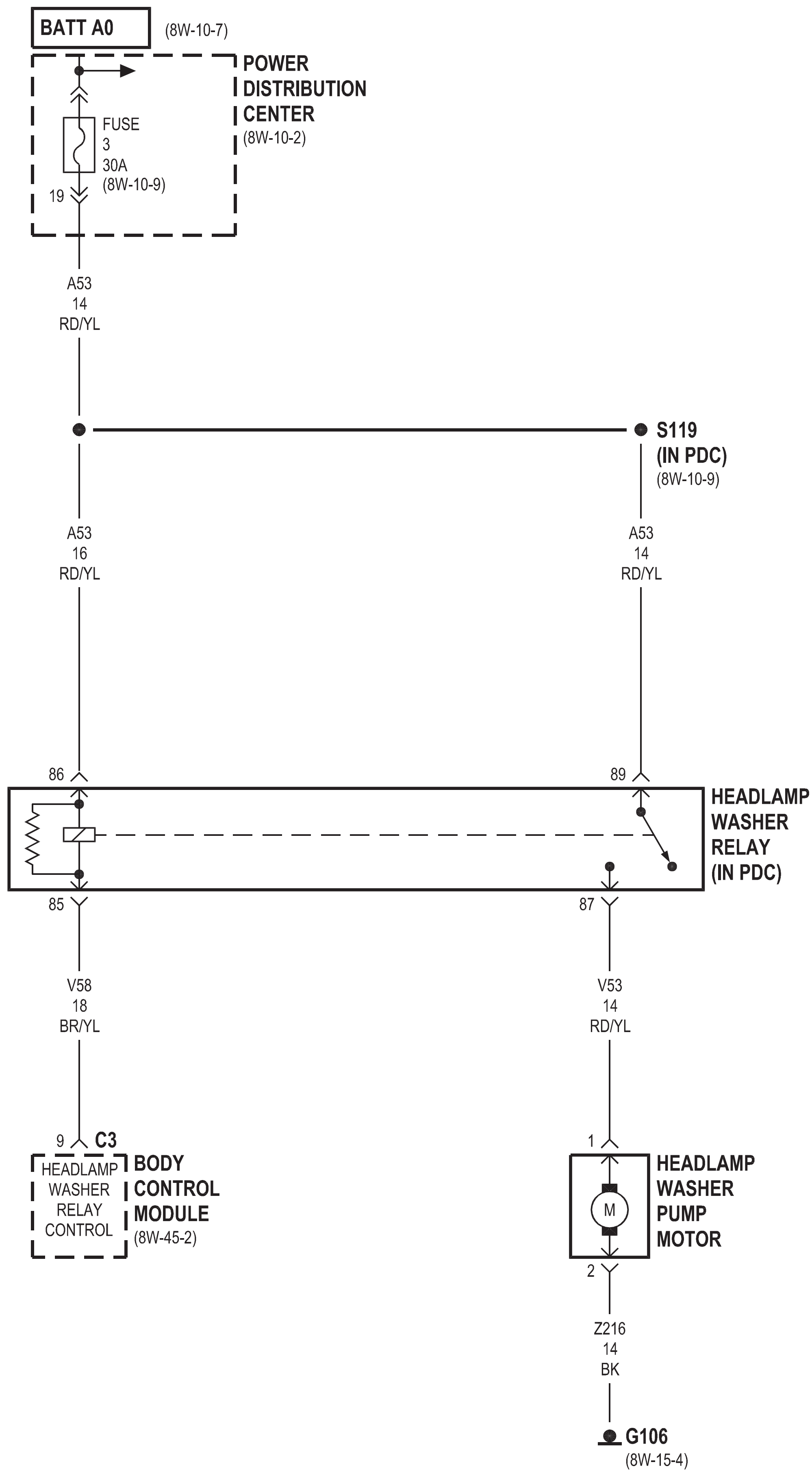

FROM
JUNCTION
BLOCK
(8W-52-2)
E
FROM
JUNCTION
BLOCK
(8W-52-2)
F
L61
16
LG
L60
16
TN
2
5
4
6
3
RIGHT
LAVALIER
MODULE
M
LEVELING
MOTOR
PARK/
TURN
SIGNAL
LAMP
HEAD-
LAMP
LAMP
REPEATER
SIDE
1
3
6
4
5
2
LEFT
LAVALIER
MODULE
HEAD-
LAMP
PARK/
TURN
SIGNAL
LAMP
M
LEVELING
MOTOR
LAMP
REPEATER
SIDE
1
Z163
14
BK
Z162
14
BK
G108
(8W-15-5)
G106
(8W-15-4)

8W-53 WIPERS


RUN-ACC A31
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
28
FUSE
15
10A
(8W-12-13)
27
1 C7
F13
18
DB
9 C1
MULTI-FUNCTION SWITCH
WIPER SWITCH
0 OFF
1 INTERMITTENT
2 INTERMITTENT
3 INTERMITTENT
4 INTERMITTENT
5 INTERMITTENT
6 INTERMITTENT
7 LOW
8 HIGH
9 MIST
10 WASH
3 C1
4 C1
V10
18
BR
V52
20
DG/RD
7 C101
V10
18
BR
V10
18
BR
2
FRONT WASHER PUMP MOTOR
M
1
10 C3
4 C2
FRONT WASHER PUMP MOTOR CONTROL
FRONT WIPER SWITCH MUX
BODY CONTROL MODULE
(8W-45-12)
(8W-45-14)
Z216
18
BK
G106
(8W-15-4)

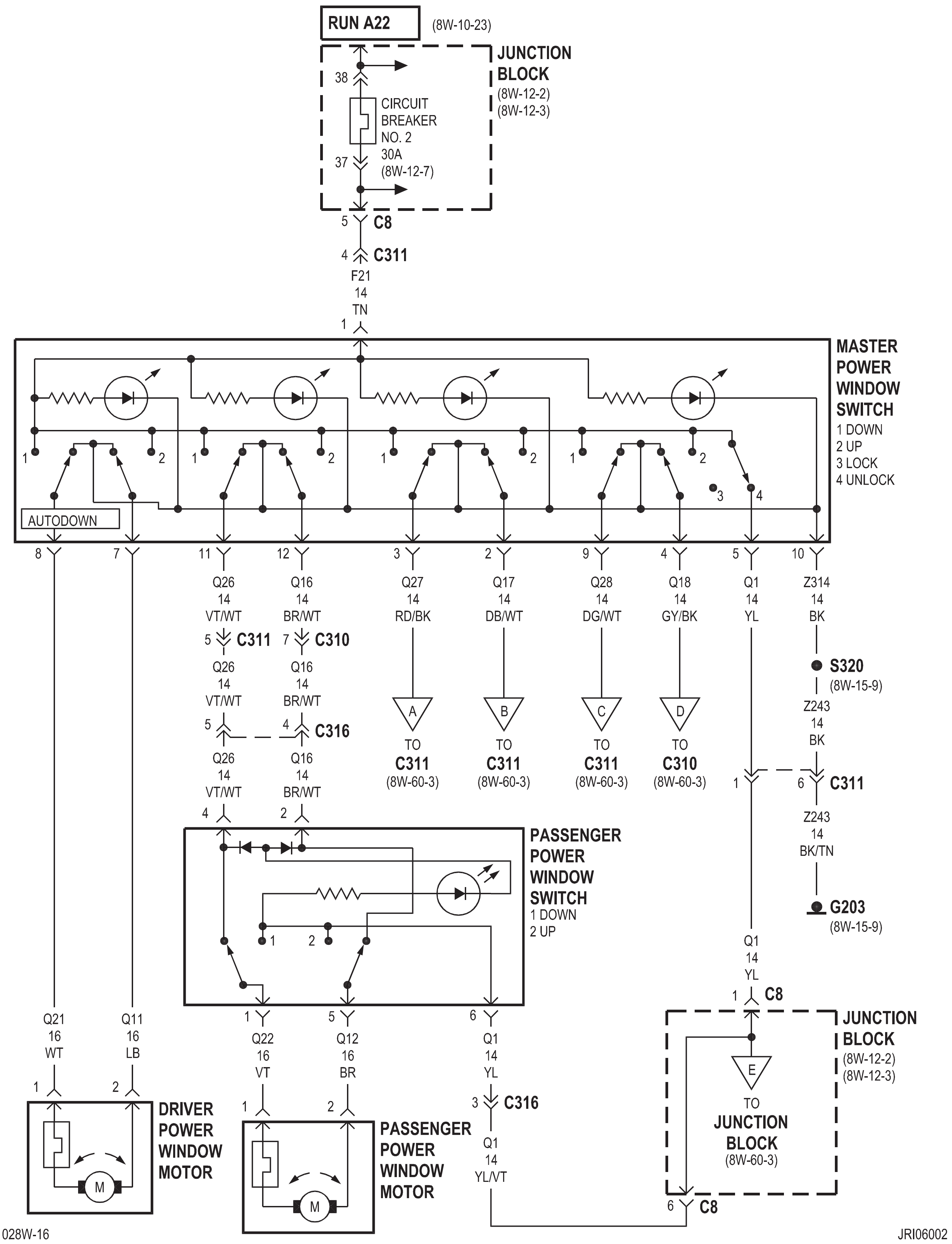

RUN-ACC A31
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
28
FUSE
15
10A
(8W-12-13)
27
10
C2
F13
20
DB
BATT A0
(8W-10-7)
POWER DISTRIBUTION CENTER
(8W-10-2)
FUSE
18
40A
(8W-10-20)
34
A5
12
RD/GY
S122
(IN PDC)
(8W-10-20)
V5
14
DG/VT
A5
14
RD/GY
A5
12
RD/GY
47
49
52
54
53
FRONT WIPER HIGH/LOW RELAY (IN PDC)
FRONT WIPER ON/OFF RELAY (IN PDC)
45
48
46
50
51
V16
20
VT/PK
V4
14
RD/YL
V3
14
BR/WT
V14
20
RD/VT
Z247
16
BK
JR27
BUILT-UP-
EXPORT
OTHER
4
3
FRONT WIPER MOTOR
1 PARK
M
1
S109
(IN PDC)
(8W-15-3)
1
2
V55
20
TN/RD
Z114
16
BK
Z247
16
BK
G103
(8W-15-3)
6
C3
4
C3
5
C3
FRONT WIPER HIGH/LOW RELAY CONTROL
FRONT WIPER PARK SWITCH SENSE
FRONT WIPER ON/OFF RELAY CONTROL
BODY CONTROL MODULE
(8W-45-2)
(8W-45-3)
(8W-45-11)

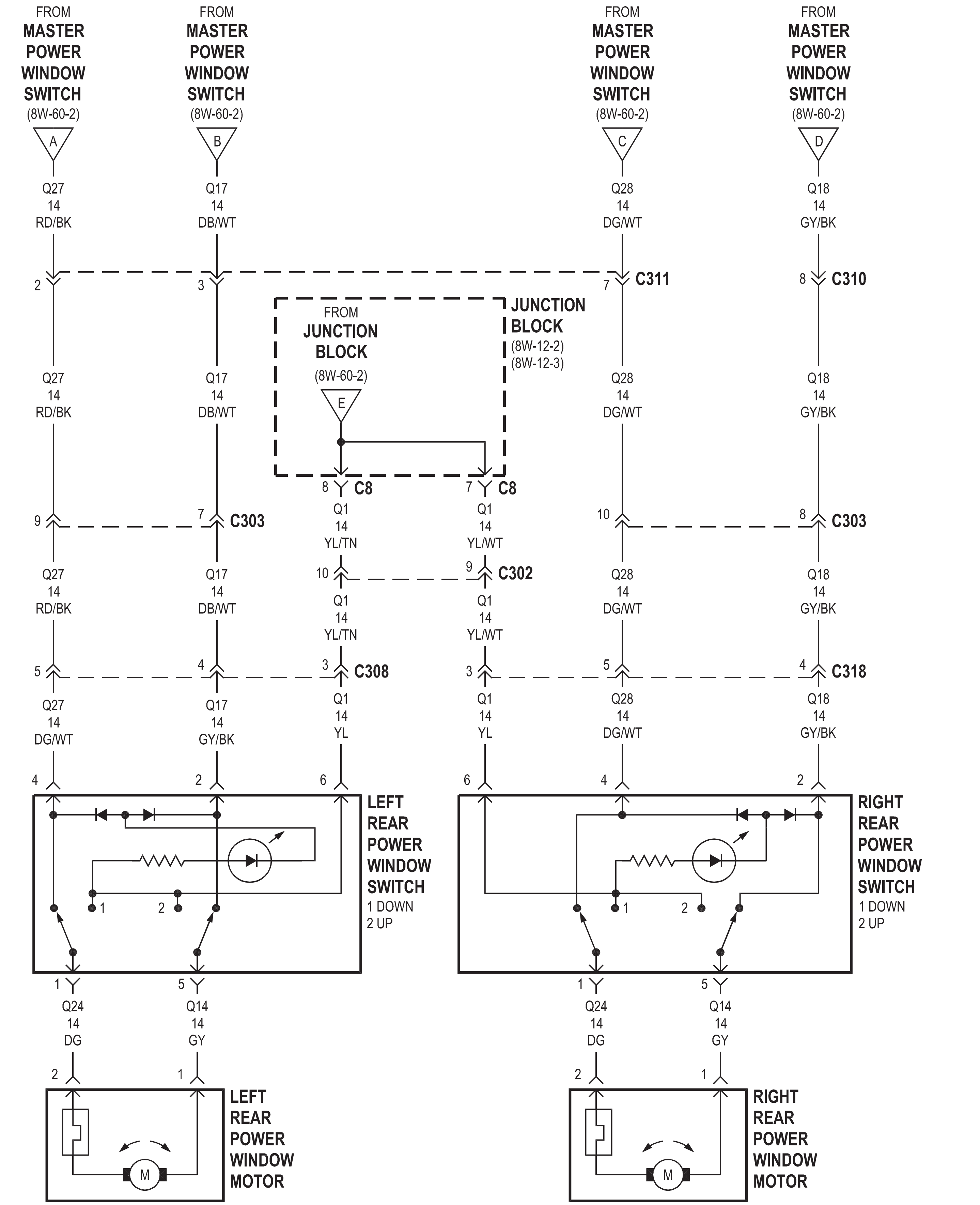
JR41 BUILT-UP-EXPORT



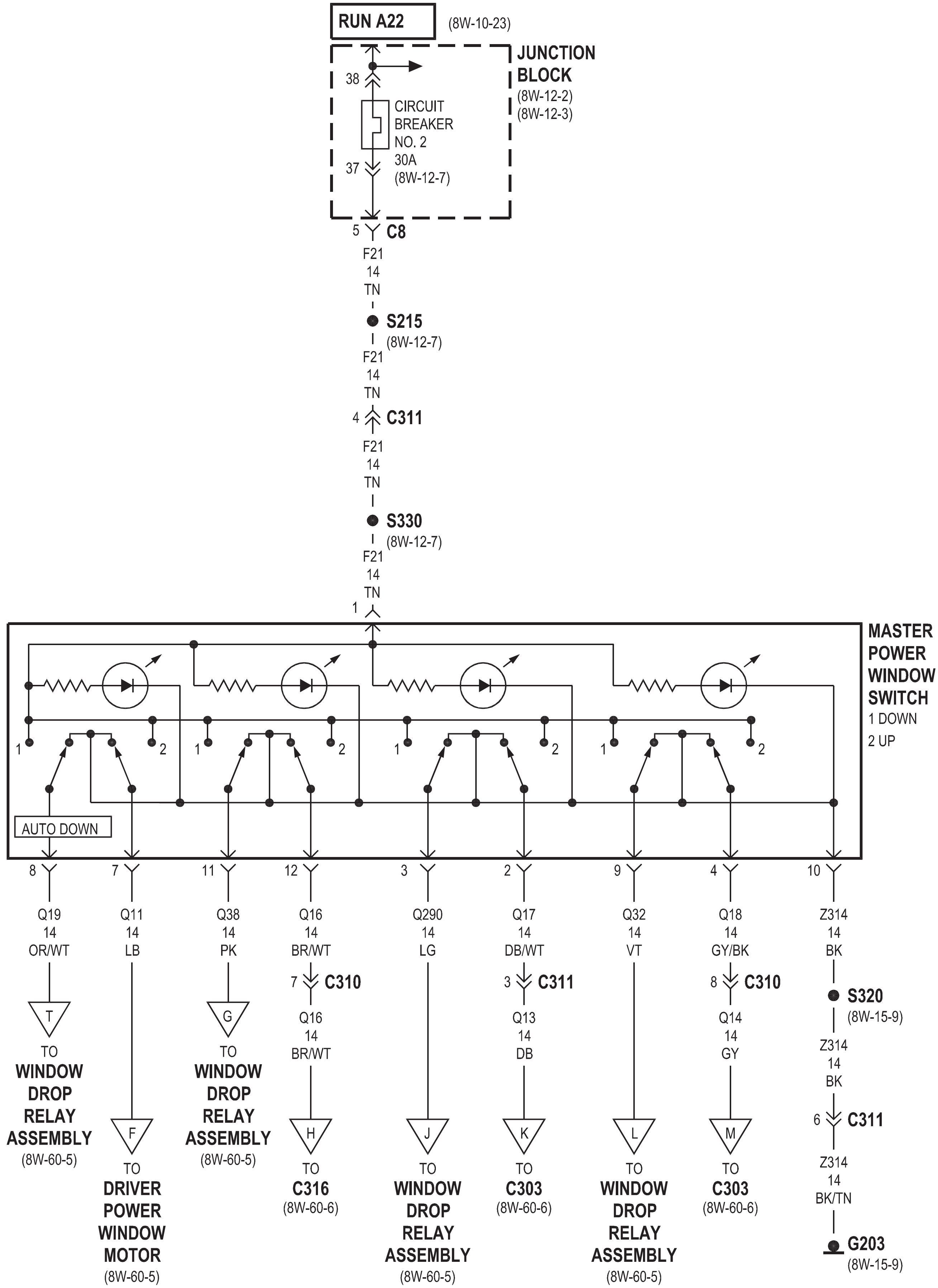
8W-60 POWER WINDOWS

JR41

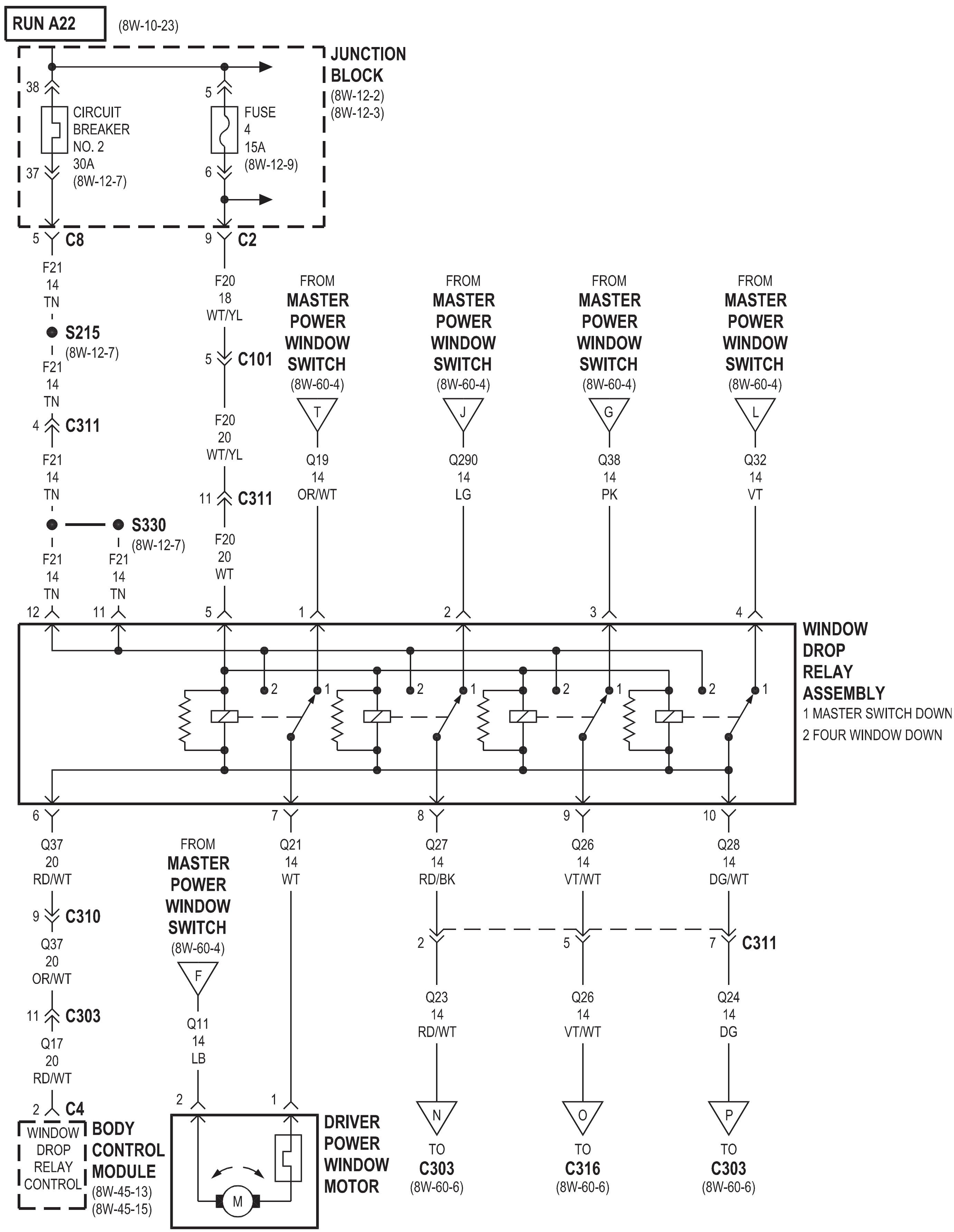

RUN A22
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
38
CIRCUIT BREAKER NO. 2
30A
(8W-12-7)
37
5 C8
4 C311
F21 14 TN
1
MASTER POWER WINDOW SWITCH
1 DOWN
2 UP
3 LOCK
4 UNLOCK
AUTODOWN
8 7 11 12 3 2 9 4 5 10
Q26 14 VT/WT
Q16 14 BR/WT
Q27 14 RD/BK
Q17 14 DB/WT
Q28 14 DG/WT
Q18 14 GY/BK
Q1 14 YL
Z314 14 BK
5 C311
7 C310
S320
(8W-15-9)
Z243 14 BK
5 4 C316
A TO C311 (8W-60-3)
B TO C311 (8W-60-3)
C TO C311 (8W-60-3)
D TO C310 (8W-60-3)
1 6 C311
Z243 14 BK/TN
G203
(8W-15-9)
PASSENGER POWER WINDOW SWITCH
1 DOWN
2 UP
Q21 16 WT
Q11 16 LB
1 5 6
Q22 16 VT
Q12 16 BR
Q1 14 YL
3 C316
Q1 14 YL/VT
1 C8
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
E TO JUNCTION BLOCK (8W-60-3)
6 C8
DRIVER POWER WINDOW MOTOR
PASSENGER POWER WINDOW MOTOR
M

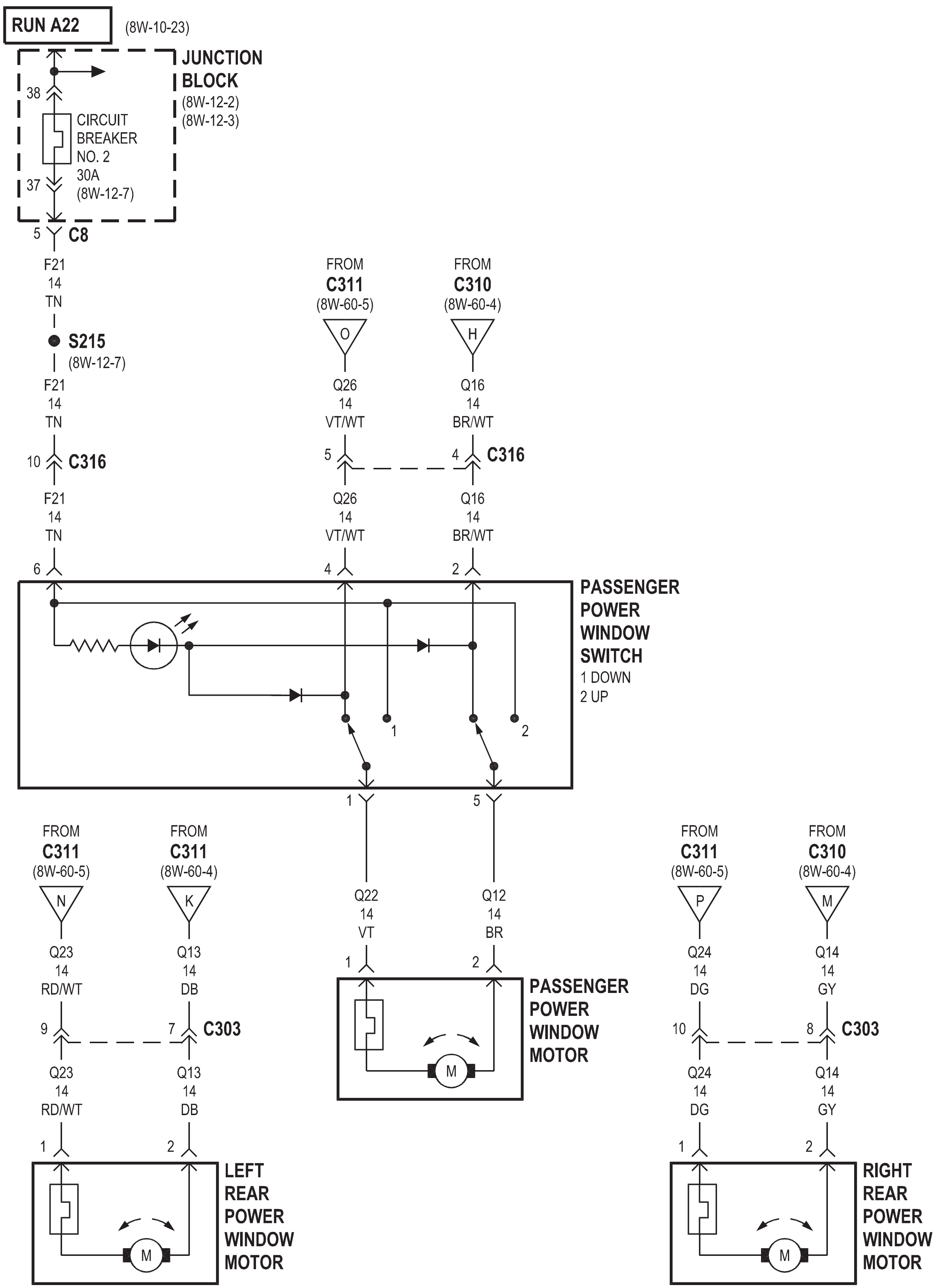

FROM
MASTER
POWER
WINDOW
SWITCH
(8W-60-2)
A
B
C
D
Q27
14
RD/BK
Q17
14
DB/WT
Q28
14
DG/WT
Q18
14
GY/BK
C311
C310
FROM
JUNCTION
BLOCK
(8W-60-2)
E
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
C8
C303
C302
Q1
14
YL/TN
YL/WT
C308
C318
Q27
14
DG/WT
Q17
14
GY/BK
Q1
14
YL
LEFT
REAR
POWER
WINDOW
SWITCH
1 DOWN
2 UP
RIGHT
REAR
POWER
WINDOW
SWITCH
1 DOWN
2 UP
Q24
14
DG
Q14
14
GY
LEFT
REAR
POWER
WINDOW
MOTOR
RIGHT
REAR
POWER
WINDOW
MOTOR
M

JR27

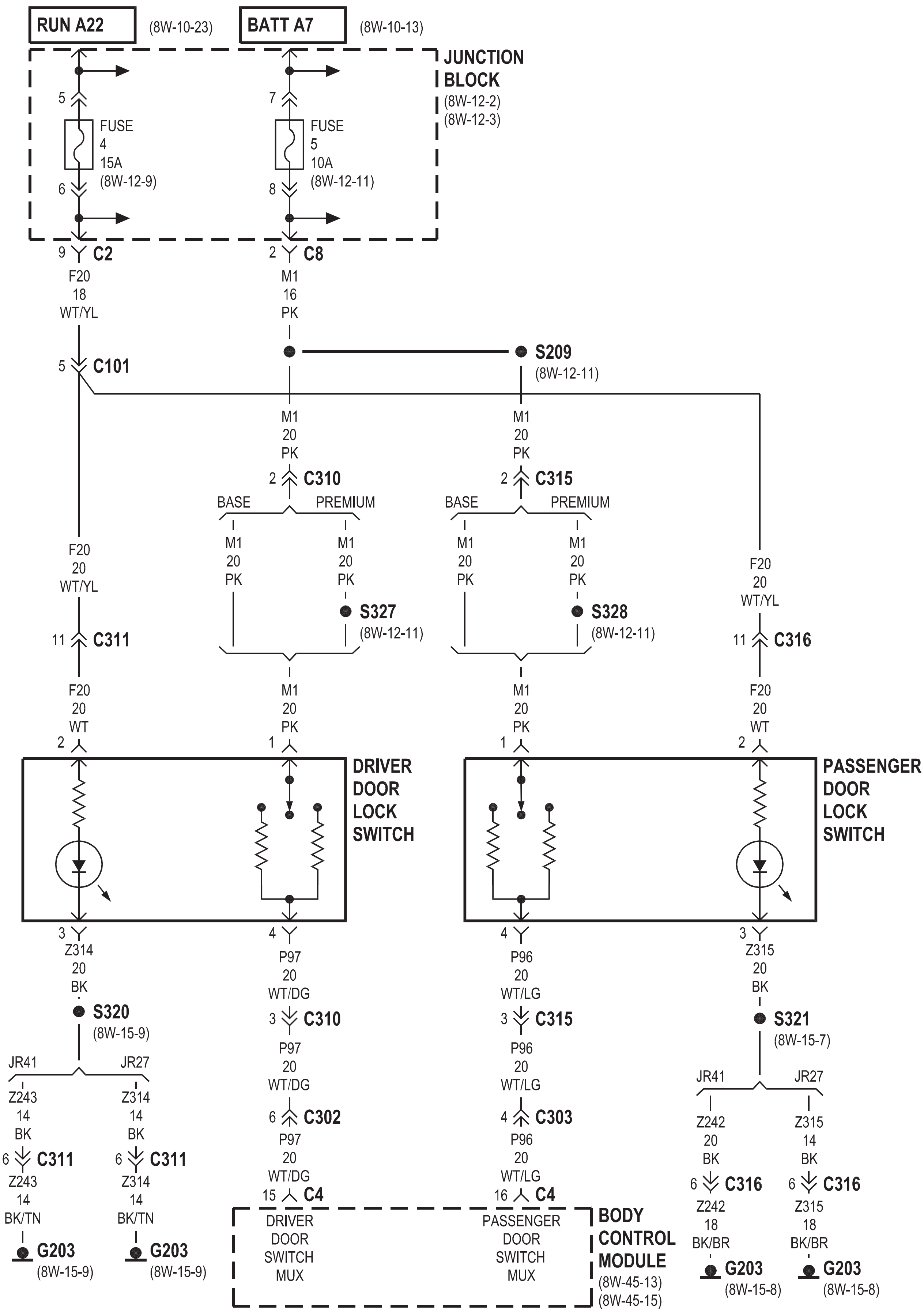

RUN A22
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
38
CIRCUIT BREAKER NO. 2
30A
(8W-12-7)
37
5 C8
F21 14 TN
S215
(8W-12-7)
F21 14 TN
4 C311
F21 14 TN
S330
(8W-12-7)
F21 14 TN
1
MASTER POWER WINDOW SWITCH
1 DOWN
2 UP
1 2
AUTO DOWN
8 Q19 14 OR/WT
T
TO WINDOW DROP RELAY ASSEMBLY
(8W-60-5)
7 Q11 14 LB
F
TO DRIVER POWER WINDOW MOTOR
(8W-60-5)
11 Q38 14 PK
G
TO WINDOW DROP RELAY ASSEMBLY
(8W-60-5)
12 Q16 14 BR/WT
7 C310
Q16 14 BR/WT
H
TO C316
(8W-60-6)
3 Q290 14 LG
J
TO WINDOW DROP RELAY ASSEMBLY
(8W-60-5)
2 Q17 14 DB/WT
3 C311
Q13 14 DB
K
TO C303
(8W-60-6)
9 Q32 14 VT
L
TO WINDOW DROP RELAY ASSEMBLY
(8W-60-5)
4 Q18 14 GY/BK
8 C310
Q14 14 GY
M
TO C303
(8W-60-6)
10 Z314 14 BK
S320
(8W-15-9)
Z314 14 BK
6 C311
Z314 14 BK/TN
G203
(8W-15-9)

JR27


RUN A22
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
CIRCUIT BREAKER NO. 2 30A (8W-12-7)
FUSE 4 15A (8W-12-9)
38
37
5
6
5 C8
9 C2
F21 14 TN
S215 (8W-12-7)
F20 18 WT/YL
5 C101
4 C311
F20 20 WT/YL
11 C311
S330 (8W-12-7)
F20 20 WT
FROM MASTER POWER WINDOW SWITCH (8W-60-4)
T
J
G
L
Q19 14 OR/WT
Q290 14 LG
Q38 14 PK
Q32 14 VT
12
11
5
1
2
3
4
WINDOW DROP RELAY ASSEMBLY
1 MASTER SWITCH DOWN
2 FOUR WINDOW DOWN
6
7
8
9
10
Q37 20 RD/WT
9 C310
Q37 20 OR/WT
11 C303
Q17 20 RD/WT
2 C4
WINDOW DROP RELAY CONTROL
BODY CONTROL MODULE (8W-45-13) (8W-45-15)
F
Q11 14 LB
Q21 14 WT
Q27 14 RD/BK
Q26 14 VT/WT
Q28 14 DG/WT
2
5
7 C311
Q23 14 RD/WT
Q26 14 VT/WT
Q24 14 DG
DRIVER POWER WINDOW MOTOR
M
N
O
P
TO C303 (8W-60-6)
TO C316 (8W-60-6)
TO C303 (8W-60-6)

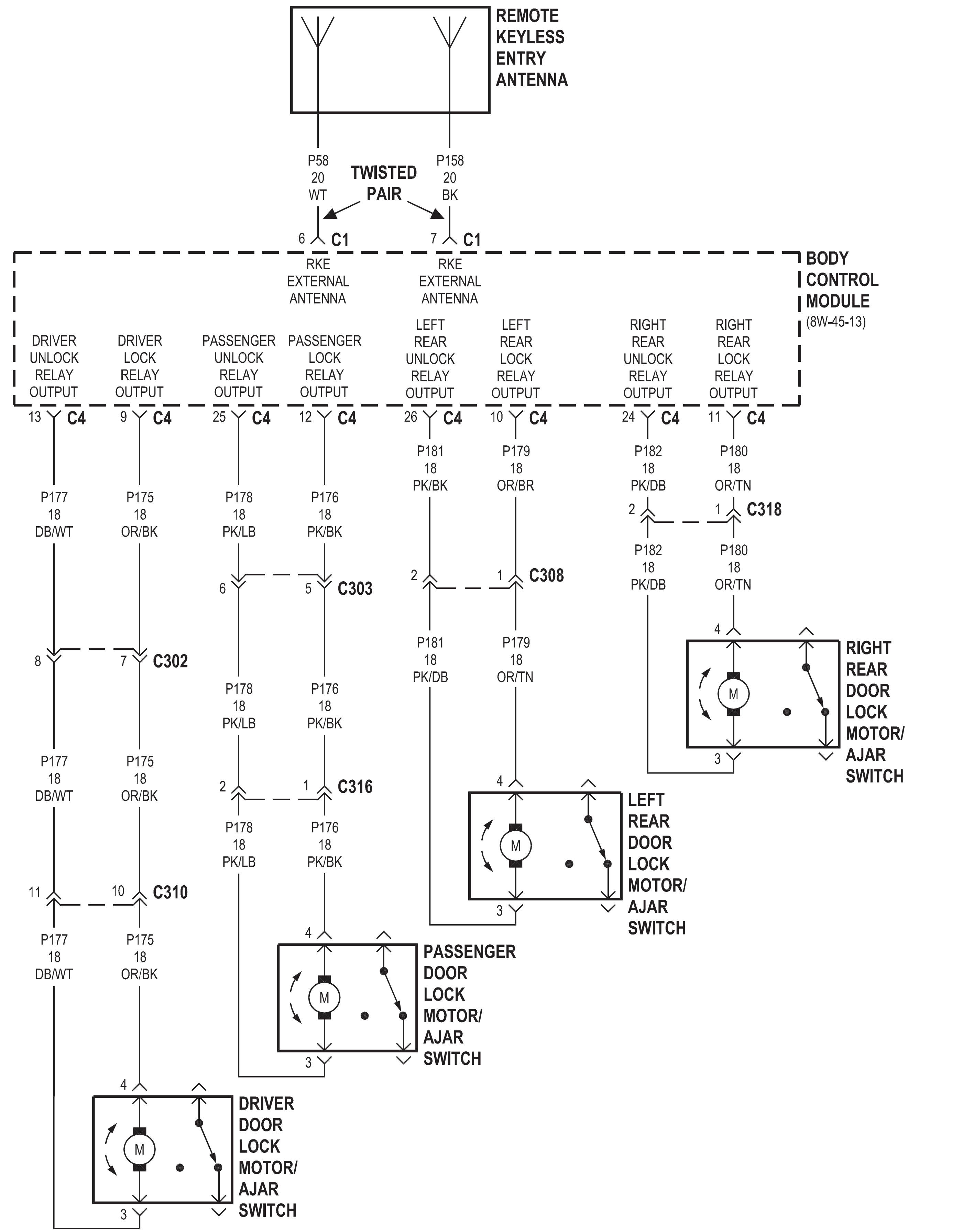

RUN A22
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
38
CIRCUIT BREAKER NO. 2
30A
(8W-12-7)
37
5
C8
F21
14
TN
S215
(8W-12-7)
F21
14
TN
10
C316
F21
14
TN
FROM
C311
(8W-60-5)
O
Q26
14
VT/WT
5
FROM
C310
(8W-60-4)
H
Q16
14
BR/WT
4
C316
Q26
14
VT/WT
Q16
14
BR/WT
6
4
2
PASSENGER POWER WINDOW SWITCH
1 DOWN
2 UP
1
2
1
5
FROM
C311
(8W-60-5)
N
FROM
C311
(8W-60-4)
K
Q22
14
VT
Q12
14
BR
FROM
C311
(8W-60-5)
P
FROM
C310
(8W-60-4)
M
Q23
14
RD/WT
Q13
14
DB
1
2
PASSENGER POWER WINDOW MOTOR
M
Q24
14
DG
Q14
14
GY
9
7
C303
10
8
C303
Q23
14
RD/WT
Q13
14
DB
Q24
14
DG
Q14
14
GY
1
2
1
2
LEFT REAR POWER WINDOW MOTOR
M
RIGHT REAR POWER WINDOW MOTOR
M

8W-61 POWER DOOR LOCKS

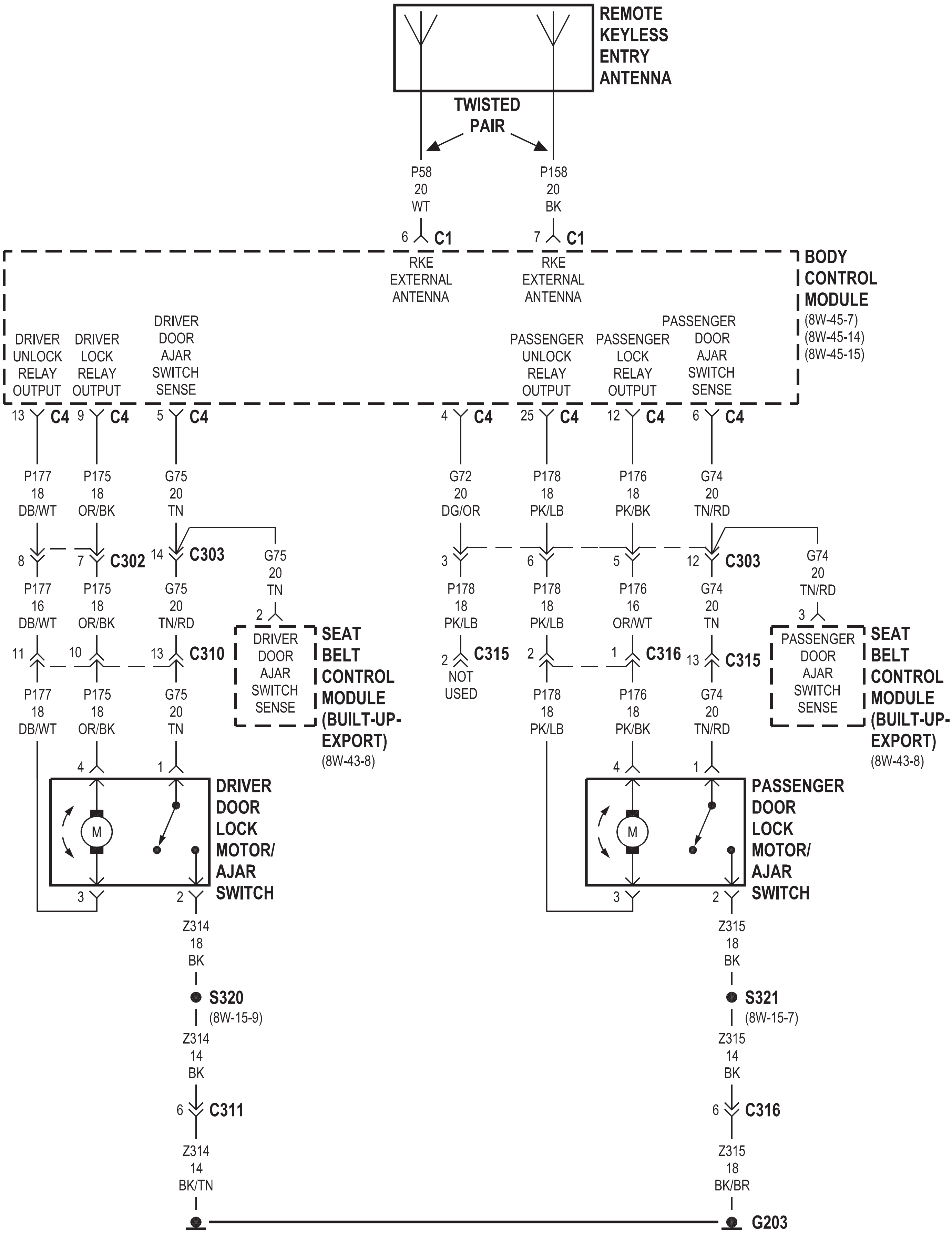


028W-16 JRI06102

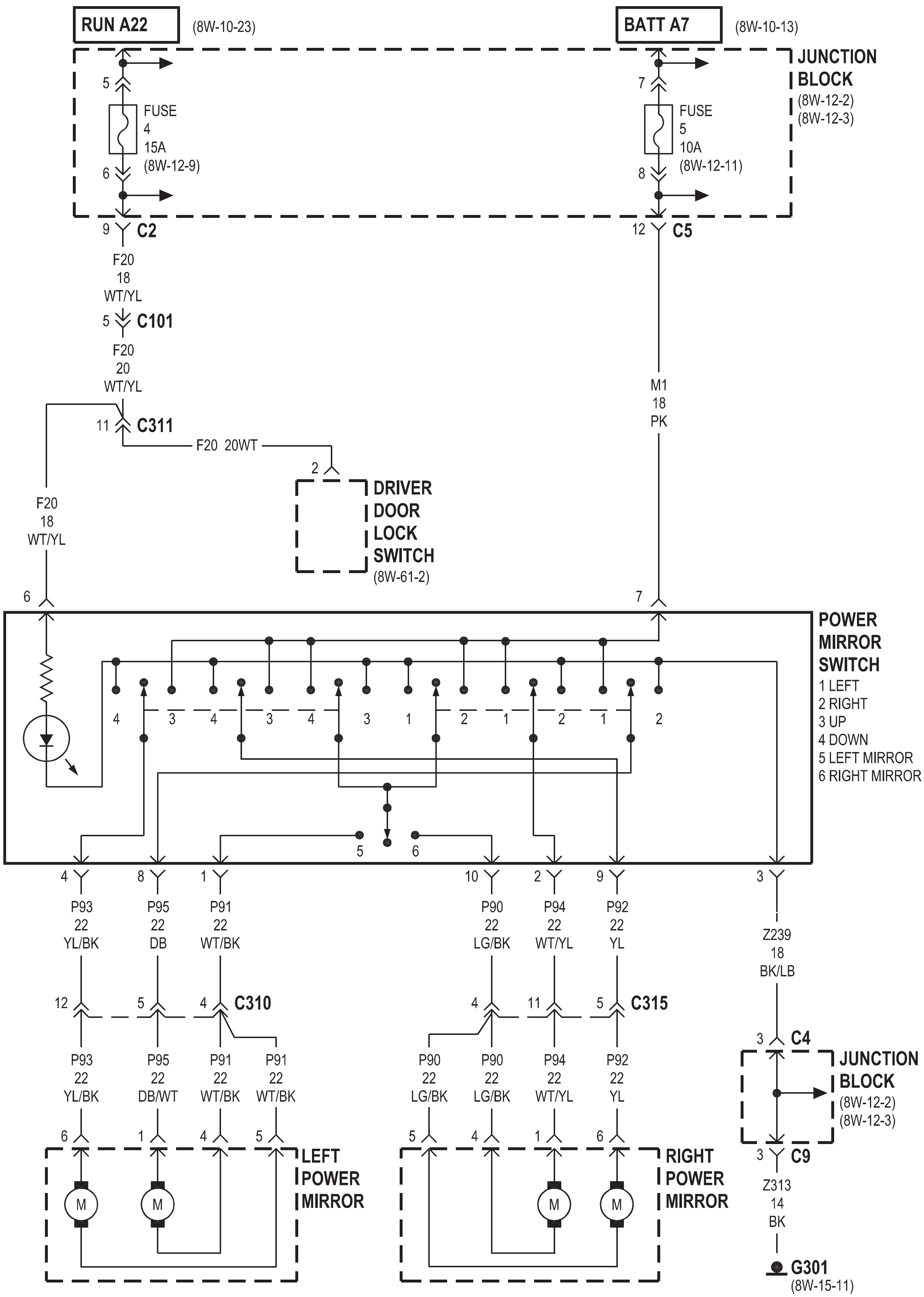
JR41


REMOTE KEYLESS ENTRY ANTENNA
P58 20 WT
P158 20 BK
TWISTED PAIR
6 C1
7 C1
RKE EXTERNAL ANTENNA
RKE EXTERNAL ANTENNA
BODY CONTROL MODULE
(8W-45-13)
DRIVER UNLOCK RELAY OUTPUT
DRIVER LOCK RELAY OUTPUT
PASSENGER UNLOCK RELAY OUTPUT
PASSENGER LOCK RELAY OUTPUT
LEFT REAR UNLOCK RELAY OUTPUT
LEFT REAR LOCK RELAY OUTPUT
RIGHT REAR UNLOCK RELAY OUTPUT
RIGHT REAR LOCK RELAY OUTPUT
13 C4
9 C4
25 C4
12 C4
26 C4
10 C4
24 C4
11 C4
P181 18 PK/BK
P179 18 OR/BR
P182 18 PK/DB
P180 18 OR/TN
2
1 C318
P182 18 PK/DB
P180 18 OR/TN
P177 18 DB/WT
P175 18 OR/BK
P178 18 PK/LB
P176 18 PK/BK
6
5 C303
2
1 C308
8
7 C302
P181 18 PK/DB
P179 18 OR/TN
P178 18 PK/LB
P176 18 PK/BK
4
M
3
RIGHT REAR DOOR LOCK MOTOR/ AJAR SWITCH
P177 18 DB/WT
P175 18 OR/BK
2
1 C316
P178 18 PK/LB
P176 18 PK/BK
4
M
3
LEFT REAR DOOR LOCK MOTOR/ AJAR SWITCH
11
10 C310
P177 18 DB/WT
P175 18 OR/BK
4
M
3
PASSENGER DOOR LOCK MOTOR/ AJAR SWITCH
4
M
3
DRIVER DOOR LOCK MOTOR/ AJAR SWITCH

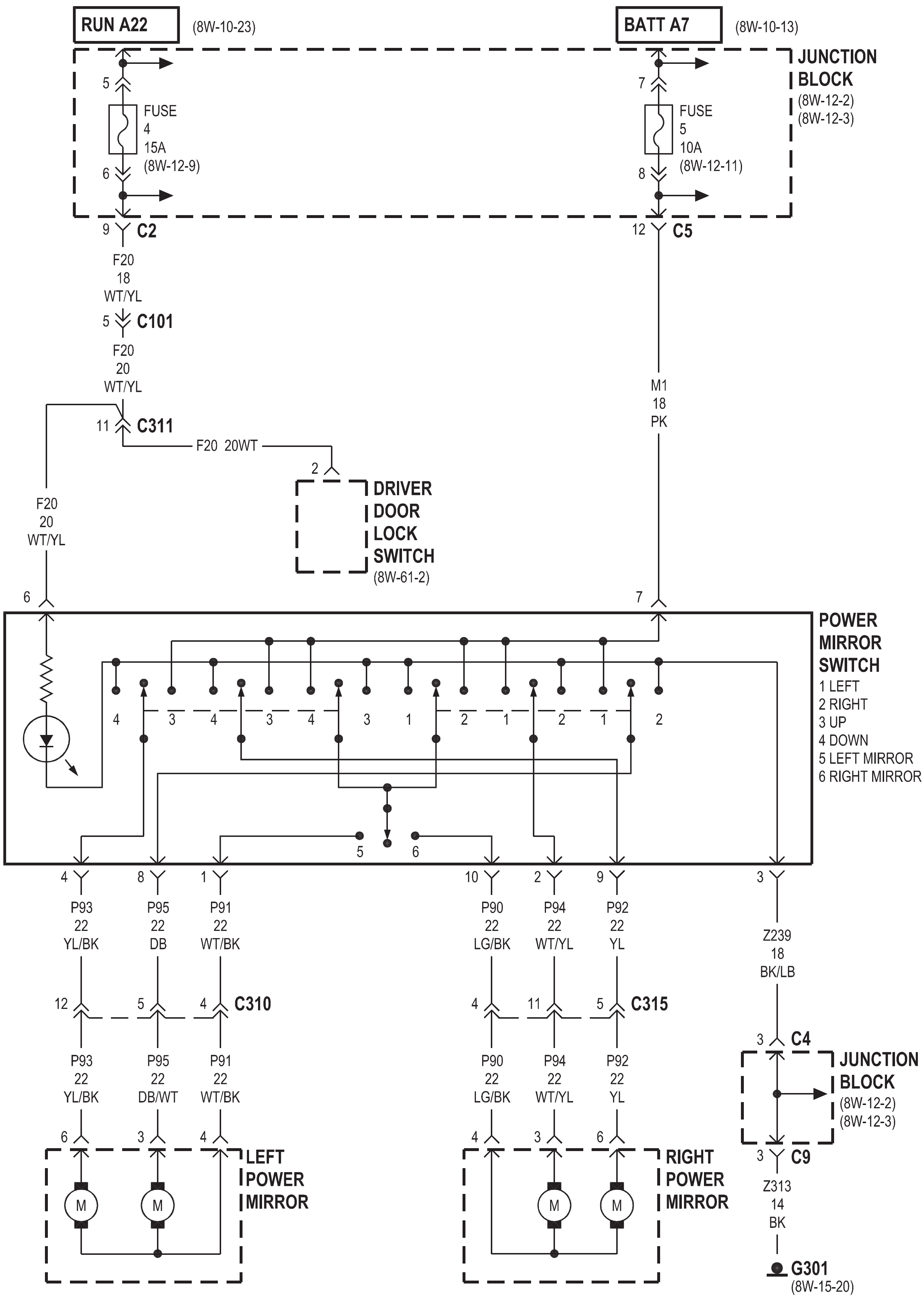
JR27


REMOTE KEYLESS ENTRY ANTENNA
TWISTED PAIR
P58 20 WT
P158 20 BK
6 C1
7 C1
RKE EXTERNAL ANTENNA
RKE EXTERNAL ANTENNA
BODY CONTROL MODULE
(8W-45-7)
(8W-45-14)
(8W-45-15)
DRIVER UNLOCK RELAY OUTPUT
DRIVER LOCK RELAY OUTPUT
DRIVER DOOR AJAR SWITCH SENSE
PASSENGER UNLOCK RELAY OUTPUT
PASSENGER LOCK RELAY OUTPUT
PASSENGER DOOR AJAR SWITCH SENSE
13 C4
9 C4
5 C4
4 C4
25 C4
12 C4
6 C4
P177 18 DB/WT
P175 18 OR/BK
G75 20 TN
G72 20 DG/OR
P178 18 PK/LB
P176 18 PK/BK
G74 20 TN/RD
8
7 C302
14 C303
G75 20 TN
3
6
5
12 C303
G74 20 TN/RD
P177 16 DB/WT
P175 18 OR/BK
G75 20 TN/RD
2
P178 18 PK/LB
P178 18 PK/LB
P176 16 OR/WT
G74 20 TN
3
DRIVER DOOR AJAR SWITCH SENSE
SEAT BELT CONTROL MODULE (BUILT-UP-EXPORT)
(8W-43-8)
PASSENGER DOOR AJAR SWITCH SENSE
SEAT BELT CONTROL MODULE (BUILT-UP-EXPORT)
(8W-43-8)
11
10
13 C310
2 C315
NOT USED
2
1 C316
13 C315
P177 18 DB/WT
P175 18 OR/BK
G75 20 TN
P178 18 PK/LB
P176 18 PK/BK
G74 20 TN/RD
4
1
4
1
M
M
DRIVER DOOR LOCK MOTOR/ AJAR SWITCH
PASSENGER DOOR LOCK MOTOR/ AJAR SWITCH
3
2
3
2
Z314 18 BK
Z315 18 BK
S320
(8W-15-9)
S321
(8W-15-7)
Z314 14 BK
Z315 14 BK
6 C311
6 C316
Z314 14 BK/TN
Z315 18 BK/BR
G203
(8W-15-8)
(8W-15-9)

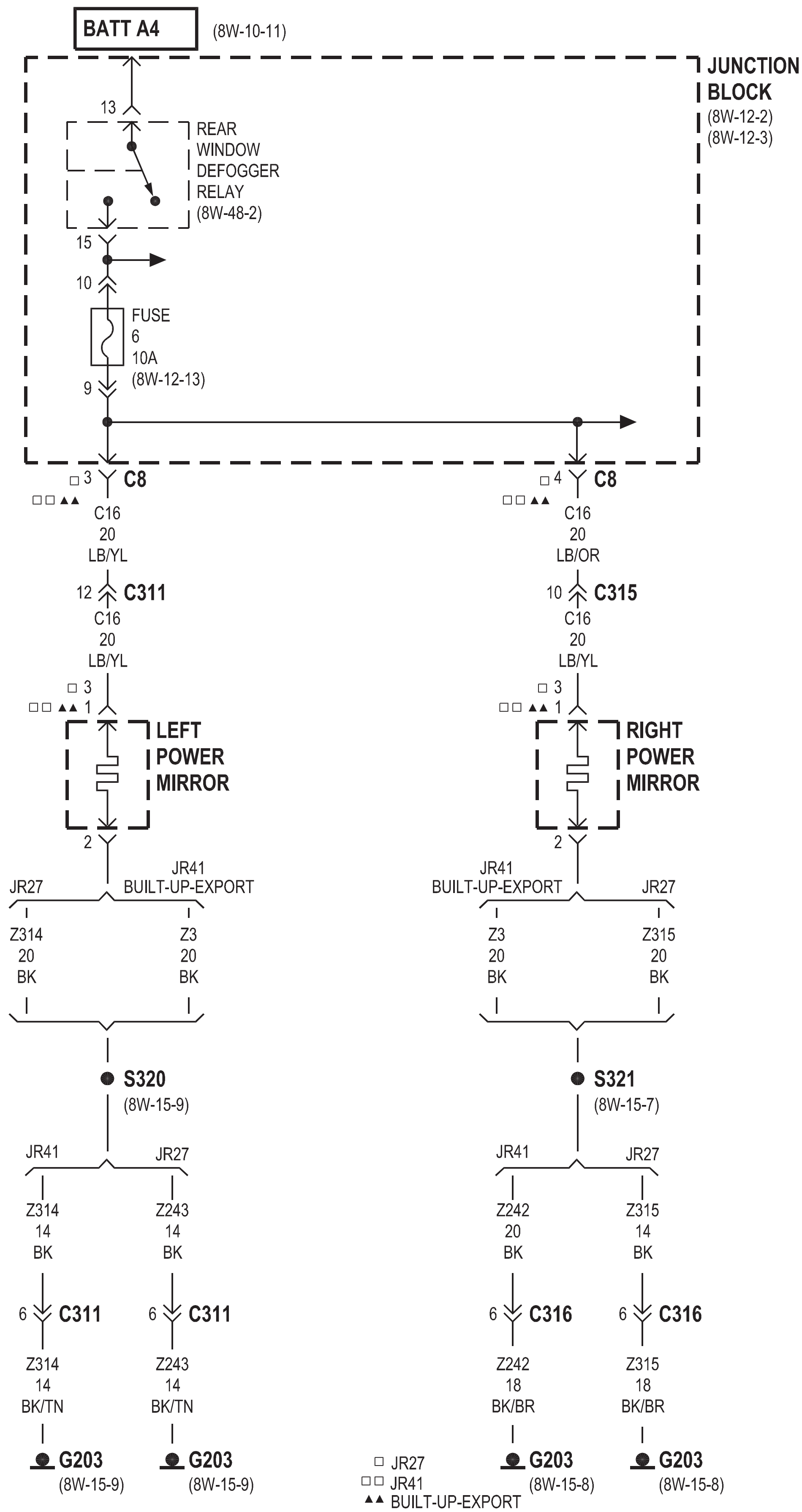
8W-62 POWER MIRRORS


RUN A22
(8W-10-23)
BATT A7
(8W-10-13)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
FUSE
4
15A
(8W-12-9)
FUSE
5
10A
(8W-12-11)
C2
C5
F20
18
WT/YL
C101
F20
20
WT/YL
C311
F20 20WT
M1
18
PK
DRIVER DOOR LOCK SWITCH
(8W-61-2)
F20
18
WT/YL
POWER MIRROR SWITCH
1 LEFT
2 RIGHT
3 UP
4 DOWN
5 LEFT MIRROR
6 RIGHT MIRROR
P93
22
YL/BK
P95
22
DB
P91
22
WT/BK
P90
22
LG/BK
P94
22
WT/YL
P92
22
YL
Z239
18
BK/LB
C310
C315
C4
P93
22
YL/BK
P95
22
DB/WT
P91
22
WT/BK
P91
22
WT/BK
P90
22
LG/BK
P90
22
LG/BK
P94
22
WT/YL
P92
22
YL
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
C9
Z313
14
BK
LEFT POWER MIRROR
RIGHT POWER MIRROR
M
G301
(8W-15-11)

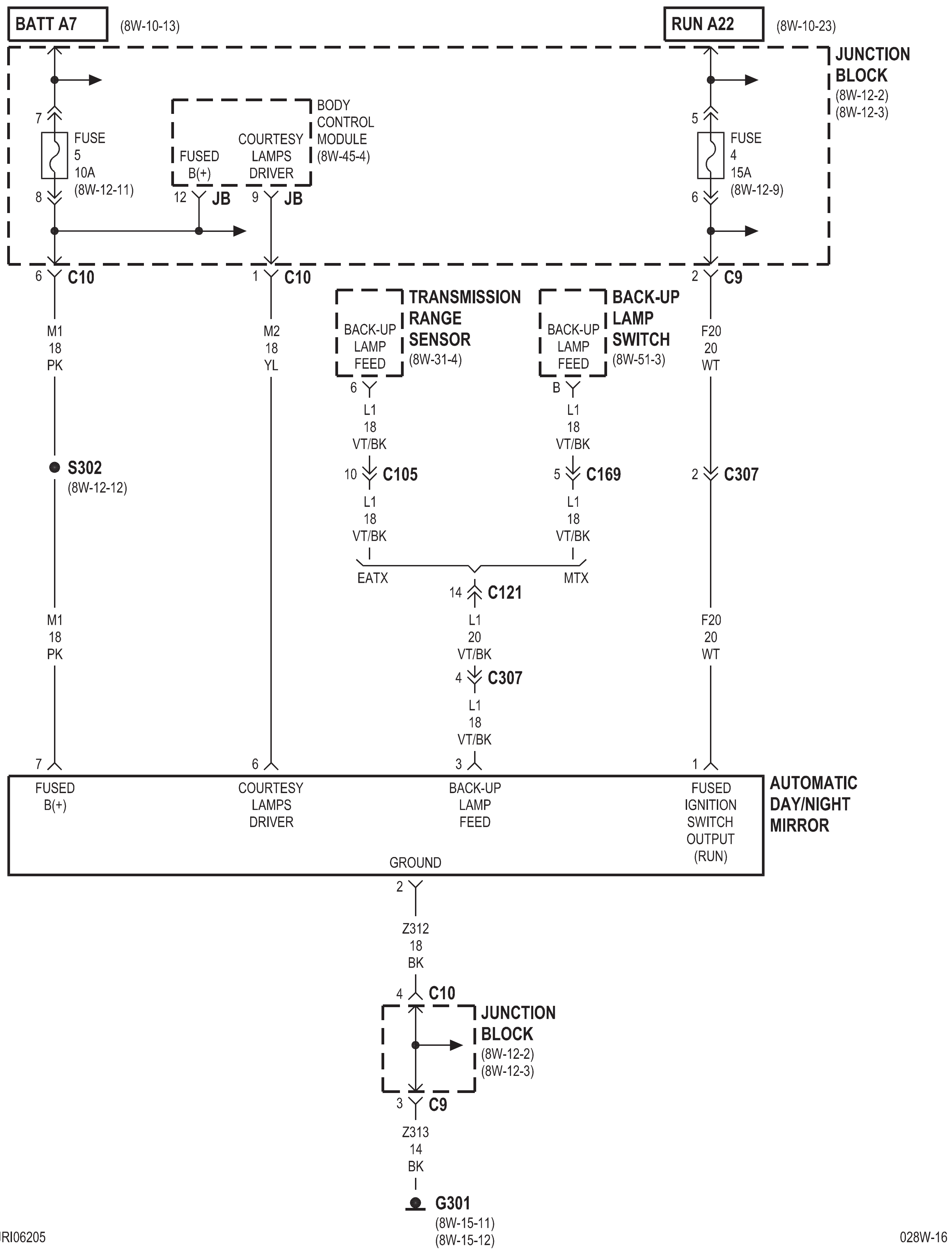
JR41



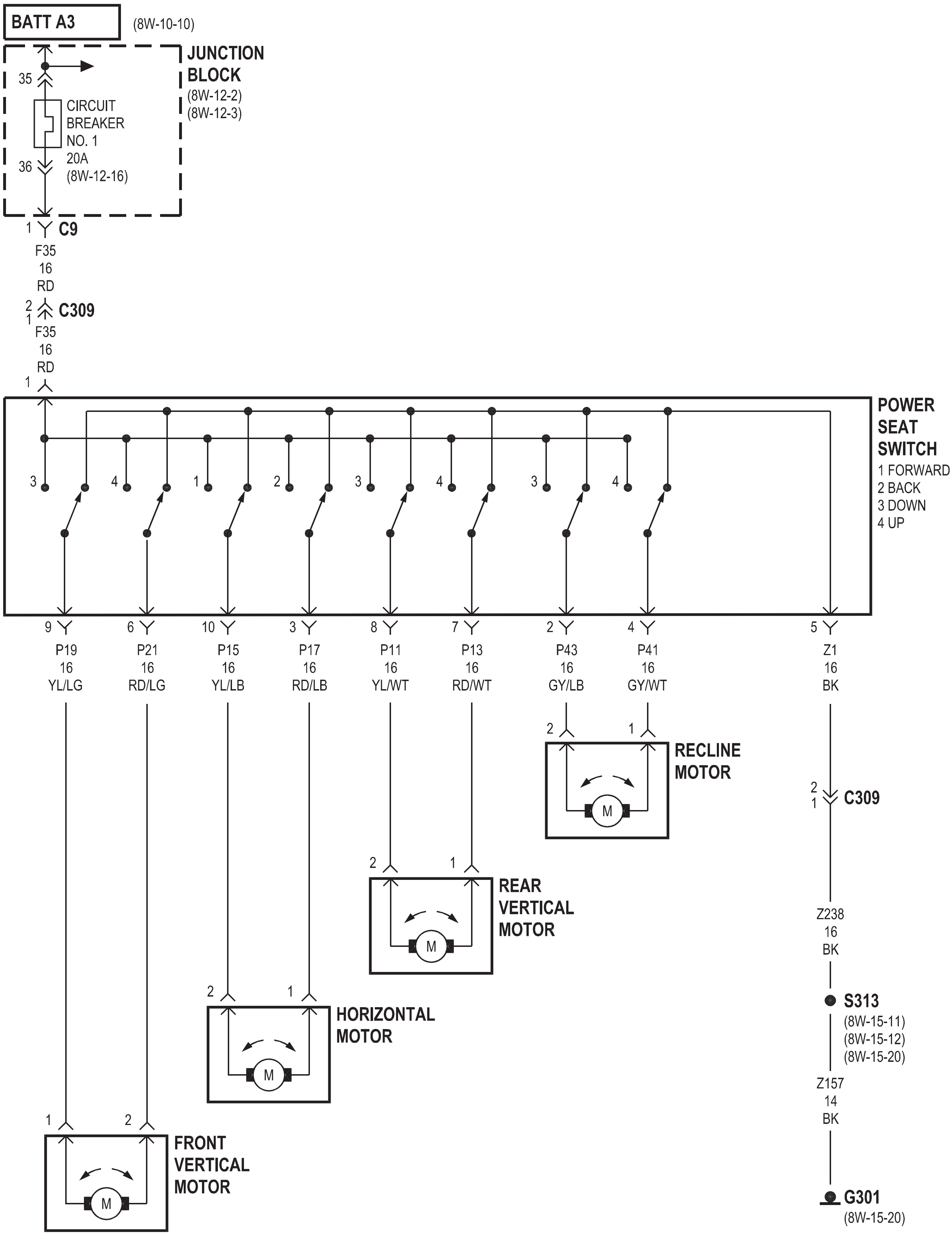
RUN A22
(8W-10-23)
BATT A7
(8W-10-13)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
5
FUSE
4
15A
(8W-12-9)
6
7
FUSE
5
10A
(8W-12-11)
8
9
C2
12
C5
F20
18
WT/YL
5
C101
F20
20
WT/YL
11
C311
F20 20WT
2
DRIVER
DOOR
LOCK
SWITCH
(8W-61-2)
M1
18
PK
F20
20
WT/YL
6
7
POWER
MIRROR
SWITCH
1 LEFT
2 RIGHT
3 UP
4 DOWN
5 LEFT MIRROR
6 RIGHT MIRROR
4 3 4 3 4 3 1 2 1 2 1 2
5
6
4
8
1
10
2
9
3
P93
22
YL/BK
P95
22
DB
P91
22
WT/BK
P90
22
LG/BK
P94
22
WT/YL
P92
22
YL
Z239
18
BK/LB
12
5
4
C310
4
11
5
C315
3
C4
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
P93
22
YL/BK
P95
22
DB/WT
P91
22
WT/BK
P90
22
LG/BK
P94
22
WT/YL
P92
22
YL
6
3
4
LEFT
POWER
MIRROR
M
M
4
3
6
RIGHT
POWER
MIRROR
M
M
3
C9
Z313
14
BK
G301
(8W-15-20)

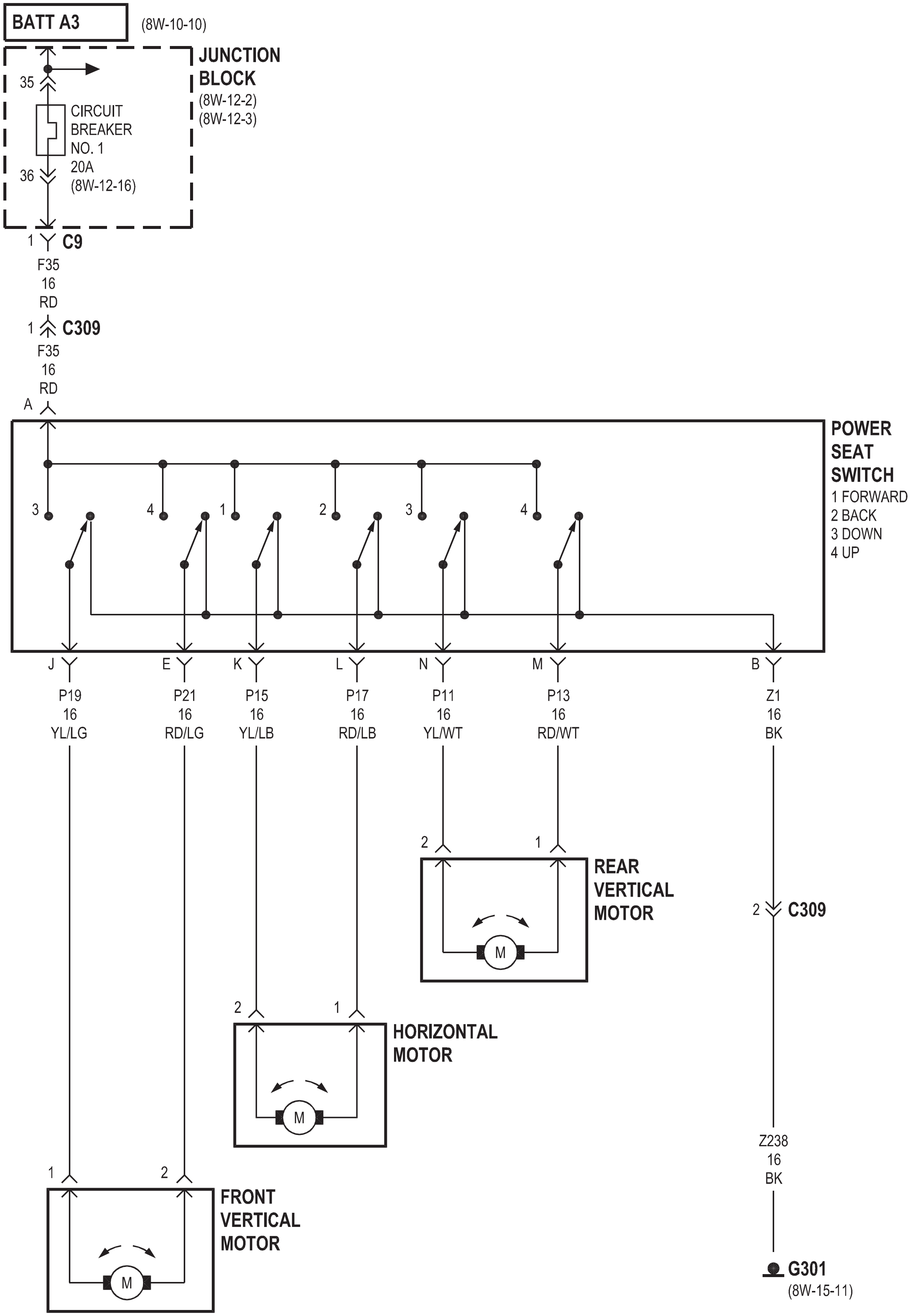

BATT A4
(8W-10-11)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
13
REAR
WINDOW
DEFOGGER
RELAY
(8W-48-2)
15
10
FUSE
6
10A
(8W-12-13)
9
3 C8
4 C8
C16
20
LB/YL
C16
20
LB/OR
12 C311
10 C315
C16
20
LB/YL
3
1
LEFT
POWER
MIRROR
RIGHT
POWER
MIRROR
2
JR27
JR41
BUILT-UP-EXPORT
Z314
20
BK
Z3
20
BK
Z315
20
BK
S320
(8W-15-9)
S321
(8W-15-7)
JR41
JR27
Z314
14
BK
Z243
14
BK
Z242
20
BK
Z315
14
BK
6 C311
6 C316
Z314
14
BK/TN
Z243
14
BK/TN
Z242
18
BK/BR
Z315
18
BK/BR
G203
(8W-15-9)
(8W-15-8)
□ JR27
□□ JR41
▲▲ BUILT-UP-EXPORT

JR27

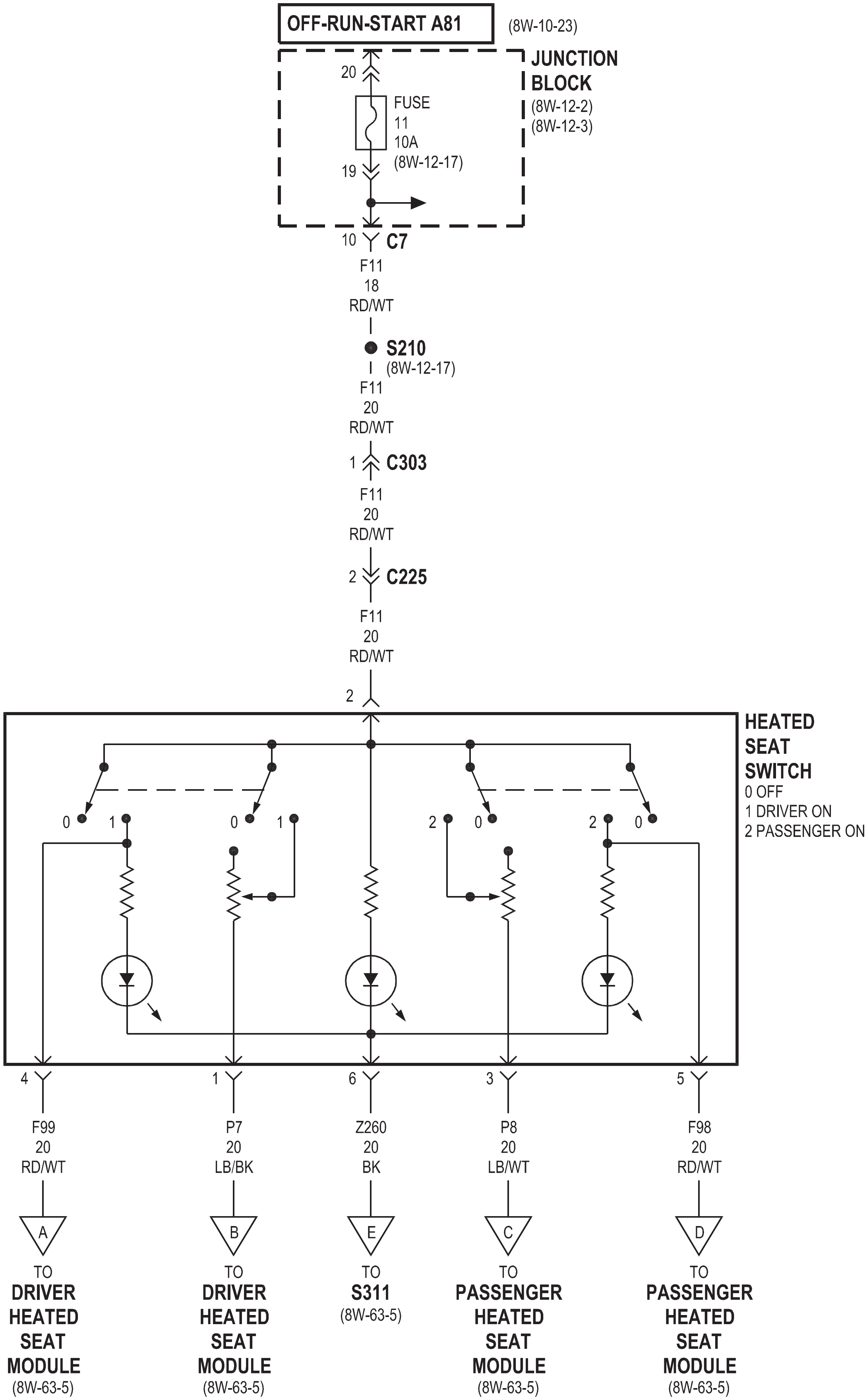

BATT A7
(8W-10-13)
RUN A22
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
FUSE 5 10A (8W-12-11)
BODY CONTROL MODULE (8W-45-4)
FUSED B(+)
COURTESY LAMPS DRIVER
12 JB
9 JB
FUSE 4 15A (8W-12-9)
6 C10
1 C10
2 C9
M1 18 PK
M2 18 YL
F20 20 WT
TRANSMISSION RANGE SENSOR (8W-31-4)
BACK-UP LAMP FEED
BACK-UP LAMP SWITCH (8W-51-3)
L1 18 VT/BK
10 C105
5 C169
2 C307
S302 (8W-12-12)
EATX
MTX
14 C121
L1 20 VT/BK
4 C307
AUTOMATIC DAY/NIGHT MIRROR
FUSED B(+)
COURTESY LAMPS DRIVER
BACK-UP LAMP FEED
FUSED IGNITION SWITCH OUTPUT (RUN)
GROUND
Z312 18 BK
4 C10
3 C9
Z313 14 BK
G301 (8W-15-11) (8W-15-12)

8W-63 POWER SEAT

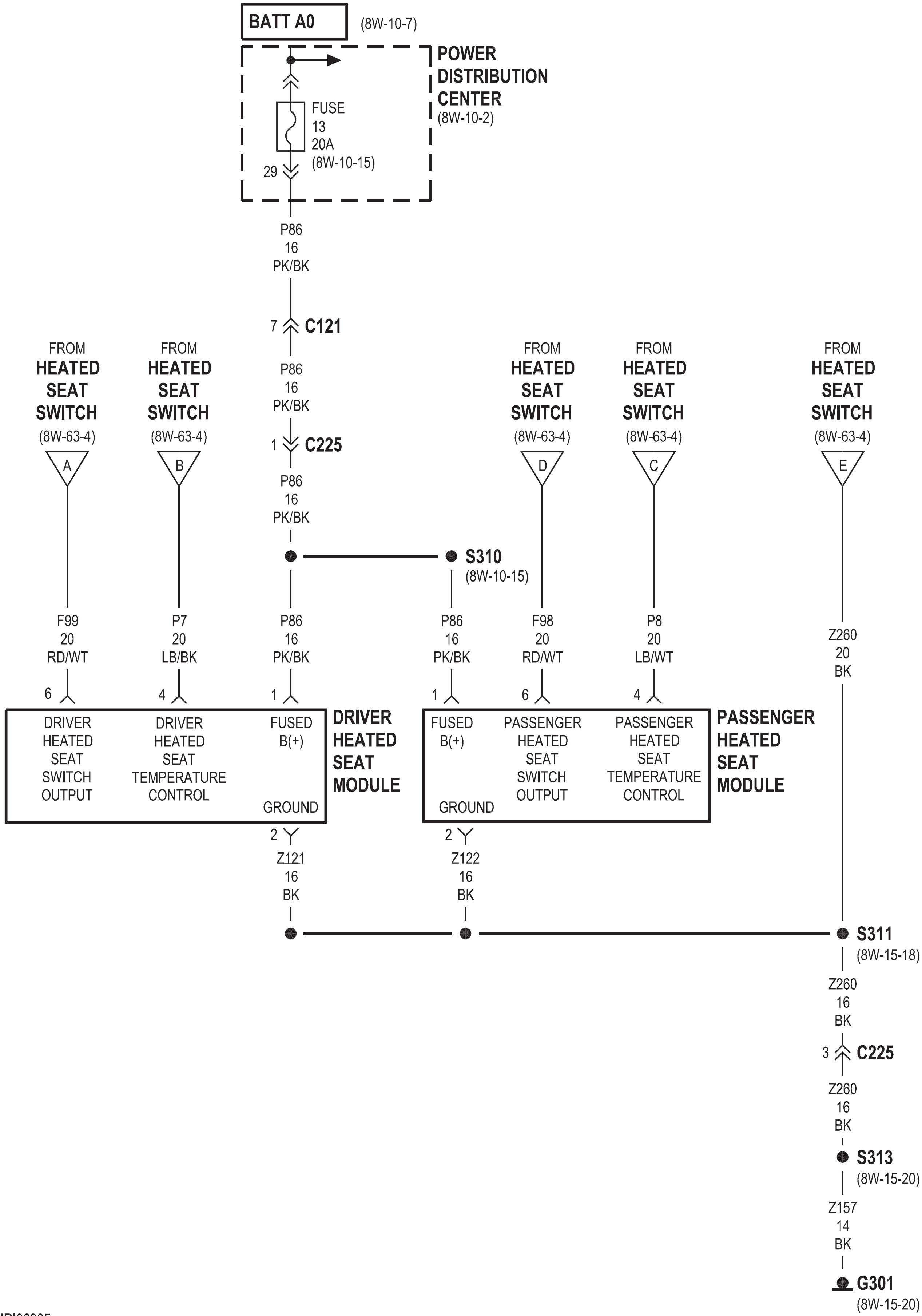

BATT A3
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
35
CIRCUIT BREAKER NO. 1
20A
(8W-12-16)
36
1
C9
F35
16
RD
2
1
C309
F35
16
RD
1
POWER SEAT SWITCH
1 FORWARD
2 BACK
3 DOWN
4 UP
3
4
1
2
3
4
3
4
9
6
10
3
8
7
2
4
5
P19
16
YL/LG
P21
16
RD/LG
P15
16
YL/LB
P17
16
RD/LB
P11
16
YL/WT
P13
16
RD/WT
P43
16
GY/LB
P41
16
GY/WT
Z1
16
BK
2
1
RECLINE MOTOR
M
2
1
C309
2
1
REAR VERTICAL MOTOR
M
Z238
16
BK
S313
(8W-15-11)
(8W-15-12)
(8W-15-20)
2
1
HORIZONTAL MOTOR
M
Z157
14
BK
1
2
FRONT VERTICAL MOTOR
M
G301
(8W-15-20)


BATT A3
(8W-10-10)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
35
CIRCUIT BREAKER NO. 1
20A
(8W-12-16)
36
1 C9
F35
16
RD
1 C309
F35
16
RD
A
POWER SEAT SWITCH
1 FORWARD
2 BACK
3 DOWN
4 UP
3
4
1
2
3
4
J
E
K
L
N
M
B
P19
16
YL/LG
P21
16
RD/LG
P15
16
YL/LB
P17
16
RD/LB
P11
16
YL/WT
P13
16
RD/WT
Z1
16
BK
2
1
REAR VERTICAL MOTOR
M
2 C309
2
1
HORIZONTAL MOTOR
M
Z238
16
BK
1
2
FRONT VERTICAL MOTOR
M
G301
(8W-15-11)

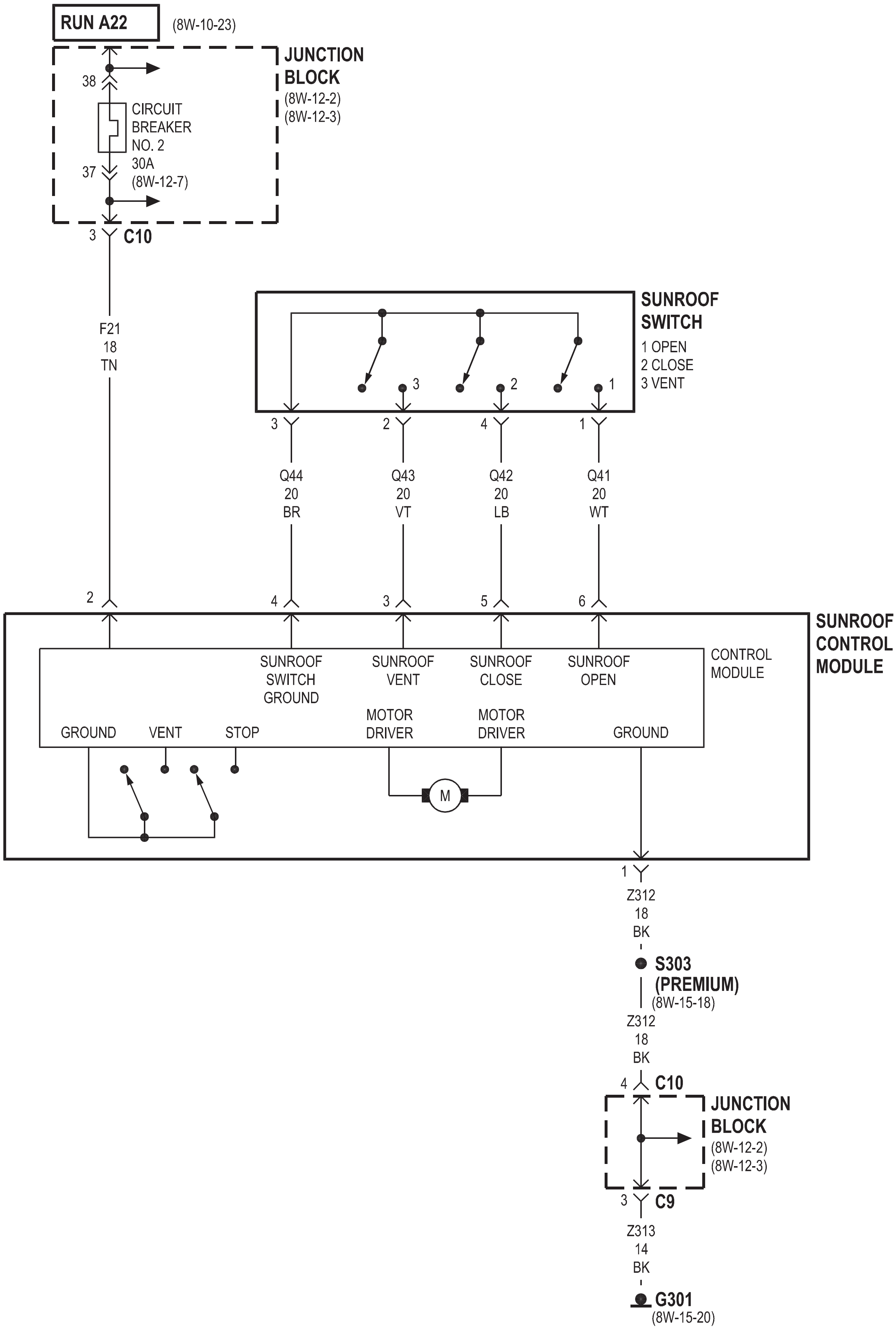
JR41 BUILT-UP-EXPORT



JR41 BUILT-UP-EXPORT

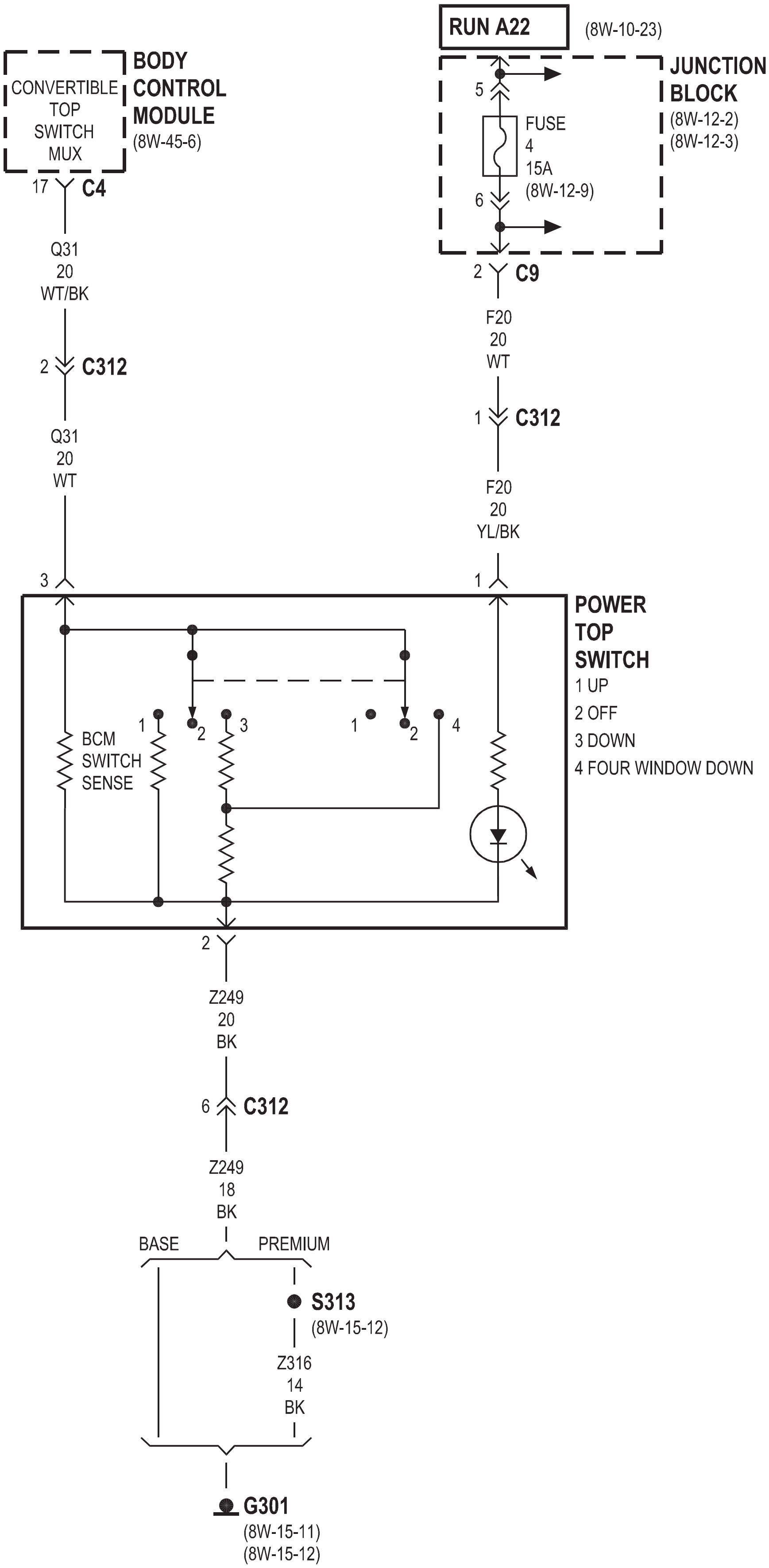


8W-64 POWER SUNROOF

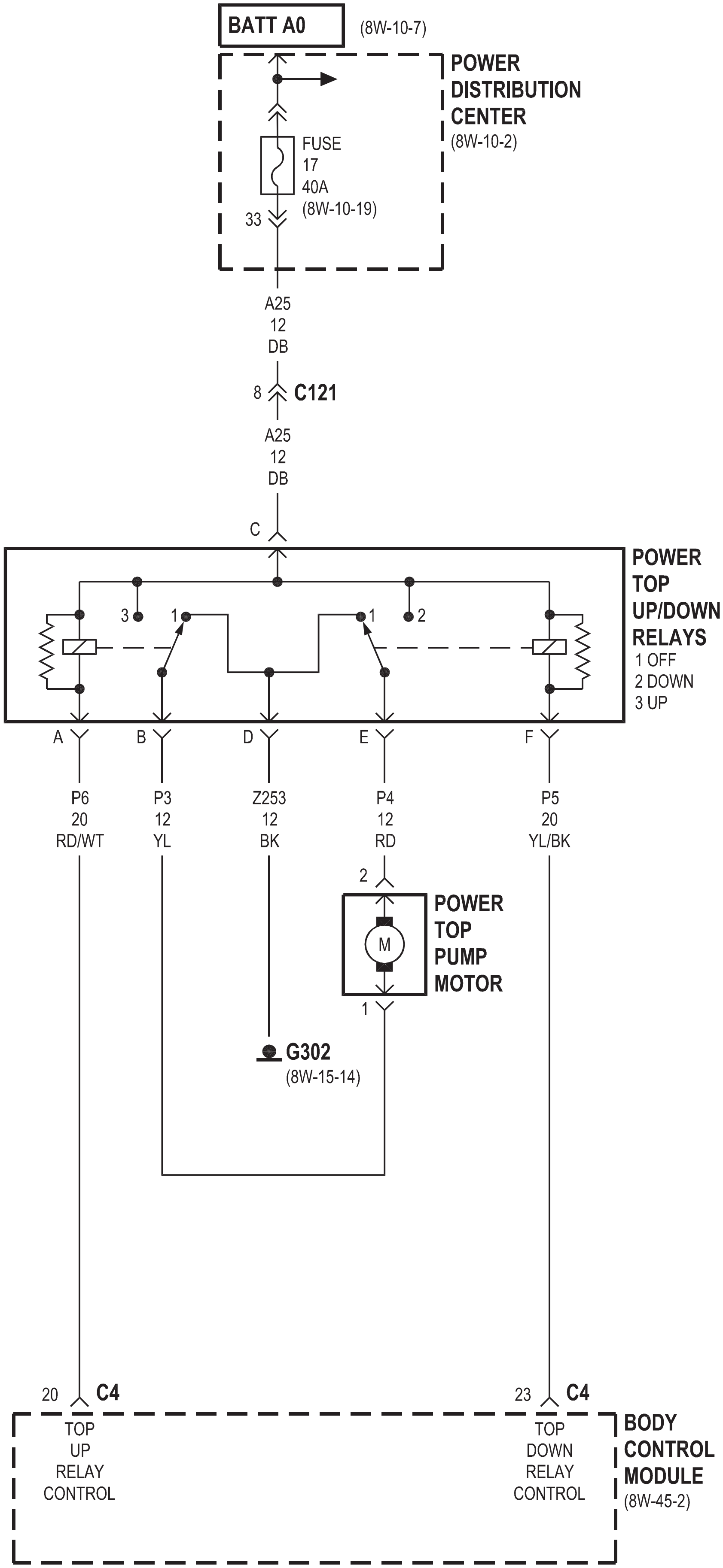

RUN A22
(8W-10-23)
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
38
CIRCUIT
BREAKER
NO. 2
30A
(8W-12-7)
37
3
C10
F21
18
TN
SUNROOF
SWITCH
1 OPEN
2 CLOSE
3 VENT
3
2
1
3
2
4
1
Q44
20
BR
Q43
20
VT
Q42
20
LB
Q41
20
WT
2
4
3
5
6
SUNROOF
CONTROL
MODULE
CONTROL
MODULE
SUNROOF
SWITCH
GROUND
SUNROOF
VENT
SUNROOF
CLOSE
SUNROOF
OPEN
GROUND
VENT
STOP
MOTOR
DRIVER
MOTOR
DRIVER
GROUND
M
1
Z312
18
BK
S303
(PREMIUM)
(8W-15-18)
Z312
18
BK
4
C10
JUNCTION
BLOCK
(8W-12-2)
(8W-12-3)
3
C9
Z313
14
BK
G301
(8W-15-20)

8W-66 POWER TOP

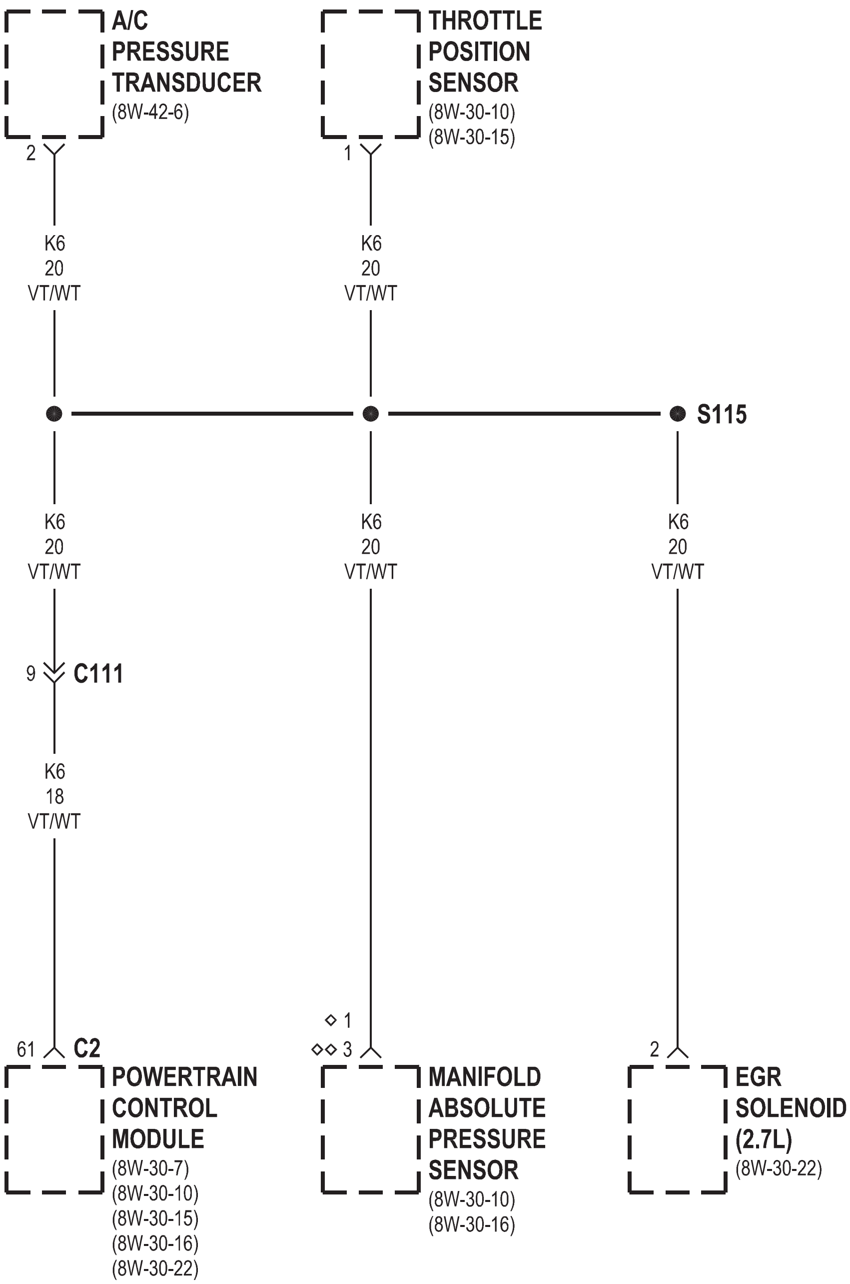
JR27


RUN A22
(8W-10-23)
JUNCTION BLOCK
(8W-12-2)
(8W-12-3)
5
FUSE
4
15A
(8W-12-9)
6
2 C9
F20
20
WT
1 C312
F20
20
YL/BK
BODY CONTROL MODULE
(8W-45-6)
CONVERTIBLE TOP SWITCH MUX
17 C4
Q31
20
WT/BK
2 C312
Q31
20
WT
3
1
POWER TOP SWITCH
1 UP
2 OFF
3 DOWN
4 FOUR WINDOW DOWN
BCM SWITCH SENSE
1
2
3
1
2
4
2
Z249
20
BK
6 C312
Z249
18
BK
BASE
PREMIUM
S313
(8W-15-12)
Z316
14
BK
G301
(8W-15-11)
(8W-15-12)

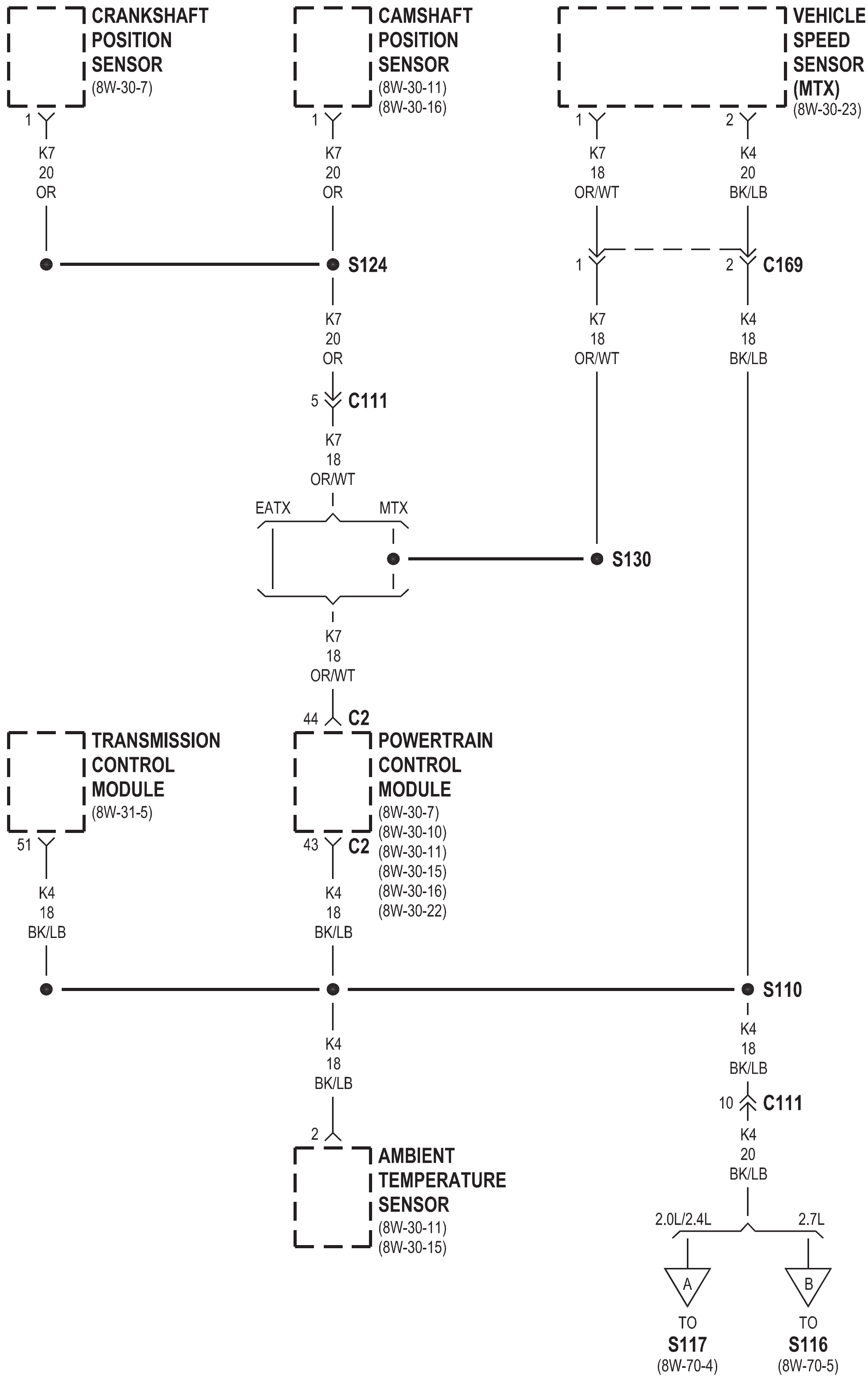
JR27


BATT A0
(8W-10-7)
POWER
DISTRIBUTION
CENTER
(8W-10-2)
FUSE
17
40A
(8W-10-19)
33
A25
12
DB
8
C121
A25
12
DB
C
POWER
TOP
UP/DOWN
RELAYS
1 OFF
2 DOWN
3 UP
3
1
1
2
A
B
D
E
F
P6
20
RD/WT
P3
12
YL
Z253
12
BK
P4
12
RD
P5
20
YL/BK
2
POWER
TOP
PUMP
MOTOR
M
1
G302
(8W-15-14)
20
C4
23
C4
TOP
UP
RELAY
CONTROL
TOP
DOWN
RELAY
CONTROL
BODY
CONTROL
MODULE
(8W-45-2)

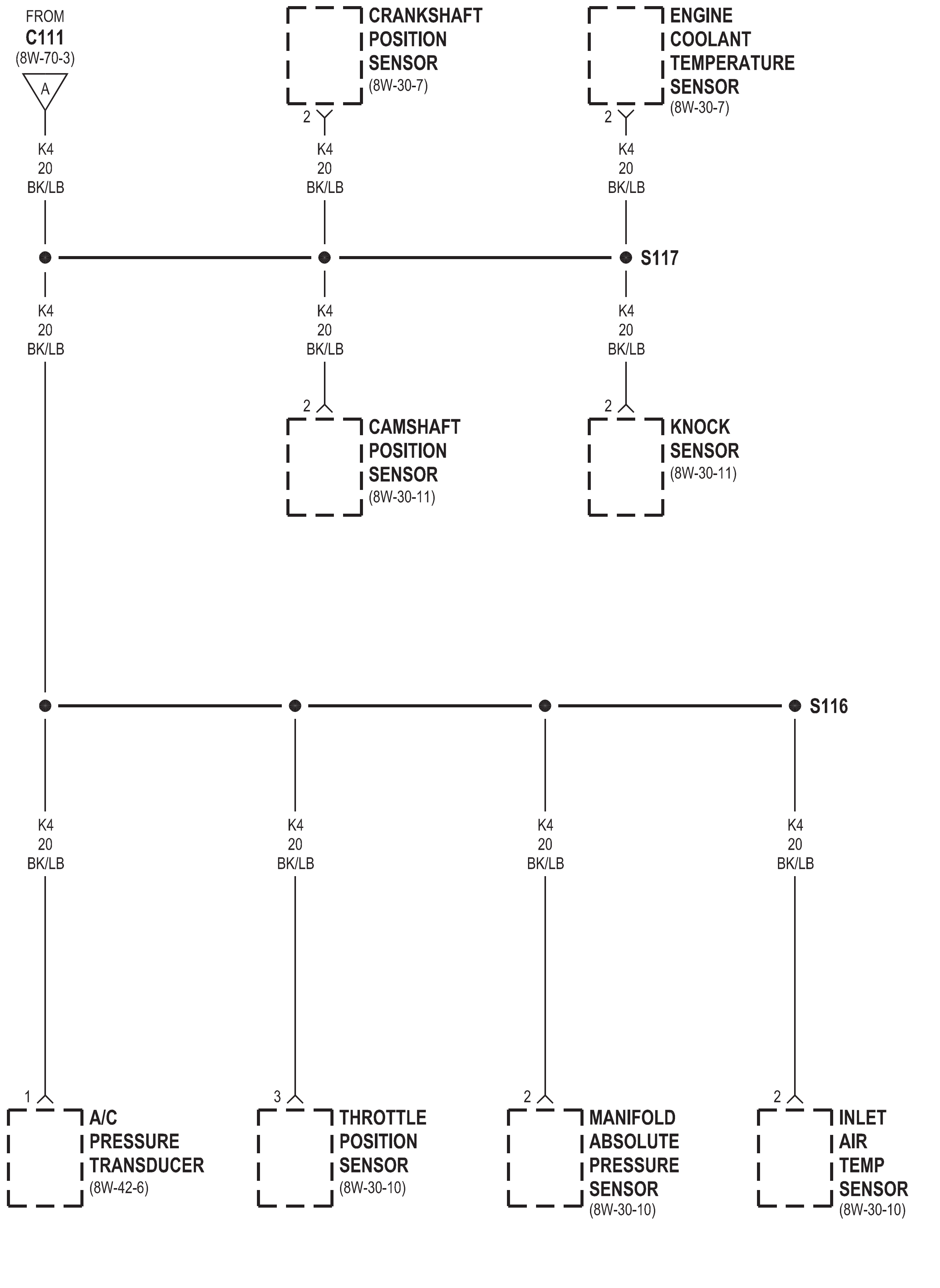
8W-70 SPLICE INFORMATION


A/C
PRESSURE
TRANSDUCER
(8W-42-6)
2
THROTTLE
POSITION
SENSOR
(8W-30-10)
(8W-30-15)
1
K6
20
VT/WT
K6
20
VT/WT
S115
K6
20
VT/WT
K6
20
VT/WT
K6
20
VT/WT
9
C111
K6
18
VT/WT
61
C2
POWERTRAIN
CONTROL
MODULE
(8W-30-7)
(8W-30-10)
(8W-30-15)
(8W-30-16)
(8W-30-22)
◇ 1
◇◇ 3
MANIFOLD
ABSOLUTE
PRESSURE
SENSOR
(8W-30-10)
(8W-30-16)
2
EGR
SOLENOID
(2.7L)
(8W-30-22)

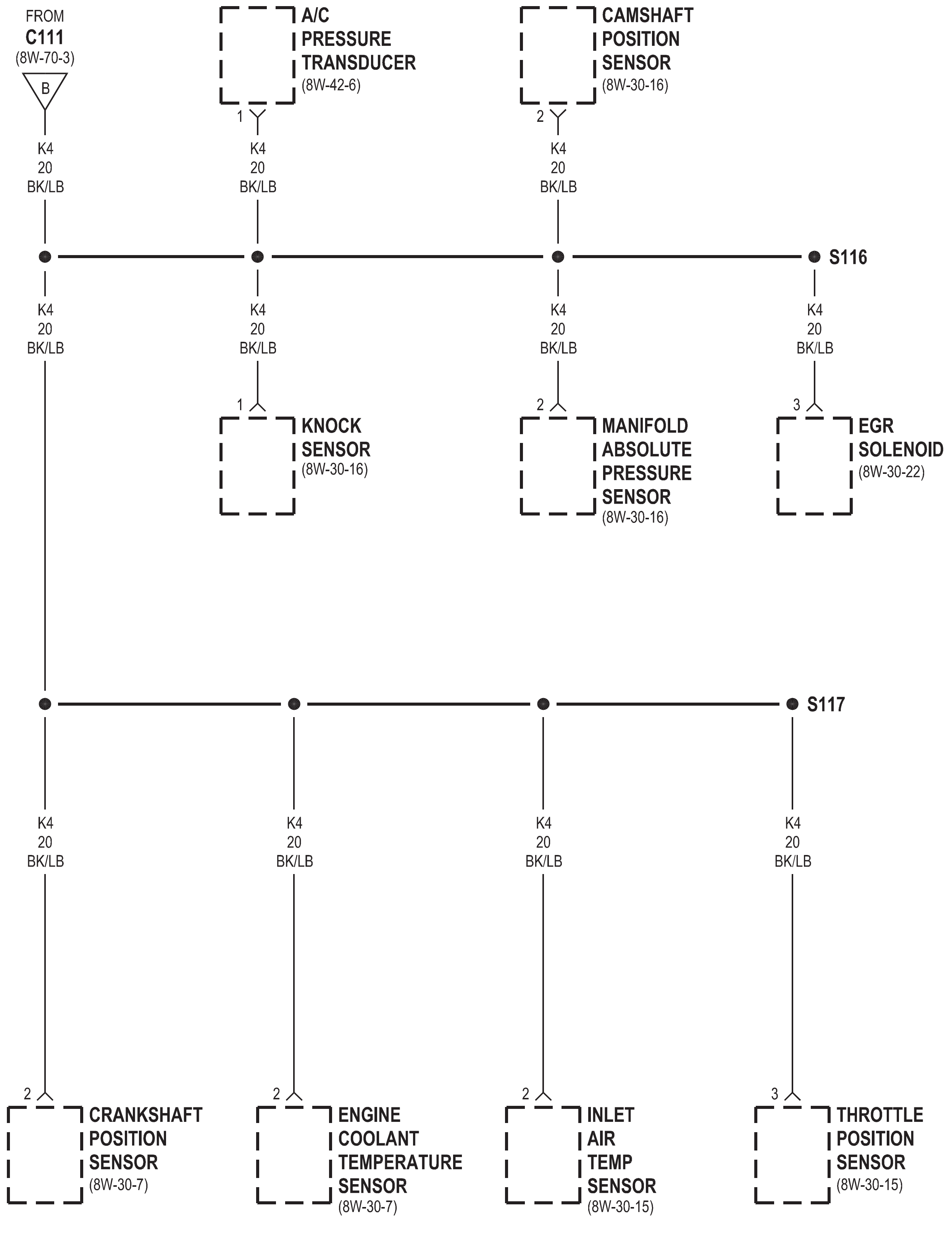
◇ 2.7L
◇◇ 2.0L/2.4L


CRANKSHAFT POSITION SENSOR
(8W-30-7)
CAMSHAFT POSITION SENSOR
(8W-30-11)
(8W-30-16)
VEHICLE SPEED SENSOR (MTX)
(8W-30-23)
1
K7
20
OR
2
K4
BK/LB
18
OR/WT
S124
C169
C111
5
EATX
MTX
S130
44
C2
TRANSMISSION CONTROL MODULE
(8W-31-5)
POWERTRAIN CONTROL MODULE
(8W-30-7)
(8W-30-10)
(8W-30-15)
(8W-30-22)
51
43
S110
10
AMBIENT TEMPERATURE SENSOR
2.0L/2.4L
2.7L
A
B
TO
S117
(8W-70-4)
S116
(8W-70-5)

2.0L/2.4L

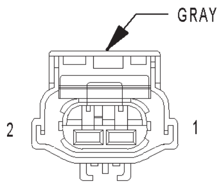

FROM
C111
(8W-70-3)
A
K4
20
BK/LB
CRANKSHAFT POSITION SENSOR
(8W-30-7)
2
ENGINE COOLANT TEMPERATURE SENSOR
(8W-30-7)
S117
CAMSHAFT POSITION SENSOR
(8W-30-11)
KNOCK SENSOR
(8W-30-11)
S116
1
A/C PRESSURE TRANSDUCER
(8W-42-6)
3
THROTTLE POSITION SENSOR
(8W-30-10)
MANIFOLD ABSOLUTE PRESSURE SENSOR
(8W-30-10)
INLET AIR TEMP SENSOR
(8W-30-10)

2.7L



JRI07005

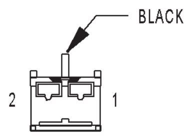
8W-80 CONNECTOR PIN-OUTS



A/C COMPRESSOR CLUTCH

A/C COMPRESSOR CLUTCH - GRAY 2 WAY

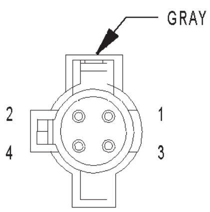
CAV	CIRCUIT	FUNCTION
1	C3 14DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
2	-	-



A/C EVAPORATOR TEMPERATURE SENSOR

A/C EVAPORATOR TEMPERATURE SENSOR - BLACK 2 WAY

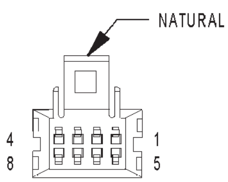
CAV	CIRCUIT	FUNCTION
1	C12 20LG/BK	EVAPORATOR TEMPERATURE SENSOR SIGNAL
2	C57 20DB/GY	SENSOR GROUND



A/C PRESSURE TRANSDUCER

A/C PRESSURE TRANSDUCER - GRAY 4 WAY

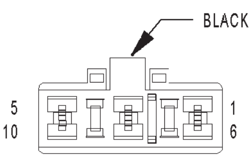
CAV	CIRCUIT	FUNCTION
1	K4 20BK/LB	SENSOR GROUND
2	K6 20VT/WT	5V SUPPLY
3	C18 20DB	A/C PRESSURE SIGNAL
4	-	-



A/C-HEATER CONTROL C1

A/C-HEATER CONTROL C1 - NATURAL 8 WAY

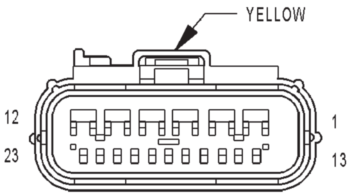
CAV	CIRCUIT	FUNCTION
1	C57 20DB/GY	SENSOR GROUND
2	C16 20LB/YL	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
3	E17 18YL/BK	DAY BRIGHTNESS SENSE
4	E2 20OR	PANEL LAMPS DRIVER
5	C21 20DB/OR	A/C SWITCH SENSE
6	C58 20RD/TN	A/C MODE SWITCH MUX
7	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
8	C82 20YL/OR	TEMPERATURE SELECT SIGNAL



A/C-HEATER CONTROL C2

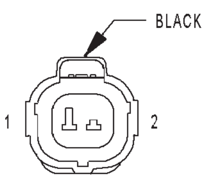
A/C-HEATER CONTROL C2 - BLACK 10 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	C4 16TN	LOW BLOWER MOTOR DRIVER
3	C6 14LB	M2 BLOWER MOTOR DRIVER
4	-	-
5	Z119 14BK/GY	GROUND
6	-	-
7	C5 16LG	M1 BLOWER MOTOR DRIVER
8	-	-
9	-	-
10	C7 12BK/TN	HIGH BLOWER MOTOR DRIVER



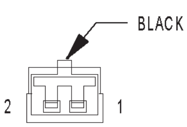
AIRBAG CONTROL MODULE (ORC) - YELLOW 23 WAY

CAV	CIRCUIT	FUNCTION
1	R56 20LB/DG	PASSENGER SEAT BELT TENSIONER LINE 1
2	R54 20LB/YL	PASSENGER SEAT BELT TENSIONER LINE 2
3	R62 20OR/YL	PASSENGER SQUIB 2 LINE 1
4	R64 20TN/YL	PASSENGER SQUIB 2 LINE 2
5	R42 20BK/YL	PASSENGER SQUIB 1 LINE 1
6	R44 20DG/YL	PASSENGER SQUIB 1 LINE 2
7	R55 20LG/DG	DRIVER SEAT BELT TENSIONER LINE 1
8	R53 20LG/YL	DRIVER SEAT BELT TENSIONER LINE 2
9	R61 20OR/LB	DRIVER SQUIB 2 LINE 1
10	R63 20TN/LB	DRIVER SQUIB 2 LINE 2
11	R43 20BK/LB	DRIVER SQUIB 1 LINE 1
12	R45 20DG/LB	DRIVER SQUIB 1 LINE 2
13	-	-
14	F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
15	F23 20DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
16	Z100 18BK	GROUND
17	-	-
18	-	-
19	-	-
20	-	-
21	D25 20VT/YL (JR27)	PCI BUS
21	D25 20VT (JR41)	PCI BUS
22	-	-
23	-	-



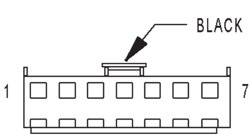
AMBIENT TEMP SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K25 18VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND



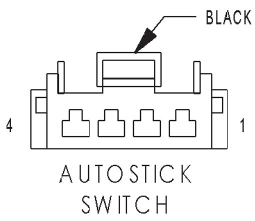
ASH RECEIVER LAMP - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	E2 20OR/WT	PANEL LAMPS DRIVER
2	Z158 20BK/LG	GROUND



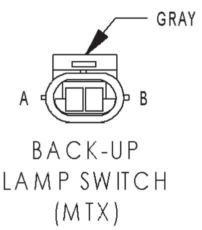
AUTOMATIC DAY/NIGHT MIRROR (JR27) - BLACK 7 WAY

CAV	CIRCUIT	FUNCTION
1	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
2	Z312 18BK	GROUND
3	L1 18VT/BK	BACK-UP LAMP FEED
4	-	-
5	-	-
6	M2 18YL	COURTESY LAMPS DRIVER
7	M1 18PK	FUSED B(+)



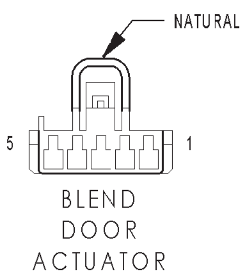
AUTOSTICK SWITCH - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	T44 20YL (JR27)	AUTOSTICK DOWNSHIFT SWITCH SENSE
1	T44 20YL/LB (JR41)	AUTOSTICK DOWNSHIFT SWITCH SENSE
2	T5 20LG (JR27)	AUTOSTICK UPSHIFT SWITCH SENSE
2	T5 20LG/LB (JR41)	AUTOSTICK UPSHIFT SWITCH SENSE
3	Z191 20BK	GROUND
4	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)



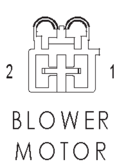
BACK-UP LAMP SWITCH (MTX) - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
B	L1 18VT/BK	BACK-UP LAMP FEED
A	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)



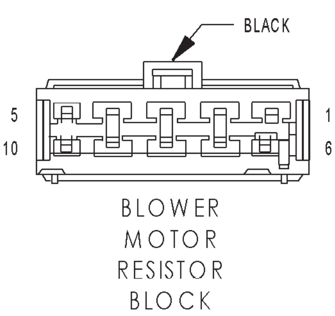
BLEND DOOR ACTUATOR - NATURAL 5 WAY

CAV	CIRCUIT	FUNCTION
1	C33 20DB/RD	BLEND AIR DOOR DRIVER
2	C57 20DB/GY	SENSOR GROUND
3	C36 20RD/WT	BLEND DOOR FEEDBACK SIGNAL
4	C26 20PK/DB	5V SUPPLY
5	C34 20DB/WT	COMMON DOOR DRIVER



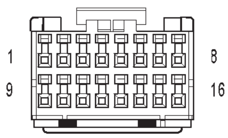
BLOWER MOTOR - 2 WAY

CAV	CIRCUIT	FUNCTION
1	C7 12BK	BLOWER MOTOR DRIVER
2	C1 12DG	FUSED B(+)



BLOWER MOTOR RESISTOR BLOCK - BLACK 10 WAY

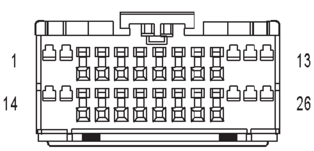
CAV	CIRCUIT	FUNCTION
1	C7 12BK	BLOWER MOTOR DRIVER
2	C7 12BK/TN	HIGH BLOWER MOTOR DRIVER
3	C6 16LB	M2 BLOWER MOTOR DRIVER
4	C5 14LG	M1 BLOWER MOTOR DRIVER
5	C4 14TN	LOW BLOWER MOTOR DRIVER
6	-	-
7	-	-
8	-	-
9	-	-
10	-	-



BODY CONTROL MODULE C1

BODY CONTROL MODULE C1 - 16 WAY

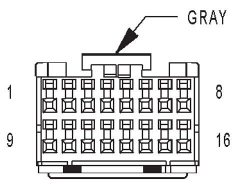
CAV	CIRCUIT	FUNCTION
1	E19 20RD	PANEL LAMPS DIMMER SIGNAL
2	X3 20BK/RD	HORN SWITCH SENSE
3	G69 20BK/OR	VTSS INDICATOR DRIVER
4	G26 20LB	KEY-IN IGNITION SWITCH SENSE
5	X11 20OR (JR27) (PREMIUM)	TOP DOWN AUDIO EQUAL
6	P58 20WT	RKE EXTERNAL ANTENNA
7	P158 20BK	RKE EXTERNAL ANTENNA
8	-	-
9	-	-
10	D19 20VT/OR	BODY CONTROL MODULE FLASH ENABLE
11	-	-
12	A31 18BK/LB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
13	Z380 18BK/DG (PREMIUM)	GROUND
14	E17 18YL/BK	DAY BRIGHTNESS SENSE
15	-	-
16	-	-



BODY CONTROL MODULE C2

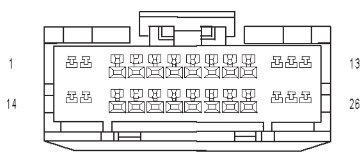
BODY CONTROL MODULE C2 - 26 WAY

CAV	CIRCUIT	FUNCTION
1	C26 20PK/DB	5V SUPPLY
2	Z132 16BK/GY	GROUND
3	P1 18BK/WT	DECKLID RELEASE SWITCH SENSE
4	V52 20DG/RD	FRONT WIPER SWITCH MUX
5	C7 18BK/TN	HIGH BLOWER MOTOR DRIVER
6	C21 20DB/OR	A/C SWITCH SENSE
7	C37 20YL	MODE DOOR FEEDBACK SIGNAL
8	C36 18RD/WT	BLEND DOOR FEEDBACK SIGNAL
9	C12 20LG/BK	EVAPORATOR TEMPERATURE SENSOR SIGNAL
10	C57 20DB/GY	SENSOR GROUND
11	E2 18OR/BR	PANEL LAMPS DRIVER
12	E2 20OR	PANEL LAMPS DRIVER
13	E2 20OR/WT	PANEL LAMPS DRIVER
14	C82 20YL/OR	TEMPERATURE SELECT SIGNAL
15	C34 20DB/WT	COMMON DOOR DRIVER
16	D25 20VT/YL	PCI BUS (RADIO)
17	D25 20VT/YL (JR27)	PCI BUS (AIRBAG)
17	D25 20VT (JR41)	PCI BUS (AIRBAG)
18	D25 20VT/PK	PCI BUS (SKIM)
19	D25 20VT/OR	PCI BUS (MIC)
20	D25 20VT/GY	PCI BUS (DLC)
21	D25 18VT/LG (JR41)	PCI BUS (SAB)
22	E2 20OR	PANEL LAMPS DRIVER
23	C58 20RD/TN	A/C MODE SWITCH MUX
24	C32 20GY/DB	RECIRCULATION DOOR DRIVER
25	C33 20DB/RD	BLEND AIR DOOR DRIVER
26	C35 20DG/YL	MODE DOOR DRIVER



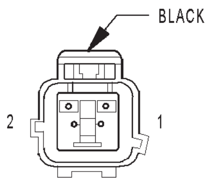
BODY CONTROL MODULE C3 - GRAY 16 WAY

CAV	CIRCUIT	FUNCTION
1	D25 20OR	PCI BUS (PCM)
2	D25 18YL/VT	PCI BUS (ABS)
3	D25 20VT/YL	PCI BUS (TCM)
4	V55 20TN/RD	FRONT WIPER PARK SWITCH SENSE
5	V14 20RD/VT	FRONT WIPER ON/OFF RELAY CONTROL
6	V16 20VT/PK	FRONT WIPER HIGH/LOW RELAY CONTROL
7	-	-
8	-	-
9	V58 18BR/YL (JR41 BUILT-UP-EXPORT)	HEADLAMP WASHER RELAY CONTROL
10	V10 18BR	FRONT WASHER PUMP MOTOR CONTROL
11	-	-
12	-	-
13	Z132 18BK	GROUND
14	-	-
15	-	-
16	P340 18LG/YL	BATTERY FEED



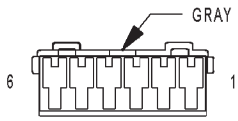
BODY CONTROL MODULE C4 - 26 WAY

CAV	CIRCUIT	FUNCTION
1	P2 18BK/WT	DECKLID RELEASE SOLENOID DRIVER
2	Q17 20RD/WT (JR27)	WINDOW DROP RELAY CONTROL
3	G72 20DG/OR (VTSS)	PASSENGER CYLINDER LOCK SWITCH MUX
4	G73 20LG/OR (VTSS)	DRIVER CYLINDER LOCK SWITCH MUX
5	G75 20TN	DRIVER DOOR AJAR SWITCH SENSE
6	G74 20TN/RD	PASSENGER DOOR AJAR SWITCH SENSE
7	G77 20TN/OR (JR41)	LEFT REAR DOOR AJAR SWITCH SENSE
8	G76 20TN/YL (JR41)	RIGHT REAR DOOR AJAR SWITCH SENSE
9	P175 18OR/BK	DRIVER LOCK RELAY OUTPUT
10	P179 18OR/BR (JR41)	LEFT REAR LOCK RELAY OUTPUT
11	P180 18OR/TN (JR41)	RIGHT REAR LOCK RELAY OUTPUT
12	P176 18PK/BK	PASSENGER LOCK RELAY OUTPUT
13	P177 18DB/WT	DRIVER UNLOCK RELAY OUTPUT
14	G38 18GY (JR27)	GARAGE DOOR OPENER ENABLE
15	P97 20WT/DG	DRIVER DOOR SWITCH MUX
16	P96 20WT/LG	PASSENGER DOOR SWITCH MUX
17	Q31 20WT/BK (JR27)	CONVERTIBLE TOP SWITCH MUX
18	G78 18TN/BK	DECKLID AJAR SWITCH SENSE
19	E2 20OR	PANEL LAMPS DRIVER
20	P6 20RD/WT (JR27)	TOP UP RELAY CONTROL
21	G71 20VT/YL (VTSS)	DECKLID SECURITY SWITCH SENSE
22	G4 18DB	FUEL LEVEL SENSOR SIGNAL
23	P5 20 YL/BK (JR27)	TOP DOWN RELAY CONTROL
24	P182 18PK/DB (JR41)	RIGHT REAR UNLOCK RELAY OUTPUT
25	P178 18PK/LB	PASSENGER UNLOCK RELAY OUTPUT
26	P181 18PK/BK (JR41)	LEFT REAR UNLOCK RELAY OUTPUT



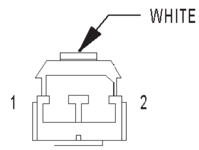
BRAKE FLUID LEVEL SWITCH - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	G9 20GY/BK	RED BRAKE WARNING INDICATOR DRIVER
2	Z231 20BK	GROUND



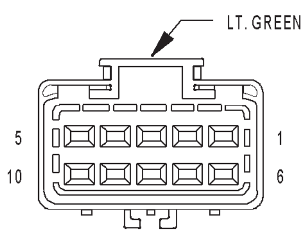
BRAKE LAMP SWITCH - GRAY 6 WAY

CAV	CIRCUIT	FUNCTION
1	K29 20WT/PK	BRAKE SWITCH SENSE
2	Z241 20BK/LG	GROUND
3	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
4	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
5	L50 16WT/TN	BRAKE LAMP SWITCH OUTPUT
6	A7 16RD/BK	FUSED B(+)



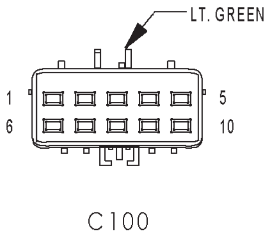
BRAKE TRANSMISSION SHIFT INTERLOCK SOLENOID - WHITE 2 WAY

CAV	CIRCUIT	FUNCTION
1	K29 18 WT/PK (JR27)	BRAKE SWITCH SENSE
1	K29 20WT/PK (JR41)	BRAKE SWITCH SENSE
2	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)



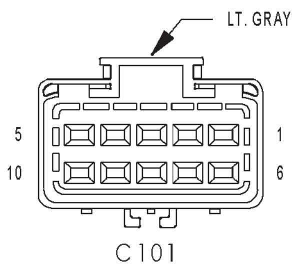
C100 - LT. GREEN (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	A15 16PK
2	A51 20RD/WT
2	A51 20RD/WT
3	D6 20PK/LB (EATX)
4	D20 20LG
5	D21 20PK
6	G6 20GY
7	G29 20BK/TN
8	K29 18 WT/PK (EATX JR27)
8	K29 20WT/PK (EATX JR41)
9	L101 18RD (BUILT-UP-EXPORT)



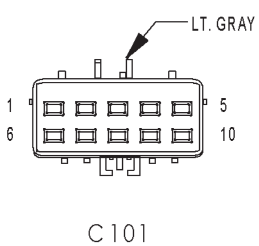
C100 - LT. GREEN (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	A15 16PK
2	A51 20RD/WT
3	D6 20PK/LB (EATX)
4	D20 20LG
5	D21 20PK (EATX)
5	D21 20PK
6	G6 18GY
7	G29 20BK/TN
8	K29 20WT/PK (EATX)
8	K29 20WT/PK (EATX)
9	L101 18RD (BUILT-UP-EXPORT)
9	L101 18RD (BUILT-UP-EXPORT)
10	-



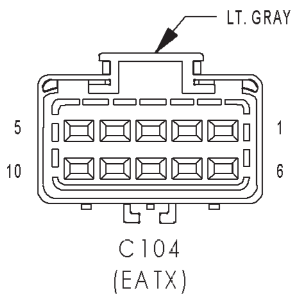
C101 - LT. GRAY (INSTRUMENT PANEL)

CAV	CIRCUIT
1	A1 16RD
2	F12 20DB/WT
3	A41 16YL
4	A2 12PK/BK
5	F20 20WT/YL
5	F20 20WT/YL
6	F30 16RD (JR27) (JR41 BUILT-UP EXPORT)
6	F30 16RD
7	V10 18BR
8	V37 20RD/LG
9	L36 18LG (JR27 BUILT-UP-EXPORT)
10	-



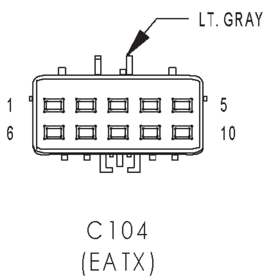
C101 - LT. GRAY (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	A1 16RD
2	F12 18DB/WT
3	A41 16YL (EATX)
3	A41 16YL
4	A2 12PK/BK
5	F20 18WT/YL
6	F30 16RD
7	V10 18BR
7	V10 18BR
8	V37 20PK/LG
9	L36 18LG (JR27 BUILT-UP-EXPORT)
10	-



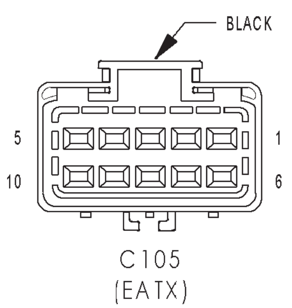
C104 (EATX) - LT. GRAY
(HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	T9 18OR/BK
2	T54 18VT/YL
3	T41 20BK/WT
4	-
5	T16 16RD
6	T19 18WT
7	T41 20BK/LB
8	T50 18DG
9	T59 18PK
10	T60 18BR



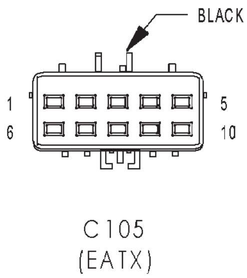
C104 (EATX) - LT. GRAY
(AUTOMATIC TRANSMISSION SIDE)

CAV	CIRCUIT
1	T9 18OR/BK
2	T54 18VT/YL
3	T41 20BK/WT
4	-
5	T16 16RD
6	T19 18WT
7	T41 20BK/LB
8	T50 18DG
9	T59 18PK
10	T60 18BR



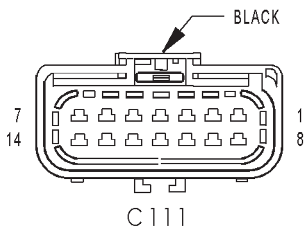
C105 (EATX) - BLACK
(HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	F20 18WT
2	T1 20LG/BK
3	T3 18VT
4	T13 20DB/BK
5	T14 20LG/WT
6	T20 18LB
7	T42 18VT/WT
8	T47 18YL/BK
9	T52 20RD/BK
10	L1 18VT/BK



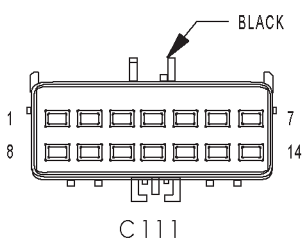
C105 (EATX) - BLACK
(AUTOMATIC TRANSMISSION SIDE)

CAV	CIRCUIT
1	F20 18WT
2	T1 20LG/BK
3	T3 18VT
4	T13 18DB/BK
5	T14 18LG/WT
6	T20 18LB
7	T42 20VT/WT
8	T47 18YL/BK
9	T52 18RD/BK
10	L1 18VT/BK



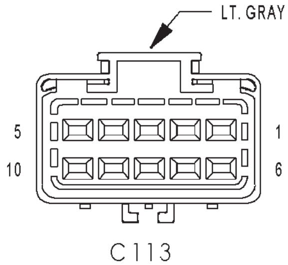
C111 - BLACK (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	Z186 18BK
2	K39 20GY/RD
3	K40 20BR/WT
4	K59 20VT/BK
5	K7 18OR/WT
6	A142 14DG/OR
7	K60 20YL/BK
8	G6 18GY
9	K6 18VT/WT
10	K4 18BK/LB
11	F142 16OR/DG
12	K10 20DB/OR (2.0L/2.4L)
13	F42 16DG/LG
14	Z88 16BK/LG (2.7L)



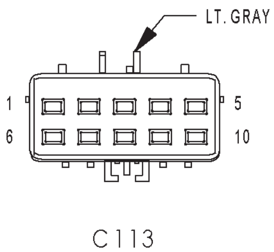
C111 - BLACK (ENGINE HARNESS SIDE)

CAV	CIRCUIT
1	Z1 20BK
2	K39 20GY/RD
3	K40 20BR/WT
4	K59 20VT/BK
5	K7 20OR
6	A142 14DG/OR
7	K60 20YL/BK
8	G6 20GY
9	K6 20VT/WT
10	K4 20BK/LB
11	F142 18OR/DG (2.7L)
11	F142 16OR/DG (EXCEPT 2.7L)
12	K10 20DB/LG (EXCEPT 2.7L)
13	F42 16DG/LG
14	Z88 16BK/LG (2.7L)



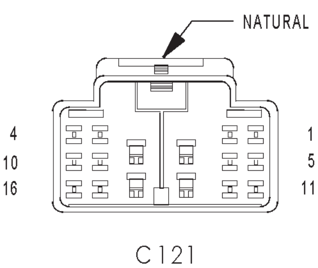
C113 - LT. GRAY (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	C3 14DB/BK
2	K90 20TN
3	K141 20TN/WT
4	K341 20PK/WT (EXCEPT JR41 BUILT-UP-EXPORT MTX)
5	T40 14BR
6	F12 18DB/WT
7	C18 20DB
8	V32 20YL/RD
9	K22 20OR/DB
10	Z108 14BK/TN



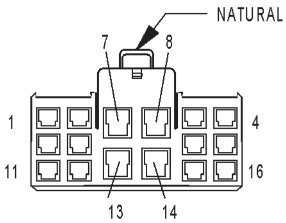
C113 - LT. GRAY (ENGINE HARNESS SIDE)

CAV	CIRCUIT
1	C3 14DB/BK
2	K90 20TN
3	K141 20TN/WT
4	K341 20TN/WT (2.7L)
5	T40 12BR (2.7L)
5	T40 16BR (2.0L/2.4L)
6	F12 18DB/WT
7	C18 20DB
8	V32 20YL/RD
9	K22 20OR/DB
10	Z108 14BK/TN



C121 - NATURAL (HEADLAMP AND DASH SIDE)

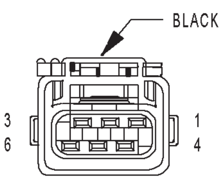
CAV	CIRCUIT
1	K106 18WT/DG
2	K107 18OR
3	L95 18DG/YL (JR27 BUILT-UP-EXPORT)
4	A45 18BR (JR27)
5	B1 18YL/DB (ABS)
6	B2 18YL (ABS)
7	P86 16PK/BK (JR41 BUILT-UP-EXPORT)
8	A25 12DB (JR27)
9	-
10	T44 20YL (AUTOSTICK)
11	T5 20LG (AUTOSTICK)
12	F12 18DB/WT
13	A141 14DG/WT
14	L1 18VT/BK
15	B3 18LG/DB
16	B4 18LG



C121

C121 - NATURAL (UNIBODY SIDE)

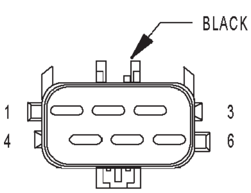
CAV	CIRCUIT
1	K106 20WT/DG
2	K107 20OR
3	L95 18DG/YL (JR27 BUILT-UP-EXPORT)
4	A45 18BR (JR27)
5	B1 20YL/DB (ABS)
6	B2 20YL (ABS)
7	P86 16PK/BK (JR41 BUILT-UP-EXPORT)
8	A25 12DB (JR27)
9	-
10	T44 20YL/LB (JR41 AUTOSTICK)
10	T44 20YL (JR27 AUTOSTICK)
11	T5 20LG (JR27 AUTOSTICK)
11	T5 20LG/LB (JR41 AUTOSTICK)
12	F12 20DB/WT
13	A141 14DG/WT
14	L1 20VT/BK
15	B3 20LG/DB
16	B4 20LG



C169
(2.0L/2.4L MTX)

C169 (2.0L/2.4L MTX) - BLACK (HEADLAMP AND DASH SIDE)

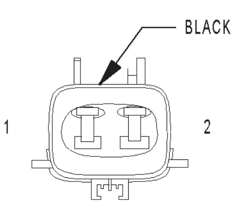
CAV	CIRCUIT
1	K7 18OR/WT (BUILT-UP-EXPORT)
2	K4 18BK/LB (BUILT-UP-EXPORT)
3	G7 18WT/OR (BUILT-UP-EXPORT)
4	F20 18WT
5	L1 18VT/BK
6	-



C169
(2.0L/2.4L MTX)

C169 (2.0L/2.4L MTX) - BLACK (MTX HARNESS SIDE)

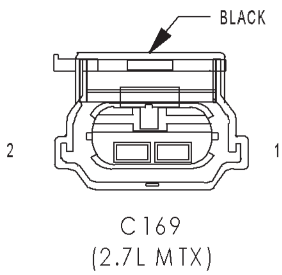
CAV	CIRCUIT
1	-
2	-
3	-
4	F20 18WT
5	L1 18VT/BK
6	-



C169
(2.7L MTX)

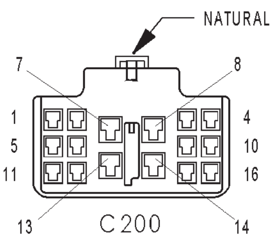
C169 (2.7L MTX) - BLACK (MTX HARNESS SIDE)

CAV	CIRCUIT
1	F20 18WT
2	L1 18VT/BK



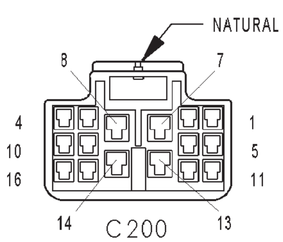
C169 (2.7L MTX) - BLACK (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	F20 18WT
2	L1 18VT/BK



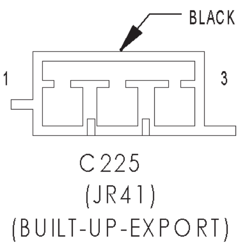
C200 - NATURAL (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	C34 20DB/WT
2	C35 20DG/YL
3	C33 20DB/RD
4	C4 16TN
5	C57 20DB/GY
6	C26 20PK/DB
7	C7 14BK/TN
8	C1 14DG
9	C12 20LG/BK
10	C36 18RD/WT
11	C37 20YL
12	C5 16LG
13	-
14	-
15	C6 14LB
16	C32 20GY/DB



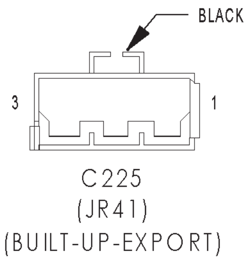
C200 - NATURAL (HVAC SIDE)

CAV	CIRCUIT
1	C34 20DB/WT
2	C35 20DG/YL
3	C33 20DB/RD
4	C4 14TN
5	C57 20DB/GY
6	C26 20PK/DB
7	C7 12BK/TN
8	C1 12DG
9	C12 20LG/BK
10	C36 20RD/WT
11	C37 20YL
12	C5 14LG
13	-
14	-
15	C6 16LB
16	C32 20GY/DB



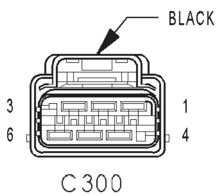
C225 (JR41) (BUILT-UP-EXPORT) - BLACK
(HEATED SEAT)

CAV	CIRCUIT
1	P86 16PK/BK
2	F11 20RD/WT (AUTOSTICK)
3	Z260 16BK



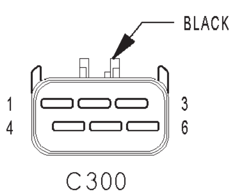
C225 (JR41) (BUILT-UP-EXPORT) - BLACK
(BODY SIDE)

CAV	CIRCUIT
1	P86 16PK/BK
2	F11 20RD/WT
2	F11 20RD/WT
3	Z260 16BK



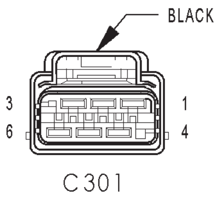
C300 - BLACK (BODY SIDE)

CAV	CIRCUIT
1	L1 20VT/BK
1	L1 20VT/BK
2	L50 18WT/TN
2	L50 18WT/TN
3	L61 20LG (JR27)
3	L61 20LG/TN (JR41)
4	L7 20BK/YL
4	L7 20BK/YL
5	Z151 18BK (JR27)
5	Z143 18BK (JR41)
5	Z150 18BK
6	L95 18DG/YL (JR27 BUILT-UP-EXPORT)
6	L36 18LG (JR41 BUILT-UP-EXPORT)



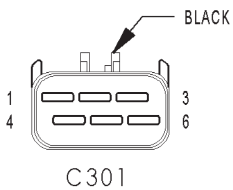
C300 - BLACK (LEFT REAR LAMP SIDE)

CAV	CIRCUIT
1	L1 18VT/BK
2	L50 18WT/TN
3	L61 18LG
4	L7 18BK/YL
5	Z149 18BK (JR27)
5	Z150 18BK (JR41)
6	L36 18LB (BUILT-UP-EXPORT)



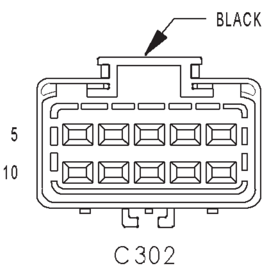
C301 - BLACK (BODY SIDE)

CAV	CIRCUIT
1	L1 20VT/BK
2	L50 18WT/TN
3	L60 20TN
4	L7 20BK/YL
5	Z150 18BK
5	Z151 18BK
6	-



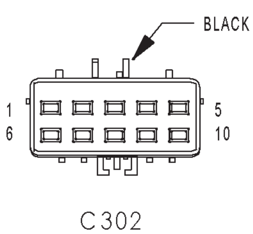
C301 - BLACK (RIGHT REAR LAMP SIDE)

CAV	CIRCUIT
1	L1 18VT/BK
2	L50 18WT/TN
3	L60 18LG (JR27)
3	L60 18LG (CHRYSLER BUILT-UP-EXPORT)
3	L60 18TN (DODGE)
4	L7 18BK/YL
5	Z151 18BK
6	-



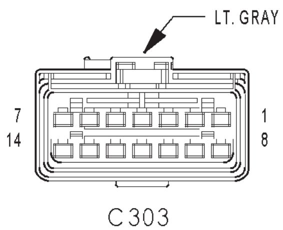
C302 - BLACK (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	F30 16RD (JR27) (JR41 BUILT-UP-EXPORT)
2	G9 20GY/BK
3	G73 20LG/OR (VTSS) (EXCEPT JR27 BASE)
4	L36 18LG (JR41 BUILT-UP-EXPORT) (JR27 EXCEPT BUILT-UP-EXPORT)
5	M2 20YL (JR27)
5	M2 20YL (JR27)
6	P97 20WT/DG
7	P175 18OR/BK
8	P177 18DB/WT
9	Q1 14YL/WT (JR41)
10	Q1 14YL/TN (JR41)



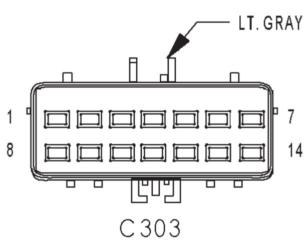
C302 - BLACK (BODY SIDE)

CAV	CIRCUIT
1	F30 16RD (JR27) (JR41 BUILT-UP-EXPORT)
2	G9 18GY/BK (JR27)
2	G9 18GY/DB (JR41)
3	G73 20LG/OR (VTSS)
4	L36 18LG (JR41 BUILT-UP-EXPORT)
5	M2 18YL (JR27)
5	M2 18YL (JR27)
6	P97 20WT/DG
7	P175 18OR/BK
8	P177 18DB/WT
9	Q1 14YL/WT (JR41)
10	Q1 14YL/TN (JR41)



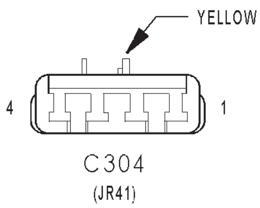
C303 - LT. GRAY (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	F11 20RD/WT
2	F13 18DB (JR27)
2	G75 20TN (JR41)
3	G72 20DG/OR (VTSS)
4	P96 20WT/LG
5	P176 16OR/WT (JR27)
5	P176 18PK/BK (JR41)
6	P178 18PK/LB
7	Q13 14DB (JR27)
7	Q17 14DB/WT (JR41)
8	Q14 14GY (JR27)
8	Q18 14GY/BK (JR41)
9	Q23 14RD/WT (JR27)
9	Q27 14RD/BK (JR41)
10	Q28 14DG/WT (JR41)
10	Q24 14DG (JR27)
11	Q37 20OR/WT (JR27)
11	G74 20TN/RD (JR41)
12	F14 18LG/YL (JR41)
12	G74 20TN (JR27)
13	-
14	D25 18VT/LG (JR41)
14	G75 20TN/RD (JR27)



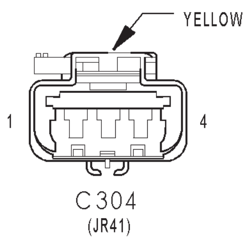
C303 - LT. GRAY (BODY SIDE)

CAV	CIRCUIT
1	F11 20RD/WT (AUTOSTICK)
2	F13 18DB (JR27 BUILT-UP-EXPORT)
2	G75 20TN (JR41)
3	G72 20DG/OR (VTSS)
4	P96 20WT/LG
5	P176 18PK/BK
6	P178 18PK/LB
7	Q13 14DB (JR27)
7	Q17 14DB/WT (JR41)
8	Q14 14GY (JR27)
8	Q18 14GY/BK (JR41)
9	Q23 14RD/WT (JR27)
9	Q27 14RD/BK (JR41)
10	Q24 14DG (JR27)
10	Q28 14DG/WT (JR41)
11	Q17 20RD/WT (JR27)
11	G74 20TN/RD (JR41)
12	F14 20LG/YL (JR41 SIDE AIRBAG)
12	G74 20TN/RD (JR27)
12	F14 20LG/YL (JR41 SIDE AIRBAG)
12	G74 20TN/RD (JR27 BUILT-UP-EXPORT)
13	-
14	G75 20TN (JR27) (BUILT-UP-EXPORT)
14	D25 20VT/YL (JR41 SIDE AIRBAG)
14	G75 20TN (JR27)
14	D25 20VT/YL (JR41 SIDE AIRBAG)



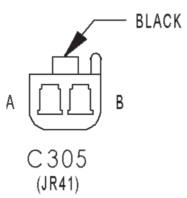
C304 (JR41) - YELLOW (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	R53 20LG/YL
2	R55 20LG/DG
3	R54 20LB/YL
4	R56 20LB/DG



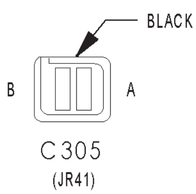
C304 (JR41) - YELLOW (BODY SIDE)

CAV	CIRCUIT
1	R53 18LG/YL
2	R55 18LG/DG
3	R54 18LB/YL
4	R56 18LB/DG



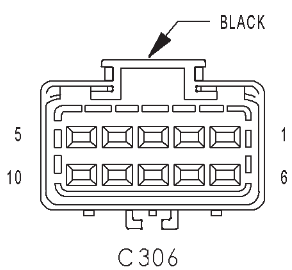
C305 (JR41) - BLACK (BODY SIDE)

CAV	CIRCUIT
B	Z143 18BK
A	L50 18WT/TN



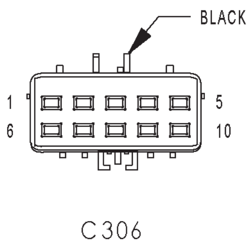
C305 (JR41) - BLACK (CHMSL SIDE)

CAV	CIRCUIT
B	Z1 18BK
A	L50 18BK/TN



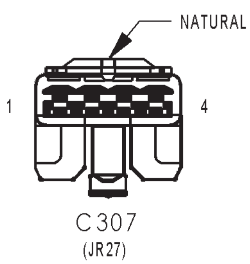
C306 - BLACK (INSTRUMENT PANEL)

CAV	CIRCUIT
1	-
2	-
3	-
4	-
5	X93 18WT/RD (PREMIUM)
5	X51 18BR/YL (BASE)
6	X94 18TN/VT (PREMIUM)
6	X52 18DB/WT (BASE)
7	X91 18WT/BK (PREMIUM)
7	X57 18BR/LB (BASE)
8	X92 18TN/BK (PREMIUM)
8	X58 18DB/OR (BASE)
9	X60 18DG/RD (PREMIUM)
9	X60 18DG/RD (PREMIUM)
10	-



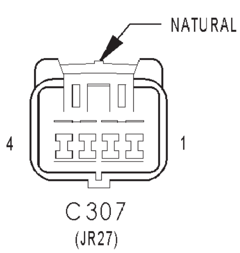
C306 - BLACK (BODY SIDE)

CAV	CIRCUIT
1	-
2	-
3	-
4	-
5	X93 18WT/RD
6	X94 18TN/VT
7	X91 18WT/BK
8	X92 18TN/BK
9	X60 20DG/RD (BUILT-UP-EXPORT)
10	-



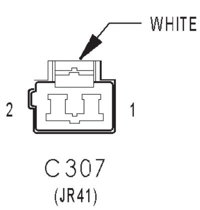
C307 (JR27) - NATURAL (DOME LAMP SIDE)

CAV	CIRCUIT
1	M2 18YL
2	F20 20WT (AUTOMATIC DAY/NIGHT MIRROR)
3	G38 18GY (EXCEPT BASE)
4	L1 18VT/BK (AUTOMATIC DAY/NIGHT MIRROR)



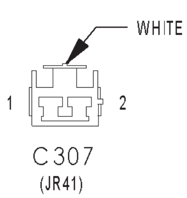
C307 (JR27) - NATURAL (BODY SIDE)

CAV	CIRCUIT
1	M2 18YL
2	F20 20WT
3	G38 18GY
4	L1 20VT/BK



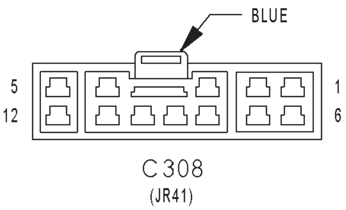
C307 (JR41) - WHITE (BODY SIDE)

CAV	CIRCUIT
1	M2 18YL
2	-



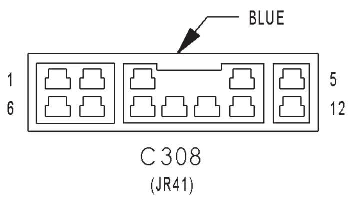
C307 (JR41) - WHITE (DOME LAMP SIDE)

CAV	CIRCUIT
1	M2 20YL
2	-



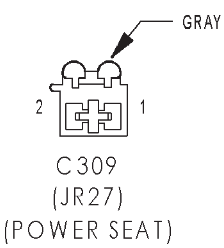
C308 (JR41) - BLUE (BODY SIDE)

CAV	CIRCUIT
1	P179 18OR/BR
2	P181 18PK/BK
3	Q1 14YL/TN
4	Q17 14DB/WT
5	Q27 14RD/BK
6	G77 20TN/OR
7	Z317 18BK
8	-
9	-
10	-
11	-
12	-



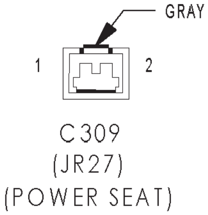
C308 (JR41) - BLUE (REAR DOOR SIDE)

CAV	CIRCUIT
1	P179 18OR/TN
2	P181 18PK/DB
3	Q1 14YL
4	Q17 14GY/BK
5	Q27 14DG/WT
6	G77 20TN/YL
7	Z317 18BK
8	-
9	-
10	-
11	-
12	-



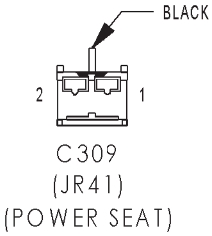
C309 (JR27) (POWER SEAT) - GRAY (BODY SIDE)

CAV	CIRCUIT
1	F35 16RD
2	Z238 16BK



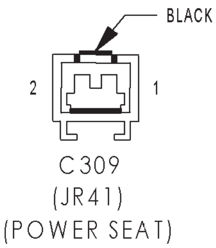
C309 (JR27) (POWER SEAT) - GRAY (POWER SEAT JUMPER SIDE)

CAV	CIRCUIT
1	F35 16RD
2	Z1 16BK



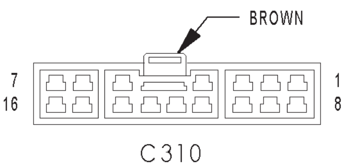
C309 (JR41) (POWER SEAT) - BLACK (BODY SIDE)

CAV	CIRCUIT
1	Z238 16BK
2	F35 16RD



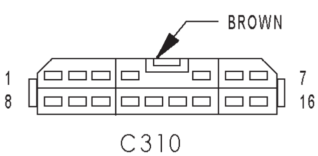
C309 (JR41) (POWER SEAT) - BLACK (POWER SEAT JUMPER SIDE)

CAV	CIRCUIT
1	F35 16RD
2	Z1 16BK



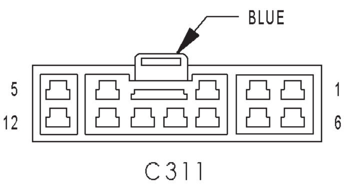
C310 - BROWN (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	M2 20YL (JR27)
2	M1 20PK
3	P97 20WT/DG
4	P91 22WT/BK
5	P95 22DB
6	-
7	Q16 14BR/WT
8	Q18 14GY/BK (JR41)
8	Q14 14GY (JR27)
9	Q37 20OR/WT (JR27)
10	P175 18OR/BK
11	P177 18DB/WT
12	P93 22YL/BK
13	G75 20TN (JR41)
13	G75 20TN/RD (JR27)
14	-
15	-
16	-



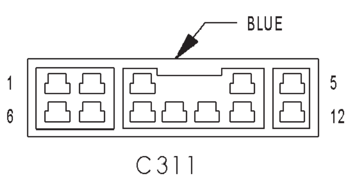
C310 - BROWN (LEFT FRONT DOOR SIDE)

CAV	CIRCUIT
1	M2 20YL (JR27 LOADED)
2	M1 20PK
3	P97 20WT/DG
4	P91 22WT/BK
4	P91 22WT/BK (JR27)
5	P95 22DB/WT
6	-
7	Q16 14BR/WT
8	Q18 14GY/BK
9	Q37 20RD/WT (JR27)
10	P175 18OR/BK
11	P177 18DB/WT
12	P93 22YL/BK
13	G75 20TN
14	-
15	-
16	-



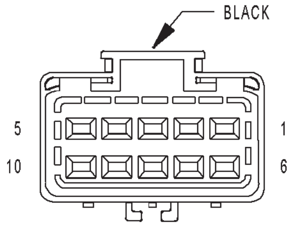
C311 - BLUE (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	Q1 14YL (JR41)
2	Q23 14RD/WT (JR27)
2	Q27 14RD/BK (JR41)
3	Q17 14DB/WT (JR41)
3	Q13 14DB (JR27)
4	F21 14TN
5	Q26 14VT/WT
6	Z314 14BK/TN (JR27)
6	Z243 14BK/TN (JR41)
7	Q28 14DG/WT (JR41)
7	Q24 14DG (JR27)
8	X55 18BR/RD (JR27 BASE)
8	X85 18LG/BK (JR27 PREMIUM)
8	X85 18LG/DG (JR41 PREMIUM)
8	X55 18BR/RD (BASE)
9	X87 18LG/VT (PREMIUM)
9	X53 18DG (BASE)
9	X53 18DG (JR27 BASE)
10	G73 20LG/OR (VTSS)
11	F20 20WT/YL
11	F20 20WT/YL
12	C16 20LB/YL (JR27) (JR41 BUILT-UP-EXPORT)



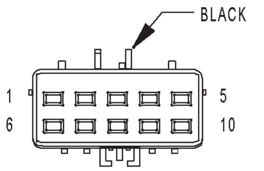
C311 - BLUE (LEFT FRONT DOOR SIDE)

CAV	CIRCUIT
1	Q1 14YL (JR41)
2	Q27 14RD/BK
3	Q17 14DB/WT
4	F21 14TN
5	Q26 14VT/WT
6	Z314 14BK (JR27)
6	Z243 14BK (JR41)
7	Q28 14DG/WT
8	X85 18LG/DG
9	X87 18LG/VT
10	G73 20LG/OR (VTSS)
11	F20 20WT/YL (JR27)
11	F20 20WT/YL
12	C16 20LB/YL



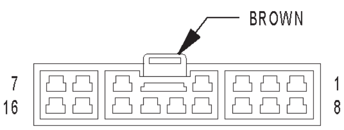
C312 (JR27) (JR41 BUILT-UP-EXPORT) - BLACK
(CONSOLE SIDE)

CAV	CIRCUIT
1	F20 20YL/BK (JR27)
2	Q31 20WT (JR27)
3	Z316 14BK
4	-
5	-
6	Z249 20BK (JR27)
7	M1 18PK
8	M2 18YL
9	-
10	F30 14RD



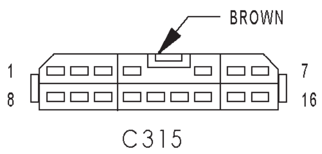
C312 (JR27) (JR41 BUILT-UP-EXPORT) - BLACK
(BODY SIDE)

CAV	CIRCUIT
1	F20 20WT (JR27)
2	Q31 20WT/BK (JR27)
3	Z316 14BK
4	-
5	-
6	Z249 18BK (JR27)
7	M1 18PK (BUILT-UP-EXPORT)
7	M1 18PK/VT
8	M2 18YL
9	-
10	F30 16RD



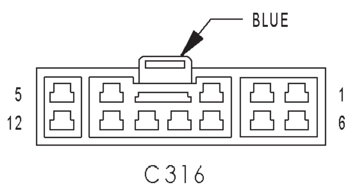
C315 - BROWN (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	M2 20YL (JR27)
2	M1 20PK
3	P96 20WT/LG
4	P90 22LG/BK
5	P92 22YL
6	-
7	-
8	-
9	-
10	C16 20LB/OR (JR27) (JR41 BUILT-UP-EXPORT)
11	P94 22WT/YL
12	G72 20DG/OR (JR27)
13	G74 20TN (JR27)
13	G74 20TN/RD (JR41)
14	-
15	-
16	-



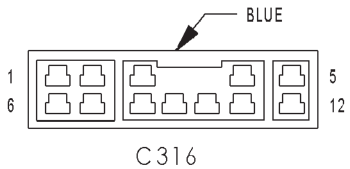
C315 - BROWN (RIGHT FRONT DOOR SIDE)

CAV	CIRCUIT
1	M2 20YL (JR27 LOADED)
2	M1 20PK
3	P96 20WT/LG
4	P90 22LG/BK
4	P90 22LG/BK (JR27)
5	P92 22YL
6	-
7	-
8	-
9	-
10	C16 20LB/YL
11	P94 22WT/YL
12	-
13	G74 20TN/RD
14	-
15	-
16	-



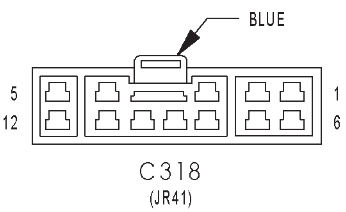
C316 - BLUE (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	P176 16OR/WT (JR27)
1	P176 18PK/BK (JR41)
2	P178 18PK/LB (JR41)
2	P178 16PK/LB (JR27)
3	Q1 14YL/VT
4	Q16 14BR/WT
5	Q26 14VT/WT
6	Z315 18BK/BR (JR27)
6	Z237 20BK (EXCEPT BUILT-UP-EXPORT)
6	Z242 18BK/BR (JR41)
7	G72 20DG/OR (VTSS)
8	X56 18DB/RD (JR27 BASE)
8	X80 18LB/BK (PREMIUM)
8	X56 18DB/RD (BASE)
9	X82 18LB/VT (PREMIUM)
9	X54 18VT (BASE)
9	X54 18VT (JR27) (BASE)
10	F21 14TN (JR27)
11	F20 20WT
11	F20 20WT/YL
12	-



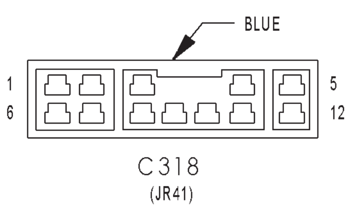
C316 - BLUE (RIGHT FRONT DOOR SIDE)

CAV	CIRCUIT
1	P176 18PK/BK
2	P178 18PK/LB
3	Q1 14YL
4	Q16 14BR/WT
5	Q26 14VT/WT
6	Z315 14BK (JR27)
6	Z242 20BK (JR41)
7	G72 20DG/OR (VTSS)
8	X80 18LB/BK
9	X82 18LB/VT
10	F21 14TN (JR27)
11	F20 20WT
12	-



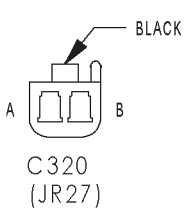
C318 (JR41) - BLUE (BODY SIDE)

CAV	CIRCUIT
1	P180 18OR/TN
2	P182 18PK/DB
3	Q1 14YL/WT
4	Q18 14GY/BK
5	Q28 14DG/WT
6	G76 20TN/YL
7	Z318 18BK
8	-
9	-
10	-
11	-
12	-



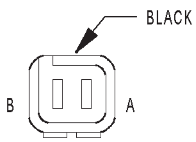
C318 (JR41) - BLUE (RIGHT REAR DOOR SIDE)

CAV	CIRCUIT
1	P180 18OR/TN
2	P182 18PK/DB
3	Q1 14YL
4	Q18 14GY/BK
5	Q28 14DG/WT
6	G76 20TN/YL
7	Z318 18BK
8	-
9	-
10	-
11	-
12	-



C320 (JR27) - BLACK (BODY SIDE)

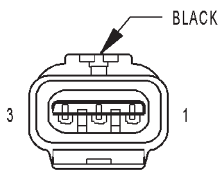
CAV	CIRCUIT
B	Z149 18BK
A	L7 20BK/YL



C320
(JR27)

C320 (JR27) - BLACK (REAR SIDE)

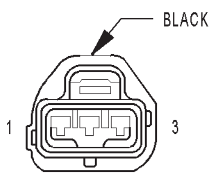
CAV	CIRCUIT
B	Z149 18BK
A	L7 18BK/YL



C320
(JR41)

C320 (JR41) - BLACK (BODY SIDE)

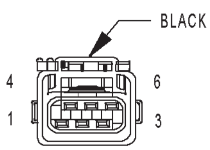
CAV	CIRCUIT
1	L7 18BK/YL
2	Z150 18BK
3	L36 18LB (REAR FOG LAMPS)



C320
(JR41)

C320 (JR41) - BLACK (REAR SIDE)

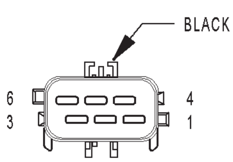
CAV	CIRCUIT
1	L7 18BK/YL
2	Z150 18BK
3	L36 18LG (REAR FOG LAMPS)



C321

C321 - BLACK (FUEL PUMP SIDE)

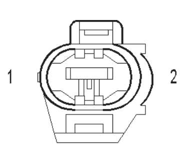
CAV	CIRCUIT
1	A141 14DG/WT
2	G4 18DB
3	Z211 14BK
4	F12 20DB/WT
5	K106 20WT/DG
6	K107 20OR



C321

C321 - BLACK (BODY SIDE)

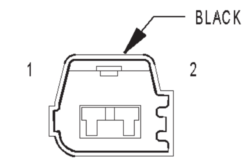
CAV	CIRCUIT
1	A141 14DG/WT
2	G4 18DB
3	Z211 14BK
4	F12 20DB/WT
5	K106 20WT/DG
6	K107 20OR



C322
(JR27)
(BUILT-UP-EXPORT)

C322 (JR27) (BUILT-UP-EXPORT) - BLACK (LEFT TAIL STOP TURN HARNESS)

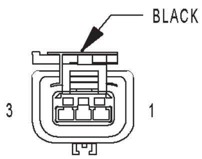
CAV	CIRCUIT
1	Z149 18BK
2	L36 18LB



C322
(JR27)
(BUILT-UP-EXPORT)

C322 (JR27) (BUILT-UP-EXPORT) - BLACK (FOG LAMP HARNESS)

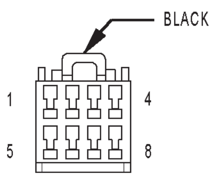
CAV	CIRCUIT
1	Z149 18BK
2	L36 18LG



CAMSHAFT
POSITION
SENSOR

CAMSHAFT POSITION SENSOR - BLACK 3 WAY

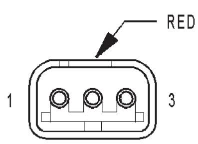
CAV	CIRCUIT	FUNCTION
1	K7 20OR	8V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL



CD
CHANGER

CD CHANGER - BLACK 8 WAY

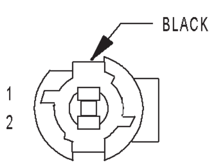
CAV	CIRCUIT	FUNCTION
1	X40 22GY/WT	AUDIO OUT RIGHT
2	E14 22OR/TN	PANEL LAMPS DIMMER SIGNAL
3	D25 22VT/YL	PCI BUS
4	X112 22RD	IGNITION SWITCH OUTPUT (RUN-ACC)
5	X41 22DG/WT	AUDIO OUT LEFT
6	Z4 22BK/OR	GROUND
7	Z140 22BK/TN	GROUND
8	X160 22GY/YL	B(+)



CENTER HIGH
MOUNTED
STOP LAMP
(JR27)

CENTER HIGH MOUNTED STOP LAMP (JR27) - RED 3 WAY

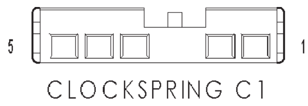
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	-	-
3	Z143 18BK	GROUND



CENTER HIGH
MOUNTED
STOP LAMP
(JR41)

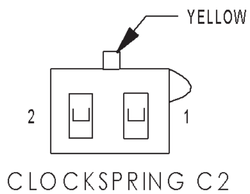
CENTER HIGH MOUNTED STOP LAMP (JR41) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	L50 18BK/TN	BRAKE LAMP SWITCH OUTPUT



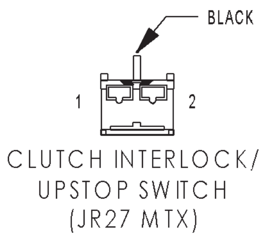
CLOCKSPRING C1 - 5 WAY

CAV	CIRCUIT	FUNCTION
1	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
2	Z123 20BK/OR	GROUND
3	X3 20BK/RD	HORN SWITCH SENSE
4	R63 20TN/LB	DRIVER SQUIB 2 LINE 2
5	R61 20OR/LB	DRIVER SQUIB 2 LINE 1



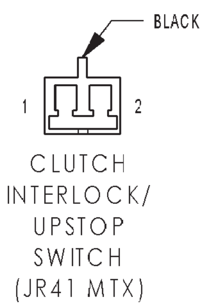
CLOCKSPRING C2 - YELLOW 2 WAY

CAV	CIRCUIT	FUNCTION
1	R43 20BK/LB	DRIVER SQUIB 1 LINE 1
2	R45 20DG/LB	DRIVER SQUIB 1 LINE 2



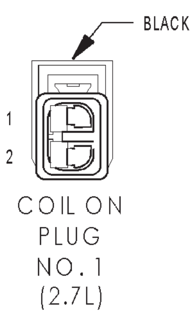
CLUTCH INTERLOCK/ UPSTOP SWITCH (JR27 MTX) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	T141 16YL/RD	FUSED IGNITION SWITCH OUTPUT (START)
2	A41 16YL	FUSED IGNITION SWITCH OUTPUT (START)



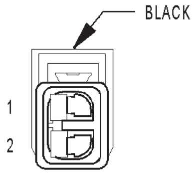
CLUTCH INTERLOCK/ UPSTOP SWITCH (JR41 MTX) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	A41 16YL	FUSED IGNITION SWITCH OUTPUT (START)
2	T141 16YL/RD	FUSED IGNITION SWITCH OUTPUT (START)



COIL ON PLUG NO. 1 (2.7L) - BLACK 2 WAY

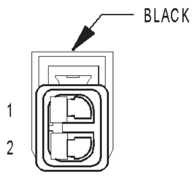
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K91 16TN/RD	COIL ON PLUG DRIVER NO. 1



COIL ON PLUG NO. 2 (2.7L)

COIL ON PLUG NO. 2 (2.7L) - BLACK 2 WAY

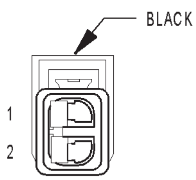
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K92 16TN/PK	COIL ON PLUG DRIVER NO. 2



COIL ON PLUG NO. 3 (2.7L)

COIL ON PLUG NO. 3 (2.7L) - BLACK 2 WAY

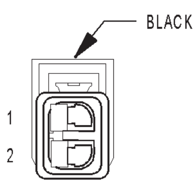
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K93 16TN/OR	COIL ON PLUG DRIVER NO. 3



COIL ON PLUG NO. 4 (2.7L)

COIL ON PLUG NO. 4 (2.7L) - BLACK 2 WAY

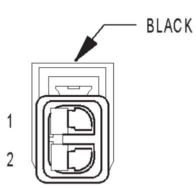
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K94 16TN/LG	COIL ON PLUG DRIVER NO. 4



COIL ON PLUG NO. 5 (2.7L)

COIL ON PLUG NO. 5 (2.7L) - BLACK 2 WAY

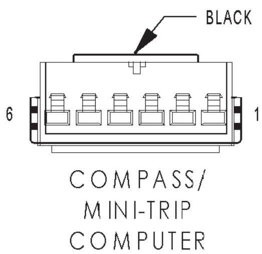
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K95 16TN/DG	COIL ON PLUG DRIVER NO. 5



COIL ON PLUG NO. 6 (2.7L)

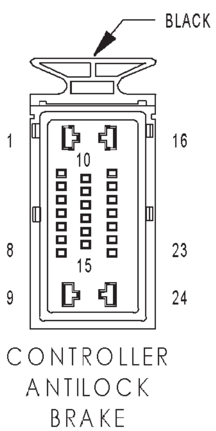
COIL ON PLUG NO. 6 (2.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K96 16TN/LB	COIL ON PLUG DRIVER NO. 6



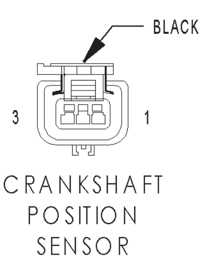
COMPASS/ MINI-TRIP COMPUTER - BLACK 6 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/RD	PCI BUS
3	M1 20PK	FUSED B(+)
4	Z104 20BK	GROUND
5	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
6	-	-



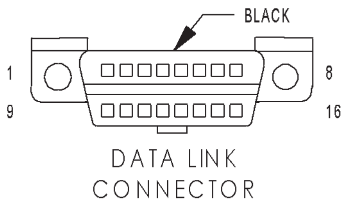
CONTROLLER ANTILOCK BRAKE - BLACK 24 WAY

CAV	CIRCUIT	FUNCTION
1	Z101 12BK	GROUND
2	B1 18YL/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL
3	B2 18YL	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
4	-	-
5	D25 18YL/VT	PCI BUS
6	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
7	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
8	-	-
9	A20 12RD/DB	FUSED B(+)
10	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	Z102 12BK	GROUND
17	-	-
18	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
19	B3 18LG/DB	LEFT REAR WHEEL SPEED SENSOR SIGNAL
20	B4 18LG	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
21	-	-
22	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR SIGNAL
23	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
24	A10 12RD/DG	FUSED B(+)



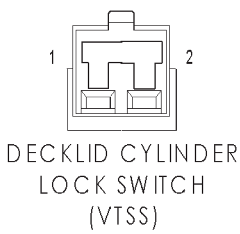
CRANKSHAFT POSITION SENSOR - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K7 20OR	8V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL



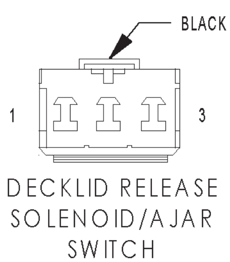
DATA LINK CONNECTOR - BLACK 16 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/GY	PCI BUS
3	-	-
4	Z305 20BK/YL	GROUND
5	Z306 20BK/VT	GROUND
6	D20 20LG	SCI RECEIVE
7	D21 20PK	SCI TRANSMIT
8	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
9	D19 20VT/OR	BODY CONTROL MODULE FLASH ENABLE
10	Y98 18WT/DG (JR41)	NOT USED
11	-	-
12	-	-
13	-	-
14	D6 20PK/LB	SCI RECEIVE
15	-	-
16	M1 20PK	FUSED B(+)



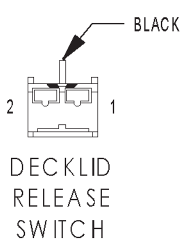
DECKLID CYLINDER LOCK SWITCH (VTSS) - 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z236 20BK	GROUND
2	G71 20VT/YL	DECKLID SECURITY SWITCH SENSE



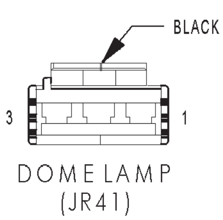
DECKLID RELEASE SOLENOID/AJAR SWITCH - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	P2 18BK/WT	DECKLID RELEASE CONTROL
2	Z217 16BK/VT (JR41)	GROUND
2	Z217 16BK (JR27)	GROUND
3	G78 18TN/BK	DECKLID AJAR SWITCH SENSE



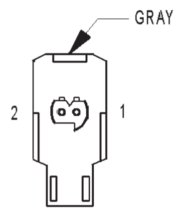
DECKLID RELEASE SWITCH - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	P1 18BK/WT	DECKLID RELEASE SWITCH SENSE
2	Z223 20BK/DB	GROUND



DOME LAMP (JR41) - BLACK 3 WAY

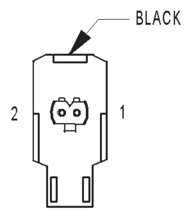
CAV	CIRCUIT	FUNCTION
1	-	-
2	M1 20PK	FUSED B(+)
3	M2 20YL (PREMIUM)	COURTESY LAMPS DRIVER
3	M2 20YL	COURTESY LAMPS DRIVER



DRIVER AIRBAG
SQUIB 1

DRIVER AIRBAG SQUIB 1 - GRAY 2 WAY

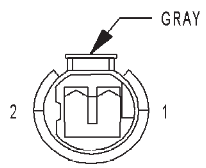
CAV	CIRCUIT	FUNCTION
1	R45 20DG/LB	DRIVER SQUIB 1 LINE 2
2	R43 20BK/LB	DRIVER SQUIB 1 LINE 1



DRIVER AIRBAG
SQUIB 2

DRIVER AIRBAG SQUIB 2 - BLACK 2 WAY

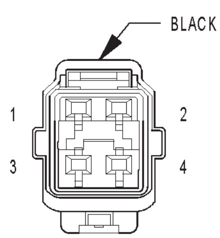
CAV	CIRCUIT	FUNCTION
1	R63 20DG/LB	DRIVER SQUIB 2 LINE 2
2	R61 20BK/LB	DRIVER SQUIB 2 LINE 1



DRIVER CYLINDER
LOCK SWITCH
(VTSS)

DRIVER CYLINDER LOCK SWITCH (VTSS) - GRAY 2 WAY

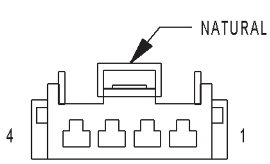
CAV	CIRCUIT	FUNCTION
1	G73 20LG/OR	DRIVER CYLINDER LOCK SWITCH MUX
2	M1 20PK	FUSED B(+)



DRIVER DOOR
LOCK MOTOR/
AJAR SWITCH

DRIVER DOOR LOCK MOTOR/AJAR SWITCH - BLACK 4 WAY

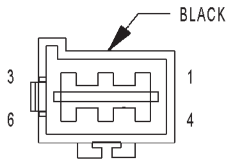
CAV	CIRCUIT	FUNCTION
1	G75 20TN	DRIVER DOOR AJAR SWITCH SENSE
2	Z314 18BK (JR27)	GROUND
2	Z243 18BK (JR41)	GROUND
3	P177 18DB/WT	DRIVER UNLOCK RELAY OUTPUT
4	P175 18OR/BK	DRIVER LOCK RELAY OUTPUT



DRIVER DOOR
LOCK SWITCH

DRIVER DOOR LOCK SWITCH - NATURAL 4 WAY

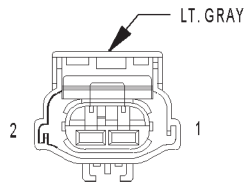
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
3	Z314 20BK	GROUND
4	P97 20WT/DG	DRIVER DOOR SWITCH MUX



DRIVER HEATED SEAT MODULE (JR41 BUILT-UP-EXPORT)

DRIVER HEATED SEAT MODULE (JR41 BUILT-UP-EXPORT) - BLACK 6 WAY

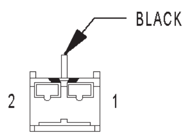
CAV	CIRCUIT	FUNCTION
1	P86 16PK/BK	FUSED B(+)
2	Z121 16BK	GROUND
3	-	-
4	P7 20LB/BK	DRIVER HEATED SEAT TEMPERATURE CONTROL
5	-	-
6	F99 20RD/WT	DRIVER HEATED SEAT SWITCH OUTPUT



DRIVER POWER WINDOW MOTOR

DRIVER POWER WINDOW MOTOR - LT. GRAY 2 WAY

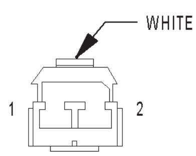
CAV	CIRCUIT	FUNCTION
1	Q21 14WT (JR27)	MASTER WINDOW SWITCH LEFT FRONT DOWN
1	Q21 16WT (JR41)	MASTER WINDOW SWITCH LEFT FRONT DOWN
2	Q11 14LB (JR27)	DRIVER WINDOW DRIVER (UP)
2	Q11 16LB (JR41)	DRIVER WINDOW DRIVER (UP)



DRIVER SEAT BELT SOLENOID (JR27 BUILT-UP-EXPORT)

DRIVER SEAT BELT SOLENOID (JR27 BUILT-UP-EXPORT) - BLACK 2 WAY

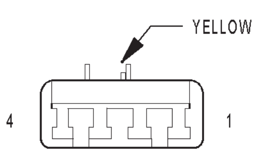
CAV	CIRCUIT	FUNCTION
1	R7 18OR/BK	LEFT SEAT BELT SOLENOID CONTROL
2	Z220 18BK	GROUND



DRIVER SEAT BELT SWITCH (JR41 EXCEPT BUILT-UP-EXPORT)

DRIVER SEAT BELT SWITCH (JR41 EXCEPT BUILT-UP-EXPORT) - WHITE 2 WAY

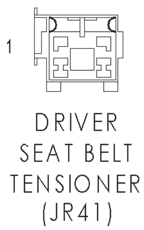
CAV	CIRCUIT	FUNCTION
1	Z237 20BK	GROUND
2	G10 20LG/RD	SEAT BELT SWITCH SENSE



DRIVER SEAT BELT TENSIONER (JR27)

DRIVER SEAT BELT TENSIONER (JR27) - YELLOW 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z237 20BK (EXCEPT BUILT-UP-EXPORT)	GROUND
2	G10 20LG/RD (EXCEPT BUILT-UP-EXPORT)	SEAT BELT SWITCH SENSE
3	R53 20LG/YL	DRIVER SEAT BELT TENSIONER LINE 2
4	R55 20LG/DG	DRIVER SEAT BELT TENSIONER LINE 1

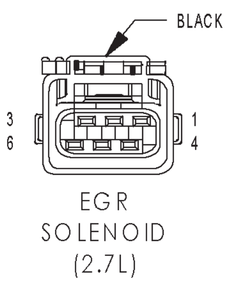


DRIVER SEAT BELT TENSIONER (JR41) - 2 WAY

CAV	CIRCUIT	FUNCTION
1	R53 18LG/YL	DRIVER SEAT BELT TENSIONER LINE 2
2	R55 18LG/DG	DRIVER SEAT BELT TENSIONER LINE 1

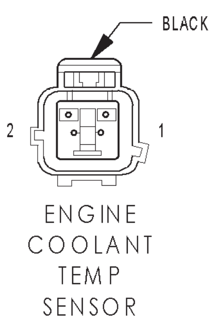
EGR SOLENOID (2.0L/2.4L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F142 16OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K35 20GY/YL	EGR SOLENOID CONTROL



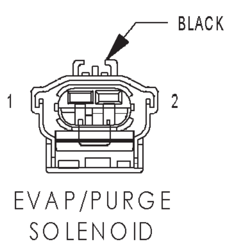
EGR SOLENOID (2.7L) - BLACK 6 WAY

CAV	CIRCUIT	FUNCTION
1	K235 20LG/PK	EGR SENSOR SIGNAL
2	K6 20VT/WT	5V SUPPLY
3	K4 20BK/LB	SENSOR GROUND
4	K35 20GY/YL	EGR SOLENOID CONTROL
5	-	-
6	F142 18OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT



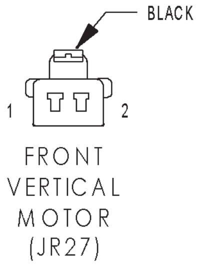
ENGINE COOLANT TEMP SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
2	K4 20BK/LB	SENSOR GROUND



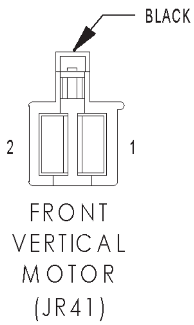
EVAP/PURGE SOLENOID - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K52 18PK/BK	EVAPORATIVE EMISSION SOLENOID CONTROL
2	K108 18WT/TN	EVAPORATIVE SOLENOID SENSE



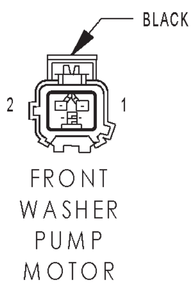
FRONT VERTICAL MOTOR (JR27) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	P19 16 YL/LG	LEFT SEAT FRONT DOWN
2	P21 16RD/LG	LEFT SEAT FRONT UP



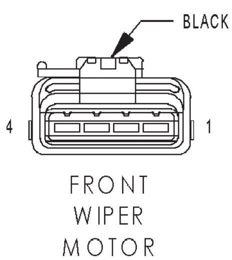
FRONT VERTICAL MOTOR (JR41) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	P19 16YL/LG	LEFT SEAT FRONT UP
2	P21 16RD/LG	LEFT SEAT FRONT DOWN



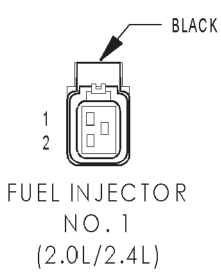
FRONT WASHER PUMP MOTOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z216 18BK	GROUND
2	V10 18BR	FRONT WASHER PUMP MOTOR CONTROL



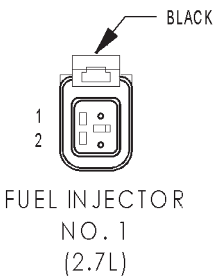
FRONT WIPER MOTOR - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	V55 20TN/RD	FRONT WIPER PARK SWITCH SENSE
2	Z114 16BK	GROUND
3	V3 14BR/WT	FRONT WIPER LOW SPEED OUTPUT
4	V4 14RD/YL	FRONT WIPER HIGH SPEED OUTPUT



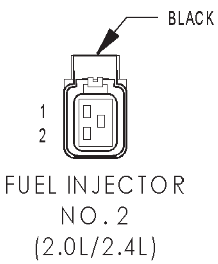
FUEL INJECTOR NO. 1 (2.0L/2.4L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K11 18WT/DB	INJECTOR NO. 1 DRIVER



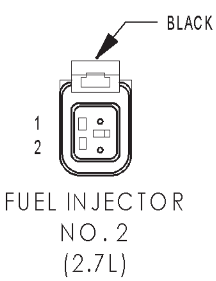
FUEL INJECTOR NO. 1 (2.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K11 18WT/DB	INJECTOR NO. 1 DRIVER



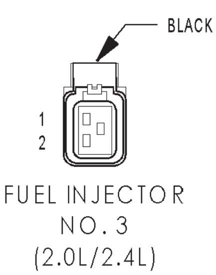
FUEL INJECTOR NO. 2 (2.0L/2.4L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K12 18TN	INJECTOR NO. 2 DRIVER



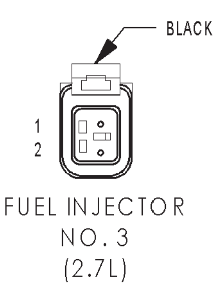
FUEL INJECTOR NO. 2 (2.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K12 18TN	INJECTOR NO. 2 DRIVER



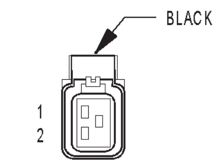
FUEL INJECTOR NO. 3 (2.0L/2.4L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K13 18YL/WT	INJECTOR NO. 3 DRIVER



FUEL INJECTOR NO. 3 (2.7L) - BLACK 2 WAY

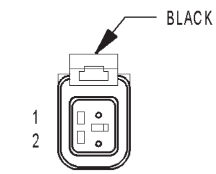
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K13 18YL/WT	INJECTOR NO. 3 DRIVER



FUEL INJECTOR
NO. 4
(2.0L/2.4L)

FUEL INJECTOR NO. 4 (2.0L/2.4L) - BLACK 2 WAY

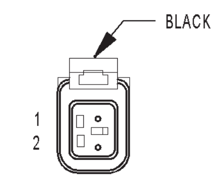
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K14 18LB/BR	INJECTOR NO. 4 DRIVER



FUEL INJECTOR
NO. 4
(2.7L)

FUEL INJECTOR NO. 4 (2.7L) - BLACK 2 WAY

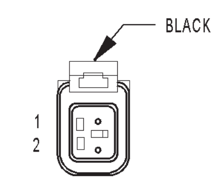
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K14 18LB/BR	INJECTOR NO. 4 DRIVER



FUEL INJECTOR
NO. 5
(2.7L)

FUEL INJECTOR NO. 5 (2.7L) - BLACK 2 WAY

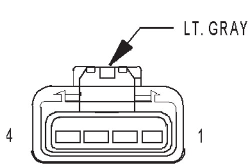
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K38 18GY	INJECTOR NO. 5 DRIVER



FUEL INJECTOR
NO. 6
(2.7L)

FUEL INJECTOR NO. 6 (2.7L) - BLACK 2 WAY

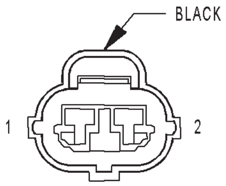
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K58 18BR/DB	INJECTOR NO. 6 DRIVER



FUEL PUMP
MODULE C1

FUEL PUMP MODULE C1 - LT. GRAY 4 WAY

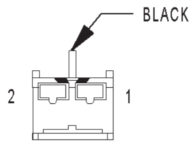
CAV	CIRCUIT	FUNCTION
1	Z211 14BK	GROUND
2	Z211 14BK	GROUND
3	G4 18DB	FUEL LEVEL SENSOR SIGNAL
4	A141 14DG/WT	FUEL PUMP RELAY OUTPUT



GENERATOR

GENERATOR - BLACK 2 WAY

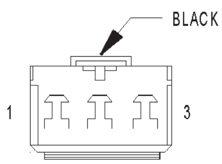
CAV	CIRCUIT	FUNCTION
1	F142 18OR/DG (2.7L)	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
1	F142 16OR/DG (2.0L/2.4L)	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K20 18DG	GENERATOR FIELD DRIVER



GLOVE BOX
LAMP

GLOVE BOX LAMP - BLACK 2 WAY

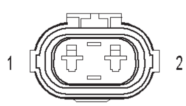
CAV	CIRCUIT	FUNCTION
1	Z152 20BK/YL	GROUND
2	M1 20PK	FUSED B(+)



HEADLAMP
LEVELING SWITCH
(BUILT-UP-EXPORT)

HEADLAMP LEVELING SWITCH (BUILT-UP-EXPORT) - BLACK 3 WAY

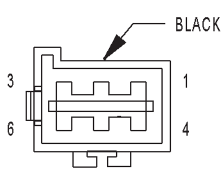
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
2	Z3 16BK/OR (JR27)	GROUND
2	Z3 16BK (JR41)	GROUND
3	L101 18RD	HEADLAMP ADJUST SIGNAL



HEADLAMP
WASHER
PUMP MOTOR
(JR41
BUILT-UP-EXPORT)

HEADLAMP WASHER PUMP MOTOR (JR41 BUILT-UP-EXPORT) - 2 WAY

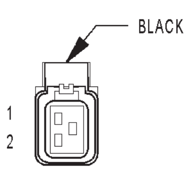
CAV	CIRCUIT	FUNCTION
1	V53 14RD/YL	HEADLAMP WASHER PUMP MOTOR CONTROL
2	Z216 14BK	GROUND



HEATED
SEAT SWITCH
(JR41
BUILT-UP-EXPORT)

HEATED SEAT SWITCH (JR41 BUILT-UP-EXPORT) - BLACK 6 WAY

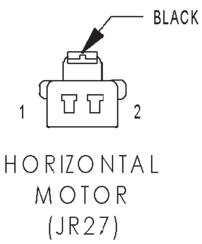
CAV	CIRCUIT	FUNCTION
1	P7 20LB/BK	DRIVER HEATED SEAT TEMPERATURE CONTROL
2	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
3	P8 20LB/WT	PASSENGER HEATED SEAT TEMPERATURE CONTROL
4	F99 20RD/WT	DRIVER HEATED SEAT SWITCH OUTPUT
5	F98 20RD/WT	PASSENGER HEATED SEAT SWITCH OUTPUT
6	Z260 20BK	GROUND



HIGH NOTE
HORN

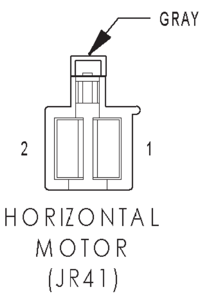
HIGH NOTE HORN - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z308 18BK	GROUND
2	X2 18DG/RD	HORN RELAY OUTPUT



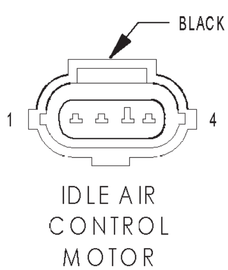
HORIZONTAL MOTOR (JR27) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	P17 16RD/LB	LEFT SEAT HORIZONTAL REARWARD
2	P15 16YL/LB	LEFT SEAT HORIZONTAL FORWARD



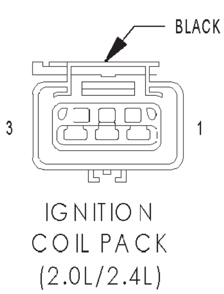
HORIZONTAL MOTOR (JR41) - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	P15 16YL/LB	LEFT SEAT HORIZONTAL REARWARD
2	P17 16RD/LB	LEFT SEAT HORIZONTAL FORWARD



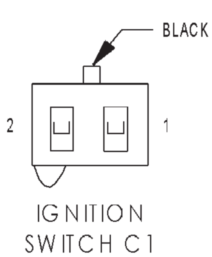
IDLE AIR CONTROL MOTOR - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	K39 20GY/RD	IDLE AIR CONTROL MOTOR NO. 1 DRIVER
2	K60 20YL/BK	IDLE AIR CONTROL MOTOR NO. 2 DRIVER
3	K40 20BR/WT	IDLE AIR CONTROL MOTOR NO. 3 DRIVER
4	K59 20VT/BK	IDLE AIR CONTROL MOTOR NO. 4 DRIVER



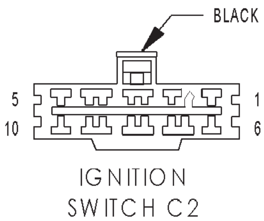
IGNITION COIL PACK (2.0L/2.4L) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K17 16DB/TN	IGNITION COIL NO. 2 DRIVER
2	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K19 16BK/GY	IGNITION COIL NO. 1 DRIVER



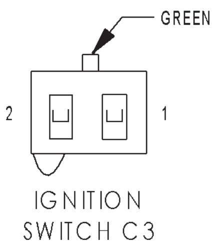
IGNITION SWITCH C1 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	A51 20RD/WT	FUSED B(+)
2	A81 20DG/RD	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)



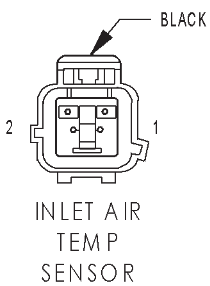
IGNITION SWITCH C2 - BLACK 10 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	A2 12PK/BK	FUSED B(+)
4	A22 12BK/OR	FUSED IGNITION SWITCH OUTPUT (RUN)
5	-	-
6	-	-
7	A1 16RD	FUSED B(+)
8	A31 18BK/LB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
8	A31 16BK/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
9	A21 16DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
10	A41 16YL	FUSED IGNITION SWITCH OUTPUT (START)



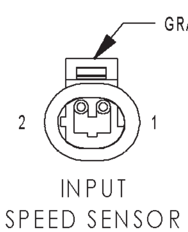
IGNITION SWITCH C3 - GREEN 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z233 20BK/WT	GROUND
2	G26 20LB	KEY-IN IGNITION SWITCH SENSE



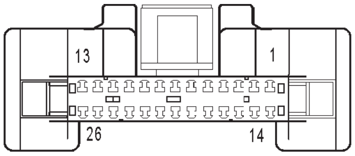
INLET AIR TEMP SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K21 20BK/RD	INLET AIR TEMPERATURE SIGNAL
2	K4 20BK/LB	SENSOR GROUND



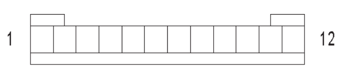
INPUT SPEED SENSOR - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	T13 18DB/BK	SPEED SENSOR GROUND
2	T52 18RD/BK	INPUT SPEED SENSOR SIGNAL



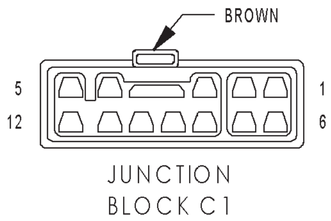
INSTRUMENT CLUSTER - 26 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/OR	PCI BUS (MIC)
3	D25 20VT/RD	PCI BUS (TRAVELER)
4	-	-
5	G69 20BK/OR	VTSS INDICATOR DRIVER
6	-	-
7	-	-
8	-	-
9	-	-
10	Z105 18BK/LB	GROUND
11	Z106 18BK/OR	GROUND
12	E2 20OR	PANEL LAMPS DRIVER
13	L36 18LG	REAR FOG LAMP INDICATOR
14	G6 20GY	ENGINE OIL PRESSURE SWITCH SENSE
15	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
16	-	-
17	-	-
18	L61 18LG/TN	LEFT TURN SIGNAL
19	L60 18TN/BR	RIGHT TURN SIGNAL
20	-	-
21	F33 20PK/WT	FUSED B(+)
22	G9 18GY/BK	RED BRAKE WARNING INDICATOR DRIVER
23	Z104 20BK	GROUND
24	G10 20LG/RD (EXCEPT BUILT-UP-EXPORT)	SEAT BELT SWITCH SENSE
25	G29 20BK/TN	LOW WASHER FLUID SWITCH SENSE
26	L39 18LB	FOG LAMP SWITCH OUTPUT



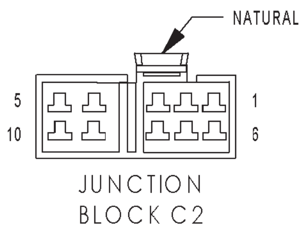
JUNCTION BLOCK BODY CONTROL MODULE JB - 12 WAY

CAV	CIRCUIT	FUNCTION
1	L3 14RD/OR	DIMMER SWITCH HIGH BEAM OUTPUT
2	INTERNAL	FUSED B(+)
3	INTERNAL	REAR WINDOW DEFOGGER RELAY CONTROL
4	INTERNAL	HEADLAMP DELAY RELAY OUTPUT
5	INTERNAL	HEADLAMP DELAY RELAY CONTROL
6	INTERNAL	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
7	INTERNAL	HORN RELAY CONTROL
8	INTERNAL	HEADLAMP SWITCH OUTPUT
9	M2 18YL (JR27)	COURTESY LAMPS DRIVER
9	M2 20YL (JR41)	COURTESY LAMPS DRIVER
10	INTERNAL	GROUND
11	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	INTERNAL	FUSED B(+)



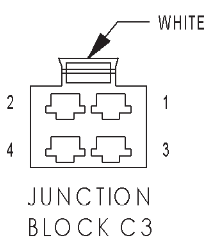
JUNCTION BLOCK C1 - BROWN 12 WAY

CAV	CIRCUIT	FUNCTION
1	G9 20GY/DB	RED BRAKE WARNING INDICATOR DRIVER
2	-	-
3	L34 18RD/OR	FUSED RIGHT HIGH BEAM OUTPUT
4	L60 16TN	RIGHT TURN SIGNAL
5	L61 16LG	LEFT TURN SIGNAL
6	L33 18LG/BR	FUSED LEFT HIGH BEAM OUTPUT
7	-	-
8	L7 18BK/YL (JR27)	HEADLAMP SWITCH OUTPUT
8	L7 16BK/YL (JR41)	HEADLAMP SWITCH OUTPUT
9	L7 18BK/BR (JR27)	HEADLAMP SWITCH OUTPUT
9	L7 16BK/BR (JR41)	HEADLAMP SWITCH OUTPUT
10	L39 18LB/OR (FRONT FOG LAMPS)	HEADLAMP SWITCH OUTPUT
11	L39 18LB (FRONT FOG LAMPS)	HEADLAMP SWITCH OUTPUT
12	L43 18VT	FUSED LEFT LOW BEAM OUTPUT



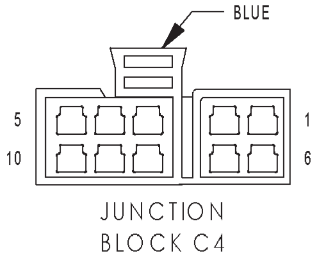
JUNCTION BLOCK C2 - NATURAL 10 WAY

CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN (ABS)	BRAKE LAMP SWITCH OUTPUT
2	A7 16RD/BK	FUSED B(+)
3	L50 16WT/TN	BRAKE LAMP SWITCH OUTPUT
4	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
5	L44 18VT/RD	FUSED RIGHT LOW BEAM OUTPUT
6	F11 18RD/WT (EATX)	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
7	A21 16DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
8	X2 18DG/RD	HORN RELAY OUTPUT
8	X2 18DG/RD	HORN RELAY OUTPUT
9	F20 18WT/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
10	F13 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)



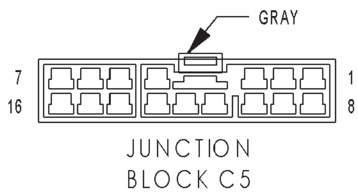
JUNCTION BLOCK C3 - WHITE 4 WAY

CAV	CIRCUIT	FUNCTION
1	A7 16RD/BK	FUSED B(+)
2	A13 12PK/WT	FUSED B(+)
3	A3 12RD/WT	FUSED B(+)
4	A4 12BK/PK	FUSED B(+)



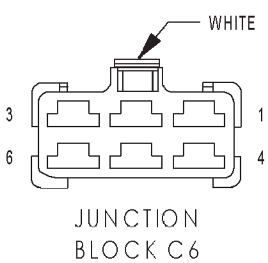
JUNCTION BLOCK C4 - BLUE 10 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	Z106 18BK/OR	GROUND
3	Z239 18BK/LB	GROUND
4	F23 20DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
5	G9 20GY/BK	RED BRAKE WARNING INDICATOR DRIVER
6	Z3 16BK/OR (JR27) (BUILT-UP-EXPORT)	GROUND
6	Z3 16BK (JR41)(BUILT-UP-EXPORT)	GROUND
7	Z305 20BK/YL	GROUND
8	-	-
9	Z115 16BK/RD	GROUND
10	Z126 18BK/LG	GROUND



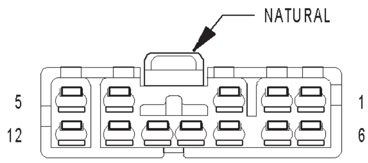
JUNCTION BLOCK C5 - GRAY 16 WAY

CAV	CIRCUIT	FUNCTION
1	F75 16VT	FUSED B(+)
2	-	-
3	L7 16BK/YL	HEADLAMP SWITCH OUTPUT
4	-	-
5	L39 20LB/WT	FOG LAMP SWITCH OUTPUT
6	G9 18GY/BK	RED BRAKE WARNING INDICATOR DRIVER
7	-	-
8	-	-
9	A21 16DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
10	L39 18LB	FOG LAMP SWITCH OUTPUT
11	-	-
12	M1 18PK	FUSED B(+)
13	M1 16PK/DB	FUSED B(+)
14	A31 16BK/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
15	Z110 20BK	GROUND
16	F14 18LG/YL (JR41)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
16	F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)



JUNCTION BLOCK C6 - WHITE 6 WAY

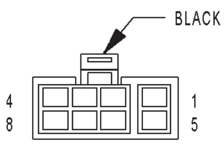
CAV	CIRCUIT	FUNCTION
1	A22 12BK/OR	FUSED IGNITION SWITCH OUTPUT (RUN)
2	L4 16VT/WT	DIMMER SWITCH LOW BEAM OUTPUT
2	L4 16VT/WT	DIMMER SWITCH LOW BEAM OUTPUT
3	L3 14RD/OR	DIMMER SWITCH HIGH BEAM OUTPUT
4	A3 16RD/WT	FUSED B(+)
4	A3 16RD/WT	FUSED B(+)
5	-	-
6	C1 14DG	BLOWER MOTOR FEED



JUNCTION BLOCK C7

JUNCTION BLOCK C7 - NATURAL 12 WAY

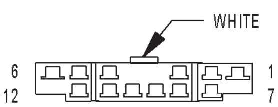
CAV	CIRCUIT	FUNCTION
1	F13 18DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
2	A81 20DG/RD	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
3	L60 18TN/BR	RIGHT TURN SIGNAL
4	L44 20VT/RD (EXCEPT BUILT-UP-EXPORT)	FUSED RIGHT LOW BEAM OUTPUT
5	C16 20LB/YL	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
6	X12 18RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
7	L61 16LG	LEFT TURN SIGNAL
8	L60 16TN	RIGHT TURN SIGNAL
9	L61 18LG/TN	LEFT TURN SIGNAL
10	F11 18RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
11	F33 20PK/WT	FUSED B(+)
12	F33 16PK/RD	FUSED B(+)



JUNCTION BLOCK C8

JUNCTION BLOCK C8 - BLACK 8 WAY

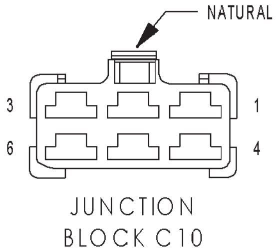
CAV	CIRCUIT	FUNCTION
1	Q1 14YL (JR41)	POWER WINDOW SWITCH FEED
2	M1 16PK	FUSED B(+)
3	C16 20LB/YL (JR27) (JR41 BUILT-UP-EXPORT)	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
4	C16 20LB/OR (JR27) (JR41 BUILT-UP-EXPORT)	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
5	F21 14TN	FUSED IGNITION SWITCH OUTPUT (RUN)
6	Q1 14YL/VT (JR41)	POWER WINDOW SWITCH FEED
7	Q1 14YL/WT (JR41)	POWER WINDOW SWITCH FEED
8	Q1 14YL/TN (JR41)	POWER WINDOW SWITCH FEED



JUNCTION BLOCK C9

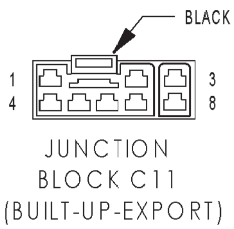
JUNCTION BLOCK C9 - WHITE 12 WAY

CAV	CIRCUIT	FUNCTION
1	F35 16RD (POWER SEATS)	FUSED B(+)
2	F20 20WT (JR27)	FUSED IGNITION SWITCH OUTPUT (RUN)
3	Z313 14BK	GROUND
4	L60 20TN	RIGHT TURN SIGNAL
5	L61 20LG (JR27)	LEFT TURN SIGNAL
5	L61 20LG/TN (JR41)	LEFT TURN SIGNAL
6	C15 12BK/WT	REAR WINDOW DEFOGGER RELAY OUTPUT
7	M1 18PK/VT (JR27) (JR41 BUILT-UP-EXPORT)	FUSED B(+)
8	-	-
9	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
9	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
10	L7 20BK/YL (JR27)	HEADLAMP SWITCH OUTPUT
10	L7 20BK/YL	HEADLAMP SWITCH OUTPUT
11	-	-
12	M1 18PK	FUSED B(+)



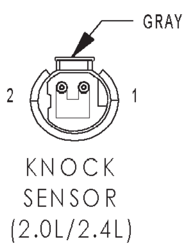
JUNCTION BLOCK C10 - NATURAL 6 WAY

CAV	CIRCUIT	FUNCTION
1	M2 18YL (JR27)	COURTESY LAMPS DRIVER
1	M2 18YL (JR27)	COURTESY LAMPS DRIVER
1	M2 20YL (JR41)	COURTESY LAMPS DRIVER
1	M2 20YL (JR41)	COURTESY LAMPS DRIVER
2	-	-
3	F21 18TN (JR41) (PREMIUM)	FUSED IGNITION SWITCH OUTPUT (RUN)
4	Z312 18BK (JR27)	GROUND
4	Z312 18BK (EXCEPT JR41 BASE)	GROUND
5	-	-
6	M1 18PK (JR27)	COURTESY LAMPS DRIVER
6	M1 20PK (JR41)	FUSED B(+)



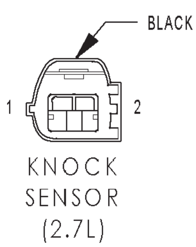
JUNCTION BLOCK C11 (BUILT-UP-EXPORT) - BLACK 8 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	L25 20BR	FUSED FOG LAMP SWITCH FEED
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-



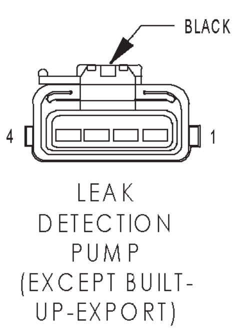
KNOCK SENSOR (2.0L/2.4L) - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	K42 18DB/LG	KNOCK SENSOR SIGNAL
2	K4 20BK/LB	SENSOR GROUND



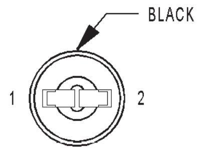
KNOCK SENSOR (2.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K4 20BK/LB	SENSOR GROUND
2	K42 18DB/LG	KNOCK SENSOR SIGNAL



LEAK DETECTION PUMP (EXCEPT BUILT-UP-EXPORT) - BLACK 4 WAY

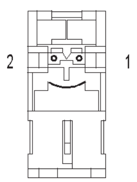
CAV	CIRCUIT	FUNCTION
1	-	-
2	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	K106 20WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
4	K107 20OR	LEAK DETECTION PUMP SWITCH SENSE



LEFT
BACK-UP LAMP

LEFT BACK-UP LAMP - BLACK 2 WAY

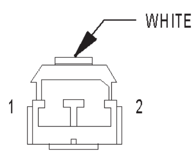
CAV	CIRCUIT	FUNCTION
1	Z149 18BK (JR27)	GROUND
1	Z150 18BK (JR41)	GROUND
2	L1 18VT/BK	BACK-UP LAMP FEED



LEFT
CURTAIN
AIRBAG
(JR41)

LEFT CURTAIN AIRBAG (JR41) - 2 WAY

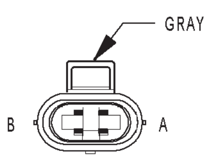
CAV	CIRCUIT	FUNCTION
1	R77 20LB/BR	LEFT CURTAIN AIRBAG LINE 2
2	R75 20LB/OR	LEFT CURTAIN AIRBAG LINE 1



LEFT DOOR
COURTESY LAMP
(JR27)

LEFT DOOR COURTESY LAMP (JR27) - WHITE 2 WAY

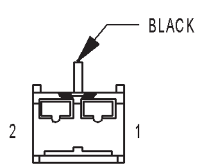
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	M2 20YL	COURTESY LAMPS DRIVER



LEFT FOG
LAMP

LEFT FOG LAMP - GRAY 2 WAY

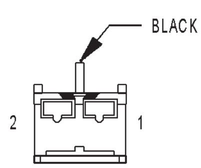
CAV	CIRCUIT	FUNCTION
B	Z145 18BK	GROUND
A	L39 18LB/OR	FOG LAMP SWITCH OUTPUT



LEFT FRONT
DOOR SPEAKER

LEFT FRONT DOOR SPEAKER - BLACK 2 WAY

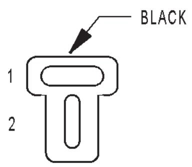
CAV	CIRCUIT	FUNCTION
1	X87 18LG/VT (PREMIUM)	AMPLIFIED LEFT FRONT SPEAKER (+)
1	X87 18LG/VT (BASE)	LEFT FRONT SPEAKER (+)
2	X85 18LG/DG (PREMIUM)	AMPLIFIED LEFT FRONT SPEAKER (-)
2	X85 18LG/DG (BASE)	LEFT FRONT SPEAKER (-)



LEFT FRONT
INSTRUMENT
PANEL SPEAKER
(EXCEPT JR27 PREMIUM)

LEFT FRONT INSTRUMENT PANEL SPEAKER (EXCEPT JR27 PREMIUM) - BLACK 2 WAY

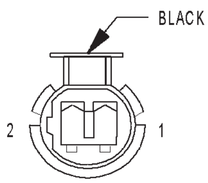
CAV	CIRCUIT	FUNCTION
1	X55 18BR/RD (JR27)	LEFT INSTRUMENT PANEL SPEAKER (-)
1	X81 18YL/BK (JR41)	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (-)
2	X53 18DG (JR27)	LEFT INSTRUMENT PANEL SPEAKER (+)
2	X83 18YL/RD (JR41)	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (+)



LEFT FRONT INSTRUMENT PANEL SPEAKER (JR27 PREMIUM)

LEFT FRONT INSTRUMENT PANEL SPEAKER (JR27 PREMIUM) - BLACK 2 WAY

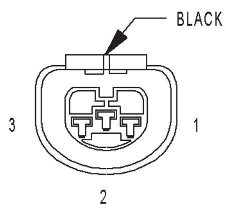
CAV	CIRCUIT	FUNCTION
1	X83 18YL/RD	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (+)
2	X81 18YL/BK	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (-)



LEFT FRONT WHEEL SPEED SENSOR

LEFT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY

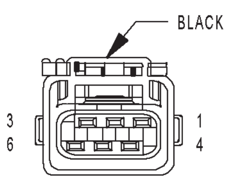
CAV	CIRCUIT	FUNCTION
1	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR SIGNAL



LEFT HEADLAMP (EXCEPT BUILT-UP-EXPORT)

LEFT HEADLAMP (EXCEPT BUILT-UP-EXPORT) - BLACK 3 WAY

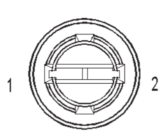
CAV	CIRCUIT	FUNCTION
1	L43 18VT	FUSED LEFT LOW BEAM OUTPUT
2	Z141 18BK	GROUND
3	L33 18LG/BR	FUSED LEFT HIGH BEAM OUTPUT



LEFT LAVALIER MODULE (BUILT-UP-EXPORT)

LEFT LAVALIER MODULE (BUILT-UP-EXPORT) - BLACK 6 WAY

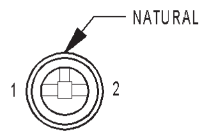
CAV	CIRCUIT	FUNCTION
1	Z163 14BK	GROUND
2	L101 18RD	HEADLAMP ADJUST SIGNAL
3	L33 18LG/BR	FUSED LEFT HIGH BEAM OUTPUT
4	L61 16LG	LEFT TURN SIGNAL
5	L7 18BK/BR (JR27)	HEADLAMP SWITCH OUTPUT
5	L7 16BK/BR (JR41)	HEADLAMP SWITCH OUTPUT
6	L43 18VT	FUSED LEFT LOW BEAM OUTPUT



LEFT LICENSE LAMP (JR27)

LEFT LICENSE LAMP (JR27) - 2 WAY

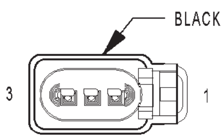
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
2	Z149 18BK	GROUND



LEFT LICENSE LAMP (JR41 BUILT-UP-EXPORT)

LEFT LICENSE LAMP (JR41 BUILT-UP-EXPORT) - NATURAL 2 WAY

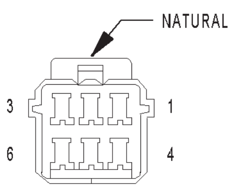
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
2	Z150 18BK	GROUND



LEFT PARK/ TURN SIGNAL LAMP (EXCEPT BUILT-UP-EXPORT)

LEFT PARK/TURN SIGNAL LAMP (EXCEPT BUILT-UP-EXPORT) - BLACK 3 WAY

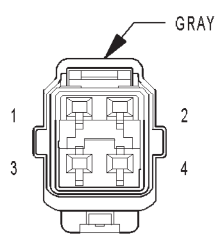
CAV	CIRCUIT	FUNCTION
1	L61 16LG	LEFT TURN SIGNAL
2	L7 18BK/BR (JR27)	HEADLAMP SWITCH OUTPUT
2	L7 16BK/BR (JR41)	HEADLAMP SWITCH OUTPUT
3	Z148 18BK	GROUND



LEFT POWER MIRROR

LEFT POWER MIRROR - NATURAL 6 WAY

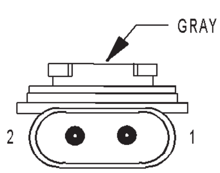
CAV	CIRCUIT	FUNCTION
1	P95 22DB/WT (JR27)	LEFT MIRROR HORIZONTAL
1	C16 20LB/YL (JR41)	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
2	Z314 20BK (JR27)	GROUND
2	Z3 20BK (JR41)	GROUND
3	C16 20LB/YL (JR27)	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
3	P95 22DB/WT (JR41)	LEFT MIRROR HORIZONTAL
4	P91 22WT/BK	LEFT/RIGHT MIRROR HORIZONTAL SUPPLY
5	P91 22WT/BK (JR27)	LEFT/RIGHT MIRROR VERTICAL SUPPLY
6	P93 22YL/BK	LEFT MIRROR VERTICAL



LEFT REAR DOOR LOCK MOTOR/ AJAR SWITCH (JR41)

LEFT REAR DOOR LOCK MOTOR/AJAR SWITCH (JR41) - GRAY 4 WAY

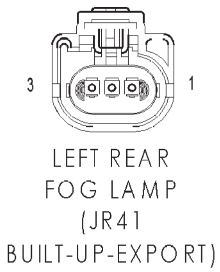
CAV	CIRCUIT	FUNCTION
1	G77 20TN/YL	LEFT REAR DOOR AJAR SWITCH SENSE
2	Z317 18BK	GROUND
3	P181 18PK/DB	LEFT REAR UNLOCK RELAY OUTPUT
4	P179 18OR/TN	LEFT REAR LOCK RELAY OUTPUT



LEFT REAR FOG LAMP (JR27 BUILT-UP-EXPORT)

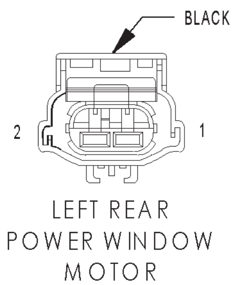
LEFT REAR FOG LAMP (JR27 BUILT-UP-EXPORT) - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z149 18BK	GROUND
2	L36 18LG	REAR FOG LAMP RELAY OUTPUT



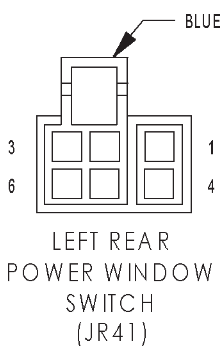
LEFT REAR FOG LAMP (JR41 BUILT-UP-EXPORT) - 3 WAY

CAV	CIRCUIT	FUNCTION
1	Z150 18BK	GROUND
2	-	-
3	L36 18LG	REAR FOG LAMP INDICATOR



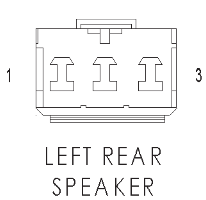
LEFT REAR POWER WINDOW MOTOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	Q23 14RD/WT (JR27)	WINDOW LEFT REAR B(+) DOWN
1	Q14 14GY (JR41)	WINDOW LEFT REAR B(+) UP
2	Q13 14DB (JR27)	WINDOW LEFT REAR B(+) UP
2	Q24 14DG (JR41)	WINDOW LEFT REAR B(+) DOWN



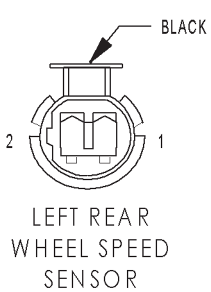
LEFT REAR POWER WINDOW SWITCH (JR41) - BLUE 6 WAY

CAV	CIRCUIT	FUNCTION
1	Q24 14DG	WINDOW LEFT REAR B(+) DOWN
2	Q17 14GY/BK	LEFT REAR WINDOW DRIVER (UP)
3	-	-
4	Q27 14DG/WT	MASTER WINDOW SWITCH LEFT REAR DOWN
5	Q14 14GY	WINDOW LEFT REAR B(+) UP
6	Q1 14YL	WINDOW SWITCH FEED



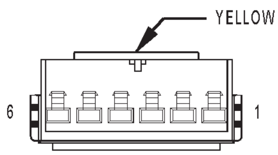
LEFT REAR SPEAKER - 3 WAY

CAV	CIRCUIT	FUNCTION
1	X91 18WT/BK (PREMIUM)	AMPLIFIED LEFT REAR SPEAKER (-)
1	X91 18WT/BK (BASE)	LEFT REAR SPEAKER (-)
2	-	-
3	X93 18WT/RD (PREMIUM)	AMPLIFIED LEFT REAR SPEAKER (+)
3	X93 18WT/RD (BASE)	LEFT REAR SPEAKER (+)



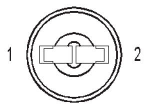
LEFT REAR WHEEL SPEED SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	B4 20LG	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B3 20LG/DB	LEFT REAR WHEEL SPEED SENSOR SIGNAL



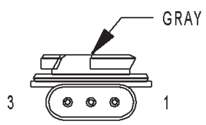
LEFT SIDE IMPACT AIRBAG CONTROL MODULE (JR41) - YELLOW 6 WAY

CAV	CIRCUIT	FUNCTION
1	F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	D25 20VT/YL	PCI BUS
3	R75 20LB/OR	LEFT CURTAIN AIRBAG LINE 1
4	R77 20LB/BR	LEFT CURTAIN AIRBAG LINE 2
5	Z134 20BK	GROUND
6	Z134 20BK	GROUND



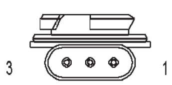
LEFT TAIL/SIDE MARKER LAMP - 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z149 18BK (JR27)	GROUND
1	Z150 18BK (JR41)	GROUND
2	L7 18BK/YL	HEADLAMP SWITCH OUTPUT



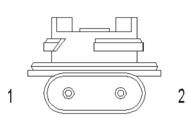
LEFT TAIL/STOP LAMP - GRAY 3 WAY

CAV	CIRCUIT	FUNCTION
1	Z149 18BK (JR27)	GROUND
1	Z150 18BK (JR41)	GROUND
2	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
3	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT



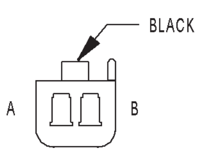
LEFT TAIL/TURN SIGNAL LAMP (JR41/DODGE) - 3 WAY

CAV	CIRCUIT	FUNCTION
1	Z150 18BK	GROUND
2	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
3	L61 18LG	LEFT TURN SIGNAL



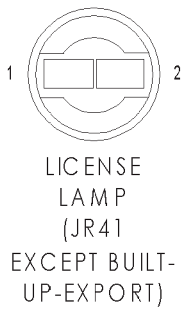
LEFT TURN LAMP (CHRYSLER/EXCEPT JR41 DODGE) - 2 WAY

CAV	CIRCUIT	FUNCTION
1	L61 18LG	LEFT TURN SIGNAL
2	Z149 18BK (JR27)	GROUND
2	Z150 18BK (JR41)	GROUND



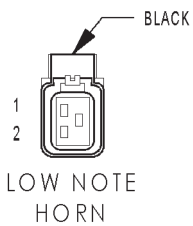
LEFT VISOR/VANITY LAMPS - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
B	G38 18GY (JR27)	GARAGE DOOR OPENER ENABLE
A	M1 18PK (JR27)	FUSED B(+)
B	Z312 20BK (JR41)	GROUND
A	M1 20PK (JR41)	FUSED B(+)



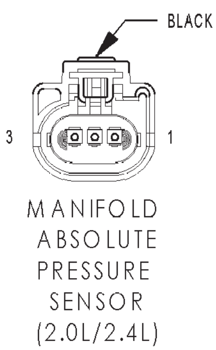
LICENSE LAMP (JR41 EXCEPT BUILT-UP-EXPORT) - 2 WAY

CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
2	Z150 18BK	GROUND



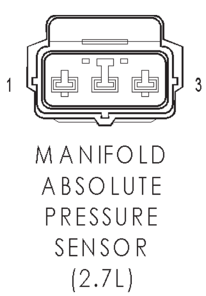
LOW NOTE HORN - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z307 18BK	GROUND
2	X2 18DG/RD	HORN RELAY OUTPUT



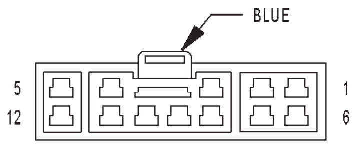
MANIFOLD ABSOLUTE PRESSURE SENSOR (2.0L/2.4L) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K1 20DG/RD	MAP SENSOR SIGNAL
2	K4 20BK/LB	SENSOR GROUND
3	K6 20VT/WT	5V SUPPLY



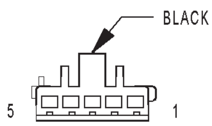
MANIFOLD ABSOLUTE PRESSURE SENSOR (2.7L) - 3 WAY

CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K1 20DG/RD	MAP SENSOR SIGNAL



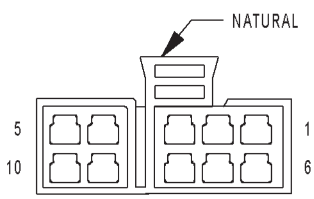
MASTER POWER WINDOW SWITCH - BLUE 12 WAY

CAV	CIRCUIT	FUNCTION
1	F21 14TN	FUSED IGNITION SWITCH OUTPUT (RUN)
2	Q17 14DB/WT	LEFT REAR WINDOW DRIVER (UP)
3	Q290 14LG (JR27)	MASTER WINDOW SWITCH LEFT REAR DOWN
3	Q27 14RD/BK (JR41)	MASTER WINDOW SWITCH LEFT REAR DOWN
4	Q18 14GY/BK	RIGHT REAR WINDOW DRIVER (UP)
5	Q1 14YL (JR41)	WINDOW SWITCH FEED
6	-	-
7	Q11 14LB (JR27)	LEFT FRONT WINDOW DRIVER (UP)
7	Q11 16LB (JR41)	LEFT FRONT WINDOW DRIVER (UP)
8	Q21 16WT (JR41)	MASTER WINDOW SWITCH LEFT FRONT DOWN
8	Q19 14OR/WT (JR27)	MASTER WINDOW SWITCH LEFT FRONT DOWN
9	Q28 14DG/WT (JR41)	MASTER WINDOW SWITCH RIGHT REAR DOWN
9	Q32 14VT (JR27)	MASTER WINDOW SWITCH RIGHT REAR DOWN
10	Z314 14BK	GROUND
11	Q38 14PK (JR27)	MASTER WINDOW SWITCH RIGHT FRONT DOWN
11	Q26 14VT/WT (JR41)	MASTER WINDOW SWITCH RIGHT FRONT DOWN
12	Q16 14BR/WT	MASTER WINDOW SWITCH RIGHT FRONT UP



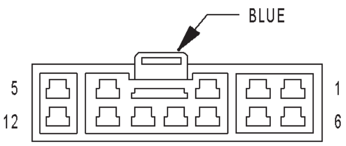
MODE DOOR ACTUATOR - BLACK 5 WAY

CAV	CIRCUIT	FUNCTION
1	C35 20DG/YL	MODE DOOR DRIVER
2	C57 20DB/GY	SENSOR GROUND
3	C37 20YL	MODE DOOR FEEDBACK SIGNAL
4	C26 20PK/DB	5V SUPPLY
5	C34 20DB/WT	COMMON DOOR DRIVER



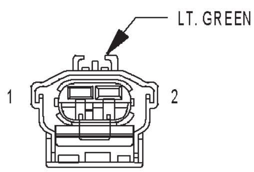
MULTI-FUNCTION SWITCH C1 - NATURAL 10 WAY

CAV	CIRCUIT	FUNCTION
1	L61 16LG	LEFT TURN SIGNAL
2	L60 16TN	RIGHT TURN SIGNAL
3	V10 18BR	FRONT WASHER PUMP MOTOR CONTROL
4	V52 20DG/RD	FRONT WIPER SWITCH MUX
5	Z234 16BK	GROUND
6	-	-
7	-	-
8	A15 16PK	FUSED B(+)
9	F13 18DB (JR27)	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
9	F13 18DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
10	-	-



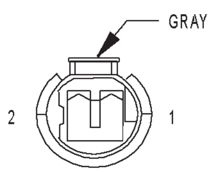
MULTI-FUNCTION SWITCH C2 - BLUE 12 WAY

CAV	CIRCUIT	FUNCTION
1	L4 16VT/WT	DIMMER SWITCH LOW BEAM OUTPUT
2	L4 16VT/WT	DIMMER SWITCH LOW BEAM OUTPUT
3	L3 14RD/OR	DIMMER SWITCH HIGH BEAM OUTPUT
4	A3 16RD/WT	FUSED B(+)
5	A3 16RD/WT	FUSED B(+)
6	L7 16BK/YL	HEADLAMP SWITCH OUTPUT
7	F33 16PK/RD	FUSED B(+)
8	E19 20RD	PANEL LAMPS DIMMER SIGNAL
9	C57 20DB/GY	SENSOR GROUND
10	L36 18LG (EXCEPT JR41 DOMESTIC)	REAR FOG LAMP INDICATOR
11	L25 20BR (BUILT-UP-EXPORT)	FOG LAMP DRIVER
11	L44 20VT/RD (EXCEPT BUILT-UP-EXPORT)	FRONT FOG LAMP OUTPUT
12	L39 20LB/WT	FOG LAMP SWITCH OUTPUT



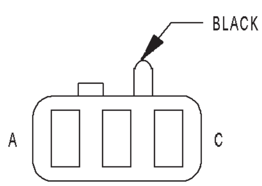
OIL PRESSURE SWITCH - LT. GREEN 2 WAY

CAV	CIRCUIT	FUNCTION
1	G6 20GY	ENGINE OIL PRESSURE SWITCH SENSE
2	-	-



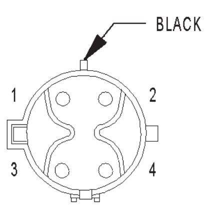
OUTPUT SPEED SENSOR - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	T13 18DB/BK	SPEED SENSOR GROUND
2	T14 18LG/WT	OUTPUT SPEED SENSOR SIGNAL



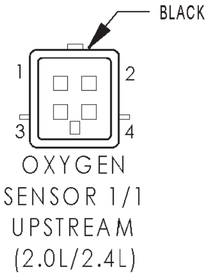
OVERHEAD MAP/COURTESY LAMPS (JR41) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
C	M2 20YL	COURTESY LAMPS DRIVER
B	M1 20PK	FUSED B(+)
A	Z312 20BK	GROUND



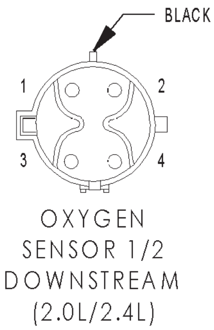
OXYGEN SENSOR 1/1 RIGHT BANK UP (2.7L) - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z192 20BK	GROUND
2	F142 18OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K127 18DB/LG	OXYGEN SENSOR GROUND
4	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL



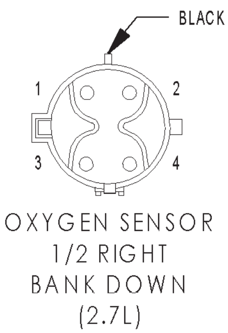
OXYGEN SENSOR 1/1 UPSTREAM (2.0L/2.4L) - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	K79 18OR/RD	OXYGEN SENSOR 1/1 HEATER CONTROL
2	F142 16OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K127 18DB/OR	OXYGEN SENSOR GROUND
4	K41 20BK/LG	OXYGEN SENSOR 1/1 SIGNAL



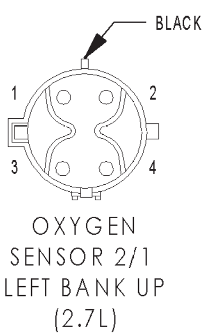
OXYGEN SENSOR 1/2 DOWNSTREAM (2.0L/2.4L) - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z186 20BK	GROUND
2	F142 16OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K127 18DB/OR	OXYGEN SENSOR GROUND
4	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL



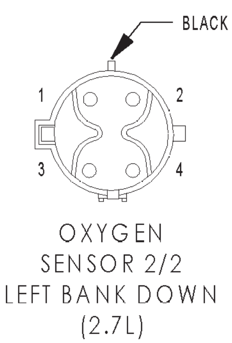
OXYGEN SENSOR 1/2 RIGHT BANK DOWN (2.7L) - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z188 20BK	GROUND
2	F142 18OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K127 18DB/LG	OXYGEN SENSOR GROUND
4	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL



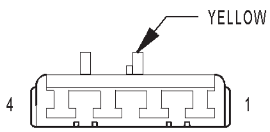
OXYGEN SENSOR 2/1 LEFT BANK UP (2.7L) - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z193 20BK	GROUND
2	F142 18OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K127 18DB/LG	OXYGEN SENSOR GROUND
4	K241 20LG/RD	OXYGEN SENSOR 2/1 SIGNAL



OXYGEN SENSOR 2/2 LEFT BANK DOWN (2.7L) - BLACK 4 WAY

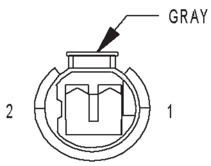
CAV	CIRCUIT	FUNCTION
1	Z186 20BK	GROUND
2	F142 18OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K127 18DB/LG	OXYGEN SENSOR GROUND
4	K341 20TN/WT	OXYGEN SENSOR 2/2 SIGNAL



PASSENGER AIRBAG

PASSENGER AIRBAG - YELLOW 4 WAY

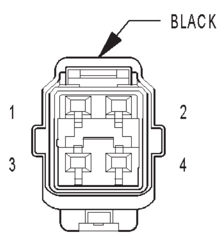
CAV	CIRCUIT	FUNCTION
1	R42 20BK/YL	PASSENGER SQUIB 1 LINE 1
2	R44 20DG/YL	PASSENGER SQUIB 1 LINE 2
3	R62 20OR/YL	PASSENGER SQUIB 2 LINE 1
4	R64 20TN/YL	PASSENGER SQUIB 2 LINE 2



PASSENGER CYLINDER LOCK SWITCH (JR41) (VTSS)

PASSENGER CYLINDER LOCK SWITCH (JR41) (VTSS) - GRAY 2 WAY

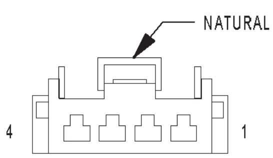
CAV	CIRCUIT	FUNCTION
1	G72 20DG/OR	PASSENGER CYLINDER LOCK SWITCH MUX
2	M1 20PK	FUSED B(+)



PASSENGER DOOR LOCK MOTOR/ AJAR SWITCH

PASSENGER DOOR LOCK MOTOR/AJAR SWITCH - BLACK 4 WAY

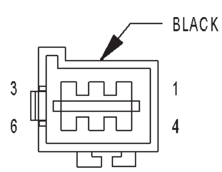
CAV	CIRCUIT	FUNCTION
1	G74 20TN/RD	PASSENGER DOOR AJAR SWITCH SENSE
2	Z315 18BK (JR27)	GROUND
2	Z242 18BK (JR41)	GROUND
3	P178 18PK/LB	PASSENGER UNLOCK RELAY OUTPUT
4	P176 18PK/BK	PASSENGER LOCK RELAY OUTPUT



PASSENGER DOOR LOCK SWITCH

PASSENGER DOOR LOCK SWITCH - NATURAL 4 WAY

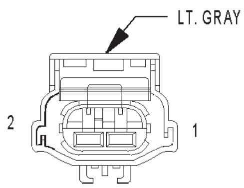
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
3	Z315 20BK	GROUND
4	P96 20WT/LG	PASSENGER DOOR SWITCH MUX



PASSENGER HEATED SEAT MODULE (JR41 BUILT-UP-EXPORT)

PASSENGER HEATED SEAT MODULE (JR41 BUILT-UP-EXPORT) - BLACK 6 WAY

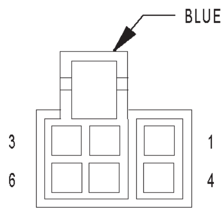
CAV	CIRCUIT	FUNCTION
1	P86 16PK/BK	FUSED B(+)
2	Z122 16BK	GROUND
3	-	-
4	P8 20LB/WT	PASSENGER HEATED SEAT TEMPERATURE CONTROL
5	-	-
6	F98 20RD/WT	PASSENGER HEATED SEAT SWITCH OUTPUT



PASSENGER POWER WINDOW MOTOR

PASSENGER POWER WINDOW MOTOR - LT. GRAY 2 WAY

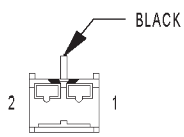
CAV	CIRCUIT	FUNCTION
1	Q22 14VT (JR27)	RIGHT FRONT WINDOW DRIVER (DOWN)
1	Q22 16VT (JR41)	RIGHT FRONT WINDOW DRIVER (DOWN)
2	Q12 14BR (JR27)	LEFT FRONT WINDOW DRIVER (UP)
2	Q12 16BR (JR41)	LEFT FRONT WINDOW DRIVER (UP)



PASSENGER POWER WINDOW SWITCH

PASSENGER POWER WINDOW SWITCH - BLUE 6 WAY

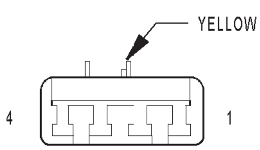
CAV	CIRCUIT	FUNCTION
1	Q22 14VT (JR27)	RIGHT FRONT WINDOW DRIVER (DOWN)
1	Q22 16VT (JR41)	RIGHT FRONT WINDOW DRIVER (DOWN)
2	Q16 14BR/WT	MASTER WINDOW SWITCH RIGHT FRONT UP
3	-	-
4	Q26 14VT/WT	MASTER WINDOW SWITCH RIGHT FRONT DOWN
5	Q12 14BR (JR27)	RIGHT FRONT WINDOW DRIVER (UP)
5	Q12 16BR (JR41)	RIGHT FRONT WINDOW DRIVER (UP)
6	F21 14TN (JR27)	FUSED IGNITION SWITCH OUTPUT (RUN)
6	Q1 14YL (JR41)	WINDOW SWITCH FEED



PASSENGER SEAT BELT SOLENOID (JR27)

PASSENGER SEAT BELT SOLENOID (JR27) - BLACK 2 WAY

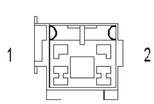
CAV	CIRCUIT	FUNCTION
1	R8 18OR/RD	RIGHT SEAT BELT SOLENOID CONTROL
2	Z219 18BK	GROUND



PASSENGER SEAT BELT TENSIONER (JR27)

PASSENGER SEAT BELT TENSIONER (JR27) - YELLOW 4 WAY

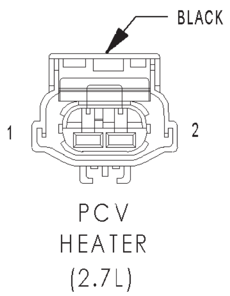
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	R54 20LB/YL	PASSENGER SEAT BELT TENSIONER LINE 2
4	R56 20LB/DG	PASSENGER SEAT BELT TENSIONER LINE 1



PASSENGER SEAT BELT TENSIONER (JR41)

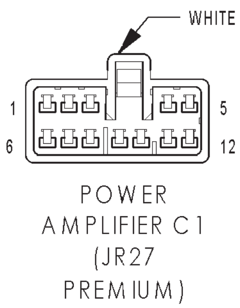
PASSENGER SEAT BELT TENSIONER (JR41) - 2 WAY

CAV	CIRCUIT	FUNCTION
1	R54 18LB/YL	PASSENGER SEAT BELT TENSIONER LINE 2
2	R56 18LB/DG	PASSENGER SEAT BELT TENSIONER LINE 1



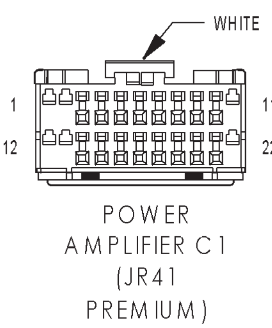
PCV HEATER (2.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F142 18OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	Z194 18BK	GROUND



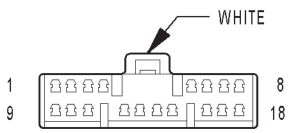
POWER AMPLIFIER C1 (JR27 PREMIUM) - WHITE 12 WAY

CAV	CIRCUIT	FUNCTION
1	X82 18LB/VT	AMPLIFIED RIGHT DOOR SPEAKER (+)
2	X87 18LG/VT	AMPLIFIED LEFT DOOR SPEAKER (+)
3	X92 18TN/BK	AMPLIFIED RIGHT REAR SPEAKER (-)
4	X84 18OR/BK	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (-)
5	X83 18YL/RD	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (+)
6	X80 18LB/BK	AMPLIFIED RIGHT DOOR SPEAKER (-)
7	X85 18LG/BK	AMPLIFIED LEFT DOOR SPEAKER (-)
8	X94 18TN/VT	AMPLIFIED RIGHT REAR SPEAKER (+)
9	X93 18WT/RD	AMPLIFIED LEFT REAR SPEAKER (+)
10	X91 18 WT/BK	AMPLIFIED LEFT REAR SPEAKER (-)
11	X86 18OR/RD	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (+)
12	X81 18YL/BK	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (-)



POWER AMPLIFIER C1 (JR41 PREMIUM) - WHITE 22 WAY

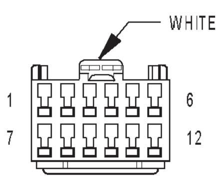
CAV	CIRCUIT	FUNCTION
1	F75 16VT	FUSED B(+)
2	Z115 16BK/RD	GROUND
3	X60 18DG/RD	RADIO 12V OUTPUT
4	X54 18VT	RIGHT FRONT SPEAKER (+)
5	X53 18DG	LEFT FRONT SPEAKER (+)
6	X52 18DB/WT	RIGHT REAR SPEAKER (+)
7	X51 18BR/YL	LEFT REAR SPEAKER (+)
8	-	-
9	-	-
10	X93 18WT/RD	AMPLIFIED LEFT REAR SPEAKER (+)
11	X94 18TN/VT	AMPLIFIED RIGHT REAR SPEAKER (+)
12	F75 16VT	FUSED B(+)
13	Z126 16BK/LG	GROUND
14	-	-
15	X56 18DB/RD	RIGHT FRONT SPEAKER (-)
16	X55 18BR/RD	LEFT FRONT SPEAKER (-)
17	X58 18DB/OR	RIGHT REAR SPEAKER (-)
18	X57 18BR/LB	LEFT REAR SPEAKER (-)
19	-	-
20	-	-
21	X91 18WT/BK	AMPLIFIED LEFT REAR SPEAKER (-)
22	X92 18TN/BK	AMPLIFIED RIGHT REAR SPEAKER (-)



POWER AMPLIFIER C2 (JR27 PREMIUM)

POWER AMPLIFIER C2 (JR27 PREMIUM) - WHITE 18 WAY

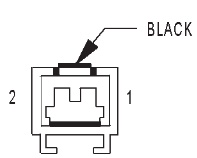
CAV	CIRCUIT	FUNCTION
1	F75 16VT	FUSED B(+)
2	-	-
3	-	-
4	-	-
5	X52 18DB/WT	RIGHT REAR SPEAKER (+)
6	X51 18BR/YL	LEFT REAR SPEAKER (+)
7	X54 18VT	RIGHT FRONT SPEAKER (+)
8	X53 18DG	LEFT FRONT SPEAKER (+)
9	Z115 16BK/RD	GROUND
10	-	-
11	-	-
12	-	-
13	X11 20OR	TOP DOWN AUDIO EQUAL
14	X60 18DG/RD	RADIO 12V OUTPUT
15	X58 18DB/OR	RIGHT REAR SPEAKER (-)
16	X57 18BR/LB	LEFT REAR SPEAKER (-)
17	X56 18DB/RD	RIGHT FRONT SPEAKER (-)
18	X55 18BR/RD	LEFT FRONT SPEAKER (-)



POWER AMPLIFIER C2 (JR41 PREMIUM)

POWER AMPLIFIER C2 (JR41 PREMIUM) - WHITE 12 WAY

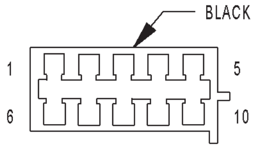
CAV	CIRCUIT	FUNCTION
1	X87 18LG/VT	AMPLIFIED LEFT FRONT SPEAKER (+)
2	X82 18LB/VT	AMPLIFIED RIGHT FRONT SPEAKER (+)
3	X83 18YL/RD	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (+)
4	X86 18OR/RD	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (+)
5	-	-
6	-	-
7	X85 18LG/DG	AMPLIFIED LEFT FRONT SPEAKER (-)
8	X80 18LB/BK	AMPLIFIED RIGHT FRONT SPEAKER (-)
9	X81 18YL/BK	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (-)
10	X84 18OR/BK	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (-)
11	-	-
12	-	-



POWER ANTENNA (BUILT-UP-EXPORT)

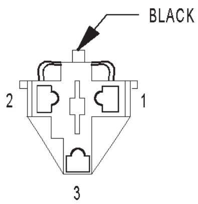
POWER ANTENNA (BUILT-UP-EXPORT) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	M1 18PK	FUSED B(+)
2	X60 20DG/RD	RADIO 12V OUTPUT



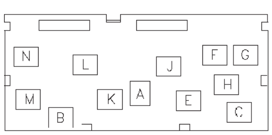
POWER MIRROR SWITCH - BLACK 10 WAY

CAV	CIRCUIT	FUNCTION
1	P91 22WT/BK	LEFT/RIGHT MIRROR HORIZONTAL SUPPLY
2	P94 22WT/YL	RIGHT MIRROR HORIZONTAL
3	Z239 18BK/LB	GROUND
4	P93 22YL/BK	LEFT MIRROR VERTICAL
5	-	-
6	F20 20WT/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
6	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
7	M1 18PK	FUSED B(+)
8	P95 22DB	LEFT MIRROR HORIZONTAL
9	P92 22YL	RIGHT MIRROR VERTICAL
10	P90 22LG/BK	RIGHT POWER MIRROR SUPPLY



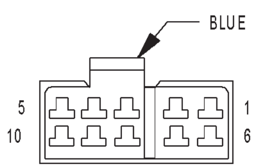
POWER OUTLET (JR27) (JR41 BUILT-UP-EXPORT) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	F30 14RD	CIGAR LIGHTER RELAY OUTPUT
2	-	-
3	Z316 14BK	GROUND



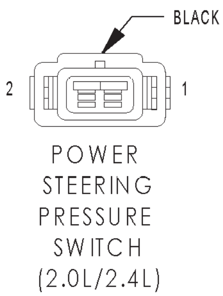
POWER SEAT SWITCH (JR27) - 12 WAY

CAV	CIRCUIT	FUNCTION
N	P11 16YL/WT	LEFT SEAT REAR DOWN
M	P13 16RD/WT	LEFT SEAT REAR UP
L	P17 16RD/LB	LEFT SEAT HORIZONTAL REARWARD
K	P15 16YL/LB	LEFT SEAT HORIZONTAL FORWARD
J	P19 16YL/LG	LEFT SEAT FRONT DOWN
H	-	-
G	-	-
F	-	-
E	P21 16RD/LG	LEFT SEAT FRONT UP
C	-	-
B	Z1 16BK	GROUND
A	F35 16RD	FUSED B(+)



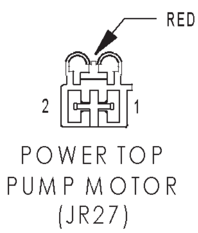
POWER SEAT SWITCH (JR41) - BLUE 10 WAY

CAV	CIRCUIT	FUNCTION
1	F35 16RD	FUSED B(+)
2	P43 16GY/LB	LEFT SEAT RECLINER SWITCH DOWN
3	P17 16RD/LB	LEFT SEAT HORIZONTAL FORWARD
4	P41 16GY/WT	LEFT SEAT RECLINER SWITCH UP
5	Z1 16BK	GROUND
6	P21 16RD/LG	LEFT SEAT FRONT DOWN
7	P13 16RD/WT	LEFT SEAT REAR DOWN
8	P11 16YL/WT	LEFT SEAT REAR UP
9	P19 16YL/LG	LEFT SEAT FRONT UP
10	P15 16YL/LB	LEFT SEAT HORIZONTAL REARWARD



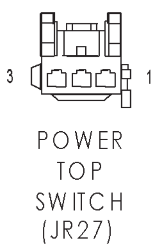
POWER STEERING PRESSURE SWITCH (2.0L/2.4L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K10 20DB/LG	STEERING PRESSURE SWITCH SENSE
2	Z244 20BK	GROUND



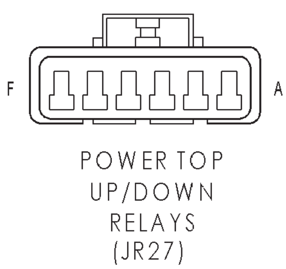
POWER TOP PUMP MOTOR (JR27) - RED 2 WAY

CAV	CIRCUIT	FUNCTION
1	P3 12YL	TOP UP RELAY OUTPUT
2	P4 12RD	TOP DOWN RELAY OUTPUT



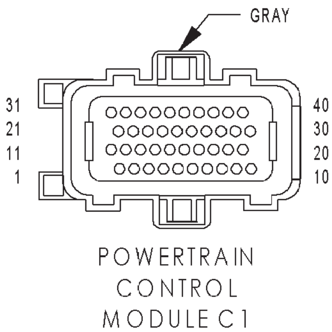
POWER TOP SWITCH (JR27) - 3 WAY

CAV	CIRCUIT	FUNCTION
1	F20 20YL/BK	FUSED IGNITION SWITCH OUTPUT (RUN)
2	Z249 20BK	GROUND
3	Q31 20WT	CONVERTIBLE TOP SWITCH MUX



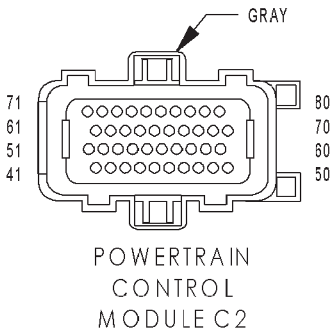
POWER TOP UP/DOWN RELAYS (JR27) - 6 WAY

CAV	CIRCUIT	FUNCTION
F	P5 20YL/BK	TOP DOWN RELAY CONTROL
E	P4 12RD	TOP DOWN RELAY OUTPUT
D	Z253 12BK	GROUND
C	A25 12DB	FUSED B(+)
B	P3 12YL	TOP UP RELAY OUTPUT
A	P6 20RD/WT	TOP UP RELAY CONTROL



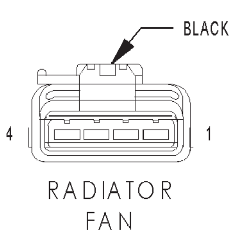
POWERTRAIN CONTROL MODULE C1 - GRAY 40 WAY

CAV	CIRCUIT	FUNCTION
1	K94 16TN/LG (2.7L)	COIL ON PLUG DRIVER NO. 4
2	K93 16TN/OR (2.7L)	COIL ON PLUG DRIVER NO. 3
3	K17 16DB/TN (2.0L/2.4L)	IGNITION COIL NO. 2 DRIVER
3	K92 16TN/PK (2.7L)	COIL ON PLUG DRIVER NO. 2
4	K96 16TN/LB (2.7L)	COIL ON PLUG DRIVER NO. 6
5	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
6	A142 14DG/OR	AUTOMATIC SHUTDOWN RELAY OUTPUT
7	K13 18YL/WT	INJECTOR NO. 3 DRIVER
8	K20 18DG	GENERATOR FIELD DRIVER
9	-	-
10	Z108 14BK/TN	GROUND
11	K91 16TN/RD (2.7L)	COIL ON PLUG DRIVER NO. 1
11	K19 16BK/GY (2.0L/2.4L)	IGNITION COIL NO. 1 DRIVER
12	-	-
13	K11 18WT/DB	INJECTOR NO. 1 DRIVER
14	K58 18BR/DB (2.7L)	INJECTOR NO. 6 DRIVER
15	K38 18GY (2.7L)	INJECTOR NO. 5 DRIVER
16	K14 18LB/BR	INJECTOR NO. 4 DRIVER
17	K12 18TN	INJECTOR NO. 2 DRIVER
18	K79 18OR/RD (2.0L/2.4L)	OXYGEN SENSOR 1/1 HEATER CONTROL
19	-	-
20	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
21	K95 16TN/DG (2.7L)	COIL ON PLUG DRIVER NO. 5
22	-	-
23	-	-
24	-	-
25	K42 18DB/LG	KNOCK SENSOR SIGNAL
26	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
27	K127 18DB/OR (2.0L/2.4L)	OXYGEN SENSOR GROUND
27	K127 18DB/LG (2.7L)	OXYGEN SENSOR GROUND
28	-	-
29	K241 20LG/RD (2.7L)	OXYGEN SENSOR 2/1 SIGNAL
30	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL
31	K90 20TN	ENGINE STARTER MOTOR RELAY CONTROL
32	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
33	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
34	K235 20LG/PK (2.7L)	EGR SENSOR SIGNAL
35	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
36	K1 20DG/RD	MAP SENSOR SIGNAL
37	K21 20BK/RD	INTAKE AIR TEMPERATURE SIGNAL
38	-	-
40	K35 20GY/YL	EGR SOLENOID CONTROL



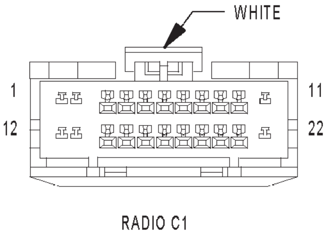
POWERTRAIN CONTROL MODULE C2 - GRAY 40 WAY

CAV	CIRCUIT	FUNCTION
41	V37 20PK/LG	SPEED CONTROL SWITCH SIGNAL
42	C18 20DB	A/C PRESSURE SIGNAL
43	K4 18BK/LB	SENSOR GROUND
44	K7 18OR/WT	8V SUPPLY
45	K10 20DB/OR (2.0L/2.4L)	STEERING PRESSURE SWITCH SENSE
46	A14 14RD/TN	FUSED B(+)
47	Z109 14BK	GROUND
48	K40 20BR/WT	IDLE AIR CONTROL MOTOR NO. 3 DRIVER
49	K60 20YL/BK	IDLE AIR CONTROL MOTOR NO. 2 DRIVER
50	Z107 14BK/TN	GROUND
51	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL
52	K25 18VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
53	K341 20PK/WT (2.7L) (EATX)	OXYGEN SENSOR 2/2 SIGNAL
54	-	-
55	C24 20DB/TN	LOW SPEED RADIATOR FAN RELAY CONTROL
56	V36 20TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
57	K39 20GY/RD	IDLE AIR CONTROL MOTOR NO. 1 DRIVER
58	K59 20VT/BK	IDLE AIR CONTROL MOTOR NO. 4 DRIVER
59	D25 20OR	PCI BUS
60	-	-
61	K6 18VT/WT	5V SUPPLY
62	K29 20WT/PK	BRAKE SWITCH SENSE
63	T10 20YL/DG (EATX)	TORQUE MANAGEMENT REQUEST SENSE
64	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
65	D21 20PK	SCI TRANSMIT
66	G7 18WT/OR	VEHICLE SPEED SENSOR SIGNAL
67	K51 20DB/VT	AUTOMATIC SHUTDOWN RELAY CONTROL
68	K52 18PK/BK	EVAPORATIVE EMISSION SOLENOID CONTROL
69	C27 20DB/PK	HIGH SPEED RADIATOR FAN RELAY CONTROL
70	K108 18WT/TN	EVAPORATIVE SOLENOID SENSE
71	K71 20WT/RD (EATX)	EATX RPM SIGNAL
72	K107 18OR	LEAK DETECTION PUMP SWITCH SENSE
73	-	-
74	K31 20BR/LG	FUEL PUMP RELAY CONTROL
75	D20 20LG	SCI RECEIVE
76	T41 20BK/LB (EATX)	TRS T41 SENSE
77	K106 18WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
78	-	-
79	-	-
80	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL



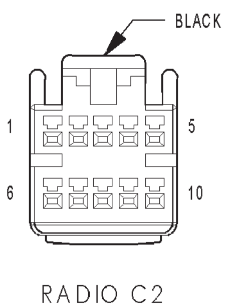
RADIATOR FAN - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z212 12BK	GROUND
2	Z213 12BK	GROUND
3	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
4	C25 12YL	HIGH SPEED RADIATOR FAN RELAY OUTPUT



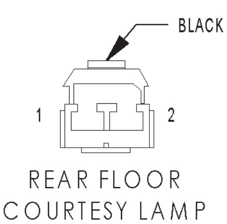
RADIO C1 - WHITE 22 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	X12 18RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
3	E2 18OR/BR	PANEL LAMPS DRIVER
4	-	-
5	-	-
6	-	-
7	X54 18VT	RIGHT FRONT DOOR SPEAKER (+)
8	X56 18DB/RD	RIGHT FRONT DOOR SPEAKER (-)
9	X55 18BR/RD	LEFT FRONT DOOR SPEAKER (-)
10	X53 18DG	LEFT FRONT DOOR SPEAKER (+)
11	Z1 18BK	GROUND
12	M1 20PK	FUSED B(+)
13	X60 18DG/RD	RADIO 12V OUTPUT
14	D25 20VT/YL	PCI BUS
15	-	-
16	-	-
17	-	-
18	X51 18BR/YL	LEFT REAR SPEAKER (+)
19	X57 18BR/LB	LEFT REAR SPEAKER (-)
20	X58 18DB/OR	RIGHT REAR SPEAKER (-)
21	X52 18DB/WT	RIGHT REAR SPEAKER (+)
22	-	-



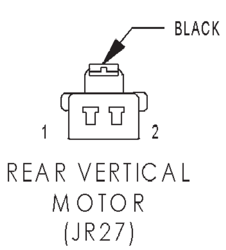
RADIO C2 - BLACK 10 WAY

CAV	CIRCUIT	FUNCTION
1	X40 24GY/WT	AUDIO OUT RIGHT
2	Z4 22BK/OR	GROUND
3	C235 WT/LB	CD GROUND SHIELD
4	D25 22VT/YL	PCI BUS
5	X112 22RD	IGNITION SWITCH OUTPUT (RUN-ACC)
6	X41 22DG/WT	AUDIO OUT LEFT
7	Z140 22BK/TN	GROUND
8	-	-
9	E14 22OR/TN	PANEL LAMPS DIMMER SIGNAL
10	X160 22GY/YL	B(+)



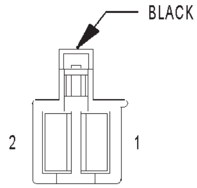
REAR FLOOR COURTESY LAMP - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	M1 18PK	FUSED B(+)
2	M2 18YL	COURTESY LAMPS DRIVER



REAR VERTICAL MOTOR (JR27) - BLACK 2 WAY

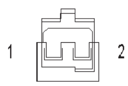
CAV	CIRCUIT	FUNCTION
1	P13 16RD/WT	LEFT SEAT REAR UP
2	P11 16YL/WT	LEFT SEAT REAR DOWN



REAR VERTICAL MOTOR (JR41)

REAR VERTICAL MOTOR (JR41) - BLACK 2 WAY

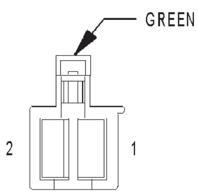
CAV	CIRCUIT	FUNCTION
1	P11 16YL/WT	LEFT SEAT REAR UP
2	P13 16RD/WT	LEFT SEAT REAR DOWN



RECIRCULATION DOOR ACTUATOR

RECIRCULATION DOOR ACTUATOR - 2 WAY

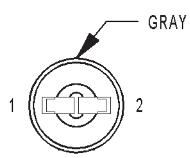
CAV	CIRCUIT	FUNCTION
1	C32 20GY/DB	RECIRCULATION DOOR DRIVER
2	C34 20DB/WT	COMMON DOOR DRIVER



RECLINE MOTOR (JR41)

RECLINE MOTOR (JR41) - GREEN 2 WAY

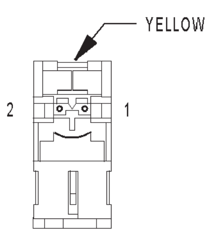
CAV	CIRCUIT	FUNCTION
1	P41 16GY/WT	LEFT SEAT RECLINER SWITCH UP
2	P43 16GY/LB	LEFT SEAT RECLINER SWITCH DOWN



RIGHT BACK-UP LAMP

RIGHT BACK-UP LAMP - GRAY 2 WAY

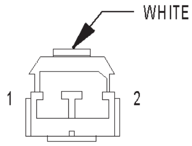
CAV	CIRCUIT	FUNCTION
1	Z151 18BK	GROUND
2	L1 18VT/BK	BACK-UP LAMP FEED



RIGHT CURTAIN AIRBAG (JR41)

RIGHT CURTAIN AIRBAG (JR41) - YELLOW 2 WAY

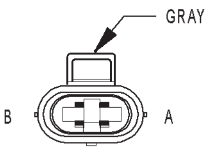
CAV	CIRCUIT	FUNCTION
1	R76 20LB/WT	RIGHT CURTAIN AIRBAG LINE 2
2	R74 20LB/YL	RIGHT CURTAIN AIRBAG LINE 1



RIGHT DOOR COURTESY LAMP (JR27)

RIGHT DOOR COURTESY LAMP (JR27) - WHITE 2 WAY

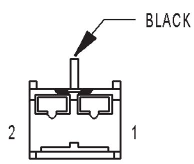
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	M2 20YL	COURTESY LAMPS DRIVER



RIGHT FOG LAMP

RIGHT FOG LAMP - GRAY 2 WAY

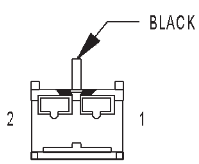
CAV	CIRCUIT	FUNCTION
B	Z144 18BK	GROUND
A	L39 18LB	FOG LAMP SWITCH OUTPUT



RIGHT FRONT DOOR SPEAKER

RIGHT FRONT DOOR SPEAKER - BLACK 2 WAY

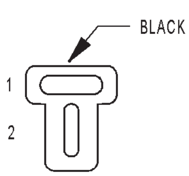
CAV	CIRCUIT	FUNCTION
1	X82 18LB/VT (PREMIUM)	AMPLIFIED RIGHT FRONT SPEAKER (+)
1	X82 18LB/VT (BASE)	RIGHT FRONT SPEAKER (+)
2	X80 18LB/BK (PREMIUM)	AMPLIFIED RIGHT FRONT SPEAKER (-)
2	X80 18LB/BK (BASE)	RIGHT FRONT SPEAKER (-)



RIGHT FRONT INSTRUMENT PANEL SPEAKER (EXCEPT JR27 PREMIUM)

RIGHT FRONT INSTRUMENT PANEL SPEAKER (EXCEPT JR27 PREMIUM) - BLACK 2 WAY

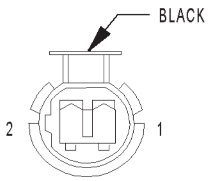
CAV	CIRCUIT	FUNCTION
1	X56 18DB/RD (JR27)	RIGHT INSTRUMENT PANEL SPEAKER (-)
1	X84 18OR/BK (JR41)	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (-)
2	X54 18VT (JR27)	RIGHT INSTRUMENT PANEL SPEAKER (+)
2	X86 18OR/RD (JR41)	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (+)



RIGHT FRONT INSTRUMENT PANEL SPEAKER (JR27 PREMIUM)

RIGHT FRONT INSTRUMENT PANEL SPEAKER (JR27 PREMIUM) - BLACK 2 WAY

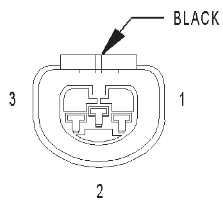
CAV	CIRCUIT	FUNCTION
1	X84 18OR/BK	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (-)
2	X86 18OR/RD	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (+)



RIGHT FRONT WHEEL SPEED SENSOR

RIGHT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY

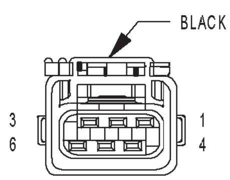
CAV	CIRCUIT	FUNCTION
1	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL



RIGHT HEADLAMP (EXCEPT BUILT-UP-EXPORT)

RIGHT HEADLAMP (EXCEPT BUILT-UP-EXPORT) - BLACK 3 WAY

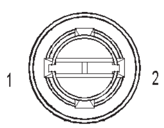
CAV	CIRCUIT	FUNCTION
1	L44 18VT/RD	FUSED RIGHT LOW BEAM OUTPUT
2	Z142 18BK	GROUND
3	L34 18RD/OR	FUSED RIGHT HIGH BEAM OUTPUT



RIGHT LAVALIER MODULE (BUILT-UP-EXPORT)

RIGHT LAVALIER MODULE (BUILT-UP-EXPORT) - BLACK 6 WAY

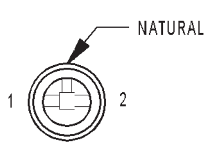
CAV	CIRCUIT	FUNCTION
1	Z162 14BK	GROUND
2	L101 18RD	HEADLAMP ADJUST SIGNAL
3	L34 18RD/OR	FUSED RIGHT HIGH BEAM OUTPUT
4	L60 16TN	RIGHT TURN SIGNAL
5	L7 18BK/YL (JR27)	HEADLAMP SWITCH OUTPUT
5	L7 16BK/YL (JR41)	HEADLAMP SWITCH OUTPUT
6	L44 18VT/RD	FUSED RIGHT LOW BEAM OUTPUT



RIGHT LICENSE LAMP (JR27)

RIGHT LICENSE LAMP (JR27) - 2 WAY

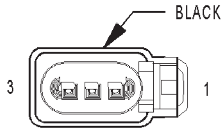
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
2	Z149 18BK	GROUND



RIGHT LICENSE LAMP (JR41 BUILT-UP-EXPORT)

RIGHT LICENSE LAMP (JR41 BUILT-UP-EXPORT) - NATURAL 2 WAY

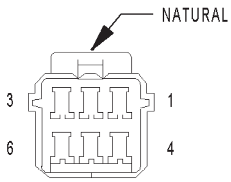
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
2	Z150 18BK	GROUND



RIGHT PARK/
TURN SIGNAL LAMP
(EXCEPT BUILT-
UP-EXPORT)

RIGHT PARK/TURN SIGNAL LAMP (EXCEPT BUILT-UP-EXPORT) - BLACK 3 WAY

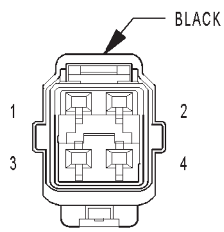
CAV	CIRCUIT	FUNCTION
1	L60 16TN	RIGHT TURN SIGNAL
2	L7 18BK/YL (JR27)	HEADLAMP SWITCH OUTPUT
2	L7 16BK/YL (JR41)	HEADLAMP SWITCH OUTPUT
3	Z147 18BK	GROUND



RIGHT POWER
MIRROR

RIGHT POWER MIRROR - NATURAL 6 WAY

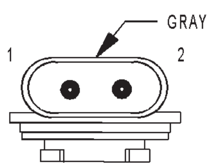
CAV	CIRCUIT	FUNCTION
1	P94 22WT/YL (JR27)	RIGHT MIRROR VERTICAL
1	C16 20LB/YL (JR41)	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
2	Z315 20BK (JR27)	GROUND
2	Z3 20BK (JR41)	GROUND
3	C16 20LB/YL (JR27)	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
3	P94 22WT/YL (JR41)	RIGHT MIRROR VERTICAL
4	P90 22LG/BK	MIRROR FEED
5	P90 22LG/BK (JR27)	MIRROR FEED
6	P92 22YL	RIGHT MIRROR HORIZONTAL



RIGHT REAR
DOOR LOCK MOTOR/
AJAR SWITCH
(JR41)

RIGHT REAR DOOR LOCK MOTOR/AJAR SWITCH (JR41) - BLACK 4 WAY

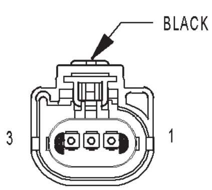
CAV	CIRCUIT	FUNCTION
1	G76 20TN/YL	RIGHT REAR DOOR AJAR SWITCH SENSE
2	Z318 18BK	GROUND
3	P182 18PK/DB	RIGHT REAR UNLOCK RELAY OUTPUT
4	P180 18OR/TN	RIGHT REAR LOCK RELAY OUTPUT



RIGHT REAR
FOG LAMP
(JR27
BUILT-UP-EXPORT)

RIGHT REAR FOG LAMP (JR27 BUILT-UP-EXPORT) - GRAY 2 WAY

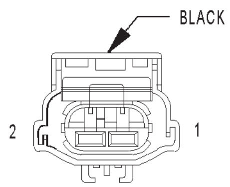
CAV	CIRCUIT	FUNCTION
1	Z149 18BK	GROUND
2	L36 18LG	REAR FOG LAMP RELAY OUTPUT



RIGHT REAR
FOG LAMP
(JR-41
BUILT-UP-EXPORT)

RIGHT REAR FOG LAMP (JR41 BUILT-UP-EXPORT) - BLACK 3 WAY

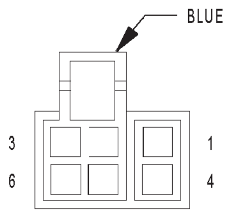
CAV	CIRCUIT	FUNCTION
1	Z150 18BK	GROUND
2	-	-
3	L36 18LG	REAR FOG LAMP RELAY OUTPUT



RIGHT REAR POWER WINDOW MOTOR

RIGHT REAR POWER WINDOW MOTOR - BLACK 2 WAY

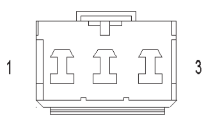
CAV	CIRCUIT	FUNCTION
1	Q24 14DG (JR27)	WINDOW RIGHT REAR B(+) DOWN
1	Q14 14GY (JR41)	WINDOW RIGHT REAR B(+) UP
2	Q14 14GY (JR27)	WINDOW RIGHT REAR B(+) UP
2	Q24 14DG (JR41)	WINDOW RIGHT REAR B(+) DOWN



RIGHT REAR POWER WINDOW SWITCH (JR41)

RIGHT REAR POWER WINDOW SWITCH (JR41) - BLUE 6 WAY

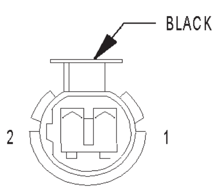
CAV	CIRCUIT	FUNCTION
1	Q24 14DG	WINDOW RIGHT REAR B(+) DOWN
2	Q18 14GY/BK	RIGHT REAR WINDOW DRIVER (UP)
3	-	-
4	Q28 14DG/WT	MASTER WINDOW SWITCH RIGHT REAR DOWN
5	Q14 14GY	WINDOW RIGHT REAR B(+) UP
6	Q1 14YL	WINDOW SWITCH FEED



RIGHT REAR SPEAKER

RIGHT REAR SPEAKER - 3 WAY

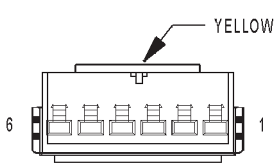
CAV	CIRCUIT	FUNCTION
1	X92 18TN/BK (PREMIUM)	AMPLIFIED RIGHT REAR SPEAKER (-)
1	X92 18TN/BK (BASE)	RIGHT REAR SPEAKER (-)
2	-	-
3	X94 18TN/VT (PREMIUM)	AMPLIFIED RIGHT REAR SPEAKER (+)
3	X94 18TN/VT (BASE)	RIGHT REAR SPEAKER (+)



RIGHT REAR WHEEL SPEED SENSOR

RIGHT REAR WHEEL SPEED SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	B2 20YL	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B1 20YL/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL



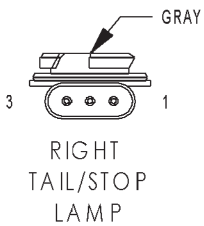
RIGHT SIDE IMPACT AIRBAG CONTROL MODULE (JR41)

RIGHT SIDE IMPACT AIRBAG CONTROL MODULE (JR41) - YELLOW 6 WAY

CAV	CIRCUIT	FUNCTION
1	F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	D25 20VT/YL	PCI BUS
3	R74 20LB/YL	RIGHT CURTAIN AIRBAG LINE 1
4	R76 20LB/WT	RIGHT CURTAIN AIRBAG LINE 2
5	-	-
6	Z135 20BK	GROUND

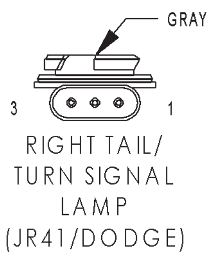
RIGHT TAIL/SIDE MARKER LAMP - 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z151 18BK	GROUND
2	L7 18BK/YL	HEADLAMP SWITCH OUTPUT



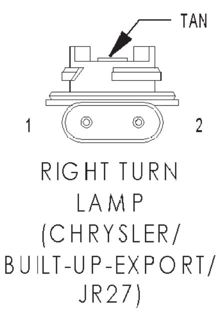
RIGHT TAIL/STOP LAMP - GRAY 3 WAY

CAV	CIRCUIT	FUNCTION
1	Z151 18BK	GROUND
2	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
3	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT



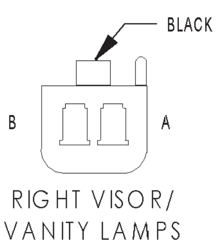
RIGHT TAIL/TURN SIGNAL LAMP (JR41/DODGE) - GRAY 3 WAY

CAV	CIRCUIT	FUNCTION
1	Z151 18BK	GROUND
2	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
3	L60 18TN	RIGHT TURN SIGNAL



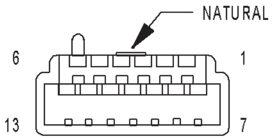
RIGHT TURN LAMP (CHRYSLER/BUILT-UP-EXPORT/JR27) - TAN 2 WAY

CAV	CIRCUIT	FUNCTION
1	L60 18LG	RIGHT TURN SIGNAL
2	Z151 18BK	GROUND



RIGHT VISOR/VANITY LAMPS - BLACK 2 WAY

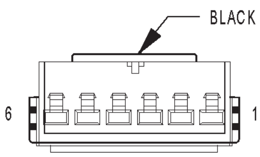
CAV	CIRCUIT	FUNCTION
B	Z312 18BK (JR27)	GROUND
A	M1 18PK (JR27)	FUSED B(+)
B	Z312 20BK (JR41)	GROUND
A	M1 20PK (JR41)	FUSED B(+)



SEAT BELT CONTROL MODULE (JR27 BUILT-UP-EXPORT)

SEAT BELT CONTROL MODULE (JR27 BUILT-UP-EXPORT) - NATURAL 13 WAY

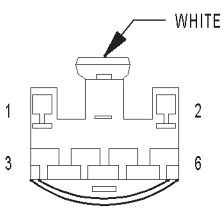
CAV	CIRCUIT	FUNCTION
1	-	-
2	G75 20TN	DRIVER DOOR AJAR SWITCH SENSE
3	G74 20TN/RD	PASSENGER DOOR AJAR SWITCH SENSE
4	F13 18DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
5	A45 18BR	FUSED B(+)
6	Z128 18BK	GROUND
7	R7 18OR/BK	DRIVER SEAT BELT SOLENOID CONTROL
8	R8 18OR/RD	PASSENGER SEAT BELT SOLENOID CONTROL
9	-	-
10	-	-
11	-	-
12	-	-
13	Z129 18BK	GROUND



SENTRY KEY IMMOBILIZER MODULE

SENTRY KEY IMMOBILIZER MODULE - BLACK 6 WAY

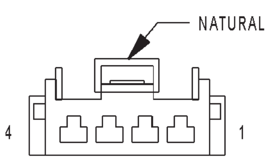
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/PK	PCI BUS
3	-	-
4	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	Z110 20BK	GROUND
6	A51 20RD/WT	FUSED B(+)



SUNROOF CONTROL MODULE (JR41)

SUNROOF CONTROL MODULE (JR41) - WHITE 6 WAY

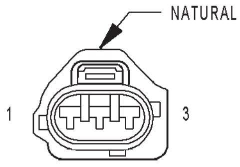
CAV	CIRCUIT	FUNCTION
1	Z312 18BK	GROUND
2	F21 18TN	FUSED IGNITION SWITCH OUTPUT (RUN)
3	Q43 20VT	SUNROOF VENT
4	Q44 20BR	SUNROOF SWITCH GROUND
5	Q42 20LB	SUNROOF CLOSE
6	Q41 20WT	SUNROOF OPEN



SUNROOF SWITCH (JR41)

SUNROOF SWITCH (JR41) - NATURAL 4 WAY

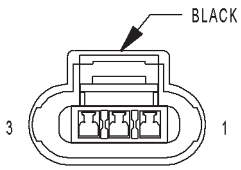
CAV	CIRCUIT	FUNCTION
1	Q41 20WT	SUNROOF OPEN
2	Q43 20VT	SUNROOF VENT
3	Q44 20BR	SUNROOF SWITCH GROUND
4	Q42 20LB	SUNROOF CLOSE



THROTTLE POSITION SENSOR (2.0L/2.4L)

THROTTLE POSITION SENSOR (2.0L/2.4L) - NATURAL 3 WAY

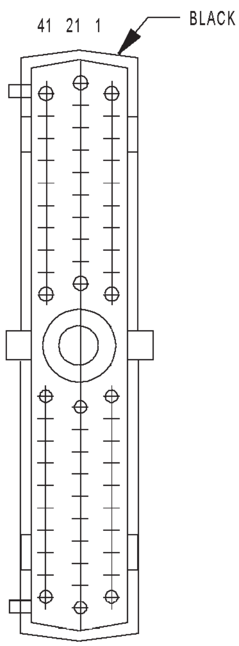
CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5 VOLT SUPPLY
2	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
3	K4 20BK/LB	SENSOR GROUND



THROTTLE POSITION SENSOR (2.7L)

THROTTLE POSITION SENSOR (2.7L) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
3	K4 20BK/LB	SENSOR GROUND



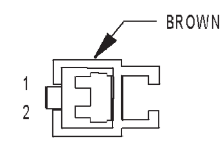
TRANSMISSION CONTROL MODULE

TRANSMISSION CONTROL MODULE - BLACK 60 WAY

CAV	CIRCUIT	FUNCTION
1	T1 20LG/BK	TRS T1 SENSE
2	-	-
3	T3 18VT	TRS T3 SENSE
4	-	-
5	T5 20LG (AUTOSTICK)	AUTOSTICK UPSHIFT SWITCH SENSE
6	K71 20WT/RD	EATX RPM SIGNAL
7	D21 20PK	SCI TRANSMIT
8	A41 16YL	FUSED IGNITION SWITCH OUTPUT (START)
9	T9 18OR/BK	OVERDRIVE PRESSURE SWITCH SENSE
10	T10 20YL/DG	TORQUE MANAGEMENT REQUEST SENSE
11	F11 18RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
12	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
13	T13 20DB/BK	SPEED SENSOR GROUND
14	T14 20LG/WT	OUTPUT SPEED SENSOR SIGNAL
15	T15 20LG	TRANSMISSION CONTROL RELAY CONTROL
16	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
17	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
18	-	-
19	T19 18WT	2-4 SOLENOID CONTROL
20	T20 18LB	LOW/REVERSE SOLENOID CONTROL
21	-	-
22	-	-
23	-	-
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	-	-
30	-	-

TRANSMISSION CONTROL MODULE - BLACK 60 WAY

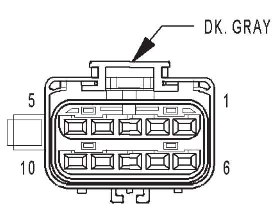
CAV	CIRCUIT	FUNCTION
31	-	-
32	-	-
33	-	-
34	-	-
35	-	-
36	-	-
37	-	-
38	-	-
39	-	-
40	-	-
41	T41 20BK/WT	TRS T41 SENSE
42	T42 18VT/WT	TRS T42 SENSE
43	D25 20VT/YL	PCI BUS
44	T44 20YL (AUTOSTICK)	AUTOSTICK DOWNSHIFT SWITCH SENSE
45	-	-
46	D6 20PK/LB	SCI RECEIVE
47	T47 18YL/BK	2-4 PRESSURE SWITCH SENSE
48	-	-
49	-	-
50	T50 18DG	LOW/REVERSE PRESSURE SWITCH SENSE
51	K4 18BK/LB	SENSOR GROUND
52	T52 20RD/BK	INPUT SPEED SENSOR SIGNAL
53	Z112 16BK/YL	GROUND
54	T54 18VT/YL	TRANSMISSION TEMPERATURE SENSOR SIGNAL
55	-	-
56	A24 16BK	FUSED B(+)
57	Z113 16BK/RD	GROUND
58	G7 18WT/OR	VEHICLE SPEED SENSOR SIGNAL
59	T59 18PK	UNDERDRIVE SOLENOID CONTROL
60	T60 18BR	OVERDRIVE SOLENOID CONTROL



TRANSMISSION RANGE INDICATOR ILLUMINATION (PRNDL)

TRANSMISSION RANGE INDICATOR ILLUMINATION (PRNDL) - BROWN 2 WAY

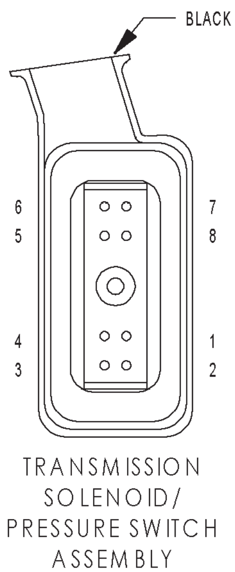
CAV	CIRCUIT	FUNCTION
1	E2 20OR	PANEL LAMPS DRIVER
2	Z157 18BK (JR27)	GROUND
2	Z157 20BK (JR41)	GROUND



TRANSMISSION RANGE SENSOR

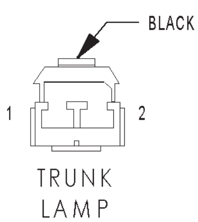
TRANSMISSION RANGE SENSOR - DK. GRAY 10 WAY

CAV	CIRCUIT	FUNCTION
1	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
2	-	-
3	T13 20DB/BK	SPEED SENSOR GROUND
4	T54 18VT/YL	TRANSMISSION TEMPERATURE SENSOR SIGNAL
5	T41 20BK/LB	TRS T41 SENSE
6	L1 18VT/BK	BACK-UP LAMP FEED
7	T1 20LG/BK	TRS T1 SENSE
8	T3 18VT	TRS T3 SENSE
9	T42 20VT/WT	TRS T42 SENSE
10	T41 20BK/WT	TRS T41 SENSE



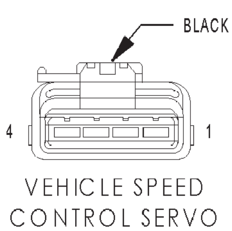
TRANSMISSION SOLENOID/ PRESSURE SWITCH ASSEMBLY - BLACK 8 WAY

CAV	CIRCUIT	FUNCTION
1	T47 18YL/BK	2-4 PRESSURE SWITCH SENSE
2	T50 18DG	LOW/REVERSE PRESSURE SWITCH SENSE
3	T9 18OR/BK	OVERDRIVE PRESSURE SWITCH SENSE
4	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
5	T59 18PK	UNDERDRIVE SOLENOID CONTROL
6	T60 18BR	OVERDRIVE SOLENOID CONTROL
7	T20 18LB	LOW/REVERSE SOLENOID CONTROL
8	T19 18WT	2-4 SOLENOID CONTROL



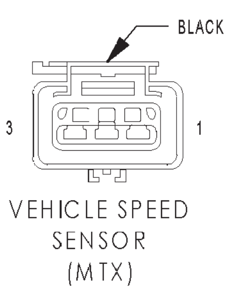
TRUNK LAMP - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	G78 18TN/BK	DECKLID AJAR SWITCH SENSE
2	M1 18PK	FUSED B(+)



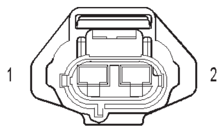
VEHICLE SPEED CONTROL SERVO - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	V36 20TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
2	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL
3	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
4	Z190 20BK	GROUND



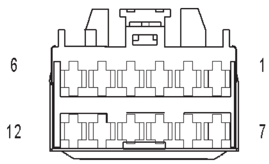
VEHICLE SPEED SENSOR (MTX) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K7 18OR/WT	8V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	G7 18WT/OR	VEHICLE SPEED SENSOR SIGNAL



WASHER FLUID LEVEL SWITCH - 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z261 20BK	GROUND
2	G29 20BK/TN	WASHER FLUID SWITCH SENSE



WINDOW DROP RELAY ASSEMBLY (JR27) - 12 WAY

CAV	CIRCUIT	FUNCTION
1	Q19 14OR/WT	MASTER WINDOW SWITCH LEFT FRONT DOWN
2	Q290 14LG	MASTER WINDOW SWITCH LEFT REAR DOWN
3	Q38 14PK	MASTER WINDOW SWITCH RIGHT FRONT (DOWN)
4	Q32 14VT	MASTER WINDOW SWITCH RIGHT REAR (DOWN)
5	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
6	Q37 20RD/WT	WINDOW DROP RELAY CONTROL
7	Q21 14WT	LEFT FRONT WINDOW DRIVER (DOWN)
8	Q27 14RD/BK	LEFT REAR WINDOW DRIVER (DOWN)
9	Q26 14VT/WT	RIGHT FRONT WINDOW DRIVER (DOWN)
10	Q28 14DG/WT	WINDOW DROP RELAY RIGHT FRONT (DOWN)
11	F21 14TN	FUSED IGNITION SWITCH OUTPUT (RUN)
12	F21 14TN	FUSED IGNITION SWITCH OUTPUT (RUN)

8W-91 CONNECTOR/GROUND/SPLICE LOCATION

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CONNECTOR/GROUND/SPLICE LOCATION

DESCRIPTION

This section provides illustrations identifying connector, ground, and splice locations in the vehicle. Connector, ground, and splice indexes are provided. Use the wiring diagrams in each section for connector, ground, and splice identification. Refer to the index for the proper figure number. For items that are not shown in this section N/S is placed in the Fig. column.

CONNECTORS

Connector Name/Number	Color	Location	Fig.
A/C Compressor Clutch (2.0L/2.4L)	GY	Top of Compressor	13, 16
A/C Compressor Clutch (2.7L)	GY	Top of Compressor	15, 16
A/C Evaporator Temperature Sensor	BK	Right Side of HVAC	32
A/C-Heater Control C1	NAT	Rear of Control, Center of Instrument Panel	21, 25
A/C-Heater Control C2	BK	Rear of Control, Center of Instrument Panel	21, 25
A/C Pressure Transducer	GY	Top of A/C Compressor	16
Airbag Control Module (Occupant Restraint Controller)	GY	Center Body Near Shifter Assembly	21, 34
Ambient Temperature Sensor	BK	Front Center of Engine Compartment	1
Antenna		Center of Instrument Panel and Trunk	21, 25, 34, 35, 46, 47
Ash Receiver Lamp	BK	Rear of Lamp	21, 25
Automatic Day/Night Mirror	BK	At Mirror	33
Autostick Switch	BK	Center of Body at Base of Shifter	35
Back-Up Lamp Switch (MTX)	GY	Rear of Transmission	11
Battery Negative Post		Left Side Engine Compartment	9
Battery Positive Post		Left Side Engine Compartment	8, 9
Battery Positive Terminal		Left Side Engine Compartment	8
Blend Door Actuator	NAT	At Blend Door	N/S
Blower Motor		At Blower Motor	N/S
Blower Motor Resister Block	BK	Right Side of HVAC	32
Body Control Module C1		Left Front Kick Panel	21, 29

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

Connector Name/Number	Color	Location	Fig.
Body Control Module C2		Left Front Kick Panel	21, 29
Body Control Module C3	WT	Left Front Kick Panel	29
Body Control Module C4	WT	Left Front Kick Panel	29
Brake Fluid Level Switch	BK	Left Rear Engine Compartment	5, 6
Brake Lamp Switch	GY	At Brake Pedal	N/S
Brake Transmission Shift Interlock Solenoid	WT	At Steering Column	21
C100	LT/GN	Lower Left Side Instrument Panel	21, 22, 31
C101	LT/GY	Lower Left Side Instrument Panel	21, 22, 31
C104 (EATX)	LT/GY	Left Front Engine Compartment	4, 10, 12
C105 (EATX)	BK	Left Front Engine Compartment	4, 10, 12
C111	BK	Left Side Engine Compartment	5
C113	LT/GY	Left Side Engine Compartment	5
C121	BK	Left Side Cowl Panel	36
C169 (MTX)	BK	Left Front Engine Compartment	4, 11, 12
C200	NAT	Lower Center Instrument Panel	21
C225 (Built-Up-Export)	BK	Center Body Behind Occupant Restraint Controller	35
C300	BK	In Trunk Near Left Tail Lamp	41
C301	BK	In Trunk Near Right Tail Lamp	41
C302	BK	Lower Left Side Instrument Panel	21, 22, 31, 36
C303	LT/GY	Lower Left Side Instrument Panel	21, 36
C304	YL	Center Body to Console	35
C305	BK	At Decklid	49
C306	BK	Under Passenger Seat	21, 34, 35
C307	WT	Lower Left Side Instrument Panel	36
C308	BL	At Left B-Pillar	37, 42
C309 (Power Seat)	BK	Under Driver Seat	35
C310	BR	Lower Left Side Instrument Panel	21
C311	BL	Lower Left Side Instrument Panel	21
C312 (Except JR41 Domestic)	BK	Center Behind Occupant Restraint Controller	35
C315	BR	Right Side Instrument Panel	21, 23, 43, 44
C316	BL	Right Side Instrument Panel	21, 23, 43, 44
C318	BL	At Right B-Pillar	42
C320	BK	Near License Lamp	48
C321	BK	Left Rear Body Near Wheel Opening	38
C322 (Built-Up-Export)	BK	Rear Body to Rear Fog Lamp Harness	N/S
Camshaft Position Sensor (2.0L/2.4L)	BK	Left Side of Cylinder Head	14
Camshaft Position Sensor (2.7L)	BK	Front of Engine	15

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

Connector Name/Number	Color	Location	Fig.
Center High Mounted Stop Lamp	BK	At Lamp	N/S
Cigar Lighter Feed		Lower Center Instrument Panel	21, 24
Cigar Lighter Ground		Lower Center Instrument Panel	21, 24
Clockspring C1		Rear of Clockspring	21
Clockspring C2	YL	Rear of Clockspring	21
Clutch Interlock/ Upstop Switch (MTX)	BK	At Switch	N/S
Coil On Plug No.1 (2.7L)	BK	At Plug	15
Coil On Plug No.2 (2.7L)	BK	At Plug	15
Coil On Plug No.3 (2.7L)	BK	At Plug	15
Coil On Plug No.4 (2.7L)	BK	At Plug	15
Coil On Plug No.5 (2.7L)	BK	At Plug	15
Coil On Plug No.6 (2.7L)	BK	At Plug	15
Compact Disk Changer	BK	At Compact Disk Changer	N/S
Compass/Mini-Trip Computer	BK	Upper Center Instrument Panel	21, 25
Controller Antilock Brake	BK	Left Front Engine Compartment	4
Crankshaft Position Sensor (2.0L/2.4L)	BK	Rear of Cylinder Block	18
Crankshaft Position Sensor (2.7L)	BK	Rear of Engine	15
Data Link Connector	BK	Lower Left Center Instrument Panel	21, 22
Decklid Cylinder Lock Switch		At Decklid	48
Decklid Release Solenoid/Ajar Switch	BK	At Decklid	48, 49
Decklid Release Switch	BK	Left Side Instrument Panel	21
Decklid Security Switch (VTSS)	BK	At Decklid	49
Dome Lamp	BK	At Lamp	45
Driver Airbag Squib No.1	GY	Back Side of the Driver Airbag Module	27
Driver Airbag Squib No.2	BK	Back Side of the Driver Airbag Module	27
Driver Cylinder Lock Switch	GY	In Driver Door	N/S
Driver Door Lock Motor/Ajar Switch	BK	In Driver Door	N/S
Driver Door Lock Switch	NAT	In Driver Door	N/S
Driver Power Window Motor	LT/GY	In Driver Door	N/S
Driver Seat Belt Solenoid (Built-Up-Export)	BK	Under Driver Seat	N/S
Driver Seat Belt Switch (JR27)	WT	Near Buckle	21
Driver Seat Belt Switch (JR41)	WT	Near Belt Real	21
Driver Seat Belt Tensioner	YL	Under Driver Seat	21, 34
EGR Solenoid (2.0L/2.4L)	BK	At Solenoid	18

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

Connector Name/Number	Color	Location	Fig.
EGR Solenoid (2.7L)	BK	At Solenoid	15
Engine Coolant Temperature Sensor (2.0L/2.4L)	BK	At Sensor	14
Engine Coolant Temperature Sensor (2.7L)	BK	At Sensor	15
Engine Starter Motor		At Engine Starter Motor	15
Evaporative Purge Solenoid	BK	Left Side Engine Compartment	5
Front Vertical Motor	BK	Under Seat	N/S
Front Washer Pump Motor	BK	Right Front Engine Compartment	2
Front Wiper Motor	BK	Left Rear Engine Compartment	6
Fuel Injector No.1 (2.0L/2.4L)	BK	At Injector	14
Fuel Injector No.1 (2.7L)	BK	At Injector	15
Fuel Injector No.2 (2.0L/2.4L)	BK	At Injector	14
Fuel Injector No.2 (2.7L)	BK	At injector	15
Fuel Injector No.3 (2.0L/2.4L)	BK	At Injector	14
Fuel Injector No.3 (2.7L)	BK	At Injector	15
Fuel Injector No.4 (2.0L/2.4L)	BK	At Injector	14
Fuel Injector No.4 (2.7L)	BK	At Injector	15
Fuel Injector No.5 (2.7L)	BK	At Injector	15
Fuel Injector No.6 (2.7L)	BK	At Injector	15
Fuel Pump Module C1	LT/GY	Center Rear of Trunk Area	N/S
Generator (2.0L/2.4L)	BK	Rear of Generator	16
Generator (2.7L)	BK	Rear of Generator	15, 16
Glove Box Lamp	BK	At Lamp	21, 30
Headlamp Leveling Switch (Built-Up-Export)	BK	Left Side Instrument Panel	21
Headlamp Washer Pump Motor		At Pump	N/S
High Note Horn	BK	Left Front Engine Compartment	7
Horizontal Motor (JR27)	BK	Under Seat	N/S
Horizontal Motor (JR41)	GY	Under Seat	N/S
Idle Air Control Motor (2.0L/2.4L)	BK	On Throttle Body	13
Idle Air Control Motor (2.7L)	BK	On Throttle Body	15
Ignition Coil Pack (2.0L/2.4L)	BK	Top of Valve Cover	14
Ignition Switch C1	BK	At Switch	21
Ignition Switch C2	BK	At Switch	21
Ignition Switch C3	GN	At Switch	21
Inlet Air Temperature Sensor	BK	On Intake	17
Input Speed Sensor	GY	Left Front of Transmission	10
Instrument Cluster		Rear of Cluster	21, 26
Junction Block Body Control Module-JB		Left Front Kick Panel	28
Junction Block C1	BR	Left Front Kick Panel	29

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

Connector Name/Number	Color	Location	Fig.
Junction Block C2	NAT	Left Front Kick Panel	29
Junction Block C3	WT	Left Front Kick Panel	29
Junction Block C4	BL	Left Front Kick Panel	21, 29
Junction Block C5	GY	Left Front Kick Panel	21, 29
Junction Block C6	WT	Left Front Kick Panel	21, 29
Junction Block C7	NAT	Left Front Kick Panel	21, 29
Junction Block C8	BK	Left Front Kick Panel	21, 29
Junction Block C9	WT	Left Front Kick Panel	29, 36
Junction Block C10	NAT	Left Front Kick Panel	36
Junction Block C11 (Built-Up-Export)	BK	Left Front Kick Panel	21, 29
Knock Sensor (2.0L/2.4L)	GY	At Sensor	14
Knock Sensor (2.7L)	BK	Below Throttle Body	N/S
Leak Detection Pump	BK	On Fuel Tank	N/S
Left Back-Up Lamp	GY	At Lamp	N/S
Left Curtain Airbag		On Airbag Module At Headliner	37
Left Door Courtesy Lamp	WT	At Lamp	N/S
Left Fog Lamp	GY	On Airbag Module At Headliner	7
Left Front Door Speaker	BK	At Speaker, Similar to Right, See Passenger Door Connectors	N/S
Left Front Instrument Panel Speaker	BK	At Speaker	21, 22
Left Front Wheel Speed Sensor	BK	Left Fender Side Shield	5
Left Headlamp (Except Built-Up-Export)	BK	Left Headlamp Opening	4
Left Lavalier Module (Built-Up-Export)	BK	Left Headlamp Opening	N/S
Left License Lamp	NAT	At Lamp	N/S
Left Park/Turn Signal Lamp (Except Built-Up-Export)	BK	Left Headlamp Opening	4
Left Power Mirror	NAT	At Mirror	N/S
Left Rear Door Lock Motor/Ajar Switch	GY	In Door Near Latch	42
Left Rear Fog Lamp (Built-Up-Export)	GY	At Lamp	N/S
Left Rear Power Window Motor	BK	At Motor	38, 42
Left Rear Power Window Switch (JR41)	BL	At Switch	42
Left Rear Speaker	BK	Left Side Shelf Panel at Speaker	38, 39
Left Rear Wheel Speed Sensor	BK	Left Quarter Panel	37
Left Side Impact Airbag Control Module	YL	At B-Pillar	37

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

Connector Name/Number	Color	Location	Fig.
Left Tail/Side Marker Lamp		At Lamp	N/S
Left Tail/Stop Lamp	GY	At Lamp	N/S
Left Tail/Turn Signal Lamp		At Lamp	N/S
Left Turn Lamp		At Lamp	N/S
Left Visor/Vanity Lamps	BK	At Lamp	33
Licence Lamp (Except BUX)	NAT	At Lamp	N/S
Low Note Horn	BK	Right Front Grille Area	1
Manifold Absolute Pressure Sensor (2.0L/2.4L)	BK	Intake Manifold	13
Manifold Absolute Pressure Sensor (2.7L)	BK	Intake Manifold	15
Master Power Window Switch	BL	At Switch	N/S
Mode Door Actuator	BK	Left Side of HVAC	32
Multi-Function Switch C1	NAT	Left Side of Switch	21
Multi-Function Switch C2	BL	Right Side of Switch	21
Negative Battery Cable	BK	Left Side Engine Compartment	5
Oil Pressure Switch (2.0L/ 2.4L)	LT/GN	Rear of Engine at Switch	18
Oil Pressure Switch (2.7L)	LT/GN	Rear of Engine at Switch	15
Output Speed Sensor	GY	Left Side of Transmission	10
Overhead Map Courtesy Lamps	BK	At Lamp Assy	45
Oxygen Sensor 1/1 Right Bank Up (2.7)	BK	At Sensor	15, 20
Oxygen Sensor 1/1 Upstream (2.0L/2.4L)	BK	Rear of Engine	18, 19
Oxygen Sensor 1/2 Downstream (2.0L/2.4L)	BK	Rear of Engine	19
Oxygen Sensor 1/2 Right Bank Down (2.7L)	BK	Right Rear of Engine	20
Oxygen Sensor 2/1 Left Bank Up (2.7)	BK	At Sensor	15, 20
Oxygen Sensor 2/2 Left Bank Down (2.7)	BK	At Sensor	20
Park Brake Switch	NAT	Center of Body at Park Brake Lever	35
Passenger Airbag	YL	Right Side Instrument Panel	21, 30
Passenger Cylinder Lock Switch	GY	In Passenger Door	43
Passenger Door Lock Motor/Ajar Switch	BK	In Passenger Door	43, 44
Passenger Door Lock Switch	NAT	In Passenger Door	43, 44
Passenger Power Window Motor	LT/GY	In Passenger Door	43, 44
Passenger Power Window Switch	BL	In Passenger Door	43, 44

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

Connector Name/Number	Color	Location	Fig.
Passenger Seat Belt Solenoid (Built-Up-Export)	BK	Under Passenger Seat	N/S
Passenger Seat Belt Tensioner	YL	Under Passenger Seat	21, 34
PCV Heater (2.7L)	BK	On PCV Valve	N/S
Power Amplifier C1 (Premium)	WT	Under Passenger Seat	21, 34
Power Amplifier C2 (Premium)	WT	Under Passenger Seat	21, 34
Power Antenna (Built-Up-Export)	BK	Right Trunk	46, 47
Power Distribution Center	BK	Left Front Engine Compartment	5, 8
Power Mirror Switch	BK	At Switch	21
Power Outlet	BK	Rear of Outlet	N/S
Power Seat Switch	BL	At Switch	N/S
Power Steering Pressure Switch	BK	Left Side of Steering Gear	N/S
Power Top Pump Motor	RD	At Motor	38
Power Top Switch		At switch on Center Console	N/S
Power Top Up/Down Relays		At Relay	38
Powertrain Control Module C1 (2.0L/2.4L)	GY	At Module	N/S
Powertrain Control Module C1 (2.7L)		At Module	15
Powertrain Control Module C2	GY	At Module	5
Radiator Fan	BK	Front Center of Engine Compartment	4
Radio C1	WT	Rear of Radio	21, 25
Radio C2	BK	Rear of Radio	N/S
Rear Floor Courtesy Lamp	BK	At Lamp	N/S
Rear Vertical Motor	BK	Under Seat	N/S
Rear Window Defogger Feed		Left Side Shelf Panel	38
Rear Window Defogger Ground		Right Side of Rear Window Defogger	N/S
Recirculation Door Actuator		At Actuator	N/S
Right Back-Up Lamp	GY	At Lamp	N/S
Right Curtain Airbag		On Airbag Module At Headliner	39
Right Door Courtesy Lamp	WT	At Lamp	44
Right Fog Lamp	GY	At Lamp	2
Right Front Door Speaker	BK	At Speaker	43, 44
Right Front Instrument Panel Speaker	BK	At Speaker	21, 23
Right Front Wheel Speed Sensor	BK	Right Fender Side Shield	3
Right Headlamp (Except Built-Up-Export)	BK	At Right Headlamp Opening	1, 2
Right Lavalier Module (Built-Up-Export)	BK	At Right Headlamp Opening	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

Connector Name/Number	**Color**	**Location**	**Fig.**
Right License Lamp		At Lamp	N/S
Right Park/Turn Signal Lamp (Except Built-Up-Export)	BK	Right Headlamp Opening	1, 2
Right Power Mirror	NAT	At Mirror	43, 44
Right Rear Door Lock Motor/Ajar Switch	BK	In Door near Latch	42
Right Rear Fog Lamp (Built-Up-Export)	BK	At Lamp	N/S
Right Rear Power Window Motor (JR41)	BK	At Motor	42
Right Rear Power Window Switch (JR41)	BK	At Switch	42
Right Rear Speaker (JR41)		At Speaker	39
Right Rear Speaker (JR27)		At Speaker see left speaker	N/S
Right Rear Wheel Speed Sensor	BK	Right Side Trunk Area	40
Right Side Impact Airbag Module	YL	At B-Pillar, see graphic for Left	N/S
Right Tail/Side Marker Lamp		At Lamp	N/S
Right Tail/Stop Lamp	GY	At Lamp	N/S
Right Tail/Turn Signal Lamp	GY	At Lamp	N/S
Right Turn Lamp	TN	At Lamp	N/S
Right Visor/Vanity Lamps	BK	At Lamp	33
Seat Belt Control Module (Built-Up-Export)	NAT	Under Driver Seat	N/S
Sentry Key Immobilizer Module	BK	At Steering Column	21
Sunroof Control Module		In Left Headliner	45
Sunroof Switch		In Left Headliner	45
Throttle Position Sensor (2.0L/2.4L)	NAT	On Throttle Body	13
Throttle Position Sensor (2.7L)	BK	On Throttle Body	15
Transmission Control Module	BK	Left Front Engine Compartment	4
Transmission Range Indicator Illumination (PRNDL)	BR	Center of Body Near Shifter Assembly	35
Transmission Range Sensor	DK/GY	Left Side of Transmission	10
Transmission Solenoid/ Pressure Switch Assembly	BK	Left Side of Transmission	10
Trunk Lamp	BK	Rear Center Shelf Panel	39
Vehicle Speed Control Servo	BK	Left Side of Engine Compartment at Servo	5
Vehicle Speed Sensor (MTX)	BK	Right Side of Transmission	11
Washer Fluid Level Switch	BK	At the Washer Fluid Reservoir	N/S
Window Drop Relay Assembly		In Driver Door	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

GROUNDS

Connector Name/Number	Location	Fig.
G100	Left Strut Tower	5
G103	Near Left Strut Tower	5
G104 (2.7L)	Near EGR Solenoid	15
G106	Right Headlamp Area	1
G108	Left Headlamp Area	4
G113	Left Headlamp Area	4
G201	Center Body Between Occupant Restraint Controller and Shift Assembly	21, 34
G202	Lower Left Center Instrument Panel	21, 22
G203	Left Side Instrument Panel	21, 22
G300	Center of Trunk Opening Below Latch	41
G301	Left Side Cowl	36
G302	Left Front of Trunk	49
G303	Right Front Side of Trunk	47
G307	On Right B-Pillar, see G308 figure	N/S
G308	On Left B-Pillar	37
G310	Rear Center Decklid	48

SPLICES

Splice Number	Location	Fig.
S100(ATX)	Left Front Engine Compartment	4
S102	Internal to the Power Distribution Center	5
S103	Internal to the Power Distribution Center	5
S104	Internal to the Power Distribution Center	5
S105	Internal to the Power Distribution Center	5
S106	Internal to the Power Distribution Center	5
S108	Internal to the Power Distribution Center	5
S109	Internal to the Power Distribution Center	5
S110	Left Side Engine Compartment	5
S112 (ATX)	Internal to the Power Distribution Center	5
S113	In T/O for Starter Feed Terminal	10
S114 (2.0L/2.4L)	Near T/O for MAP/IAT Sensor	14
S115	Near T/O for MAP/IAT Sensor	13, 14
S116	Near T/O for A/C Compressor Clutch	13
S117	Near T/O for Camshaft Position Sensor	14
S118 (2.7L)	Near T/O for Oxygen Sensor 2/1 Left Bank Up	N/S
S119 (Build-Up-Export)	Internal in Power Distribution Center	N/S
S121	Near T/O for Powertrain Control Module C1	14
S122	Internal to Power Distribution Center	5
S124	Near T/O for Camshaft Position Sensor	14

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

Splice Number	Location	Fig.
S125	Near A/T inline Connectors	10
S126	Left Front Engine Compartment	4
S130 (MTX)	Left Front Engine Compartment	4
S134	Near T/O for Camshaft Position Sensor	14
S135	Near T/O for Power Steering Pressure Switch	N/S
S137 (2.7L)	Near T/O for Oxygen Sensor 1/1 Right Bank Up	N/S
S138 (2.7L)	Near T/O for Oxygen Sensor 2/2 Left Bank Down	N/S
S139 (2.7L)	Near T/O for Knock Sensor	N/S
S143 (2.7L)	Left Fuel Rail	N/S
S144 (2.7L)	Right Fuel Rail	N/S
S148 (2.0L/2.4L)	Near T/O For Ignition Coil Pack	14
S149 (2.7L)	Near T/O For Generator Feed	N/S
S150 (2.0L/2.4L)	Near T/O for Powertrain Control Module C1	14
S200	Between A/C Evap Temperature Sensor & Blend Door Actuator	32
S201	Between Blend Door Actuator and Mode Door Actuator	N/S
S202	Between Blend Door Actuator and Mode Door Actuator	N/S
S203	Center of Instrument Panel, Near Take-out for Data Link Connector	N/S
S207	Left Side of Instrument Panel	21, 22
S208 (Built-Up-Export)	Left Side of Instrument Panel	21, 22
S209	Left Center of Instrument Panel	21, 22
S210	Left Center of Instrument Panel	21, 22
S211	Left Center of Instrument Panel	21, 22
S212	Left Center of Instrument Panel	21, 22
S214	Right Center of Instrument Panel	21, 22
S215	Left Side of Instrument Panel	21
S300	Near Take-out for Left Side Curtain Airbag, Left Rear Shelf	N/S
S301	Front Left Center of Trunk	N/S
S302	Between Automatic Day/Night Mirror and Left Visor/Vanity Lamp	33
S303	Near Splice S302 on Mirror Side	N/S
S304	Between Left Tail/Stop Lamp and Left Turn Lamp	N/S
S305	Between Right Tail/Stop Lamp and Right Turn Lamp	N/S
S313	Center Body Floor Between Airbag Module and Shifter Assembly	35
S318	Near T/O for Left Tail/Stop Lamp	N/S
S319	Near T/O for Right Tail/Stop Lamp	N/S
S320	In Driver Door	44
S321	In Passenger Door	44
S326	Near Fuel Pump Module	N/S
S327 (JR41)	Driver Door Forward From Take-out for Power Window and Power Mirror Switches	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

Splice Number	Location	Fig.
S238 (JR41)	Passenger Door Forward From Take-out for Power Window and Power Mirror Switches	N/S
S330	In Driver Door	44
S400	In Driver Door	44
S401	In Passenger Door	44
S410	Near Left License Lamp	N/S
S411	Near Left Rear Fog Lamp	N/S
S412	Between T/O for C320 & T/O For License Lamp	N/S
S413	Between Left Rear Fog Lamp & Right Rear Fog Lamp	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

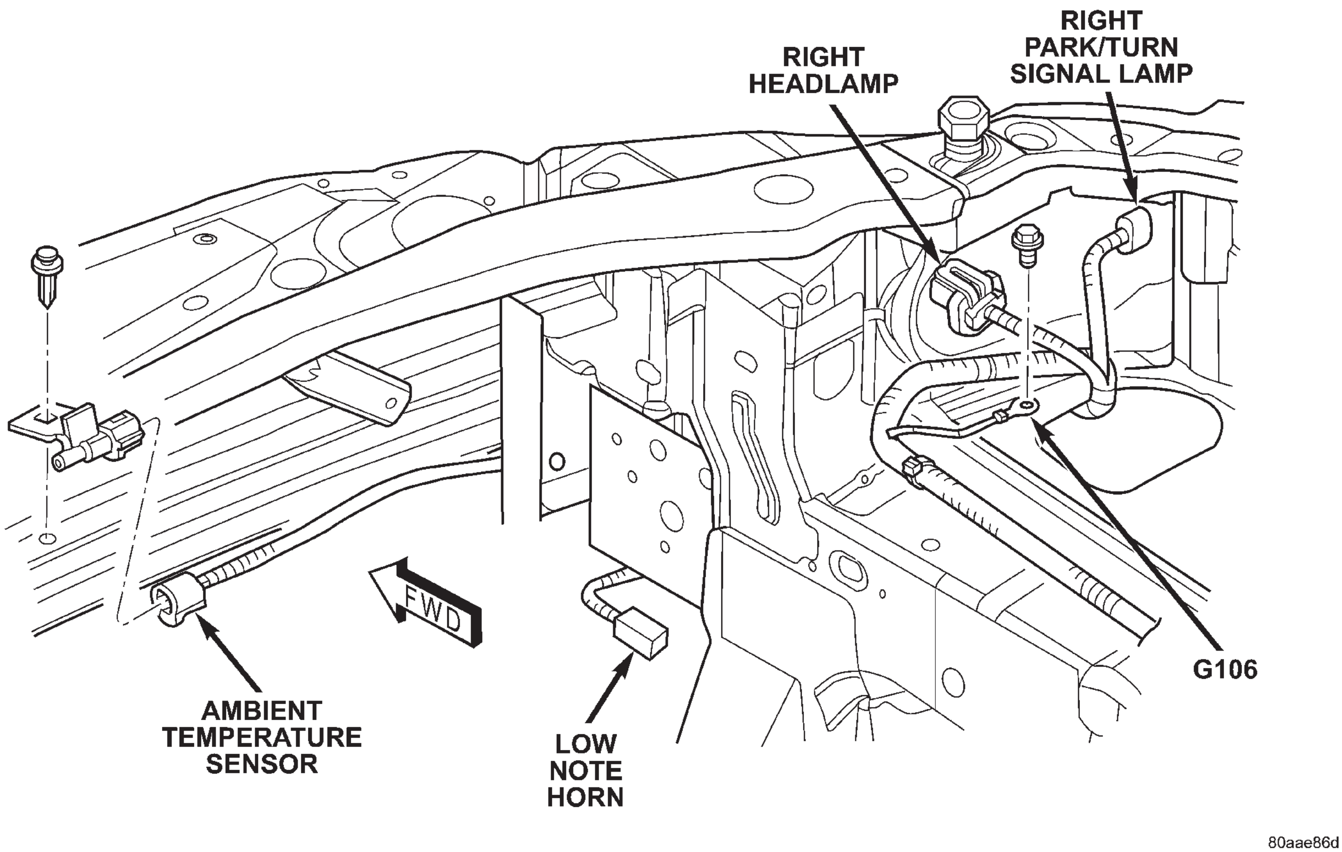


Fig. 1 RIGHT HEADLAMP CONNECTORS

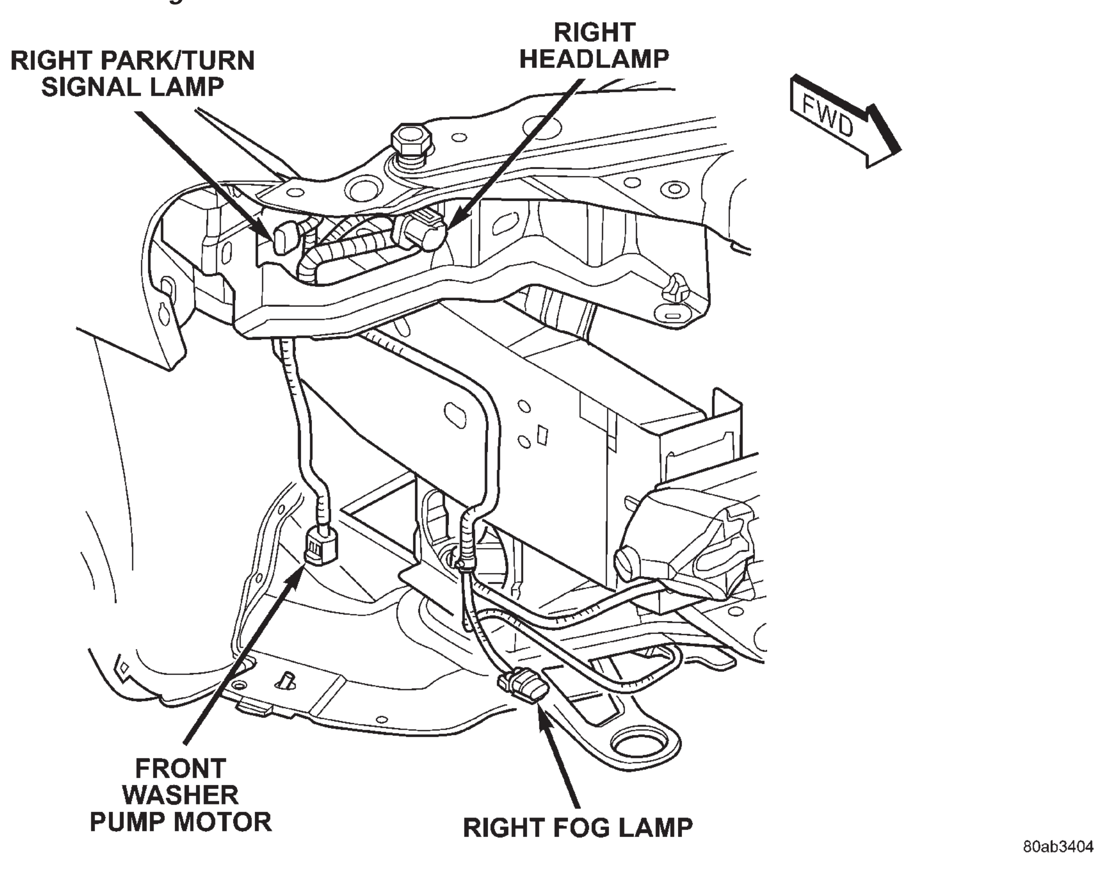


Fig. 2 RIGHT FRONT ENGINE COMPARTMENT CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

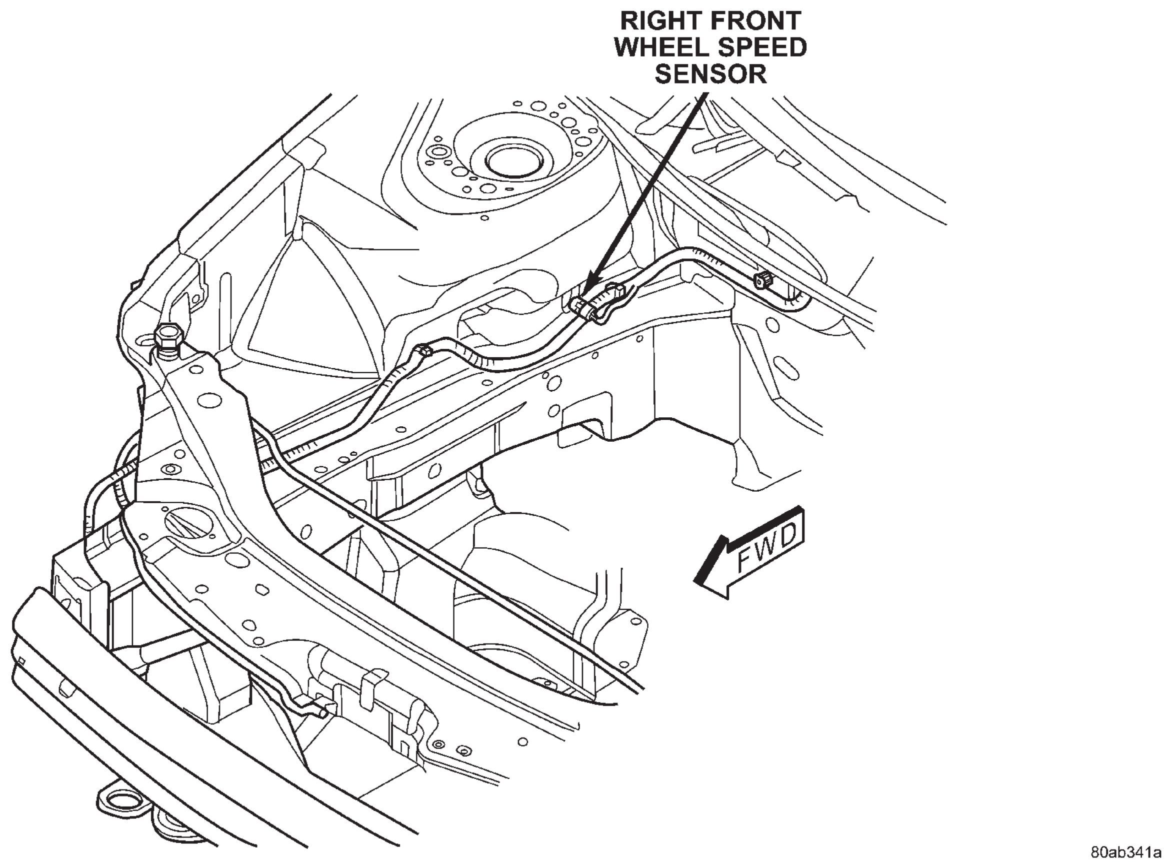


Fig. 3 RIGHT SIDE ENGINE COMPARTMENT CONNECTORS

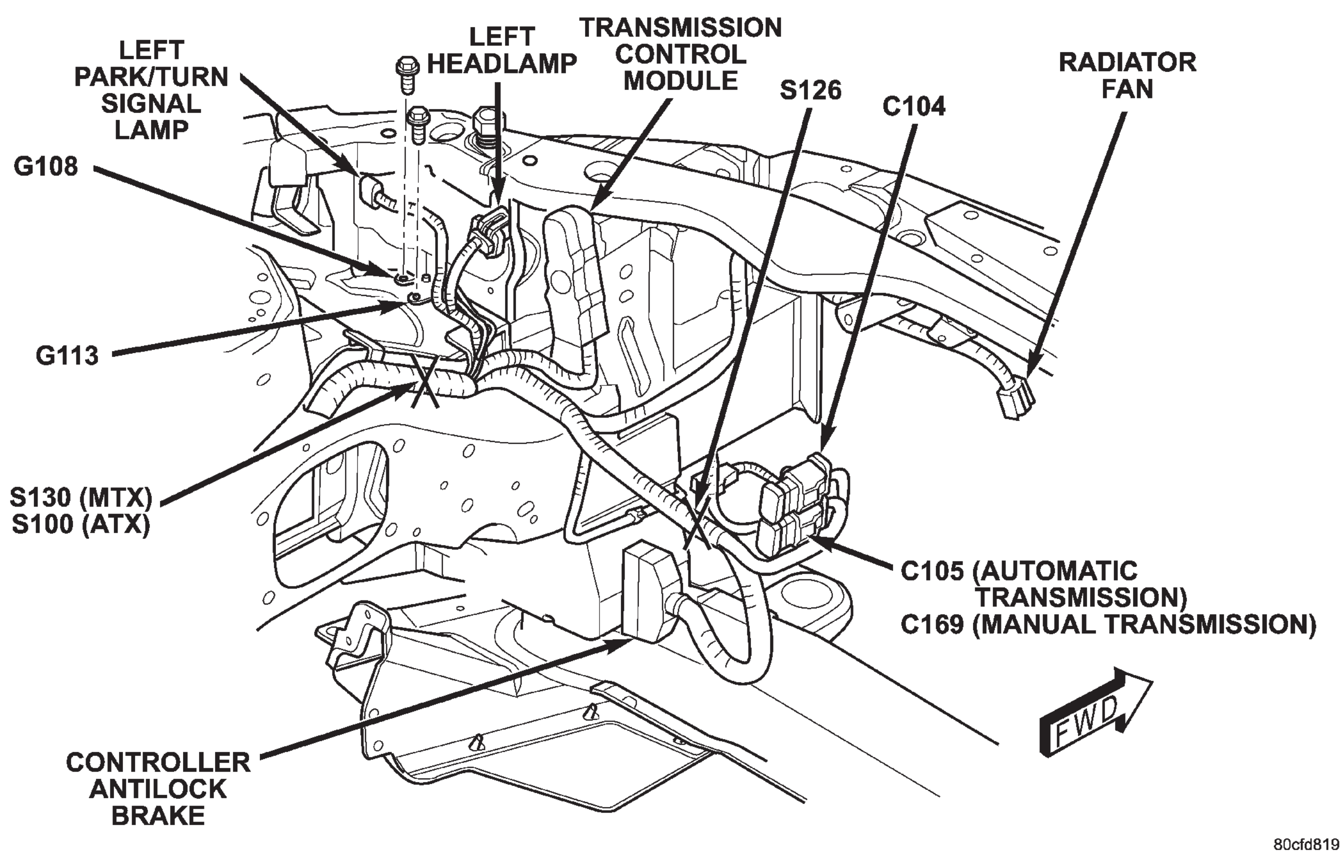


Fig. 4 LEFT FRONT ENGINE COMPARTMENT CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

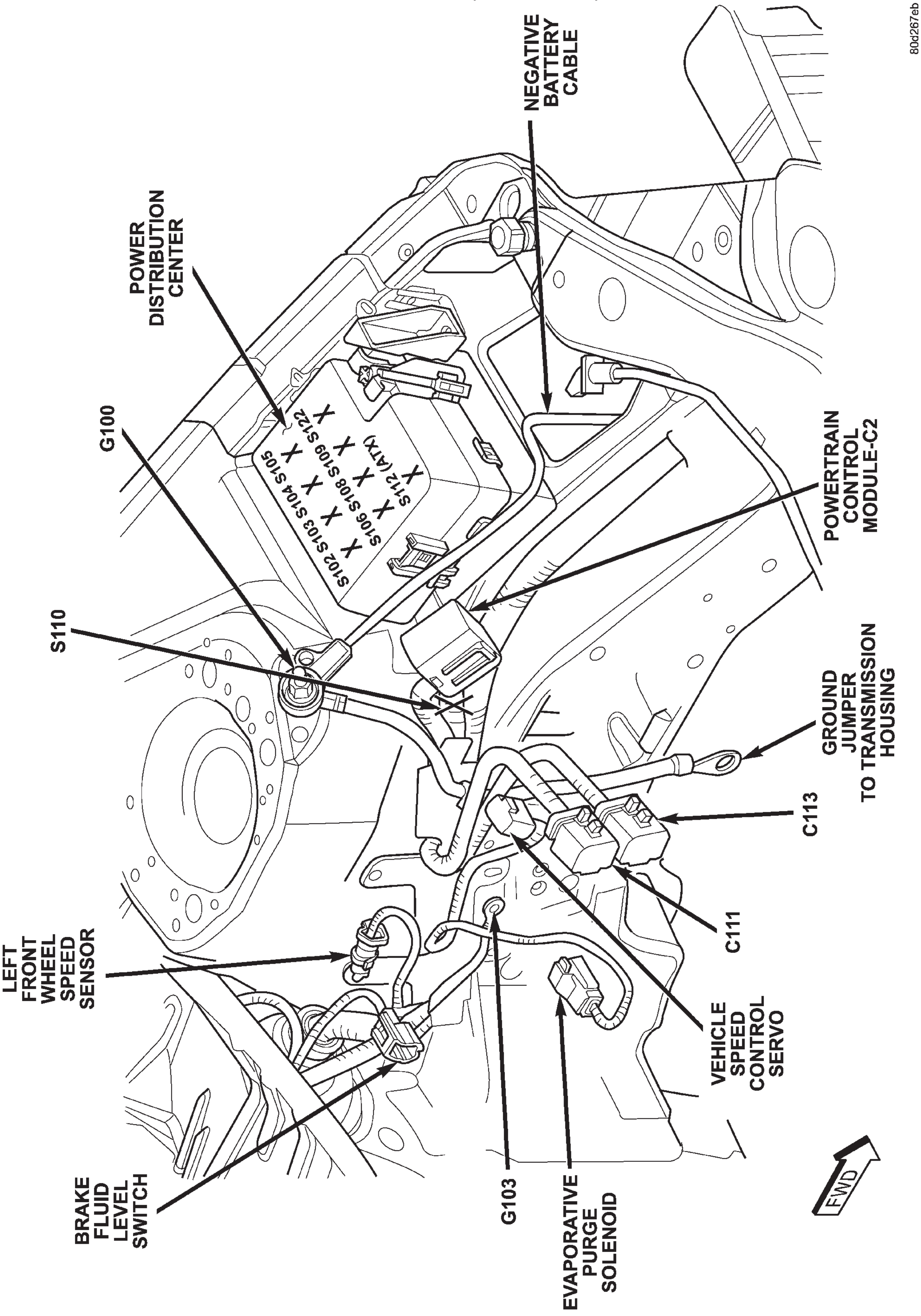


Fig. 5 LEFT SIDE ENGINE COMPARTMENT CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

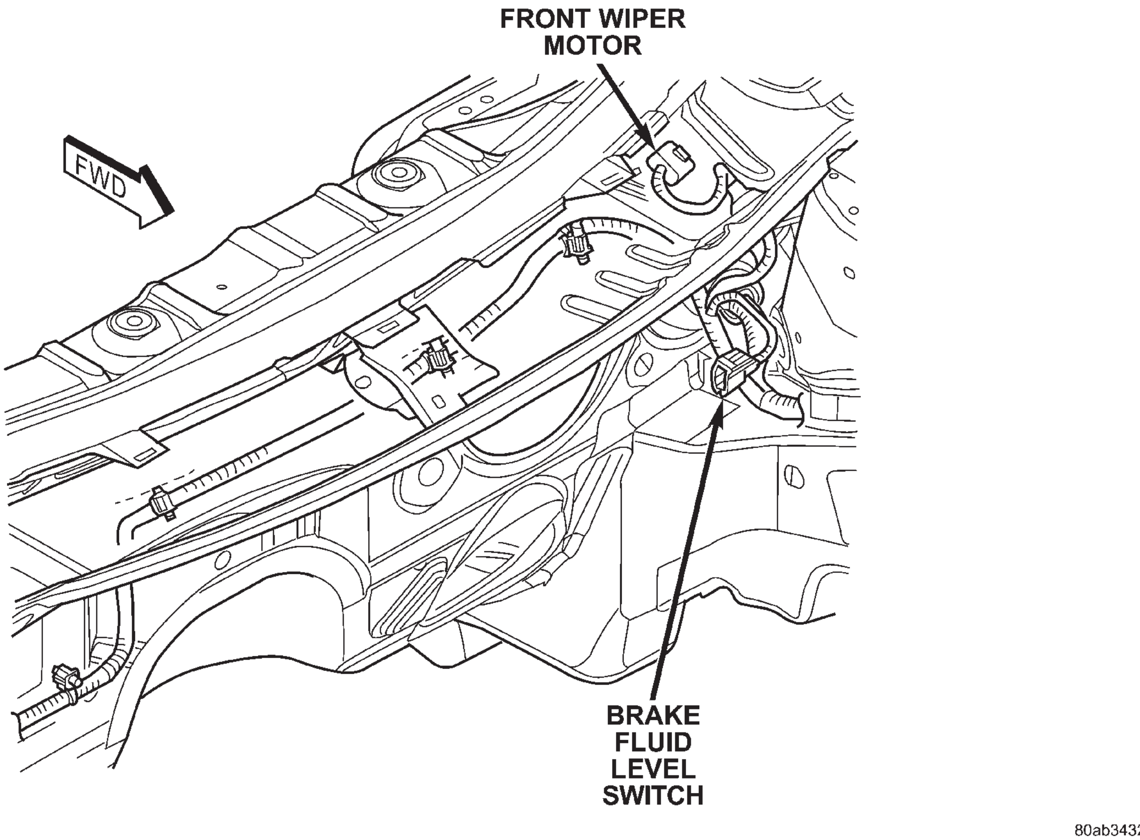


Fig. 6 LEFT REAR ENGINE COMPARTMENT CONNECTORS

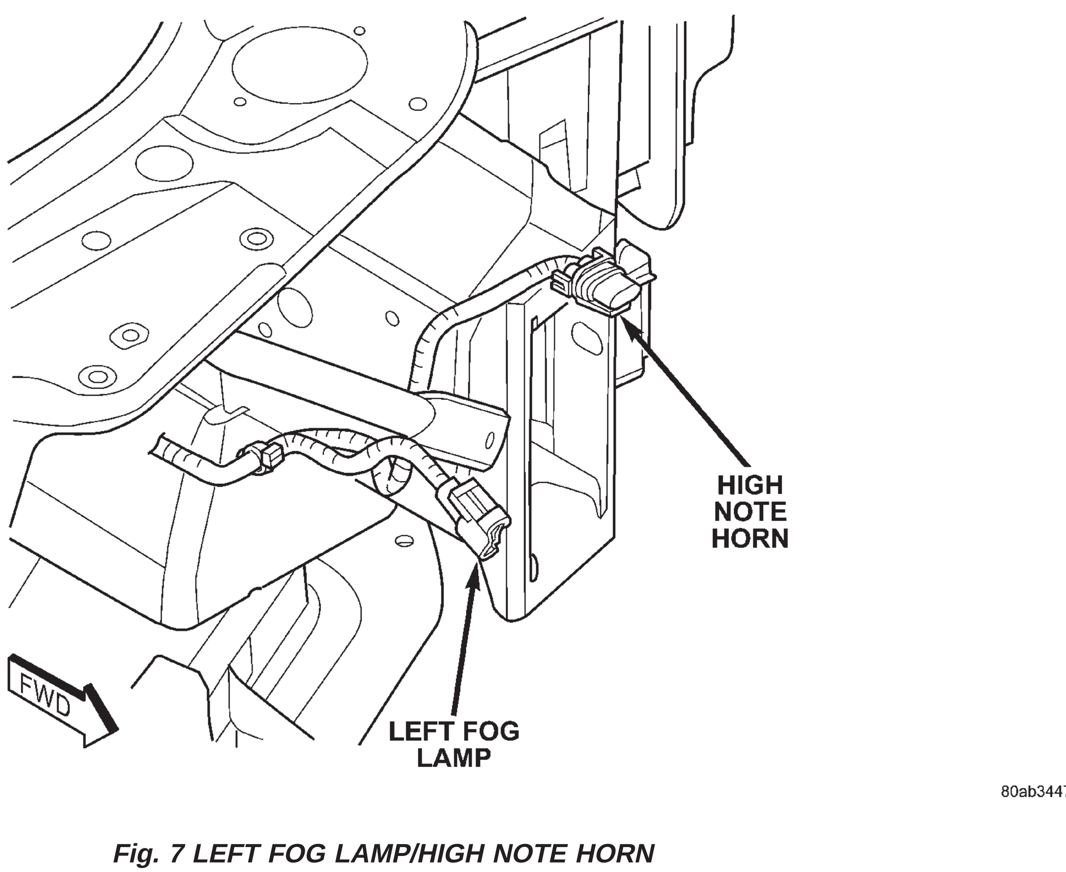


Fig. 7 LEFT FOG LAMP/HIGH NOTE HORN

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

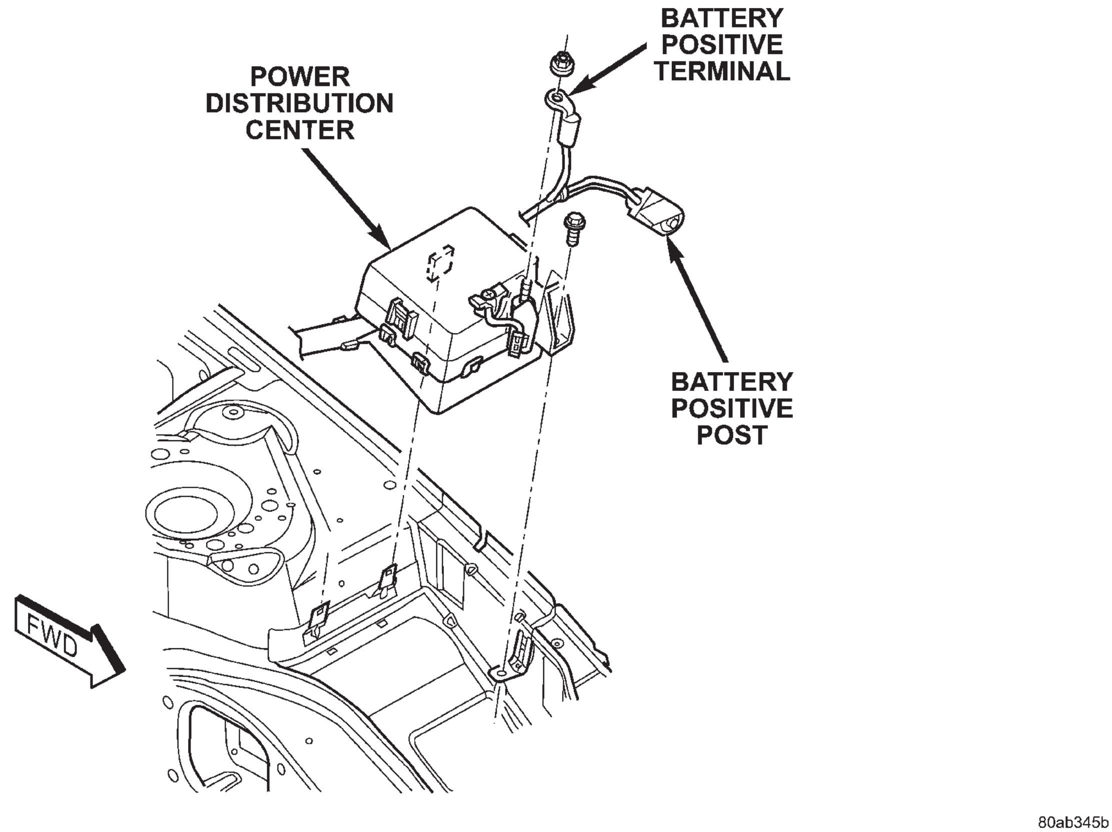


Fig. 8 POWER DISTRIBUTION CENTER

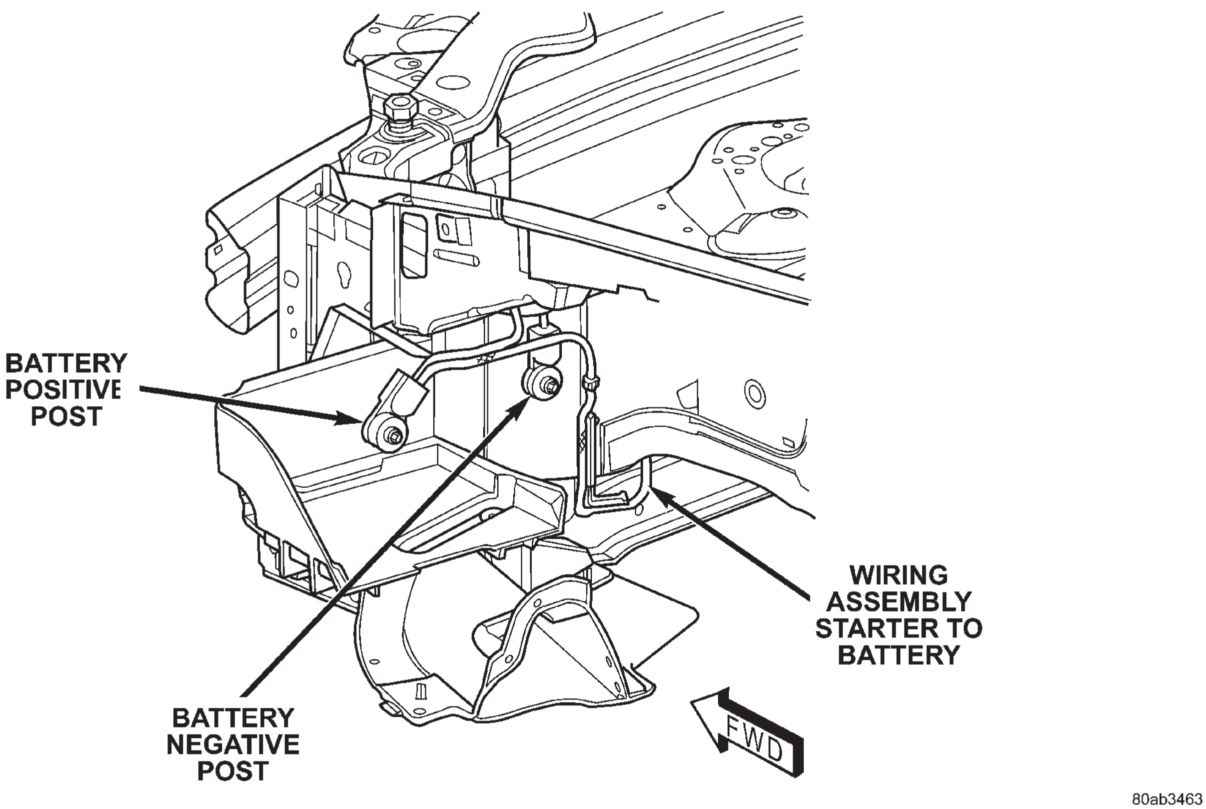


Fig. 9 BATTERY CABLE CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

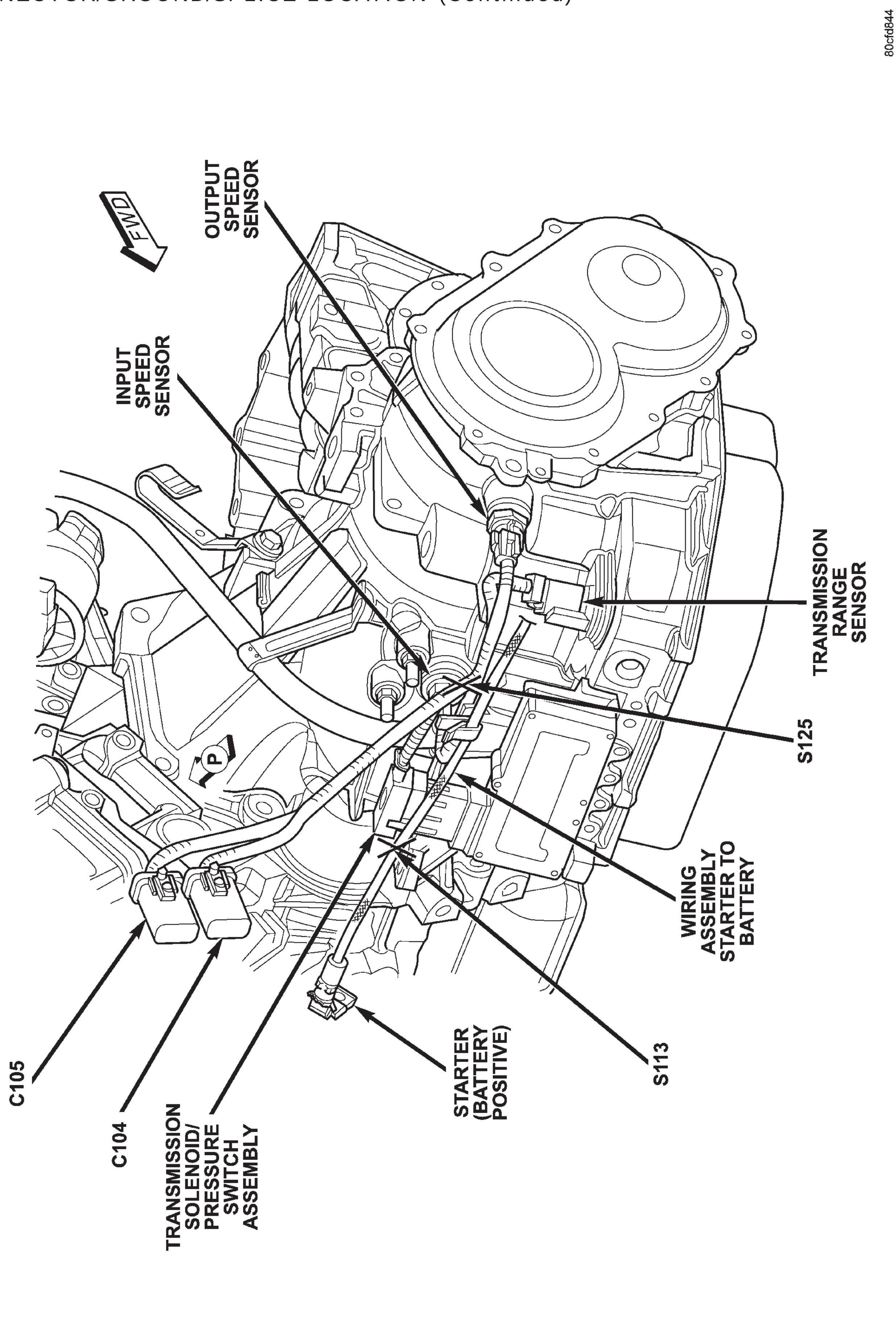


Fig. 10 AUTOMATIC TRANSMISSION CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

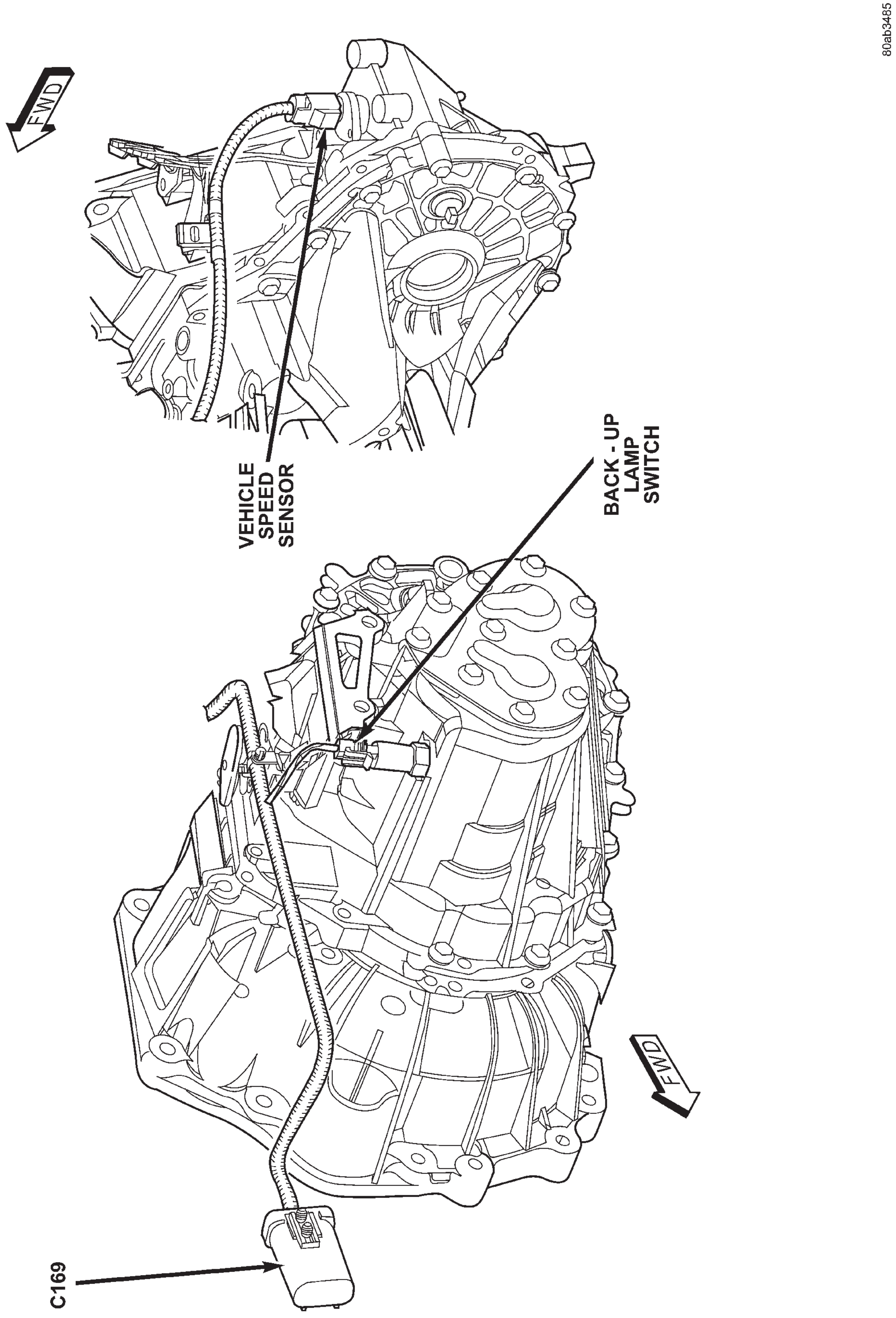


Fig. 11 MANUAL TRANSMISSION CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

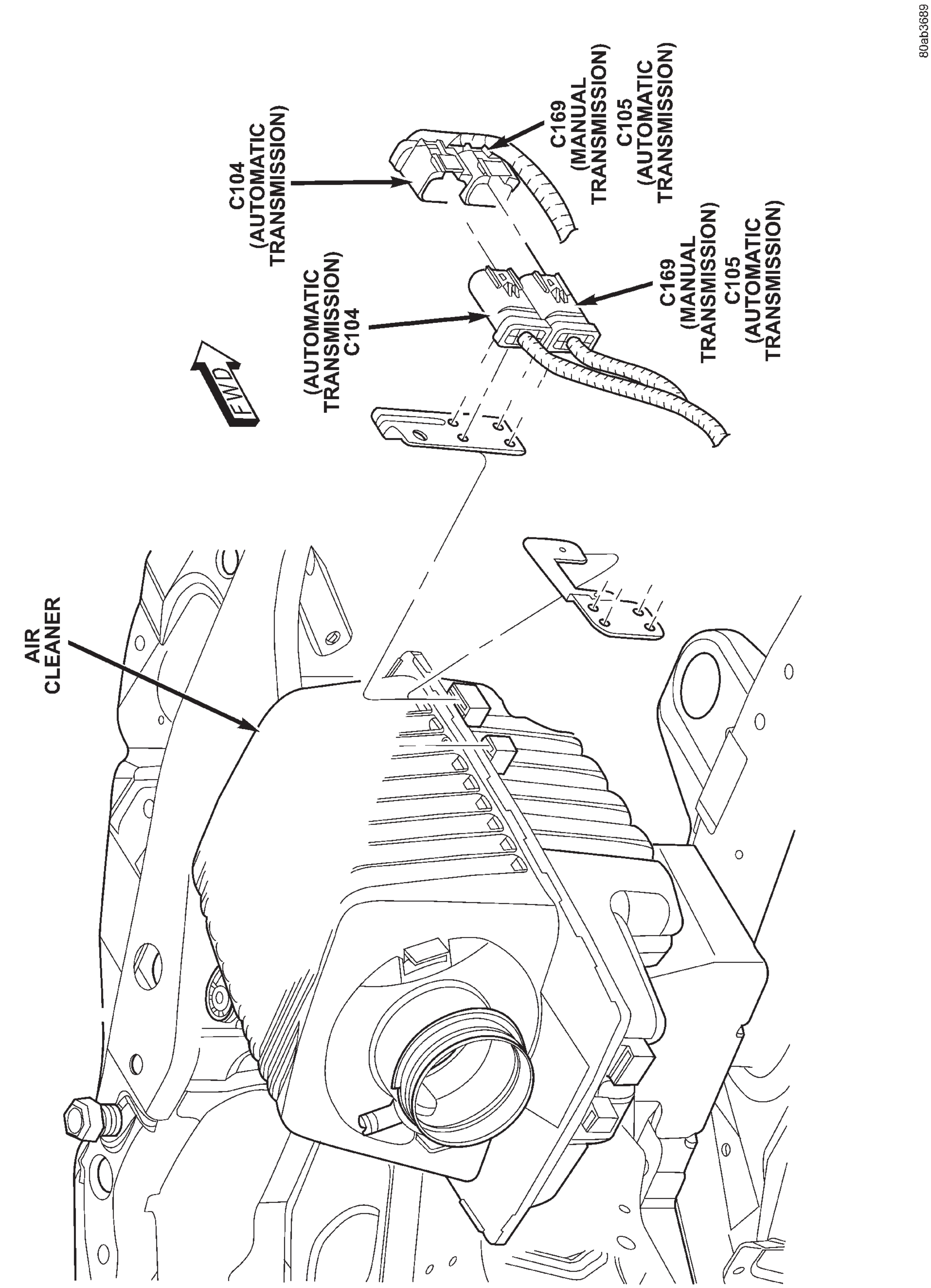


Fig. 12 TRANSMISSION INLINE CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

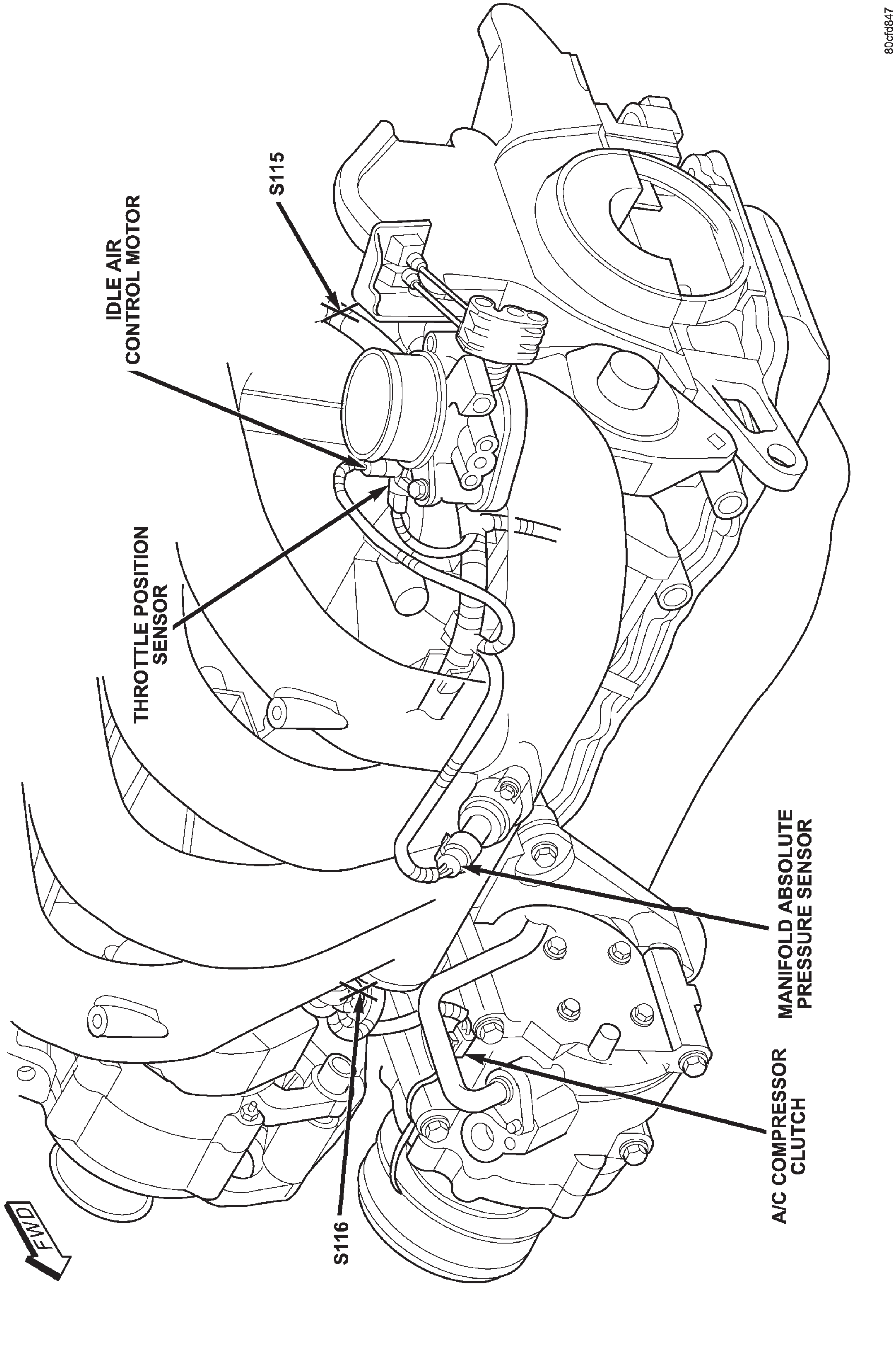


Fig. 13 ENGINE FRONT CONNECTORS 2.0L/2.4L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

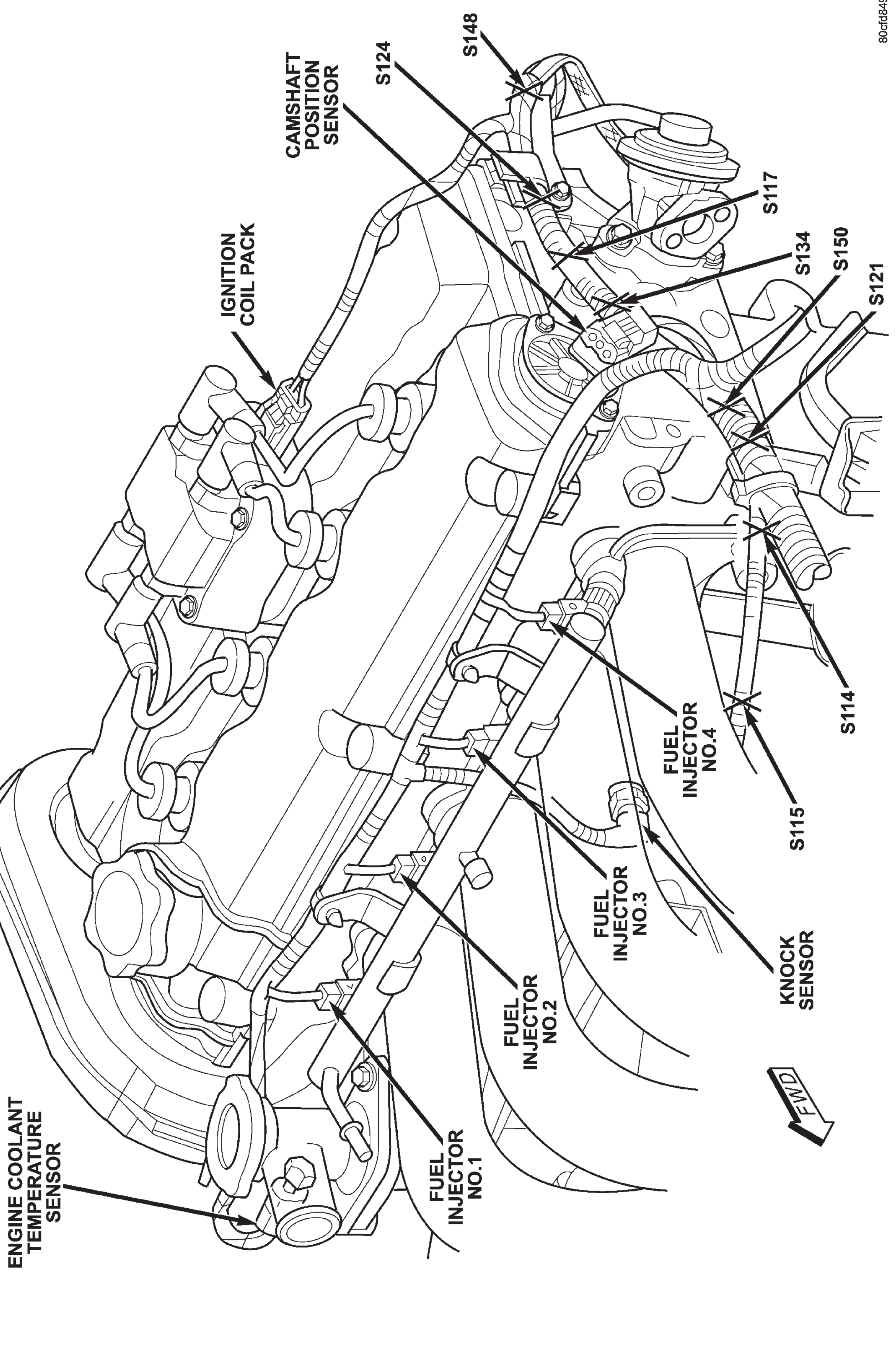


Fig. 14 FUEL INJECTOR CONNECTORS 2.0L/2.4L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

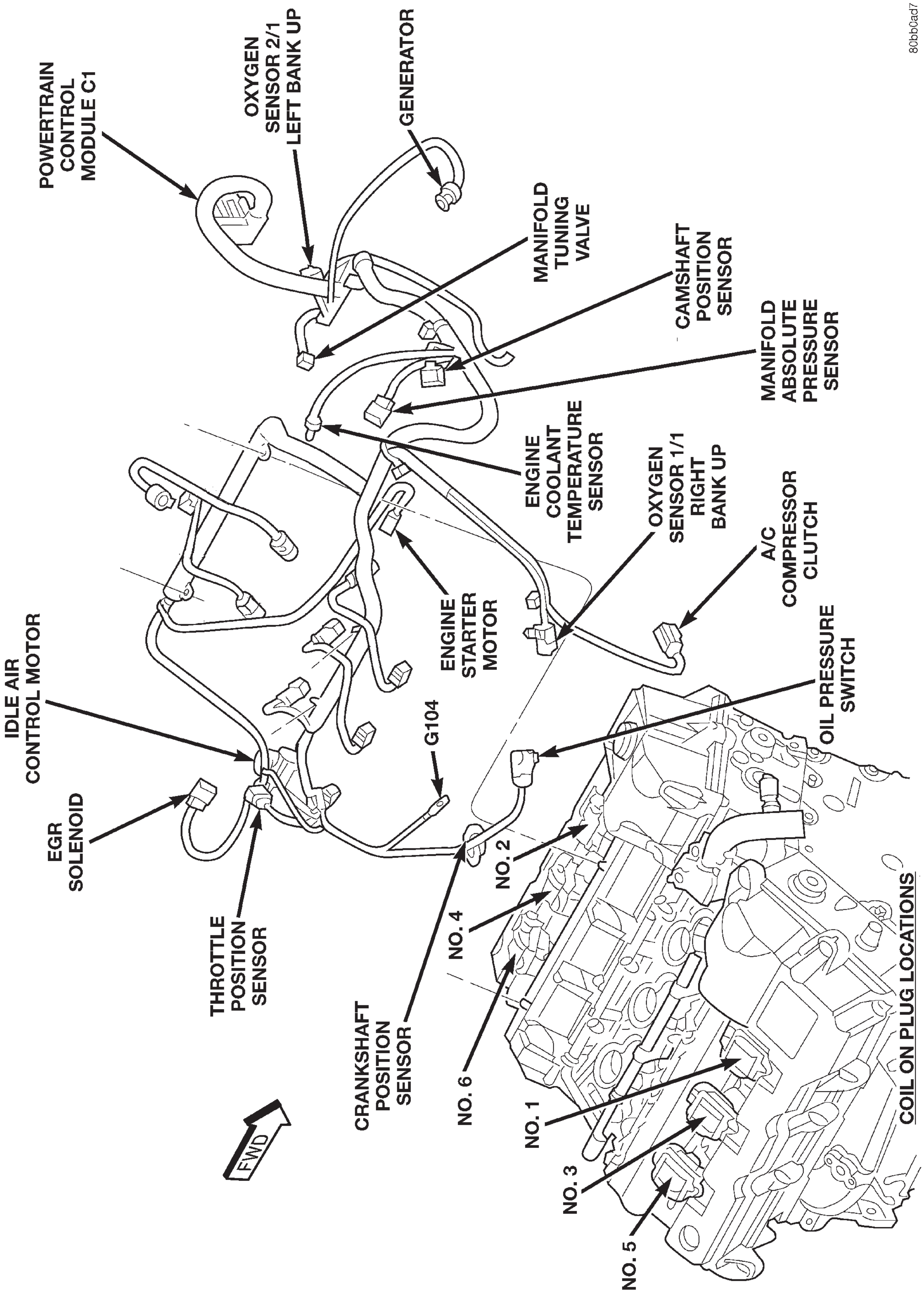


Fig. 15 ENGINE CONNECTORS, 2.7L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

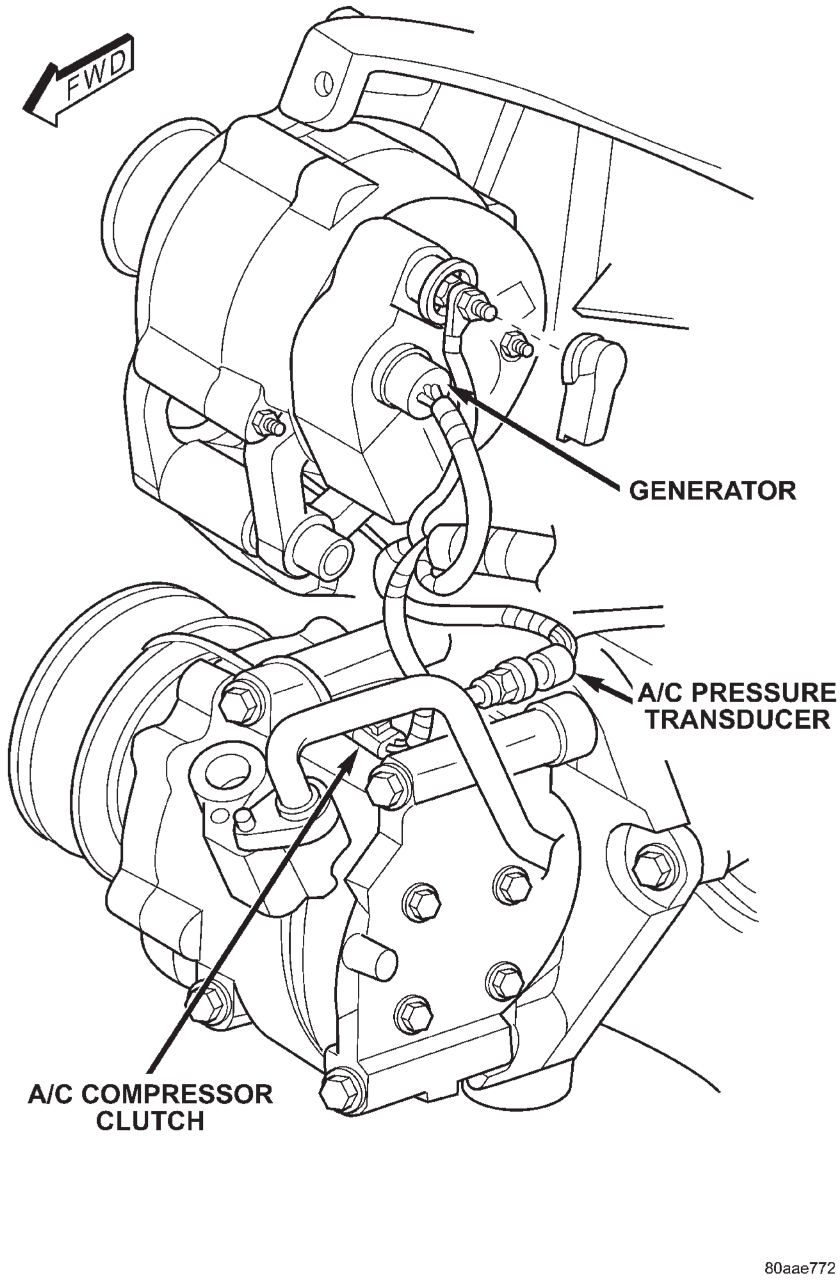
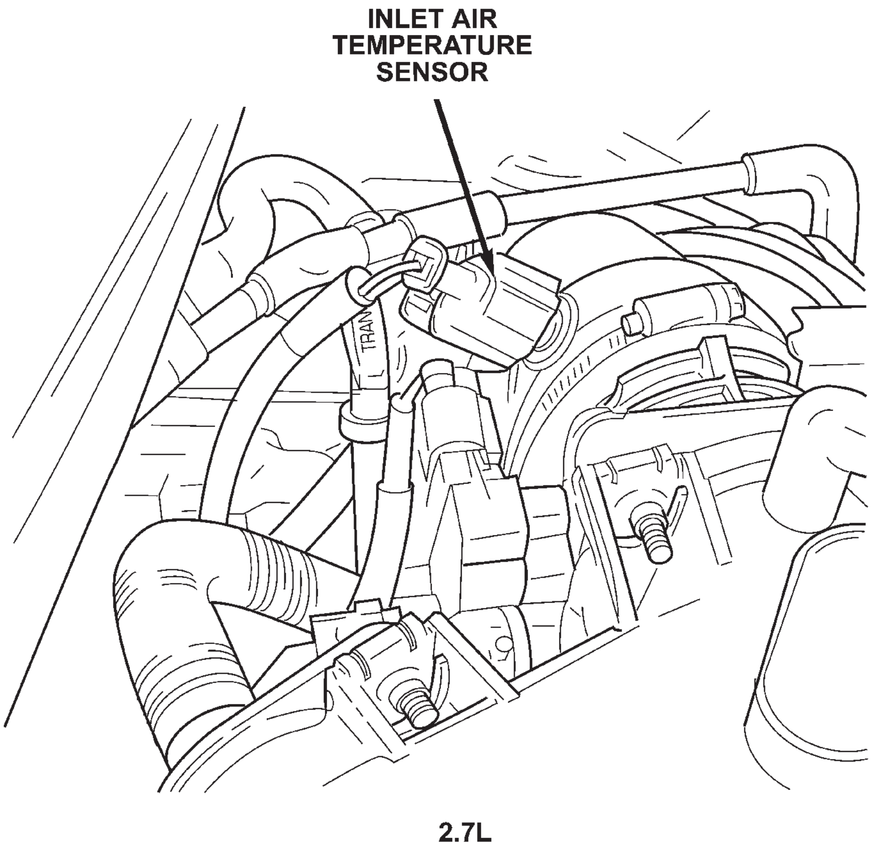


Fig. 16 GENERATOR AND A/C CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



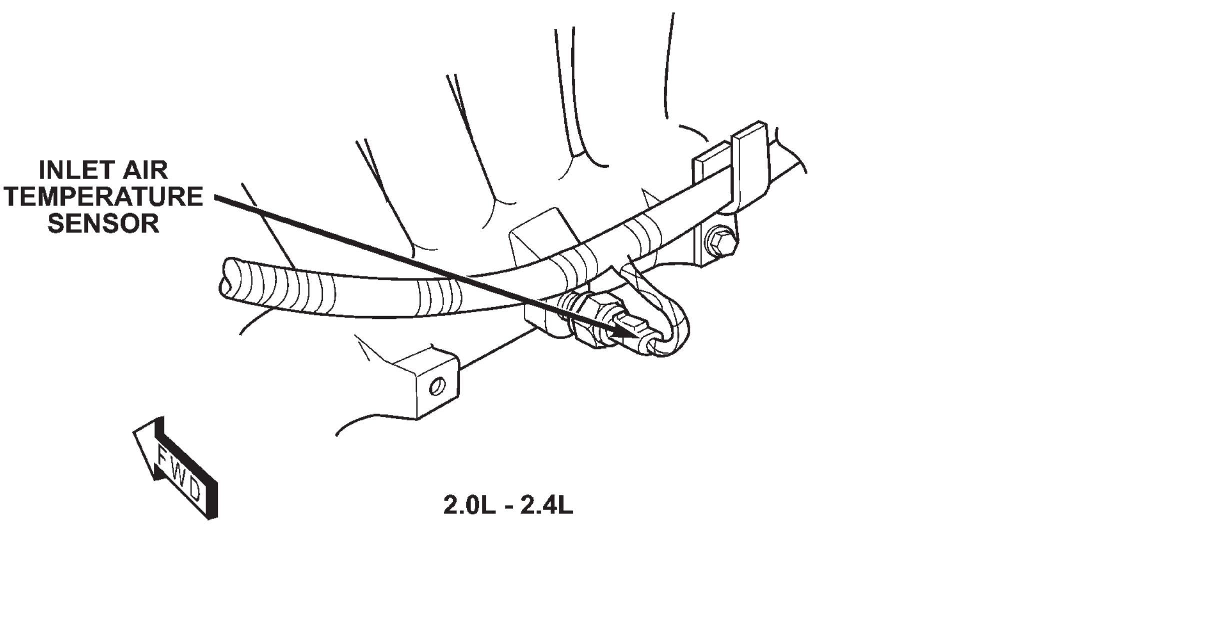


Fig. 17 INLET AIR TEMPERATURE SENSOR

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

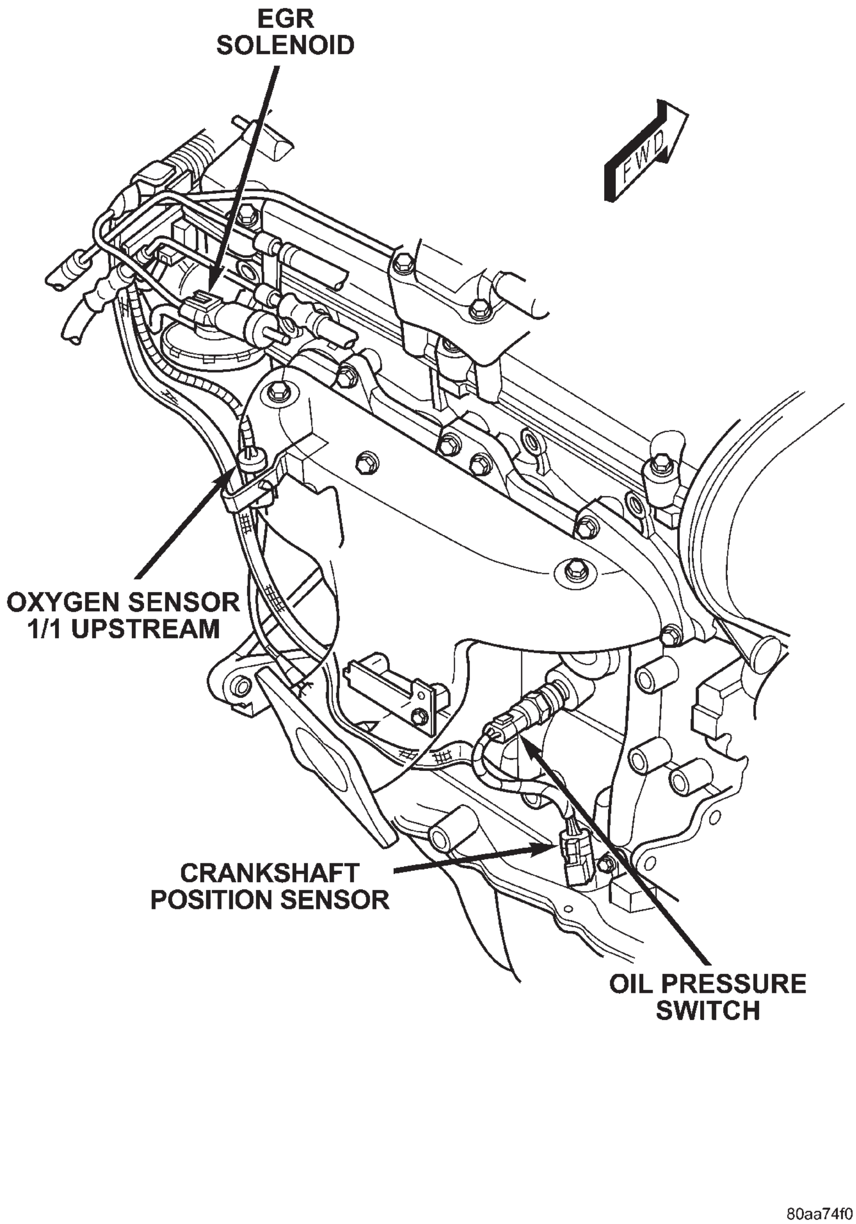


Fig. 18 REAR ENGINE CONNECTORS - 2.0L/2.4L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

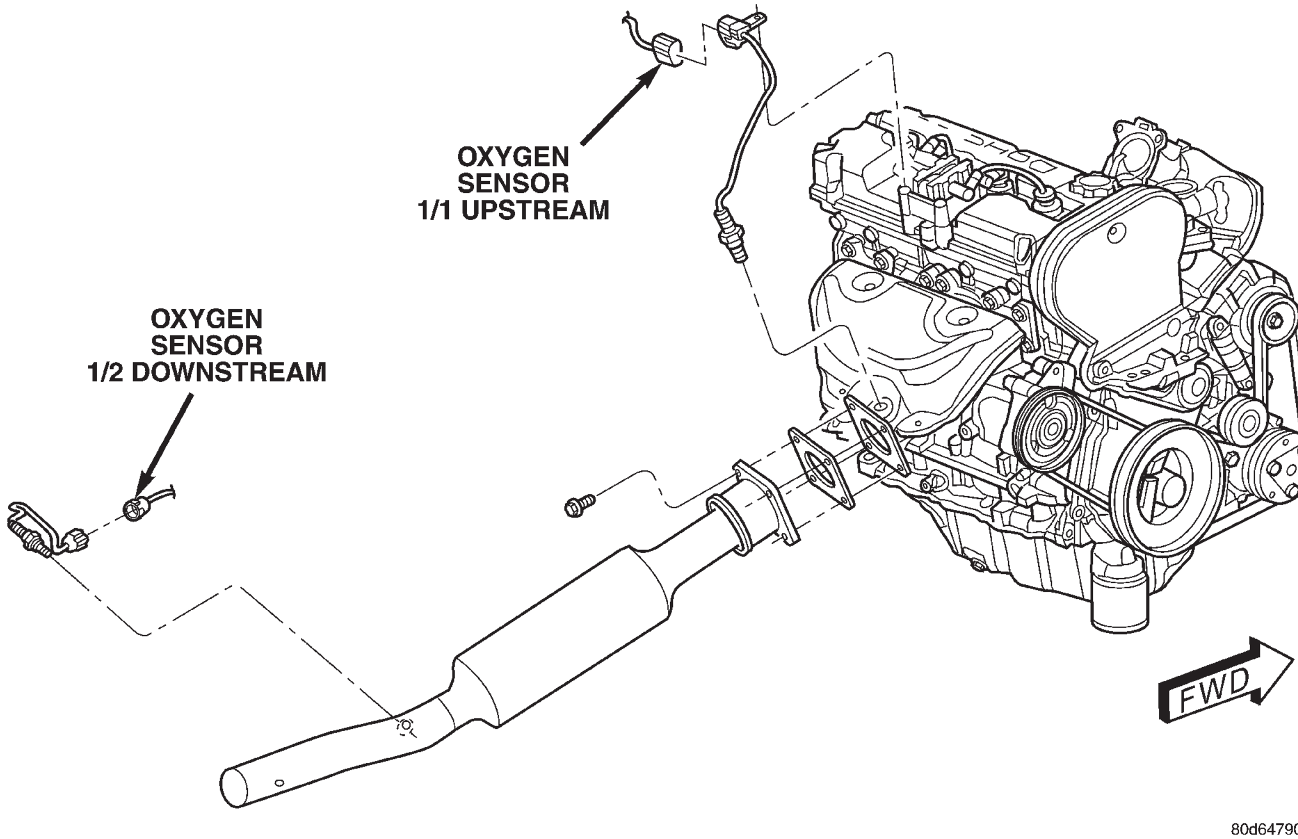


Fig. 19 OXYGEN SENSORS - 2.0L/2.4L

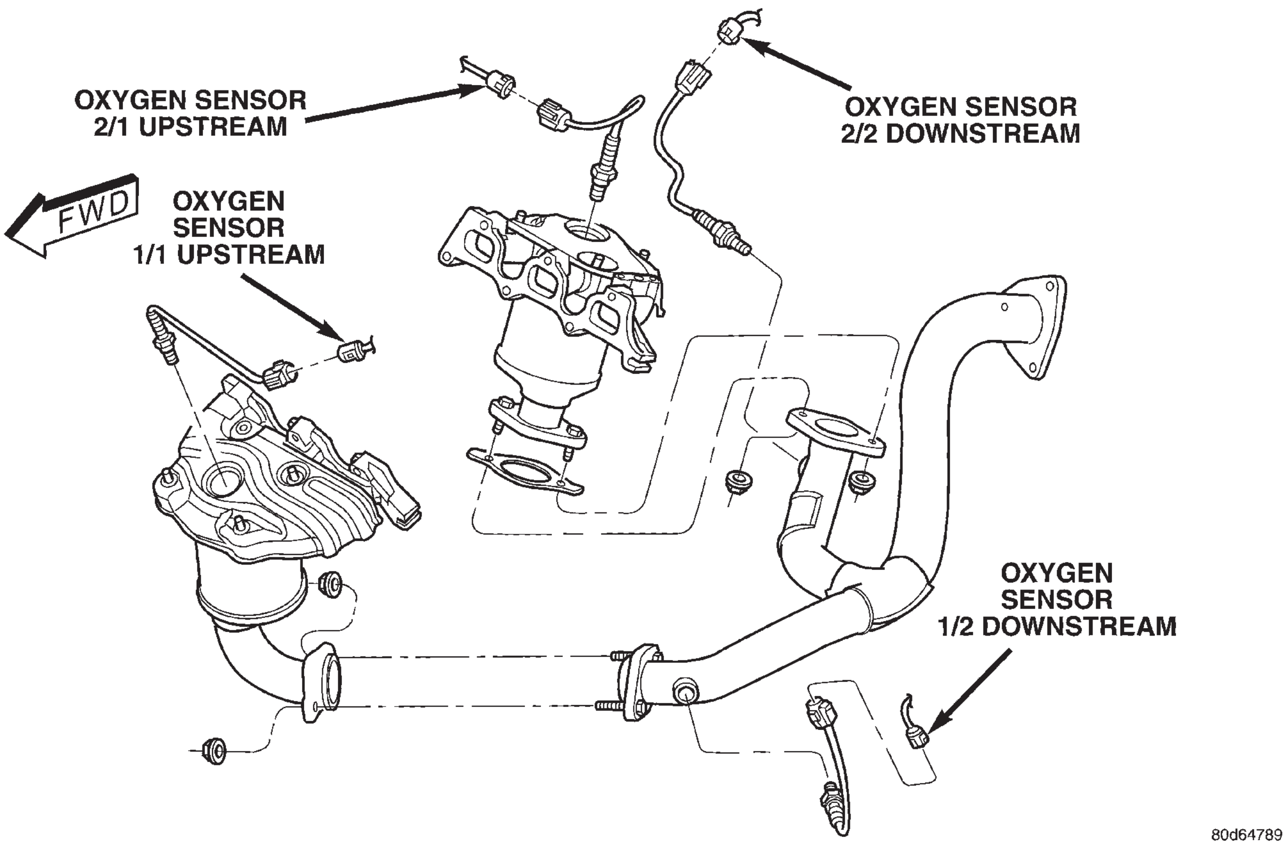


Fig. 20 OXYGEN SENSORS 2.7L

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

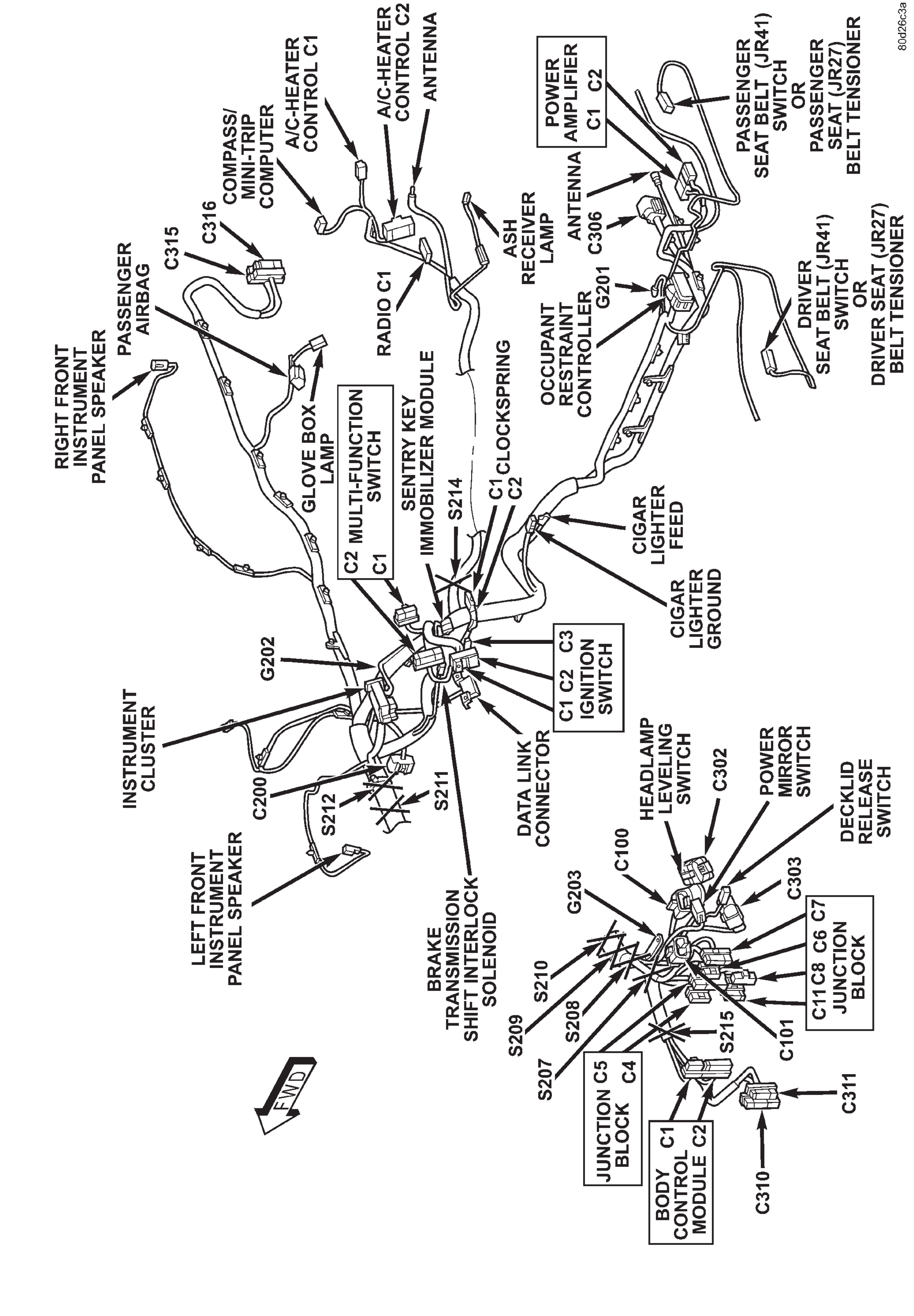


Fig. 21 INSTRUMENT PANEL HARNESS CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

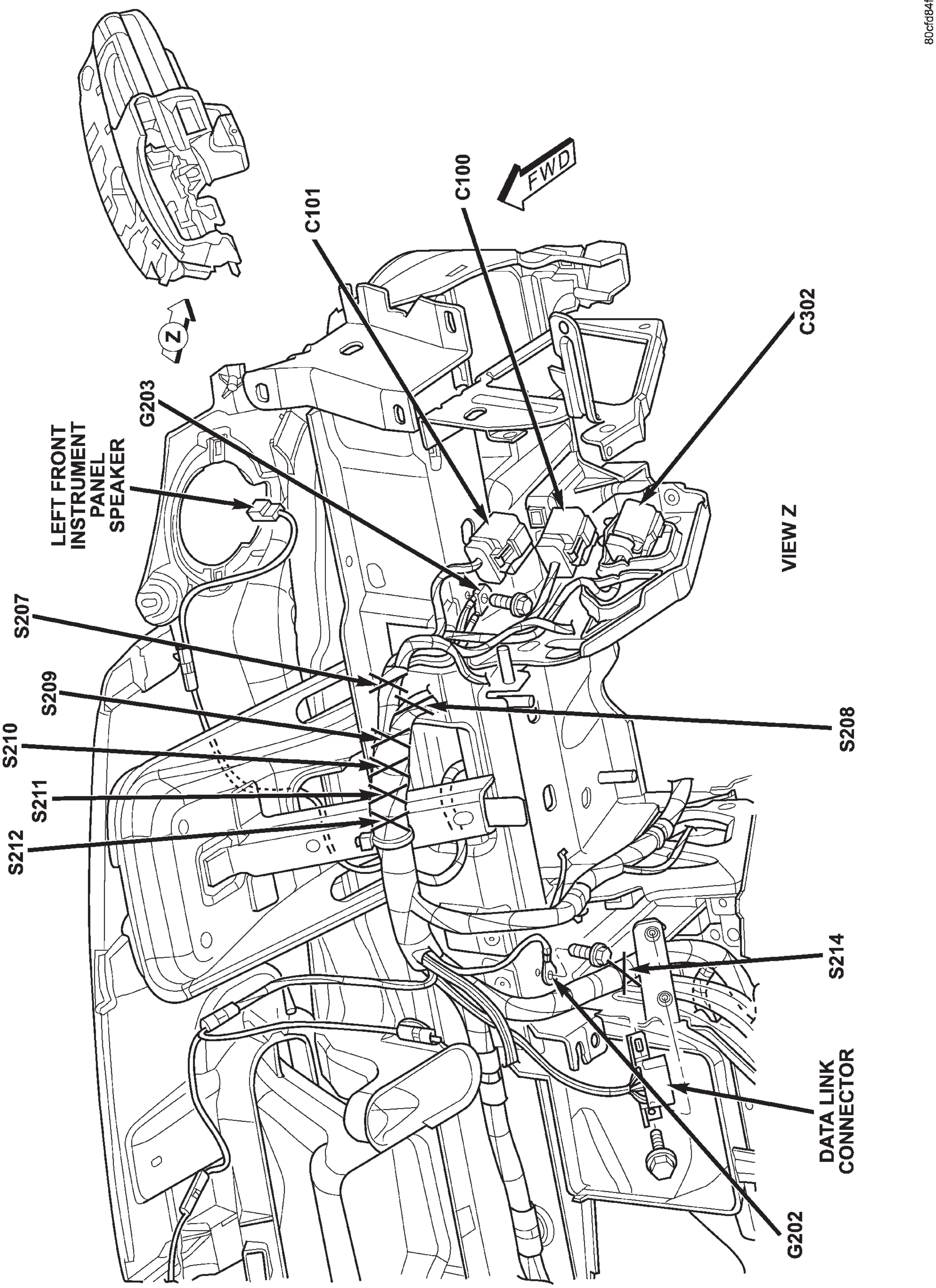


Fig. 22 LEFT SIDE INSTRUMENT PANEL

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

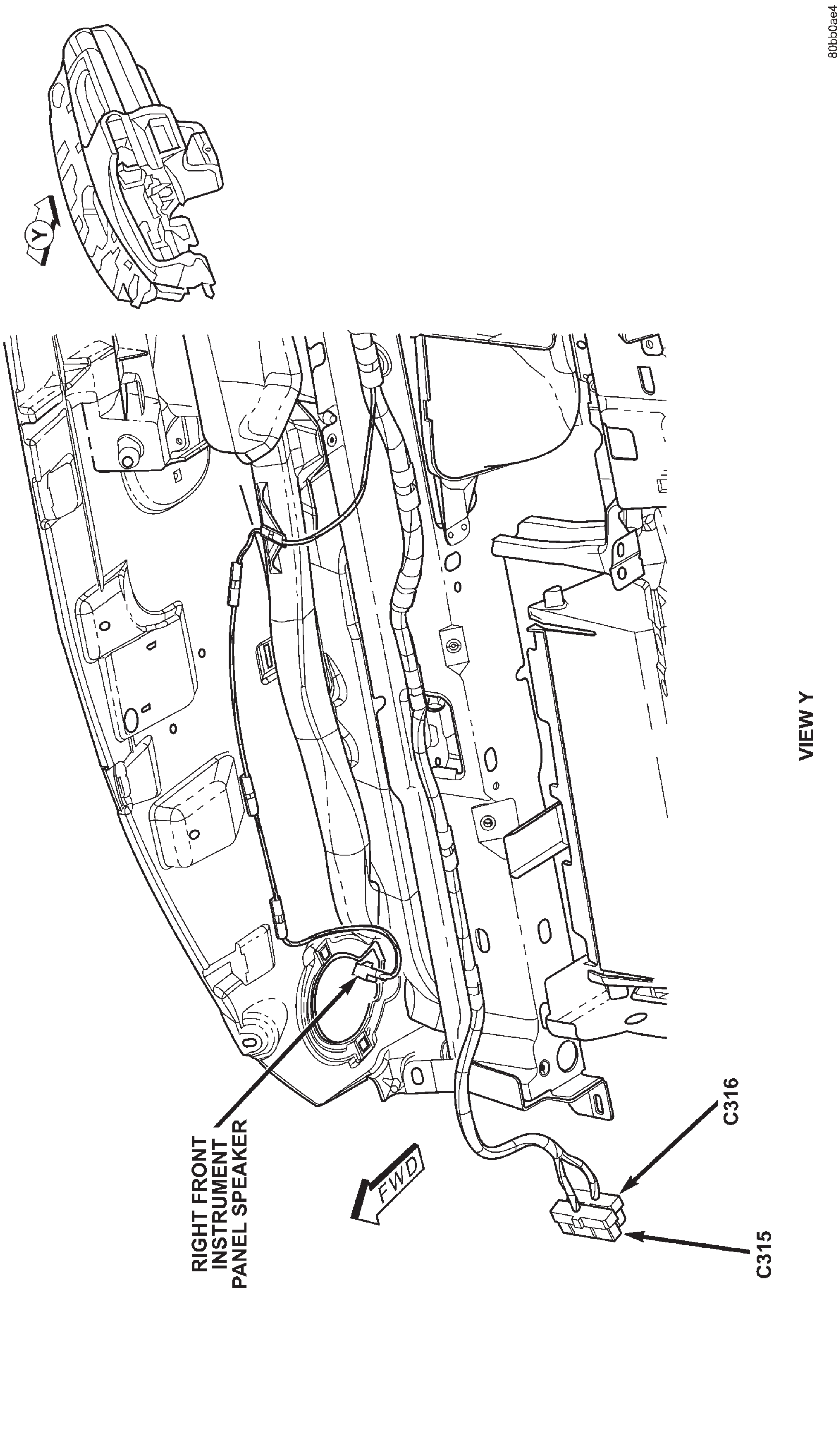


Fig. 23 RIGHT SIDE INSTRUMENT PANEL

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

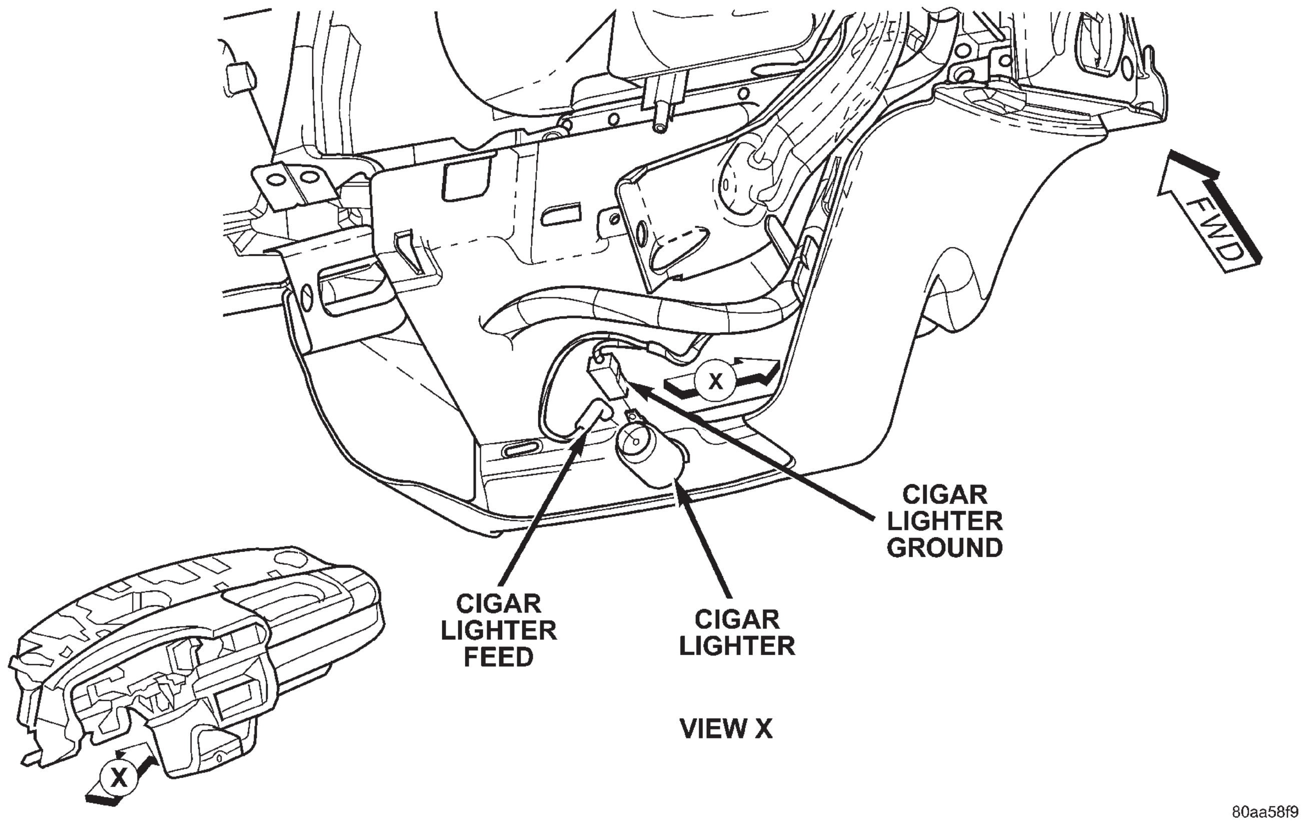


Fig. 24 CENTER INSTRUMENT PANEL CONNECTORS

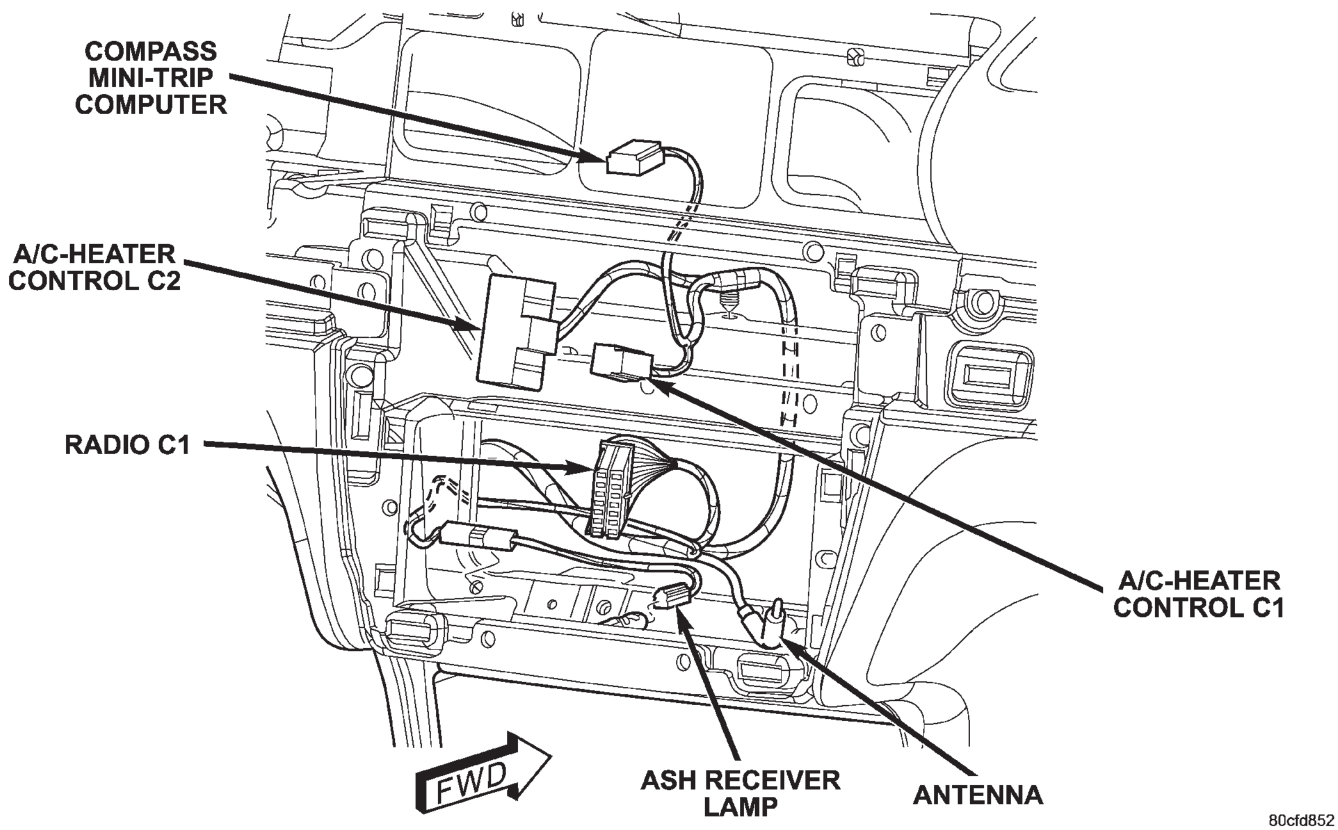


Fig. 25 CENTER INSTRUMENT PANEL CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

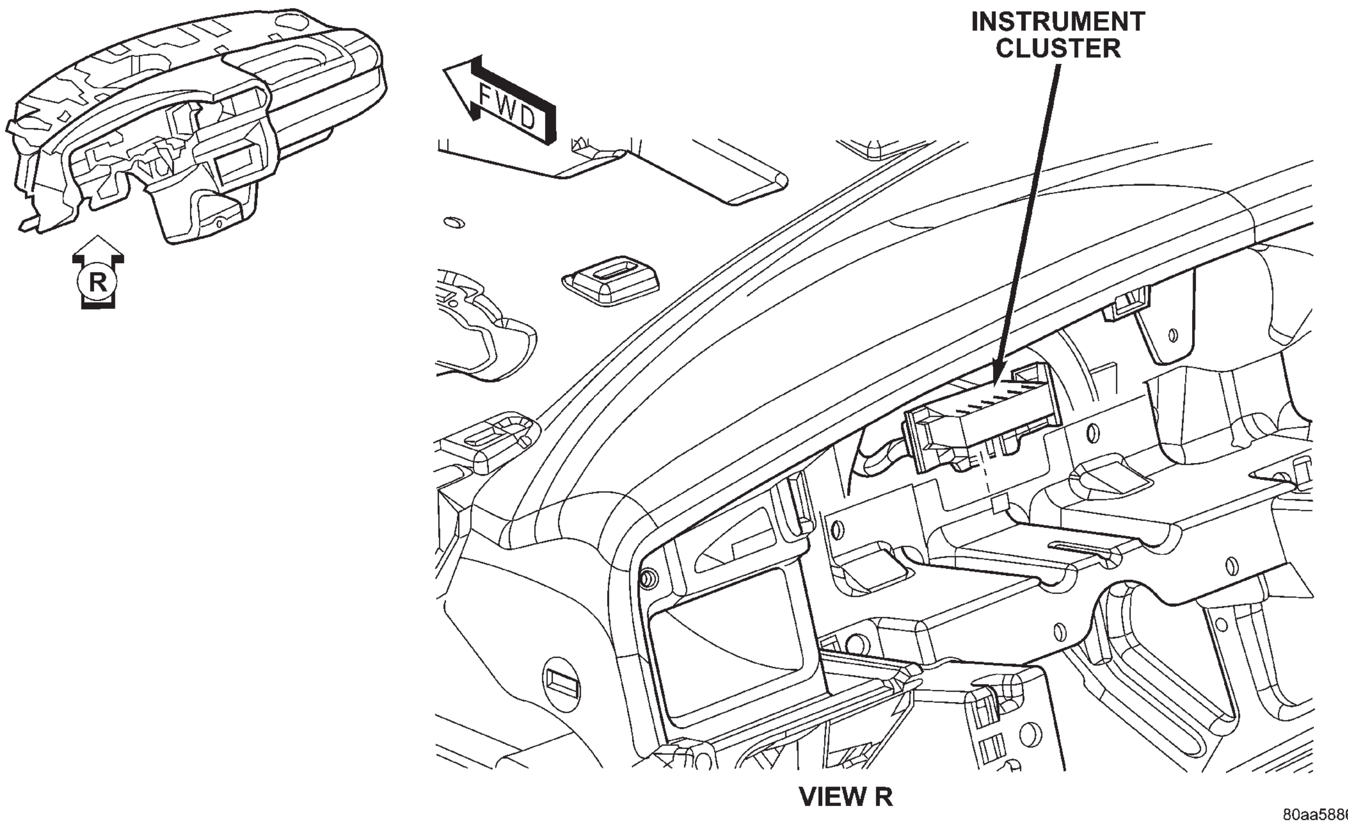


Fig. 26 INSTRUMENT CLUSTER

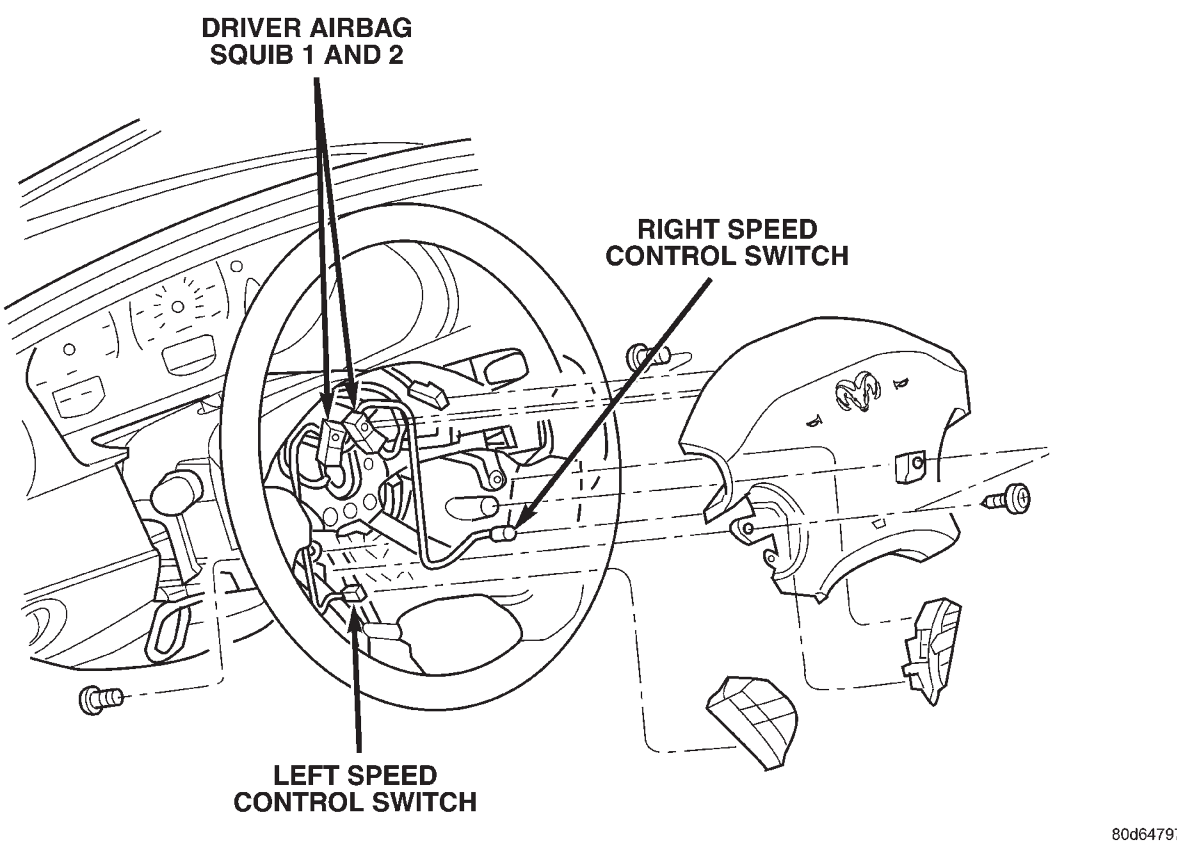


Fig. 27 STEERING COLUMN

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

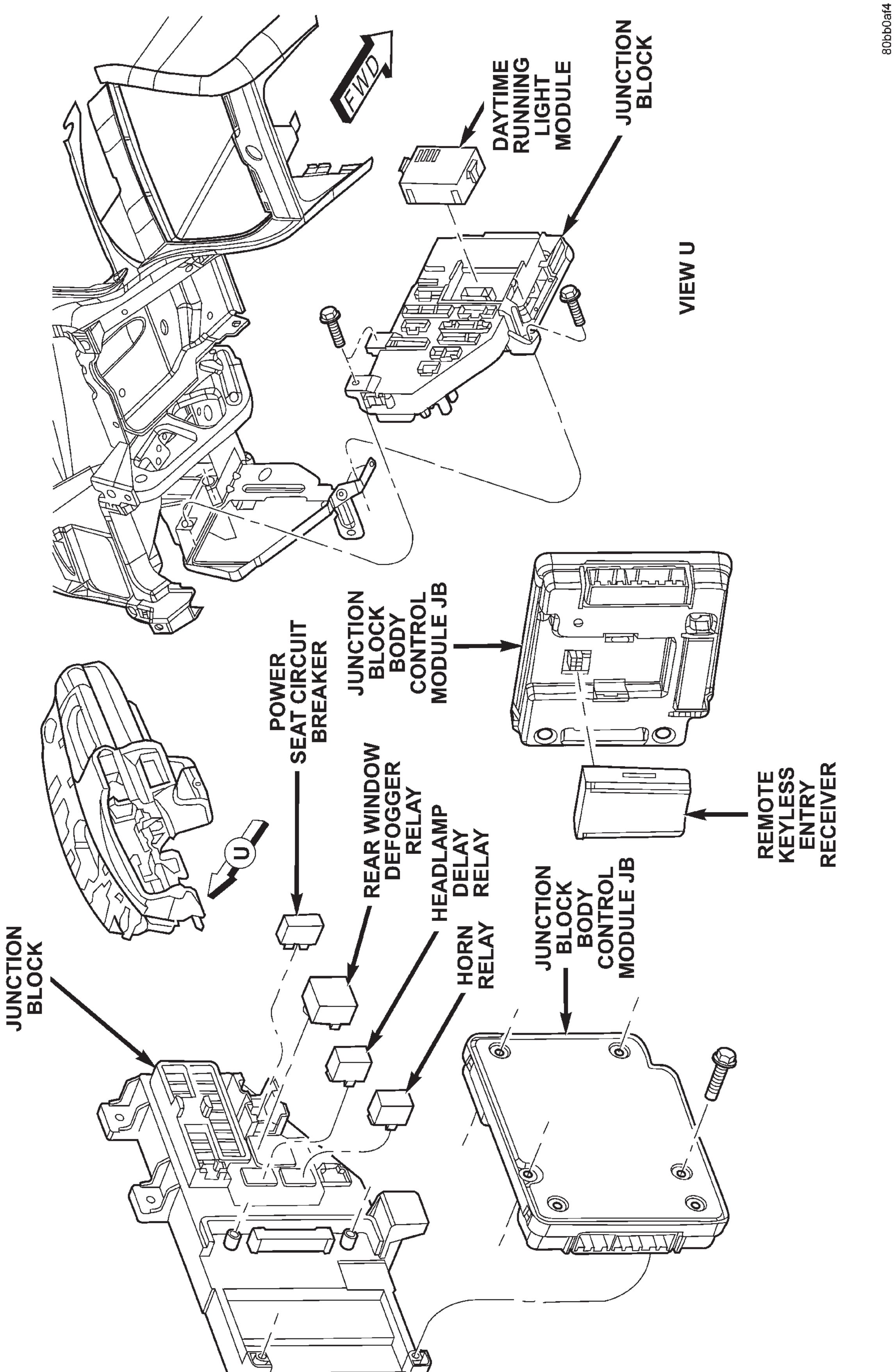


Fig. 28 JUNCTION BLOCK

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

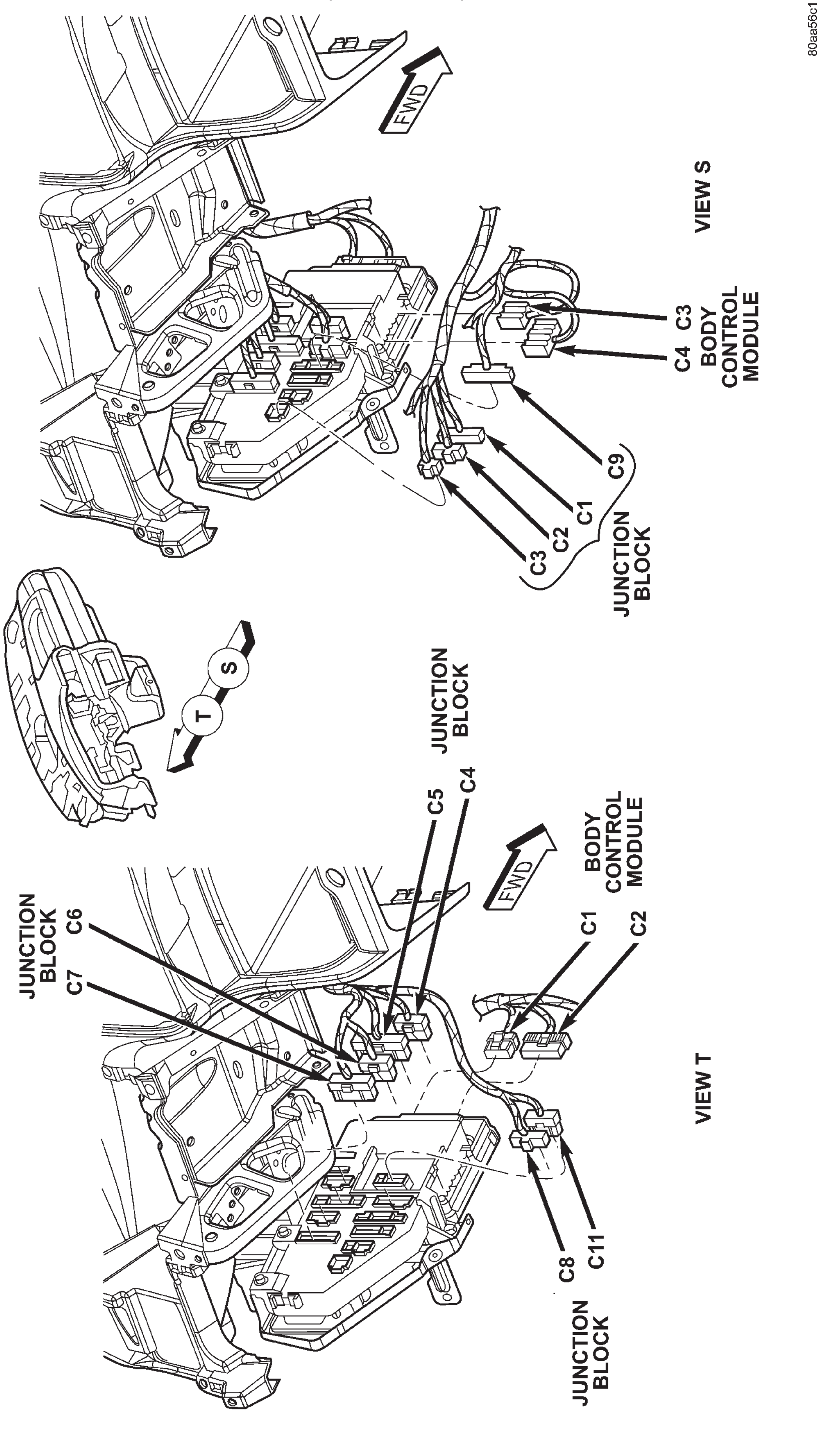


Fig. 29 LEFT FRONT KICK PANEL

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

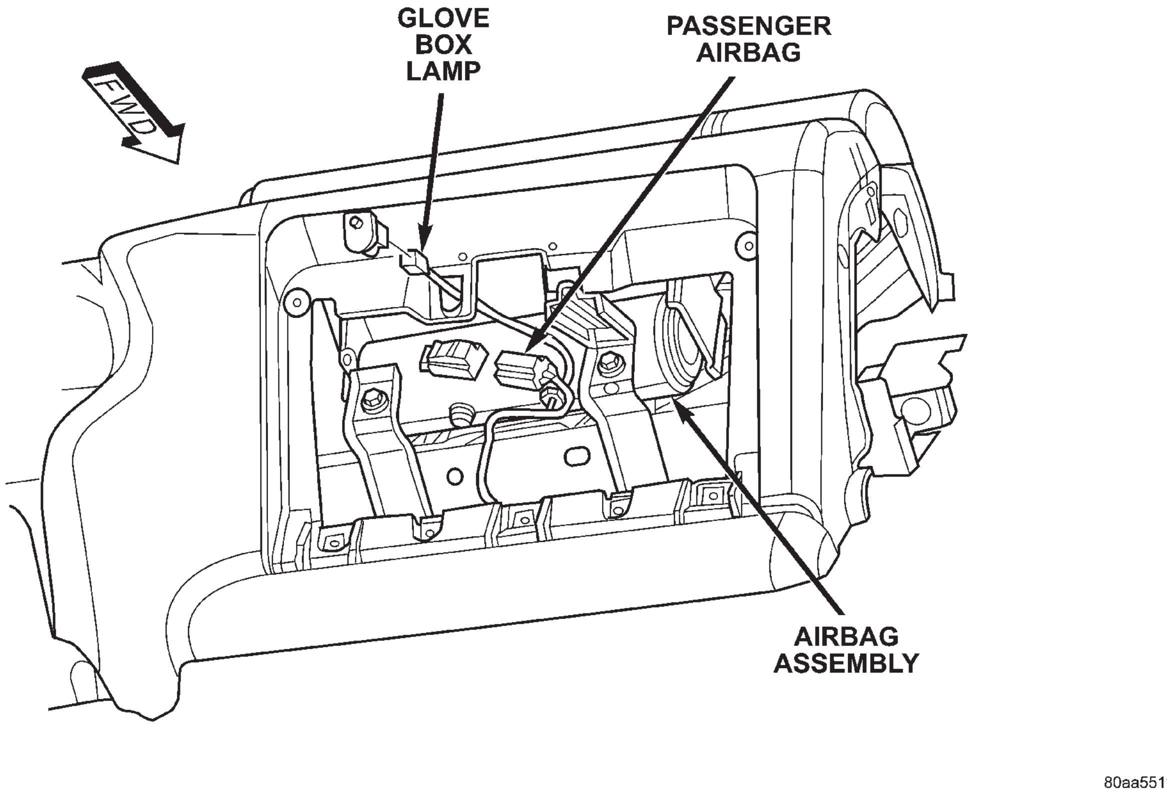


Fig. 30 GLOVE BOX CONNECTORS

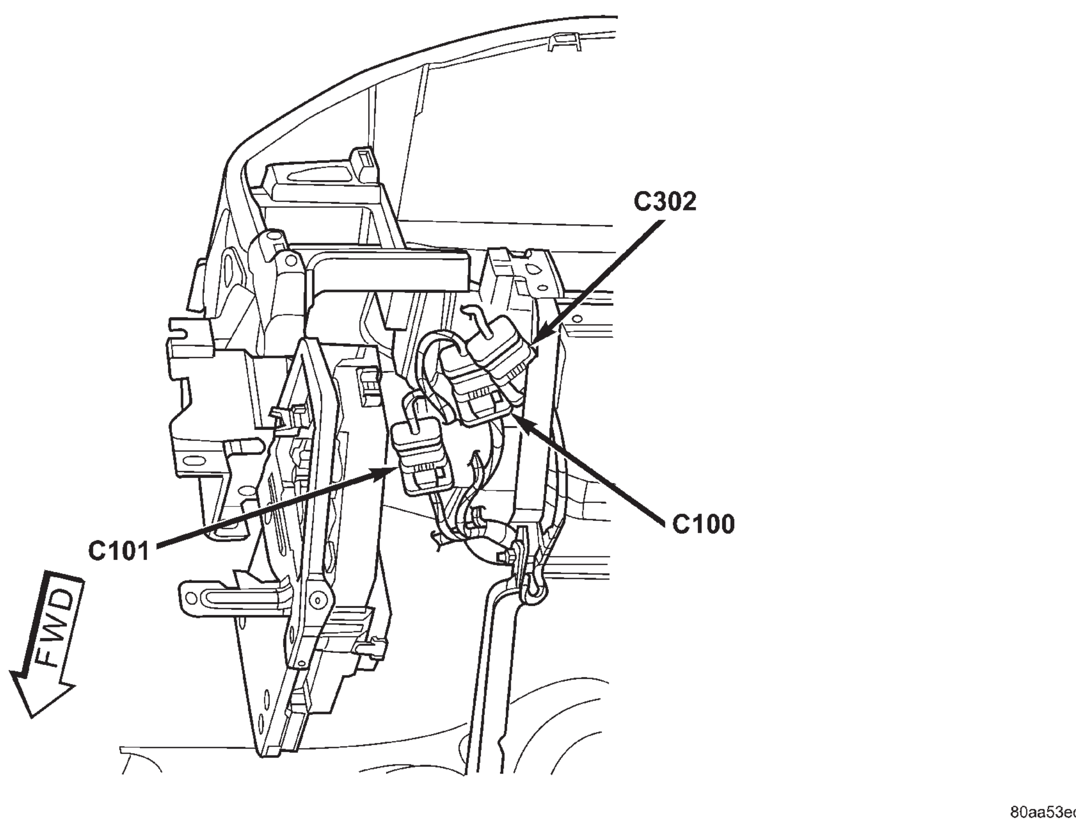


Fig. 31 LEFT INSTRUMENT PANEL INLINES

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

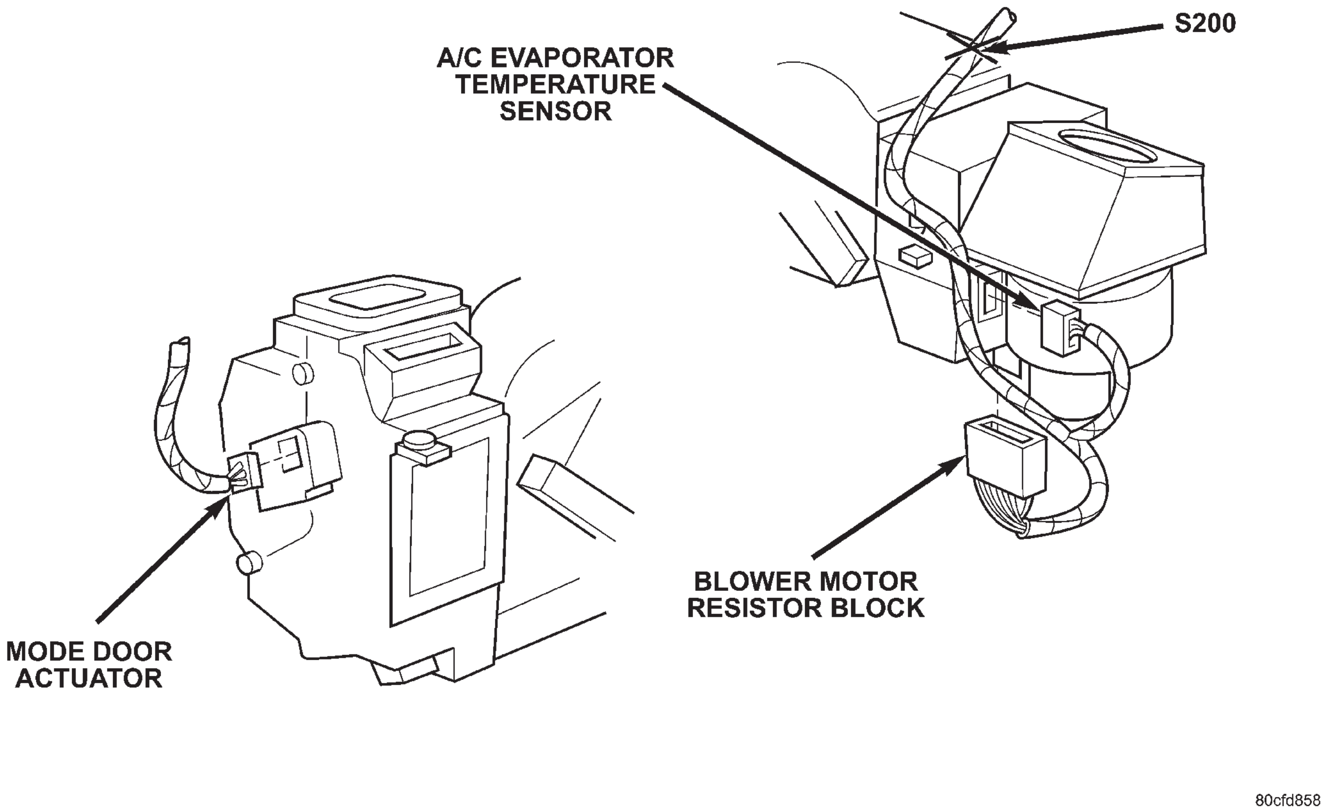


Fig. 32 HVAC CONNECTORS

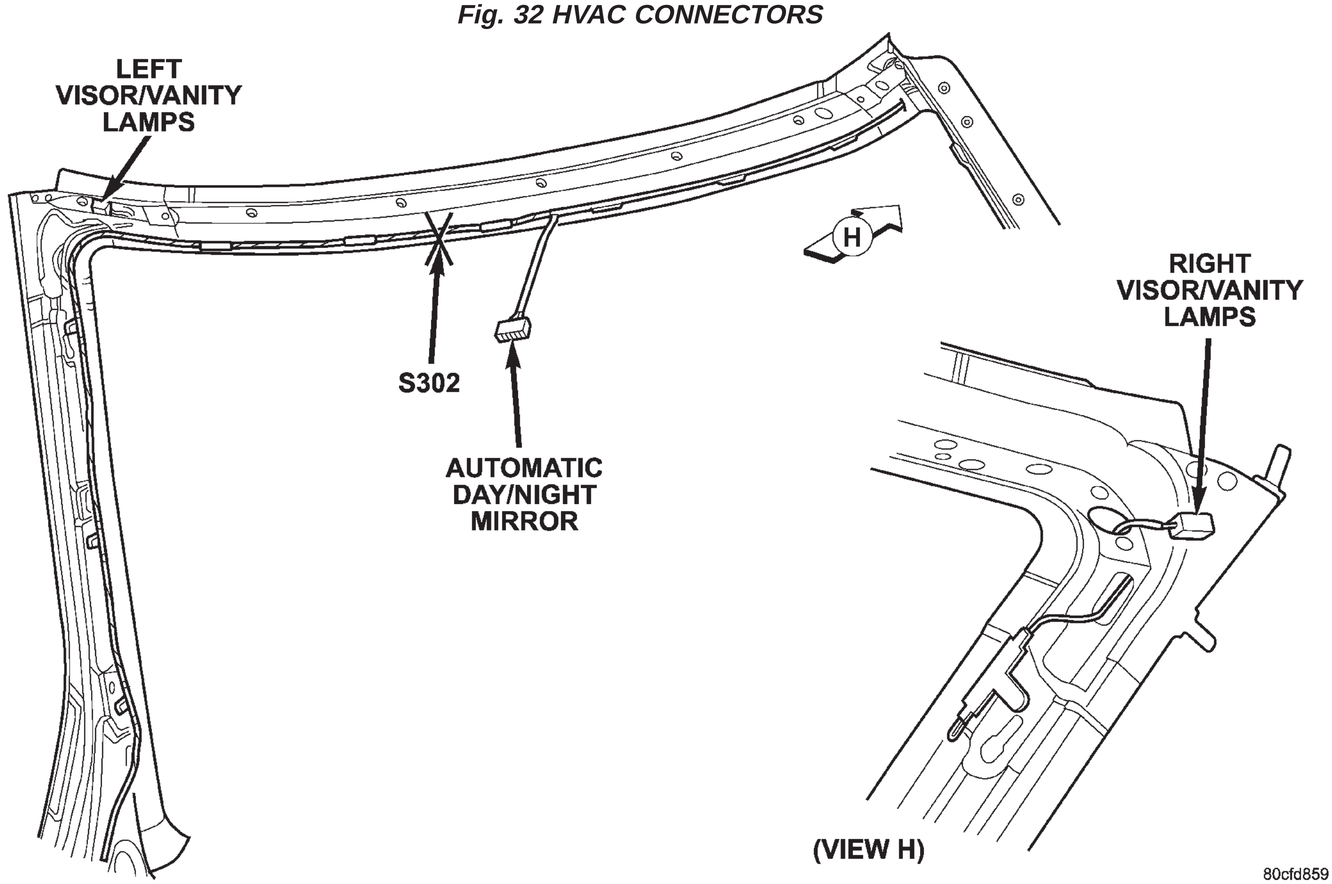


Fig. 33 HEADER CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

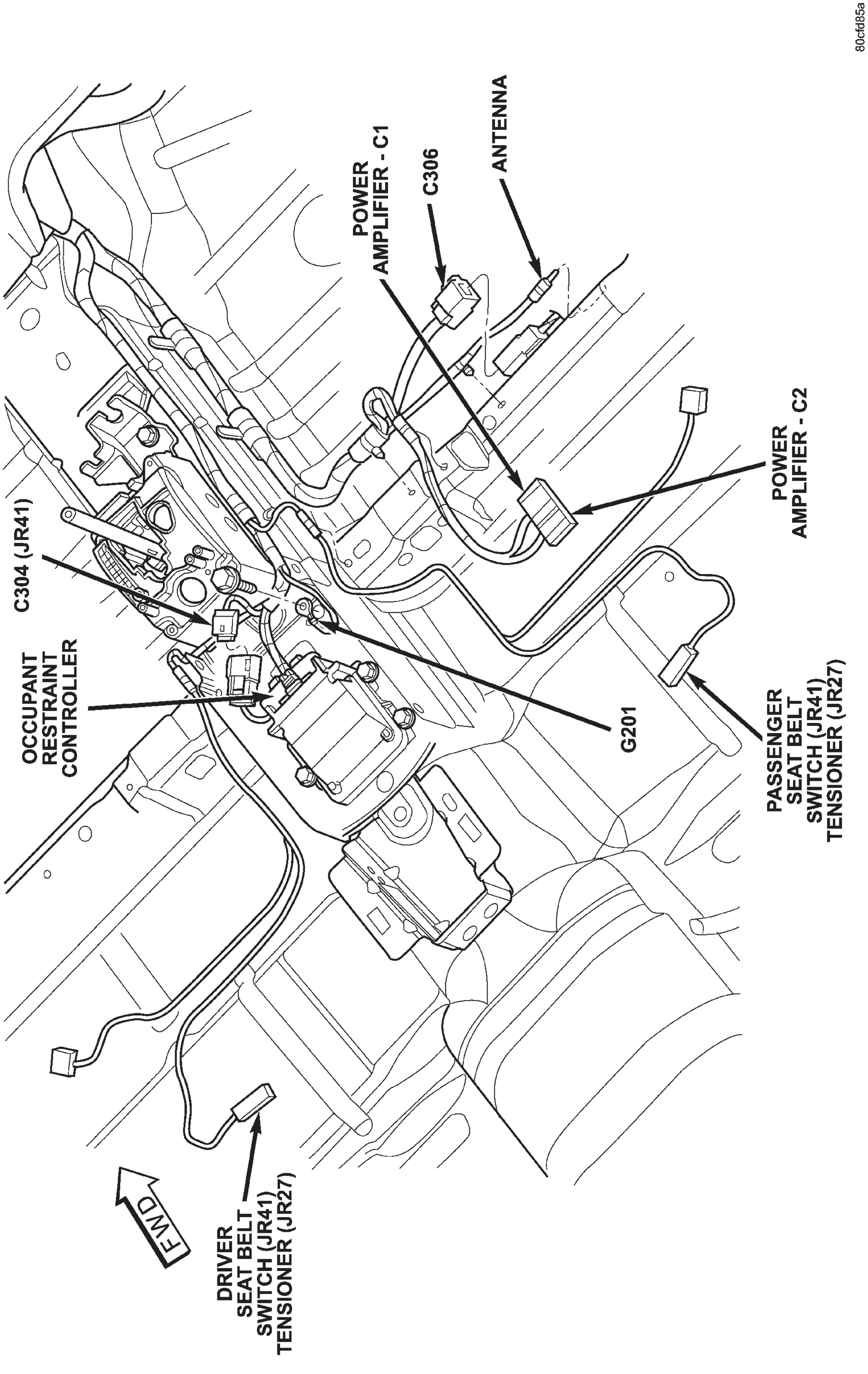


Fig. 34 FRONT CENTER BODY CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

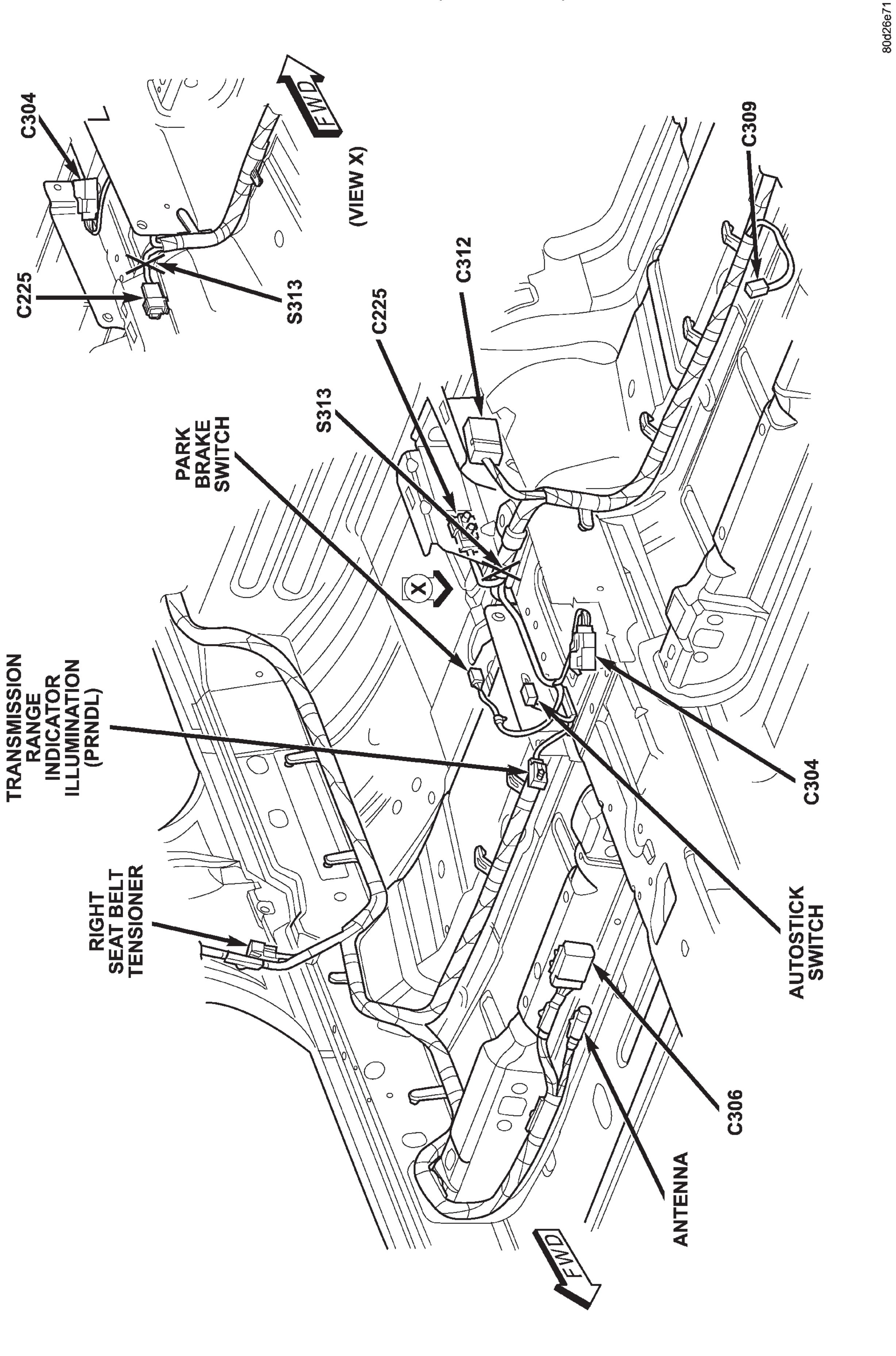


Fig. 35 CENTER BODY CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

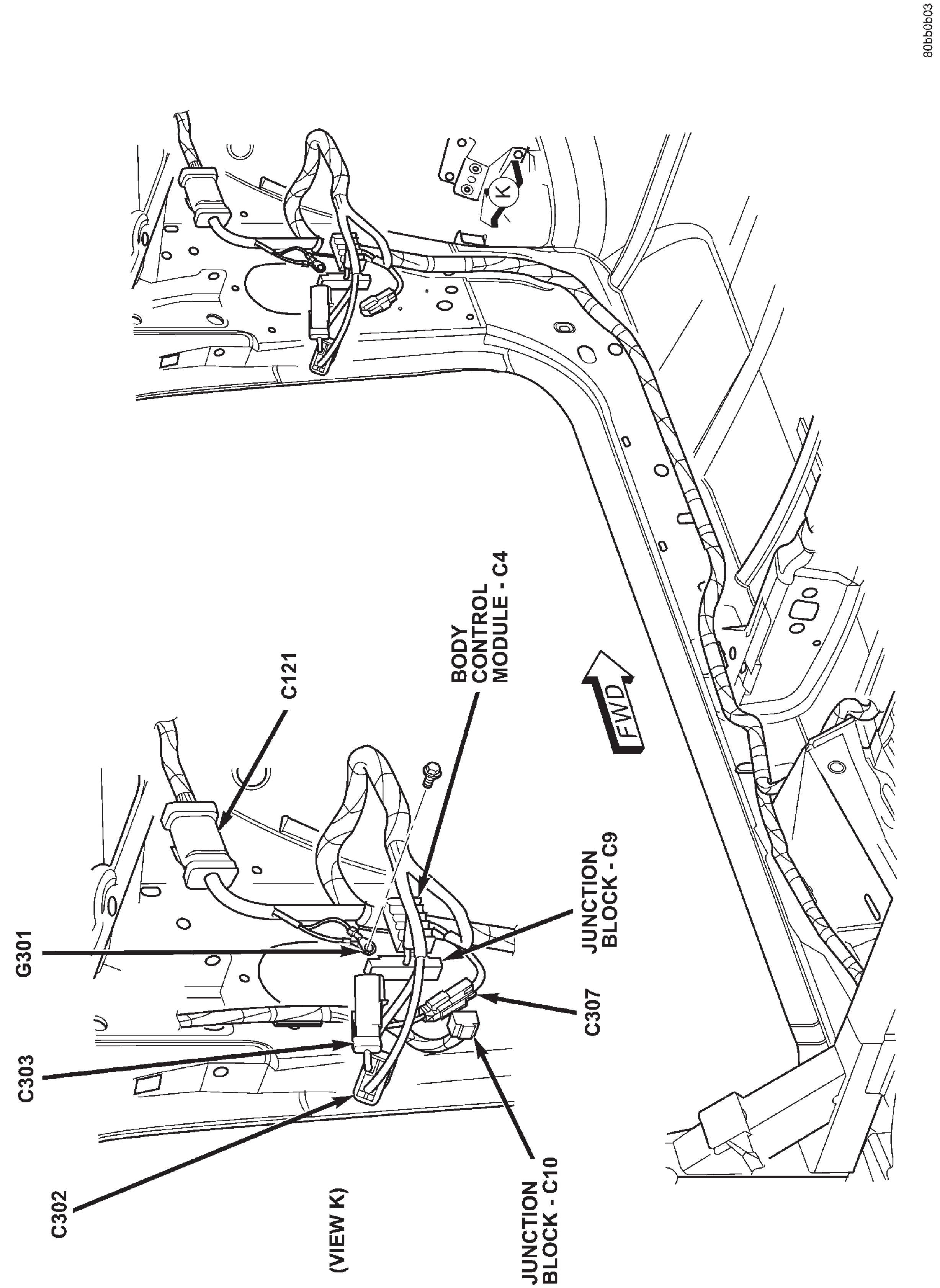


Fig. 36 LEFT FRONT BODY CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

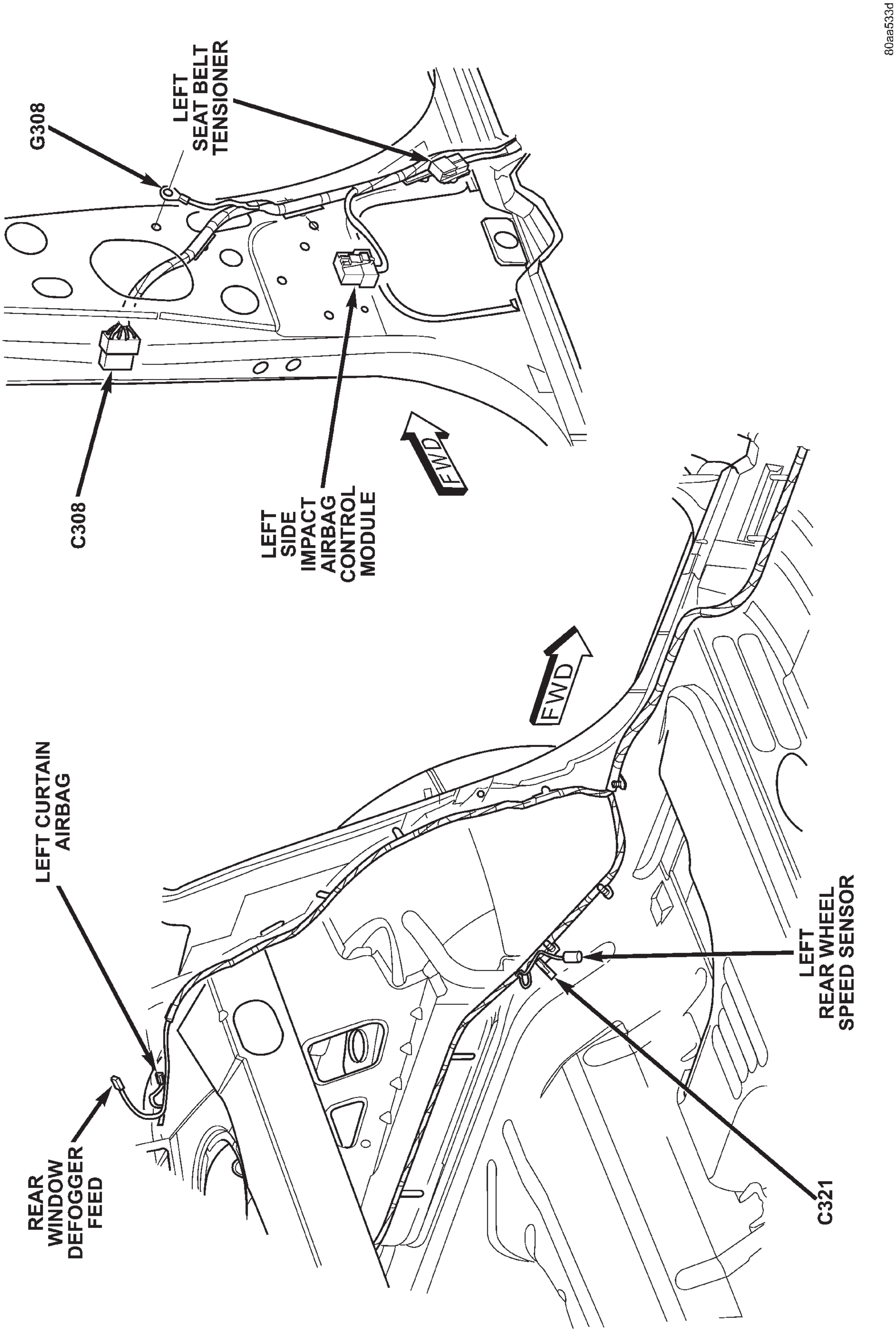


Fig. 37 LEFT SIDE BODY CONNECTORS (JR-41)

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

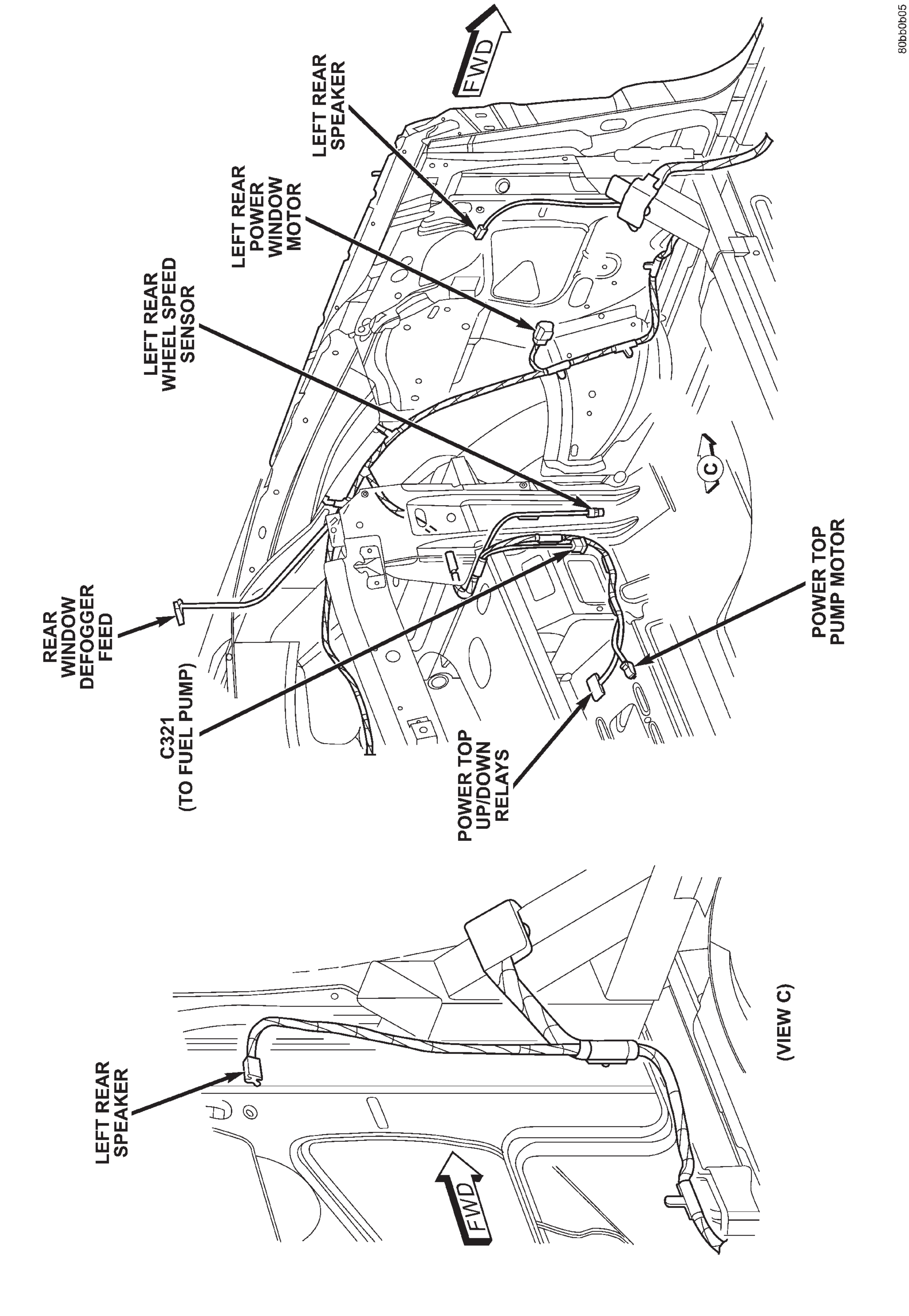


Fig. 38 LEFT SIDE BODY CONNECTORS (JR-27)

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

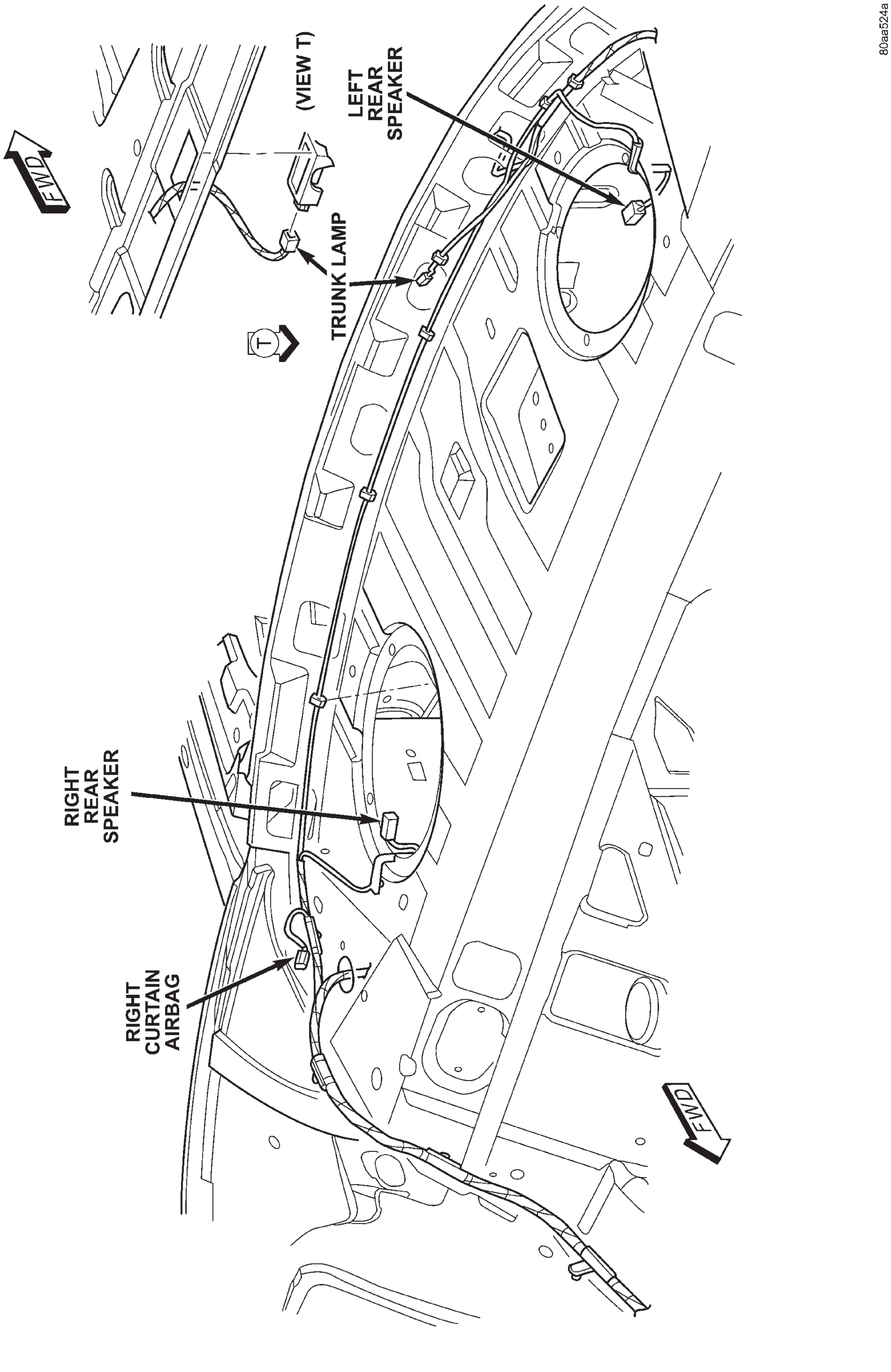


Fig. 39 REAR BODY CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

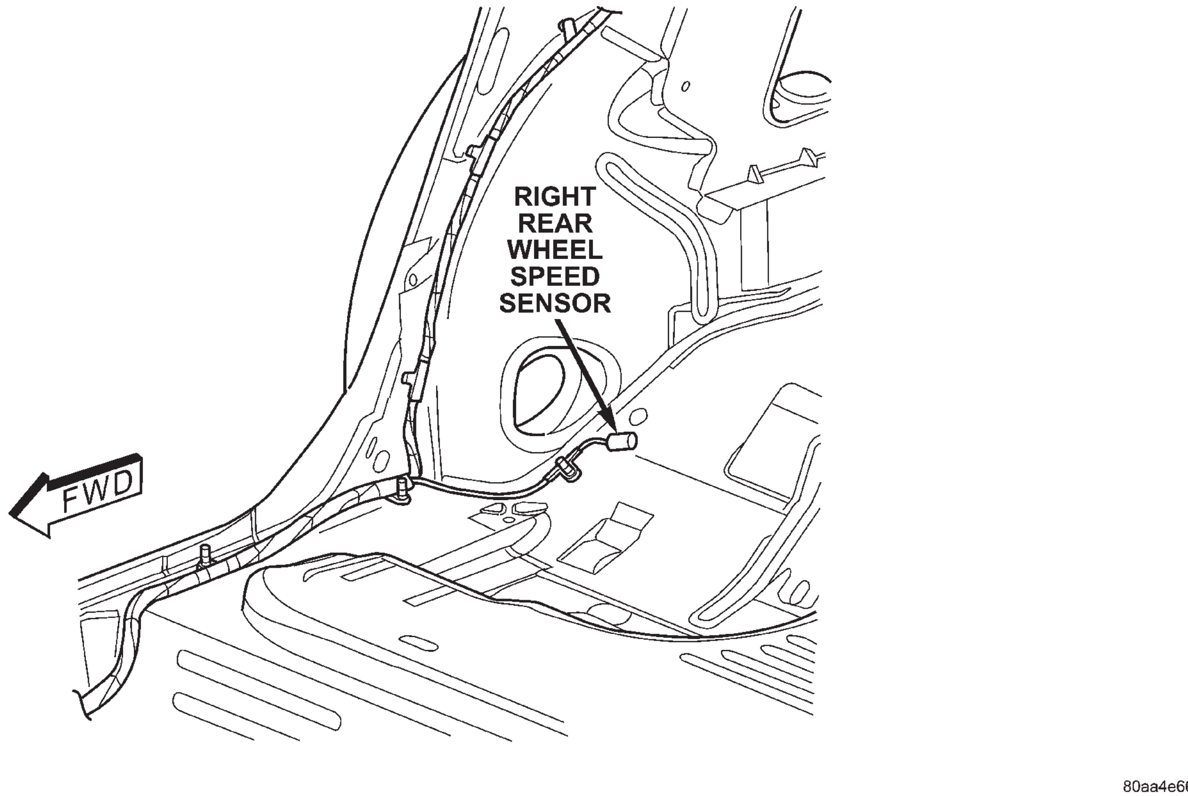


Fig. 40 RIGHT REAR QUARTER PANEL

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

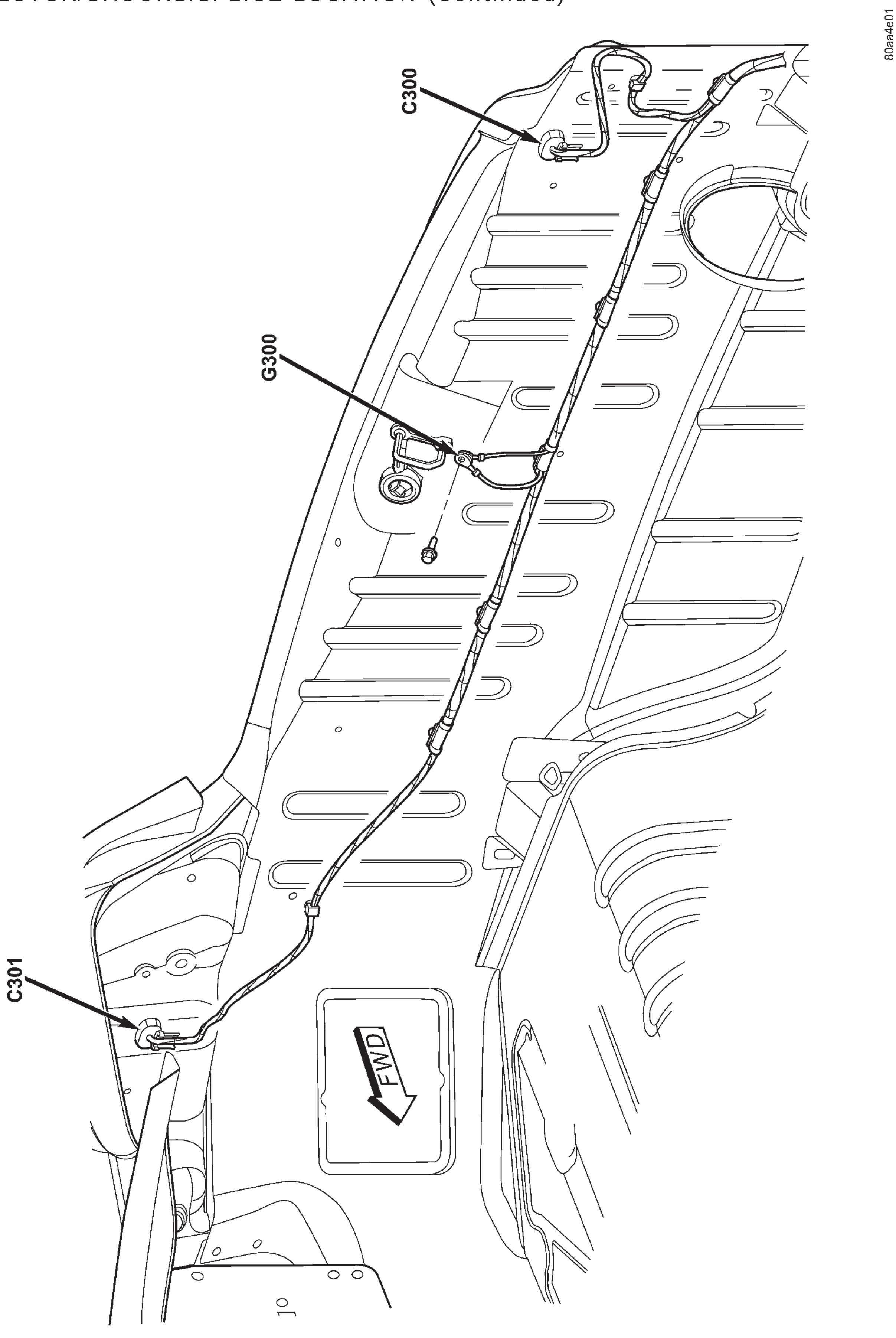


Fig. 41 REAR BODY LIGHTING CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

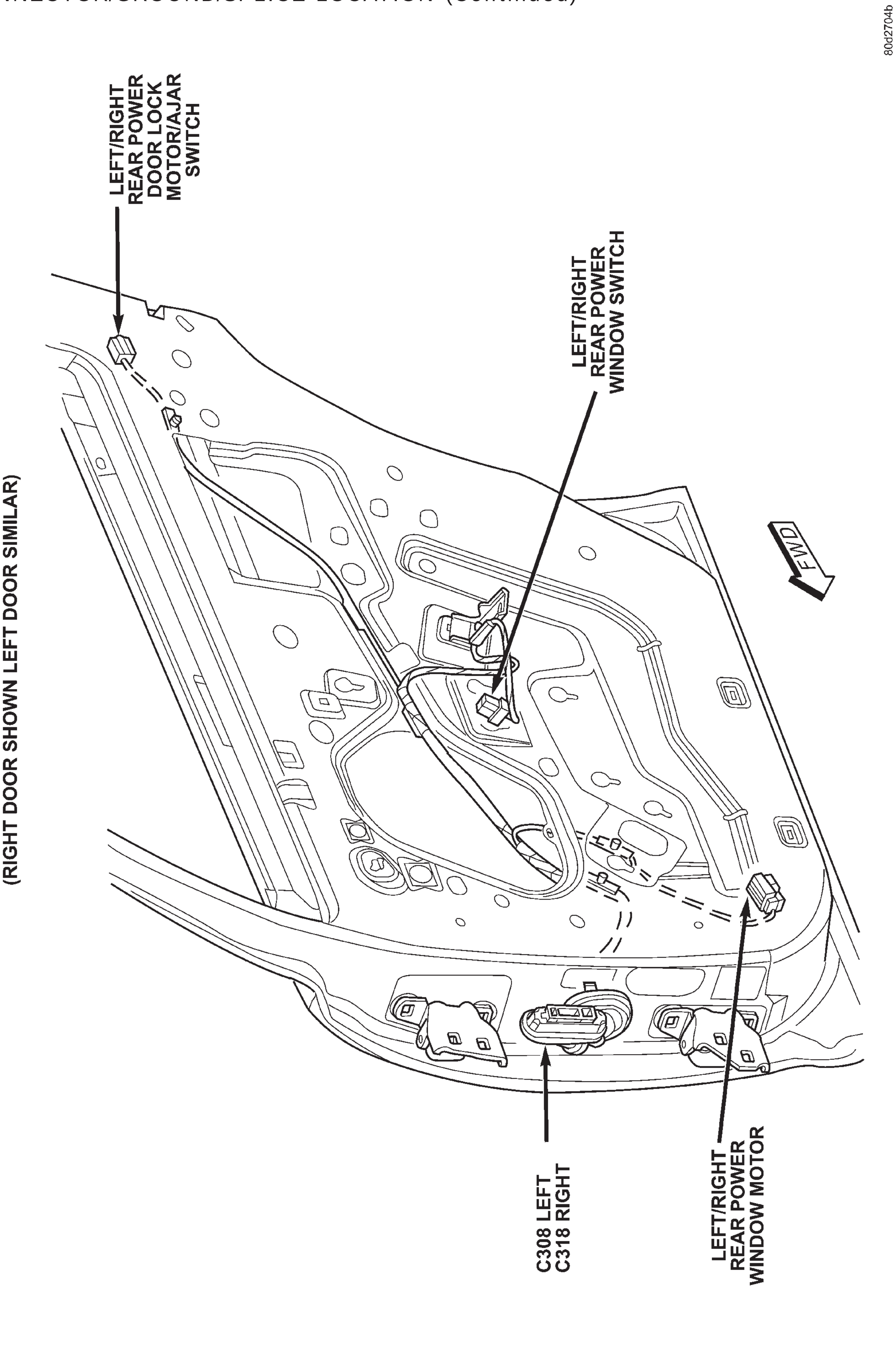


Fig. 42 REAR DOOR CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

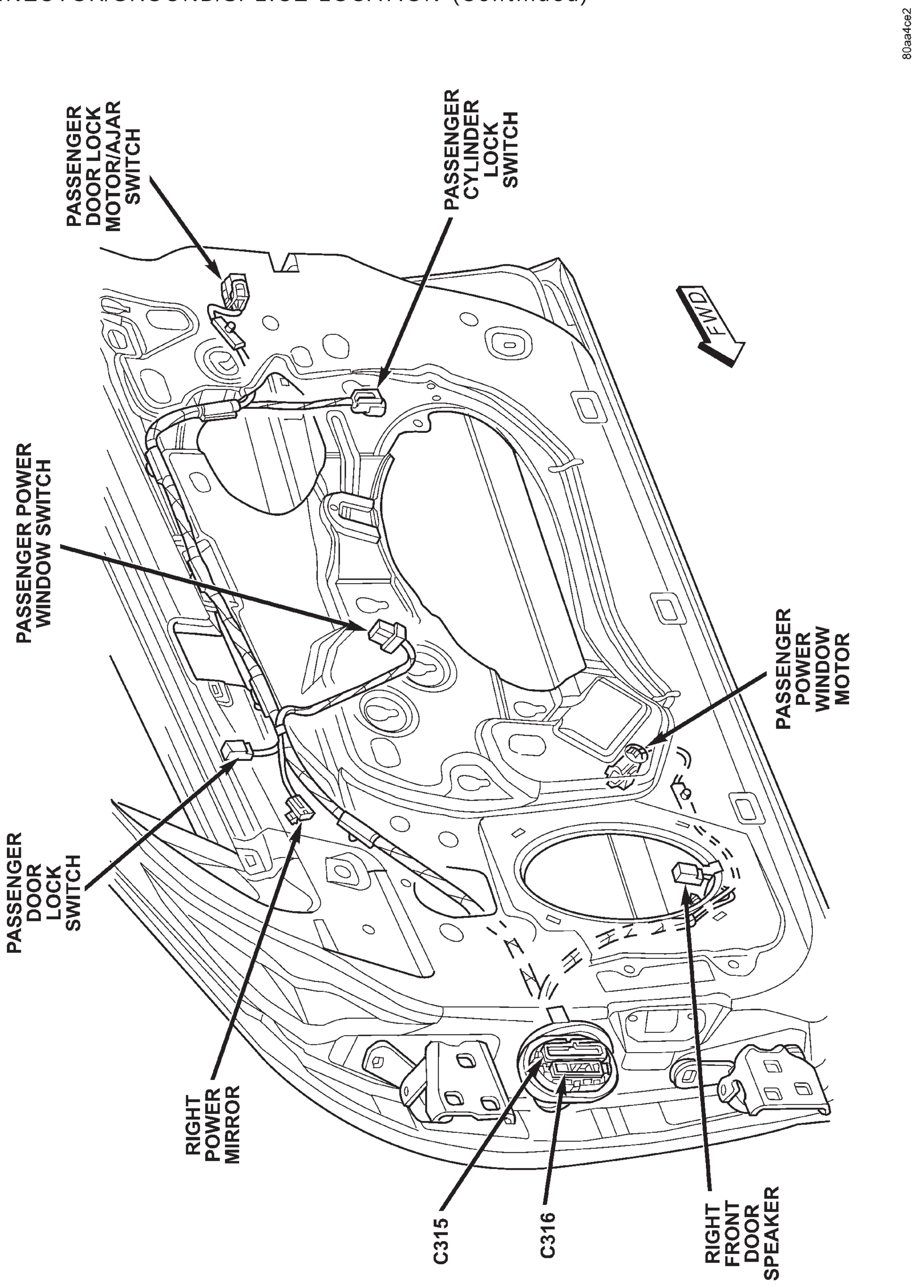


Fig. 43 PASSENGER DOOR CONNECTORS (JR-41)

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

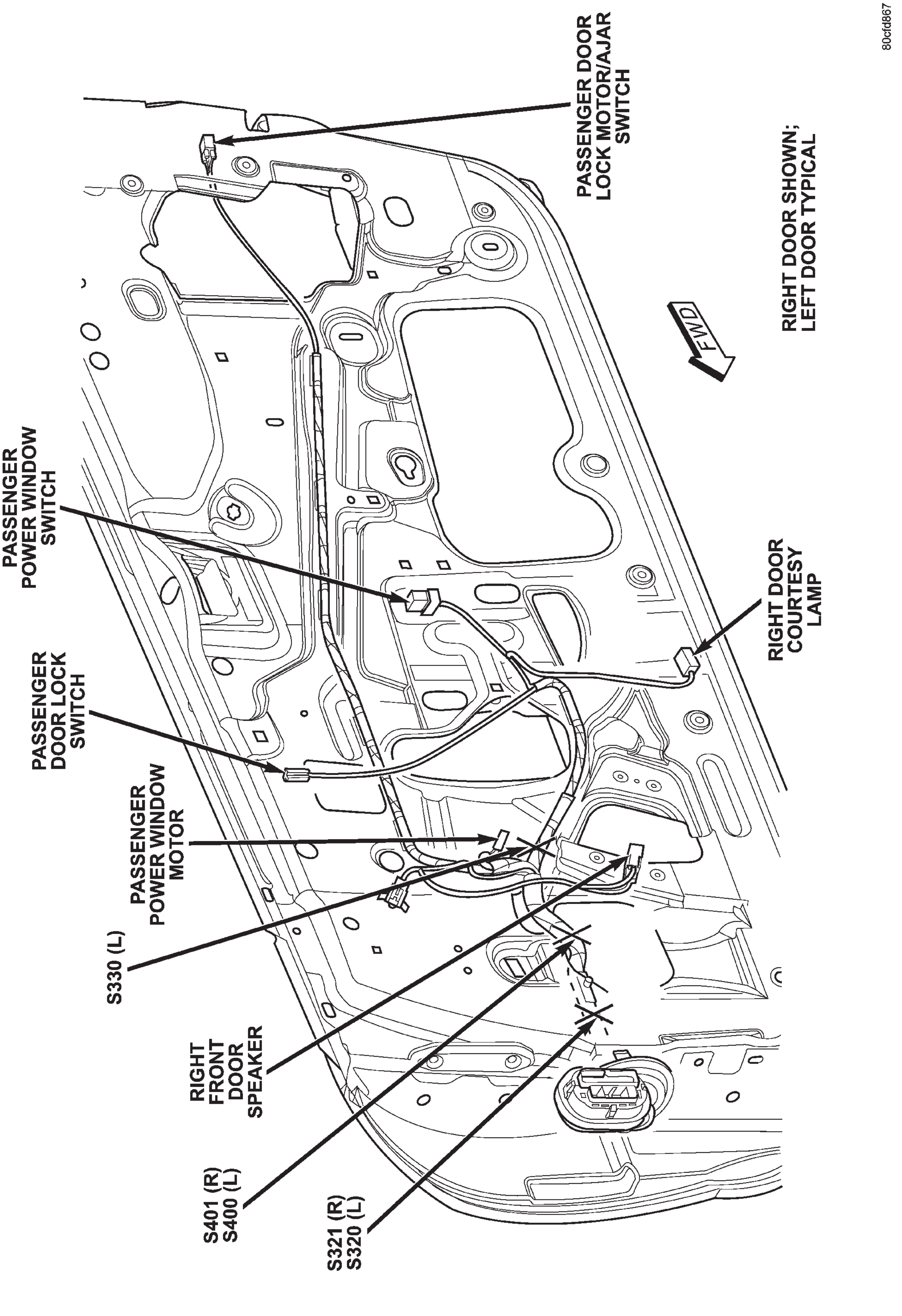


Fig. 44 PASSENGER DOOR CONNECTORS (JR-27)

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

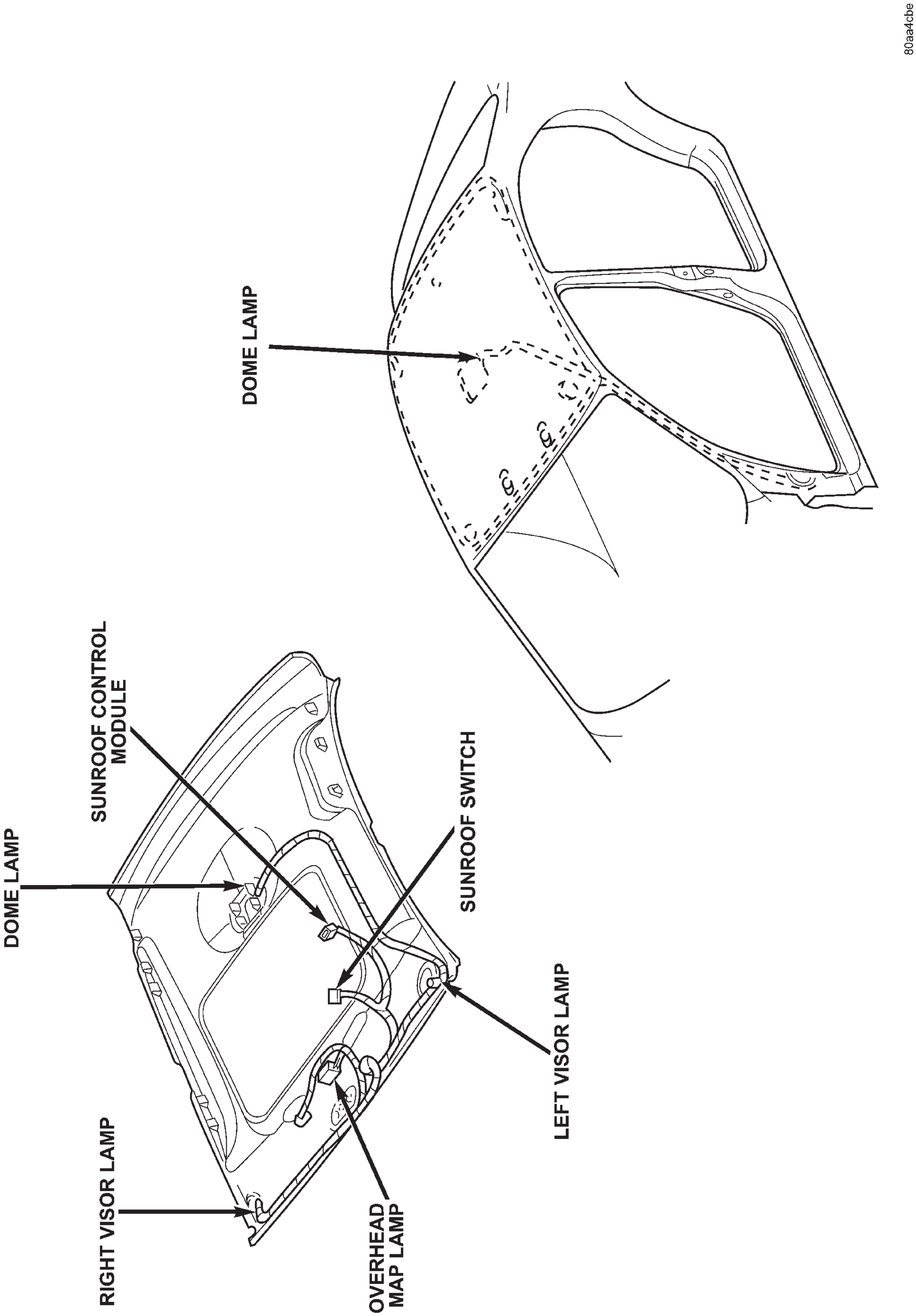


Fig. 45 ROOF CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

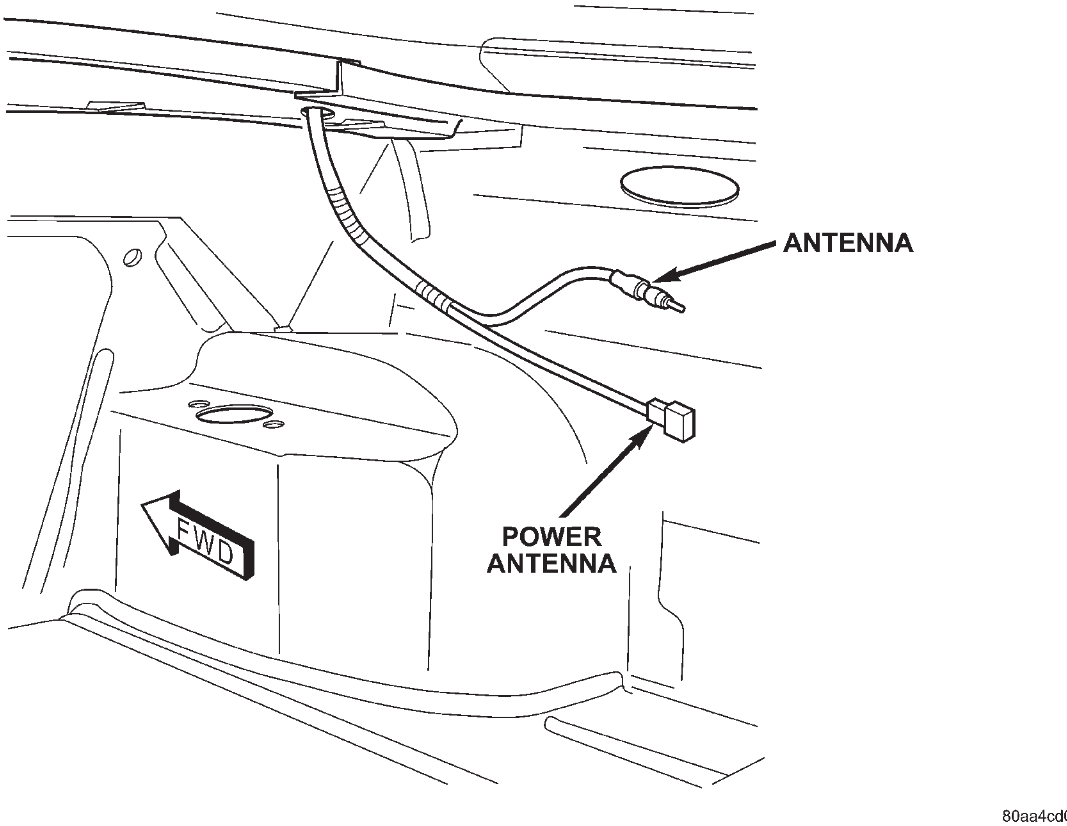


Fig. 46 TRUNK CONNECTORS

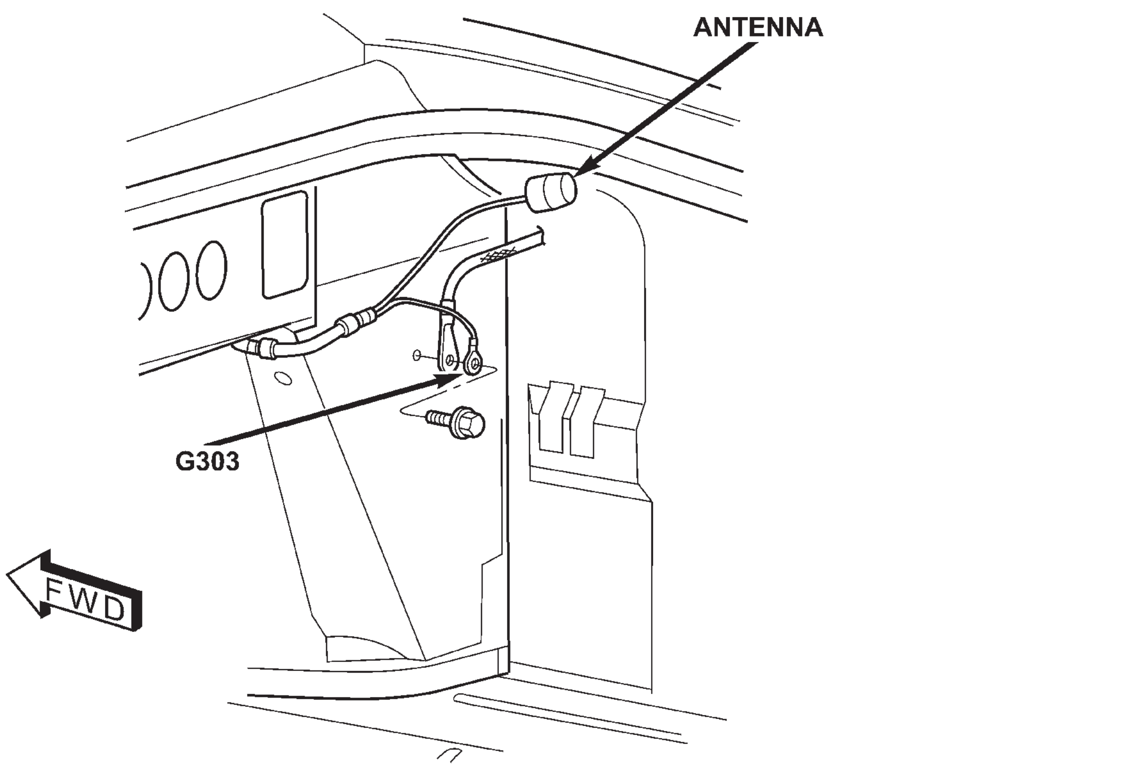


Fig. 47 TRUNK CONNECTORS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

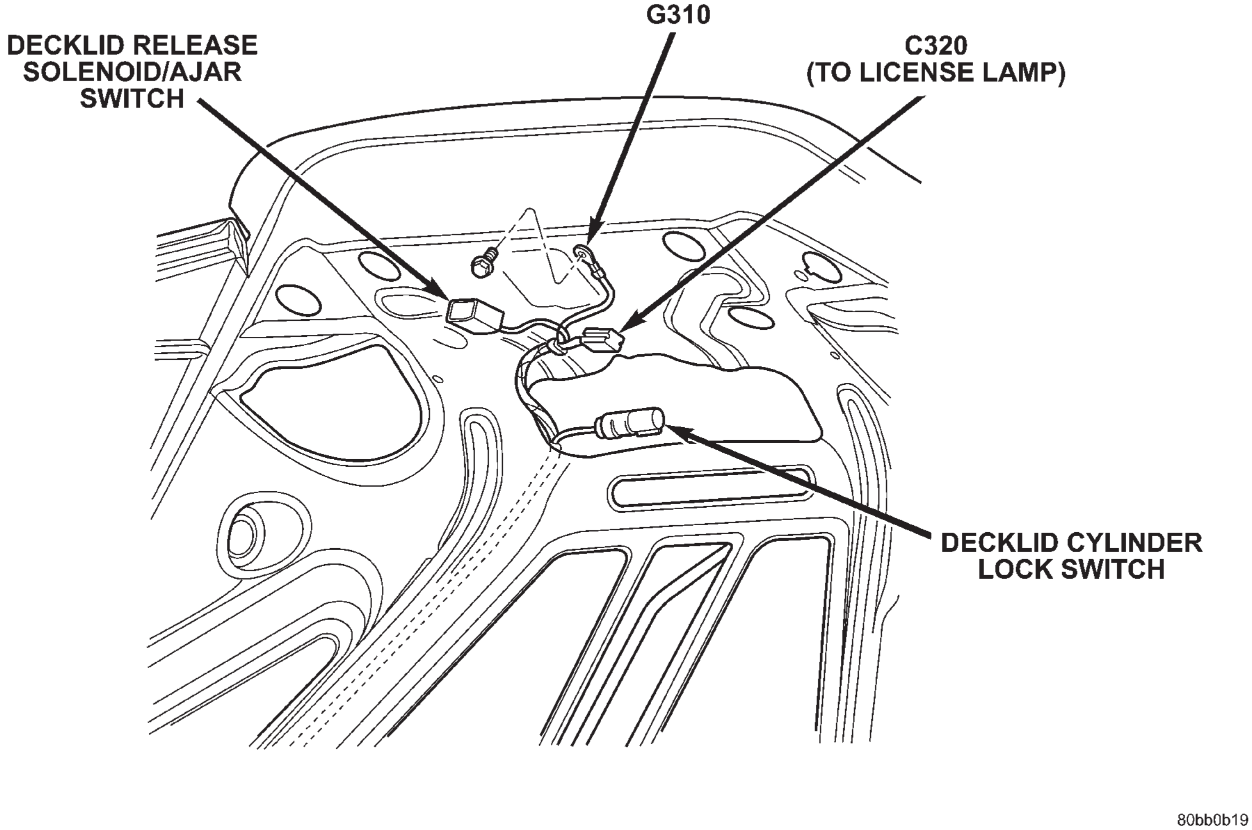


Fig. 48 DECKLID CONNECTORS (JR-27)

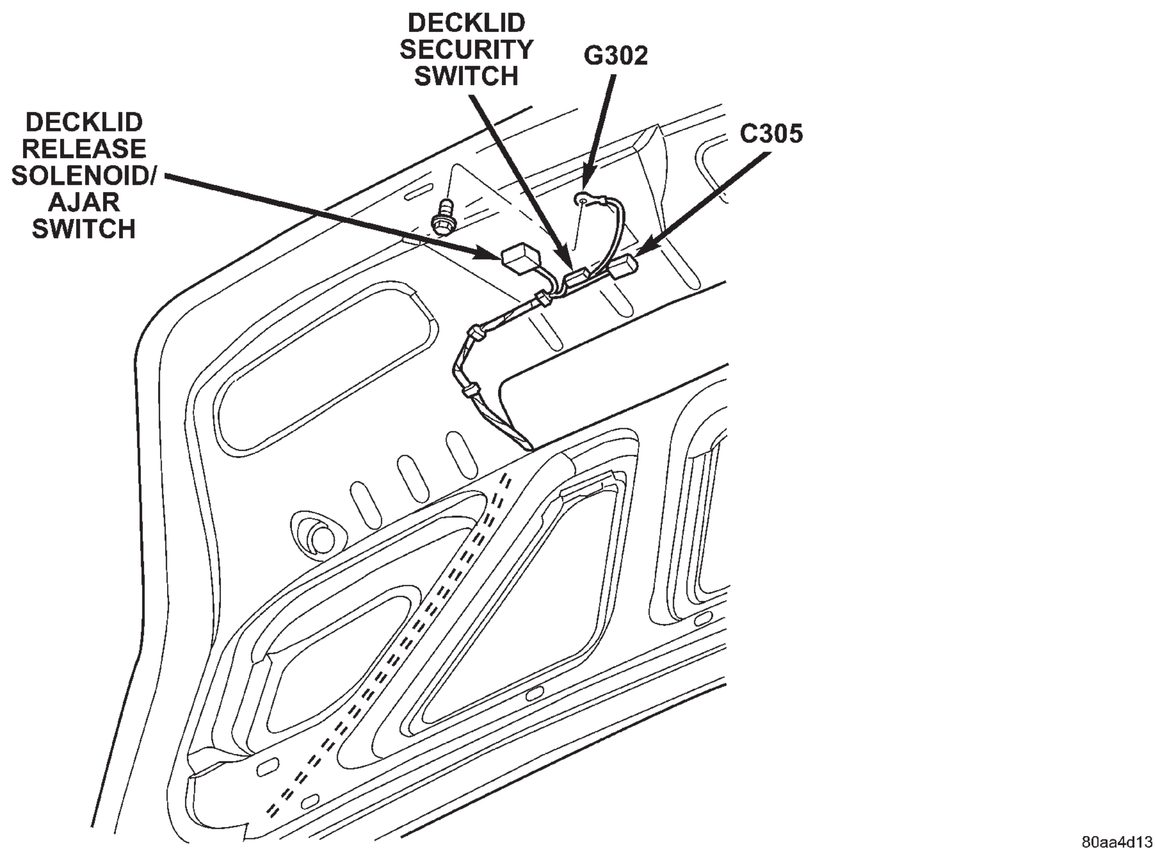


Fig. 49 DECKLID CONNECTORS (JR-41)

8W-97 POWER DISTRIBUTION

TABLE OF CONTENTS

POWER DISTRIBUTION

DESCRIPTION

This group covers the various standard and optional power distribution components used on this model. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

OPERATION

The power distribution system for this vehicle is designed to provide safe, reliable, centralized and convenient to access distribution of the electrical current required to operate all of the many standard and optional factory-installed electrical and electronic powertrain, chassis, safety, comfort and convenience systems. At the same time, these systems were designed to provide centralized locations for conducting diagnosis of faulty circuits, and for sourcing the additional current requirements of many aftermarket vehicle accessory and convenience items.

These power distribution systems also incorporate various types of circuit control and protection features, including:

- Fuses
- Fuse cartridges
- Fusible links
- Automatic resetting circuit breakers
- Relays
- Flashers
- Timers
- Circuit splice blocks.

The power distribution system for this vehicle consists of the following components:

- Power Distribution Center (PDC)
- Junction Block (JB)
- Accessory power outlet.

CENTER CONSOLE POWER OUTLET

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Open the console lid (Fig. 1).

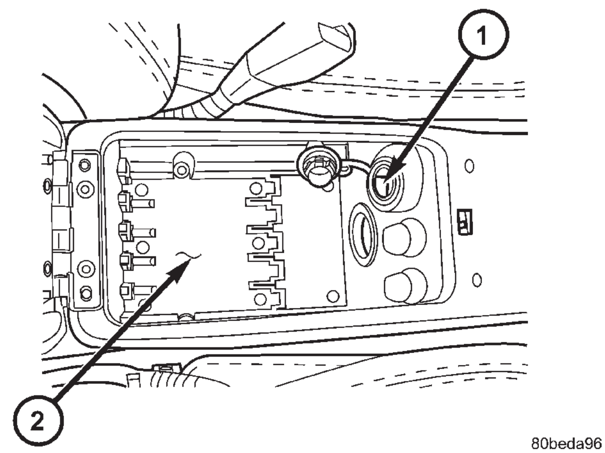


Fig. 1 POWER OUTLET

1 - POWER OUTLET
2 - CENTER CONSOLE

CENTER CONSOLE POWER OUTLET (Continued)

(3) Look inside and note position of the retaining bosses (Fig. 2).

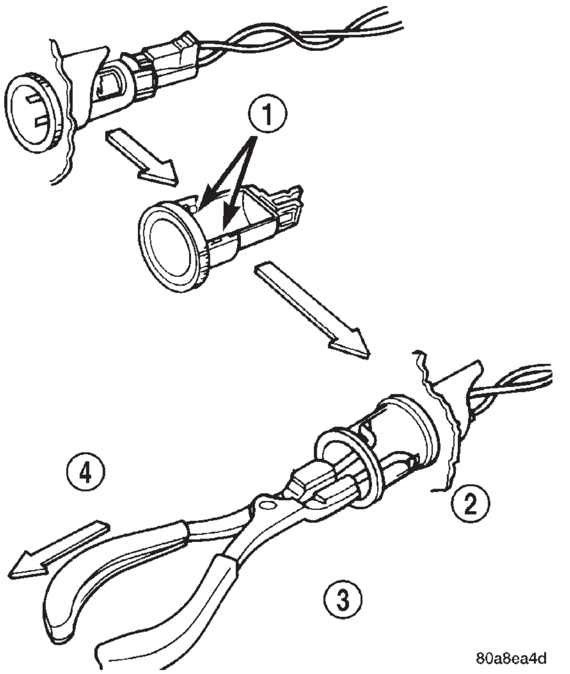


Fig. 2 Cigar Lighter / Power Outlet Base Removal

1 - RETAINING BOSSES-ENGAGE PLIERS HERE
2 - PARTIALLY REMOVED
3 - EXTERNAL SNAP-RING PLIERS
4 - PULL BASE OUT-THROUGH MOUNTING RING

(4) Using external snap ring pliers with 90 degree tips. Insert pliers with tips against bosses and squeeze forcing bosses out of base.

(5) Pull out the base through mounting ring by gently rocking pliers. A tool can be made to do the same. Refer to (Fig. 3).

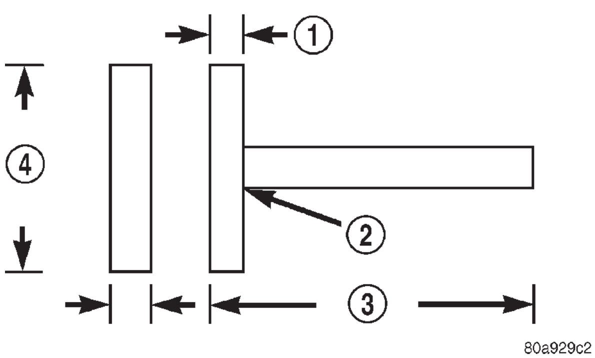


Fig. 3 Tool For Cigar Lighter / Power Outlet Removal

1 - 2.5MM (3/32 INS.)
2 - WELD
3 - 100MM (4 INS.)
4 - 22.25 TO 22.45MM (7/8 TO 57/64 INS.)

(6) Disconnect the base wires.

(7) Set base aside and remove base mount ring.

INSTALLATION

(1) Install base mount ring.

(2) Connect the base wires.

(3) Firmly snap base into position inside of the center console.

(4) Connect the battery negative cable.

IOD FUSE

DESCRIPTION

All vehicles are equipped with an Ignition-Off Draw (IOD) fuse that is disconnected within the Junction Block (JB) when the vehicle is shipped from the factory. Dealer personnel are to reconnect the IOD fuse in the JB as part of the preparation procedures performed just prior to new vehicle delivery.

OPERATION

The term ignition-off draw identifies a normal condition where power is being drained from the battery with the ignition switch in the Off position. The IOD fuse feeds the memory and sleep mode functions for some of the electronic modules in the vehicle as well as various other accessories that require battery current when the ignition switch is in the Off position, including the clock. The only reason the IOD fuse is disconnected is to reduce the normal IOD of the vehicle electrical system during new vehicle transportation and pre-delivery storage to reduce battery depletion, while still allowing vehicle operation so that the vehicle can be loaded, unloaded and moved as needed by both vehicle transportation company and dealer personnel.

The IOD fuse is disconnected from Junction Block (JB) fuse cavity 5 when the vehicle is shipped from the assembly plant. Dealer personnel must reconnect the IOD fuse when the vehicle is being prepared for delivery in order to restore full electrical system operation. Once the vehicle is prepared for delivery, the IOD function of this fuse becomes transparent and the fuse that has been assigned the IOD designation becomes only another Fused B(+) circuit fuse. The IOD fuse serves no useful purpose to the dealer technician in the service or diagnosis of any vehicle system or condition, other than the same purpose as that of any other standard circuit protection device.

The IOD fuse can be used by the vehicle owner as a convenient means of reducing battery depletion when a vehicle is to be stored for periods not to exceed about thirty days. However, it must be remembered that disconnecting the IOD fuse will not eliminate IOD, but only reduce this normal condition.

IOD FUSE (Continued)

If a vehicle will be stored for more than about thirty days, the battery negative cable should be disconnected to eliminate normal IOD; and, the battery should be tested and recharged at regular intervals during the vehicle storage period to prevent the battery from becoming discharged or damaged. Refer to **Battery** for the location of additional service information covering the battery.

REMOVAL

NOTE: When removing or installing the IOD fuse, it is important that the ignition switch be in the Off position. Failure to place the ignition switch in the Off position can cause the radio display to become scrambled when the IOD fuse is installed. Removing and installing the IOD fuse again with the ignition switch in the Off position will usually correct the scrambled radio display condition.

(1) Turn the ignition switch to the Off position.
(2) Remove the cover from the left end cap of the instrument panel.
(3) Remove fuse 5 from the Junction Block.

INSTALLATION

(1) Insert fuse 5 into the Junction Block.
(2) Install the cover to instrument panel end cap.

JUNCTION BLOCK

DESCRIPTION

An electrical Junction Block (JB) is located in the left end cap of the instrument panel. The JB combines the functions previously provided by a separate fuse block module and relay center. It also serves to simplify and centralize numerous electrical components, as well as to distribute electrical current to many of the accessory systems in the vehicle. It eliminates the need for numerous splice connections and serves in place of a bulkhead connector between many of the engine compartment, instrument panel, and body wire harnesses.

The JB is positioned on a mounting bracket up and under the left instrument panel (Fig. 4). It is secured by three screws. The JB is concealed behind the left instrument panel endcap. The left instrument panel endcap is a snap-fit fuse access cover that conceals the JB fuses and includes the fuse layout to ensure proper fuse identification. The left instrument panel endcap must be removed to access components other than the fuses in the JB.

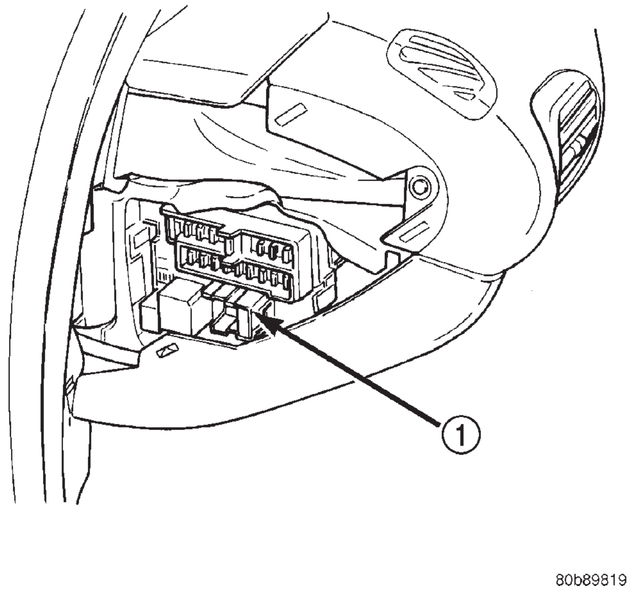


Fig. 4 Junction Block Location
1 - JUNCTION BLOCK

OPERATION

All of the current entering and leaving the JB does so through wire harnesses, which are connected to the JB through integral connector receptacles molded into the JB housing. The JB houses blade-type fuses, blade-type automatic resetting circuit breakers, full International Standards Organization (ISO) relays, and ISO micro-relays. Internal connection of all the JB circuits is accomplished by an intricate network of hard wiring and bus bars. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

The fuses, circuit breakers, relays, and are available for service replacement. The JB unit cannot be repaired and is only serviced as an assembly. If any internal circuit or the JB housing is faulty or damaged, the entire Junction Block assembly must be replaced.

JUNCTION BLOCK (Continued)

REMOVAL

WARNING:
ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO ELECTRICAL/RESTRAINTS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

The Junction Block (JB) and Body Control Module (BCM) are attached to each other. After removal they can be separated. Junction Block and Body Control Module assemblies are located on the driver's side of the vehicle (Fig. 5).

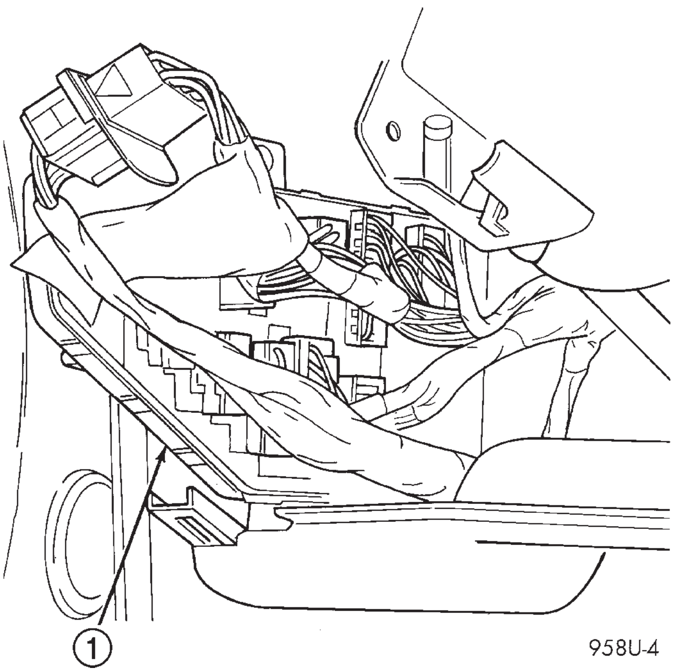


Fig. 5 Junction Block/BCM Location

1 - JUNCTION/BCM

(1) Open hood then disconnect and isolate the battery negative remote cable from the remote terminal on the left shock tower (Fig. 6).
(2) Open the front driver's door and remove end cap.
(3) Remove center bezel.
(4) Remove instrument cluster hood.
(5) Remove silencer.
(6) Remove wire harness connectors from Junction Block.
(7) Remove Junction Block three mounting screws.
(8) Remove Junction Block/BCM by pulling straight down from the mounting bayonet.

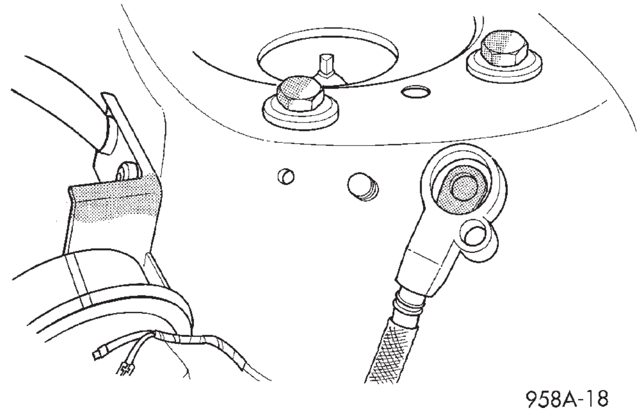


Fig. 6 Battery Negative Remote Cable

(9) Disconnect BCM wire connectors and remove the assembly.
(10) Remove Junction Block/BCM from vehicle.
(11) With the Junction Block/BCM removed from the vehicle, separate the BCM from the Junction Block.
(12) Remove the two BCM attaching screws and release the two BCM locking latches from the Junction Block.
(13) Disconnect BCM from the Junction Block.

INSTALLATION

(1) Connect BCM to the Junction Block.
(2) Install the BCM to the Junction Block and install the attaching screws.
(3) Install Junction Block/BCM to vehicle.
(4) Connect BCM wire connectors.
(5) Install Junction Block mounting screws.
(6) Connect wire harness connectors to Junction Block.
(7) Install silencer.
(8) Install instrument cluster hood.
(9) Install center bezel.
(10) Install end cap.
(11) Connect battery negative cable.

POWER DISTRIBUTION CENTER

DESCRIPTION

All of the electrical current distributed throughout this vehicle is directed through the standard equipment Power Distribution Center (PDC). The molded plastic PDC housing is located in the left front corner of the engine compartment. The PDC housing has a molded plastic cover that includes an integral hinge feature on the inboard side, and an integral latch on the outboard side. The PDC cover is easily removed for service access and has a convenient fuse and

POWER DISTRIBUTION CENTER (Continued)

relay layout label affixed to the inside surface of the cover to ensure proper component identification.

The PDC housing is secured in the engine compartment on the left front corner with three screws to the transmission and engine control module bracket. A small red molded plastic protective cover on the top near the rear of the PDC is unsnapped to access the battery/generator cable input connection stud. All of the PDC outputs are through the integral engine compartment wire harness, which exits from the rear of the PDC housing.

OPERATION

All of the current from the battery/generator cable connection enters the Power Distribution Center (PDC) through a 140 ampere fusible link that is secured to the top of the PDC housing. The PDC houses up to fourteen maxi-fuse cartridges, which replace all in-line fusible links. The PDC also houses up to eleven blade-type fuses, up to four full International Standards Organization (ISO) relays, and up to eight ISO micro-relays. Internal connection of all the PDC circuits is accomplished by an intricate network of hard wiring and bus bars. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

The fusible link, fuse cartridges, fuses and relays are available for service replacement. The PDC unit cannot be repaired and is only serviced as a unit with the engine compartment wire harness. If the PDC is faulty or damaged, the engine compartment wire harness assembly must be replaced.

REMOVAL

The Power Distribution Center (PDC) is serviced as a unit with the engine compartment wire harness. If any internal circuit of the PDC or the PDC housing is faulty or damaged, the entire PDC and engine compartment wire harness unit must be replaced.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the Air Inlet System (housing and resonator).

(3) Disconnect each of the engine compartment wire harness connectors. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

(4) Remove the fasteners that secure each of the engine compartment wire harness ground eyelets to the vehicle body and chassis components.

(5) Disengage each of the retainers that secure the engine compartment wire harness to the vehicle body and chassis components.

(6) Remove the three screws retaining the PDC to its mounting bracket.

(7) Remove the PDC and the engine compartment wire harness from the engine compartment as a unit.

INSTALLATION

The Power Distribution Center (PDC) is serviced as a unit with the engine compartment wire harness. If any internal circuit of the PDC or the PDC housing is faulty or damaged, the entire PDC and engine compartment wire harness unit must be replaced.

NOTE: If the power distribution center is being replaced with a new unit, be certain to transfer each of the fuses, fuse cartridges, fusible links and relays from the old power distribution center to the proper cavities of the new power distribution center. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

(1) Position the PDC over the mounting bracket between the Powertrain and Transmission Control Modules in the engine compartment.

(2) Align the PDC mounting slots with the blades on the PDC mounting bracket.

(3) Install the three mounting screws into the PDC.

(4) Route the engine compartment wire harness from the PDC through the engine compartment, engaging each of the harness retainers to the mounting provisions in the vehicle body and chassis components. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

(5) Install and tighten the fasteners that secure each of the engine compartment wire harness ground eyelets to the vehicle body and chassis components.

(6) Reconnect each of the engine compartment wire harness connectors.

(7) Connect the battery negative cable.

POWER OUTLET

REMOVAL

(1) Disconnect and isolate the battery negative cable.
(2) Remove left side console lower cover.
(3) Disconnect wire harness connectors from power outlet.
(4) Twist power outlet retainer from the back of power outlet.
(5) Remove power outlet.

INSTALLATION

(1) Install power outlet to instrument panel.
(2) Install retainer to power outlet.
(3) Connect wire harness connectors.
(4) Install left side console lower cover.
(5) Connect battery negative cable.

ENGINE

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ENGINE 2.0L DOHC

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ENGINE 2.0L DOHC

DESCRIPTION

The 2.0 Liter (122 cu. in.) in-line four cylinder engine is a dual over-head camshaft with hydraulic lash adjusters and four valves per cylinder design (Fig. 1). The engine does not have provisions for a free wheeling valvetrain.

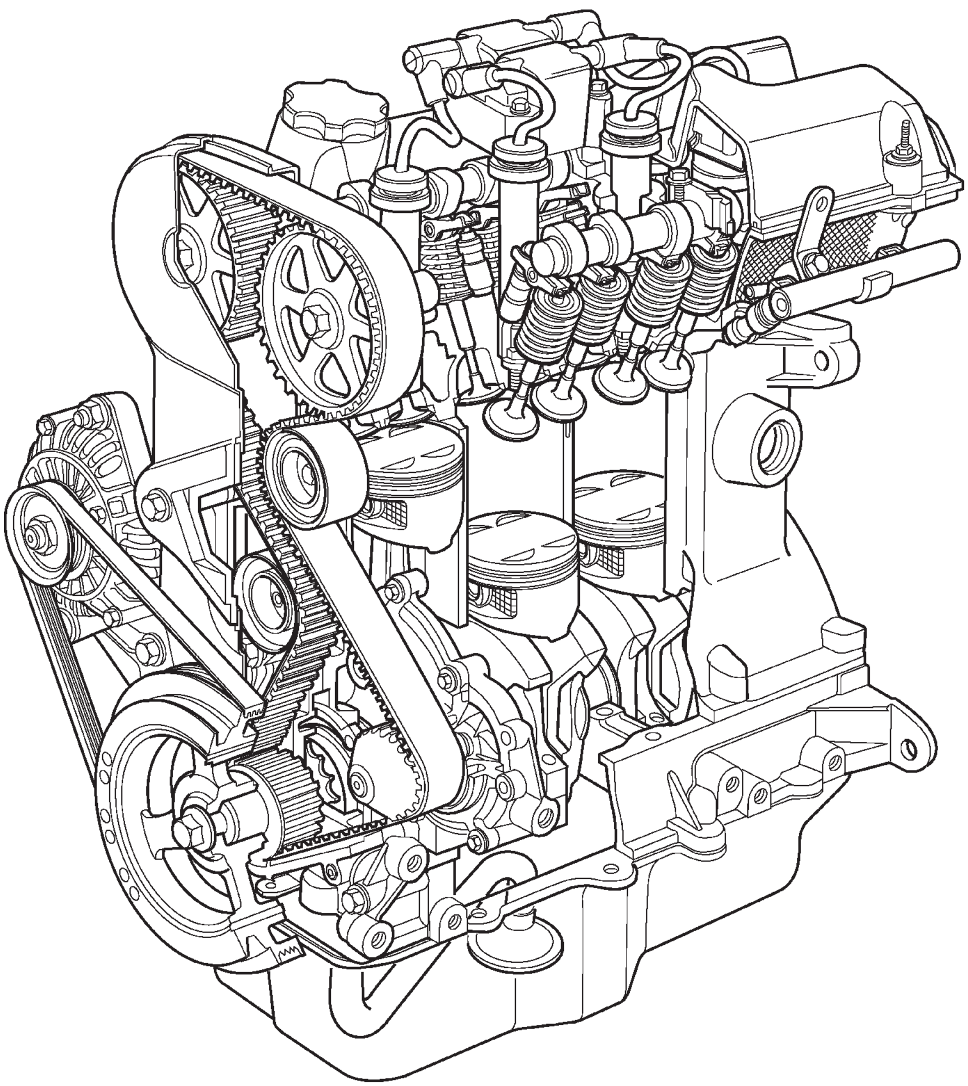


Fig. 1 2.0L DOHC Engine

ENGINE 2.0L DOHC (Continued)

The cylinders are numbered from front of the engine to the rear. The firing order is 1–3–4–2.

The engine identification number is located on the left rear of the cylinder block (Fig. 2).

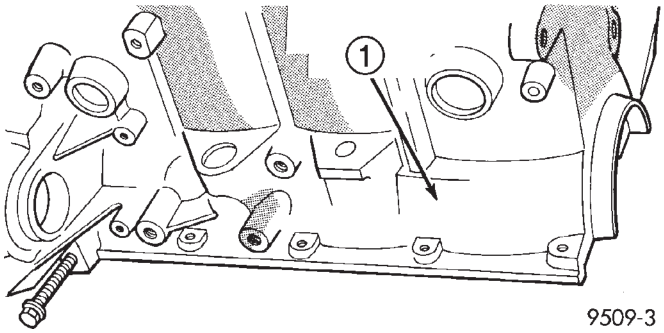


Fig. 2 Engine Identification

1 - ENGINE IDENTIFICATION LOCATION

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - INTRODUCTION

Engine diagnosis is helpful in determining the causes of malfunctions not detected and remedied by routine maintenance.

These malfunctions may be classified as either mechanical (e.g., a strange noise), or performance (e.g., engine idles rough and stalls).

Refer to the Engine Mechanical and the Engine Performance diagnostic charts, for possible causes and corrections of malfunctions (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING - MECHANICAL) (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING - PERFORMANCE).

For fuel system diagnosis, (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - DIAGNOSIS AND TESTING).

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that cannot be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following:

- Cylinder Compression Pressure Test
- Cylinder Combustion Pressure Leakage Test
- Engine Cylinder Head Gasket Failure Diagnosis
- Intake Manifold Leakage Diagnosis
- Hydraulic Lash Adjuster Noise Diagnosis
- Engine Oil Leak Inspection

ENGINE 2.0L DOHC (Continued)

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	1. Weak battery.	1. Test battery. Charge or replace as necessary. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - DIAGNOSIS AND TESTING)
	2. Corroded or loose battery connections.	2. Clean and tighten battery connections. Apply a coat of light mineral grease to terminals.
	3. Faulty starter.	3. Test starting system. (Refer to 8 - ELECTRICAL/STARTING - DIAGNOSIS AND TESTING)
	4. Faulty coil(s) or control unit.	4. Test and replace as needed. (Refer to Appropriate Diagnostic Information)
	5. Incorrect spark plug gap.	5. Set gap. (Refer to 8 - ELECTRICAL/IGNITION CONTROL - SPECIFICATIONS)
	6. Contamination in fuel system.	6. Clean system and replace fuel filter.
	7. Faulty fuel pump.	7. Test fuel pump and replace as needed. (Refer to Appropriate Diagnostic Information)
	8. Incorrect engine timing.	8. Check for a skipped timing belt/chain.
ENGINE STALLS OR IDLES ROUGH	1. Idle speed too low.	1. Test minimum air flow. (Refer to Appropriate Diagnostic Information)
	2. Incorrect fuel mixture.	2. (Refer to Appropriate Diagnostic Information)
	3. Intake manifold leakage.	3. Inspect intake manifold, manifold gasket, and vacuum hoses.
	4. Faulty ignition coil(s).	4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)

ENGINE 2.0L DOHC (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE LOSS OF POWER	1. Dirty or incorrectly gapped plugs.	1. Clean plugs and set gap.
	2. Contamination in fuel system.	2. Clean system and replace fuel filter.
	3. Faulty fuel pump.	3. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	4. Incorrect valve timing.	4. Correct valve timing.
	5. Leaking cylinder head gasket.	5. Replace cylinder head gasket.
	6. Low compression.	6. Test compression of each cylinder.
	7. Burned, warped, or pitted valves.	7. Replace valves.
	8. Plugged or restricted exhaust system.	8. Perform exhaust restriction test. (Refer to 11 - EXHAUST SYSTEM - DIAGNOSIS AND TESTING) Install new parts, as necessary.
	9. Faulty ignition coil(s).	9. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES ON ACCELERATION	1. Dirty or incorrectly gapped spark plugs.	1. Clean spark plugs and set gap.
	2. Contamination in Fuel System.	2. Clean fuel system and replace fuel filter.
	3. Burned, warped, or pitted valves.	3. Replace valves.
	4. Faulty ignition coil(s).	4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES AT HIGH SPEED	1. Dirty or incorrect spark plug gap.	1. Clean spark plugs and set gap.
	2. Faulty ignition coil(s).	2. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	3. Dirty fuel injector(s).	3. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	4. Contamination in fuel system.	4. Clean system and replace fuel filter.

ENGINE 2.0L DOHC (Continued)

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - MECHANICAL

CONDITION	POSSIBLE CAUSES	CORRECTION
NOISY VALVES	1. High or low oil level in crankcase.	1. Check and correct engine oil level.
	2. Thin or diluted oil.	2. Change oil to correct viscosity.
	3. Thick oil	3. (a) Change engine oil and filter.
		(b) Run engine to operating temperature.
		(c) Change engine oil and filter again.
	4. Low oil pressure.	4. Check and correct engine oil level.
	5. Dirt in tappets/lash adjusters.	5. Replace rocker arm/hydraulic lash adjuster assembly.
	6. Worn rocker arms.	6. Inspect oil supply to rocker arms.
	7. Worn tappets/lash adjusters.	7. Install new rocker arm/hydraulic lash adjuster assembly.
	8. Worn valve guides.	8. Ream guides and install new valves with oversize stems.
	9. Excessive runout of valve seats on valve faces.	9. Grind valve seats and valves.
	10. Missing adjuster pivot.	10. Replace rocker arm/hydraulic lash adjuster assembly.
CONNECTING ROD NOISE	1. Insufficient oil supply.	1. Check engine oil level.
	2. Low oil pressure.	2. Check engine oil level. Inspect oil pump relief valve and spring.
	3. Thin or diluted oil.	3. Change oil to correct viscosity.
	4. Thick oil	4. (a) Change engine oil and filter.
		(b) Run engine to operating temperature.
		(c) Change engine oil and filter again.
	5. Excessive bearing clearance.	5. Measure bearings for correct clearance. Repair as necessary.
	6. Connecting rod journal out-of-round.	6. Replace crankshaft or grind surface.
	7. Misaligned connecting rods.	7. Replace bent connecting rods.

ENGINE 2.0L DOHC (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
MAIN BEARING NOISE	1. Insufficient oil supply.	1. Check engine oil level.
	2. Low oil pressure.	2. Check engine oil level. Inspect oil pump relief valve and spring.
	3. Thin or diluted oil.	3. Change oil to correct viscosity.
	4. Thick oil	4. (a) Change engine oil and filter.
		(b) Run engine to operating temperature.
		(c) Change engine oil and filter again.
	5. Excessive bearing clearance.	5. Measure bearings for correct clearance. Repair as necessary.
	6. Excessive end play.	6. Check thrust bearing for wear on flanges.
	7. Crankshaft journal out-of-round or worn.	7. Replace crankshaft or grind journals.
	8. Loose flywheel or torque converter.	8. Tighten to correct torque.
OIL PRESSURE DROP	1. Low oil level.	1. Check engine oil level.
	2. Faulty oil pressure sending unit.	2. Install new sending unit.
	3. Low oil pressure.	3. Check sending unit and main bearing oil clearance.
	4. Clogged oil filter.	4. Install new oil filter.
	5. Worn parts in oil pump.	5. Replace worn parts or pump.
	6. Thin or diluted oil.	6. Change oil to correct viscosity.
	7. Oil pump relief valve stuck.	7. Remove valve and inspect, clean, or replace.
	8. Oil pump suction tube loose.	8. Remove oil pan and install new tube or clean, if necessary.
	9. Oil pump cover warped or cracked.	9. Install new oil pump.
	10. Excessive bearing clearance.	10. Measure bearings for correct clearance.
OIL LEAKS	1. Misaligned or deteriorated gaskets.	1. Replace gasket(s).
	2. Loose fastener, broken or porous metal part.	2. Tighten, repair or replace the part.
	3. Misaligned or deteriorated cup or threaded plug.	3. Replace as necessary.

ENGINE 2.0L DOHC (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL CONSUMPTION OR SPARK PLUGS FOULED	1. PCV system malfunction.	1. Check system and repair as necessary. (Refer to 25 - EMISSIONS CONTROL/ EVAPORATIVE EMISSIONS/PCV VALVE - DIAGNOSIS AND TESTING)
	2. Worn, scuffed or broken rings.	2. Hone cylinder bores. Install new rings.
	3. Carbon in oil ring slots.	3. Install new rings.
	4. Rings fitted too tightly in grooves.	4. Remove rings and check grooves. If groove is not proper width, replace piston.
	5. Worn valve guide(s).	5. Ream guide(s) and replace valve(s) with oversize valve(s) and seal(s).
	6. Valve stem seal(s) worn or damaged.	6. Replace seal(s).

DIAGNOSIS AND TESTING - CYLINDER COMPRESSION PRESSURE TEST

The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

Ensure the battery is completely charged and the engine starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

(1) Check engine oil level and add oil if necessary.

(2) Drive the vehicle until engine reaches normal operating temperature. Select a route free from traffic and other forms of congestion, observe all traffic laws, and accelerate through the gears several times briskly.

(3) Remove all spark plugs from engine. As spark plugs are being removed, check electrodes for abnormal firing indicators fouled, hot, oily, etc. Record cylinder number of spark plug for future reference.

(4) Remove the Auto Shutdown (ASD) relay from the PDC.

(5) Be sure throttle blade is fully open during the compression check.

(6) Insert compression gauge adaptor Special Tool 8116 or the equivalent, into the #1 spark plug hole in cylinder head. Connect the 0–500 psi (Blue) pressure transducer (Special Tool CH7059) with cable adaptors to the DRBIII®. For Special Tool identification, (Refer to 9 - ENGINE - SPECIAL TOOLS).

(7) Crank engine until maximum pressure is reached on gauge. Record this pressure as #1 cylinder pressure.

(8) Repeat the previous step for all remaining cylinders.

(9) Compression should not be less than 689 kPa (100 psi) and not vary more than 25 percent from cylinder to cylinder.

(10) If one or more cylinders have abnormally low compression pressures, repeat the compression test.

(11) If the same cylinder or cylinders repeat an abnormally low reading on the second compression test, it could indicate the existence of a problem in the cylinder in question. **The recommended compression pressures are to be used only as a guide to diagnosing engine problems. An engine should not be disassembled to determine the cause of low compression unless some malfunction is present.**

DIAGNOSIS AND TESTING - CYLINDER COMBUSTION PRESSURE LEAKAGE TEST

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will detect:

- Exhaust and intake valve leaks (improper seating).
- Leaks between adjacent cylinders or into water jacket.
- Any causes for combustion/compression pressure loss.

WARNING: DO NOT REMOVE THE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

Check the coolant level and fill as required. DO NOT install the pressure cap.

ENGINE 2.0L DOHC (Continued)

Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.

Clean spark plug recesses with compressed air.

Remove the spark plugs.

Remove the oil filler cap.

Remove the air cleaner.

Calibrate the tester according to the manufacturer's instructions. The shop air source for testing should maintain 483 kPa (70 psi) minimum, 1,379 kPa (200 psi) maximum, with 552 kPa (80 psi) recommended.

Perform the test procedures on each cylinder according to the tester manufacturer's instructions. While testing, listen for pressurized air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the coolant.

All gauge pressure indications should be equal, with no more than 25% leakage per cylinder.

FOR EXAMPLE: At 552 kPa (80 psi) input pressure, a minimum of 414 kPa (60 psi) should be maintained in the cylinder.

DIAGNOSIS AND TESTING - ENGINE OIL LEAK INSPECTION

Begin with a thorough visual inspection of the engine, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

(1) Do not clean or degrease the engine at this time because some solvents may cause rubber to swell, temporarily stopping the leak.

(2) Add an oil soluble dye (use as recommended by manufacturer). Start the engine and let idle for approximately 15 minutes. Check the oil dipstick to make sure the dye is thoroughly mixed as indicated with a bright yellow color under a black light.

(3) Using a black light, inspect the entire engine for fluorescent dye, particularly at the suspected area of oil leak. If the oil leak is found and identified, repair as necessary.

(4) If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat inspection.

(5) **If the oil leak source is not positively identified at this time**, proceed with the air leak detection test method as follows:

- Disconnect the fresh air hose (make-up air) at the cylinder head cover and plug or cap the nipple on the cover.
- Remove the PCV valve hose from the cylinder head cover. Cap or plug the PCV valve nipple on the cover.
- Attach an air hose with pressure gauge and regulator to the dipstick tube.

CAUTION: Do not subject the engine assembly to more than 20.6 kpa (3 PSI) of test pressure.

- Gradually apply air pressure from 1 psi to 2.5 psi maximum while applying soapy water at the suspected source. Adjust the regulator to the suitable test pressure that provides the best bubbles which will pinpoint the leak source. If the oil leak is detected and identified, repair per service manual procedures.
- If the leakage occurs at the crankshaft rear oil seal area, refer to the section, Inspection for Rear Seal Area Leak.

(6) If no leaks are detected, turn off the air supply. Remove the air hose, all plugs, and caps. Install the PCV valve and fresh air hose (make-up air). Proceed to next step.

(7) Clean the oil off the suspect oil leak area using a suitable solvent. Drive the vehicle at various speeds approximately 24 km (15 miles). Inspect the engine for signs of an oil leak by using a black light.

NOTE: If oil leakage is observed at the dipstick tube to block location; remove the tube, clean and reseal using Mopar® Stud & Bearing Mount (press fit tube applications only), and for O-ring style tubes, remove tube and replace the O-ring seal.

INSPECTION FOR REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

(1) Disconnect the battery.

(2) Raise the vehicle.

(3) Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak. If a leak is present in this area, remove transmission for further inspection.

(a) Circular spray pattern generally indicates seal leakage or crankshaft damage.

(b) Where leakage tends to run straight down, possible causes are a porous block, oil gallery cup plug, bedplate to cylinder block mating surfaces and seal bore. See proper repair procedures for these items.

(4) If no leaks are detected, pressurize the crankcase as previously described.

CAUTION: Do not exceed 20.6 kPa (3 psi).

ENGINE 2.0L DOHC (Continued)

(5) If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks and scratches. The crankshaft seal flange is especially machined to complement the function of the rear oil seal.

(6) For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled.

(7) After the oil leak root cause and appropriate corrective action have been identified, replace component(s) as necessary.

STANDARD PROCEDURE

STANDARD PROCEDURE - REPAIR OF DAMAGED OR WORN THREADS

Damaged or worn threads (excluding spark plug and camshaft bearing cap attaching threads) can be repaired. Essentially, this repair consists of drilling out worn or damaged threads, tapping the hole with a special Heli-Coil Tap, (or equivalent) and installing an insert into the tapped hole. This brings the hole back to its original thread size.

CAUTION: Be sure that the tapped holes maintain the original center line.

Heli-Coil tools and inserts are readily available from automotive parts jobbers.

STANDARD PROCEDURE - HYDROSTATIC LOCKED ENGINE

When an engine is suspected to be hydrostatically locked, regardless of what caused the problem, the following steps should be used.

CAUTION: DO NOT use starter motor to rotate the engine, severe damage may occur.

(1) Inspect air cleaner, induction system and intake manifold to insure system is dry and clear of foreign material.

(2) Remove negative battery cable.

(3) Place a shop towel around the spark plugs when removing them from the engine. This will catch any fluid that may possibly be in the cylinder under pressure.

(4) With all spark plugs removed, rotate engine crankshaft using a breaker bar and socket.

(5) Identify the fluid in the cylinder(s) (i.e., coolant, fuel, oil or other).

(6) Make sure all fluid has been removed from the cylinders. Inspect engine for damage (i.e., connecting rods, pistons, valves, etc.)

(7) Repair engine or components as necessary to prevent this problem from re-occurring.

CAUTION: Squirt approximately one teaspoon of oil into the cylinders, rotate engine to lubricate the cylinder walls to prevent damage on restart.

(8) Install new spark plugs.

(9) Drain engine oil and remove oil filter.

(10) Install a new oil filter.

(11) Fill engine with specified amount of approved oil.

(12) Connect negative battery cable.

(13) Start engine and check for any leaks.

STANDARD PROCEDURE - FORM-IN-PLACE GASKETS AND SEALERS

There are numerous places where form-in-place gaskets are used on the engine. Care must be taken when applying form-in-place gaskets to assure obtaining the desired results. **Do not use form-in-place gasket material unless specified.** Bead size, continuity, and location are of great importance. Too thin a bead can result in leakage while too much can result in spill-over which can break off and obstruct fluid feed lines. A continuous bead of the proper width is essential to obtain a leak-free gasket.

There are numerous types of form-in-place gasket materials that are used in the engine area. Mopar® Engine RTV GEN II, Mopar® ATF-RTV, and Mopar® Gasket Maker gasket materials, each have different properties and can not be used in place of the other.

MOPAR® ENGINE RTV GEN II is used to seal components exposed to engine oil. This material is a specially designed black silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil. Moisture in the air causes the material to cure. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® ATF RTV is a specifically designed black silicone rubber RTV that retains adhesion and sealing properties to seal components exposed to automatic transmission fluid, engine coolants, and moisture. This material is available in three ounce tubes and has a shelf life of one year. After one year

ENGINE 2.0L DOHC (Continued)

this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® GASKET MAKER is an anaerobic type gasket material. The material cures in the absence of air when squeezed between two metallic surfaces. It will not cure if left in the uncovered tube. The anaerobic material is for use between two machined surfaces. Do not use on flexible metal flanges.

MOPAR® BED PLATE SEALANT is a unique (green-in-color) anaerobic type gasket material that is specially made to seal the area between the bed-plate and cylinder block without disturbing the bearing clearance or alignment of these components. The material cures slowly in the absence of air when torqued between two metallic surfaces, and will rapidly cure when heat is applied.

MOPAR® GASKET SEALANT is a slow drying, permanently soft sealer. This material is recommended for sealing threaded fittings and gaskets against leakage of oil and coolant. Can be used on threaded and machined parts under all temperatures. This material is used on engines with multi-layer steel (MLS) cylinder head gaskets. This material also will prevent corrosion. Mopar® Gasket Sealant is available in a 13 oz. aerosol can or 4oz./16 oz. can w/applicator.

SEALER APPLICATION

Mopar® Gasket Maker material should be applied sparingly 1 mm (0.040 in.) diameter or less of sealant to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Components should be torqued in place within 15 minutes. The use of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Engine RTV GEN II or ATF RTV gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. All mounting holes must be circled. For corner sealing, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant may be removed with a shop towel. Components should be torqued in place while the sealant is still wet to the touch (within 10 minutes). The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Gasket Sealant in an aerosol can should be applied using a thin, even coat sprayed completely over both surfaces to be joined, and both sides of a gasket. Then proceed with assembly. Material in a can w/applicator can be brushed on evenly over the sealing surfaces. Material in an aerosol can should be used on engines with multi-layer steel gaskets.

STANDARD PROCEDURE - ENGINE GASKET SURFACE PREPARATION

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

Never use the following to clean gasket surfaces:

- Metal scraper
- Abrasive pad or paper to clean cylinder block and head
- High speed power tool with an abrasive pad or a wire brush (Fig. 3)

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover
- Plastic or wood scraper (Fig. 3)
- Drill motor with 3M Roloc™ Bristle Disc (white or yellow) (Fig. 3)

CAUTION: Excessive pressure or high RPM (beyond the recommended speed), can damage the sealing surfaces. The mild (white, 120 grit) bristle disc is recommended. If necessary, the medium (yellow, 80 grit) bristle disc may be used on cast iron surfaces with care.

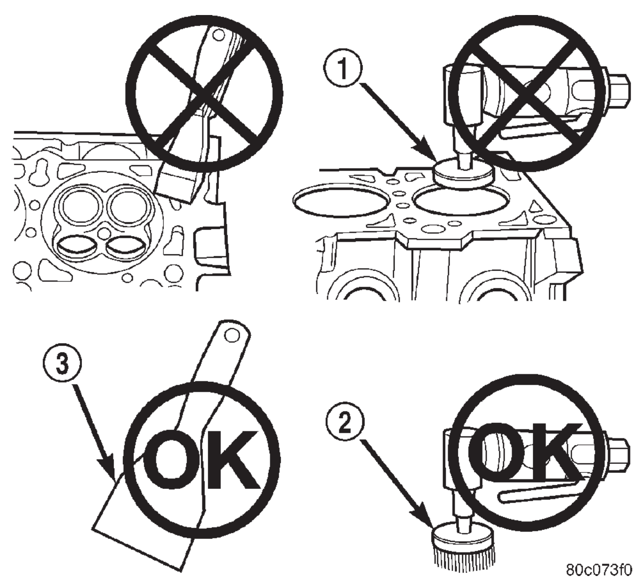


Fig. 3 Proper Tool Usage For Surface Preparation

1 - ABRASIVE PAD
2 - 3M ROLOC™ BRISTLE DISC
3 - PLASTIC/WOOD SCRAPER

ENGINE 2.0L DOHC (Continued)

STANDARD PROCEDURE - MEASURING BEARING CLEARANCE USING PLASTIGAGE

Engine crankshaft bearing clearances can be determined by use of Plastigage or equivalent. The following is the recommended procedure for the use of Plastigage:

(1) Remove oil film from surface to be checked. Plastigage is soluble in oil.

(2) Place a piece of Plastigage across the entire width of the bearing shell in the cap approximately 6.35 mm (1/4 in.) off center and away from the oil holes (Fig. 4). (In addition, suspected areas can be checked by placing the Plastigage in the suspected area). Torque the bearing cap bolts of the bearing being checked to the proper specifications.

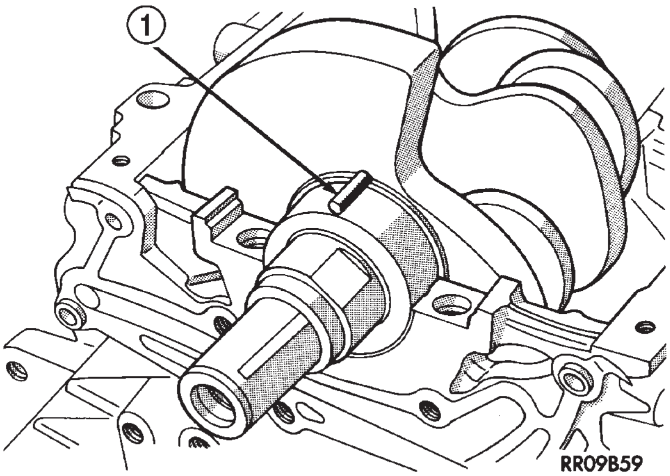


Fig. 4 Plastigage Placed in Lower Shell—Typical

1 - PLASTIGAGE

(3) Remove the bearing cap and compare the width of the flattened Plastigage with the metric scale provided on the package. Locate the band closest to the same width. This band shows the amount of clearance in thousandths of a millimeter. Differences in readings between the ends indicate the amount of taper present. Record all readings taken. Compare clearance measurements to specs found in engine specifications (Refer to 9 - ENGINE - SPECIFICATIONS). **Plastigage generally is accompanied by two scales. One scale is in inches, the other is a metric scale.**

NOTE: Plastigage is available in a variety of clearance ranges. Use the most appropriate range for the specifications you are checking.

(4) Install the proper crankshaft bearings to achieve the specified bearing clearances.

STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS

Using a blunt tool such as a drift and a hammer, strike the bottom edge of the cup plug. With the cup plug rotated, grasp firmly with pliers or other suitable tool and remove plug (Fig. 5).

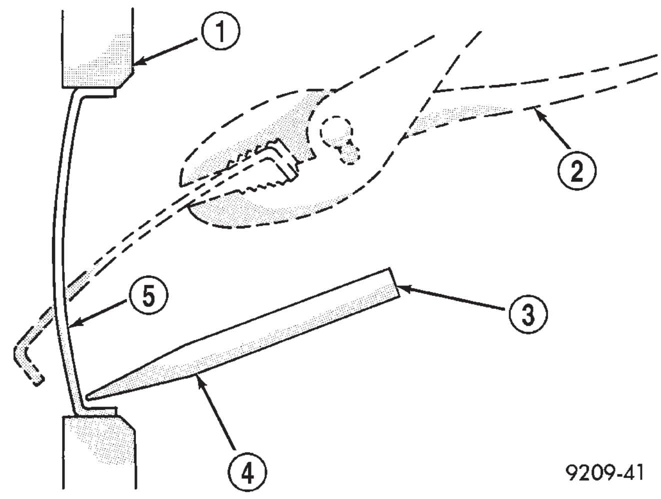


Fig. 5 Core Hole Plug Removal

1 - CYLINDER BLOCK
2 - REMOVE PLUG WITH PLIERS
3 - STRIKE HERE WITH HAMMER
4 - DRIFT PUNCH
5 - CUP PLUG

CAUTION: Do not drive cup plug into the casting as restricted cooling can result and cause serious engine problems.

Thoroughly clean inside of cup plug hole in cylinder block or head. Be sure to remove old sealer. Lightly coat inside of cup plug hole with Mopar® Stud and Bearing Mount. Make certain the new plug is cleaned of all oil or grease. Using proper drive plug, drive plug into hole so that the sharp edge of the plug is at least 0.5 mm (0.020 in.) inside the lead-in chamfer.

It is not necessary to wait for curing of the sealant. The cooling system can be refilled and the vehicle placed in service immediately.

REMOVAL - ENGINE ASSEMBLY

(1) Perform fuel pressure release procedure (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).

(2) Disconnect negative battery cable.

(3) Drain cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(4) Discharge A/C system using a suitable refrigerant recovery machine.

ENGINE 2.0L DOHC (Continued)

(5) Remove throttle body air inlet hose and air cleaner housing assembly.

(6) Remove upper radiator crossmember.

(7) Disconnect upper and lower radiator hoses at radiator.

(8) Manual Transmission equipped vehicles:

- Disconnect speed sensor connector.
- Disconnect back up lamp switch connector.
- Disconnect transmission shift cables.
- Disconnect clutch cable.

(9) Automatic Transmission equipped vehicles:

- Disconnect transmission shift cable.
- Disconnect transmission electrical harness connectors (C104 & C105) (Refer to 8 - ELECTRICAL/CONNECTOR/GROUND LOCATIONS - DESCRIPTION).
- Using a blade or suitable hose cutter, cut transaxle oil cooler lines off flush with fittings. Plug lines and fittings to prevent debris from entering transaxle or cooler circuit. A service splice kit will be installed upon reassembly.

(10) Disconnect A/C lines at condenser. Remove cooling module assembly (radiator, fan module, and condenser).

(11) Disconnect engine electrical harness from PCM and bulkhead connectors.

(12) Raise vehicle on hoist.

(13) Remove both front wheels.

(14) Remove left and right splash shields.

(15) Remove both axle shafts (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL).

(16) Drain engine oil.

(17) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(18) Remove power steering pump from bracket. **Do not** disconnect power steering lines from pump. Reposition pump and support with suitable retaining strap.

(19) Disconnect heater return hose from pipe connection at right front frame rail area.

(20) Disconnect A/C compressor electrical connectors.

(21) Disconnect exhaust pipe from manifold.

(22) Remove through bolts from front and rear engine mounts.

(23) Remove rear mount bracket from transmission.

(24) Remove structural collar and torque reaction bracket (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - REMOVAL).

(25) Remove transmission dust shield.

(26) Automatic Transmission equipped vehicles:

- Mark flex plate to torque converter position. Remove torque converter bolts.

(27) Lower vehicle.

(28) Disconnect positive cable from battery and PDC.

(29) Disconnect ground cable from left side transaxle mount bracket.

(30) Disconnect throttle and speed control cables.

(31) Disconnect coolant recovery container overflow hose.

(32) Disconnect heater hose at thermostat housing.

(33) Disconnect all ground straps attaching to engine.

(34) Disconnect brake booster and vapor purge vacuum hoses.

(35) Disconnect fuel line from fuel rail.

(36) Disconnect generator connectors.

(37) Remove intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(38) Remove generator.

(39) Remove A/C suction line at compressor. Cap suction port and line.

(40) Remove A/C compressor.

(41) Raise vehicle enough to allow engine dolly 6135 and cradle 6710 with posts 6848 to be installed under vehicle (Fig. 6).

(42) Loosen cradle engine mounts to allow movement for positioning onto engine locating holes on the engine bedplate, compressor and support bracket. Install adapters 6909 to the two post at rear of engine. Lower vehicle and position cradle mounts until the engine is resting on posts. Tighten post mounts to cradle frame. This will keep mounts from moving when removing or installing engine/transmission assembly. Secure engine/transmission to dolly/cradle with safety straps.

(43) Lower vehicle so weight of the engine and transmission ONLY is on the cradle.

(44) Remove right and left side vertical engine mount bolts.

(45) Slowly raise vehicle in short length spans. Inspect at each interval for potential engine or transaxle contact to vehicle components. Move the cradle/dolly fixture as necessary to allow for removal clearance.

INSTALLATION - ENGINE ASSEMBLY

(1) Position engine/transaxle assembly under vehicle and slowly lower vehicle in short length spans. Inspect at each interval for potential engine or transaxle contact to vehicle components. Move the cradle/dolly fixture as necessary to allow for installation clearance.

(2) Continue lowering vehicle until right side engine mount and left side transaxle mount align to their mounting locations. Install mounting bolts and torque to 61 N·m (45 ft. lbs.).

ENGINE 2.0L DOHC (Continued)

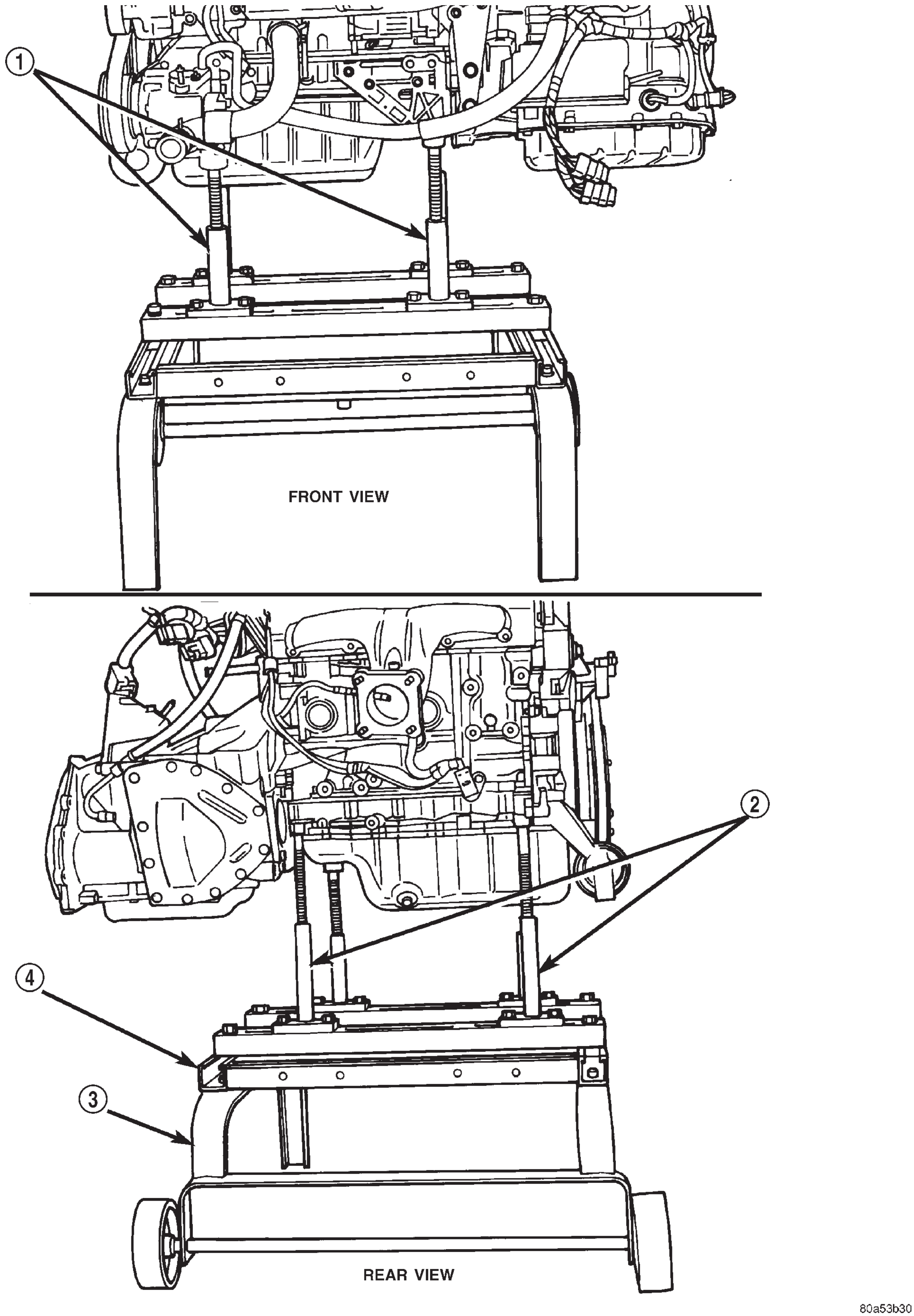


Fig. 6 Positioning Engine Cradle Support Post Mounts

ENGINE 2.0L DOHC (Continued)

1 - SPECIAL TOOLS POST 6848
2 - SPECIAL TOOLS POST 6848 WITH ADAPTERS 6909
3 - SPECIAL TOOL 6135 DOLLY
4 - SPECIAL TOOL 6710 CRADLE

(3) Remove safety straps from engine/transaxle assembly. Slowly raise vehicle enough to remove the engine dolly and cradle.
(4) Install A/C compressor.
(5) Connect A/C suction line to compressor.
(6) Install generator.
(7) Install intake manifold. Torque fasteners to 12 N·m (105 in. lbs.) (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).
(8) Connect generator connectors.
(9) Connect fuel line to fuel rail.
(10) Connect brake booster and vapor purge hoses.
(11) Connect all ground straps to engine.
(12) Connect heater hose to thermostat housing.
(13) Connect coolant recovery container overflow hose.
(14) Connect throttle and speed control cables.
(15) Connect ground cable to left side transaxle mount bracket.
(16) Connect positive cable to battery and PDC.
(17) Raise vehicle on hoist.
(18) Automatic Transmission equipped vehicles:
• Install torque converter bolts.
(19) Install transmission dust shield.
(20) Install structural collar and torque reaction bracket (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - INSTALLATION).
(21) Install rear mount bracket to transmission.
(22) Install front and rear engine mount through bolts. Torque fasteners to 61 N·m (45 ft. lbs.).
(23) Connect exhaust pipe to exhaust manifold. Torque fasteners to 28 N·m (250 in. lbs.).
(24) Connect A/C compressor electrical connectors.
(25) Connect heater return hose to pipe connection at right front frame rail area.
(26) Install power steering pump to bracket.
(27) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
(28) Install both axle shafts (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION).
(29) Install new oil filter.
(30) Install left and right splash shields.
(31) Install both front wheels.
(32) Lower vehicle.
(33) Connect engine electrical harness to PCM and bulkhead connectors.
(34) Install cooling module assembly (radiator, fan module, and condenser). Connect A/C lines to condenser.
(35) Manual Transmission equipped vehicles:
• Connect clutch cable.
• Connect transmission shift cables.
• Connect back up lamp switch connector.
• Connect speed sensor connector.
(36) Automatic Transmission equipped vehicles:
• Connect transmission shift cable.
• Connect transmission electrical connectors (C104 & C105) (Refer to 8 - ELECTRICAL/CONNECTOR/GROUND LOCATIONS - DESCRIPTION).
• Connect transmission oil cooler lines using service splice kit. Refer to instructions provided with kit.
(37) Connect upper and lower radiator hoses.
(38) Install upper radiator crossmember.
(39) Install throttle body air inlet hose and air cleaner housing assembly.
(40) Fill engine crankcase with proper oil to correct level.
(41) Evacuate and recharge A/C system (Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).
(42) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).
(43) Connect negative battery cable.
(44) Start engine and run until normal operating temperature is reached.

ENGINE 2.0L DOHC (Continued)

SPECIFICATIONS

2.0L DOHC ENGINE

DESCRIPTION	SPECIFICATION
General Specification	
Type	In-Line OHV, DOHC
Number of Cylinders	4
Displacement	2.0 Liters (122 cu. in.)
Bore	87.5 mm (3.445 in.)
Stroke	83.0 mm (3.268 in.)
Compression Ratio	9.6:1
Firing Order	1-3-4-2
Compression Pressure	1172–1551 kPa (170–225 psi)
Max. Variation Between Cylinders	25%
Cylinder Block	
Cylinder Bore Diameter	87.4924–87.5076 mm (3.4446–3.4452 in.)
Out-of-Round (Max.)	0.051 mm (0.002 in.)
Taper (Max.)	0.051 mm (0.002 in.)
Pistons	
Piston Diameter	87.463–87.481 mm (3.4434–3.4441 in.)
Clearance @ 17.5 mm (11/16 in.) from bottom of skirt	0.018–0.050 mm (0.0007–0.0020 in.)
Weight	340–350 grams (11.99–12.34 oz.)
Land Clearance (Diametrical)	0.740–0.803 mm (0.029–0.031 in.)
Piston Length	64.8 mm (2.551 in.)
Piston Ring Groove Depth No. 1	3.983–4.132 mm (0.157–0.163 in.)
Piston Ring Groove Depth No. 2	4.456–4.605 mm (0.175–0.181 in.)
Piston Ring Groove Depth No. 3	3.841–4.075 mm (0.151–0.160 in.)
Piston Pins	
Clearance in Piston	0.008–0.020 mm (0.0003–0.0008 in.)
Clearance in Connecting Rod	Interference
Diameter	20.998–21.003 mm (0.8267–0.8269 in.)
End Play	None
Length	74.75–75.25 mm (2.943–2.963 in.)
Piston Rings	
Ring Gap—Top Compression Ring	0.23–0.52 mm (0.009–0.020 in.)
Wear Limit	0.8 mm (0.031 in.)
Ring Gap—2nd Compression Ring	0.49–0.78 mm (0.019–0.031 in.)
Wear Limit	0.8 mm (0.031 in.)
Ring Gap—Oil Control Steel Rails	0.23–0.66 mm (0.009–0.026 in.)
Wear Limit	1.0 mm (0.039 in.)
Ring Side Clearance—Compression Rings	0.025–0.065 mm (0.0010–0.0026 in.)
Wear Limit	0.10 mm (0.004 in.)
Ring Side Clearance—Oil Ring Pack	0.004–0.178 mm (0.0002–0.0070 in.)
Ring Width—Compression Rings	1.17–1.19 mm (0.046–0.047 in.)
Ring Width—Oil Ring Pack	2.854–3.008 mm (0.1124–0.1184 in.)
Connecting Rod	
Bearing Clearance	0.026–0.059 mm (0.001–0.0023 in.)
Wear Limit	0.075 mm (0.003 in.)
Bore Diameter—Piston Pin	20.96–20.98 mm (0.8252–0.8260 in.)

ENGINE 2.0L DOHC (Continued)

DESCRIPTION	SPECIFICATION
Bore Diameter—Crankshaft End	50.991–51.005 mm (2.0075–2.0081 in.)
Side Clearance	0.13–0.38 mm (0.005–0.015 in.)
Wear Limit	0.40 mm (0.016 in.)
Weight—Total (Less Bearing)	548.8 grams (19.36 oz.)
Crankshaft	
Connecting Rod Journal Diameter	47.9924–48.0076 mm (1.8894–1.8900 in.)
Main Bearing Journal Diameter	51.9924–52.0076 mm (2.0469–2.0475 in.)
Journal Out-of-Round (Max.)	0.0035 mm (0.0001 in.)
Journal Taper (Max.)	0.0038 mm (0.0001 in.)
End Play	0.09–0.24 mm (0.0035–0.0094 in.)
Wear Limit	0.37 mm (0.015 in.)
Main Bearing Diametrical Clearance	0.022–0.062 mm (0.0008–0.0024 in.)
Hydraulic Lash Adjuster	
Body Diameter	15.901–15.913 mm (0.626–0.6264 in.)
Plunger Travel Minimum (Dry)	3.0 mm (0.118 in.)
Cylinder Head Camshaft Bearing Bore Diameter	
Journals No.1–6	26.020–26.041 mm (1.024–1.025 in.)
Camshaft	
Journal Diameter No. 1–6	25.951–25.970 mm (1.021–1.022 in.)
Bearing Clearance—Diametrical	0.069–0.071 mm (0.0027–0.003 in.)
End Play	0.05–0.15 mm (0.002–0.006 in.)
Lift (Zero Lash)	
Intake	8.65 mm (0.340 in.)

DESCRIPTION	SPECIFICATION
Exhaust	7.95 mm (0.312 in.)
Intake Valve Timing*	
Closes (ABDC)	33.6°
Opens (BTDC)	3.8°
Duration	212.8°
Exhaust Valve Timing*	
Closes (BTDC)	1°
Opens (BBDC)	41.8°
Duration	220.8°
Valve Overlap	0°
*All readings in crankshaft degrees, at 0.5 mm (0.019 in.) of valve lift.	
Cylinder Head	
Material	Cast Aluminum
Gasket Thickness (Compressed)	0.71 mm (0.028 in.)
Valve Seat	
Angle	44.5°- 45°
Seat Diameter—Intake	34.37 - 34.63mm (1.353 - 1.363in.)
Seat Diameter—Exhaust	27.06 - 27.32mm (1.065 - 1.075in.)
Runout (Max.)	0.05 mm (0.002 in.)
Valve Seat Width—Intake and Exhaust	0.9–1.3 mm (0.035–0.051 in.)
Service Limit—Intake	2.0 mm (0.079 in.)
Service Limit—Exhaust	2.5 mm (0.098 in.)
Valve Guide	
Diameter I.D.	5.975–6.000 mm (0.235–0.236 in.)
Guide Bore Diameter	11.0–11.02 mm (0.4330–0.4338 in.)
Guide Height (spring seat to guide tip)	13.25–13.75 mm (0.521–0.541 in.)
Valves	
Face Angle—Intake and Exhaust	44.5—45°

ENGINE 2.0L DOHC (Continued)

DESCRIPTION	SPECIFICATION
Head Diameter—Intake	34.67–34.93 mm 1.364–1.375 in.)
Head Diameter—Exhaust	28.32–28.52 mm (1.114–1.122 in.)
Valve Length (Overall)	
—Intake	112.76–113.32 mm (4.439–4.461 in.)
—Exhaust	110.89–111.69 mm (4.365–4.397 in.)
Valve Stem Diameter	
—Intake	5.934–5.952 mm (0.2337–0.2344 in.)
—Exhaust	5.906–5.924 mm (0.2326–0.2333 in.)
Valve Margin	
Intake	1.200–1.700 mm (0.047–0.066
Service Limit	0.95 mm (1/32 in.)
Exhaust	0.985–1.315 mm (0.038–0.051 in.)
Service Limit	1.05 mm (3/64 in.)
Valve Stem Tip Height	
Intake	48.04 mm (1.891 in.)
Exhaust	47.99 mm (1.889 in.)
Valve Stem to Guide Clearance	
Intake	0.048–0.066 mm (0.0018–0.0025 in.)
Max. Allowable	0.076 mm (0.003 in.)
Exhaust	0.0736–0.094 mm (0.0029–0.0037 in.)
Max. Allowable	0.101 mm (0.004 in.)
Valve Springs	
Free Length (Approx.)	49.3 mm (1.940 in.)

DESCRIPTION	SPECIFICATION
Nominal Force (Valve Closed)	245–328 N @ 38.0 mm (66–74 lbs. @ 1.496 in.)
Nominal Force (Valve Open)	565–627 N @ 29.3 mm (127–141 lbs. @ 1.53 in.)
Installed Height	36.93 - 38.93mm (1.453 - 1.532in.)
Number of Coils	7.80
Wire Diameter	3.61 mm (0.142 in.)
Oil Pump	
Clearance Over Rotors (Max.)	0.10 mm (0.004 in.)
Cover Out-of-Flat (Max.)	0.076 mm (0.003 in.)
Inner Rotor Thickness (Min.)	7.64 mm (0.301 in.)
Outer Rotor Thickness (Min.)	7.64 mm (0.301 in.)
Outer Rotor Clearance (Max.)	0.039 mm (0.015 in.)
Outer Rotor Diameter (Min.)	79.95 mm (3.148 in.)
Tip Clearance Between Rotors (Max.)	0.20 mm (0.008 in.)
Oil Pressure	
At Curb Idle Speed*	25 kPa (4 psi)
At 3000 rpm	170–550 kPa (25–80 psi)
CAUTION: *If pressure is ZERO at curb idle, DO NOT run engine at 3000 rpm.	

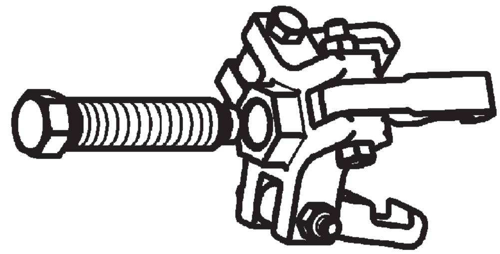
ENGINE 2.0L DOHC (Continued)

TORQUE

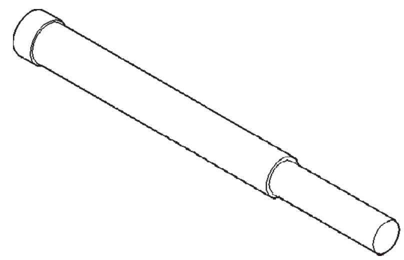
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Camshaft Sprocket—Bolt	115	85	—
Connecting Rod Cap—Bolts	27 +¼ turn	20 +¼ turn	—
Crankshaft Main Bearing Cap/Bedplate			
—M8 Bolts	34	25	—
—M11 Bolts	81	60	—
Crankshaft Damper	136	100	—
Cylinder Head—Bolts	Refer to Procedure		
Cylinder Head Cover—Bolts	12	—	105
Drive Plate to Crankshaft	95	70	—
Engine Mount Bracket Right—Bolts	61	45	—
Engine Mount Front and Rear—Through Bolt	61	45	—
Exhaust Manifold to Cylinder Head—Bolts	23	—	200
Exhaust Manifold Heat Shield—Bolts	12	—	105
Intake Manifold—Bolts	28	—	250
Oil Filter	20	15	—
Oil Filter Adaptor	80	60	—
Oil Pan—Bolts	12	—	105
Oil Pan Drain—Plug	27	20	—
Oil Pump to Block—Bolts	28	—	250
Oil Pump Cover Plate—Bolts	12	—	105
Oil Pump Pick-up Tube—Bolt	23	—	200
Oil Pump Relief Valve—Cap	42	30	—
PCV Valve—Screw	8	—	70
Spark Plugs	18	13	—
Timing Belt Covers			
—Front Cover Bolts	12	—	105
—Rear Cover Bolts	12	—	105
Hydraulic Timing Belt Tensioner—Bolts	31	23	—

SPECIAL TOOLS

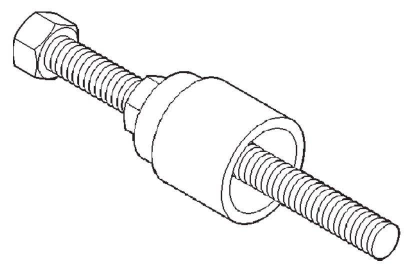
2.0L DOHC ENGINE



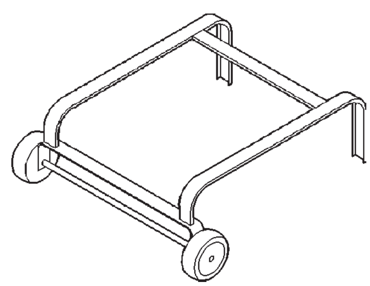
Puller 8454



Crankshaft Damper Removal Insert 6827-A

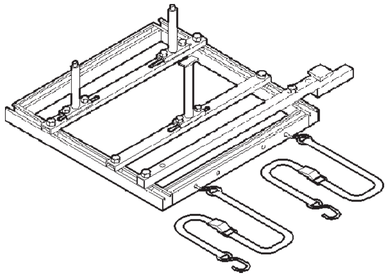


Crankshaft Damper/Sprocket Installer 6792

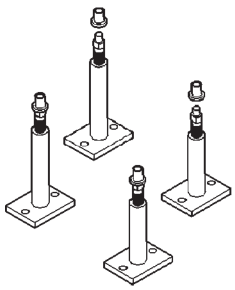


Dolly 6135

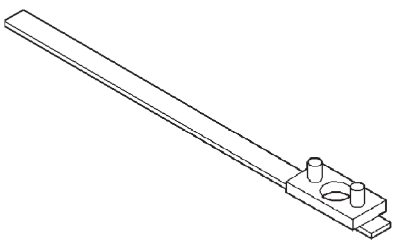
ENGINE 2.0L DOHC (Continued)



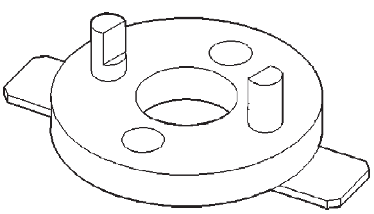
Cradle 6710



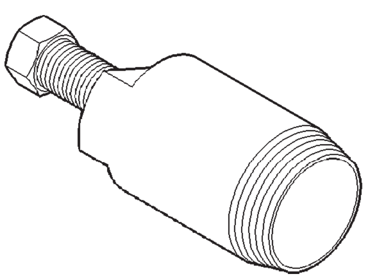
Post Kit Engine Cradle 6848



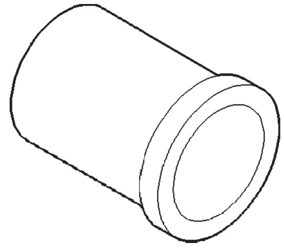
Camshaft Sprocket Remover/Installer C-4687



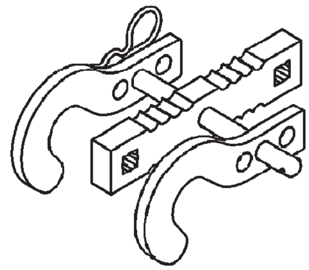
Camshaft Sprocket Remover/Installer Adapter C-4687-1



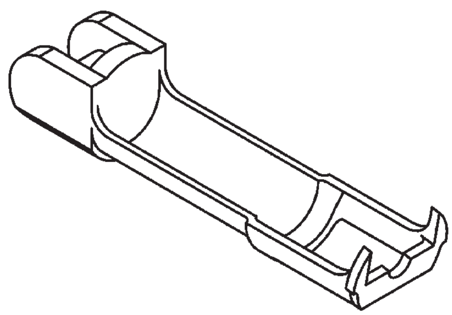
Camshaft Seal Remover C-4679A



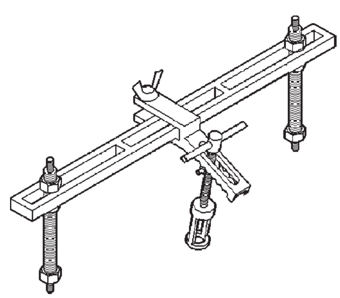
Camshaft Seal Installer MD-998306



Valve Spring Compressor 8215-A

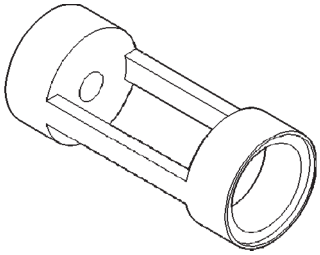


Adaptor 8436

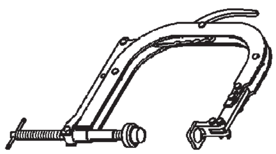


Valve Spring Compressor MD-998772-A

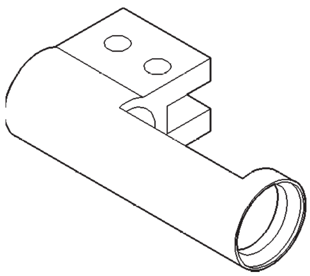
ENGINE 2.0L DOHC (Continued)



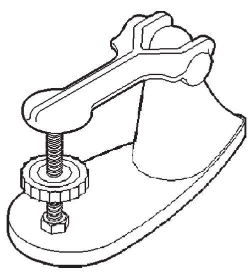
Valve Spring Compressor Adapter 6779



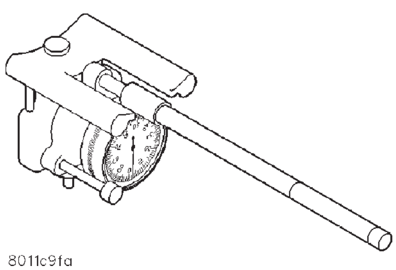
Valve Spring Compressor C-3422-D



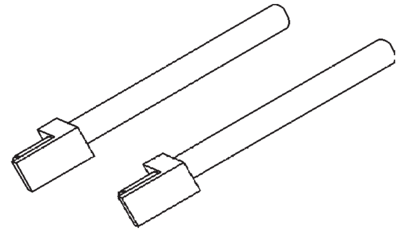
Spring Compressor Adaptor 6526



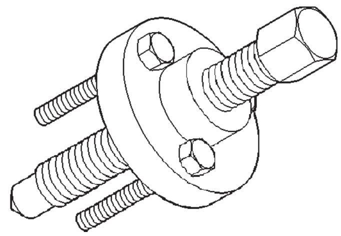
Valve Spring Tester C-647



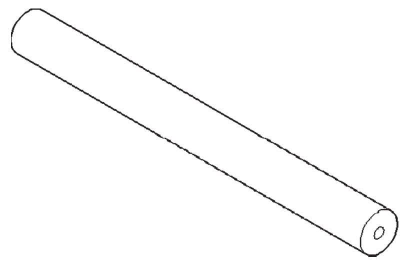
Cylinder Bore Gage C-119



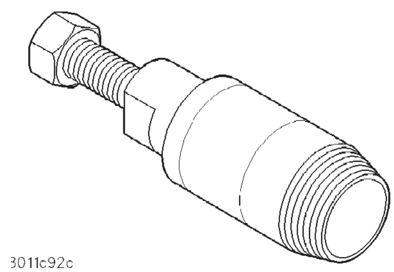
Connecting Rod Guides 8189



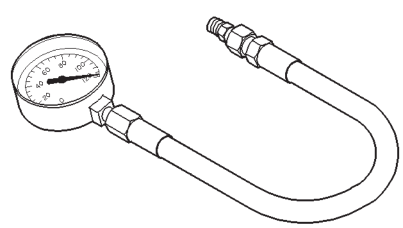
Crankshaft Sprocket Remover 6793



Crankshaft Sprocket Remover Insert C-4685-C2

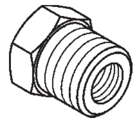


Crankshaft Seal Remover 6771

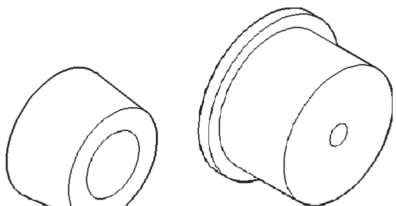


Oil Pressure Gage C-3292

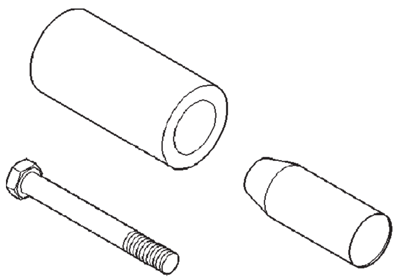
ENGINE 2.0L DOHC (Continued)



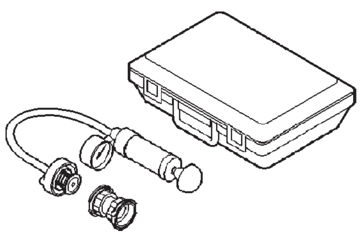
Adaptor 8406



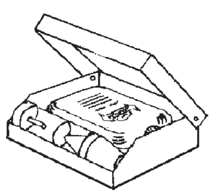
Rear Crankshaft Seal Guide and Installer 6926-1 and 6926-2



Front Crankshaft Oil Seal Installer 6780

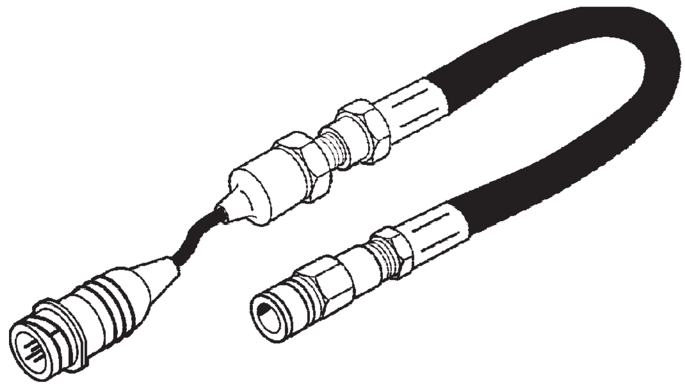


Cooling System Tester 7700

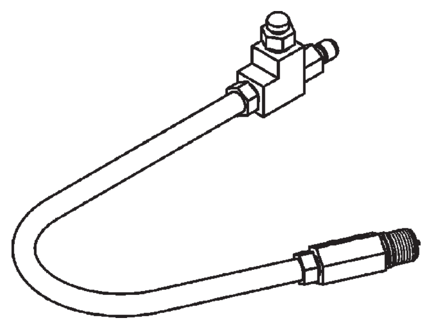


Combustion Leak Tester C-3685-A

DRB III® with PEP Module OT-CH6010A



Pressure Transducer CH7059



Cylinder Compression Pressure Adaptor 8116

AIR CLEANER ELEMENT

REMOVAL

(1) Disconnect negative battery cable.
(2) Disconnect inlet air temperature sensor electrical connector.
(3) Disconnect fresh air makeup hose from throttle body air inlet hose.
(4) Disconnect PCV hose from intake manifold.
(5) Loosen hose clamp at throttle body air inlet hose. Remove hose from throttle body.
(6) Push in on locking tabs to disengage air inlet hose from air cleaner housing. Remove throttle body air inlet hose and air cleaner element together.
(7) Separate air cleaner element from throttle body air inlet hose.

INSTALLATION

(1) Clean any debris from inside air cleaner housing.
(2) Install air cleaner element onto throttle body air inlet hose.
(3) Install throttle body air inlet hose into air cleaner housing. Push in on hose until an audible "click" is heard from locking tabs.
(4) Install hose on throttle body. Tighten hose clamp.
(5) Connect PCV hose to intake manifold.
(6) Connect fresh air makeup hose.
(7) Connect inlet air temperature sensor electrical connector.
(8) Connect negative battery cable.

AIR CLEANER HOUSING

REMOVAL

(1) Disconnect negative battery cable.
(2) Disconnect inlet air temperature sensor electrical connector.
(3) Disconnect fresh air makeup hose from throttle body air inlet hose.
(4) Loosen hose clamp at throttle body air inlet hose. Remove hose from throttle body (Fig. 7).
(5) Remove push pin securing air duct to upper radiator support.
(6) Remove nut on bracket that holds air cleaner housing.
(7) Pull air cleaner housing straight up off locating pins (Fig. 7).

INSTALLATION

(1) Install air cleaner housing straight down on locating pins (Fig. 7).
(2) Install nut on bracket that holds air cleaner housing and tighten.

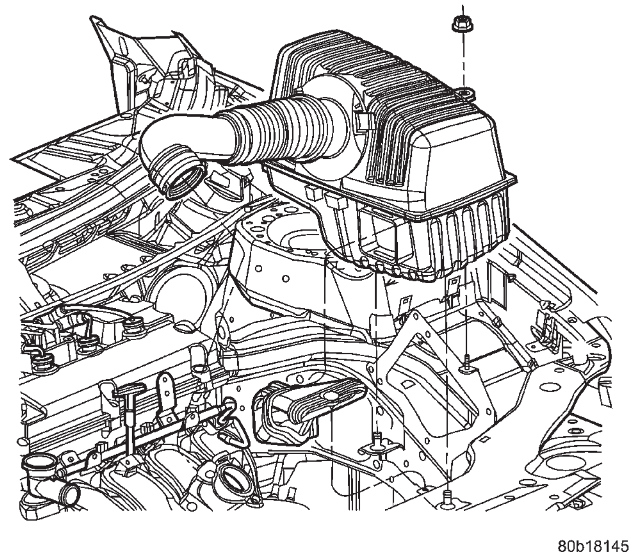


Fig. 7 Air Cleaner Housing

(3) Install push pin that secures air duct to upper radiator support.
(4) Install throttle body air inlet hose to throttle body. Tighten hose clamp.
(5) Connect fresh air makeup hose.
(6) Connect inlet air temperature sensor electrical connector.
(7) Connect negative battery cable.

CYLINDER HEAD

DESCRIPTION

The cross flow designed, aluminum cylinder head contains dual over-head camshafts with four valves per cylinder (Fig. 8). The valves are arrange in two in-line banks. The intake valves face toward the front of the vehicle. The exhaust valves face the dash panel. The cylinder head incorporates powdered metal valve guides and seats. The cylinder head is sealed to the block using a multi-layer steel head gasket and retaining bolts.

Integral oil galleries providing lubrication passages to the hydraulic lash adjusters, camshafts, and valve mechanisms.

OPERATION

The cylinder head closes the combustion chamber, allowing the pistons to compress the fuel/air mixture for ignition. The valves are actuated by the lobe profiles on the camshaft to open and close at specified duration to either allow clean air in the combustion chamber or the exhaust gases out; depending on the stroke of the engine.

CYLINDER HEAD (Continued)

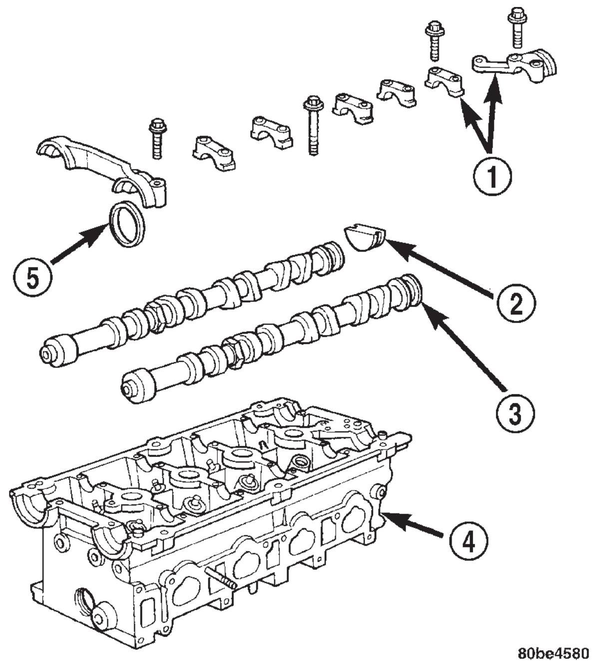


Fig. 8 Cylinder Head and Camshafts

1 - CAMSHAFT BEARING CAPS
2 - PLUG
3 - CAMSHAFT
4 - CYLINDER HEAD
5 - CAMSHAFT OIL SEAL

DIAGNOSIS AND TESTING—CYLINDER HEAD GASKET

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

Possible indications of the cylinder head gasket leaking between adjacent cylinders are:

- Loss of engine power
- Engine misfiring
- Poor fuel economy

Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:

- Engine overheating
- Loss of coolant
- Excessive steam (white smoke) emitting from exhaust
- Coolant foaming

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between adjacent cylinders, follow the procedures in Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING). An engine cylinder head gasket leaking between adjacent cylinders will result in approximately a 50–70% reduction in compression pressure.

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

COOLING SYSTEM TESTER METHOD

WARNING: WITH COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester 7700 or equivalent to pressure cap neck. Start the engine and observe the tester's pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

CHEMICAL TEST METHOD

Combustion leaks into the cooling system can also be checked by using Bloc-Chek Kit C-3685-A or equivalent. Perform test following the procedures supplied with the tool kit.

REMOVAL - CYLINDER HEAD

(1) Perform fuel system pressure release procedure **before attempting any repairs.** (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

(2) Disconnect negative battery cable.

(3) Drain cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(4) Remove throttle body air inlet hose and air cleaner housing assembly.

(5) Remove intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(6) Disconnect heater hose from thermostat housing.

(7) Remove heater tube support bracket from cylinder head.

(8) Disconnect camshaft position sensor electrical connector.

(9) Disconnect EGR solenoid electrical connector (If equipped).

(10) Raise vehicle on hoist.

CYLINDER HEAD (Continued)

(11) Disconnect exhaust pipe from exhaust manifold.

(12) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(13) Remove crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).

(14) Remove front timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

(15) Remove timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(16) Remove camshaft sprockets (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(17) Remove timing belt idler pulley and rear timing belt cover.

(18) Remove cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

(19) Remove camshafts and rocker arms (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - REMOVAL).

(20) Remove cylinder head bolts and remove cylinder head from engine block.

(21) Inspect and clean cylinder head (Refer to 9 - ENGINE - STANDARD PROCEDURE).

CLEANING

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Remove all gasket material from cylinder head and block. (Refer to 9 - ENGINE - STANDARD PROCEDURE) Be careful not to gouge or scratch the aluminum head sealing surface.

Clean all engine oil passages.

INSPECTION

(1) Cylinder head must be flat within 0.1 mm (0.004 in.) (Fig. 9).

(2) Inspect camshaft bearing journals for scoring.

(3) Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.

(4) Using a small hole gauge and a micrometer, measure valve guides in 3 places top, middle and bottom (Fig. 10). (Refer to 9 - ENGINE - SPECIFICATIONS) Replace guides if they are not within specification.

(5) Check valve guide height (Fig. 11).

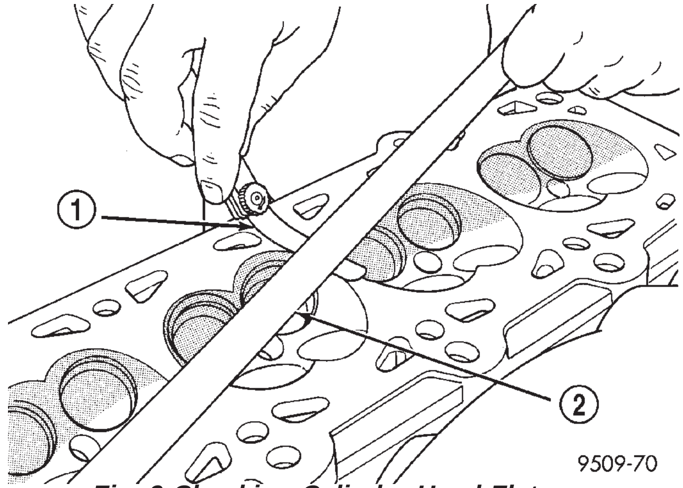


Fig. 9 Checking Cylinder Head Flatness

1 - FEELER GAUGE
2 - STRAIGHT EDGE

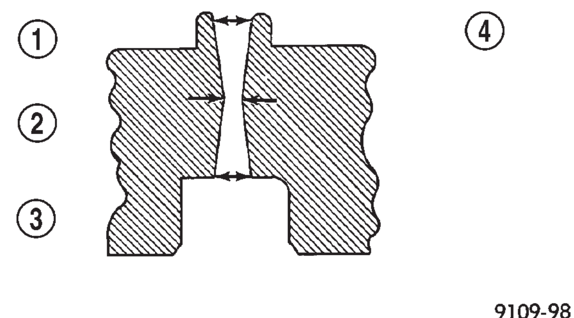


Fig. 10 Checking Wear on Valve Guide—Typical

1 - TOP
2 - MIDDLE
3 - BOTTOM
4 - CUT AWAY VIEW OF VALVE GUIDE MEASUREMENT LOCATIONS

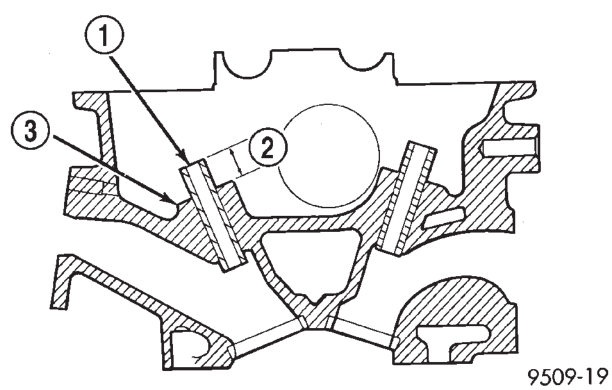


Fig. 11 Valve Guide Height

1 - VALVE GUIDE
2 - 13.25 - 13.75 MM (0.521 - 0.541 IN.)
3 - SPRING SEAT

CYLINDER HEAD (Continued)

INSTALLATION - CYLINDER HEAD

NOTE: The Cylinder head bolts should be examined BEFORE reuse. If the threads are necked down, the bolts must be replaced (Fig. 12).

Necking can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale, the bolt should be replaced.

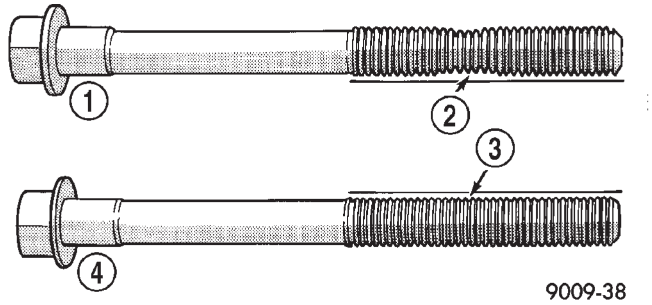


Fig. 12 Checking Bolts for Stretching (Necking)

1 - STRETCHED BOLT
2 - THREADS ARE NOT STRAIGHT ON LINE
3 - THREADS ARE STRAIGHT ON LINE
4 - UNSTRETCHED BOLT

(1) Before installing the bolts, the threads should be coated with engine oil.

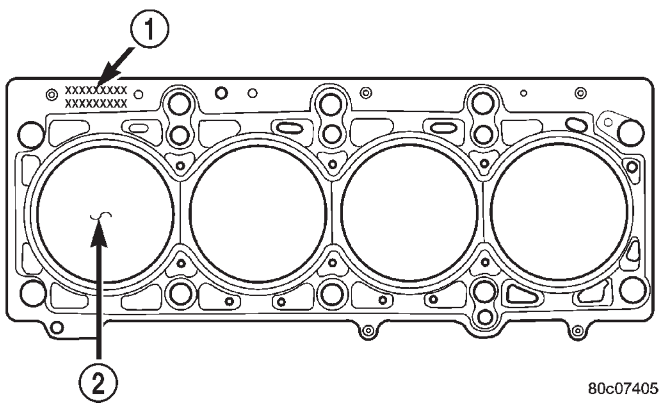


Fig. 13 Cylinder Head Gasket Positioning

1 - PART NUMBER FACES UP
2 - NO. 1 CYLINDER

(2) Position new cylinder head gasket on block with part number facing up (Fig. 13). Ensure gasket is seated over the locating dowels in block.

(3) Install cylinder head on block.

(4) Tighten the cylinder head bolts in the sequence shown in (Fig. 14). Using the 4 step torque turn method, tighten according to the following values:

First:
- All bolts to 34 N·m (25 ft. lbs.)

Second:
- Bolts 1–6 to 68 N·m (50 ft. lbs.)
- Bolts 7–10 to 49 N·m (35 ft. lbs.)

Third:
- Bolts 1–6 to 68 N·m (50 ft. lbs.)
- Bolts 7–10 to 49 N·m (35 ft. lbs.)

CAUTION: Do not use a torque wrench for the Fourth step.

Fourth:
- **Turn all bolts an additional 1/4 Turn**

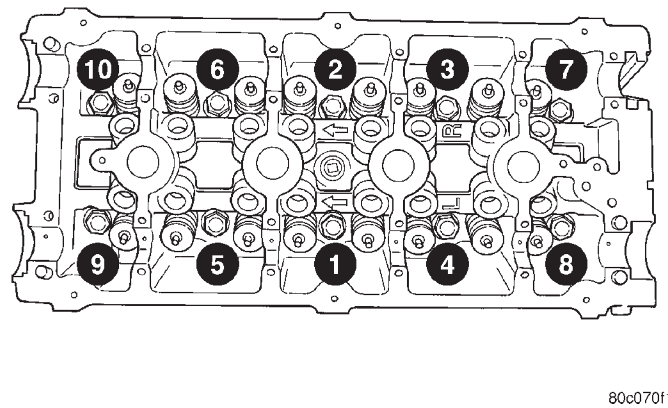


Fig. 14 Cylinder Head Tightening Sequence

(5) Install rocker arms and camshafts (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - INSTALLATION).

(6) Install cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

(7) Install rear timing belt cover and timing belt idler pulley (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(8) Install camshaft sprockets (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(9) Install timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(10) Install front timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(11) Install crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(12) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(13) Connect exhaust pipe to exhaust manifold. Torque fasteners to 28 N·m (250 in. lbs.).

(14) Connect camshaft position sensor electrical connector.

(15) Connect EGR solenoid electrical connector (If equipped).

CYLINDER HEAD (Continued)

(16) Install heater tube support bracket to cylinder head.

(17) Connect heater hose to thermostat housing.

(18) Install intake manifold (Refer to 9 - ENGINE/ MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(19) Install throttle body air inlet hose and air cleaner housing assembly.

(20) Fill cooling system (Refer to 7 - COOLING/ ENGINE - STANDARD PROCEDURE).

(21) Connect negative battery cable.

CAMSHAFT OIL SEAL(S)

REMOVAL

(1) Remove timing belt. (Refer to 9 - ENGINE/ VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(2) Hold each camshaft sprocket with Special Tool C-4687 and adaptor C-4687-1, while removing center bolt (Fig. 15).

(3) Remove camshaft sprockets.

(4) Remove rear timing belt cover. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)

(5) Remove camshaft seal using Special Tool C-4679A (Fig. 16).

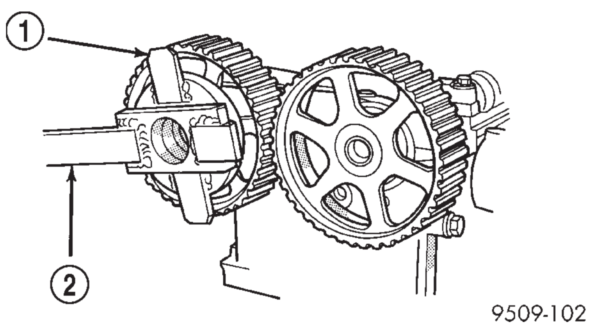


Fig. 15 Camshaft Sprocket - Removal/Installation

1 - ADAPTER C-4687–1
2 - SPECIAL TOOL C-4687

CAUTION: Do not nick shaft seal surface or seal bore.

INSTALLATION

(1) Shaft seal surface must be free of varnish, dirt or nicks. Polish with 400 grit paper if necessary.

(2) Install camshaft seals into cylinder head using Special Tool MD-998306 until flush with head (Fig. 17).

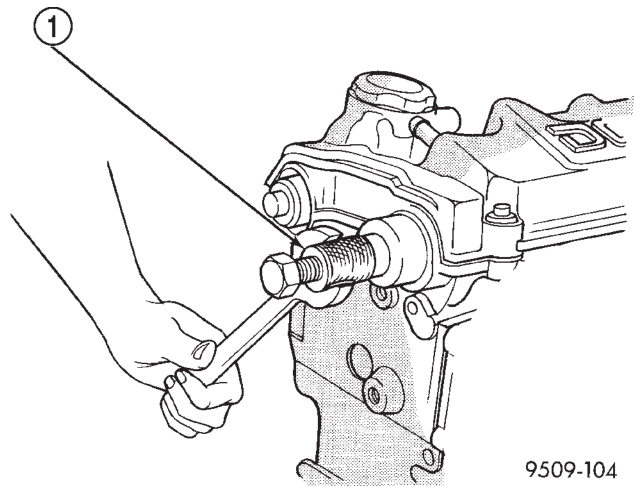


Fig. 16 Camshaft Oil Seal - Removal With C-4679A

1 - SPECIAL TOOL C-4679A

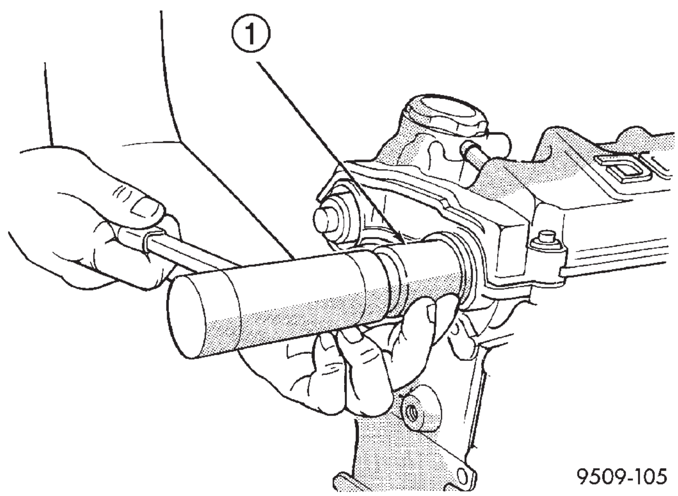


Fig. 17 Camshaft Seal - Installation

1 - SPECIAL TOOL MD 998306

(3) Install rear timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(4) Install camshaft sprockets. Hold each camshaft sprocket with Special Tool C-4687 and adaptor C-4687-1 and tighten center bolt to 115 N·m (85 ft. lbs.) (Fig. 15).

(5) Install timing belt and front timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

CAMSHAFT(S)

DESCRIPTION

Both nodular iron camshafts have six bearing journal surfaces and two cam lobes per cylinder (Fig. 18). Flanges at the rear journals control camshaft end play. Provision for a cam position sensor is located on the intake camshaft on the rear of the cylinder head. A hydrodynamic oil seal is used for oil control at the front of the camshaft.

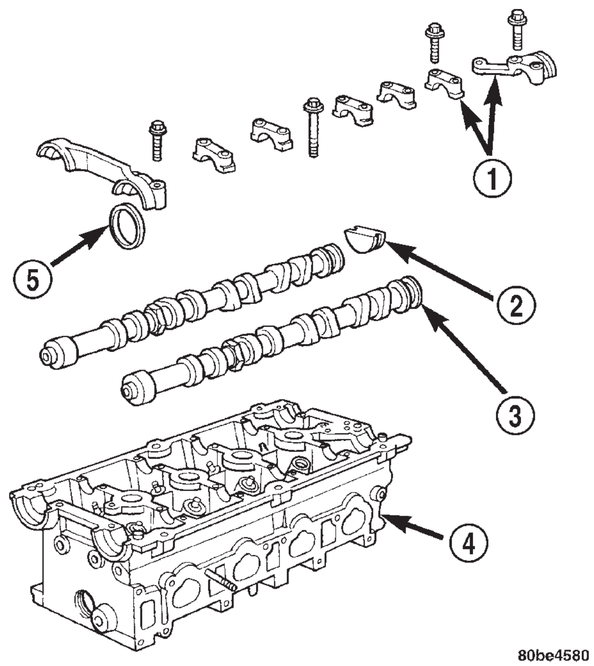


Fig. 18 Cylinder Head and Camshafts

1 - CAMSHAFT BEARING CAPS
2 - PLUG
3 - CAMSHAFT
4 - CYLINDER HEAD
5 - CAMSHAFT OIL SEAL

OPERATION

The camshaft is driven by the crankshaft via drive sprockets and belt. The camshaft has precisely machined lobes to provide accurate valve timing and duration.

STANDARD PROCEDURE - CAMSHAFT END-PLAY

(1) Oil camshaft journals and install camshaft **WITHOUT** cam follower assemblies. Install rear cam caps and tighten screws to specified torque.

(2) Using a suitable tool, move camshaft as far rearward as it will go.

(3) Zero dial indicator (Fig. 19).

(4) Move camshaft as far forward as it will go.

(5) Record reading on dial indicator. For end play specification, (Refer to 9 - ENGINE - SPECIFICATIONS).

(6) If end play is excessive, check cylinder head and camshaft for wear; replace as necessary.

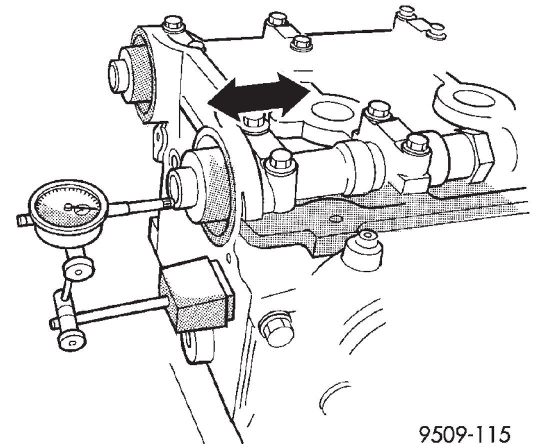


Fig. 19 Camshaft End Play - Typical

REMOVAL

(1) Remove cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

(2) Remove camshaft position sensor and camshaft target magnet (Refer to 8 - ELECTRICAL/IGNITION CONTROL/CAMSHAFT POSITION SENSOR - REMOVAL).

(3) Remove timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(4) Remove camshaft sprockets and rear timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

(5) Bearing caps are identified for location. Remove the outside bearing caps first (Fig. 20).

(6) Loosen the camshaft bearing cap attaching fasteners in sequence shown (Fig. 21) one camshaft at a time.

CAUTION: Camshafts are not interchangeable. The intake cam number 6 thrust bearing face spacing is wider.

(7) Identify the camshafts before removing from the head. The camshafts are not interchangeable.

(8) Remove camshafts from cylinder head.

NOTE: If removing rocker arms, identify for reinstallation in the original position.

CLEANING

Clean camshaft with a suitable solvent.

CAMSHAFT(S) (Continued)

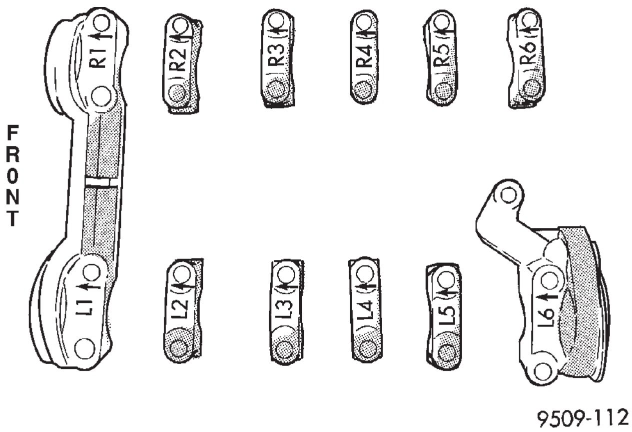


Fig. 20 Camshaft Bearing Cap Identification

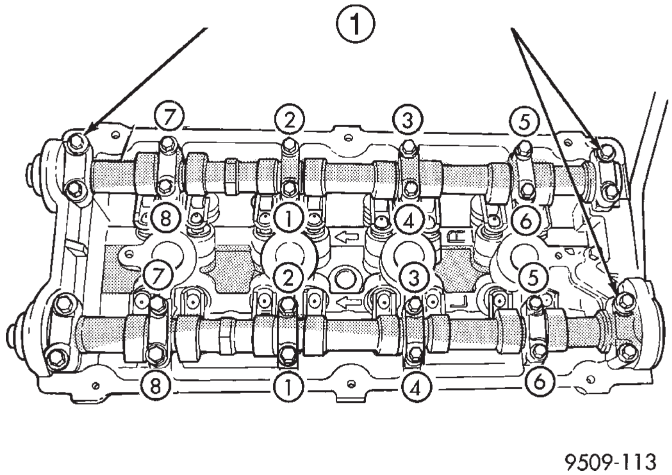


Fig. 21 Camshaft Bearing Cap - Removal

1 - REMOVE OUTSIDE BEARING CAPS FIRST

INSPECTION

(1) Inspect camshaft bearing journals for damage and binding (Fig. 22). If journals are binding, check the cylinder head for damage. Also check cylinder head oil holes for clogging.

(2) Check the cam lobe and bearing surfaces for abnormal wear and damage. Replace camshaft if defective.

NOTE: If camshaft is replaced due to lobe wear or damage, always replace the rocker arms.

(3) Measure the lobe actual wear (unworn area - wear zone = actual wear) (Fig. 22) and replace camshaft if out of limit. Standard value is 0.0254 mm (0.001 in.), wear **limit** is 0.254 mm (0.010 in.).

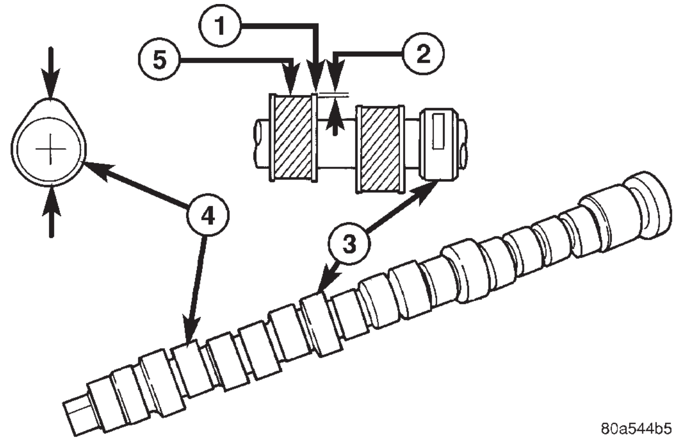


Fig. 22 Checking Camshaft(s) for Wear

1 - UNWORN AREA
2 - ACTUAL WEAR
3 - BEARING JOURNAL
4 - LOBE
5 - WEAR ZONE

INSTALLATION

CAUTION: Ensure that NONE of the pistons are at top dead center when installing the camshafts.

(1) Lubricate all camshaft bearing journals, rocker arms and camshaft lobes.

(2) Install all rocker arms in original positions, if reused.

(3) Position camshafts on cylinder head bearing journals. Install right and left camshaft bearing caps No. 2 – 5 and right No. 6. Tighten M6 fasteners to 12 N·m (105 in. lbs.) in sequence shown in (Fig. 23).

(4) Apply Mopar® Gasket Maker to No. 1 and No. 6 bearing caps (Fig. 24). Install bearing caps and tighten M8 fasteners to 28 N·m (250 in. lbs.).

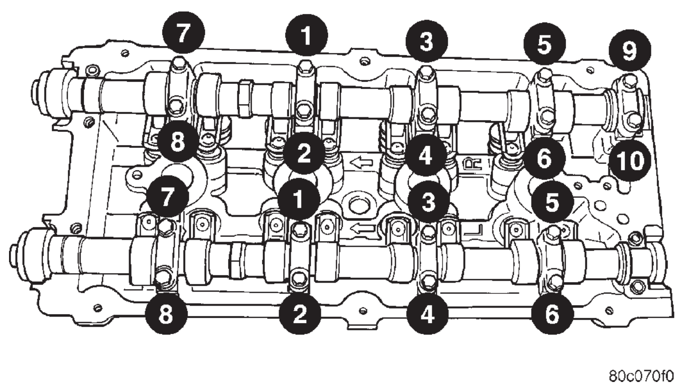


Fig. 23 Camshaft Bearing Cap Tightening Sequence

NOTE: Bearing end caps must be installed before seals can be installed.

CAMSHAFT(S) (Continued)

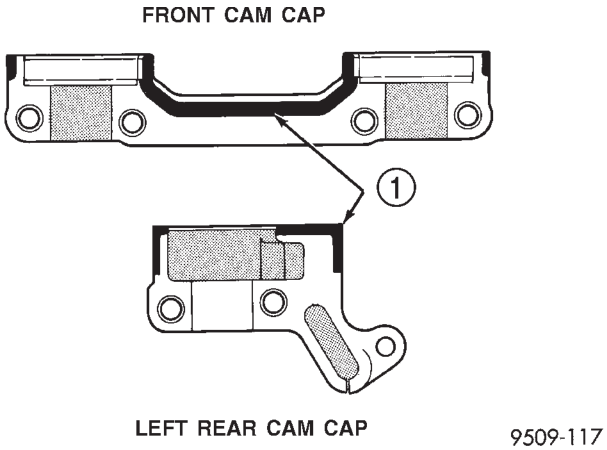


Fig. 24 Camshaft Bearing Cap Sealing

1 - 1.5 mm (.060 in.) DIAMETER BEAD OF MOPAR GASKET MAKER

(5) Install camshaft oil seals (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT OIL SEAL(S) - INSTALLATION).

(6) Install camshaft target magnet and camshaft position sensor.

(7) Install cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

(8) Install rear timing belt cover and camshaft sprockets (Refer to 9 - ENGINE/VALVE TIMING/ TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(9) Install timing belt and front timing belt cover-(Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

CYLINDER HEAD COVER

REMOVAL

(1) Remove ignition coil and plug wires.

(2) Disconnect PCV and make-up air hoses from cylinder head cover.

(3) Remove the cylinder head cover fasteners.

(4) Remove cylinder head cover from cylinder head.

CLEANING

Clean cylinder head and cover mating surfaces using a suitable solvent.

INSPECTION

Inspect cover rails for flatness.

INSTALLATION

NOTE: Replace spark plug well seals when installing a new cylinder head cover gasket.

(1) Install new cylinder head cover gaskets (Fig. 25) and spark plug well seals (Fig. 26).

(2) Replace cylinder head cover bolt seals (Fig. 27).

CAUTION: Do not allow oil or solvents to contact the timing belt as they can deteriorate the rubber and cause tooth skipping.

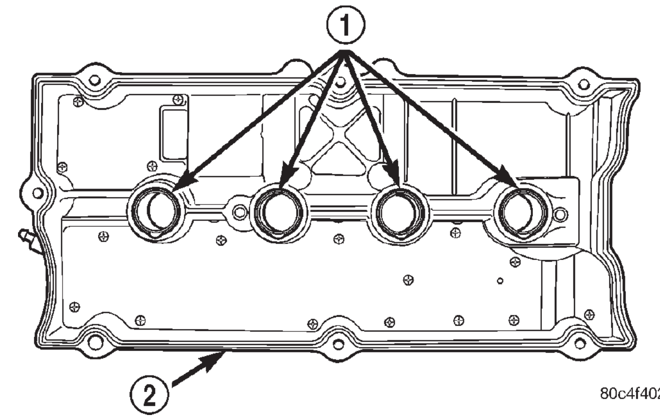


Fig. 25 Cylinder Head Cover Gasket and Spark Plug Well Seals

1 - SPARK PLUG WELL SEALS
2 - GASKET

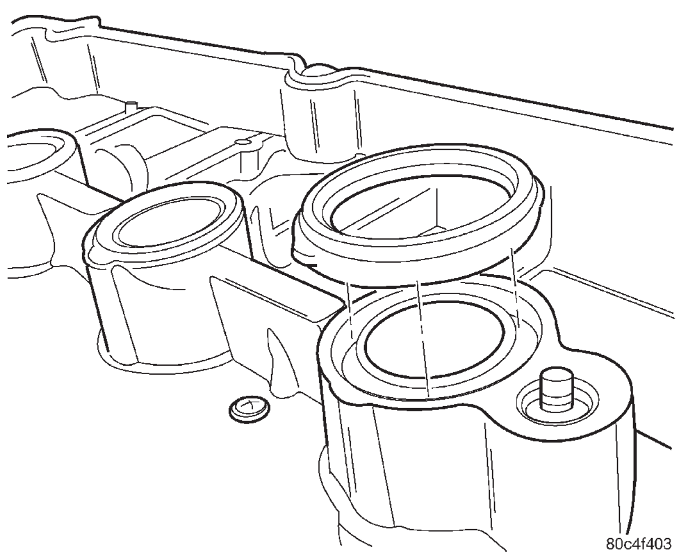


Fig. 26 Spark Plug Well Seals

(3) Apply Mopar® Engine RTV GEN II at the camshaft cap corners and at the top edge of the 1/2 round seal (Fig. 28).

CYLINDER HEAD COVER (Continued)

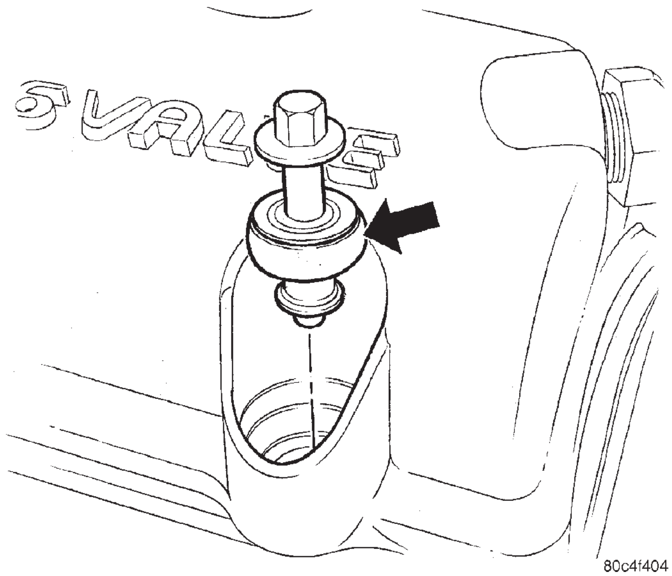


Fig. 27 Cylinder Head Cover Bolt Seals

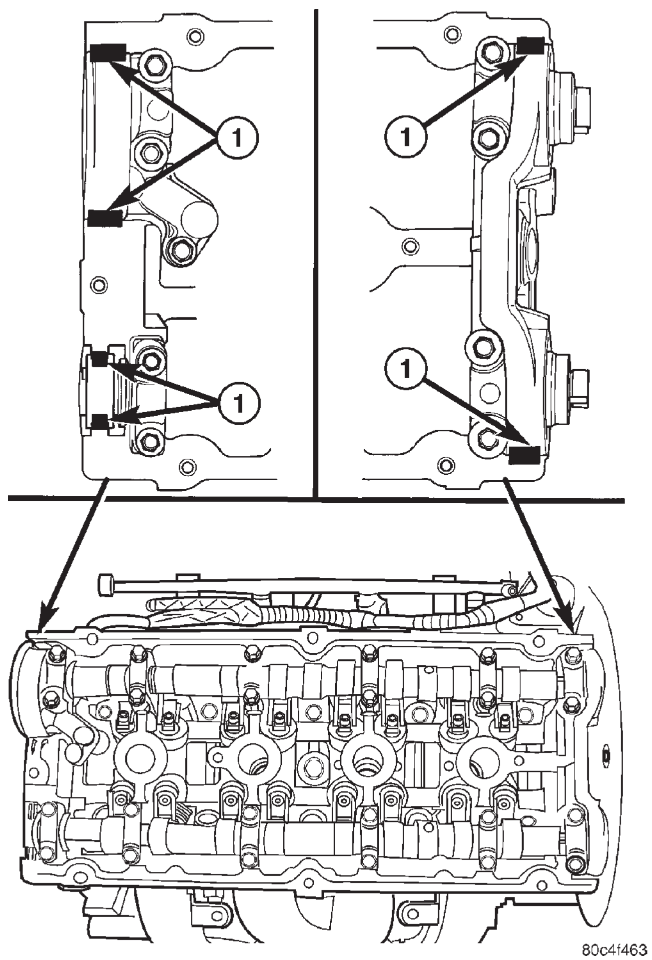


Fig. 28 Sealer Locations

1 – SEALER LOCATION

CAUTION: When installing cylinder head cover bolts, be careful not to interchange the two (2) center bolts with the seven (7) perimeter bolts. The two (2) center bolts contain an aluminum washer between the bolt head and torque limiter for sealing purposes.

(4) Install cylinder head cover assembly to cylinder head. Install all bolts, ensuring the two (2) bolts containing the sealing washer are located in the center locations of cover. Tighten bolts in sequence shown in (Fig. 29). Using a 3 step torque method as follows:

(a) Tighten all bolts to 4.5 N·m (40 in. lbs.).
(b) Tighten all bolts to 9.0 N·m (80 in. lbs.).
(c) Tighten all bolts to 12 N·m (105 in. lbs.).

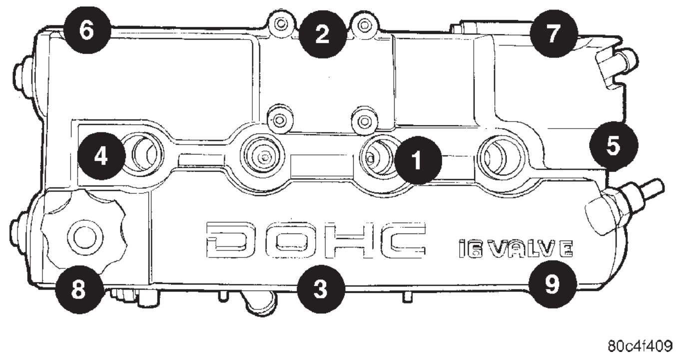


Fig. 29 Cylinder Head Cover Tightening Sequence

(5) Connect PCV and make-up air hoses to cylinder head cover.

(6) Install ignition coil and plug wires. Tighten fasteners to 12 N·m (105 in. lbs.).

HYDRAULIC LASH ADJUSTERS

DIAGNOSIS AND TESTING

HYDRAULIC LASH ADJUSTER NOISE DIAGNOSIS

A tappet-like noise may be produced from several items. Check the following items.

(1) Engine oil level too high or too low. This may cause aerated oil to enter the adjusters and cause them to be spongy.

(2) Insufficient running time after rebuilding cylinder head. Low speed running up to 1 hour may be required.

(3) During this time, turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.

(4) Low oil pressure.

HYDRAULIC LASH ADJUSTERS (Continued)

(5) The oil restrictor (integral to the cylinder head gasket) in the vertical oil passage to the cylinder head is plugged with debris.

(6) Air ingested into oil due to broken or cracked oil pump pick up.

(7) Worn valve guides.

(8) Rocker arm ears contacting valve spring retainer.

(9) Rocker arm loose, adjuster stuck or at maximum extension and still leaves lash in the system.

(10) Faulty lash adjuster.

a. Check lash adjusters for sponginess while installed in cylinder head. Depress part of rocker arm over adjuster. Normal adjusters should feel very firm. Spongy adjusters can be bottomed out easily.

b. Remove suspected lash adjusters, and replace as necessary.

REMOVAL

NOTE: This procedure is for in-vehicle service with camshafts installed.

(1) Remove cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

(2) Remove rocker arm (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - REMOVAL).

(3) Remove hydraulic lifter (Fig. 30).

(4) Repeat removal procedure for each hydraulic lifter.

(5) If reusing, mark each hydraulic lifter for reassembly in original position. Lifters are serviced as an assembly.

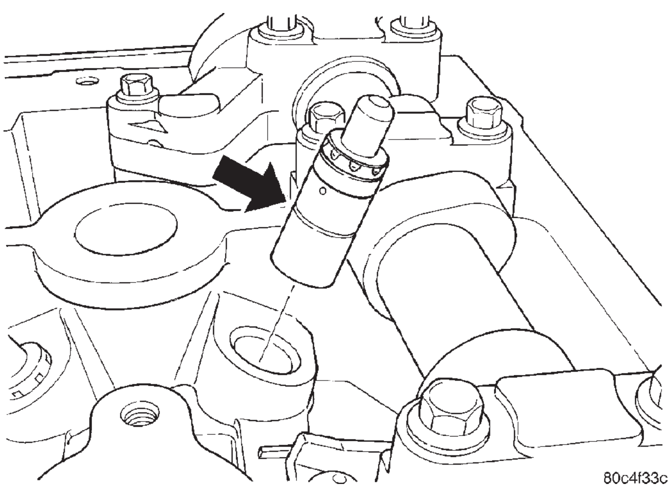


Fig. 30 Hydraulic Lifter

INSTALLATION

(1) Install hydraulic lifter (Fig. 30). Ensure the lifters are at least partially full of engine oil. This is indicated by little or no plunger travel when the lifter is depressed.

(2) Install rocker arm (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - INSTALLATION).

(3) Repeat installation procedure for each hydraulic lifter.

(4) Install cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

INTAKE/EXHAUST VALVES & SEATS

DESCRIPTION

The valves are made of heat resistant steel. They have chrome plated stems to prevent scuffing. Viton rubber valve stem seals are integral with the spring seats. The valves have three-bead lock keepers to retain springs and to promote valve rotation.

OPERATION

The four valves per cylinder (two intake and two exhaust) are opened by using roller camshaft followers which pivot on hydraulic lash adjusters.

CLEANING

(1) Clean all valves thoroughly and discard burned, warped and cracked valves.

ROCKER ARMS

REMOVAL

NOTE: This procedure is for in-vehicle service with camshafts installed.

(1) Disconnect negative battery cable.

(2) Remove cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

(3) Remove spark plugs.

(4) Rotate engine until the camshaft lobe, on the rocker arm being removed, is positioned on its base circle (heel). Also, the piston should be a minimum of 6.3 mm (0.25 in) below TDC position.

CAUTION: If cam follower assemblies are to be reused, always mark position for reassembly in their original positions.

ROCKER ARMS (Continued)

(5) Using Special Tools 8215-A and 8436 slowly depress valve assembly until rocker arm can be removed (Fig. 31).

(6) Repeat removal procedure for each rocker arm.

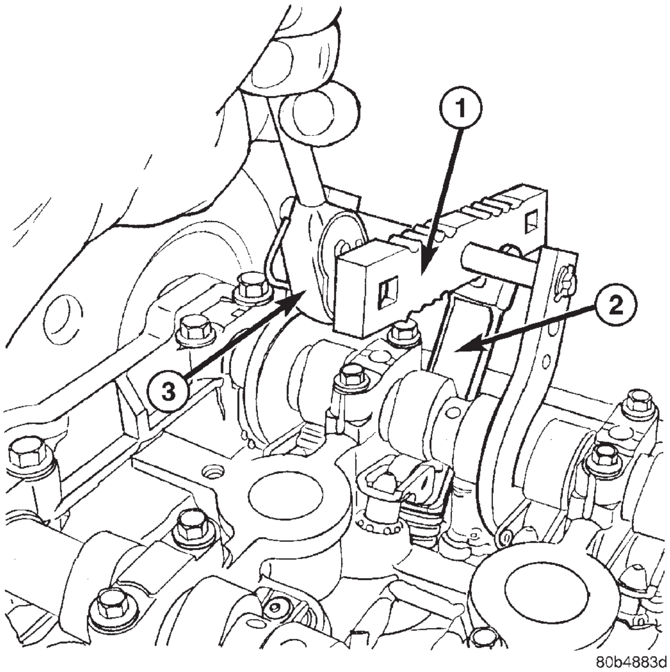


Fig. 31 Rocker Arm - Removal/Installation

1 - SPECIAL TOOL 8215-A
2 - SPECIAL TOOL 8436
3 - 3/8″ DRIVE RACHET

INSPECTION

Inspect the rocker arm for wear or damage (Fig. 32). Replace as necessary.

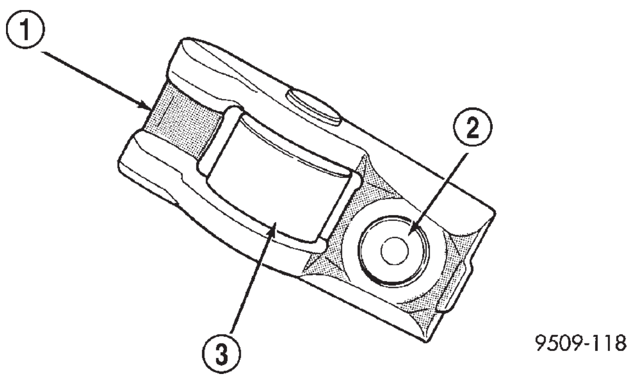


Fig. 32 Rocker Arm

1 - TIP
2 - LASH ADJUSTER POCKET
3 - ROLLER

INSTALLATION

(1) Lubricate rocker arm with clean engine oil.

(2) Using Special Tools 8215-A and 8436 slowly depress valve assembly until rocker arm can be installed on the hydraulic lifter and valve stem (Fig. 31).

(3) Repeat installation procedure for each rocker arm.

(4) Install spark plugs.

(5) Install cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

(6) Connect negative battery cable.

VALVE SPRINGS AND SEALS

REMOVAL

REMOVAL - CYLINDER HEAD ON

(1) Disconnect negative battery cable.

(2) Remove timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(3) Remove cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

(4) Remove camshafts (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - REMOVAL).

(5) Rotate crankshaft until piston is at TDC.

(6) With air hose attached to adapter tool installed in spark plug hole, apply 90-120 psi air pressure.

(7) Using Special Tool MD-998772-A with adapter 6779 (Fig. 33), compress valve springs and remove valve locks.

(8) Remove valve spring(s).

(9) Remove valve stem seal(s) by a using valve stem seal tool (Fig. 35).

REMOVAL - CYLINDER HEAD OFF

(1) With cylinder head removed from cylinder block, compress valve springs using a universal valve spring compressor.

(2) Remove valve retaining locks, valve spring retainers, valve stem seals and valve springs.

(3) Before removing valves, **remove any burrs from valve stem lock grooves to prevent damage to the valve guides.** Identify valves, locks and retainers to insure installation in original location.

(4) Inspect the valves. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - INSPECTION)

VALVE SPRINGS AND SEALS (Continued)

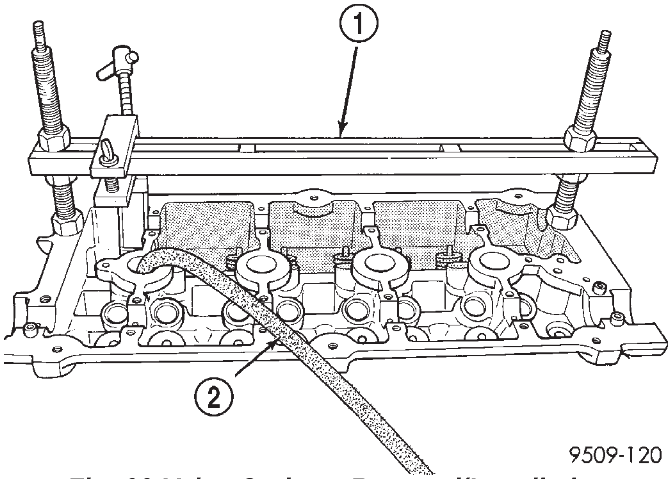


Fig. 33 Valve Spring - Removal/Installation

1 - VALVE SPRING COMPRESSOR MD 998772A
2 - AIR HOSE

INSPECTION

(1) Whenever valves have been removed for inspection, reconditioning or replacement, valve springs should be tested for correct tension. Discard the springs that do not meet specifications. The following specifications apply to both intake and exhaust valves springs:

- Valve Closed Nominal Tension—76 lbs. @ 38.0 mm (1.50 in.)
- Valve Open Nominal Tension—136 lbs. @ 29.75 mm (1.17 in.)

(2) Inspect each valve spring for squareness with a steel square and surface plate, test springs from both ends. If the spring is more than 1.5 mm (1/16 inch) out of square, install a new spring.

INSTALLATION

INSTALLATION - CYLINDER HEAD ON

(1) Install valve seal/valve spring seat assembly (Fig. 34). Push the assembly down to seat it onto the valve guide.

(2) Install valve spring and retainer, use Special Tool MD-998772-A with adapter 6779 to compress valve springs only enough to install locks (Fig. 33). Correct alignment of tool is necessary to avoid nicking valve stems.

(3) Remove air hose and install spark plugs.

(4) Install camshafts (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - INSTALLATION).

(5) Install cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

(6) Install timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(7) Connect negative battery cable.

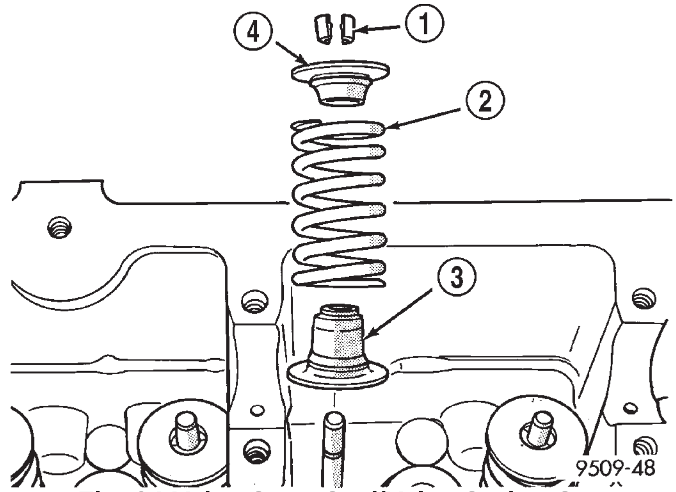


Fig. 34 Valve Stem Seal/Valve Spring Seat

1 - VALVE RETAINING LOCKS
2 - VALVE SPRING
3 - VALVE SEAL AND VALVE SPRING SEAT ASSEMBLY
4 - VALVE SPRING RETAINER

INSTALLATION - CYLINDER HEAD OFF

(1) Coat valve stems with clean engine oil and insert in cylinder head.

(2) Install new valve stem seals on all valves using a valve stem seal tool (Fig. 35). The valve stem seals should be pushed firmly and squarely over valve guide.

CAUTION: When oversize valves are used, the corresponding oversize valve seal must also be used. Excessive guide wear may result if oversize seals are not used with oversize valves.

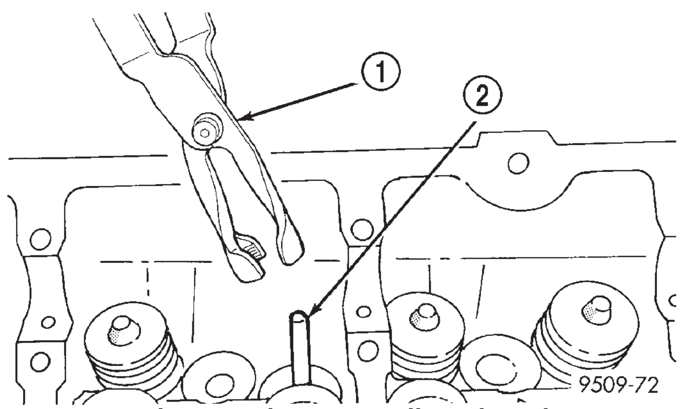


Fig. 35 Valve Stem Oil Seal Tool

1 - VALVE SEAL TOOL
2 - VALVE STEM

(3) Install valve springs and retainers. Compress valve springs only enough to install locks, taking care not to misalign the direction of compression.

VALVE SPRINGS AND SEALS (Continued)

Nicked valve stems may result from misalignment of the valve spring compressor.

CAUTION: When depressing the valve spring retainers with valve spring compressor the locks can become dislocated. Ensure both locks are in the correct location after removing tool.

(4) Check the valve spring installed height B after refacing the valve and seat (Fig. 36). Make sure measurements are taken from top of spring seat to the bottom surface of spring retainer. If height is greater than 38.75 mm (1.525 in.), install a 0.762 mm (0.030 in.) spacer under the valve spring seat to bring spring height back within specification.

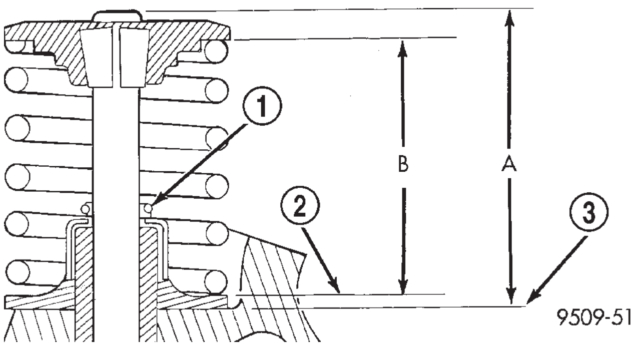


Fig. 36 Checking Spring Installed Height and Valve Tip Height Dimensions

1 - GARTER SPRING
2 - VALVE SPRING SEAT
3 - CYLINDER HEAD SURFACE

ENGINE BLOCK

DESCRIPTION

The cast iron cylinder block is a two-piece assembly, consisting of the cylinder block and bedplate (Fig. 37). The bedplate incorporates the main bearing caps and bolts to the cylinder block. This design offers a much stronger lower end and increased cylinder block rigidity. The rear oil seal retainer is integral with the block. The bedplate and block are serviced as an assembly.

STANDARD PROCEDURE - CYLINDER BORE HONING

(1) Used carefully, the cylinder bore resizing hone, recommended tool C-823 or equivalent, equipped with 220 grit stones, is the best tool for this honing procedure. In addition to deglazing, it will reduce taper and out-of-round as well as removing light scuffing, scoring or scratches. Usually a few strokes will clean up a bore and maintain the required limits.

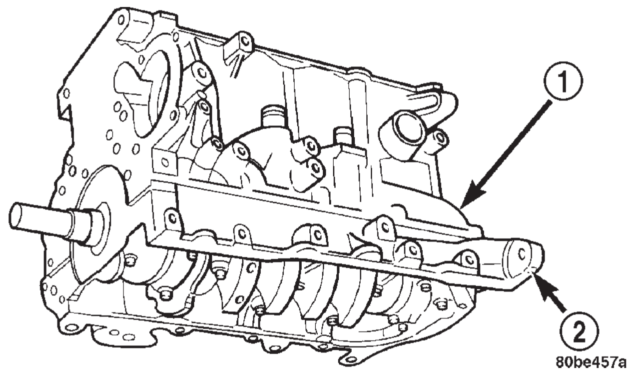


Fig. 37 Cylinder Block and Bedplate

1 - CYLINDER BLOCK
2 - BEDPLATE

(2) Deglazing of the cylinder walls may be done using a cylinder surfacing hone, recommended tool C-3501 or equivalent, equipped with 280 grit stones, if the cylinder bore is straight and round. 20–60 strokes depending on the bore condition, will be sufficient to provide a satisfactory surface. Use a light honing oil. **Do not use engine or transmission oil, mineral spirits or kerosene.** Inspect cylinder walls after each 20 strokes.

(3) Honing should be done by moving the hone up and down fast enough to get a cross-hatch pattern. When hone marks **intersect** at 40-60 degrees, the cross hatch angle is most satisfactory for proper seating of rings (Fig. 38).

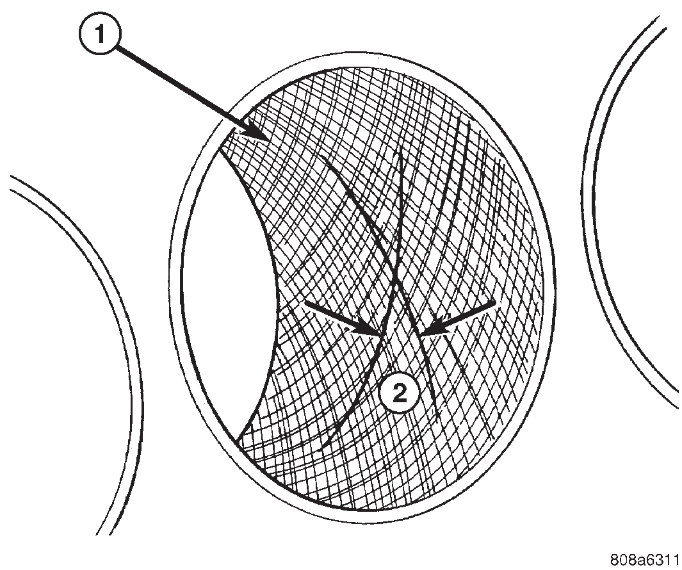


Fig. 38 Cylinder Bore Cross-Hatch Pattern

1 - CROSS-HATCH PATTERN
2 - 40°–60°

ENGINE BLOCK (Continued)

(4) A controlled hone motor speed between 200–300 RPM is necessary to obtain the proper cross-hatch angle. The number of up and down strokes per minute can be regulated to get the desired 40–60 degree angle. Faster up and down strokes increase the cross-hatch angle.

(5) After honing, it is necessary that the block be cleaned again to remove all traces of abrasive.

CAUTION: Ensure all abrasives are removed from engine parts after honing. It is recommended that a solution of soap and hot water be used with a brush and the parts then thoroughly dried. The bore can be considered clean when it can be wiped clean with a white cloth and cloth remains clean. Oil the bores after cleaning to prevent rusting.

CLEANING

Clean cylinder block thoroughly using a suitable cleaning solvent.

INSPECTION

ENGINE BLOCK

(1) Clean cylinder block thoroughly and check all core hole plugs for evidence of leaking.

(2) If new core plugs are to be installed, (Refer to 9 - ENGINE - STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS).

(3) Examine block and cylinder bores for cracks or fractures.

(4) Check block deck surfaces for flatness. Deck surface must be within service limit of 0.1 mm (0.004 in.).

CYLINDER BORE

NOTE: The cylinder bores should be measured at normal room temperature, 21°C (70°F).

The cylinder walls should be checked for out-of-round and taper with Tool C119 or equivalent (Fig. 39) (Refer to 9 - ENGINE - SPECIFICATIONS). If the cylinder walls are badly scuffed or scored, the cylinder block should be replaced, and new pistons and rings fitted.

Measure the cylinder bore at three levels in directions A and B (Fig. 39). Top measurement should be 10 mm (3/8 in.) down and bottom measurement should be 10 mm (3/8 in.) up from bottom of bore. (Refer to 9 - ENGINE - SPECIFICATIONS).

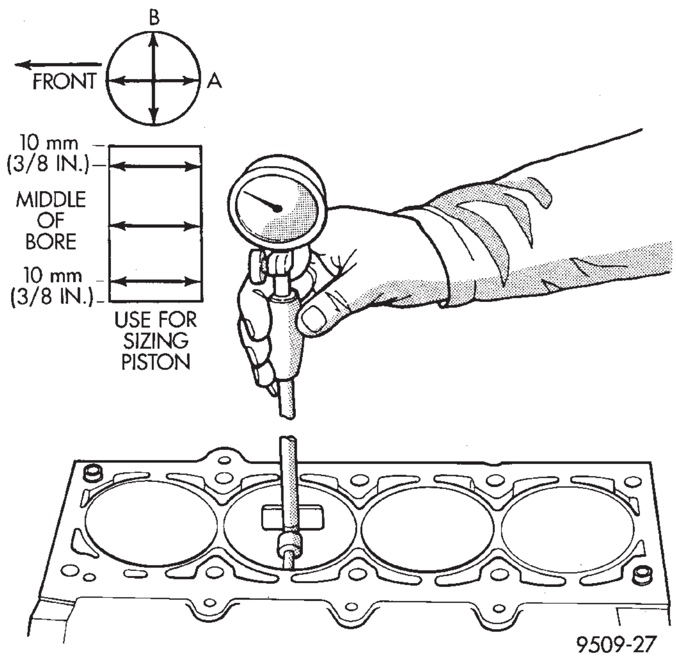


Fig. 39 Checking Cylinder Bore Size

CONNECTING ROD BEARINGS

STANDARD PROCEDURE - CONNECTING ROD AND BEARING - FITTING

(1) Measure connecting rod bearing clearance using Plastigage (Fig. 40). For more information on use of Plastigage (Refer to 9 - ENGINE - STANDARD PROCEDURE). Refer to Engine Specifications for connecting rod specifications. (Refer to 9 - ENGINE - SPECIFICATIONS)

CAUTION: Do not rotate crankshaft or the Plastigage may be smeared.

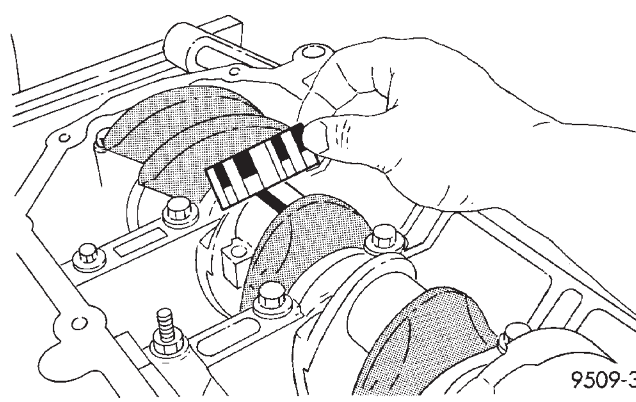


Fig. 40 Connecting Rod Bearing

NOTE: The rod bearing bolts should not be reused.

(2) Before installing **NEW** bolts, lubricate the threads with clean engine oil.

CONNECTING ROD BEARINGS (Continued)

(3) Install each bolt finger tight than alternately torque each bolt to assemble the cap properly.

(4) Tighten the bolts to 27 N·m PLUS 1/4 turn (20 ft. lbs. PLUS 1/4 turn) **Do not use a torque wrench for last step.**

(5) Using a feeler gauge, check connecting rod side clearance (Fig. 41). Refer to Engine Specifications for connecting rod specifications. (Refer to 9 - ENGINE - SPECIFICATIONS)

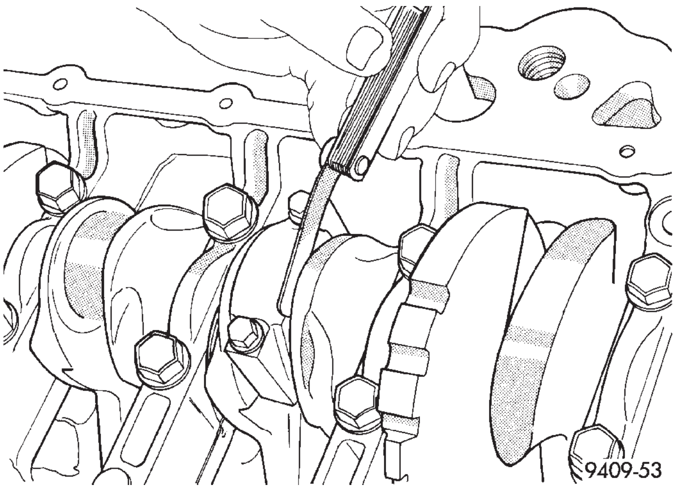


Fig. 41 Connecting Rod Side Clearance

CRANKSHAFT

DESCRIPTION

The crankshaft is made of nodular cast iron and includes five main bearing journals and four connecting rod journals (Fig. 42). The number three journal is the location for the thrust bearing. The mains and connecting rod journals have undercut fillet radiuses that are rolled for added strength. To optimize bearing loading, eight counterweights are used.

OPERATION

The crankshaft transfers force generated by combustion within the cylinder to the flywheel or flexplate.

STANDARD PROCEDURE - CRANKSHAFT END PLAY

(1) Mount a dial indicator to front of engine, locating probe on nose of the crankshaft (Fig. 43).

(2) Move crankshaft all the way to the rear of its travel.

(3) Zero the dial indicator.

(4) Move crankshaft all the way to the front of its travel and read the dial indicator. For crankshaft specifications (Refer to 9 - ENGINE - SPECIFICATIONS)

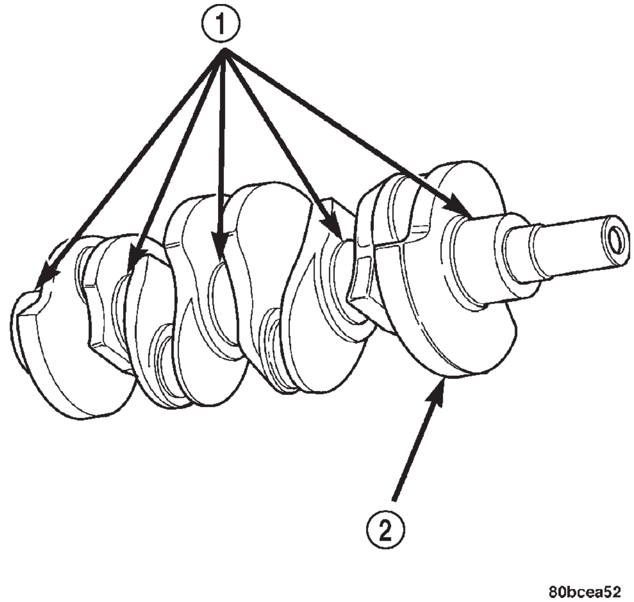


Fig. 42 Crankshaft - Typical

1 - MAIN BEARING JOURNALS
2 - COUNTER BALANCE WEIGHTS

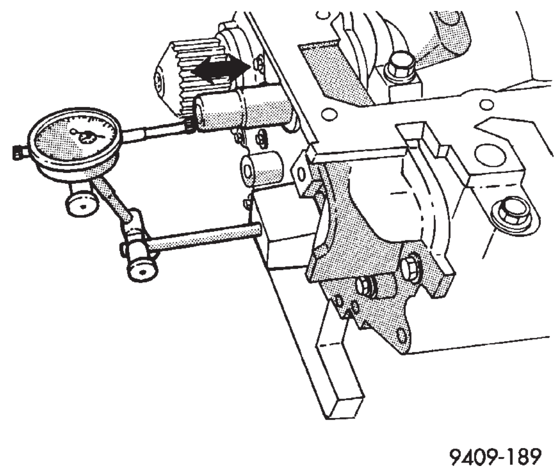


Fig. 43 Checking Crankshaft End Play

REMOVAL

(1) Remove engine assembly (Refer to 9 - ENGINE - REMOVAL).

(2) Separate transaxle from engine.

(3) Remove drive plate/flexplate.

(4) Remove crankshaft rear oil seal. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - REMOVAL)

(5) Mount engine on a suitable repair stand.

(6) Remove crankshaft vibration damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).

(7) Remove front timing belt cover, front engine mount bracket, and timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

CRANKSHAFT (Continued)

(8) Remove the timing belt tensioner and pulley bracket (Refer to 9 - ENGINE/VALVE TIMING/ TMNG BELT/CHAIN TENSIONER&PULLEY - REMOVAL).

(9) Remove camshaft sprockets and rear timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/ TIMING BELT / CHAIN COVER(S) - REMOVAL).

(10) Remove crankshaft sprocket (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - FRONT - REMOVAL).

(11) Remove oil filter and adapter (Fig. 44).

(12) Remove oil pan(Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).

(13) Remove oil pump pick-up tube.

(14) Remove oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL).

(15) Remove crankshaft position sensor (Fig. 44).

(16) Using a permanent ink or paint marker, identify cylinder number on each connecting rod cap.

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods. Damage to connecting rod could occur.

(17) Remove all connecting rod bolts and caps. Care should be taken not to damage the fracture rod and cap surfaces.

NOTE: Do not reuse connecting rod bolts.

(18) Remove all main bearing cap and bedplate bolts from the engine block (Fig. 45).

(19) Using a mallet tap the bedplate loose from the engine block dowel pins.

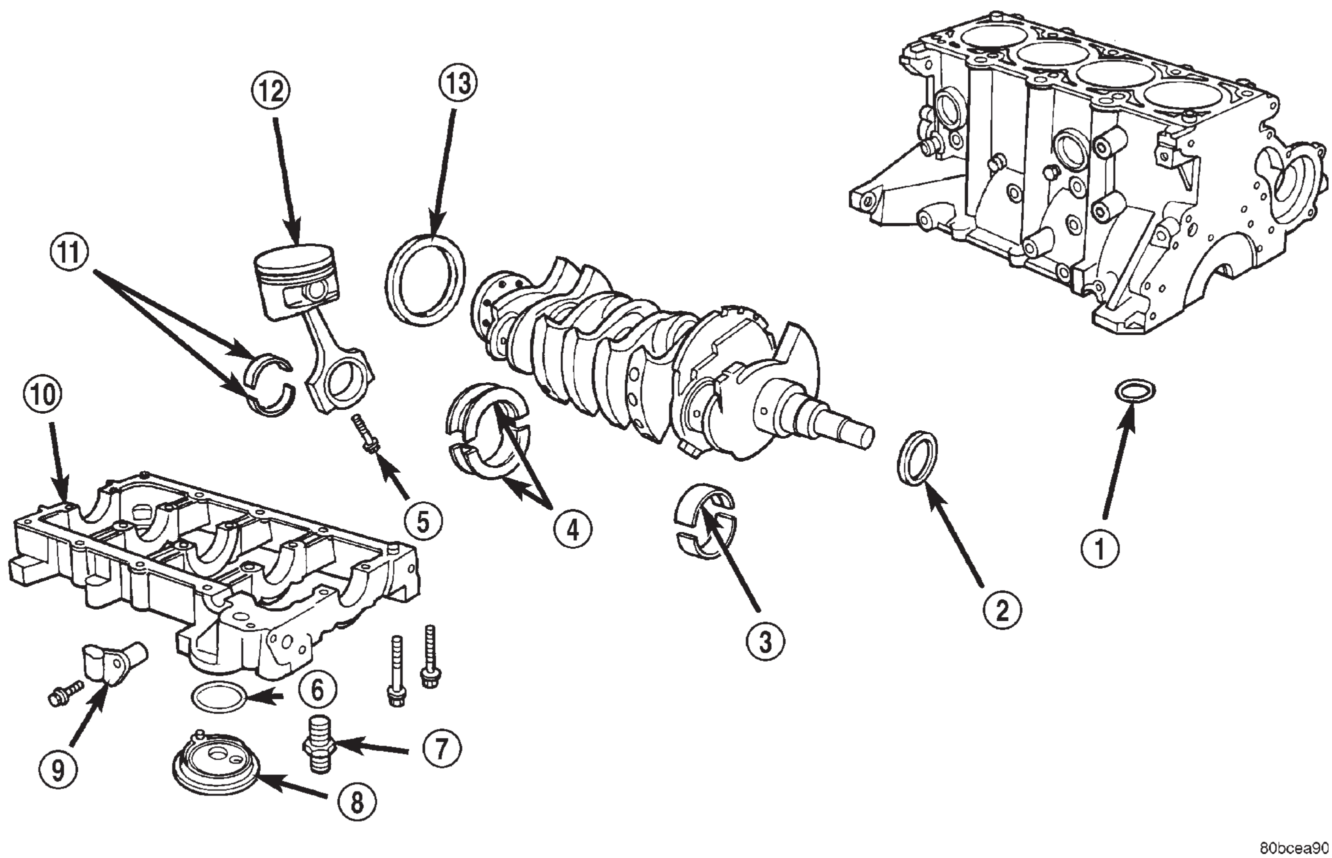


Fig. 44 Cylinder Block and Components

1 - OIL PASSAGE O-RING
2 - SEAL
3 - UPPER BEARING (GROOVED)
4 - THRUST BEARINGS
5 - BOLT
6 - O-RING
7 - NIPPLE
8 - OIL FILTER ADAPTER
9 - CRANKSHAFT POSITION SENSOR (CPS)
10 - MAIN BEARING CAP/BED PLATE ASSEMBLY
11 - CONNECTING ROD BEARINGS
12 - PISTON AND CONNECTING ROD ASSEMBLY
13 - SEAL

CRANKSHAFT (Continued)

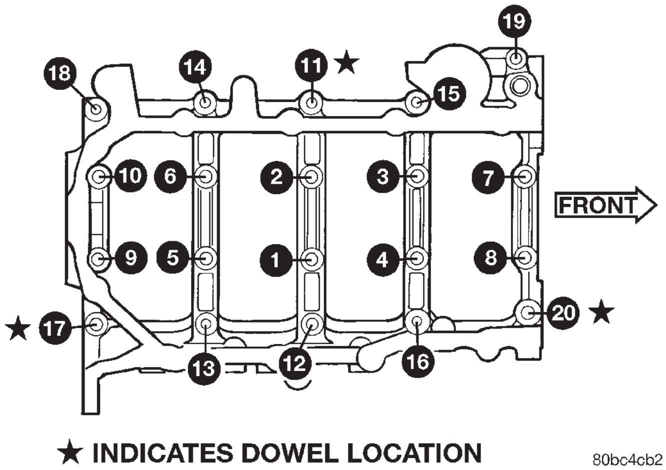


Fig. 45 Bedplate Bolts

CAUTION: Do not pry up on one side of the bedplate. Damage may occur to cylinder block and bedplate alignment.

(20) Bedplate should be removed evenly from the cylinder block dowel pins.

(21) Lift out crankshaft from cylinder block. Be sure not to damage the main bearings or journals when removing the crankshaft.

CRANKSHAFT MAIN BEARINGS LOCATION

The crankshaft is supported in five main bearings. All upper bearing shells in the crankcase have oil grooves. All lower bearing shells installed in the (bedplate) main bearing cap are plain. Crankshaft end play is controlled by a flanged bearing on the number three main bearing journal (Fig. 46).

NOTE: The upper and lower main Bearing shells are Not interchangeable. The lower shells have a revised tab to prevent improper installation.

INSPECTION

The crankshaft journals should be checked for excessive wear, taper and scoring (Fig. 47). Limits of taper or out of round on any crankshaft journals should be held to 0.025 mm (0.001 in.). Journal grinding should not exceed 0.305 mm (0.012 in.) under the standard journal diameter. DO NOT grind thrust faces of No. 3 main bearing. DO NOT nick crank pin or bearing fillets. After grinding, remove rough edges from crankshaft oil holes and clean out all passages.

CAUTION: With the nodular cast iron crankshafts, it is important that the final paper or cloth polish be in the same direction as normal rotation in the engine.

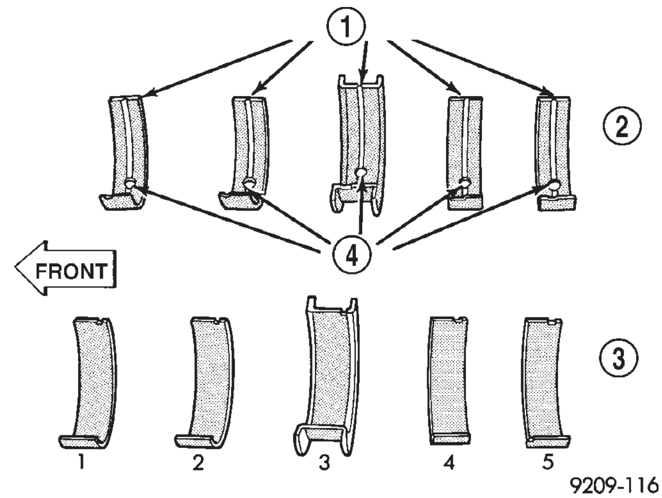


Fig. 46 Main Bearing Identification

1 - OIL GROOVES
2 - UPPER BEARINGS
3 - LOWER BEARINGS
4 - OIL HOLES

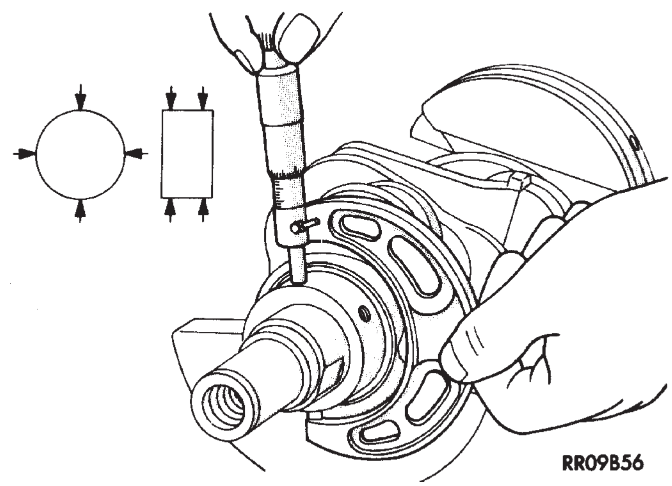


Fig. 47 Crankshaft Journal Measurements

Upper and lower No. 3 bearing halves are flanged to carry the crankshaft thrust loads and are NOT interchangeable with any other bearing halves in the engine (Fig. 47). All bearing cap bolts removed during service procedures are to be cleaned and oiled before installation. Bearing shells are available in standard and the following undersized: 0.016 mm (0.0006 in.), 0.032 mm (0.0012 in.), 0.250 mm (0.010 in.). Never install an undersize bearing that will reduce clearance below specifications.

INSTALLATION

(1) Install the main bearing shells with the lubrication groove in the cylinder block. Install O-ring into recess in the block (Fig. 48).

CRANKSHAFT (Continued)

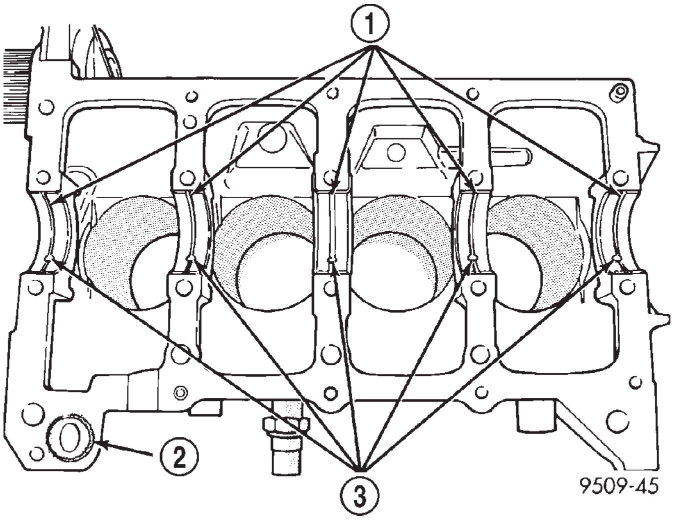


Fig. 48 Installing Main Bearing Upper Shell

1 - LUBRICATION GROOVES
2 - O-RING
3 - OIL HOLES

(2) Make certain oil holes in block line up with oil hole in bearings and bearing tabs seat in the block tab slots.

CAUTION: Do Not get oil on the bedplate mating surface. It will affect the sealer ability to seal the bedplate to cylinder block.

(3) Oil the bearings and journals and install crankshaft in cylinder block.

CAUTION: Use only the specified anaerobic sealer on the bedplate or damage may occur to the engine.

(4) Apply 1.5–2.0 mm (0.059–0.078 in.) bead of Mopar® Bed Plate Sealant to cylinder block as shown in (Fig. 49).

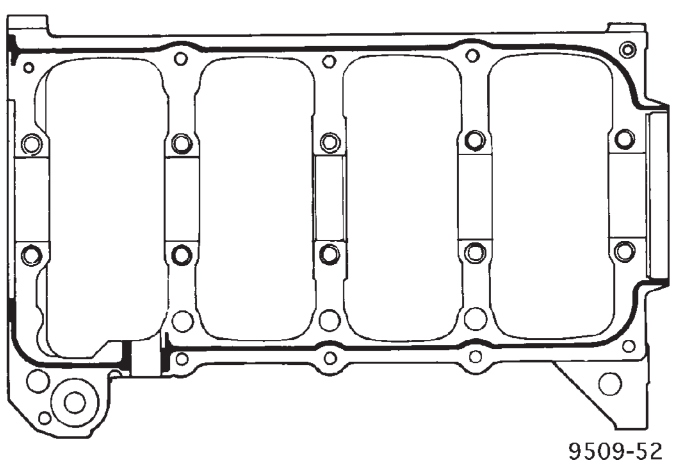


Fig. 49 Main Bearing Caps/Bedplate Sealing

(5) Install lower main bearings into main bearing cap/bedplate. Make certain the bearing tabs are seated into the bedplate slots. Install the main bearing/bedplate into engine block.

(6) Before installing the bolts oil threads with clean engine oil, wipe off any excess oil.

(7) Install main bearing bedplate to engine block bolts 11, 17 and 20 finger tight. Tighten these bolts down together until the bedplate contacts the cylinder block (Fig. 50).

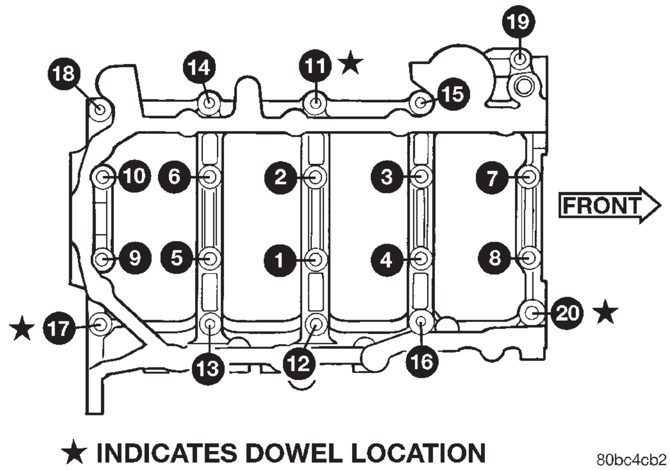


Fig. 50 Main Bearing Caps/Bedplate Torque Sequence

(8) Install main bearing bedplate to engine block bolts (1–10) and torque each bolt to 81 N·m (60 ft. lbs.) in sequence shown in (Fig. 50).

(9) Install main bearing bedplate to engine block bolts (11–20), with baffle studs in positions 12, 13 and 16 and torque each bolt to 34 N·m (25 ft. lbs.) in sequence shown in (Fig. 50).

(10) After the main bearing bedplate is installed, check the crankshaft turning torque. The turning torque should not exceed 5.6 N·m (50 in. lbs.).

(11) Check crankshaft end play (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - STANDARD PROCEDURE).

(12) Install connecting rod bearings and caps (Refer to 9 - ENGINE/ENGINE BLOCK/CONNECTING ROD BEARINGS - STANDARD PROCEDURE). Install new connecting rod bolts and tighten to 27 N·m (20 ft. lbs.) plus 1/4 turn.

(13) Install oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSTALLATION).

(14) Install oil pick-up tube and oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

(15) Install oil filter adapter and oil filter (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER ADAPTER - INSTALLATION).

CRANKSHAFT (Continued)

(16) Install timing belt rear cover and camshaft sprockets (Refer to 9 - ENGINE/VALVE TIMING/ TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(17) Install front crankshaft oil seal and crankshaft sprocket (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - FRONT - INSTALLATION).

(18) Install the timing belt tensioner and pulley bracket (Refer to 9 - ENGINE/VALVE TIMING/ TMNG BELT/CHAIN TENSIONER&PULLEY - INSTALLATION).

(19) Install the timing belt, front engine mount bracket, and front timing belt cover(Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(20) Install crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(21) Remove engine from repair stand and position on Special Tools 6135 and 6710 Engine Dolly and Cradle. Install safety straps around the engine to cradle and tighten and lock them into position.

(22) Install the crankshaft rear oil seal. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - INSTALLATION)

(23) Install the drive plate/flex plate.

(24) Install the transaxle to engine.

(25) Install the engine assembly (Refer to 9 - ENGINE - INSTALLATION).

(26) Perform camshaft and crankshaft timing relearn procedure as follows:

- Connect the DRB III® scan tool to the data link (diagnostic) connector. This connector is located in the passenger compartment; at the lower edge of instrument panel; near the steering column.
- Turn the ignition switch on and access the “miscellaneous” screen.
- Select “re-learn cam/crank” option and follow directions on DRB screen.

CRANKSHAFT OIL SEAL - FRONT

REMOVAL

(1) Remove the accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)

(2) Remove the crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL)

(3) Remove the timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(4) Remove the crankshaft sprocket using Special Tool 6793 and insert C-4685-C2 (Fig. 51).

(5) Remove the crankshaft sprocket key from crankshaft (Fig. 52).

CAUTION: Do not nick shaft seal surface or seal bore.

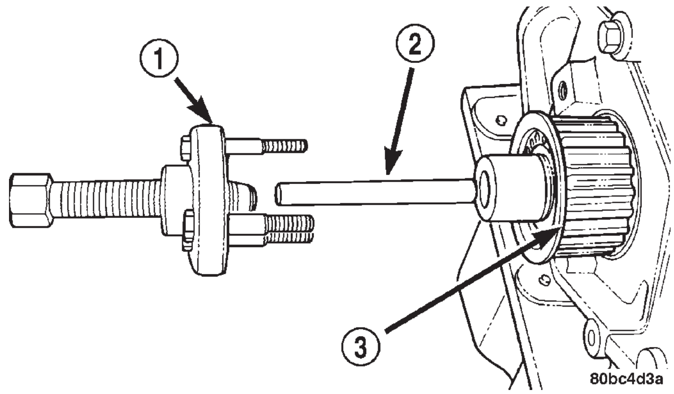


Fig. 51 Crankshaft Sprocket—Removal

1 - SPECIAL TOOL 6793
2 - SPECIAL TOOL C-4685–C2
3 - CRANKSHAFT SPROCKET

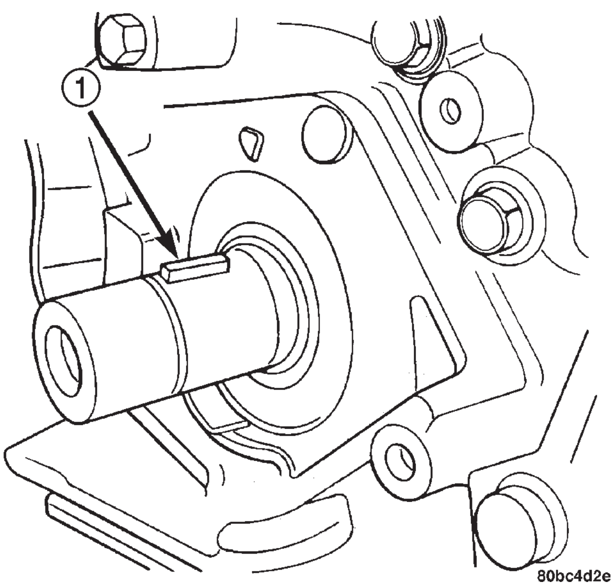


Fig. 52 Crankshaft Key

1 - CRANKSHAFT KEY

(6) Using Special Tool 6771, remove front crankshaft oil seal (Fig. 53). Do not damage the seal contact area on the crankshaft.

INSTALLATION

(1) Position seal into opening with seal spring towards the inside of engine. Using Special Tool 6780-1 (Fig. 54), install seal until flush with cover.

CRANKSHAFT OIL SEAL - FRONT (Continued)

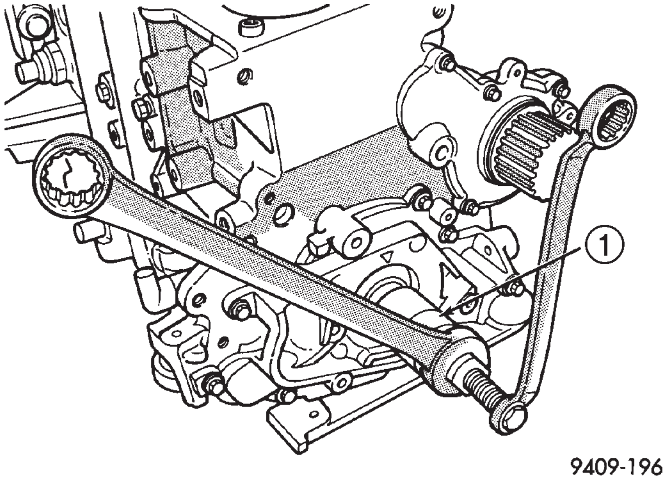


Fig. 53 Front Crankshaft Oil Seal—Removal

1 - SPECIAL TOOL 6771

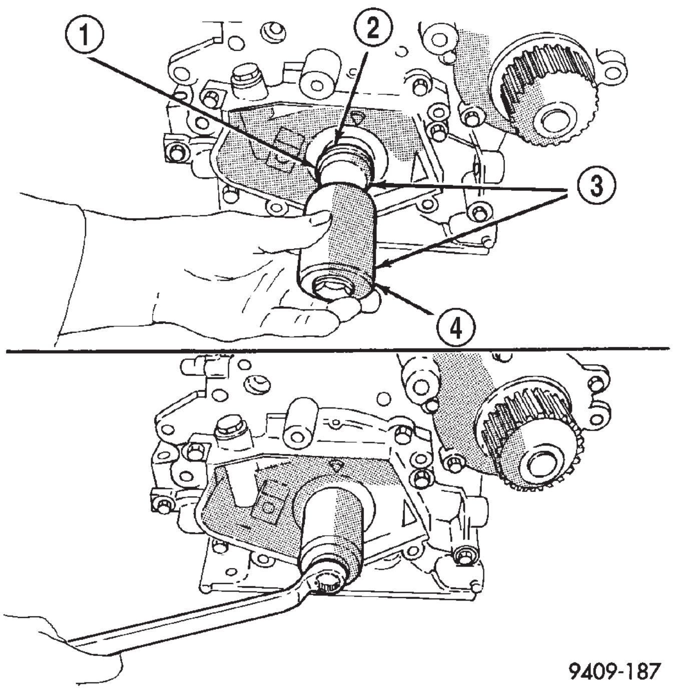


Fig. 54 Front Crankshaft Oil Seal - Installation

1 - PROTECTOR
2 - SEAL
3 - SPECIAL TOOL 6780–1
4 - INSTALLER

(2) Install the crankshaft sprocket key (Fig. 52).

(3) Install the crankshaft sprocket (Fig. 55) using Special Tool 6792.

NOTE: Make sure the word "front" on the sprocket is facing outward.

CAUTION: Use of Special Tool 6792 is required to install the crankshaft sprocket to the proper depth. Failure to use this tool will cause improper timing belt tracking.

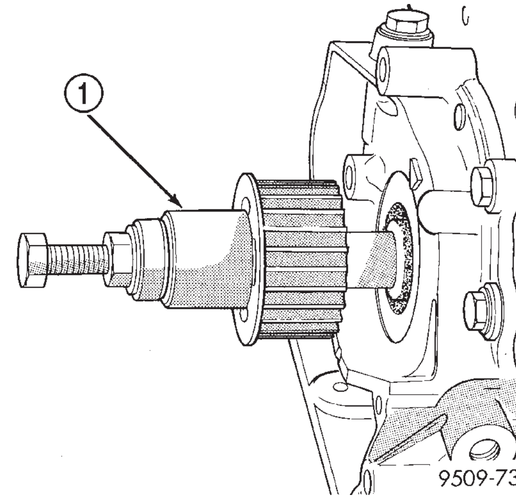


Fig. 55 Crankshaft Sprocket - Installation

1 - SPECIAL TOOL 6792

(4) Install the timing belt. (Refer to 9 - ENGINE/ VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

(5) Install crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

(6) Install accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)

CRANKSHAFT OIL SEAL - REAR

REMOVAL

(1) Remove the transaxle. (Refer to 21 - TRANSAXLE - REMOVAL) for procedure.

(2) Remove the flex plate. (Refer to 9 - ENGINE/ ENGINE BLOCK/FLEX PLATE - REMOVAL)

(3) Insert a 3/16 flat bladed screwdriver between the dust lip and the metal case of the crankshaft seal. Angle the screwdriver (Fig. 56)through the dust lip against metal case of the seal. Pry out seal.

CAUTION: Do not permit the screwdriver blade to contact crankshaft seal surface. Contact of the screwdriver blade against crankshaft edge (chamfer) is permitted.

CRANKSHAFT OIL SEAL - REAR (Continued)

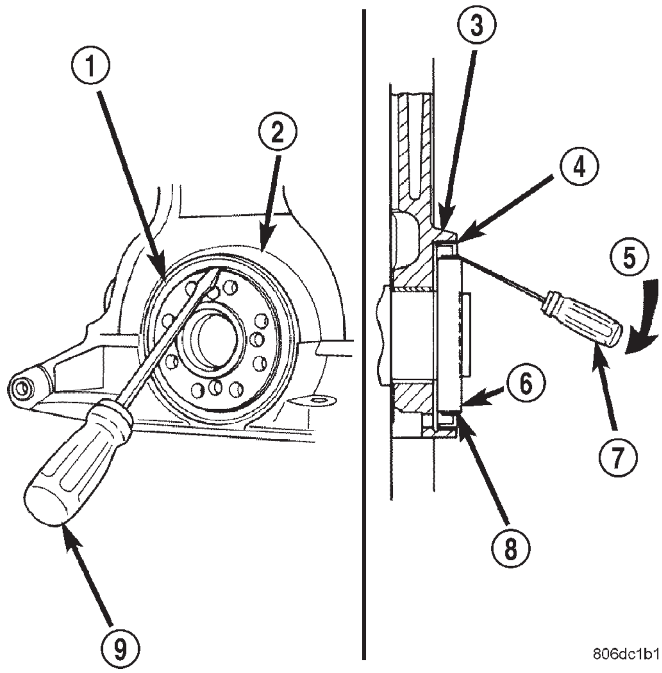


Fig. 56 Rear Crankshaft Oil Seal—Removal

1 - REAR CRANKSHAFT SEAL
2 - ENGINE BLOCK
3 - ENGINE BLOCK
4 - REAR CRANKSHAFT SEAL METAL CASE
5 - PRY IN THIS DIRECTION
6 - CRANKSHAFT
7 - SCREWDRIVER
8 - REAR CRANKSHAFT SEAL DUST LIP
9 - SCREWDRIVER

INSTALLATION

CAUTION: If burr or scratch is present on the crankshaft edge (chamfer), cleanup with 400 grit sand paper to prevent seal damage during installation of new seal.

NOTE: When installing seal, no lube on seal is needed.

(1) Place Special Tool 6926-1 on crankshaft. This is a pilot tool with a magnetic base (Fig. 57).

(2) Position seal over pilot tool. Make sure you can read the words **THIS SIDE OUT** on seal (Fig. 57). Pilot tool should remain on crankshaft during installation of seal. Ensure that the lip of the seal is facing towards the crankcase during installation.

CAUTION: If the seal is driven into the block past flush, this may cause an oil leak.

(3) Drive the seal into the block using Special Tool 6926-2 and handle C-4171 (Fig. 58) until the tool bottoms out against the block (Fig. 59).

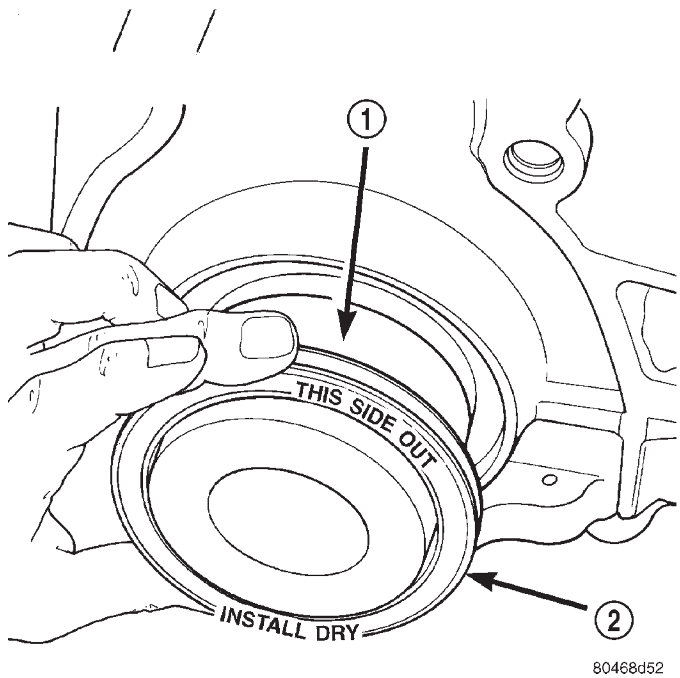


Fig. 57 Crankshaft Rear Seal and Special Tool 6926-1

1 - SPECIAL TOOL 6926–1 PILOT
2 - SEAL

(4) Install the flex plate. (Refer to 9 - ENGINE/ENGINE BLOCK/FLEX PLATE - INSTALLATION)

(5) Install the transaxle. (Refer to 21 - TRANSAXLE - INSTALLATION)

PISTON & CONNECTING ROD

DESCRIPTION

NOTE: The engine DOES NOT have provisions for a free wheeling valve train. Non free wheeling valve train means, in the event of a broken timing belt, pistons will contact the valves.

The pistons are made of a cast aluminum alloy. The pistons have pressed-in pins attached to forged powdered metal connecting rods. The pistons pin is offset 1 mm (0.0394 in.) towards the thrust side of the piston. The connecting rods are a cracked cap design and are not repairable. Hex head cap screws are used to provide alignment and durability in the assembly. The pistons and connecting rods are serviced as an assembly.

PISTON & CONNECTING ROD (Continued)

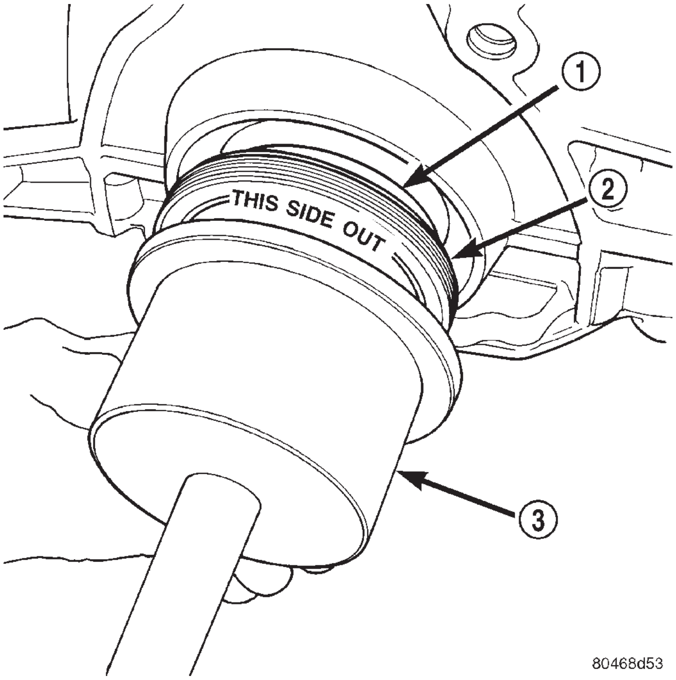


Fig. 58 Crankshaft Seal Special Tool 6926-2

1 - SPECIAL TOOL 6926–1 PILOT
2 - SEAL
3 - SPECIAL TOOL 6926–2 INSTALLER

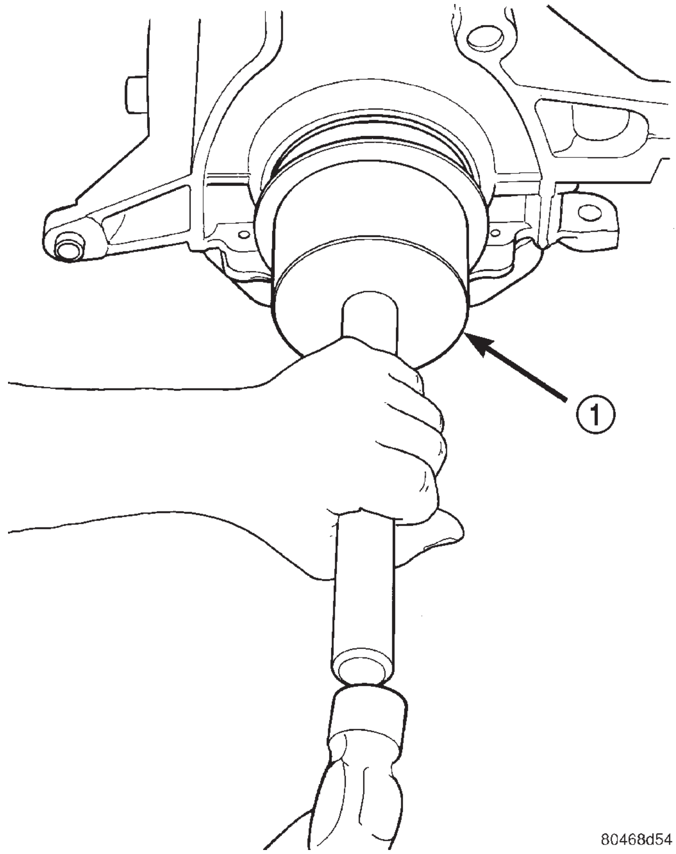


Fig. 59 Crankshaft Rear Oil Seal - Installation

1 - SPECIAL TOOL 6926–2 INSTALLER

OPERATION

The piston and connecting rod is the link between the combustion force to the crankshaft.

STANDARD PROCEDURE - PISTON TO CYLINDER BORE FITTING

Piston and cylinder wall must be clean and dry. Piston diameter should be measured 90 degrees to piston pin about 14 mm (9/16 inch.) from the bottom of the skirt as shown in (Fig. 61). Cylinder bores should be measured halfway down the cylinder bore and transverse to the engine crankshaft center line shown in (Fig. 60). Refer to for Engine Specifications (Refer to 9 - ENGINE - SPECIFICATIONS). Correct piston to bore clearance must be established in order to assure quiet and economical operation.

NOTE: Pistons and cylinder bores should be measured at normal room temperature, 21°C (70°F).

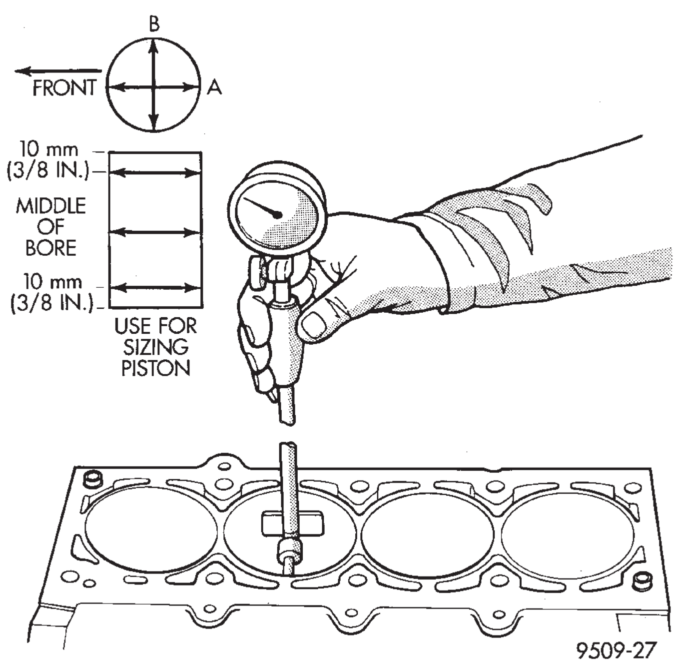


Fig. 60 Checking Cylinder Bore

PISTON & CONNECTING ROD (Continued)

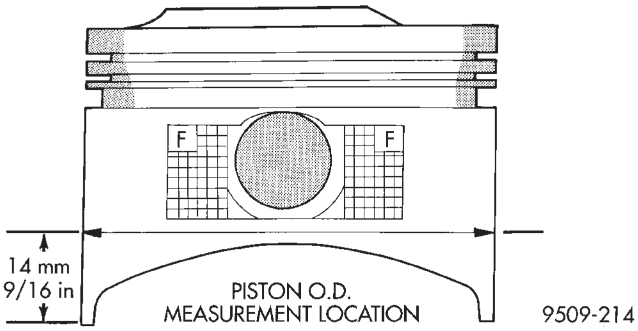


Fig. 61 Piston Measurement

REMOVAL

(1) Remove the cylinder head. (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL)

(2) Remove the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)

(3) Remove top ridge of cylinder bores with a reliable ridge reamer before removing pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation**. Mark piston with matching cylinder number (Fig. 62).

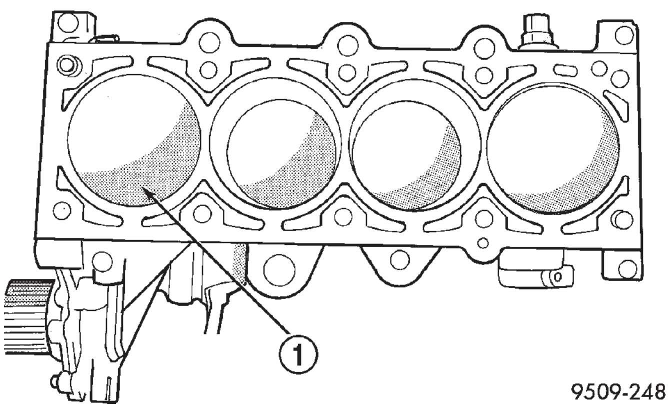


Fig. 62 Piston Markings

1 - WEIGHT DESIGNATION AND DIRECTIONAL ARROW WILL BE IMPRINTED IN THIS AREA

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods. Damage to connecting rod could occur.

(4) Using a permanent ink marker or scribe tool mark the cylinder number on the side of the rod and cap (Fig. 63) for identification.

(5) Pistons will have a stamping in the approximate location shown in (Fig. 62). These stamps will be either a directional arrow or a weight identification for the assembly. L is for light and H is for heavy. These assemblies should all be the same weight class. Service piston assemblies are marked with a S and can be used with either L or H production assemblies. The weight designation stamps should face toward the timing belt side of the engine.

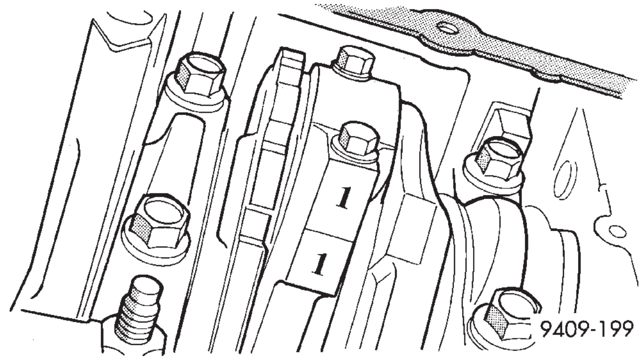


Fig. 63 Identify Connecting Rod to Cylinder

(6) Pistons and connecting rods must be removed from top of cylinder block. Rotate crankshaft so that each connecting rod is centered in cylinder bore.

(7) Remove connecting rod cap bolts **Do not use old bolts if reinstalling connecting rod.**

(8) To protect crankshaft journal and fractured rod surfaces, install Special Tool 8189, connecting rod guides onto connecting rod (Fig. 64). Carefully push each piston and rod assembly out of cylinder bore.

CAUTION: Care must be taken not to damage the fractured rod and cap joint surfaces, as engine damage many occur.

(9) Remove Special Tool 8189, connecting rod guides and re-install bearing cap on the mating rod.

NOTE: Piston and rods are serviced as an assembly.

(10) Remove piston rings. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - REMOVAL)

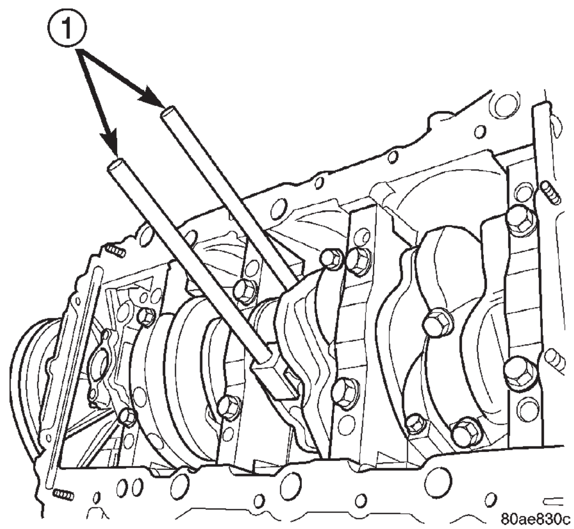


Fig. 64 Connecting Rod Guides—Typical

1 - SPECIAL TOOL 8189 CONNECTING ROD GUIDES

PISTON & CONNECTING ROD (Continued)

INSTALLATION

(1) Install piston rings on piston. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - INSTALLATION)

(2) Before installing pistons and connecting rod assemblies into the bore, ensure the compression ring gaps are staggered, and neither is in line with the oil ring rail gap.

(3) Before installing the ring compressor, ensure the oil ring expander ends are butted and the rail gaps are located as shown in (Fig. 71).

(4) Immerse the piston head and rings in clean engine oil, slide the ring compressor, over the piston (Fig. 65). **Be sure position of rings does not change during this operation**.

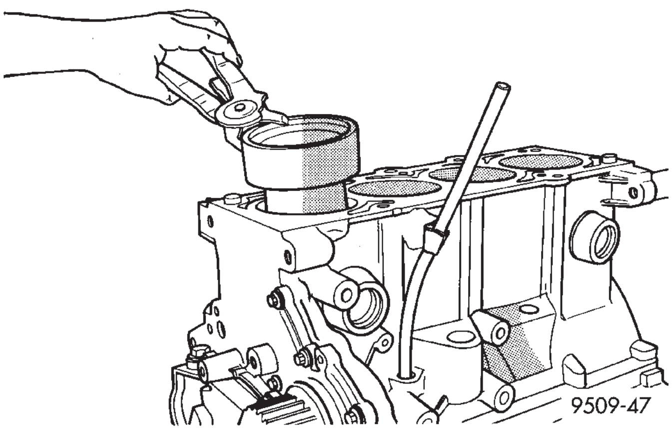


Fig. 65 Installing Piston

(5) The weight stamp designation L or H will be in the front half of the piston should face toward the front of the engine (Fig. 62).

(6) Rotate crankshaft so that the connecting rod journal is on the center of the cylinder bore. Lubricate connecting rod journal with clean engine oil.

(7) Position upper bearing half and install Special Tool 8189, connecting rod guides onto connecting rod (Fig. 64).

(8) Insert rod and piston assembly into cylinder bore and carefully guide rod over the crankshaft journal.

(9) Tap the piston down in cylinder bore, using a hammer handle. At the same time, guide connecting rod into position on connecting rod journal.

(10) Remove Special Tool 8189, connecting rod guides.

(11) Install connecting rod lower bearing half and cap. Install **New** bolts and tighten to 27 N·m (20 ft. lbs.) plus 1/4 turn.

(12) Install the cylinder head. (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION)

(13) Install the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

PISTON RINGS

STANDARD PROCEDURE - PISTON RING - FITTING

(1) Wipe cylinder bore clean. Insert ring and push down with piston to ensure it is square in bore. The ring gap measurement must be made with the ring positioned below normal ring travel in the cylinder bore. Check gap with feeler gauge (Fig. 66). For piston ring specifications (Refer to 9 - ENGINE - SPECIFICATIONS).

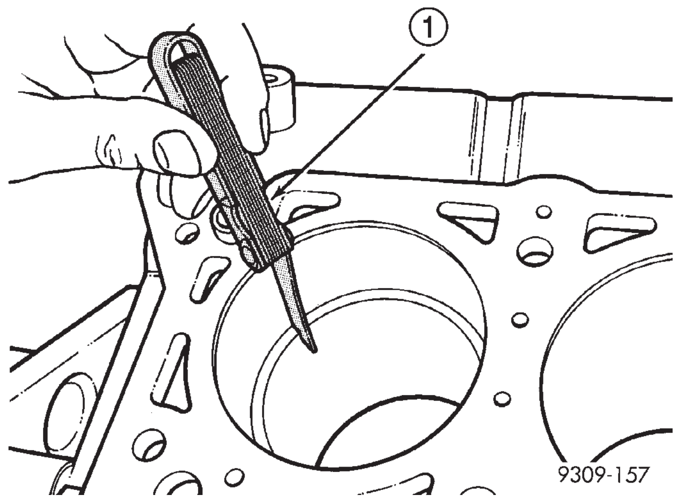


Fig. 66 Piston Ring Gap

1 - FEELER GAUGE

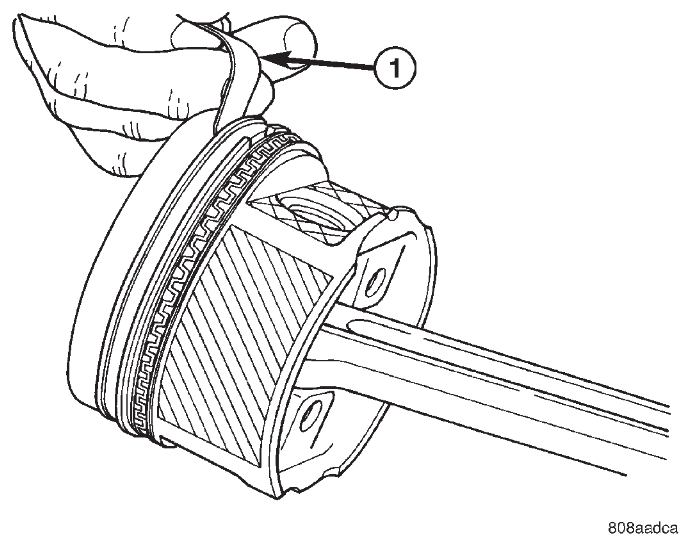


Fig. 67 Piston Ring Side Clearance

1 - FEELER GAUGE

(2) Check piston ring to groove side clearance (Fig. 67). For piston ring specifications (Refer to 9 - ENGINE - SPECIFICATIONS).

PISTON RINGS (Continued)

REMOVAL

(1) Using a suitable ring expander, remove upper and intermediate piston rings (Fig. 68).

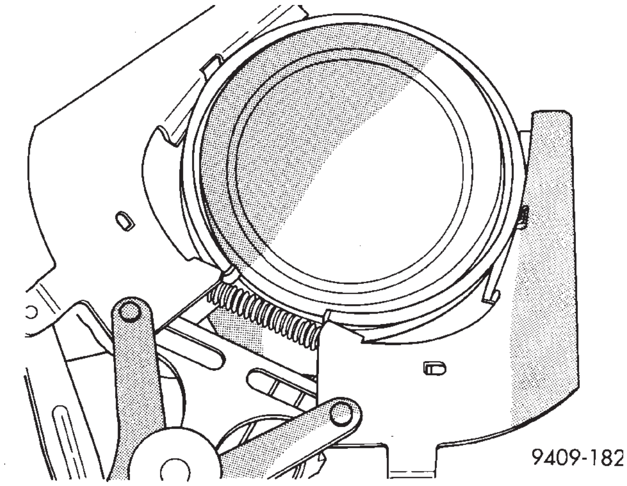


Fig. 68 Piston Rings—Removing and Installing

(2) Remove the upper oil ring side rail, lower oil ring side rail and then oil ring expander from piston.

(3) Clean ring grooves of any carbon deposits.

INSTALLATION

NOTE: The identification mark on face of upper and intermediate piston rings must point toward top of piston.

Install rings with manufacturers identification mark facing up, to the top of the piston (Fig. 69).

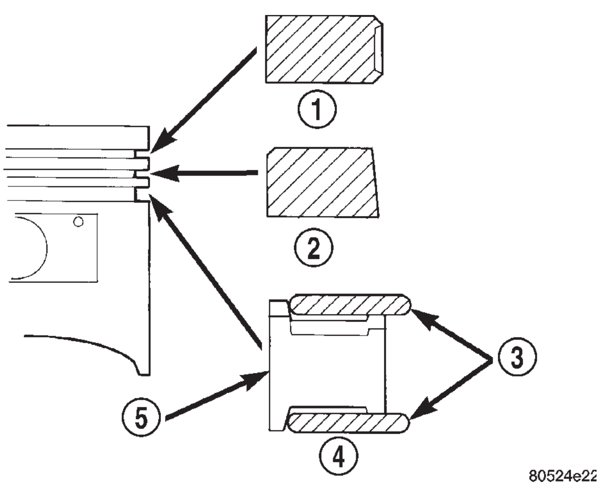


Fig. 69 Piston Ring Installation

1 - NO. 1 PISTON RING
2 - NO. 2 PISTON RING
3 - SIDE RAIL
4 - OIL RING
5 - SPACER EXPANDER

CAUTION: Install piston rings in the following order:

a. Oil ring expander.
b. Upper oil ring side rail.
c. Lower oil ring side rail.
d. No. 2 Intermediate piston ring.
e. No. 1 Upper piston ring.

(1) Install oil ring expander (Fig. 69).

(2) Install upper side rail first and then the lower side rail. Install the side rails by placing one end between the piston ring groove and the oil ring expander. Hold end firmly and press down the portion to be installed until side rail is in position. **Do not use a piston ring expander (Fig. 70).**

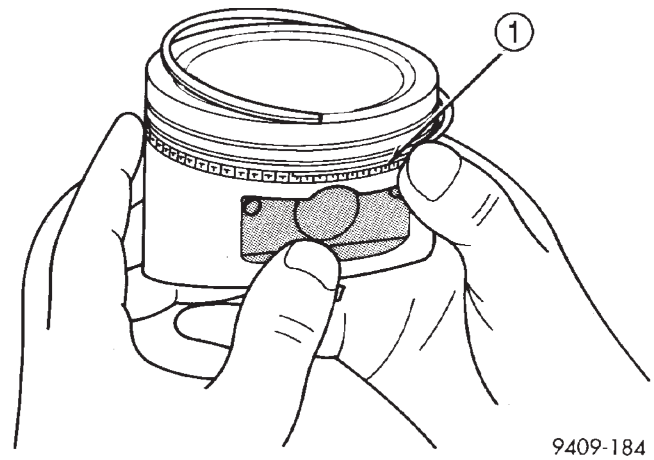


Fig. 70 Installing Side Rail

1 - SIDE RAIL END

(3) Install No. 2 piston ring and then No. 1 piston ring (Fig. 69).

(4) Position piston ring end gaps as shown in (Fig. 71).

(5) Position oil ring expander gap at least 45° from the side rail gaps but **not** on the piston pin center or on the thrust direction. Staggering ring gap is important for oil control.

PISTON RINGS (Continued)

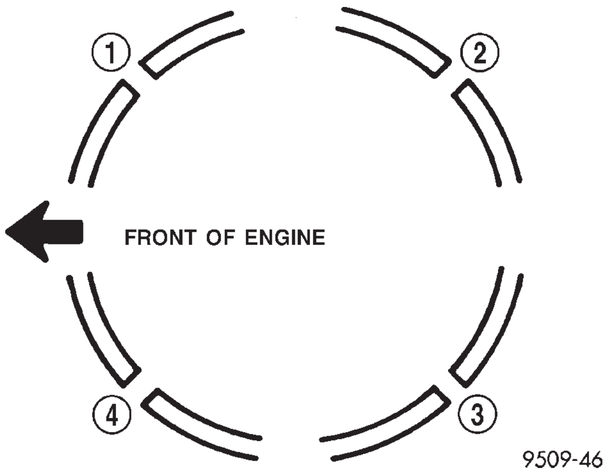


Fig. 71 Piston Ring End Gap Position

1 - GAP OF LOWER SIDE RAIL
2 - NO. 1 RING GAP
3 - GAP OF UPPER SIDE RAIL
4 - NO. 2 RING GAP AND SPACER EXPANDER GAP

STRUCTURAL COLLAR

REMOVAL

(1) Raise vehicle on hoist.

NOTE: To remove transaxle dust cover, the front bending strut must be removed.

(2) Remove structural collar from oil pan to transaxle (Fig. 72).

INSTALLATION

CAUTION: The torque procedure for the structural collar must be followed, as damage to oil pan or collar could occur.

(1) Install the structural collar (Fig. 72) using the following 3 step torque sequence:
- Step 1: Install the collar to oil pan bolts and tighten to 3 N·m (30 in. lbs.).
- Step 2: Install collar to transaxle bolts and tighten to 108 N·m (80 ft. lbs.).
- Step 3: Final torque the collar to oil pan bolts to 54 N·m (40 ft. lbs.).

(2) Lower vehicle.

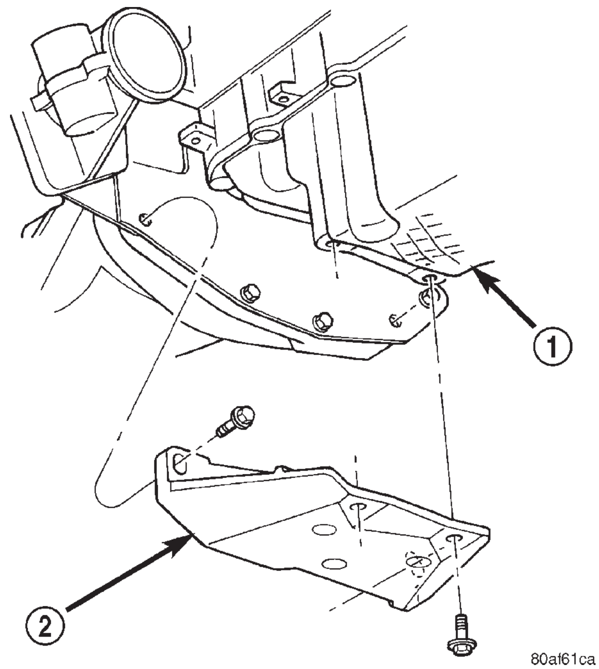


Fig. 72 Structural Collar - Removal/Installation

1 - OIL PAN
2 - STRUCTURAL COLLAR

VIBRATION DAMPER

REMOVAL

(1) Disconnect negative battery cable.
(2) Support engine under oil pan with wooden block and floor jack.
(3) Remove three right side engine mount vertical bolts to front engine bracket.
(4) Raise vehicle on hoist.
(5) Remove right front wheel and belt splash shield.
(6) Support engine under oil pan with a wooden block and screw jack (Fig. 73).
(7) Remove front and rear engine mount through bolts.
(8) Slowly lower engine down with screw jack.
(9) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
(10) Remove crankshaft damper bolt.
(11) Remove damper using Special Tool 8454 Puller and Insert 6827–A (Fig. 74).

INSTALLATION

(1) Install crankshaft vibration damper using M12 1.75 x 150 mm bolt, washer, thrust bearing and nut from Special Tool 6792 (Fig. 75).
(2) Install crankshaft vibration damper bolt and tighten to 136 N·m (100 ft. lbs.).

VIBRATION DAMPER (Continued)

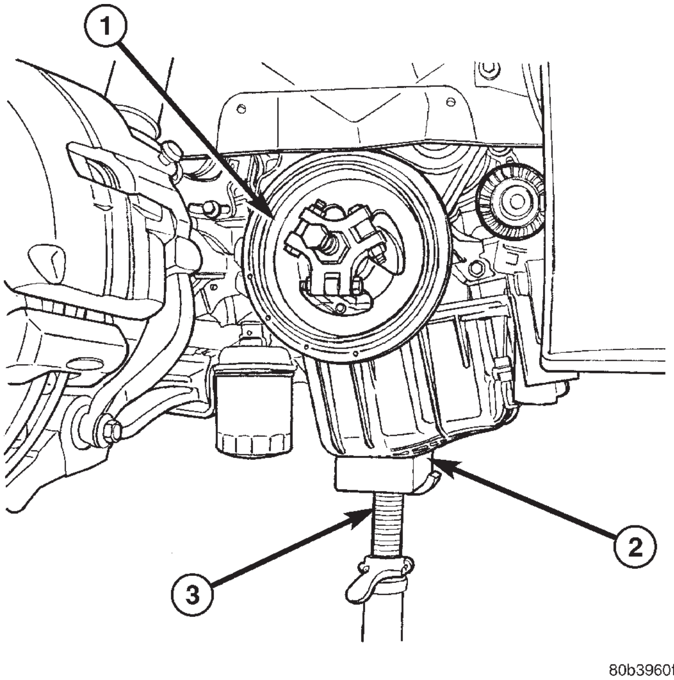


Fig. 73 Vibration Damper - Removal

1 - VIBRATION DAMPER
2 - WOODEN BLOCK
3 - SCREW JACK

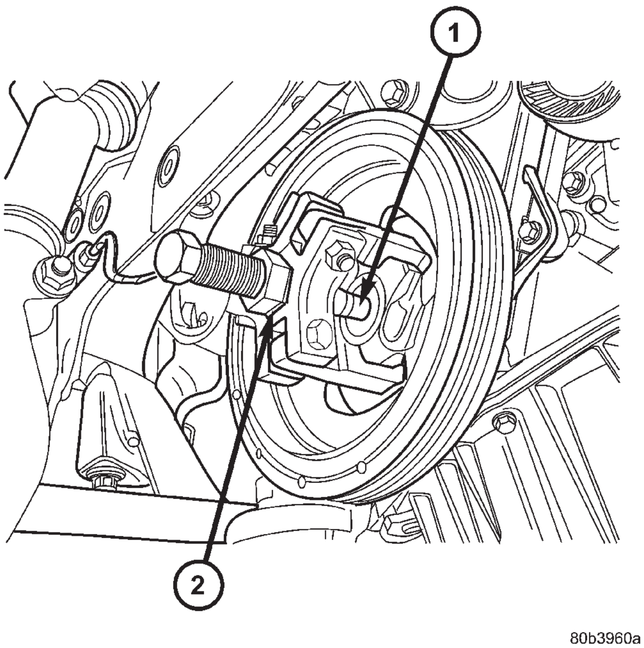


Fig. 74 Vibration Damper - Removal

1 - SPECIAL TOOL 6827-A INSERT
2 - SPECIAL TOOL 8454 PULLER

(3) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(4) Raise engine with screw jack enough to install front and rear engine mount through bolts. Torque fasteners to 61 N·m (45 ft. lbs.).

(5) Install belt splash shield and right front wheel.

(6) Lower vehicle.

(7) Support engine under oil pan with wooden block and floor jack.

(8) Slowly raise engine with floor jack until engine mount bracket aligns with right side engine mount. Install three vertical bolts to front engine bracket. Torque fasteners to 61 N·m (45 ft. lbs.).

(9) Remove floor jack.

(10) Connect negative battery cable.

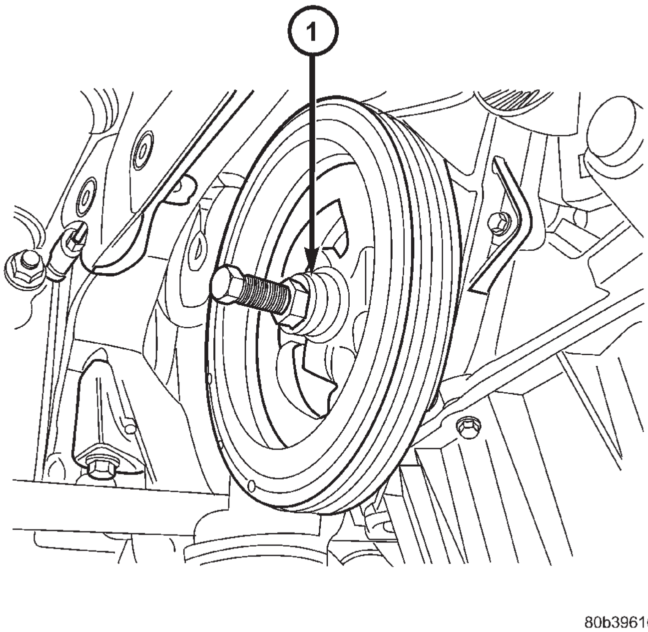


Fig. 75 Vibration Damper - Installation

1 - M12–1.75 × 150 MM BOLT, WASHER AND THRUST BEARING FROM SPECIAL TOOL 6792

ENGINE MOUNTING

ADJUSTMENTS

ENGINE SUPPORT ADJUSTMENT

The right and left support assemblies are slotted to allow for right/left drive train adjustment in relation to drive shaft assembly length.

Check and reposition right and left engine support assemblies as required. Adjust drive train position, if required, for the following conditions:

- Drive shaft distress: See Group 2, Suspension and Driveshaft.
- Any front end structural damage (after repair).
- Support Assembly replacement.

ENGINE SUPPORT ADJUSTMENT

(1) Remove the load on the engine motor mounts by carefully supporting the engine and transmission assembly with a floor jack.

(2) Loosen the right engine support assembly vertical fasteners.

(3) Loosen the left engine support assembly vertical bolts.

(4) Pry the engine right or left as required to achieve the proper drive shaft assembly length. Refer to Group 2, Suspension and Driveshaft for driveshaft identification and related assembly length measuring.

(5) Tighten right engine support assembly vertical bolts to 61 N·m (45 ft. lbs.). and tighten left engine support assembly bolts to 61 N·m (45 ft. lbs.).

(6) Recheck drive shaft length.

LEFT MOUNT

REMOVAL

(1) Disconnect negative battery cable.

(2) Remove throttle body air inlet hose and air cleaner housing assembly.

(3) Remove two nuts securing speed control servo bracket to left shock tower. Reposition servo.

(4) Support transmission with floor jack and wooden block.

(5) Remove the three vertical bolts from mount to transmission bracket (A) (Fig. 76).

(6) Slightly lower transmission with floor jack.

(7) Remove mount to frame rail fasteners (B) and remove mount (Fig. 76).

INSTALLATION

(1) Position mount to frame rail. Install mount to frame rail fasteners (B) (Fig. 76). Torque fasteners to 33 N·m (24 ft. lbs.).

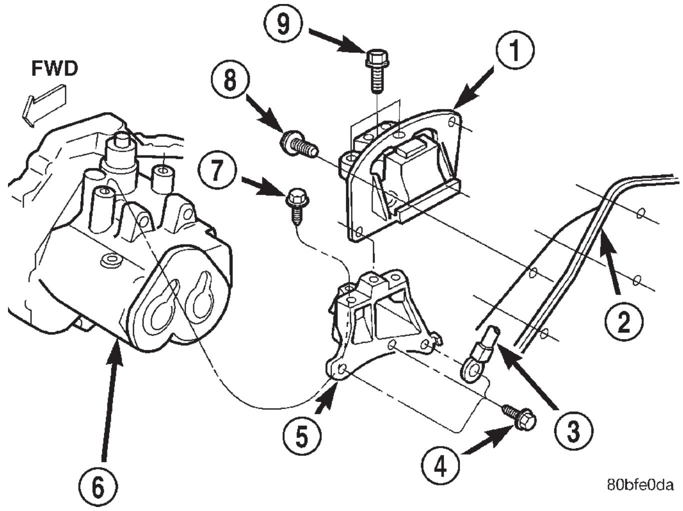


Fig. 76 Left Side Mount - Typical

1 - TRANSMISSION SUPPORT ASSEMBLY
2 - LEFT FRAME RAIL
3 - GROUND CABLE
4 - BOLT (D)
5 - TRANSMISSION BRACKET
6 - TRANSMISSION
7 - BOLT (C)
8 - BOLT (B)
9 - BOLT (A)

(2) Raise transmission into position with floor jack.

(3) Install three vertical bolts from mount to transmission bracket (A) (Fig. 76). Torque fasteners to 61 N·m (45 ft. lbs.).

(4) Remove floor jack and wooden block.

(5) Install speed control servo to left shock tower. Torque fasteners to 6.7 N·m (60 in. lbs.)

(6) Install throttle body air inlet hose and air cleaner housing assembly.

(7) Connect negative battery cable.

RIGHT MOUNT

REMOVAL

(1) Remove coolant recovery container (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY CONTAINER - REMOVAL).

(2) Remove heater tube front attaching screw.

(3) Raise vehicle on a hoist and remove inner splash shield.

(4) Remove heater tube rear attaching screw.

(5) Remove the right engine support assembly vertical fasteners from frame rail (Fig. 77).

(6) Lower vehicle. Remove the load on the engine motor mounts by carefully supporting the engine assembly with floor jack and wooden block on oil pan.

RIGHT MOUNT (Continued)

(7) Remove the bolts attaching the engine support assembly to the engine bracket (Fig. 77).

(8) Remove right engine mount.

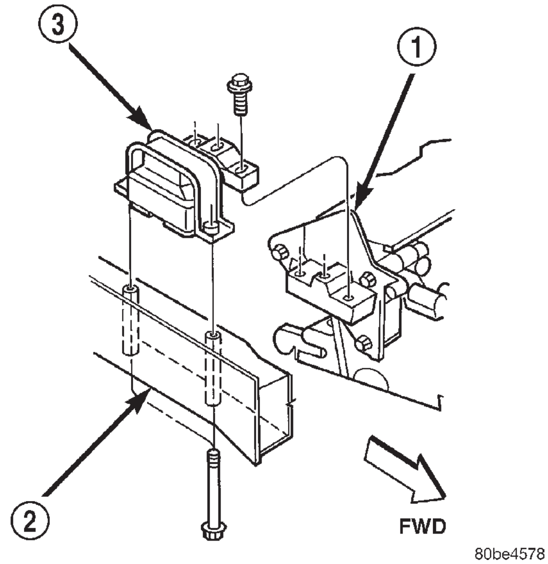


Fig. 77 Engine Mounting—Right Side

1 - ENGINE SUPPORT BRACKET
2 - FRAME RAIL
3 - RIGHT ENGINE MOUNT

INSTALLATION

(1) Position right engine mount and install frame rail to mount bolts. Tighten bolts to 61 N·m (45 ft. lbs.) (Fig. 77).

(2) Install the mount to engine support bracket bolts and tighten to 61 N·m (45 ft. lbs.) (Fig. 77).

(3) Raise vehicle on a hoist.

(4) Install heater tube rear attaching screw.

(5) Install inner splash shield and lower vehicle.

(6) Install heater tube front attaching screw.

(7) Install coolant recovery container (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY CONTAINER - INSTALLATION).

FRONT MOUNT

REMOVAL

(1) Raise vehicle.

(2) Remove front mount to bracket horizontal through bolt (Fig. 78).

(3) Remove front mount vertical bolts (Fig. 78).

(4) Remove front mount.

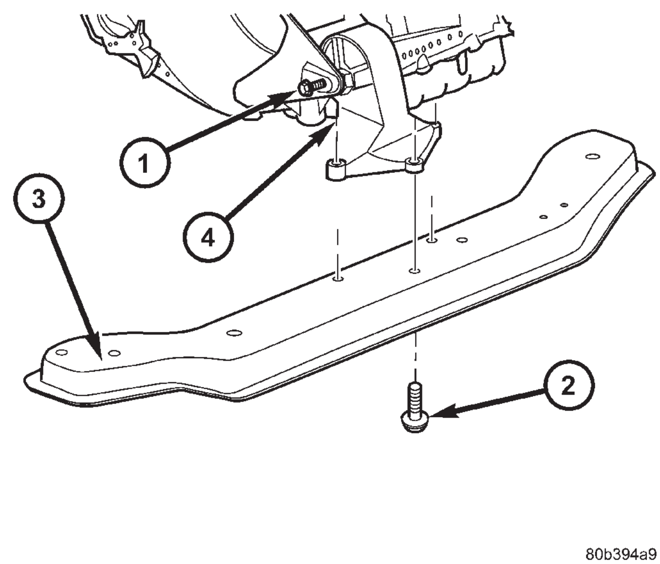


Fig. 78 FRONT ENGINE MOUNT

1 - HORIZONTAL THROUGH BOLT
2 - VERTICAL BOLT(S)
3 - LOWER RADIATOR CROSSMEMBER
4 - FRONT ENGINE MOUNT

INSTALLATION

(1) Position front mount on lower radiator crossmember.

(2) Loose install front mount to bracket through bolt.

(3) Install front mount vertical bolts. Tighten bolts to 61 N·m (45 ft. lbs.) (Fig. 78).

(4) Tighten horizontal through bolt to 61 N·m (45 ft. lbs.) (Fig. 78).

(5) Lower vehicle.

REAR MOUNT

REMOVAL

(1) Remove throttle body air inlet hose and air cleaner housing assembly.

(2) Remove three vertical bolts attaching rear mount bracket to transaxle case (Fig. 79).

(3) Raise vehicle on hoist.

(4) Remove rear mount bracket through bolt (Fig. 79).

(5) Remove horizontal bolt attaching rear mount bracket to transaxle case (Fig. 79).

(6) Remove mount bracket.

(7) Remove rear mount to suspension crossmember attaching bolts.

(8) Remove rear mount.

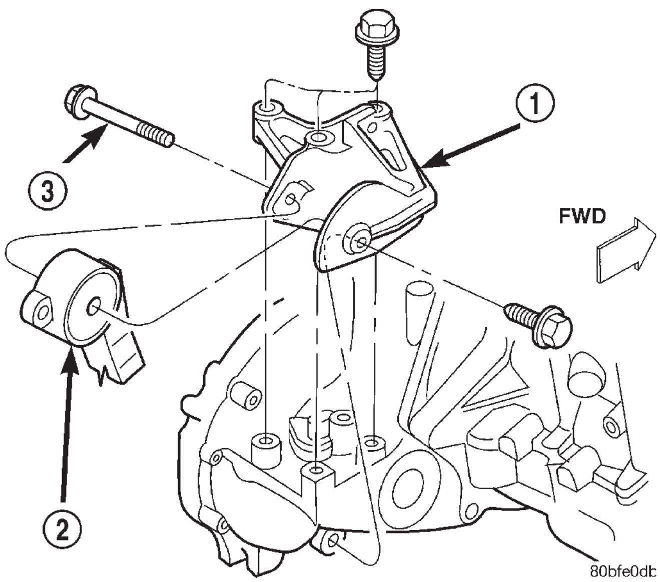


Fig. 79 Engine Mounting—Rear

1 - REAR TORQUE BRACKET
2 - REAR MOUNT
3 - THROUGH BOLT

INSTALLATION

(1) Position rear mount on suspension crossmember and loosely install bolts.

(2) Position mount bracket on transaxle and install bolts. Tighten to 110 N·m (80 ft. lbs.) (Fig. 79).

(3) Install rear mount to bracket through bolt and tighten to 61 N·m (45 ft. lbs.) (Fig. 79).

(4) Tighten rear mount to crossmember bolts to 61 N·m (45 ft. lbs.) (Fig. 79).

(5) Lower vehicle. Install throttle body air inlet hose and air cleaner housing assembly.

LUBRICATION

DESCRIPTION

The lubrication system is a full-flow filtration, pressure feed type. The oil pump (Fig. 80) is mounted in the front engine cover and driven by the crankshaft.

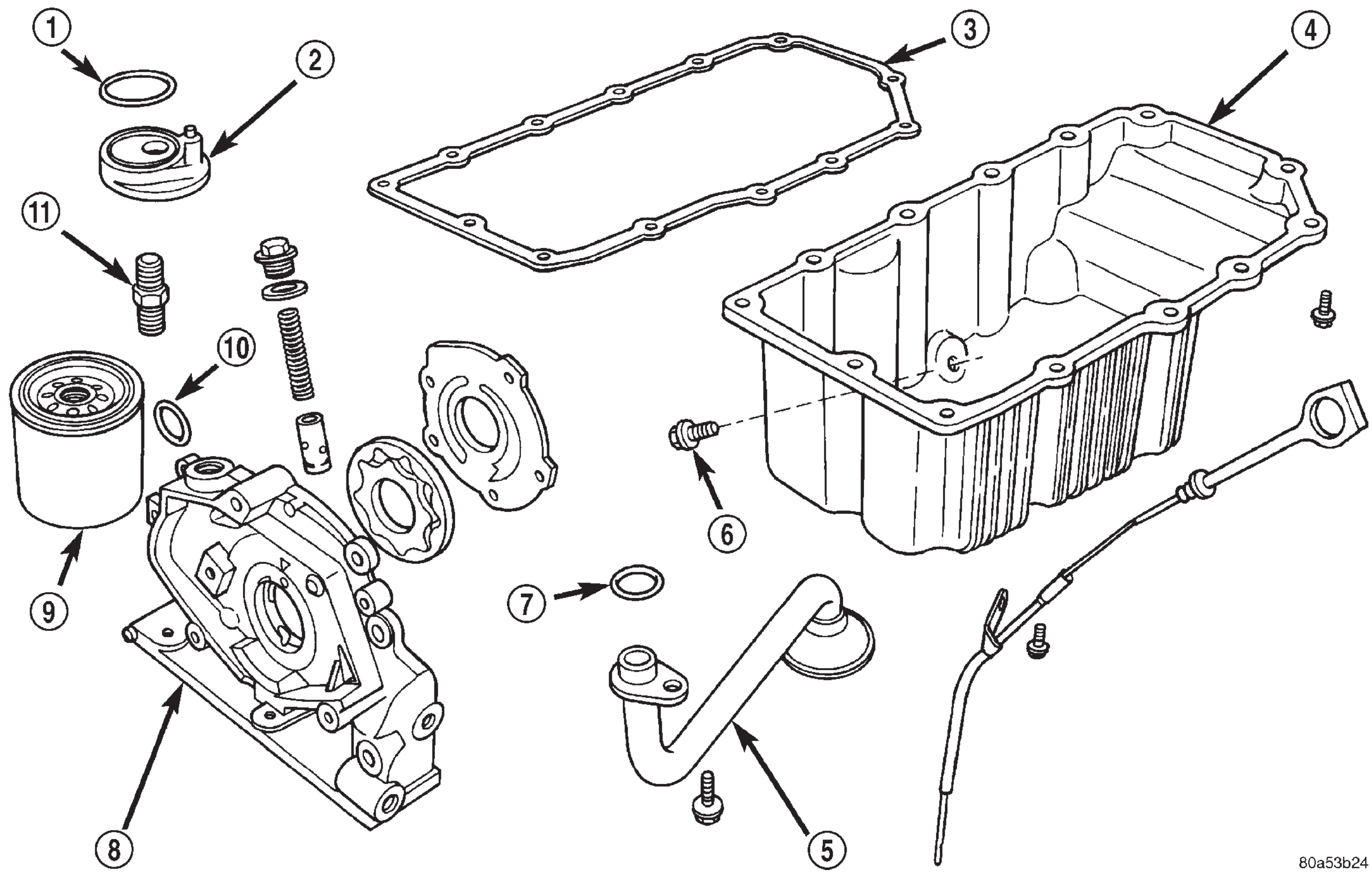


Fig. 80 Engine Lubrication Components

1 - O-RING
2 - OIL FILTER ADAPTER
3 - OIL PAN GASKET
4 - OIL PAN
5 - OIL PICK-UP TUBE
6 - DRAIN PLUG
7 - O-RING
8 - OIL PUMP BODY
9 - FILTER
10 - O-RING
11 - NIPPLE

LUBRICATION (Continued)

OPERATION

Refer to (Fig. 81) for lubrication system flow.

Engine oil drawn from the oil pan sump through the pickup tube is pressurized by the pump and routed through the full-flow filter to the main oil gallery running the length of the cylinder block. A diagonal hole in each bulkhead feeds oil to each main bearing. Drilled passages within the crankshaft route oil from main bearing journals to connecting rod journals. A vertical hole at the number five bulkhead routes pressurized oil through a restrictor and up past a cylinder head bolt to an oil gallery running the length of the cylinder head. The restrictor, an integral part of the cylinder head gasket, provides increased oil flow to the main oil gallery. The camshaft journals are partially slotted to allow a predetermined amount of pressurized oil to pass into the bearing cap cavities with small holes directed to spray lubricate the camshaft lobes. Oil returning to the pan from pressurized components supplies lubrication to the valve stems. Cylinder bores and wrist pins are splash lubricated from directed slots on the connecting rod thrust collars.

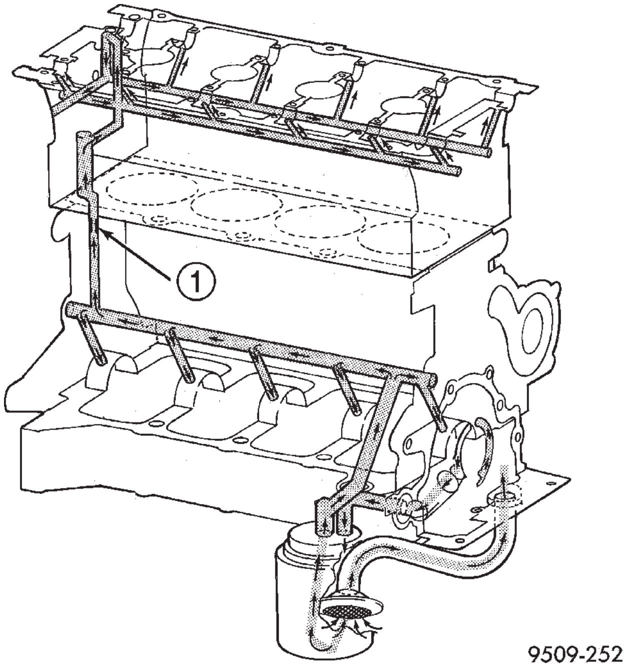


Fig. 81 Engine Lubrication System

1 - RESTRICTOR

DIAGNOSIS AND TESTING - CHECKING ENGINE OIL PRESSURE

Check oil pressure using a gauge at oil pressure switch location.

(1) Remove oil pressure switch.

(2) Install oil pressure test gauge assembly C-3292 with adaptor 8406. For Special Tool identification, (Refer to 9 - ENGINE - SPECIAL TOOLS).

CAUTION: If oil pressure is 0 at idle, Do Not Run engine at 3000 RPM.

(3) Warm engine to normal operating temperature.

(4) Monitor gauge readings at idle and 3000 rpm. Oil Pressure: **Idle** 25 kPa (4 psi) minimum, **3000 RPM** 170-550 kPa (25-80 psi).

(5) If oil pressure is 0 at idle, shut off engine and check the following:

- Pressure relief valve stuck open
- Clogged oil pick-up screen
- Damaged oil pick-up tube O-ring

OIL

STANDARD PROCEDURE

ENGINE OIL LEVEL CHECK

The best time to check engine oil level is after it has sat overnight, or if the engine has been running, allow the engine to be shut off for at least 5 minutes before checking oil level.

Checking the oil while the vehicle is on level ground will improve the accuracy of the oil level reading. Remove dipstick and observe oil level (Fig. 82). Add oil only when the level is at or below the ADD mark (Fig. 83).

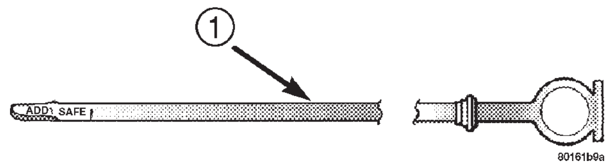


Fig. 83 Oil Level

1 - ENGINE OIL LEVEL DIPSTICK

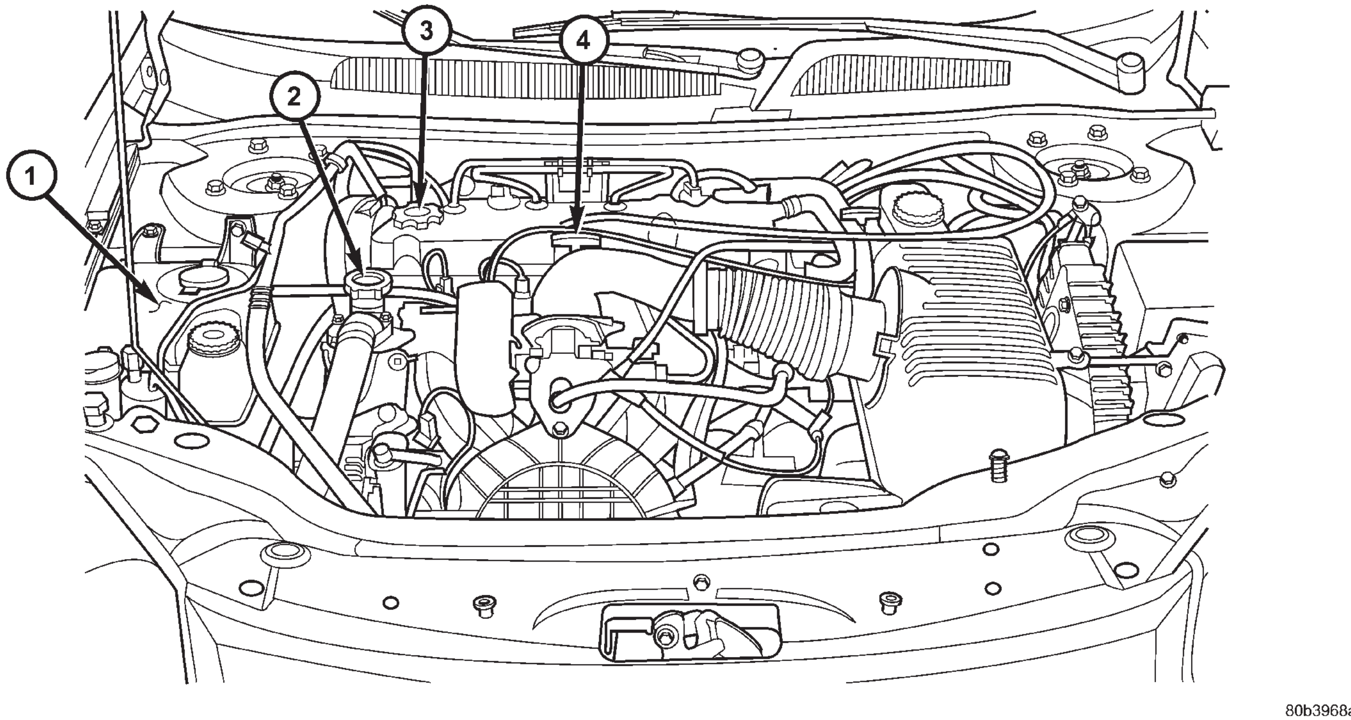


Fig. 82 Fluid Level Check - 2.0/2.4L

1 - COOLANT RECOVERY CONTAINER
2 - COOLANT PRESSURE CAP
3 - ENGINE OIL FILL CAP
4 - ENGINE OIL DIPSTICK

OIL (Continued)

STANDARD PROCEDURE - ENGINE OIL AND FILTER CHANGE

Change engine oil at mileage and time intervals described in the Maintenance Schedule. (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION)

WARNING: NEW OR USED ENGINE OIL CAN BE IRRITATING TO THE SKIN. AVOID PROLONGED OR REPEATED SKIN CONTACT WITH ENGINE OIL. CONTAMINANTS IN USED ENGINE OIL, CAUSED BY INTERNAL COMBUSTION, CAN BE HAZARDOUS TO YOUR HEALTH. THOROUGHLY WASH EXPOSED SKIN WITH SOAP AND WATER. DO NOT WASH SKIN WITH GASOLINE, DIESEL FUEL, THINNER, OR SOLVENTS, HEALTH PROBLEMS CAN RESULT. DO NOT POLLUTE, DISPOSE OF USED ENGINE OIL PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA.

Run engine until achieving normal operating temperature.

(1) Position the vehicle on a level surface and turn engine off.
(2) Remove oil fill cap (Fig. 82).
(3) Raise vehicle on hoist.
(4) Place a suitable drain pan under crankcase drain.
(5) Remove drain plug from crankcase and allow oil to drain into pan. Inspect drain plug threads for stretching or other damage. Replace drain plug and gasket if damaged.
(6) Remove oil filter. (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - REMOVAL)
(7) Install and tighten drain plug in crankcase.
(8) Install new oil filter. (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - INSTALLATION)
(9) Lower vehicle and fill crankcase with specified type and amount of engine oil. (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION)
(10) Install oil fill cap.
(11) Start engine and inspect for leaks.
(12) Stop engine and inspect oil level.

NOTE: Care should be exercised when disposing used engine oil after it has been drained from a vehicle engine. Refer to the WARNING listed above.

OIL FILTER

REMOVAL

CAUTION: When servicing the oil filter (Fig. 84), avoid deforming the filter. Use an appropriate oil filter removing tool. Position filter wrench strap close the seam at the base of the filter. The oil filter seam that joins the can to the base, is reinforced by the base plate.

(1) Turn filter counterclockwise to remove (Fig. 84).

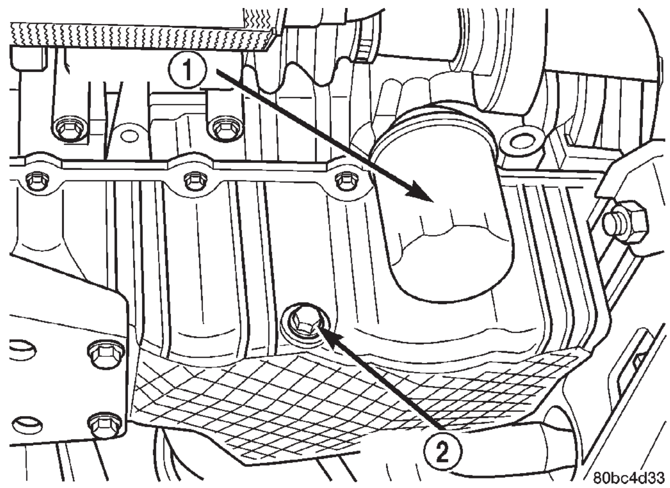


Fig. 84 Engine Oil Filter

1 - OIL FILTER
2 - DRAIN PLUG

INSTALLATION

(1) Clean and check the filter mounting surface. The surface must be smooth, flat and free of debris or old pieces of rubber.
(2) Lubricate new filter gasket.
(3) Screw filter on until gasket contacts base (Fig. 84). Tighten to 20 N·m (15 ft. lbs.).

OIL FILTER ADAPTER

REMOVAL

(1) Remove the oil filter (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - REMOVAL).

(2) Remove assembly by unscrewing adaptor fitting (Fig. 85).

(3) Remove O-ring seal.

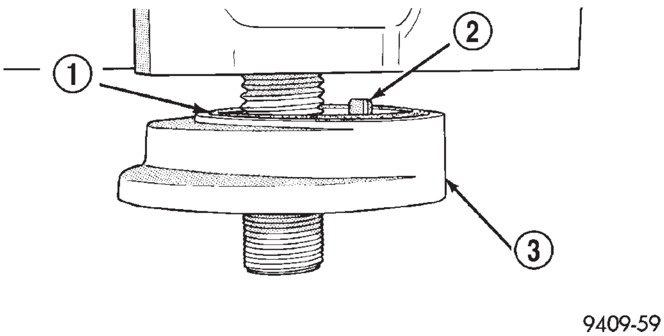


Fig. 85 Engine Oil Filter Adapter to Engine Block

1 - O-RING
2 - LOCATING ROLL PIN
3 - OIL FILTER ADAPTER

INSTALLATION

(1) Position O-ring in the groove on adapter.

(2) Align roll pin into engine block and tighten assembly to 80 N·m (60 ft. lbs.) (Fig. 85).

(3) Install oil filter (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - INSTALLATION).

OIL PAN

REMOVAL

(1) Disconnect negative cable from battery.

(2) Raise vehicle on hoist.

(3) Drain engine oil and remove oil filter.

(4) Remove oil filter adaptor from engine block (Fig. 86) (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER ADAPTER - REMOVAL).

(5) Remove structural collar (Fig. 87).

(6) Remove lateral bending brace.

(7) Remove transaxle dust cover.

(8) Remove oil pan bolts.

(9) Remove oil pan.

INSTALLATION

(1) Clean oil pan and all sealing surfaces.

(2) Apply Mopar® Silicone Rubber Adhesive Sealant at the oil pump to engine block parting line (Fig. 88).

(3) Position a new oil pan gasket onto pan.

(4) Install oil pan and tighten screws to 12 N·m (105 in. lbs.).

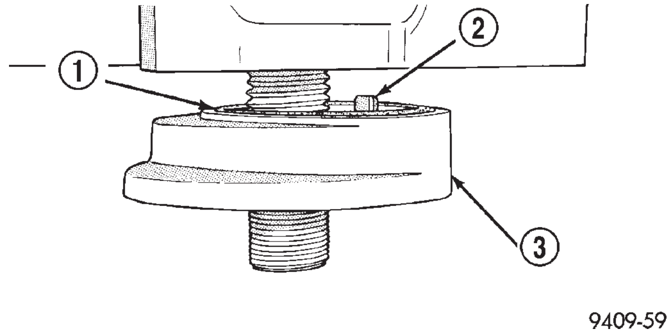


Fig. 86 Oil Filter Adaptor

1 - O-RING
2 - LOCATING ROLL PIN
3 - OIL FILTER ADAPTER

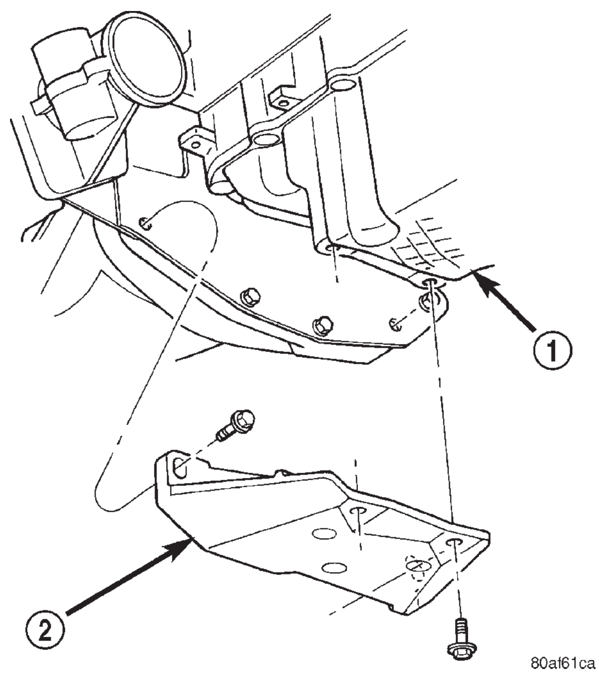


Fig. 87 Structural Collar

1 - OIL PAN
2 - STRUCTURAL COLLAR

(5) Install transaxle dust cover.

(6) Install lateral bending brace.

(7) Install structural collar (Fig. 87).

(8) Install oil filter adaptor (Fig. 86)(Refer to 9 - ENGINE/LUBRICATION/OIL FILTER ADAPTER - INSTALLATION).

(9) Install oil filter (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - INSTALLATION).

(10) Lower vehicle and fill engine crankcase with proper oil to correct level.

OIL PAN (Continued)

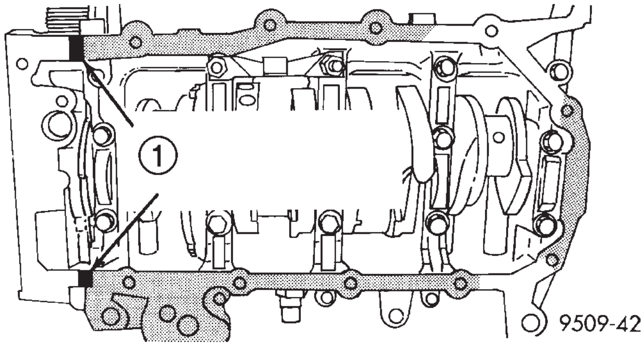


Fig. 88 Oil Pan Sealing

1 - PLACE A 1/8 INCH BEAD OF SEALER AT THE PARTING LINE OF THE OIL PUMP TO ENGINE BLOCK

OIL PRESSURE SENSOR/ SWITCH

REMOVAL

(1) Raise vehicle.

(2) Position oil collecting container under pressure switch location.

(3) Disconnect oil pressure switch electrical connector and remove switch (Fig. 89).

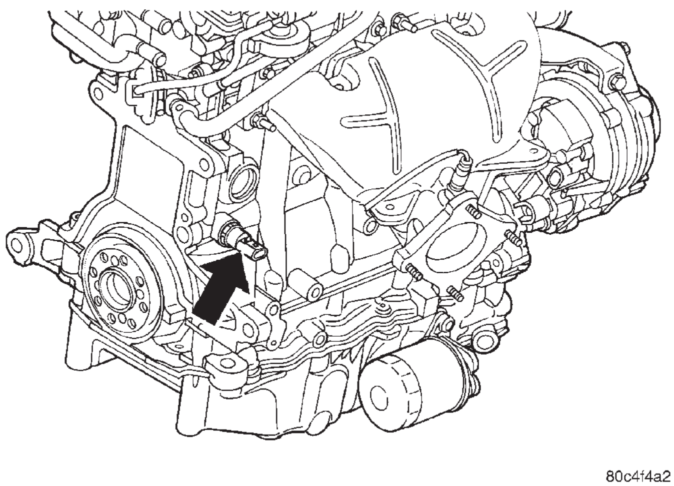


Fig. 89 Engine Oil Pressure Switch

INSTALLATION

(1) Install oil pressure switch and connect electrical connector (Fig. 89) .

(2) Lower vehicle.

(3) Start engine and allow to run a minimum of 2 minutes.

(4) Shut engine off and check engine oil level. Adjust level as necessary.

OIL PUMP

REMOVAL

(1) Disconnect negative cable from battery.

(2) Remove crankshaft vibration damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).

(3) Remove the front timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT COVER(S) - REMOVAL).

(4) Remove the timing belt (Refer to 9 - ENGINE/ VALVE TIMING/TIMING BELT AND SPROCKETS - REMOVAL).

(5) Remove the timing belt tensioner pulley bracket (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT TENSIONER & PULLEY - REMOVAL).

(6) Remove the camshaft sprockets and the rear timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT COVER(S) - REMOVAL).

(7) Drain engine oil. Remove the oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).

(8) Remove crankshaft sprocket using Special Tool 6793 and insert C-4685-C2 (Fig. 90).

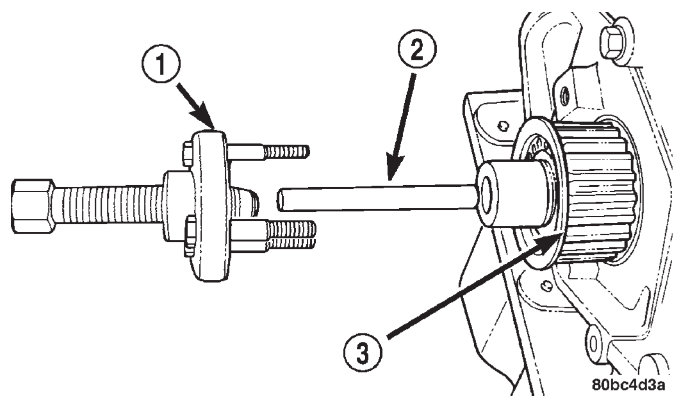


Fig. 90 Crankshaft Sprocket—Removal

1 - SPECIAL TOOL 6793
2 - SPECIAL TOOL C-4685–C2
3 - CRANKSHAFT SPROCKET

(9) Remove the oil pick-up tube.

(10) Remove the oil pump (Fig. 91) and front crankshaft seal.

OIL PUMP (Continued)

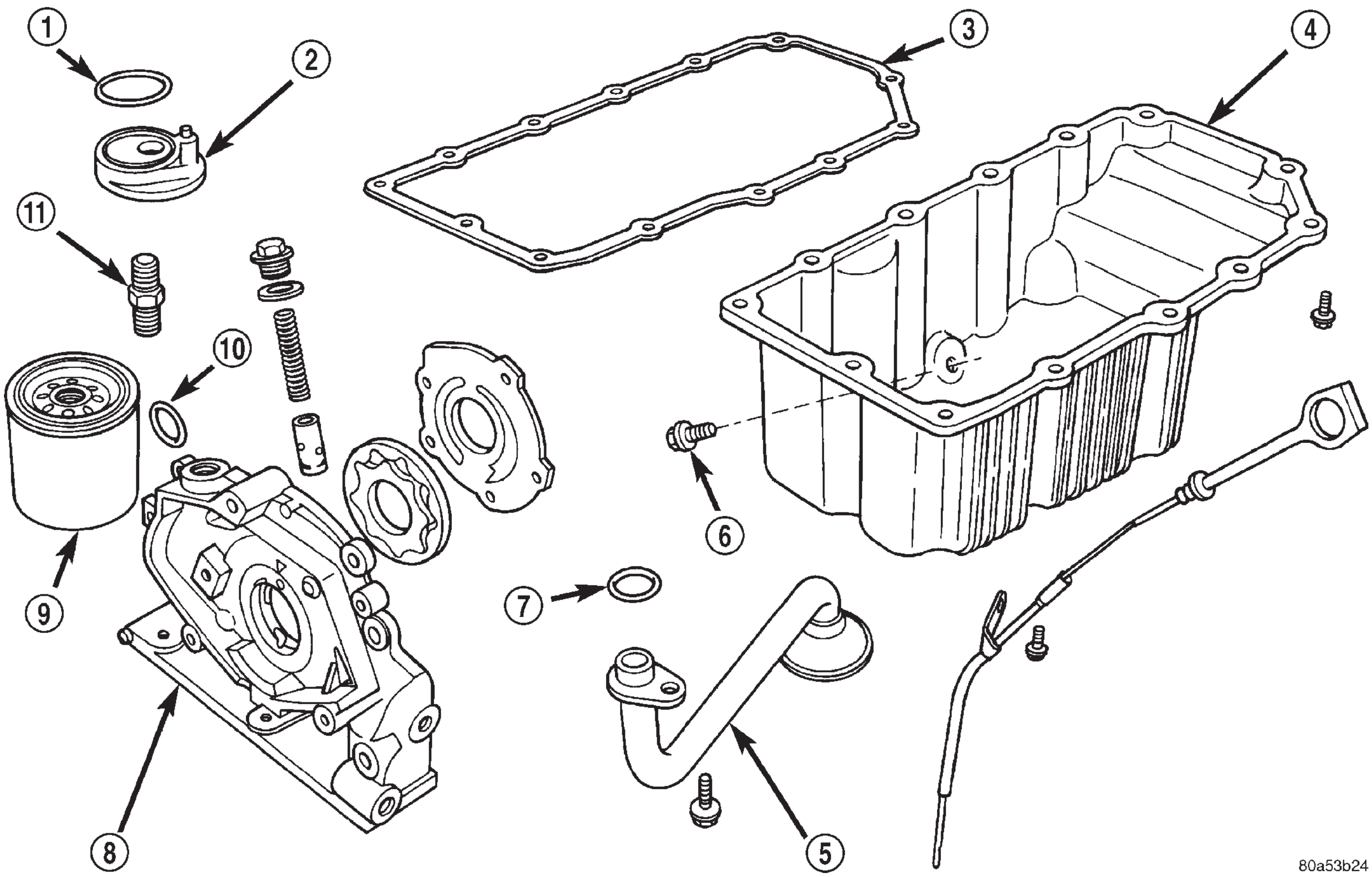


Fig. 91 Oil Pump and Tube

1 - O-RING
2 - OIL FILTER ADAPTER
3 - OIL PAN GASKET
4 - OIL PAN
5 - OIL PICK-UP TUBE
6 - DRAIN PLUG
7 - O-RING
8 - OIL PUMP BODY
9 - FILTER
10 - O-RING
11 - NIPPLE

DISASSEMBLY

(1) To remove the relief valve, proceed as follows:

(2) Remove the threaded plug and gasket from the oil pump (Fig. 92).

CAUTION: Oil pump pressure relief valve must be installed as shown in (Fig. 92) or serious damage may occur.

(3) Remove spring and relief valve (Fig. 92).

(4) Remove oil pump cover screws, and lift off cover.

(5) Remove pump rotors.

(6) Wash all parts in a suitable solvent and inspect carefully for damage or wear (Fig. 93).

INSPECTION

(1) Clean all parts thoroughly. Mating surface of the oil pump should be smooth. Replace pump cover if scratched or grooved.

(2) Lay a straightedge across the pump cover surface (Fig. 94). If a 0.076 mm (0.003 in.) feeler gauge can be inserted between cover and straight edge, cover should be replaced.

(3) Measure thickness and diameter of outer rotor. If outer rotor thickness measures 7.64 mm (0.301 in.) or less (Fig. 95), or if the diameter is 79.95 mm (3.148 in.) or less, replace outer rotor.

(4) If inner rotor measures 7.64 mm (0.301 in) or less replace inner rotor (Fig. 96).

OIL PUMP (Continued)

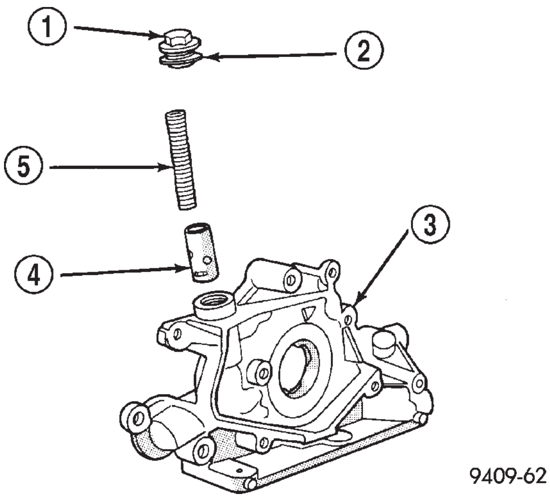


Fig. 92 Oil Pressure

1 - RETAINER CAP
2 - GASKET
3 - OIL PUMP BODY
4 - RELIEF VALVE
5 - SPRING

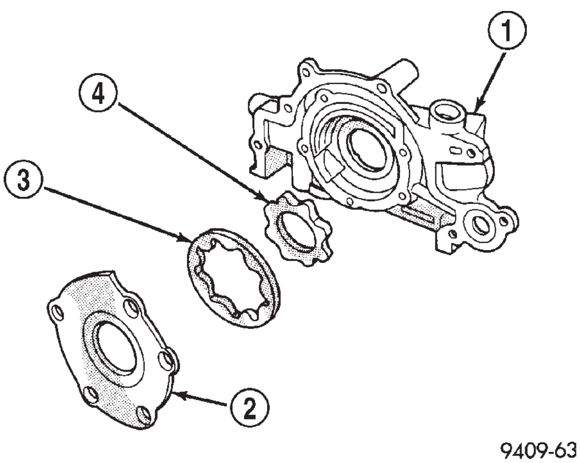


Fig. 93 Oil Pump

1 - OIL PUMP BODY
2 - OIL PUMP COVER
3 - OUTER ROTOR
4 - INNER ROTOR

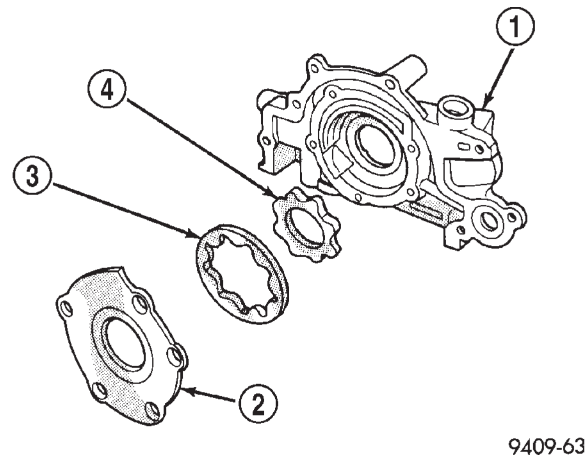


Fig. 94 Checking Oil Pump Cover Flatness

1 - OIL PUMP BODY
2 - OIL PUMP COVER
3 - OUTER ROTOR
4 - INNER ROTOR

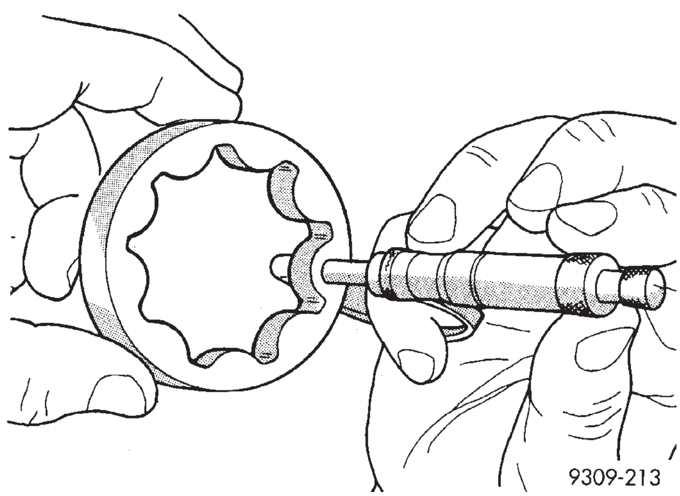


Fig. 95 Measuring Outer Rotor Thickness

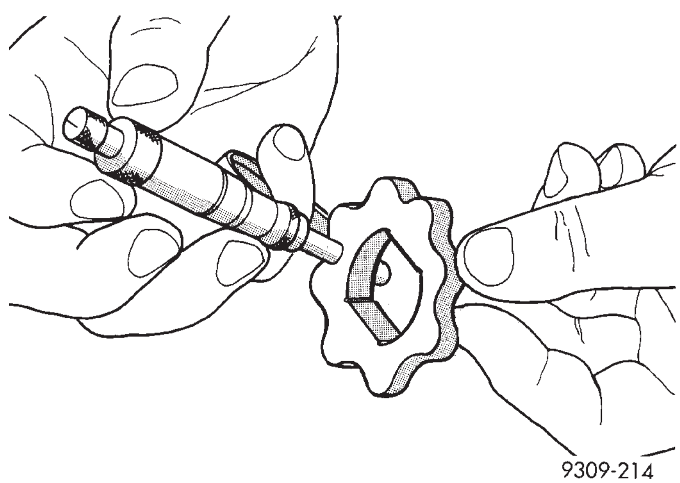


Fig. 96 Measuring Inner Rotor Thickness

OIL PUMP (Continued)

(5) Slide outer rotor into pump housing, press to one side with fingers and measure clearance between rotor and housing (Fig. 97). If measurement is 0.39 mm (0.015 in.) or more, replace housing only if outer rotor is in specification.

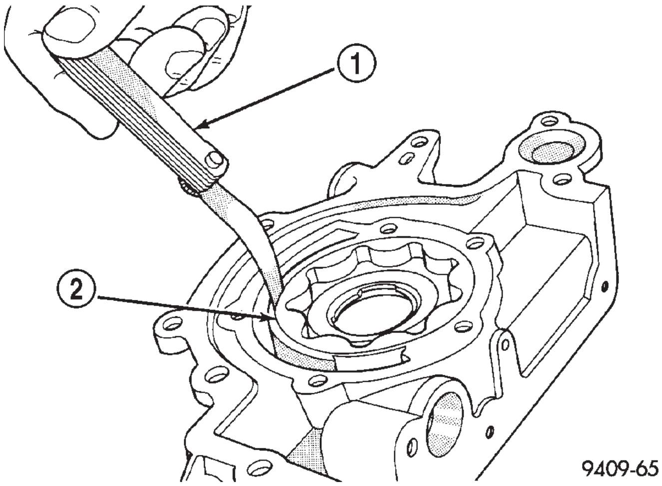


Fig. 97 Measuring Outer Rotor Clearance in Housing

1 - FEELER GAUGE
2 - OUTER ROTOR

(6) Install inner rotor into pump housing. If clearance between inner and outer rotors (Fig. 98) is 0.203 mm (0.008 in.) or more, replace both rotors.

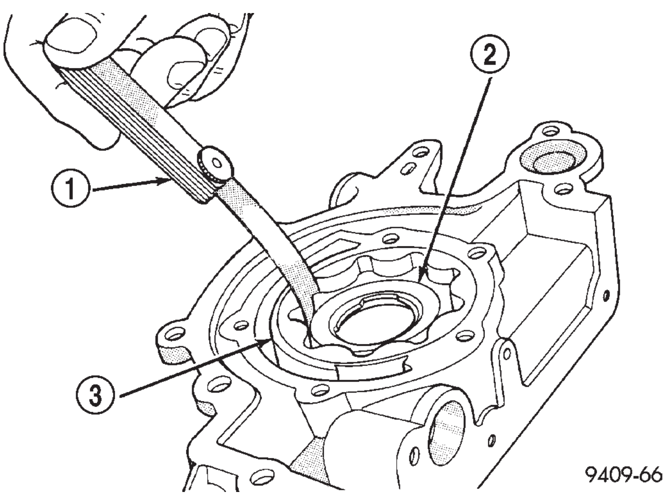


Fig. 98 Measuring Clearance Between Rotors

1 - FEELER GAUGE
2 - INNER ROTOR
3 - OUTER ROTOR

(7) Place a straightedge across the face of the pump housing, between bolt holes. If a feeler gauge of 0.102 mm (0.004 inch) or more can be inserted between rotors and the straightedge, replace pump assembly (Fig. 99). **ONLY** if rotors are in specs.

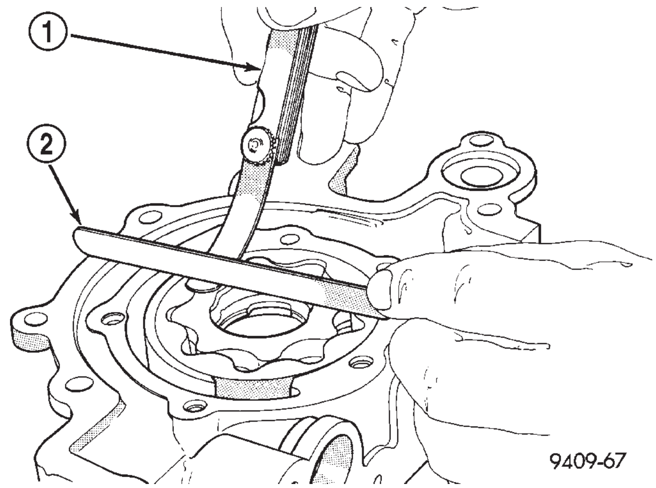


Fig. 99 Measuring Clearance Over Rotors

1 - FEELER GAUGE
2 - STRAIGHT EDGE

(8) Inspect oil pressure relief valve plunger for scoring and free operation in its bore. Small marks may be removed with 400-grit wet or dry sandpaper.

(9) The relief valve spring has a free length of approximately 60.7 mm (2.39 in.) it should test between 18 and 19 pounds when compressed to 40.5 mm (1.60 in.). Replace spring that fails to meet specifications.

(10) If oil pressure is low and pump is within specifications, inspect for worn engine bearings, damaged or missing oil pick-up tube O-ring, clogged oil pick-up tube screen, clogged oil filter and stuck open pressure relief valve or other reasons for oil pressure loss.

ASSEMBLY

(1) Install oil pump rotors (Fig. 93).

(2) Install oil pump cover and screws (Fig. 93). Tighten screws to 12 N·m (105 in. lbs.).

CAUTION: Oil pump pressure relief valve must be installed as shown in (Fig. 92) or serious damage may occur.

(3) Install spring and relief valve (Fig. 92).

(4) Install threaded plug and gasket to the oil pump (Fig. 92). Tighten plug to 41 N·m (30 ft. lbs.).

INSTALLATION

(1) Make sure all surfaces are clean and free of oil and dirt.

(2) Apply Mopar® Gasket Maker to oil pump as shown in (Fig. 100). Install oil ring into oil pump body discharge passage.

(3) Prime oil pump before installation.

OIL PUMP (Continued)

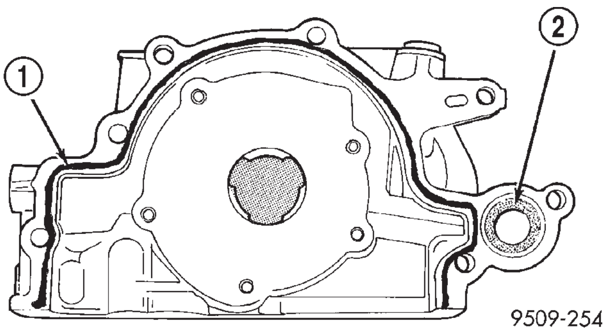


Fig. 100 Oil Pump Sealing

1 - APPLY GASKET MAKER TO OIL PUMP BODY FLANGE
2 - O-RING

(4) Align oil pump rotor flats with flats on crankshaft as you install the oil pump to the block.

NOTE: Front crankshaft seal MUST be out of pump to align, or damage may result.

(5) Torque all oil pump attaching bolts to 28 N·m (250 in. lbs.).

(6) Install new front crankshaft seal using Special Tool 6780 (Fig. 101).

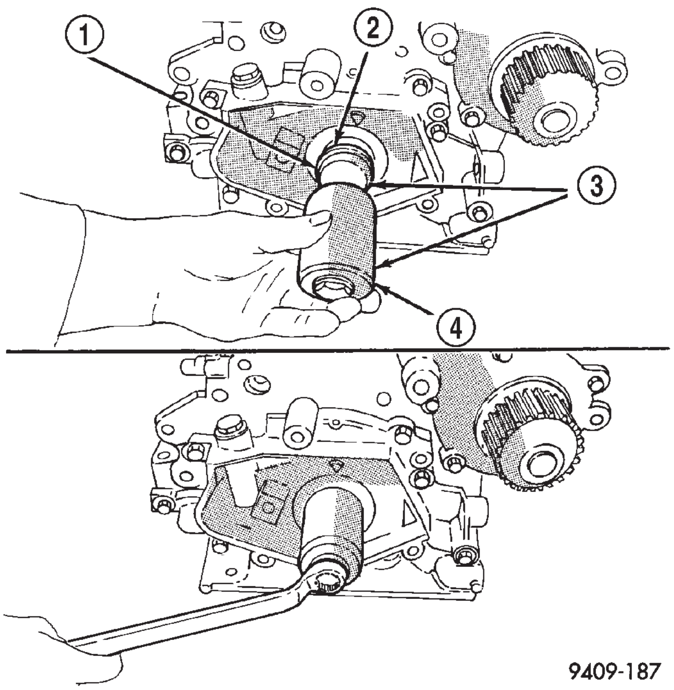


Fig. 101 Front Crankshaft Seal—Installation

1 - PROTECTOR
2 - SEAL
3 - SPECIAL TOOL 6780–1
4 - INSTALLER

(7) Install crankshaft sprocket, using Special Tool 6792 (Fig. 102).

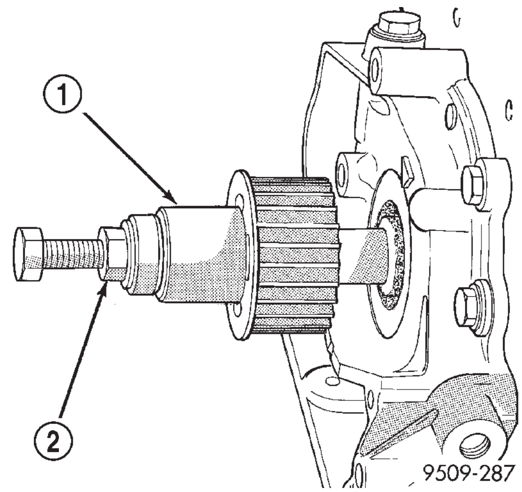


Fig. 102 Crankshaft Sprocket—Installation

1 - SPECIAL TOOL 6792
2 - TIGHTEN NUT TO INSTALL

(8) Install oil pick-up tube and oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

(9) Install timing belt rear cover and camshaft sprockets (Refer to 9 - ENGINE/VALVE TIMING/ TIMING BELT COVER(S) - INSTALLATION).

(10) Install the timing belt tensioner pulley bracket (Refer to 9 - ENGINE/VALVE TIMING/ TMNG BELT/CHAIN TENSIONER&PULLEY - INSTALLATION).

(11) Install the timing belt (Refer to 9 - ENGINE/ VALVE TIMING/TIMING BELT AND SPROCKETS - INSTALLATION).

(12) Install the front timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT COVER(S) - INSTALLATION).

(13) Install crankshaft vibration damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(14) Fill engine crankcase with proper oil to correct level.

(15) Connect negative cable to battery.

INTAKE MANIFOLD

DESCRIPTION

The intake manifold is a one piece composite plastic design that attaches to the cylinder head with fasteners. The manifold is a long branch design to enhance low and mid-range torque.

OPERATION

The intake manifold delivers air to the combustion chambers. This air allows the fuel delivered by the fuel injectors to ignite when the spark plug fire.

INTAKE MANIFOLD (Continued)

DIAGNOSIS AND TESTING - INTAKE MANIFOLD LEAKS

An intake manifold air leak is characterized by lower than normal manifold vacuum. Also, one or more cylinders may not be functioning.

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR THE FAN. DO NOT WEAR LOOSE CLOTHING.

(1) Start the engine.
(2) Spray a small stream of water (Spray Bottle) at the suspected leak area.
(3) If engine RPM'S change, the area of the suspected leak has been found.
(4) Repair as required.

REMOVAL

WARNING: RELEASE FUEL SYSTEM PRESSURE BEFORE SERVICING SYSTEM COMPONENTS. SERVICE VEHICLES IN WELL VENTILATED AREAS AND AVOID IGNITION SOURCES. NEVER SMOKE WHILE SERVICING THE VEHICLE.

(1) Perform fuel system pressure release procedure **before attempting any repairs.**(Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).
(2) Disconnect negative battery cable.
(3) Drain cooling system (Refer to 7 - COOLING/ ENGINE - STANDARD PROCEDURE).
(4) Remove throttle body air inlet hose and air cleaner housing assembly.
(5) Remove throttle and speed control cables from throttle lever and bracket.
(6) Remove EGR tube (if equipped).
(7) Remove engine oil dipstick and tube from engine block. Plug hole in block to prevent debris or fluid from entering engine crankcase.
(8) Disconnect necessary vacuum hoses from intake manifold.
(9) Disconnect the fuel supply line quick connect at the fuel rail assembly.

WARNING: WRAP SHOP TOWELS AROUND HOSE TO CATCH ANY GASOLINE SPILLAGE.

(10) Remove fastener holding fuel rail bracket to side of cylinder head.
(11) Disconnect the following electrical connectors:
- Fuel Injectors
- Knock Sensor
- ECT Sensor
- IAC
- TPS
- MAP Sensor
- A/C Pressure Sensor
- A/C Compressor Clutch
- Generator

(12) Reposition wiring harness.
(13) Remove fuel rail support bracket (Fig. 103).
(14) Remove fuel rail.

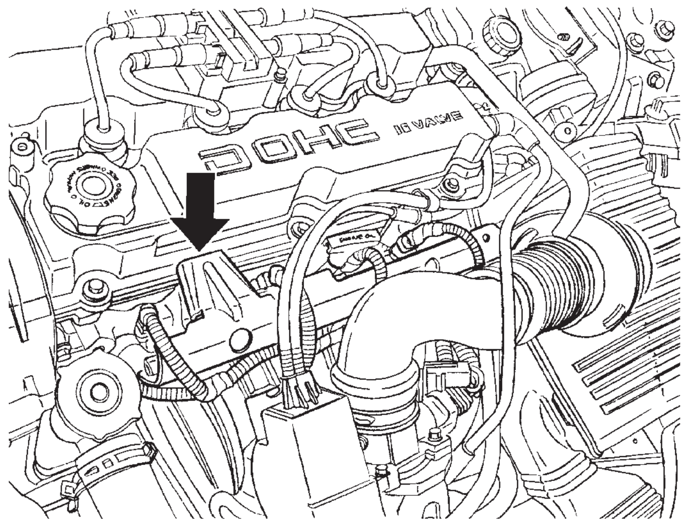


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Fig. 103 Fuel Rail Support Bracket

(15) Remove coolant outlet connector (Refer to 7 - COOLING/ENGINE/COOLANT OUTLET HOUSING - REMOVAL).
(16) Remove intake manifold fasteners. Remove intake manifold.

CLEANING

(1) Discard gasket(s).
(2) Clean all sealing surfaces.

INSPECTION

(1) Inspect manifold for cracks or distortion. Replace manifold if necessary.
(2) Inspect manifold for gasket surface damage or warpage. Replace manifold if necessary.

INSTALLATION

(1) Install new intake manifold and gasket. Gradually tighten fasteners to 28 N·m (250 in. lbs.) in sequence shown in (Fig. 104).
(2) Install coolant outlet connector (Refer to 7 - COOLING/ENGINE/COOLANT OUTLET HOUSING - INSTALLATION).
(3) Install fuel rail.
(4) Install fuel rail support bracket (Fig. 103).
(5) Connect previously disconnected electrical connectors.

INTAKE MANIFOLD (Continued)

(6) Install fastener holding fuel rail bracket to side of cylinder head.

(7) Inspect quick connect fittings for damage, replace if necessary. Connect fuel supply hose to fuel rail assembly. Check connection by pulling on connector to insure it locked into position.

(8) Connect vacuum hoses to intake manifold.

(9) Install engine oil dipstick and tube.

(10) Install EGR tube (if equipped).

(11) Install throttle and speed control cables to bracket. Connect cables to the throttle lever.

(12) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(13) Connect negative battery cable.

(14) With the DRB scan tool use ASD Fuel System Test to pressurize system to check for leaks.

CAUTION: When using the ASD Fuel System Test, the Auto Shutdown (ASD) relay will remain energized for 7 minutes or until the ignition switch is turned to the OFF position, or Stop All Test is selected.

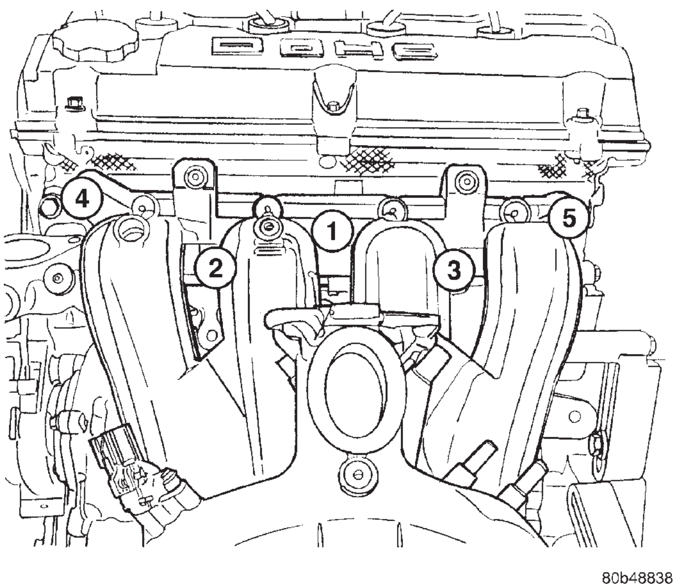


Fig. 104 Intake Manifold Tightening Sequence

EXHAUST MANIFOLD

DESCRIPTION

The exhaust manifold is made of Hi-Silicone Moly nodular cast iron for strength and high temperatures. The manifold attaches to the cylinder head.

OPERATION

The exhaust manifold collects the exhaust gasses exiting the combustion chambers. Then it channels the exhaust gasses to the exhaust pipe attached to the manifold.

REMOVAL

(1) Disconnect negative battery cable.

(2) Raise vehicle on hoist.

(3) Remove complete exhaust system (Refer to 11 - EXHAUST SYSTEM - REMOVAL).

(4) Remove rear engine mount and transaxle bracket.

(5) Remove exhaust manifold heat shield (Fig. 105).

(6) Disconnect oxygen sensor electrical connector.

(7) Remove exhaust manifold retaining fasteners and remove exhaust manifold.

(8) Remove and discard manifold gasket.

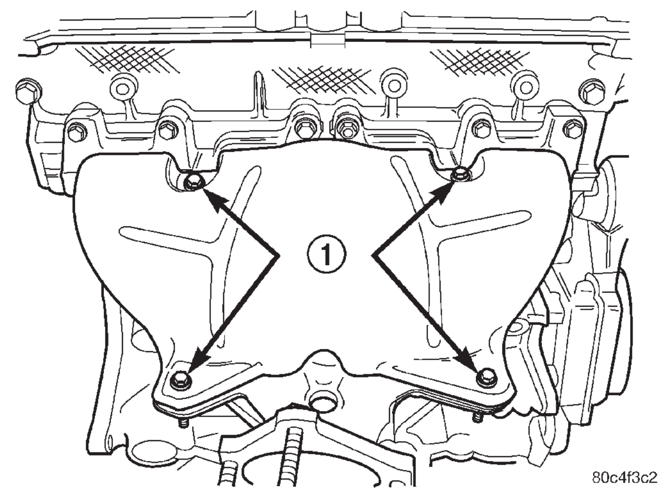


Fig. 105 Exhaust Manifold Heat Shield Bolts

1 - BOLTS

CLEANING

(1) Discard gasket (if equipped) and clean all surfaces of manifold and cylinder head.

INSPECTION

(1) Inspect manifold gasket surfaces for flatness with straight edge. Surface must be flat within 0.15 mm per 300 mm (0.006 in. per foot) of manifold length.

EXHAUST MANIFOLD (Continued)

(2) Inspect manifolds for cracks or distortion. Replace manifold as necessary.

INSTALLATION

(1) Install new exhaust manifold gasket. **DO NOT APPLY SEALER**.

(2) Position exhaust manifold in place. Gradually tighten fasteners in sequence shown in (Fig. 106) to 23 N·m (200 in. lbs.).

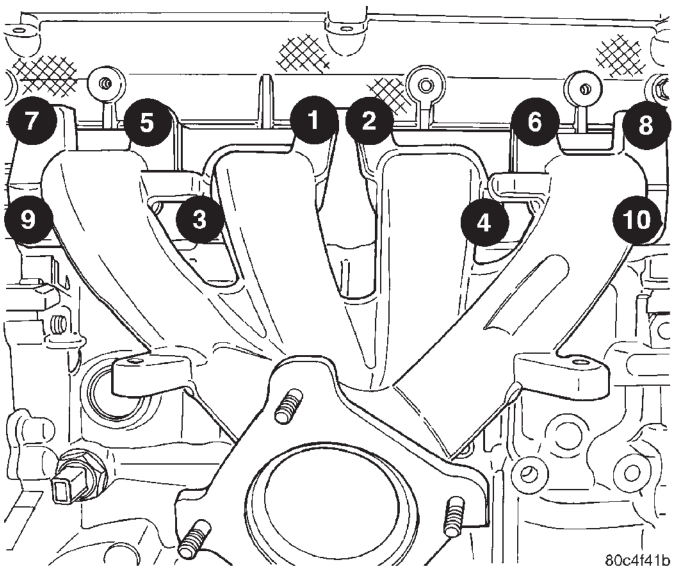


Fig. 106 Exhaust Manifold Tightening Sequence

(3) Install exhaust manifold heat shield.

(4) Connect oxygen sensor electrical connector.

(5) Install rear engine mount and transaxle bracket.

(6) Install exhaust system (Refer to 11 - EXHAUST SYSTEM - INSTALLATION). Tighten fasteners to 28 N·m (250 in. lbs.).

(7) Lower vehicle.

(8) Connect negative battery cable.

VALVE TIMING

STANDARD PROCEDURE

STANDARD PROCEDURE - CAMSHAFT/ CRANKSHAFT SYNCHRONIZATION WITH DRBIII

The camshaft and crankshaft synchronization procedure must be performed after a following component(s) replacement:

- Camshaft
- Camshaft Position Sensor
- Camshaft Sensor Target Magnet
- Crankshaft
- Cylinder Block
- Cylinder Head
- Water Pump
- Timing Belt and Timing Belt Tensioner
- Powertrain Control Module (PCM)

(1) Perform camshaft and crankshaft timing relearn procedure as follows:

- Connect the DRB III® scan tool to the data link (diagnostic) connector. This connector is located in the passenger compartment; at the lower edge of instrument panel; near the steering column.
- Turn the ignition switch on and access the “miscellaneous” screen.
- Select “re-learn cam/crank” option and follow directions on DRB III® screen.

STANDARD PROCEDURE - VALVE TIMING VERIFICATION

(1) Remove number one spark plug.

(2) Using a dial indicator, set number one cylinder to TDC on the compression stroke.

(3) Remove the access plug from the front timing belt cover.

(4) Check the timing marks on the camshaft sprockets, they should align with each other (Fig. 107).

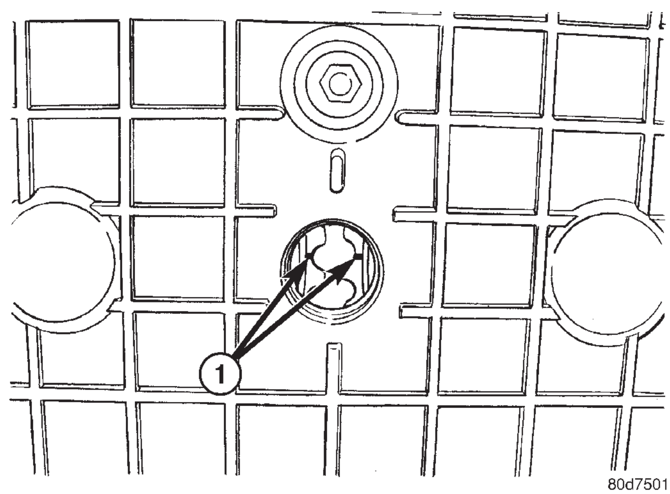


Fig. 107 Camshaft Timing Check

1 - CAMSHAFT TIMING MARKS SHOULD LINE UP

TIMING BELT COVER(S)

REMOVAL

FRONT COVER

(1) Disconnect negative battery cable.
(2) Raise vehicle on hoist.
(3) Remove right front wheel and accessory drive belt splash shield.
(4) Remove the accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
(5) Remove the crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).
(6) Remove accessory drive belt automatic tensioner.
(7) Disconnect generator connectors. Remove generator and bracket.
(8) Lower vehicle.
(9) Position a jack under engine. Raise jack enough to support engine weight.
(10) Remove the right engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/RIGHT MOUNT - REMOVAL).
(11) Remove front engine mount bracket (Fig. 108).
(12) Remove the front timing belt cover (Fig. 108).

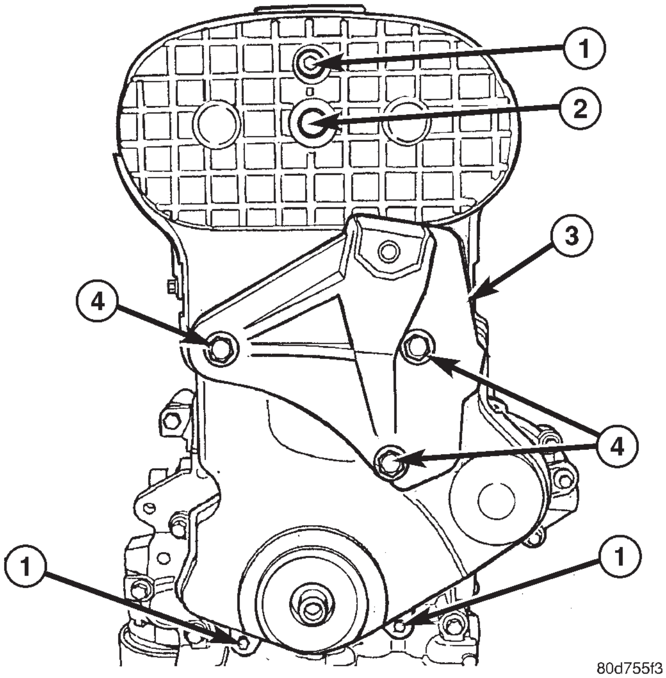


Fig. 108 Front Timing Belt Cover

1 - FRONT TIMING BELT COVER FASTENERS
2 - ACCESS PLUG
3 - FRONT ENGINE MOUNT BRACKET
4 - FASTENERS

REAR COVER

(1) Remove front timing belt cover.

CAUTION: Camshaft(s) or crankshaft should not be rotated after timing belt is removed. Damage to valve components may occur. Always align timing marks before removing timing belt.

(2) Remove timing belt, timing belt tensioner, and tensioner pulley bracket (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - REMOVAL) and (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT TENSIONER & PULLEY - REMOVAL).
(3) Hold camshaft sprockets with Special Tools C-4687 and Adaptor C-4687-1 (Fig. 109), while removing attaching bolts.
(4) Remove camshaft sprockets.
(5) Remove rear timing belt cover attaching bolts.
(6) Remove rear cover.

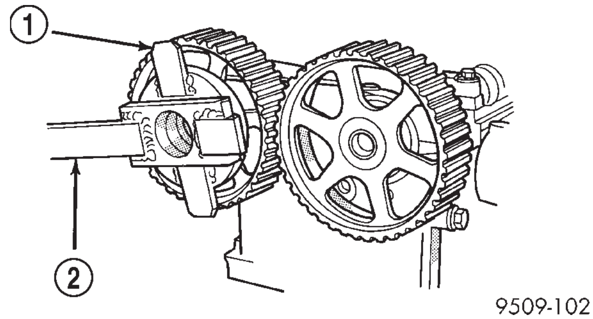


Fig. 109 Camshaft Sprocket - Removal/Installation

1 - ADAPTER C-4687–1
2 - SPECIAL TOOL C-4687

INSTALLATION

REAR COVER

(1) Install rear cover and tighten bolts to 12 N·m (105 in. lbs.).
(2) Install camshaft sprockets. While holding sprockets with Special Tools C-4687 and Adaptor C-4687-1 (Fig. 109), tighten attaching bolts to 115 N·m (85 ft. lbs.).
(3) Install tensioner pulley bracket, timing belt, and timing belt tensioner (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT TENSIONER & PULLEY - INSTALLATION) and (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - INSTALLATION).
(4) Install front cover.

FRONT COVER

(1) Install front cover and tighten bolts to 12 N·m (105 in. lbs.).

(2) Install engine front engine mount bracket (Fig. 108).

(3) Install right side engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/RIGHT MOUNT - INSTALLATION).

(4) Remove jack from under engine.

(5) Install generator bracket and generator. Reconnect generator connectors.

(6) Install accessory drive belt automatic tensioner.

(7) Install the crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(8) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(9) Install accessory drive belt splash shield and right front wheel.

(10) Connect negative battery cable.

TIMING BELT AND SPROCKETS

REMOVAL

REMOVAL - TIMING BELT

CAUTION: Camshaft(s) or crankshaft should not be rotated after timing belt is removed. Damage to valve components may occur. Always align timing marks before removing timing belt.

(1) Disconnect negative battery cable.

(2) Remove the front timing belt cover (Fig. 110) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT COVER(S) - REMOVAL).

CAUTION: Align camshaft and crankshaft timing marks before removing the timing belt by rotating the engine with the crankshaft.

(3) Rotate crankshaft until timing marks are aligned at both the camshafts and crankshaft.

(4) Loosen the timing belt tensioner fasteners.

TIMING BELT AND SPROCKETS (Continued)

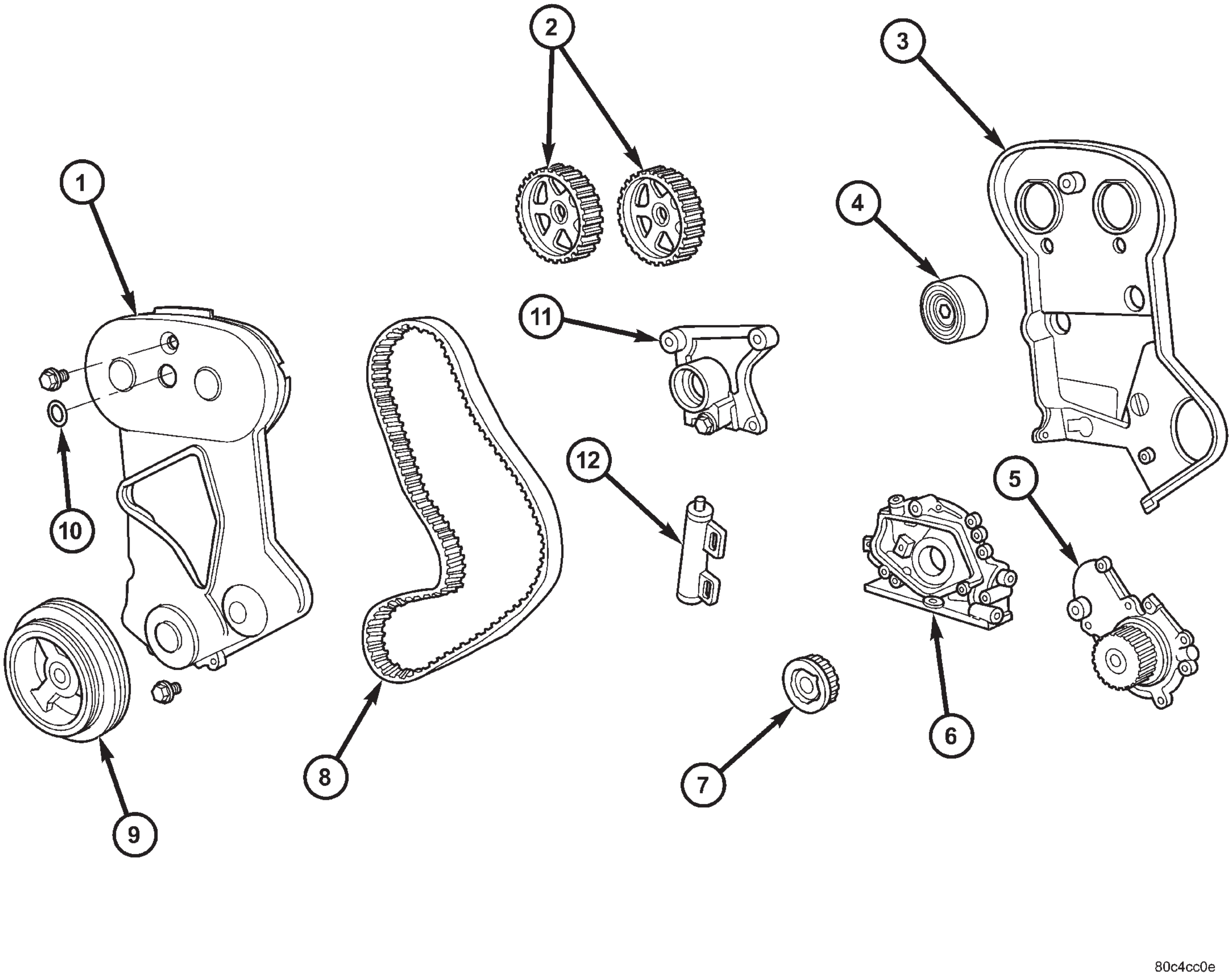


Fig. 110 Timing Belt System - 2.0L DOHC

1 - FRONT TIMING BELT COVER
2 - CAMSHAFT SPROCKETS
3 - REAR TIMING BELT COVER
4 - IDLER PULLEY
5 - WATER PUMP
6 - OIL PUMP
7 - CRANKSHAFT SPROCKET
8 - TIMING BELT
9 - CRANKSHAFT DAMPER
10 - ACCESS PLUG
11 - TENSIONER PULLEY BRACKET
12 - TIMING BELT TENSIONER

TIMING BELT AND SPROCKETS (Continued)

CAUTION: DO NOT loosen, tighten, or remove the tensioner pivot bolt (Fig. 111).

(5) Remove the timing belt from sprockets.

CAUTION: Do not rotate the camshaft once the timing belt has been removed or damage to valve components may occur.

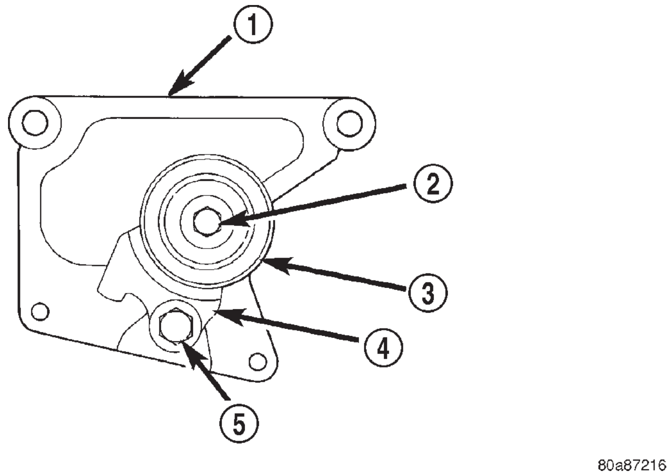


Fig. 111 Tensioner Pulley Bracket Assembly

1 - BRACKET
2 - PULLEY FASTENER
3 - PULLEY
4 - TENSIONER PULLEY PIVOT BRACKET
5 - PIVOT BOLT (DO NOT TIGHTEN, LOOSEN OR REMOVE)

REMOVAL - CAMSHAFT SPROCKET(S)

(1) Disconnect negative battery cable.

(2) Remove timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - REMOVAL).

(3) Hold camshaft sprockets with Special Tools C-4687 and Adaptor C-4687-1 (Fig. 112), while removing attaching bolts. Remove camshaft sprockets.

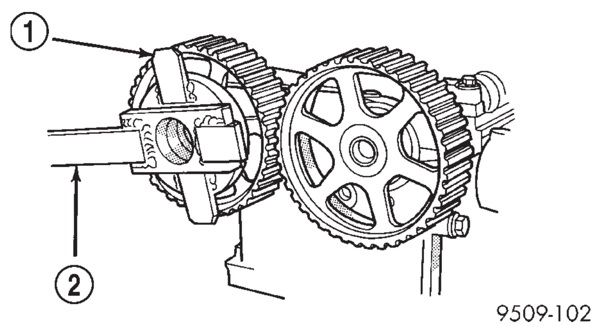


Fig. 112 Camshaft Sprocket - Removal/Installation

1 - ADAPTER C-4687–1
2 - SPECIAL TOOL C-4687

REMOVAL - CRANKSHAFT SPROCKET

(1) Disconnect negative battery cable.

(2) Remove timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - REMOVAL).

(3) Remove crankshaft sprocket using Special Tools 6793 and insert C-4685-C2 (Fig. 113).

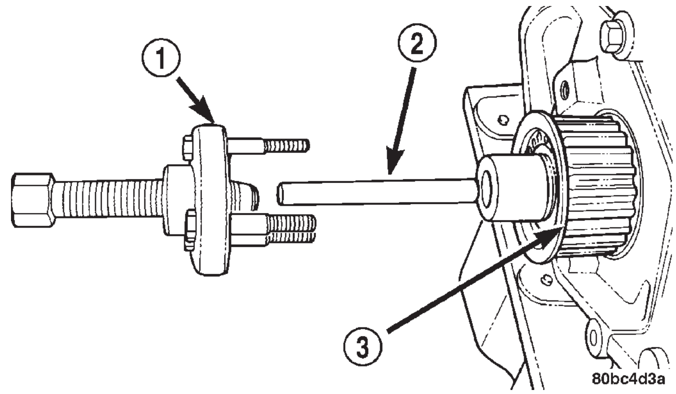


Fig. 113 Crankshaft Sprocket - Removal

1 - SPECIAL TOOL 6793
2 - SPECIAL TOOL C-4685–C2
3 - CRANKSHAFT SPROCKET

CLEANING

Do Not attempt to clean a timing belt. If contamination from oil, grease, or coolants have occurred, the timing belt should be replaced.

Clean all sprockets using a suitable solvent. Clean all sprocket grooves of any debris.

TIMING BELT AND SPROCKETS (Continued)

INSTALLATION

INSTALLATION - CRANKSHAFT SPROCKET

CAUTION: The crankshaft sprocket is set to a predetermined depth from the factory for correct timing belt tracking. If removed, use of Special Tool 6792 is required to set the sprocket to original installation depth. An incorrectly installed sprocket will result in timing belt and engine damage.

(1) Install crankshaft sprocket using Special Tool 6792 (Fig. 114).

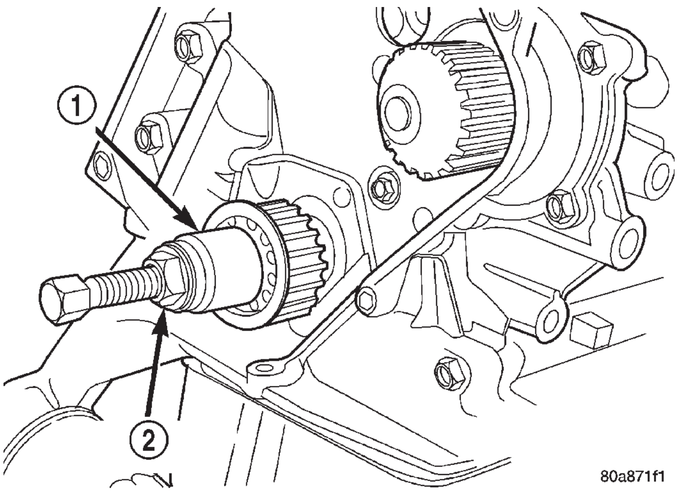


Fig. 114 Crankshaft Sprocket—Installation

1 - SPECIAL TOOL 6792
2 - TIGHTEN NUT TO INSTALL

(2) Install timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - INSTALLATION).
(3) Connect negative battery cable.

INSTALLATION - CAMSHAFT SPROCKETS

(1) Install camshaft sprockets. Hold camshaft sprockets with Special Tools C-4687 and Adaptor C-4687-1 while tightening center bolts to 115 N·m (85 ft. lbs.) (Fig. 112).
(2) Install timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - INSTALLATION).
(3) Connect negative battery cable.

INSTALLATION - TIMING BELT

(1) When the timing belt tensioner is removed from the engine it is necessary to compress the plunger into the tensioner body.
(2) Place the timing belt tensioner into a vise equipped with soft jaws and slowly compress the plunger (Fig. 115).

CAUTION: Index the tensioner in the vise the same way it is installed on the engine. This is to ensure proper pin orientation when tensioner is installed on the engine.

(3) Compress the plunger until a 1.9 mm (5/64) Allen wrench or pin can be inserted through the body and the plunger (Fig. 115).

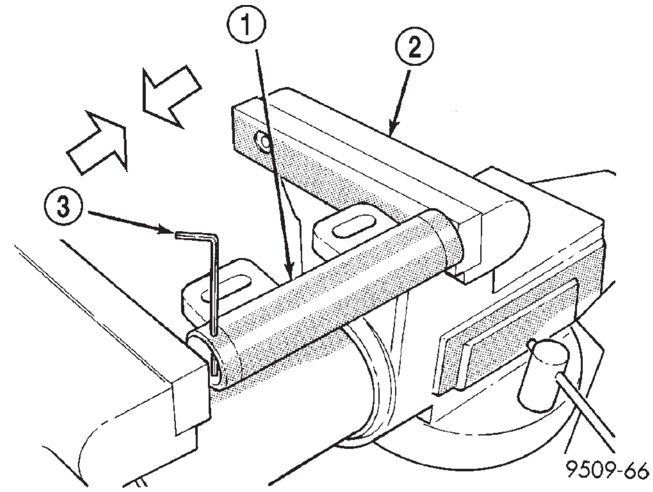


Fig. 115 Compressing Timing Belt Tensioner

1 - HYDRAULIC TENSIONER
2 - BENCH VISE (WITH SOFT JAWS)
3 - PIN

(4) Set crankshaft sprocket to TDC by aligning the sprocket with the arrow on the oil pump housing, then back off to 3 notches before TDC (Fig. 116).

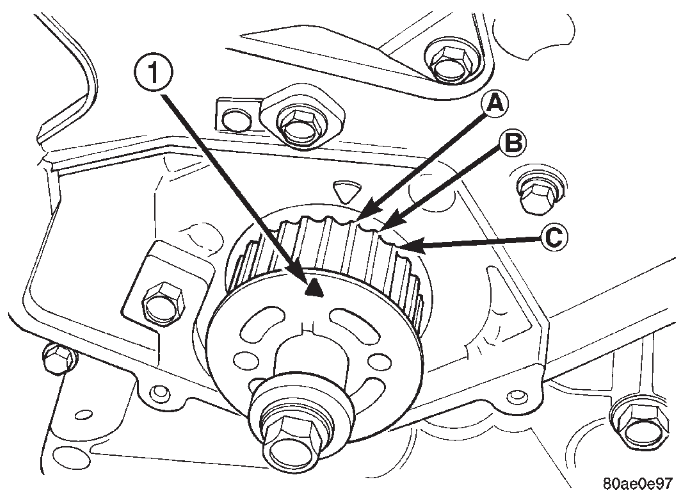


Fig. 116 Crankshaft Sprocket Timing

1 - TDC MARK

(5) Set camshafts timing marks together by aligning notches on sprockets (Fig. 117).
(6) Rotate crankshaft 1/2 tooth counterclockwise from TDC (Fig. 118).

TIMING BELT AND SPROCKETS (Continued)

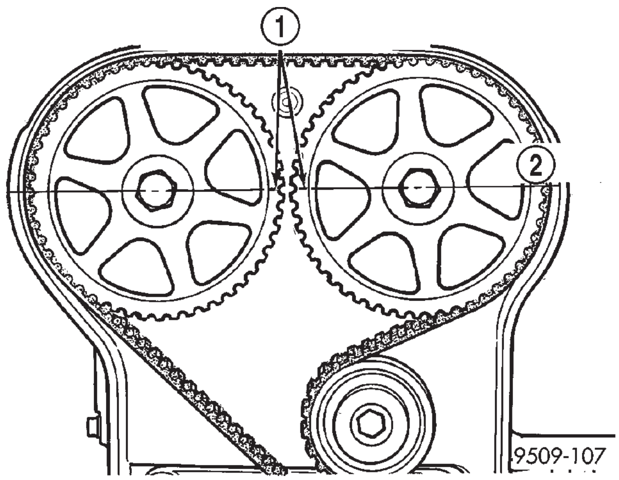


Fig. 117 Camshaft Timing Marks

1 - ALIGN CAMSHAFT SPROCKET TIMING MARKS TOGETHER
2 - CENTERLINE

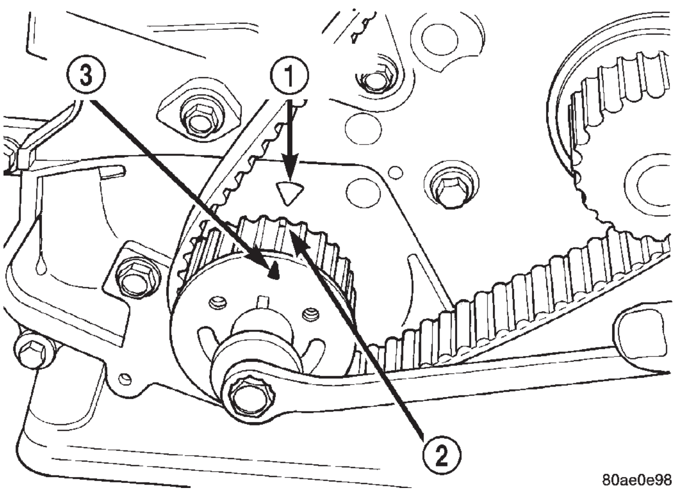


Fig. 118 Adjusting Crankshaft Sprocket for Timing Belt

1 - TDC REFERENCE MARK
2 - 1/2 NOTCH LOCATION
3 - TDC MARK

(7) Install the timing belt in this direction: Starting at the crankshaft, go around the water pump sprocket, idler pulley, camshaft sprockets and then around the tensioner pulley (Fig. 119).

(8) Move crankshaft sprocket to TDC to take up belt slack. Install tensioner to block, but do not tighten fasteners.

(9) Using a torque wrench on the tensioner pulley bolt, apply 28 N·m (250 in. lbs.) of torque against the timing belt.

(10) With torque applied to the tensioner pulley/timing belt, move the tensioner up against the pulley pivot bracket and tighten tensioner bolts to 31 N·m (23 ft. lbs.). (Fig. 119).

(11) Pull the tensioner plunger retaining pin. Pretension is correct when the pin can be removed and installed into tensioner housing and plunger.

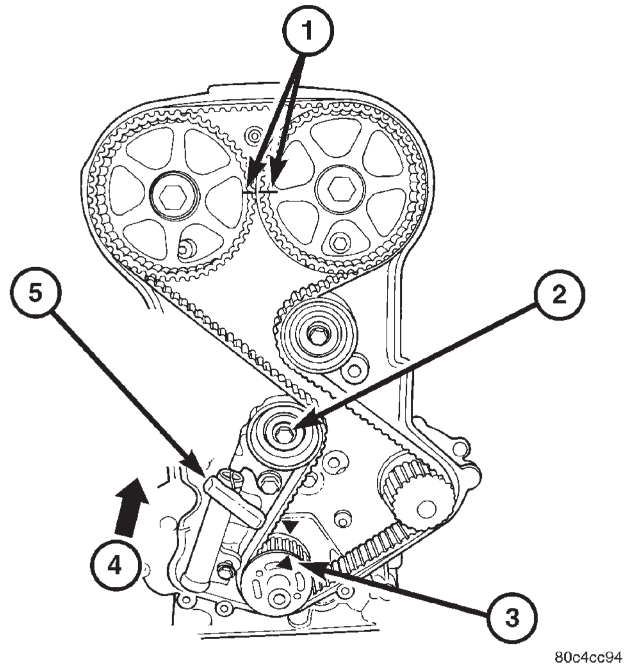


Fig. 119 Adjusting Timing Belt Tension

1 - CAMSHAFTS TDC
2 - INSTALL TORQUE WRENCH HERE
3 - CRANKSHAFT TDC
4 - MOVE TENSIONER UP
5 - LOCKING PIN INSTALLED INTO TENSIONER

(12) Rotate crankshaft 2 revolutions and check the alignment of the timing marks (Fig. 117) and (Fig. 118).

(13) Check belt tension by installing pin into tensioner housing. If pin cannot be re-installed, repeat belt tension procedure.

(14) Install the front timing belt cover (Fig. 110) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT COVER(S) - INSTALLATION).

(15) Connect negative battery cable.

(16) Perform camshaft and crankshaft timing relearn procedure as follows:

- Connect the DRB III® scan tool to the data link (diagnostic) connector. This connector is located in the passenger compartment; at the lower edge of instrument panel; near the steering column.
- Turn the ignition switch on and access the "miscellaneous" screen.
- Select "re-learn cam/crank" option and follow directions on DRB III® screen.

TIMING BELT TENSIONER & PULLEY

REMOVAL

(1) Remove the timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(2) Remove the bolts attaching the tensioner pulley bracket assembly to engine.

(3) Remove the tensioner pulley bracket assembly (Fig. 120).

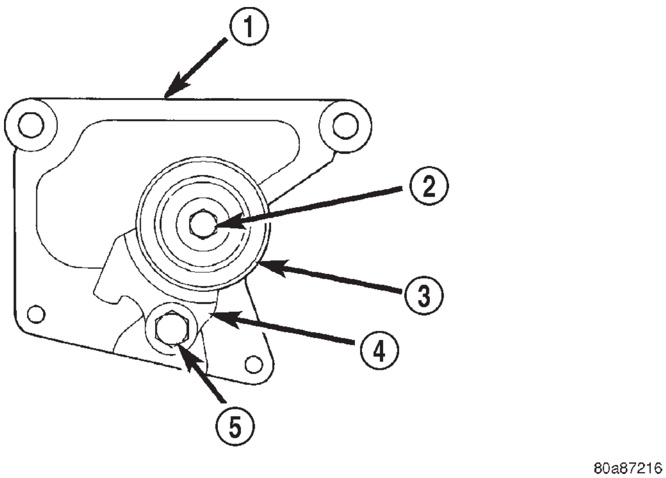


Fig. 120 Tensioner Pulley Bracket Assembly

1 - BRACKET
2 - PULLEY FASTENER
3 - PULLEY
4 - TENSIONER PULLEY PIVOT BRACKET
5 - PIVOT BOLT (DO NOT TIGHTEN, LOOSEN OR REMOVE)

INSTALLATION

(1) Position tensioner pulley bracket assembly to the engine and install attaching bolts. Tighten bolts to 31 N·m (23 ft. lbs.).

(2) Install the timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

ENGINE 2.4L DOHC

TABLE OF CONTENTS

ENGINE 2.4L DOHC

DESCRIPTION

The 2.4 Liter (148 cu. in.) in-line four cylinder engine is a double over head camshaft with hydraulic lifters and four valve per cylinder design (Fig. 1). The engine is free-wheeling; meaning it has provisions for piston-to-valve clearance. However valve-to-valve interference can occur, if camshafts are rotated independently.

The cylinders are numbered from front of the engine to the rear. The firing order is 1–3–4–2.

The engine identification number is located on the rear of the cylinder block (Fig. 2).

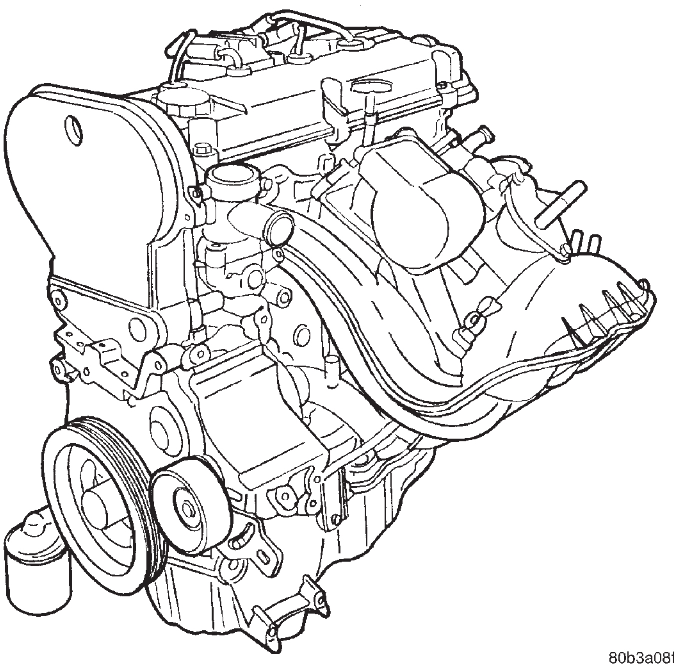


Fig. 1 2.4 Liter Engine

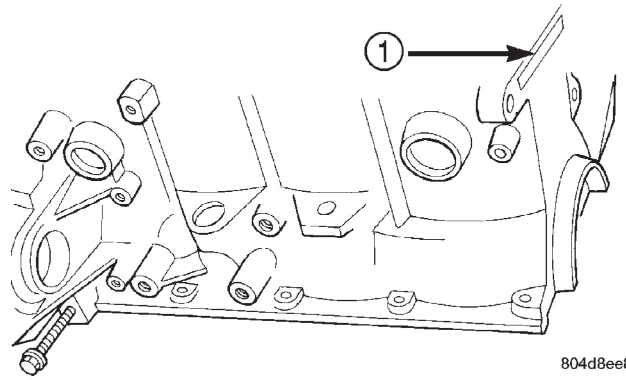


Fig. 2 Engine Identification

1 - ENGINE IDENTIFICATION LOCATION

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - INTRODUCTION

Engine diagnosis is helpful in determining the causes of malfunctions not detected and remedied by routine maintenance.

These malfunctions may be classified as either mechanical (e.g., a strange noise), or performance (e.g., engine idles rough and stalls).

Refer to the Engine Mechanical and the Engine Performance diagnostic charts, for possible causes and corrections of malfunctions (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING - MECHANICAL) (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING - PERFORMANCE).

For fuel system diagnosis, (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - DIAGNOSIS AND TESTING).

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that cannot be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following:

- Cylinder Compression Pressure Test
- Cylinder Combustion Pressure Leakage Test
- Engine Cylinder Head Gasket Failure Diagnosis
- Intake Manifold Leakage Diagnosis
- Hydraulic Lash Adjuster Noise Diagnosis
- Engine Oil Leak Inspection

ENGINE 2.4L DOHC (Continued)

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	1. Weak battery.	1. Test battery. Charge or replace as necessary. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - DIAGNOSIS AND TESTING)
	2. Corroded or loose battery connections.	2. Clean and tighten battery connections. Apply a coat of light mineral grease to terminals.
	3. Faulty starter.	3. Test starting system. (Refer to 8 - ELECTRICAL/STARTING - DIAGNOSIS AND TESTING)
	4. Faulty coil(s) or control unit.	4. Test and replace as needed. (Refer to Appropriate Diagnostic Information)
	5. Incorrect spark plug gap.	5. Set gap. (Refer to 8 - ELECTRICAL/IGNITION CONTROL - SPECIFICATIONS)
	6. Contamination in fuel system.	6. Clean system and replace fuel filter.
	7. Faulty fuel pump.	7. Test fuel pump and replace as needed. (Refer to Appropriate Diagnostic Information)
	8. Incorrect engine timing.	8. Check for a skipped timing belt/chain.
ENGINE STALLS OR IDLES ROUGH	1. Idle speed too low.	1. Test minimum air flow. (Refer to Appropriate Diagnostic Information)
	2. Incorrect fuel mixture.	2. (Refer to Appropriate Diagnostic Information)
	3. Intake manifold leakage.	3. Inspect intake manifold, manifold gasket, and vacuum hoses.
	4. Faulty ignition coil(s).	4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)

ENGINE 2.4L DOHC (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE LOSS OF POWER	1. Dirty or incorrectly gapped plugs.	1. Clean plugs and set gap.
	2. Contamination in fuel system.	2. Clean system and replace fuel filter.
	3. Faulty fuel pump.	3. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	4. Incorrect valve timing.	4. Correct valve timing.
	5. Leaking cylinder head gasket.	5. Replace cylinder head gasket.
	6. Low compression.	6. Test compression of each cylinder.
	7. Burned, warped, or pitted valves.	7. Replace valves.
	8. Plugged or restricted exhaust system.	8. Perform exhaust restriction test. (Refer to 11 - EXHAUST SYSTEM - DIAGNOSIS AND TESTING) Install new parts, as necessary.
	9. Faulty ignition coil(s).	9. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES ON ACCELERATION	1. Dirty or incorrectly gapped spark plugs.	1. Clean spark plugs and set gap.
	2. Contamination in Fuel System.	2. Clean fuel system and replace fuel filter.
	3. Burned, warped, or pitted valves.	3. Replace valves.
	4. Faulty ignition coil(s).	4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES AT HIGH SPEED	1. Dirty or incorrect spark plug gap.	1. Clean spark plugs and set gap.
	2. Faulty ignition coil(s).	2. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	3. Dirty fuel injector(s).	3. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	4. Contamination in fuel system.	4. Clean system and replace fuel filter.

ENGINE 2.4L DOHC (Continued)

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - MECHANICAL

CONDITION	POSSIBLE CAUSES	CORRECTION
NOISY VALVES	1. High or low oil level in crankcase.	1. Check and correct engine oil level.
	2. Thin or diluted oil.	2. Change oil to correct viscosity.
	3. Thick oil	3. (a) Change engine oil and filter.
		(b) Run engine to operating temperature.
		(c) Change engine oil and filter again.
	4. Low oil pressure.	4. Check and correct engine oil level.
	5. Dirt in tappets/lash adjusters.	5. Replace rocker arm/hydraulic lash adjuster assembly.
	6. Worn rocker arms.	6. Inspect oil supply to rocker arms.
	7. Worn tappets/lash adjusters.	7. Install new rocker arm/hydraulic lash adjuster assembly.
	8. Worn valve guides.	8. Ream guides and install new valves with oversize stems.
	9. Excessive runout of valve seats on valve faces.	9. Grind valve seats and valves.
	10. Missing adjuster pivot.	10. Replace rocker arm/hydraulic lash adjuster assembly.
CONNECTING ROD NOISE	1. Insufficient oil supply.	1. Check engine oil level.
	2. Low oil pressure.	2. Check engine oil level. Inspect oil pump relief valve and spring.
	3. Thin or diluted oil.	3. Change oil to correct viscosity.
	4. Thick oil	4. (a) Change engine oil and filter.
		(b) Run engine to operating temperature.
		(c) Change engine oil and filter again.
	5. Excessive bearing clearance.	5. Measure bearings for correct clearance. Repair as necessary.
	6. Connecting rod journal out-of-round.	6. Replace crankshaft or grind surface.
	7. Misaligned connecting rods.	7. Replace bent connecting rods.

ENGINE 2.4L DOHC (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
MAIN BEARING NOISE	1. Insufficient oil supply.	1. Check engine oil level.
	2. Low oil pressure.	2. Check engine oil level. Inspect oil pump relief valve and spring.
	3. Thin or diluted oil.	3. Change oil to correct viscosity.
	4. Thick oil	4. (a) Change engine oil and filter.
		(b) Run engine to operating temperature.
		(c) Change engine oil and filter again.
	5. Excessive bearing clearance.	5. Measure bearings for correct clearance. Repair as necessary.
	6. Excessive end play.	6. Check thrust bearing for wear on flanges.
	7. Crankshaft journal out-of-round or worn.	7. Replace crankshaft or grind journals.
	8. Loose flywheel or torque converter.	8. Tighten to correct torque.
OIL PRESSURE DROP	1. Low oil level.	1. Check engine oil level.
	2. Faulty oil pressure sending unit.	2. Install new sending unit.
	3. Low oil pressure.	3. Check sending unit and main bearing oil clearance.
	4. Clogged oil filter.	4. Install new oil filter.
	5. Worn parts in oil pump.	5. Replace worn parts or pump.
	6. Thin or diluted oil.	6. Change oil to correct viscosity.
	7. Oil pump relief valve stuck.	7. Remove valve and inspect, clean, or replace.
	8. Oil pump suction tube loose.	8. Remove oil pan and install new tube or clean, if necessary.
	9. Oil pump cover warped or cracked.	9. Install new oil pump.
	10. Excessive bearing clearance.	10. Measure bearings for correct clearance.
OIL LEAKS	1. Misaligned or deteriorated gaskets.	1. Replace gasket(s).
	2. Loose fastener, broken or porous metal part.	2. Tighten, repair or replace the part.
	3. Misaligned or deteriorated cup or threaded plug.	3. Replace as necessary.

ENGINE 2.4L DOHC (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL CONSUMPTION OR SPARK PLUGS FOULED	1. PCV system malfunction.	1. Check system and repair as necessary. (Refer to 25 - EMISSIONS CONTROL/ EVAPORATIVE EMISSIONS/PCV VALVE - DIAGNOSIS AND TESTING)
	2. Worn, scuffed or broken rings.	2. Hone cylinder bores. Install new rings.
	3. Carbon in oil ring slots.	3. Install new rings.
	4. Rings fitted too tightly in grooves.	4. Remove rings and check grooves. If groove is not proper width, replace piston.
	5. Worn valve guide(s).	5. Ream guide(s) and replace valve(s) with oversize valve(s) and seal(s).
	6. Valve stem seal(s) worn or damaged.	6. Replace seal(s).

DIAGNOSIS AND TESTING - CYLINDER COMPRESSION PRESSURE TEST

The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

Ensure the battery is completely charged and the engine starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

(1) Check engine oil level and add oil if necessary.

(2) Drive the vehicle until engine reaches normal operating temperature. Select a route free from traffic and other forms of congestion, observe all traffic laws, and accelerate through the gears several times briskly.

(3) Remove all spark plugs from engine. As spark plugs are being removed, check electrodes for abnormal firing indicators fouled, hot, oily, etc. Record cylinder number of spark plug for future reference.

(4) Remove the Auto Shutdown (ASD) relay from the PDC.

(5) Be sure throttle blade is fully open during the compression check.

(6) Insert compression gauge adaptor Special Tool 8116 or the equivalent, into the #1 spark plug hole in cylinder head. Connect the 0–500 psi (Blue) pressure transducer (Special Tool CH7059) with cable adaptors to the DRBIII®. For Special Tool identification, (Refer to 9 - ENGINE - SPECIAL TOOLS).

(7) Crank engine until maximum pressure is reached on gauge. Record this pressure as #1 cylinder pressure.

(8) Repeat the previous step for all remaining cylinders.

(9) Compression should not be less than 689 kPa (100 psi) and not vary more than 25 percent from cylinder to cylinder.

(10) If one or more cylinders have abnormally low compression pressures, repeat the compression test.

(11) If the same cylinder or cylinders repeat an abnormally low reading on the second compression test, it could indicate the existence of a problem in the cylinder in question. **The recommended compression pressures are to be used only as a guide to diagnosing engine problems. An engine should not be disassembled to determine the cause of low compression unless some malfunction is present.**

DIAGNOSIS AND TESTING - CYLINDER COMBUSTION PRESSURE LEAKAGE TEST

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will detect:

• Exhaust and intake valve leaks (improper seating).

• Leaks between adjacent cylinders or into water jacket.

• Any causes for combustion/compression pressure loss.

WARNING: DO NOT REMOVE THE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

Check the coolant level and fill as required. DO NOT install the pressure cap.

ENGINE 2.4L DOHC (Continued)

Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.

Clean spark plug recesses with compressed air.

Remove the spark plugs.

Remove the oil filler cap.

Remove the air cleaner.

Calibrate the tester according to the manufacturer's instructions. The shop air source for testing should maintain 483 kPa (70 psi) minimum, 1,379 kPa (200 psi) maximum, with 552 kPa (80 psi) recommended.

Perform the test procedures on each cylinder according to the tester manufacturer's instructions. While testing, listen for pressurized air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the coolant.

All gauge pressure indications should be equal, with no more than 25% leakage per cylinder.

FOR EXAMPLE: At 552 kPa (80 psi) input pressure, a minimum of 414 kPa (60 psi) should be maintained in the cylinder.

DIAGNOSIS AND TESTING - ENGINE OIL LEAK INSPECTION

Begin with a thorough visual inspection of the engine, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

(1) Do not clean or degrease the engine at this time because some solvents may cause rubber to swell, temporarily stopping the leak.

(2) Add an oil soluble dye (use as recommended by manufacturer). Start the engine and let idle for approximately 15 minutes. Check the oil dipstick to make sure the dye is thoroughly mixed as indicated with a bright yellow color under a black light.

(3) Using a black light, inspect the entire engine for fluorescent dye, particularly at the suspected area of oil leak. If the oil leak is found and identified, repair as necessary.

(4) If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat inspection.

(5) **If the oil leak source is not positively identified at this time**, proceed with the air leak detection test method as follows:

- Disconnect the fresh air hose (make-up air) at the cylinder head cover and plug or cap the nipple on the cover.
- Remove the PCV valve hose from the cylinder head cover. Cap or plug the PCV valve nipple on the cover.
- Attach an air hose with pressure gauge and regulator to the dipstick tube.

CAUTION: Do not subject the engine assembly to more than 20.6 kpa (3 PSI) of test pressure.

- Gradually apply air pressure from 1 psi to 2.5 psi maximum while applying soapy water at the suspected source. Adjust the regulator to the suitable test pressure that provides the best bubbles which will pinpoint the leak source. If the oil leak is detected and identified, repair per service manual procedures.
- If the leakage occurs at the crankshaft rear oil seal area, refer to the section, Inspection for Rear Seal Area Leak.

(6) If no leaks are detected, turn off the air supply. Remove the air hose, all plugs, and caps. Install the PCV valve and fresh air hose (make-up air). Proceed to next step.

(7) Clean the oil off the suspect oil leak area using a suitable solvent. Drive the vehicle at various speeds approximately 24 km (15 miles). Inspect the engine for signs of an oil leak by using a black light.

NOTE: If oil leakage is observed at the dipstick tube to block location; remove the tube, clean and reseal using Mopar® Stud & Bearing Mount (press fit tube applications only), and for O-ring style tubes, remove tube and replace the O-ring seal.

INSPECTION FOR REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

(1) Disconnect the battery.

(2) Raise the vehicle.

(3) Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak. If a leak is present in this area, remove transmission for further inspection.

(a) Circular spray pattern generally indicates seal leakage or crankshaft damage.

(b) Where leakage tends to run straight down, possible causes are a porous block, oil gallery cup plug, bedplate to cylinder block mating surfaces and seal bore. See proper repair procedures for these items.

(4) If no leaks are detected, pressurize the crankcase as previously described.

CAUTION: Do not exceed 20.6 kPa (3 psi).

ENGINE 2.4L DOHC (Continued)

(5) If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks and scratches. The crankshaft seal flange is especially machined to complement the function of the rear oil seal.

(6) For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled.

(7) After the oil leak root cause and appropriate corrective action have been identified, replace component(s) as necessary.

STANDARD PROCEDURE

STANDARD PROCEDURE - REPAIR OF DAMAGED OR WORN THREADS

Damaged or worn threads (excluding spark plug and camshaft bearing cap attaching threads) can be repaired. Essentially, this repair consists of drilling out worn or damaged threads, tapping the hole with a special Heli-Coil Tap, (or equivalent) and installing an insert into the tapped hole. This brings the hole back to its original thread size.

CAUTION: Be sure that the tapped holes maintain the original center line.

Heli-Coil tools and inserts are readily available from automotive parts jobbers.

STANDARD PROCEDURE - HYDROSTATIC LOCKED ENGINE

When an engine is suspected to be hydrostatically locked, regardless of what caused the problem, the following steps should be used.

CAUTION: DO NOT use starter motor to rotate the engine, severe damage may occur.

(1) Inspect air cleaner, induction system and intake manifold to insure system is dry and clear of foreign material.

(2) Remove negative battery cable.

(3) Place a shop towel around the spark plugs when removing them from the engine. This will catch any fluid that may possibly be in the cylinder under pressure.

(4) With all spark plugs removed, rotate engine crankshaft using a breaker bar and socket.

(5) Identify the fluid in the cylinder(s) (i.e., coolant, fuel, oil or other).

(6) Make sure all fluid has been removed from the cylinders. Inspect engine for damage (i.e., connecting rods, pistons, valves, etc.)

(7) Repair engine or components as necessary to prevent this problem from re-occurring.

CAUTION: Squirt approximately one teaspoon of oil into the cylinders, rotate engine to lubricate the cylinder walls to prevent damage on restart.

(8) Install new spark plugs.

(9) Drain engine oil and remove oil filter.

(10) Install a new oil filter.

(11) Fill engine with specified amount of approved oil.

(12) Connect negative battery cable.

(13) Start engine and check for any leaks.

STANDARD PROCEDURE - FORM-IN-PLACE GASKETS AND SEALERS

There are numerous places where form-in-place gaskets are used on the engine. Care must be taken when applying form-in-place gaskets to assure obtaining the desired results. **Do not use form-in-place gasket material unless specified.** Bead size, continuity, and location are of great importance. Too thin a bead can result in leakage while too much can result in spill-over which can break off and obstruct fluid feed lines. A continuous bead of the proper width is essential to obtain a leak-free gasket.

There are numerous types of form-in-place gasket materials that are used in the engine area. Mopar® Engine RTV GEN II, Mopar® ATF-RTV, and Mopar® Gasket Maker gasket materials, each have different properties and can not be used in place of the other.

MOPAR® ENGINE RTV GEN II is used to seal components exposed to engine oil. This material is a specially designed black silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil. Moisture in the air causes the material to cure. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® ATF RTV is a specifically designed black silicone rubber RTV that retains adhesion and sealing properties to seal components exposed to automatic transmission fluid, engine coolants, and moisture. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

ENGINE 2.4L DOHC (Continued)

MOPAR® GASKET MAKER is an anaerobic type gasket material. The material cures in the absence of air when squeezed between two metallic surfaces. It will not cure if left in the uncovered tube. The anaerobic material is for use between two machined surfaces. Do not use on flexible metal flanges.

MOPAR® BED PLATE SEALANT is a unique (green-in-color) anaerobic type gasket material that is specially made to seal the area between the bed-plate and cylinder block without disturbing the bearing clearance or alignment of these components. The material cures slowly in the absence of air when torqued between two metallic surfaces, and will rapidly cure when heat is applied.

MOPAR® GASKET SEALANT is a slow drying, permanently soft sealer. This material is recommended for sealing threaded fittings and gaskets against leakage of oil and coolant. Can be used on threaded and machined parts under all temperatures. This material is used on engines with multi-layer steel (MLS) cylinder head gaskets. This material also will prevent corrosion. Mopar® Gasket Sealant is available in a 13 oz. aerosol can or 4oz./16 oz. can w/applicator.

SEALER APPLICATION

Mopar® Gasket Maker material should be applied sparingly 1 mm (0.040 in.) diameter or less of sealant to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Components should be torqued in place within 15 minutes. The use of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Engine RTV GEN II or ATF RTV gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. All mounting holes must be circled. For corner sealing, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant may be removed with a shop towel. Components should be torqued in place while the sealant is still wet to the touch (within 10 minutes). The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Gasket Sealant in an aerosol can should be applied using a thin, even coat sprayed completely over both surfaces to be joined, and both sides of a gasket. Then proceed with assembly. Material in a can w/applicator can be brushed on evenly over the sealing surfaces. Material in an aerosol can should be used on engines with multi-layer steel gaskets.

STANDARD PROCEDURE - ENGINE GASKET SURFACE PREPARATION

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

Never use the following to clean gasket surfaces:

- Metal scraper
- Abrasive pad or paper to clean cylinder block and head
- High speed power tool with an abrasive pad or a wire brush (Fig. 3)

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover
- Plastic or wood scraper (Fig. 3)
- Drill motor with 3M Roloc™ Bristle Disc (white or yellow) (Fig. 3)

CAUTION: Excessive pressure or high RPM (beyond the recommended speed), can damage the sealing surfaces. The mild (white, 120 grit) bristle disc is recommended. If necessary, the medium (yellow, 80 grit) bristle disc may be used on cast iron surfaces with care.

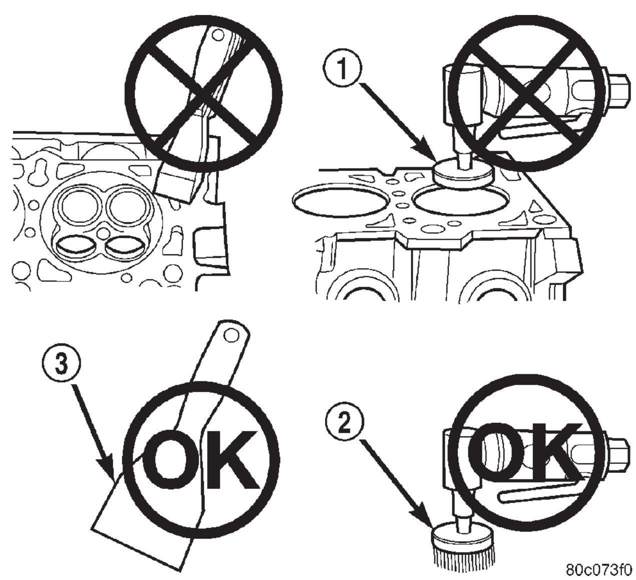


Fig. 3 Proper Tool Usage For Surface Preparation

1 - ABRASIVE PAD
2 - 3M ROLOC™ BRISTLE DISC
3 - PLASTIC/WOOD SCRAPER

ENGINE 2.4L DOHC (Continued)

STANDARD PROCEDURE - MEASURING BEARING CLEARANCE USING PLASTIGAGE

Engine crankshaft bearing clearances can be determined by use of Plastigage or equivalent. The following is the recommended procedure for the use of Plastigage:

(1) Remove oil film from surface to be checked. Plastigage is soluble in oil.

(2) Place a piece of Plastigage across the entire width of the bearing shell in the cap approximately 6.35 mm (1/4 in.) off center and away from the oil holes (Fig. 4). (In addition, suspected areas can be checked by placing the Plastigage in the suspected area). Torque the bearing cap bolts of the bearing being checked to the proper specifications.

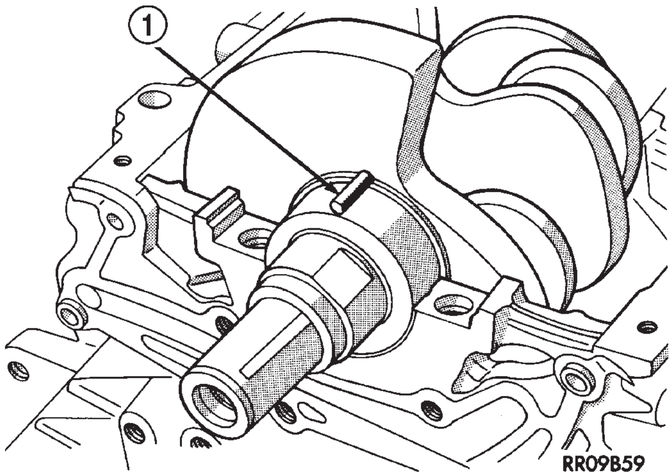


Fig. 4 Plastigage Placed in Lower Shell—Typical

1 - PLASTIGAGE

(3) Remove the bearing cap and compare the width of the flattened Plastigage with the metric scale provided on the package. Locate the band closest to the same width. This band shows the amount of clearance in thousandths of a millimeter. Differences in readings between the ends indicate the amount of taper present. Record all readings taken. Compare clearance measurements to specs found in engine specifications (Refer to 9 - ENGINE - SPECIFICATIONS). **Plastigage generally is accompanied by two scales. One scale is in inches, the other is a metric scale.**

NOTE: Plastigage is available in a variety of clearance ranges. Use the most appropriate range for the specifications you are checking.

(4) Install the proper crankshaft bearings to achieve the specified bearing clearances.

STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS

Using a blunt tool such as a drift and a hammer, strike the bottom edge of the cup plug. With the cup plug rotated, grasp firmly with pliers or other suitable tool and remove plug (Fig. 5).

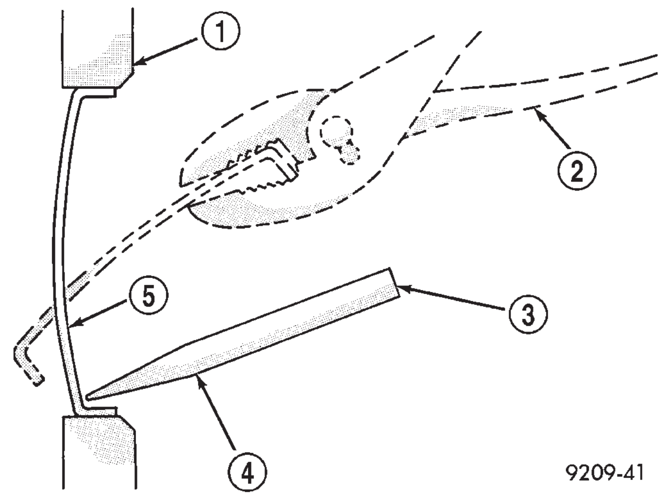


Fig. 5 Core Hole Plug Removal

1 - CYLINDER BLOCK
2 - REMOVE PLUG WITH PLIERS
3 - STRIKE HERE WITH HAMMER
4 - DRIFT PUNCH
5 - CUP PLUG

CAUTION: Do not drive cup plug into the casting as restricted cooling can result and cause serious engine problems.

Thoroughly clean inside of cup plug hole in cylinder block or head. Be sure to remove old sealer. Lightly coat inside of cup plug hole with Mopar® Stud and Bearing Mount. Make certain the new plug is cleaned of all oil or grease. Using proper drive plug, drive plug into hole so that the sharp edge of the plug is at least 0.5 mm (0.020 in.) inside the lead-in chamfer.

It is not necessary to wait for curing of the sealant. The cooling system can be refilled and the vehicle placed in service immediately.

REMOVAL - ENGINE ASSEMBLY

(1) Perform fuel pressure release procedure (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).

(2) Disconnect negative battery cable.

(3) Drain cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(4) Discharge A/C system using a suitable refrigerant recovery machine.

ENGINE 2.4L DOHC (Continued)

(5) Remove throttle body air inlet hose and air cleaner housing assembly.

(6) Remove upper radiator crossmember.

(7) Disconnect upper and lower radiator hoses at radiator.

(8) Using a blade or suitable hose cutter, cut transaxle oil cooler lines off flush with fittings. Plug lines and fittings to prevent debris from entering transaxle or cooler circuit. A service splice kit will be installed upon reassembly.

(9) Disconnect A/C lines at condenser. Remove cooling module assembly (radiator, fan module, and condenser).

(10) Disconnect transmission electrical harness connectors (C104 & C105) (Refer to 8 - ELECTRICAL/CONNECTOR/GROUND LOCATIONS - DESCRIPTION).

(11) Disconnect transmission shift cable.

(12) Disconnect engine electrical harness from PCM and bulkhead connectors.

(13) Raise vehicle on hoist.

(14) Remove both front wheels.

(15) Remove left and right splash shields.

(16) Remove both axle shafts (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL).

(17) Drain engine oil.

(18) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(19) Remove power steering pump from bracket. **Do not** disconnect power steering lines from pump. Reposition pump and support with suitable retaining strap.

(20) Disconnect heater return hose from pipe connection at right front frame rail area.

(21) Disconnect A/C compressor electrical connectors.

(22) Disconnect exhaust pipe from manifold.

(23) Remove through bolts from front and rear engine mounts.

(24) Remove rear mount bracket from transmission.

(25) Remove structural collar and torque reaction bracket (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - REMOVAL).

(26) Mark flex plate to torque converter position. Remove torque converter bolts.

(27) Lower vehicle.

(28) Disconnect positive cable from battery and PDC.

(29) Disconnect ground cable from left side transaxle mount bracket.

(30) Disconnect throttle and speed control cables.

(31) Disconnect coolant recovery container overflow hose.

(32) Disconnect heater hose at thermostat housing.

(33) Disconnect all ground straps attaching to engine.

(34) Disconnect brake booster and vapor purge vacuum hoses.

(35) Disconnect fuel line from fuel rail.

(36) Disconnect generator connectors.

(37) Remove intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(38) Remove generator.

(39) Remove A/C suction line at compressor. Cap suction port and line.

(40) Remove A/C compressor.

(41) Raise vehicle enough to allow engine dolly 6135 and cradle 6710 with posts 6848 to be installed under vehicle (Fig. 6).

(42) Loosen cradle engine mounts to allow movement for positioning onto engine locating holes on the engine bedplate, compressor and support bracket. Install adapters 6909 to the two post at rear of engine. Lower vehicle and position cradle mounts until the engine is resting on posts. Tighten post mounts to cradle frame. This will keep mounts from moving when removing or installing engine/transmission assembly. Secure engine/transmission to dolly/cradle with safety straps.

(43) Lower vehicle so weight of the engine and transmission ONLY is on the cradle.

(44) Remove right and left side vertical engine mount bolts.

(45) Slowly raise vehicle in short length spans. Inspect at each interval for potential engine or transaxle contact to vehicle components. Move the cradle/dolly fixture as necessary to allow for removal clearance.

INSTALLATION - ENGINE ASSEMBLY

(1) Position engine/transaxle assembly under vehicle and slowly lower vehicle in short length spans. Inspect at each interval for potential engine or transaxle contact to vehicle components. Move the cradle/dolly fixture as necessary to allow for installation clearance.

(2) Continue lowering vehicle until right side engine mount and left side transaxle mount align to their mounting locations. Install mounting bolts and torque to 61 N·m (45 ft. lbs.).

(3) Remove safety straps from engine/transaxle assembly. Slowly raise vehicle enough to remove the engine dolly and cradle.

(4) Install A/C compressor.

(5) Connect A/C suction line to compressor.

(6) Install generator.

ENGINE 2.4L DOHC (Continued)

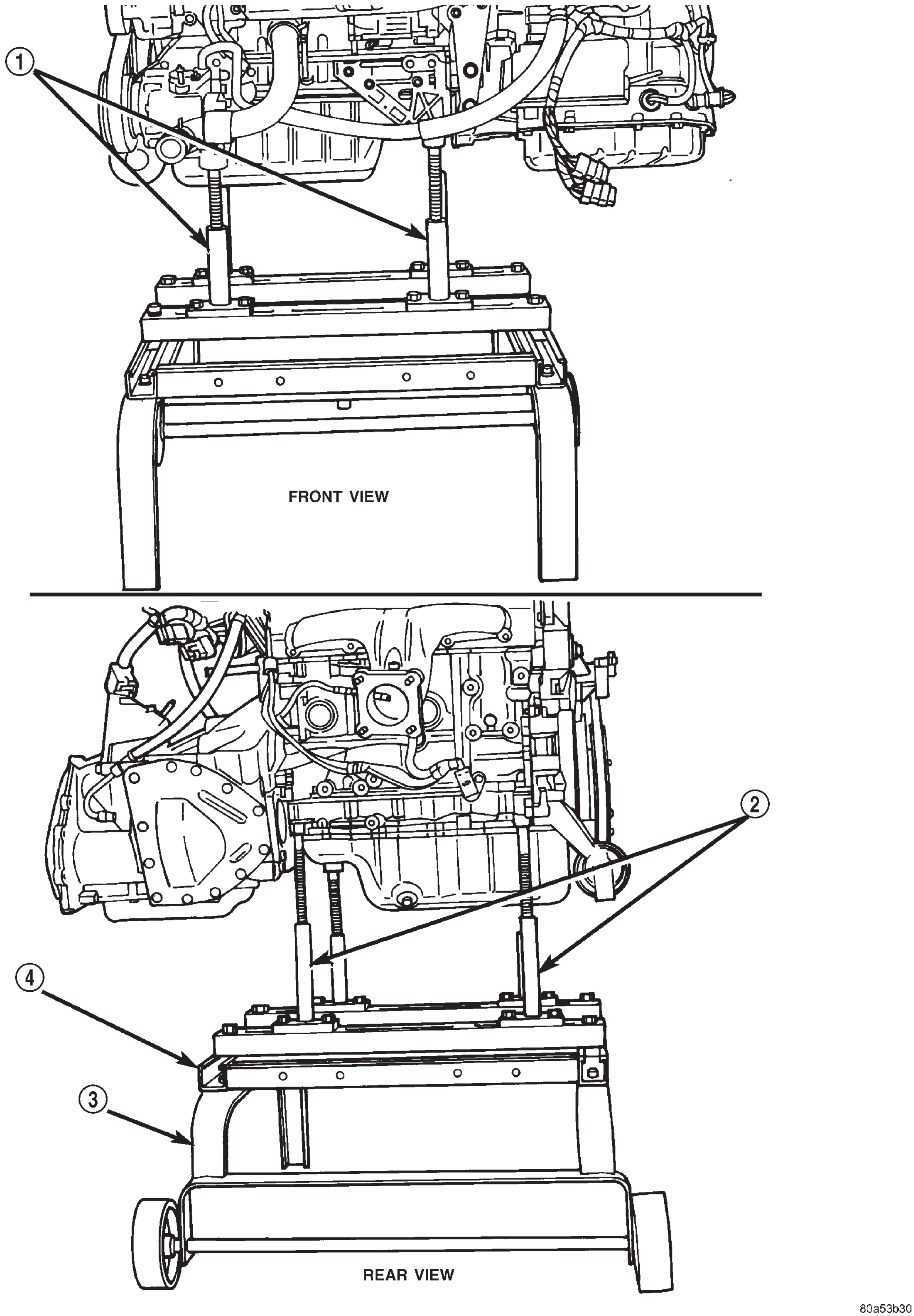


Fig. 6 Positioning Engine Cradle Support Post Mounts

ENGINE 2.4L DOHC (Continued)

1 - SPECIAL TOOLS POST 6848
2 - SPECIAL TOOLS POST 6848 WITH ADAPTERS 6909
3 - SPECIAL TOOL 6135 DOLLY
4 - SPECIAL TOOL 6710 CRADLE

(7) Install intake manifold. Torque fasteners to 12 N·m (105 in. lbs.) (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).
(8) Connect generator connectors.
(9) Connect fuel line to fuel rail.
(10) Connect brake booster and vapor purge hoses.
(11) Connect all ground straps to engine.
(12) Connect heater hose to thermostat housing.
(13) Connect coolant recovery container overflow hose.
(14) Connect throttle and speed control cables.
(15) Connect ground cable to left side transaxle mount bracket.
(16) Connect positive cable to battery and PDC.
(17) Raise vehicle on hoist.
(18) Install torque converter bolts.
(19) Install structural collar and torque reaction bracket (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - INSTALLATION).
(20) Install rear mount bracket to transmission.
(21) Install front and rear engine mount through bolts. Torque fasteners to 61 N·m (45 ft. lbs.).
(22) Connect exhaust pipe to exhaust manifold. Torque fasteners to 28 N·m (250 in. lbs.).
(23) Connect A/C compressor electrical connectors.
(24) Connect heater return hose to pipe connection at right front frame rail area.
(25) Install power steering pump to bracket.
(26) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
(27) Install both axle shafts (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION).
(28) Install new oil filter.
(29) Install left and right splash shields.
(30) Install both front wheels.
(31) Lower vehicle.
(32) Connect engine electrical harness to PCM and bulkhead connectors.
(33) Connect transmission shift cable.
(34) Connect transmission electrical connectors (C104 & C105) (Refer to 8 - ELECTRICAL/CONNECTOR/GROUND LOCATIONS - DESCRIPTION).
(35) Install cooling module assembly (radiator, fan module, and condenser). Connect A/C lines to condenser.
(36) Connect transmission oil cooler lines using service splice kit. Refer to instructions provided with kit.
(37) Connect upper and lower radiator hoses.
(38) Install upper radiator crossmember.
(39) Install throttle body air inlet hose and air cleaner housing assembly.
(40) Fill engine crankcase with proper oil to correct level.
(41) Evacuate and recharge A/C system (Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).
(42) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).
(43) Connect negative battery cable.
(44) Start engine and run until normal operating temperature is reached.

SPECIFICATIONS

2.4L ENGINE

DESCRIPTION	SPECIFICATION
General Specification	
Type	In-Line OHV, DOHC
Number of Cylinders	4
Displacement	2.4 Liters (148 cu. in.)
Bore	87.5 mm (3.445 in.)
Stroke	101.0 mm (3.976 in.)
Compression Ratio	9.5:1
Firing Order	1-3-4-2
Compression Pressure	1172–1551 kPa (170–225 psi)
Max. Variation Between Cylinders	25%
Cylinder Block	
Cylinder Bore Diameter	87.4924–87.5076 mm (3.4446–3.4452 in.)
Out-of-Round (Max.)	0.051 mm (0.002 in.)

ENGINE 2.4L DOHC (Continued)

DESCRIPTION	SPECIFICATION
Taper (Max.)	0.051 mm (0.002 in.)
Pistons	
Piston Diameter	87.463–87.481 mm (3.4434–3.4441 in.)
Clearance @ 14 mm (9/16 in.) from bottom of skirt	0.024–0.057 mm (0.0009–0.0022 in.)
Weight	332–346 grams (11.85–12.20 oz.)
Land Clearance (Diametrical)	0.614–0.664 mm (0.024–0.026 in.)
Piston Length	60.3 mm (2.374 in.)
Piston Ring Groove Depth No. 1	4.640–4.784 mm (0.182–0.188 in.)
Piston Ring Groove Depth No. 2	4.575–4.719 mm (0.180–0.185 in.)
Piston Ring Groove Depth No. 3	4.097–4.236 mm (0.161–0.166 in.)
Piston Pins	
Clearance in Piston	0.005–0.018 mm (0.0002–0.0008 in.)
Clearance in Connecting Rod	Interference
Diameter	21.998–22.003 mm (0.8660–0.8662 in.)
End Play	None
Length	72.75–73.25 mm (2.864–2.883 in.)
Piston Rings	
Ring Gap—Top Compression Ring	0.25–0.51 mm (0.0098–0.020 in.)
Wear Limit	0.8 mm (0.031 in.)
Ring Gap—2nd Compression Ring	0.23–0.48 mm (0.009–0.018 in.)
Wear Limit	0.8 mm (0.031 in.)
Ring Gap—Oil Control Steel Rails	0.25–0.64 mm (0.0098–0.025 in.)

DESCRIPTION	SPECIFICATION
Wear Limit	1.0 mm (0.039 in.)
Ring Side Clearance—Compression Rings	0.030–0.080 mm (0.0011–0.0031 in.)
Wear Limit	0.10 mm (0.004 in.)
Ring Side Clearance—Oil Ring Pack	0.012–0.178 mm (0.0004–0.0070 in.)
Ring Width—Compression Rings	1.47–1.50 mm (0.057–0.059 in.)
Ring Width—Oil Ring Pack	2.72–2.88 mm (0.107–0.1133 in.)
Connecting Rod	
Bearing Clearance	0.025–0.071 mm (0.0009–0.0027 in.)
Wear Limit	0.075 mm (0.003 in.)
Bore Diameter—Piston Pin	20.96–20.98 mm (0.8252–0.8260 in.)
Bore Diameter—Crankshaft End	53.007–52.993 mm (2.0868–2.0863 in.)
Side Clearance	0.13–0.38 mm (0.005–0.015 in.)
Wear Limit	0.40 mm (0.016 in.)
Weight—Total (Less Bearing)	565.8 grams (19.96 oz.)
Crankshaft	
Connecting Rod Journal Diameter	49.984–50.000 mm (1.967–1.9685 in.)
Main Bearing Journal Diameter	59.992–60.008 mm (2.361–2.3625 in.)
Journal Out-of-Round (Max.)	0.0035 mm (0.0001 in.)
Journal Taper (Max.)	0.0038 mm (0.0001 in.)
End Play	0.09–0.24 mm (0.0035–0.0094 in.)
Wear Limit	0.37 mm (0.015 in.)
Main Bearing Diametrical Clearance	0.018–0.058 mm (0.0007–0.0023 in.)

ENGINE 2.4L DOHC (Continued)

DESCRIPTION	SPECIFICATION
Hydraulic Lash Adjuster	
Body Diameter	15.901–15.913 mm (0.626–0.6264 in.)
Plunger Travel Minimum (Dry)	3.0 mm (0.118 in.)
Cylinder Head Camshaft Bearing Bore Diameter	
Journals No.1–6	26.020–26.041 mm (1.024–1.025 in.)
Camshaft	
Journal Diameter No. 1–6	25.951–25.970 mm (1.021–1.022 in.)
Bearing Clearance—Diametrical	0.069–0.071 mm (0.0027–0.003 in.)
End Play	0.05–0.17 mm (0.0019–0.0066 in.)
Lift (Zero Lash)	
Intake	8.25 mm (0.324 in.)
Exhaust	6.52 mm (0.256 in.)
Intake Valve Timing*	
Closes (ABDC	51°
Opens (BTDC)	1°
Duration	232°
Exhaust Valve Timing*	
Closes (ATDC)	8°
Opens (BBDC)	52°
Duration	240°
Valve Overlap	9°
*All readings in crankshaft degrees, at 0.5 mm (0.019 in.) of valve lift.	
Cylinder Head	
Material	Cast Aluminum
Gasket Thickness (Compressed)	0.71 mm (0.028 in.)
Valve Seat	
Angle	45°
Seat Diameter—Intake	33 mm (1.299 in.)
Seat Diameter—Exhaust	28 mm (1.102 in.)

DESCRIPTION	SPECIFICATION
Runout (Max.)	0.05 mm (0.002 in.)
Valve Seat Width—Intake and Exhaust	0.9–1.3 mm (0.035–0.051 in.)
Service Limit—Intake	2.0 mm (0.079 in.)
Service Limit—Exhaust	2.5 mm (0.098 in.)
Valve Guide	
Diameter I.D.	5.975–6.000 mm (0.235–0.236 in.)
Guide Bore Diameter	11.0–11.02 mm (0.4330–0.4338 in.)
Guide Height (spring seat to guide tip)	13.25–13.75 mm (0.521–0.541 in.)
Valves	
Face Angle—Intake and Exhaust	44.5—45°
Head Diameter—Intake	34.67–34.93 mm 1.364–1.375 in.)
Head Diameter—Exhaust	30.37–30.63 mm (1.195–1.205 in.)
Valve Length (Overall)	
—Intake	112.76–113.32 mm (4.439–4.461 in.)
—Exhaust	109.59–110.09 mm (4.314–4.334 in.)
Valve Stem Diameter	
—Intake	5.934–5.952 mm (0.2337–0.2344 in.)
—Exhaust	5.906–5.924 mm (0.2326–0.2333 in.)
Valve Margin	
Intake	1.285–1.615 mm (0.050–0.063
Service Limit	0.95 mm (1/32 in.)
Exhaust	0.985–1.315 mm (0.038–0.051 in.)
Service Limit	1.05 mm (3/64 in.)

ENGINE 2.4L DOHC (Continued)

DESCRIPTION	SPECIFICATION
Valve Stem Tip Height	
Intake	48.04 mm (1.891 in.)
Exhaust	47.99 mm (1.889 in.)
Valve Stem to Guide Clearance	
Intake	0.048–0.066 mm (0.0018–0.0025 in.)
Max. Allowable	0.076 mm (0.003 in.)
Service Limit	0.25 mm (0.010 in.)
Exhaust	0.0736–0.094 mm (0.0029–0.0037 in.)
Max. Allowable	0.101 mm (0.004 in.)
Service Limit	0.25 mm (0.010 in.)
Valve Springs	
Free Length (Approx.)	48.4 mm (1.905 in.)
Nominal Force (Valve Closed)	338 N @ 38.0 mm (75.98 lbs. @ 1.496 in.)
Nominal Force (Valve Open)	607 N @ 29.75 mm (136 lbs. @ 1.172 in.)
Installed Height	38.00 mm (1.496 in.)
Number of Coils	7.82
Wire Diameter	3.86 mm (1.496 in.)
Oil Pump	
Clearance Over Rotors (Max.)	0.10 mm (0.004 in.)
Cover Out-of-Flat (Max.)	0.025 mm (0.001 in.)
Inner Rotor Thickness (Min.)	9.40 mm (0.370 in.)
Outer Rotor Thickness (Min.)	9.40 mm (0.370 in.)

DESCRIPTION	SPECIFICATION
Outer Rotor Clearance (Max.)	0.039 mm (0.015 in.)
Outer Rotor Diameter (Min.)	79.95 mm (3.148 in.)
Tip Clearance Between Rotors (Max.)	0.20 mm (0.008 in.)
Oil Pressure	
At Curb Idle Speed*	25 kPa (4 psi)
At 3000 rpm	170–550 kPa (25–80 psi)
CAUTION: *If pressure is ZERO at curb idle, DO NOT run engine at 3000 rpm.	

TORQUE

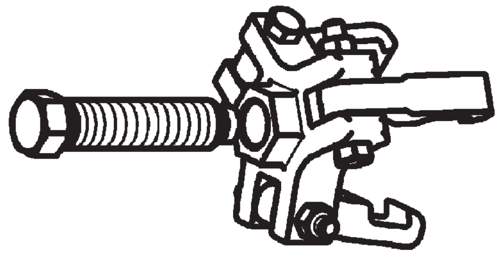
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Balance Shaft Carrier to Block—Bolts	54	40	—
Balance Shaft Gear Cover—Double Ended Fastener	12	—	105
Balance Shaft Sprocket—Bolt	28	—	250
Balance Shaft Chain Tensioner—Bolts	12	—	105
Balance Shaft Carrier Cover—Bolts	12	—	105
Camshaft Sprocket—Bolt	115	85	—
Connecting Rod Cap—Bolts	27 +¼ turn	20 +¼ turn	—
Crankshaft Main Bearing Cap/Bedplate			
—M8 Bolts	28		250
—M11 Bolts	75	55	—
Crankshaft Damper	136	100	—
Cylinder Head—Bolts	(Refer to 9 - ENGINE/ CYLINDER HEAD - INSTALLATION)		
Cylinder Head Cover—Bolts	12	—	105

ENGINE 2.4L DOHC (Continued)

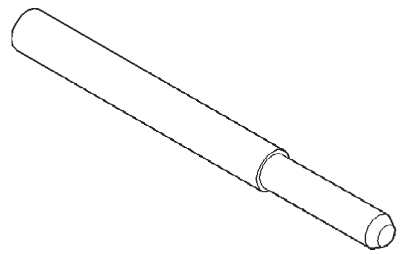
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Flex Plate to Crankshaft	95	70	—
Engine Mount Bracket Right—Bolts	61	45	—
Engine Mounting—Bolts	(Refer to 9 ENGINE/ ENGINE MOUNTING)		
Exhaust Manifold to Cylinder Head—Bolts	23	—	200
Exhaust Manifold Heat Shield—Bolts	12	—	105
Intake Manifold —Bolts	28	—	250
Oil Filter	14	10	—
Oil Pan—Bolts	12	—	105
Oil Pan Drain—Plug	27	20	—
Oil Pump to Block—Bolts	28	—	250
Oil Pump Cover Plate—Bolts	12	—	105
Oil Pump Pick-up Tube—Bolt	23	—	200
Oil Pump Relief Valve—Cap	41	30	—
Spark Plugs	18	13	—
Structural Collar	(Refer to 9 - ENGINE/ ENGINE BLOCK/ STRUCTURAL COLLAR - INSTALLATION)		
Timing Belt Covers			
- Front Covers to Rear Cover—Bolts	9	—	80
- Rear Cover—M6 Bolts	12	—	105
—M8 Bolts	28	—	250
Timing Belt Tensioner Assembly—Bolts	61	45	—

SPECIAL TOOLS

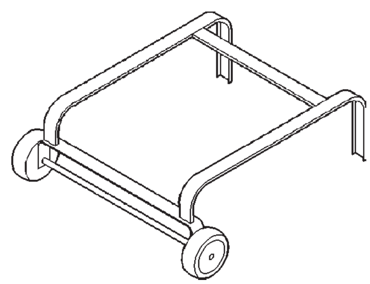
2.4L ENGINE



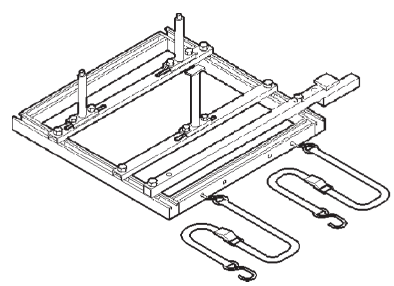
Puller 8454



Crankshaft Damper Removal Insert 6827A

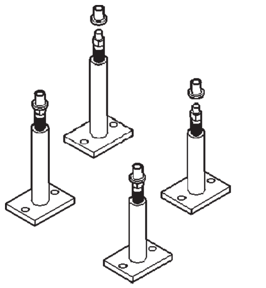


Dolly 6135

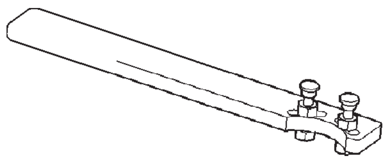


Cradle 6710A

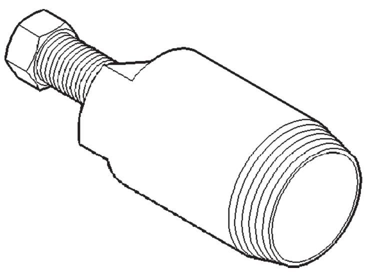
ENGINE 2.4L DOHC (Continued)



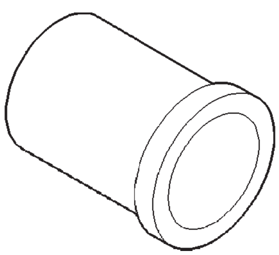
Post Kit Engine Cradle 6848



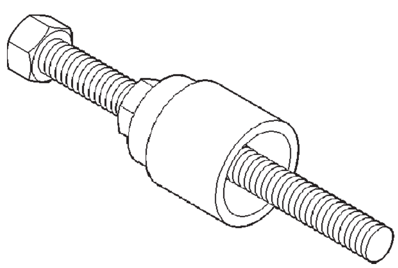
Camshaft Sprocket Holder 6847



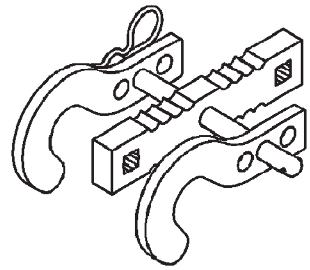
Camshaft Seal Remover C-4679A



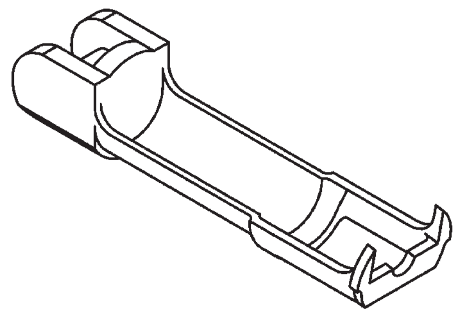
Camshaft Seal Installer MD-998306



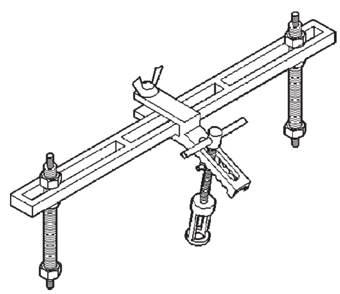
Crankshaft Damper/Sprocket Installer 6792



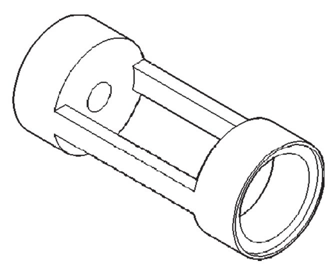
Valve Spring Compressor 8215-A



Adaptor 8436

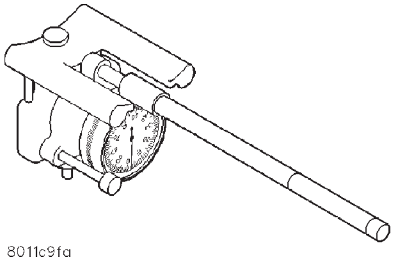


Valve Spring Compressor MD998772A

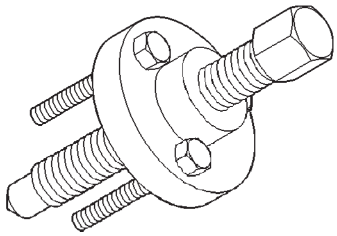


Valve Spring Compressor Adapter 6779

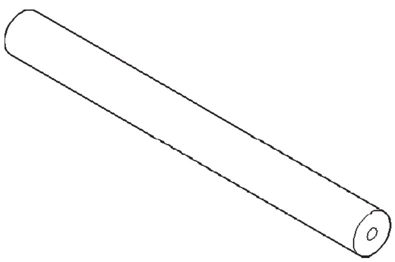
ENGINE 2.4L DOHC (Continued)



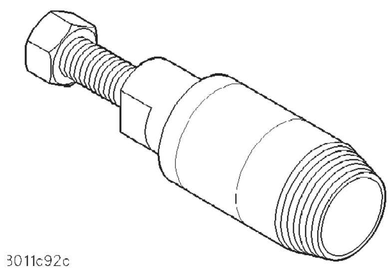
Indicator, Cylinder Bore C-119



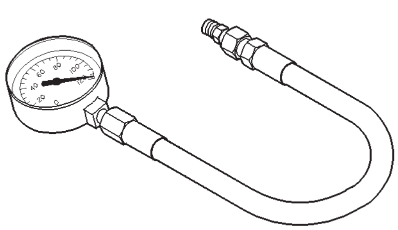
Crankshaft Sprocket Remover 6793



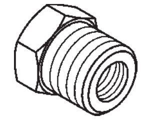
Crankshaft Sprocket Remover Insert C-4685-C2



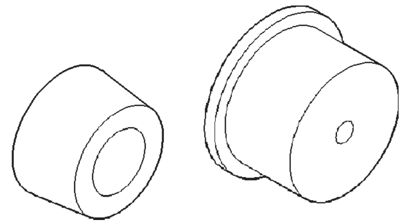
Front Crankshaft Oil Seal Remover 6771



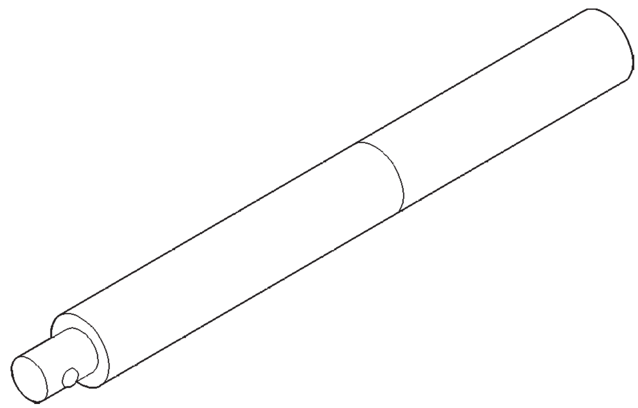
Oil Pressure Gauge C-3292



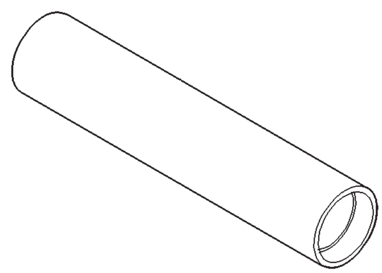
Adapter 8406



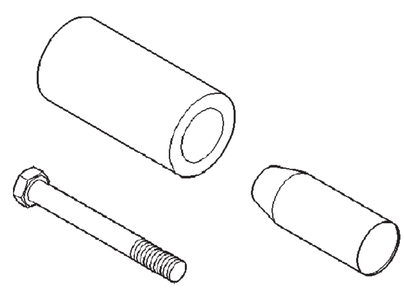
Rear Crankshaft Oil Seal Installer 6926



Driver Handle C-4171

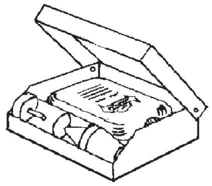


Balance Shaft Sprocket Installer 6052

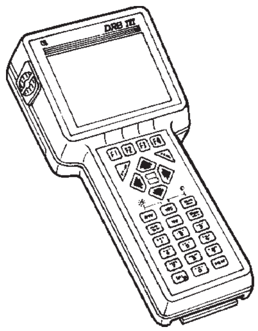


Front Crankshaft Oil Seal Installer 6780

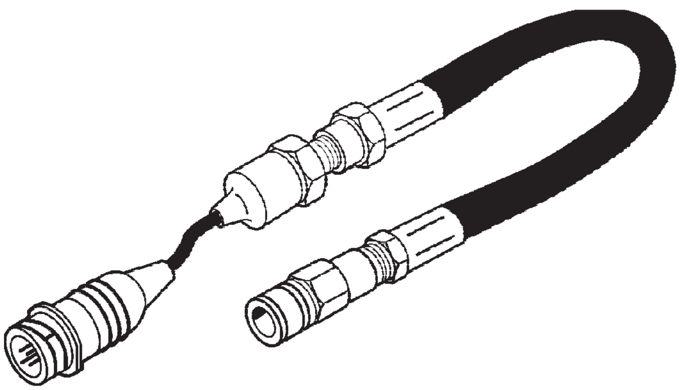
ENGINE 2.4L DOHC (Continued)



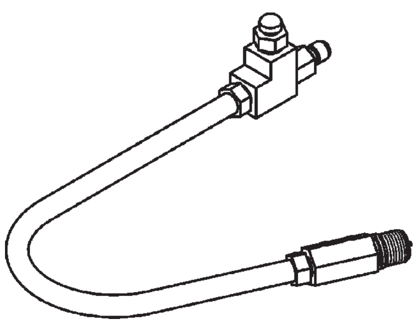
Combustion Leak Tester C-3685-A



DRB III® with PEP Module OT-CH6010A



Pressure Transducer CH7059



Cylinder Compression Pressure Adaptor 8116

AIR CLEANER ELEMENT

REMOVAL

(1) Disconnect negative battery cable.

(2) Disconnect inlet air temperature sensor electrical connector.

(3) Disconnect fresh air makeup hose from throttle body air inlet hose.

(4) Disconnect PCV hose from intake manifold.

(5) Loosen hose clamp at throttle body air inlet hose. Remove hose from throttle body.

(6) Push in on locking tabs to disengage air inlet hose from air cleaner housing. Remove throttle body air inlet hose and air cleaner element together.

(7) Separate air cleaner element from throttle body air inlet hose.

INSTALLATION

(1) Clean any debris from inside air cleaner housing.

(2) Install air cleaner element onto throttle body air inlet hose.

(3) Install throttle body air inlet hose into air cleaner housing. Push in on hose until an audible “click” is heard from locking tabs.

(4) Install hose on throttle body. Tighten hose clamp.

(5) Connect PCV hose to intake manifold.

(6) Connect fresh air makeup hose.

(7) Connect inlet air temperature sensor electrical connector.

(8) Connect negative battery cable.

AIR CLEANER HOUSING

REMOVAL

(1) Disconnect negative battery cable.

(2) Disconnect inlet air temperature sensor electrical connector.

(3) Disconnect fresh air makeup hose from throttle body air inlet hose.

(4) Loosen hose clamp at throttle body air inlet hose. Remove hose from throttle body (Fig. 7).

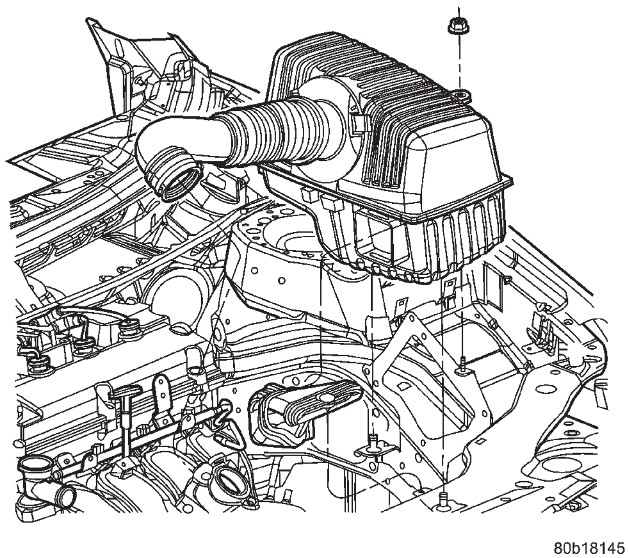


Fig. 7 Air Cleaner Housing

(5) Remove push pin securing air duct to upper radiator support.

(6) Remove nut on bracket that holds air cleaner housing.

(7) Pull air cleaner housing straight up off locating pins (Fig. 7).

INSTALLATION

(1) Install air cleaner housing straight down on locating pins (Fig. 7).

(2) Install nut on bracket that holds air cleaner housing and tighten.

(3) Install push pin that secures air duct to upper radiator support.

(4) Install throttle body air inlet hose to throttle body. Tighten hose clamp.

(5) Connect fresh air makeup hose.

(6) Connect inlet air temperature sensor electrical connector.

(7) Connect negative battery cable.

CYLINDER HEAD

DESCRIPTION

The cross flow designed, aluminum cylinder head contains dual over-head camshafts with four valves per cylinder (Fig. 8). The valves are arranged in two in-line banks. The intake valves face toward the front of the vehicle. The exhaust valves face the dash panel. The cylinder head incorporates powdered metal valve guides and seats. The cylinder head is sealed to the block using a multi-layer steel head gasket and retaining bolts.

Integral oil galleries provide lubrication passages to the hydraulic lash adjusters, camshafts, and valve mechanisms.

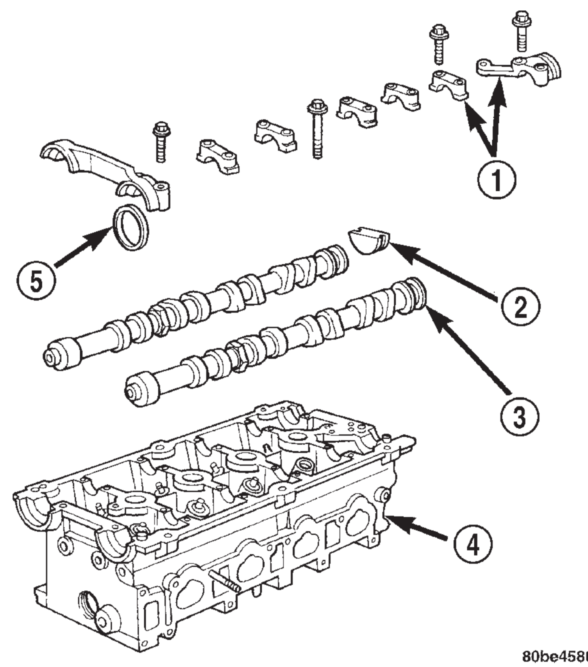


Fig. 8 Cylinder Head and Camshafts

1 - CAMSHAFT BEARING CAPS
2 - PLUG
3 - CAMSHAFT
4 - CYLINDER HEAD
5 - CAMSHAFT OIL SEAL

OPERATION

The cylinder head closes the combustion chamber, allowing the pistons to compress the fuel/air mixture for ignition. The valves are actuated by the lobe profiles on the camshaft to open and close at specified duration to either allow clean air in the combustion chamber or the exhaust gases out; depending on the stroke of the engine.

CYLINDER HEAD (Continued)

DIAGNOSIS AND TESTING—CYLINDER HEAD GASKET

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

Possible indications of the cylinder head gasket leaking between adjacent cylinders are:

- Loss of engine power
- Engine misfiring
- Poor fuel economy

Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:

- Engine overheating
- Loss of coolant
- Excessive steam (white smoke) emitting from exhaust
- Coolant foaming

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between adjacent cylinders, follow the procedures in Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING). An engine cylinder head gasket leaking between adjacent cylinders will result in approximately a 50–70% reduction in compression pressure.

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

COOLING SYSTEM TESTER METHOD

WARNING: WITH COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester 7700 or equivalent to pressure cap neck. Start the engine and observe the tester's pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

CHEMICAL TEST METHOD

Combustion leaks into the cooling system can also be checked by using Bloc-Chek Kit C-3685-A or equivalent. Perform test following the procedures supplied with the tool kit.

REMOVAL - CYLINDER HEAD

(1) Perform fuel system pressure release procedure **before attempting any repairs.** (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

(2) Disconnect negative battery cable.

(3) Drain cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(4) Remove throttle body air inlet hose and air cleaner housing assembly.

(5) Remove intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(6) Disconnect heater hose from thermostat housing.

(7) Remove heater tube support bracket from cylinder head.

(8) Disconnect camshaft position sensor electrical connector.

(9) Disconnect EGR solenoid electrical connector.

(10) Raise vehicle on hoist.

(11) Disconnect exhaust pipe from exhaust manifold.

(12) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(13) Remove crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).

(14) Remove upper and lower timing belt covers (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL).

(15) Remove timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(16) Remove camshaft sprockets (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(17) Remove timing belt idler pulley and rear timing belt cover.

(18) Remove cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

(19) Remove camshafts and rocker arms (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - REMOVAL).

(20) Remove cylinder head bolts and remove cylinder head from engine block.

(21) Inspect and clean cylinder head (Refer to 9 - ENGINE - STANDARD PROCEDURE).

CYLINDER HEAD (Continued)

CLEANING

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Remove all gasket material from cylinder head and block (Refer to 9 - ENGINE - STANDARD PROCEDURE). Be careful not to gouge or scratch the aluminum head sealing surface.

Clean all engine oil passages.

INSPECTION

(1) Cylinder head must be flat within 0.1 mm (0.004 in.) (Fig. 9).

(2) Inspect camshaft bearing journals for scoring.

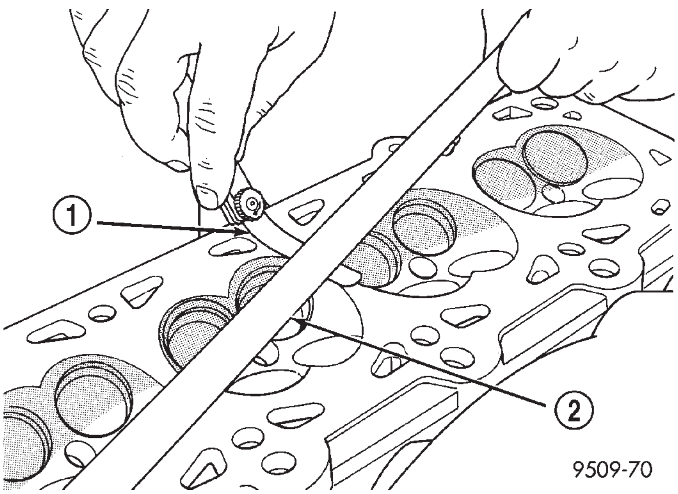


Fig. 9 Checking Cylinder Head Flatness

1 - FEELER GAUGE
2 - STRAIGHT EDGE

(3) Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.

(4) Using a small hole gauge and a micrometer, measure valve guides in 3 places top, middle and bottom (Fig. 10). (Refer to 9 - ENGINE - SPECIFICATIONS) Replace guides if they are not within specification.

(5) Check valve guide height (Fig. 11).

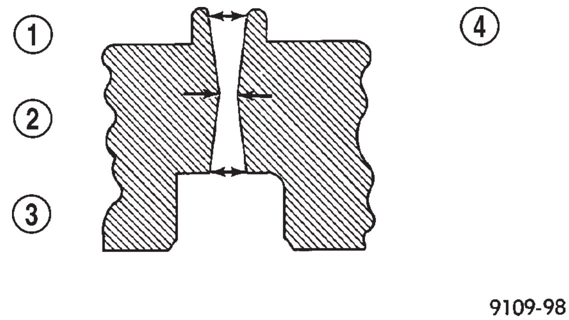


Fig. 10 Checking Wear on Valve Guide—Typical

1 - TOP
2 - MIDDLE
3 - BOTTOM
4 - CUT AWAY VIEW OF VALVE GUIDE MEASUREMENT LOCATIONS

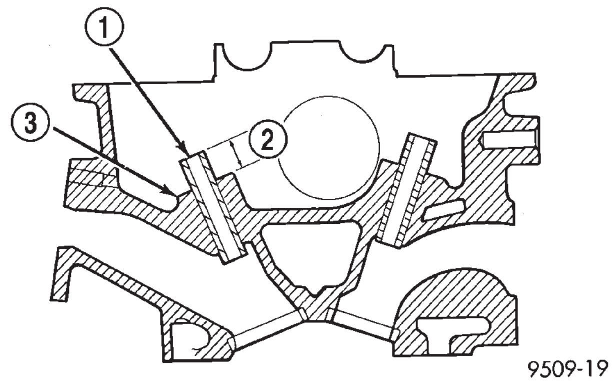


Fig. 11 Valve Guide Height

1 - VALVE GUIDE
2 - 13.25 - 13.75 MM (0.521 - 0.541 IN.)
3 - SPRING SEAT

INSTALLATION - CYLINDER HEAD

NOTE: The Cylinder head bolts should be examined BEFORE reuse. If the threads are necked down, the bolts must be replaced (Fig. 12).

Necking can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale, the bolt should be replaced.

(1) Before installing the bolts, the threads should be coated with engine oil.

(2) Position cylinder head gasket on block.

(3) Install cyllinder head on block.

(4) Tighten the cylinder head bolts in the sequence shown in (Fig. 13). Using the 4 step torque turn method, tighten according to the following values:

- First: All to 34 N·m (25 ft. lbs.)
- Second: All to 68 N·m (50 ft. lbs.)
- Third: All to 68 N·m (50 ft. lbs.)

CYLINDER HEAD (Continued)

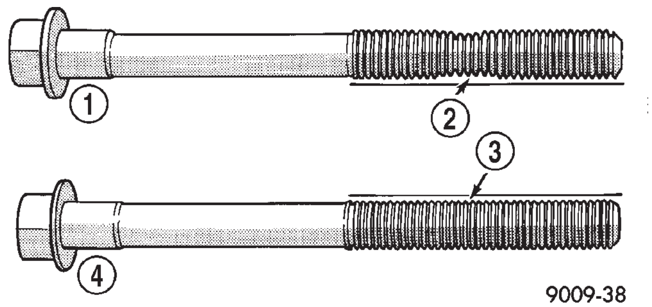


Fig. 12 Checking Bolts for Stretching (Necking)

1 - STRETCHED BOLT
2 - THREADS ARE NOT STRAIGHT ON LINE
3 - THREADS ARE STRAIGHT ON LINE
4 - UNSTRETCHED BOLT

CAUTION: Do not use a torque wrench for the Fourth step.

- **Fourth: Turn all bolts an additional 1/4 Turn**

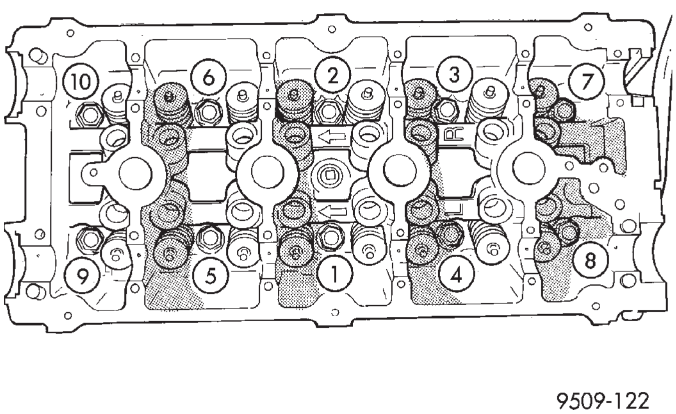


Fig. 13 Cylinder Head Tightening Sequence

(5) Install rocker arms and camshafts (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - INSTALLATION).

(6) Install cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

(7) Install rear timing belt cover and timing belt idler pulley (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(8) Install camshaft sprockets (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(9) Install timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(10) Install upper and lower timing belt covers (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(11) Install crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(12) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(13) Connect exhaust pipe to exhaust manifold. Torque fasteners to 28 N·m (250 in. lbs.).

(14) Connect camshaft position sensor electrical connector.

(15) Connect EGR solenoid electrical connector.

(16) Install heater tube support bracket to cylinder head.

(17) Connect heater hose to thermostat housing.

(18) Install intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

(19) Install throttle body air inlet hose and air cleaner housing assembly.

(20) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(21) Connect negative battery cable.

CAMSHAFT OIL SEAL(S)

REMOVAL

(1) Remove timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - REMOVAL).

(2) Hold each camshaft sprocket with Special Tool 6847 while removing center bolt (Fig. 14).

(3) Remove camshaft sprockets.

(4) Remove rear timing belt cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT COVER(S) - REMOVAL).

(5) Remove camshaft seal using Special Tool C-4679A (Fig. 15).

CAUTION: Do not nick shaft seal surface or seal bore.

CAMSHAFT OIL SEAL(S) (Continued)

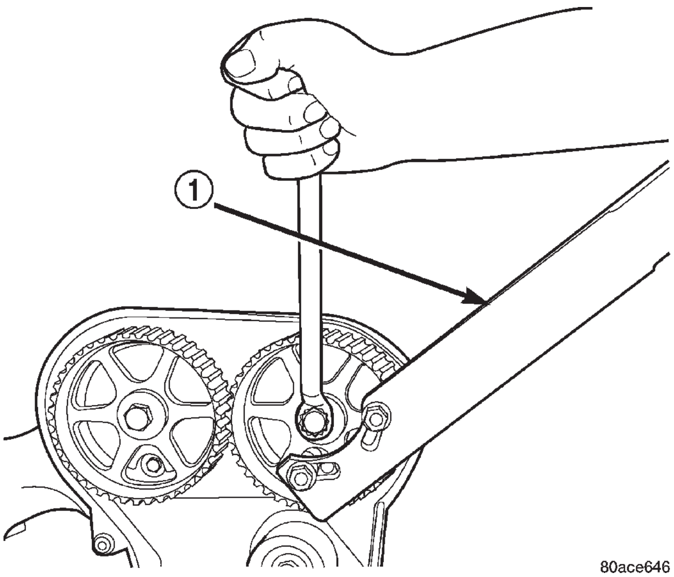


Fig. 14 Camshaft Sprocket - Removal/Installation

1 - SPECIAL TOOL 6847

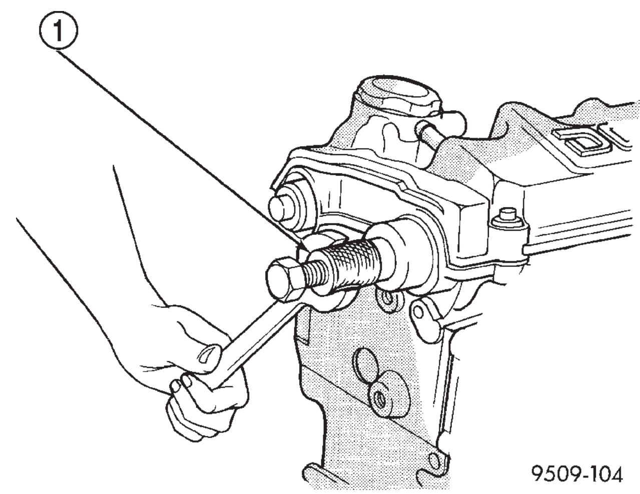


Fig. 15 Camshaft Oil Seal - Removal With C-4679A

1 - SPECIAL TOOL C-4679

INSTALLATION

(1) Shaft seal surface must be free of varnish, dirt or nicks. Polish with 400 grit paper if necessary.

(2) Install camshaft seals into cylinder head using Special Tool MD-998306 until flush with head (Fig. 16).

(3) Install timing belt rear cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT COVER(S) - INSTALLATION).

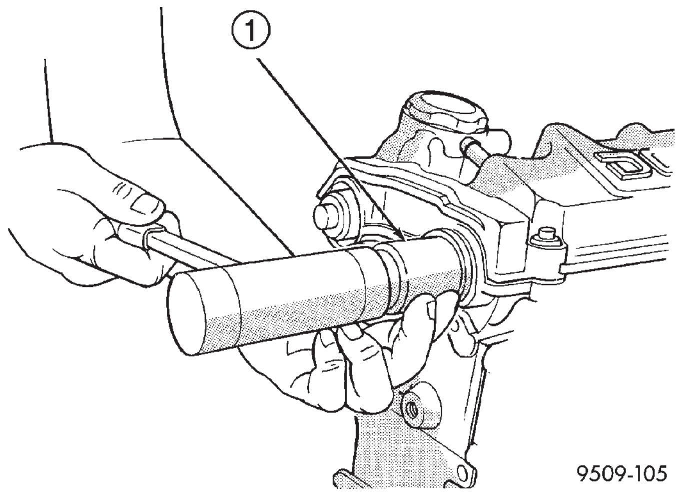


Fig. 16 Camshaft Seal - Installation

1 - SPECIAL TOOL MD-998306

(4) Install camshaft sprockets. Hold each sprocket with Special Tool 6847 and tighten center bolt to 115 N·m (85 ft. lbs.) (Fig. 14).

(5) Install timing belt and front covers (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - INSTALLATION) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT COVER(S) - INSTALLATION).

CAMSHAFT(S)

DESCRIPTION

Both camshafts have six bearing journal surfaces and two cam lobes per cylinder (Fig. 17). Flanges at the rear journals control camshaft end play. Provision for a cam position sensor is located on the intake camshaft on the rear of the cylinder head. A hydro-dynamic oil seal is used for oil control at the front of the camshaft.

OPERATION

The camshaft is driven by the crankshaft via drive sprockets and belt. The camshaft has precisely machined lobes to provide accurate valve timing and duration.

CAMSHAFT(S) (Continued)

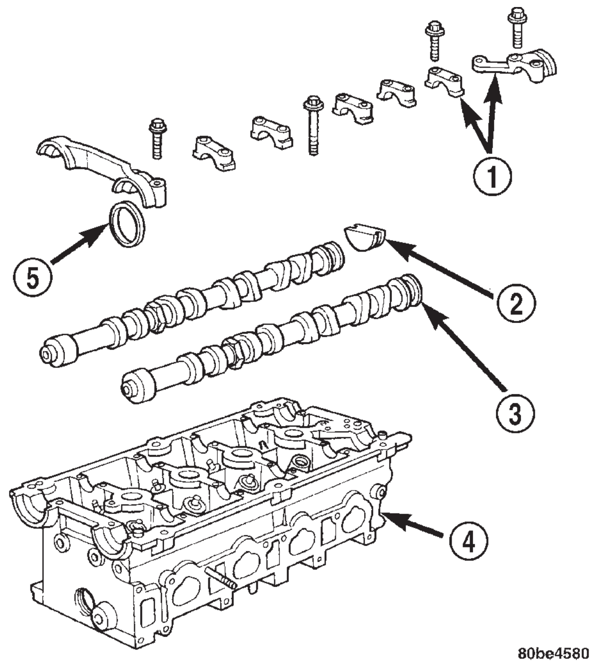


Fig. 17 Camshafts

1 - CAMSHAFT BEARING CAPS
2 - PLUG
3 - CAMSHAFT
4 - CYLINDER HEAD
5 - CAMSHAFT OIL SEAL

STANDARD PROCEDURE - MEASURING CAMSHAFT END PLAY

(1) Oil camshaft journals and install camshaft **WITHOUT** rocker arms. Install rear cam caps and tighten screws to specified torque.

(2) Using a suitable tool, move camshaft as far rearward as it will go.

(3) Zero dial indicator (Fig. 18).

(4) Move camshaft as far forward as it will go.

(5) Record reading on dial indicator. For end play specification, (Refer to 9 - ENGINE - SPECIFICATIONS).

(6) If end play is excessive, check cylinder head and camshaft for wear; replace as necessary.

REMOVAL

(1) Remove cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER - REMOVAL).

(2) Remove camshaft position sensor and camshaft target magnet (Refer to 8 - ELECTRICAL/IGNITION CONTROL/CAMSHAFT POSITION SENSOR - REMOVAL).

(3) Remove timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - REMOVAL).

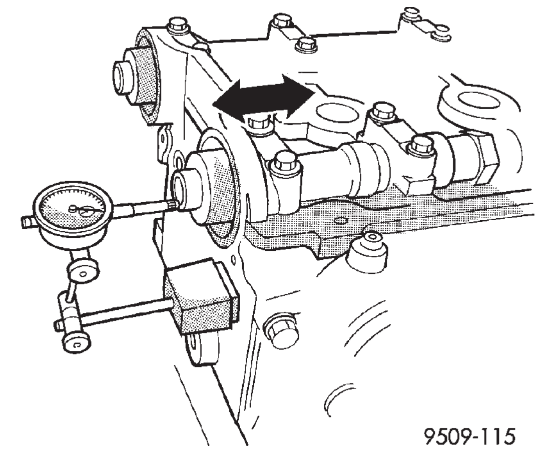


Fig. 18 Camshaft End Play - Typical

(4) Remove camshaft sprockets and timing belt rear cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT COVER(S) - REMOVAL).

(5) Bearing caps are identified for location. Remove the outside bearing caps first (Fig. 19).

(6) Loosen the camshaft bearing cap attaching fasteners in sequence shown (Fig. 20) one camshaft at a time.

CAUTION: Camshafts are not interchangeable. The intake cam number 6 thrust bearing face spacing is wider.

(7) Identify the camshafts before removing from the head. The camshafts are not interchangeable.

(8) Remove camshafts from cylinder head.

NOTE: If removing rocker arms, identify for reinstallation in the original position.

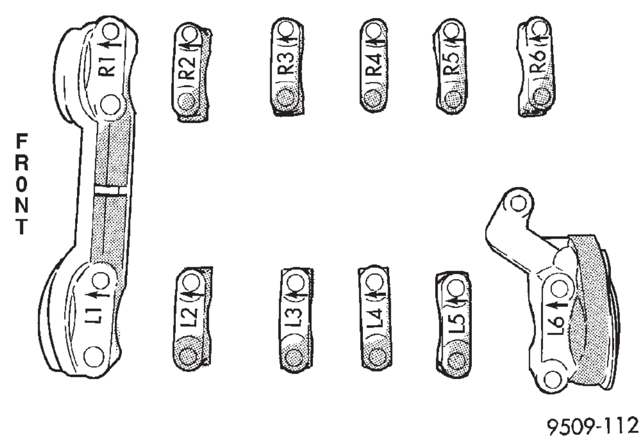


Fig. 19 Camshaft Bearing Cap Identification

CAMSHAFT(S) (Continued)

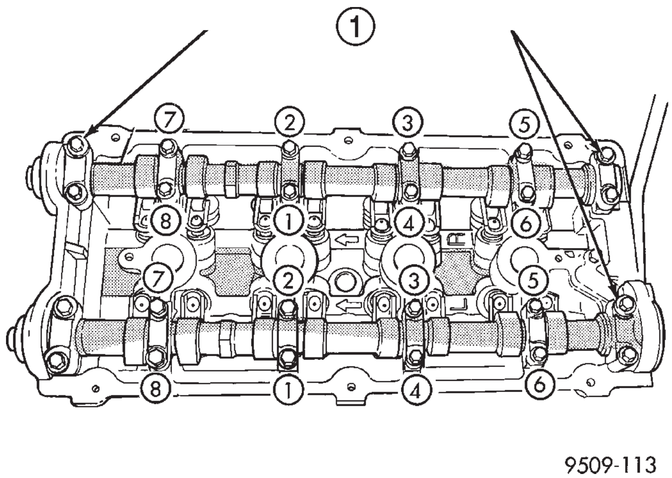


Fig. 20 Camshaft Bearing Cap - Removal

1 - REMOVE OUTSIDE BEARING CAPS FIRST

CLEANING

Clean camshaft with a suitable solvent.

INSPECTION

(1) Inspect camshaft bearing journals for damage and binding (Fig. 21). If journals are binding, check the cylinder head for damage. Also check cylinder head oil holes for clogging.

(2) Check the cam lobe and bearing surfaces for abnormal wear and damage. Replace camshaft if defective.

NOTE: If camshaft is replaced due to lobe wear or damage, always replace the rocker arms.

(3) Measure the lobe actual wear (unworn area - wear zone = actual wear) (Fig. 21) and replace camshaft if out of limit. Standard value is 0.0254 mm (0.001 in.), wear **limit** is 0.254 mm (0.010 in.).

INSTALLATION

CAUTION: Ensure that NONE of the pistons are at top dead center when installing the camshafts.

(1) Lubricate all camshaft bearing journals, rocker arms and camshaft lobes.

(2) Install all rocker arms in original positions, if reused.

(3) Position camshafts on cylinder head bearing journals. Install right and left camshaft bearing caps No. 2 – 5 and right No. 6. Tighten M6 fasteners to 12 N·m (105 in. lbs.) in sequence shown in (Fig. 22).

(4) Apply Mopar® Gasket Maker to No. 1 and No. 6 bearing caps (Fig. 23). Install bearing caps and tighten M8 fasteners to 28 N·m (250 in. lbs.).

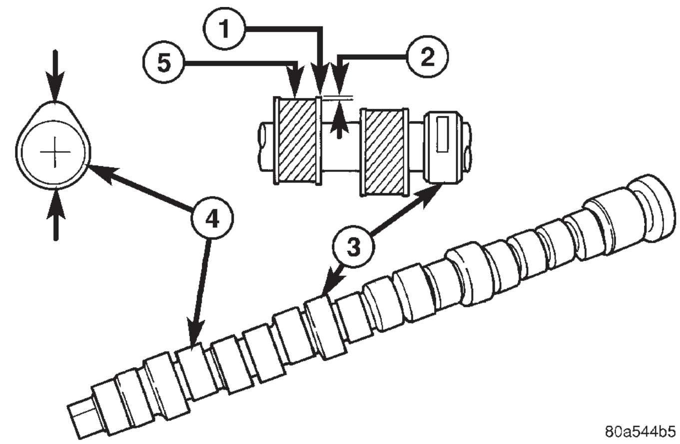


Fig. 21 Checking Camshaft(s) for Wear

1 - UNWORN AREA
2 - ACTUAL WEAR
3 - BEARING JOURNAL
4 - LOBE
5 - WEAR ZONE

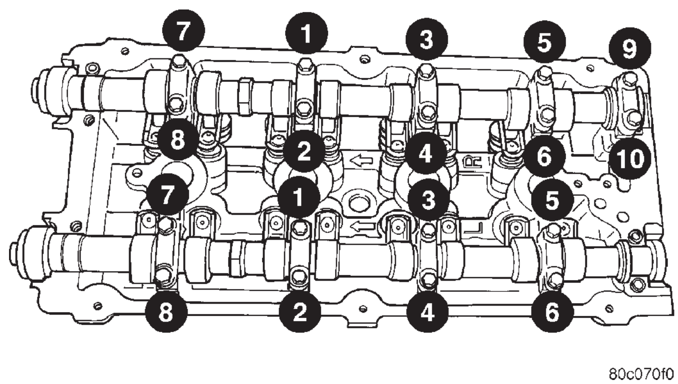


Fig. 22 Camshaft Bearing Cap Tightening Sequence

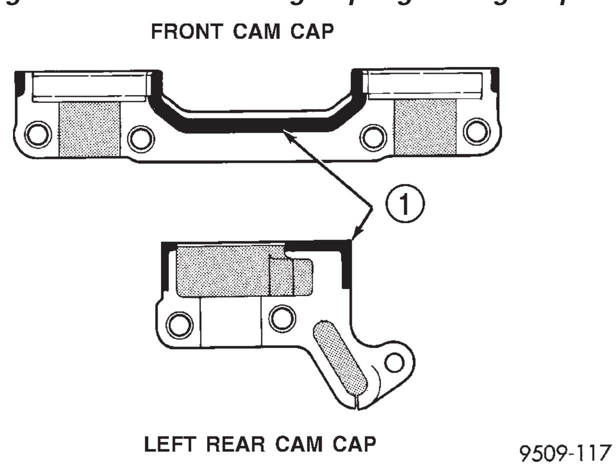


Fig. 23 Camshaft Bearing Cap Sealing

1 - 1.5 mm (.060 in.) DIAMETER BEAD OF MOPAR GASKET MAKER

NOTE: Bearing end caps must be installed before seals can be installed.

CAMSHAFT(S) (Continued)

(5) Install camshaft oil seals (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT OIL SEAL(S) - INSTALLATION).

(6) Install camshaft target magnet and camshaft position sensor.

(7) Install cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER - INSTALLATION).

(8) Install timing belt rear cover and camshaft sprockets (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT COVER(S) - INSTALLATION).

(9) Install timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - INSTALLATION).

CYLINDER HEAD COVER

REMOVAL

(1) Remove ignition coil and plug wires (Fig. 24). Remove ground strap.

(2) Remove the cylinder head cover fasteners.

(3) Remove cylinder head cover from cylinder head.

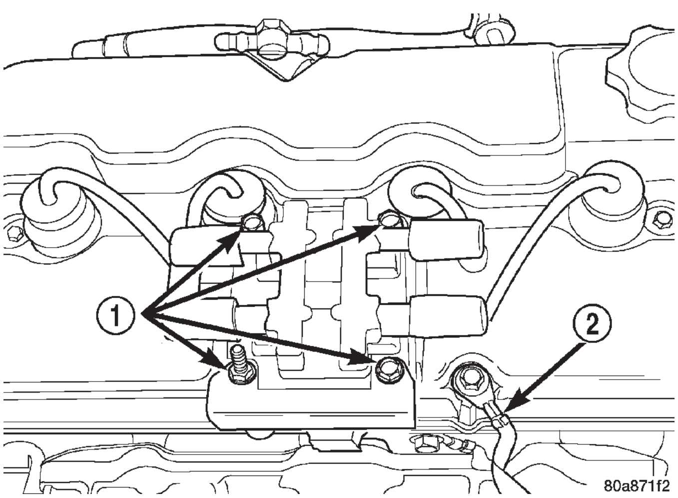


Fig. 24 Ignition Coil and Ground Strap

1 - IGNITION COIL FASTENERS
2 - GROUND STRAP

CLEANING

Clean cylinder head and cover mating surfaces using a suitable solvent.

INSPECTION

Inspect cover rails for flatness.

INSTALLATION

NOTE: Replace spark plug well seals when installing a new cylinder head cover gasket.

(1) Install new cylinder head cover gaskets and spark plug seals (Fig. 25).

CAUTION: Do not allow oil or solvents to contact the timing belt as they can deteriorate the rubber and cause tooth skipping.

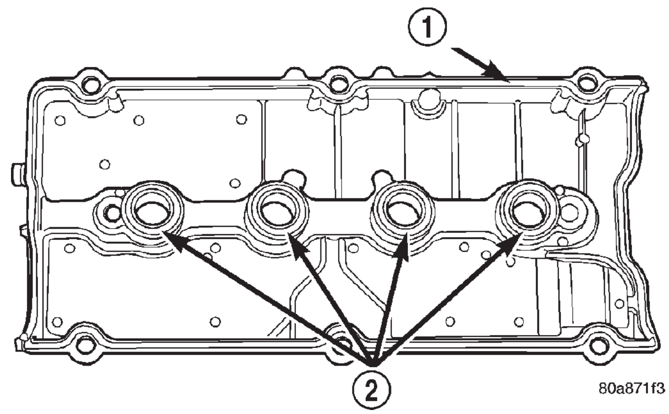


Fig. 25 Cylinder Head Cover Gasket and Spark Plug Seals

1 - ONE PIECE RUBBER GASKET
2 - SPARK PLUG WELL SEALS

(2) Apply Mopar® Engine RTV GEN II at the camshaft cap corners and at the top edge of the 1/2 round seal.

(3) Install cylinder head cover assembly to head and tighten fasteners in sequence shown in (Fig. 26). Using the 3 step torque method:

(a) Tighten all fasteners to 4.5 N·m (40 in. lbs.)
(b) Tighten all fasteners to 9.0 N·m (80 in. lbs.)
(c) Tighten all fasteners to 12 N·m (105 in. lbs.)

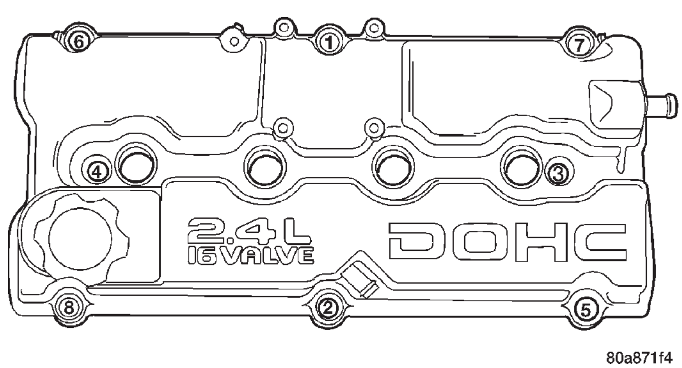


Fig. 26 Cylinder Head Cover Tightening Sequence

(4) Install ignition coil and plug wires. Tighten fasteners to 12 N·m (105 in. lbs.).

(5) Install ground strap.

HYDRAULIC LASH ADJUSTERS

DIAGNOSIS AND TESTING

HYDRAULIC LASH ADJUSTER NOISE DIAGNOSIS

A tappet-like noise may be produced from several items. Check the following items.

(1) Engine oil level too high or too low. This may cause aerated oil to enter the adjusters and cause them to be spongy.

(2) Insufficient running time after rebuilding cylinder head. Low speed running up to 1 hour may be required.

(3) During this time, turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.

(4) Low oil pressure.

(5) The oil restrictor (integral to the cylinder head gasket) in the vertical oil passage to the cylinder head is plugged with debris.

(6) Air ingested into oil due to broken or cracked oil pump pick up.

(7) Worn valve guides.

(8) Rocker arm ears contacting valve spring retainer.

(9) Rocker arm loose, adjuster stuck or at maximum extension and still leaves lash in the system.

(10) Faulty lash adjuster.

a. Check lash adjusters for sponginess while installed in cylinder head. Depress part of rocker arm over adjuster. Normal adjusters should feel very firm. Spongy adjusters can be bottomed out easily.

b. Remove suspected lash adjusters, and replace as necessary.

REMOVAL

NOTE: This procedure is for in-vehicle service with camshafts installed.

(1) Remove cylinder head cover. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

(2) Remove rocker arm. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - REMOVAL)

(3) Remove hydraulic lash adjuster (Fig. 27).

(4) Repeat removal procedure for each hydraulic lash adjuster.

(5) If reusing, mark each hydraulic lash adjuster for reassembly in original position. Lash adjusters are serviced as an assembly.

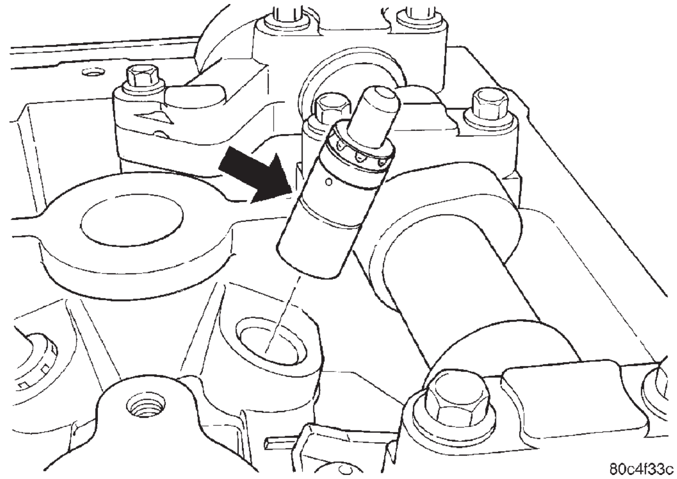


Fig. 27 Hydraulic Lash Adjuster

INSTALLATION

(1) Install hydraulic lash adjuster (Fig. 27). Ensure the lash adjusters are at least partially full of engine oil. This is indicated by little or no plunger travel when the lifter is depressed.

(2) Install rocker arm. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - INSTALLATION)

(3) Repeat installation procedure for each hydraulic lash adjuster.

(4) Install cylinder head cover. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

INTAKE/EXHAUST VALVES & SEATS

DESCRIPTION

The valves are made of heat resistant steel. They have chrome plated stems to prevent scuffing. Viton rubber valve stem seals are integral with the spring seats. The valves have three-bead lock keepers to retain springs and to promote valve rotation.

OPERATION

The four valves per cylinder (two intake and two exhaust) are opened by using roller rocker arms which pivot on hydraulic lash adjusters.

CLEANING

(1) Clean all valves thoroughly and discard burned, warped and cracked valves.

ROCKER ARMS

REMOVAL

NOTE: This procedure is for in-vehicle service with camshafts installed.

(1) Disconnect negative battery cable.
(2) Remove cylinder head cover. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)
(3) Remove spark plugs.
(4) Rotate engine until the camshaft lobe, on the follower being removed, is positioned on its base circle (heel). Also, the piston should be a minimum of 6.3 mm (0.25 in) below TDC position.

CAUTION: If cam follower assemblies are to be reused, always mark position for reassembly in their original positions.

(5) Using Special Tools 8215-A and 8436 slowly depress valve assembly until rocker arm can be removed (Fig. 28).
(6) Repeat removal procedure for each rocker arm.

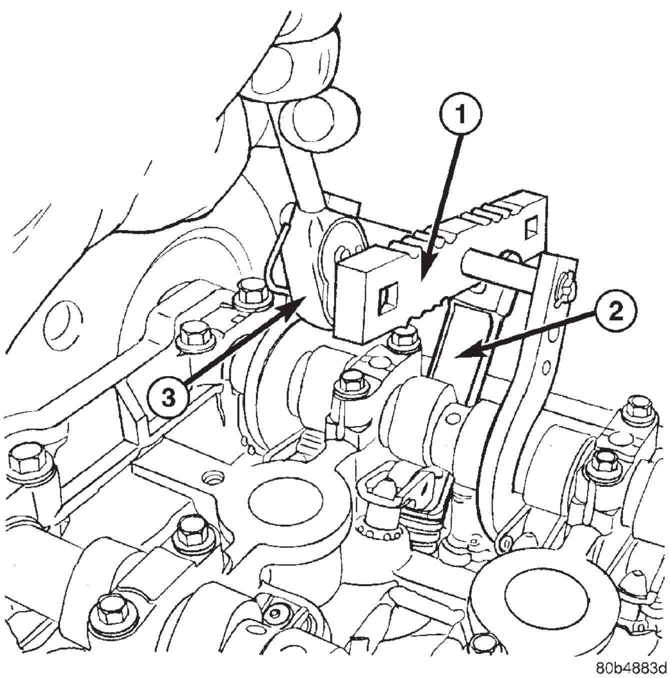


Fig. 28 Rocker Arm - Removal/Installation

1 - SPECIAL TOOL 8215-A
2 - SPECIAL TOOL 8436
3 - 3/8″ DRIVE RACHET

INSPECTION

Inspect the rocker arm for wear or damage (Fig. 29). Replace as necessary.

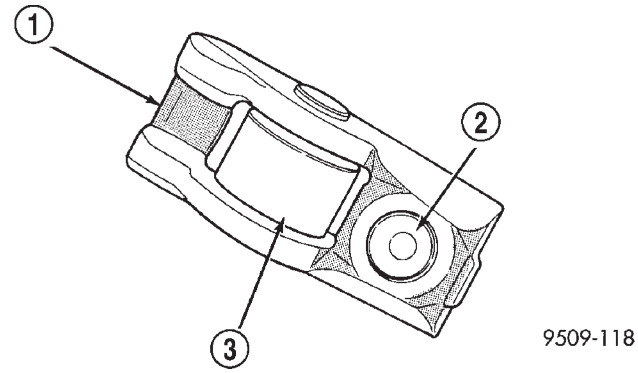


Fig. 29 Rocker Arm

1 - TIP
2 - LASH ADJUSTER POCKET
3 - ROLLER

INSTALLATION

(1) Lubricate rocker arm with clean engine oil.
(2) Using Special Tools 8215-A and 8436 slowly depress valve assembly until rocker arm can be installed on the hydraulic lifter and valve stem (Fig. 28).
(3) Repeat installation procedure for each rocker arm.
(4) Install spark plugs.
(5) Install cylinder head cover. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)
(6) Connect negative battery cable.

VALVE SPRINGS & SEALS

REMOVAL

REMOVAL - CYLINDER HEAD ON

(1) Disconnect negative battery cable.
(2) Remove timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).
(3) Remove cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).
(4) Remove camshafts (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - REMOVAL).
(5) Rotate crankshaft until piston is at TDC.
(6) With air hose attached to adapter tool installed in spark plug hole, apply 90-120 psi air pressure.

VALVE SPRINGS & SEALS (Continued)

(7) Using Special Tool MD-998772-A with adapter 6779 (Fig. 30), compress valve springs and remove valve locks.

(8) Remove valve spring(s).

(9) Remove valve stem seal(s) by a using valve stem seal tool (Fig. 32).

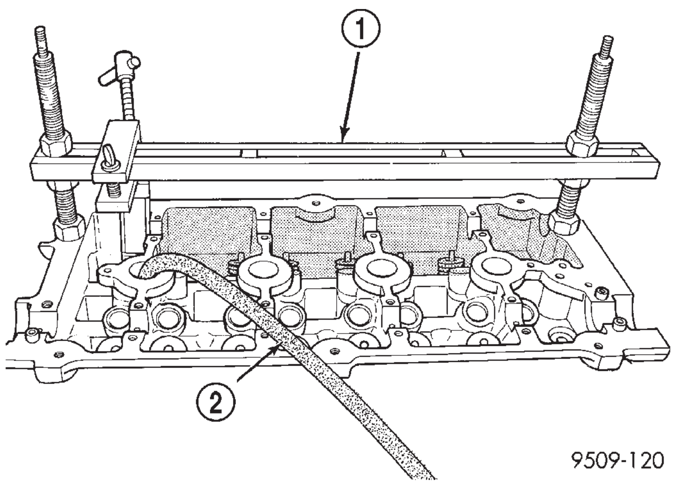


Fig. 30 Valve Spring - Removal/Installation

1 - VALVE SPRING COMPRESSOR MD 998772A
2 - AIR HOSE

REMOVAL - CYLINDER HEAD OFF

(1) With cylinder head removed from cylinder block, compress valve springs using a universal valve spring compressor.

(2) Remove valve retaining locks, valve spring retainers, valve stem seals and valve springs.

(3) Before removing valves, **remove any burrs from valve stem lock grooves to prevent damage to the valve guides.** Identify valves, locks and retainers to insure installation in original location.

(4) Inspect the valves. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - INSPECTION)

INSPECTION

(1) Whenever valves have been removed for inspection, reconditioning or replacement, valve springs should be tested for correct tension. Discard the springs that do not meet specifications. The following specifications apply to both intake and exhaust valves springs:

- Valve Closed Nominal Tension—76 lbs. @ 38.0 mm (1.50 in.)
- Valve Open Nominal Tension—136 lbs. @ 29.75 mm (1.17 in.)

(2) Inspect each valve spring for squareness with a steel square and surface plate, test springs from both ends. If the spring is more than 1.5 mm (1/16 inch) out of square, install a new spring.

INSTALLATION

INSTALLATION - CYLINDER HEAD ON

(1) Install valve seal/valve spring seat assembly (Fig. 31). Push the assembly down to seat it onto the valve guide.

(2) Install valve spring and retainer, use Special Tool MD-998772-A with adapter 6779 to compress valve springs only enough to install locks (Fig. 30). Correct alignment of tool is necessary to avoid nicking valve stems.

(3) Remove air hose and install spark plugs.

(4) Install camshafts (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - INSTALLATION).

(5) Install cylinder head cover (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

(6) Install timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(7) Connect negative battery cable.

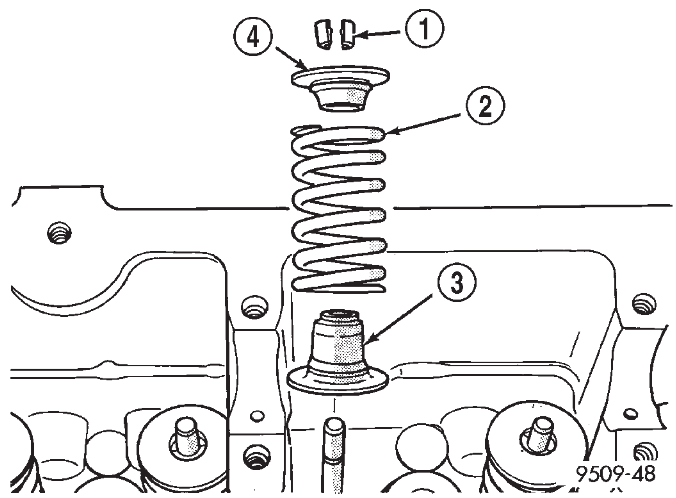


Fig. 31 Valve Stem Seal/Valve Spring Seat

1 - VALVE RETAINING LOCKS
2 - VALVE SPRING
3 - VALVE SEAL AND VALVE SPRING SEAT ASSEMBLY
4 - VALVE SPRING RETAINER

INSTALLATION - CYLINDER HEAD OFF

(1) Coat valve stems with clean engine oil and insert in cylinder head.

(2) Install new valve stem seals on all valves using a valve stem seal tool (Fig. 32). The valve stem seals should be pushed firmly and squarely over valve guide.

CAUTION: When oversize valves are used, the corresponding oversize valve seal must also be used. Excessive guide wear may result if oversize seals are not used with oversize valves.

VALVE SPRINGS & SEALS (Continued)

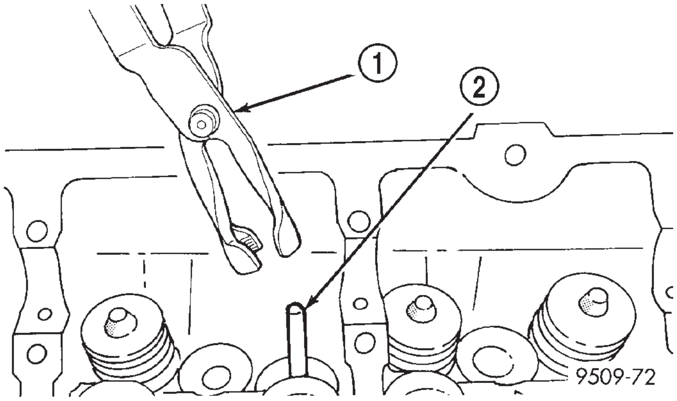


Fig. 32 Valve Stem Oil Seal Tool

1 - VALVE SEAL TOOL
2 - VALVE STEM

(3) Install valve springs and retainers. Compress valve springs only enough to install locks, taking care not to misalign the direction of compression. Nicked valve stems may result from misalignment of the valve spring compressor.

CAUTION: When depressing the valve spring retainers with valve spring compressor the locks can become dislocated. Ensure both locks are in the correct location after removing tool.

(4) Check the valve spring installed height B after refacing the valve and seat (Fig. 33). Make sure measurements are taken from top of spring seat to the bottom surface of spring retainer. If height is greater than 38.75 mm (1.525 in.), install a 0.762 mm (0.030 in.) spacer under the valve spring seat to bring spring height back within specification.

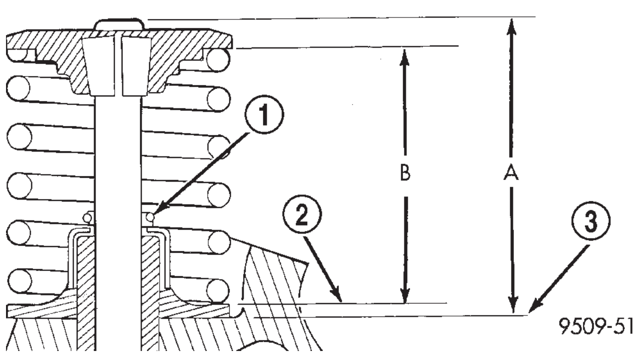


Fig. 33 Checking Spring Installed Height and Valve Tip Height Dimensions

1 - GARTER SPRING
2 - VALVE SPRING SEAT
3 - CYLINDER HEAD SURFACE

ENGINE BLOCK

DESCRIPTION

The cast iron cylinder block is a two-piece assembly, consisting of the cylinder block and bedplate (Fig. 34). The bedplate incorporates the main bearing caps and bolts to the cylinder block. This design offers a much stronger lower end and increased cylinder block rigidity. The rear oil seal retainer is integral with the block. The bedplate and block are serviced as an assembly.

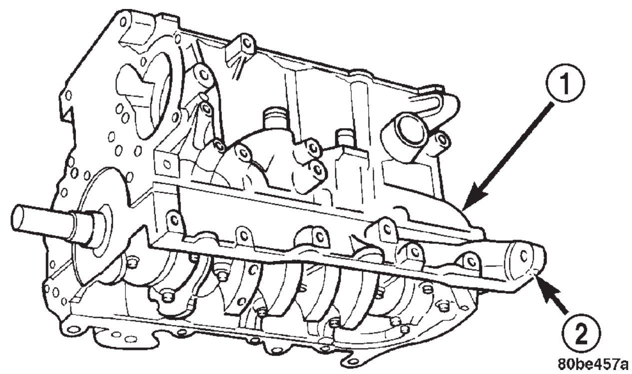


Fig. 34 Cylinder Block and Bedplate

1 - CYLINDER BLOCK
2 - BEDPLATE

STANDARD PROCEDURE

STANDARD PROCEDURE - PISTON TO CYLINDER BORE FITTING

Piston and cylinder wall must be clean and dry. Piston diameter should be measured 90 degrees to piston pin about 14 mm (9/16 inch.) from the bottom of the skirt as shown in (Fig. 36). Cylinder bores should be measured halfway down the cylinder bore and transverse to the engine crankshaft center line shown in (Fig. 35). Refer to for Engine Specifications (Refer to 9 - ENGINE - SPECIFICATIONS). Correct piston to bore clearance must be established in order to assure quiet and economical operation.

NOTE: Pistons and cylinder bores should be measured at normal room temperature, 21°C (70°F).

ENGINE BLOCK (Continued)

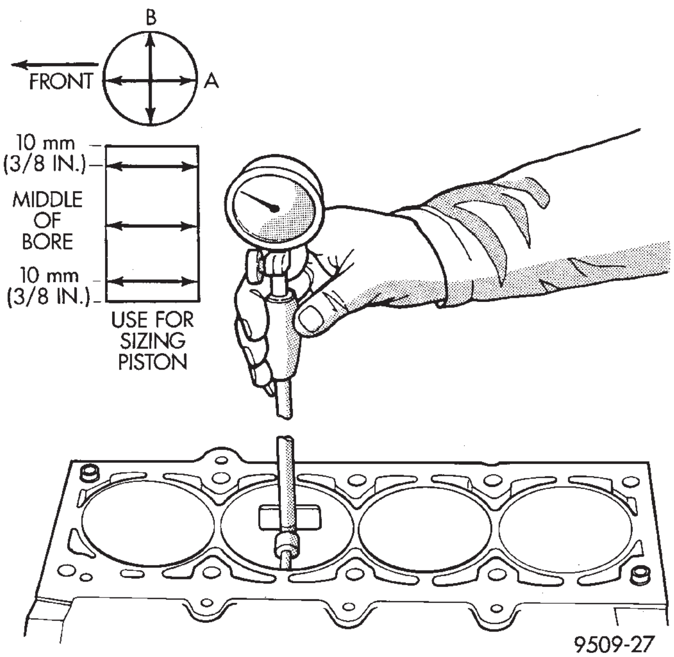


Fig. 35 Checking Cylinder Bore

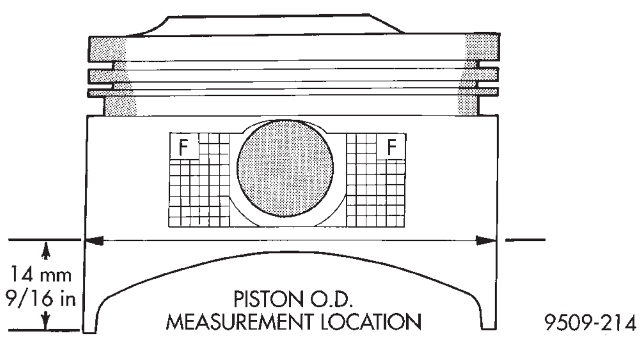


Fig. 36 Piston Measurement

STANDARD PROCEDURE - CYLINDER BORE HONING

(1) Used carefully, the cylinder bore resizing hone, recommended tool C-823 or equivalent, equipped with 220 grit stones, is the best tool for this honing procedure. In addition to deglazing, it will reduce taper and out-of-round as well as removing light scuffing, scoring or scratches. Usually a few strokes will clean up a bore and maintain the required limits.

(2) Deglazing of the cylinder walls may be done using a cylinder surfacing hone, recommended tool C-3501 or equivalent, equipped with 280 grit stones, if the cylinder bore is straight and round. 20–60 strokes depending on the bore condition, will be sufficient to provide a satisfactory surface. Use a light honing oil. **Do not use engine or transmission oil, mineral spirits or kerosene.** Inspect cylinder walls after each 20 strokes.

(3) Honing should be done by moving the hone up and down fast enough to get a cross-hatch pattern. When hone marks **intersect** at 40-60 degrees, the cross hatch angle is most satisfactory for proper seating of rings (Fig. 37).

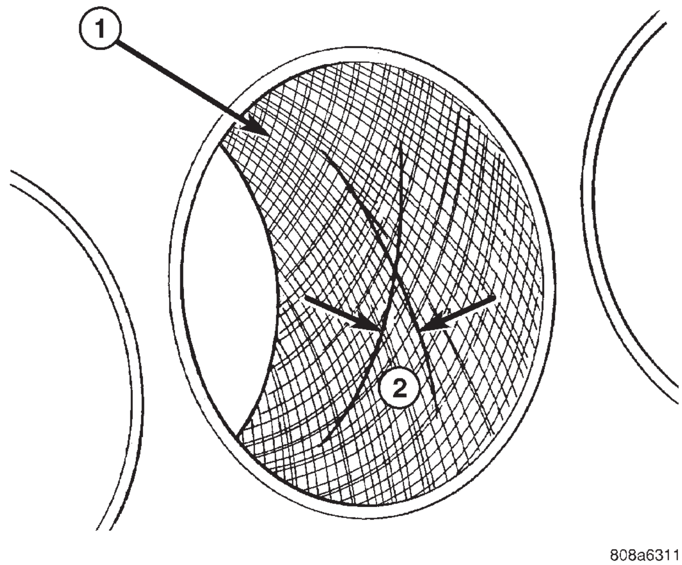


Fig. 37 Cylinder Bore Cross-Hatch Pattern

1 - CROSS-HATCH PATTERN
2 - 40°–60°

(4) A controlled hone motor speed between 200–300 RPM is necessary to obtain the proper cross-hatch angle. The number of up and down strokes per minute can be regulated to get the desired 40–60 degree angle. Faster up and down strokes increase the cross-hatch angle.

(5) After honing, it is necessary that the block be cleaned again to remove all traces of abrasive.

CAUTION: Ensure all abrasives are removed from engine parts after honing. It is recommended that a solution of soap and hot water be used with a brush and the parts then thoroughly dried. The bore can be considered clean when it can be wiped clean with a white cloth and cloth remains clean. Oil the bores after cleaning to prevent rusting.

CLEANING

Clean cylinder block thoroughly using a suitable cleaning solvent.

INSPECTION

ENGINE BLOCK

(1) Clean cylinder block thoroughly and check all core hole plugs for evidence of leaking.

ENGINE BLOCK (Continued)

(2) If new core plugs are to be installed, (Refer to 9 - ENGINE - STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS).

(3) Examine block and cylinder bores for cracks or fractures.

(4) Check block deck surfaces for flatness. Deck surface must be within service limit of 0.1 mm (0.004 in.).

CYLINDER BORE

NOTE: The cylinder bores should be measured at normal room temperature, 21°C (70°F).

The cylinder walls should be checked for out-of-round and taper with Tool C119 or equivalent (Fig. 38) (Refer to 9 - ENGINE - SPECIFICATIONS). If the cylinder walls are badly scuffed or scored, the cylinder block should be replaced, and new pistons and rings fitted.

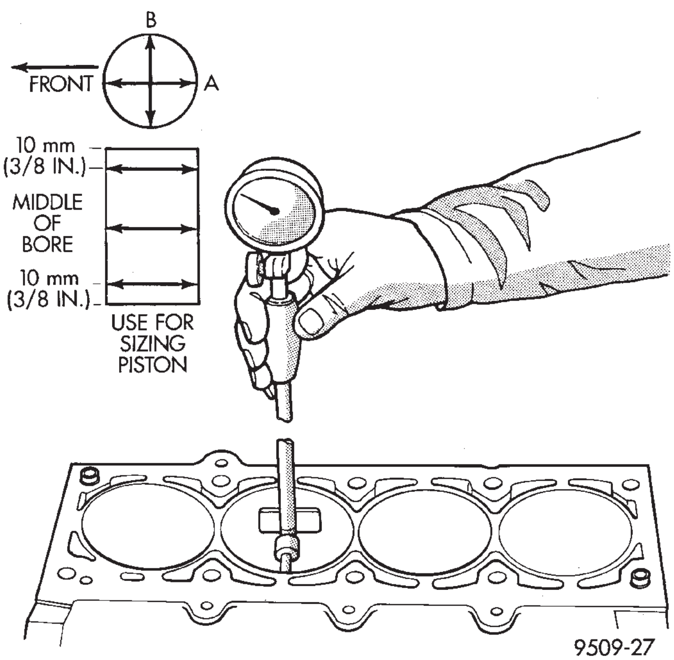


Fig. 38 Checking Cylinder Bore Size

Measure the cylinder bore at three levels in directions A and B (Fig. 38). Top measurement should be 10 mm (3/8 in.) down and bottom measurement should be 10 mm (3/8 in.) up from bottom of bore. (Refer to 9 - ENGINE - SPECIFICATIONS).

CONNECTING ROD BEARINGS

STANDARD PROCEDURE

CONNECTING ROD - FITTING

(1) For measuring connecting rod bearing clearance procedure and use of Plastigage(Refer to 9 - ENGINE - STANDARD PROCEDURE). For bearing clearance refer to Engine Specifications. (Refer to 9 - ENGINE - SPECIFICATIONS)

NOTE: The rod bearing bolts should not be reused.

(2) Before installing the **NEW** bolts the threads should be oiled with clean engine oil.

(3) Install each bolt finger tight then alternately torque each bolt to assemble the cap properly.

(4) Tighten the bolts to 27 N·m PLUS 1/4 turn (20 ft. lbs. PLUS 1/4 turn) **Do not use a torque wrench for last step.**

(5) Using a feeler gauge, check connecting rod side clearance (Fig. 39). Refer to clearance specifications (Refer to 9 - ENGINE - SPECIFICATIONS).

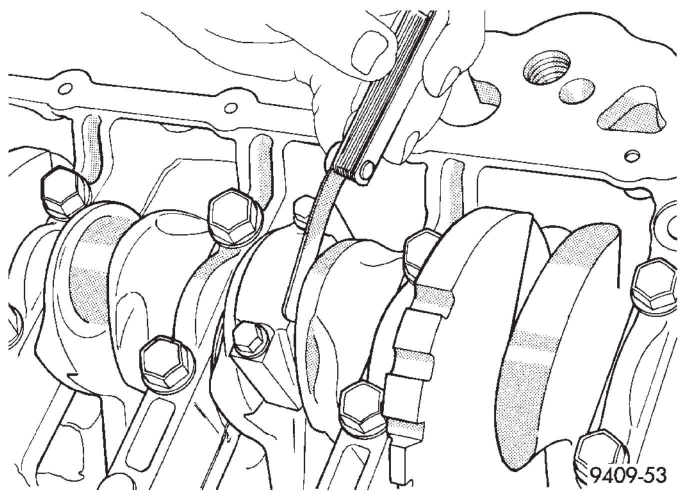


Fig. 39 Connecting Rod Side Clearance

CRANKSHAFT

DESCRIPTION

The crankshaft is made of nodular cast iron and includes five main bearing journals and four connecting rod journals (Fig. 40). The number three journal is the location for the thrust bearing. The mains and connecting rod journals have undercut fillet radiuses that are rolled for added strength. To optimize bearing loading, eight counterweights are used.

CRANKSHAFT (Continued)

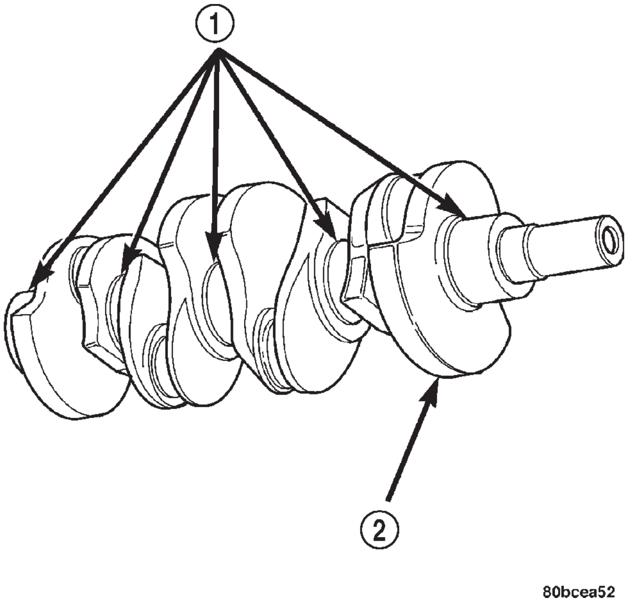


Fig. 40 Crankshaft - Typical

1 - MAIN BEARING JOURNALS
2 - COUNTER BALANCE WEIGHTS

OPERATION

The crankshaft transfers force generated by combustion within the cylinder to the flywheel or flexplate.

STANDARD PROCEDURE - MEASURING CRANKSHAFT END PLAY

(1) Mount a dial indicator to front of engine with the locating probe on nose of crankshaft (Fig. 41).
(2) Move crankshaft all the way to the rear of its travel.
(3) Zero the dial indicator.
(4) Move crankshaft all the way to the front and read the dial indicator. (Refer to 9 - ENGINE - SPECIFICATIONS) for end play specification.

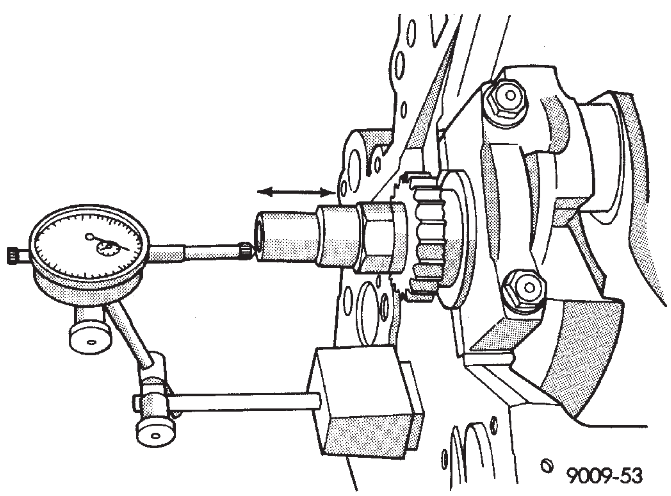


Fig. 41 Checking Crankshaft End Play—Typical

REMOVAL

NOTE: Crankshaft can not be removed when engine is in vehicle.

(1) Remove engine assembly from vehicle. (Refer to 9 - ENGINE - REMOVAL)
(2) Separate engine from transaxle.
(3) Remove flex plate and crankshaft rear oil seal.
(4) Mount engine on a repair stand.
(5) Drain engine oil and remove oil filter.
(6) Remove the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)
(7) Remove engine mount support bracket.
(8) Remove the crankshaft damper and timing belt covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)
(9) Remove the timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)
(10) Remove the crankshaft sprocket and oil pump. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL)
(11) Remove balance shafts and housing assembly. (Refer to 9 - ENGINE/VALVE TIMING/BALANCE SHAFT - REMOVAL)

NOTE: If piston/connecting rod replacement is necessary, remove cylinder head.

(12) Using a permanent ink or paint marker, identify cylinder number on each connecting rod cap.

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods. Damage to connecting rod could occur.

(13) Remove all connecting rod bolts and caps. Care should be taken not to damage the fracture rod and cap surfaces.

NOTE: Do not reuse connecting rod bolts.

(14) Remove all bedplate bolts from the engine block (Fig. 42).
(15) Using a mallet gently tap the bedplate loose from the engine block dowel pins.

CAUTION: Do not pry up on one side of the bedplate. Damage may occur to cylinder block to bedplate alignment and thrust bearing.

(16) Bedplate should be removed evenly from the cylinder block dowel pins to prevent damage to the dowel pins and thrust bearing.
(17) Lift out crankshaft from cylinder block. Do not damage the main bearings or journals when removing the crankshaft.

CRANKSHAFT (Continued)

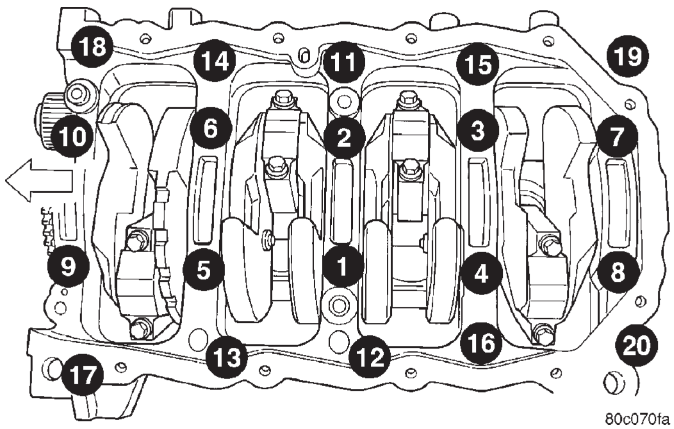


Fig. 42 Bedplate Bolt Tightenening Sequence

INSPECTION

The crankshaft journals should be checked for excessive wear, taper and scoring (Fig. 43). Limits of taper or out of round on any crankshaft journals should be held to 0.025 mm (0.001 in.). Journal grinding should not exceed 0.305 mm (0.012 in.) under the standard journal diameter. DO NOT grind thrust faces of No. 3 main bearing. DO NOT nick crank pin or bearing fillets. After grinding, remove rough edges from crankshaft oil holes and clean out all passages.

CAUTION: With the nodular cast iron crankshafts, it is important that the final paper or cloth polish be in the same direction as normal rotation in the engine.

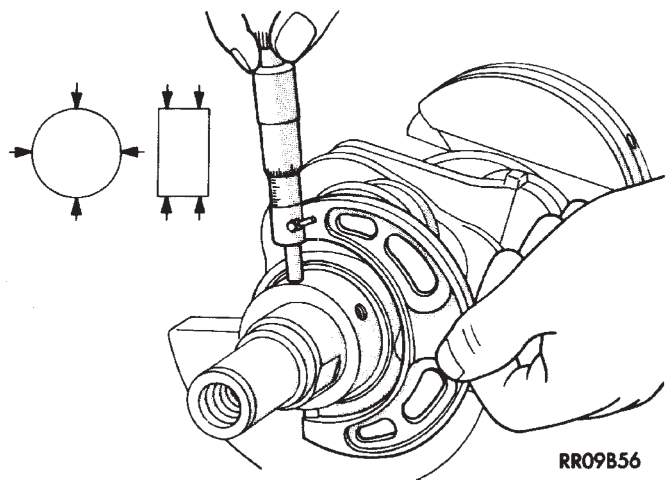


Fig. 43 Crankshaft Journal Measurements

Upper and lower No. 3 bearing halves are flanged to carry the crankshaft thrust loads and are NOT interchangeable with any other bearing halves in the engine (Fig. 47). All bearing cap bolts removed during service procedures are to be cleaned and oiled before installation. Bearing shells are available in standard and the following undersized: 0.016 mm (0.0006 in.), 0.032 mm (0.0012 in.), 0.250 mm (0.010 in.). Never install an undersize bearing that will reduce clearance below specifications.

INSTALLATION

(1) Install the main bearing upper shells with the lubrication groove in the cylinder block (Fig. 44).

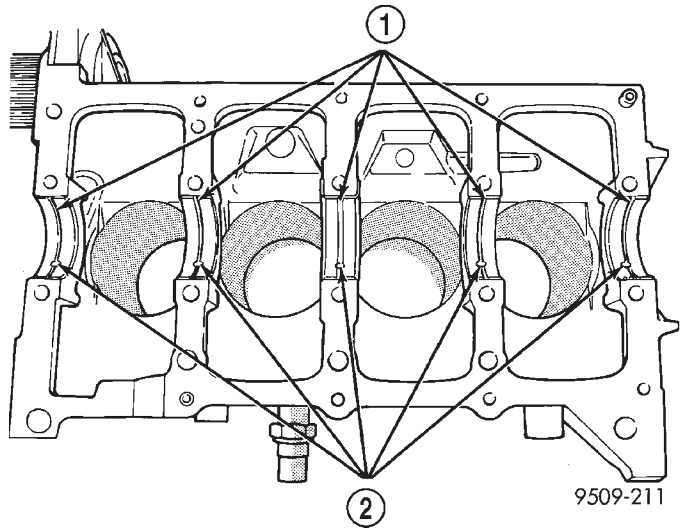


Fig. 44 Installing Main Bearing Upper Shell

1 - LUBRICATION GROOVES
2 - OIL HOLES

(2) Make certain oil holes in block line up with oil hole in bearings and bearing tabs seat in the block tab slots.

CAUTION: Do not get oil on the bedplate mating surface. It will affect the sealer ability to seal the bedplate to cylinder block.

(3) Oil the bearings and journals. Install crankshaft.

CAUTION: Use only the specified anaerobic sealer on the bedplate or damage may occur to the engine.

(4) Apply 1.5 to 2.0 mm (0.059 to 0.078 in.) bead of Mopar® Bed Plate Sealant to cylinder block as shown in (Fig. 45).

(5) Install lower main bearings into main bearing cap/bedplate. Make certain the bearing tabs are seated into the bedplate slots. Install the main bearing/bedplate into engine block.

(6) Before installing the bolts the threads should be oiled with clean engine oil, wipe off any excess oil.

(7) Install main bearing bedplate to engine block bolts 11, 17, and 20 finger tight. Tighten these bolts down together until the bedplate contacts the cylinder block.

CRANKSHAFT (Continued)

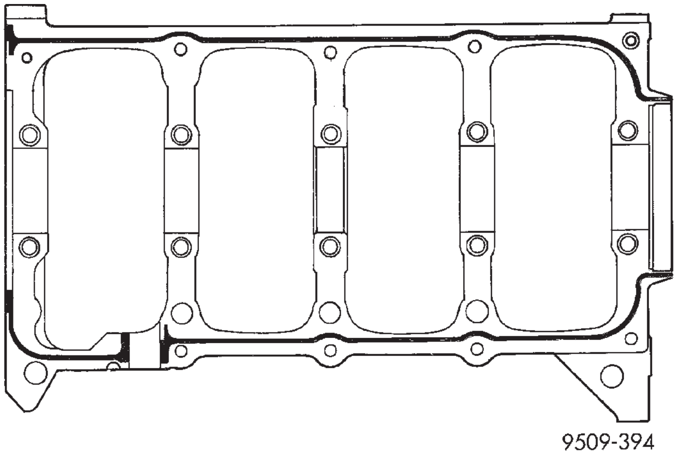


Fig. 45 Bedplate Sealing

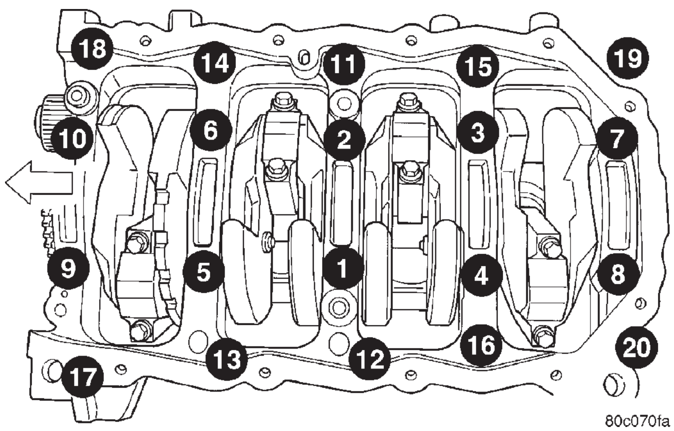


Fig. 46 Bedplate Bolt Torque Sequence

(8) To ensure correct thrust bearing alignment, perform the following steps:

• Step 1: Rotate crankshaft until number 4 piston is at TDC.

• Step 2: Move crankshaft rearward to limits of travel.

• Step 3: Then, move crankshaft forward to limits of travel.

• Step 4: Wedge an appropriate tool between the rear of the cylinder block **(NOT BED PLATE)** and the rear crankshaft counterweight. This will hold the crankshaft in it's furthest forward position.

• Step 5: Install and tighten bolts (1–10) in sequence shown in (Fig. 46) to 41 N·m (30 ft. lbs.).

• Step 6: Remove wedge tool used to hold crankshaft.

(9) Tighten bolts (1–10) again to 41 N·m (30 ft. lbs.) in sequence shown in (Fig. 46).

(10) Tighten bolts (1–10) to 75 N·m (55 ft. lbs.) in sequence shown in (Fig. 46).

(11) Install main bearing bedplate to engine block bolts (11–20), and torque each bolt to 28 N·m (250 in. lbs.) in sequence shown in (Fig. 46).

(12) Tighten bolts (11–20) again to 28 N·m (250 in. lbs.) in sequence shown in (Fig. 46).

(13) After the main bearing bedplate is installed, check the crankshaft turning torque. The turning torque should not exceed 5.6 N·m (50 in. lbs.).

(14) Install connecting rod bearings and caps. **Do Not Reuse Connecting Rod Bolts.** Torque connecting rod bolts to 27 N·m (20 ft. lbs.) plus 1/4 turn.

(15) Install balance shafts and housing assembly. (Refer to 9 - ENGINE/VALVE TIMING/BALANCE SHAFT - INSTALLATION)

(16) Install the oil pump. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSTALLATION)

(17) Install cylinder head if it was removed (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION).

(18) Install the timing belt rear cover. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)

(19) Install crankshaft sprocket (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(20) Install the timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

(21) Install the timing belt front covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)

(22) Install engine mount support bracket.

(23) Install the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

(24) Install the oil filter.

(25) Install crankshaft rear oil seal. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - INSTALLATION)

(26) Install flex plate. Apply Mopar® Lock & Seal Adhesive to bolt threads and tighten to 95 N·m (70 ft. lbs.).

(27) Attach transaxle to engine. Tighten attaching bolts to 101 N·m (75 ft. lbs.).

(28) Install the engine assembly. (Refer to 9 - ENGINE - INSTALLATION)

CRANKSHAFT MAIN BEARINGS

STANDARD PROCEDURE - MAIN BEARING - FITTING

For crankshaft specifications (Refer to 9 - ENGINE - SPECIFICATIONS).

CRANKSHAFT MAIN BEARINGS

The crankshaft is supported in five main bearings. All upper and lower bearing shells in the crankcase have oil grooves. Crankshaft end play is controlled by a flanged bearing on the number three main bearing journal (Fig. 47).

CRANKSHAFT MAIN BEARINGS (Continued)

Upper and lower Number 3 bearing halves are flanged to carry the crankshaft thrust loads and are NOT interchangeable with any other bearing halves in the engine (Fig. 47). All bearing cap bolts removed during service procedures are to be cleaned and oiled before installation. Bearing shells are available in standard and the following undersized: 0.025 mm (0.001 in.) and 0.250 mm (0.010 in.). Never install an undersize bearing that will reduce clearance below specifications. Replace or machine the crankshaft as necessary to obtain proper bearing clearances.

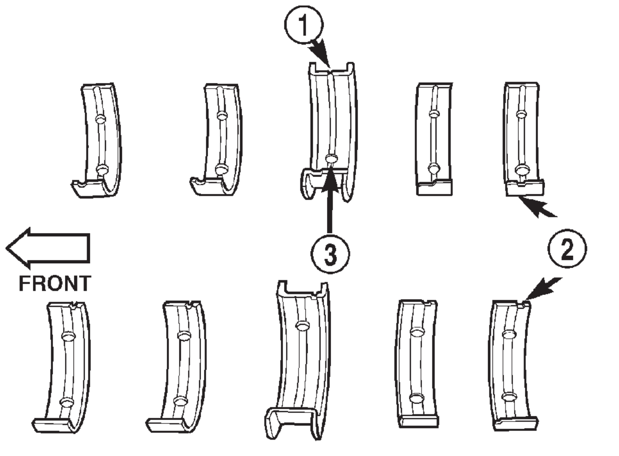


Fig. 47 Main Bearing Identification

1 - OIL GROOVE
2 - MAIN BEARINGS
3 - OIL HOLE

MAIN BEARING INSTALLATION

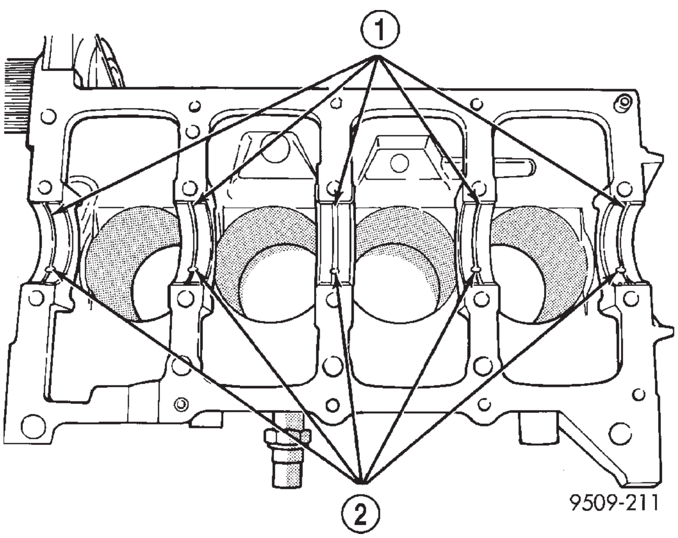


Fig. 48 Installing Main Bearing Upper Shell

1 - LUBRICATION GROOVES
2 - OIL HOLES

(1) Install the main bearing shells with the lubrication groove in the cylinder block (Fig. 48).

(2) Make certain oil holes in block line up with oil holes in bearings. Bearing tabs must seat in the block tab slots.

CAUTION: Do not get oil on the bedplate mating surface. It will may effect the sealer ability to seal the bedplate to cylinder block.

(3) Oil the bearings and journals and install crankshaft.

CAUTION: Use only the specified anaerobic sealer on the bedplate or damage may occur to the engine. Ensure that both cylinder block and bedplate surfaces are clean.

(4) Apply 1.5 to 2.0 mm (0.059 to 0.078 in.) bead of anaerobic sealer Mopar® Bed Plate Sealant to cylinder block as shown in (Fig. 49).

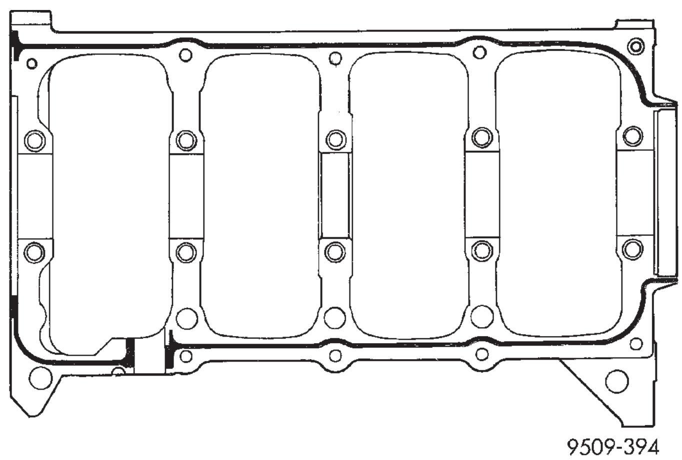


Fig. 49 Main Bearing Caps/Bedplate Sealing

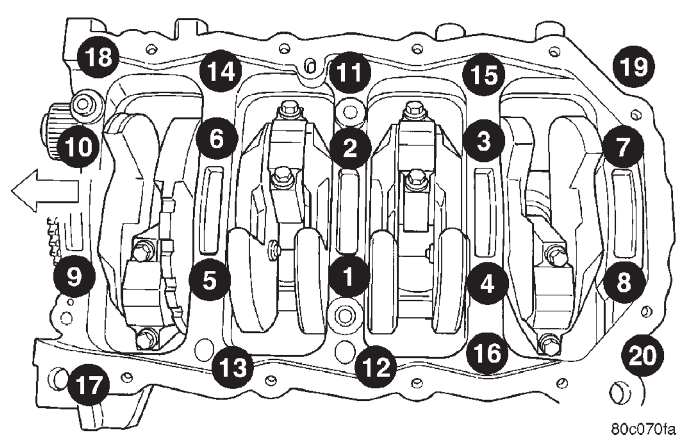


Fig. 50 Main Bearing Caps/Bedplate Tightening Sequence

(5) Install lower main bearings into main bearing cap/bedplate. Make certain the bearing tabs are seated into the bedplate slots.

(6) Position the main bearing/bedplate onto the engine block.

CRANKSHAFT MAIN BEARINGS (Continued)

(7) Before installing bolts, lubricate the threads with clean engine oil, wipe off any excess oil.

(8) Install main bearing bedplate to engine block bolts 11, 17 and 20 finger tight. Tighten these bolts down together until the bedplate contacts the cylinder block.

(9) To ensure correct thrust bearing alignment, perform the following steps:

- Step 1: Rotate crankshaft until number 4 piston is at TDC.
- Step 2: Move crankshaft rearward to limits of travel.
- Step 3: Then, move crankshaft forward to limits of travel.
- Step 4: Wedge an appropriate tool between the rear of the cylinder block **(NOT BED PLATE)** and the rear crankshaft counterweight. This will hold the crankshaft in it's furthest forward position.
- Step 5: Install and tighten bolts (1–10) in sequence shown in (Fig. 50) to 41 N·m (30 ft. lbs.).
- Step 6: Remove wedge tool used to hold crankshaft.

(10) Tighten bolts (1–10) again to 41 N·m (30 ft. lbs.) in sequence shown in (Fig. 50).

(11) Tighten bolts (1–10) to 75 N·m (55 ft. lbs.) in sequence shown in (Fig. 50).

(12) Install main bearing bedplate to engine block bolts (11–20), and torque each bolt to 28 N·m (250 in. lbs.) in sequence shown in (Fig. 50).

(13) Tighten bolts (11–20) again to 28 N·m (250 in. lbs.) in sequence shown in (Fig. 50).

(14) After the main bearing bedplate is installed, check the crankshaft turning torque. The turning torque should not exceed 5.6 N·m (50 in. lbs.).

CRANKSHAFT OIL SEAL - FRONT

REMOVAL

(1) Disconnect negative battery cable.

(2) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(3) Remove crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).

(4) Remove timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(5) Remove crankshaft sprocket using Special Tool 6793 and insert C-4685-C2 (Fig. 51).

CAUTION: Do not nick shaft seal surface or seal bore.

(6) Use Tool 6771 to remove front crankshaft oil seal (Fig. 52). Be careful not to damage the seal surface of cover.

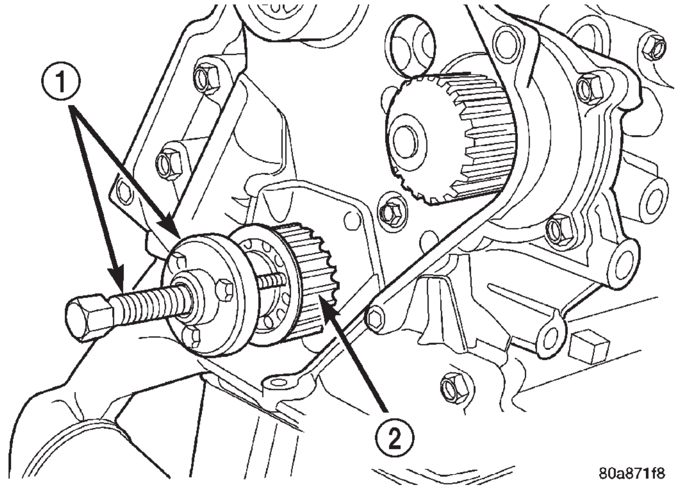


Fig. 51 Crankshaft Sprocket—Removal

1 - SPECIAL TOOL 6793
2 - CRANKSHAFT SPROCKET

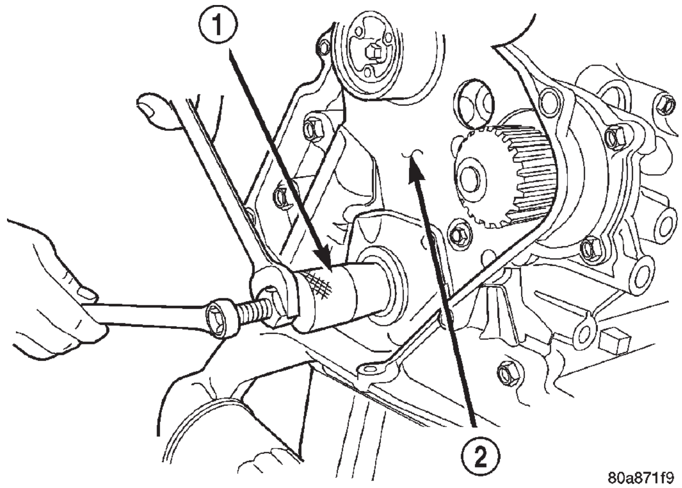


Fig. 52 Front Crankshaft Oil Seal—Removal

1 - SPECIAL TOOL 6771
2 - REAR TIMING BELT COVER

INSTALLATION

(1) Install new seal by using Special Tool 6780 (Fig. 53).

(2) Place seal into opening with seal spring towards the inside of engine. Install seal until flush with cover.

(3) Install crankshaft sprocket using Special Tool 6792 (Fig. 54).

(4) Install timing belt and timing belt covers (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

CRANKSHAFT OIL SEAL - FRONT (Continued)

(5) Install crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(6) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(7) Connect negative battery cable.

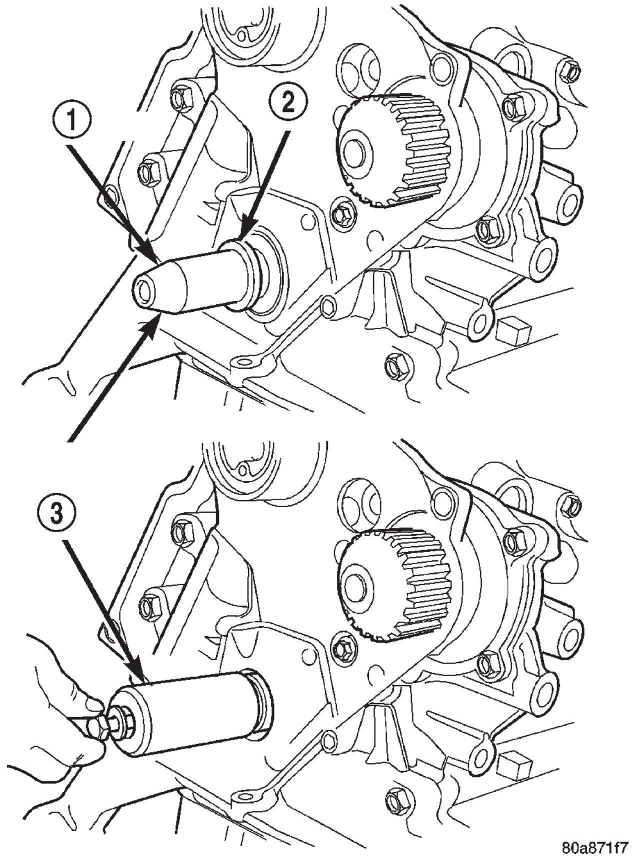


Fig. 53 Front Crankshaft Oil Seal—Installation

1 - PROTECTOR
2 - SEAL
3 - SPECIAL TOOL 6780

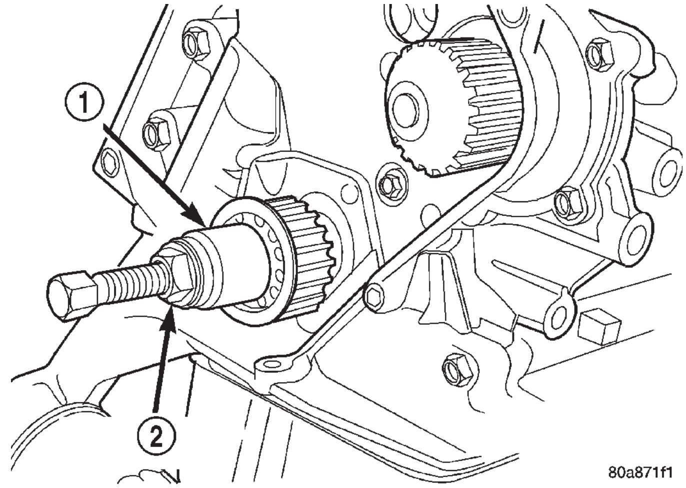


Fig. 54 Crankshaft Sprocket—Installation

1 - SPECIAL TOOL 6792
2 - TIGHTEN NUT TO INSTALL

CRANKSHAFT OIL SEAL - REAR

REMOVAL

(1) Remove transaxle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - REMOVAL).

(2) Remove flex plate (Refer to 9 - ENGINE/ENGINE BLOCK/FLEX PLATE - REMOVAL).

(3) Insert a 3/16 flat bladed screwdriver between the dust lip and the metal case of the crankshaft seal. Angle the screwdriver (Fig. 55)through the dust lip against metal case of the seal. Pry out seal.

CAUTION: Do not permit the screwdriver blade to contact crankshaft seal surface. Contact of the screwdriver blade against crankshaft edge (chamfer) is permitted.

INSTALLATION

CAUTION: If burr or scratch is present on the crankshaft edge (chamfer), cleanup with 400 grit sand paper to prevent seal damage during installation of new seal.

NOTE: When installing seal, no lube on seal is needed.

(1) Place Special Tool 6926-1 Seal Guide on crankshaft (Fig. 56).

(2) Position seal over guide tool (Fig. 56). Guide tool should remain on crankshaft during installation of seal. Ensure that the lip of the seal is facing towards the crankcase during installation.

CRANKSHAFT OIL SEAL - REAR (Continued)

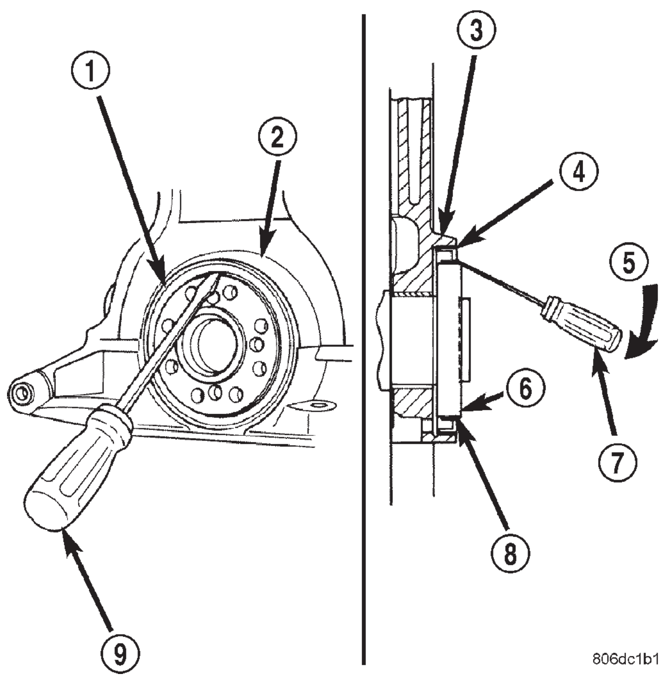


Fig. 55 Rear Crankshaft Oil Seal—Removal

1 - REAR CRANKSHAFT SEAL
2 - ENGINE BLOCK
3 - ENGINE BLOCK
4 - REAR CRANKSHAFT SEAL METAL CASE
5 - PRY IN THIS DIRECTION
6 - CRANKSHAFT
7 - SCREWDRIVER
8 - REAR CRANKSHAFT SEAL DUST LIP
9 - SCREWDRIVER

CAUTION: If the seal is driven into the block past flush, this may cause an oil leak.

(3) Drive the seal into the block using Special Tool 6926-2 and handle C-4171 (Fig. 57) until the tool bottoms out against the block (Fig. 58).

(4) Install flex plate. Apply Mopar® Lock & Seal Adhesive to bolt threads and tighten bolts to 95 N·m (70 ft. lbs.).

(5) Install transaxle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - INSTALLATION).

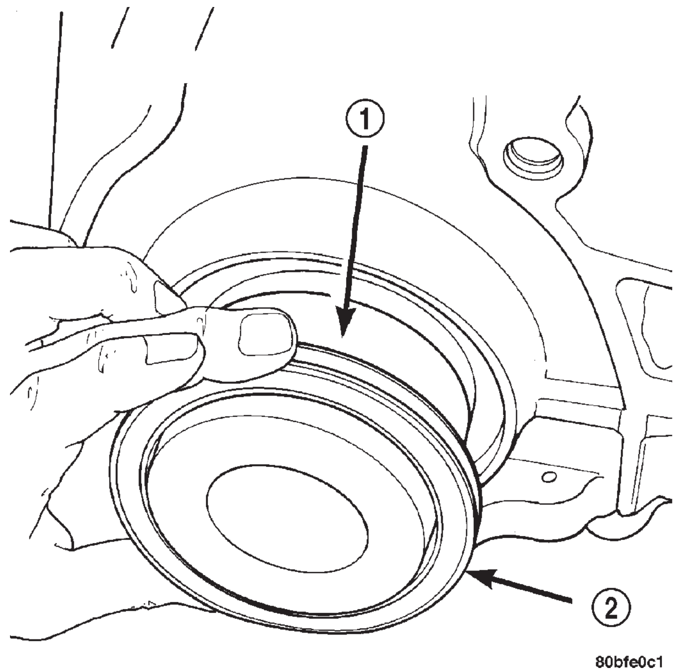


Fig. 56 Rear Crankshaft Seal and Special Tool 6926-1

1 - SPECIAL TOOL 6926–1 PILOT
2 - SEAL

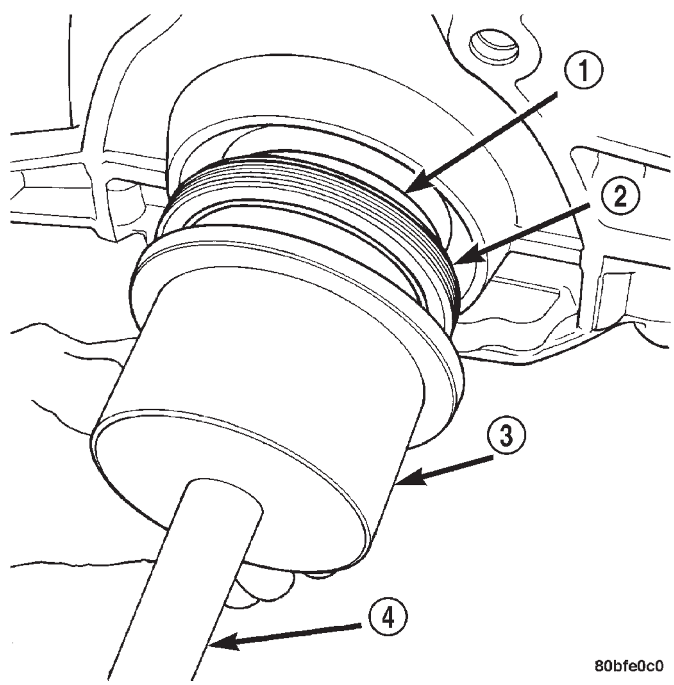


Fig. 57 Crankshaft Seal and Special Tools 6926-2 & C-4171

1 - SPECIAL TOOL 6926–1 PILOT
2 - SEAL
3 - SPECIAL TOOL 6926–2 INSTALLER
4 - SPECIAL TOOL C-4171

CRANKSHAFT OIL SEAL - REAR (Continued)

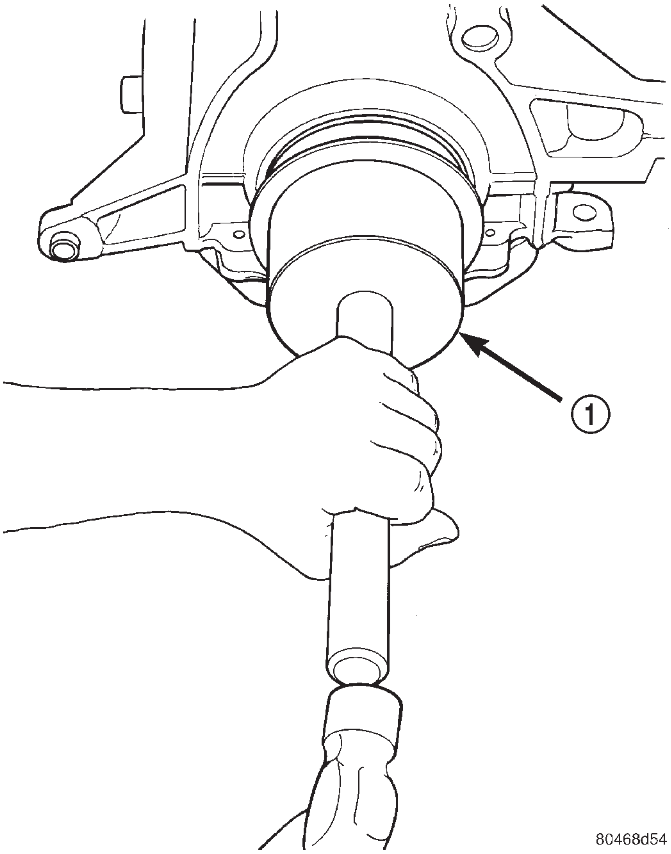


Fig. 58 Rear Crankshaft Seal—Installation

1 - SPECIAL TOOL 6926–2 INSTALLER

FLEX PLATE

REMOVAL

(1) Remove the transaxle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - REMOVAL).

(2) Remove the flex plate attaching bolts (Fig. 59).

(3) Remove the flex plate (Fig. 59).

INSTALLATION

(1) Position the drive plate on crankshaft (Fig. 59).

(2) Apply Mopar® Lock & Seal Adhesive to flex plate bolt threads.

(3) Install the flex plate bolts and tighten to 95 N·m (70 ft. lbs.) (Fig. 59).

(4) Install the transaxle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - INSTALLATION).

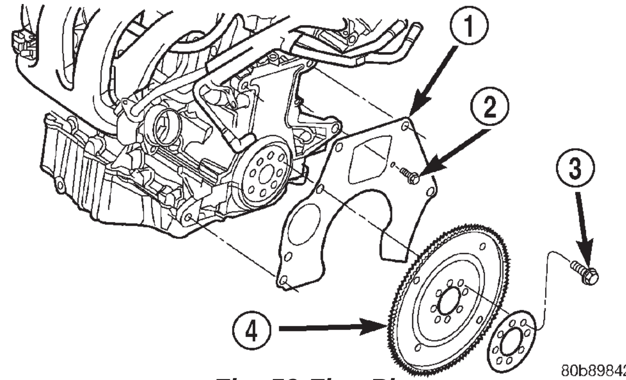


Fig. 59 Flex Plate

1 - ADAPTOR PLATE
2 - BOLT
3 - BOLT (QTY. 8)
4 - FLEX PLATE

PISTON & CONNECTING ROD

DESCRIPTION

The pistons are made of a cast aluminum alloy. The pistons have pressed-in pins attached to forged powdered metal connecting rods. The pistons pin is offset 1 mm (0.0394 in.) towards the thrust side of the piston. The connecting rods are a cracked cap design and are not repairable. Hex head cap screws are used to provide alignment and durability in the assembly. The pistons and connecting rods are serviced as an assembly.

OPERATION

The piston and connecting rod is the link between the combustion force to the crankshaft.

REMOVAL

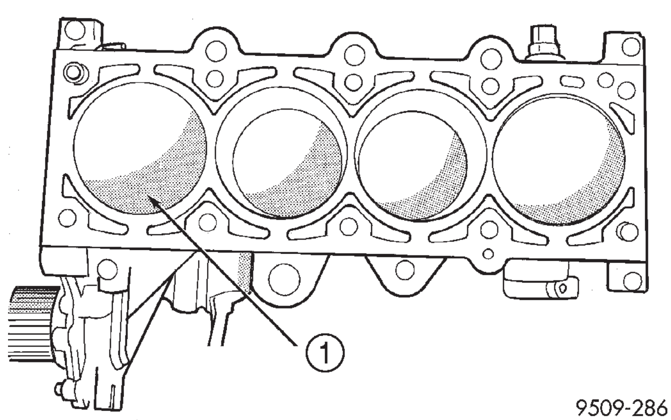


Fig. 60 Piston Markings

1 - DIRECTIONAL ARROW WILL BE IMPRINTED IN THIS AREA

NOTE: Cylinder Head must be removed before Pistons and Rods (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL).

PISTON & CONNECTING ROD (Continued)

(1) Remove top ridge of cylinder bores with a reliable ridge reamer before removing pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation**.

(2) Pistons have a directional stamping in the front half of the piston facing towards the **front** of engine (Fig. 60).

(3) Remove oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).

(4) Remove Balance Shaft Carrier Assembly (Refer to 9 - ENGINE/VALVE TIMING/BALANCE SHAFT CARRIER - REMOVAL).

(5) Using a permanent ink or paint marker, identify cylinder number on each connecting rod cap (Fig. 61).

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods. Damage to connecting rod could occur.

(6) Remove connecting rod bolts and cap. Care should be taken not to damage the fracture rod and cap surfaces.

NOTE: Do not reuse connecting rod bolts.

(7) Pistons and connecting rods must be removed from top of cylinder block. Rotate crankshaft so that each connecting rod is centered in cylinder bore.

(8) Push piston and rod assembly out of cylinder bore.

NOTE: Be careful not to nick crankshaft journals.

(9) After removal, install bearing cap on the mating rod.

(10) Repeat procedure for each piston and connecting rod assembly.

(11) Piston and connecting rods are serviced as an assembly.

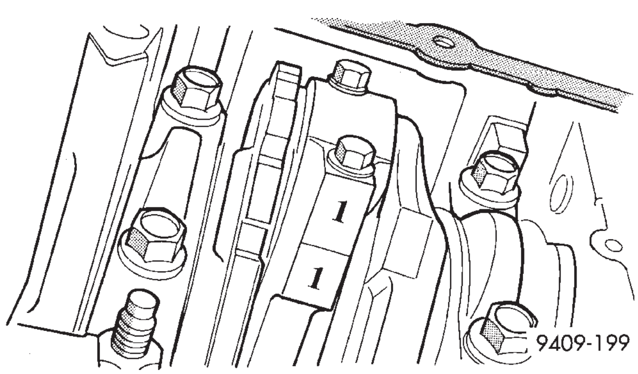


Fig. 61 Identify Connecting Rod to Cylinder

INSTALLATION

(1) Before installing pistons and connecting rod assemblies into the bore, be sure that compression ring gaps are staggered so that neither is in line with oil ring rail gap (Fig. 62).

(2) Before installing the ring compressor, make sure the oil ring expander ends are butted and the rail gaps located as shown in (Fig. 62). As viewed from top.

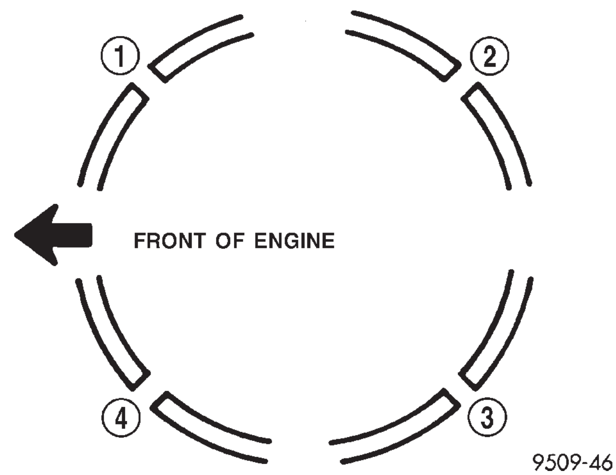


Fig. 62 Piston Ring End Gap Position

1 - GAP OF LOWER SIDE RAIL
2 - NO. 1 RING GAP
3 - GAP OF UPPER SIDE RAIL
4 - NO. 2 RING GAP AND SPACER EXPANDER GAP

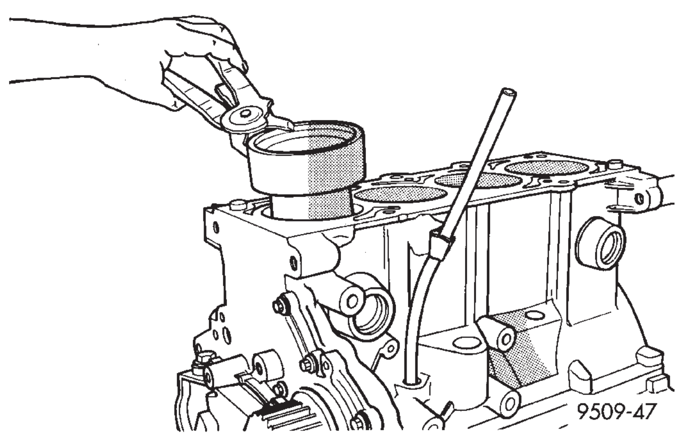


Fig. 63 Piston—Installation

(3) Immerse the piston head and rings in clean engine oil, slide the ring compressor, over the piston (Fig. 63). **Be sure position of rings does not change during this operation** .

(4) The directional stamp on the piston should face toward the front of the engine (Fig. 60).

PISTON & CONNECTING ROD (Continued)

(5) Rotate crankshaft so that the connecting rod journal is on the center of the cylinder bore. Insert rod and piston assembly into cylinder bore and guide rod over the crankshaft journal.

(6) Tap the piston down in cylinder bore, using a hammer handle. At the same time, guide connecting rod into position on connecting rod journal.

NOTE: The connecting rod cap bolts should not be reused.

(7) Before installing the **NEW** bolts the threads should be coated with clean engine oil.

(8) Install each bolt finger tight then alternately torque each bolt to assemble the cap properly.

CAUTION: Do not use a torque wrench for second part of last step.

(9) Tighten the bolts to 27 N·m PLUS 1/4 turn (20 ft. lbs. PLUS 1/4 turn).

(10) Using a feeler gauge, check connecting rod side clearance (Fig. 64).

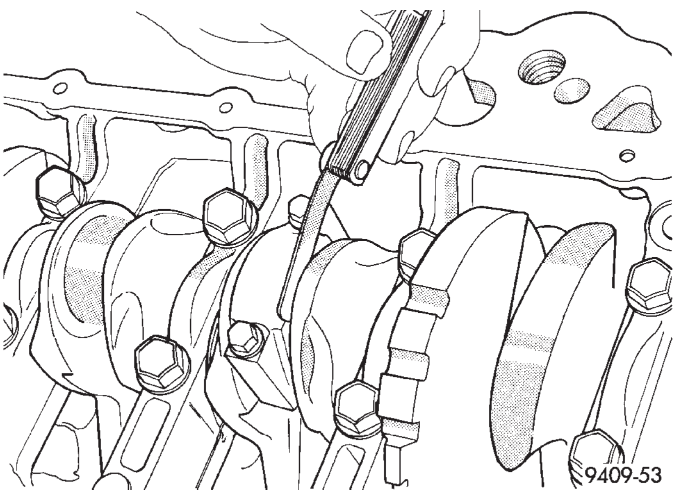


Fig. 64 Checking Connecting Rod Side Clearance

(11) Install Balance Shaft Carrier Assembly (Refer to 9 - ENGINE/VALVE TIMING/BALANCE SHAFT CARRIER - INSTALLATION).

(12) Install oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

(13) Install cylinder head (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION).

PISTON RINGS

STANDARD PROCEDURE

PISTON RING - FITTING

(1) Wipe cylinder bore clean. Insert ring and push down with piston to ensure it is square in bore. The ring gap measurement must be made with the ring positioning at least 12 mm (0.50 inch) from bottom of cylinder bore. Check gap with feeler gauge (Fig. 65). Refer to Engine Specifications.

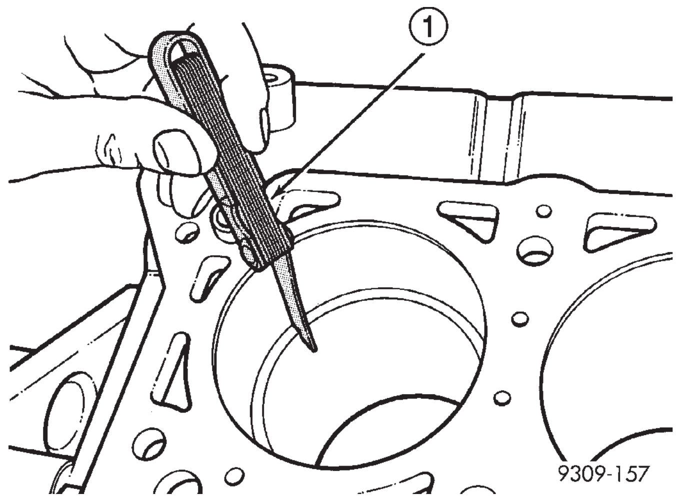


Fig. 65 Piston Ring Gap

1 - FEELER GAUGE

(2) Check piston ring to groove side clearance (Fig. 66). Refer to Engine Specifications.

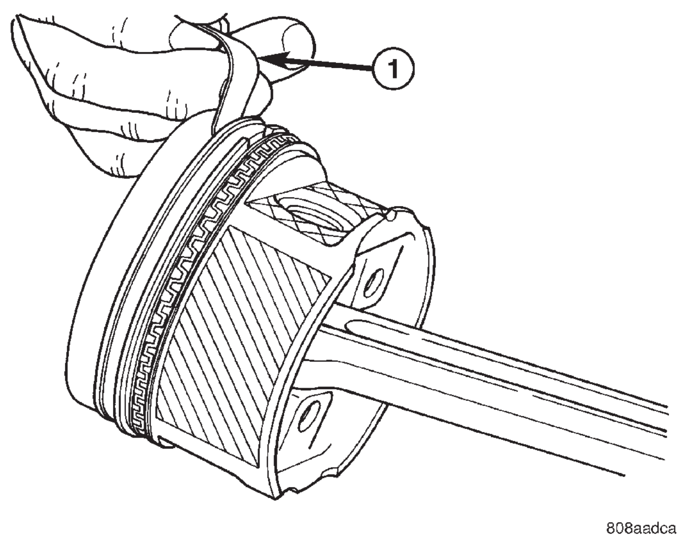


Fig. 66 Piston Ring Side Clearance

1 - FEELER GAUGE

PISTON RINGS (Continued)

PISTON RINGS - INSTALLATION

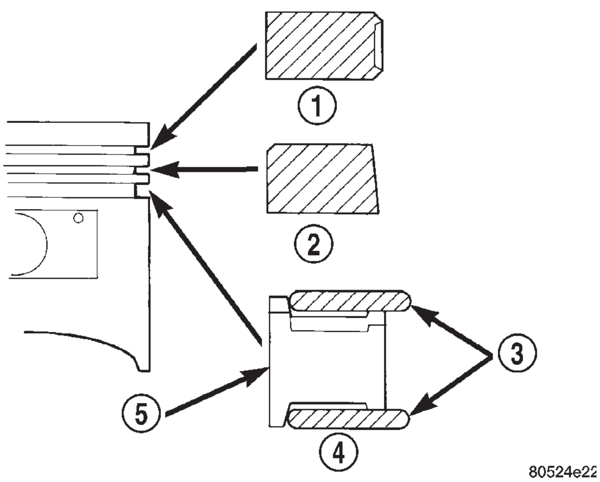


Fig. 67 Piston Ring Installation

1 - NO. 1 PISTON RING
2 - NO. 2 PISTON RING
3 - SIDE RAIL
4 - OIL RING
5 - SPACER EXPANDER

(1) Install rings with manufacturers I.D. mark facing up, to the top of the piston (Fig. 67).

CAUTION: Install piston rings in the following order:

- Oil ring expander.
- Upper oil ring side rail.
- Lower oil ring side rail.
- No. 2 Intermediate piston ring.
- No. 1 Upper piston ring.

(2) Install the side rail by placing one end between the piston ring groove and the expander. Hold end firmly and press down the portion to be installed until side rail is in position. **Do not use a piston ring expander** (Fig. 68).

(3) Install upper side rail first and then the lower side rail.

(4) Install No. 2 piston ring and then No. 1 piston ring.

(5) Position piston ring end gaps as shown in (Fig. 69).

(6) Position oil ring expander gap at least 45° from the side rail gaps but **not** on the piston pin center or on the thrust direction. Staggering ring gap is important for oil control.

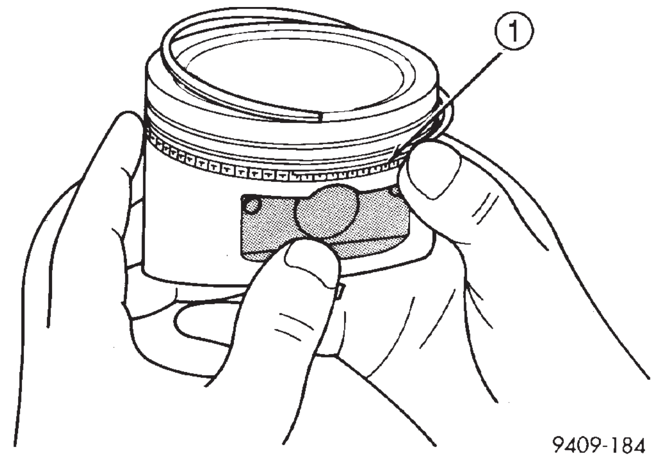


Fig. 68 Installing Side Rail

1 - SIDE RAIL END

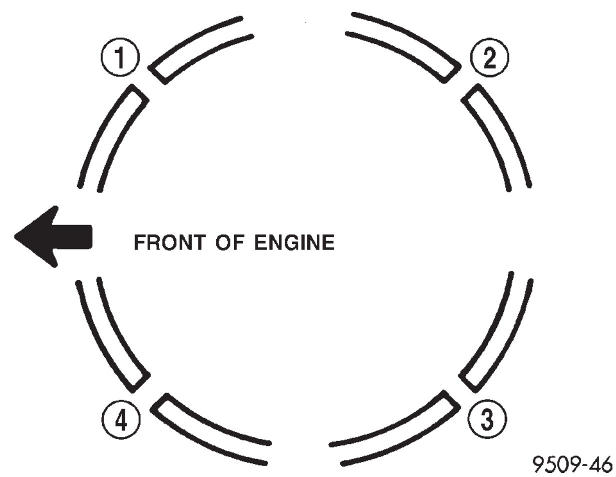


Fig. 69 Piston

1 - GAP OF LOWER SIDE RAIL
2 - NO. 1 RING GAP
3 - GAP OF UPPER SIDE RAIL
4 - NO. 2 RING GAP AND SPACER EXPANDER GAP

VIBRATION DAMPER

REMOVAL

(1) Disconnect negative battery cable.

(2) Support engine under oil pan with wooden block and floor jack.

(3) Remove three right side engine mount vertical bolts to front engine bracket.

(4) Raise vehicle on hoist.

(5) Remove right front wheel and belt splash shield.

(6) Support engine under oil pan with a wooden block and screw jack (Fig. 70).

(7) Remove front and rear engine mount through bolts.

(8) Slowly lower engine down with screw jack.

(9) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

VIBRATION DAMPER (Continued)

(10) Remove crankshaft damper bolt.

(11) Remove damper using Special Tool 8454 Puller and Insert 6827–A (Fig. 71).

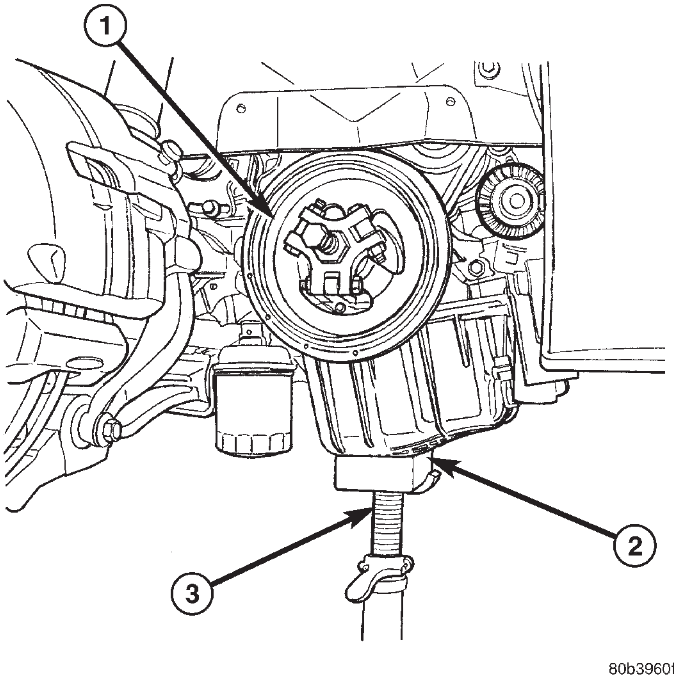


Fig. 70 Vibration Damper - Removal

1 - VIBRATION DAMPER
2 - WOODEN BLOCK
3 - SCREW JACK

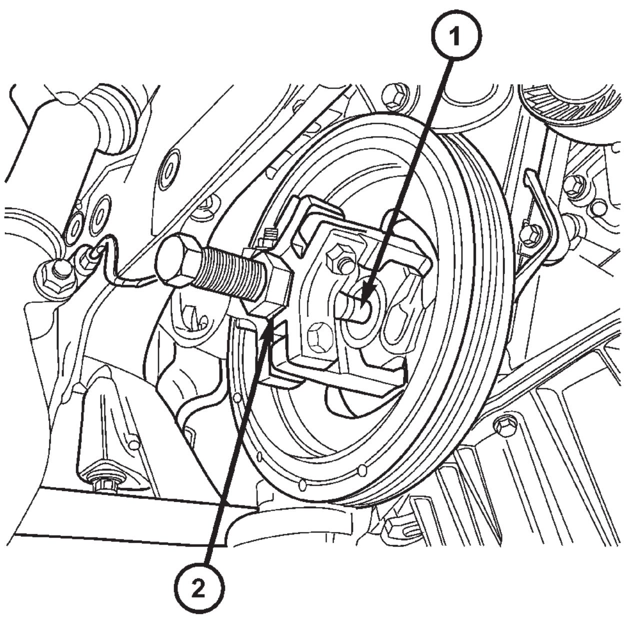


Fig. 71 Vibration Damper - Removal

1 - SPECIAL TOOL 6827-A INSERT
2 - SPECIAL TOOL 8454 PULLER

INSTALLATION

(1) Install crankshaft vibration damper using M12 1.75 x 150 mm bolt, washer, thrust bearing and nut from Special Tool 6792 (Fig. 72).

(2) Install crankshaft vibration damper bolt and tighten to 136 N·m (100 ft. lbs.).

(3) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(4) Raise engine with screw jack enough to install front and rear engine mount through bolts. Torque fasteners to 61 N·m (45 ft. lbs.).

(5) Install belt splash shield and right front wheel.

(6) Lower vehicle.

(7) Support engine under oil pan with wooden block and floor jack.

(8) Slowly raise engine with floor jack until engine mount bracket aligns with right side engine mount. Install three vertical bolts to front engine bracket. Torque fasteners to 61 N·m (45 ft. lbs.).

(9) Remove floor jack.

(10) Connect negative battery cable.

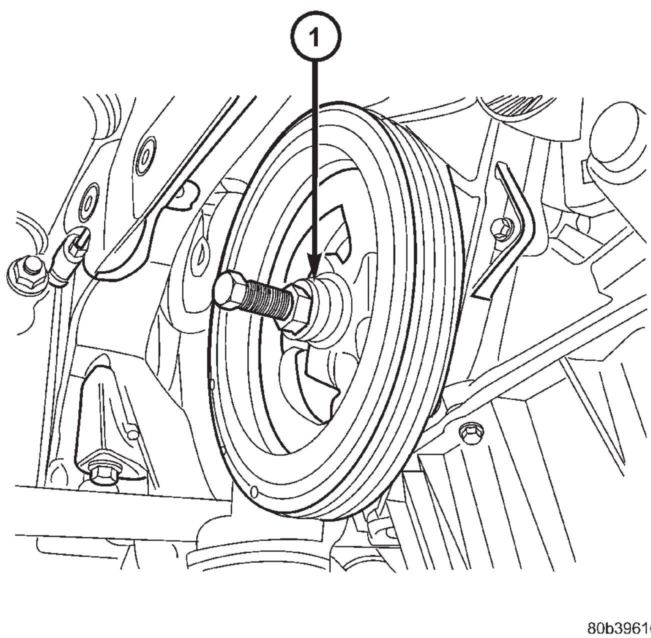


Fig. 72 Vibration Damper - Installation

1 - M12–1.75 × 150 MM BOLT, WASHER AND THRUST BEARING FROM SPECIAL TOOL 6792

STRUCTURAL COLLAR

REMOVAL

(1) Raise vehicle on hoist.

(2) Remove front engine mount through bolt.

(3) Remove bolts attaching torque reaction bracket to engine and transaxle (Fig. 73). Remove torque reaction bracket.

(4) Remove bolts attaching structural collar to oil pan and transaxle (Fig. 73). Remove structural collar.

INSTALLATION

CAUTION: Torque procedure for structural collar and torque reaction bracket must be followed or damage could occur to oil pan, collar, and/or bracket.

(1) Perform the following steps for installing structural collar and torque reaction bracket. Refer to (Fig. 73):

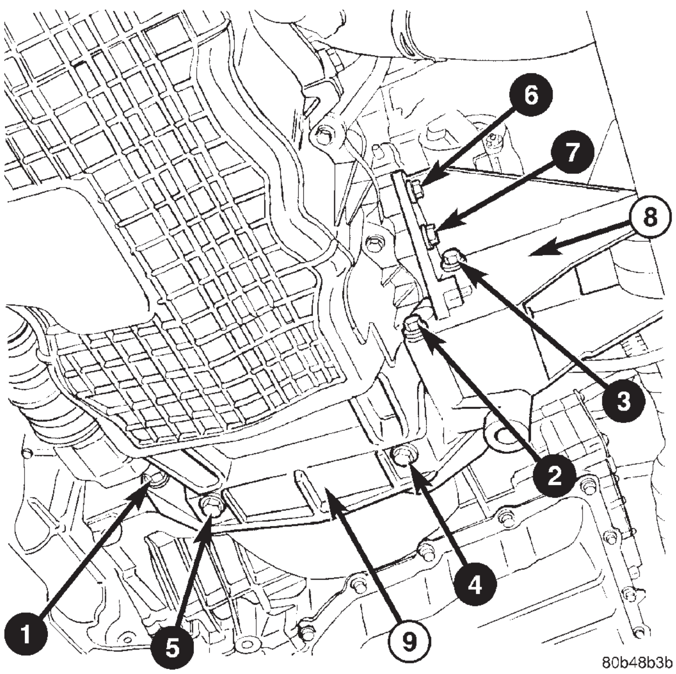


Fig. 73 Structural Collar and Torque Reaction Bracket

1-7 - BOLT TIGHTENING SEQUENCE
8 - TORQUE REACTION BRACKET
9 - STRUCTURAL COLLAR

- Step 1: Place collar into position between transaxle and oil pan. Install collar to transaxle bolt (1), **hand tight only**.
- Step 2: Install collar to oil pan bolts (4) and (5), **hand tight only**.
- Step 3: Position torque reaction bracket in place. Install attaching bolts (2) and (3), **hand tight only**.
- Step 4: Final torque bolts (1-3) to 101 N·m (75 ft. lbs.).
- Step 5: Install bolts (6) and (7) through torque reduction bracket into engine block, **hand tight only**.
- Step 6: Final torque bolts (4) and (5) to 45 N·m (35 ft. lbs.).
- Step 7: Final torque bolts (6) and (7) to 61 N·m (45 ft. lbs.).

(2) Install front engine mount through bolt and torque to 61 N·m (45 ft. lbs.).

(3) Lower vehicle.

ENGINE MOUNTING

ADJUSTMENTS

ENGINE SUPPORT ADJUSTMENT

The right and left support assemblies are slotted to allow for right/left drive train adjustment in relation to drive shaft assembly length.

Check and reposition right and left engine support assemblies as required. Adjust drive train position, if required, for the following conditions:

- Drive shaft distress: See Group 2, Suspension and Driveshaft.
- Any front end structural damage (after repair).
- Support Assembly replacement.

ENGINE SUPPORT ADJUSTMENT

(1) Remove the load on the engine motor mounts by carefully supporting the engine and transmission assembly with a floor jack.

(2) Loosen the right engine support assembly vertical fasteners.

(3) Loosen the left engine support assembly vertical bolts.

(4) Pry the engine right or left as required to achieve the proper drive shaft assembly length. Refer to Group 2, Suspension and Driveshaft for driveshaft identification and related assembly length measuring.

(5) Tighten right engine support assembly vertical bolts to 61 N·m (45 ft. lbs.). and tighten left engine support assembly bolts to 61 N·m (45 ft. lbs.).

(6) Recheck drive shaft length.

LEFT MOUNT

REMOVAL

(1) Disconnect negative battery cable.
(2) Remove throttle body air inlet hose and air cleaner housing assembly.
(3) Remove two nuts securing speed control servo bracket to left shock tower. Reposition servo.
(4) Support transmission with floor jack and wooden block.
(5) Remove the three vertical bolts from mount to transmission bracket (A) (Fig. 74).
(6) Slightly lower transmission with floor jack.
(7) Remove mount to frame rail fasteners (B) and remove mount (Fig. 74).

INSTALLATION

(1) Position mount to frame rail. Install mount to frame rail fasteners (B) (Fig. 74). Torque fasteners to 33 N·m (24 ft. lbs.).
(2) Raise transmission into position with floor jack.
(3) Install three vertical bolts from mount to transmission bracket (A) (Fig. 74). Torque fasteners to 61 N·m (45 ft. lbs.).
(4) Remove floor jack and wooden block.
(5) Install speed control servo to left shock tower. Torque fasteners to 6.7 N·m (60 in. lbs.)
(6) Install throttle body air inlet hose and air cleaner housing assembly.
(7) Connect negative battery cable.

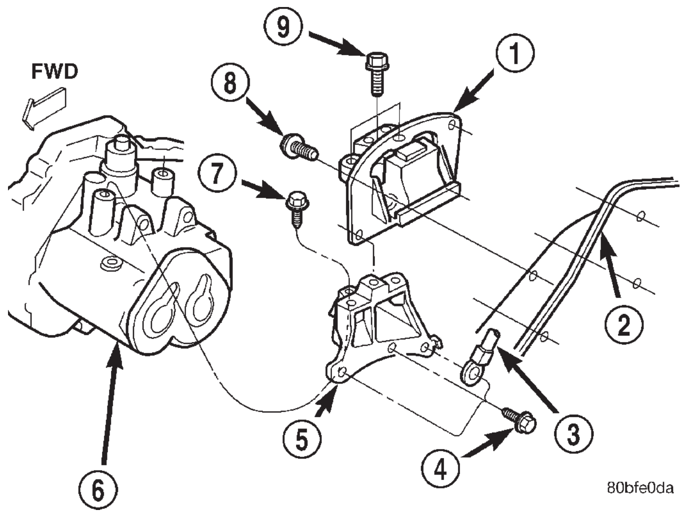


Fig. 74 Left Side Mount - Typical

1 - TRANSMISSION SUPPORT ASSEMBLY
2 - LEFT FRAME RAIL
3 - GROUND CABLE
4 - BOLT (D)
5 - TRANSMISSION BRACKET
6 - TRANSMISSION
7 - BOLT (C)
8 - BOLT (B)
9 - BOLT (A)

REAR MOUNT

REMOVAL

(1) Remove throttle body air inlet hose and air cleaner housing assembly.
(2) Remove three vertical bolts attaching rear mount bracket to transaxle case (Fig. 75).
(3) Raise vehicle on hoist.
(4) Remove rear mount bracket through bolt (Fig. 75).
(5) Remove horizontal bolt attaching rear mount bracket to transaxle case (Fig. 75).
(6) Remove mount bracket.
(7) Remove rear mount to suspension crossmember attaching bolts.
(8) Remove rear mount.

INSTALLATION

(1) Position rear mount on suspension crossmember and loosely install bolts.
(2) Position mount bracket on transaxle and install bolts. Tighten to 110 N·m (80 ft. lbs.) (Fig. 75).
(3) Install rear mount to bracket through bolt and tighten to 61 N·m (45 ft. lbs.) (Fig. 75).

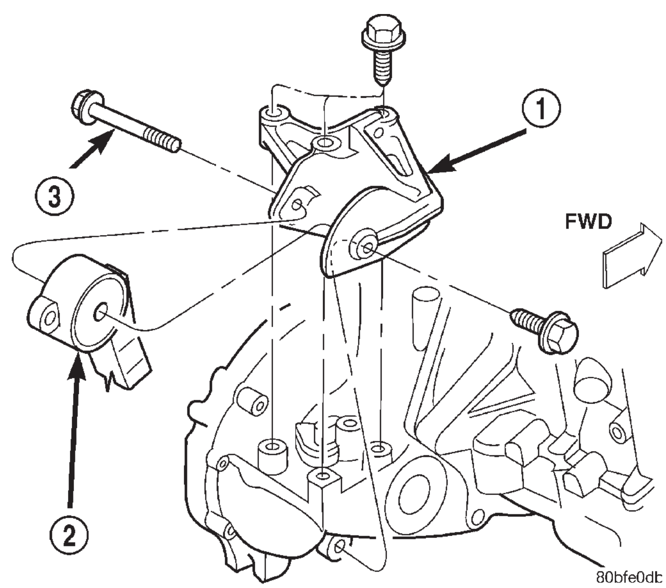


Fig. 75 Engine Mounting—Rear

1 - REAR TORQUE BRACKET
2 - REAR MOUNT
3 - THROUGH BOLT

(4) Tighten rear mount to crossmember bolts to 61 N·m (45 ft. lbs.) (Fig. 75).
(5) Lower vehicle. Install throttle body air inlet hose and air cleaner housing assembly.

RIGHT MOUNT

REMOVAL

(1) Remove coolant recovery container (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY CONTAINER - REMOVAL).

(2) Remove heater tube front attaching screw.

(3) Raise vehicle on a hoist and remove inner splash shield.

(4) Remove heater tube rear attaching screw.

(5) Remove the right engine support assembly vertical fasteners from frame rail (Fig. 76).

(6) Lower vehicle. Remove the load on the engine motor mounts by carefully supporting the engine assembly with floor jack and wooden block on oil pan.

(7) Remove the bolts attaching the engine support assembly to the engine bracket (Fig. 76).

(8) Remove right engine mount.

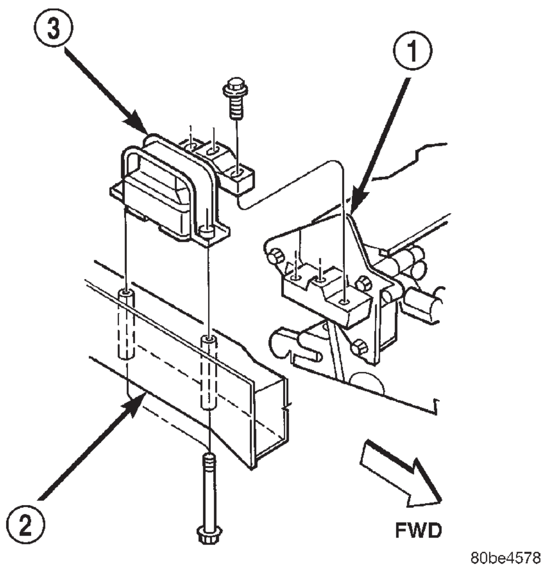


Fig. 76 Engine Mounting—Right Side

1 - ENGINE SUPPORT BRACKET
2 - FRAME RAIL
3 - RIGHT ENGINE MOUNT

INSTALLATION

(1) Position right engine mount and install frame rail to mount bolts. Tighten bolts to 61 N·m (45 ft. lbs.) (Fig. 76).

(2) Install the mount to engine support bracket bolts and tighten to 61 N·m (45 ft. lbs.) (Fig. 76).

(3) Raise vehicle on a hoist.

(4) Install heater tube rear attaching screw.

(5) Install inner splash shield and lower vehicle.

(6) Install heater tube front attaching screw.

(7) Install coolant recovery container (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY CONTAINER - INSTALLATION).

FRONT MOUNT

REMOVAL

(1) Raise vehicle.

(2) Remove front mount to bracket horizontal through bolt (Fig. 77).

(3) Remove front mount vertical bolts (Fig. 77).

(4) Remove front mount.

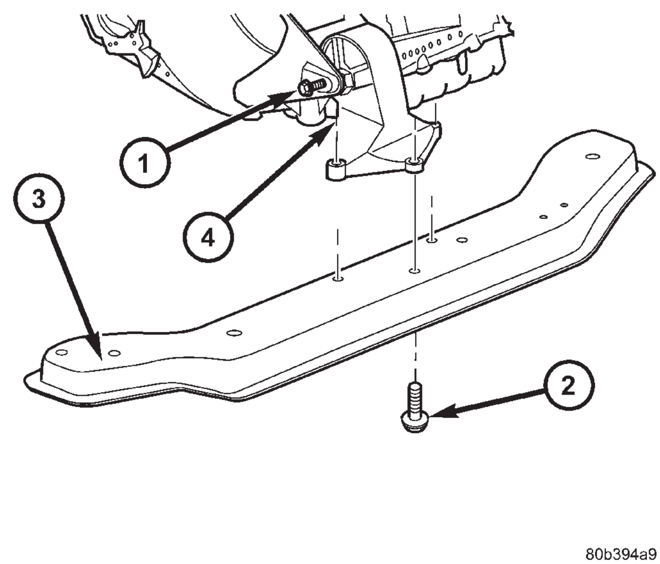


Fig. 77 FRONT ENGINE MOUNT

1 - HORIZONTAL THROUGH BOLT
2 - VERTICAL BOLT(S)
3 - LOWER RADIATOR CROSSMEMBER
4 - FRONT ENGINE MOUNT

INSTALLATION

(1) Position front mount on lower radiator crossmember.

(2) Loose install front mount to bracket through bolt.

(3) Install front mount vertical bolts. Tighten bolts to 61 N·m (45 ft. lbs.) (Fig. 77).

(4) Tighten horizontal through bolt to 61 N·m (45 ft. lbs.) (Fig. 77).

(5) Lower vehicle.

LUBRICATION

DESCRIPTION

The lubrication system is a full-flow filtration, pressure feed type. The oil pump (Fig. 78) is mounted in the front engine cover and driven by the crankshaft.

LUBRICATION (Continued)

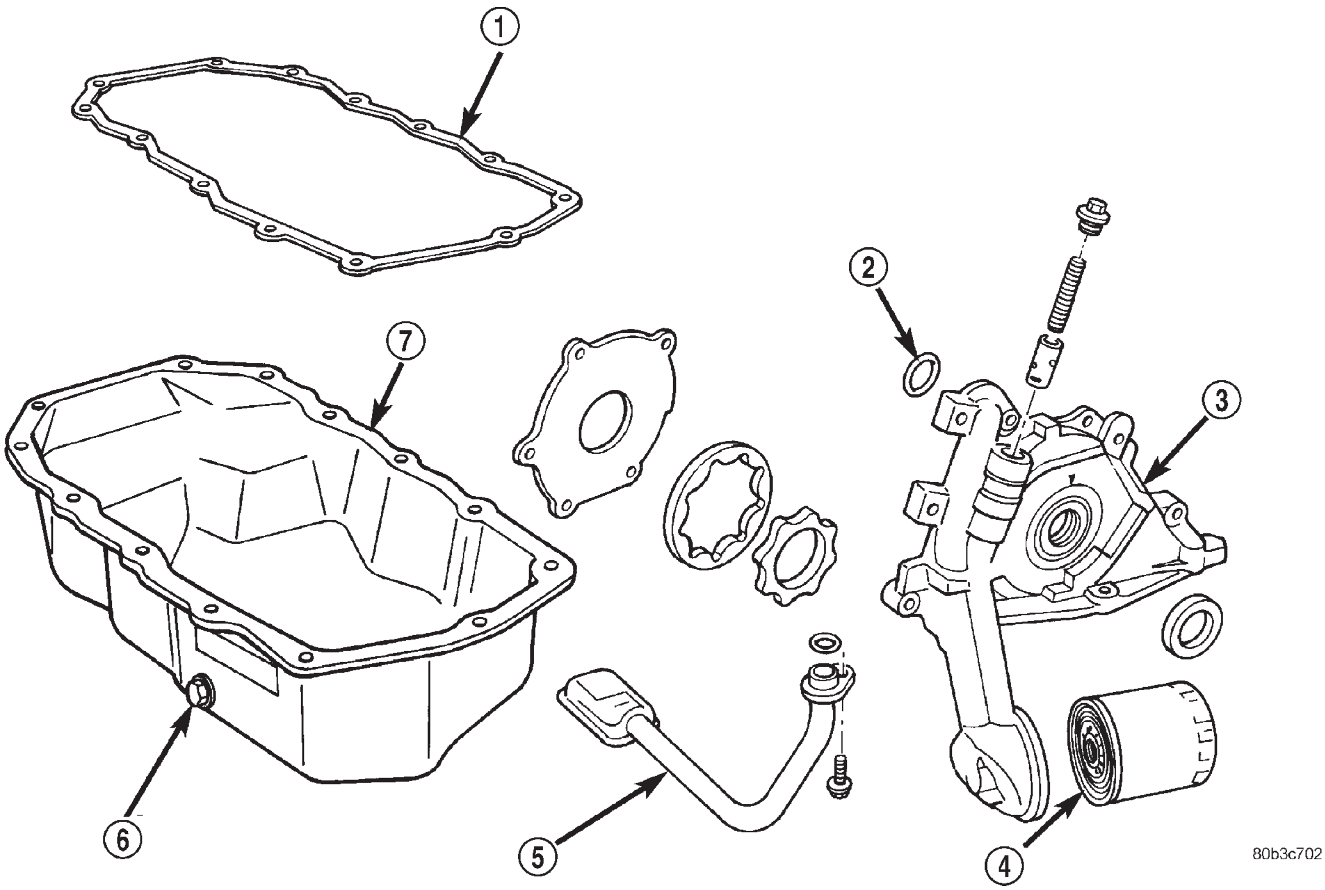


Fig. 78 Lubrication Components - Typical

1 - OIL PAN GASKET
2 - O-RING
3 - OIL PUMP BODY
4 - FILTER
5 - OIL PICK-UP TUBE
6 - DRAIN PLUG
7 - OIL PAN

OPERATION

Engine oil drawn up through the pickup tube and is pressurized by the oil pump and routed through the full-flow filter to the main oil gallery running the length of the cylinder block. A diagonal hole in each bulkhead feeds oil to each main bearing. Drilled passages within the crankshaft route oil from main bearing journals to connecting rod journals. Balance shaft lubrication is provided through an oil passage from the number one main bearing cap through the balance shaft carrier support leg. This passage directly supplies oil to the front bearings and internal machined passages in the shafts that routes oil from front to the rear shaft bearing journals. A vertical hole at the number five bulkhead routes pressurized oil through a restrictor (integral to the cylinder head gasket) up past a cylinder head bolt to an oil gallery running the length of the cylinder head. The camshaft journals are partially slotted to allow a predetermined amount of pressurized oil to pass into the bearing cap cavities. Lubrication of the camshaft lobes are provided by small holes in the camshaft bearing caps that are directed towards each lobe. Oil returning to the pan from pressurized components supplies lubrication to the valve stems. Cylinder bores and wrist pins are splash lubricated from directed slots on the connecting rod thrust collars.

DIAGNOSIS AND TESTING - CHECKING ENGINE OIL PRESSURE

(1) Disconnect and remove oil pressure switch. (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE SENSOR/SWITCH - REMOVAL)

(2) Install Special Tools C-3292 Gauge with 8406 Adaptor fitting.

(3) Start engine and record oil pressure. Refer to Specifications for correct oil pressure requirements. (Refer to 9 - ENGINE - SPECIFICATIONS)

LUBRICATION (Continued)

CAUTION: If oil pressure is 0 at idle, do not perform the 3000 RPM test

(4) If oil pressure is 0 at idle. Shut off engine, check for pressure relief valve stuck open, a clogged oil pick-up screen or a damaged oil pick-up tube O-ring.

(5) After test is complete, remove test gauge and fitting.

(6) Install oil pressure switch and connector. (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE SENSOR/SWITCH - INSTALLATION)

OIL

STANDARD PROCEDURE

ENGINE OIL LEVEL CHECK

The best time to check engine oil level is after it has sat overnight, or if the engine has been running, allow the engine to be shut off for at least 5 minutes before checking oil level.

Checking the oil while the vehicle is on level ground will improve the accuracy of the oil level reading. Remove dipstick and observe oil level (Fig. 79). Add oil only when the level is at or below the ADD mark (Fig. 80).

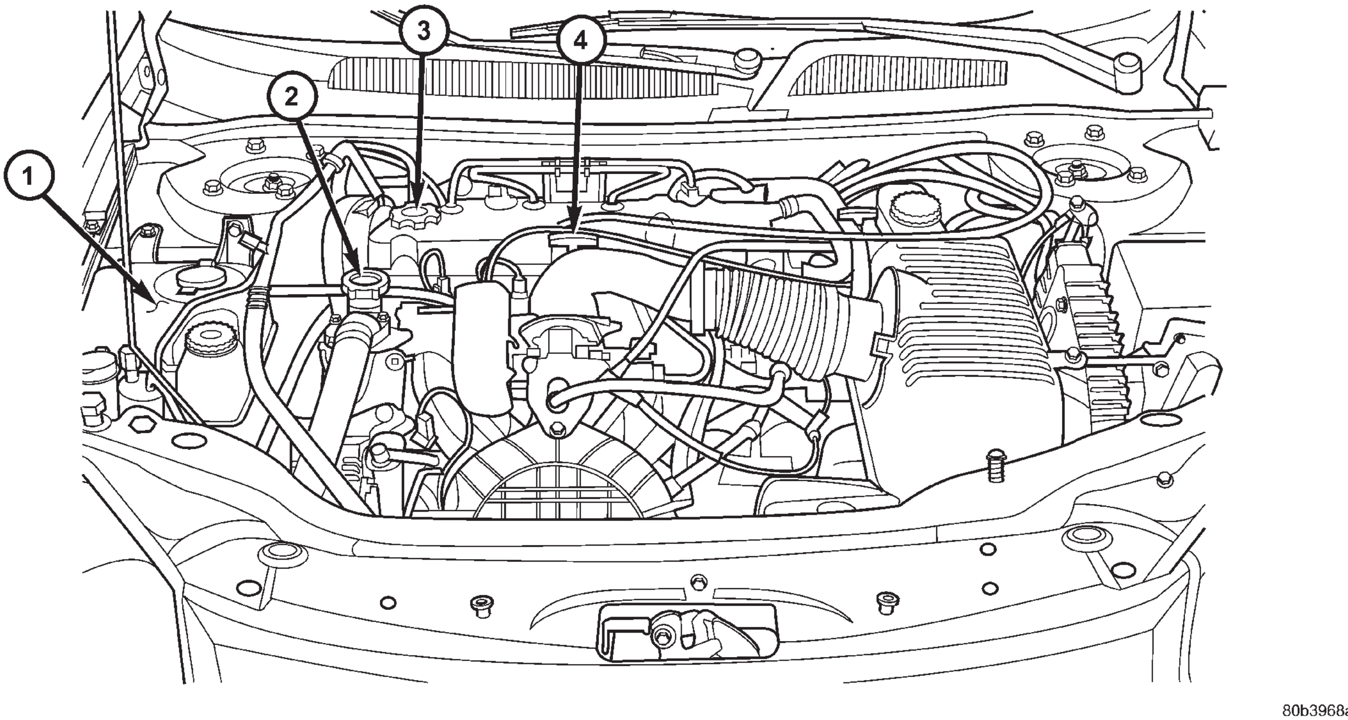


Fig. 79 Fluid Level Check - 2.0/2.4L

1 - COOLANT RECOVERY CONTAINER
2 - COOLANT PRESSURE CAP
3 - ENGINE OIL FILL CAP
4 - ENGINE OIL DIPSTICK

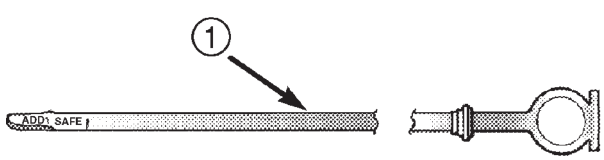


Fig. 80 Oil Level

1 - ENGINE OIL LEVEL DIPSTICK

OIL (Continued)

STANDARD PROCEDURE - ENGINE OIL AND FILTER CHANGE

Change engine oil at mileage and time intervals described in the Maintenance Schedule. (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION)

WARNING: NEW OR USED ENGINE OIL CAN BE IRRITATING TO THE SKIN. AVOID PROLONGED OR REPEATED SKIN CONTACT WITH ENGINE OIL. CONTAMINANTS IN USED ENGINE OIL, CAUSED BY INTERNAL COMBUSTION, CAN BE HAZARDOUS TO YOUR HEALTH. THOROUGHLY WASH EXPOSED SKIN WITH SOAP AND WATER. DO NOT WASH SKIN WITH GASOLINE, DIESEL FUEL, THINNER, OR SOLVENTS, HEALTH PROBLEMS CAN RESULT. DO NOT POLLUTE, DISPOSE OF USED ENGINE OIL PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA.

Run engine until achieving normal operating temperature.

(1) Position the vehicle on a level surface and turn engine off.
(2) Remove oil fill cap (Fig. 82).
(3) Raise vehicle on hoist.
(4) Place a suitable drain pan under crankcase drain.
(5) Remove drain plug from crankcase and allow oil to drain into pan. Inspect drain plug threads for stretching or other damage. Replace drain plug and gasket if damaged.
(6) Remove oil filter. (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - REMOVAL)
(7) Install and tighten drain plug in crankcase.
(8) Install new oil filter. (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - INSTALLATION)
(9) Lower vehicle and fill crankcase with specified type and amount of engine oil. (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION)
(10) Install oil fill cap.
(11) Start engine and inspect for leaks.
(12) Stop engine and inspect oil level.

NOTE: Care should be exercised when disposing used engine oil after it has been drained from a vehicle engine. Refer to the WARNING listed above.

OIL FILTER

DESCRIPTION

The engine oil filter (Fig. 81) is a high quality full-flow, disposable type. Replace the oil filter with a Mopar® or the equivalent.

REMOVAL

(1) Raise vehicle on hoist.
(2) Position an oil collecting container under oil filter location.

CAUTION: When servicing the oil filter avoid deforming the filter can by installing the remove/install tool band strap against the can to base lock seam. The lock seam joining the can to the base is reinforced by the base plate.

(3) Using a suitable filter wrench, turn oil filter (Fig. 81) counterclockwise to remove.

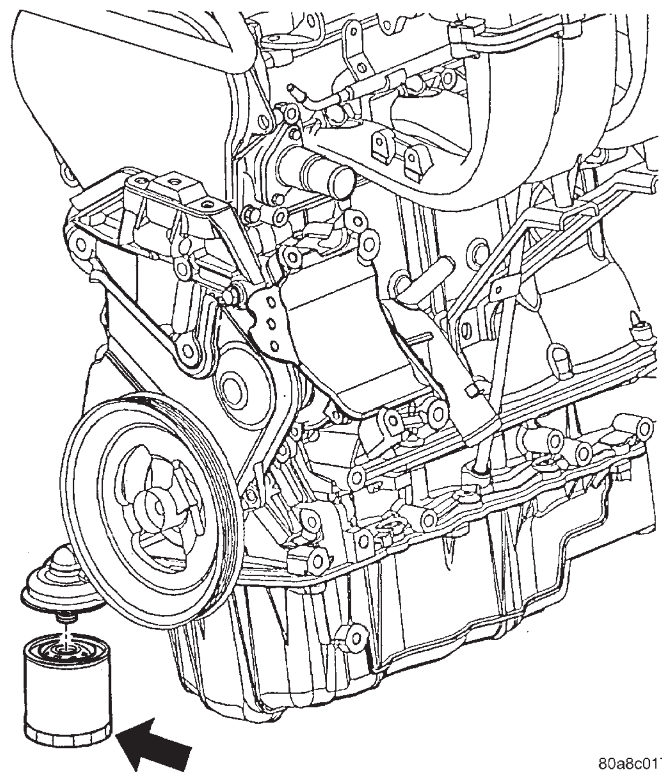


Fig. 81 Oil Filter

INSTALLATION

(1) Clean and check filter mounting surface. The surface must be smooth, flat and free of debris or pieces of gasket.
(2) Lubricate new oil filter gasket with clean engine oil.
(3) Screw oil filter (Fig. 81) on until the gasket contacts base. Tighten to 21 N·m (15 ft. lbs.).

OIL PAN

REMOVAL

(1) Disconnect negative battery cable.

(2) Raise vehicle on hoist and drain engine oil.

(3) Remove structural collar and torque reaction bracket (Refer to 9 - ENGINE/ENGINE BLOCK/ STRUCTURAL COVER - REMOVAL).

(4) Remove bolts attaching oil pan.

(5) Remove oil pan.

(6) Clean oil pan and all gasket surfaces.

INSTALLATION

(1) Apply Mopar® Engine RTV GEN II at the oil pump to engine block parting line (Fig. 82).

(2) Install the oil pan gasket to the block (Fig. 83).

(3) Install pan and tighten the screws to 12 N·m (105 in. lbs.).

(4) Install structural collar and torque reaction bracket (Refer to 9 - ENGINE/ENGINE BLOCK/ STRUCTURAL COVER - INSTALLATION).

(5) Lower vehicle and fill engine crankcase with proper oil to correct level.

(6) Connect negative battery cable.

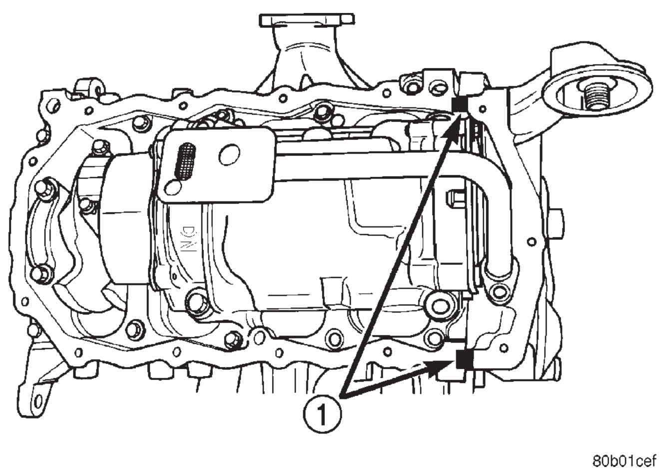


Fig. 82 Oil Pan Sealing

1 - PLACE A 3 MM (1/8 INCH.) BEAD OF SEALANT AT THE PARTING LINE OF THE OIL PUMP BODY TO ENGINE BLOCK

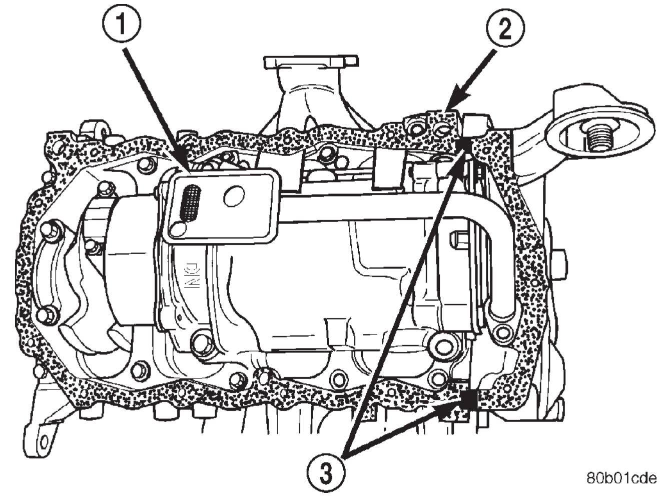


Fig. 83 Oil Pan Gasket Installation

1 - OIL PICK-UP TUBE
2 - OIL PAN GASKET
3 - SEALER

OIL PRESSURE SENSOR/ SWITCH

REMOVAL

(1) Raise vehicle.

(2) Position oil collecting container under pressure switch location.

(3) Disconnect oil pressure switch electrical connector and remove switch (Fig. 84).

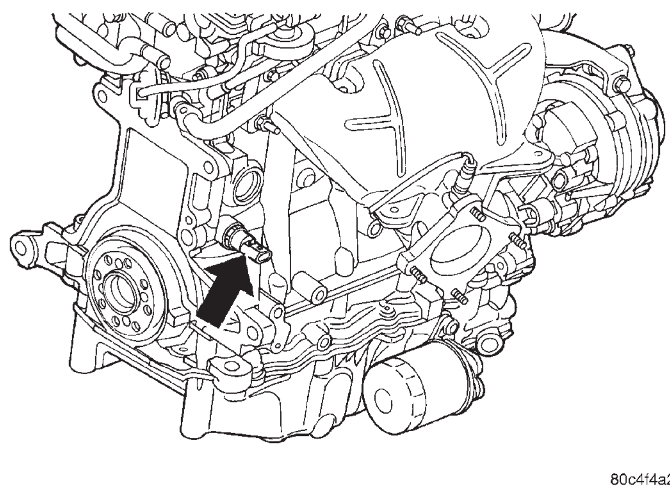


Fig. 84 Engine Oil Pressure Switch

INSTALLATION

(1) Install oil pressure switch and connect electrical connector (Fig. 89) .

(2) Lower vehicle.

(3) Start engine and allow to run a minimum of 2 minutes.

(4) Shut engine off and check engine oil level. Adjust level as necessary.

OIL PUMP

REMOVAL

(1) Disconnect negative battery cable.

(2) Remove crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).

(3) Remove Timing Belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(4) Remove Oil Pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).

(5) Remove Crankshaft Sprocket using Special Tool 6793 and insert C-4685-C2 (Fig. 85).

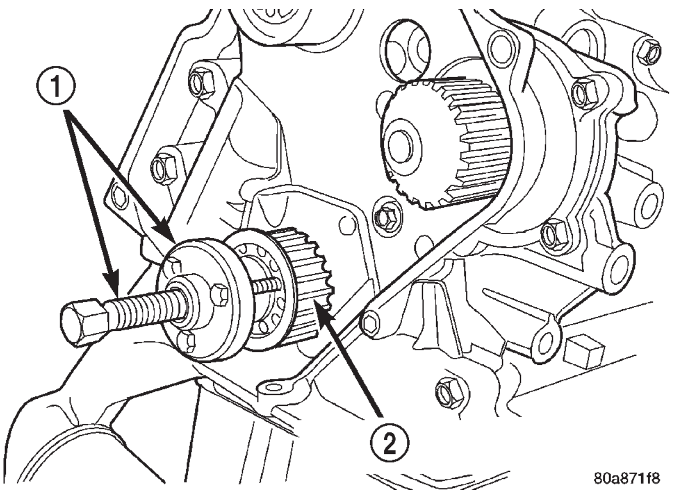


Fig. 85 Crankshaft Sprocket—Removal

1 - SPECIAL TOOL 6793
2 - CRANKSHAFT SPROCKET

OIL PUMP (Continued)

(6) Remove oil pick-up tube.

(7) Remove oil pump, (Fig. 86) and front crankshaft seal.

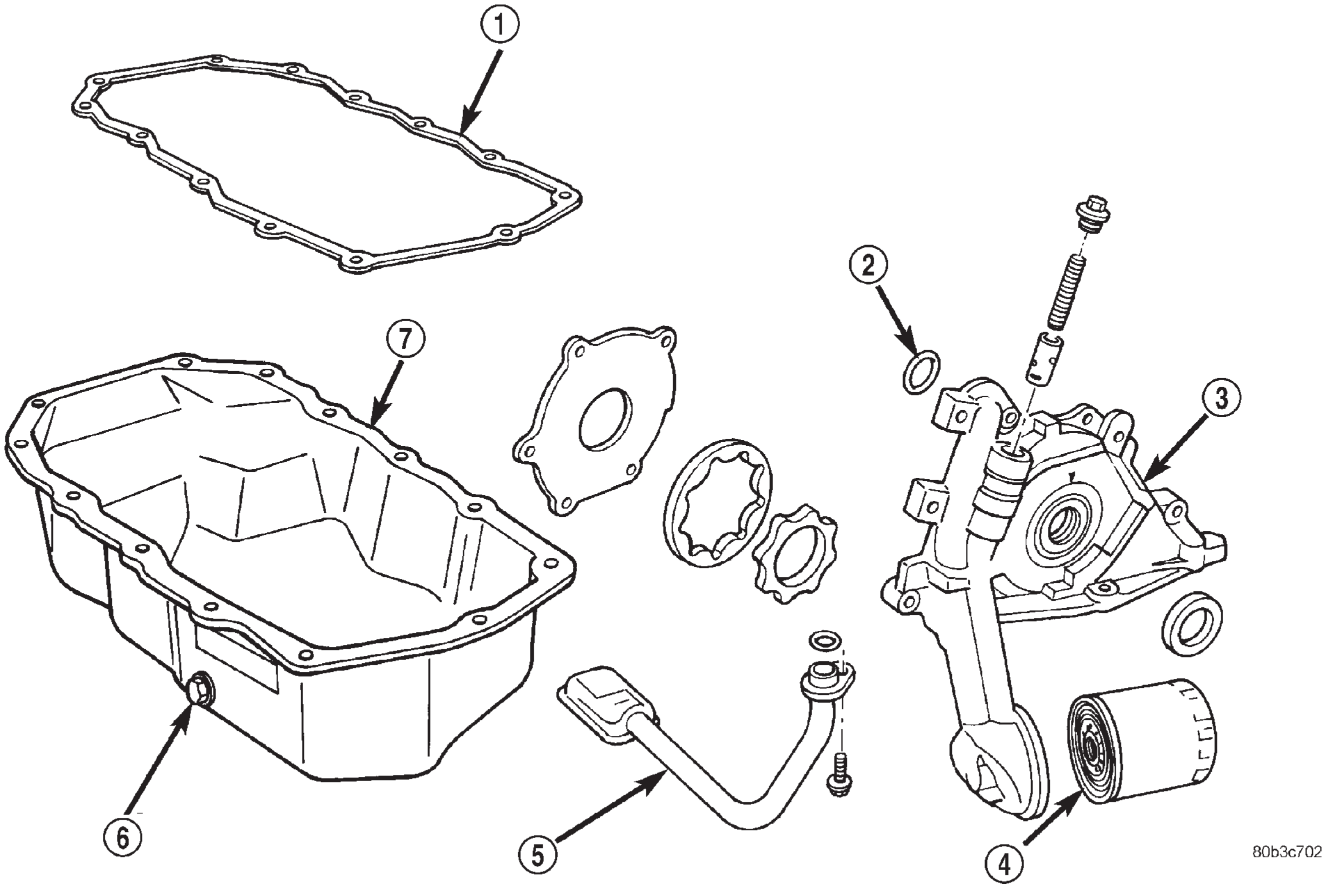


Fig. 86 Oil Pump and Pick-up Tube

1 - OIL PAN GASKET
2 - O-RING
3 - OIL PUMP BODY
4 - FILTER
5 - OIL PICK-UP TUBE
6 - DRAIN PLUG
7 - OIL PAN

OIL PUMP (Continued)

DISASSEMBLY

(1) To remove the relief valve, proceed as follows:

(a) Remove the threaded plug and gasket from the oil pump (Fig. 87).

(b) Remove spring and relief valve (Fig. 87).

(2) Remove oil pump cover screws, and lift off cover.

(3) Remove pump rotors.

(4) Wash all parts in a suitable solvent and inspect carefully for damage or wear.

CLEANING

(1) Clean all parts thoroughly in a suitable solvent.

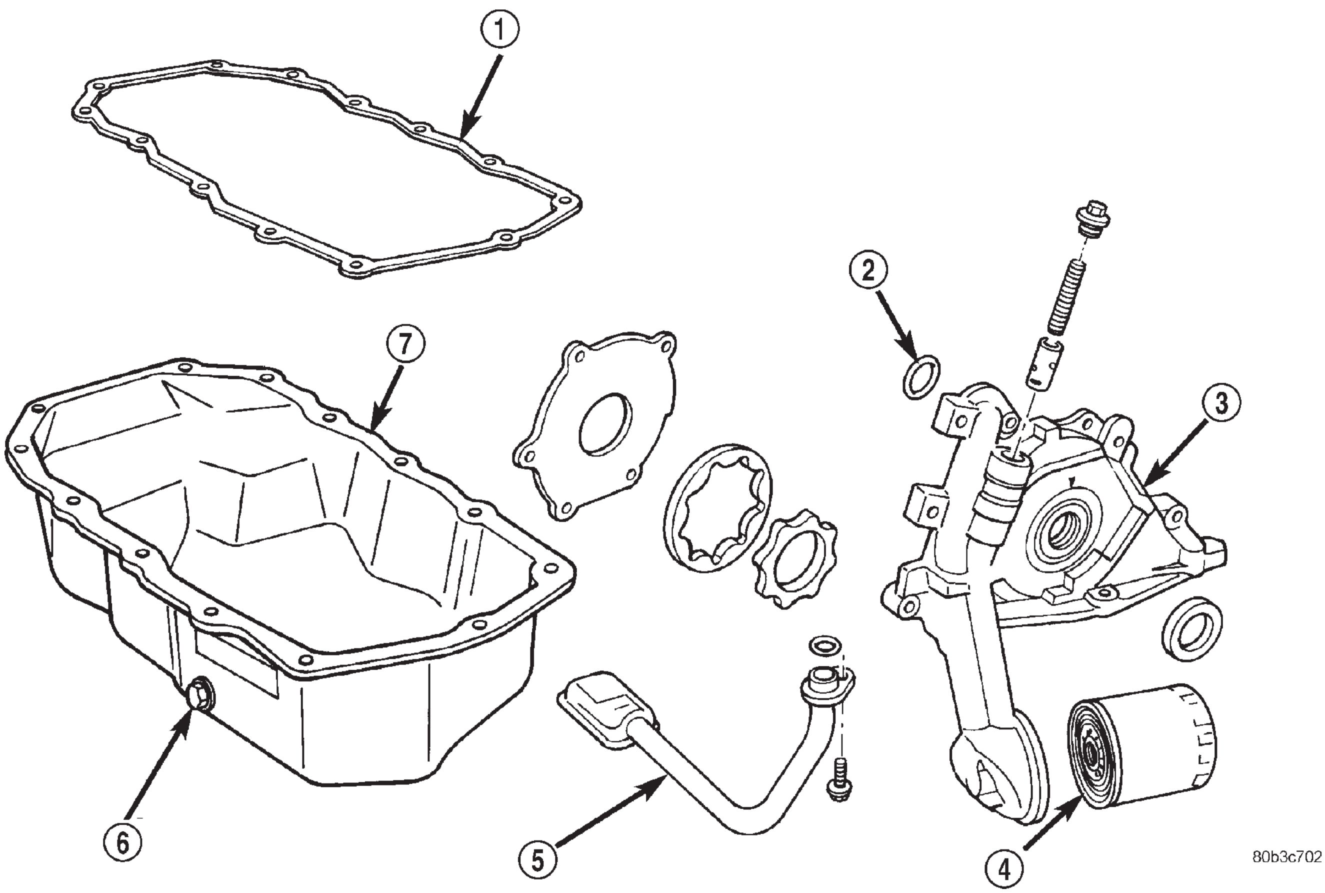


Fig. 87 Oil Pressure Relief Valve

1 - OIL PAN GASKET
2 - O-RING
3 - OIL PUMP BODY
4 - FILTER
5 - OIL PICK-UP TUBE
6 - DRAIN PLUG
7 - OIL PAN

OIL PUMP (Continued)

INSPECTION

(1) Clean all parts thoroughly. Mating surface of the oil pump should be smooth (Fig. 88). Replace pump cover if scratched or grooved.

(2) Lay a straightedge across the pump cover surface (Fig. 89). If a 0.025 mm (0.001 in.) feeler gauge can be inserted between cover and straight edge, cover should be replaced.

(3) Measure thickness and diameter of outer rotor. If outer rotor thickness measures 9.40 mm (0.370 in.) or less (Fig. 90), or if the diameter is 79.95 mm (3.148 in.) or less, replace outer rotor.

(4) If inner rotor measures 9.40 mm (0.370 in.) or less replace inner rotor (Fig. 91).

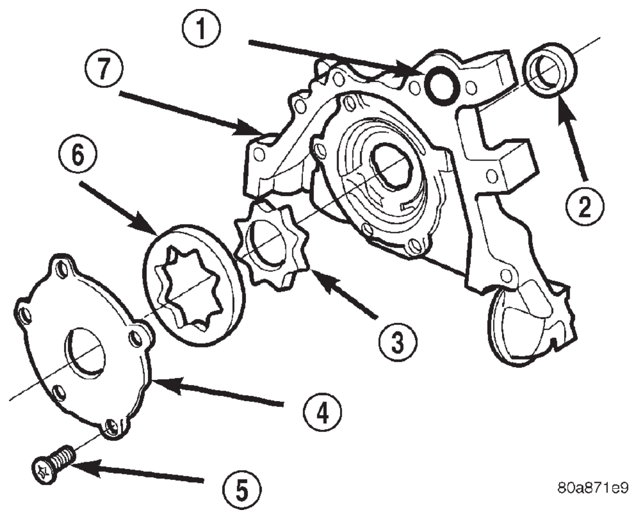


Fig. 88 Oil Pump

1 - O-RING
2 - SEAL
3 - INNER ROTOR
4 - OIL PUMP COVER
5 - FASTENER
6 - OUTER ROTOR
7 - OIL PUMP BODY

(5) Slide outer rotor into pump housing, press to one side with fingers and measure clearance between rotor and housing (Fig. 92). If measurement is 0.39 mm (0.015 in.) or more, replace housing only if outer rotor is in specification.

(6) Install inner rotor into pump housing. If clearance between inner and outer rotors (Fig. 93) is 0.203 mm (0.008 in.) or more, replace both rotors.

(7) Place a straightedge across the face of the pump housing, between bolt holes. If a feeler gauge of 0.102 mm (0.004 in.), or more can be inserted between rotors and the straightedge, replace pump assembly (Fig. 94), **ONLY** if rotors are in specifications.

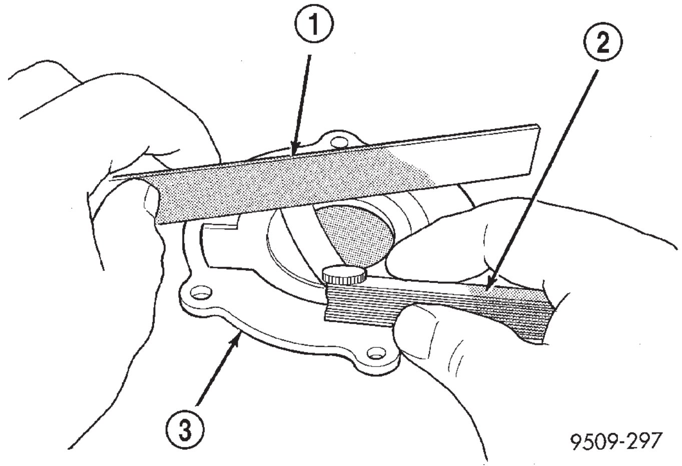


Fig. 89 Checking Oil Pump Cover Flatness

1 - STRAIGHT EDGE
2 - FEELER GAUGE
3 - OIL PUMP COVER

(8) Inspect oil pressure relief valve plunger for scoring and free operation in its bore. Small marks may be removed with 400 grit wet or dry sandpaper.

(9) The relief valve spring has a free length of approximately 60.7 mm (2.39 inches) it should test between 18 and 19 pounds when compressed to 40.5 mm (1.60 inches). Replace spring that fails to meet specifications.

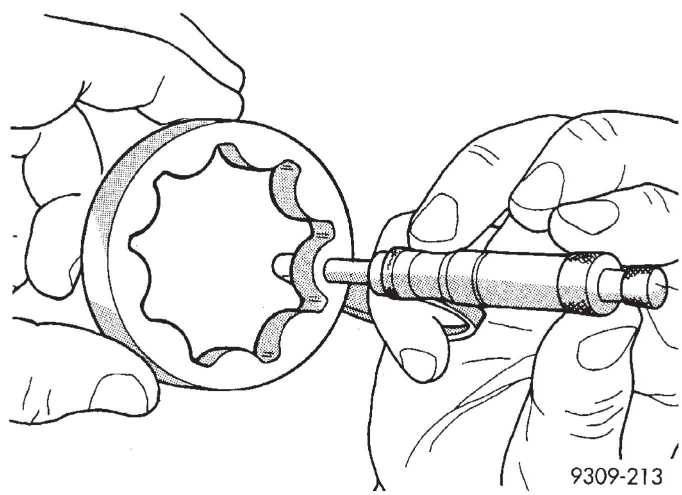


Fig. 90 Measuring Outer Rotor Thickness

(10) If oil pressure is low and pump is within specifications, inspect for worn engine bearings or other reasons for oil pressure loss.

OIL PUMP (Continued)

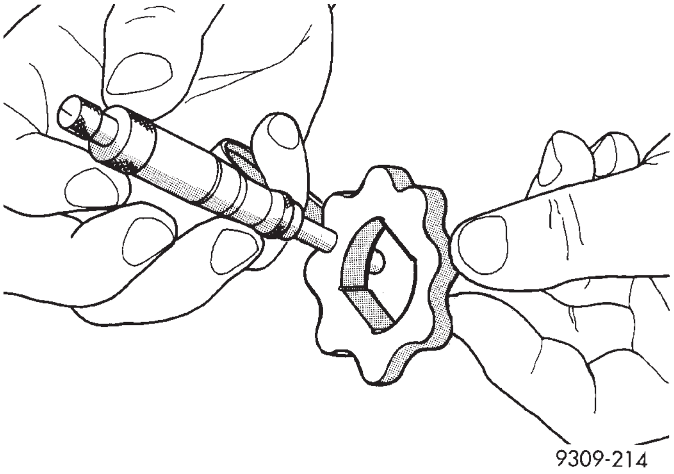


Fig. 91 Measuring

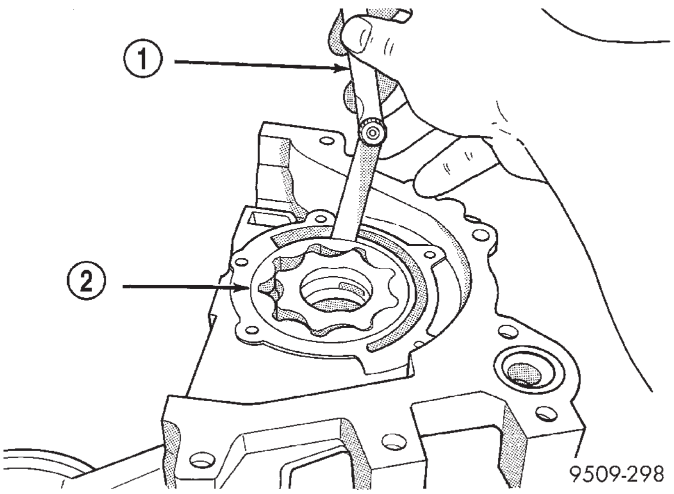


Fig. 92 Measuring Outer Rotor Clearance in Housing

1 - FEELER GAUGE
2 - OUTER ROTOR

ASSEMBLY

(1) Assemble pump, using new parts as required. **Install the inner rotor with chamfer facing the cast iron oil pump cover.**

(2) Prime oil pump before installation by filling rotor cavity with engine oil.

(3) Install cover and tighten screws to 12 N·m (105 in. lbs.).

CAUTION: Oil pump pressure relief valve must be installed as shown in (Fig. 87) or serious damage may occur.

(4) Install relief valve, spring, gasket and cap as shown in (Fig. 87). Tighten cap to 41 N·m (30 ft. lbs.).

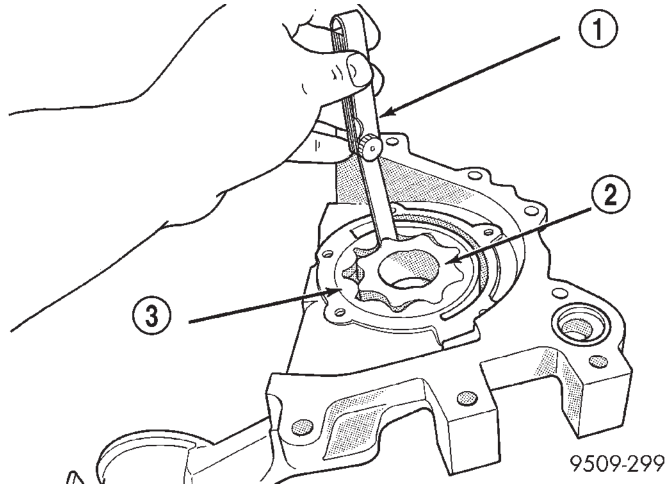


Fig. 93 Measuring Clearance Between Rotors

1 - FEELER GAUGE
2 - INNER ROTOR
3 - OUTER ROTOR

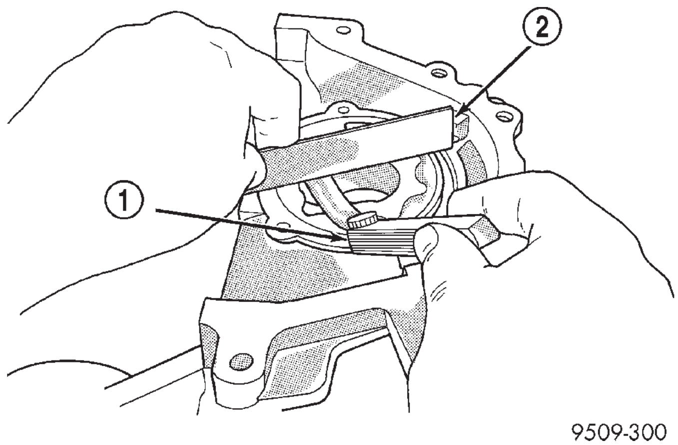


Fig. 94 Measuring Clearance Over Rotors

1 - FEELER GAUGE
2 - STRAIGHT EDGE

OIL PUMP (Continued)

INSTALLATION

(1) Make sure all surfaces are clean and free of oil and dirt.

(2) Apply Mopar® Gasket Maker to oil pump as shown in (Fig. 95). Install oil ring into oil pump body discharge passage.

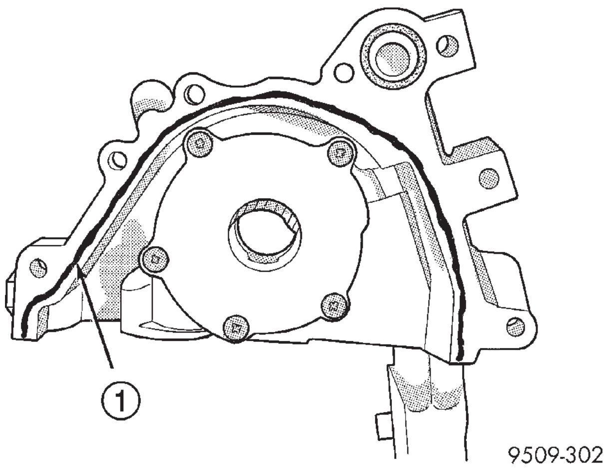


Fig. 95 Oil Pump Sealing

1 - APPLY GASKET MAKER TO OIL PUMP BODY FLANGE

(3) Prime oil pump before installation.

(4) Align oil pump rotor flats with flats on crankshaft as you install the oil pump to the block.

NOTE: Front crankshaft seal MUST be out of pump to align, or damage may result.

(5) Install new front crankshaft seal using Special Tool 6780 (Fig. 96).

(6) Install crankshaft sprocket using Special Tool 6792 (Fig. 97).

(7) Install oil pump pick-up tube.

(8) Install oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

(9) Install Timing Belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(10) Install crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(11) Replace oil filter.

(12) Lower vehicle.

(13) Fill engine crankcase with proper oil to correct level.

(14) Connect negative battery cable.

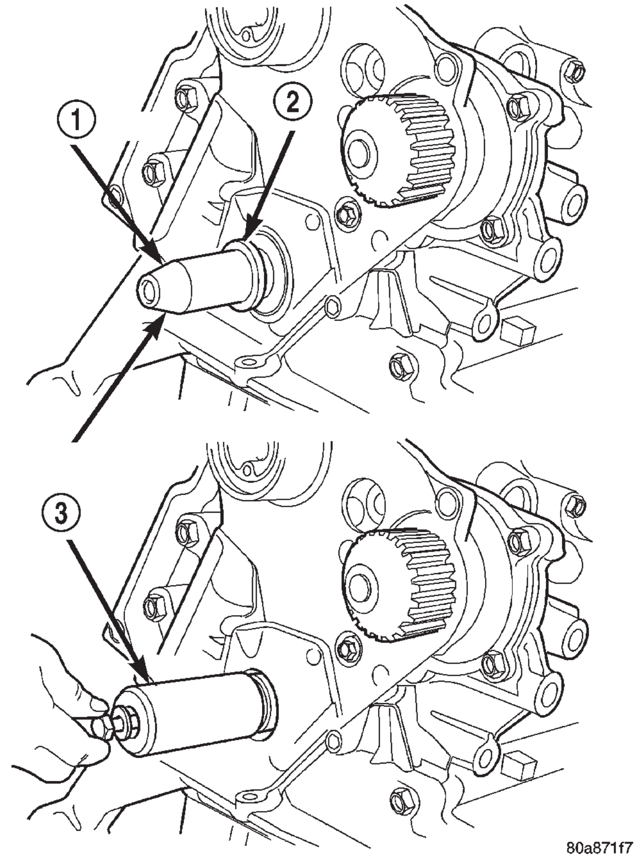


Fig. 96 Front Crankshaft Seal—Installation

1 - PROTECTOR
2 - SEAL
3 - SPECIAL TOOL 6780

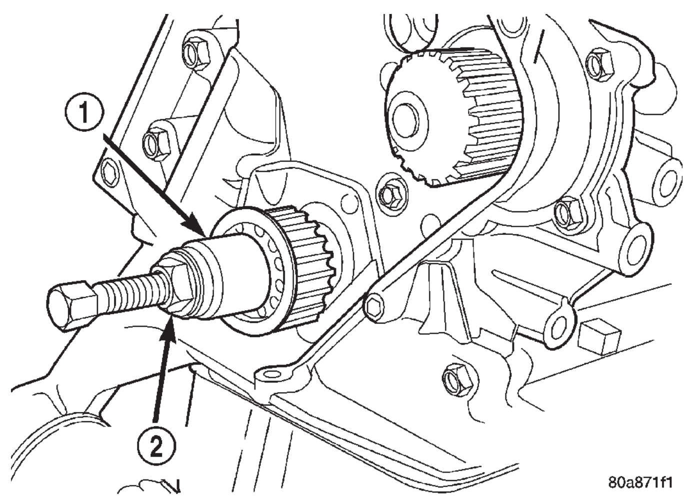


Fig. 97 Crankshaft Sprocket—Installation

1 - SPECIAL TOOL 6792
2 - TIGHTEN NUT TO INSTALL

INTAKE MANIFOLD

DESCRIPTION

The intake manifold is a one piece composite plastic design that attaches to the cylinder head with fasteners. The manifold is a long branch design to enhance low and mid-range torque.

OPERATION

The intake manifold delivers air to the combustion chambers. This air allows the fuel delivered by the fuel injectors to ignite when the spark plugs fire.

DIAGNOSIS AND TESTING - INTAKE MANIFOLD LEAKS

An intake manifold air leak is characterized by lower than normal manifold vacuum. Also, one or more cylinders may not be functioning.

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR THE FAN. DO NOT WEAR LOOSE CLOTHING.

(1) Start the engine.
(2) Spray a small stream of water (Spray Bottle) at the suspected leak area.
(3) If engine RPM'S change, the area of the suspected leak has been found.
(4) Repair as required.

REMOVAL

WARNING: RELEASE FUEL SYSTEM PRESSURE BEFORE SERVICING SYSTEM COMPONENTS. SERVICE VEHICLES IN WELL VENTILATED AREAS AND AVOID IGNITION SOURCES. NEVER SMOKE WHILE SERVICING THE VEHICLE.

(1) Perform fuel system pressure release procedure **before attempting any repairs.**(Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).
(2) Disconnect negative battery cable.
(3) Drain cooling system (Refer to 7 - COOLING/ ENGINE - STANDARD PROCEDURE).
(4) Remove throttle body air inlet hose and air cleaner housing assembly.
(5) Remove throttle and speed control cables from throttle lever and bracket.
(6) Remove EGR tube.
(7) Remove engine oil dipstick and tube from engine block. Plug hole in block to prevent debris or fluid from entering engine crankcase.
(8) Disconnect necessary vacuum hoses from intake manifold.
(9) Disconnect the fuel supply line quick connect at the fuel rail assembly.

WARNING: WRAP SHOP TOWELS AROUND HOSE TO CATCH ANY GASOLINE SPILLAGE.

(10) Remove fastener holding fuel rail bracket to side of cylinder head.
(11) Disconnect the following electrical connectors:
- Fuel Injectors
- Knock Sensor
- ECT Sensor
- IAC
- TPS
- MAP Sensor
- A/C Pressure Sensor
- A/C Compressor Clutch
- Generator

(12) Reposition wiring harness.
(13) Remove fuel rail support bracket (Fig. 98).
(14) Remove fuel rail.

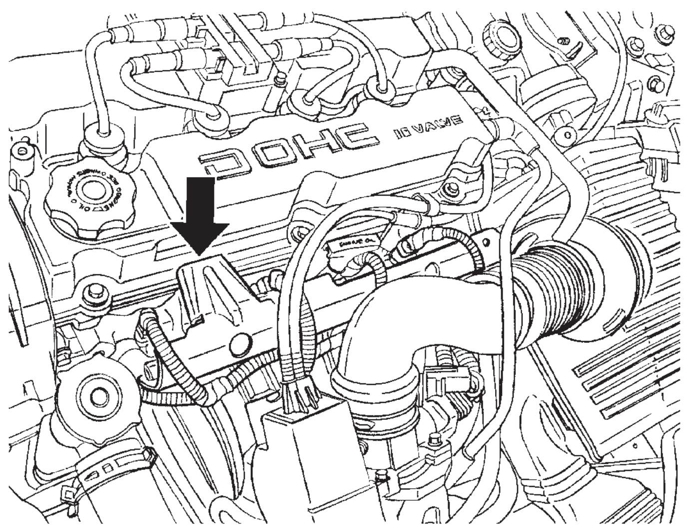


Fig. 98 Fuel Rail Support Bracket

(15) Remove coolant outlet connector (Refer to 7 - COOLING/ENGINE/COOLANT OUTLET HOUSING - REMOVAL).
(16) Remove intake manifold fasteners. Remove intake manifold.

CLEANING

(1) Discard gasket(s).
(2) Clean all sealing surfaces.

INSPECTION

(1) Inspect manifold for cracks or distortion. Replace manifold if necessary.

INTAKE MANIFOLD (Continued)

(2) Inspect manifold for gasket surface damage or warpage. Replace manifold if necessary.

INSTALLATION

(1) Install new intake manifold and gasket. Gradually tighten fasteners to 28 N·m (250 in. lbs.) in sequence shown in (Fig. 99).

(2) Install coolant outlet connector (Refer to 7 - COOLING/ENGINE/COOLANT OUTLET HOUSING - INSTALLATION).

(3) Install fuel rail.

(4) Install fuel rail support bracket (Fig. 98).

(5) Connect previously disconnected electrical connectors.

(6) Install fastener holding fuel rail bracket to side of cylinder head.

(7) Inspect quick connect fittings for damage, replace if necessary. Connect fuel supply hose to fuel rail assembly. Check connection by pulling on connector to insure it locked into position.

(8) Connect vacuum hoses to intake manifold.

(9) Install engine oil dipstick and tube.

(10) Install EGR tube (Refer to 25 - EMISSIONS CONTROL/EXHAUST GAS RECIRCULATION/ TUBE - INSTALLATION).

(11) Install throttle and speed control cables to bracket. Connect cables to the throttle lever.

(12) Fill cooling system (Refer to 7 - COOLING/ ENGINE - STANDARD PROCEDURE).

(13) Connect negative battery cable.

(14) With the DRB scan tool use ASD Fuel System Test to pressurize system to check for leaks.

CAUTION: When using the ASD Fuel System Test, the Auto Shutdown (ASD) relay will remain energized for 7 minutes or until the ignition switch is turned to the OFF position, or Stop All Test is selected.

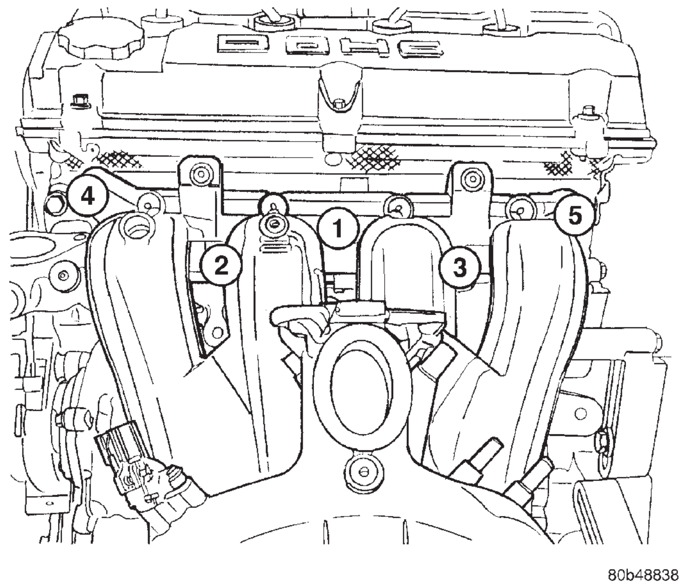


Fig. 99 Intake Manifold Tightening Sequence

REMOVAL

(1) Disconnect negative battery cable.

(2) Raise vehicle on hoist.

(3) Remove complete exhaust system (Refer to 11 - EXHAUST SYSTEM - REMOVAL).

(4) Remove rear engine mount and transaxle bracket.

(5) Remove exhaust manifold heat shield (Fig. 100).

(6) Disconnect oxygen sensor electrical connector.

(7) Remove exhaust manifold retaining fasteners and remove exhaust manifold.

(8) Remove and discard manifold gasket.

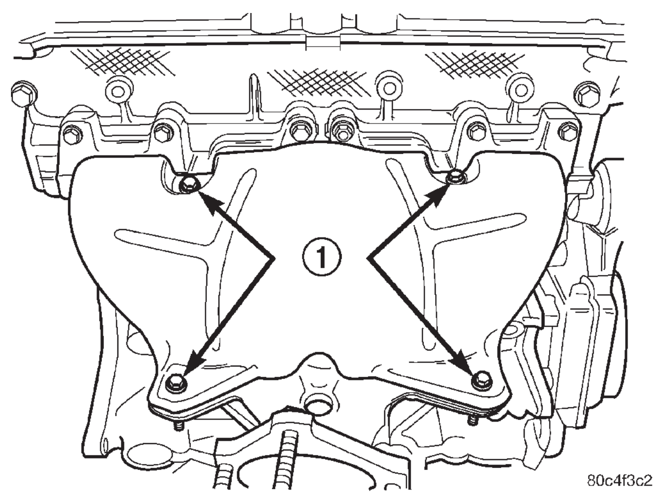


Fig. 100 Exhaust Manifold Heat Shield Bolts

1 - BOLTS

EXHAUST MANIFOLD

DESCRIPTION

The exhaust manifold is made of Hi-Silicone Moly nodular cast iron for strength and high temperatures. The manifold attaches to the cylinder head.

OPERATION

The exhaust manifold collects the exhaust gasses exiting the combustion chambers. Then it channels the exhaust gasses to the exhaust pipe attached to the manifold.

EXHAUST MANIFOLD (Continued)

CLEANING

(1) Discard gasket (if equipped) and clean all surfaces of manifold and cylinder head.

INSPECTION

(1) Inspect manifold gasket surfaces for flatness with straight edge. Surface must be flat within 0.15 mm per 300 mm (0.006 in. per foot) of manifold length.

(2) Inspect manifolds for cracks or distortion. Replace manifold as necessary.

INSTALLATION

(1) Install new exhaust manifold gasket. **DO NOT APPLY SEALER**.

(2) Position exhaust manifold in place. Tighten fasteners in sequence shown in (Fig. 101) to 23 N·m (200 in. lbs.). Repeat this procedure until all fasteners are at specified torque.

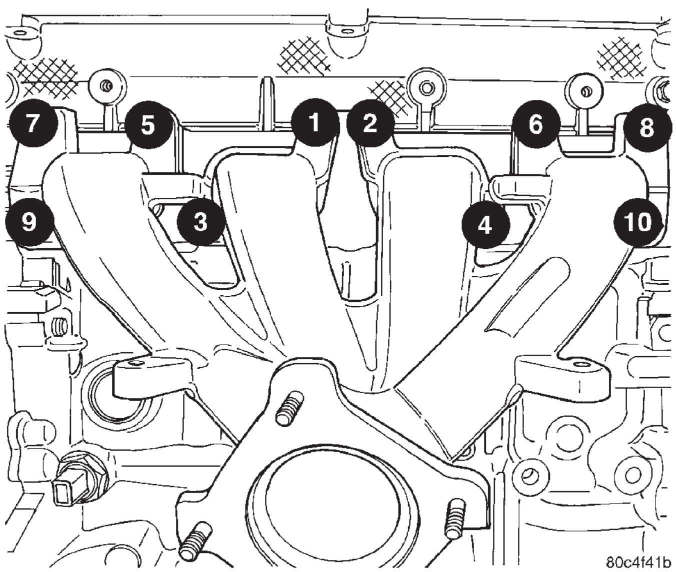


Fig. 101 EXHAUST MANIFOLD TIGHTENING SEQUENCE

(3) Install exhaust manifold heat shield.

(4) Connect oxygen sensor electrical connector.

(5) Install rear engine mount and transaxle bracket.

(6) Install exhaust system (Refer to 11 - EXHAUST SYSTEM - INSTALLATION). Tighten fasteners to 28 N·m (250 in. lbs.).

(7) Lower vehicle.

(8) Connect negative battery cable.

BALANCE SHAFTS AND CARRIER ASSEMBLY

DESCRIPTION

The 2.4L engine is equipped with two nodular cast iron balance shafts installed in a cast aluminum carrier attached to the lower cylinder block (Fig. 102).

OPERATION

The balance shafts are driven by the crankshaft via a roller chain and sprockets. The balance shafts are connected by helical gears. The dual counter rotating shafts decrease second order vertical shaking forces caused by component movement.

BALANCE SHAFTS AND CARRIER ASSEMBLY (Continued)

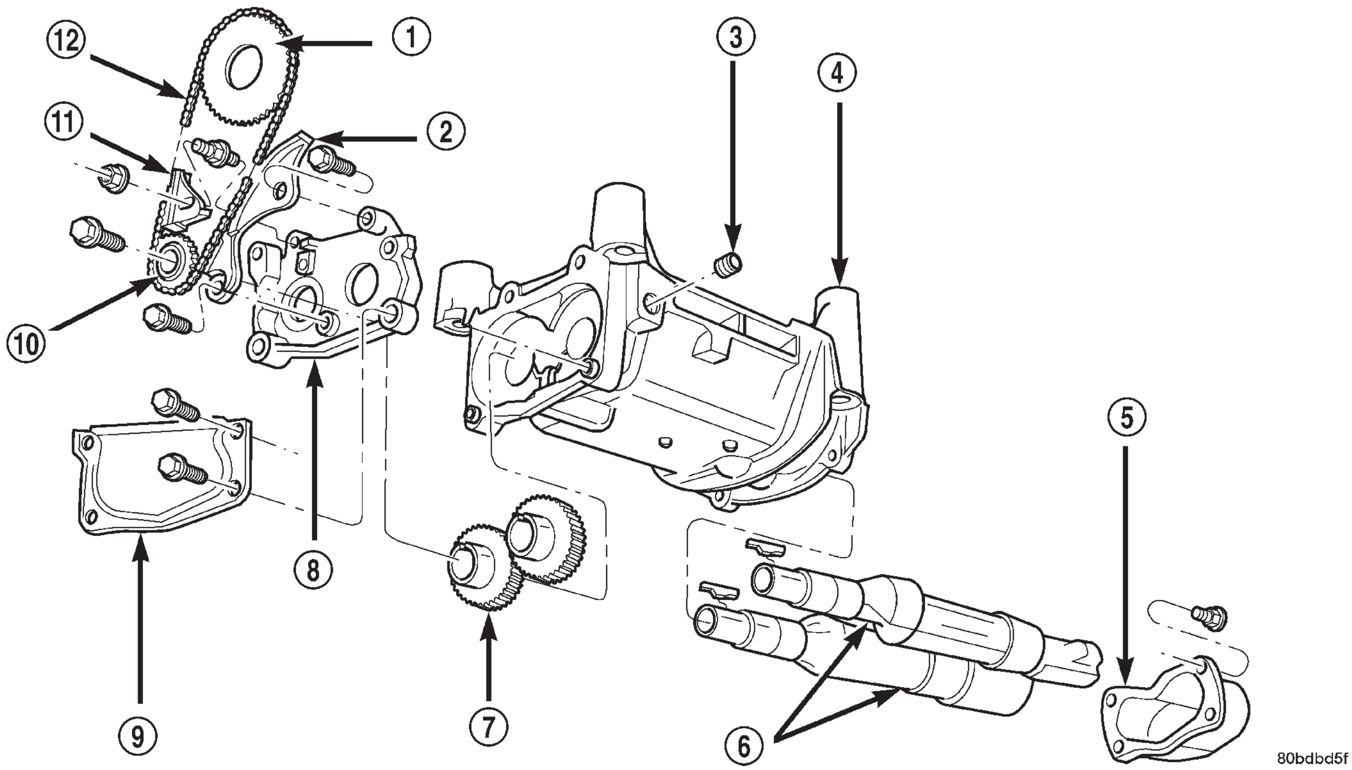


Fig. 102 Balance Shafts and Carrier Assembly

1 - SPROCKET
2 - TENSIONER
3 - PLUG
4 - CARRIER
5 - REAR COVER
6 - BALANCE SHAFTS
7 - GEARS
8 - GEAR COVER
9 - CHAIN COVER
10 - SPROCKET
11 - GUIDE
12 - CHAIN

REMOVAL

BALANCE SHAFTS/CHAIN/SPROCKETS

NOTE: For service procedures requiring only temporary relocation of carrier assembly refer to BALANCE SHAFT CARRIER procedure below.

(1) Drain engine oil.

(2) Remove the oil pan and pick-up tube (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).

(3) If replacing crankshaft sprocket, remove oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL).

(4) Remove chain cover, guide and tensioner (Fig. 103).

(5) Remove screw retaining balance shaft drive sprocket (Fig. 104). Remove chain and sprocket.

(6) Using two wide pry bars, work the crankshaft sprocket back and forth until it is off the crankshaft-shaft.

(7) Remove gear cover retaining stud (double ended to also retain chain guide). Remove cover and balance shaft gears (Fig. 105).

(8) Remove rear cover and balance shafts (Fig. 106).

(9) Remove four carrier to crankcase attaching bolts to separate carrier from engine bedplate.

BALANCE SHAFTS AND CARRIER ASSEMBLY (Continued)

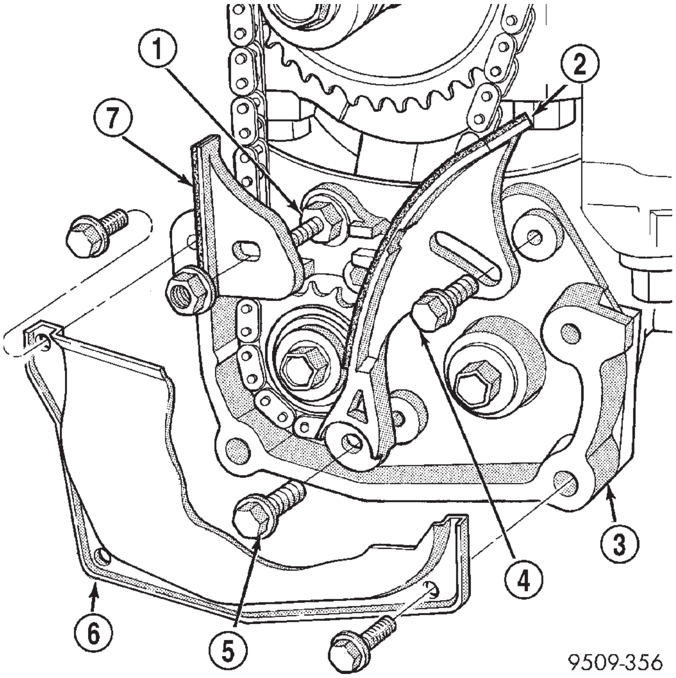


Fig. 103 Chain Cover, Guide and Tensioner

1 - STUD
2 - TENSIONER (ADJUSTER)
3 - GEAR COVER
4 - ADJUST SCREW
5 - PIVOT SCREW
6 - CHAIN COVER (CUTAWAY)
7 - GUIDE

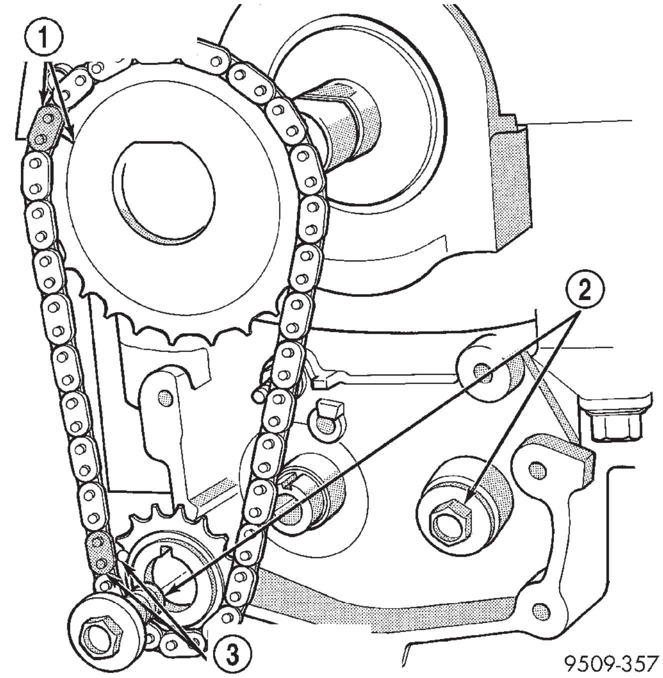


Fig. 104 Drive Chain and Sprockets

1 - NICKEL PLATED LINK AND MARK
2 - GEAR/SPROCKET SCREWS
3 - NICKEL PLATED LINK AND DOT

BALANCE SHAFT CARRIER

The following components will remain intact during carrier removal: Gear cover, gears, balance shafts and the rear cover (Fig. 102).

(1) Drain engine oil.

(2) Remove the oil pan and pick-up tube (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).

(3) Remove chain cover, guide and tensioner (Fig. 103).

(4) Remove screw retaining balance shaft drive sprocket (Fig. 104).

(5) Move balance shaft inboard through drive chain sprocket. Sprocket will hang in lower chain loop.

(6) Remove carrier to crankcase attaching bolts to remove carrier.

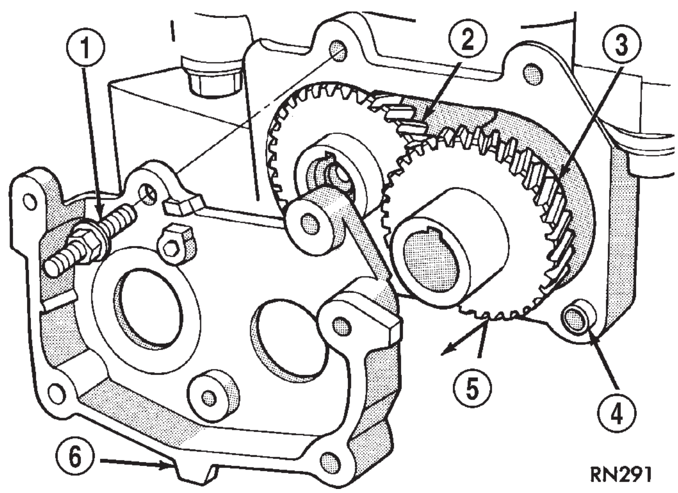


Fig. 105 Gear Cover and Gears

1 - STUD (DOUBLE ENDED)
2 - DRIVE GEAR
3 - DRIVEN GEAR
4 - CARRIER DOWEL
5 - GEAR(S)
6 - GEAR COVER

BALANCE SHAFTS AND CARRIER ASSEMBLY (Continued)

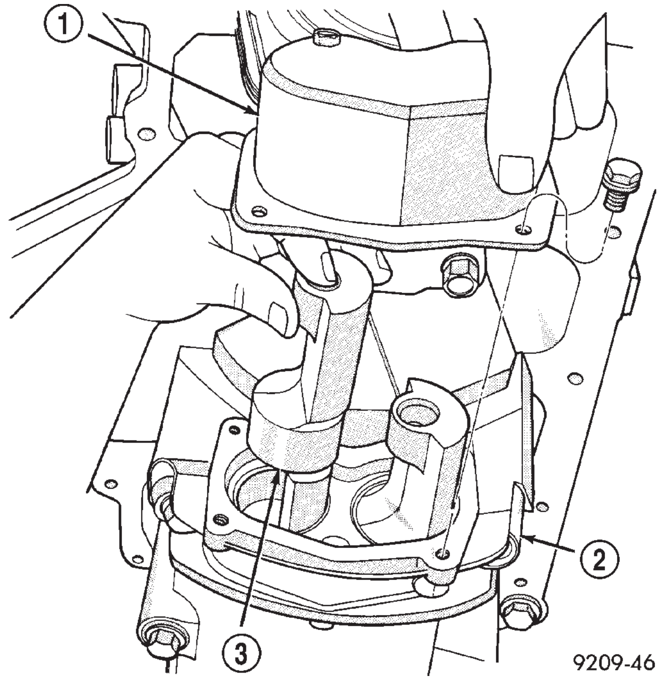


Fig. 106 Balance Shaft - Removal/Installation

1 - REAR COVER
2 - CARRIER
3 - BALANCE SHAFT

INSTALLATION

BALANCE SHAFT INSTALLATION/TIMING

Balance shaft and carrier assembly installation is the reverse of the removal procedure. **During installation crankshaft-to-balance shaft timing must be established. Refer to Timing procedure in this section.**

(1) With balance shafts installed in carrier (Fig. 102) position carrier on crankcase and install four attaching bolts and tighten to 54 N·m (40 ft. lbs.).

(2) Turn balance shafts until both shaft key ways are up, parallel to vertical centerline of engine. Install short hub drive gear on sprocket driven shaft and long hub gear on gear driven shaft. After installation gear and balance shaft keyways must be up with gear timing marks meshed as shown in (Fig. 107).

(3) Install gear cover and tighten double ended stud/washer fastener to 12 N·m (105 in. lbs.).

(4) Align flat on balance shaft drive sprocket to the flat on crankshaft (Fig. 108).

(5) Install balance shaft drive sprocket on crankshaft using Special Tool 6052 (Fig. 109).

(6) Turn crankshaft until number 1 cylinder is at top dead center (TDC). The timing marks on the chain sprocket should line up with the parting line on the left side of number one main bearing cap. (Fig. 110).

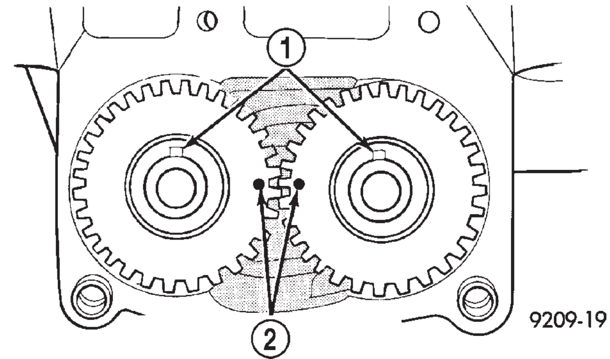


Fig. 107 Gear Timing

1 - KEY WAYS UP
2 - GEAR ALIGNMENT DOTS

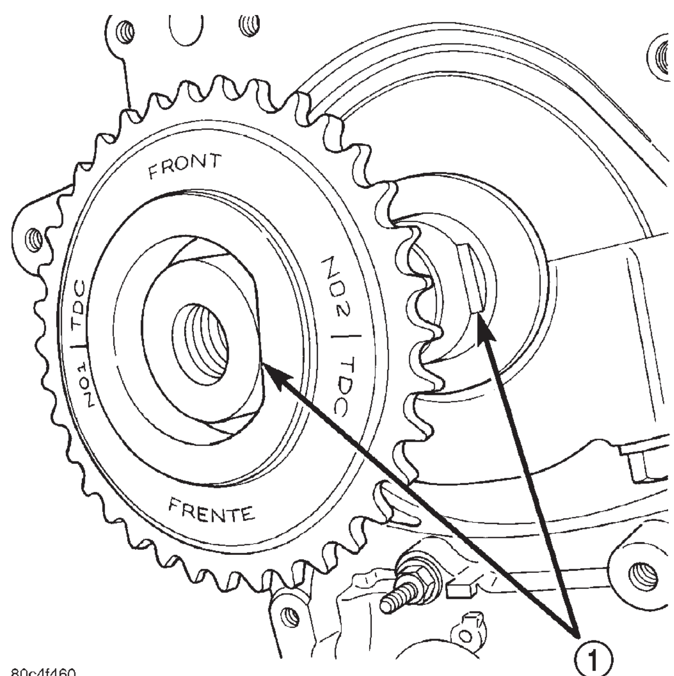


Fig. 108 Balance Shaft Sprocket Alignment to Crankshaft

1 - ALIGN FLATS

(7) Place chain over crankshaft sprocket so that the plated link of the chain is over the number 1 cylinder timing mark on the balance shaft crankshaft sprocket (Fig. 110).

(8) Place balance shaft sprocket into the timing chain (Fig. 110) and align the timing mark on the sprocket (dot) with the (lower) plated link on the chain.

NOTE: The lower plated link is 8 links from the upper link.

(9) With balance shaft keyways pointing up (12 o'clock) slide the balance shaft sprocket onto the nose of the balance shaft. The balance shaft may have to be pushed in slightly to allow for clearance.

BALANCE SHAFTS AND CARRIER ASSEMBLY (Continued)

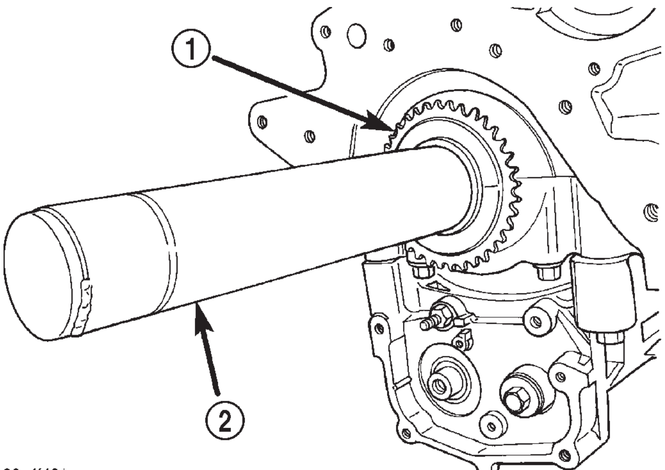


Fig. 109 Balance Shaft Drive

1 - SPROCKET
2 - SPECIAL TOOL 6052

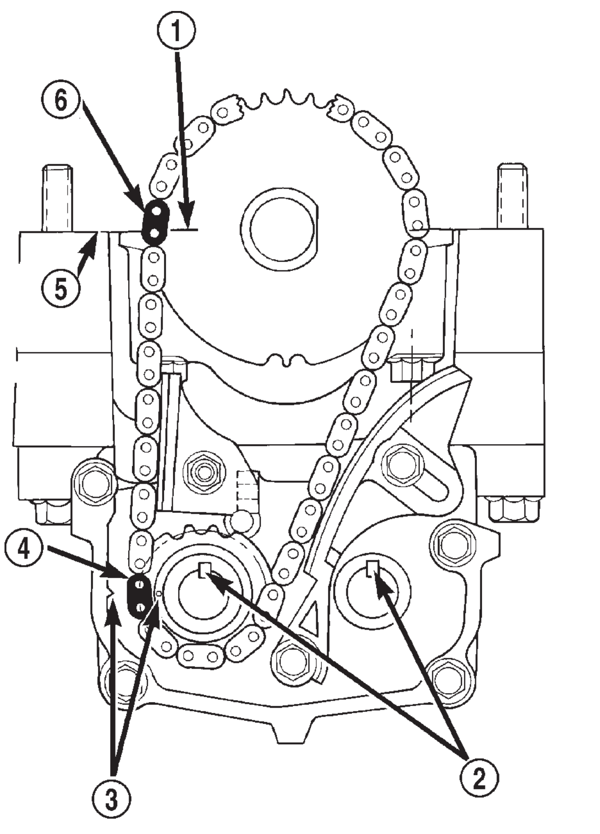


Fig. 110 Balance Shaft Timing

1 - MARK ON SPROCKET
2 - KEYWAYS UP
3 - ALIGN MARKS
4 - PLATED LINK
5 - PARTING LINE (BEDPLATE TO BLOCK)
6 - PLATED LINK

NOTE: THE TIMING MARK ON THE SPROCKET, THE (LOWER) NICKEL PLATED LINK, AND THE ARROW ON THE SIDE OF THE GEAR COVER SHOULD LINE UP WHEN THE BALANCE SHAFTS ARE TIMED CORRECTLY.

(10) If the sprockets are timed correctly, install the balance shaft bolts and tighten to 28 N·m (250 in. lbs.). A wood block placed between crankcase and crankshaft counterbalance will prevent crankshaft and gear rotation.

(11) **CHAIN TENSIONING:**

(a) Install chain tensioner loosely assembled.

(b) Position guide on double ended stud making sure tab on the guide fits into slot on the gear cover. Install and tighten nut/washer assembly to 12 N·m (105 in. lbs.).

(c) Place a shim 1 mm (0.039 in.) thick x 70 mm (2.75 in.) long or between tensioner and chain. Push tensioner and shim up against the chain. **Apply firm pressure 2.5–3 Kg (5.5–6.6 lbs.) directly behind the adjustment slot to take up all slack.** Chain must have shoe radius contact as shown in (Fig. 111).

(d) With the load applied, tighten top tensioner bolt first, then bottom pivot bolt. Tighten bolts to 12 N·m (105 in. lbs.). Remove shim.

(e) Install carrier covers and tighten screws to 12 N·m (105 in. lbs.).

(12) If removed, install oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSTALLATION).

(13) Install pick-up tube and oil pan (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

(14) Fill engine crankcase with proper oil to correct level.

BALANCE SHAFTS AND CARRIER ASSEMBLY (Continued)

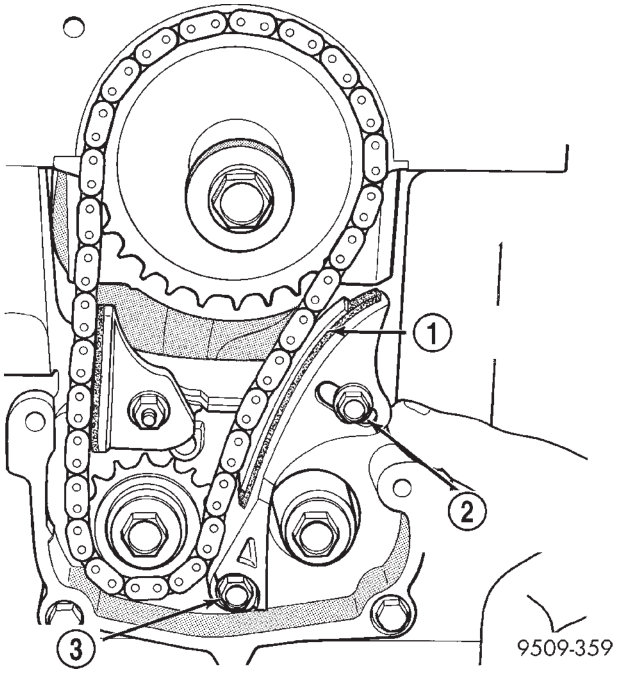


Fig. 111 Chain Tension Adjustment

1 - 1MM (0.039 IN.) SHIM
2 - TENSIONER (ADJUSTER) BOLT
3 - PIVOT BOLT

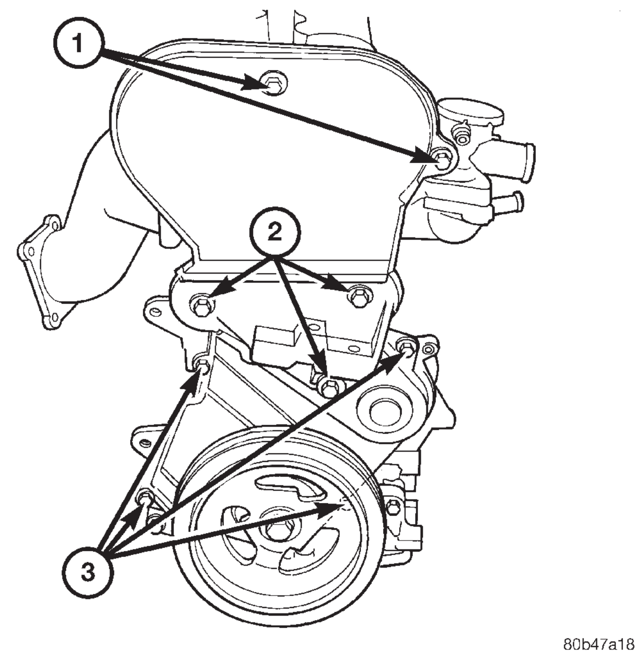


Fig. 112 Front Timing Belt Covers

1 - UPPER TIMING BELT COVER FASTENERS
2 - ENGINE SUPPORT BRACKET FASTENERS
3 - LOWER TIMING BELT COVER FASTENERS

TIMING BELT COVER(S)

REMOVAL

FRONT COVER - UPPER

(1) Remove upper timing belt cover fasteners (Fig. 112) and remove cover.

FRONT COVER - LOWER

(1) Disconnect negative battery cable.
(2) Raise vehicle on hoist.
(3) Remove right front wheel and belt splash shield.
(4) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).
(5) Remove crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).
(6) Remove AC/Generator belt tensioner.
(7) Lower vehicle.
(8) Disconnect generator connectors.
(9) Remove generator and bracket.
(10) Raise vehicle on hoist.
(11) Remove fasteners attaching lower timing cover (Fig. 112).
(12) Remove lower timing cover.

REAR COVER

(1) Remove upper and lower front timing belt covers.
(2) Remove Timing Belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).
(3) Remove timing belt idler pulley.
(4) Remove both camshaft sprockets. Hold camshaft sprockets with Special Tool 6847 while removing center bolts (Fig. 113).
(5) Remove rear timing belt cover fasteners and remove cover from engine (Fig. 114).

INSTALLATION

FRONT COVER - UPPER

(1) Install timing belt cover. Torque fasteners to 9 N·m (80 in. lbs.) (Fig. 112).

FRONT COVER - LOWER

(1) Install lower timing belt cover and torque fasteners to 9 N·m (80 in. lbs.) (Fig. 112).
(2) Lower vehicle.
(3) Install generator and bracket.
(4) Connect generator connectors.
(5) Raise vehicle.
(6) Install AC/Generator belt tensioner.

TIMING BELT COVER(S) (Continued)

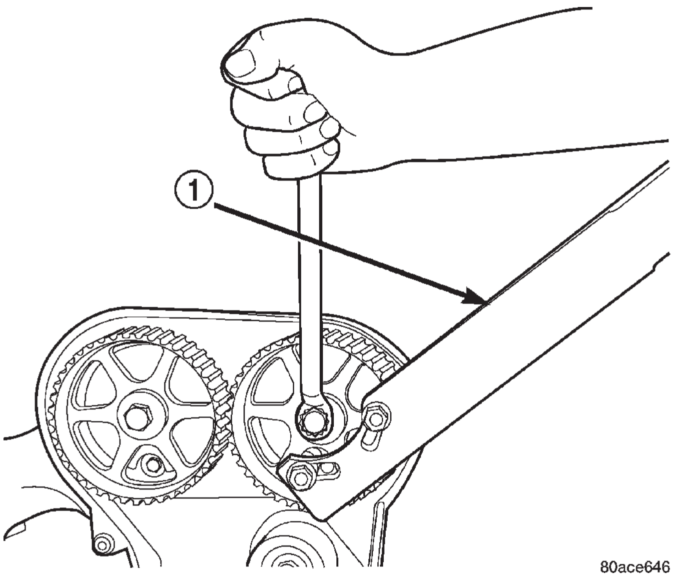


Fig. 113 Camshaft Sprocket - Removal/Installation

1 - SPECIAL TOOL 6847

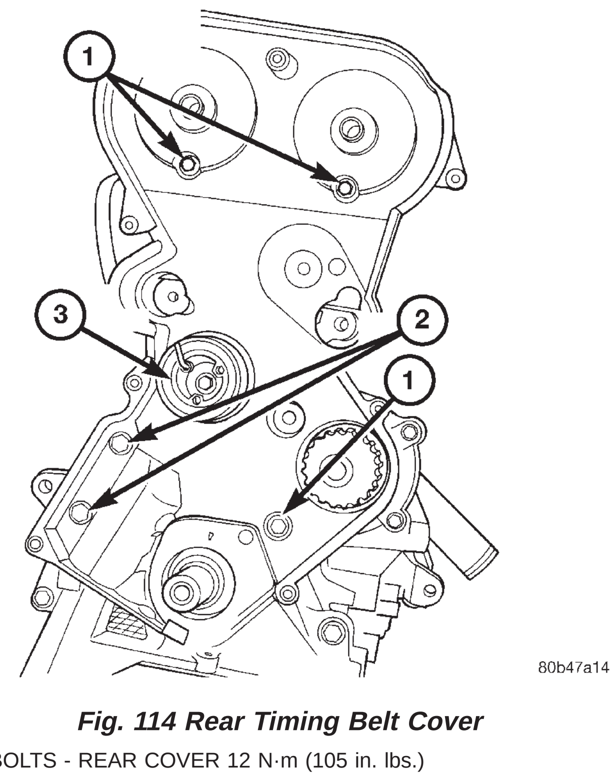


Fig. 114 Rear Timing Belt Cover

1 - BOLTS - REAR COVER 12 N·m (105 in. lbs.)
2 - BOLTS - REAR COVER 28 N·m (250 in. lbs.)
3 - TIMING BELT TENSIONER

(7) Install crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(8) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(9) Install belt splash shield and right front wheel.

(10) Lower vehicle.

(11) Connect negative battery cable.

REAR COVER

(1) Install rear timing belt cover and fasteners. Torque fasteners to specified values (Fig. 114).

(2) Install camshaft sprockets. Hold camshaft sprockets with Special Tool 6847 while tightening center bolts to 115 N·m (85 ft. lbs) (Fig. 113).

(3) Install timing belt idler pulley.

(4) Install timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(5) Install upper and lower front timing belt covers.

TIMING BELT AND SPROCKET(S)

REMOVAL

REMOVAL - TIMING BELT

(1) Disconnect negative battery cable.

(2) Raise vehicle on hoist. Remove right front wheel.

(3) Remove belt splash shield.

(4) Remove accessory drive belts.

(5) Remove crankshaft damper bolt, and remove damper.

(6) Remove AC/Generator belt tensioner.

(7) Disconnect generator connections. Remove generator and bracket.

(8) Remove upper and lower timing belt covers (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL) (Fig. 115).

(9) Remove coolant recovery container (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY CONTAINER - REMOVAL).

(10) Remove right engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/RIGHT MOUNT - REMOVAL).

(11) Remove engine support bracket (Fig. 115).

TIMING BELT AND SPROCKET(S) (Continued)

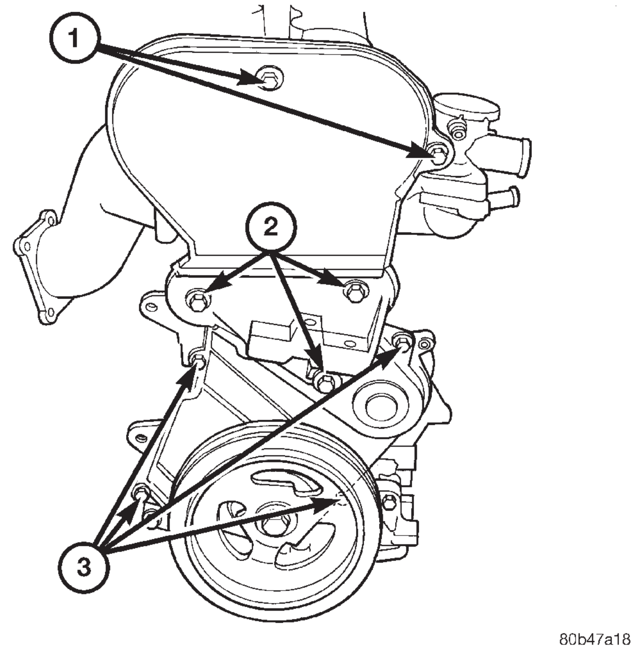


Fig. 115 Front Timing Belt Covers

1 - UPPER TIMING BELT COVER FASTENERS
2 - ENGINE SUPPORT BRACKET FASTENERS
3 - LOWER TIMING BELT COVER FASTENERS

CAUTION: When aligning crankshaft and camshaft timing marks always rotate engine from crankshaft. Camshaft should not be rotated after timing belt is removed. Damage to valve components may occur. Always align timing marks before removing timing belt.

(12) Before the removal of the timing belt, rotate crankshaft until the TDC mark on oil pump housing aligns with the TDC mark on crankshaft sprocket (trailing edge of sprocket tooth) (Fig. 116).

NOTE: The crankshaft sprocket TDC mark is located on the trailing edge of the sprocket tooth. Failure to align trailing edge of sprocket tooth to TDC mark on oil pump housing will cause the camshaft timing marks to be misaligned.

(13) Install 6 mm Allen wrench into belt tensioner. Before rotating the tensioner, insert the long end of a 1/8” or 3 mm Allen wrench into the pin hole on the front of the tensioner (Fig. 117). While rotating the tensioner counterclockwise, push in lightly on the 1/8” or 3 mm Allen wrench, until it slides into the locking hole.

(14) Remove timing belt.

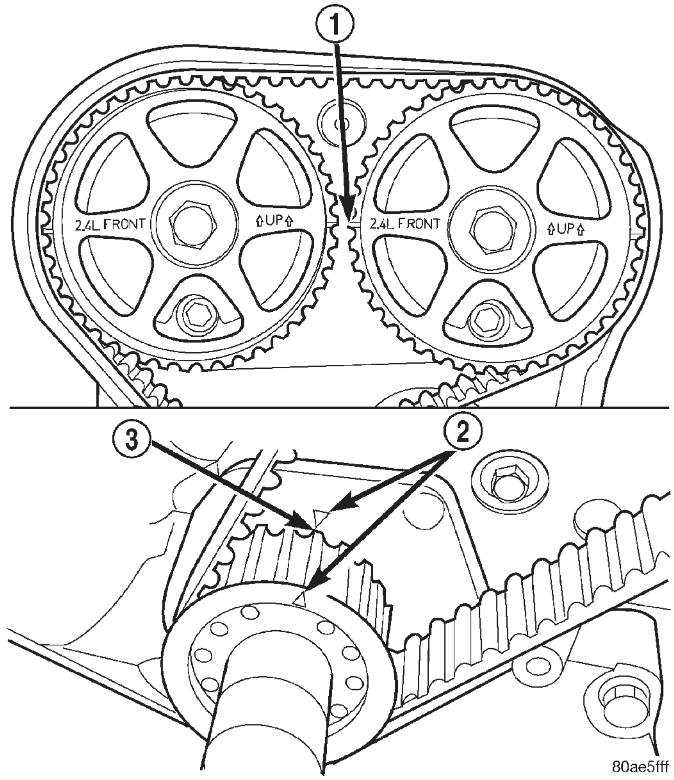


Fig. 116 Crankshaft and Camshaft Timing

1 - CAMSHAFT TIMING MARKS
2 - CRANKSHAFT TDC MARKS
3 - TRAILING EDGE OF SPROCKET TOOTH

CAUTION: If timing belt was damaged due to incorrect tracking (alignment), the belt tensioner assembly must be replaced. Refer to Timing Belt Tensioner Assembly Removal and Installation procedure in this section.

TIMING BELT AND SPROCKET(S) (Continued)

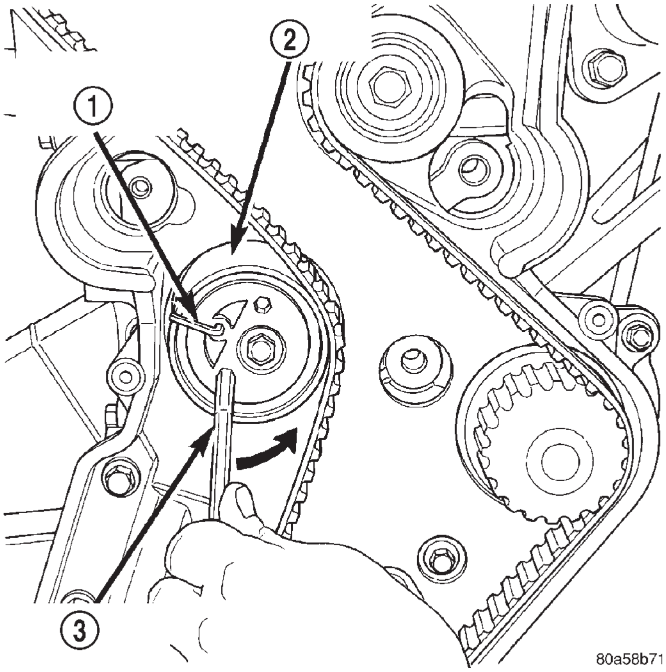


Fig. 117 Locking Timing Tensioner

1 - 1/8 OR 3mm ALLEN WRENCH
2 - BELT TENSIONER
3 - 6mm ALLEN WRENCH

REMOVAL - CAMSHAFT SPROCKETS

(1) Disconnect negative battery cable.

(2) Remove timing belt (Refer to 9 - ENGINE/ VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(3) Hold camshaft sprockets with Special Tool 6847 while removing center bolts (Fig. 118).

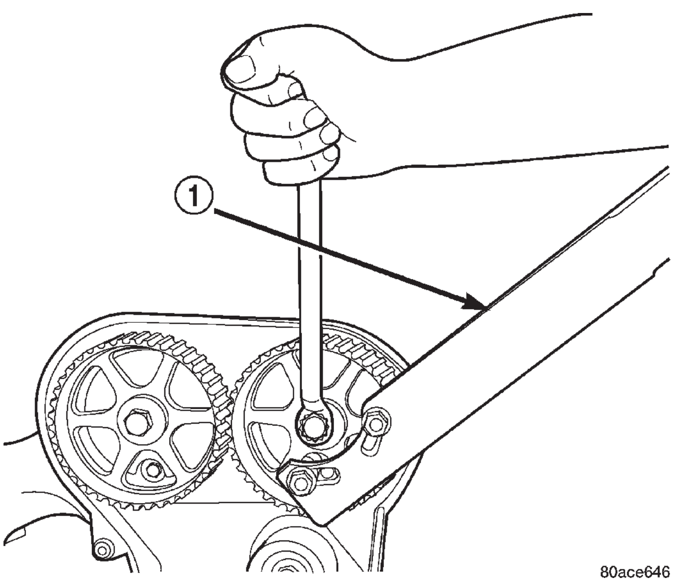


Fig. 118 Camshaft Sprocket - Removal/Installation

1 - SPECIAL TOOL 6847

REMOVAL - CRANKSHAFT SPROCKET

(1) Disconnect negative battery cable.

(2) Remove timing belt (Refer to 9 - ENGINE/ VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(3) Remove crankshaft sprocket using Special Tools 6793 and insert C-4685-C2 (Fig. 119).

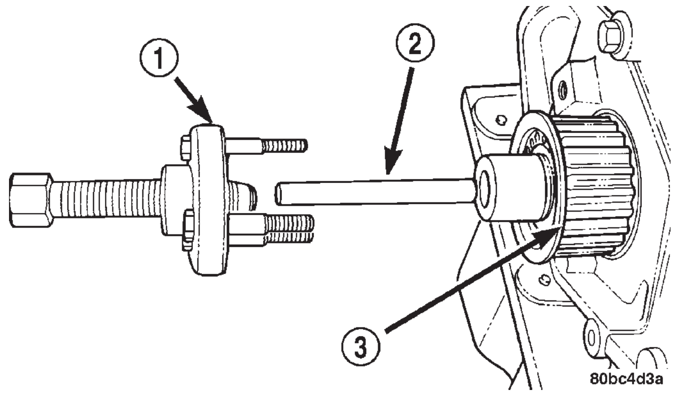


Fig. 119 Crankshaft Sprocket - Removal

1 - SPECIAL TOOL 6793
2 - SPECIAL TOOL C-4685–C2
3 - CRANKSHAFT SPROCKET

CLEANING

Do Not attempt to clean a timing belt. If contamination from oil, grease, or coolants have occurred, the timing belt should be replaced.

Clean all sprockets using a suitable solvent. Clean all sprocket grooves of any debris.

INSTALLATION

INSTALLATION - CRANKSHAFT SPROCKET

CAUTION: The crankshaft sprocket is set to a predetermined depth from the factory for correct timing belt tracking. If removed, use of Special Tool 6792 is required to set the sprocket to original installation depth. An incorrectly installed sprocket will result in timing belt and engine damage.

(1) Install crankshaft sprocket using Special Tool 6792 (Fig. 120).

(2) Install timing belt. (Refer to 9 - ENGINE/ VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

(3) Connect negative battery cable.

TIMING BELT AND SPROCKET(S) (Continued)

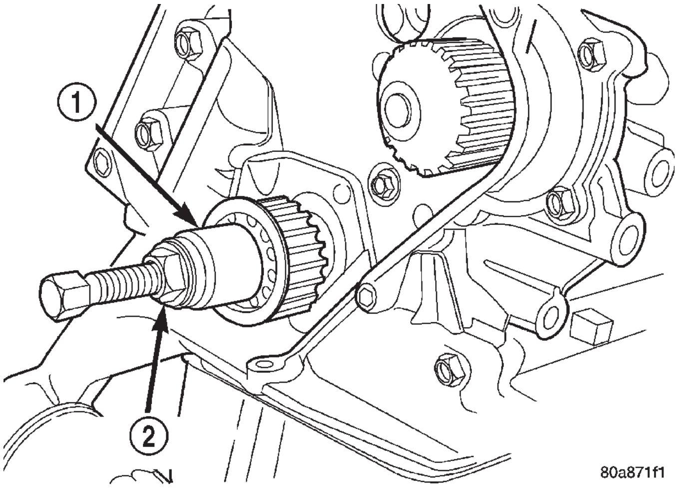


Fig. 120 Crankshaft Sprocket—Installation

1 - SPECIAL TOOL 6792
2 - TIGHTEN NUT TO INSTALL

INSTALLATION - CAMSHAFT SPROCKETS

(1) Install camshaft sprockets. Hold camshaft sprockets with Special Tool 6847 while tightening center bolts to 115 N·m (85 ft. lbs.) (Fig. 118).

(2) Install timing belt (Refer to 9 - ENGINE/ VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

(3) Connect negative battery cable.

INSTALLATION - TIMING BELT

(1) Set crankshaft sprocket to TDC by aligning the sprocket with the arrow on the oil pump housing.

(2) Set camshafts timing marks so that the exhaust camshaft sprocket is a 1/2 notch below the intake camshaft sprocket (Fig. 121).

CAUTION: Ensure that the arrows on both camshaft sprockets are facing up.

(3) Install timing belt. Starting at the crankshaft, go around the water pump sprocket, idler pulley, camshaft sprockets and then around the tensioner (Fig. 122).

(4) Move the exhaust camshaft sprocket counter-clockwise (Fig. 122) to align marks and take up belt slack.

NOTE: A new tensioner is held in the wound position by a pull pin.

(5) Remove the pull pin or Allen wrench from the belt tensioner.

(6) Once the timing belt has been installed and tensioner released, rotate the crankshaft two (2) complete revolutions. Verify that the TDC marks on crankshaft and timing marks on the camshafts are aligned as shown in (Fig. 123).

(7) Install engine mount support bracket (Fig. 115).

(8) Install upper timing belt cover. Torque fasteners to 9 N·m (80 in. lbs.) (Fig. 115).

(9) Install the lower timing belt cover. Torque fasteners to 9 N·m (80 in. lbs.) (Fig. 115).

(10) Install generator and bracket. Connect generator connections.

(11) Install AC/Generator belt tensioner.

(12) Install crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(13) Install right engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/RIGHT MOUNT - INSTALLATION).

(14) Install coolant recovery container (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY CONTAINER - INSTALLATION).

(15) Install accessory drive belts.

(16) Install belt splash shield.

(17) Install right front wheel.

(18) Connect negative battery cable.

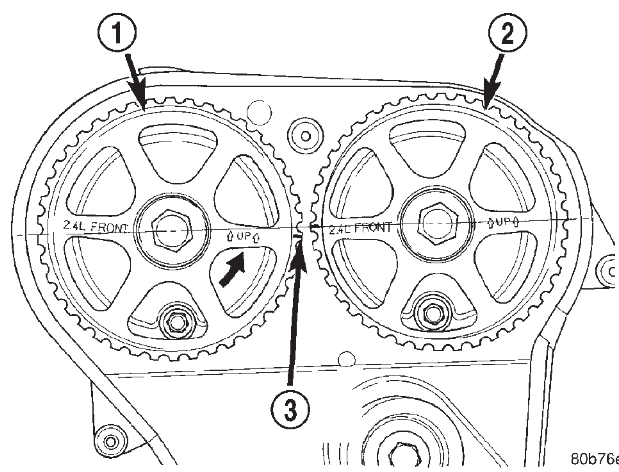


Fig. 121 Camshaft Sprocket Alignment

1 - CAMSHAFT SPROCKET-EXHAUST
2 - CAMSHAFT SPROCKET-INTAKE
3 - 1/2 NOTCH LOCATION

TIMING BELT AND SPROCKET(S) (Continued)

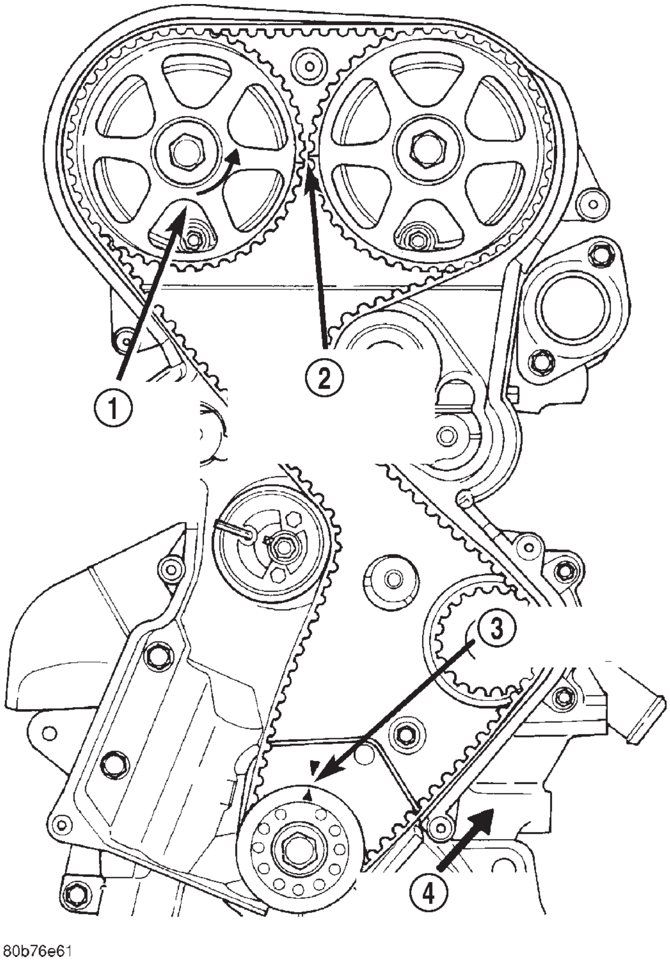


Fig. 122 Timing Belt - Installation

1 - ROTATE CAMSHAFT SPROCKET TO TAKE UP BELT SLACK
2 - CAMSHAFT TIMING MARKS 1/2 NOTCH LOCATION
3 - CRANKSHAFT AT TDC
4 - INSTALL BELT IN THIS DIRECTION

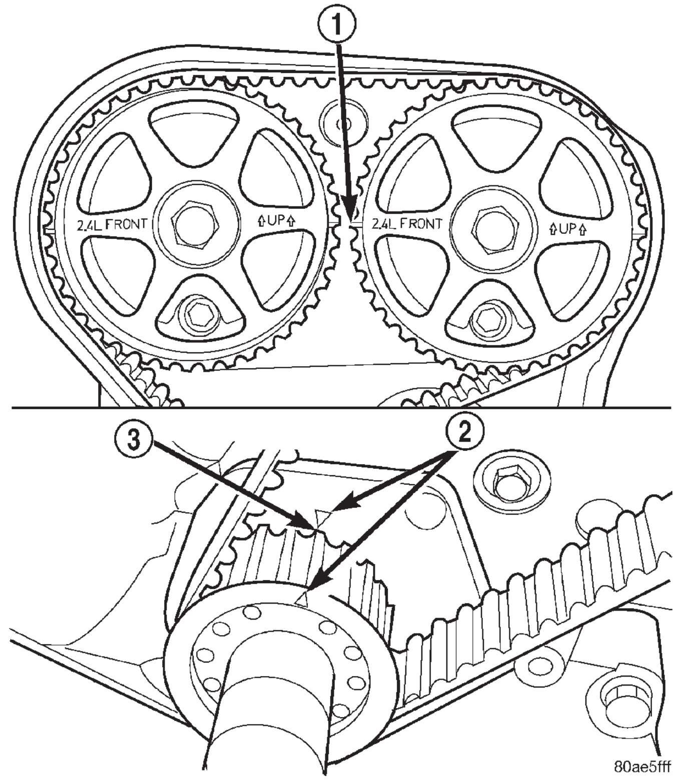


Fig. 123 Crankshaft and Camshaft Timing

1 - CAMSHAFT TIMING MARKS
2 - CRANKSHAFT TDC MARKS
3 - TRAILING EDGE OF SPROCKET TOOTH

TIMING BELT TENSIONER & PULLEY

REMOVAL

(1) Remove the timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - REMOVAL).

(2) Remove timing belt idler pulley.

(3) Hold camshaft sprocket with Special Tool 6847 while removing bolt (Fig. 124). Remove both cam sprockets.

(4) Remove rear timing belt cover fasteners and remove cover from engine (Fig. 125).

(5) Remove lower bolt attaching timing belt tensioner assembly to engine and remove tensioner **as an assembly** (Fig. 126).

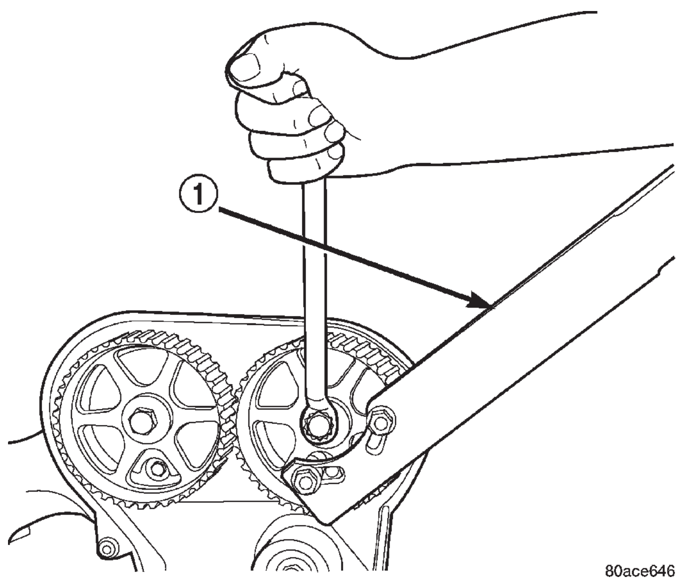


Fig. 124 Camshaft Sprocket - Removal/Installation

1 - SPECIAL TOOL 6847

TIMING BELT TENSIONER & PULLEY (Continued)

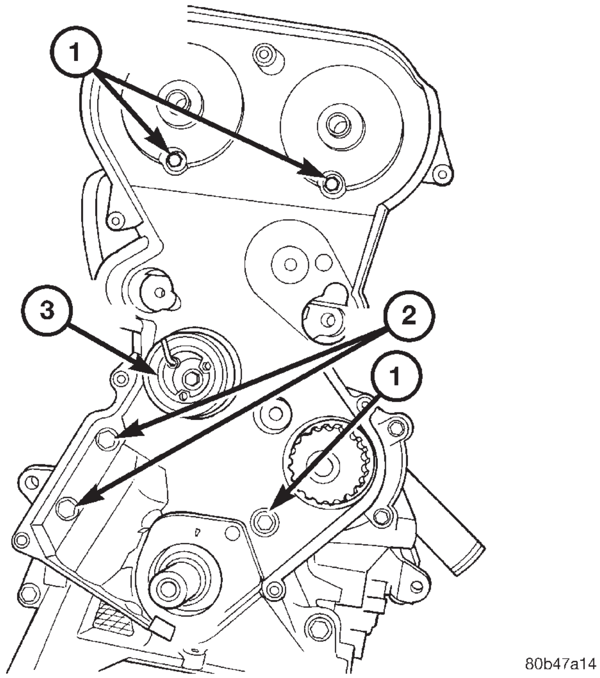


Fig. 125 Rear Timing Belt Cover

1 - BOLTS - REAR COVER 12 N·m (105 in. lbs.)
2 - BOLTS - REAR COVER 28 N·m (250 in. lbs.)
3 - TIMING BELT TENSIONER

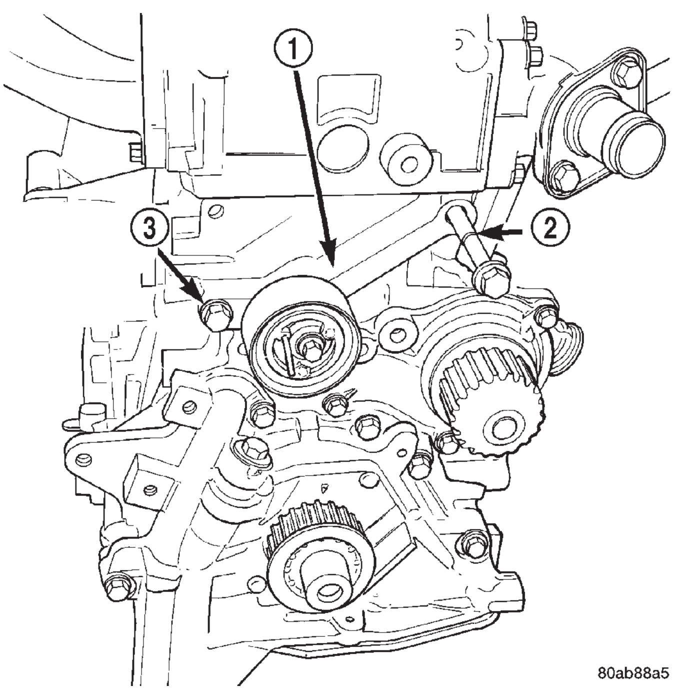


Fig. 126 Timing Belt Tensioner Assembly—Removal/Installation

1 - TIMING BELT TENSIONER ASSEMBLY
2 - TENSIONER ASSEMBLY UPPER BOLT
3 - TENSIONER ASSEMBLY LOWER BOLT

INSTALLATION

(1) Align timing belt tensioner assembly to engine and install lower mounting bolt **but do not tighten** (Fig. 126). To properly align tensioner assembly—install one of the engine bracket mounting bolts (M10) 5 to 7 turns into the tensioner's upper mounting location (Fig. 126).

(2) Torque the tensioner's lower mounting bolt to 61 N·m (45 ft. lbs.). Remove the upper bolt used for tensioner alignment.

(3) Install rear timing belt cover and fasteners (Fig. 125).

(4) Install timing belt idler pulley and torque mounting bolt to 61 N·m (45 ft. lbs.).

(5) Install camshaft sprockets. Use Special Tool 6847 to hold sprockets (Fig. 124), torque bolts to 115 N·m (85 ft. lbs.).

(6) Install the timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - INSTALLATION).

ENGINE 2.7L DOHC

TABLE OF CONTENTS

ENGINE 2.7L DOHC

DESCRIPTION

The 2.7 Liter (167 Cubic Inches) 60 degree V-6 engine is a double overhead camshaft design with hydraulic lifters and four valves per cylinder (Fig. 1). The engine does not have provisions for a free wheeling valve train.

The cylinders are numbered from front to rear, with the right bank odd numbered, and the left bank even numbered (Fig. 2). The firing order is 1–2–3–4–5–6.

The engine identification number is located on the rear of the cylinder block just below the left cylinder head (Fig. 3)

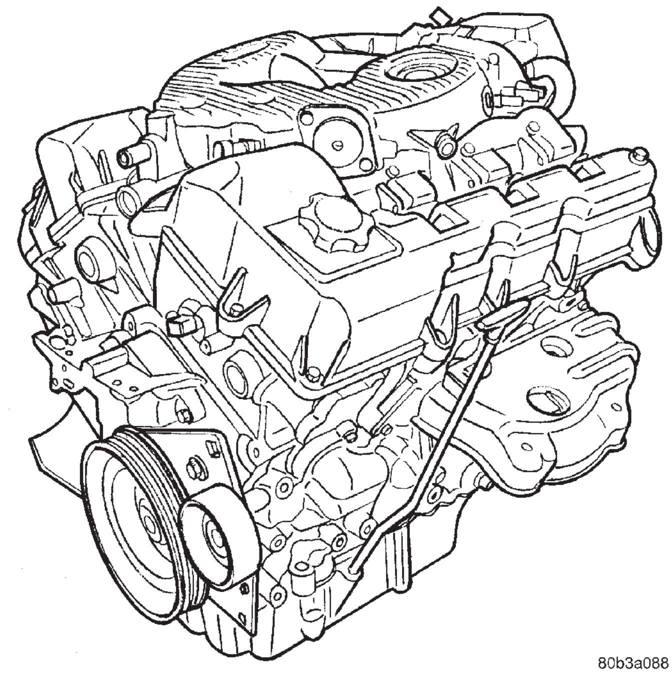


Fig. 1 2.7 Liter Engine

ENGINE 2.7L DOHC (Continued)

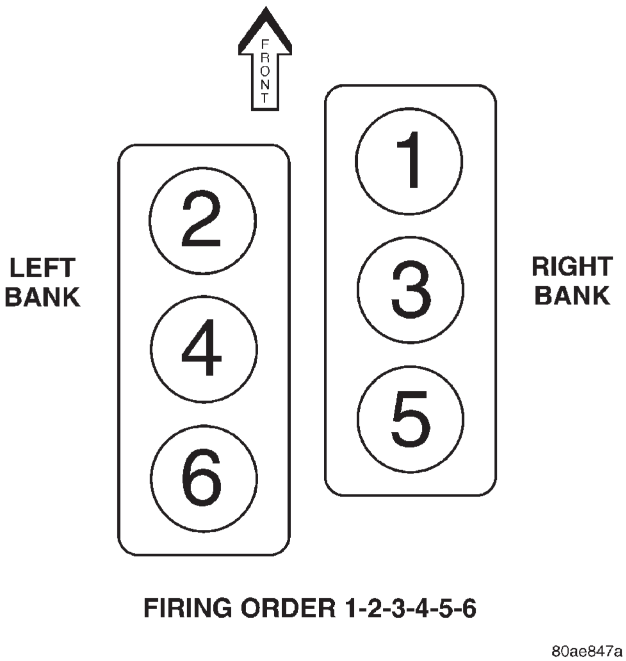


Fig. 2 Cylinder Numbering and Firing Order

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - INTRODUCTION

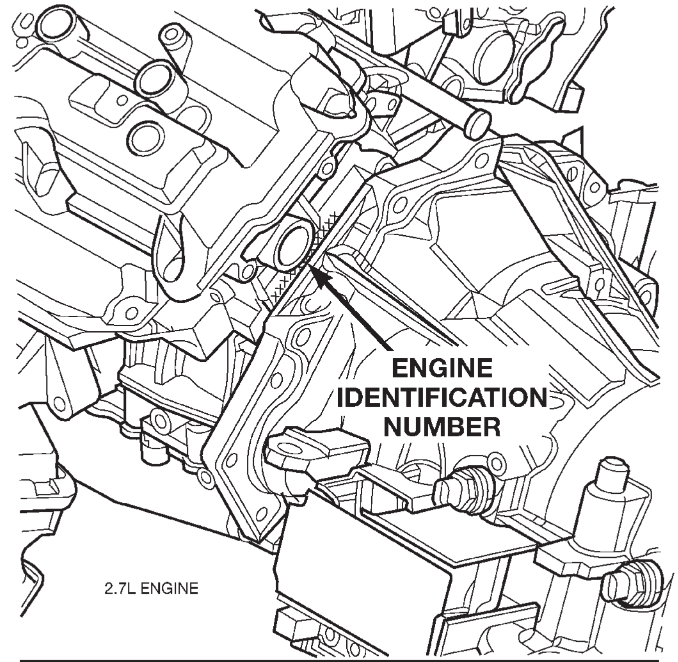
Engine diagnosis is helpful in determining the causes of malfunctions not detected and remedied by routine maintenance.

These malfunctions may be classified as either mechanical (e.g., a strange noise), or performance (e.g., engine idles rough and stalls).

Refer to Service Diagnosis—Mechanical Chart and Service Diagnosis—Performance Chart, for possible causes and corrections of malfunctions. Refer to FUEL SYSTEM for the fuel system diagnosis.

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that cannot be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following:

- Cylinder Compression Pressure Test
- Cylinder Combustion Pressure Leakage Test
- Cylinder Head Gasket Failure Diagnosis
- Intake Manifold Leakage Diagnosis
- Lash Adjuster (Tappet) Noise Diagnosis
- Engine Oil Leak Inspection



X MODEL YEAR	X MANUFACTURING PLANT	XXXXX COMPONENT CODE/USAGE	XXXX MONTH/DAY	XXXXX SERIAL CODE
LAST DIGIT OF MODEL YEAR	KENOSHA 9	ENGINE 2.7L USAGE PASS CAR PC		

80ae830a

Fig. 3 Engine Identification

ENGINE 2.7L DOHC (Continued)

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	1. Weak battery.	1. Test battery. Charge or replace as necessary. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/ BATTERY - DESCRIPTION)
	2. Corroded or loose battery connections.	2. Clean and tighten battery connections. Apply a coat of light mineral grease to terminals.
	3. Faulty starter.	3. Test starting system. (Refer to 8 - ELECTRICAL/STARTING - DIAGNOSIS AND TESTING)
	4. Faulty coil(s) or control unit.	4. Test and replace as needed. (Refer to Appropriate Diagnostic Information)
	5. Incorrect spark plug gap.	5. Check and adjust gap as needed.
	6. Contamination in fuel system.	6. Clean system and replace fuel filter.
	7. Faulty fuel pump.	7. Test fuel pump and replace as needed. (Refer to Appropriate Diagnostic Information)
	8. Incorrect engine timing.	8. Check for a skipped timing chain.
ENGINE STALLS OR IDLES ROUGH	1. Idle speed too low.	1. Test minimum air flow. (Refer to Appropriate Diagnostic Information)
	2. Incorrect fuel mixture.	2. (Refer to Appropriate Diagnostic Information)
	3. Intake manifold leakage.	3. Inspect intake manifold gasket, manifold, and vacuum hoses.
	4. Faulty coil(s).	4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)

ENGINE 2.7L DOHC (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE LOSS OF POWER	1. Dirty or incorrectly gapped plugs.	1. Set gap as needed or replace plug(s).
	2. Contamination in fuel system.	2. Clean system and replace fuel filter.
	3. Faulty fuel pump.	3. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	4. Incorrect valve timing.	4. Correct valve timing as needed.
	5. Leaking cylinder head gasket.	5. Replace cylinder head gasket.
	6. Low compression.	6. Test compression of each cylinder.
	7. Burned, warped, or pitted valves.	7. Replace valves.
	8. Plugged or restricted exhaust system.	8. Check exhaust system restriction. Replace parts, as necessary.
	9. Faulty coil(s).	9. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES ON ACCELERATION	1. Dirty or incorrectly gapped spark plugs.	1. Set gap as needed or replace plug(s).
	2. Contamination in Fuel System.	2. Clean fuel system and replace fuel filter.
	3. Burned, warped, or pitted valves.	3. Replace valves.
	4. Faulty coil(s).	4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES AT HIGH SPEED	1. Dirty or incorrect spark plug gap.	1. Set gap as needed or replace plug(s).
	2. Faulty coil(s).	2. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	3. Dirty fuel injector(s).	Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
	4. Contamination in fuel system.	4. Clean system and replace fuel filter.

ENGINE 2.7L DOHC (Continued)

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - MECHANICAL

CONDITION	POSSIBLE CAUSES	CORRECTION
NOISY VALVES	1. High or low oil level in crankcase.	1. Check and correct engine oil level.
	2. Thin or diluted oil.	2. Change oil to correct viscosity.
	3. Thick oil	3. (a.) Change oil and filter.
		(b.) Run engine to operating temperature.
		(c.) Change oil and filter again.
	4. Low oil pressure.	4. Check and correct engine oil level.
	5. Dirt in tappets/lash adjusters.	5. Replace rocker arm/hydraulic lash adjuster assembly.
	6. Worn rocker arms.	6. Inspect oil supply to rocker arms.
	7. Worn tappets/lash adjusters.	7. Install new rocker arm/hydraulic lash adjuster assembly.
	8. Worn valve guides.	8. Ream guides and install new valves with oversize stems.
	9. Excessive runout of valve seats on valve faces.	9. Grind valve seats and valves.
	10. Missing adjuster pivot.	10. Replace rocker arm/hydraulic lash adjuster assembly.
CONNECTING ROD NOISE	1. Insufficient oil supply.	1. Check engine oil level.
	2. Low oil pressure.	2. Check engine oil level. Inspect oil pump relief valve and spring.
	3. Thin or diluted oil.	3. Change oil to correct viscosity.
	4. Thick oil	3. (a.) Change oil and filter.
		(b.) Run engine to operating temperature.
		(c.) Change oil and filter again.
	5. Excessive bearing clearance.	5. Measure bearings for correct clearance. Repair as necessary.
	6. Connecting rod journal out-of-round.	6. Replace crankshaft or grind surface.
	7. Misaligned connecting rods.	7. Replace bent connecting rods.

ENGINE 2.7L DOHC (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
MAIN BEARING NOISE	1. Insufficient oil supply.	1. Check engine oil level.
	2. Low oil pressure.	2. Check engine oil level. Inspect oil pump relief valve and spring.
	3. Thin or diluted oil.	3. Change oil to correct viscosity.
	4. Thick oil	3. (a.) Change oil and filter.
		(b.) Run engine to operating temperature.
		(c.) Change oil and filter again.
	4. Excessive bearing clearance.	4. Measure bearings for correct clearance. Repair as necessary.
	5. Excessive end play.	5. Check thrust bearing for wear on flanges.
	6. Crankshaft journal out-of-round or worn.	6. Replace crankshaft or grind journals.
	7. Loose flywheel or torque converter.	7. Tighten to correct torque.
OIL PRESSURE DROP	1. Low oil level.	1. Check engine oil level.
	2. Faulty oil pressure sending unit.	2. Install new sending unit.
	3. Low oil pressure.	3. Check sending unit and main bearing oil clearance.
	4. Clogged oil filter.	4. Install new oil filter.
	5. Worn parts in oil pump.	5. Replace worn parts or pump.
	6. Thin or diluted oil.	6. Change oil to correct viscosity.
	7. Oil pump relief valve stuck.	7. Remove valve and inspect, clean, or replace.
	8. Oil pump suction tube loose.	8. Remove oil pan and install new tube or clean, if necessary.
	9. Oil pump cover warped or cracked.	9. Install new oil pump.
	10. Excessive bearing clearance.	10. Measure bearings for correct clearance.
OIL LEAKS	1. Misaligned or deteriorated gaskets.	1. Replace gasket(s).
	2. Loose fastener, broken or porous metal part.	2. Tighten, repair or replace the part.
	3. Misaligned or deteriorated cup or threaded plug.	3. Replace as necessary.

ENGINE 2.7L DOHC (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL CONSUMPTION OR SPARK PLUGS FOULED	1. PCV system malfunction.	1. Check system and repair as necessary. (Refer to Appropriate Diagnostic Manual)
	2. Worn, scuffed or broken rings.	2. Hone cylinder bores. Install new rings.
	3. Carbon in oil ring slots.	3. Clean pistons and install new rings.
	4. Rings fitted too tightly in grooves.	4. Remove rings and check grooves. If groove is not proper width, replace piston.
	5. Worn valve guide(s).	5. Replace cylinder head(s).
	6. Valve stem seal(s) worn or damaged.	6. Replace seal(s).

DIAGNOSIS AND TESTING - CYLINDER COMPRESSION PRESSURE TEST

The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

Ensure the battery is completely charged and the engine starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

(1) Check engine oil level and add oil if necessary.

(2) Drive the vehicle until engine reaches normal operating temperature. Select a route free from traffic and other forms of congestion, observe all traffic laws, and accelerate through the gears several times briskly.

(3) Remove all spark plugs from engine. As spark plugs are being removed, check electrodes for abnormal firing indicators fouled, hot, oily, etc. Record cylinder number of spark plug for future reference.

(4) Remove the Auto Shutdown (ASD) relay from the PDC.

(5) Be sure throttle blade is fully open during the compression check.

(6) Insert compression gauge adaptor Special Tool 8116 or the equivalent, into the #1 spark plug hole in cylinder head. Connect the 0–500 psi (Blue) pressure transducer (Special Tool CH7059) with cable adaptors to the DRBIII®. For Special Tool identification, (Refer to 9 - ENGINE - SPECIAL TOOLS).

(7) Crank engine until maximum pressure is reached on gauge. Record this pressure as #1 cylinder pressure.

(8) Repeat the previous step for all remaining cylinders.

(9) Compression should not be less than 689 kPa (100 psi) and not vary more than 25 percent from cylinder to cylinder.

(10) If one or more cylinders have abnormally low compression pressures, repeat the compression test.

(11) If the same cylinder or cylinders repeat an abnormally low reading on the second compression test, it could indicate the existence of a problem in the cylinder in question. **The recommended compression pressures are to be used only as a guide to diagnosing engine problems. An engine should not be disassembled to determine the cause of low compression unless some malfunction is present.**

DIAGNOSIS AND TESTING - CYLINDER COMBUSTION PRESSURE LEAKAGE TEST

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will detect:

- Exhaust and intake valve leaks (improper seating).
- Leaks between adjacent cylinders or into water jacket.
- Any causes for combustion/compression pressure loss.

WARNING: DO NOT REMOVE THE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

Check the coolant level and fill as required. DO NOT install the pressure cap.

Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.

Clean spark plug recesses with compressed air.

Remove the spark plugs.

Remove the oil filler cap.

Remove the air cleaner.

ENGINE 2.7L DOHC (Continued)

Calibrate the tester according to the manufacturer's instructions. The shop air source for testing should maintain 483 kPa (70 psi) minimum, 1,379 kPa (200 psi) maximum, with 552 kPa (80 psi) recommended.

Perform the test procedures on each cylinder according to the tester manufacturer's instructions. While testing, listen for pressurized air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the coolant.

All gauge pressure indications should be equal, with no more than 25% leakage per cylinder.

FOR EXAMPLE: At 552 kPa (80 psi) input pressure, a minimum of 414 kPa (60 psi) should be maintained in the cylinder.

DIAGNOSIS AND TESTING - ENGINE OIL LEAK INSPECTION

Begin with a thorough visual inspection of the engine, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

(1) Do not clean or degrease the engine at this time because some solvents may cause rubber to swell, temporarily stopping the leak.

(2) Add an oil soluble dye (use as recommended by manufacturer). Start the engine and let idle for approximately 15 minutes. Check the oil dipstick to make sure the dye is thoroughly mixed as indicated with a bright yellow color under a black light.

(3) Using a black light, inspect the entire engine for fluorescent dye, particularly at the suspected area of oil leak. If the oil leak is found and identified, repair as necessary.

(4) If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat inspection.

(5) **If the oil leak source is not positively identified at this time**, proceed with the air leak detection test method as follows:

- Disconnect the fresh air hose (make-up air) at the cylinder head cover and plug or cap the nipple on the cover.
- Remove the PCV valve hose from the cylinder head cover. Cap or plug the PCV valve nipple on the cover.
- Attach an air hose with pressure gauge and regulator to the dipstick tube.

CAUTION: Do not subject the engine assembly to more than 20.6 kpa (3 PSI) of test pressure.

- Gradually apply air pressure from 1 psi to 2.5 psi maximum while applying soapy water at the suspected source. Adjust the regulator to the suitable test pressure that provides the best bubbles which will pinpoint the leak source. If the oil leak is detected and identified, repair per service manual procedures.
- If the leakage occurs at the crankshaft rear oil seal area, refer to the section, Inspection for Rear Seal Area Leak.

(6) If no leaks are detected, turn off the air supply. Remove the air hose, all plugs, and caps. Install the PCV valve and fresh air hose (make-up air). Proceed to next step.

(7) Clean the oil off the suspect oil leak area using a suitable solvent. Drive the vehicle at various speeds approximately 24 km (15 miles). Inspect the engine for signs of an oil leak by using a black light.

NOTE: If oil leakage is observed at the dipstick tube to block location; remove the tube, clean and reseal using Mopar® Stud & Bearing Mount (press fit tube applications only), and for O-ring style tubes, remove tube and replace the O-ring seal.

INSPECTION FOR REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

(1) Disconnect the battery.

(2) Raise the vehicle.

(3) Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak. If a leak is present in this area, remove transmission for further inspection.

(a) Circular spray pattern generally indicates seal leakage or crankshaft damage.

(b) Where leakage tends to run straight down, possible causes are a porous block, oil gallery cup plug, bedplate to cylinder block mating surfaces and seal bore. See proper repair procedures for these items.

(4) If no leaks are detected, pressurize the crankcase as previously described.

CAUTION: Do not exceed 20.6 kPa (3 psi).

(5) If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

ENGINE 2.7L DOHC (Continued)

CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks and scratches. The crankshaft seal flange is especially machined to complement the function of the rear oil seal.

(6) For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled.

(7) After the oil leak root cause and appropriate corrective action have been identified, replace component(s) as necessary.

STANDARD PROCEDURE

STANDARD PROCEDURE - REPAIR OF DAMAGED OR WORN THREADS

Damaged or worn threads (excluding spark plug and camshaft bearing cap attaching threads) can be repaired. Essentially, this repair consists of drilling out worn or damaged threads, tapping the hole with a special Heli-Coil Tap, (or equivalent) and installing an insert into the tapped hole. This brings the hole back to its original thread size.

CAUTION: Be sure that the tapped holes maintain the original center line.

Heli-Coil tools and inserts are readily available from automotive parts jobbers.

STANDARD PROCEDURE - HYDROSTATIC LOCKED ENGINE

When an engine is suspected to be hydrostatically locked, regardless of what caused the problem, the following steps should be used.

CAUTION: DO NOT use starter motor to rotate the engine, severe damage may occur.

(1) Inspect air cleaner, induction system and intake manifold to insure system is dry and clear of foreign material.

(2) Remove negative battery cable.

(3) Place a shop towel around the spark plugs when removing them from the engine. This will catch any fluid that may possibly be in the cylinder under pressure.

(4) With all spark plugs removed, rotate engine crankshaft using a breaker bar and socket.

(5) Identify the fluid in the cylinder(s) (i.e., coolant, fuel, oil or other).

(6) Make sure all fluid has been removed from the cylinders. Inspect engine for damage (i.e., connecting rods, pistons, valves, etc.)

(7) Repair engine or components as necessary to prevent this problem from re-occurring.

CAUTION: Squirt approximately one teaspoon of oil into the cylinders, rotate engine to lubricate the cylinder walls to prevent damage on restart.

(8) Install new spark plugs.

(9) Drain engine oil and remove oil filter.

(10) Install a new oil filter.

(11) Fill engine with specified amount of approved oil.

(12) Connect negative battery cable.

(13) Start engine and check for any leaks.

STANDARD PROCEDURE - FORM-IN-PLACE GASKETS AND SEALERS

There are numerous places where form-in-place gaskets are used on the engine. Care must be taken when applying form-in-place gaskets to assure obtaining the desired results. **Do not use form-in-place gasket material unless specified.** Bead size, continuity, and location are of great importance. Too thin a bead can result in leakage while too much can result in spill-over which can break off and obstruct fluid feed lines. A continuous bead of the proper width is essential to obtain a leak-free gasket.

There are numerous types of form-in-place gasket materials that are used in the engine area. Mopar® Engine RTV GEN II, Mopar® ATF-RTV, and Mopar® Gasket Maker gasket materials, each have different properties and can not be used in place of the other.

MOPAR® ENGINE RTV GEN II is used to seal components exposed to engine oil. This material is a specially designed black silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil. Moisture in the air causes the material to cure. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® ATF RTV is a specifically designed black silicone rubber RTV that retains adhesion and sealing properties to seal components exposed to automatic transmission fluid, engine coolants, and moisture. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® GASKET MAKER is an anaerobic type gasket material. The material cures in the absence of air when squeezed between two metallic surfaces. It will not cure if left in the uncovered tube. The anaerobic material is for use between two machined surfaces. Do not use on flexible metal flanges.

ENGINE 2.7L DOHC (Continued)

MOPAR® BED PLATE SEALANT is a unique (green-in-color) anaerobic type gasket material that is specially made to seal the area between the bed-plate and cylinder block without disturbing the bearing clearance or alignment of these components. The material cures slowly in the absence of air when torqued between two metallic surfaces, and will rapidly cure when heat is applied.

MOPAR® GASKET SEALANT is a slow drying, permanently soft sealer. This material is recommended for sealing threaded fittings and gaskets against leakage of oil and coolant. Can be used on threaded and machined parts under all temperatures. This material is used on engines with multi-layer steel (MLS) cylinder head gaskets. This material also will prevent corrosion. Mopar® Gasket Sealant is available in a 13 oz. aerosol can or 4oz./16 oz. can w/applicator.

SEALER APPLICATION

Mopar® Gasket Maker material should be applied sparingly 1 mm (0.040 in.) diameter or less of sealant to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Components should be torqued in place within 15 minutes. The use of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Engine RTV GEN II or ATF RTV gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. All mounting holes must be circled. For corner sealing, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant may be removed with a shop towel. Components should be torqued in place while the sealant is still wet to the touch (within 10 minutes). The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Gasket Sealant in an aerosol can should be applied using a thin, even coat sprayed completely over both surfaces to be joined, and both sides of a gasket. Then proceed with assembly. Material in a can w/applicator can be brushed on evenly over the sealing surfaces. Material in an aerosol can should be used on engines with multi-layer steel gaskets.

STANDARD PROCEDURE - ENGINE GASKET SURFACE PREPARATION

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

Never use the following to clean gasket surfaces:

- Metal scraper
- Abrasive pad or paper to clean cylinder block and head
- High speed power tool with an abrasive pad or a wire brush (Fig. 4)

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover
- Plastic or wood scraper (Fig. 4)
- Drill motor with 3M Roloc™ Bristle Disc (white or yellow) (Fig. 4)

CAUTION: Excessive pressure or high RPM (beyond the recommended speed), can damage the sealing surfaces. The mild (white, 120 grit) bristle disc is recommended. If necessary, the medium (yellow, 80 grit) bristle disc may be used on cast iron surfaces with care.

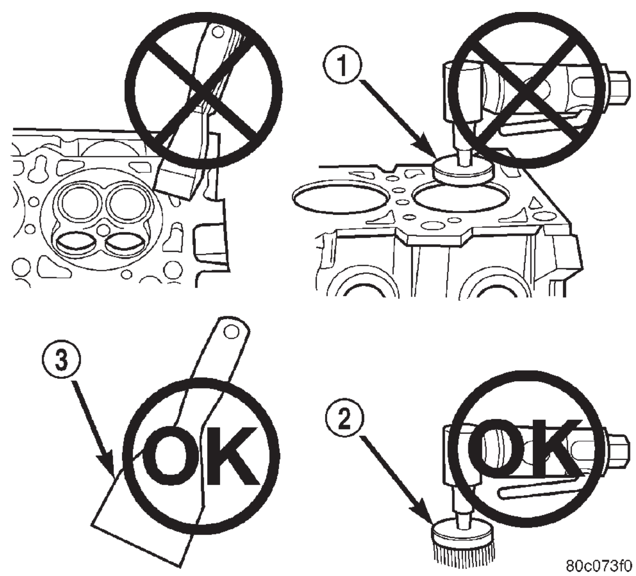


Fig. 4 Proper Tool Usage For Surface Preparation

1 - ABRASIVE PAD
2 - 3M ROLOC™ BRISTLE DISC
3 - PLASTIC/WOOD SCRAPER

STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS

Using a blunt tool such as a drift and a hammer, strike the bottom edge of the cup plug. With the cup plug rotated, grasp firmly with pliers or other suitable tool and remove plug (Fig. 5).

CAUTION: Do not drive cup plug into the casting as restricted cooling can result and cause serious engine problems.

ENGINE 2.7L DOHC (Continued)

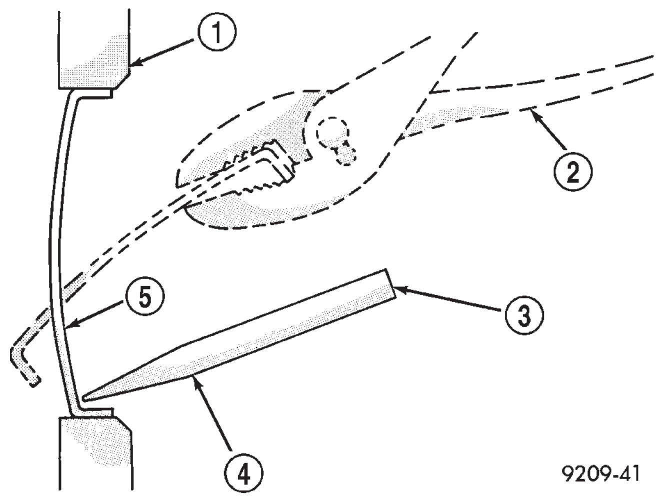


Fig. 5 Core Hole Plug Removal

1 - CYLINDER BLOCK
2 - REMOVE PLUG WITH PLIERS
3 - STRIKE HERE WITH HAMMER
4 - DRIFT PUNCH
5 - CUP PLUG

Thoroughly clean inside of cup plug hole in cylinder block or head. Be sure to remove old sealer. Lightly coat inside of cup plug hole with Mopar® Stud and Bearing Mount. Make certain the new plug is cleaned of all oil or grease. Using proper drive plug, drive plug into hole so that the sharp edge of the plug is at least 0.5 mm (0.020 in.) inside the lead-in chamfer.

It is not necessary to wait for curing of the sealant. The cooling system can be refilled and the vehicle placed in service immediately.

REMOVAL - ENGINE ASSEMBLY

(1) Release fuel pressure(Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE).

(2) Disconnect negative battery cable.

(3) Drain cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(4) Discharge A/C system using a suitable refrigerant recovery machine.

(5) Remove throttle body air inlet hose and air cleaner housing assembly.

(6) Raise vehicle on hoist.

(7) Remove both front wheels.

(8) Remove left and right splash shields.

(9) Remove fasteners attaching lower front fascia to crossmember.

(10) Remove fasteners attaching lower air shield to crossmember.

(11) Remove front bumper fascia.

(12) Lower vehicle.

(13) Remove upper radiator crossmember.

(14) Disconnect upper and lower radiator hoses at radiator.

(15) Using a blade or suitable hose cutter, cut transaxle oil cooler lines off flush with fittings. Plug lines and fittings to prevent debris from entering transaxle or cooler circuit. A service splice kit will be installed upon reassembly.

(16) Disconnect A/C lines at condenser. Remove cooling module (fan, radiator, A/C condenser).

(17) Disconnect transmission electrical harness connectors (C104 & C105) (Refer to 8 - ELECTRICAL/CONNECTOR/GROUND LOCATIONS - DESCRIPTION).

(18) Disconnect transmission shift cable.

(19) Disconnect engine electrical harness from PCM and bulkhead connectors.

(20) Remove fasteners attaching ABS brake module to lower radiator crossmember. Support module with a suitable retaining strap.

(21) Disconnect brake line from retaining clips that attach to lower radiator crossmember.

(22) Raise vehicle.

(23) Remove both axle shafts (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL).

(24) Remove front engine mount through bolt. Remove front engine mount from lower radiator crossmember.

(25) Remove lower radiator crossmember.

(26) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(27) Remove power steering pump and bracket as an assembly. **Do not** disconnect power steering lines from pump. Reposition pump and support with suitable retaining strap.

(28) Disconnect heater return hose from pipe connection at right front frame rail area.

(29) Disconnect A/C compressor electrical connector.

(30) Remove A/C compressor mounting bolts. Reposition A/C compressor and support with suitable retaining strap. Generator can be removed with engine assembly.

(31) Remove structural collar (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - REMOVAL).

(32) Remove the exhaust cross-under pipe (Refer to 11 - EXHAUST SYSTEM/CROSS-OVER PIPE - REMOVAL).

(33) Remove rear engine mount and transaxle bracket.

(34) Drain engine oil.

(35) Remove transaxle torque converter housing cover.

ENGINE 2.7L DOHC (Continued)

(36) Mark flex plate to torque converter position. Remove torque converter bolts.

(37) Lower vehicle.

(38) Disconnect positive cable from battery and PDC.

(39) Disconnect ground cable from left side transaxle mount bracket.

(40) Disconnect throttle and speed control cables.

(41) Disconnect coolant pressure bottle coolant hose from engine coolant outlet connector.

(42) Disconnect heater hose from engine coolant outlet connector.

(43) Disconnect ground strap at right shock tower.

(44) Disconnect fuel line.

(45) Disconnect brake booster and vapor purge vacuum hoses.

(46) Disconnect all ground straps attaching to engine.

(47) Position vehicle height to allow engine dolly 6135 and cradle 6710 with posts 6848 to be installed under vehicle.

(48) Loosen cradle engine mounts to allow movement for positioning onto engine locating holes on the engine block, compressor mount bracket and oil pan rail. Lower vehicle and position cradle until the engine is resting on posts (Fig. 6). Tighten post mounts to cradle frame to prevent movement when removing or installing engine/transaxle assembly. Secure engine/transaxle assembly to dolly/cradle with safety straps.

(49) Lower vehicle so weight of the engine and transmission ONLY is on the cradle.

(50) Remove right and left side engine mount bolts.

(51) Slowly raise vehicle in short length spans. Inspect at each interval for potential engine or transaxle contact to vehicle components. Move the cradle/dolly fixture as necessary to allow for removal clearance.

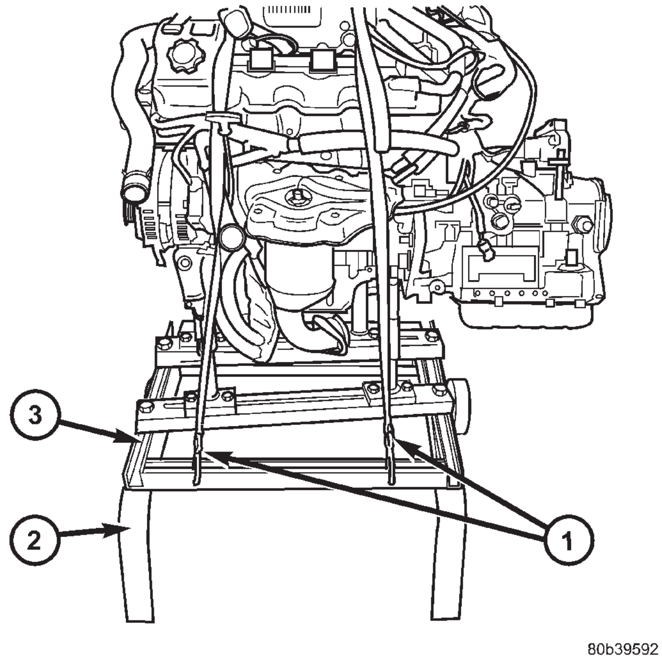


Fig. 6 ENGINE REMOVAL CRADLE

1 - SAFETY STRAPS
2 - SPECIAL TOOL 6135
3 - SPECIAL TOOL 6710

INSTALLATION - ENGINE ASSEMBLY

(1) Position engine/transaxle assembly under vehicle and slowly lower vehicle in short length spans. Inspect at each interval for potential engine or transaxle contact to vehicle components. Move the cradle/dolly fixture as necessary to allow for installation clearance (Fig. 6).

(2) Continue lowering vehicle until right side engine mount and left side transaxle mount align to their mounting locations. Install mounting bolts and torque to 61 N·m (45 ft. lbs.).

(3) Remove safety straps from engine/transaxle assembly. Slowly raise vehicle enough to remove the engine dolly and cradle.

(4) Reattach all ground straps to engine.

(5) Connect brake booster and vapor purge vacuum hoses.

(6) Connect fuel line.

(7) Connect ground strap to right shock tower.

(8) Connect heater hose to coolant outlet connector.

(9) Connect coolant pressure bottle coolant hose to coolant outlet connector.

(10) Connect throttle and speed control cables.

(11) Connect ground cable to left side transaxle mount bracket.

(12) Connect positive cable to battery and PDC.

(13) Raise vehicle.

(14) Install torque converter bolts.

(15) Install torque converter housing cover.

(16) Install rear engine mount and transaxle bracket.

(17) Install exhaust cross-under pipe (Refer to 11 - EXHAUST SYSTEM/CROSS-OVER PIPE - INSTALLATION).

(18) Install structural collar (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - INSTALLATION).

(19) Install A/C compressor to bracket.

(20) Connect A/C compressor clutch electrical connector.

(21) Connect heater return hose to pipe connection at right front frame rail area.

(22) Install power steering pump and bracket assembly.

ENGINE 2.7L DOHC (Continued)

(23) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(24) Install lower radiator crossmember.

(25) Install front engine mount to lower radiator crossmember. Install front engine mount through bolt.

(26) Install both axle shafts (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION).

(27) Lower vehicle.

(28) Connect brake line to retaining clips that attach to lower radiator crossmember.

(29) Install fasteners attaching ABS module to lower radiator crossmember.

(30) Connect engine electrical harness to PCM and bulkhead connectors.

(31) Connect transmission shift cable.

(32) Connect transmission electrical harness connectors (C104 & C105) (Refer to 8 - ELECTRICAL/CONNECTOR/GROUND LOCATIONS - DESCRIPTION).

(33) Install cooling module (fan, radiator, A/C condenser). Connect A/C lines to condenser.

(34) Connect transmission oil cooler lines using service splice kit. Refer to instructions provided with kit.

(35) Connect upper and lower radiator hoses to radiator.

(36) Install upper radiator crossmember.

(37) Raise vehicle.

(38) Ensure oil pan drain plug is tight. Install new oil filter.

(39) Install front bumper fascia and lower air shield to lower radiator crossmember.

(40) Install left and right splash shields.

(41) Install both front wheels.

(42) Lower vehicle.

(43) Install throttle body air inlet hose and air cleaner housing assembly.

(44) Fill engine crankcase with proper oil to correct level.

(45) Evacuate and recharge Air Conditioning system (Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

(46) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(47) Connect negative battery cable.

(48) Start engine and run until operating temperature is reached.

SPECIFICATIONS

2.7L ENGINE

DESCRIPTION	SPECIFICATION
General Specifications	
Type	60° DOHC V-6 24-Valve
Displacement	2.7 Liters (167 Cubic Inches)
Bore & Stroke	86.0 x 78.5 mm (3.386 in. x 3.091 in.)
Compression Ratio	9.67:1
Lead Cylinder	#1 Right Bank
Firing Order	1-2-3-4-5-6
Cylinder Block	
Cylinder Bore Diameter	86.0 mm ±0.0076 (3.3859 in. ±0.0003)
Out of Round (Max.)	0.076 mm (0.003 in.)
Taper (Max.)	0.051 mm (0.002 in.)
Pistons	
Material	Aluminum Alloy
Piston Diameter	85.983 mm ±0.019 (3.3851 in. ±0.0017)
Clearance at Size Location	– 0.0096 to +0.0436 mm (– 0.0003 to +0.0016 in.)
Piston Weight	316–326 grams (11.1466–11.4994 oz.)
Piston Ring Groove Diameter—No. 1	77.8–78 mm (3.063–3.070 in.)
Piston Ring Groove Diameter—No. 2	75.9–76.1 mm (2.988–2.996 in.)
Piston Ring Groove Diameter—No. 3	76.5–76.7 mm (3.011–3.019 in.)
Piston Pins	
Type	Full Floating
Pin Diameter	21.997–22.000 mm (0.8661–0.8662 in.)
Clearance in Piston	0.005–0.013 mm (0.0002–0.0005 in.)
Clearance in Rod	0.007–0.018 mm (0.0003–0.0008 in.)

ENGINE 2.7L DOHC (Continued)

DESCRIPTION	SPECIFICATION
Piston Rings	
Ring Gap—Top Compression Ring	0.20–0.36 mm (0.008–0.014 in.)
Ring Gap—2nd Compression Ring	0.37–0.63 mm (0.0146–0.0249 in.)
Ring Gap—Oil Control (Steel Rails)	0.25–0.76 mm (0.010–0.030 in.)
Piston Ring Side Clearance	
Compression Ring—Top	0.035–0.083 mm (0.0013–0.0032 in.)
Compression Ring—Second	0.040–0.080 mm (0.0016–0.0031 in.)
Oil Ring (Steel Rails)	0.058–0.204 mm (0.0022–0.0080 in.)
Piston Ring Width	
Compresion Rings—Top and Second	1.47–1.49 mm (0.0579–0.0587 in.)
Oil Ring (Steel Rails)	0.445–0.470 mm (0.0176–0.0186 in.)
Connecting Rods	
Bearing Clearance	0.024–0.064 mm (0.001–0.0026 in.)
Side Clearance	0.13–0.38 mm (0.0052–0.015 in.)
Side Clearance (Max.)	0.4318 mm (0.017 in.)
Piston Pin Bore Diameter	22.007–22.015 mm (0.8665–0.8668 in.)
Bearing Bore Out of Round (Max.)	0.004 mm (0.0002 in.)
Total Weight (Less Bearing)	529.9 ±7 grams (18.6917 ±0.247 oz.)
Crankshaft Main Bearing Journals	
Diameter	63.49–63.51 mm (2.4997–2.5004 in.)
Bearing Clearance	0.035–0.053 mm (0.0014–0.0021 in.)
Bearing Clearance (Max.)	0.087 mm (0.0034 in.)
Out of Round (Max.)	0.015 mm (0.0006 in.))

DESCRIPTION	SPECIFICATION
Taper (Max.)	0.015 mm (0.0006 in.)
End Play	0.0475–0.2725 mm (0.0019–0.0108 in.)
End Play (Max.)	0.43 mm (0.017 in.)
Connecting Rod Journals	
Diameter	53.51–53.49 mm (2.1067–2.106 in.)
Bearing Clearance	0.024–0.064 mm (0.001–0.0026 in.)
Out of Round (Max.)	0.015 mm (0.0006 in.)
Taper (Max.)	0.015 mm (0.0006 in.)
Camshaft	
Bore Diameter	24.050–24.071 mm (0.9469–0.09476 in.)
Bearing Journal Diameter	24.000–23.981 (0.9449–0.9441 in.)
Bearing Clearance	0.05–0.09 mm (0.0020–0.0035 in.)
Bearing Clearance (Max.)	0.13 mm (0.0051 in.)
End Play	0.13 mm (0.0051–0.0110 in.)
Valve Timing—Intake Valve	
Opens (ATDC)	2°
Closes (ABDC)	44°
Duration	222°
Valve Timing—Exhaust Valve	
Opens (BBDC)	36°
Closes (ATDC)	4°
Duration	220°
Valve Overlap	2°
Cylinder Head	
Gasket Thickness (Compressed)	1.50 mm ±0.05 (0.0591 in. ±0.002 in.)
Valve Seat Angle	45°–45.5°
Valve Seat Runout (Max.)	0.05 mm (0.002 in.)

ENGINE 2.7L DOHC (Continued)

DESCRIPTION	SPECIFICATION
Intake Valve Seat Width	1.00–1.5 mm (0.0394–0.0591 in.)
Exhaust Valve Seat Width	1.25–1.75 mm (0.0492–0.0689 in.)
Guide Bore Diameter (Std.)	5.975–6.00 mm (0.2353–0.2363 in.)
Valve Guide Height*—Intake & Exhaust	13.25–13.75 mm (0.5217–0.5414 in.)
*Measured from cylinder head surface to top of guide	
Valves	
Face Angle	44.5°–45.5°
Head Diameter—Intake	33.67–33.93 (1.3256–1.3358 in.)
Head Diameter—Exhaust	27.67–27.93 mm (1.0894–1.1000 in.)
Length—Intake (Overall)	107.89–108.39 mm (4.2476–4.2673 in.)
Length—Exhaust (Overall)	105.88–106.38 mm (4.1685–4.1882 in.)
Stem Diameter—Intake	5.934–5.952 mm (0.2337–0.2344 in.)
Stem Diameter—Exhaust	5.906–5.924 mm (0.2326–0.2333 in.)
Stem-to-Guide Clearance—Intake (New)	0.023–0.066 mm (0.0009–0.0026 in.)
Stem-to-Guide Clearance—Exhaust (New)	0.051–0.094 mm (0.002–0.0037 in.)
Stem-to-Guide Clearance—Intake (Max., Rocking Method)	0.29 mm (0.0114 in.)
Stem-to-Guide Clearance—Exhaust (Max., Rocking Method)	0.370 mm (0.0146 in.)
Valve Lift—Intake (Zero Lash)	9.0 mm (0.3543 in.)
Valve Lift—Exhaust (Zero Lash)	8.0 mm (0.3150 in.)
Valve Stem Tip Height—Intake	47.120 ±0.467 mm (1.8551 ±0.00184 in.)
Valve Stem Tip Height—Exhaust	48.672 ±0.467 mm (1.9162 ±0.00184 in.)

DESCRIPTION	SPECIFICATION
Valve Spring	
Free Length—Intake & Exhaust (Approx.)	45.63 mm (1.7965 in.)
Spring Force—Intake & Exhaust (Valve Closed)	249–284 N @ 38.0 mm (56.0–64.0 lbs. @ 1.4961 in.)
Spring Force—Intake (Valve Open)	658–721 N @ 29.0 mm (147.9–162.1 lbs. @ 1.1417 in.)
Spring Force—Exhaust (Valve Open)	614–671 N @ 30.0 mm (138.0–150.8 lbs. @ 1.1811 in.)
Number of Coils—Intake & Exhaust	7.35
Wire Diameter—Intake & Exhaust	3.861 mm (0.1520 in.)
Installed Height—Intake & Exhaust (Spring seat to bottom of retainer)	38.0 mm (1.4961 in.)
Oil Pump	
Clearance Over Rotors (Max.)	0.077 mm (0.003 in.)
Cover—Out-of-Flat (Max.)	0.025 mm (0.001 in.)
Inner & Outer Rotor Thickness	9.475–9.500 mm (0.3731–0.3741 in.)
Outer Rotor Clearance (Max.)	0.39 mm (0.015 in.)
Outer Rotor Diameter (Min.)	89.175 mm (3.5109 in.)
Tip Clearance Between Rotors (Max.)	0.20 mm (0.008 in.)
Oil Pressure	
(NOTE: At Normal Operating Temperatures)	
Pressure @ Curb Idle Speed*	34.7 kPa Min. (5 psi) Min.
Pressure @ 3000 RPM	300–724 kPa (45–105 psi)
*CAUTION: If oil pressure is zero at idle, DO NOT run engine at 3000 RPM.	

ENGINE 2.7L DOHC (Continued)

TORQUE

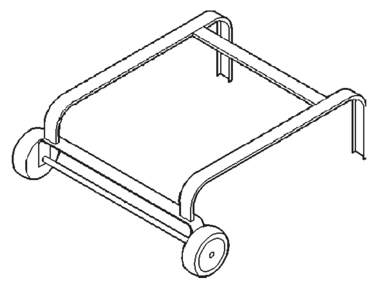
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
A/C Compressor to Engine—Bolts	28	21	—
Camshaft Sprocket—Bolts	28	—	250
Camshaft Chain Tensioner (Secondary)—Bolts	12	—	105
Camshaft Bearing Cap—Bolts	12	—	105
Connecting Rod Cap—Bolts	27 +¼ Turn	20 +¼ Turn	—
Crankshaft Main Bearing Cap			
—Tie Bolts	28	—	250
—Inner Cap Bolts	20 +¼ Turn	15 +¼ Turn	—
—Outer Cap Bolts	27 +¼ Turn	20 +¼ Turn	—
Crankshaft Damper—Bolt	170	125	—
Cylinder Head—Bolts	(Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION)		
Cylinder Head Cover—Bolts	12	—	105
Exhaust Manifold—Bolts	23	—	200
Exhaust Manifold Heat Shield—Bolts	12	—	105
Exhaust Manifold to Catalytic Converter V-Band Clamp	11	—	100
Engine Mount Bracket to Block—Bolts	61	45	—
Engine Mount Isolator—Nuts	61	45	—
Intake Manifold (Upper and Lower)—Bolts	12	—	105
Generator Bracket—Bolts	41	30	—
Oil Pan			
—Bolts	28	—	250
—Nuts	12	—	105
Oil Pan Drain—Plug	27	20	—
Oil Filter	16	12	—
Oil Pump to Block—Bolts	28	—	250
Oil Pump Cover—Bolts	12	—	105
Oil Pump Pick Up Tube—Bolt	28	—	250
PCV Valve	7	—	60
Crankshaft Rear Seal Retainer—Bolts	12	—	105
Spark Plugs	20	15	—
Starter Mounting—Bolts	41	30	—
Structural Collar	(Refer to 9 - ENGINE/ENGINE BLOCK/ STRUCTURAL COVER - INSTALLATION)		
Thermostat Housing/Water Inlet Connector—Bolts	12	—	105
Throttle Body—Bolts	12	—	105

ENGINE 2.7L DOHC (Continued)

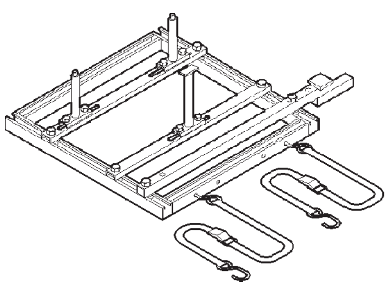
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Timing Chain Cover			
—M6 Bolts	12	—	105
—M10 Bolts	54	40	—
Timing Chain Tensioner (Primary)	54	40	—
Timing Chain Guide Access Plug	20	15	—
Water Pump—Bolts	12	—	105
Cooling System Bleed Screw	12	—	105
Water Outlet Housing—Bolts	12	—	105

SPECIAL TOOLS

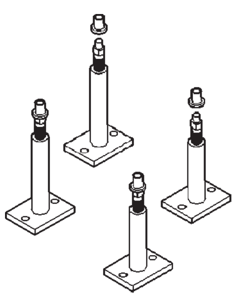
2.7L ENGINE



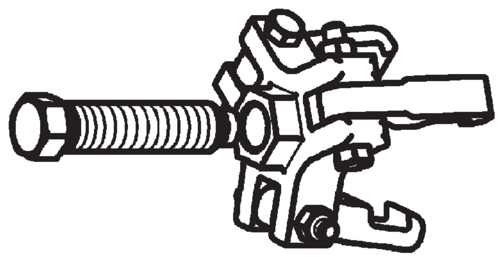
Dolly 6135



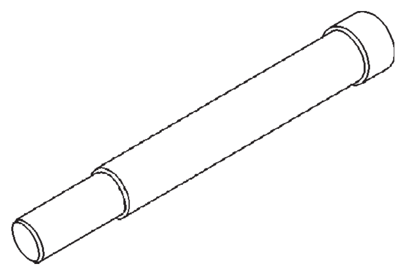
Cradle 6710



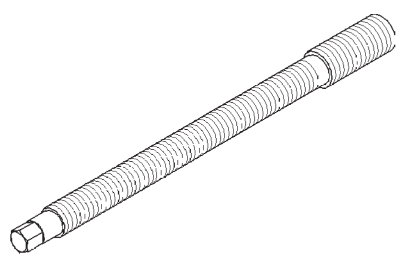
Post Kit Engine Cradle 6848



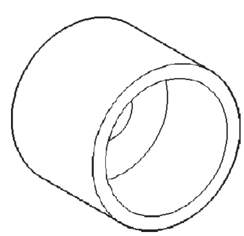
Puller 8454



Crankshaft Damper Remover Insert 8194

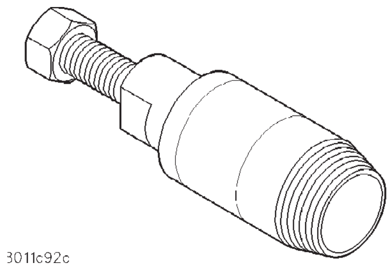


Crankshaft Damper Installer Screw 8179

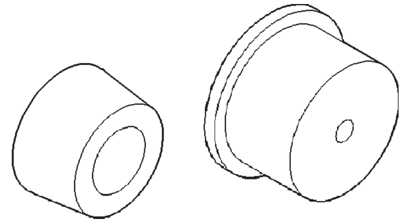


Crankshaft Damper Installer 6792-1

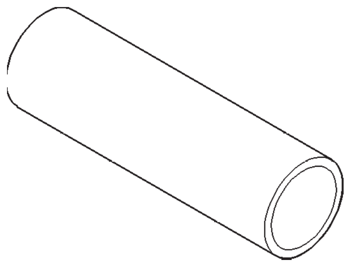
ENGINE 2.7L DOHC (Continued)



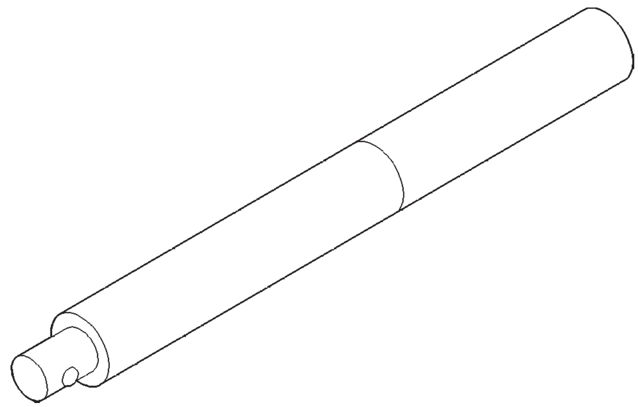
Crankshaft Seal Remover 6771



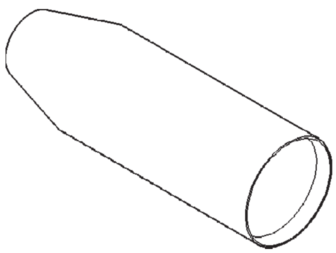
Crankshaft Rear Seal Guide 6926-1 & Installer 6926-2



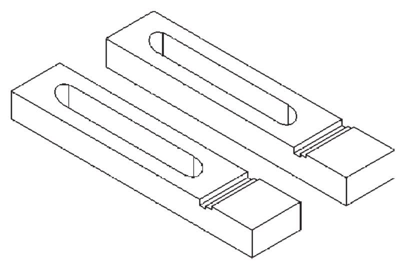
Crankshaft Seal & Sprocket Installer 6780-1



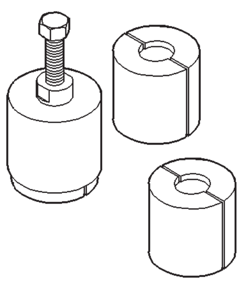
Driver Handle C-4171



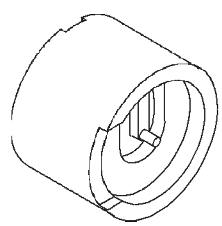
Crankshaft Seal Protector 6780-2



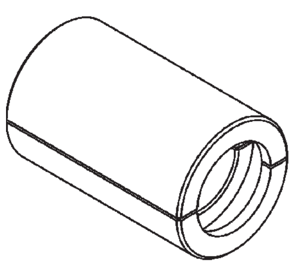
Crankshaft Real Seal Retainer Alignment Fixture 8225



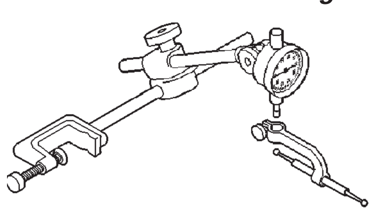
Puller 5048



Timing Chain Tensioner Resetting Gauge 8186

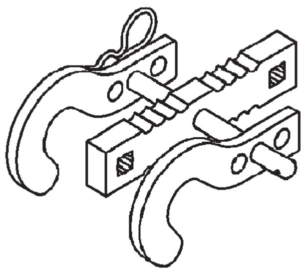


Puller Adaptor 8539

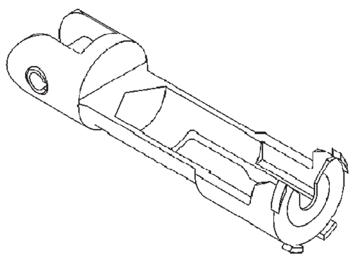


Dial Indicator C-3339

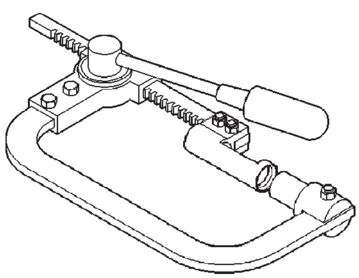
ENGINE 2.7L DOHC (Continued)



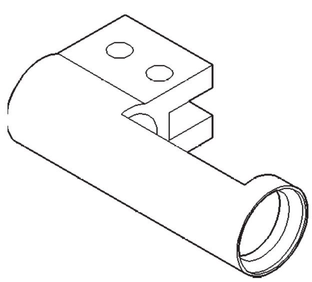
Valve Spring Compressor 8215-A



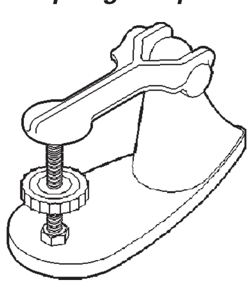
Adaptor 8216-A



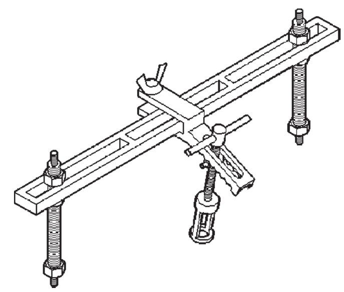
Valve Spring Compressor C-3422-B



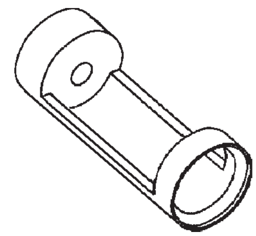
Valve Spring Adapter 6526



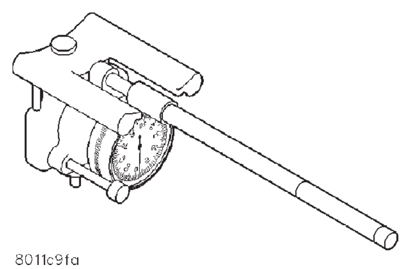
Valve Spring Tester C-647



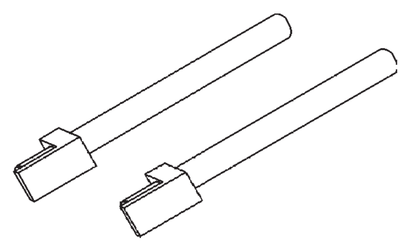
Valve Spring Compressor MD-998772-A



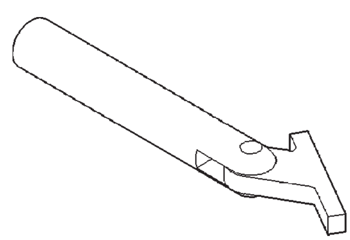
Valve Spring Adapter 6527



Indicator Bore Size C-119

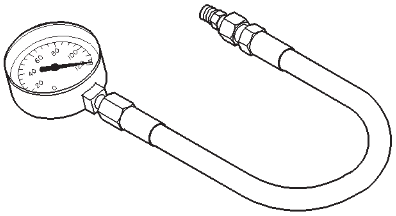


Connecting Rod Installation Guides 8189

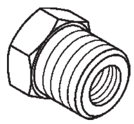


Main Bearing Remover/Installer C-3059

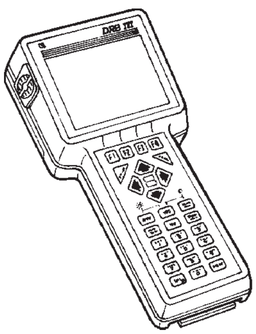
ENGINE 2.7L DOHC (Continued)



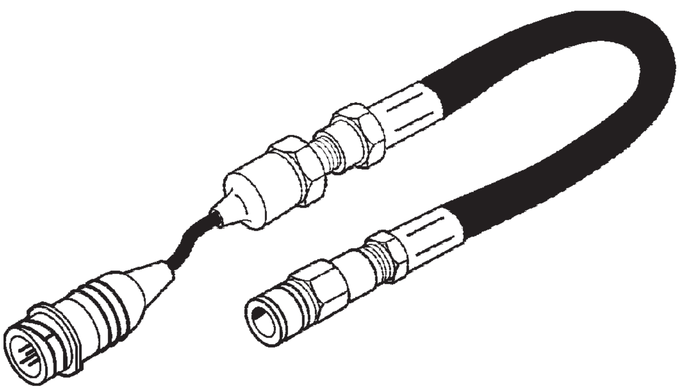
Oil Pressure Gauge C-3292



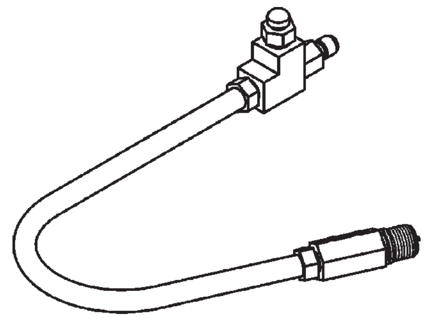
Adapter 8406



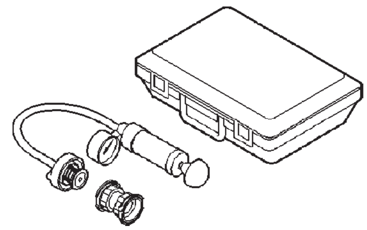
DRB III® with PEP Module OT-CH6010A



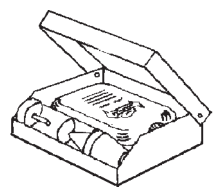
Pressure Transducer CH7059



Adaptor 8116



Cooling System Tester 7700



Combustion Leak Tester C-3685-A

AIR CLEANER ELEMENT

REMOVAL

(1) Disconnect negative battery cable.

(2) Disconnect inlet air temperature sensor electrical connector (Fig. 7).

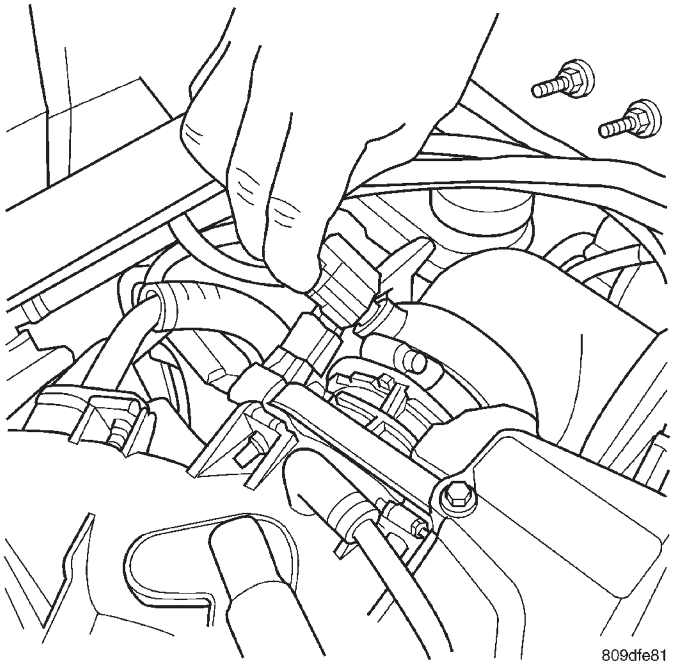


Fig. 7 INLET AIR TEMPERATURE SENSOR

(3) Disconnect fresh air makeup hose from throttle body air inlet hose (Fig. 8).

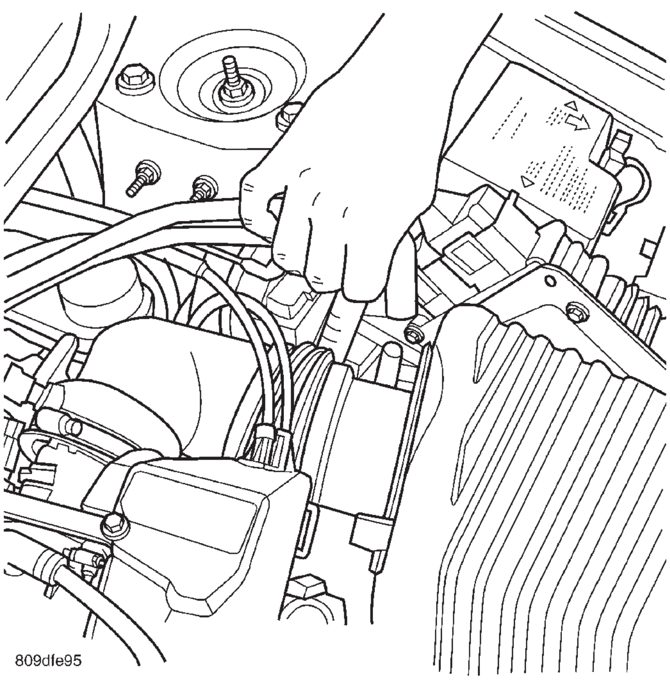


Fig. 8 MAKE UP AIR HOSE

(4) Loosen hose clamp at throttle body (Fig. 9). Remove hose from throttle body.

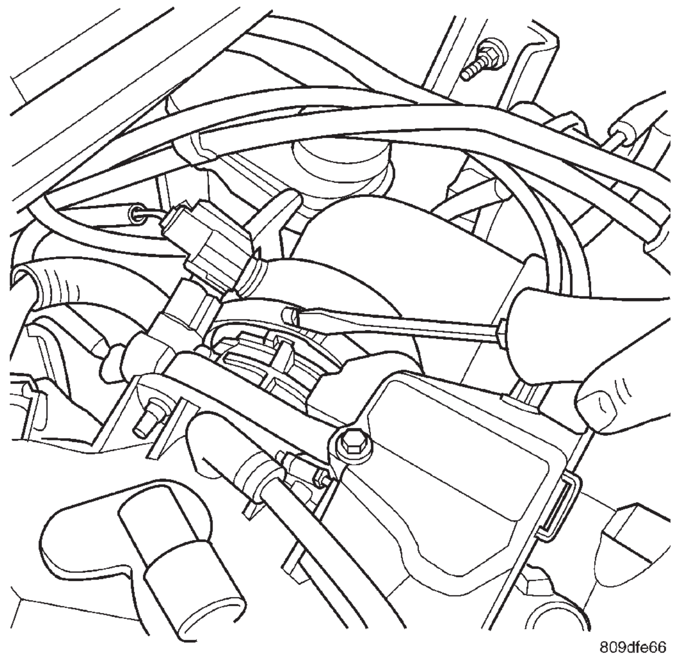


Fig. 9 HOSE CLAMP

(5) Push in on locking tabs to disengage air inlet hose from air cleaner housing. Pull air inlet hose out far enough to disengage air cleaner element from hose with screwdriver (Fig. 10).

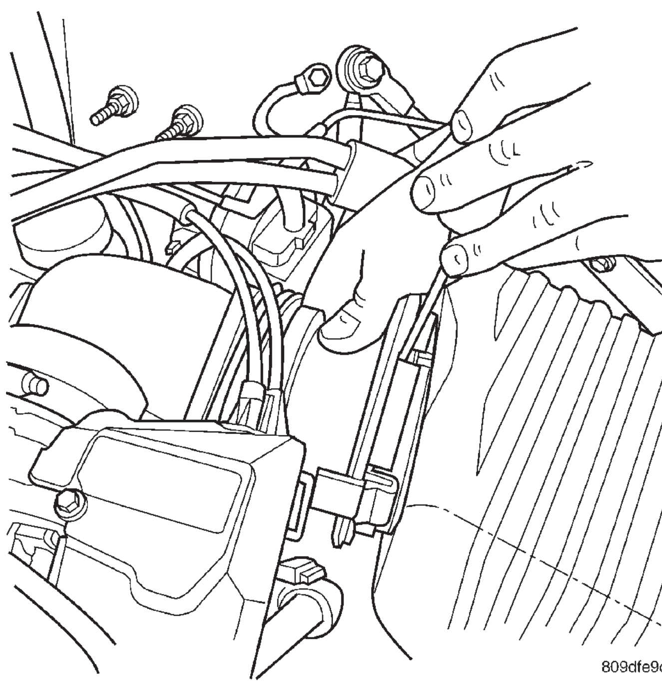


Fig. 10 AIR FILTER TO HOSE

(6) Remove throttle body air inlet hose.

(7) Remove air cleaner element from air cleaner housing.

AIR CLEANER ELEMENT (Continued)

INSTALLATION

(1) Clean any debris from inside air cleaner housing.

(2) Install air cleaner element into air cleaner housing (Fig. 11). Verify element rests properly on mounting bosses inside air cleaner housing.

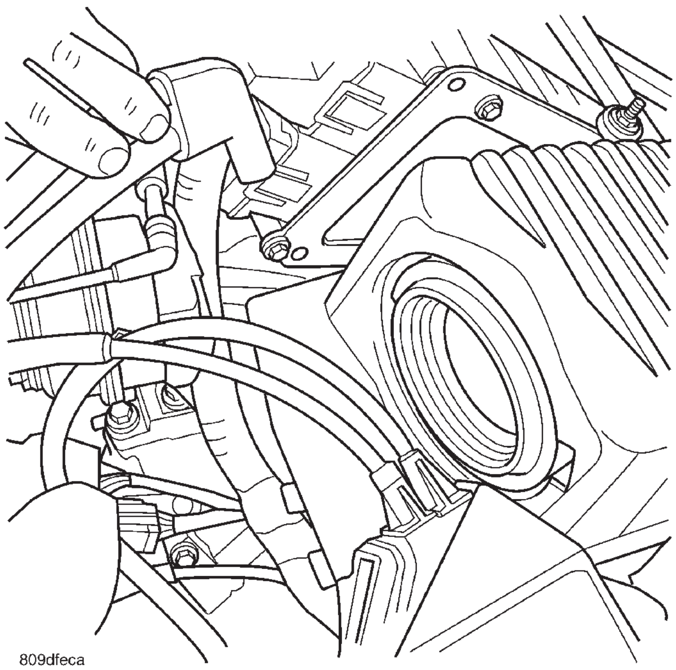


Fig. 11 AIR FILTER IN HOUSING

(3) Install throttle body air inlet hose into air cleaner housing. Push in on hose until an audible "click" is heard from locking tabs.

(4) Install hose on throttle body. Tighten hose clamp (Fig. 9).

(5) Connect fresh air makeup hose (Fig. 8).

(6) Connect inlet air temperature sensor electrical sensor (Fig. 7).

(7) Connect negative battery cable.

AIR CLEANER HOUSING

REMOVAL

(1) Disconnect negative battery cable.

(2) Disconnect inlet air temperature sensor electrical connector (Fig. 12).

(3) Disconnect fresh air makeup hose from throttle body air inlet hose (Fig. 13). Loosen clamp at throttle body (Fig. 14).

(4) Remove hose from throttle body.

(5) Remove nut on bracket that holds air cleaner housing.

(6) Pull air cleaner housing straight up off of locating pins.

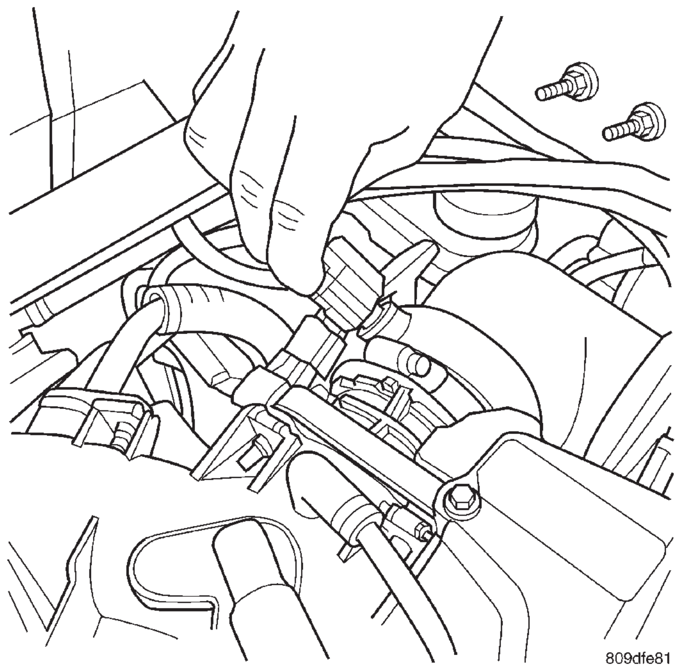


Fig. 12 INLET AIR TEMPERATURE SENSOR

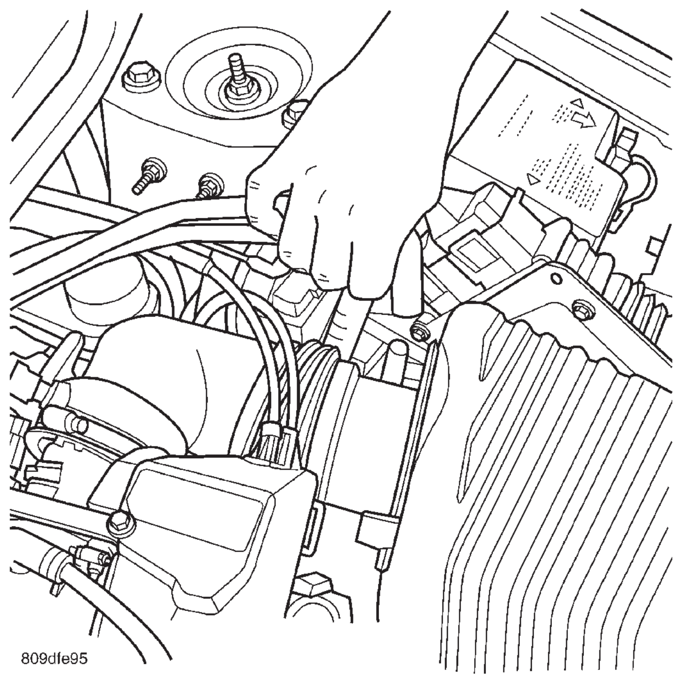


Fig. 13 MAKE UP AIR HOSE

AIR CLEANER HOUSING (Continued)

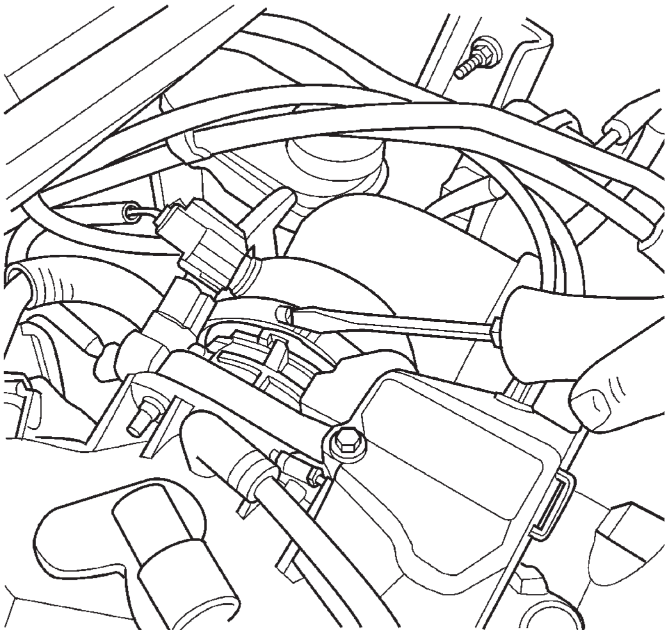


Fig. 14 HOSE CLAMP

INSTALLATION

(1) Install air cleaner housing straight down on locating pins.

(2) Install nut on bracket that holds air cleaner housing and tighten.

(3) Install throttle body air inlet hose to throttle body. Tighten hose clamp (Fig. 14).

(4) Connect fresh air makeup hose (Fig. 13).

(5) Connect inlet air temperature sensor electrical connector (Fig. 12).

(6) Connect negative battery cable.

CYLINDER HEAD

DESCRIPTION

The cylinder heads are made of an aluminum alloy (Fig. 15). The cylinder head features four valves per cylinder with pressed in powdered metal valve guides. The cylinder heads provide enclosures for the timing chain drive, necessitating a unique right and left cylinder head.

DIAGNOSIS AND TESTING—CYLINDER HEAD GASKET

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

Possible indications of the cylinder head gasket leaking between adjacent cylinders are:

- Loss of engine power
- Engine misfiring
- Poor fuel economy

Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:

- Engine overheating
- Loss of coolant
- Excessive steam (white smoke) emitting from exhaust
- Coolant foaming

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between adjacent cylinders, follow the procedures in Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING). An engine cylinder head gasket leaking between adjacent cylinders will result in approximately a 50–70% reduction in compression pressure.

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

CYLINDER HEAD (Continued)

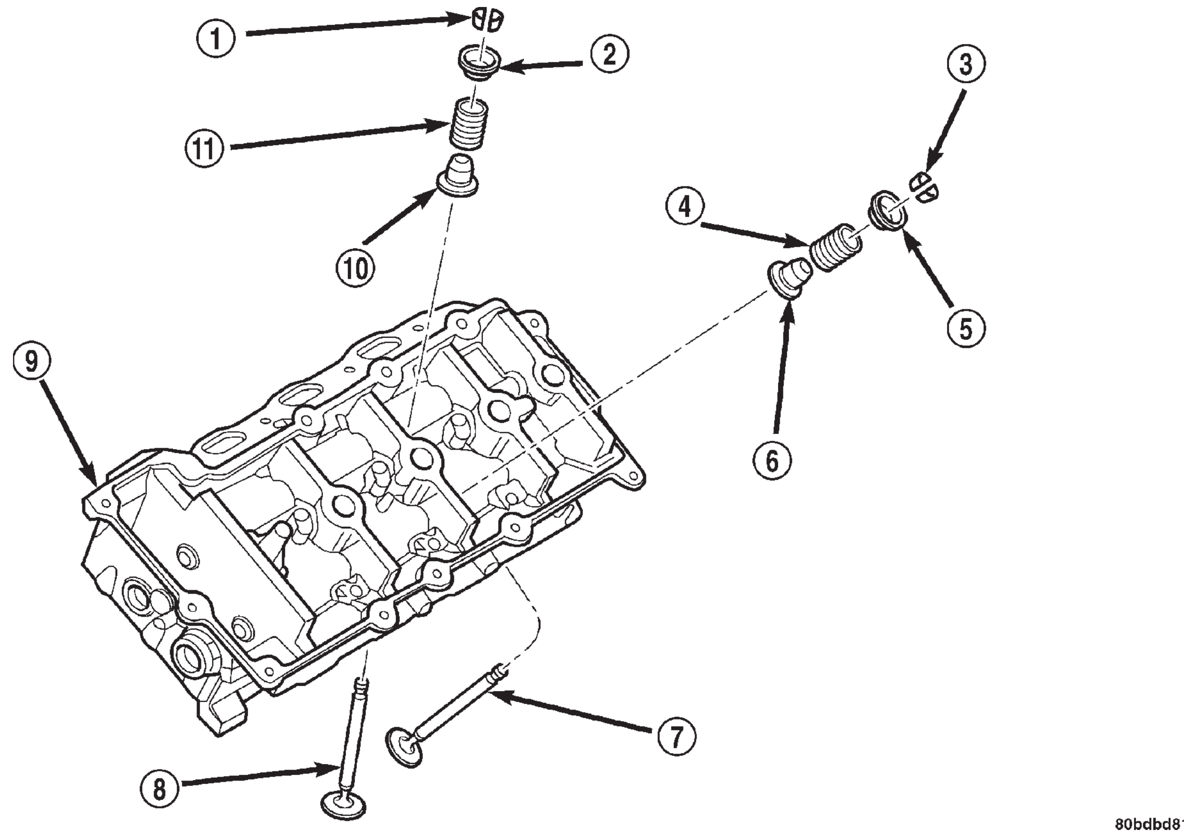


Fig. 15 CYLINDER HEAD, VALVES, & SPRINGS

1 - VALVE KEEPER
2 - SPRING RETAINER
3 - VALVE KEEPER
4 - VALVE SPRING-EXHAUST
5 - SPRING RETAINER
6 - VALVE STEM SEAL
7 - VALVE-EXHAUST
8 - VALVE-INTAKE
9 - CYLINDER HEAD
10 - VALVE STEM SEAL
11 - VALVE SPRING-INTAKE

COOLING SYSTEM TESTER METHOD

WARNING: WITH COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester 7700 or equivalent to pressure cap neck. Start the engine and observe the tester's pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

CHEMICAL TEST METHOD

Combustion leaks into the cooling system can also be checked by using Bloc-Chek Kit C-3685-A or equivalent. Perform test following the procedures supplied with the tool kit.

REMOVAL

(1) Perform fuel pressure release procedure **before attempting any repairs.** (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

(2) Disconnect negative cable from remote jumper terminal.

(3) Drain cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(4) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(5) Remove the vibration dampner (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).

(6) Remove exhaust cross-under pipe (Refer to 11 - EXHAUST SYSTEM/CROSS-OVER PIPE - REMOVAL).

CYLINDER HEAD (Continued)

(7) Remove the appropriate catalytic converter (Refer to 11 - EXHAUST SYSTEM/CATALYTIC CONVERTER - REMOVAL).

(8) Remove upper and lower intake manifolds(Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(9) Remove cylinder head covers and timing chain cover. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)

(10) Remove water outlet connector (Fig. 16). (Refer to 7 - COOLING/ENGINE/COOLANT OUTLET HOUSING - REMOVAL)

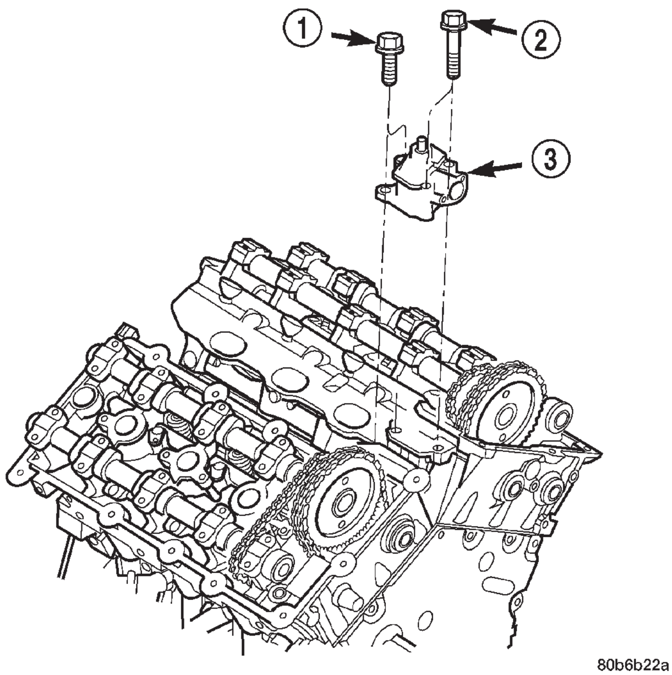


Fig. 16 Coolant Outlet Connector- 2.7L

1 - BOLT (2)
2 - BOLT (2)
3 - COOLANT OUTLET CONNECTOR

(11) Rotate crankshaft until crankshaft sprocket timing mark aligns with timing mark on oil pump housing.

(12) Remove primary timing chain. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(13) Remove camshaft bearing caps **gradually** in REVERSE sequence of installation (10–1) (Fig. 17).

(14) Remove camshafts and valvetrain components from cylinder head (Fig. 18). Note component locations for re-installation in original locations.

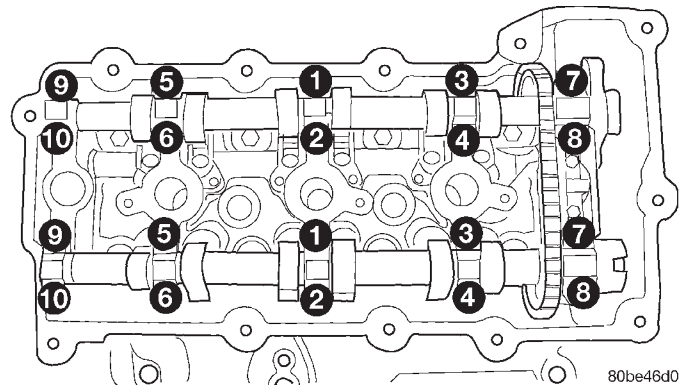


Fig. 17 CAMSHAFT BEARING CAPS

CAUTION: Ensure cylinder head bolts 11–9 (Fig. 19) are removed before attempting the removal of cylinder head, as damage to cylinder head and/or block may occur.

(15) Remove cylinder head bolts in reverse sequence of installation (Fig. 19) starting with bolts 11–9, then bolts 8–1.

(16) Remove cylinder head(s).

(17) Remove and discard cylinder head gasket.

(18) Clean cylinder head and block sealing surfaces. (Refer to 9 - ENGINE/CYLINDER HEAD - CLEANING)

CLEANING

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Remove all gasket material from cylinder head and block (Refer to 9 - ENGINE - STANDARD PROCEDURE). Be careful not to gouge or scratch the aluminum head sealing surface.

Clean all engine oil passages.

INSPECTION

(1) Before cleaning, check for leaks, damage and cracks.

(2) Clean cylinder head and oil passages.

(3) Check cylinder head for flatness (Fig. 20).

(4) Cylinder head must be flat within:

- Standard dimension = less than 0.05 mm (0.002 inch.)
- Service Limit = 0.2 mm (0.008 inch.)
- Grinding Limit = Maximum of 0.2 mm (0.008 inch.) is permitted.

CYLINDER HEAD (Continued)

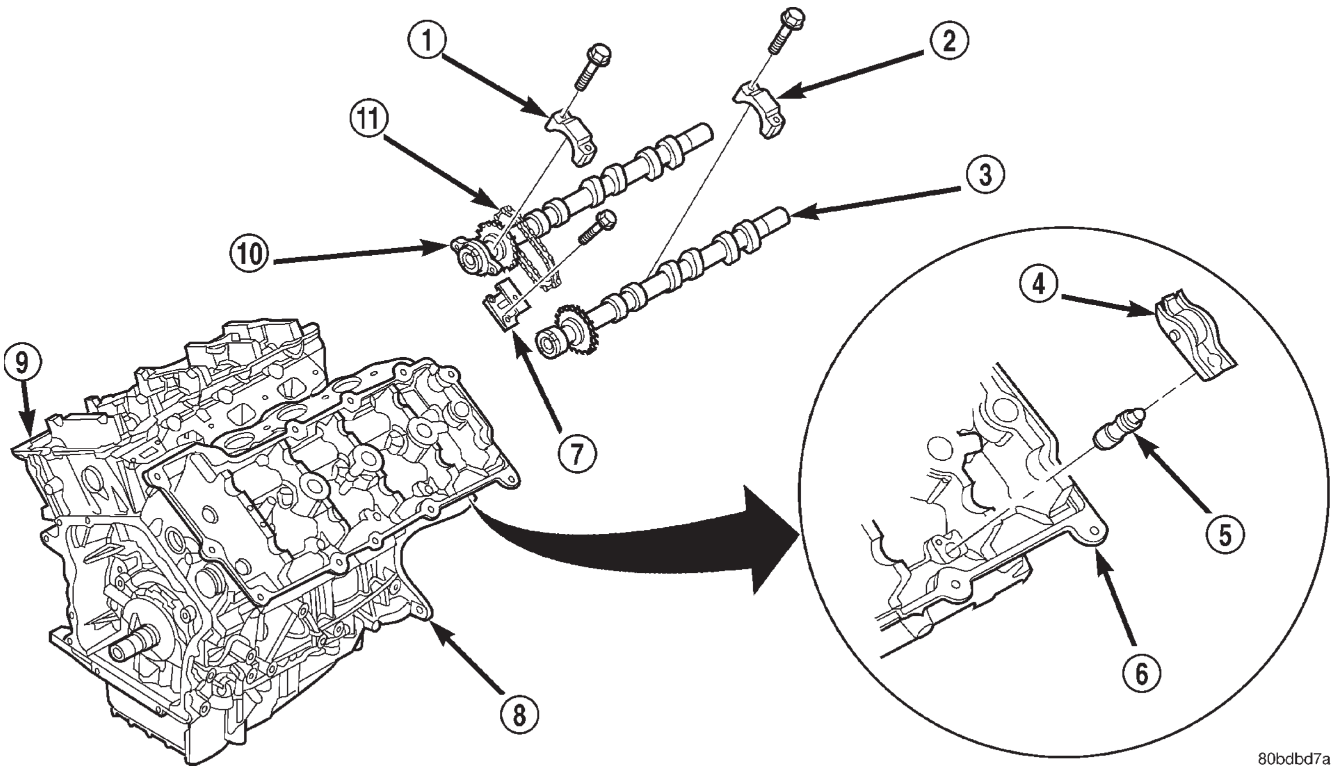


Fig. 18 CAMSHAFT & VALVETRAIN COMPONENTS

1 - CAMSHAFT BEARING CAP-INTAKE
2 - CAMSHAFT BEARING CAP-EXHAUST
3 - CAMSHAFT-EXHAUST
4 - ROCKER ARM
5 - HYDRAULIC LIFTER
6 - CYLINDER HEAD
7 - CAMSHAFT (SECONDARY) CHAIN TENSIONER
8 - CYLINDER BLOCK
9 - CYLINDER HEAD
10 - CAMSHAFT-INTAKE
11 - CAMSHAFT (SECONDARY) TIMING CHAIN

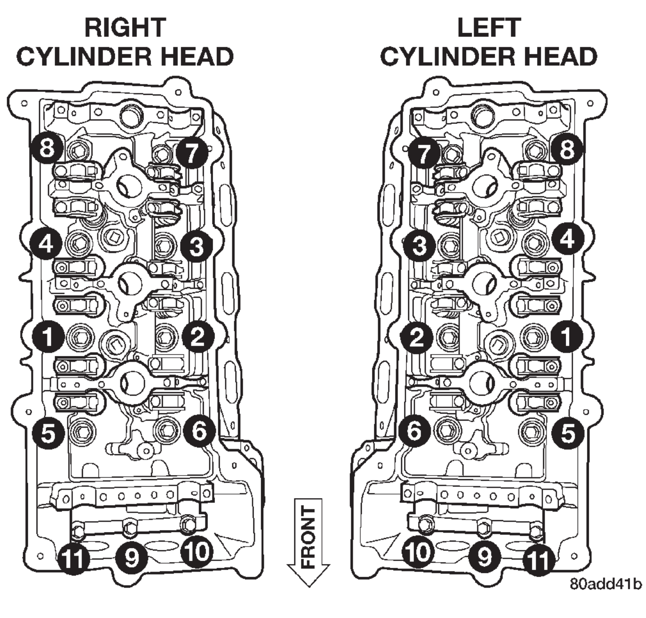


Fig. 19 CYLINDER HEAD BOLTS

CAUTION: 0.20 mm (0.008 in.) MAX is a combined total dimension of the stock removal limit from cylinder head and block top surface (Deck) together.

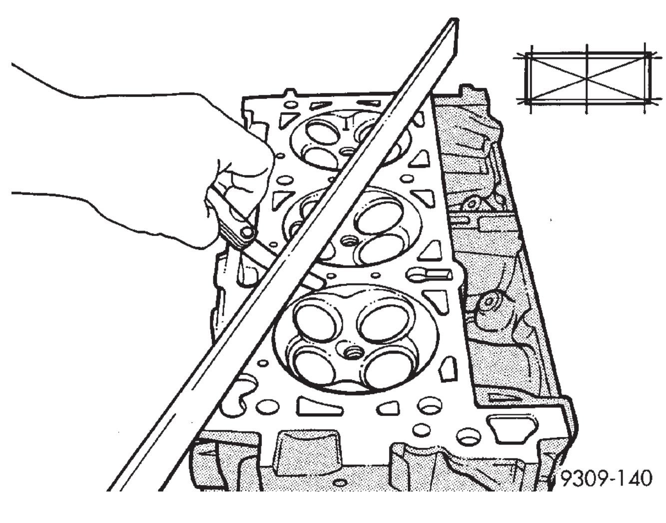


Fig. 20 Checking Cylinder Head Flatness—Typical

CYLINDER HEAD (Continued)

INSTALLATION

NOTE: The cylinder head bolts are tightened using a torque plus angle procedure. The bolts must be examined BEFORE reuse. If the threads are necked down the bolts must be replaced (Fig. 21)

Necking can be checked by holding a straight edge against the threads. If all the threads do not contact the scale, the bolt must be replaced (Fig. 21)

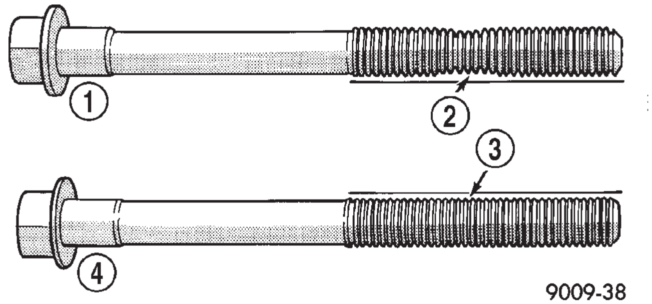


Fig. 21 Check for Stretched Bolts

1 - STRETCHED BOLT
2 - THREADS ARE NOT STRAIGHT ON LINE
3 - THREADS ARE STRAIGHT ON LINE
4 - UNSTRETCHED BOLT

CAUTION: When cleaning cylinder head and cylinder block surfaces, DO NOT use a metal scraper because the surfaces could be cut or ground. Use ONLY a wooden or plastic scraper.

(1) Clean sealing surfaces of cylinder head and block. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

(2) Install new head gasket over locating dowels.

(3) Install cylinder head to block, assuring head is properly positioned over locating dowels.

(4) Lubricate bolt threads with clean engine oil and install bolts.

(5) Tighten bolts in sequence shown in (Fig. 22), using the following steps and torque values:

- Step 1: Bolts 1–8 to 48 N·m (35 ft. lbs.)
- Step 2: Bolts 1–8 to 75 N·m (55 ft. lbs.)
- Step 3: Bolts 1–8 to 75 N·m (55 ft. lbs.)
- Step 4: Bolts 1–8 to +90° Turn **Do not use a torque wrench for this step.**
- Step 5: Bolts 9–11 to 28 N·m (250 in. lbs.)

(6) Install all valvetrain components and camshafts. (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - INSTALLATION) Tighten camshaft bearing caps in sequence shown in (Fig. 23) to 12 N·m (105 in. lbs.).

(7) Install timing chain and sprockets. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

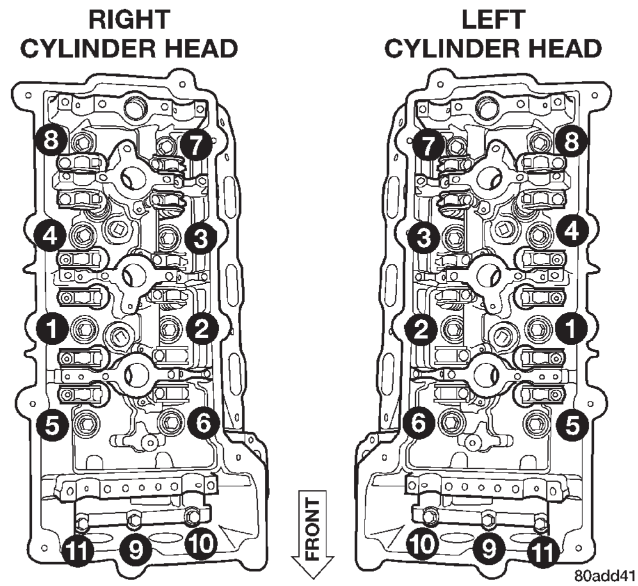


Fig. 22 Cylinder Head Tightening Sequence

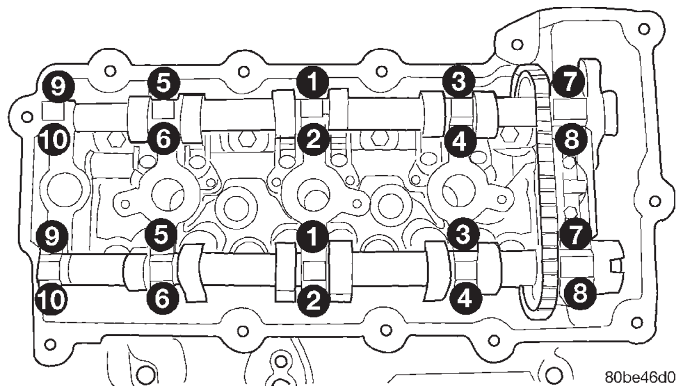


Fig. 23 Camshaft Bearing Cap Tightening Sequence

(8) Install water outlet connector. (Refer to 7 - COOLING/ENGINE/COOLANT OUTLET HOUSING - INSTALLATION)

(9) Install cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

(10) Install timing chain cover and crankshaft vibration damper. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION) (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

(11) Install lower and upper intake manifolds. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

(12) Install catalytic converter (Refer to 11 - EXHAUST SYSTEM/CATALYTIC CONVERTER - INSTALLATION).

(13) Install exhaust cross-under pipe (Refer to 11 - EXHAUST SYSTEM/CROSS-OVER PIPE - INSTALLATION).

CYLINDER HEAD (Continued)

(14) Install accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)

(15) Fill cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(16) Connect negative cable to remote jumper terminal.

CAMSHAFT(S)

DESCRIPTION

The assembled fabricated camshafts are composed of five bearing journals machined into a hollow steel tube (Fig. 24). Six steel lobes, a secondary timing drive sprocket, and a primary sprocket/thrust flange are pressed onto the camshaft tube using a unique assembly process. Camshaft end play is controlled by the primary camshaft sprocket attachment flange on the intake camshafts and by a thrust flange on the exhaust camshafts.

OPERATION

The camshaft has precisely machined (egg shaped) lobes to provide accurate valve timing and duration. The camshaft is driven by the crankshaft via drive sprockets and chains.

REMOVAL

(1) Remove the primary timing chain. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(2) Remove secondary chain tensioner mounting bolts.

NOTE: Camshaft bearing caps have been marked during engine manufacturing. For example, number one exhaust camshaft bearing is marked “1E>”

(3) Slowly loosen camshaft bearing cap bolts in reverse order of installation (Fig. 25).

(4) Remove camshaft bearing caps.

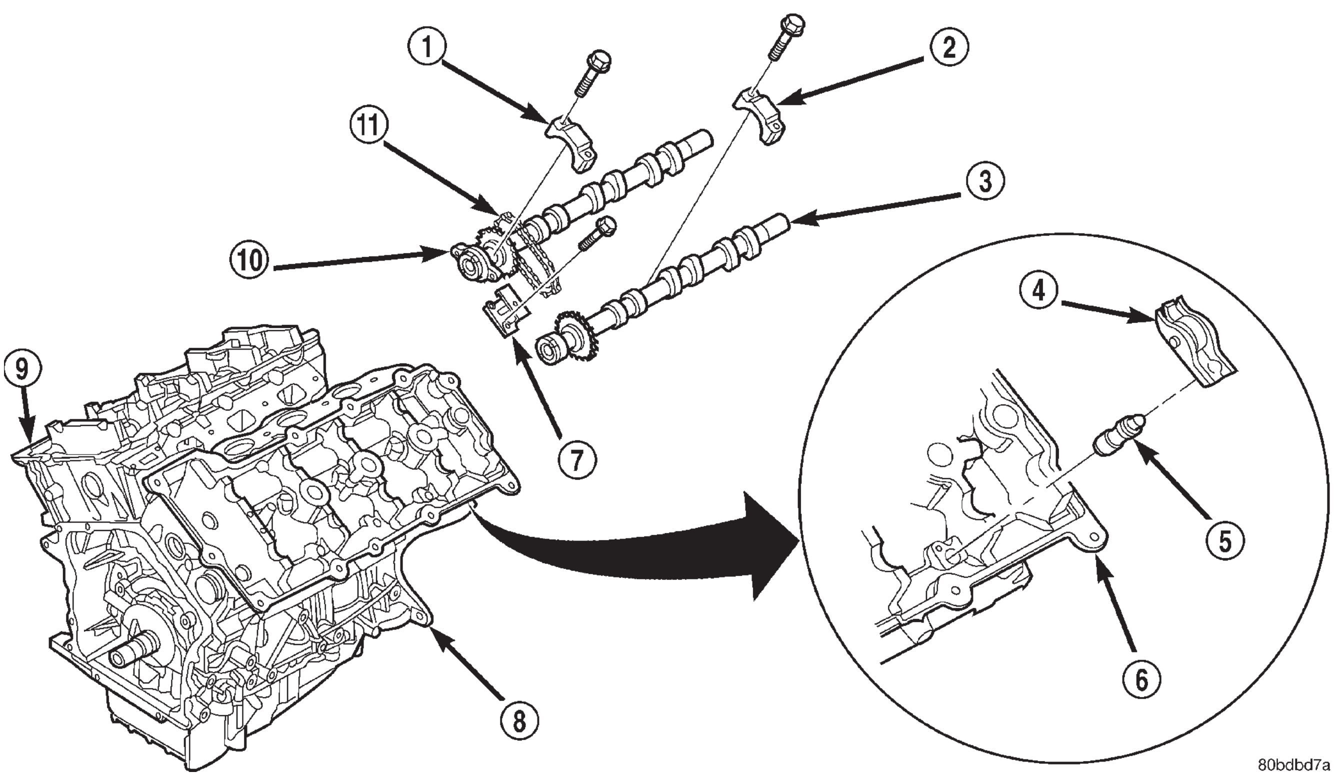


Fig. 24 Camshaft and Valvetrain Components

1 - CAMSHAFT BEARING CAP-INTAKE
2 - CAMSHAFT BEARING CAP-EXHAUST
3 - CAMSHAFT-EXHAUST
4 - ROCKER ARM
5 - HYDRAULIC LIFTER
6 - CYLINDER HEAD
7 - CAMSHAFT (SECONDARY) CHAIN TENSIONER
8 - CYLINDER BLOCK
9 - CYLINDER HEAD
10 - CAMSHAFT-INTAKE
11 - CAMSHAFT (SECONDARY) TIMING CHAIN

CAMSHAFT(S) (Continued)

(5) Remove camshafts, secondary chain, and tensioner together as an assembly.

(6) Remove tensioner and camshaft chain from camshafts.

(7) Inspect camshafts. (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - INSPECTION)

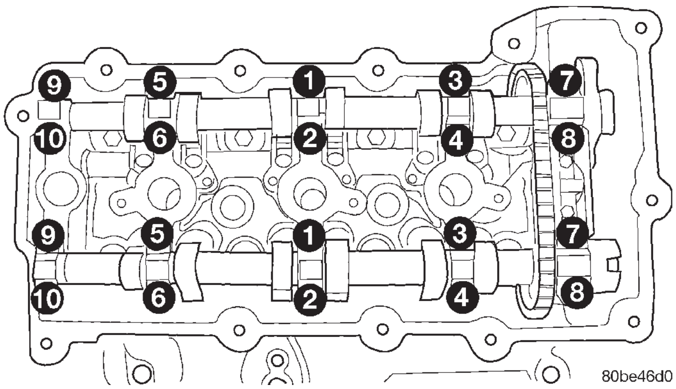


Fig. 25 Camshaft Bearing Cap Tightening Sequence

INSPECTION

(1) Inspect camshaft bearing journals for damage and binding (Fig. 26). If journals are binding, check the cylinder head for damage. Also check cylinder head oil holes for clogging.

(2) Inspect camshaft sprockets for excessive wear. Replace camshafts if necessary.

(3) Check the cam lobe surfaces for abnormal wear and damage. Replace camshaft if defective. Measure the actual wear (Fig. 26)and replace, if out of limits—standard value is 0.0254 mm (0.001 in.); wear **limit** is 0.254 mm (0.010 in.).

INSTALLATION

CAUTION: When the timing chain is removed and the cylinder heads are installed, DO NOT rotate the camshafts or crankshaft without first locating the proper crankshaft position. Failure to do so will result in valve and/or piston damage.

(1) Assemble camshaft chain on the cams. Ensure that plated links are facing toward the front. Align the plated links to the dot on the camshaft sprockets (Fig. 28).

(2) If camshaft chain tensioner is already in the compressed and locked position, proceed to step (4).

(3) When the camshaft chain tensioner is removed, it is necessary to compress and lock the tensioner using the following procedures:

(a) Place tensioner into a soft jaw vise (Fig. 27).

(b) SLOWLY compress tensioner until fabricated lock pin or the equivalent can be inserted into the locking holes.

(c) Remove compressed and locked tensioner from the vise.

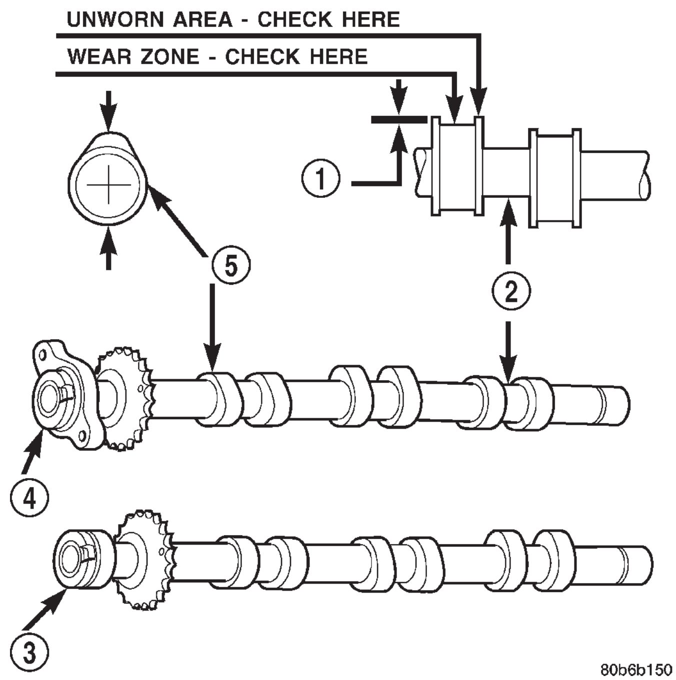


Fig. 26 Camshaft Inspection

1 - ACTUAL WEAR
2 - BEARING JOURNAL
3 - EXHAUST CAMSHAFT
4 - INTAKE CAMSHAFT
5 - LOBE

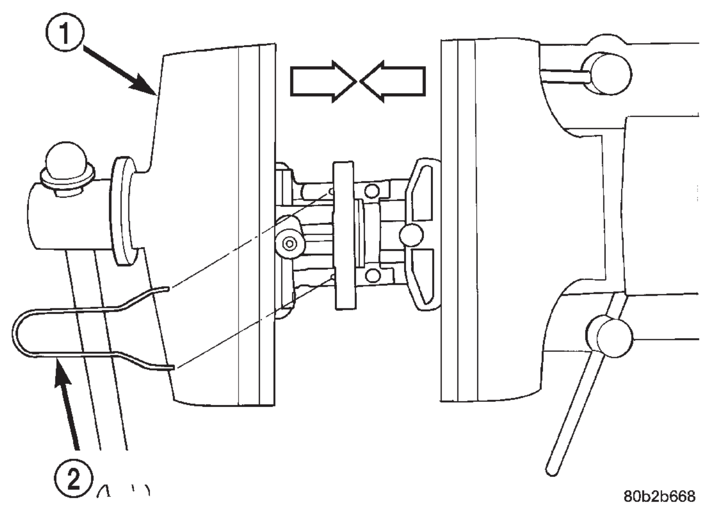


Fig. 27 Locking Camshaft (Secondary) Chain Tensioner

1 - VISE
2 - LOCK PIN

(4) Insert the compressed and locked camshaft chain tensioner in-between the camshafts and chain.

(5) Rotate the cams so that the plated links and dots are facing the 12:00 O'clock position (Fig. 28).

CAMSHAFT(S) (Continued)

(6) Install cams to cylinder head. Ensure that rocker arms are correctly seated and in proper positions.

(7) Install camshaft bearing caps. Ensure that bearing caps are installed in same position as removed.

(8) Tighten cam bearing cap bolts gradually in sequence shown in (Fig. 25) to 12 N·m (105 in. lbs.).

(9) Install secondary chain tensioner bolts and tighten to 12 N·m (105 in. lbs.).

(10) Remove locking pin from secondary tensioners.

(11) Measure camshafts end play. (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - STANDARD PROCEDURE)

(12) Install the primary timing chain. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

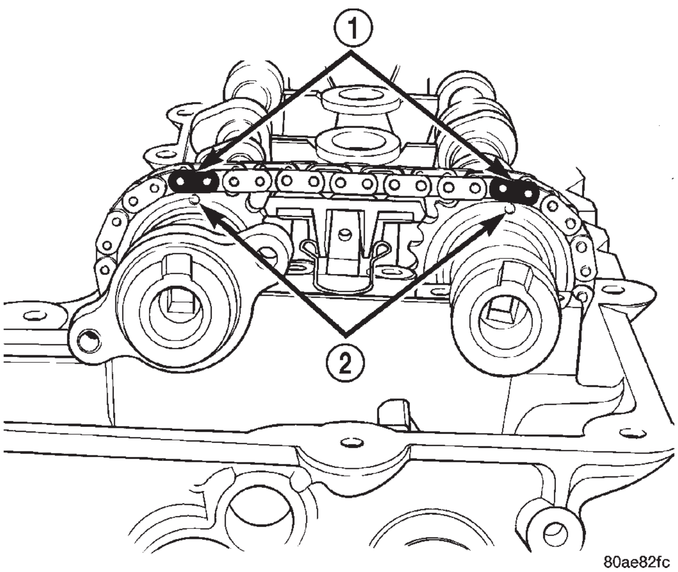


Fig. 28 Camshaft Chain Timing

1 - PLATED CHAIN LINKS
2 - CAMSHAFT TIMING MARKS (DOTS)

CYLINDER HEAD COVER - LEFT

REMOVAL

(1) Disconnect negative battery cable.

(2) Remove upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

(3) Disconnect electrical connectors from ignition coils and capacitor. Reposition electrical harness.

(4) Remove ground strap from cylinder head cover stud.

(5) Disconnect electrical harness retaining clips from cylinder head cover studs. Reposition electrical harness.

(6) Remove fastener attaching ignition coil capacitor.

(7) Loosen all cylinder head cover attaching bolts (Fig. 29).

NOTE: Cylinder head cover attaching bolts are captured to the cover.

(8) Remove cylinder head cover.

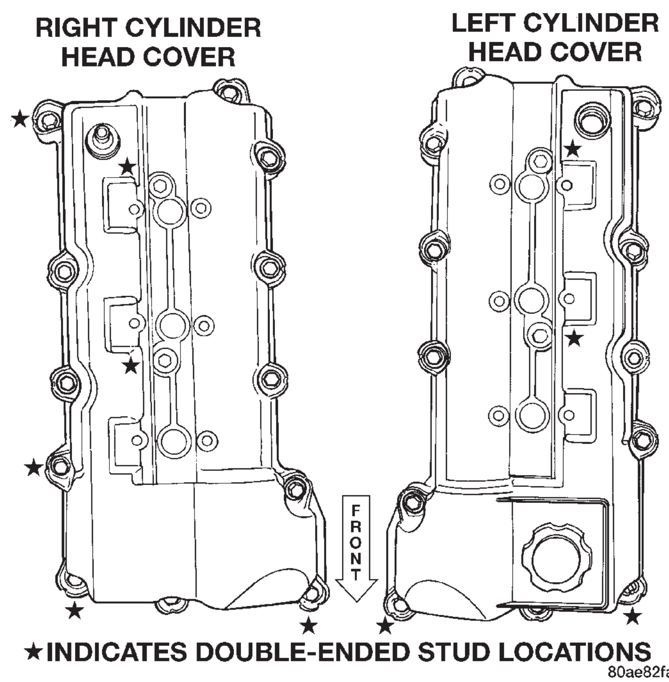


Fig. 29 Cylinder Head Covers

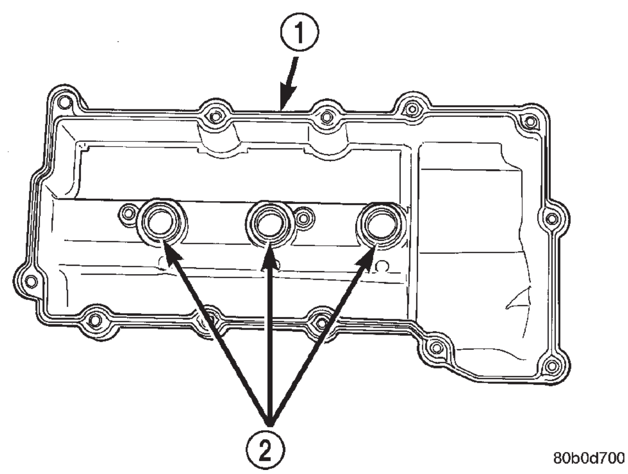


Fig. 30 Cylinder Head Cover Gasket and Spark Plug Seals

1 - ONE PIECE GASKET
2 - SPARK PLUG WELL SEALS

CYLINDER HEAD COVER - LEFT (Continued)

INSTALLATION

(1) Clean cylinder head cover and both sealing surfaces. Inspect and replace gaskets as necessary (Fig. 30).

(2) Install cylinder head cover and hand start all fasteners. Verify that all double-ended studs are in the correct locations as shown in (Fig. 29).

(3) Tighten cylinder head cover attaching bolts and double-ended studs to 12 N·m (105 in. lbs.).

(4) Install ignition coil capacitor and fastener.

(5) Connect all electrical connectors and harness clips.

(6) Install ground strap to cylinder head cover stud.

(7) Install upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

(8) Connect negative battery cable.

CYLINDER HEAD COVER - RIGHT

REMOVAL

(1) Disconnect negative battery cable.

(2) Remove upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

(3) Disconnect electrical connectors from ignition coils and capacitor. Reposition electrical harness.

(4) Remove make up air hose from cylinder head cover grommet.

(5) Remove ground strap from cylinder head cover stud.

(6) Disconnect electrical harness retaining clips from cylinder head cover studs. Reposition electrical harness.

(7) Remove fastener attaching ignition coil capacitor.

(8) Remove ignition coils.

(9) Loosen all cylinder head cover attaching bolts (Fig. 31).

NOTE: Cylinder head cover attaching bolts are captured to the cover.

(10) Remove cylinder head cover.

INSTALLATION

(1) Clean cylinder head cover and both sealing surfaces. Inspect and replace gaskets as necessary (Fig. 32).

(2) Install cylinder head cover and hand start all fasteners. Verify that all double-ended studs are in the correct locations as shown in (Fig. 31).

(3) Tighten cylinder head cover attaching bolts and double-ended studs to 12 N·m (105 in. lbs.).

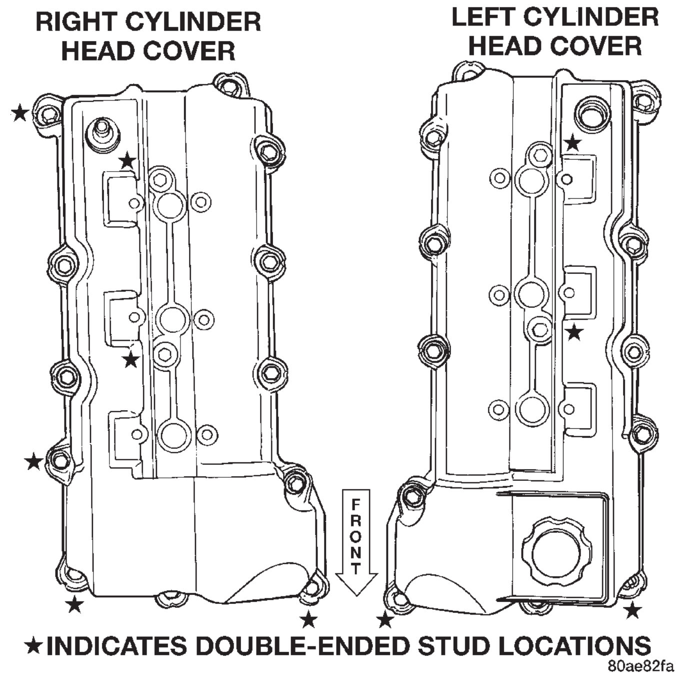


Fig. 31 Cylinder Head Covers

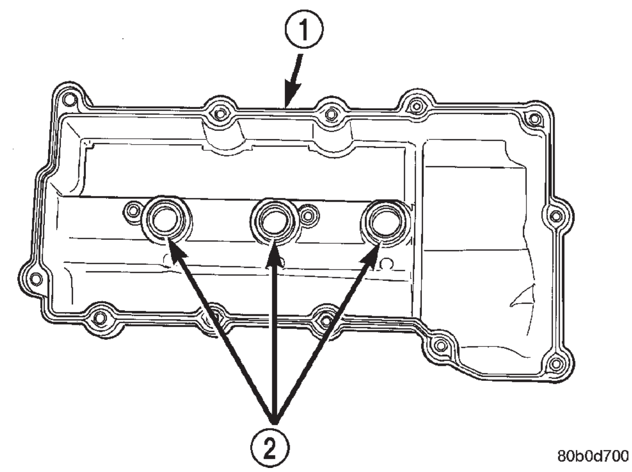


Fig. 32 Cylinder Head Cover Gasket and Spark Plug Seals

1 - ONE PIECE GASKET
2 - SPARK PLUG WELL SEALS

(4) Install ignition coils.

(5) Install ignition coil capacitor and fastener.

(6) Connect ground strap to cylinder head cover stud.

(7) Connect make up air hose to cylinder head cover grommet.

(8) Connect all electrical connectors and harness clips.

(9) Install upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

INTAKE/EXHAUST VALVES & SEATS

DESCRIPTION

The valves are made of heat resistant steel, and have chrome plated stems to prevent scuffing (Fig. 15). The four valves per cylinder (two intake and two exhaust) are actuated by roller rocker arms, which pivot on stationary lash adjusters. All valves use three bead lock keepers to retain springs and to promote valve rotation.

OPERATION

The intake valve allows the air/fuel mixture to enter the combustion chamber. The exhaust valve allows the burned air/fuel mixture to exit the combustion chamber. Also, the intake and exhaust valves seal the combustion chamber during the compression and power strokes.

STANDARD PROCEDURE - VALVE AND VALVE SEAT REFACING

The intake and exhaust valves have a 44.5 to 45 degree face angle. The valve seats have a 45 to 45.5 degree face angle. The valve face and valve seat angles are shown in (Fig. 33).

VALVES

Inspect the remaining margin after the valves are refaced. (Refer to 9 - ENGINE - SPECIFICATIONS)

VALVE SEATS

(1) When refacing valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.

(2) Measure the concentricity of valve seat using dial indicator. Total runout should not exceed 0.051 mm (0.002 inch.) total indicator reading.

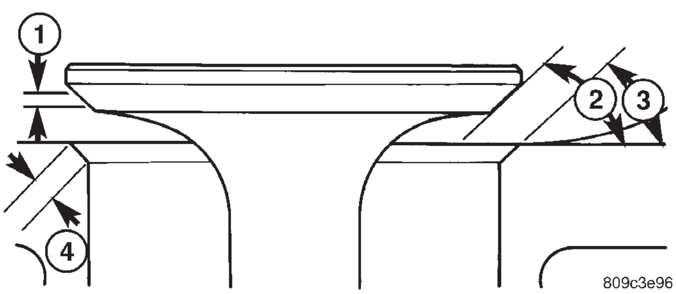


Fig. 33 Valve Face and Seat

1 - SEAT WIDTH
2 - FACE ANGLE
3 - SEAT ANGLE
4 - SEAT CONTACT AREA

(3) Inspect the valve seat with Prussian blue to determine where the valve contacts the seat. To do this, coat valve seat **LIGHTLY**with Prussian blue then set valve in place. Rotate the valve with light pressure. If the blue is transferred to the center of valve face, contact is satisfactory. If the blue is transferred to top edge of valve face, then lower valve seat with a 15 degree stone. If the blue is transferred to the bottom edge of valve face, then raise valve seat with a 65 degree stone.

NOTE: Valve seats which are worn or burned can be reworked, provided that correct angle and seat width are maintained. Otherwise cylinder head must be replaced.

(4) When seat is properly positioned the width of the intake 1.00 to 1.50 mm (0.0394 to 0.0591 in.) and exhaust seats should be 1.25 to 1.75 mm (0.049 to 0.069 in.) (Fig. 33).

(5) Check the valve spring installed height after refacing the valve and seat (Fig. 34).

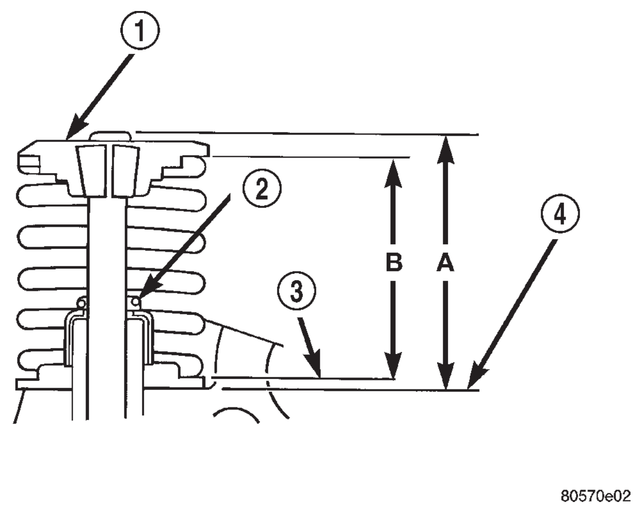


Fig. 34 Checking Valve Tip Height and Valve

1 - SPRING RETAINER
2 - GARTER SPRING
3 - VALVE SPRING SEAT TOP
4 - CYLINDER HEAD SURFACE

VALVE AND SPRING INSTALLED HEIGHT

(1) Coat valve stems with clean engine oil and insert them in cylinder head.

(2) If valves or seats have been refaced, check valve tip height (A) (Fig. 34). If valve tip height for intake valve is greater than 47.59 (1.8737 in.) or 49.14 (1.9347 in.) for exhaust valve, grind valve tip until within specifications. Make sure measurement is taken from cylinder head surface to the top of valve stem.

INTAKE/EXHAUST VALVES & SEATS (Continued)

(3) Install valve seal/spring seat assembly over valve guides on all valve stems (Fig. 35). Ensure that the garter spring is intact around the top of the rubber seal.

(4) Position valve springs and retainer on spring seat (Fig. 35).

(5) Compress valve spring with a valve spring compressor.

(6) Install retainer locks and release tool.

(7) If valves and/or seats are refaced, measure the installed height of springs (B) (Fig. 34). Measurement is taken from top of spring seat to the bottom surface of spring retainer. If height is greater than 38.75 mm (1.5256 in.), install a 0.762 mm (0.030 in.) spacer in head counterbore under the valve spring seat to bring spring height back within specification.

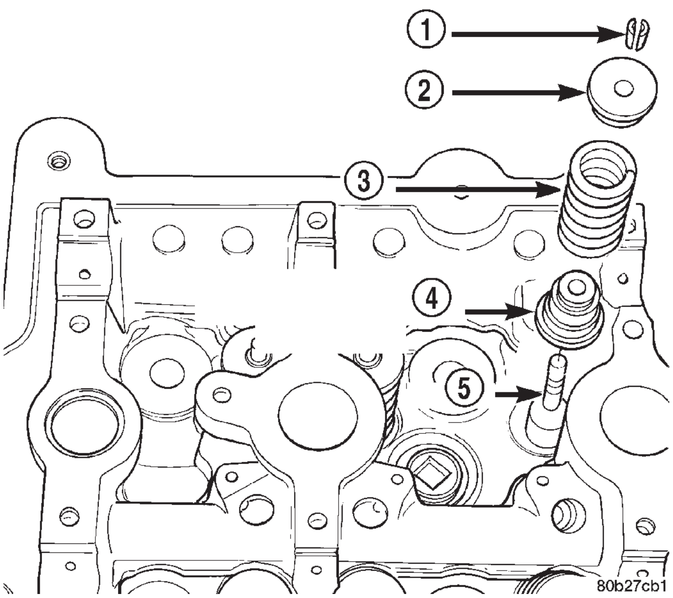


Fig. 35 Valve Seal and Spring

1 - VALVE RETAINING LOCKS
2 - VALVE SPRING RETAINER
3 - VALVE SPRING
4 - VALVE SEAL AND VALVE SPRING SEAT ASSEMBLY
5 - VALVE

REMOVAL

(1) Remove cylinder head(s). (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL)

(2) Remove valve spring. (Refer to 9 - ENGINE/ CYLINDER HEAD/VALVE SPRINGS - REMOVAL)

(3) Before removing valves, **remove any burrs from valve stem lock grooves to prevent damage to the valve guides.**

(4) Remove valve. Identify each valve to ensure installation in original location.

INSPECTION

VALVES

(1) Clean and inspect valves thoroughly. Replace burned, warped and cracked valves.

(2) Measure valve stems for wear (Fig. 36). For valve specifications, (Refer to 9 - ENGINE - SPECIFICATIONS).

NOTE: Valve stems are chrome plated and should not be polished (Fig. 36).

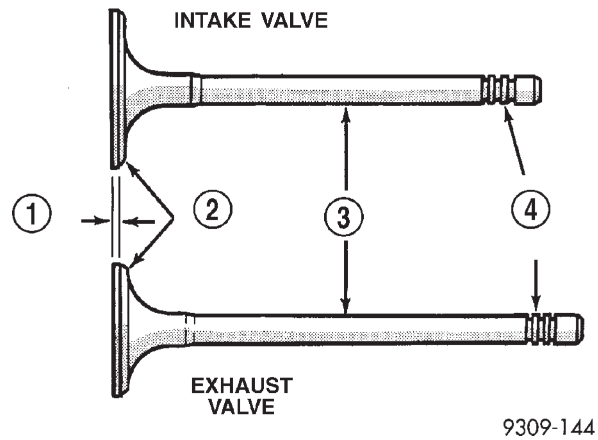


Fig. 36 Intake and Exhaust Valves

1 - MARGIN
2 - FACE
3 - STEM
4 - VALVE SPRING RETAINER LOCK GROOVES

VALVE GUIDES

(1) Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.

(2) Measure valve stem-to-guide clearance as follows:

(3) Install valve into cylinder head so it is 15 mm (0.590 inch.) off the valve seat. A small piece of hose may be used to hold valve in place.

(4) Attach dial indicator Tool C-3339 to cylinder head and set it at right angle of valve stem being measured (Fig. 37).

(5) Move valve to and from the indicator. For clerance specifications, (Refer to 9 - ENGINE - SPECIFICATIONS).

NOTE: Replace cylinder head if stem-to-guide clearance exceeds specifications, or if guide is loose in cylinder head.

INTAKE/EXHAUST VALVES & SEATS (Continued)

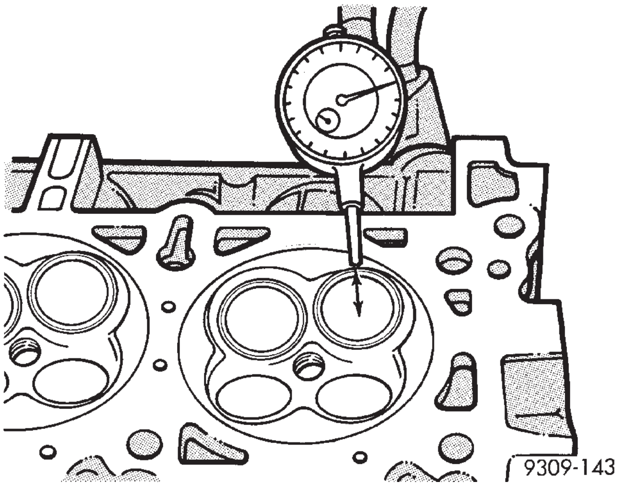


Fig. 37 Measuring Valve Guide Wear - Typical

INSTALLATION

(1) Coat valve stems with clean engine oil and insert them in cylinder head.

(2) If valves or seats have been reground, check valve tip height (A) (Fig. 38). If valve tip height for intake valve is greater than 47.59 mm (1.8737 in.) or 49.14 mm (1.9347 in.) for exhaust valve, grind valve tip until within specifications. Make sure measurement is taken from cylinder head surface to the top of valve stem.

(3) Install valve spring. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - INSTALLATION)

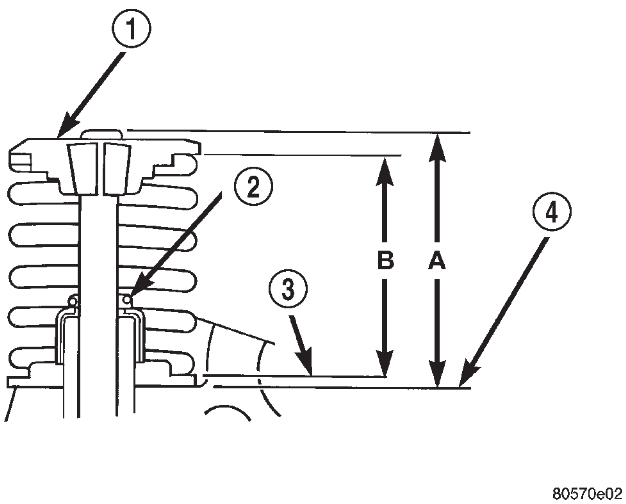


Fig. 38 Checking Valve Tip Height and Valve Spring Installed Height

1 - SPRING RETAINER
2 - GARTER SPRING
3 - VALVE SPRING SEAT TOP
4 - CYLINDER HEAD SURFACE

VALVE SPRINGS

DESCRIPTION

The valve springs are made from high strength, chrome-silicon steel (Fig. 15). The springs are common for intake and exhaust applications. The valve spring seat is integral with the valve stem seal, which incorporates a garter spring to maintain consistent lubrication control to the valve stem.

OPERATION

The valve spring returns the valve against its seat for a positive seal of the combustion chamber.

REMOVAL

REMOVAL - IN VEHICLE

(1) Perform fuel system pressure release procedure **before attempting any repairs.** (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

(2) Disconnect negative cable from remote jumper terminal.

(3) Remove air cleaner housing and inlet hose.

(4) Remove upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

(5) Remove cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

(6) Remove crankshaft vibration damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL), timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL), and timing chain (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(7) Remove camshafts and rocker arms. (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - REMOVAL)

(8) With air hose attached to spark plug adapter installed in the cylinder being serviced, apply 620.5–689 kPa (90–100 psi) air pressure. This is to hold valves in place while servicing components.

(9) Using Special Tool MD 998772A with adapter 6779, compress valve spring and remove valve locks, retainer, and valve spring.

(10) Remove valve stem seal (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE STEM SEALS - REMOVAL).

VALVE SPRINGS (Continued)

REMOVAL - OFF VEHICLE

(1) With cylinder head removed, compress valve springs using a Special Tool C-3422-B, Valve Spring Compressor.

(2) Remove valve retaining locks, valve spring retainers, valve springs and valve spring seat/stem seal assembly (Fig. 39).

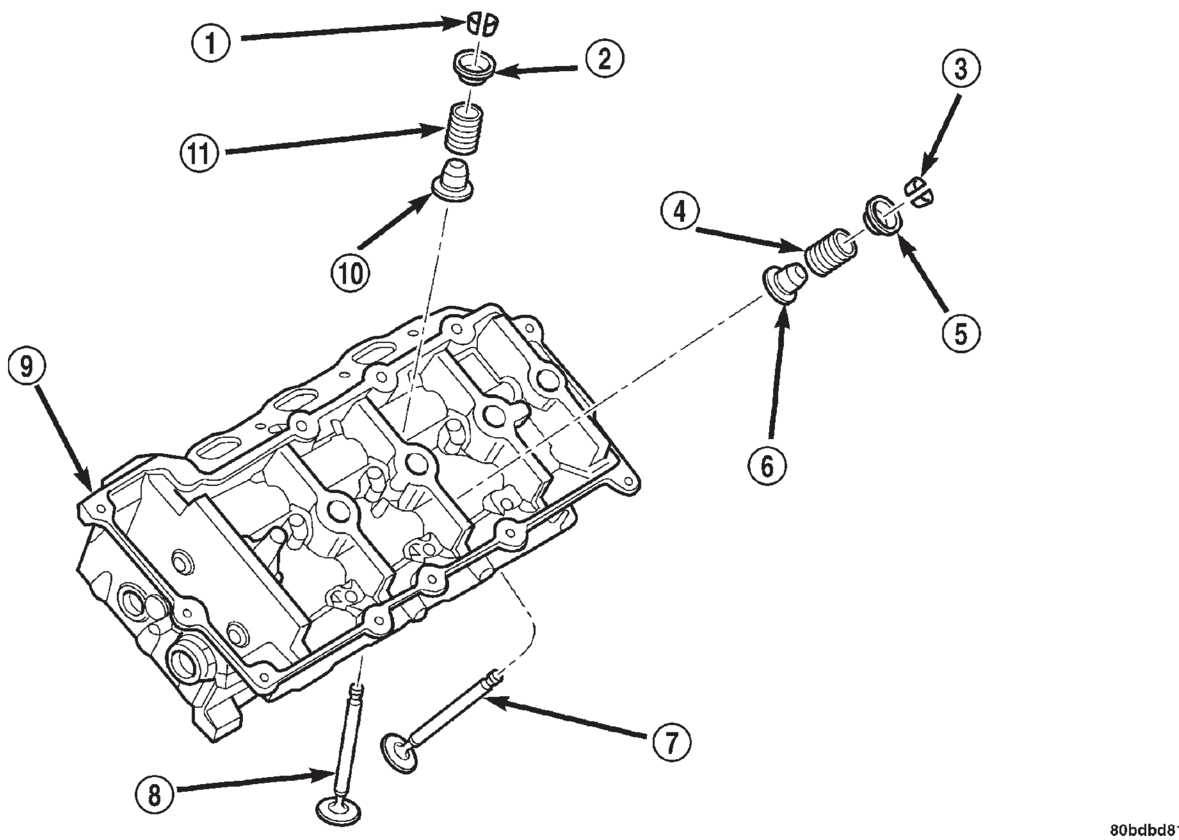


Fig. 39 VALVE, SPRING SEAT/SEAL, SPRING, REATINER AND LOCKS

1 - VALVE KEEPER
2 - SPRING RETAINER
3 - VALVE KEEPER
4 - VALVE SPRING-EXHAUST
5 - SPRING RETAINER
6 - VALVE STEM SEAL
7 - VALVE-EXHAUST
8 - VALVE-INTAKE
9 - CYLINDER HEAD
10 - VALVE STEM SEAL
11 - VALVE SPRING-INTAKE

VALVE SPRINGS (Continued)

INSPECTION

Whenever valves have been removed for inspection, reconditioning or replacement, valve springs should be tested (Fig. 40). **As an example;** the compression length of a spring to be tested is 38.00 mm (1.496 in.). Turn the table of Tool C-647 until surface is in line with the 38.00 mm (1.496 in.) mark on the threaded stud and the zero mark on the front. Place spring over stud on the table and lift compressing lever to set tone device. Pull on torque wrench until ping is heard. Take reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at test length. Fractional measurements are indicated on the table for finer adjustments. Refer to Engine Specifications to obtain specified height and allowable tensions (Refer to 9 - ENGINE - SPECIFICATIONS). Replace any springs that do not meet specifications.

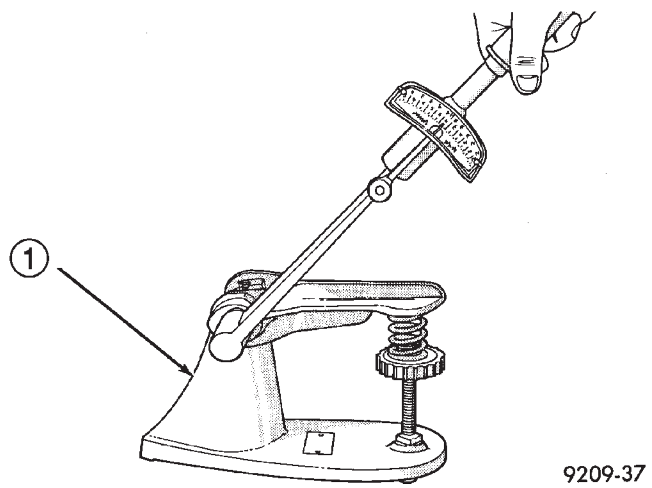


Fig. 40 TESTING VALVE SPRING

1 - SPECIAL TOOL C-647

INSTALLATION

INSTALLATION - IN VEHICLE

(1) The valve stem seal/valve spring seat should be pushed firmly and squarely over the valve guide using the valve stem as guide. **Do Not Force** seal against top of guide. When installing the valve retainer locks, compress the spring **only enough** to install locks

(2) Follow the same procedure on the remaining cylinders using the firing sequence 1-2-3-4-5-6. **Make sure piston is at TDC on the cylinder that the valve spring is to be removed.**

(3) Remove spark plug adapter tool and Special Tool MD 998772A.

(4) Install rocker arm(s).

(5) Install camshafts (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - INSTALLATION), timing chain (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION), and timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(6) Install cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

(7) Install upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

(8) Install air cleaner housing and inlet hose.

(9) Connect negative cable.

INSTALLATION - OFF VEHICLE

(1) If removed, install valve(s). (Refer to 9 - ENGINE/CYLINDER HEAD/INTAKE/EXHAUST VALVES & SEATS - INSTALLATION)

(2) If valves or seats have been reground, check valve tip height (A) (Fig. 41). If valve tip height for intake valve is greater than 47.59 mm (1.8737 in.) or 49.14 mm (1.9347 in.) for exhaust valve, grind valve tip until within specifications. Make sure measurement is taken from cylinder head surface to the top of valve stem.

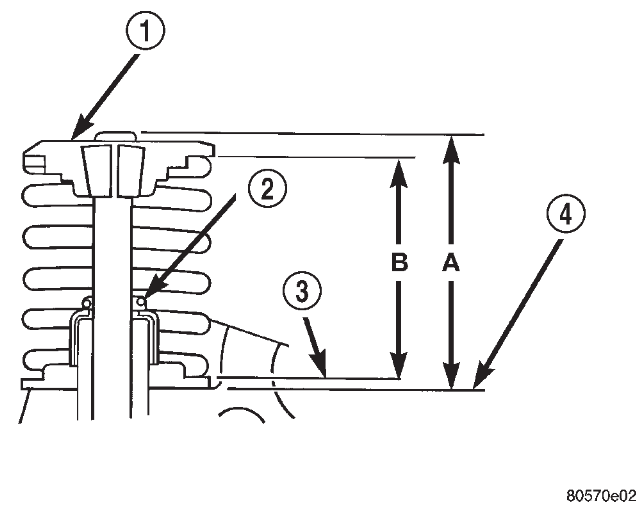


Fig. 41 Valve Tip Height and Valve Spring Installed Height

1 - SPRING RETAINER
2 - GARTER SPRING
3 - VALVE SPRING SEAT TOP
4 - CYLINDER HEAD SURFACE

(3) Install valve seal/spring seat assembly over valve guides on all valve stems (Fig. 42). Ensure that the garter spring is intact around the top of the rubber seal. Install valve springs, valve retainers.

VALVE SPRINGS (Continued)

(4) Compress valve springs with a valve spring compressor install locks and release tool. **If valves and/or seats are reground, measure the installed height of springs (B) (Fig. 41), make sure measurements are taken from top of spring seat to the bottom surface of spring retainer.** If height is greater than 38.75 mm (1.5256 in.), install a 0.762 mm (0.030 in.) spacer in head counterbore under the valve spring seat to bring spring height back within specification.

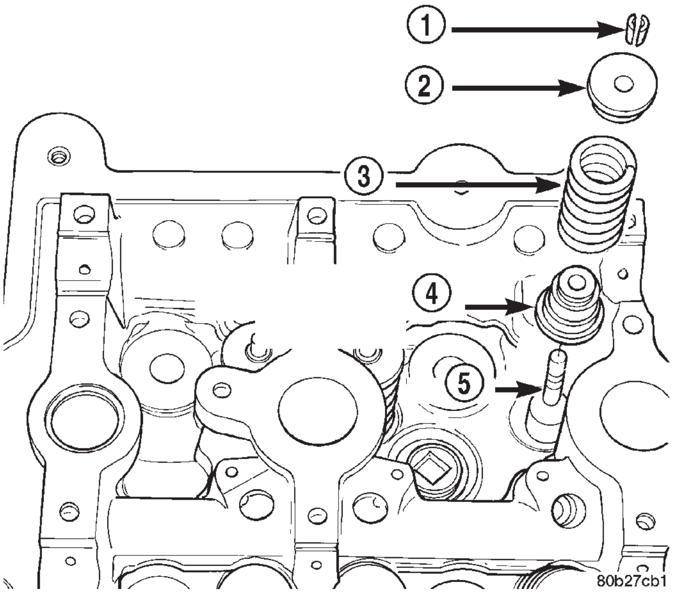


Fig. 42 Valve Seal and Spring

1 - VALVE RETAINING LOCKS
2 - VALVE SPRING RETAINER
3 - VALVE SPRING
4 - VALVE SEAL AND VALVE SPRING SEAT ASSEMBLY
5 - VALVE

VALVE STEM SEALS

REMOVAL

(1) Remove valve spring. (Refer to 9 - ENGINE/ CYLINDER HEAD/VALVE SPRINGS - REMOVAL)

(2) Remove valve stem seal by using a valve seal tool (Fig. 43).

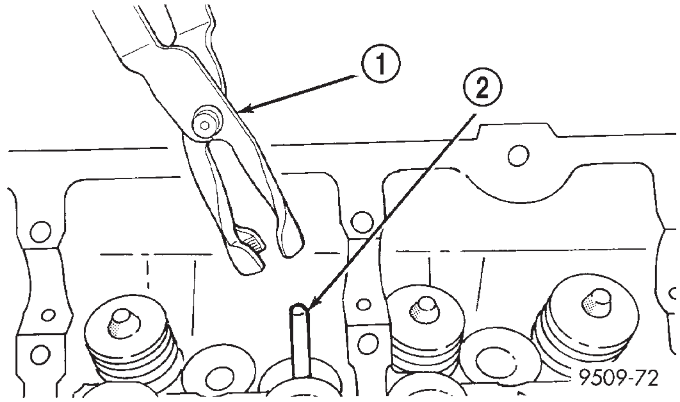


Fig. 43 Valve Stem Seal—Removal

1 - VALVE SEAL TOOL
2 - VALVE STEM

INSTALLATION

(1) The valve stem seal/valve spring seat should be pushed firmly and squarely over the valve guide using the valve stem as guide. **Do Not Force** seal against top of guide.

(2) Install valve spring. (Refer to 9 - ENGINE/ CYLINDER HEAD/VALVE SPRINGS - INSTALLATION)

HYDRAULIC LASH ADJUSTERS

DIAGNOSIS AND TESTING - HYDRAULIC LASH ADJUSTER NOISE DIAGNOSIS

Proper noise diagnosis is essential in locating the source of a NVH complaint. Locating a lash adjuster (tappet) type noise can sometimes be difficult. As a result, an initial misdiagnosis may occur.

Refer to LASH ADJUSTER (TAPPET) NOISE CHART indicating possible lash adjuster (tappet) noise sources and possible sources that could lead to a misdiagnosis.

Refer to LASH ADJUSTER (TAPPET) NOISE CHART for possible causes and correction of a lash adjuster (tappet) type noise.

HYDRAULIC LASH ADJUSTERS (Continued)

LASH ADJUSTER (TAPPET) NOISE CHART

POSSIBLE CAUSES	CORRECTION
1. Engine oil level—too high or too low. This may cause aerated oil to enter the adjusters and cause them to be spongy.	1. Check and correct engine oil level.
2. Insufficient running time after rebuilding cylinder head.	2. Low speed running of up to 1 hour may be required to fully evacuate trapped air from the valve train system. During this time, turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.
3. Air trapped in lash adjuster (after 1 hour run time).	3. See below: (a) Check lash adjusters for sponginess while installed in cylinder head. Depress part of rocker arm over adjuster. Normal adjusters should feel very firm. Very spongy adjusters can be bottomed out easily. (b) If lash adjuster(s) are still spongy, replace with new adjuster/rocker arm assembly.
4. Low oil pressure	4. See below: (a) Check and correct engine oil level. (b) Check engine oil pressure. (c) Check for excessive bearing clearance and correct. (d) Check for worn oil pump.
5. Oil passage to cylinder head(s) plugged with debris.	5. Check cylinder head oil passages and cylinder head gasket restrictor for blockage. Clean or replace as necessary.
6. Worn valve guide(s).	6. Ream guide(s) and replace valve(s) with oversize valves and seal(s).
7. Air injested into oil due to broken or cracked oil pump pickup tube.	7. Inspect pickup tube and replace as necessary.
8. Collapsed lash adjuster due to debris injestion.	8. Clean debris from engine and replace lash adjuster(s).

REMOVAL

(1) Remove cylinder head cover(s). (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

(2) Remove rocker arm(s). (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - REMOVAL)

CAUTION: If lash adjusters and rocker arms are to be reused, always mark position for reassembly in their original positions.

(3) Remove lash adjuster(s).

INSTALLATION

(1) Install hydraulic lash adjuster making sure adjusters are at least partially full of oil. This can be verified by little or no plunger travel when lash adjuster is depressed.

(2) Install rocker arm(s) (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - INSTALLATION) and cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

ROCKER ARMS

DESCRIPTION

The rocker arms are composed of steel stampings with an integral roller bearing (Fig. 44). The rocker arms incorporate a 0.5 mm (0.0197 in.) oil hole in the lash adjuster socket for roller/camshaft lobe lubrication (Fig. 44).

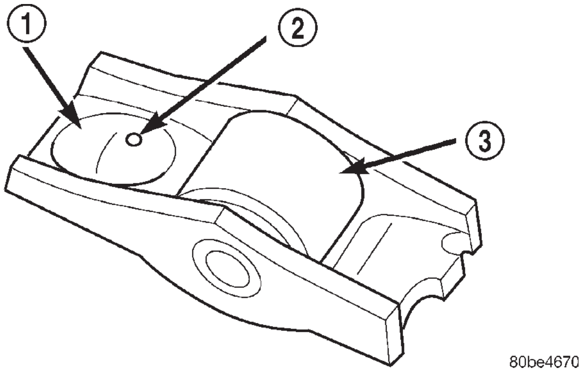


Fig. 44 Rocker Arm

1 – LASH ADJUSTER POCKET
2 – OIL SQUIRT HOLE
3 – ROLLER

OPERATION

The rocker arm is the pivot point between the camshaft lobe and the valve.

REMOVAL

(1) Remove cylinder head cover(s). (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

CAUTION: Always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

(2) Rotate engine until the cam lobe is on its base circle (heel), on the rocker arm being removed.

CAUTION: Depress valve spring only enough to remove rocker arm.

(3) Using Special Tools 8215-A and 8216-A Adaptor, depress valve spring only enough to release tension on rocker arm (Fig. 45).

(4) Remove rocker arm from cylinder head.

CAUTION: If rocker arms are to be reused, identify position of rocker arms for reassembly in their original positions.

(5) Repeat procedure for each rocker arm removed.

(6) Inspect the rocker arm for wear or damage. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - INSPECTION)

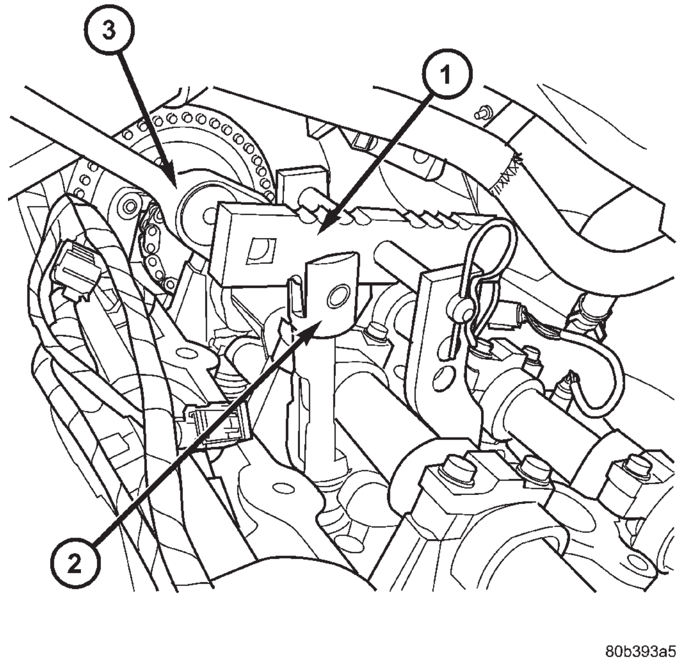


Fig. 45 Rocker Arm - Removal/Installation - 2.7L

1 - SPECIAL TOOL 8215-A
2 - SPECIAL TOOL 8216-A
3 - 3/8″ DRIVE RACHET

INSPECTION

Inspect the cam follower assembly for wear or damage (Fig. 46). Replace as necessary.

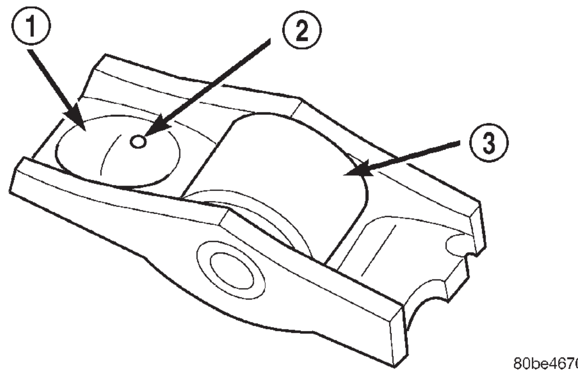


Fig. 46 Rocker Arm

1 – LASH ADJUSTER POCKET
2 – OIL SQUIRT HOLE
3 – ROLLER

INSTALLATION

(1) Lubricate rocker arms with clean engine oil before installation.

ROCKER ARMS (Continued)

(2) Rotate engine until cam lobe is on its base circle (heel) of rocker arm being installed.

(3) Using Special Tools 8215-A and 8216-A Adaptor, depress valve spring only enough to install rocker arm (Fig. 45).

(4) Install rocker arm in original position (if reused) over valve and lash adjuster. Release tension on valve spring.

NOTE: Inspect rocker arm for proper engagement into lash adjuster and valve tip.

(5) Repeat procedure for each rocker arm being installed.

(6) Install cylinder head cover(s). Refer to procedure in this section.

ENGINE BLOCK

DESCRIPTION

The cylinder block is made of heat treated aluminum with cast-in-place iron liners (Fig. 47). The block is a closed deck design with the right bank forward. To provide high rigidity and improved NVH, the block has cast-in contours and ribs, along with powdered metal 6 bolt main caps (4 vertical, 2 horizontal), with a die cast aluminum structural beam windage tray mounted to the main caps.

The block design allows coolant flow between the cylinder bores and an internal coolant by-pass to the thermostat.

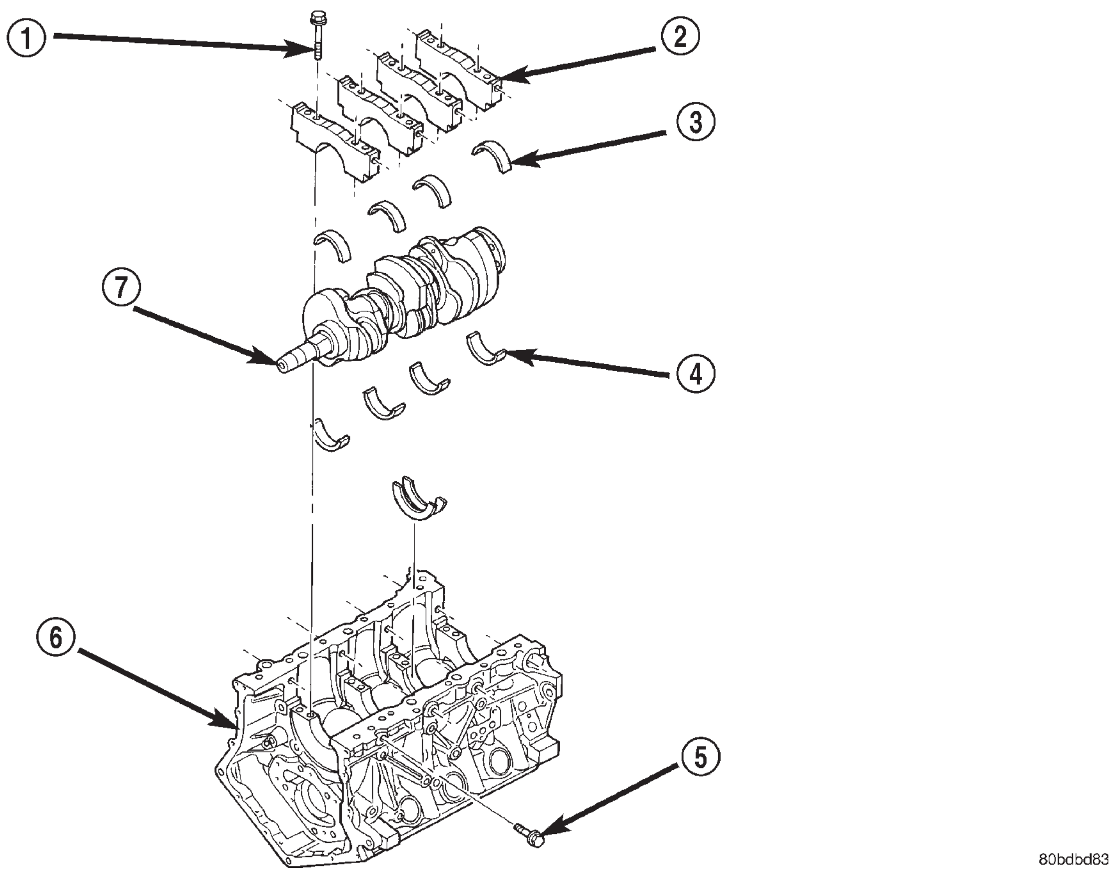


Fig. 47 ENGINE BLOCK AND CRANKSHAFT

1 - MAIN CAP BOLT—VERTICAL
2 - MAIN CAP
3 - MAIN BEARING—LOWER
4 - MAIN BEARING—UPPER
5 - MAIN CAP BOLT —HORIZONTAL
6 - CYLINDER BLOCK
7 - CRANKSHAFT

ENGINE BLOCK (Continued)

STANDARD PROCEDURE - CYLINDER BORE HONING

(1) Used carefully, the cylinder bore resizing hone, recommended tool C-823 or equivalent, equipped with 220 grit stones, is the best tool for this honing procedure. In addition to deglazing, it will reduce taper and out-of-round as well as removing light scuffing, scoring or scratches. Usually a few strokes will clean up a bore and maintain the required limits.

(2) Deglazing of the cylinder walls may be done using a cylinder surfacing hone, recommended tool C-3501 or equivalent, equipped with 280 grit stones, if the cylinder bore is straight and round. 20–60 strokes depending on the bore condition, will be sufficient to provide a satisfactory surface. Use a light honing oil. **Do not use engine or transmission oil, mineral spirits or kerosene.** Inspect cylinder walls after each 20 strokes.

(3) Honing should be done by moving the hone up and down fast enough to get a cross-hatch pattern. When hone marks **intersect** at 40-60 degrees, the cross hatch angle is most satisfactory for proper seating of rings (Fig. 48).

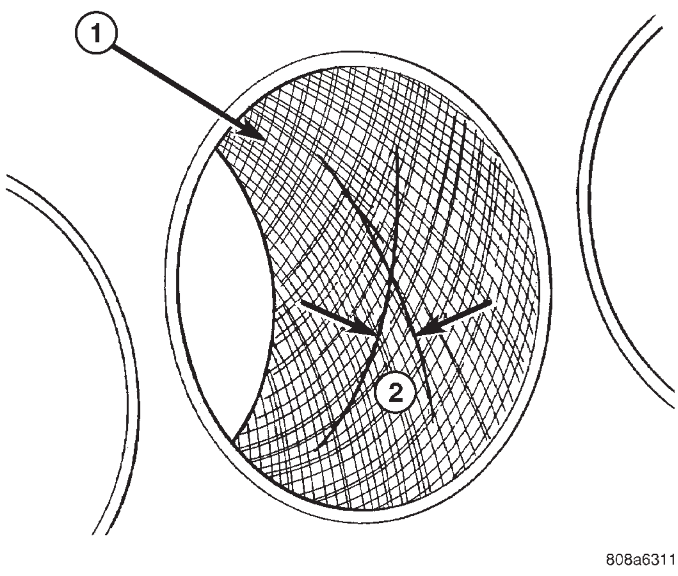


Fig. 48 Cylinder Bore Cross-Hatch Pattern

1 - CROSS-HATCH PATTERN
2 - 40°–60°

(4) A controlled hone motor speed between 200–300 RPM is necessary to obtain the proper cross-hatch angle. The number of up and down strokes per minute can be regulated to get the desired 40–60 degree angle. Faster up and down strokes increase the cross-hatch angle.

(5) After honing, it is necessary that the block be cleaned again to remove all traces of abrasive.

CAUTION: Ensure all abrasives are removed from engine parts after honing. It is recommended that a solution of soap and hot water be used with a brush and the parts then thoroughly dried. The bore can be considered clean when it can be wiped clean with a white cloth and cloth remains clean. Oil the bores after cleaning to prevent rusting.

CLEANING

Clean cylinder block thoroughly using a suitable cleaning solvent.

INSPECTION

ENGINE BLOCK

(1) Clean cylinder block thoroughly and check all core hole plugs for evidence of leaking.

(2) If new core plugs are to be installed, (Refer to 9 - ENGINE - STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS).

(3) Examine block and cylinder bores for cracks or fractures.

(4) Check block deck surfaces for flatness. Deck surface must be within service limit of 0.1 mm (0.004 in.).

CYLINDER BORE

NOTE: The cylinder bores should be measured at normal room temperature, 21°C (70°F).

The cylinder walls should be checked for out-of-round and taper with Tool C119 or equivalent (Fig. 49) (Refer to 9 - ENGINE - SPECIFICATIONS). If the cylinder walls are badly scuffed or scored, the cylinder block should be replaced, and new pistons and rings fitted.

Measure the cylinder bore at three levels in directions A and B (Fig. 49). Top measurement should be 10 mm (3/8 in.) down and bottom measurement should be 10 mm (3/8 in.) up from bottom of bore. (Refer to 9 - ENGINE - SPECIFICATIONS).

ENGINE BLOCK (Continued)

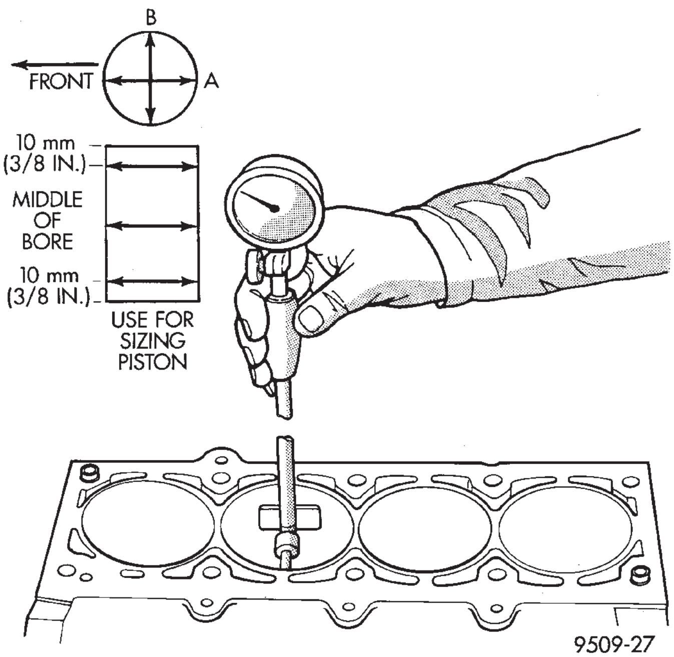


Fig. 49 Checking Cylinder Bore Size

CONNECTING ROD BEARINGS

STANDARD PROCEDURE - CONNECTING ROD AND BEARING FITTING

CONNECTING ROD BEARING

Fit all connecting rods on one bank until complete. The bearing caps are not interchangeable and should be marked at removal to ensure correct assembly.

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces as engine damage may occur.

The bearing shells must be installed with the tangs inserted into the machined grooves in the rods and caps. Also, assure that the hole in upper bearing half aligns with oil squirt hole in rod. Install cap with the tangs on the same side as the rod.

CAUTION: Assure that hole in upper bearing half aligns with hole in connecting rod as engine damage may occur.

Limits of taper or out-of-round on any crankshaft journals should be held to 0.015 mm (0.0006 in.). Bearings are available 0.025 mm (0.001 in.) and 0.250 mm (0.010 in.) undersize. **Install the bearings in pairs. Do not use a new bearing half with an old bearing half. Do not file the rods or bearing caps.**

(1) For measuring Main Bearing Clearance and Connecting Rod Bearing Clearance use plastigage (Fig. 50). For more information on using plastigage (Refer to 9 - ENGINE - STANDARD PROCEDURE). Refer to Engine Specifications for bearing clearance specifications (Refer to 9 - ENGINE - SPECIFICATIONS).

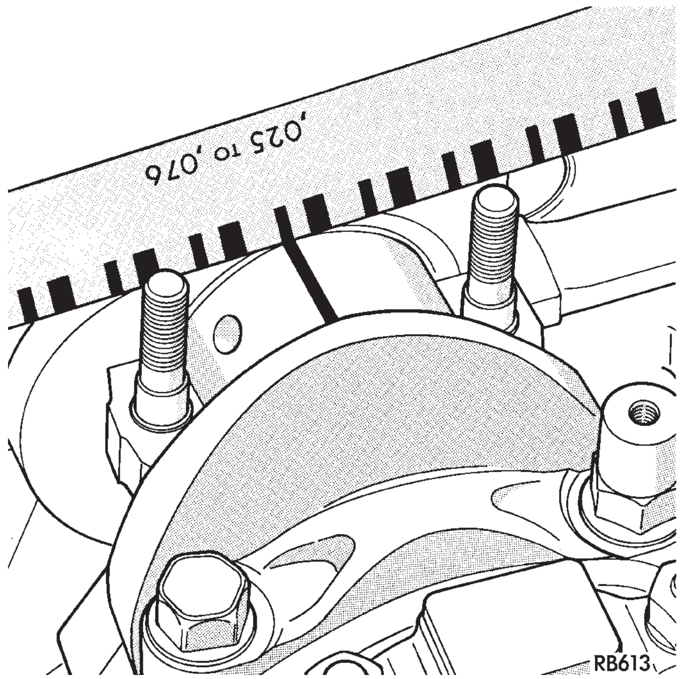


Fig. 50 Checking Connecting Rod Bearing Clearance—Typical

CONNECTING ROD BOLTS

NOTE: The connecting rod bearing cap bolts must be examined before reuse. If the threads are necked down due to stretching, the bolt(s) must be replaced (Fig. 51).

NOTE: Connecting rod bolts are retained in the rod cap with a light press fit. If bolts are to be removed, use a hammer and punch to drive bolts from connecting rod cap using care not to damage fractured cap surface.

(1) Examine connecting rod bolt for stretching. Stretching can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale the bolt should be replaced.

(2) Before installing the bolts, lubricate the threads with engine oil.

(3) Install bolts finger tight. Then alternately torque each nut to assemble the cap properly.

(4) Tighten the nuts to specification. (Refer to 9 - ENGINE - SPECIFICATIONS)

CONNECTING ROD BEARINGS (Continued)

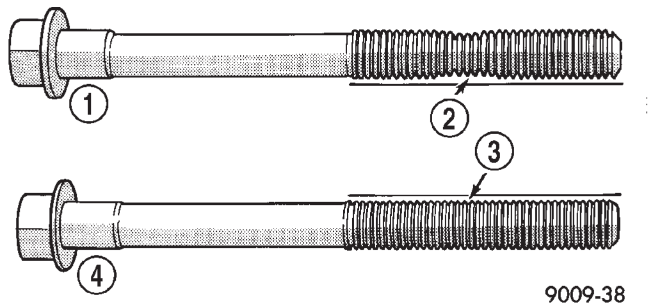


Fig. 51 Check for Stretched Bolts

1 - STRETCHED BOLT
2 - THREADS ARE NOT STRAIGHT ON LINE
3 - THREADS ARE STRAIGHT ON LINE
4 - UNSTRETCHED BOLT

CONNECTING ROD SIDE CLEARANCE

(1) Mount a dial indicator to a stationary point on engine. Locate probe perpendicular to and resting against the connecting rod cap being checked. Move connecting rod all the way to rear of its travel. Zero the dial indicator. Move connecting rod forward to limit of travel and read the dial indicator (Fig. 52). Compare measurement to specification listed in engine specifications (Refer to 9 - ENGINE - SPECIFICATIONS). Repeat procedure for each connecting rod. Turn crankshaft for connecting rod accessibility.

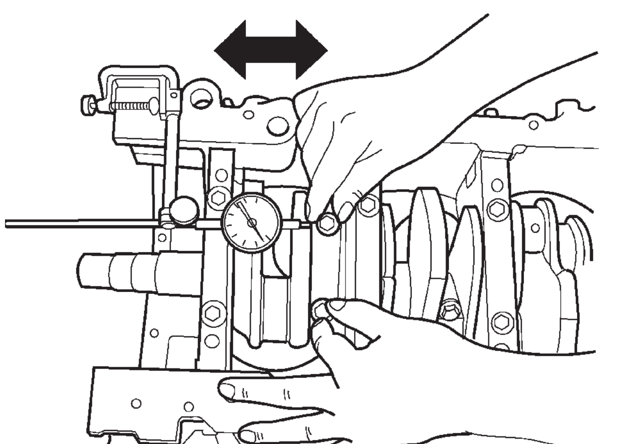


Fig. 52 Connecting Rod Side Clearance Measuring

CRANKSHAFT

DESCRIPTION

The crankshaft is constructed of a forged micro alloy steel. The six throw, nine counterweight crankshaft is supported by four select fit main bearings with the number three serving as the thrust washer location (Fig. 47). The select fit identification markings will be on the rear side of the number nine (rearmost) counterweight. The six separate connecting rod throws are an even-firing design which reduces torque fluctuations while a vibration damper is used to control torsional vibration.

The crankshaft oil seals are a one piece design. The front seal is retained by the timing chain cover, and the rear seal in a housing that attaches to the cylinder block.

OPERATION

The crankshaft transfers force generated by combustion within the cylinder to the flywheel or flexplate.

STANDARD PROCEDURE - CRANKSHAFT END PLAY

(1) Mount a dial indicator to a stationary point at front of engine. Locate the probe perpendicular against nose of crankshaft (Fig. 53).

(2) Move crankshaft all the way to the rear of its travel.

(3) Zero the dial indicator.

(4) Move crankshaft all the way to the front and read the dial indicator. For crankshaft end play clearances (Refer to 9 - ENGINE - SPECIFICATIONS).

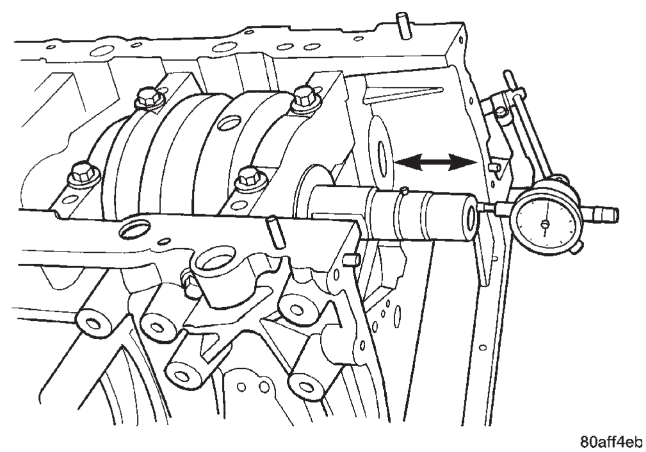


Fig. 53 CHECKING CRANKSHAFT END PLAY

REMOVAL

(1) Remove engine from vehicle (Refer to 9 - ENGINE - REMOVAL).

(2) Mount engine on an engine stand.

(3) Drain engine oil and remove oil filter.

(4) Remove oil pan and oil pick-up tube (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).

(5) Remove idler pulley bracket for accessory drive belt.

(6) Remove upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(7) Remove cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

CRANKSHAFT (Continued)

(8) Remove timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN COVER - REMOVAL).

(9) Remove primary timing chain (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN AND SPROCKETS - REMOVAL).

(10) Remove crankshaft sprocket (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN AND SPROCKETS - REMOVAL).

(11) Remove oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL).

(12) Remove crankshaft rear oil seal retainer (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT REAR OIL SEAL RETAINER - REMOVAL).

(13) Remove structural windage tray (Fig. 54).

(14) Turn crankshaft until connecting rod cap to be removed is accessible.

NOTE: Connecting rod bearing caps are not interchangeable and should be marked before removing to ensure correct reassembly.

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods. Damage to connecting rod could occur.

(15) Mark connecting rod bearing cap positions using a permanent ink marker or scribe tool.

(16) Remove connecting rod bearing caps. Use care to prevent damage to the crankshaft bearing surfaces.

CAUTION: Care should be taken not to damage the fractured rod and cap joint face surfaces or damage to the engine may occur.

(17) Remove main bearing cap bolts and tie bolts (Fig. 55).

(18) Remove main bearing caps (Fig. 55).

CAUTION: When removing crankshaft, use care not to damage bearing surfaces on the crankshaft

(19) Remove crankshaft from cylinder block (Fig. 56).

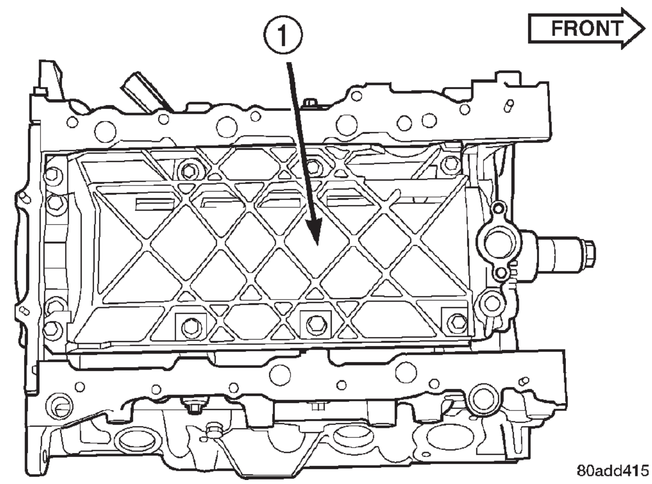


Fig. 54 Windage Tray

1 - STRUCTURAL WINDAGE TRAY

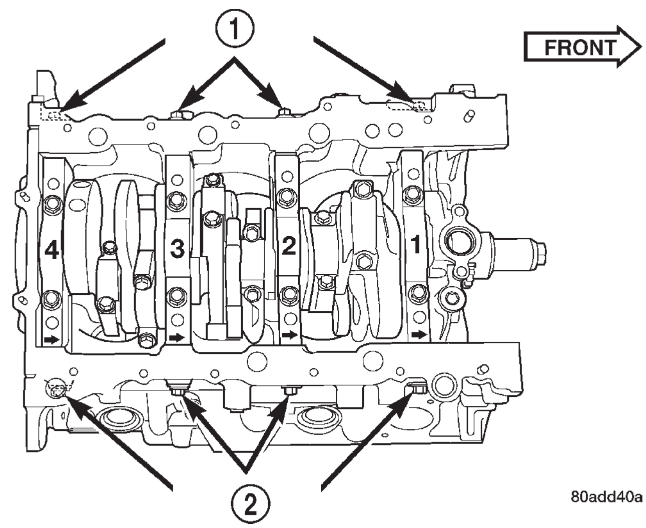


Fig. 55 Main Bearing Cap Identification

1 - TIE BOLTS
2 - TIE BOLTS

CRANKSHAFT (Continued)

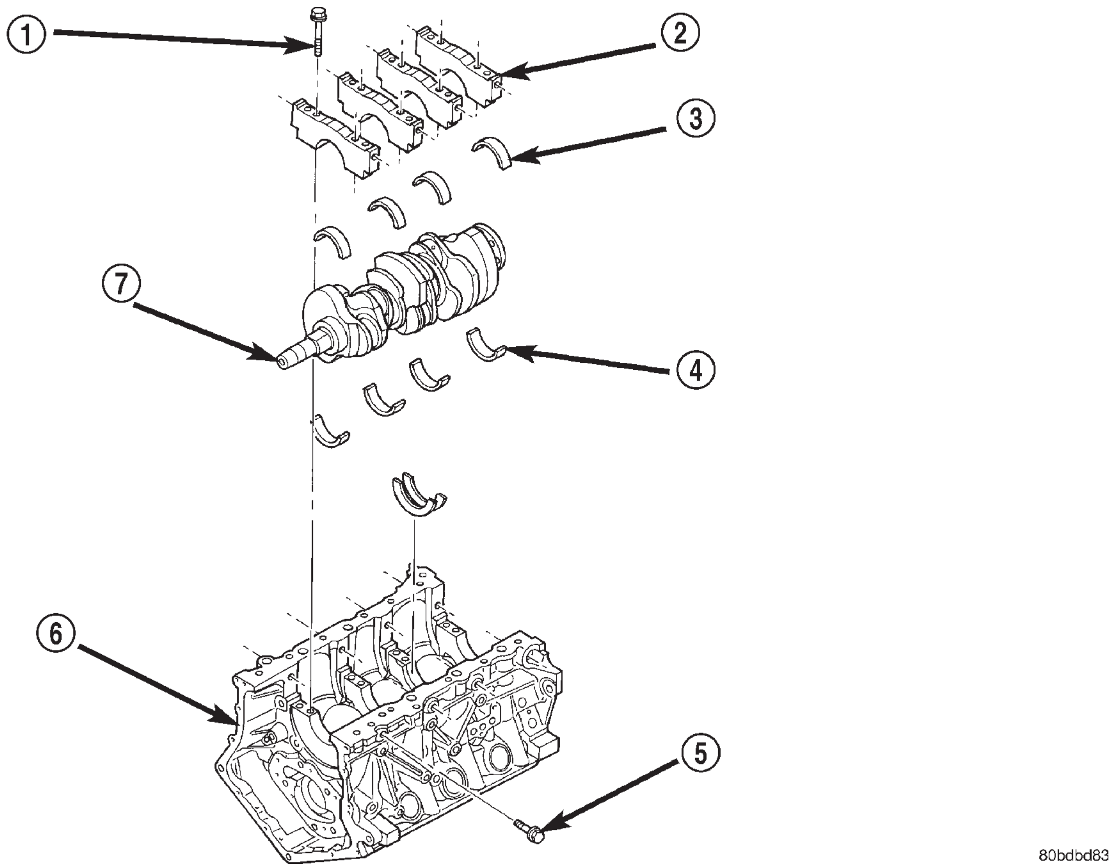


Fig. 56 CYLINDER BLOCK AND CRANKSHAFT

1 - MAIN CAP BOLT—VERTICAL
2 - MAIN CAP
3 - MAIN BEARING—LOWER
4 - MAIN BEARING—UPPER
5 - MAIN CAP BOLT —HORIZONTAL
6 - CYLINDER BLOCK
7 - CRANKSHAFT

INSTALLATION

NOTE: Upper and lower bearing halves are NOT interchangeable.

CAUTION: Main bearings are select fit (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT MAIN BEARINGS - STANDARD PROCEDURE).

(1) Lubricate upper main bearing halves with engine oil (Fig. 57).

CAUTION: When installing crankshaft, use care not to damage bearing surfaces on the crankshaft.

(2) Install crankshaft (Fig. 56).

NOTE: Make sure that the coated and oil groove side of crankshaft thrust washer faces the crankshaft thrust surface.

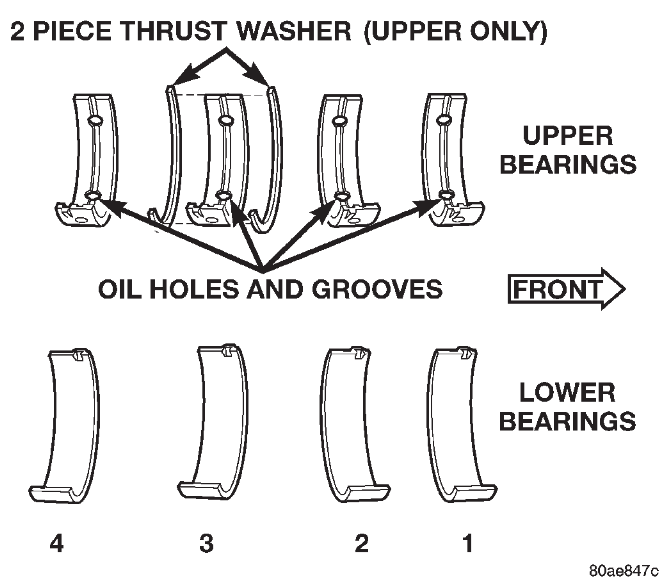


Fig. 57 Main Bearing Identification

CRANKSHAFT (Continued)

(3) Push crankshaft forward. Lubricate and install the front thrust washer by rolling the thrust washer onto the machined shelf between the No. 3 upper main bulk head and crankshaft thrust surface (Fig. 58).

(4) Move crankshaft rearward. Lubricate and install the rear thrust washer by rolling the thrust washer onto the machined shelf between the No. 3 upper main bulk head and crankshaft thrust surface.

(5) Lubricate lower main bearings with engine oil.

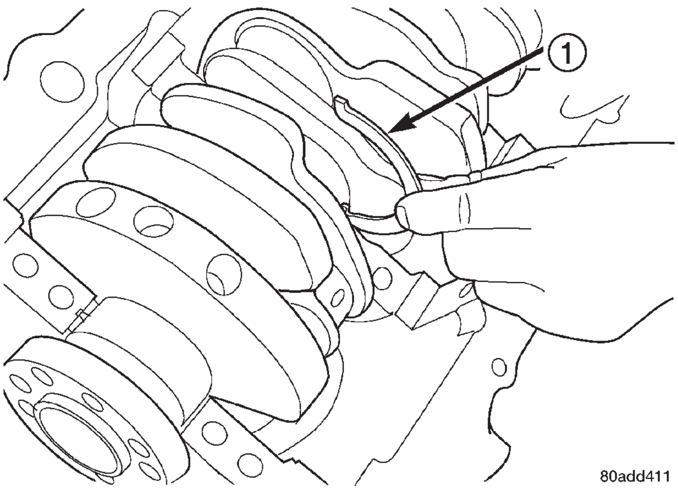


Fig. 58 Thrust Washer - Installation

1 - FRONT THRUST WASHER

(6) Install main bearings and caps.

NOTE: Lubricate main bearing cap bolts with engine oil before installation.

The main bearing cap bolts must be tightened in the proper sequence. First the inner main cap bolts, secondly the windage tray bolts, and lastly the main cap tie (horizontal) bolts.

(7) Install the inside main bearing cap bolts and tighten to 20 N·m + 1/4 Turn (15 ft. lbs. + 1/4 Turn) (Fig. 55).

(8) Measure crankshaft end play (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - STANDARD PROCEDURE).

(9) Install connecting rods and measure side clearance (Refer to 9 - ENGINE/ENGINE BLOCK/CONNECTING ROD BEARINGS - STANDARD PROCEDURE).

(10) Install windage tray (Fig. 54). Lubricate bolts with engine oil and tighten to 27 N·m + 1/4 Turn (20 ft. lbs. + 1/4 turn).

(11) Install the main cap tie (horizontal) bolts and tighten to 28 N·m (250 in. lbs.) (Fig. 55).

(12) Install rear crankshaft oil seal retainer and oil seal (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT REAR OIL SEAL RETAINER - INSTALLATION) (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - INSTALLATION).

(13) Install oil pump assembly (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSTALLATION).

(14) Install crankshaft sprocket (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN AND SPROCKETS - INSTALLATION).

(15) Install timing chain (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN AND SPROCKETS - INSTALLATION).

(16) Install timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN COVER - INSTALLATION).

(17) Install cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

(18) Install idler pulley bracket for accessory drive belt.

(19) Install oil pick-up tube and O-ring.

(20) Install oil pan and oil filter (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

(21) Install oil dipstick tube.

(22) Install engine assembly (Refer to 9 - ENGINE - INSTALLATION).

(23) Fill engine crankcase with proper oil to correct level (Refer to 9 - ENGINE/LUBRICATION/OIL - STANDARD PROCEDURE).

CRANKSHAFT MAIN BEARINGS

STANDARD PROCEDURE - CRANKSHAFT MAIN BEARING FITTING

The main bearings are “select fit” to achieve proper oil clearances. For main bearing selection, the block and crankshaft have grade identification marks.

The grade marks for the cylinder block main bearing bore grade is located on the pan rail just below the left side engine mount bracket (Fig. 60). These marks are read left to right, corresponding to main bore 1, 2, 3, 4.

The grade marks for the crankshaft are located on the rearmost crankshaft counter weight as shown in (Fig. 59). The crankshaft journal grade marks are read left to right, corresponding with journal number 1, 2, 3, 4.

Refer to the MAIN BEARING SELECTION CHART—2.7L to properly select the main bearings. For an example, if the main bore grade is 3 and the journal grade is 2, the proper select fit bearing would be (2) +0.003 mm (+0.0002 in.).

CRANKSHAFT MAIN BEARINGS (Continued)

NOTE: Service main bearings have a number from 1–5 marked in ink on the bearing surface (Fig. 61). For verification, use the MAIN BEARING SELECTION CHART—2.7L for number to size identification.

The upper main bearing has a oil feed hole and a center groove to allow lubrication of the main journal and must be properly positioned in the block.

NOTE: Although cylinder bores are graded for size, there is only one piston size.

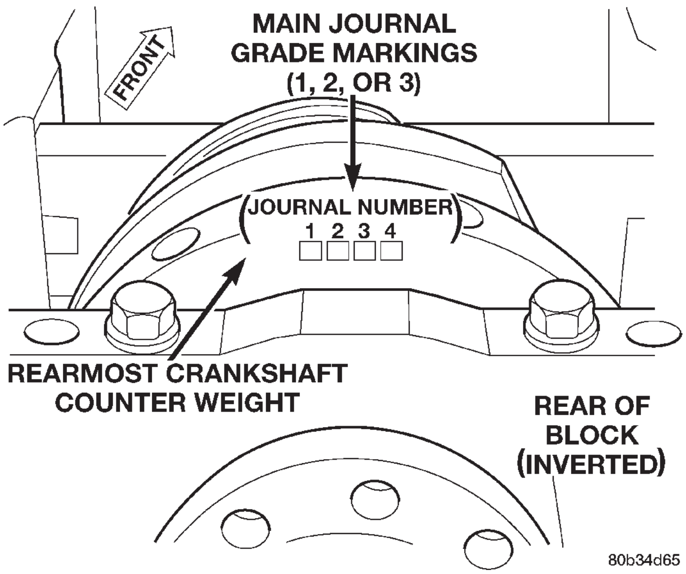


Fig. 59 Crankshaft Main Journal Grade Marking Location

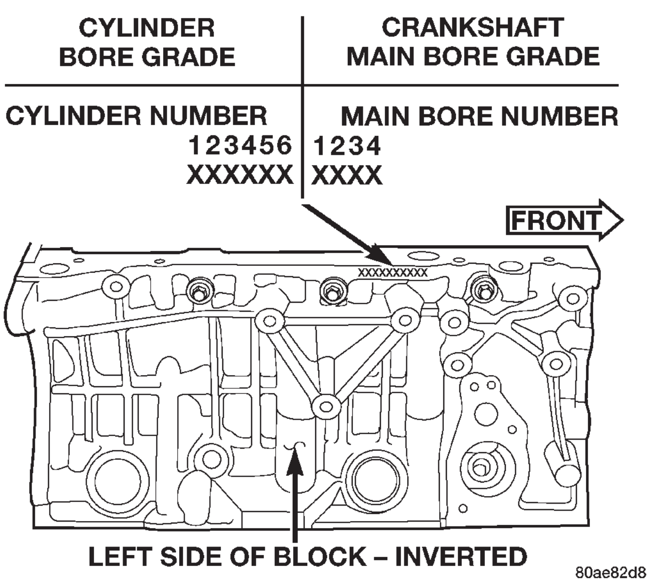


Fig. 60 Cylinder Block Main Bore Grade Marking

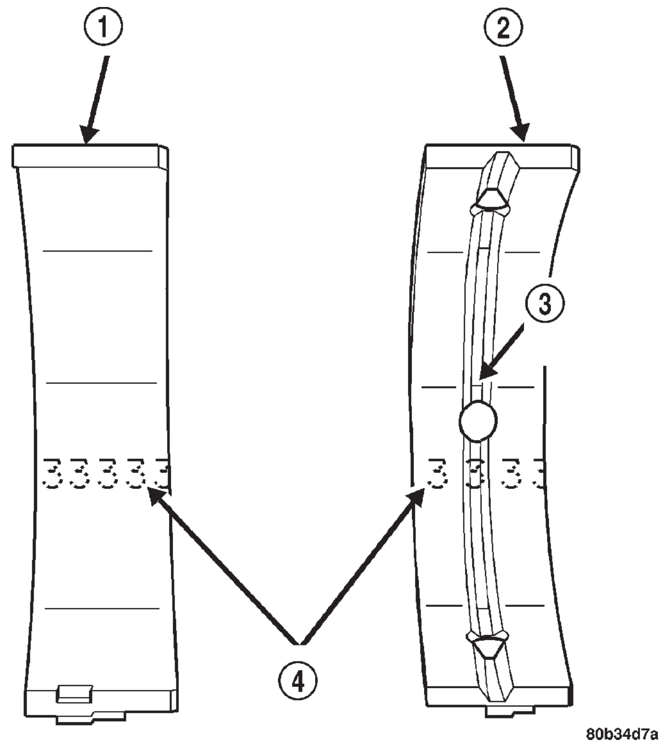


Fig. 61 Main Bearing Grade Marks

1 - LOWER MAIN BEARING
2 - UPPER MAIN BEARING
3 - OIL FEED HOLE AND GROOVE
4 - GRADE SELECTION INK MARKS

MAIN BEARING SELECTION CHART—2.7L

		Main Bearing Bore Grade Mark		
		1	**2**	**3**
Crankshaft Main Journal Grade Mark	**1**	(3) standard	(2) +0.003 mm (+0.0002 in.)	(1) +0.006 mm (+0.0003 in.)
	2	(4) -0.003 mm (-0.0002)	(3) standard	(2) +0.003 mm (+0.0002 in.)
	3	(5) -0.006 mm (-0.0003 in.)	(4) -0.003 mm (-0.0002 in.)	(3) standard

CRANKSHAFT OIL SEAL - FRONT

REMOVAL

(1) Remove crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL)

(2) Install Special Tool 8194, Insert into crankshaft nose. Remove seal using Special Tool 6771, Remover (Fig. 62).

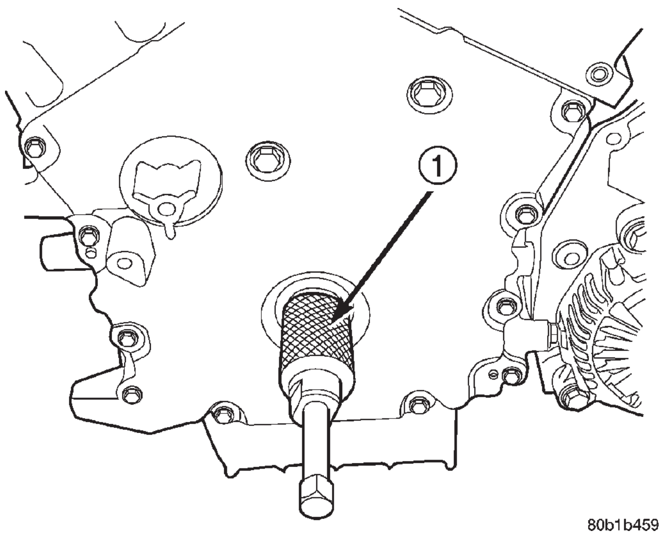


Fig. 62 Crankshaft Front Oil Seal - Removal

1 - SPECIAL TOOL 6771

INSTALLATION

(1) Install new seal using Special Tools 6780-2 Sleeve, 6780-1 Installer, and 8179 Stud (Fig. 63).

(2) Install crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

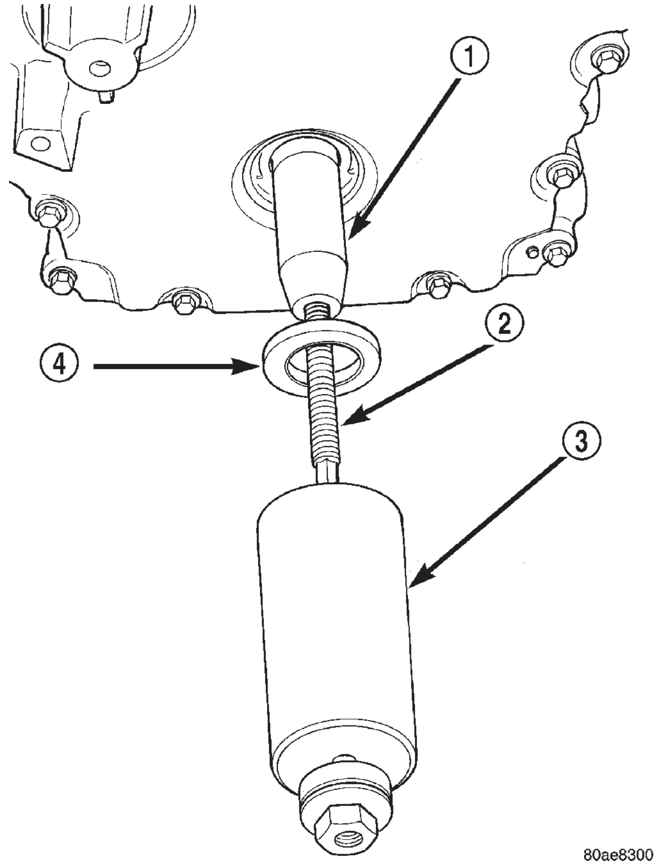


Fig. 63 Crankshaft Front Oil Seal - Installation

1 - SPECIAL TOOL 6780–2
2 - SPECIAL TOOL 8179
3 - SPECIAL TOOL 6780–1
4 - SEAL

CRANKSHAFT OIL SEAL - REAR

REMOVAL

(1) Remove transaxle from vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - REMOVAL)

(2) Remove drive plate.

(3) Insert a 3/16” wide flat bladed screwdriver between the dust lip and the metal case of the crankshaft seal. Angle the screwdriver (Fig. 64) through the dust lip against the metal case of the seal. Pry out seal.

CAUTION: Do not allow the screwdriver blade to contact the crankshaft seal surface. Contact of the screwdriver blade against crankshaft edge (chamfer) is permitted.

INSTALLATION

CAUTION: If a burr or scratch is present on the crankshaft edge (chamfer), clean surface using 400 grit sand paper to prevent seal damage during installation.

(1) Place Special Tool 6926-1 Guide on crankshaft (Fig. 65). This is a pilot tool with a magnetic base.

(2) Position seal over pilot tool. Assure that lip of seal is facing towards the crankshaft during installation. The pilot tool remains on crankshaft during seal installation.

(3) Using Special Tool 6926-2 Installer, and C-4171 Handle (Fig. 65), drive seal into the retainer housing until seal is flush with housing surface.

CRANKSHAFT OIL SEAL - REAR (Continued)

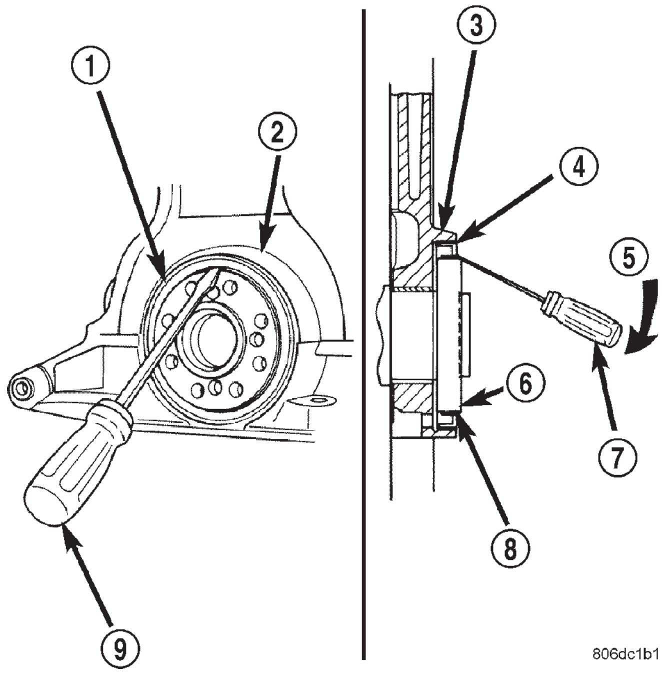


Fig. 64 Rear Crankshaft Oil Seal Removal - Typical

1 - REAR CRANKSHAFT SEAL
2 - ENGINE BLOCK
3 - ENGINE BLOCK
4 - REAR CRANKSHAFT SEAL METAL CASE
5 - PRY IN THIS DIRECTION
6 - CRANKSHAFT
7 - SCREWDRIVER
8 - REAR CRANKSHAFT SEAL DUST LIP
9 - SCREWDRIVER

(4) Install drive plate and transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - INSTALLATION)

CRANKSHAFT REAR OIL SEAL RETAINER

REMOVAL

(1) Remove crankshaft rear oil seal and oil pan. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - REMOVAL) (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)

(2) Remove seal retainer attaching screws (Fig. 66).

(3) Remove retainer and gasket (Fig. 66).

INSTALLATION

(1) Clean sealing surfaces and replace gasket as needed.

(2) Install gasket and loose assemble seal retainer to block.

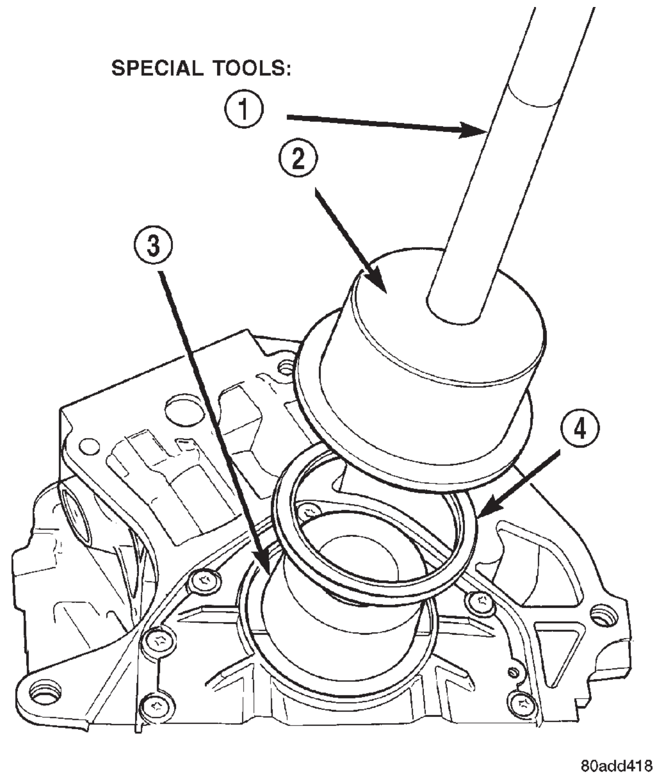


Fig. 65 Crankshaft Rear Seal - Installation

1 - C-4171 HANDLE
2 - 6926–2 INSTALLER
3 - 6926–1 GUIDE
4 - SEAL

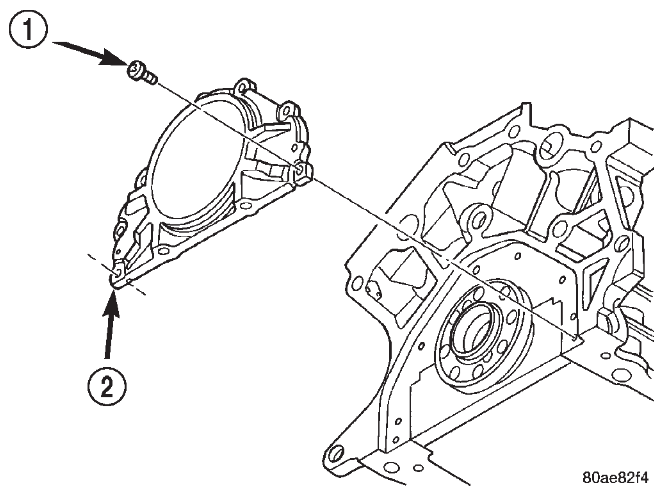


Fig. 66 Oil Seal Retainer

1 - SCREWS (7)
2 - SEAL RETAINER

NOTE: The following steps must be performed to prevent oil leaks at sealing joints.

(3) Attach Special Tools 8225 to pan rail using the oil pan fasteners.

CRANKSHAFT REAR OIL SEAL RETAINER (Continued)

NOTE: Make sure that the "2.7L" stamped on the special tool is facing the cylinder block (flat side of tools against pan rail).

(4) While applying firm pressure to the seal retainer against Special Tools 8225 (Fig. 67), tighten seal retainer screws to 12 N·m (105 in. lbs.).

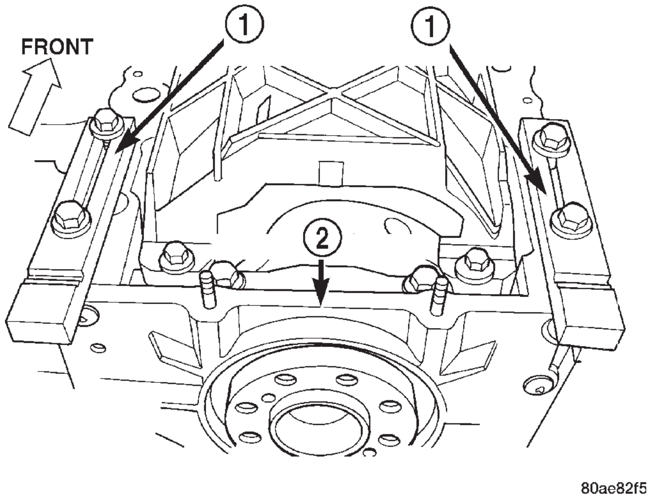


Fig. 67 SEAL RETAINER ALIGNMENT

1 - SPECIAL TOOLS 8225
2 - SEAL RETAINER

(5) Install oil pan and crankshaft rear oil seal. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION) (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - INSTALLATION)

PISTON & CONNECTING ROD

DESCRIPTION

The pistons are made of a high strength aluminum alloy with an anodized top ring groove. Piston skirts are coated with a solid lubricant for scuff resistance. The connecting rods are made of powdered metal with a "fractured cap" design. The connecting rod attaches to the piston with a full floating pin retained by lock rings. The piston and connecting rod are serviced as an assembly (Fig. 68).

OPERATION

The piston and connecting rod is the link between the combustion force to the crankshaft.

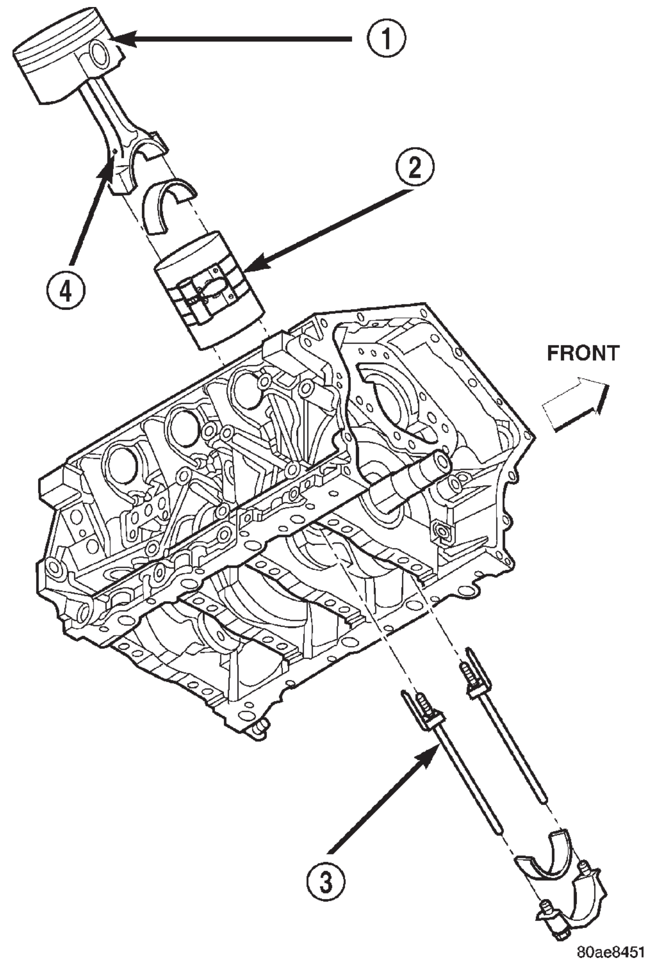


Fig. 68 Piston and Connecting Rod

1 - "F" TOWARD FRONT OF ENGINE
2 - RING COMPRESSOR
3 - SPECIAL TOOL 8189
4 - OIL SQUIRT HOLE

STANDARD PROCEDURE - FITTING PISTONS

The pistons have been cast and machined to one size and weight. The piston and rod assemblies are matched to weigh the same for engine balance.

Piston and cylinder wall must be clean and dry. Piston diameter should be measured 90 degrees to piston pin at size location shown in (Fig. 69). Cylinder bores should be measured halfway down the cylinder bore and transverse to the engine crankshaft center line. Refer to Engine Specifications. (Refer to 9 - ENGINE - SPECIFICATIONS) **Pistons and cylinder bores should be measured at normal room temperature, 70°F (21°C).**

PISTON PINS

The pistons have been cast and machined to one size and weight. The piston and rod assemblies are matched to weigh the same for engine balance.

PISTON & CONNECTING ROD (Continued)

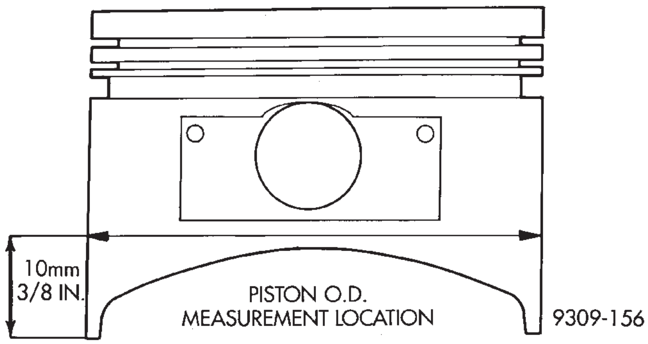


Fig. 69 Piston Measurements

The piston pin is full floating and is held in place by lock rings. **Do Not switch pistons with other rods**. Pistons and connecting rods are serviced as an assembly for balance.

REMOVAL

(1) Remove top ridge of cylinder bores with a reliable ridge reamer before removing pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation. Pistons and connecting rods must be removed from top of cylinder block. When removing piston and connecting rod assemblies from the engine, rotate crankshaft so that each connecting rod is centered in cylinder bore.**

NOTE: Connecting rod bearing caps are not interchangeable and should be marked before removing to ensure correct reassembly.

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods. Damage to connecting rod could occur.

(2) Mark connecting rod and bearing cap positions using a permanent ink marker or scribe tool (Fig. 70).

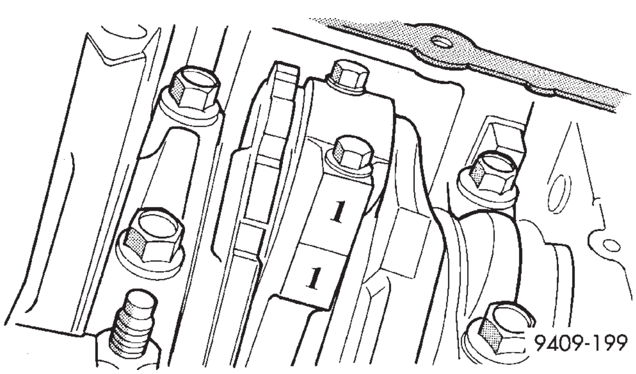


Fig. 70 IDENTIFY CONNECTING ROD TO CYLINDER

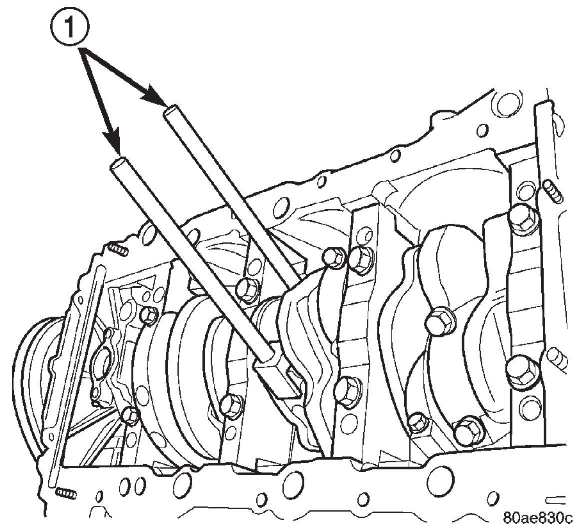


Fig. 71 CONNECTING ROD GUIDES

1 - SPECIAL TOOL 8189 CONNECTING ROD GUIDES

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces, as engine damage may occur.

(3) Remove connecting rod cap. Install Special Tool 8189 Connecting Rod Guides into the connecting rod being removed (Fig. 71). Remove each piston and rod assembly out of cylinder bore.

NOTE: Be careful not to nick crankshaft journals.

(4) After removal, install bearing cap on the mating rod to prevent damage to the fractured cap to rod surfaces.

INSTALLATION

(1) Install the piston rings. (Refer to 9 - ENGINE/ ENGINE BLOCK/PISTON RINGS - INSTALLATION)

(2) Before installing piston and connecting rod assemblies into the bore, ensure that compression ring gaps are staggered so that neither is in line with oil ring rail gap.

(3) Before installing the ring compressor, make sure the oil ring expander ends are butted and the rail gaps located as shown in (Fig. 79).

(4) Immerse the piston head and rings in clean engine oil, slide the ring compressor over the piston and tighten with the special wrench. **Ensure position of rings does not change during this operation.**

CAUTION: Ensure the hole in bearing half aligns with hole in connecting rod, as damage to engine may occur.

PISTON & CONNECTING ROD (Continued)

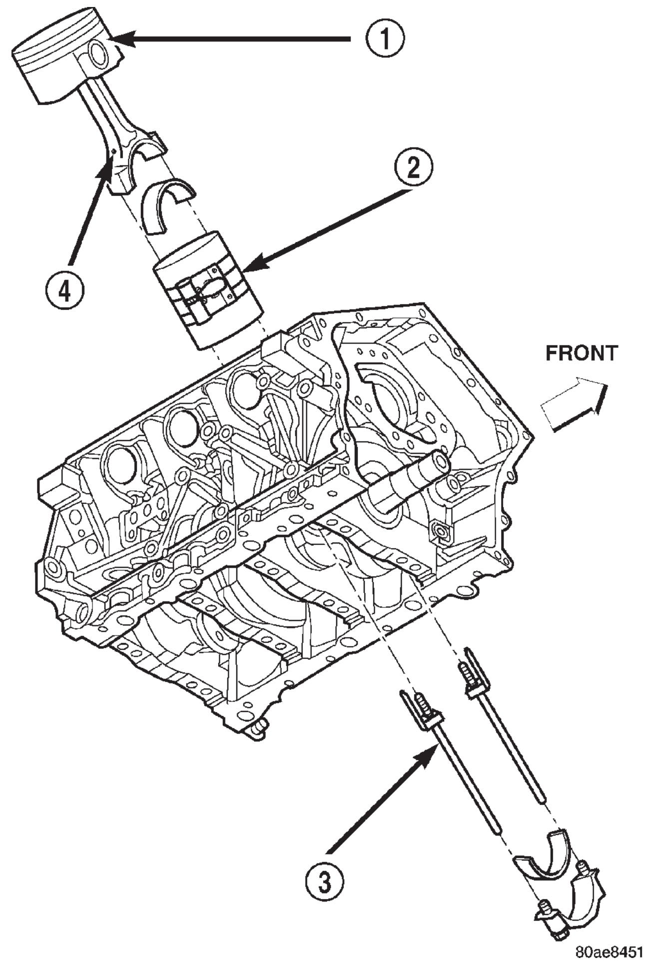


Fig. 72 Piston and Connecting Rod

1 - “F” TOWARD FRONT OF ENGINE
2 - RING COMPRESSOR
3 - SPECIAL TOOL 8189
4 - OIL SQUIRT HOLE

(5) Position bearing onto connecting rod. Ensure that hole in bearing half is aligned to hole in connecting rod. Lubricate bearing surface with clean engine oil.

(6) Install Special Tools 8189 Connecting Rod Guides into connecting rod (Fig. 71).

(7) The pistons are marked on top with an arrow and with an “F” (Front) above the pin boss. These marks must be pointing toward the front of engine on both cylinder banks. The connecting rod oil squirt hole faces the major thrust (right) side of the block (Fig. 73).

(8) Rotate crankshaft so that the connecting rod journal is on the center of the cylinder bore. Insert rod and piston into cylinder bore and guide rod over the crankshaft journal (Fig. 72).

CAUTION: Do Not interchange piston assemblies bank to bank, as engine damage may occur.

(9) Tap the piston down in cylinder bore, using a hammer handle. At the same time, guide connecting rod into position on connecting rod journal.

(10) Lubricate rod bolts and bearing surface with engine oil. Install connecting rod cap and bearing. Tighten bolts to 27 N·m (20 ft. lbs.) Plus 1/4 turn.

PISTON RINGS

STANDARD PROCEDURE - PISTON RING FITTING

(1) Wipe cylinder bore clean. Insert ring and push down with piston to ensure it is square in bore. The ring gap measurement must be made with the ring positioning at least 12 mm (0.50 inch.) from bottom of cylinder bore. Check gap with feeler gauge (Fig. 74). Refer to (Refer to 9 - ENGINE - SPECIFICATIONS) for clearance measurements.

(2) Check piston ring to groove clearance (Fig. 75). For clearance specifications (Refer to 9 - ENGINE - SPECIFICATIONS).

PISTON RINGS (Continued)

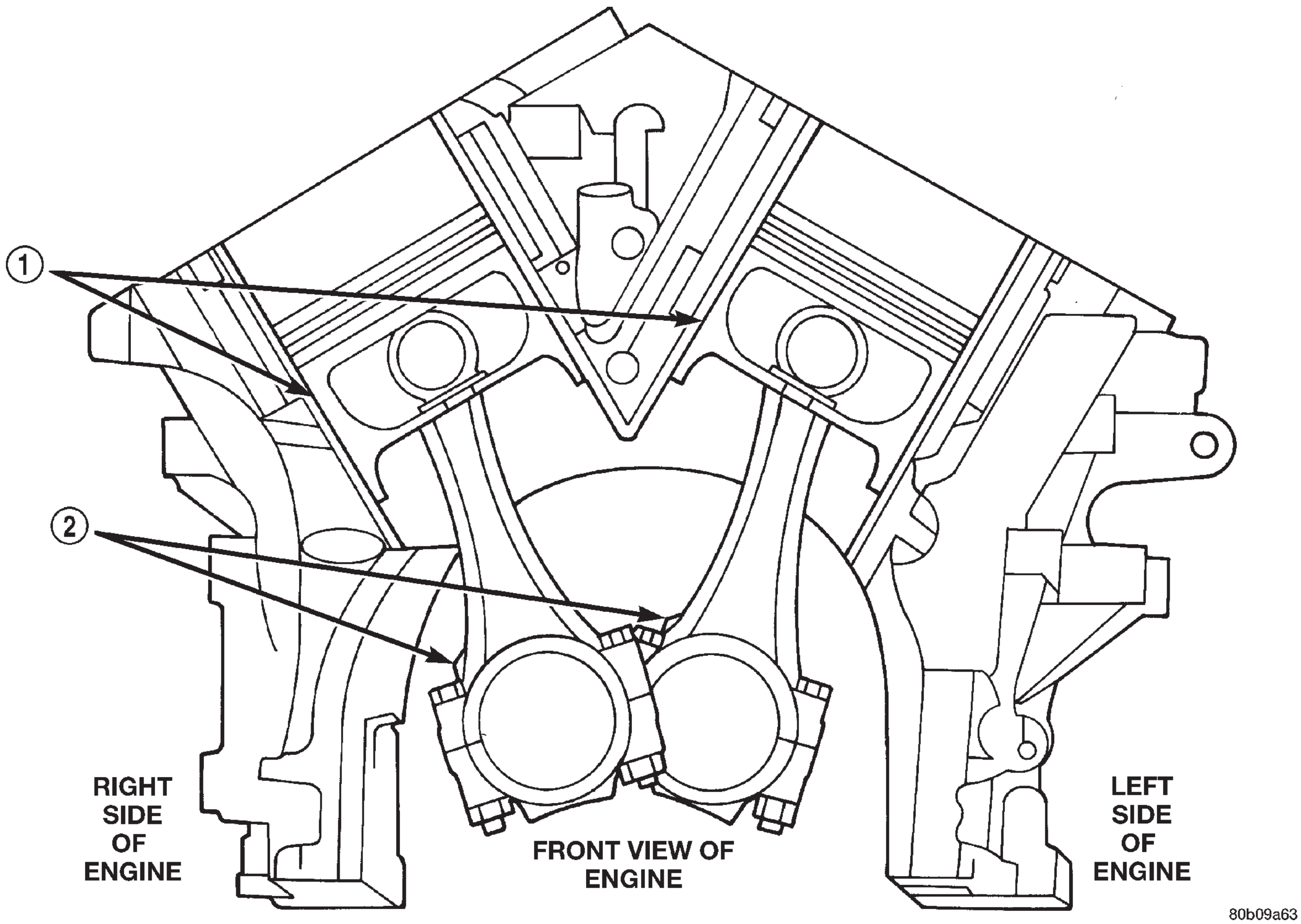


Fig. 73 Piston and Connecting Rod Positioning (Front View of Engine)

1 - MAJOR THRUST SIDE OF PISTON
2 - OIL SQUIRT HOLE

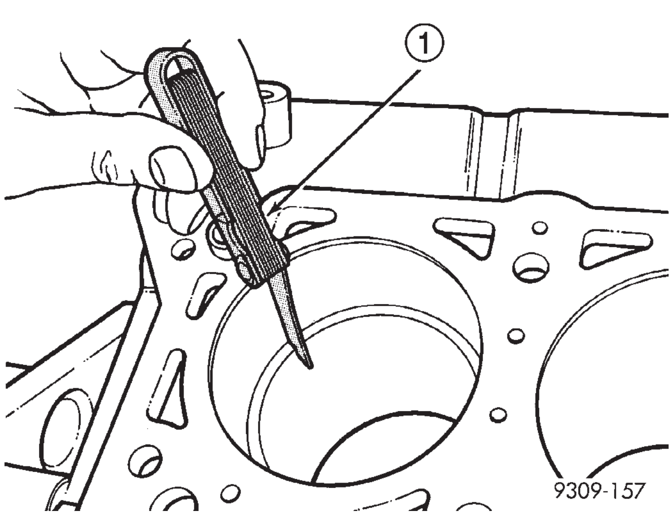


Fig. 74 CHECK GAP ON PISTON RINGS

1 - FEELER GUAGE

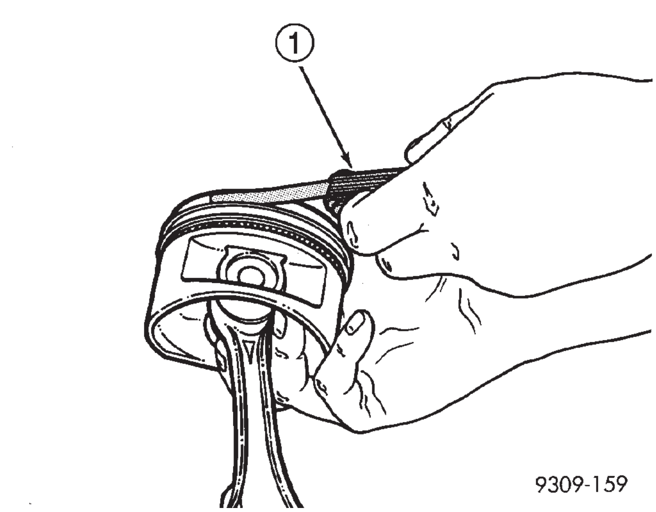


Fig. 75 Measuring Piston Ring Side Clearance

1 - FEELER GAUGE

PISTON RINGS (Continued)

REMOVAL

(1) Remove piston and connecting rod. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON & CONNECTING ROD - REMOVAL)

(2) Remove No. 1 and No.2 piston rings (Fig. 77) from piston using a ring expander tool (Fig. 78).

(3) Remove upper oil ring side rail (Fig. 77).

(4) Remove lower oil ring side rail (Fig. 77).

(5) Remove oil ring expander (Fig. 77).

INSTALLATION

(1) Measure clearance of piston rings to the cylinder bore and piston. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - STANDARD PROCEDURE)

CAUTION: Install piston rings in the following order:

- Oil ring expander.
- Upper oil ring side rail.
- Lower oil ring side rail.
- No. 2 Intermediate piston ring.
- No. 1 Upper piston ring.

(2) Install oil ring expander.

Install the side rail by placing one end between the piston ring groove and the oil ring expander. Hold end firmly and press down the portion to be installed until side rail is in position. **Do not use a piston ring expander during this step (Fig. 76).**

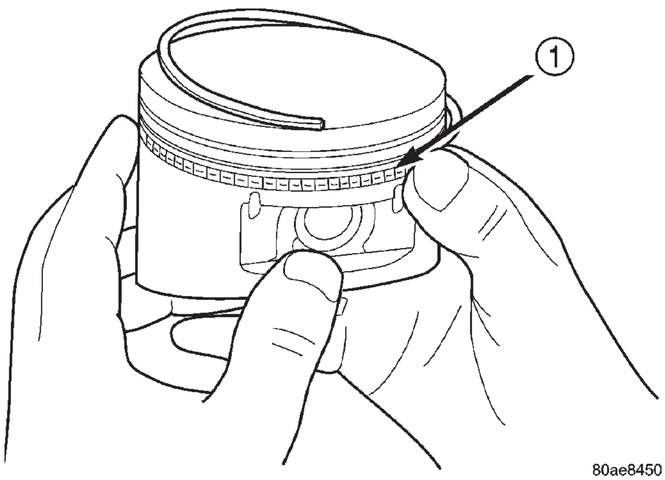


Fig. 76 SIDE RAIL - INSTALLATION

1 - SIDE RAIL END

(3) Install upper side rail first and then the lower side rail.

NOTE: The No. 1 and No. 2 piston rings have a different cross section. Ensure No. 2 ring is installed with manufacturers I.D. mark (dot) facing up, towards top of the piston (Fig. 77)

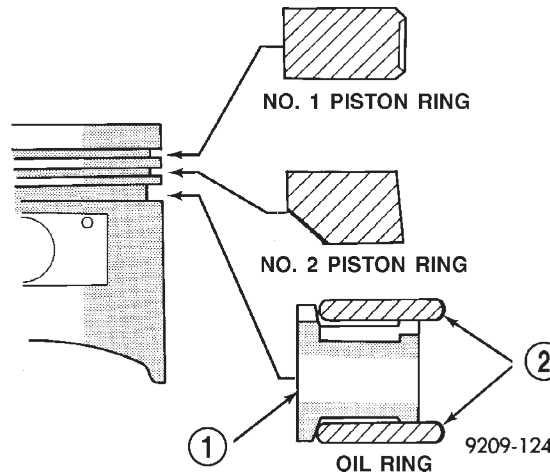


Fig. 77 PISTON RING - INSTALLATION

1 - SPACER EXPANDER

2 - SIDE RAIL

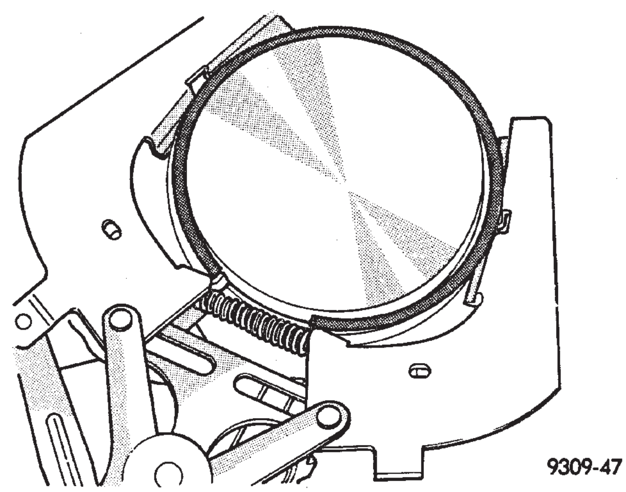


Fig. 78 UPPER AND INTERMEDIATE RINGS

(4) Install No. 2 piston ring and then No. 1 piston ring (Fig. 78).

(5) Position piston ring end gaps as shown in (Fig. 79).

(6) Position oil ring expander gap at least 45° from the side rail gaps but **not** on the piston pin center or on the thrust direction. Staggering ring gap is important for oil control.

VIBRATION DAMPER

REMOVAL

(1) Disconnect negative battery cable.

(2) Raise vehicle on hoist.

(3) Remove right front wheel and belt splash shield.

VIBRATION DAMPER (Continued)

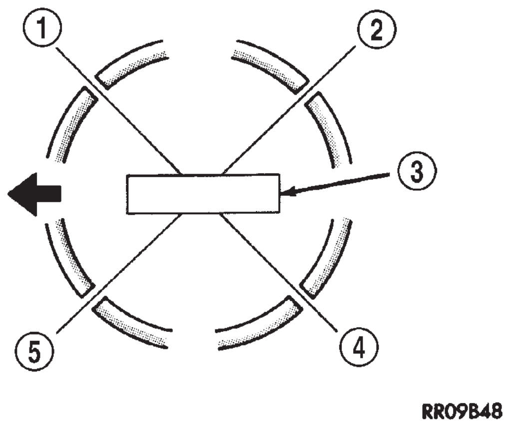


Fig. 79 PISTON RING END GAP POSITION

1 - SIDE RAIL UPPER
2 - NO. 1 RING GAP
3 - PISTON PIN
4 - SIDE RAIL LOWER
5 - NO. 2 RING GAP AND SPACER EXPANDER GAP

(4) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(5) Remove damper bolt.

(6) Remove damper by using Special Tools 8194 Insert and 8454 Puller (Fig. 80).

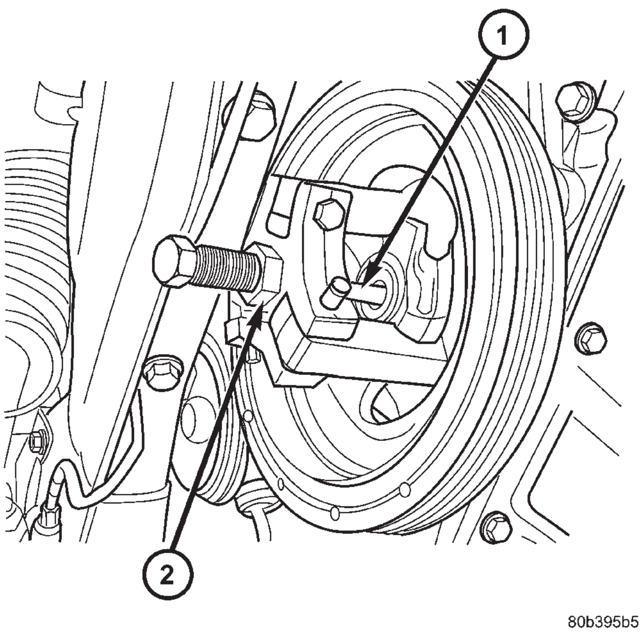


Fig. 80 VIBRATION DAMPER - REMOVAL

1 - SPECIAL TOOL 8454 PULLER
2 - SPECIAL TOOL 8194 INSERT

INSTALLATION

(1) Install damper using Special Tools 8179 Screw, with Nut and Thrust Bearing from 6792, and 6792-1 Installer (Fig. 81).

(2) Install damper center bolt. Tighten center bolt to 170 N·m (125 ft. lbs.).

(3) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(4) Install belt splash shield and right front wheel.

(5) Lower vehicle.

(6) Connect negative battery cable.

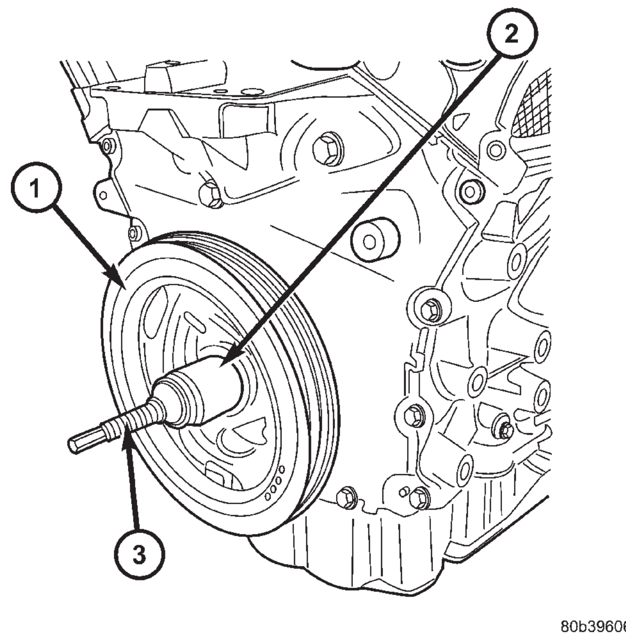


Fig. 81 VIBRATION DAMPER - INSTALLATION

1 - VIBRATION DAMPER
2 - SPECIAL TOOL 6792-1
3 - SPECIAL TOOL 8179

STRUCTURAL COLLAR

REMOVAL

(1) Raise vehicle on hoist.

(2) Remove bolts attaching structural collar to oil pan and transmission housing (Fig. 82).

(3) Remove collar (Fig. 82).

INSTALLATION

CAUTION: The collar must be tightened using this service procedure, as damage to transaxle case and/or oil pan may occur.

(1) Position structural collar (Fig. 82) on oil pan and transaxle.

STRUCTURAL COLLAR (Continued)

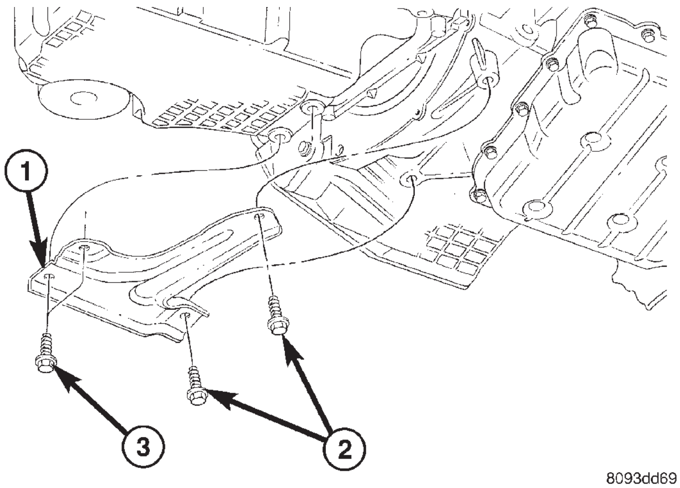


Fig. 82 Structural Collar (Note: cross-under pipe not shown)

1 - STRUCTURAL COLLAR
2 - BOLT (2) - COLLAR TO TRANSAXLE
3 - BOLT (2) - COLLAR TO OIL PAN

(2) Loosely install all bolts.

(3) Tighten the collar to oil pan bolts to 55 N·m (40 ft. lbs.).

(4) Tighten collar to transaxle bolts to 55 N·m (40 ft. lbs.).

(5) Lower vehicle.

ENGINE MOUNTING

ADJUSTMENTS

ENGINE SUPPORT ADJUSTMENT

The right and left support assemblies are slotted to allow for right/left drive train adjustment in relation to drive shaft assembly length.

Check and reposition right and left engine support assemblies as required. Adjust drive train position, if required, for the following conditions:

- Drive shaft distress: See Group 2, Suspension and Driveshaft.
- Any front end structural damage (after repair).
- Support Assembly replacement.

ENGINE SUPPORT ADJUSTMENT

(1) Remove the load on the engine motor mounts by carefully supporting the engine and transmission assembly with a floor jack.

(2) Loosen the right engine support assembly vertical fasteners.

(3) Loosen the left engine support assembly vertical bolts.

(4) Pry the engine right or left as required to achieve the proper drive shaft assembly length. Refer to Group 2, Suspension and Driveshaft for driveshaft identification and related assembly length measuring.

(5) Tighten right engine support assembly vertical bolts to 61 N·m (45 ft. lbs.). and tighten left engine support assembly bolts to 61 N·m (45 ft. lbs.).

(6) Recheck drive shaft length.

LEFT MOUNT

REMOVAL

(1) Disconnect negative battery cable.

(2) Remove throttle body air inlet hose and air cleaner housing assembly.

(3) Remove two nuts securing speed control servo bracket to left shock tower. Reposition servo.

(4) Support transmission with floor jack and wooden block.

(5) Remove the three vertical bolts from mount to transmission bracket (A) (Fig. 74).

(6) Slightly lower transmission with floor jack.

(7) Remove mount to frame rail fasteners (B) and remove mount (Fig. 74).

INSTALLATION

(1) Position mount to frame rail. Install mount to frame rail fasteners (B) (Fig. 83). Torque fasteners to 33 N·m (24 ft. lbs.).

(2) Raise transmission into position with floor jack.

(3) Install three vertical bolts from mount to transmission bracket (A) (Fig. 83). Torque fasteners to 61 N·m (45 ft. lbs.).

(4) Remove floor jack and wooden block.

(5) Install speed control servo to left shock tower. Torque fasteners to 6.7 N·m (60 in. lbs.)

(6) Install throttle body air inlet hose and air cleaner housing assembly.

(7) Connect negative battery cable.

REAR MOUNT

REMOVAL

(1) Remove throttle body air inlet hose and air cleaner housing assembly.

(2) Remove three vertical bolts attaching rear mount bracket to transaxle case (Fig. 84).

(3) Raise vehicle on hoist.

(4) Remove rear mount bracket through bolt (Fig. 84).

(5) Remove horizontal bolt attaching rear mount bracket to transaxle case (Fig. 84).

(6) Remove mount bracket.

REAR MOUNT (Continued)

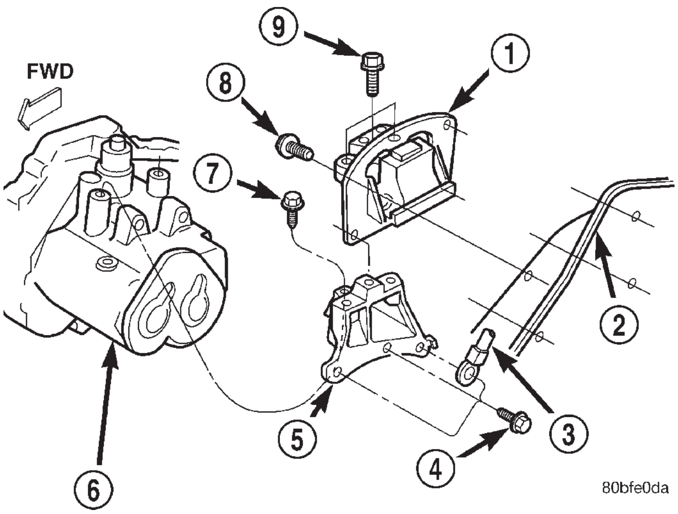


Fig. 83 Left Side Mount - Typical

1 - TRANSMISSION SUPPORT ASSEMBLY
2 - LEFT FRAME RAIL
3 - GROUND CABLE
4 - BOLT (D)
5 - TRANSMISSION BRACKET
6 - TRANSMISSION
7 - BOLT (C)
8 - BOLT (B)
9 - BOLT (A)

(7) Remove rear mount to suspension crossmember attaching bolts.

(8) Remove rear mount.

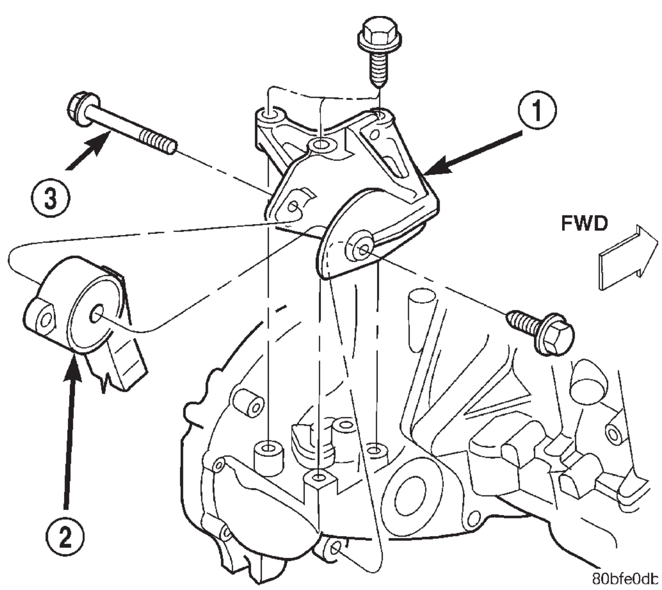


Fig. 84 Engine Mounting—Rear

1 - REAR TORQUE BRACKET
2 - REAR MOUNT
3 - THROUGH BOLT

INSTALLATION

(1) Position rear mount on suspension crossmember and loosely install bolts.

(2) Position mount bracket on transaxle and install bolts. Tighten to 110 N·m (80 ft. lbs.) (Fig. 75).

(3) Install rear mount to bracket through bolt and tighten to 61 N·m (45 ft. lbs.) (Fig. 75).

(4) Tighten rear mount to crossmember bolts to 61 N·m (45 ft. lbs.) (Fig. 75).

(5) Lower vehicle. Install throttle body air inlet hose and air cleaner housing assembly.

RIGHT MOUNT

REMOVAL

(1) Remove coolant pressure container (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY PRESS CONTAINER - REMOVAL).

(2) Remove heater tube front attaching screw.

(3) Raise vehicle on a hoist and remove inner splash shield.

(4) Remove heater tube rear attaching screw.

(5) Remove the right engine support assembly vertical fasteners from frame rail (Fig. 85).

(6) Lower vehicle. Remove the load on the engine motor mounts by carefully supporting the engine assembly with floor jack and wooden block on oil pan.

(7) Remove the bolts attaching the engine support assembly to the engine bracket (Fig. 85).

(8) Remove right engine mount.

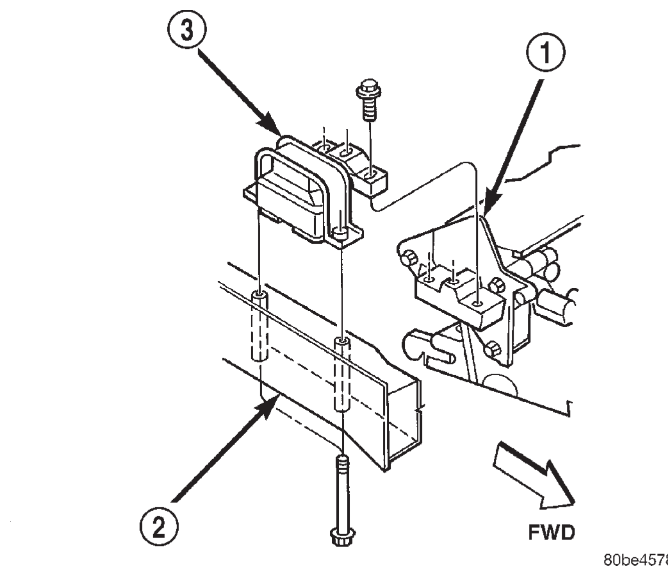


Fig. 85 Engine Mounting—Right Side

1 - ENGINE SUPPORT BRACKET
2 - FRAME RAIL
3 - RIGHT ENGINE MOUNT

RIGHT MOUNT (Continued)

INSTALLATION

(1) Position right engine mount and install frame rail to mount bolts. Tighten bolts to 61 N·m (45 ft. lbs.) (Fig. 85).

(2) Install the mount to engine support bracket bolts and tighten to 61 N·m (45 ft. lbs.) (Fig. 85).

(3) Raise vehicle on a hoist.

(4) Install heater tube rear attaching screw.

(5) Install inner splash shield and lower vehicle.

(6) Install heater tube front attaching screw.

(7) Install coolant bottle (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY PRESS CONTAINER - INSTALLATION).

FRONT MOUNT

REMOVAL

(1) Raise vehicle.

(2) Remove front mount to bracket horizontal through bolt (Fig. 86).

(3) Remove front mount vertical bolts (Fig. 86).

(4) Remove front mount.

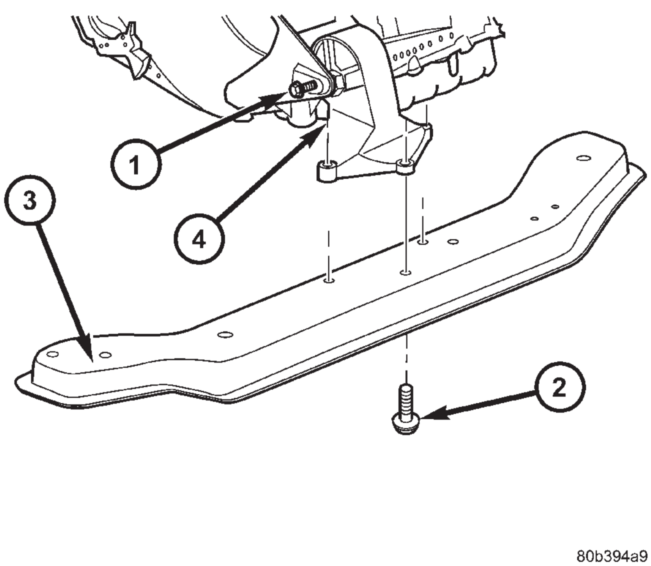


Fig. 86 FRONT ENGINE MOUNT

1 - HORIZONTAL THROUGH BOLT
2 - VERTICAL BOLT(S)
3 - LOWER RADIATOR CROSSMEMBER
4 - FRONT ENGINE MOUNT

INSTALLATION

(1) Position front mount on lower radiator crossmember.

(2) Loose install front mount to bracket through bolt.

(3) Install front mount vertical bolts. Tighten bolts to 61 N·m (45 ft. lbs.) (Fig. 77).

(4) Tighten horizontal through bolt to 61 N·m (45 ft. lbs.) (Fig. 77).

(5) Lower vehicle.

LUBRICATION

DESCRIPTION

The lubrication system is a full-flow filtration, pressure feed type. The oil pump body is mounted to the engine block. The pump inner rotor is driven by the crankshaft. A structural windage tray is used to increase power by minimizing oil windage at high engine RPM. An engine oil cooler is used on some models.

OPERATION

Oil from the oil pan is pumped by a geroter type oil pump directly coupled to the crankshaft (Fig. 87). Oil pressure is controlled by a relief valve mounted inside the oil pump housing. See (Fig. 87), (Fig. 88), and (Fig. 89) for engine oil lubrication circuits.

LUBRICATION (Continued)

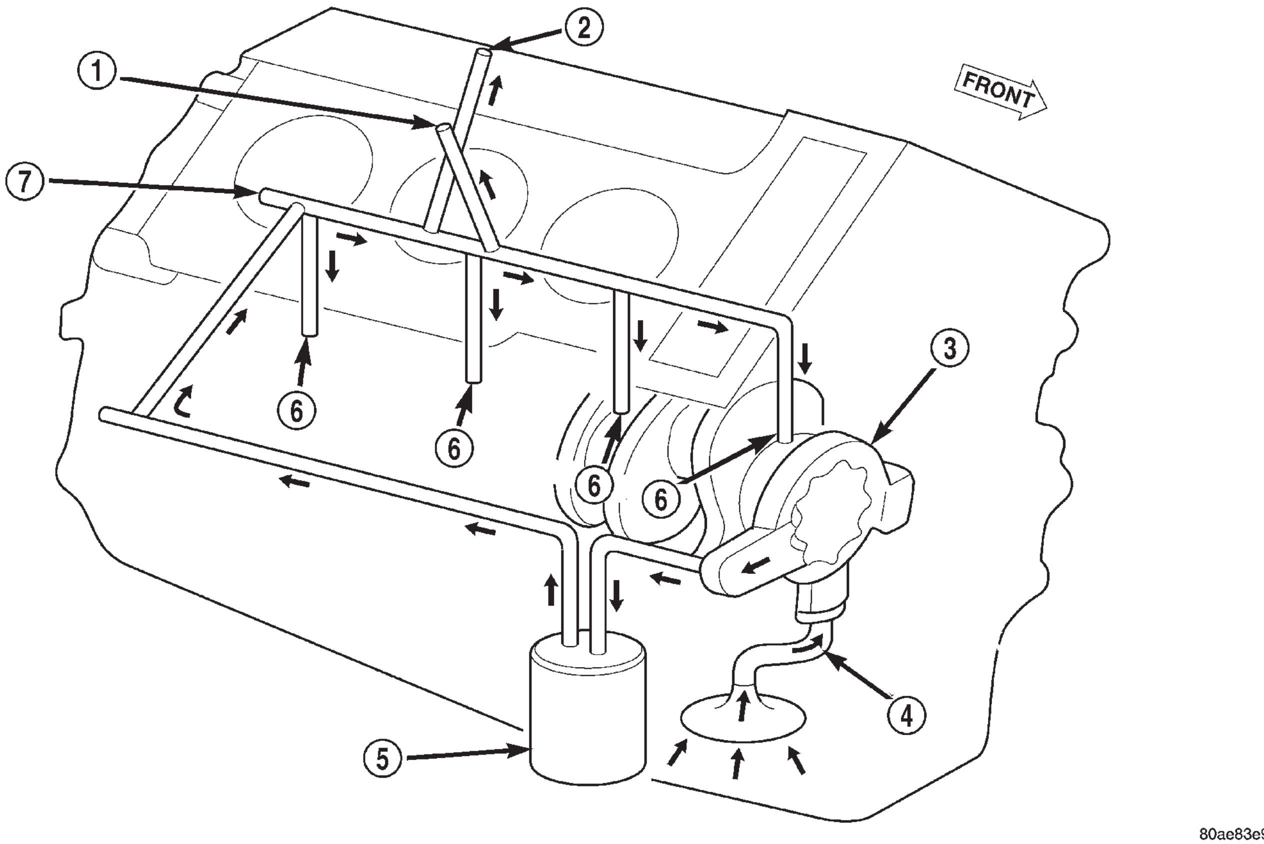


Fig. 87 Cylinder Block Oil Lubrication System

1 - TO RIGHT CYLINDER HEAD
2 - TO LEFT CYLINDER HEAD
3 - OIL PUMP
4 - OIL PICKUP TUBE
5 - OIL FILTER
6 - TO CRANKSHAFT MAIN JOURNALS
7 - MAIN OIL GALLERY

FROM:	TO:	FROM:	TO:
Oil Pump	Oil Filter Mounting (inlet)	Main Oil Gallery - Center of Block	1. Crankshaft Main Bearings
Oil Filter Mounting (inlet)	Oil Filter		2. Left Cylinder Head*
Oil Filter	Oil Filter Mounting (outlet)		3. Right Cylinder Head*
Oil Filter Mounting (outlet)	Oil Gallery - Right side of Block	Crankshaft Main Bearings	Connecting Rod Bearings
Oil Gallery - Right side of Block	Oil Gallery - Rear of Block and to Oil Cooler (some models)	Left Cylinder Head	Refer to 88
Oil Gallery - Rear of Block	Main Oil Gallery - Center of Block	Right Cylinder Head	Refer to 89
*The cylinder head gaskets have an oil restrictor to control oil flow to the cylinder heads.			

LUBRICATION (Continued)

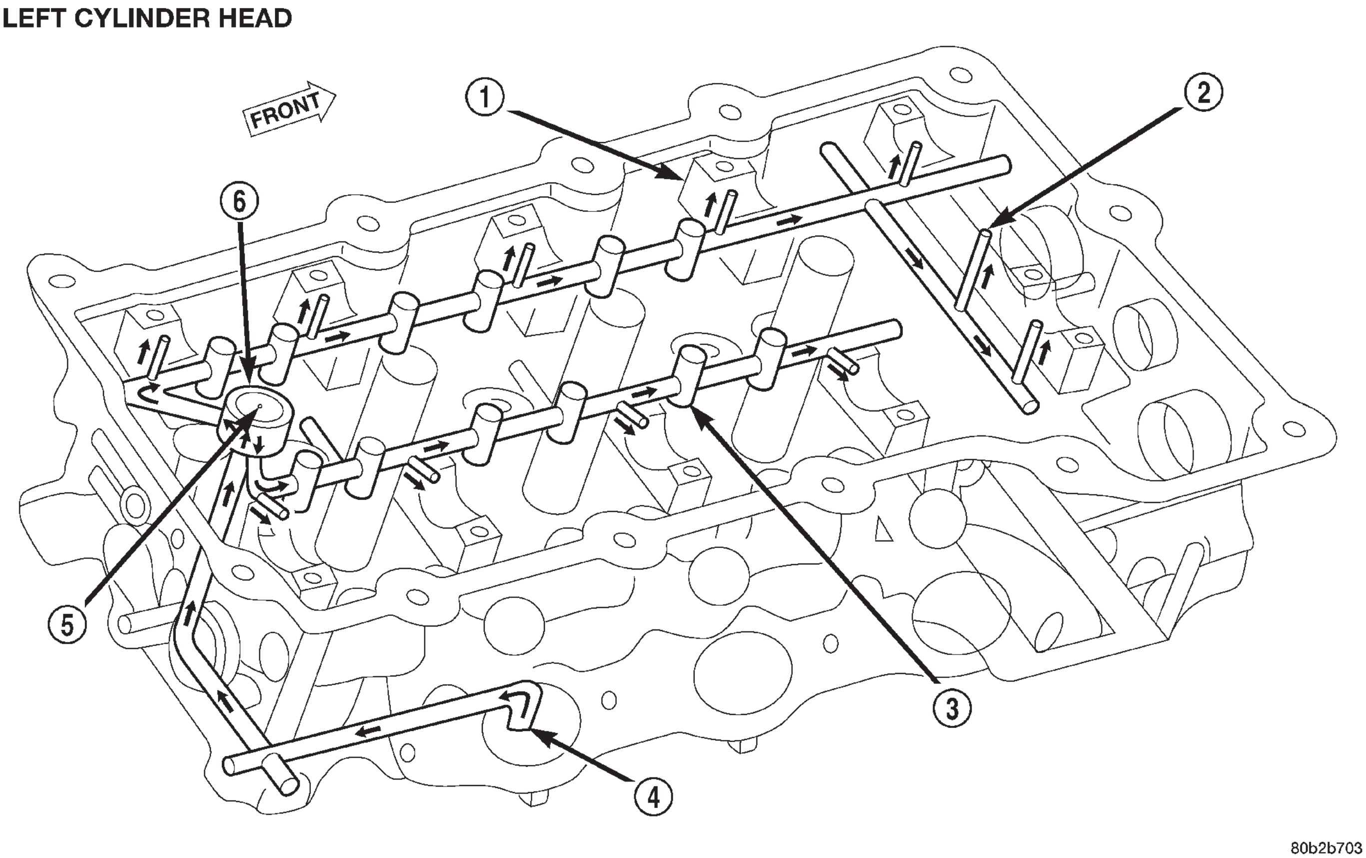


Fig. 88 Cylinder Head Oil Lubrication System - Left Side

1 - CAM JOURNALS
2 - OIL FEED TO CAMSHAFT (SECONDARY) CHAIN TENSIONER
3 - LASH ADJUSTER BORES
4 - OIL FEED FROM BLOCK
5 - VENT HOLE
6 - ACCUMULATOR

FROM:	TO:
Left Cylinder Head Oil Inlet Gallery (intake side of head)	Oil Gallery and Accumulator – Rear of Head*
Oil Gallery and Accumulator – Rear of Head*	1. Exhaust Camshaft Oil Passage 2. Intake Camshaft Oil Passage
Left Exhaust Camshaft Oil Passage	1. Left Exhaust Camshaft Journals 2. Hydraulic Valve Lash Adjusters and Rocker Arms 3. Left Camshaft (Secondary) Chain Tensioner**
Left Intake Camshaft Oil Passage	1. Left Intake Camshaft Journals 2. Hydraulic Valve Lash Adjusters and Rocker Arms
* When oil reaches the back of the cylinder head, the oil gallery feeds oil into an accumulator chamber that is located towards center of the head. The accumulator chamber is closed off with a pressed in core plug that has a small orifice to act as a vent. Oil then travels down at a 45 degree angle from the accumulator into two passages, one for the intake and one for the exhaust side of the cylinder head.	
** The secondary camshaft chain tensioner is the last component to receive oil on the left cylinder head.	

LUBRICATION (Continued)

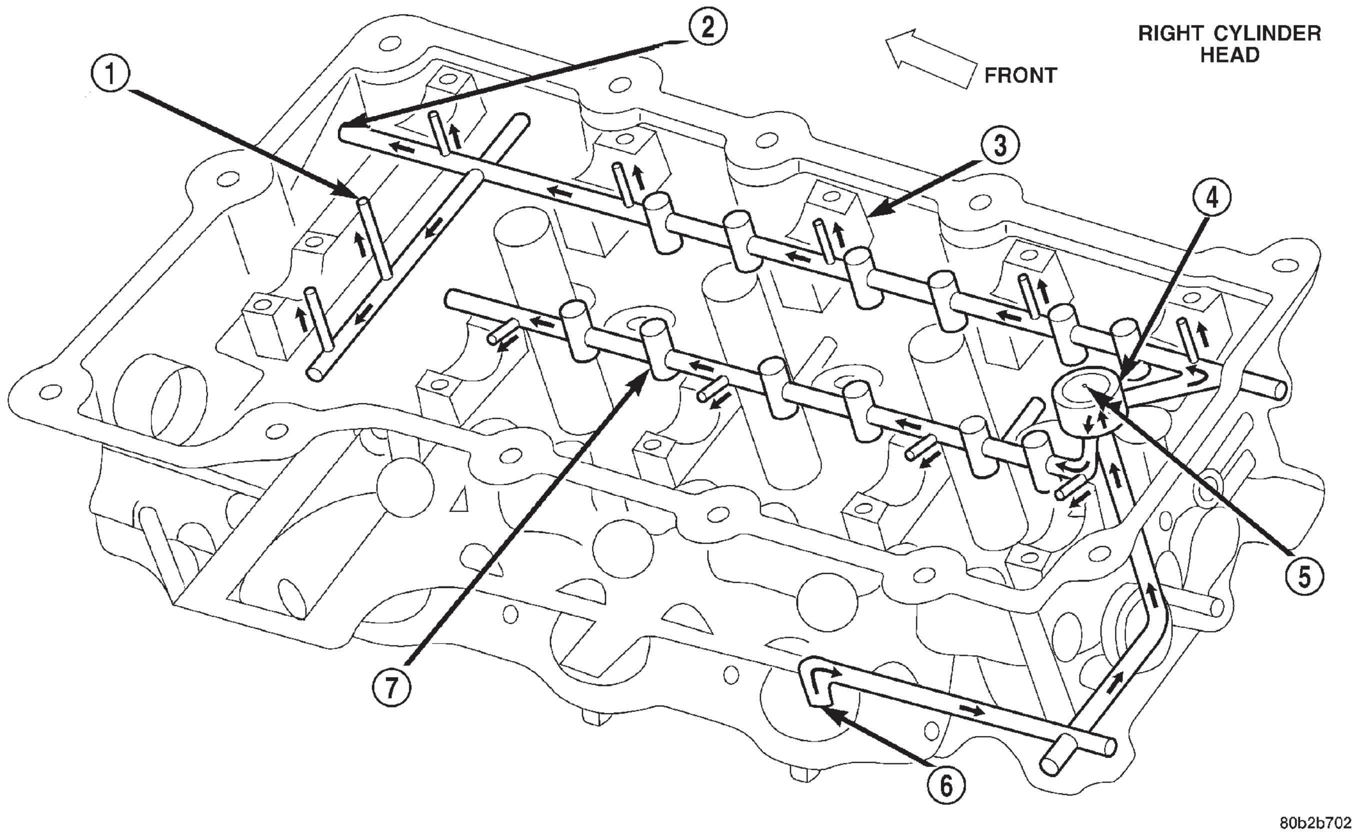


Fig. 89 Cylinder Head Oil Lubrication System - Right Side

1 - OIL FEED TO CAMSHAFT (SECONDARY) CHAIN TENSIONER
2 - OIL FEED TO TIMING CHAIN (PRIMARY) TENSIONER
3 - CAM JOURNALS
4 - ACCUMULATOR
5 - VENT HOLE
6 - OIL FEED FROM BLOCK
7 - LASH ADJUSTOR BORES

FROM:	TO:
Right Cylinder Head Oil Inlet Gallery (intake side of head)	Oil Gallery and Accumulator – Rear of Head*
Oil Gallery and Accumulator – Rear of Head*	1. Exhaust Camshaft Oil Passage 2. Intake Camshaft Oil Passage
Right Exhaust Camshaft Oil Passage	1. Right Exhaust Camshaft Journals 2. Hydraulic Valve Lash Adjusters and Rocker Arms 3. Right Camshaft (Secondary) Chain Tensioner 4. Primary Timing Chain Tensioner - Right Head**
Right Intake Camshaft Oil Passage	1. Right Intake Camshaft Journals 2. Hydraulic Valve Lash Adjusters and Rocker Arms
* When oil reaches the back of the cylinder head, the oil gallery feeds oil into an accumulator chamber that is located towards center of the head. The accumulator chamber is closed off with a pressed in core plug that has a small orifice to act as a vent. Oil then travels down at a 45 degree angle from the accumulator into two passages, one for the intake and one for the exhaust side of the cylinder head.	
** The timing (primary) chain tensioner is the last component to receive oil on the right cylinder head.	

LUBRICATION (Continued)

DIAGNOSIS AND TESTING - CHECKING ENGINE OIL PRESSURE

(1) Remove the oil pressure switch. (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE SENSOR/SWITCH - REMOVAL)

(2) Install oil pressure test gauge assembly, Special Tools C-3292 with 8406 adaptor.

(3) Start engine and monitor gauge readings.

CAUTION: If oil pressure is 0 at idle, Do Not Run engine at 3000 RPM

(4) Oil Pressure (engine at operating temperature): **Curb Idle** 34.5 kPa (5 psi) minimum **3000 RPM** 300–724 kPa (45–105 psi).

(5) If oil pressure is 0 at idle. Shut off engine, check for pressure relief valve stuck open or a clogged oil pickup screen.

(6) Install oil pressure switch after testing is completed. (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE SENSOR/SWITCH - INSTALLATION)

OIL

DESCRIPTION

For engine oil type and capacity (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION - ENGINE OIL)

STANDARD PROCEDURE

STANDARD PROCEDURE - ENGINE OIL AND FILTER CHANGE

WARNING: NEW OR USED ENGINE OIL CAN BE IRRITATING TO THE SKIN. AVOID PROLONGED OR REPEATED SKIN CONTACT WITH ENGINE OIL. CONTAMINANTS IN USED ENGINE OIL, CAUSED BY INTERNAL COMBUSTION, CAN BE HAZARDOUS TO YOUR HEALTH. THOROUGHLY WASH EXPOSED SKIN WITH SOAP AND WATER. DO NOT WASH SKIN WITH GASOLINE, DIESEL FUEL, THINNER, OR SOLVENTS, HEALTH PROBLEMS CAN RESULT. DO NOT POLLUTE, DISPOSE OF USED ENGINE OIL PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA.

Change engine oil and filter at mileage and time intervals described in the Maintenance Schedule. (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION)

TO CHANGE ENGINE OIL

(1) Run engine until achieving normal operating temperature.

(2) Position the vehicle on a level surface and turn engine off.

(3) Hoist and support vehicle on safety stands. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(4) Remove oil fill cap (Fig. 90).

(5) Place a suitable drain pan under crankcase drain.

(6) Remove drain plug from crankcase and allow oil to drain into pan. Inspect drain plug threads for stretching or other damage. Replace drain plug and gasket if damaged.

(7) Remove oil filter. Refer to (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - REMOVAL)

(8) Install drain plug in crankcase.

(9) Install new oil filter. Refer to (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - INSTALLATION)

(10) Lower vehicle and fill crankcase with specified type and amount of engine oil, (Fig. 90). (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION - ENGINE OIL) (Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS)

(11) Install oil fill cap.

(12) Start engine and inspect for leaks.

(13) Stop engine and inspect oil level.

OIL FILTER SPECIFICATION

All engines are equipped with a high quality full-flow, disposable type oil filter. When replacing oil filter, use a Mopar® filter or equivalent.

USED ENGINE OIL DISPOSAL

Care should be exercised when disposing used engine oil after it has been drained from a vehicle engine. Refer to the WARNING listed above.

STANDARD PROCEDURE - ENGINE OIL LEVEL CHECK

The best time to check engine oil level is after it has sat overnight, or if the engine has been running, allow the engine to be shut off for at least 5 minutes before checking oil level.

Checking the oil while the vehicle is on level ground will improve the accuracy of the oil level reading (Fig. 90). Add only when the level is at or below the ADD mark.

OIL (Continued)

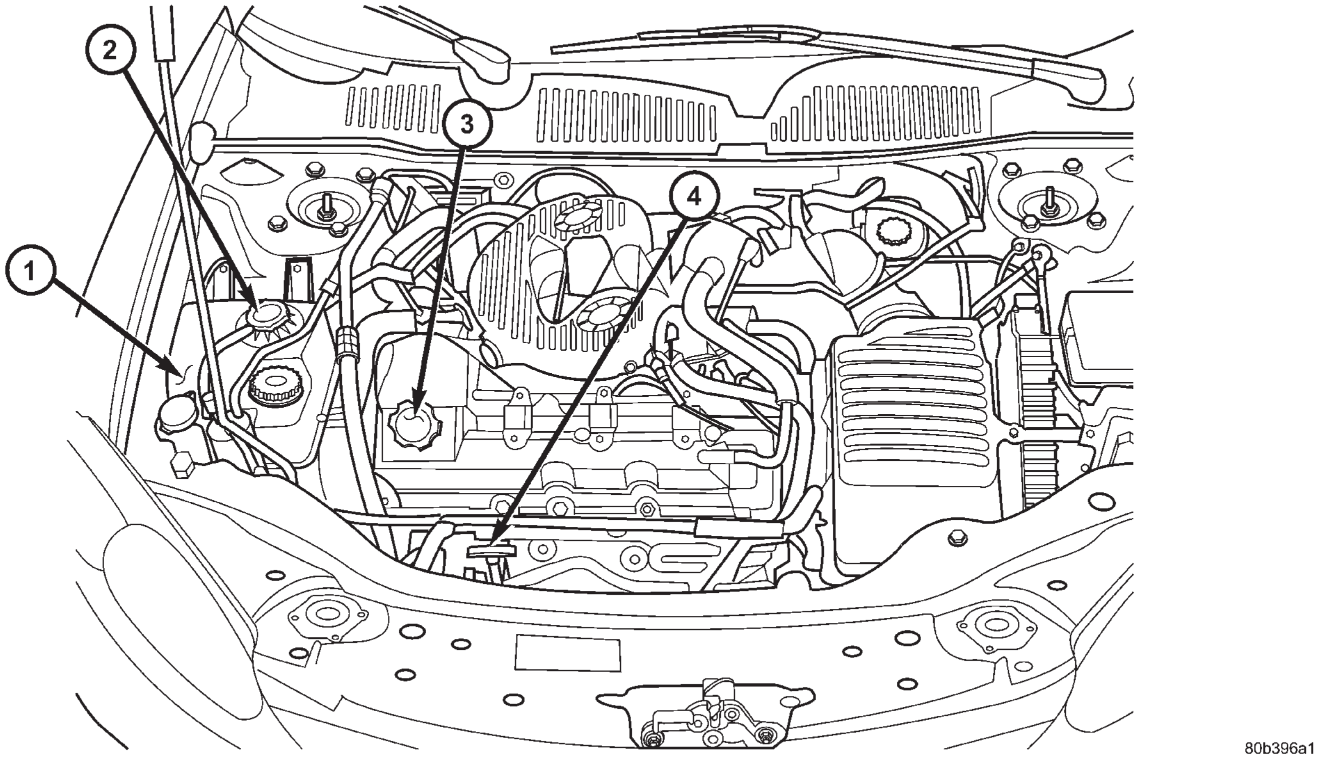


Fig. 90 Fluid Level Check - 2.7L

1 - COOLANT PRESSURE CONTAINER
2 - COOLANT PRESSURE CAP
3 - ENGINE OIL FILL
4 - ENGINE OIL DIPSTICK

OIL FILTER

REMOVAL

(1) Raise vehicle on hoist.

(2) Position a suitable collecting container under oil filter location (Fig. 91).

(3) Remove oil filter using a suitable oil filter wrench (Fig. 91). Dispose of oil filter following enviromental guidelines.

INSTALLATION

(1) Wipe filter base clean, then inspect gasket sealing surface.

(2) Lubricate gasket of new filter with clean engine oil.

(3) Install oil filter (Fig. 91) and tighten to 16 N·m (12 ft. lbs.) of torque after gasket contacts base. Use filter wrench if necessary.

(4) Fill crankcase with proper engine oil to correct level if drained. Start engine and check for leaks.

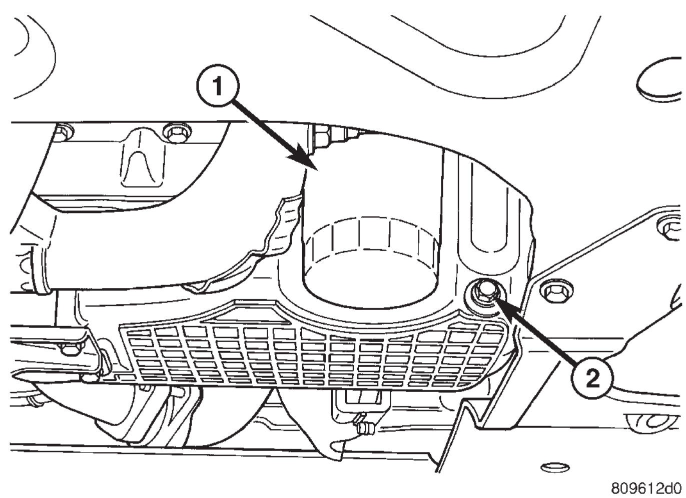


Fig. 91 Engine Oil Filter

1 - OIL FILTER
2 - OIL DRAIN PLUG

OIL PAN

REMOVAL

(1) Disconnect negative battery cable.
(2) Remove engine oil dipstick and tube.
(3) Raise vehicle on hoist.
(4) Drain engine oil and remove oil filter.
(5) Remove structural collar (Fig. 92) (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - REMOVAL).

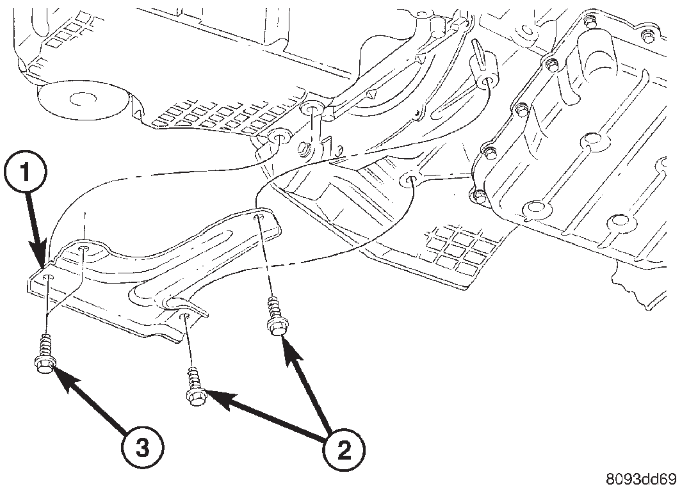


Fig. 92 Structural Collar (Note: cross-under pipe not shown)

1 - STRUCTURAL COLLAR
2 - BOLT (2) - COLLAR TO TRANSAXLE
3 - BOLT (2) - COLLAR TO OIL PAN

(6) Remove exhaust cross-under pipe (Refer to 11 - EXHAUST SYSTEM/CROSS-OVER PIPE - REMOVAL).
(7) Remove torque converter housing cover.
(8) Remove lower bolt attaching the A/C compressor to oil pan.

CAUTION: Assure removal of the two bolts attaching the timing cover to the oil pan, as damage to the timing cover and/or oil pan may occur.

(9) Remove oil pan attaching fasteners. Remove oil pan and gasket (Fig. 93).

INSTALLATION

(1) Clean oil pan and sealing surfaces. Inspect oil pan and timing chain cover gaskets. Replace as necessary.
(2) Apply an 1/8 inch bead of Mopar® Engine RTV GEN II to the front T-joints (oil pan gasket to timing cover gasket interface) and the rear T-joints (oil pan gasket to crankshaft rear oil seal retainer gasket interface) (Fig. 93).

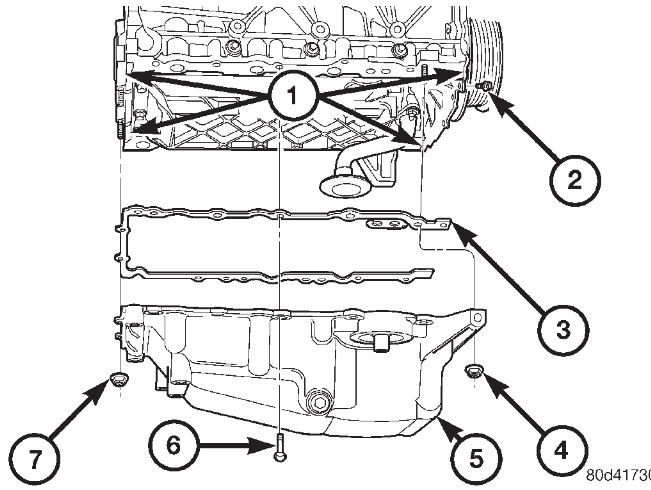


Fig. 93 Oil Pan and Sealing

1 - SEALER LOCATION
2 - BOLT-M6
3 - GASKET
4 - NUT-M6
5 - OIL PAN
6 - BOLT-M8
7 - NUT-M6

(3) Install oil pan gasket to block.

NOTE: To prevent oil leaks at oil pan to timing chain cover, the following tightening sequence procedure must be performed.

(4) Install oil pan and fasteners (Fig. 93) using the following tightening sequence:
(a) Install oil pan bolts and nuts **finger tight only—just tight enough to compress the gasket's rubber seal**.
(b) Install timing chain cover to pan bolts and tighten to 12 N·m (105 in. lbs.).
(c) Tighten oil pan bolts to 28 N·m (250 in. lbs.).
(d) Tighten oil pan nuts to 12 N·m (105 in. lbs.).
(5) Install lower bolt attaching the A/C compressor to oil pan. Tighten bolt to 28 N·m (21 ft. lbs.).
(6) Install torque converter housing cover.
(7) Install oil filter and drain plug.
(8) Install exhaust cross-under pipe(Refer to 11 - EXHAUST SYSTEM/CROSS-OVER PIPE - INSTALLATION).
(9) Install structural collar (Fig. 92)(Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - INSTALLATION).
(10) Lower vehicle.
(11) Install engine oil dipstick and tube.
(12) Fill engine crankcase with proper oil to correct level.
(13) Connect negative battery cable.

OIL PRESSURE RELIEF VALVE

REMOVAL

(1) Remove the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)

(2) Remove the pressure relief valve by remove the threaded retaining cap from the oil pump housing.

CAUTION: Oil pump pressure relief valve must be installed as shown in (Fig. 94) or engine damage may occur.

(3) Remove spring and relief valve (Fig. 94).

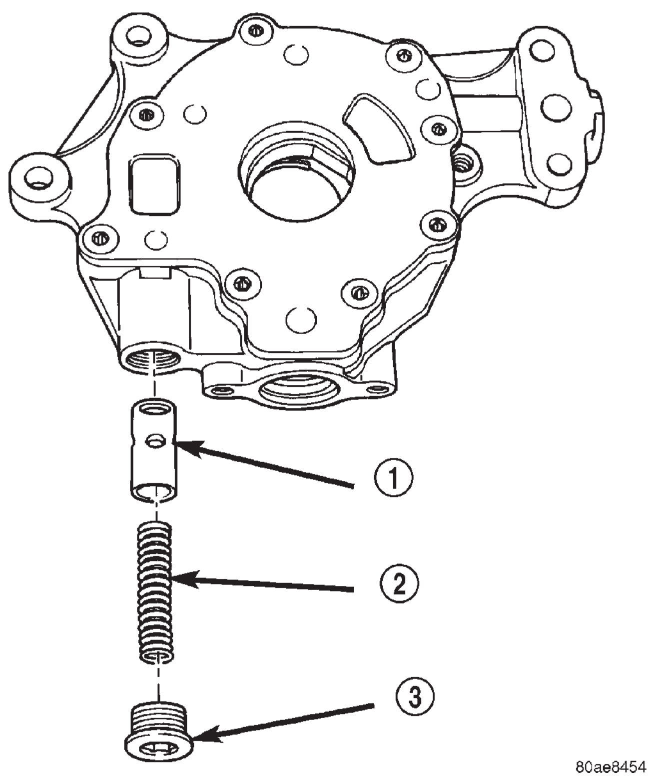


Fig. 94 Oil Pressure Relief Valve

1 - RELIEF VALVE
2 - SPRING
3 - RETAINER CAP

INSTALLATION

(1) Lubricate relief valve with oil.

CAUTION: The pressure relief valve must be installed as shown in (Fig. 94), or engine damage may occur.

(2) Install relief valve, spring and retainer cap (Fig. 94). Tighten cap to 12 N·m (105 in. lbs.).

(3) Install the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

OIL PRESSURE SWITCH

DESCRIPTION

The engine oil pressure switch is located on the right side of the engine block. The switch screws into the engine main oil gallery. The normally closed switch provides an input through a single wire to the low pressure indicator light on the instrument cluster.

REMOVAL

(1) Raise vehicle on hoist.

(2) Remove heat shield that covers oil pressure switch.

(3) Disconnect oil pressure switch electrical connector.

(4) Position an oil collecting container under switch location.

(5) Remove switch by unscrewing from the engine block.

INSTALLATION

(1) Apply Mopar® Thread Sealant to the switch threads.

(2) Install oil pressure switch.

(3) Connect electrical connector.

(4) Install oil pressure switch heat shield.

(5) Lower vehicle.

(6) Start engine and check for leaks.

(7) Check engine oil level and adjust as neccessary.

OIL PUMP

REMOVAL

The oil pump pressure relief valve can be serviced by removing the oil pan.

(1) Remove crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL)

(2) Remove timing chain cover. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)

(3) Remove timing chain and sprockets. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(4) Remove oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)

(5) Remove oil pick-up tube and O-ring (Fig. 96).

(6) Ensure that crankshaft position is at 60° ATDC of No.1 cylinder, or crankshaft sprocket mark aligns with mark on oil pump (Fig. 95). This position will properly locate oil pump upon installation.

(7) Remove oil pump attaching bolts (Fig. 96).

(8) Remove oil pump.

OIL PUMP (Continued)

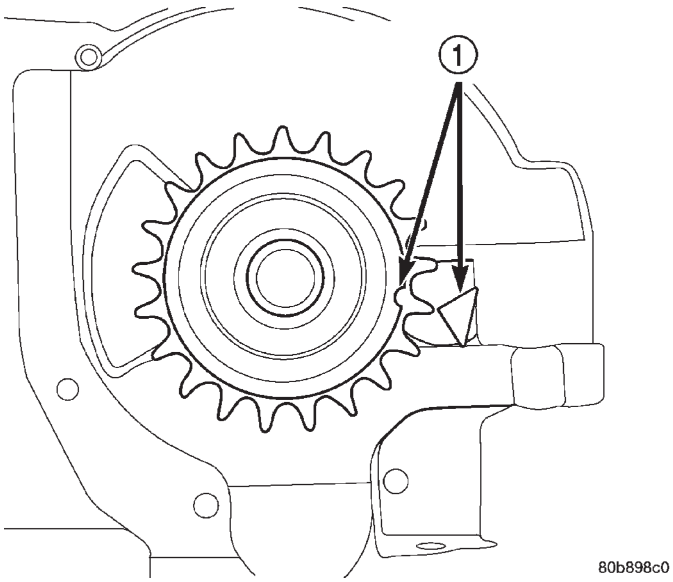


Fig. 95 Crankshaft Positioned At 60 DEGREES ATDC No.1 Cylinder

1 - CRANKSHAFT POSITION = 60° ATDC NO. 1 CYLINDER

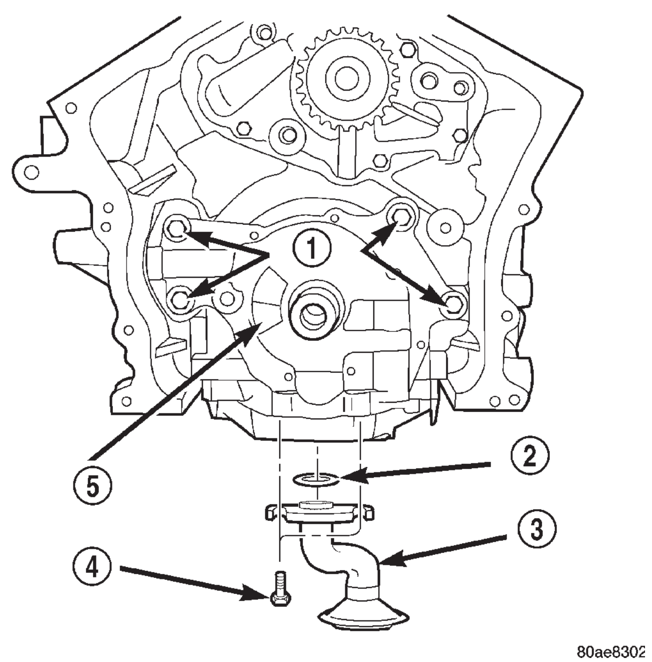


Fig. 96 Oil Pump and Pick-up Tube

1 - BOLTS
2 - O-RING
3 - PICK-UP TUBE
4 - BOLT
5 - OIL PUMP

DISASSEMBLY

(1) Remove the pressure relief valve by remove the threaded retaining cap from the oil pump housing.

CAUTION: Oil pump pressure relief valve must be installed as shown in (Fig. 97) or engine damage may occur.

(2) Remove spring and relief valve.

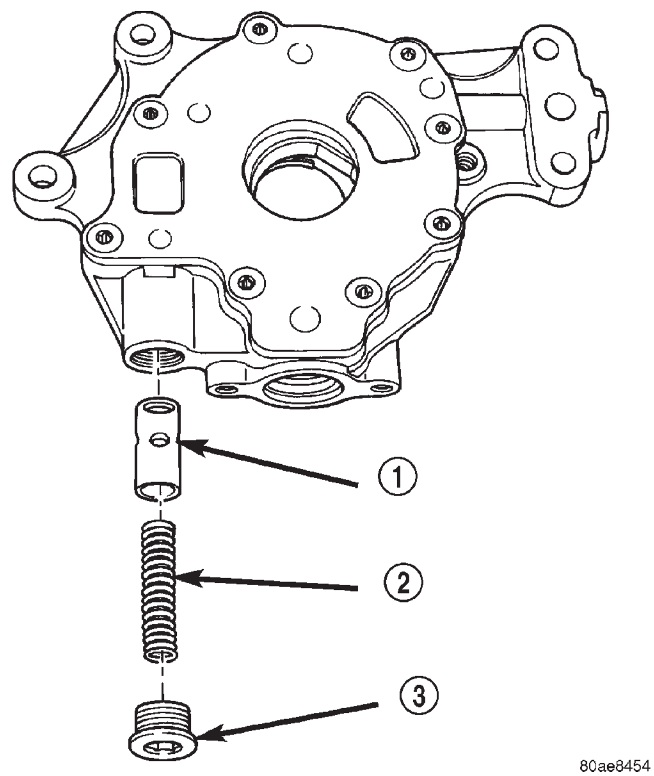


Fig. 97 Oil Pressure Relief Valve

1 - RELIEF VALVE
2 - SPRING
3 - RETAINER CAP

(3) Remove oil pump cover screws and lift off cover plate (Fig. 98).

(4) Remove pump rotors.

(5) Wash all parts in a suitable solvent.

(6) Inspect components carefully for damage or wear. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSPECTION)

CLEANING

(1) Clean all parts thoroughly in a suitable solvent.

INSPECTION

(1) Disassemble the oil pump. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - DISASSEMBLY)

OIL PUMP (Continued)

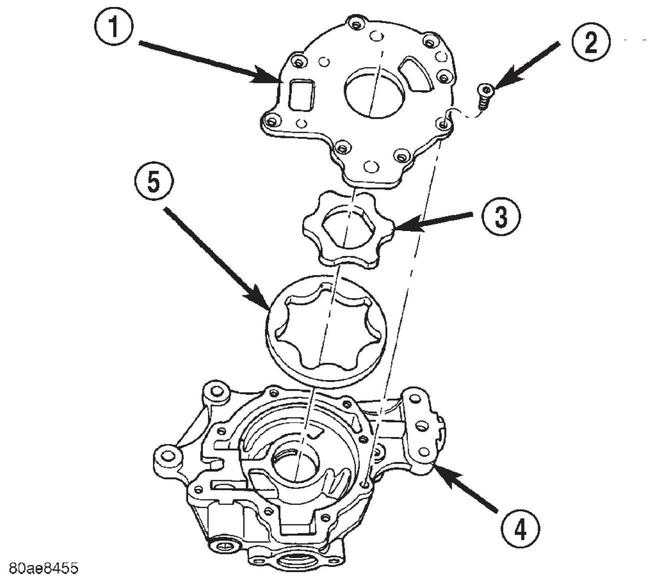


Fig. 98 Oil Pump

1 - OIL PUMP COVER
2 - SCREWS (8)
3 - OIL PUMP INNER ROTOR
4 - OIL PUMP HOUSING
5 - OIL PUMP OUTER ROTOR

(2) Clean all oil pump components. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - CLEANING)

(3) Inspect mating surface of the oil pump housing and cover. Replace oil pump if deeply scratched or grooved (minor surface scratches and polishing is normal).

(4) Lay a straightedge across the pump cover surface (Fig. 99). If a 0.025 mm (0.001 in.) feeler gauge can be inserted between cover and straight edge, cover should be replaced.

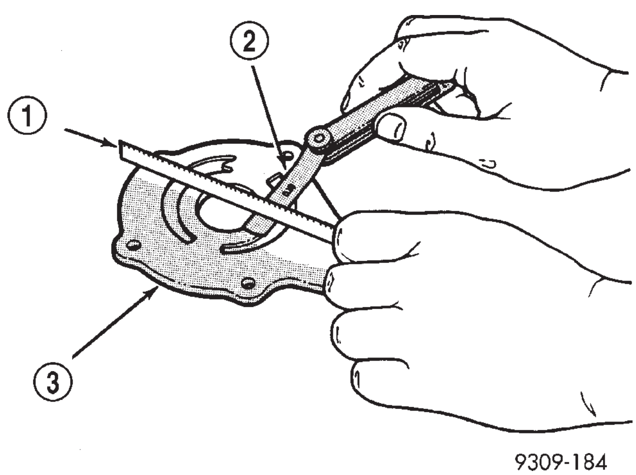


Fig. 99 CHECKING OIL PUMP COVER FLATNESS - TYPICAL

1 - STRAIGHT EDGE
2 - FEELER GAUGE
3 - OIL PUMP COVER

(5) Measure thickness and diameter of outer rotor. If outer rotor thickness measures 9.474 mm (0.373 in.) or less (Fig. 100), or if the diameter is 89.174 mm (3.5108 in.) or less, replace outer rotor.

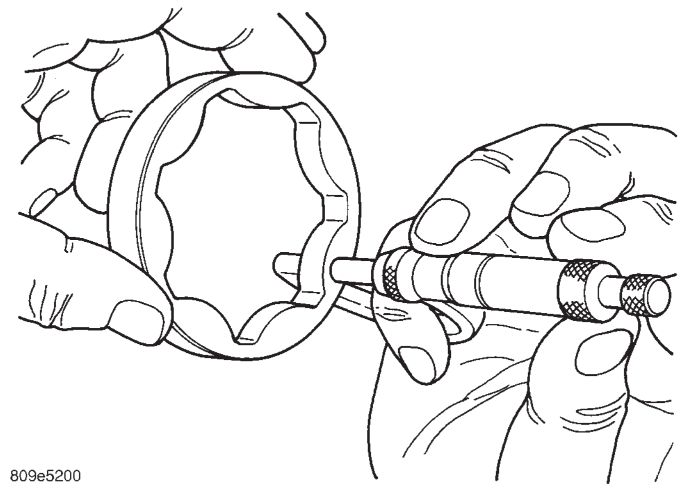


Fig. 100 MEASURING OUTER ROTOR THICKNESS

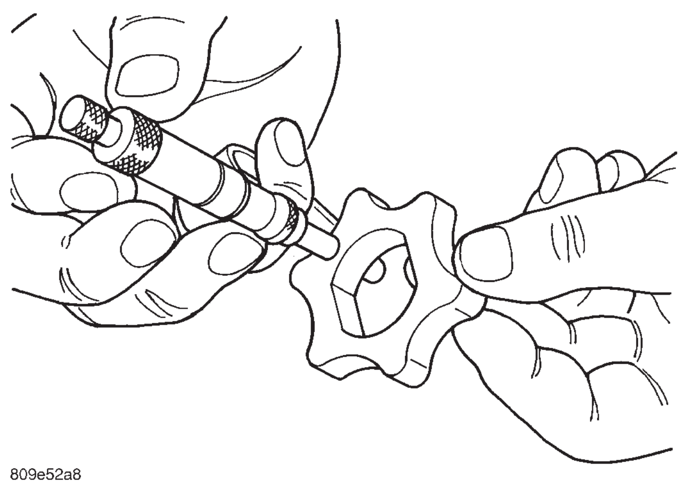


Fig. 101 MEASURING INNER ROTOR THICKNESS

(6) If inner rotor measures 9.474 mm (0.373 in.) or less replace inner rotor (Fig. 101).

(7) Slide outer rotor into body, press to one side with fingers and measure clearance between rotor and body (Fig. 102). If measurement is 0.39 mm (0.015 in.) or more, replace body only if outer rotor is in specifications.

(8) Install inner rotor into body. If clearance between inner and outer rotors (Fig. 103) is 0.20 mm (0.008 in.) or more, replace both rotors.

(9) Place a straightedge across the face of the body, between bolt holes. If a feeler gauge of 0.077 mm (0.003 in.) or more can be inserted between rotors and the straightedge, replace pump assembly (Fig. 104) **ONLY** if rotors are in specification.

OIL PUMP (Continued)

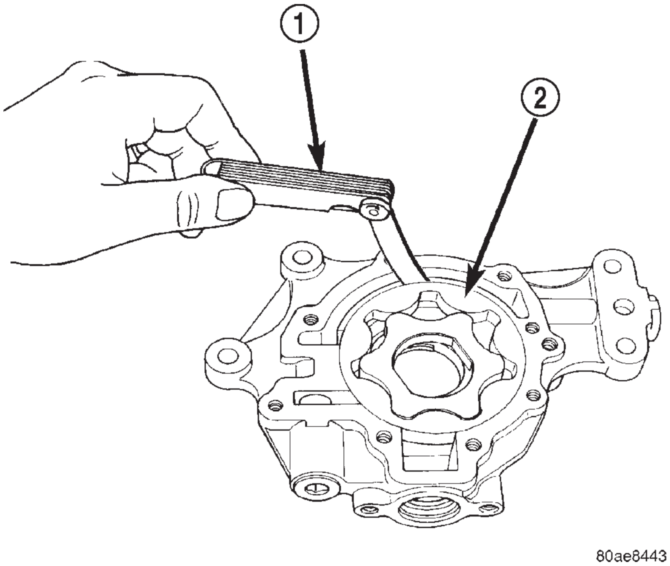


Fig. 102 MEASURING OUTER ROTOR CLEARANCE IN HOUSING

1 - FEELER GAUGE
2 - OUTER ROTOR

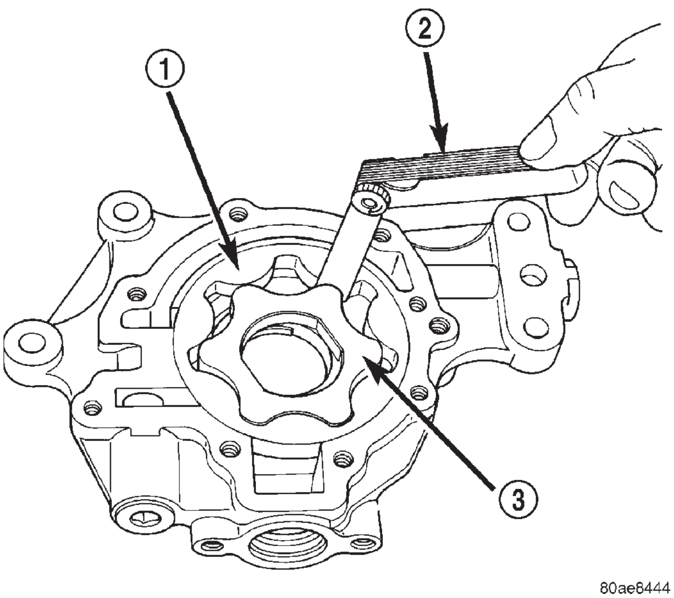


Fig. 103 MEASURING CLEARANCE BETWEEN ROTORS

1 - OUTER ROTOR
2 - FEELER GAUGE
3 - INNER ROTOR

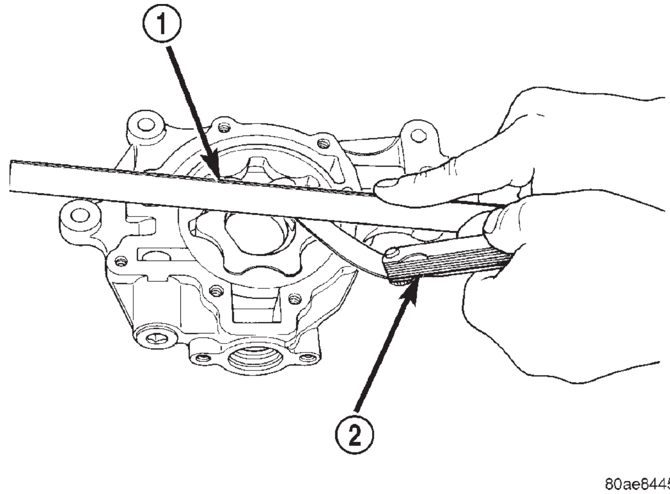


Fig. 104 MEASURING CLEARANCE OVER ROTORS

1 - STRAIGHT EDGE
2 - FEELER GAUGE

(10) Inspect oil pressure relief valve plunger for scoring and free operation in its bore. Small marks may be removed with 400-grit wet or dry sandpaper.

(11) The relief valve spring has a free length of approximately 49.5 mm (1.95 in.) it should test between 23 – 25 pounds when compressed to 34 mm (1.34 in.). Replace spring that fails to meet specifications.

(12) Assemble oil pump. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - ASSEMBLY)

ASSEMBLY

(1) Assemble pump using new parts as required.

(2) Tighten cover screws to 12 N·m (105 in. lbs.) (Fig. 98).

(3) Tighten oil pressure relief valve retaining cap to 12 N·m (105 in. lbs.) (Fig. 97).

(4) Prime oil pump before installation by filling rotor cavity with engine oil.

INSTALLATION

CAUTION: Crankshaft position must be at 60° ATDC of No.1 cylinder before installing oil pump (Fig. 95). This position will properly locate oil pump. If not properly located, severe damage to oil pump can occur.

(1) Prime oil pump before installation by filling rotor cavity with engine oil.

(2) If crankshaft has been rotated, it must be repositioned to 60° ATDC of No.1 cylinder prior to oil pump installation (Fig. 95).

(3) Install oil pump carefully over crankshaft and into position.

OIL PUMP (Continued)

(4) Install oil pump attaching bolts. Tighten bolts to 28 N·m (250 in. lbs.) (Fig. 96).

(5) Install oil pick-up tube with new O-ring. Lubricate O-ring before installation. Tighten attaching bolts to 28 N·m (250 in. lbs.) (Fig. 96).

(6) Install oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

(7) Install timing chain and sprockets. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

(8) Install timing chain cover. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)

(9) Install crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

(10) Fill crankcase with engine oil to correct level.

INTAKE MANIFOLD

DESCRIPTION

The two piece intake manifold is made of a composite material. The intake manifold features a compact, low rumble design that maximizes engine performance while minimizing induction noise.

DIAGNOSIS AND TESTING - INTAKE MANIFOLD LEAKS

An intake manifold air leak is characterized by lower than normal manifold vacuum. Also, one or more cylinders may not be functioning.

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR THE FAN. DO NOT WEAR LOOSE CLOTHING.

(1) Start the engine.

(2) Spray a small stream of water (Spray Bottle) at the suspected leak area.

(3) If engine RPM'S change, the area of the suspected leak has been found.

(4) Repair as required.

STANDARD PROCEDURE - INTAKE MANIFOLD VACUUM PORT REPAIR

The composite intake manifold vacuum ports can be repaired. Although, if the manifold plenum chamber is damaged or cracked, the manifold must be replaced.

To repair a broken or damaged vacuum nipple (port) on the composite intake manifold, perform the following procedure:

PARTS REQUIRED	TOOLS REQUIRED
Brass Nipple – 3/8″ O.D. x 1/4″ pipe thread (Speed Control Port)	Pipe Tap – 1/4″ - 18 NPT
Brass Nibble – 1/2″ O.D. x 1/4″ pipe thread (Brake Booster Port)	Drill Bit – 7/16″
	File/Sand Paper

NOTE: While performing this procedure, avoid getting the manifold material residue into the plenum chamber.

(1) File or sand the remaining port back until a flat surface is obtained (plane normal to nipple (port) axis).

(2) Drill out the nipple (port) base using a 7/16" drill bit (Fig. 105).

(3) Using a 1/4"–18 NPT pipe tap, cut internal threads (Fig. 105). Use caution to start tap in a axis same as original nipple.

(4) Apply Mopar® Thread Sealant to threads of repair nipple(s).

(5) Install repair nipple(s). Do not over torque repair nipple(s).

INTAKE MANIFOLD (Continued)

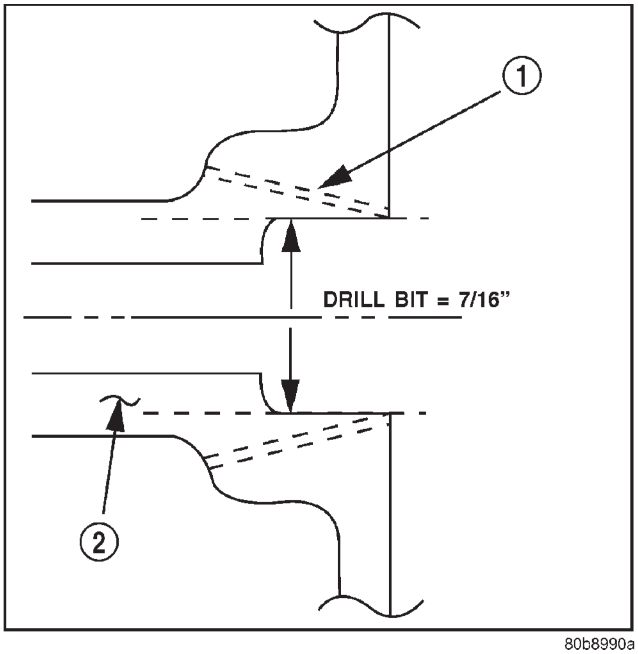


Fig. 105 MANIFOLD PORT (NIPPLE) REPAIR

1 - 1/4” — 18NPT PIPE TAP
2 - NIPPLE (PORT)

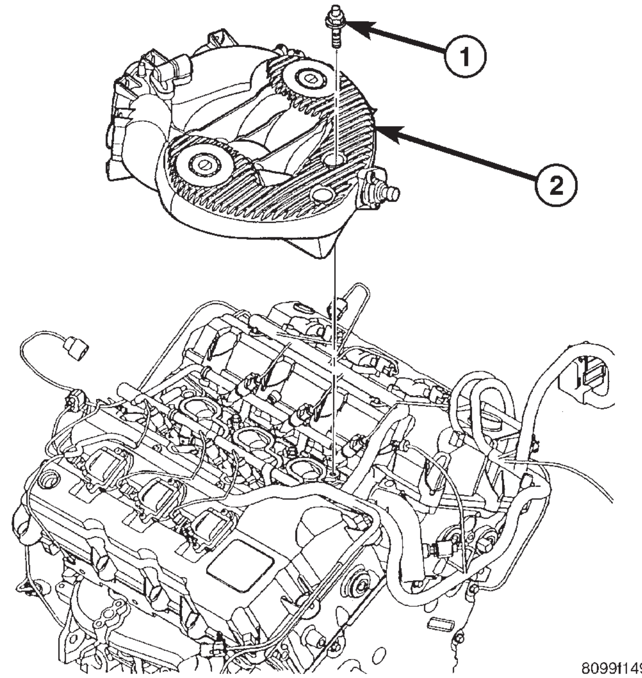


Fig. 106 INTAKE MANIFOLD - UPPER

1 - BOLT
2 - INTAKE MANIFOLD - UPPER

REMOVAL

REMOVAL - INTAKE MANIFOLD UPPER

(1) Disconnect negative battery cable.

(2) Remove throttle body air inlet hose and air cleaner housing assembly.

(3) Remove throttle cable shield. Remove throttle and speed control cables from throttle arm and bracket.

(4) Remove throttle cable bracket.

(5) Disconnect electrical connectors from the following components:

- Manifold Absolute Pressure (MAP) Sensor
- Throttle Position Sensor (TPS) Sensor
- Idle Air Control (IAC) Motor

(6) Disconnect Vapor Purge hose, Brake Booster hose, Speed Control Servo, Positive Crankcase Ventilation (PCV) hose.

(7) Loosen upper fastener at throttle body support bracket.

(8) Remove manifold attaching bolts (Fig. 107).

(9) Remove upper manifold (Fig. 106).

(10) Inspect manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSPECTION)

REMOVAL - INTAKE MANIFOLD LOWER

(1) Release fuel system pressure. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

(2) Remove upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

(3) Disconnect electrical connectors from the fuel injectors.

(4) Remove fuel supply hose from fuel rail. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL LINES - STANDARD PROCEDURE)

(5) Remove screw attaching fuel rail support bracket to the throttle body support bracket.

(6) Remove bolts attaching fuel rail.

(7) Remove fuel rail and injectors as an assembly.

(8) Remove manifold attaching bolts (Fig. 108).

(9) Remove lower manifold.

(10) Inspect manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSPECTION)

INTAKE MANIFOLD (Continued)

INSPECTION

INSPECTION - INTAKE MANIFOLD UPPER

Check manifold for:

- Damage and cracks
- Gasket surface damage or warpage
- Damaged or clogged EGR ports

If the manifold exihibits any damaged or warped conditions, replace the manifold. Clean EGR ports as neccessary.

If a vacuum port is damaged, a repair procedure can be performed (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - STANDARD PROCEDURE).

INSPECTION - INTAKE MANIFOLD LOWER

Check manifold for:

- Damage and cracks
- Gasket surface damage or warpage
- Damaged fuel injector ports

If the manifold exihibits any of these conditions, replace the manifold.

INSTALLATION

INSTALLATION - INTAKE MANIFOLD UPPER

(1) Clean and inspect sealing surfaces. Gaskets can be reused, if free of cuts or tears.

NOTE: Make sure fuel injectors and wiring harnesses are in correct position to not interfere with upper manifold installation.

(2) Position upper manifold onto lower manifold (Fig. 106).

(3) Install manifold attaching bolts and tighten in sequence shown in (Fig. 107) to 12 N·m (105 in. lbs.).

(4) Tighten upper fastener at throttle body support bracket.

(5) Connect speed control servo, PCV , brake booster, and vapor purge hoses.

(6) Connect electrical connectors to the following components:

- Manifold Absolute Pressure (MAP) Sensor
- Throttle Position Sensor (TPS) Sensor
- Idle Air Control (IAC) Motor

(7) Install throttle cable bracket.

(8) Connect throttle and speed control cables to bracket and throttle arm. Install throttle cable shield.

(9) Install throttle body air inlet hose and air cleaner housing assembly.

(10) Connect negative battery cable.

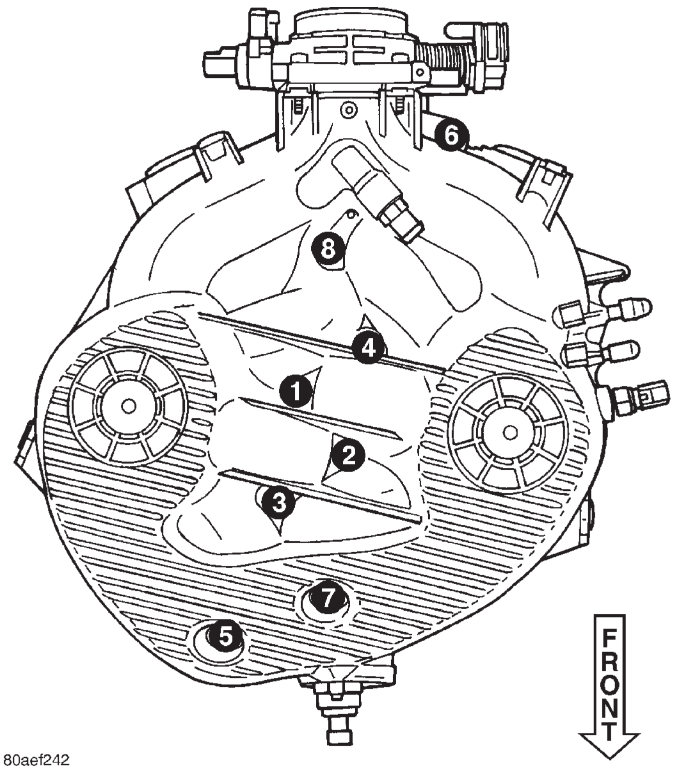


Fig. 107 Upper Intake Manifold Tightening Sequence

INSTALLATION - INTAKE MANIFOLD LOWER

(1) Clean and inspect sealing surfaces of cylinder head and manifold. Gaskets can be reused provided they are free of cuts or tears.

(2) Position manifold on cylinder head surfaces.

NOTE: For ease of installing upper intake manifold, install a bolt 2 – 3 turns to the rearmost attaching hole of intake. This will properly position lower manifold.

(3) Install fuel rail with injectors.

(4) Install manifold attaching bolts and tighten in sequence shown in (Fig. 108) to 12 N·m (105 in. lbs.). Remove bolt used for aligning manifold.

(5) Connect the fuel injector electrical connectors.

NOTE: Make sure fuel injectors are located in the correct location and position, as upper intake manifold interference could occur.

(6) Install screw attaching fuel rail support bracket to the throttle body support bracket.

(7) Connect fuel supply hose to fuel rail. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL LINES - STANDARD PROCEDURE)

(8) Install upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

INTAKE MANIFOLD (Continued)

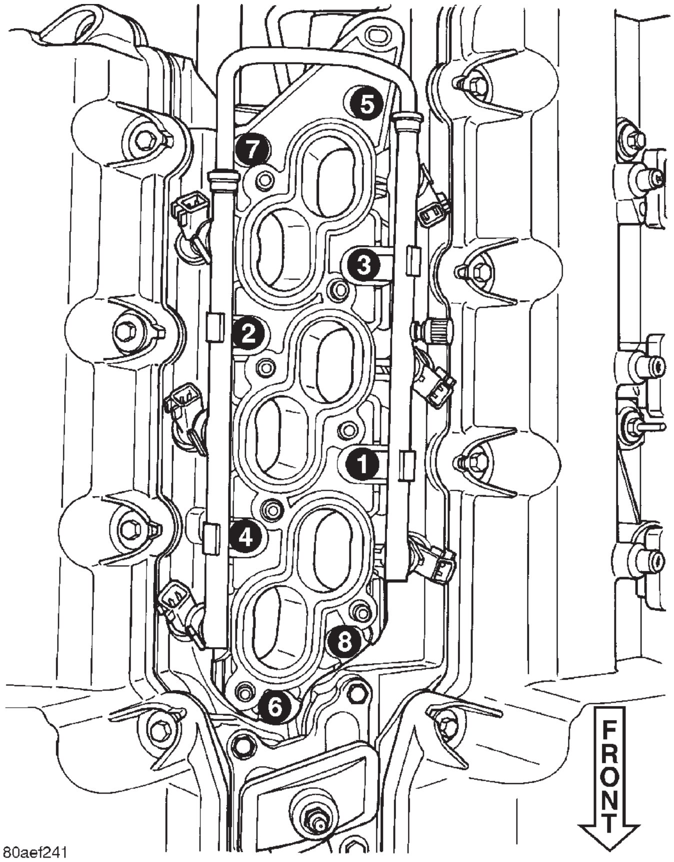


Fig. 108 Lower Intake Manifold Tightening Sequence

EXHAUST MANIFOLD

DESCRIPTION

The exhaust manifolds are made of cast nodular iron. The outlets are designed for attachment of catalytic converters.

REMOVAL

FRONT EXHAUST MANIFOLD

(1) Disconnect negative battery cable.
(2) Disconnect and remove oxygen sensor.
(3) Raise vehicle on hoist.
(4) Remove exhaust cross-under pipe (Refer to 11 - EXHAUST SYSTEM/CROSS-OVER PIPE - REMOVAL).
(5) Remove front catalytic converter (Refer to 11 - EXHAUST SYSTEM/CATALYTIC CONVERTER - REMOVAL).
(6) Lower vehicle.
(7) Remove exhaust manifold attaching bolts and remove manifold.

REAR EXHAUST MANIFOLD

(1) Disconnect negative battery cable.
(2) Remove throttle body air inlet hose and air cleaner housing assembly.
(3) Remove bolts attaching EGR tube from exhaust manifold and EGR valve. Discard gaskets.
(4) Raise vehicle on hoist.
(5) Remove exhaust system from vehicle (Refer to 11 - EXHAUST SYSTEM - REMOVAL).
(6) Remove exhaust cross-under pipe (Refer to 11 - EXHAUST SYSTEM/CROSS-OVER PIPE - REMOVAL).
(7) Remove rear catalytic converter (Refer to 11 - EXHAUST SYSTEM/CATALYTIC CONVERTER - REMOVAL).
(8) Disconnect and remove rear upstream oxygen sensor.
(9) Remove rear exhaust manifold heat shield.
(10) Remove exhaust manifold attaching bolts and remove manifold.

INSPECTION

(1) Inspect exhaust manifolds for damage or cracks.
(2) Check manifold flatness.
(3) Inspect the exhaust manifold gasket for obvious discoloration or distortion.
(4) Check distortion of the cylinder head mounting surface with a straightedge and thickness gauge.

INSTALLATION

FRONT EXHAUST MANIFOLD

(1) Install exhaust manifold and gasket. Tighten bolts starting at the center working outward to 23 N·m (200 in. lbs.).
(2) Raise vehicle on hoist.
(3) Install front catalytic converter and manifold heat shield. Tighten fasteners to 28 N·m (250 in. lbs.) (Refer to 11 - EXHAUST SYSTEM/CATALYTIC CONVERTER - INSTALLATION).
(4) Install exhaust cross-under pipe. Tighten fasteners to 28 N·m (250 in. lbs.) (Refer to 11 - EXHAUST SYSTEM/CROSS-OVER PIPE - INSTALLATION).
(5) Lower vehicle.
(6) Install oxygen sensor and connect electrical connector.
(7) Connect negative battery cable.

EXHAUST MANIFOLD (Continued)

REAR EXHAUST MANIFOLD

(1) Install exhaust manifold and gasket. Tighten bolts working from center outwards to 23 N·m (200 in. lbs.).

(2) Install rear catalytic converter and manifold heat shield. Tighten fasteners to 28 N·m (250 in. lbs.) (Refer to 11 - EXHAUST SYSTEM/CATALYTIC CONVERTER - INSTALLATION).

(3) Install oxygen sensor and connect electrical connector.

(4) Install exhaust cross-under pipe. Tighten fasteners to 28 N·m (250 in. lbs.) (Refer to 11 - EXHAUST SYSTEM/CROSS-OVER PIPE - INSTALLATION).

(5) Install exhaust system. Tighten fasteners to 28 N·m (250 in. lbs.) (Refer to 11 - EXHAUST SYSTEM - INSTALLATION).

(6) Lower vehicle.

(7) Install EGR tube using new gaskets. Tighten screws to 11 N·m (95 in. lbs.).

(8) Install throttle body air inlet hose and air cleaner housing assembly.

(9) Connect negative battery cable.

VALVE TIMING

DESCRIPTION

The timing drive system has been designed to provide quiet performance and reliability to support a **NON** free-wheeling engine. The system consists of a primary and secondary chain drive.

The **primary** timing chain drive (Fig. 109) uses a single, double-flexure, inverted tooth type chain. The primary chain drives both of the intake camshafts directly from a sprocket mounted on the crankshaft. In addition, the water pump is driven by the “back side” of the primary chain, necessitating the double-flexure type chain.

The chain is controlled by three fixed chain guides and a pivoting tensioner arm (Fig. 109). These guides utilize low-friction and long wearing nylon plastic wear faces. To tension the primary chain, a fully automatic spring-loaded, engine oil-fed, hydraulic tensioner is used. The tensioner is mounted in the right cylinder head with the plunger contacting the pivoting tensioner arm. A mechanical ratchet mechanism inside the tensioner prevents excessive chain slack upon engine start-up as the chain wears. The tensioner is designed with an internal oil reservoir to assure noise-free performance, even during engine start-up before oil pressure reaches the tensioner.

For lubrication the primary chain utilizes oil leakage from the front of the oil pump. This oil spills on the crankshaft sprocket, which is then carried by the chain throughout the primary drive.

The **secondary** timing chain drive system uses two conventional roller-type chains, one at each cylinder bank (Fig. 24). The purpose of the secondary chain is to provide a mechanical driven connection between the intake and exhaust camshafts. The intake camshafts drive the exhaust camshafts. The sprockets for both intake and exhaust camshafts are a press-fit and are only serviced as an assembly with the camshafts.

To tension the secondary chain a spring-loaded, hydraulic tensioner is used at each bank and attaches to each cylinder head between the intake and exhaust camshafts (Fig. 24). The tensioner incorporates upper and lower chain guide faces. The lower guide face is attached directly to the tensioner’s hydraulic plunger. Also, the tensioner uses an internal oil reservoir design to prevent engine start-up noise. The secondary chains are lubricated via an oil passage through the upper guide face on each tensioner.

VALVE TIMING (Continued)

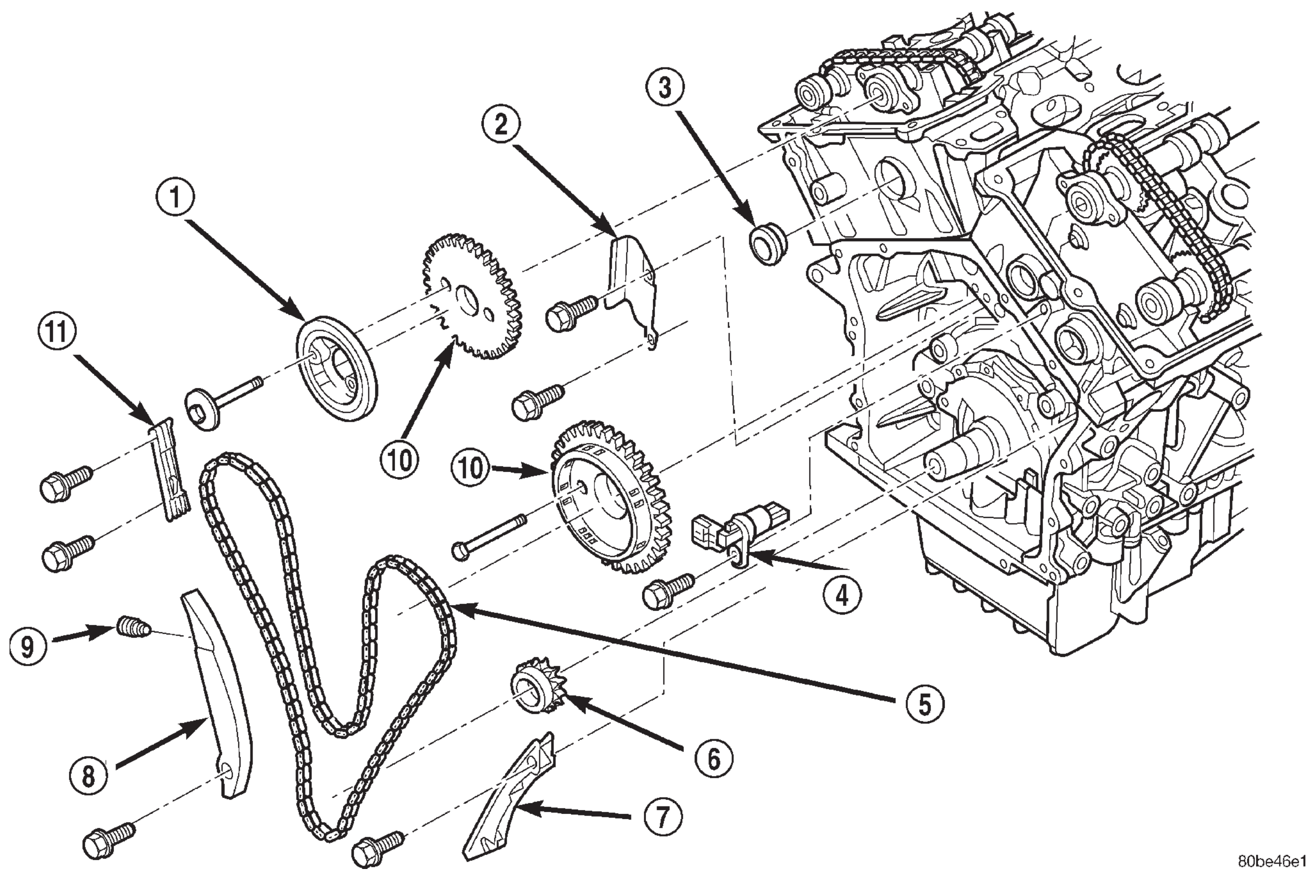


Fig. 109 TIMING DRIVE SYSTEM

1 – CAMSHAFT DAMPER (IF EQUIPPED)
2 – CHAIN GUIDE
3 – ACCESS PLUG
4 – CAMSHAFT POSITION SENSOR
5 – PRIMARY TIMING CHAIN
6 – CRANKSHAFT SPROCKET
7 – CHAIN GUIDE
8 – CHAIN TENSIONER ARM
9 – CHAIN TENSIONER
10 – CAMSHAFT SPROCKETS
11 – CHAIN GUIDE

STANDARD PROCEDURE

ENGINE TIMING - VERIFICATION

Correct timing is critical for the NON free-wheeling designed, 2.7L engine. Engine timing can be verified by using the following procedures:

(1) Remove cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

(2) Rotate engine until number one cylinder is at TDC on the EXHAUST stroke.

(3) View the intake camshaft sprocket timing mark. The mark should be 90° from the cylinder head cover sealing surface (Fig. 110)on both right and left cylinder banks.

(4) Count chain pins from the mark on the intake camshaft towards the exhaust camshaft. Engine is timed correctly when there are 12 chain pins between the timing marks on the intake camshaft and exhaust camshaft (Fig. 110).

(5) If marks are not correctly aligned, proceed to Timing Chain and Sprockets for service procedures. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

TIMING CHAIN COVER

REMOVAL

(1) Disconnect negative battery cable.

(2) Drain cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(3) Remove coolant pressure container (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY PRESS CONTAINER - REMOVAL).

(4) Raise vehicle on hoist.

(5) Remove right front wheel and belt splash shield.

TIMING CHAIN COVER (Continued)

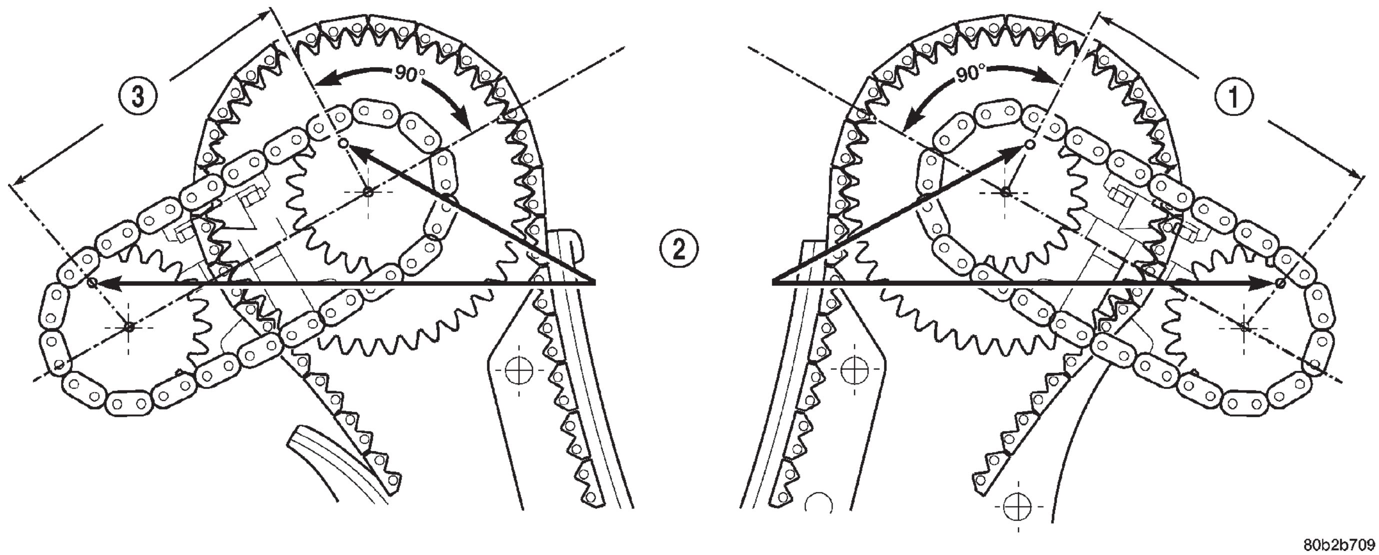


Fig. 110 ENGINE TIMING

1 - 12 PINS
2 - CAMSHAFT TIMING MARKS
3 - 12 PINS

(6) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(7) Remove crankshaft vibration dampner (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).

(8) Remove AC/Generator belt tensioner/bracket assembly.

(9) Disconnect heater hose from tube at right front frame rail area.

(10) Lower vehicle.

(11) Remove screws securing heater supply tube to right frame rail. Reposition heater supply tube.

(12) Place a floor jack with wooden block under oil pan to support engine.

(13) Remove right engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/RIGHT MOUNT - REMOVAL).

(14) Remove upper timing chain cover bolts.

(15) Raise vehicle on hoist.

(16) Remove remaining bolts securing timing chain cover to engine (Fig. 111).

(17) Remove timing chain cover.

(18) Discard timing chain cover gasket. Remove front crankshaft oil seal from cover.

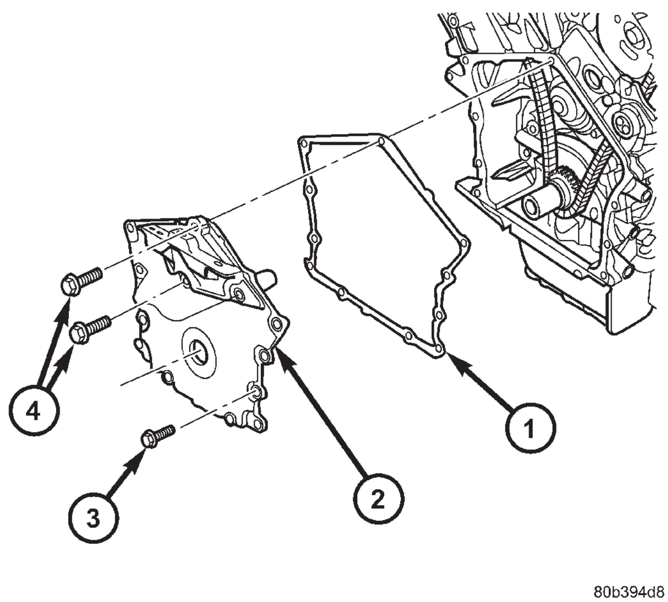


Fig. 111 TIMING CHAIN COVER

1 - GASKET
2 - TIMING CHAIN COVER
3 - BOLT - M6
4 - BOLT - M10

TIMING CHAIN COVER (Continued)

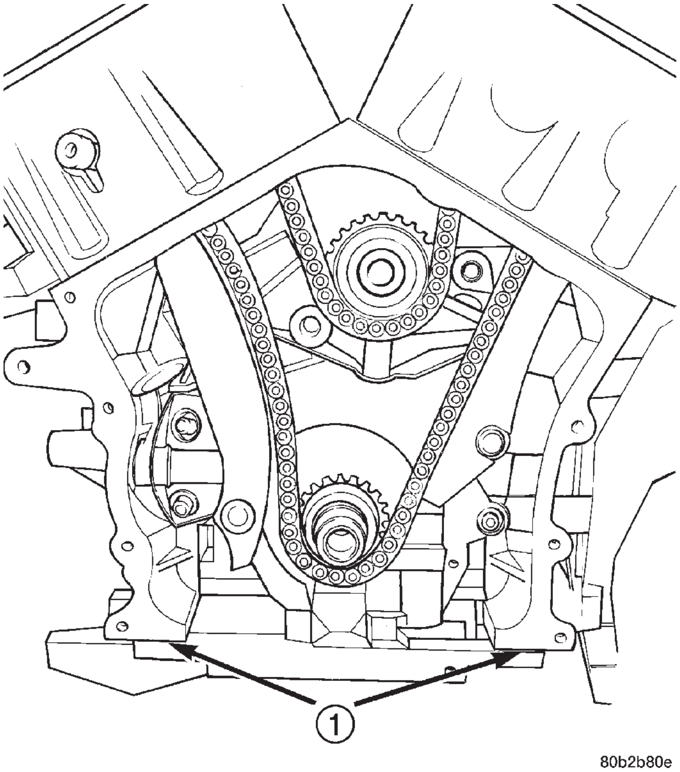


Fig. 112 TIMING CHAIN COVER SEALING

1 - PLACE A 1/8 INCH BEAD OF SEALER AT PARTING LINE

INSTALLATION

(1) Inspect and clean timing chain cover sealing surfaces.

(2) Before installing timing cover gasket apply a 1/8 inch bead of Mopar® Engine RTV GEN II to the parting lines between the oil pan and cylinder block (Fig. 112).

(3) Install timing cover and gasket. Tighten M10 cover bolts to 54 N·m (40 ft. lbs.) and M6 bolts to 12 N·m (105 in. lbs.) (Fig. 111).

(4) Install front crankshaft oil seal using Special Tool 6780-2 sleeve and 6780-1 installer.

(5) Lower vehicle.

(6) Install right engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/RIGHT MOUNT - INSTALLATION).

(7) Install screws attaching heater supply tube to right front frame rail area.

(8) Raise vehicle on hoist.

(9) Connect heater hose to supply tube at right front frame rail area.

(10) Install AC/Generator belt tensioner/bracket assembly.

(11) Install crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

(12) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(13) Install belt splash shield and right front wheel.

(14) Lower vehicle.

(15) Install coolant pressure container (Refer to 7 - COOLING/ENGINE/COOLANT RECOVERY PRESS CONTAINER - INSTALLATION).

(16) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(17) Connect negative battery cable.

TIMING CHAIN AND SPROCKETS

REMOVAL

REMOVAL - TIMING CHAIN

(1) Disconnect negative battery cable.

(2) Drain cooling system (Refer to 7 - COOLING/ ENGINE - STANDARD PROCEDURE).

(3) Remove upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

(4) Remove cylinder head covers, crankshaft vibration damper, and timing chain cover. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL) (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

(5) Align crankshaft sprocket timing mark to mark on oil pump housing (Fig. 113). The mark on oil pump housing is 60° ATDC of #1 cylinder.

CAUTION: When the timing chain is removed and the cylinder heads are still installed, DO NOT rotate the camshafts or crankshaft without first locating the proper crankshaft position. Failure to do so will result in valve and/or piston damage.

(6) Remove power steering pump and bracket as an assembly. **Do not** disconnect power steering lines from pump. Reposition pump and support with suitable retaining strap.

(7) Remove primary timing chain tensioner retainer cap and tensioner from right cylinder head (Fig. 114).

(8) Disconnect and remove camshaft position sensor from left cylinder head (Fig. 115).

(9) Remove timing chain guide access plugs from cylinder heads (Fig. 115).

NOTE: When camshaft sprocket bolts are removed, the camshafts will rotate in a clockwise direction.

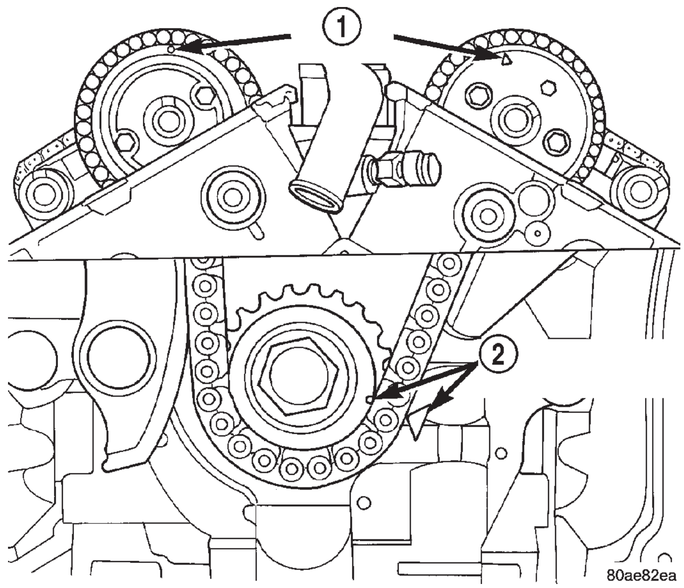


Fig. 113 TIMING MARK ALIGNMENT

1 - CAMSHAFT TIMING MARKS
2 - CRANKSHAFT TIMING MARKS

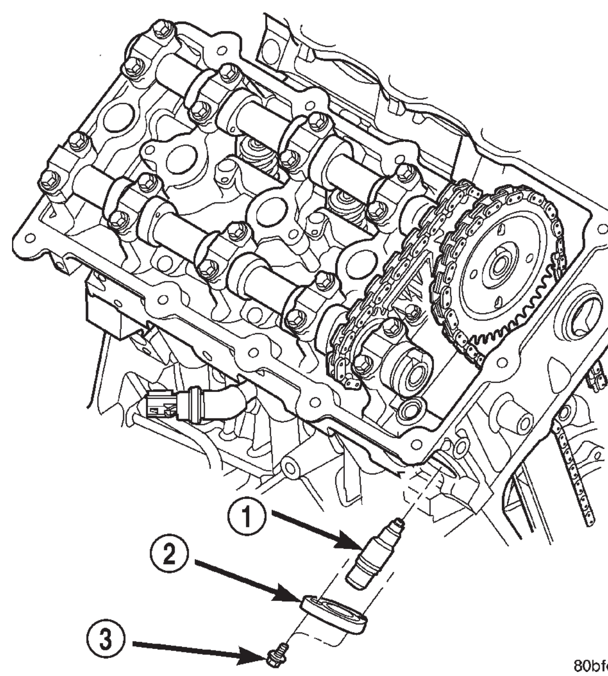


Fig. 114 PRIMARY TIMING CHAIN TENSIONER

1 - TENSIONER
2 - RETAINER CAP
3 - BOLT

TIMING CHAIN AND SPROCKETS (Continued)

(10) Starting with the right camshaft sprocket, remove the sprocket attaching bolts. Remove camshaft damper (if equipped) and sprocket (Fig. 115).

(11) Remove left side camshaft sprocket attaching bolts and remove sprocket (Fig. 115).

(12) Remove lower chain guide and tensioner arm (Fig. 115).

(13) Remove the primary timing chain.

(14) For removal of crankshaft sprocket, (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - REMOVAL).

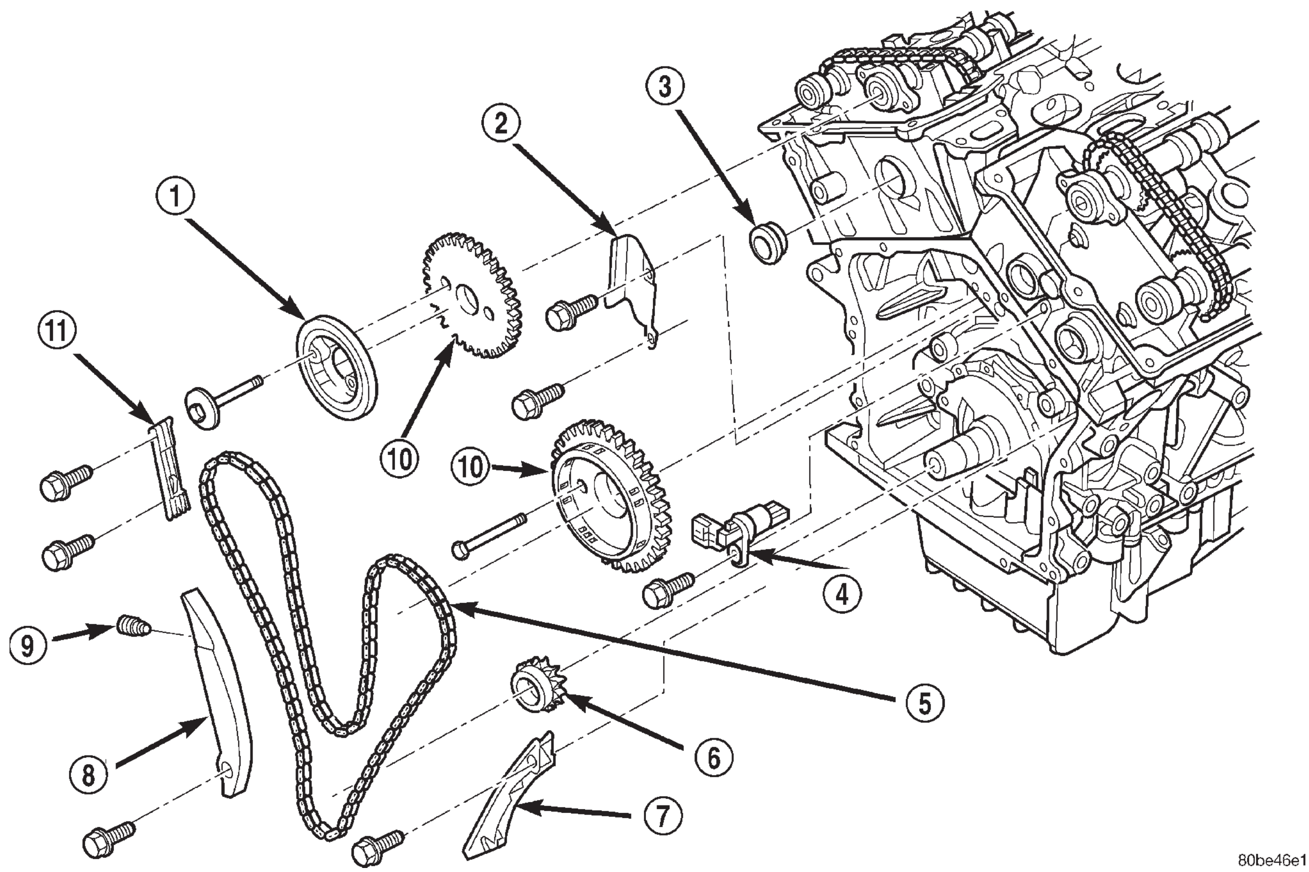


Fig. 115 TIMING DRIVE SYSTEM - PRIMARY

1 - CAMSHAFT DAMPER (IF EQUIPPED)
2 - CHAIN GUIDE
3 - ACCESS PLUG
4 - CAMSHAFT POSITION SENSOR
5 - PRIMARY TIMING CHAIN
6 - CRANKSHAFT SPROCKET
7 - CHAIN GUIDE
8 - CHAIN TENSIONER ARM
9 - CHAIN TENSIONER
10 - CAMSHAFT SPROCKETS
11 - CHAIN GUIDE

TIMING CHAIN AND SPROCKETS (Continued)

REMOVAL - CRANKSHAFT SPROCKET

(1) Remove primary timing chain. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

CAUTION: Use care not to turn crankshaft while removing crankshaft sprocket, as damage to valves and or pistons could occur.

(2) Remove crankshaft sprocket by first installing the crankshaft damper bolt. Apply grease or equivalent to damper bolt head and position Special Tools 5048-1, 5048-6, and 8539 on sprocket and crankshaft nose (Fig. 116). Remove sprocket using care not to rotate the crankshaft.

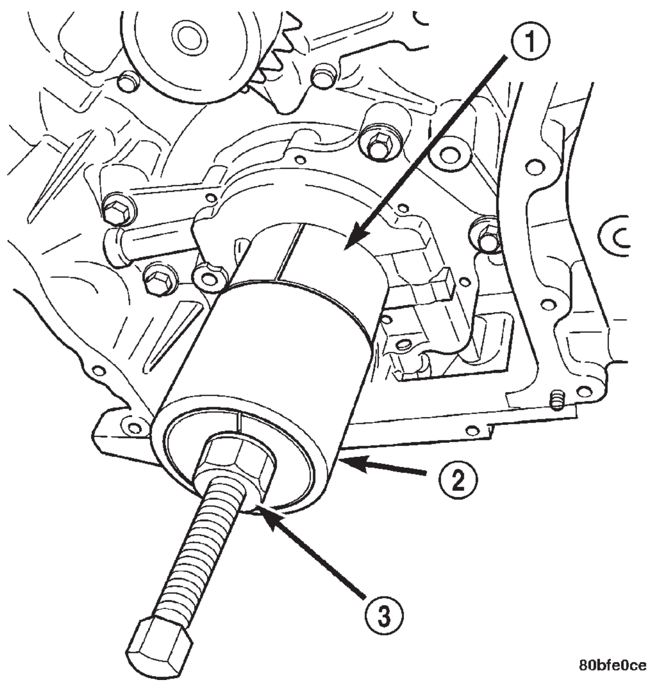


Fig. 116 Crankshaft Sprocket - Removal

1 - SPECIAL TOOL 8539
2 - SPECIAL TOOL 5048-6
3 - SPECIAL TOOL 5048-1

INSTALLATION

INSTALLATION - TIMING CHAIN

(1) Inspect all sprockets and chain guides. Replace if worn.

(2) For crankshaft sprocket installation procedures (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - INSTALLATION).

(3) If removed, install right and left side short chain guides (Fig. 115). Tighten attaching bolts to 28 N·m (250 in. lbs.).

(4) Align crankshaft sprocket timing mark to the mark on oil pump housing (Fig. 117).

NOTE: Lubricate timing chain and guides with engine oil before installation.

(5) Place left side primary chain sprocket onto the chain so that the timing mark is located in-between the two (plated) timing links (Fig. 117).

(6) Lower the primary chain with left side sprocket through the left cylinder head opening.

NOTE: The camshaft sprockets can be allowed to float on the camshaft hub during installation.

(7) Loosely position left side camshaft sprocket over camshaft hub.

(8) Align timing (plated) link to the crankshaft sprocket timing mark (Fig. 117).

(9) Position primary chain onto water pump drive sprocket.

(10) Align right camshaft sprocket timing mark to the timing (plated) link on the timing chain (Fig. 117) and loosely position over camshaft hub.

(11) Verify that all chain timing (plated) links are properly aligned to the timing marks on all sprockets (Fig. 117).

(12) Install left side lower chain guide and tensioner arm (Fig. 115). Tighten attaching bolts to 28 N·m (250 in. lbs.).

NOTE: Inspect O-ring on chain guide access plugs before installing. Replace O-ring as necessary.

(13) Install chain guide access plugs to cylinder heads (Fig. 115). Tighten plugs to 20 N·m (15 ft. lbs.).

TIMING CHAIN AND SPROCKETS (Continued)

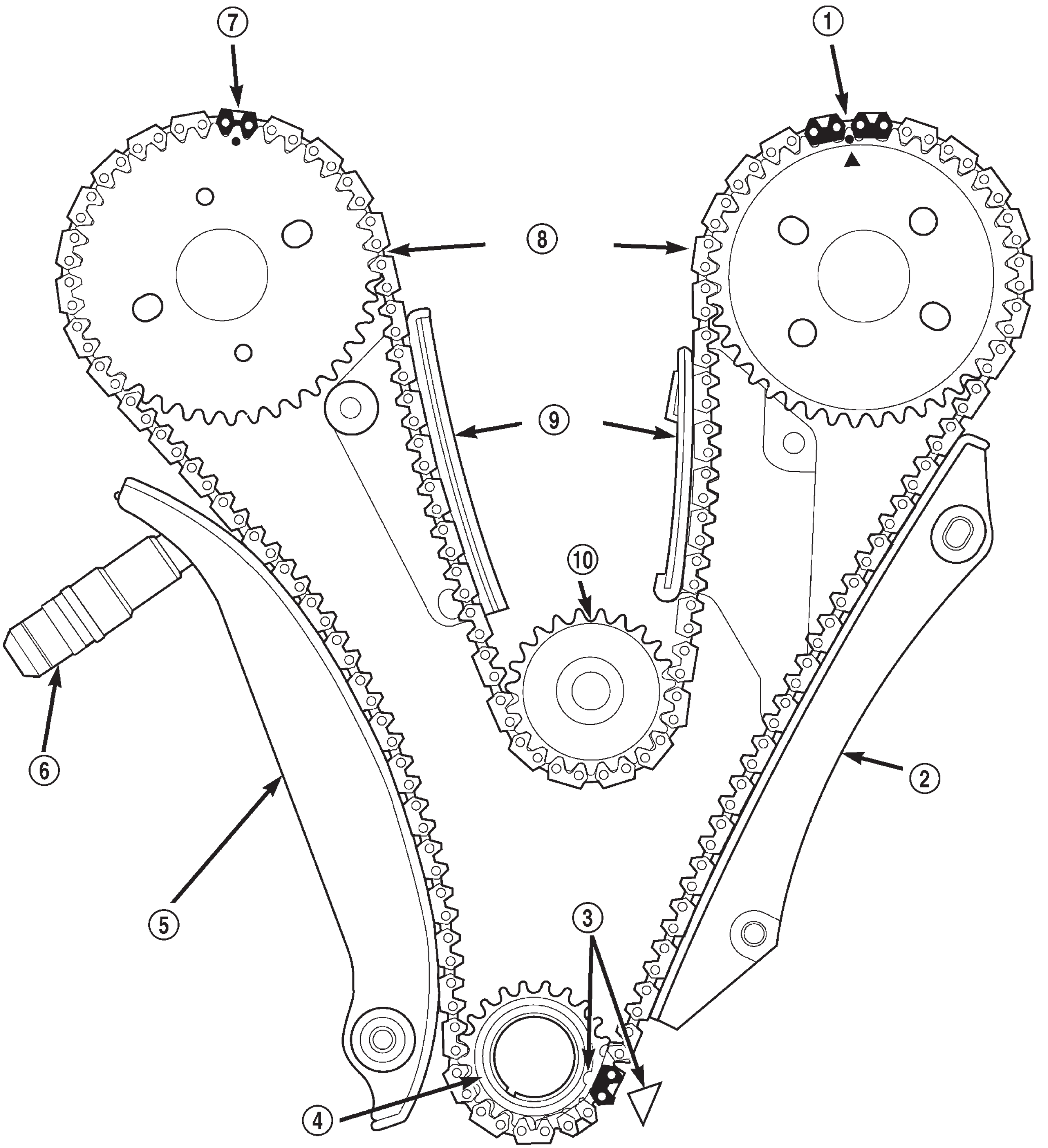


Fig. 117 TIMING CHAIN ALIGNMENT MARKS - PRIMARY

1 - CAMSHAFT TIMING MARKS
2 - CHAIN GUIDE
3 - CRANKSHAFT TIMING MARKS
4 - CRANKSHAFT SPROCKET
5 - CHAIN TENSIONER ARM
6 - CHAIN TENSIONER
7 - CAMSHAFT TIMING MARK
8 - INTAKE CAMSHAFT SPROCKETS
9 - CHAIN GUIDES
10 - WATER PUMP SPROCKET

TIMING CHAIN AND SPROCKETS (Continued)

NOTE: To reset the primary timing chain tensioner, engine oil will first need to be purged from the tensioner (Fig. 118).

(14) Purge oil from timing chain tensioner using the following procedure:

(a) Place the check ball end of tensioner into the shallow end of Special Tool 8186 (Fig. 118).

(b) Using hand pressure, slowly depress tensioner until oil is purged from tensioner (Fig. 118).

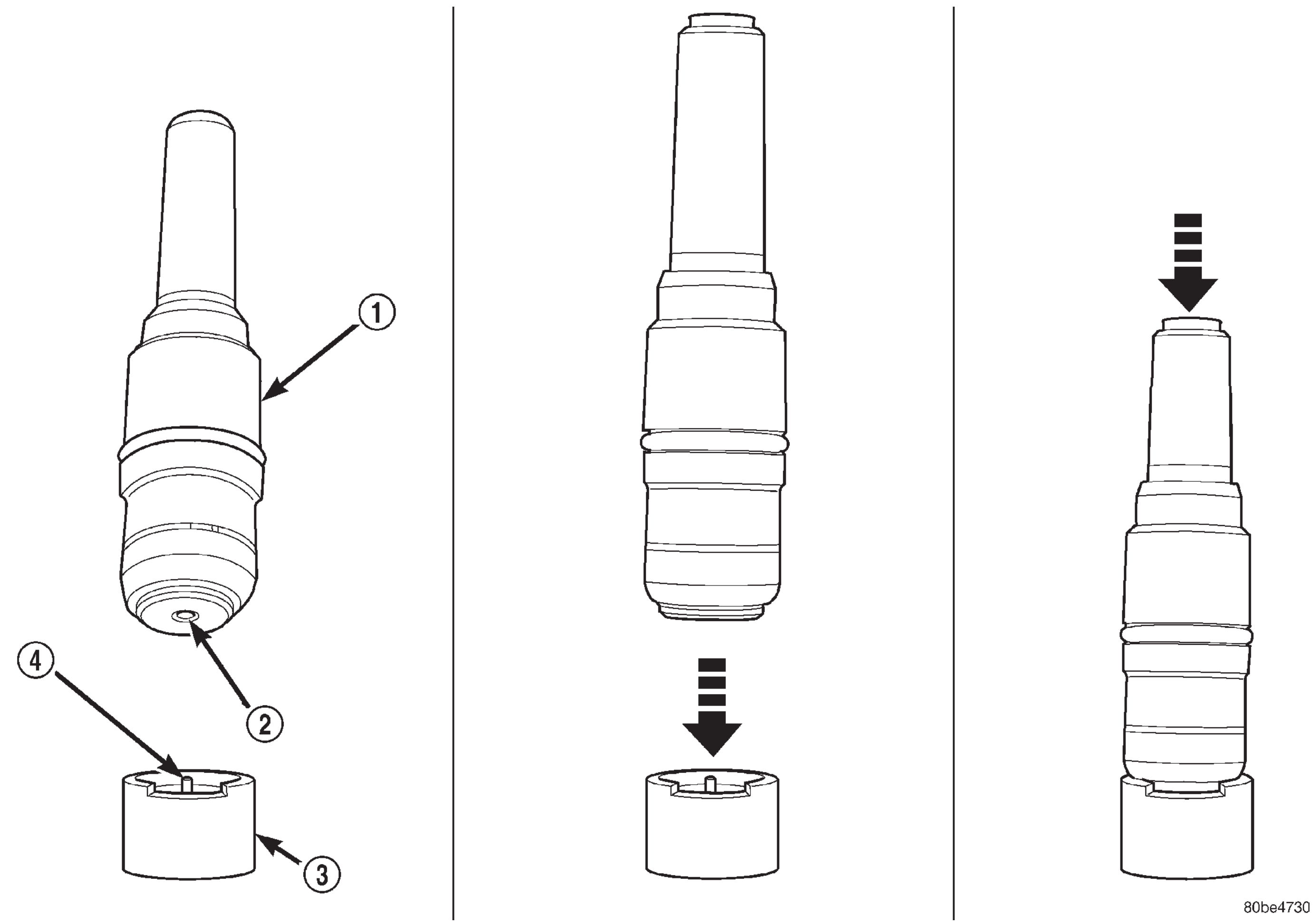


Fig. 118 TIMING CHAIN TENSIONER - OIL PURGING

1 - TENSIONER
2 - CHECK BALL
3 - SPECIAL TOOL 8186
4 - PIN

TIMING CHAIN AND SPROCKETS (Continued)

(15) Reset timing chain tensioner using the following procedure:

(a) Position cylinder plunger into the deeper end of Special Tool 8186 (Fig. 119).

(b) Apply a downward force until tensioner is reset (Fig. 119).

NOTE: If oil was not first purged from the tensioner, use slight finger pressure to assist the center arm pin of Special Tool 8186 to unseat the tensioner's check ball.

CAUTION: Ensure the tensioner is properly reset. The tensioner body must bottom against the top edge of Special Tool 8186. Failure to properly perform the resetting procedure may cause tensioner jamming.

(16) Install the reset chain tensioner into the right cylinder head (Fig. 114).

(17) Position tensioner retaining plate and tighten bolts to 12 N·m (105 in. lbs.) (Fig. 114).

(18) Starting at the right cylinder bank, first position the camshaft damper (if equipped) on camshaft hub, then insert a 3/8" square drive extension with a breaker bar into intake camshaft drive hub. Rotate camshaft until the camshaft hub aligns to the camshaft sprocket and damper attaching holes. Install the sprocket attaching bolts and tighten to 28 N·m (250 in. lbs.) (Fig. 115).

(19) Turn the left side camshaft by inserting a 3/8" square drive extension with a breaker bar into intake camshaft drive hub and rotate camshaft until the sprocket attaching bolts can be installed. Tighten sprocket bolts to 28 N·m (250 in. lbs.) (Fig. 115).

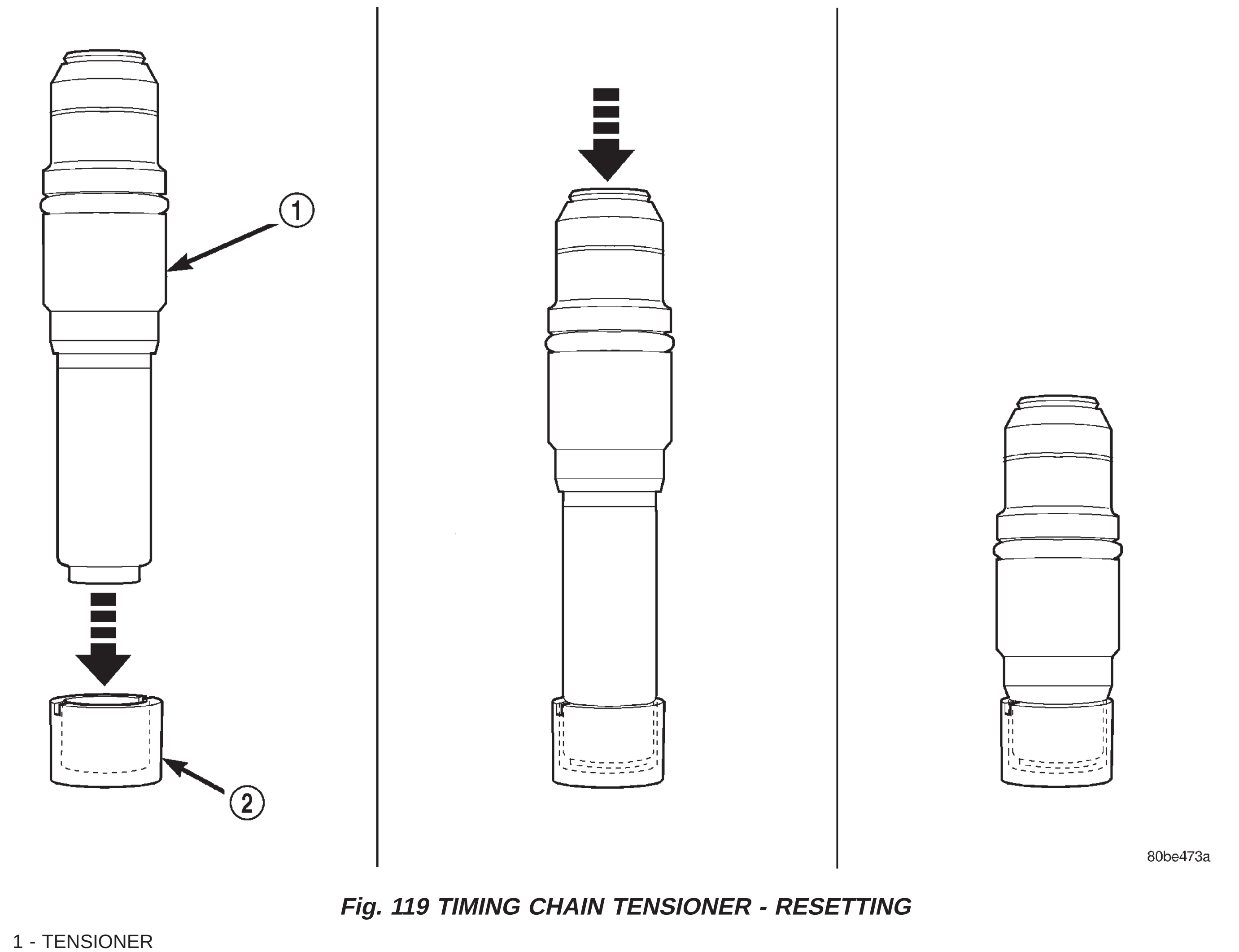


Fig. 119 TIMING CHAIN TENSIONER - RESETTING

1 - TENSIONER
2 - SPECIAL TOOL 8186

TIMING CHAIN AND SPROCKETS (Continued)

(20) Rotate engine slightly clockwise to remove timing chain slack, if necessary.

(21) Activate the timing chain tensioner by using a flat bladed pry tool to gently pry tensioner arm towards the tensioner slightly (Fig. 120). Then release the tensioner arm. Verify the tensioner is activated (extends).

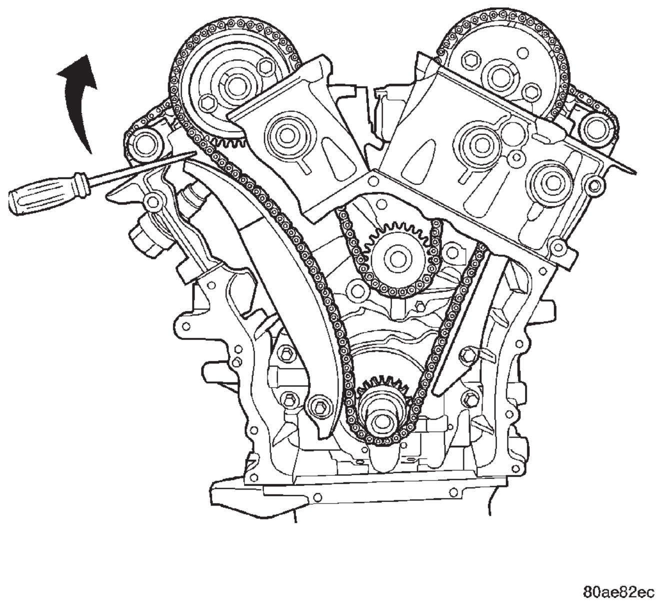


Fig. 120 TIMING CHAIN TENSIONER ACTIVATING

(22) Install power steering pump and bracket assembly.

(23) Install camshaft position sensor and connect electrical connector.

(24) Install the timing chain cover, crankshaft vibration damper, and cylinder head covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION) (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION) (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

(25) Install upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

NOTE: After installation of a reset tensioner, engine noise will occur after initial start-up. This noise will normally disappear within 5–10 seconds.

(26) Fill cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).

(27) Connect negative battery cable.

INSTALLATION - CRANKSHAFT SPROCKET

(1) Install crankshaft sprocket using Special Tools 6780-1 and 8179 (Fig. 121) until sprocket bottoms against crankshaft step flange. Use care not to rotate crankshaft.

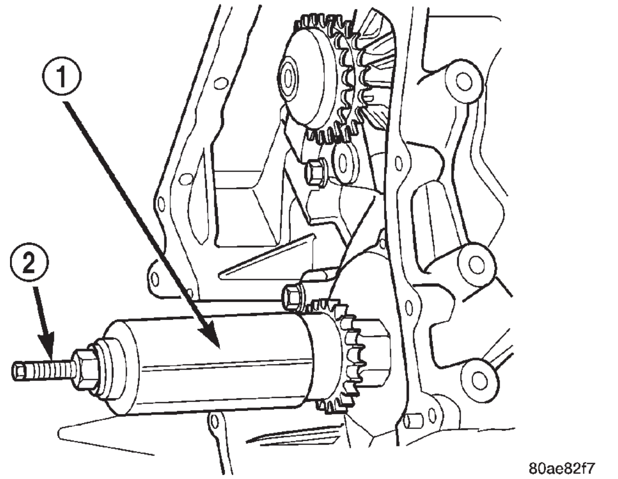


Fig. 121 Crankshaft Sprocket - Installation

1 - SPECIAL TOOL 6780–1
2 - SPECIAL TOOL 8179

(2) Verify that crankshaft sprocket is installed to proper depth by measuring from sprocket outer face to end of crankshaft (Fig. 122). Measurement should read: 39.05 ±0.50 mm (1.5374 ±0.020 in.).

(3) Install primary timing chain. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

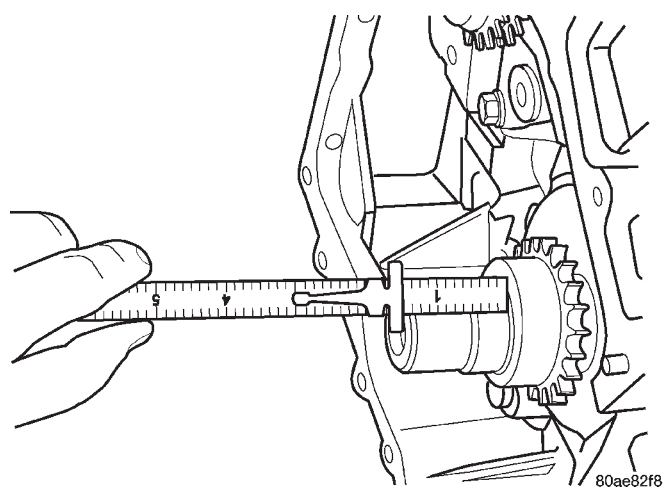


Fig. 122 Crankshaft Sprocket Depth Measurement

EXHAUST SYSTEM

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EXHAUST SYSTEM

DESCRIPTION

The exhaust system on the 2.0L/2.4L engine models consists of a front mounted catalytic converter, resonator/pipe assembly, muffler/pipe assembly, band clamps, and support isolators. The upstream oxygen sensor is located in the exhaust manifold. The downstream oxygen sensor is located in the catalytic converter.

The exhaust system on the 2.7L engine model consists of front and rear bank catalytic converters, cross-under pipe, connector pipe, resonator/pipe assembly, muffler/pipe assembly, band clamps, and support isolators. The upstream oxygen sensors are located in the front and rear exhaust manifolds. The downstream oxygen sensors are located in the cross-under pipe.

Resonators, mufflers, and exhaust pipes are tuned to each powertrain combination. (Fig. 1), (Fig. 2), and (Fig. 3).

OPERATION

The exhaust system contains, quiets, and cleans the exhaust gases generated by the engine.

EXHAUST SYSTEM (Continued)

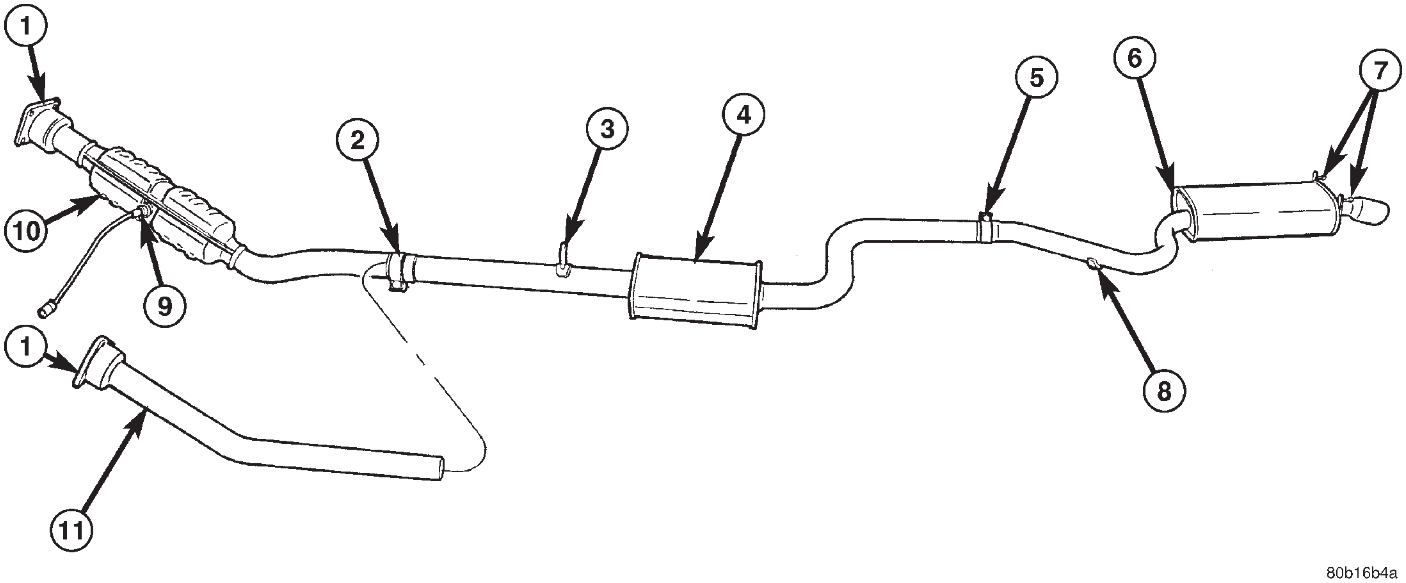

Fig. 1 EXHAUST SYSTEM

1 - FLEX JOINT
2 - BAND CLAMP
3 - RESONATOR ALIGNMENT PIN
4 - RESONATOR/PIPE ASSEMBLY
5 - BAND CLAMP
6 - MUFFLER/PIPE ASSEMBLY
7 - REAR MUFFLER SUPPORTS
8 - MIDPIPE SUPPORT
9 - OXYGEN SENSOR
10 - CATALYTIC CONVERTOR (2.0L/2.4L)
11 - CONNECTOR PIPE (2.7L)

EXHAUST SYSTEM (Continued)

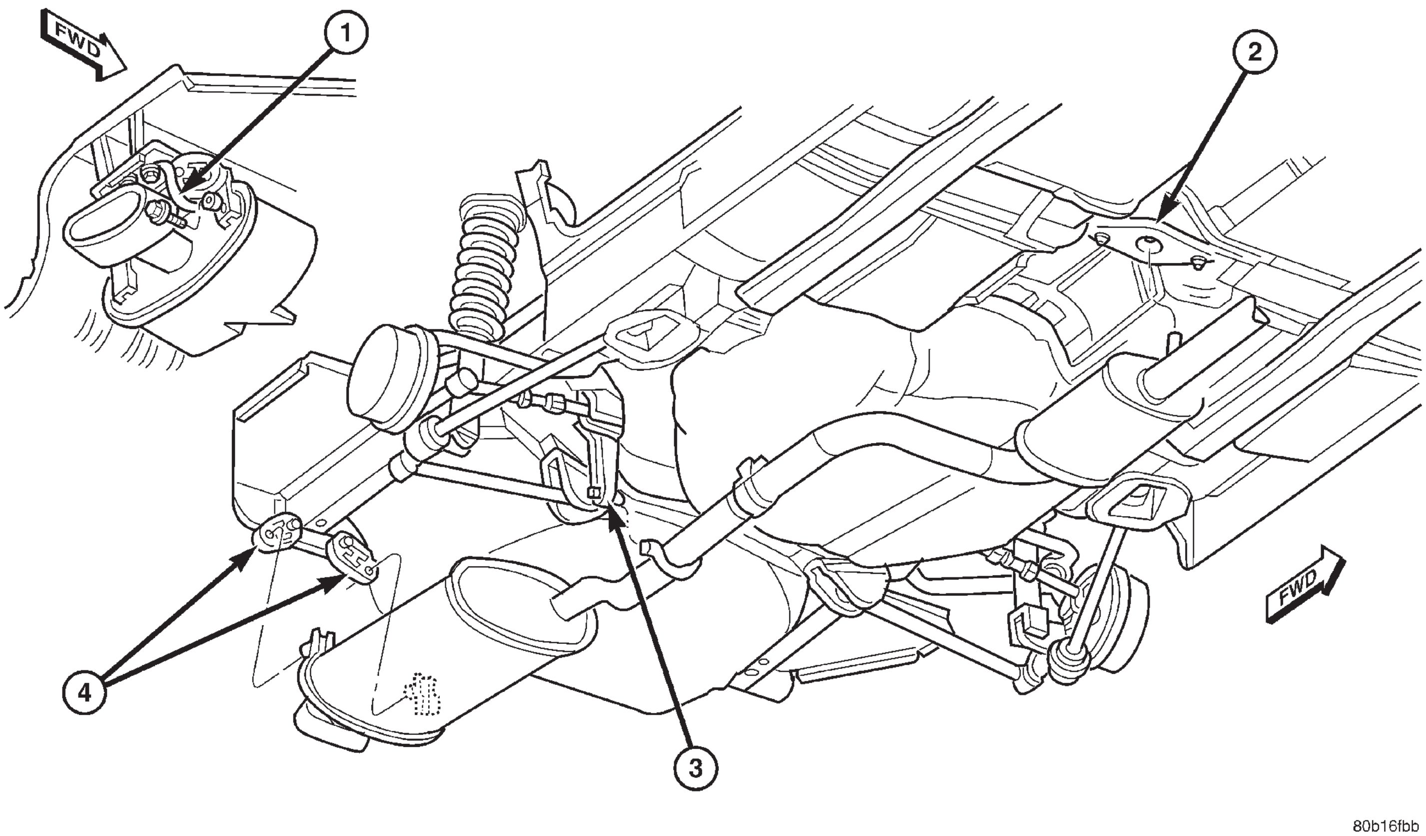

Fig. 2 EXHAUST SYSTEM SUPPORTS

1 - GROUND STRAP
2 - RESONATOR GUIDANCE BRACKET
3 - MUFFLER/FRONT PIPE SUPPORT ISOLATOR
4 - REAR MUFFLER SUPPORT ISOLATORS

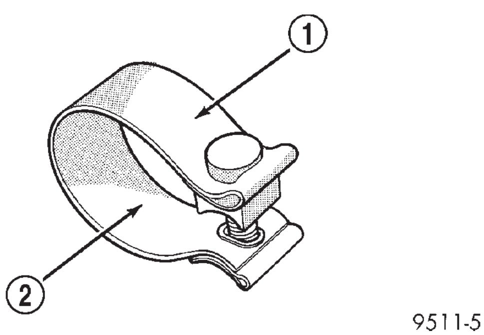

Fig. 3 Band Clamp

1 - CLAMP SIZE
2 - TORQUE SPECIFICATION

EXHAUST SYSTEM (Continued)

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - EXCESSIVE EXHAUST SYSTEM NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
EXCESSIVE EXHAUST NOISE (UNDER HOOD)	1. Exhaust manifold cracked or broken.	1. Replace manifold.
	2. Manifold to cylinder head leak.	2. Tighten manifold and/or replace gasket.
	3. EGR Valve to manifold gasket leakage.	3. Tighten fasteners or replace gasket.
	4. EGR Valve to EGR tube gasket leakage.	4. Tighten fasteners or replace gasket.
	5. EGR tube to manifold tube leakage.	5. Tighten tube nut.
	6. Exhaust flex-joint to manifold leak.	6. Tighten joint fasteners and/or replace gasket.
	7. Exhaust flex-joint.	7. Replace catalytic converter assembly.
	8. Pipe and shell noise from front exhaust pipe.	8. Characteristic of single wall pipe.
EXCESSIVE EXHAUST NOISE	1. Leak at exhaust pipe joints.	1. Tighten clamps at leaking joints.
	2. Burned or rusted out muffler assembly or exhaust pipe.	2. Replace muffler resonator tailpipe assembly or exhaust pipe with catalytic converter assembly.
	3. Burned or rusted out resonator.	3. Replace muffler resonator tailpipe assembly.
	4. Restriction in exhaust system.	4. Perform Exhaust System Restriction Check. Replace component as necessary.
	5. Converter material in muffler.	5. Replace muffler and converter assemblies. Check fuel injection and ignition systems for proper operation.

DIAGNOSIS AND TESTING - EXHAUST SYSTEM RESTRICTION CHECK

Exhaust system restriction can be checked by measuring back pressure using the DRB III® and PEP module pressure tester.

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

(1) Disconnect and remove the upstream (before catalytic converter) oxygen sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/O2 SENSOR - REMOVAL)

(2) Install the Exhaust Back Pressure Fitting Adaptor CH8519.

(3) Connect the Low Pressure Sensor (15 psi) CH7063 to the back pressure fitting.

(4) Following the PEP module instruction manual, connect all required cables to the DRB III® and PEP module. Select the available menu options on the DRBIII® display screen for using the digital pressure gauge function.

(5) Apply the park brake and start the engine.

EXHAUST SYSTEM (Continued)

(6) With transmission in Park or Neutral, raise engine speed to 2000 RPM. Monitor the pressure readings on the DRBIII®. Back pressure should not exceed specified limit. Refer to specification in table below EXHAUST BACK PRESSURE LIMITS.

NOTE: For applications with dual catalytic converters, repeat test on opposite converter using the previous steps.

(7) If pressure exceeds maximum limits, inspect exhaust system for restricted component. For further catalytic converter inspection procedures, (Refer to 11 - EXHAUST SYSTEM/CATALYTIC CONVERTER - INSPECTION). Replace component(s) as necessary.

EXHAUST BACK PRESSURE LIMITS

Exhaust Back Pressure Limit (Max)	
Vehicle in Park/Neutral (no load) RPM	3.45 Kpa (0.5 psi)

REMOVAL - EXHAUST SYSTEM

NOTE: Some service procedures require the removal of the entire exhaust system in order to gain better access to certain components for removal and installation. The following procedure explains how to remove the entire exhaust system. Refer to specific procedures if replacing individual exhaust components.

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(1) Raise vehicle on hoist and apply penetrating oil to fasteners that connect the exhaust system to the exhaust manifold (2.0L/2.4L)/cross-under pipe (2.7L).
(2) Remove ground strap from muffler.
(3) Vehicles equipped with 2.0L/2.4L engines, disconnect downstream oxygen sensor connector.
(4) Remove fasteners that attach exhaust system to exhaust manifold (2.0L/2.4L)/cross-under pipe (2.7L).

CAUTION: Do not use any tools to remove the rubber isolators—remove by hand only. Soapy water or silicone-based lubricant spray may be used to assist removal/installation of isolators. DO NOT use a petroleum-based lubricant on the isolators, as damage to the rubber material can occur.

(5) Remove support isolators from muffler supports (Fig. 2).
(6) Remove exhaust system from vehicle.

NOTE: Band clamps are spot welded to exhaust system. If a band clamp must be replaced, the spot weld must be ground off the exhaust pipe.

NOTE: When replacement is required on any component of the exhaust system, it is most important that original equipment parts (or their equivalent) be used for the following reasons:

- To insure proper alignment with other parts in the system.
- Provide acceptable exhaust noise levels and does not change exhaust system back pressure that could affect emissions and performance.

INSPECTION

Inspect the exhaust pipes, catalytic converters, muffler, and resonators for cracked joints, broken welds and corrosion damage that would result in a leaking exhaust system. Inspect the clamps, support brackets, and insulators for cracks and corrosion damage.

NOTE: Slip joint band clamps are spot welded to exhaust system. If a band clamp must be replaced, the spot weld must be ground off.

INSTALLATION - EXHAUST SYSTEM

NOTE: Always work from the front to rear of exhaust system when aligning and tightening exhaust system components.

(1) Loosely install fasteners that attach exhaust system to exhaust manifold (2.0L/2.4L)/cross-under pipe (2.7L).
(2) Install support isolators to muffler supports.
(3) Align exhaust system to maintain position and proper clearance with underbody parts. All support isolators should have equal load on them. Tighten fasteners that attach exhaust system to exhaust manifold (2.0L/2.4L)/cross-under pipe (2.7L) to 28 N·m (250 in. lbs.).
(4) Vehicles equipped with 2.0L/2.4L engines, reconnect the downstream oxygen sensor connector.
(5) Connect ground strap to muffler.
(6) Lower vehicle.

EXHAUST SYSTEM (Continued)

ADJUSTMENTS

A misaligned exhaust system is usually indicated by a vibration, rattling noise, or binding of exhaust system components. These noises are sometimes hard to distinguish from other chassis noises. Inspect exhaust system for broken or loose clamps, heat shields, isolators, and brackets. Replace or tighten as necessary. It is important that exhaust system clearances and alignment be maintained.

Perform the following procedures to align the exhaust system:

(1) Loosen clamps and support brackets.

(2) Align the exhaust system starting at the front, working rearward.

(3) Tighten all clamps and brackets once alignment and clearances are achieved.

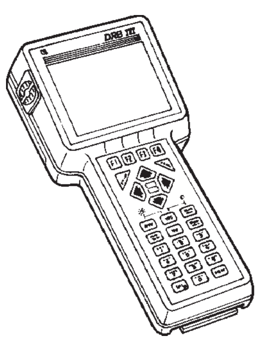
SPECIFICATIONS

TORQUE

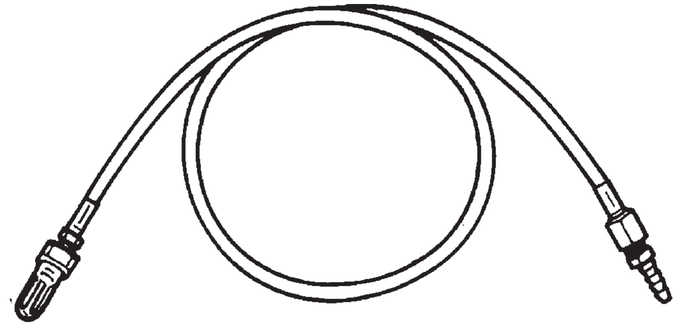
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Band Clamps—Fastener	54	40	—
Body Heat Shield—Fasteners	5	—	40
Catalytic Converter to Exhaust Manifold Flange—Fasteners	28	—	250
Cross-Under Pipe —Fasteners (2.7L)	28	—	250

SPECIAL TOOLS

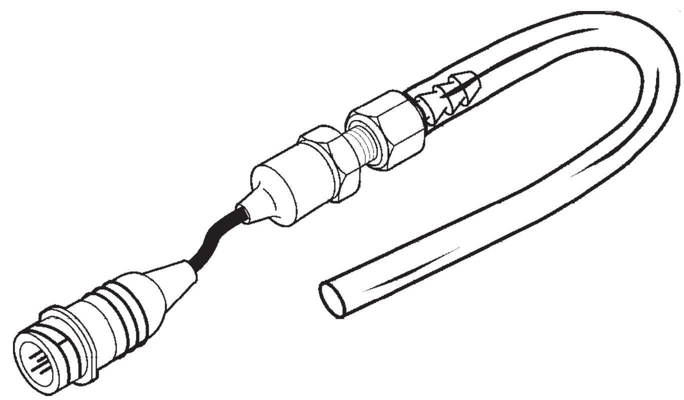
EXHAUST SYSTEM



DRB III & PEP Module - OT-CH6010A



Back Pressure Test Adapter - CH8519



Pressure Transducer CH7063

CATALYTIC CONVERTER - 2.0L/2.4L

DESCRIPTION

The under-floor, three-way catalytic converter inlet is connected to the exhaust manifold by use of a flex joint and gasket. The outlet connects to the exhaust system.

CAUTION: When servicing, care must be exercised not to dent or bend the bellows or bellows cover of the flex-joint. Should this occur, the flex-joint will eventually fail and require the catalytic converter be replaced.

An exhaust flex-joint coupling (Fig. 4) is used to secure the catalytic converter to the engine manifold.

The exhaust flex-joint is welded to the catalytic converter.

OPERATION

The three-way catalytic converter simultaneously converts three exhaust emissions into harmless gases. Specifically, HC and CO emissions are converted into water (H_2O) and carbon dioxide (CO_2). Oxides of Nitrogen (NOx) are converted into elemental Nitrogen (N) and water. The three-way catalyst is most efficient in converting HC, CO and NOx at the stoichiometric air fuel ratio of 14.7:1.

CATALYTIC CONVERTER - 2.0L/2.4L (Continued)

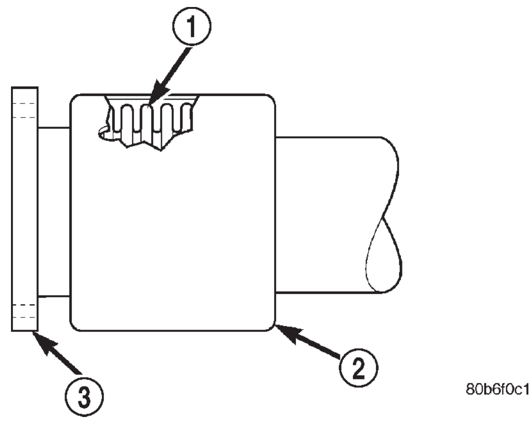


Fig. 4 FLEX-JOINT COUPLING - TYPICAL

1 - BELLOWS
2 - COVER
3 - FLANGE

The oxygen content in a catalyst is important for efficient conversion of exhaust gases. When a high oxygen content (lean) air/fuel ratio is present for an extended period, oxygen content in a catalyst can reach a maximum. When a rich air/fuel ratio is present for an extended period, the oxygen content in the catalyst can become totally depleted. When this occurs, the catalyst fails to convert the gases. This is known as catalyst ″punch through.″

Catalyst operation is dependent on its ability to store and release the oxygen needed to complete the emissions-reducing chemical reactions. As a catalyst deteriorates, its ability to store oxygen is reduced. Since the catalyst's ability to store oxygen is somewhat related to proper operation, oxygen storage can be used as an indicator of catalyst performance. Refer to the appropriate Diagnostic Information for diagnosis of a catalyst related Diagnostic Trouble Code (DTC).

The combustion reaction caused by the catalyst releases additional heat in the exhaust system, causing temperature increases in the area of the reactor under severe operating conditions. Such conditions can exist when the engine misfires or otherwise does not operate at peak efficiency. **Do not** remove spark plug wires from plugs or by any other means short out cylinders, if exhaust system is equipped with a catalytic converter. Failure of the catalytic converter can occur due to temperature increases caused by unburned fuel passing through the converter. This deterioration of the catalyst core can result in excessively high emission levels, noise complaints, and exhaust restrictions.

Unleaded gasoline must be used to avoid ruining the catalyst core. Do not allow engine to operate above 1200 RPM in neutral for extended periods over 5 minutes. This condition may result in excessive exhaust system/floor pan temperatures because of no air movement under the vehicle.

The flex joint allows flexing as the engine moves, preventing breakage that could occur from the back-and-forth motion of a transverse mounted engine.

CAUTION: Due to exterior physical similarities of some catalytic converters with pipe assemblies, extreme care should be taken with replacement parts. There are internal converter differences required in some parts of the country (particularly vehicles built for States with strict emission requirements) and between model years.

REMOVAL

NOTE: In the following procedure it is not necessary to separate the muffler/pipe assembly from the resonator/pipe assembly. They can both be removed as an assembly.

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(1) Raise vehicle on hoist and apply penetrating oil to resonator/pipe assembly band clamp, and the fasteners that connect the catalytic converter to the exhaust manifold.

(2) Remove ground strap from muffler.

(3) Loosen band clamp for resonator/pipe assembly.

CAUTION: Do not use any tools to remove the rubber isolators–remove by hand only. Soapy water or silicone–based lubricant spray may be used to assist removal/installation of isolators. DO NOT use a petroleum–based lubricant on the isolators, as damage to the rubber material can occur.

(4) Remove support isolators from muffler supports.

(5) Remove resonator/pipe and muffler/pipe as an assembly.

(6) Disconnect downstream oxygen sensor connector.

(7) Remove fasteners that attach catalytic converter to the exhaust manifold. Remove catalytic converter from vehicle.

(8) Remove and discard gasket.

INSPECTION

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

Check catalytic converter for a flow restriction. (Refer to 11 - EXHAUST SYSTEM - DIAGNOSIS AND TESTING) Exhaust System Restriction Check for procedure.

Visually inspect the catalytic converter element by using a borescope or equivalent. Remove oxygen sensor(s) and insert borescope. If borescope is not available, remove converter and inspect element using a flashlight. Inspect element for cracked or melted substrate.

NOTE: Before replacing a catalytic converter, determine the root cause of failure. Most catalytic converter failures are caused by air, fuel or ignition problems. (Refer to Appropriate Diagnostic Information) for test procedures.

INSTALLATION

NOTE: Always work from the front to rear of exhaust system when aligning and tightening exhaust system components.

(1) Clean manifold to converter sealing surfaces.
(2) Position new gasket on exhaust manifold.

NOTE: If catalytic converter is being replaced, transfer downstream oxygen sensor to new converter.

(3) Loosely attach catalytic converter to exhaust manifold.
(4) Loosely install resonator/pipe and muffler/pipe assembly to catalytic converter outlet pipe.
(5) Install support isolators to muffler supports.
(6) Align exhaust system to maintain position and proper clearance with underbody parts. All support isolators should have equal load on them. Tighten fasteners attaching catalytic converter to exhaust manifold to 28 N·m (250 in. lbs.).
(7) Tighten resonator/pipe assembly band clamp to 54 N·m (40 ft. lbs.).
(8) Connect ground strap to muffler.
(9) Lower vehicle.

CATALYTIC CONVERTER - FRONT - 2.7L

REMOVAL

(1) Disconnect negative battery cable.
(2) Disconnect upstream oxygen sensor connector.
(3) Remove 3 converter attaching nuts that are visible from the engine compartment (Fig. 5).
(4) Raise vehicle on hoist.
(5) Remove exhaust cross-under pipe (Refer to 11 - EXHAUST SYSTEM/CROSS-UNDER PIPE - REMOVAL).
(6) Remove remaining bolt attaching converter to exhaust manifold.
(7) Remove catalytic converter.
(8) Remove and discard gasket.

INSPECTION

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

Check catalytic converter for a flow restriction. (Refer to 11 - EXHAUST SYSTEM - DIAGNOSIS AND TESTING) Exhaust System Restriction Check for procedure.

Visually inspect the catalytic converter element by using a borescope or equivalent. Remove both oxygen sensors and insert borescope. If borescope is not available, remove converter and inspect element using a flashlight. Inspect element for cracked or melted substrate.

NOTE: Before replacing a catalytic converter, determine the root cause of failure. Most catalytic converter failures are caused by air, fuel or ignition problems. (Refer to Appropriate Diagnostic Information) for test procedures.

INSTALLATION

(1) Clean manifold to converter sealing surfaces.
(2) Position new gasket on converter inlet flange (Fig. 5).
(3) Ensure exhaust manifold heat shield is in position, and loosely install converter with lower attaching bolt to exhaust manifold.
(4) Lower vehicle.

CATALYTIC CONVERTER - FRONT - 2.7L (Continued)

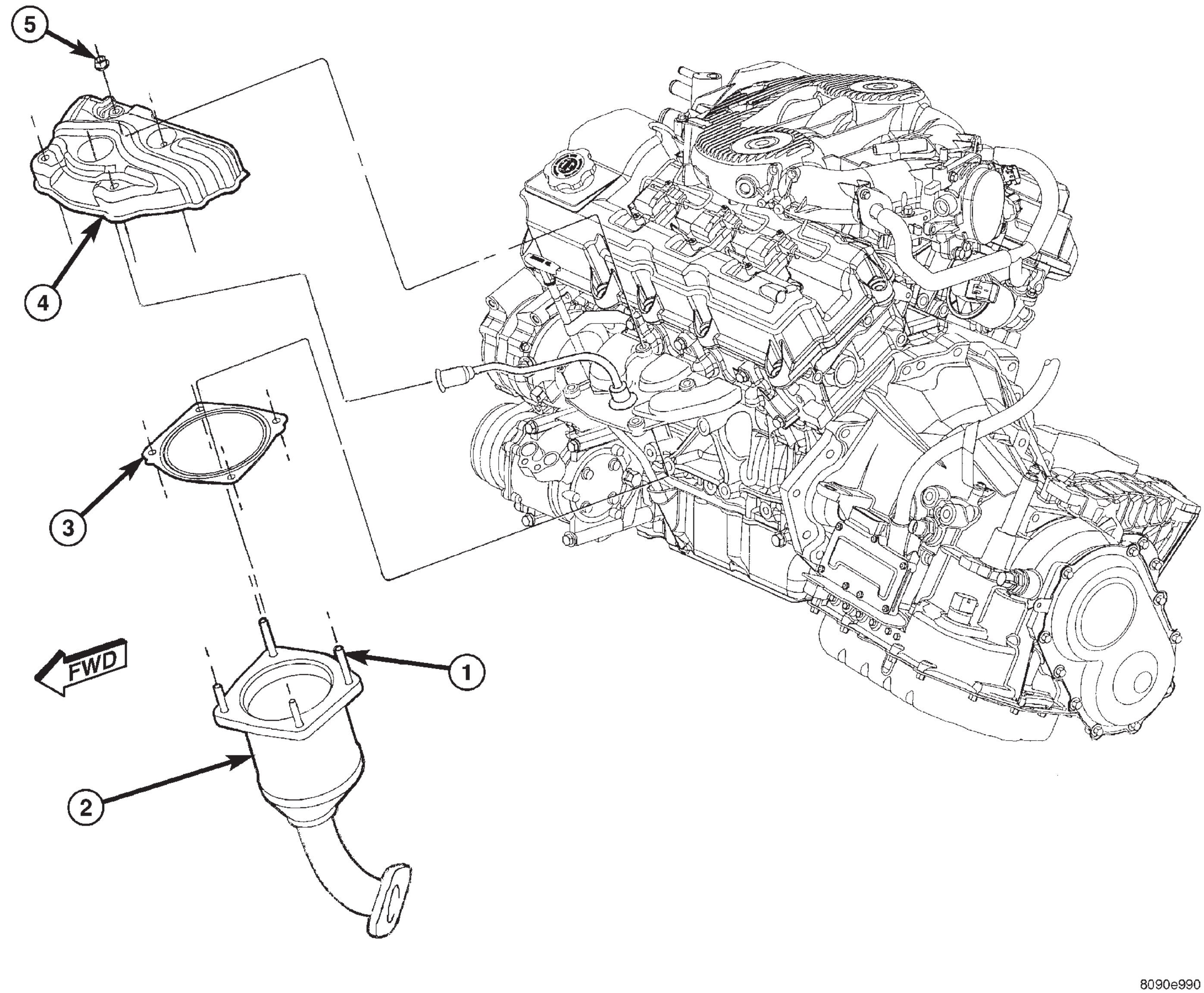

Fig. 5 CATALYTIC CONVERTER - FRONT 2.7L

1 - STUD
2 - CATALYTIC CONVERTER
3 - GASKET
4 - HEAT SHIELD
5 - NUT

(5) Install 3 nuts attaching converter to manifold. Torque nuts to 28 N·m (250 in. lbs.).

(6) Reconnect upstream oxygen sensor.

(7) Raise vehicle.

(8) Torque remaining attaching bolt to 28 N·m (250 in. lbs.).

(9) Install cross-under pipe (Refer to 11 - EXHAUST SYSTEM/CROSS-UNDER PIPE - INSTALLATION).

(10) Lower vehicle.

(11) Connect negative battery cable.

CATALYTIC CONVERTER - REAR - 2.7L

REMOVAL

(1) Disconnect negative battery cable.

(2) Raise vehicle on hoist.

(3) Remove entire exhaust system from vehicle (Refer to 11 - EXHAUST SYSTEM - REMOVAL)

(4) Remove exhaust cross-under pipe (Refer to 11 - EXHAUST SYSTEM/CROSS-UNDER PIPE - REMOVAL).

(5) Disconnect upstream oxgen sensor.

CATALYTIC CONVERTER - REAR - 2.7L (Continued)

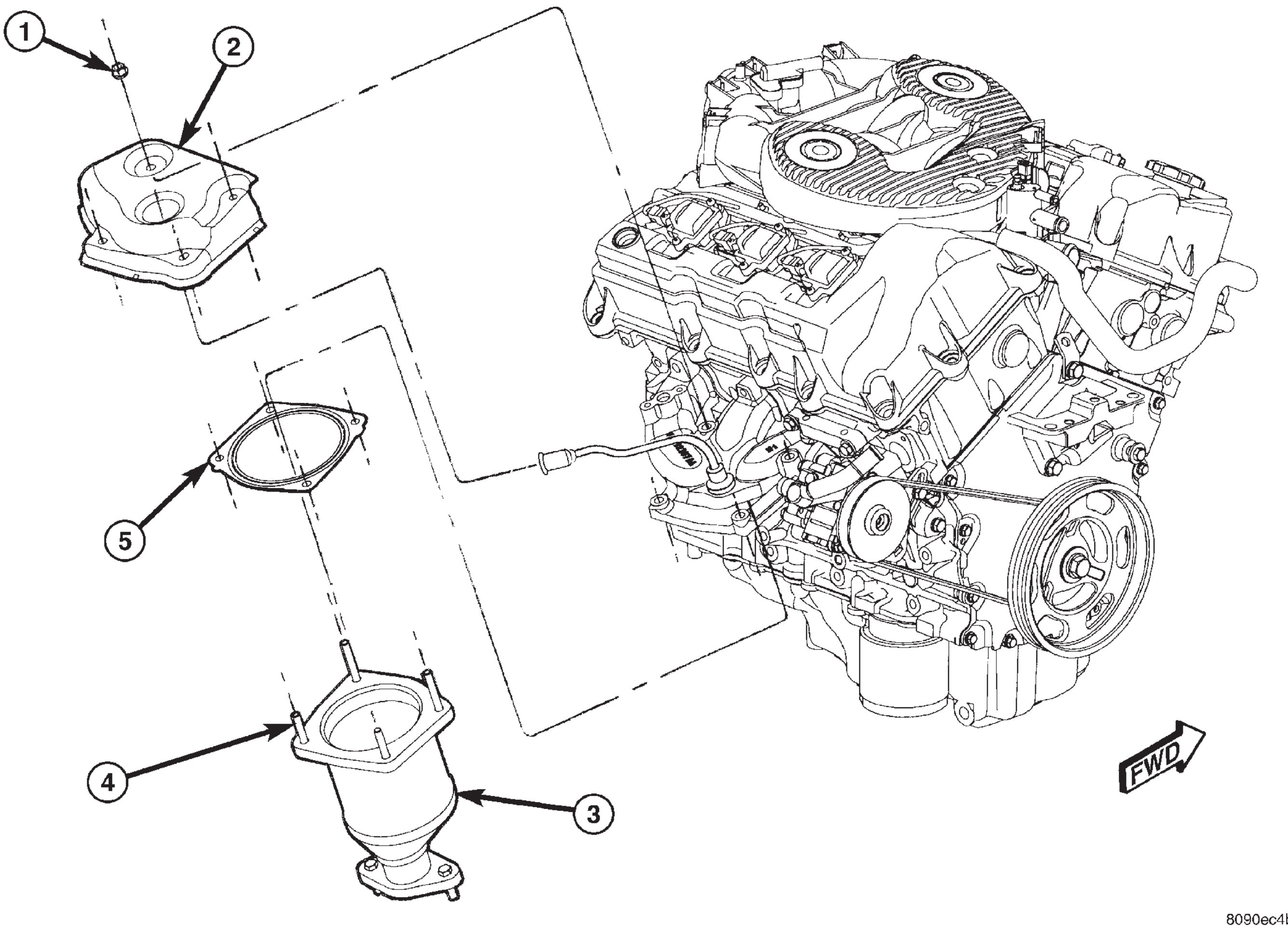

Fig. 6 CATALYTIC CONVERTER - REAR 2.7L

1 - NUT
2 - HEAT SHIELD
3 - CATALYTIC CONVERTER - REAR
4 - STUD
5 - GASKET

(6) Remove nuts attaching converter to exhaust manifold (Fig. 6).
(7) Remove exhaust manifold heat shield.
(8) Remove catalytic converter.
(9) Remove and discard gasket.

INSPECTION

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

Check catalytic converter for a flow restriction. (Refer to 11 - EXHAUST SYSTEM - DIAGNOSIS AND TESTING) Exhaust System Restriction Check for procedure.

Visually inspect the catalytic converter element by using a borescope or equivalent. Remove both oxygen sensors and insert borescope. If borescope is not available, remove converter and inspect element using a flashlight. Inspect element for cracked or melted substrate.

NOTE: Before replacing a catalytic converter, determine the root cause of failure. Most catalytic converter failures are caused by air, fuel or ignition problems. (Refer to Appropriate Diagnostic Information) for test procedures.

CATALYTIC CONVERTER - REAR - 2.7L (Continued)

INSTALLATION

(1) Clean manifold to converter sealing surfaces.

(2) Position new gasket on converter inlet flange (Fig. 6).

(3) Install converter to exhaust manifold.

(4) Install exhaust manifold heat shield into position.

(5) Install nuts attaching converter to manifold. Torque nuts to 28 N·m (250 in. lbs.).

(6) Connect upstream oxygen sensor.

(7) Install cross-under pipe(Refer to 11 - EXHAUST SYSTEM/CROSS-OVER PIPE - INSTALLATION).

(8) Install exhaust system on vehicle (Refer to 11 - EXHAUST SYSTEM - INSTALLATION).

(9) Lower vehicle.

(10) Connect negative battery cable.

CROSS-UNDER PIPE - 2.7L

REMOVAL

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(1) Raise vehicle on hoist.

(2) Disconnect downstream oxygen sensor connectors.

(3) Remove oil pan to transmission structural collar. (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - REMOVAL)

(4) Disconnect exhaust system pipe from cross-under pipe.

(5) Remove fasteners attaching cross-under pipe to catalytic converters (Fig. 7).

(6) Remove cross-under pipe (Fig. 7).

INSTALLATION

(1) Install new gasket to lower part of rear catalytic converter. If installing new cross-under pipe, transfer oxygen sensors to new pipe (Fig. 7).

(2) Loosely install cross-under pipe to catalytic converters (Fig. 7). Snug nuts up equally using hand pressure.

(3) Tighten 2 nuts for cross-under pipe to rear catalytic converter to 28 N·m (250 in. lbs.) (Fig. 7).

(4) Tighten 2 nuts for cross-under pipe to front catalytic converter to 28 N·m (250 in. lbs.) (Fig. 7).

(5) Connect exhaust system pipe to cross-under pipe. Tighten attaching fasteners to 28 N·m (250 in. lbs.)

(6) Install oil pan to transmission structural collar. (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - INSTALLATION)

(7) Reconnect downstream oxygen sensor connectors.

(8) Lower vehicle.

CROSS-UNDER PIPE - 2.7L (Continued)

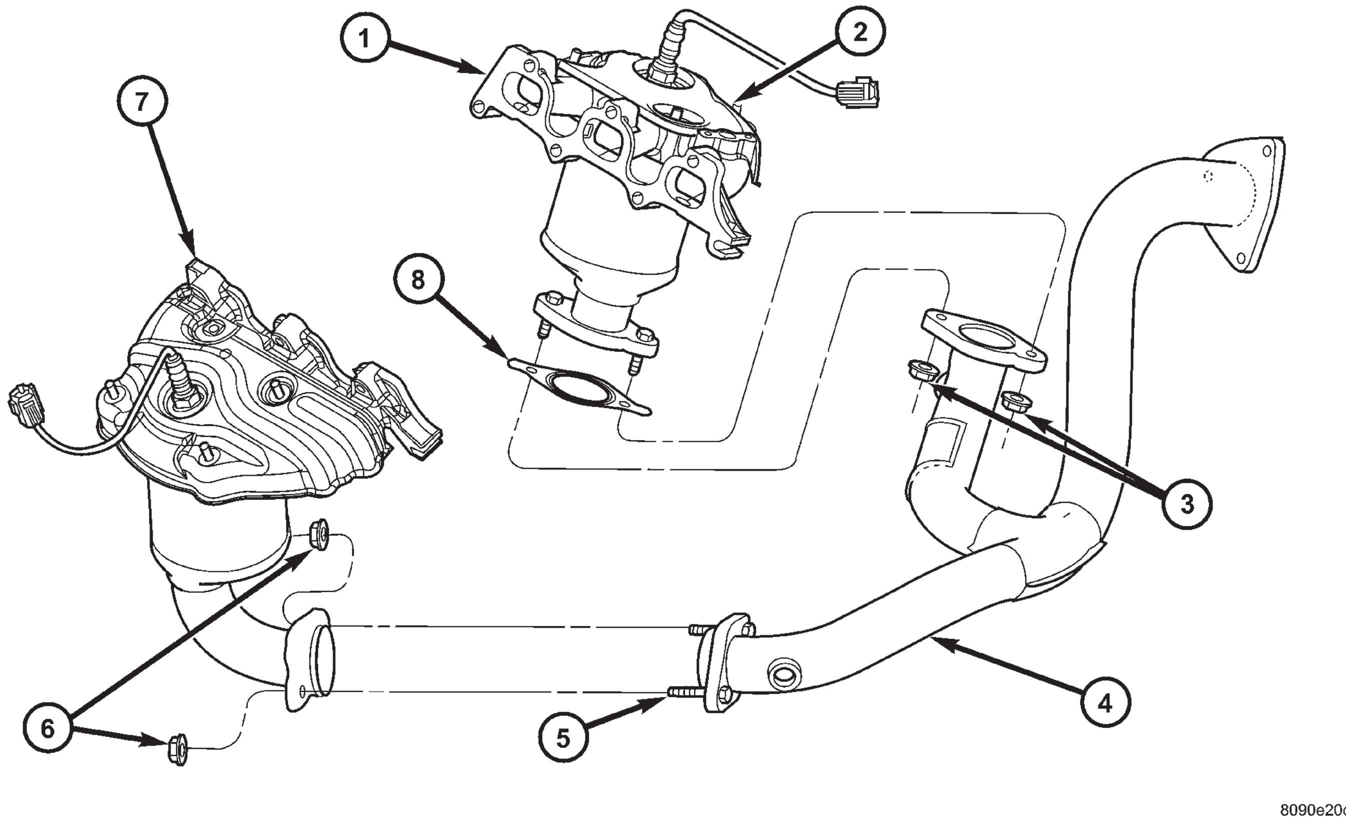


Fig. 7 CROSS-UNDER PIPE

1 - EXHAUST MANIFOLD - REAR
2 - CATALYTIC CONVERTER ATTACHING STUD
3 - NUTS - PIPE-TO-REAR CONVERTER
4 - CROSS-UNDER PIPE
5 - BOLT - PIPE-TO-FRONT CONVERTER
6 - NUT - PIPE-TO-FRONT CONVERTER
7 - EXHAUST MANIFOLD - FRONT
8 - GASKET - PIPE-TO-CONVERTER

EXHAUST PIPE - CROSS-UNDER PIPE TO RESONATOR PIPE - 2.7L

REMOVAL

NOTE: In the following procedure it is not necessary to separate the muffler/pipe assembly from the resonator/pipe assembly. They can both be removed as an assembly.

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

(1) Raise vehicle on hoist and apply penetrating oil to resonator/pipe assembly band clamp, and the fasteners that connect the exhaust system to the cross-under pipe (Fig. 1).

(2) Remove ground strap from muffler.

(3) Loosen band clamp for resonator/pipe assembly.

CAUTION: Do not use any tools to remove the rubber isolators–remove by hand only. Soapy water or silicone–based lubricant spray may be used to assist removal/installation of isolators. DO NOT use a petroleum–based lubricant on the isolators, as damage to the rubber material can occur.

(4) Remove support isolators from muffler supports.

(5) Remove resonator/pipe and muffler/pipe as an assembly.

EXHAUST PIPE - CROSS-UNDER PIPE TO RESONATOR PIPE - 2.7L (Continued)

(6) Remove fasteners that attach exhaust pipe to cross-under pipe.
(7) Remove exhaust pipe.

INSTALLATION

NOTE: Always work from the front to rear of exhaust system when aligning and tightening exhaust system components.

(1) Loosely attach exhaust pipe to cross-under pipe.
(2) Loosely install resonator/pipe and muffler/pipe assembly to exhaust pipe.
(3) Install support isolators to muffler supports.
(4) Align exhaust pipe and resonator/muffler pipe assembly to maintain position and proper clearance with underbody parts. All support isolators should have equal load on them. Tighten fasteners attaching exhaust pipe to cross-under pipe to 28 N·m (250 in. lbs.).
(5) Tighten resonator/pipe assembly band clamp to 54 N·m (40 ft. lbs.).
(6) Connect ground strap to muffler.
(7) Lower vehicle.

MUFFLER/PIPE ASSEMBLY

REMOVAL

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

(1) Raise vehicle on hoist and apply penetrating oil to band clamp of component being removed (Fig. 1).
(2) Remove ground strap from muffler.
(3) Loosen band clamp for muffler/pipe assembly.

CAUTION: Do not use any tools to remove the rubber isolators–remove by hand only. Soapy water or silicone–based lubricant spray may be used to assist removal/installation of isolators. DO NOT use a petroleum–based lubricant on the isolators, as damage to the rubber material can occur.

(4) Remove support isolators from muffler supports (Fig. 2).
(5) Remove muffler/pipe assembly from resonator pipe.

NOTE: Band clamps are spot welded to exhaust system. If a band clamp must be replaced, the spot weld must be ground off the exhaust pipe.

NOTE: When replacement is required on any component of the exhaust system, it is most important that original equipment parts (or their equivalent) be used for the following reasons:

- To insure proper alignment with other parts in the system.
- Provide acceptable exhaust noise levels and does not change exhaust system back pressure that could affect emissions and performance.

INSTALLATION

NOTE: Always work from the front to rear of exhaust system when aligning and tightening exhaust system components.

(1) Loosely install muffler/pipe assembly onto resonator pipe.
(2) Install support isolators to muffler supports.
(3) Align muffler/pipe assembly to maintain position and proper clearance with underbody parts. All support isolators should have equal load on them. Tighten band clamp to 54 N·m (40 ft. lbs.).
(4) Connect ground strap to muffler.
(5) Lower vehicle.

RESONATOR/PIPE ASSEMBLY

REMOVAL

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

(1) Raise vehicle on hoist and apply penetrating oil to band clamps of components being removed (Fig. 1).
(2) Remove muffler/pipe assembly (Refer to 11 - EXHAUST SYSTEM/MUFFLER - REMOVAL).
(3) Loosen band clamp for resonator/pipe assembly.
(4) Remove resonator/pipe assembly.

NOTE: Band clamps are spot welded to exhaust system. If a band clamp must be replaced, the spot weld must be ground off the exhaust pipe.

RESONATOR/PIPE ASSEMBLY (Continued)

NOTE: When replacement is required on any component of the exhaust system, it is most important that original equipment parts (or their equivalent) be used for the following reasons:

- To insure proper alignment with other parts in the system.
- Provide acceptable exhaust noise levels and does not change exhaust system back pressure that could affect emissions and performance.

INSTALLATION

NOTE: Always work from the front to rear of exhaust system when aligning and tightening exhaust system components.

(1) Loosely install resonator/pipe assembly and muffler/pipe assembly.

(2) Install support isolators to muffler supports.

(3) Align resonator/pipe assembly and muffler/pipe assembly to maintain position and proper clearance with underbody parts. All support isolators should have equal load on them. Tighten resonator/pipe assembly band clamp to 54 N·m (40 ft. lbs.).

(4) Tighten muffler/pipe assembly band clamp to 54 N·m (40 ft. lbs.).

(5) Connect ground strap to muffler.

(6) Lower vehicle.

HEAT SHIELDS

DESCRIPTION

The exhaust system heat shields are attached to the under body of the vehicle (Fig. 8).

OPERATION

Heat shields are needed to protect both the vehicle and the environment from the high temperatures developed near the catalytic converter.

Avoid application of rust prevention compounds or undercoating materials to exhaust system floor pan heat shields on cars so equipped. Light over spray near the edges is permitted. Application of coating will greatly reduce the efficiency of the heat shields resulting in excessive floor pan temperatures and objectionable fumes.

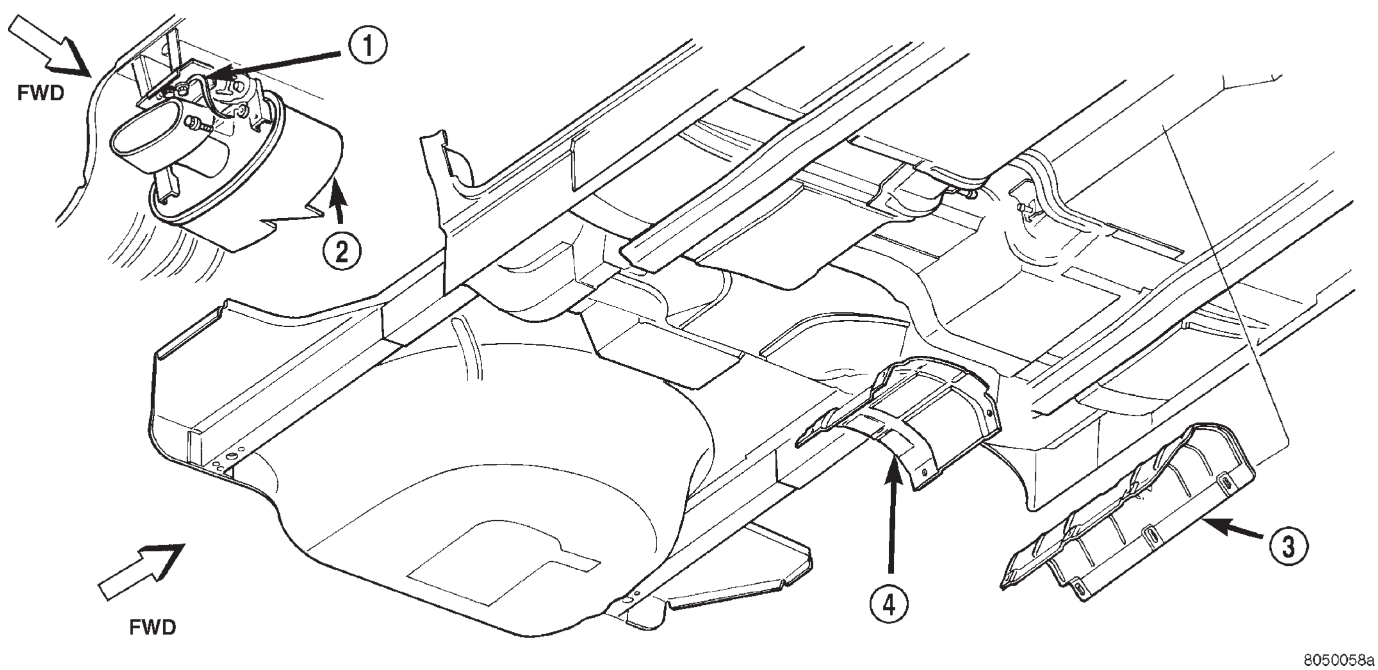


Fig. 8 Heat Shields

1 - GROUND STRAP
2 - MUFFLER
3 - HEAT SHIELD
4 - RESONATOR HEAT SHIELD

FRAME & BUMPERS

TABLE OF CONTENTS

BUMPERS

SPECIFICATIONS

TORQUE SPECIFICATIONS

DESCRIPTION	TORQUE
Rear Bumper Reinforcement	
Attaching Nut	28 N·m (21 ft. lbs.)
Front Suspension Crossmember	
Attaching Bolt Front	109 N·m (80 ft. lbs.)
Attaching Bolt Rear	102 N·m (75 ft. lbs.)
Radiator Support Crossmember	
Attaching Bolts	115 N·m (85 ft. lbs.)

FRONT FASCIA - JR-41

REMOVAL

(1) Release hood latch and open hood.
(2) Remove screws attaching fascia to front splash shields.
(3) Remove front wheelhouse splash shields as necessary to gain assess to fascia fasteners.
(4) Remove fasteners attaching top of fascia to upper crosmember.
(5) Remove fasteners attaching bottom of fascia to radiator closure panel and to brake ducts.
(6) Remove screws attaching fascia to front fenders (Fig. 1).
(7) Slide fascia forward to disengage hooks holding fascia to bottom of fender.
(8) Remove fascia from vehicle.
(9) Disengage fog lamp wire connector from body harness, if equipped.

INSTALLATION

(1) Engage fog lamp wire connector to body wire harness, if equipped.
(2) Place fascia on position on vehicle.
(3) Install fasteners attaching fascia to front fenders.
(4) Install fasteners to hold bottom of fascia to radiator closure panel and brake ducts.
(5) Install fasteners to hold top of fascia to upper crossmember.
(6) Install front wheelhouse splash shields.

FRONT FASCIA - JR-41 (Continued)

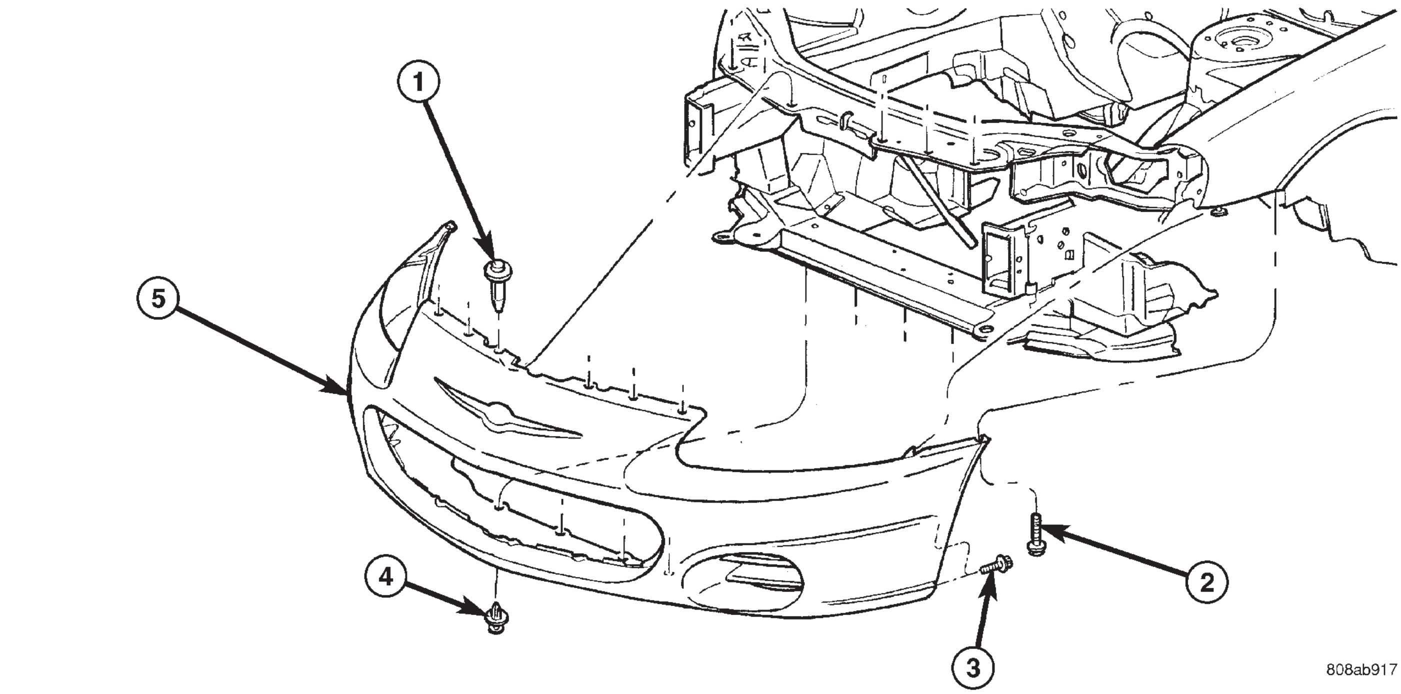


Fig. 1 Front Fascia

1 - PUSH PIN (FASCIA TO UPPER CROSMEMBER)
2 - SCREW AND WASHER (FASCIA TO FENDER)
3 - SCREW (FASCIA TO SPLASH SHIELD)
4 - PUSH PIN
(FASCIA TO LOWER CROSSMEMBER AND BRAKE DUCTS)
5 - FRONT FASCIA

FRONT FASCIA - JR-27

REMOVAL

It is not necessary to remove the headlamp assemblies to remove the front bumper fascia.

(1) Release hood latch and open hood.

(2) Remove screws holding top of grille to headlamp adapter assembly (Fig. 2).

(3) Hoist and support vehicle on safety stands. Refer to Group 0, Lubrication and Maintenance, for proper hoisting and jacking procedures.

(4) Remove push-in fasteners holding fascia to underside of bumper reinforcement.

(5) Remove inner wheelhouse as necessary to access nuts holding fascia wings to fender.

(6) Remove nuts holding fascia wings to fender.

(7) Slide fascia forward and separate fascia from vehicle.

(8) Disengage fog lamp wire connectors from back of fog lamps, if so equipped.

INSTALLATION

(1) Ensure that energy management foam is properly installed in front fascia (Fig. 3).

(2) Engage fog lamp wire connectors to back of fog lamps, if so equipped.

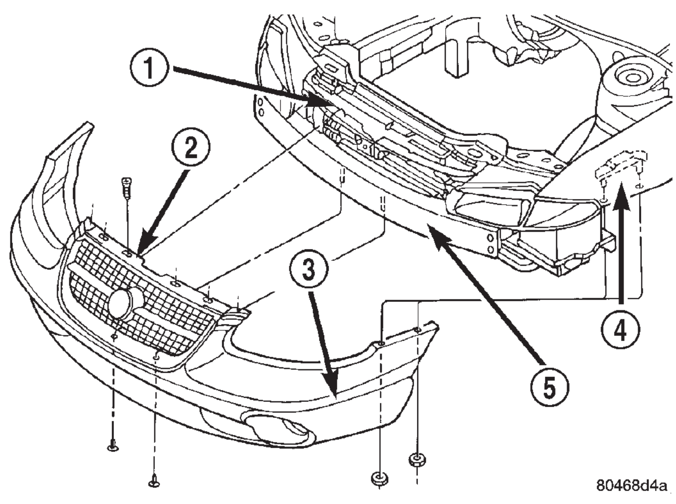


Fig. 2 Front Bumper Fascia

1 - HEADLAMP ADAPTER ASSEMBLY
2 - GRILLE
3 - FASCIA
4 - FENDER
5 - FRONT BUMPER REINFORCEMENT

(3) Position fascia on vehicle and slide rearward, being careful to ensure that the grille slides between hood latch handle and headlamp adapter assembly.

(4) Install nuts holding fascia wings to fender.

(5) Install inner wheelhouse.

FRONT FASCIA - JR-27 (Continued)

(6) Install push-in fasteners holding fascia to underside of bumper reinforcement.

(7) Install screws holding top of grille to headlamp adapter assembly.

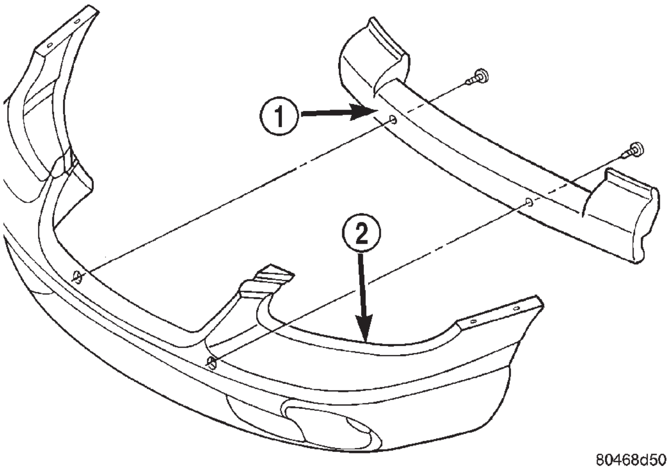


Fig. 3 Front Bumper Energy Management Foam

1 - FRONT BUMPER ENERGY MANAGEMENT FOAM
2 - FRONT FASCIA

HEADLAMP ADAPTER ASSEMBLY

REMOVAL

(1) Remove headlamp assemblies. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ HEADLAMP UNIT - REMOVAL) for proper procedure.

(2) Remove front fascia.

(3) Remove bolts holding headlamp adapter to radiator closure panel from headlamp cavities (Fig. 4).

(4) Remove bolts holding underside of adapter assembly to upper radiator crossmember.

(5) Separate headlamp adapter assembly from vehicle.

INSTALLATION

(1) Position headlamp adapter assembly on vehicle.

(2) Loosely install bolts holding headlamp adapter to radiator closure panel from headlamp cavities.

(3) Loosely install bolts holding underside of adapter assembly to upper radiator crossmember.

(4) Tighten all bolts.

(5) Install front fascia.

(6) Install headlamp assemblies. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/ HEADLAMP UNIT - INSTALLATION) for proper procedures.

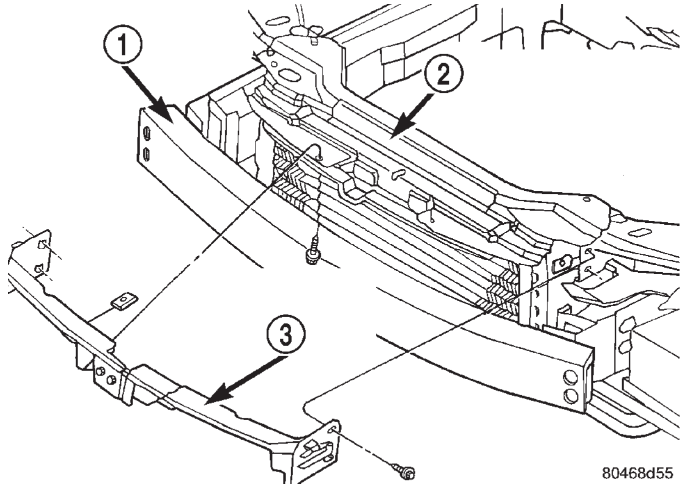


Fig. 4 Headlamp

1 - FRONT BUMPER REINFORCEMENT
2 - UPPER RADIATOR SUPPORT CROSSMEMBER
3 - HEADLAMP ADAPTER ASSEMBLY

REAR BUMPER REINFORCEMENT

REMOVAL

(1) Remove rear fascia.

(2) Support bumper reinforcement on a suitable lifting device.

(3) Mark position of nuts on frame rail to aid in installation.

(4) Remove nuts attaching rear bumper reinforcement to frame rail (Fig. 5).

(5) Remove bumper reinforcement from vehicle.

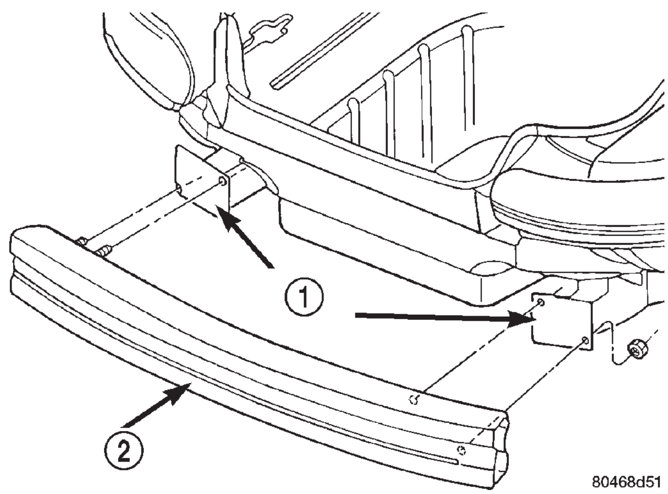


Fig. 5 Rear Bumper Reinforcement

1 - FRAME RAIL
2 - FRONT BUMPER REINFORCEMENT

REAR BUMPER REINFORCEMENT (Continued)

INSTALLATION

(1) Position rear bumper reinforcement on vehicle.

(2) Install nuts attaching bumper reinforcement to frame rail. Use marks made previously to properly position bumper reinforcement.

(3) Tighten nuts to 28 N·m (250 in. lbs.) torque.

(4) Install rear fascia.

REAR FASCIA - JR-41

REMOVAL

(1) Release decklid latch and open decklid.

(2) Remove left rear tail lamp and disengage license plate wire connector from tail lamp. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TAIL LAMP - REMOVAL).

(3) Peel back trunk carpeting at taillamps and remove nut and washer from fascia to quarter panel bracket. Discard washer.

(4) Remove push-in fasteners attaching decklid slam bumpers to top of fascia.

(5) Remove push-in fastener attaching center of fascia to rear closure panel.

(6) Remove screws attaching fascia to rear wheelhouse splash shields (Fig. 6).

(7) Remove screws attaching fascia to quarter panel at the wheelhouse opening.

(8) Slide fascia rearward to disengage hooks holding fascia to bottom of quarter panel.

(9) Remove fascia from vehicle.

INSTALLATION

(1) Position fascia on vehicle.

(2) Slide fascia forward to engage hooks attaching fascia to bottom of quarter panel.

(3) Install push-in fastener attaching center of fascia to rear closure panel.

(4) Install push-in fasteners attaching decklid slam bumpers to top of fascia.

(5) Install new nut and washer to fascia to quarter panel bracket located in the trunk area.

(6) Install screws attaching fascia to quarter panel at wheelhouse opening.

(7) Install fasteners attaching fascia to rear wheelhouse splash shields.

(8) Engage license plate wire connector to left tail lamp.

(9) Install tail lamps. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/TAIL LAMP - INSTALLATION).

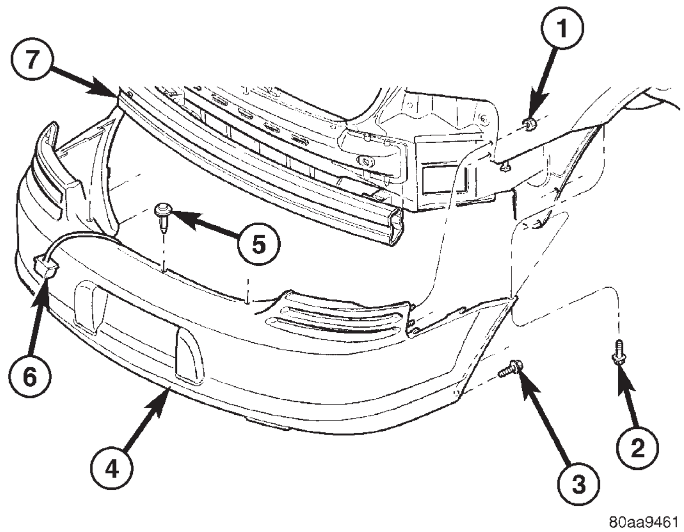


Fig. 6 Rear Bumper

1 - NUT (FASCIA TO QUARTER PANEL)
2 - SCREW AND WASHER (FASCIA TO QUARTER PANEL)
3 - SCREW (FASCIA TO SPLASHSHIELD)
4 - REAR FASCIA
5 - PUSH PIN (FASCIA TO DECKLID OPENING REINFORCMENT)
6 - LICENSE PLATE LAMP HARNESS
7 - BUMPER REINFORCEMENT

REAR FASCIA - JR-27

REMOVAL

(1) Release decklid latch and open decklid.

(2) Remove trunk lining as necessary to access nut attaching rear fascia to rear closure panel.

(3) Remove screws attaching fascia to rear closure panel and nuts securing to inner quarter panel (Fig. 7).

(4) Hoist and support vehicle on safety stands. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(5) Remove push-in fasteners attaching bottom of fascia to rear bumper reinforcement.

(6) Disengage license plate lamp wire connector.

(7) Remove rear wheelhouse splash shields as necessary to access nuts attaching fascia to quarter panels.

(8) Remove nuts attaching rear fascia to quarter panels.

(9) Remove screw attaching fascia to right rear quarter panel.

(10) Slide fascia rearward and remove from vehicle.

REAR FASCIA - JR-27 (Continued)

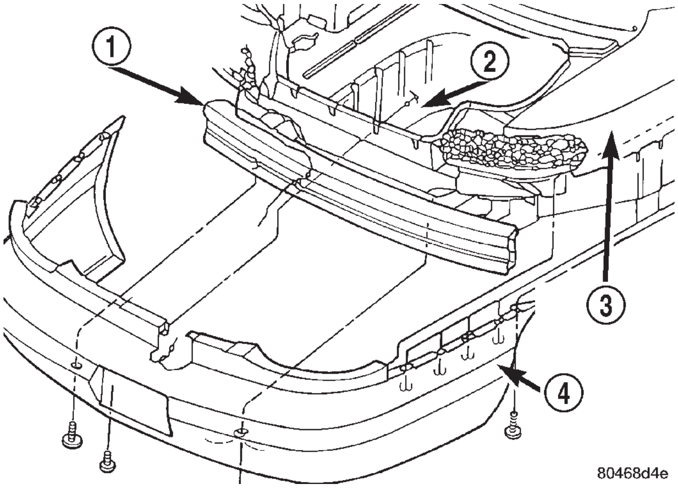


Fig. 7 Rear Bumper Fascia

1 - REAR BUMPER REINFORCEMENT
2 - TRUNK
3 - QUARTER PANEL
4 - REAR BUMPER FASCIA

INSTALLATION

(1) Ensure that the energy management foam is properly installed in rear fascia (Fig. 8).

(2) Position fascia on vehicle and slide forward to engage studs on quarter panel.

CAUTION: Ensure that license plate wire connector is properly routed through energy management foam and fascia.

(3) Install nuts attaching rear fascia to quarter panels, starting with the rearward nut working forward.

(4) Install screw attaching rear fascia to right rear quarter panel.

NOTE: Hold fascia completely forward until first nut is secured.

(5) Install rear wheelhouse splash shields.

(6) Connect license plate lamp wire connector.

(7) Install push-in fasteners attaching rear fascia to rear bumper reinforcement.

(8) Install nuts attaching rear fascia to inner quarter panel.

(9) Install screws attaching rear fascia to closure panel.

(10) Install trunk lining.

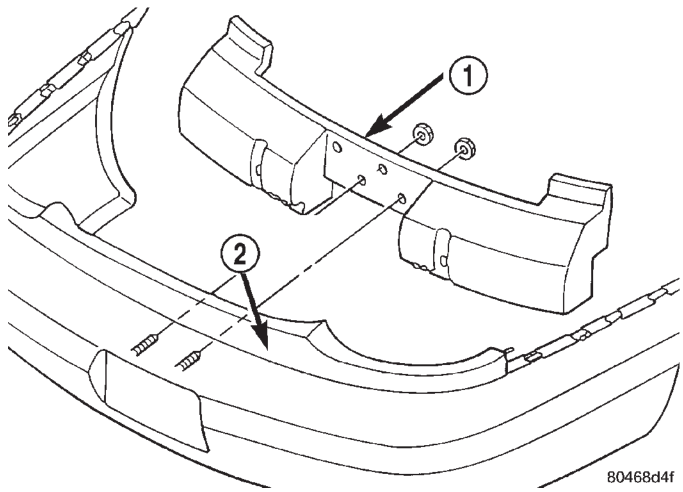


Fig. 8 Rear Bumper Energy Management Foam

1 - ENERGY MANAGEMENT FOAM
2 - REAR BUMPER FASCIA

FRAME

SPECIFICATIONS - FRAME DIMENSIONS

Frame dimensions are listed in metric scale. All dimensions are from center to center of Principal Locating Point (PLP), or from center to center of PLP and fastener location.

VEHICLE PREPARATION

Position the vehicle on a level work surface. Using screw or bottle jacks, adjust the vehicle PLP heights to the specified dimension above a level work surface. Vertical dimensions can be taken from the work surface to the locations indicated were applicable.

FRAME (Continued)

INDEX

DESCRIPTION	FIGURE
ENGINE COMPARTMENT TOP VIEW	9
ENGINE COMPARTMENT SIDE VIEW	10
FORWARD FRAME SECTION BOTTOM VIEW	11
REAR FRAME SECTION SIDE VIEW	12
REAR FRAME SECTION BOTTOM VIEW	13

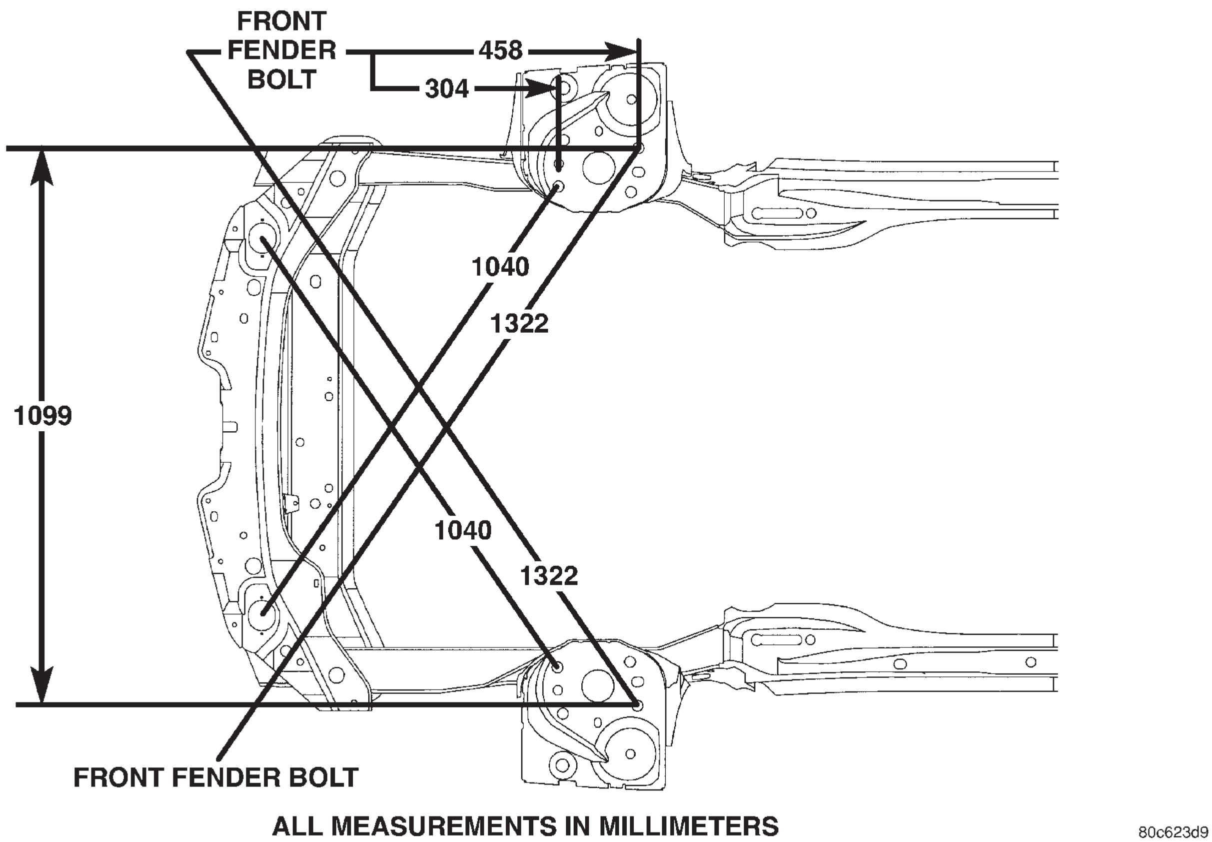


Fig. 9 ENGINE COMPARTMENT TOP VIEW

FRAME (Continued)

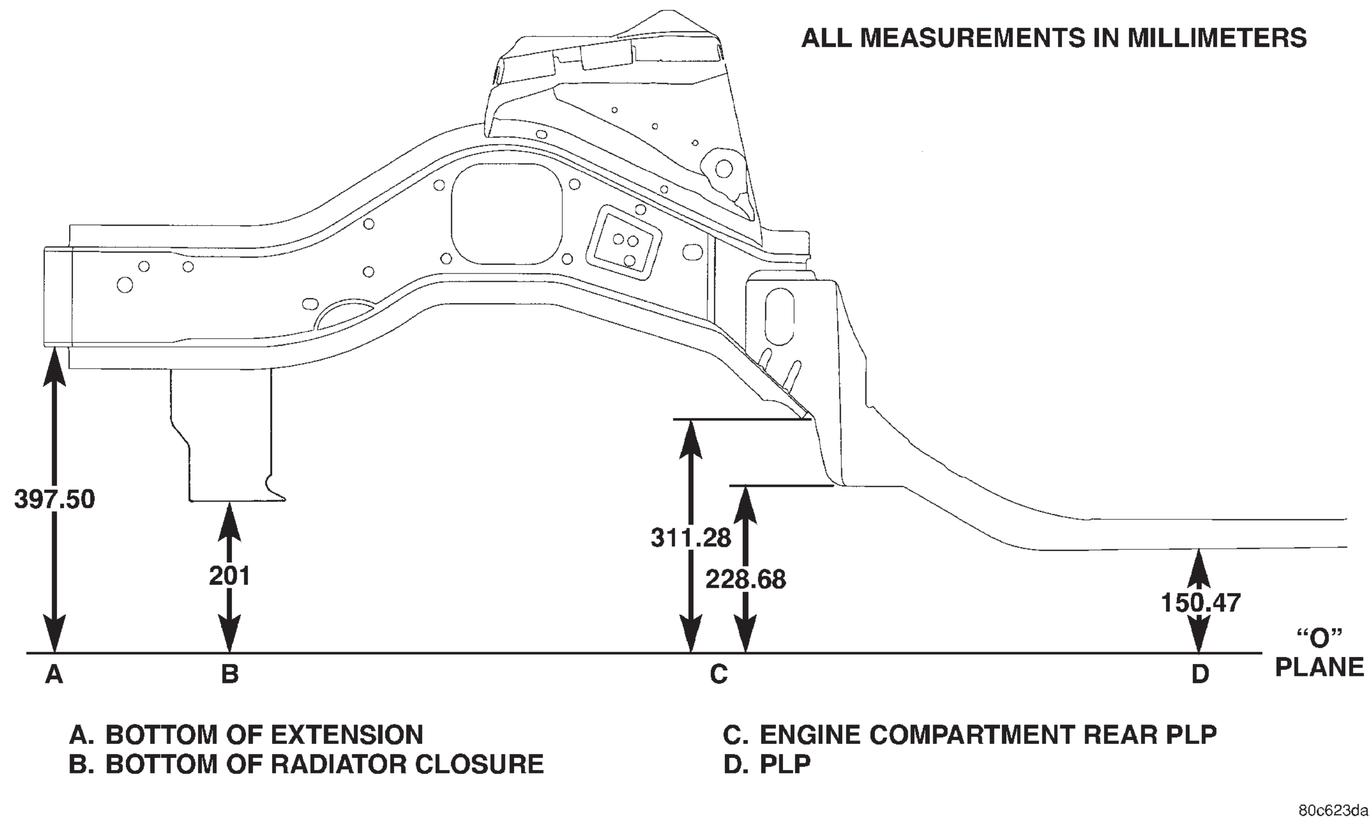


Fig. 10 ENGINE COMPARTMENT SIDE VIEW

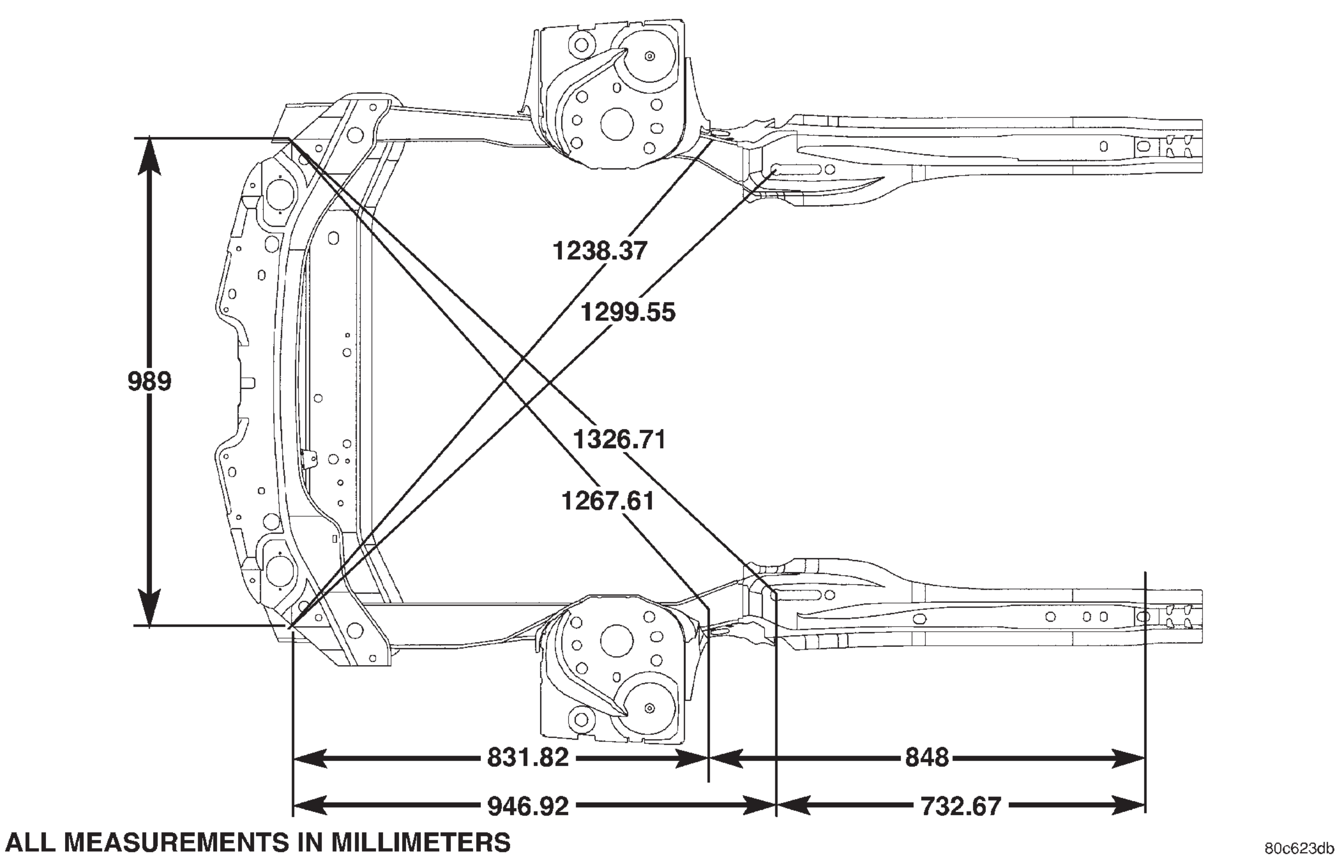


Fig. 11 FORWARD FRAME SECTION BOTTOM VIEW

FRAME (Continued)

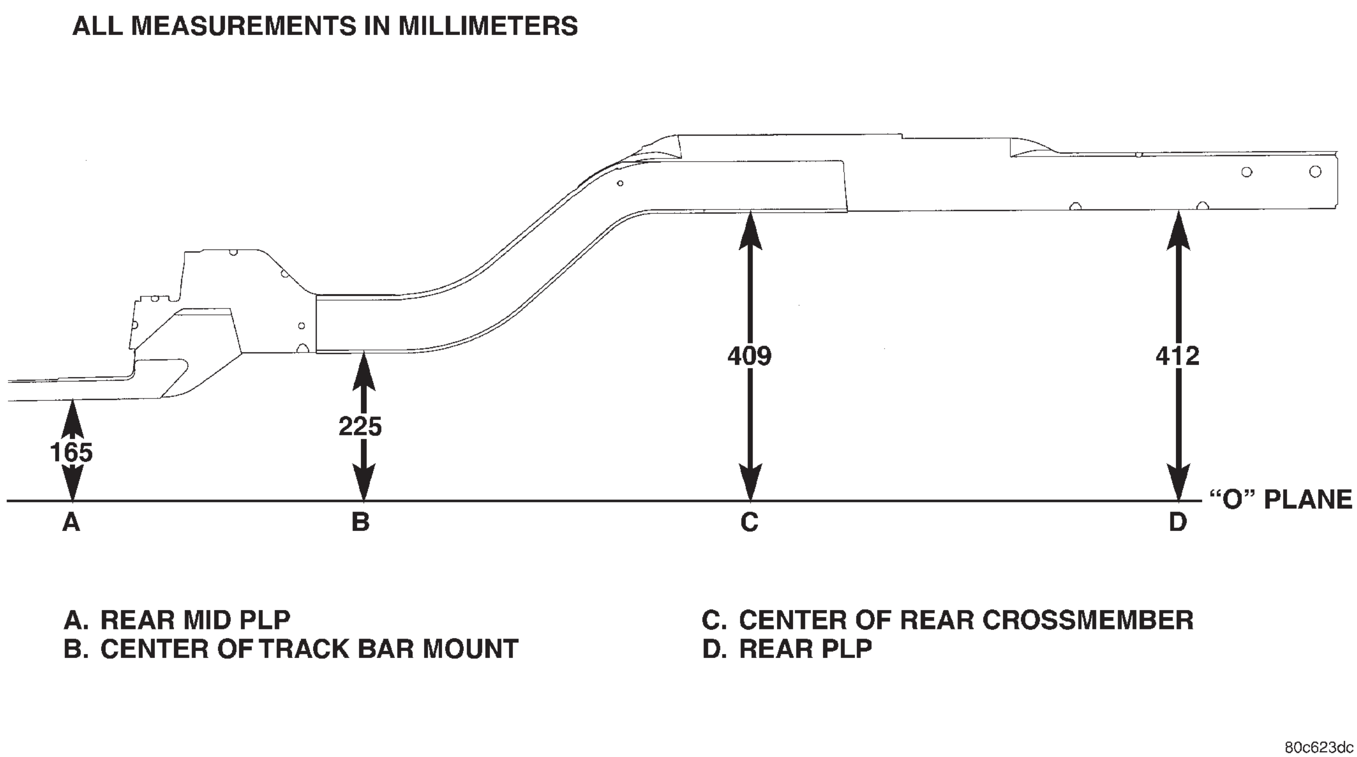


Fig. 12 REAR FRAME SECTION SIDE VIEW

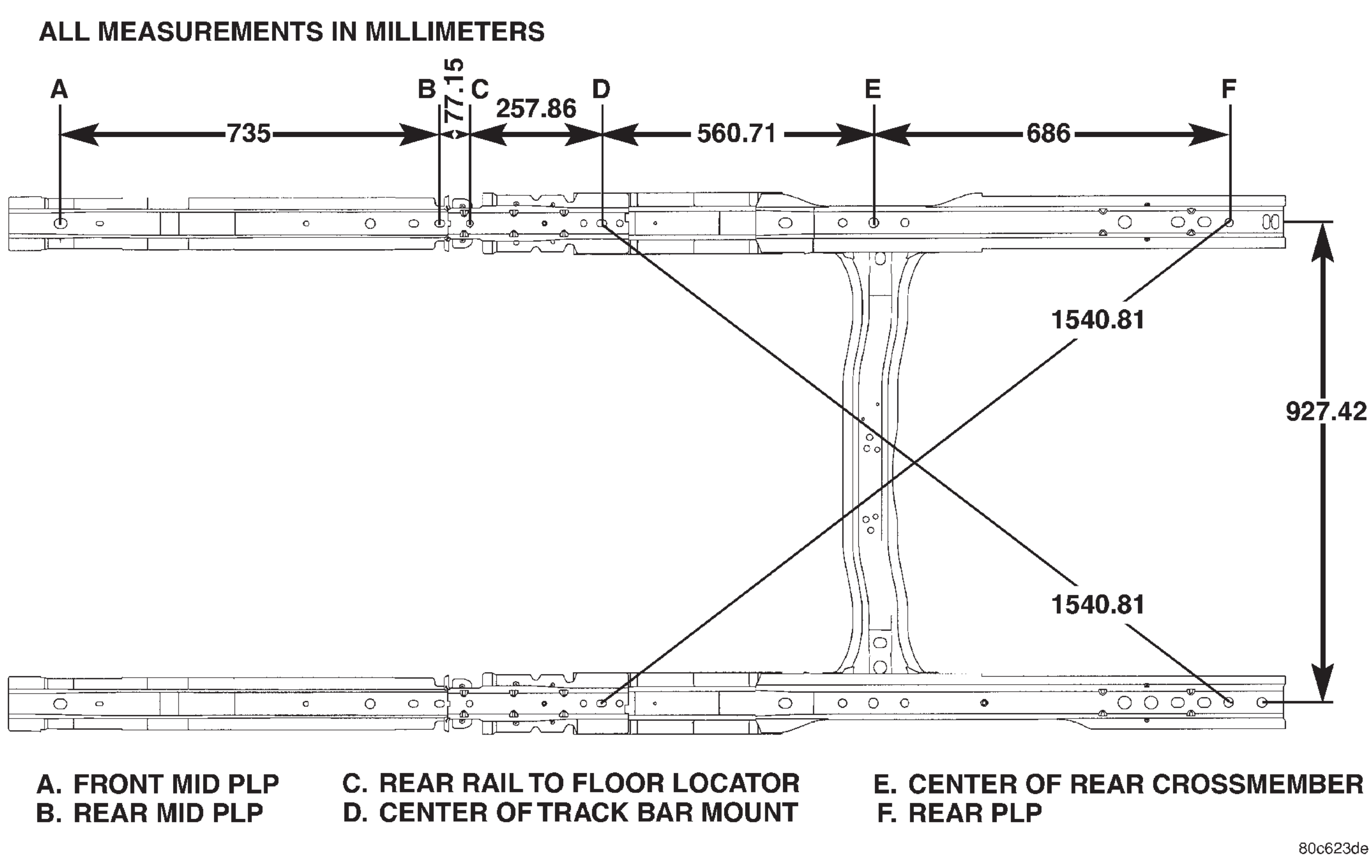


Fig. 13 REAR FRAME SECTION BOTTOM VIEW

FRONT SUSPENSION CROSSMEMBER

REMOVAL

(1) Hoist and support vehicle on safety stands. (Refer to LUBRICATION & MAINTENANCE/HOISTING - SERVICE PROCEDURE).

(2) Place a suitable lifting device under front suspension crossmember.

(3) Remove bolts attaching suspension strut to the lower control arm. (Refer to 2 - SUSPENSION/FRONT/STRUT - REMOVAL).

(4) Disengage lower ball joints from lower control arms. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - REMOVAL).

(5) Remove bolts attaching front of suspension crossmember to frame rails under upper control arms.

(6) Loosen bolts attaching rear of suspension crossmember to frame rail torque boxes.

(7) Allow the front of the suspension crossmember to swing away from the frame rails.

(8) Remove bolts attaching steering gear to top of suspension crossmember (Fig. 14).

CAUTION: Do not allow steering gear to hang by the pressure or return hoses, damage to hoses can result.

(9) Using mechanics wire, tie steering gear to structure above.

(10) Raise crossmember back into position.

(11) Remove bolts attaching rear of crossmember to frame rail torque boxes.

(12) Lower front suspension crossmember away from bottom of vehicle.

INSTALLATION

(1) Raise front suspension crossmember into position on vehicle.

(2) Loosely install bolts attaching rear of crossmember to frame rail torque boxes.

(3) Lower crossmember and install bolts attaching steering gear to top of suspension crossmember.

(4) Raise crossmember into position.

(5) Tighten bolts holding rear of suspension crossmember to frame rail torque boxes.

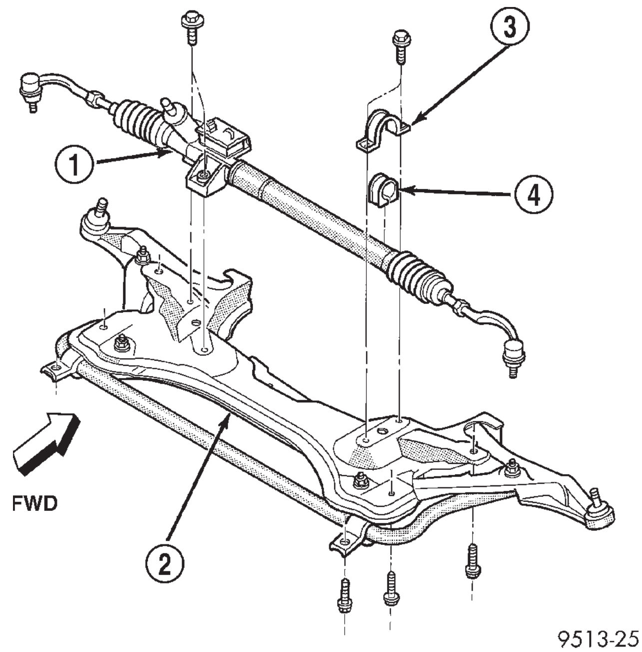


Fig. 14 Front Suspension Crossmember

1 - STEERING GEAR
2 - FRONT SUSPENSION CROSSMEMBER
3 - CLAMP
4 - ISOLATOR

(6) Install bolts attaching front of suspension crossmember to frame rails under upper control arm.

(7) Engage lower ball joint to lower control arms. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - INSTALLATION).

(8) Install bolts attaching suspension strut to lower control arm. (Refer to 2 - SUSPENSION/FRONT/STRUT - INSTALLATION).

REAR SUSPENSION CROSSMEMBER

DESCRIPTION

This vehicle is equipped with a bolt in type rear suspension crossmember. The crossmember on this vehicle is the same for all of the optional suspensions that are available on the vehicle.

REAR SUSPENSION CROSSMEMBER (Continued)

REMOVAL

(1) Raise vehicle on jackstands or centered on a frame contact type hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - SERVICE PROCEDURE).

(2) Remove both rear wheel and tire assemblies from the vehicle.

(3) Remove the shock absorber clevis bracket to rear knuckle attaching bolt and nut on both sides of the vehicle (Fig. 15).

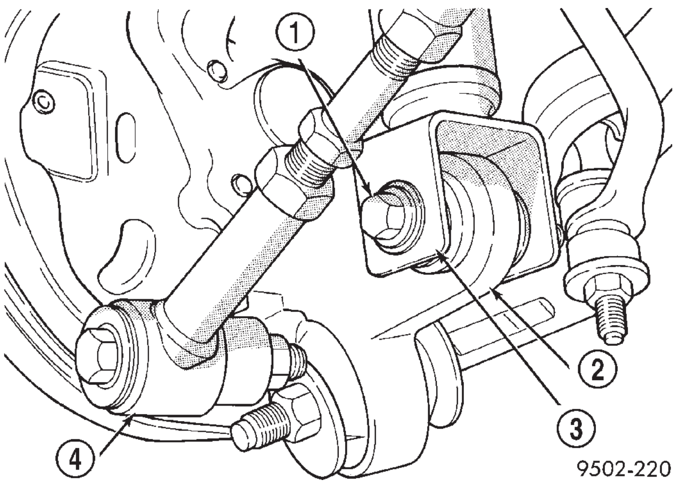


Fig. 15 Shock Absorber To Knuckle Attaching

1 - ATTACHING BOLT
2 - REAR KNUCKLE
3 - SHOCK ABSORBER CLEVIS BRACKET
4 - LATERAL LINK

(4) Remove muffler support bracket from rear frame rail (Fig. 16).

(5) Remove the rear exhaust pipe hanger from the rear suspension crossmember (Fig. 17). Let exhaust system drop down as far as possible.

(6) Position a transmission jack and wooden block under the center of the rear suspension crossmember to support and lower crossmember during removal (Fig. 18).

(7) If vehicle is equipped with antilock brakes, remove routing clips for wheel speed sensor cable from brackets on upper control arm (Fig. 19).

(8) Remove the nuts and bolts on each side of vehicle attaching the 4 lateral links to the knuckles.

(9) Remove the 4 bolts attaching the rear suspension crossmember to rear frame rails (Fig. 20).

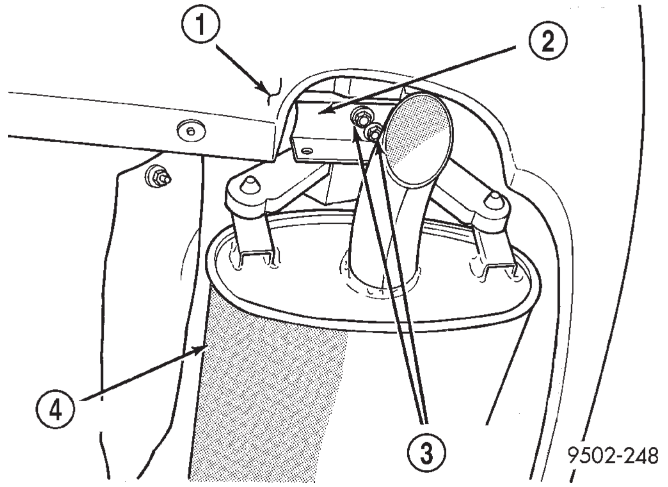


Fig. 16 Muffler Support Bracket

1 - REAR FASCIA
2 - MUFFLER SUPPORT BRACKET
3 - ATTACHING BOLTS
4 - MUFFLER

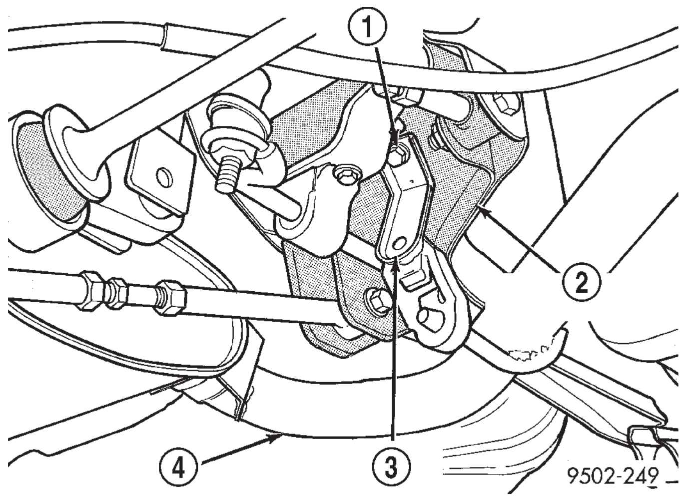


Fig. 17 Exhaust Pipe Hanger At Rear Suspension Crossmember

1 - BOLT
2 - REAR SUSPENSION CROSSMEMBER
3 - HANGER BRACKET
4 - EXHAUST PIPE

(10) Lower the rear suspension crossmember enough to access the upper control arm pivot bar to crossmember attaching bolts (Fig. 21). Remove the 4 bolts attaching the upper control arms to the suspension crossmember. Remove the control arms from the crossmember.

REAR SUSPENSION CROSSMEMBER (Continued)

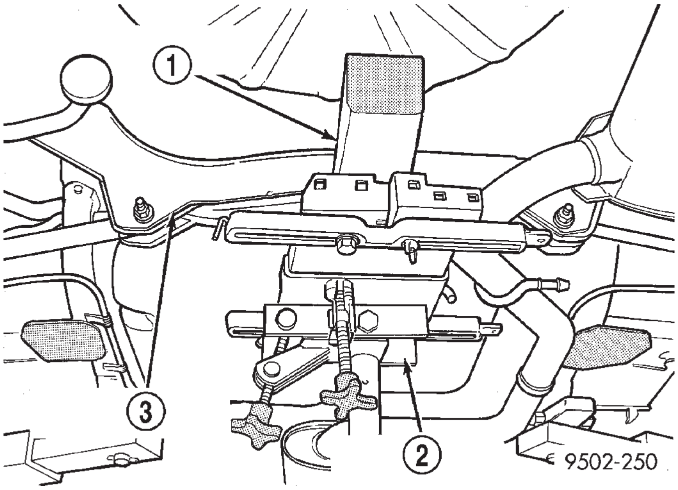


Fig. 18 Lowering And Supporting Rear Suspension Crossmember

1 - WOODEN BLOCK
2 - TRANSMISSION JACK
3 - REAR SUSPENSION CROSSMEMBER

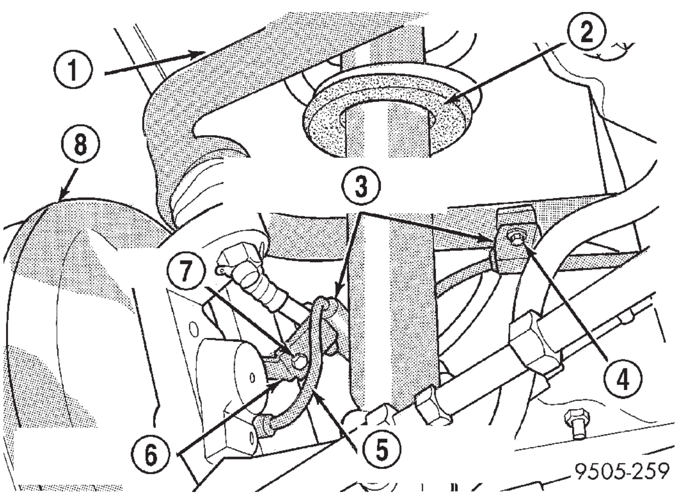


Fig. 19 Speed Sensor Cable Attachment To Control Arm

1 - UPPER CONTROL ARM
2 - SHOCK ABSORBER
3 - SPEED SENSOR CABLE ROUTING CLIPS
4 - BOLT
5 - SPEED SENSOR CABLE
6 - BRAKE FLEX HOSE BRACKET
7 - BOLT
8 - BRAKE DRUM

(11) Lower the rear suspension crossmember, lateral arms and stabilizer bar as far as possible using the transmission jack. Then with the aid of a helper remove rear suspension crossmember from the vehicle.

NOTE: When installing the lateral links on the crossmember, the lateral link attaching bolts must be installed as listed below. Install the forward lateral link to crossmember bolts so that the head of the bolt will be toward the front of the vehicle when the crossmember is installed. Install the rear lateral link to crossmember bolts so that the threaded end of the bolt will be facing toward the front of the vehicle when the crossmember is installed.

(12) Transfer the lateral links, stabilizer bar mounting brackets and the stabilizer bar and bushings to the replacement crossmember before installing the replacement crossmember in the vehicle.

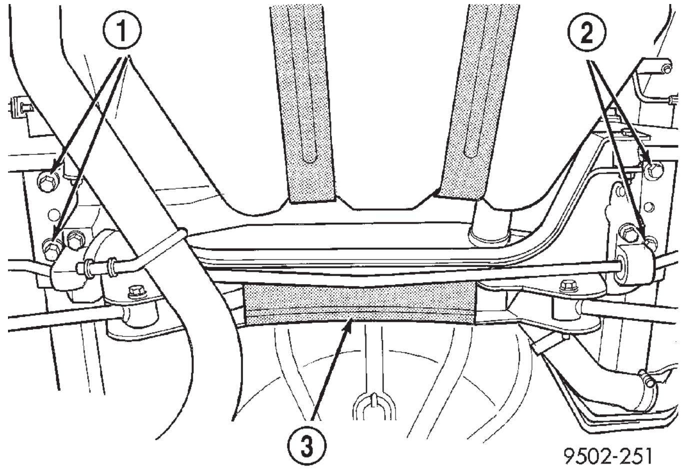


Fig. 20 Suspension Crossmember Attachment To Frame Rails

1 - ATTACHING BOLTS
2 - ATTACHING BOLTS
3 - REAR SUSPENSION CROSSMEMBER

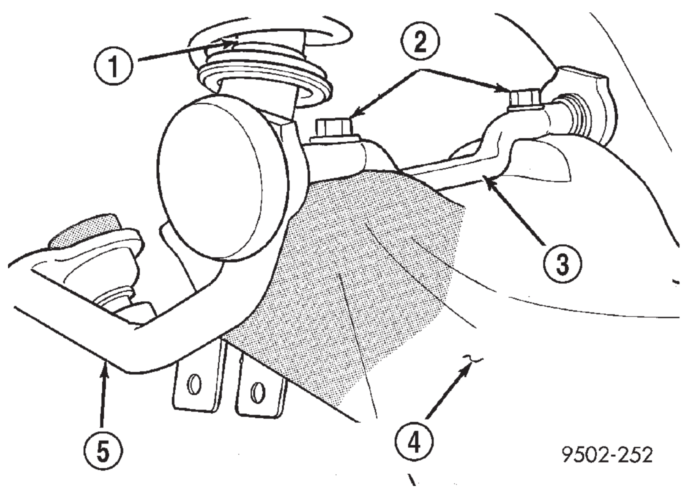


Fig. 21 Upper Control Arm Attachment To Crossmember

1 - SHOCK ABSORBER
2 - ATTACHING BOLTS
3 - UPPER CONTROL ARM PIVOT BAR
4 - REAR SUSPENSION CROSSMEMBER
5 - UPPER CONTROL ARM

REAR SUSPENSION CROSSMEMBER (Continued)

Tighten the stabilizer bar mounting bracket to rear crossmember mounting bolts to 27 N·m (20 ft. lbs.) torque. Tighten the 4 lateral link to crossmember attaching bolts to 95 N·m (80 ft. lbs.) torque.

INSTALLATION

(1) Install the rear suspension crossmember, lateral arms and rear stabilizer bar back into the vehicle as an assembly.

(2) With the aid of a helper position rear suspension crossmember back in vehicle and support it using the transmission jack.

(3) Align the upper control arm pivot bars with the mounting holes in the rear suspension crossmember. Install and tighten the 4 pivot bar to crossmember attaching bolts (Fig. 21) to 107 N·m (80 ft. lbs.) torque.

(4) Using transmission jack, raise rear suspension crossmember up to the rear frame rails and loosely install the 4 attaching bolts.

(5) Position a drift of the appropriate size into the positioning hole in each side of rear suspension crossmember and locating holes in the frame rail of the body. (Fig. 22). This is required to properly position rear suspension crossmember side-to-side and front-to-rear in the body of the vehicle. Then tighten the 4 crossmember to frame rail attaching bolts to 95 N·m (70 ft. lbs.) torque. Remove drifts from rear suspension crossmember.

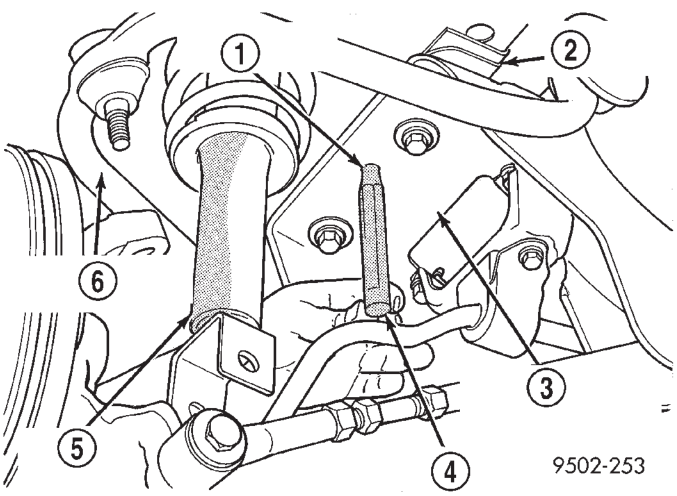


Fig. 22 Locating Rear Suspension Crossmember In Vehicle

1 - POSITIONING HOLE
2 - FRAME RAIL
3 - REAR SUSPENSION CROSSMEMBER
4 - DRIFT
5 - SHOCK ABSORBER
6 - UPPER CONTROL ARM

(6) Align lateral links with knuckles and install the lateral arm to knuckle attaching bolts. Tighten the 4 lateral arm to spindle attaching bolts to 95 N·m (70 ft. lbs.) torque.

(7) Remove transmission jack supporting rear suspension crossmember.

(8) Install muffler support bracket on rear frame rail (Fig. 16). Install rear exhaust pipe hanger on rear suspension crossmember (Fig. 17).

(9) If vehicle is equipped with antilock brakes, install the wheel speed sensor cable routing clip on upper control arm mounting bracket (Fig. 19). Install and securely tighten attaching bolt.

(10) Install wheel and tire assembly on vehicle. Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified 129 N·m (95 ft. lbs.) torque.

(11) Lower vehicle to the ground.

(12) Check and reset if required, rear wheel alignment to meet the preferred specifications.

FRONT TOW HOOK

REMOVAL

(1) Raise vehicle and support on safety stands.

(2) Remove bolts (Fig. 23).

(3) Remove tow hook from vehicle.

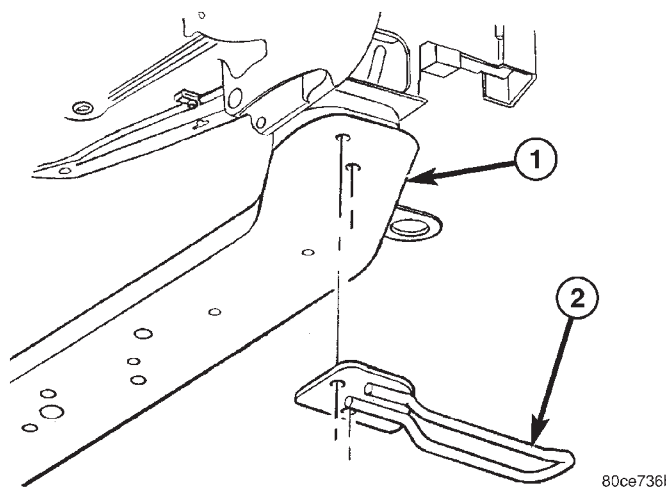


Fig. 23 FRONT TOW HOOK

1 - FRONT SUB DECKING PALLET
2 - TOW HOOK (RECOVERY BRACKET)

INSTALLATION

(1) Place tow in position.

(2) Install bolts (Fig. 23). Tighten to 55 to 115 N·m (55 to 85 ft. lbs.) torque.

(3) Remove safety stands and lower vehicle.

FUEL SYSTEM

TABLE OF CONTENTS

FUEL DELIVERY

TABLE OF CONTENTS

FUEL DELIVERY

DESCRIPTION

The front wheel drive car uses a plastic fuel tank located rear center of the vehicle.

The Fuel Delivery System consists of: the following items:

- Electric fuel pump module
- Fuel filter
- Tubes/lines/hoses
- Fuel injectors

The in-tank fuel pump module contains the fuel pump. The pump is serviced as part of the fuel pump module. Refer to Fuel Pump Module.

The fuel filter is replaceable, it is mounted on the outside and on top of the fuel tank. Refer to the Maintenance Schedules in the Introduction section of this manual for recommended fuel filter replacement intervals.

OPERATION

The fuel system is provided fuel pressure by an in-tank pump module. The PCM controls the operation of the fuel system by providing battery voltage to the fuel pump through the fuel pump relay. The PCM requires only three inputs and a good ground to operate the fuel pump relay. The three inputs are:

- Ignition voltage
- Crankshaft Position (CKP) sensor
- Camshaft Position (CMP) sensor

DIAGNOSIS AND TESTING - FUEL DELIVERY SYSTEM

(Refer to Appropriate Diagnostic Information)

STANDARD PROCEDURE

STANDARD PROCEDURE - FUEL SYSTEM PRESSURE RELEASE PROCEDURE

(1) Remove Fuel Pump relay from Power Distribution Center (PDC). For location of relay, refer to label on underside of PDC cover.

(2) Start and run engine until it stalls.

(3) Attempt restarting engine until it will no longer run.

(4) Turn ignition key to OFF position.

(5) Place a rag or towel below fuel line quick-connect fitting at fuel rail.

(6) Return fuel pump relay to PDC.

(7) One or more Diagnostic Trouble Codes (DTC's) may have been stored in PCM memory due to fuel pump relay removal. The DRB III® scan tool must be used to erase a DTC.

STANDARD PROCEDURE - DRAINING FUEL TANK

Two different procedures may be used to drain fuel tank (lowering tank or using DRB scan tool).

The quickest draining procedure involves lowering the fuel tank.

WARNING: RELEASE FUEL SYSTEM PRESSURE BEFORE SERVICING FUEL SYSTEM COMPONENTS. SERVICE VEHICLES IN WELL VENTILATED AREAS AND AVOID IGNITION SOURCES. NEVER SMOKE WHILE SERVICING THE VEHICLE.

As an alternative procedure, the electric fuel pump may be activated allowing tank to be drained at fuel rail connection. Refer to DRBIII® scan tool for fuel pump activation procedures. Before disconnecting fuel line at fuel rail, release fuel pressure. Refer to the Fuel System Pressure Release Procedure in this group for procedures. Disconnect the fuel line at the fuel rail and remove the plastic retainer from the fuel rail. Take plastic retainer and install it back into the fuel line from body. Attach end of special test hose tool number 6539 at fuel line connection from the body line. Position opposite end of this hose tool to an approved gasoline draining station. Activate fuel pump and drain tank until empty. When done remove the special test hose tool number 6539 from the body line. Remove the plastic retainer from the special test hose tool number 6539 and reinstall it into the fuel line from the body. Install the fuel line to the fuel rail.

If electric fuel pump is not operating, tank must be lowered for fuel draining. Refer to following procedures.

(1) Remove fuel filler cap.

(2) Perform the Fuel System Pressure Release procedure.

(3) Disconnect negative cable from battery.

(4) Raise vehicle and support.

(5) Certain models are equipped with a separate grounding wire (strap) connecting the fuel fill tube assembly to the body. Disconnect wire by removing screw.

(6) Open fuel fill door and remove screws mounting fuel filler tube assembly to body. Do not disconnect rubber fuel fill or vent hoses from tank at this time.

(7) Place a transmission jack under center of fuel tank. Apply a slight amount of pressure to fuel tank with transmission jack.

(8) Remove fuel tank mounting strap nuts from mounting strap studs.

(9) **Lower the tank just enough so that the filler tube fitting is the highest point of the fuel tank.**

FUEL DELIVERY (Continued)

(10) Remove filler tube from fuel tank. Tank will be drained through this fitting.

WARNING: WRAP SHOP TOWELS AROUND HOSES TO CATCH ANY GASOLINE SPILLAGE.

(11) Drain fuel tank into holding tank or a properly labeled **Gasoline** safety container.

CAUTION: GASOLINE OR GASOLINE VAPORS ARE HIGHLY FLAMMABLE. A FIRE COULD OCCUR IF AN IGNITION SOURCE IS PRESENT. NEVER DRAIN OR STORE GASOLINE OR DIESEL FUEL IN AN OPEN CONTAINER, DUE TO THE POSSIBILITY OF FIRE OR EXPLOSION.

(12) If fuel pump module removal is necessary, refer to Fuel Pump Module Removal/Installation in this section.

SPECIFICATIONS

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Fuel Tank Straps	54	39.8	
Filler Tube Ground Strap	7.5		66
Filler Tube Screws	1.9		16
Fuel Filler Tube Clamp	3.6		31.8
Fuel Rail to Intake Manifold 4-Cylinder	11.9		105
Fuel Rail to Cylinder Head 4-Cylinder	22		195
Fuel Rail to Intake Manifold 2.7L	11.9		105

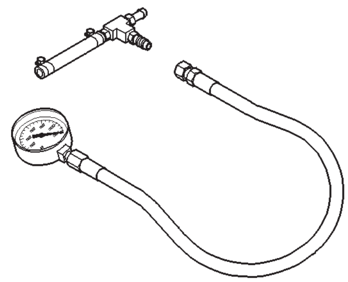
FUEL SYSTEM PRESSURE

400 kpa ±34 kpa (58 psi ± 5 psi)

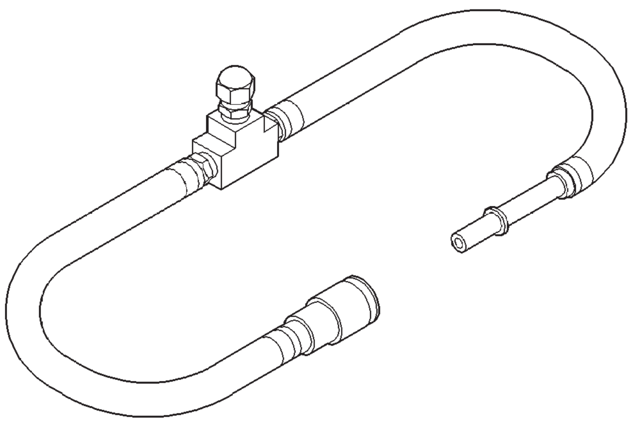
FUEL DELIVERY (Continued)

SPECIAL TOOLS

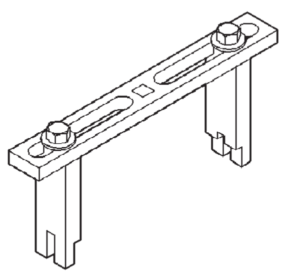
FUEL



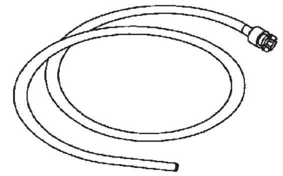
Pressure Gauge Assembly C–4799–B



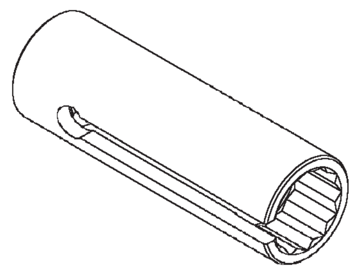
Fuel Pressure Test Adapter 6539



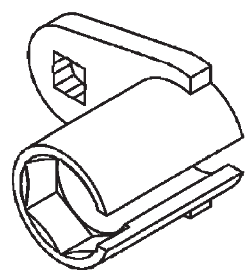
Spanner Wrench 6856



Fuel Line Adapter 1/4



O2S (Oxygen Sensor) Remover/Installer—C-4907



O2S(Oxygen Sensor) Remover/Installer - 8439

FUEL LEVEL SENDING UNIT / SENSOR

DESCRIPTION

The fuel gauge level sending unit is attached to the side of fuel pump module. The level sensor is a variable resistor.

OPERATION

Its resistance changes with the amount of fuel in the tank. The float arm attached to the sensor moves as the fuel level changes.

The fuel level input is used as an input for OBD II. If the fuel level is below 15% or above 85% of total tank capacity several monitors are disabled. There are diagnostics for the level circuit open and shorted.

REMOVAL

Remove fuel pump module. Refer to Fuel Pump Module in this section.

(1) Depress retaining tab and remove the fuel pump/level sensor connector from the bottom of the fuel pump module electrical connector (Fig. 1).

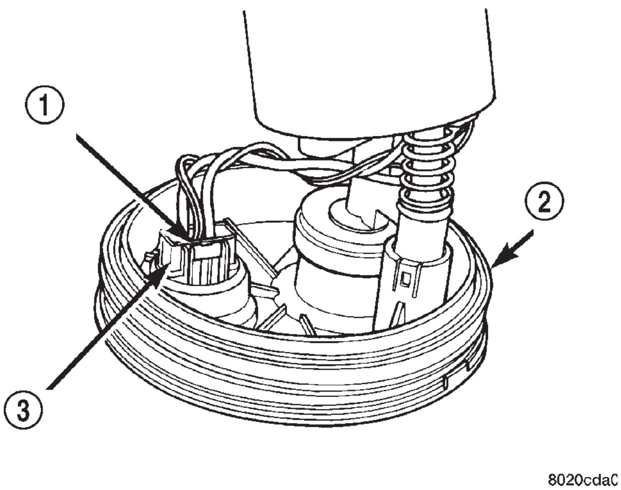


Fig. 1 Fuel Pump/Level Sensor Electrical Connector

1 - RETAINING TAB
2 - TANK SEAL
3 - ELECTRICAL CONNECTOR

(2) Pull off locking wedge (Fig. 2).

(3) Using a small screwdriver lift locking finger away from terminal and push level sensor and ground terminals out of connector (Fig. 3).

(4) Push level sensor signal and ground terminals out of the connector (Fig. 3).

(5) Use screwdriver to move locking tab on level sensor and move level sensor down channel to remove (Fig. 4).

(6) Slide level sensor wires through opening fuel pump module.

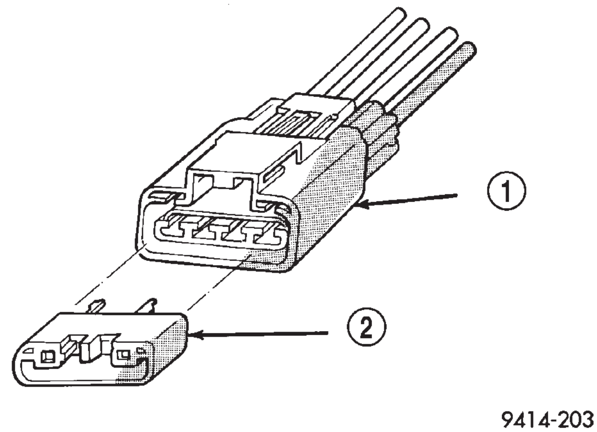


Fig. 2 Wire Terminal Locking Wedge

1 - ELECTRICAL CONNECTOR
2 - LOCKING WEDGE

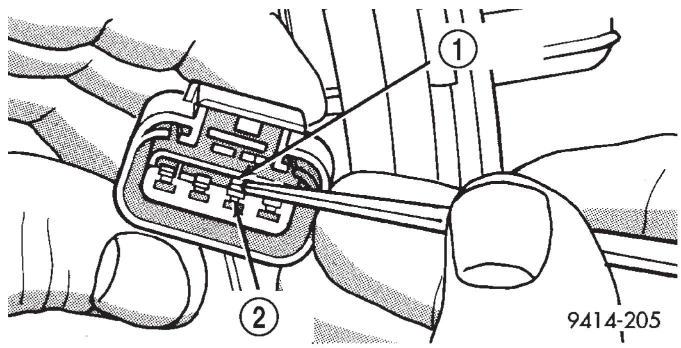


Fig. 3 Removing Wires From Connector

1 - LOCKING FINGER
2 - WIRE TERMINAL

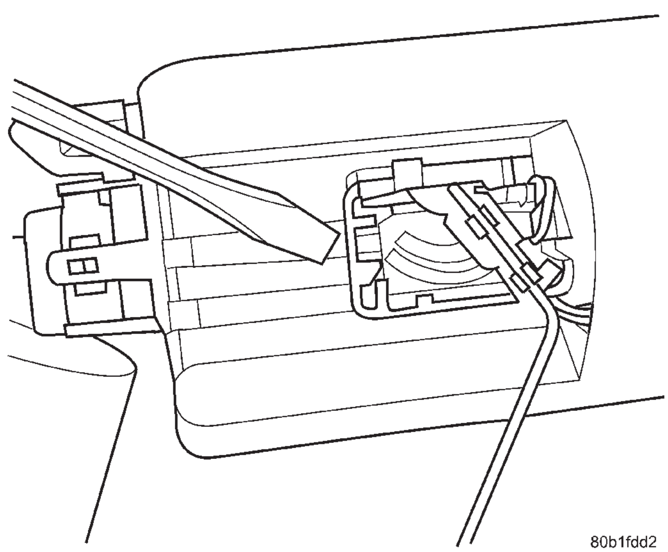


Fig. 4 LOOSENING LEVEL SENSOR

(7) Slide level sensor out of installation channel in module.

FUEL LEVEL SENDING UNIT / SENSOR (Continued)

INSTALLATION

(1) Insert level sensor wires into bottom of opening in module.

(2) Wrap wires into groove in back of level sensor.

(3) While feeding wires into guide grooves, slide level sensor up into channel until it snaps into place. Ensure tab at bottom of sensor locks in place.

(4) Install level sensor wires in connector. Push the wires up through the connector and then pull them down until they lock in place. Ensure signal and ground wires are installed in the correct position.

(5) Install locking wedge on connector.

(6) Push connector up into bottom of fuel pump module electrical connector.

(7) Install fuel pump module. Refer to Fuel Pump Module in this section.

FUEL PRESSURE REGULATOR

DESCRIPTION

A combination fuel filter and fuel pressure regulator is used on all gas powered engines. It is located on the top of the fuel pump module.

It contains a diaphragm, calibrated springs and a fuel return valve. The internal fuel filter (Fig. 5) is also part of the assembly.

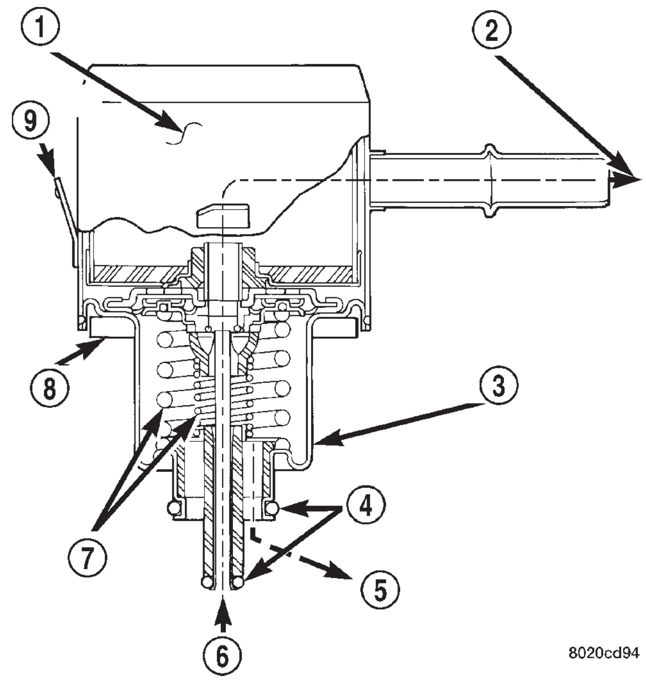


Fig. 5 Side View—Filter/Regulator

1 - INTERNAL FUEL FILTER
2 - FUEL FLOW TO FUEL INJECTORS
3 - FUEL FILTER/FUEL PRESSURE REGULATOR
4 - O-RINGS
5 - EXCESS FUEL BACK TO TANK
6 - FUEL INLET
7 - CALIBRATED SPRINGS
8 - RUBBER GROMMET AT PUMP MODULE
9 - LOCKING TAB

OPERATION

Fuel Pressure Regulator Operation: The pressure regulator is a mechanical device that is calibrated to maintain fuel system operating pressure of approximately 400 kPa ±34 kPa (58 psi ±5 psi.) at the fuel injectors.

Fuel is supplied to the filter/regulator by the electric fuel pump through an opening tube at the bottom of filter/regulator (Fig. 5).

The fuel pump module contains a check valve to maintain some fuel pressure when the engine is not operating. This will help to start the engine.

If fuel pressure at the pressure regulator exceeds approximately 58 psi, an internal diaphragm closes and excess fuel pressure is routed back into the tank through the pressure regulator. A separate fuel return line is not used with any gas powered engine.

REMOVAL

WARNING: THE FUEL SYSTEM IS UNDER A CONSTANT PRESSURE, EVEN WITH ENGINE OFF. BEFORE SERVICING THE FUEL FILTER/FUEL PRESSURE REGULATOR, THE FUEL SYSTEM PRESSURE MUST BE RELEASED.

(1) Refer to Fuel System Pressure Release in the Fuel Delivery System section of this group. The fuel filter/fuel pressure regulator is located on the top of fuel pump module. Fuel pump module removal is not necessary.

(2) Raise vehicle on hoist.

(3) Remove fuel tank, refer to the Fuel Tank Removal (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL TANK - REMOVAL).

(4) Disconnect fuel supply line at the Filter/Regulator nipple (refer to Quick Connect Fittings in this section).

(5) Depress locking spring tab on side of Fuel/Regulator (Fig. 6) and rotate 90° counter-clockwise and pull out.

NOTE: Make sure that the upper and lower O-rings are on the Filter/Regulator assembly.

INSTALLATION

Lightly lubricate the O-rings with engine oil.

FUEL PRESSURE REGULATOR (Continued)

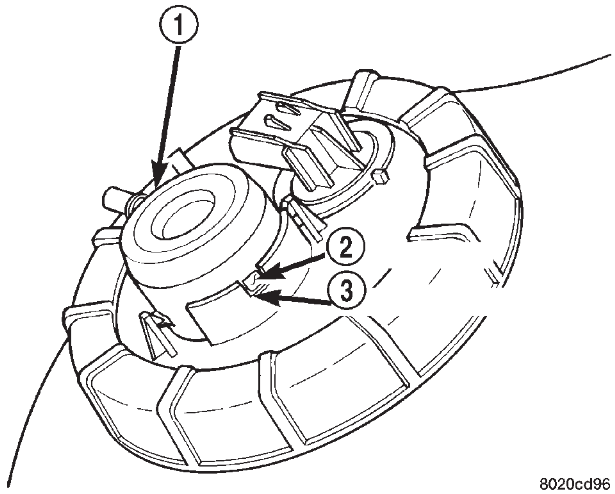


Fig. 6 Locking Spring Tab

1 - FUEL FILTER/PRESSURE REGULATOR
2 - SPRING TAB
3 - LOCATING SLOT

(1) Insert Filter/Regulator into the opening in the fuel pump module, align the two hold down tabs with the flange.

(2) While applying downward pressure, rotate the Filter/Regulator clockwise until the the spring tab engages the locating slot (Fig. 7).

(3) Install the fuel tank, refer to Fuel Tank Installation (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL TANK - INSTALLATION).

(4) Connect the fuel line to the Filter/Regulator.

(5) Lower vehicle from hoist.

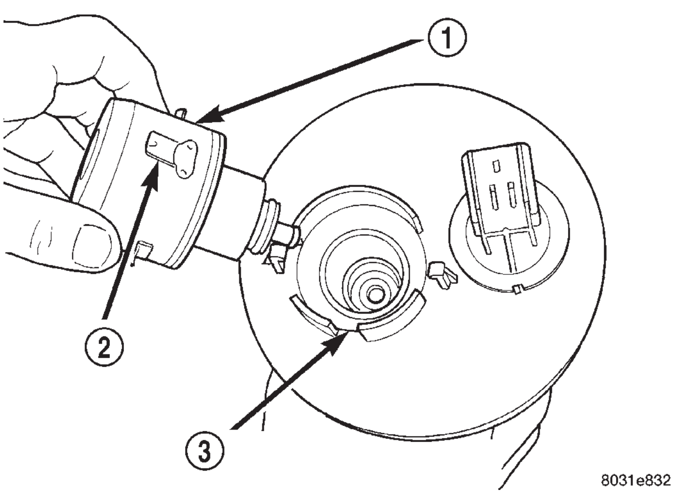


Fig. 7 Spring Tab In Locating Slot

1 - FUEL FILTER/PRESSURE REGULATOR
2 - SPRING TAB
3 - LOCATING SLOT

FUEL PUMP

DESCRIPTION

The electric fuel pump is located in and is part of the fuel pump module. It is a positive displacement, gerotor type, immersible pump with a permanent magnet electric motor. The fuel pump module is suspended in fuel in the fuel tank.

OPERATION

The pump draws fuel through a strainer and pushes it through the motor to the outlet. The pump contains a check valve. The valve, in the pump outlet, maintains pump pressure during engine off conditions, for a short while. It is normal for fuel pressure to drop to zero after cooldown. The fuel pump relay provides voltage to the fuel pump. The fuel pump has a maximum deadheaded pressure output of approximately 880 kPa (130 psi). The regulator adjusts fuel system pressure to approximately 400 kpa ±34 kpa (58 psi ± 5 psi).

NOTE: Checkvalve maintains volume of fuel in the rail and lines, not pressure.

FUEL PUMP MODULE

DESCRIPTION

The fuel pump module contains the fuel pump, fuel reservoir, level sensor, inlet strainer, and fuel pressure regulator/filter (Fig. 8).

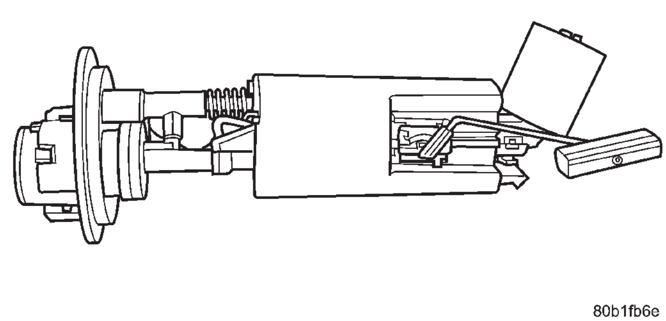


Fig. 8 FUEL PUMP MODULE

OPERATION

The Chrysler fuel pump module is an in-tank unit with an integral fuel level sensor and pressure regulator. The pump is driven by a 12 volt DC motor any time the fuel pump relay is energized. Serviceable components on the module include:

- Inlet strainer
- Fuel level sensor

FUEL PUMP MODULE (Continued)

- Fuel Filter/Pressure regulator

The pump draws fuel through a strainer and pushes it through the motor to the outlet. The pump contains two check valves. One valve relieves internal fuel pump pressure and regulates maximum pump output. The second valve, in the pump outlet, maintains pump pressure during engine off conditions.

The fuel system use a positive displacement, gerotor, with a permanent magnet electric motor. This fuel system does not contain the traditional fuel return lines. The regulator contains a calibrated spring which forces a diaphragm against the fuel filter return port. When pressure exceeds the calibrated amount, the diaphragm retracts, allowing excess pressure and fuel to vent into the tank.

The maximum deadhead pressure is approximately 880 kPa (130 psi). The regulator adjusts fuel system pressure to approximately 400 ±34 kPa (58 ± 5 psi).

The inlet strainer, level sensor and fuel pressure regulator/filter are the only serviceable items.

REMOVAL

(1) Release fuel pressure, Refer to Fuel System Pressure Release Procedure in the Fuel Delivery section.

(2) Remove Fuel Tank refer to the Fuel Tank Removal/Installation in this group.

WARNING: THE FUEL RESERVOIR OF THE FUEL PUMP MODULE DOES NOT EMPTY OUT WHEN THE TANK IS DRAINED. THE FUEL IN THE RESERVOIR WILL SPILL OUT WHEN THE MODULE IS REMOVED.

(3) Disconnect fuel line from fuel pump module by depressing quick connect retainers with thumb and fore finger.

(4) Slide fuel pump module electrical connector lock to unlock.

(5) Disconnect the electrical connection from the fuel pump module, by pushing down on connector retainer and pulling connector off of module.

(6) Use Special Tool #6856 to remove fuel pump module locknut (Fig. 9).

(7) Remove fuel pump and O-ring seal from tank. Discard old seal.

INSTALLATION

(1) Wipe seal area of tank clean and place a new seal in position in the tank opening.

(2) Position fuel pump in the tank. Make sure the alignment tabs on the underside of the fuel pump module flange sits in the notches on the fuel tank (Fig. 10).

(3) Position the locknut over the fuel pump module.

(4) Tighten the locknut using Special Tool #6856 to 55 N·m (40.5 ft. lbs.).

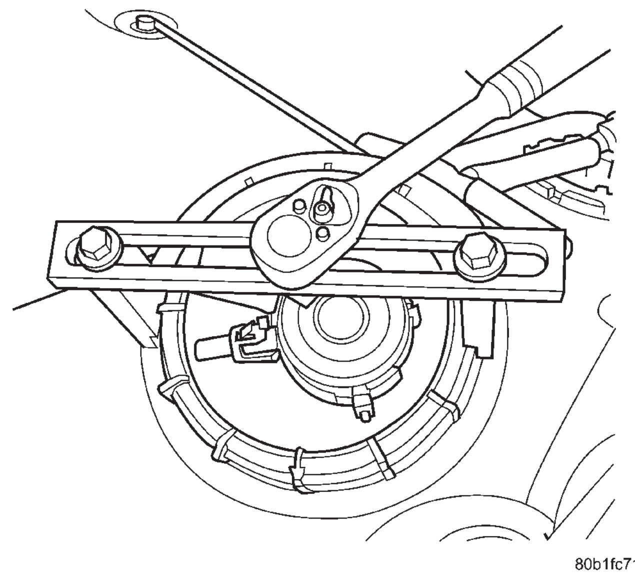


Fig. 9 FUEL TANK LOCKNUT

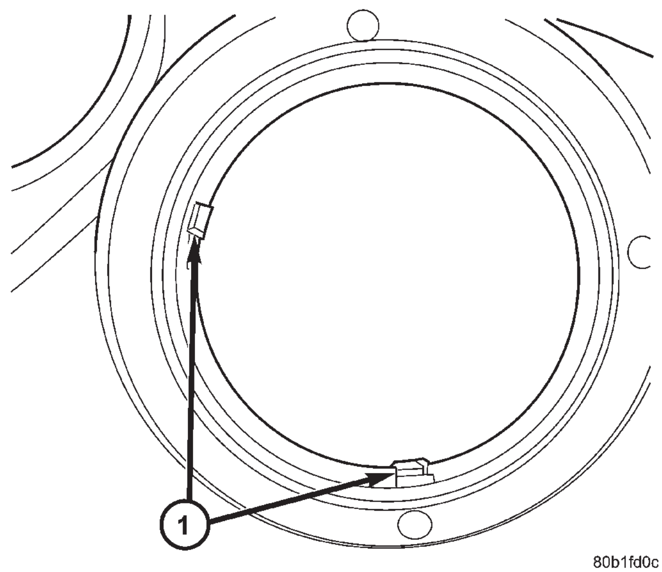


Fig. 10 Fuel Tank Locator

1 - LOCATING NOTCHES

CAUTION: Over tightening the pump lock ring may result in a leak.

(5) Connect the electrical connector.

(6) Connect the fuel line to the fuel pump.

(7) Install the fuel tank, refer to fuel tank installation (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL TANK - INSTALLATION).

(8) Lower vehicle.

(9) Connect the battery cable.

(10) Fill fuel tank. Use the DRB III® scan tool to pressurize the fuel system. Check for leaks.

FUEL RAIL

REMOVAL

REMOVAL - 4 CYLINDER

(1) Perform fuel system pressure release procedure **before servicing or starting repairs.** Refer to Fuel System Pressure Release Procedure in this section.

(2) Disconnect negative cable from battery.

(3) Remove wiring harness from fuel rail support bracket (Fig. 11).

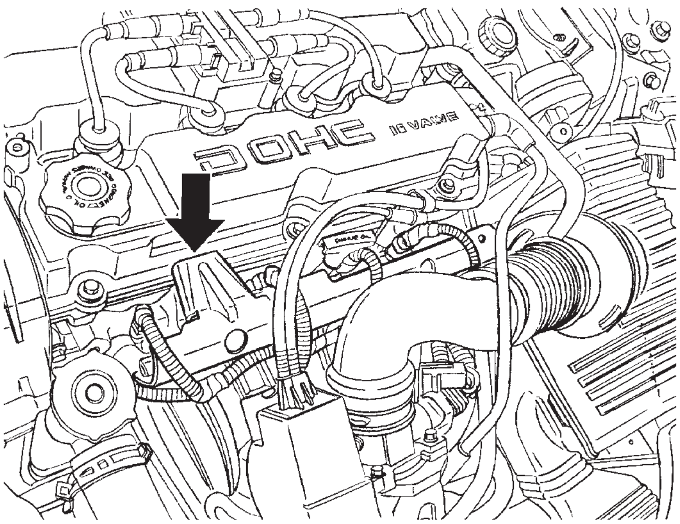


Fig. 11 FUEL RAIL AND BRACKET

(4) Remove fuel rail support bracket.

(5) Disconnect the wiring connectors for fuel injectors harness (Fig. 12).

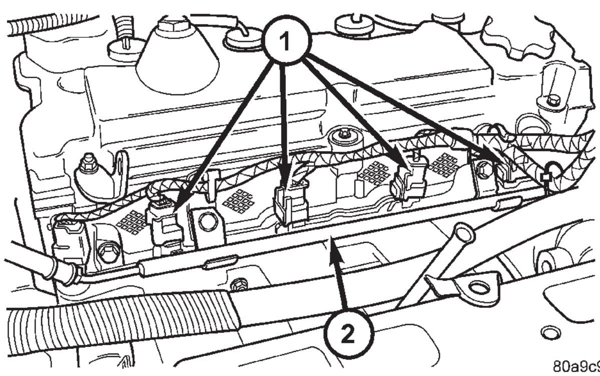


Fig. 12 FUEL RAIL AND INJECTORS

1 - Fuel Injectors
2 - Fuel Rail

(6) Remove wiring harness from fuel rail brackets.

(7) Disconnect the connectors from the fuel injectors.

(8) Remove throttle and speed control cables from the fuel rail (Fig. 13).

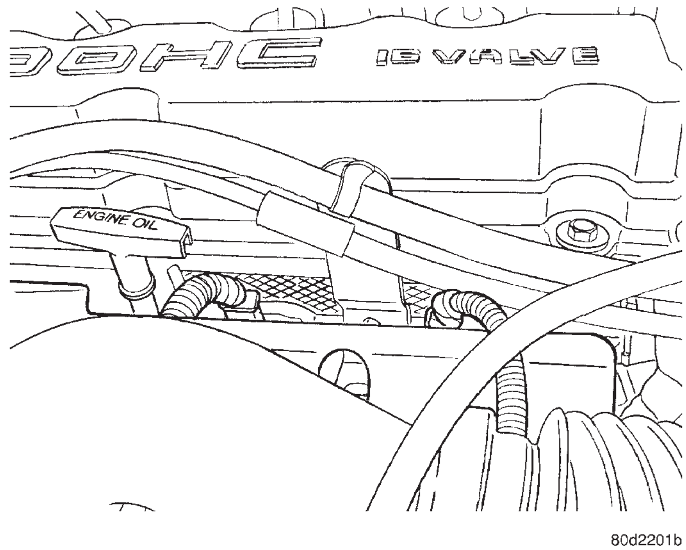


Fig. 13 THROTTLE AND SPEED CONTROL CABLE

(9) Remove fuel hose quick connect fitting from the chassis tube. **Refer to Fuel Hoses, Clamps and Quick Connect Fittings in this Section.** Place a shop towel under the connections to absorb any fuel spilled from the fitting.

WARNING: WRAP A SHOP TOWEL AROUND HOSES TO CATCH ANY GASOLINE SPILLAGE.

(10) Remove fuel rail attaching bolts.

(11) Remove fuel rail. Be careful not to damage the injector O-rings upon removal from their ports.

REMOVAL - 2.7L

WARNING: RELEASE FUEL SYSTEM PRESSURE BEFORE SERVICING FUEL RAIL. SERVICE VEHICLES IN WELL VENTILATED AREAS AND AVOID IGNITION SOURCES. NEVER SMOKE WHILE SERVICING THE VEHICLE.

(1) Release fuel system pressure. Refer to Fuel System Pressure Release Procedure in this section.

(2) Disconnect the negative battery cable.

(3) Remove intake manifold plenum. Refer to the Engine section for information.

(4) Remove intake manifold plenum mounting bolts. Lift Plenum up off of engine. Cover intake manifold to prevent foreign material from entering engine.

FUEL RAIL (Continued)

(5) Disconnect fuel supply tube quick connect fitting at the rear of the fuel rail. Refer to Quick Connect Fittings in the Fuel Delivery Section.

(6) If the injector connectors are not tagged with their cylinder number, tag them to identify the correct cylinder (Fig. 14).

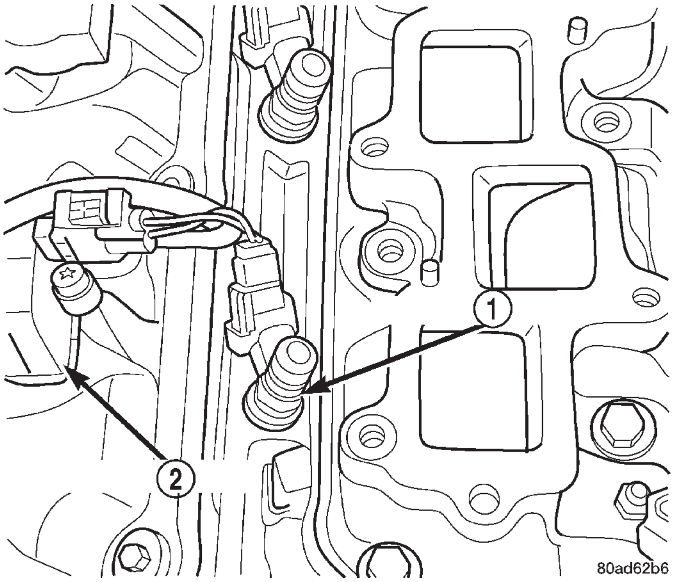


Fig. 14 Injector Electrical Connectors

1 - FUEL INJECTOR
2 - IGNITION COIL

(7) Remove electrical connectors from the fuel injectors.

(8) Remove mounting bolts on both sides of fuel rail.

(9) Lift fuel rail straight up off of cylinder head.

(10) Remove retaining clips from fuel injectors at fuel rail.

(11) Remove fuel injector from fuel rail.

INSTALLATION

INSTALLATION - 4 CYLINDER

(1) Ensure injector holes are clean. Replace O-rings if damaged.

(2) Lubricate injector O-rings with a drop of clean engine oil to ease installation.

(3) Put the tip of each injector into their ports. Push the assembly into place until the injectors are seated in the ports.

(4) Install the 2 fuel rail mounting bolts to intake manifold. Tighten bolts to 11.9 N·m (105 in. lbs.) torque.

(5) Install the fuel rail mounting bolt to cylinder head. Tighten bolt to 22 N·m (195 in. lbs.) torque

(6) Connect the connectors to the fuel injectors.

(7) Install fuel rail support bracket and loosely install all bolts (Fig. 11).

(8) Tighten three fasteners to intake manifold to 28.3 N·m (250 in. lbs.) torque.

(9) Tighten two bolts to fuel rail to 8.5 N·m (75 in. lbs.) torque.

(10) Install wiring harness to brackets (Fig. 12).

(11) Connect the throttle and speed control cables to fuel rail bracket (Fig. 13).

(12) Connect negative battery cable.

(13) Use the DRBIII® scan tool to pressurize the fuel system. Check for leaks.

INSTALLATION - 2.7L

(1) Lightly lubricate the fuel injector O-rings with a couple drops of clean engine oil.

(2) Install retaining clips on fuel injectors.

(3) Push injectors into fuel injector rail until clips are in the correct position.

(4) Position fuel rail over cylinder heads, and push rail into place. Tighten fuel rail mounting bolts to 11.9 N·m (105 in. lbs.) torque.

(5) Connect the fuel supply tube quick connect fitting to the fuel rail. Refer to Quick Connect Fittings in the Fuel Delivery Section.

(6) Connect the electrical connectors to the fuel injectors.

(7) Install intake manifold plenum. Refer to the Engine section for information.

(8) Connect negative cable to battery.

FUEL TANK

DESCRIPTION

The fuel tank is constructed of a plastic material. Its main functions are for fuel storage and for placement of the fuel pump module. The tank is made from High density Polyethylene (HDPE) material.If equipped with ORVR (Onboard Refueling Vapor Recovery) it has been added to the fuel tank to control refueling vapor emissions.

OPERATION

All models pass a full 360 degree rollover test without fuel leakage. To accomplish this, fuel and vapor flow controls are required for all fuel tank connections.

All models are equipped with either one or two rollover valves mounted into the top of the fuel tank (or pump module).

An evaporation control system is connected to the rollover valve(s)/control valve(Refer to 25 - EMISSIONS CONTROL/EVAPORATIVE EMISSIONS/ORVR - OPERATION) to reduce emissions of fuel

FUEL TANK (Continued)

vapors into the atmosphere, when the tank is vented due to vapor expansion in the tank. When fuel evaporates from the fuel tank, vapors pass through vent hoses or tubes to a charcoal canister where they are temporarily held. When the engine is running, the vapors are drawn into the intake manifold. In addition, fuel vapors produced during vehicle refueling are allowed to pass through the vent hoses/tubes to the charcoal canister(s) for temporary storage (prior to being drawn into the intake manifold). All models are equipped with a self-diagnosing system using a Leak Detection Pump (LDP). Refer to the Emission Control System for additional information.

INLET CHECK VALVE

All vehicles have an inlet check valve on the inside of the fuel tank at the filler inlet

The valve prevents fuel from splashing back on customer during vehicle refueling. The valve is a non-serviceable item.

REMOVAL

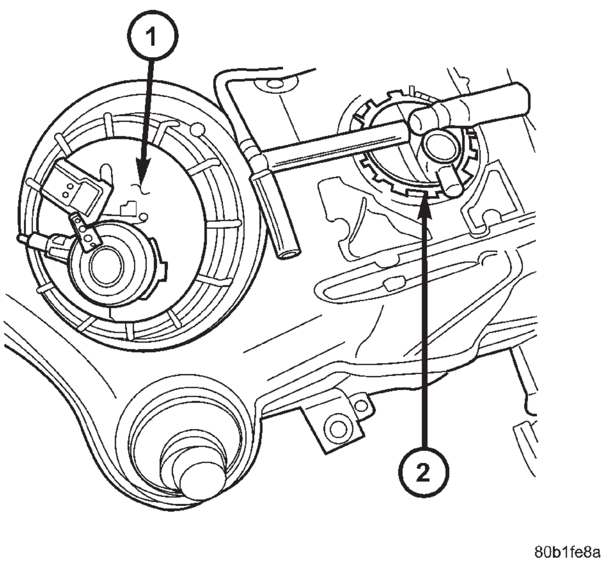


Fig. 15 FUEL TANK

1 - Fuel Pump Module
2 - ORVR Control Valve

(1) Remove fuel filler cap and perform Fuel System Pressure Release procedure.

(2) Disconnect negative cable from battery.

(3) Drain fuel tank dry into holding tank or a properly labeled **GASOLINE** safety container.

(4) Raise vehicle on hoist and support.

(5) Use a transmission jack to support fuel tank. Remove bolts from fuel tank straps.

(6) Lower tank slightly.

(7) Disconnect the fuel filler vent tube.

(8) Disconnect fuel line and vapor line.

(9) Disconnect the vacuum line from the LDP.

(10) Disconnect fuel filler tube by loosing the clamp and removing hose.

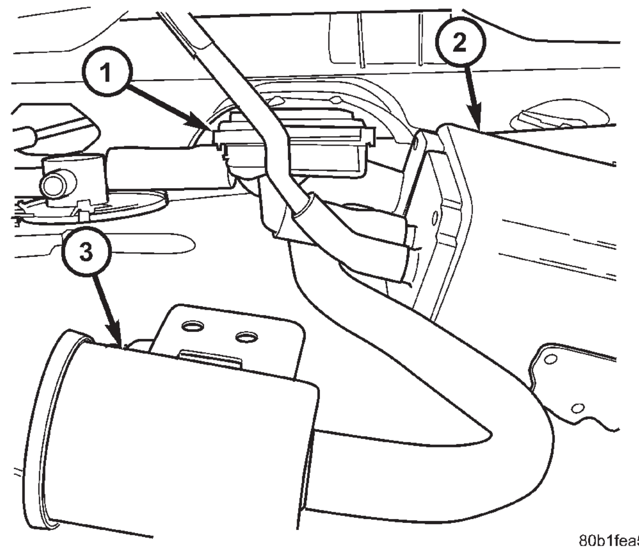


Fig. 16 ORVR AND EVAP COMPONENTS

1 - Liquid Separator
2 - EVAP Canister
3 - LDP Filter

(11) Slide fuel pump module electrical connector lock to unlock.**The fuel pump module electrical connector has a retainer that locks it in place (Fig. 17)**.

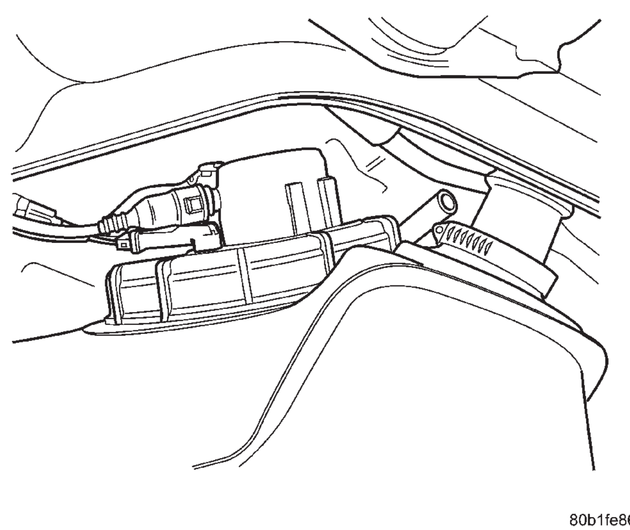


Fig. 17 FUEL PUMP MODULE LOCATION

(12) Push down on connector retainer and pull connector off module.

(13) Lower tank from vehicle (Fig. 15) and (Fig. 16).

FUEL TANK (Continued)

INSTALLATION

(1) Position fuel tank on transmission jack.

(2) Raise tank into position and carefully work filler tube onto the fuel tank. A light coating of clean engine oil on the tube end may be used to aid assembly. Connect fuel filler tube hose and tighten clamp.

(3) Connect fuel pump/module electrical connector. Place retainer in locked position.

(4) Connect the EVAP, vapor, and vacuum lines.

(5) Lubricate the fuel supply line with clean 30 weight engine oil, install the quick connect fuel fitting. Refer to Tube/Fitting Assembly in the Fuel Delivery section of this section.

(6) Attach filler vent line to filler tube. Pull on connector to make sure of connection.

(7) Place LDP air filter under right rear tank strap before tightening.

(8) Tighten strap bolts to 54 N·m (40 ft. lbs.) torque. Remove transmission jack.

(9) Tighten filler hose clamp to 3.6 N·m (31.8 in. lbs.).

CAUTION: Ensure straps are not twisted or bent before or after tightening strap nuts.

(10) Fill fuel tank, replace cap, and connect battery negative cable.

(11) Use the DRBIII® scan tool to pressurize the fuel system. Check for leaks.

FUEL TANK FILLER TUBE

REMOVAL

(1) Disconnect negative cable from battery.

(2) Drain fuel tank.

(3) Remove 3 screws from filler neck to quarter panel (Fig. 18).

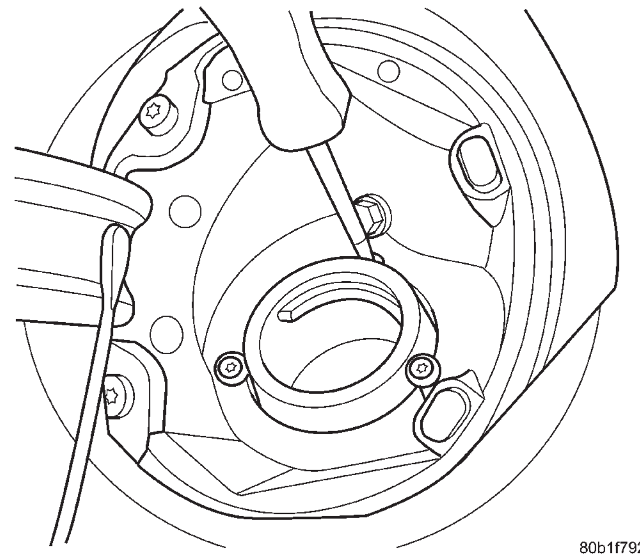


Fig. 18 FILLER DOOR

(4) Raise and support vehicle on host.

(5) Remove the ground strap (Fig. 19).

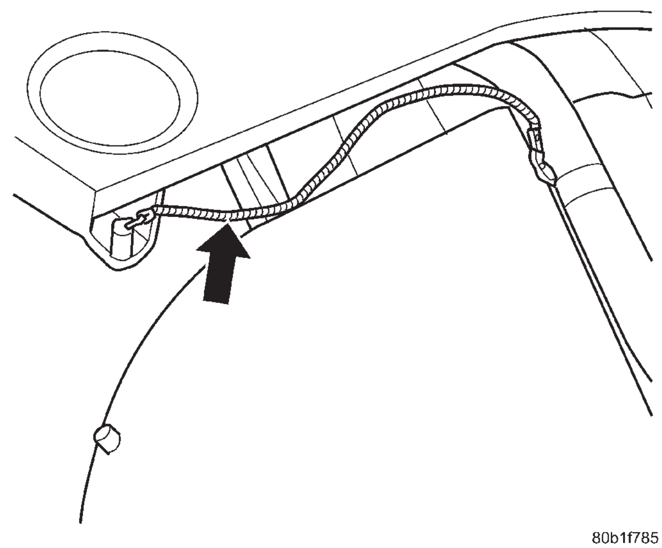


Fig. 19 GROUND STRAP

(6) Loosen clamps at filler neck.

(7) Remove filler neck from the fuel tank.

(8) Use transmission jack to support the fuel tank.

(9) Remove the rear bolts for fuel tank straps.

(10) Lower the fuel tank enough to reach the filler tube vent line connection.

(11) Disconnect the filler tube vent line.

(12) Remove the fuel filler tube.

INSTALLATION

(1) Install filler neck to filler hose.

(2) Connect the fuel filler vent tube.

(3) Raise fuel tank into position.

(4) Install fuel tank straps and tighten bolts to 54 N·m (39.8 ft. lbs).

(5) Remove the transmission jack.

(6) Tighten clamps 3.6 N·m (31.8 in. lbs.).

(7) Install ground strap (Fig. 19) 7.5 N·m (66 in. lbs.).

(8) Lower vehicle.

(9) Install 3 screws to filler neck and quarter panel (Fig. 18) 1.9 N·m (16 in. lbs.).

(10) Fill tank and check for leaks.

(11) Connect negative cable from battery.

FUEL TANK VENT TUBE

REMOVAL

(1) Perform fuel system pressure release.
(2) Disconnect negative cable from battery.
(3) Drain fuel tank.
(4) Raise and support vehicle on host.
(5) Lower fuel tank, refer to Fuel Tank Removal/Installation in this section.
(6) Remove vent hose from top of tank.
(7) Remove vent hose from fuel filler neck.

INSTALLATION

(1) Install vent hose and tighten clamp.
(2) Install fuel tank, refer to Fuel Tank Removal/Installation in this section.
(3) Install vent hose to fuel filler neck and tighten clamp.
(4) Lower vehicle.
(5) Fill fuel tank and check for leaks.
(6) Connect negative cable to battery.

INLET FILTER

REMOVAL

(1) Remove fuel pump module. Refer to Fuel Pump Module Removal in this section.
(2) Using a thin straight blade screwdriver, pry back the locking tabs on fuel pump reservoir and remove the strainer (Fig. 20).

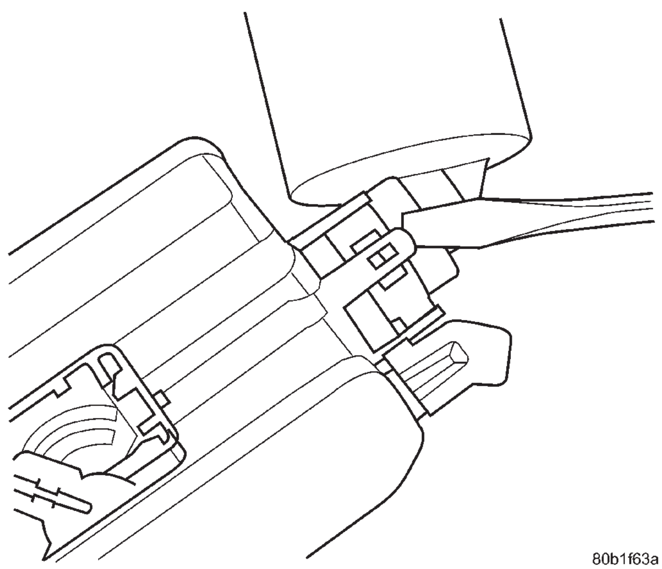


Fig. 20 INLET STRAINER

(3) Remove strainer O-ring from the fuel pump reservoir body (Fig. 21).
(4) Remove any contaminants in the fuel tank by washing the inside of the fuel tank.

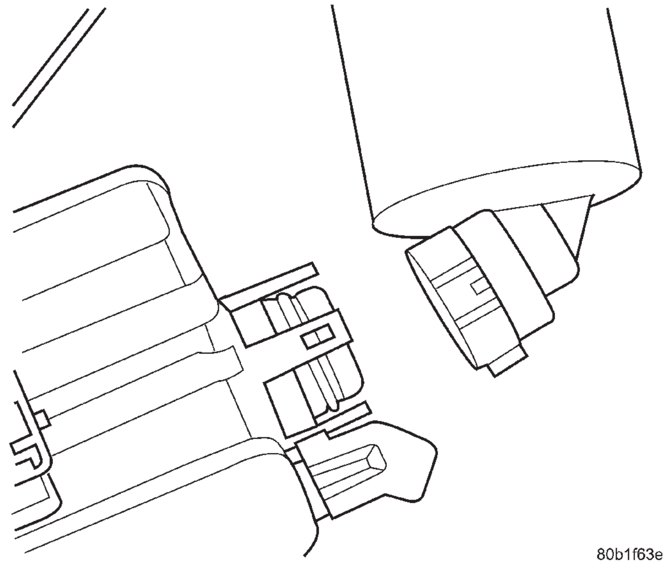


Fig. 21 INLET STRAINER REMOVED

INSTALLATION

(1) Lubricate the strainer O-ring with clean engine oil.
(2) Insert strainer O-ring into outlet of strainer so that it sits evenly on the step inside the outlet.
(3) Push strainer onto the inlet of the fuel pump reservoir body. Make sure the locking tabs on the reservoir body lock over the locking tangs on the strainer.
(4) Install fuel pump module. Refer to Fuel Pump Module Installation in this section.

QUICK CONNECT FITTING

STANDARD PROCEDURE - QUICK-CONNECT FITTINGS

REMOVAL

When disconnecting a quick-connect fitting, the retainer will remain on the fuel tube nipple.

WARNING: RELEASE FUEL SYSTEM PRESSURE BEFORE DISCONNECTING A QUICK-CONNECT FITTINGS. REFER TO THE FUEL PRESSURE RELEASE PROCEDURE.

(1) Perform Fuel Pressure Release Procedure. Refer to the Fuel Pressure Release Procedure in this section.
(2) Disconnect negative cable from battery or auxiliary jumper terminal.
(3) Squeeze retainer tabs together and pull fuel tube/quick-connect fitting assembly off of fuel tube nipple. The retainer will remain on fuel tube.

QUICK CONNECT FITTING (Continued)

INSTALLATION

CAUTION: Never install a quick-connect fitting without the retainer being either on the fuel tube or already in the quick-connect fitting. In either case, ensure the retainer locks securely into the quick-connect fitting by firmly pulling on fuel tube and fitting to ensure it is secured.

(1) Using a clean lint free cloth, clean the fuel tube nipple and retainer.

(2) Prior to connecting the fitting to the fuel tube, coat the fuel tube nipple with clean 30 weight engine oil.

(3) Push the quick-connect fitting over the fuel tube until the **retainer seats and a click is heard.**

(4) The plastic quick-connect fitting has windows in the sides of the casing. When the fitting completely attaches to the fuel tube, the retainer locking ears and the fuel tube shoulder are visible in the windows. If they are not visible, the retainer was not properly installed (Fig. 22). **Do not rely upon the audible click to confirm a secure connection.**

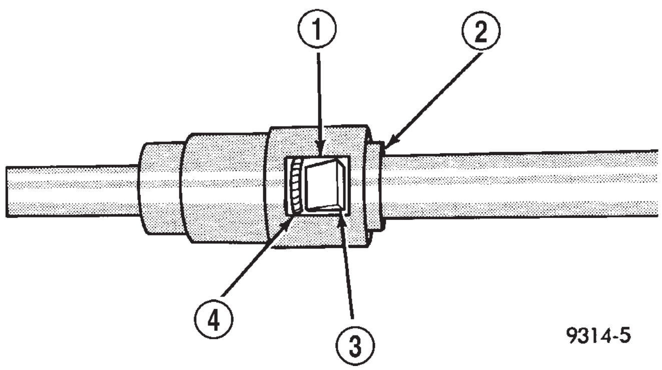


Fig. 22 Plastic Quick-Connect Fitting/Fuel Tube Connection

1 - WINDOW
2 - TAB (2)
3 - EAR
4 - SHOULDER (ON TUBE)

(5) Connect negative cable to battery or auxiliary jumper terminal.

CAUTION: When using the ASD Fuel System Test, the Auto Shutdown (ASD) Relay remains energized for several minutes, until the test is stopped, or until the ignition switch is turned to the Off position.

(6) Use the DRB III® scan tool ASD Fuel System Test to pressurize the fuel system. Check for leaks.

TWO-TAB TYPE FITTING

This type of fitting is equipped with tabs located on both sides of the fitting (Fig. 23). These tabs are supplied for disconnecting the quick-connect fitting from component being serviced.

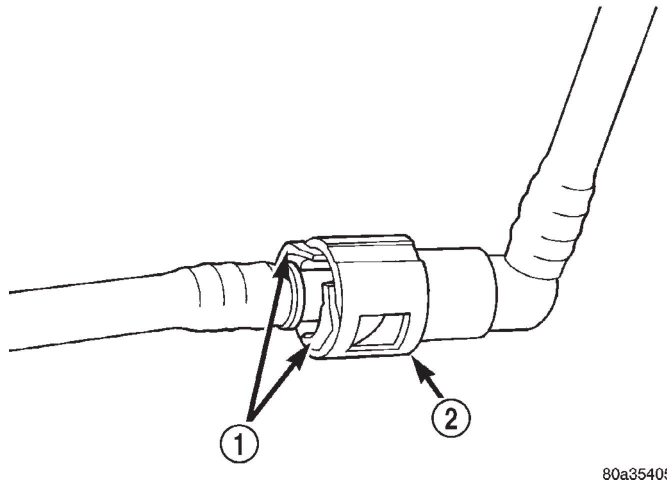


Fig. 23 Typical Two-Tab Type Quick-Connect Fitting

1 - TAB(S)
2 - QUICK-CONNECT FITTING

CAUTION: The interior components (O-rings, spacers) of this type of quick-connect fitting are not serviced separately, but new plastic retainers are available. Do not attempt to repair damaged fittings or fuel lines/tubes. If repair is necessary, replace the complete fuel tube assembly.

WARNING: THE FUEL SYSTEM IS UNDER A CONSTANT PRESSURE (EVEN WITH THE ENGINE OFF). BEFORE SERVICING ANY FUEL SYSTEM HOSES, FITTINGS OR LINES, THE FUEL SYSTEM PRESSURE MUST BE RELEASED. REFER TO THE FUEL PRESSURE RELEASE PROCEDURE IN THIS GROUP.

DISCONNECTION/CONNECTION

(1) Perform fuel pressure release procedure. Refer to Fuel Pressure Release Procedure in this group.

(2) Disconnect negative battery cable from battery or auxiliary jumper terminal.

(3) Clean fitting of any foreign material before disassembly.

(4) To disconnect quick-connect fitting, squeeze plastic retainer tabs (Fig. 23) against sides of quick-connect fitting with your fingers. Tool use is not required for removal and may damage plastic retainer. Pull fitting from fuel system component being serviced. The plastic retainer will remain on component being serviced after fitting is discon-

QUICK CONNECT FITTING (Continued)

nected. The O-rings and spacer will remain in quick-connect fitting connector body.

(5) Inspect quick-connect fitting body and component for damage. Replace as necessary.

CAUTION: When the quick-connect fitting was disconnected, the plastic retainer will remain on the component being serviced. If this retainer must be removed, very carefully release the retainer from the component with two small screwdrivers. After removal, inspect the retainer for cracks or any damage.

(6) Prior to connecting quick-connect fitting to component being serviced, check condition of fitting and component. Clean parts with a lint-free cloth. Lubricate with clean engine oil.

(7) Insert quick-connect fitting to component being serviced and into plastic retainer. When a connection is made, a click will be heard.

(8) Verify a locked condition by firmly pulling on fuel tube and fitting (15-30 lbs.).

(9) Connect negative cable to battery or auxiliary jumper terminal.

(10) Use the DRB III® scan tool ASD Fuel System Test to pressurize the fuel system. Check for leaks.

PLASTIC RETAINER RING TYPE FITTING

This type of fitting can be identified by the use of a full-round plastic retainer ring (Fig. 24) usually black in color.

CAUTION: The interior components (O-rings, spacers, retainers) of this type of quick-connect fitting are not serviced separately. Do not attempt to repair damaged fittings or fuel lines/tubes. If repair is necessary, replace the complete fuel tube assembly.

WARNING: THE FUEL SYSTEM IS UNDER A CONSTANT PRESSURE (EVEN WITH THE ENGINE OFF). BEFORE SERVICING ANY FUEL SYSTEM HOSES, FITTINGS OR LINES, THE FUEL SYSTEM PRESSURE MUST BE RELEASED. REFER TO THE FUEL SYSTEM PRESSURE RELEASE PROCEDURE IN THIS GROUP.

DISCONNECTION/CONNECTION

(1) Perform fuel pressure release procedure. Refer to Fuel Pressure Release Procedure in this section.

(2) Disconnect negative battery cable from battery or auxiliary jumper terminal.

(3) Clean fitting of any foreign material before disassembly.

(4) To release fuel system component from quick-connect fitting, firmly push fitting towards component being serviced while firmly pushing plastic retainer ring into fitting (Fig. 24). With plastic ring depressed, pull fitting from component. **The plastic retainer ring must be pressed squarely into fitting body. If this retainer is cocked during removal, it may be difficult to disconnect fitting. Use an open-end wrench on shoulder of plastic retainer ring to aid in disconnection.**

(5) After disconnection, plastic retainer ring will remain with quick-connect fitting connector body.

(6) Inspect fitting connector body, plastic retainer ring and fuel system component for damage. Replace as necessary.

(7) Prior to connecting quick-connect fitting to component being serviced, check condition of fitting and component. Clean parts with a lint-free cloth. Lubricate with clean engine oil.

(8) Insert quick-connect fitting into component being serviced until a click is felt.

(9) Verify a locked condition by firmly pulling on fuel tube and fitting (15-30 lbs.).

(10) Connect negative battery cable to battery or auxiliary jumper terminal.

(11) Use the DRB III® scan tool ASD Fuel System Test to pressurize the fuel system. Check for leaks.

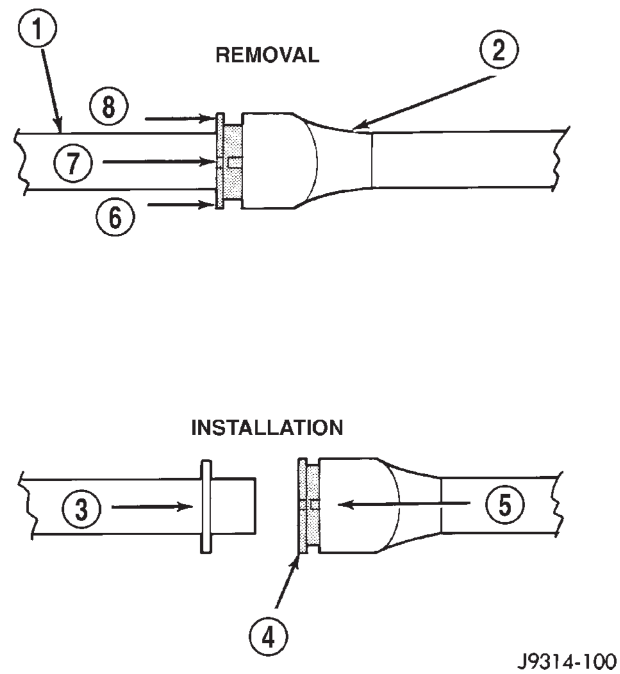


Fig. 24 Plastic Retainer Ring Type Fitting

1 - FUEL TUBE
2 - QUICK CONNECT FITTING
3 - PUSH
4 - PLASTIC RETAINER
5 - PUSH
6 - PUSH
7 - PUSH
8 - PUSH

FUEL INJECTION

TABLE OF CONTENTS

FUEL INJECTION

OPERATION

OPERATION - INJECTION SYSTEM

All engines used in this section have a sequential Multi-Port Electronic Fuel Injection system. The MPI system is computer regulated and provides precise air/fuel ratios for all driving conditions. The Powertrain Control Module (PCM) operates the fuel injection system.

The PCM regulates:

- Ignition timing
- Air/fuel ratio
- Emission control devices
- Cooling fan
- Charging system
- Idle speed
- Vehicle speed control

Various sensors provide the inputs necessary for the PCM to correctly operate these systems. In addition to the sensors, various switches also provide inputs to the PCM.

The PCM can adapt its programming to meet changing operating conditions.

Fuel is injected into the intake port above the intake valve in precise metered amounts through electrically operated injectors. The PCM fires the injectors in a specific sequence. Under most operating conditions, the PCM maintains an air fuel ratio of 14.7 parts air to 1 part fuel by constantly adjusting injector pulse width. Injector pulse width is the length of time the injector is open.

The PCM adjusts injector pulse width by opening and closing the ground path to the injector. Engine RPM (speed) and manifold absolute pressure (air density) are the **primary** inputs that determine injector pulse width.

OPERATION - MODES OF OPERATION

As input signals to the PCM change, the PCM adjusts its response to output devices. For example, the PCM must calculate a different injector pulse width and ignition timing for idle than it does for Wide Open Throttle (WOT). There are several different modes of operation that determine how the PCM responds to the various input signals.

There are two different areas of operation, OPEN LOOP and CLOSED LOOP.

During OPEN LOOP modes the PCM receives input signals and responds according to preset PCM programming. Inputs from the upstream and downstream heated oxygen sensors are not monitored during OPEN LOOP modes, except for heated oxygen sensor diagnostics (they are checked for shorted conditions at all times).

During CLOSED LOOP modes the PCM monitors the inputs from the upstream and downstream heated oxygen sensors. The upstream heated oxygen sensor input tells the PCM if the calculated injector pulse width resulted in the ideal air-fuel ratio of 14.7 to one. By monitoring the exhaust oxygen content through the upstream heated oxygen sensor, the PCM can fine tune injector pulse width. Fine tuning injector pulse width allows the PCM to achieve optimum fuel economy combined with low emissions.

For the PCM to enter CLOSED LOOP operation, the following must occur:

(1) Engine coolant temperature must be over 35°F.

- If the coolant is over 35° the PCM will wait 38 seconds.
- If the coolant is over 50°F the PCM will wait 15 seconds.
- If the coolant is over 167°F the PCM will wait 3 seconds.

(2) For other temperatures the PCM will interpolate the correct waiting time.

(3) O2 sensor must read either greater than 0.745 volts or less than 0.29 volt.

(4) The multi-port fuel injection systems has the following modes of operation:

- Ignition switch ON (Zero RPM)
- Engine start-up
- Engine warm-up
- Cruise
- Idle
- Acceleration
- Deceleration
- Wide Open Throttle
- Ignition switch OFF

(5) The engine start-up (crank), engine warm-up, deceleration with fuel shutoff and wide open throttle modes are OPEN LOOP modes. Under most operating conditions, the acceleration, deceleration (with A/C on), idle and cruise modes, **with the engine at operating temperature** are CLOSED LOOP modes.

IGNITION SWITCH ON (ZERO RPM) MODE

When the ignition switch activates the fuel injection system, the following actions occur:

- The PCM monitors the engine coolant temperature sensor and throttle position sensor input. The PCM determines basic fuel injector pulse width from this input.
- The PCM determines atmospheric air pressure from the MAP sensor input to modify injector pulse width.

When the key is in the ON position and the engine is not running (zero rpm), the Auto Shutdown (ASD) and fuel pump relays de-energize after approximately

FUEL INJECTION (Continued)

1 second. Therefore, battery voltage is not supplied to the fuel pump, ignition coil, fuel injectors and heated oxygen sensors.

ENGINE START-UP MODE

This is an OPEN LOOP mode. If the vehicle is in park or neutral (automatic transaxles) or the clutch pedal is depressed (manual transaxles) the ignition switch energizes the starter relay. The following actions occur when the starter motor is engaged.

- If the PCM receives the camshaft position sensor and crankshaft position sensor signals, it energizes the Auto Shutdown (ASD) relay and fuel pump relay. If the PCM does not receive both signals within approximately one second, it will not energize the ASD relay and fuel pump relay. The ASD and fuel pump relays supply battery voltage to the fuel pump, fuel injectors, ignition coil, (EGR solenoid and PCV heater if equipped) and heated oxygen sensors.
- The PCM energizes the injectors (on the 69° degree falling edge) for a calculated pulse width until it determines crankshaft position from the camshaft position sensor and crankshaft position sensor signals. The PCM determines crankshaft position within 1 engine revolution.
- After determining crankshaft position, the PCM begins energizing the injectors in sequence. It adjusts injector pulse width and controls injector synchronization by turning the individual ground paths to the injectors On and Off.
- When the engine idles within ±64 RPM of its target RPM, the PCM compares current MAP sensor value with the atmospheric pressure value received during the Ignition Switch On (zero RPM) mode.

Once the ASD and fuel pump relays have been energized, the PCM determines injector pulse width based on the following:

- MAP
- Engine RPM
- Battery voltage
- Engine coolant temperature
- Inlet/Intake air temperature (IAT)
- Throttle position
- The number of engine revolutions since cranking was initiated

During Start-up the PCM maintains ignition timing at 9° BTDC.

ENGINE WARM-UP MODE

This is an OPEN LOOP mode. The following inputs are received by the PCM:

- Manifold Absolute Pressure (MAP)
- Crankshaft position (engine speed)
- Engine coolant temperature
- Inlet/Intake air temperature (IAT)
- Camshaft position
- Knock sensor
- Throttle position
- A/C switch
- Battery voltage
- Vehicle speed
- Speed control
- O2 sensors

The PCM adjusts injector pulse width and controls injector synchronization by turning the individual ground paths to the injectors On and Off.

The PCM adjusts ignition timing and engine idle speed. Engine idle speed is adjusted through the idle air control motor.

CRUISE OR IDLE MODE

When the engine is at operating temperature this is a CLOSED LOOP mode. During cruising or idle the following inputs are received by the PCM:

- Manifold absolute pressure
- Crankshaft position (engine speed)
- Inlet/Intake air temperature
- Engine coolant temperature
- Camshaft position
- Knock sensor
- Throttle position
- Exhaust gas oxygen content
- A/C control positions
- Battery voltage
- Vehicle speed

The PCM adjusts injector pulse width and controls injector synchronization by turning the individual ground paths to the injectors On and Off.

The PCM adjusts engine idle speed and ignition timing. The PCM adjusts the air/fuel ratio according to the oxygen content in the exhaust gas (measured by the upstream and downstream heated oxygen sensor).

The PCM monitors for engine misfire. During active misfire and depending on the severity, the PCM either continuously illuminates or flashes the malfunction indicator lamp (Check Engine light on instrument panel). Also, the PCM stores an engine misfire DTC in memory, if 2nd trip with fault.

The PCM performs several diagnostic routines. They include:

- Oxygen sensor monitor
- Downstream heated oxygen sensor diagnostics during open loop operation (except for shorted)
- Fuel system monitor
- EGR monitor (if equipped)
- Purge system monitor
- Catalyst efficiency monitor
- All inputs monitored for proper voltage range, rationality.
- All monitored components (refer to the Emission section for On-Board Diagnostics).

FUEL INJECTION (Continued)

The PCM compares the upstream and downstream heated oxygen sensor inputs to measure catalytic convertor efficiency. If the catalyst efficiency drops below the minimum acceptable percentage, the PCM stores a diagnostic trouble code in memory, after 2 trips.

During certain idle conditions, the PCM may enter a variable idle speed strategy. During variable idle speed strategy the PCM adjusts engine speed based on the following inputs.

- A/C sense
- Battery voltage
- Battery temperature or Calculated Battery Temperature
- Engine coolant temperature
- Engine run time
- Inlet/Intake air temperature
- Vehicle mileage

ACCELERATION MODE

This is a CLOSED LOOP mode. The PCM recognizes an abrupt increase in Throttle Position sensor output voltage or MAP sensor output voltage as a demand for increased engine output and vehicle acceleration. The PCM increases injector pulse width in response to increased fuel demand.

- Wide Open Throttle-open loop

DECELERATION MODE

This is a CLOSED LOOP mode. During deceleration the following inputs are received by the PCM:

- A/C sense
- Battery voltage
- Inlet/Intake air temperature
- Engine coolant temperature
- Crankshaft position (engine speed)
- Exhaust gas oxygen content (upstream heated oxygen sensor)
- Knock sensor
- Manifold absolute pressure
- Throttle position sensor
- IAC motor (solenoid) control changes in response to MAP sensor feedback

The PCM may receive a closed throttle input from the Throttle Position Sensor (TPS) when it senses an abrupt decrease in manifold pressure. This indicates a hard deceleration (Open Loop). In response, the PCM may momentarily turn off the injectors. This helps improve fuel economy, emissions and engine braking.

WIDE-OPEN-THROTTLE MODE

This is an OPEN LOOP mode. During wide-open-throttle operation, the following inputs are used by the PCM:

- Inlet/Intake air temperature
- Engine coolant temperature
- Engine speed
- Knock sensor
- Manifold absolute pressure
- Throttle position

When the PCM senses a wide-open-throttle condition through the Throttle Position Sensor (TPS) it de-energizes the A/C compressor clutch relay. This disables the air conditioning system and disables EGR (if equipped).

The PCM adjusts injector pulse width to supply a predetermined amount of additional fuel, based on MAP and RPM.

IGNITION SWITCH OFF MODE

When the operator turns the ignition switch to the OFF position, the following occurs:

- All outputs are turned off, unless 02 Heater Monitor test is being run. Refer to the Emission section for On-Board Diagnostics.
- No inputs are monitored except for the heated oxygen sensors. The PCM monitors the heating elements in the oxygen sensors and then shuts down.

FUEL CORRECTION or ADAPTIVE MEMORIES

DESCRIPTION

In Open Loop, the PCM changes pulse width without feedback from the O2 Sensors. Once the engine warms up to approximately 30 to 35° F, the PCM goes into closed loop **Short Term Correction** and utilizes feedback from the O2 Sensors. Closed loop **Long Term Adaptive Memory** is maintained above 170° to 190° F unless the PCM senses wide open throttle. At that time the PCM returns to Open Loop operation.

OPERATION

Short Term

The first fuel correction program that begins functioning is the short term fuel correction. This system corrects fuel delivery in direct proportion to the readings from the Upstream O2 Sensor.

The PCM monitors the air/fuel ratio by using the input voltage from the O2 Sensor. When the voltage reaches its preset high or low limit, the PCM begins to add or remove fuel until the sensor reaches its switch point. The short term corrections then begin.

The PCM makes a series of quick changes in the injector pulse-width until the O2 Sensor reaches its opposite preset limit or switch point. The process then repeats itself in the opposite direction.

Short term fuel correction will keep increasing or decreasing injector pulse-width based upon the upstream O2 Sensor input. The maximum range of

FUEL INJECTION (Continued)

authority for short term memory is 25% (+/-) of base pulse-width. Short term is violated and is lost when ignition is turned OFF.

Long Term

The second fuel correction program is the long term adaptive memory. In order to maintain correct emission throughout all operating ranges of the engine, a cell structure based on engine rpm and load (MAP) is used.

Ther number of cells varies upon the driving conditions. Two cells are used only during idle, based upon TPS and Park/Neutral switch inputs. There may be two other cells used for deceleration, based on TPS, engine rpm, and vehicle speed. The other twelve cells represent a manifold pressure and an rpm range. Six of the cells are high rpm and the other six are low rpm. Each of these cells is a specific MAP voltage range Typical Adaptive Memory Fuel Cells .

As the engine enters one of these cells the PCM looks at the amount of short term correction being used. Because the goal is to keep short term at 0 (O2 Sensor switching at 0.5 volt), long term will update in the same direction as short term correction was moving to bring the short term back to 0. Once short term is back at 0, this long term correction factor is stored in memory.

The values stored in long term adaptive memory are used for all operating conditions, including open loop and cold starting. However, the updating of the long term memory occurs after the engine has exceeded approximately 170°-190° F, with fuel control in closed loop and two minutes of engine run time. This is done to prevent any transitional temperature or start-up compensations from corrupting long term fuel correction.

Long term adaptive memory can change the pulse-width by as much as 25%, which means it can correct for all of short term. It is possible to have a problem that would drive long term to 25% and short term to another 25% for a total change of 50% away from base pulse-width calculation.

TYPICAL ADAPTIVE MEMORY FUEL CELLS

	Open Throttle	Open Throttle	Open Throttle	Open Throttle	Open Throttle	Open Throttle	Idle	Decel
Vacuum	20	17	13	9	5	0		
Above 1,984 rpm	1	3	5	7	9	11	13 Drive	15
Below 1,984 rpm	0	2	4	6	8	10	12 Neutral	14
MAP volt =	0	1.4	2.0	2.6	3.3	3.9		

Fuel Correction Diagnostics

There are two fuel correction diagnostic routines:

- Fuel System Rich
- Fuel System Lean

A DTC is set and the MIL is illuminated if the PCM detects either of these conditions. This is determined based on total fuel correction, short term times long term.

PROGRAMMABLE COMMUNICATIONS INTERFACE (PCI) BUS

DESCRIPTION

The Programmable Communication Interface Multiplex system (PCI Bus) consist of a single wire. The Body Control Module (BCM) acts as a splice to connect each module and the Data Link Connector (DLC) together. Each module is wired in parallel to the data bus through its PCI chip set and uses its ground as the bus reference. The wiring is a minimum 20 gage wire.

OPERATION

Various modules exchange information through a communications port called the PCI Bus. The Powertrain Control Module (PCM) transmits the Malfunction Indicator Lamp (Check Engine) On/Off signal and engine RPM on the PCI Bus. The PCM receives the Air Conditioning select input, transaxle gear position inputs over the PCI Bus. The PCM also receives the air conditioning evaporator temperature signal from the PCI Bus.

The following components access or send information on the PCI Bus.

- Instrument Panel
- Body Control Module
- Air Bag System Diagnostic Module
- Full ATC Display Head (if equipped)
- ABS Module

FUEL INJECTION (Continued)

- Transmission Control Module
- Powertrain Control Module
- Travel Module

SYSTEM DIAGNOSIS

OPERATION

The PCM can test many of its own input and output circuits. If the PCM senses a fault in a major system, the PCM stores a Diagnostic Trouble Code (DTC) in memory.

For DTC information see On-Board Diagnostics (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - DESCRIPTION) .

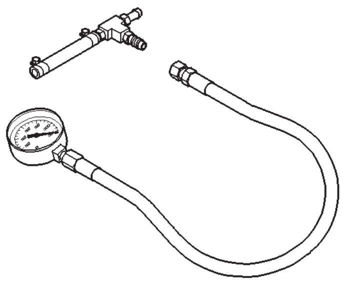
SPECIFICATIONS

TORQUE

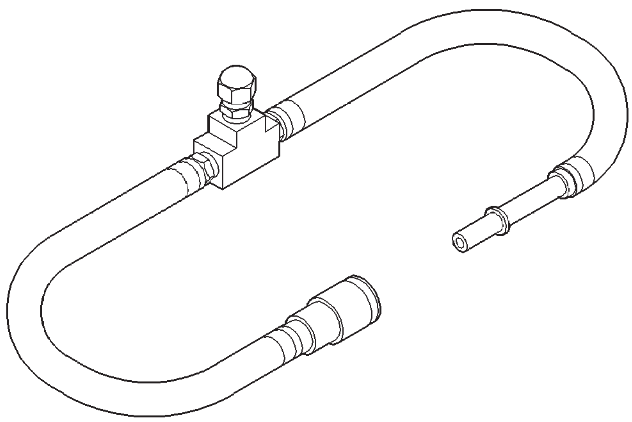
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
MAP SENSOR 4-CYLINDER	4.5		40
MAP SENSOR 2.7L	4.5		40
POWER STEERING RESERVOIR PLASTIC MANIFOLD	5.7		50
POWER STEERING RESERVOIR ALUMINUM MANIFOLD	11.9		105
THROTTLE CABLE BRACKET 4-CYLINDER	14.1		125
THROTTLE CABLE BRACKET 2.7L	13.6		120
EGR TUBE TO MANIFOLD 2.4L	11.3		100
EGR TUBE TO MANIFOLD 2.7L	11.3		100
THROTTLE BODY BOLTS 4-CYLINDER	13.6		120
THROTTLE BODY BOLTS 2.7L	13.6		120
LOWER SUPPORT BRACKET 2.7L	31.1	23	
O2 Sensors	27	20	
The composite manifolds uses special Plastic screws. The factory installed Plastic screws can be removed and installed up to 5 times. Do not exceed the specified torque. These screws must be installed slowly (less than 600 rpms) to avoid melting the parent material. There are service repair screws available for repair. They require a higher torque than the original screws.			

SPECIAL TOOLS

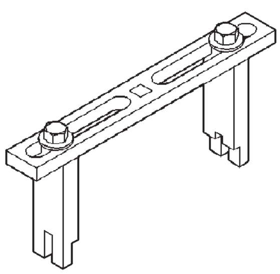
FUEL



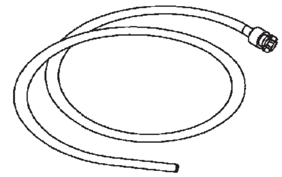
Pressure Gauge Assembly C–4799–B



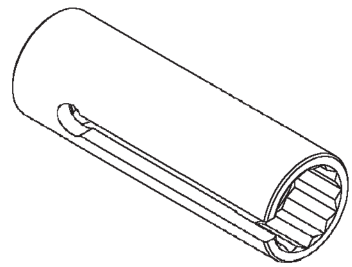
Fuel Pressure Test Adapter 6539



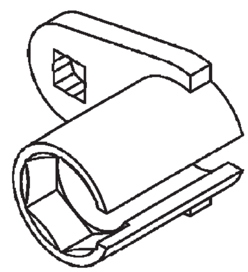
Spanner Wrench 6856



Fuel Line Adapter 1/4



O2S (Oxygen Sensor) Remover/Installer—C-4907



O2S(Oxygen Sensor) Remover/Installer - 8439

ACCELERATOR PEDAL

REMOVAL

(1) Hold the throttle body throttle lever in the wide open position. Remove the throttle cable from the throttle body cam (Fig. 1).

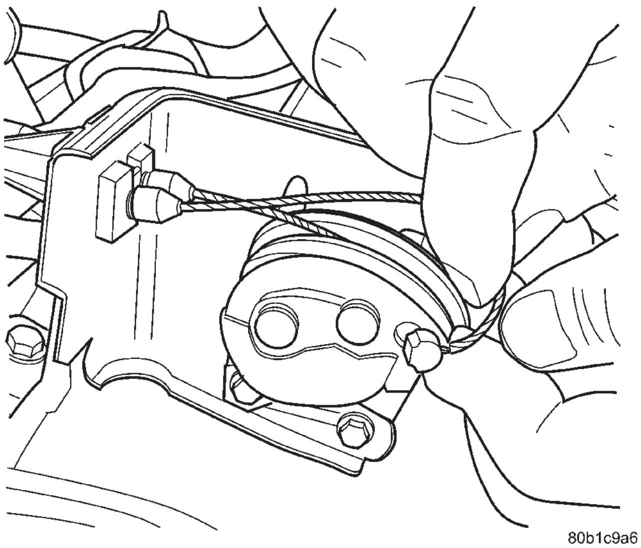


Fig. 1 THROTTLE CABLE RELEASE

(2) From inside the vehicle, hold up the pedal and remove the pedal retainer and throttle cable from the upper end of the pedal lever (Fig. 2).

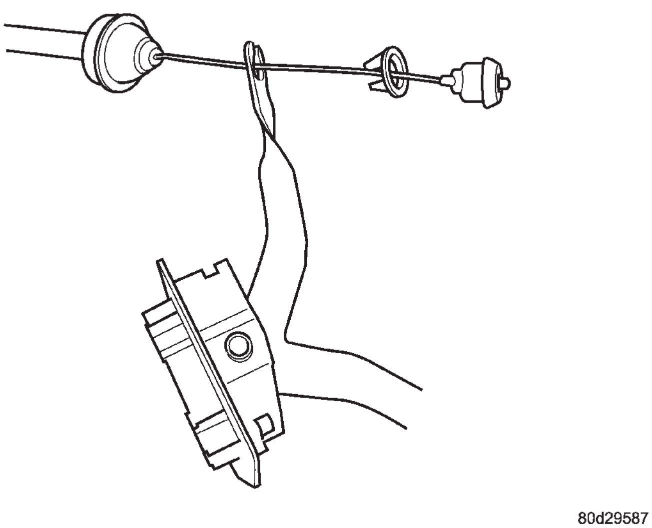


Fig. 2 CABLE CLIP

(3) Remove nuts from accelerator pedal attaching studs. Remove assembly from vehicle (Fig. 3).

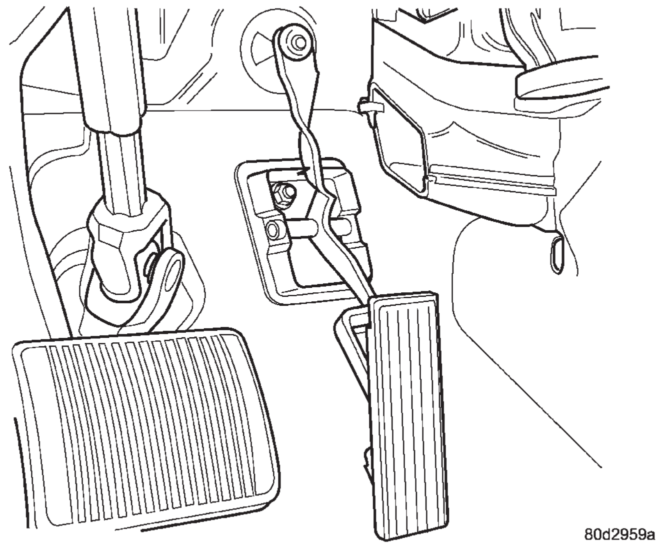


Fig. 3 ACCELERATOR PEDAL

INSTALLATION

(1) Position accelerator pedal assembly on dash panel. Install retaining nuts. Tighten retaining nuts to 12 N·m (105 in. lbs.) torque (Fig. 3).

(2) From inside the vehicle, hold up the pedal and install the throttle cable and pedal retainer in the upper end of the pedal lever (Fig. 2).

(3) From the engine compartment, hold the throttle body lever in the wide open position and install the throttle cable (Fig. 1).

CRANKSHAFT POSITION SENSOR

DESCRIPTION

The 4 cylinder crankshaft sensor is located on the rear of the engine near the accessory drive belt (Fig. 4). The 2.7L crankshaft sensor is located on the rear of the transmission housing, above the differential housing (Fig. 5). The bottom of the sensor is positioned next to the drive plate.

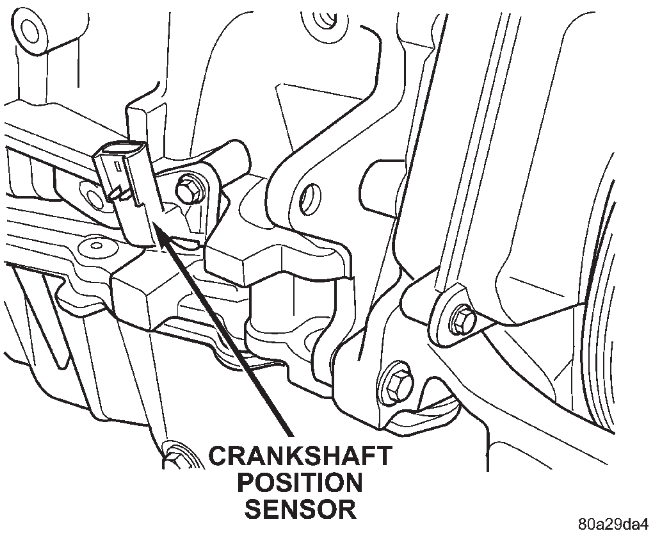


Fig. 4 4 Cylinder

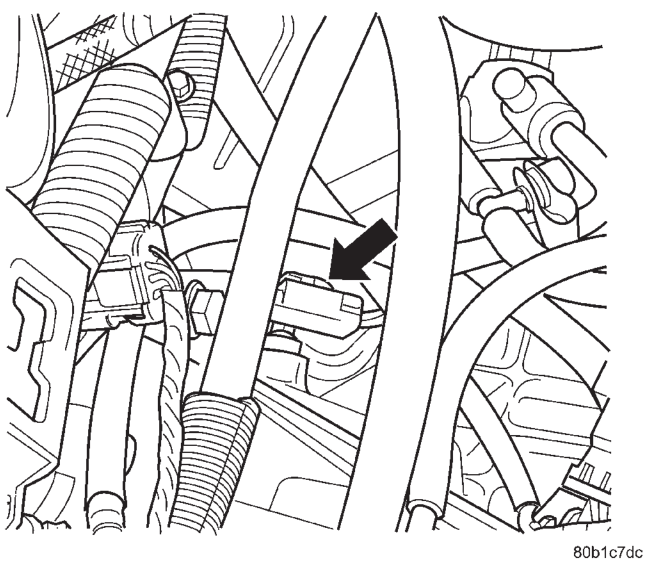


Fig. 5 2.7L

OPERATION

The Crankshaft Position (CKP) sensor is a Hall-effect sensor. The PCM sends approximately 8 volts to the Hall-effect sensor. This voltage is required to operate the Hall-effect chip and the electronics inside the sensor. A ground for the sensor is provided through the sensor return circuit of the PCM. The input to the PCM occurs on a 5 volt output reference circuit.

The notches generate pulses from high to low in the crankshaft position sensor output voltage. When a metal portion of the counterweight aligns with the crankshaft position sensor, the sensor output voltage goes low (less than 0.5 volts). When a notch aligns with the sensor, voltage goes high (5.0 volts). As a group of notches pass under the sensor, the output voltage switches from low (metal) to high (notch) then back to low.

If available, an oscilloscope can display the square wave patterns of each voltage pulses. From the width of the output voltage pulses, the PCM calculates engine speed. The width of the pulses represent the amount of time the output voltage stays high before switching back to low. The period of time the sensor output voltage stays high before switching back to low is referred to as pulse width. The faster the engine is operating, the smaller the pulse width on the oscilloscope.

By counting the pulses and referencing the pulse from the 60 degree signature notch, the PCM calculates crankshaft angle (position). In each group of timing reference notches, the first notch represents 69 degrees before top dead center (BTDC). The second notch represents 49 degrees BTDC. The third notch represents 29 degrees. The last notch in each set represents 9 degrees before top dead center (TDC).

The timing reference notches are machined at 20° increments. From the voltage pulse width the PCM tells the difference between the timing reference notches and the 60 degree signature notch. The 60 degree signature notch produces a longer pulse width than the smaller timing reference notches. If the camshaft position sensor input switches from high to low when the 60 degree signature notch passes under the crankshaft position sensor, the PCM knows cylinder number one is the next cylinder at TDC. The crankshaft position sensor notifies the PCM that 2 cylinders are on Top Dead Center. Based on this, the PCM will energize one of these 2 cylinder's injectors and ignition coil. The camshaft position sensor identifies which cylinder of the 2 is on Top Dead Center and on the compression stroke.

The second crankshaft counterweight has two sets of four timing reference notches including a 60 degree signature notch (Fig. 6).

The crankshaft position sensor detects slots cut into the transmission driveplate extension (Fig. 7). There are 3 sets of slots. Two sets contains 4 slots, and 1 set contains 5 slots for a total of 13 slots (Fig. 8). Basic timing is set by the position of the last slot in each group. Once the Powertrain Control Module (PCM) senses the last slot, it determines crankshaft

CRANKSHAFT POSITION SENSOR (Continued)

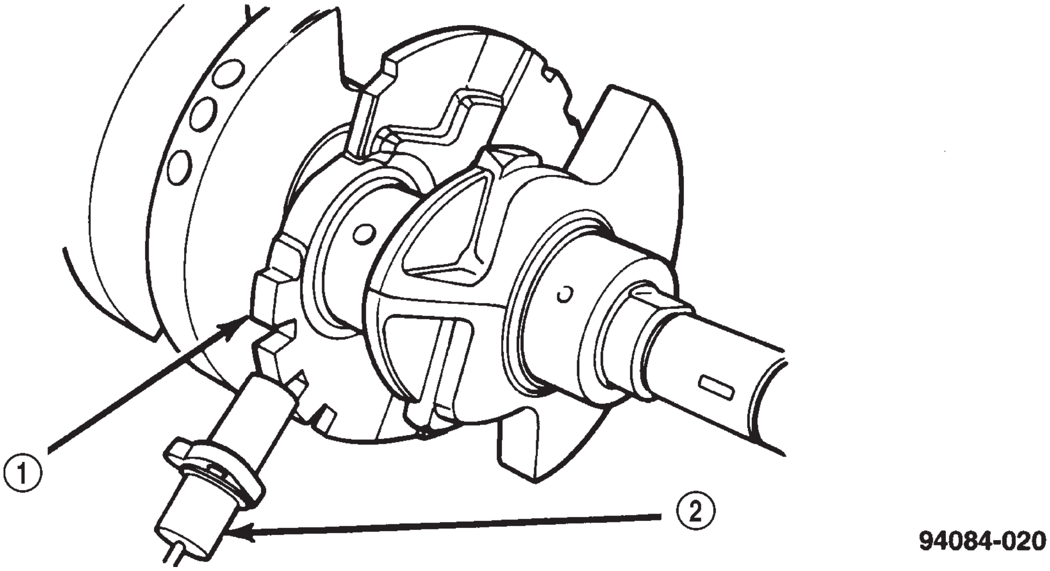


Fig. 6 Timing Reference Notches - 4 Cylinder

1 - MACHINED NOTCHES
2 - CRANKSHAFT POSITION SENSOR

position (which piston will next be at TDC) from the camshaft position sensor input. The 4 pulses generated by the crankshaft position sensor represent the 69°, 49°, 29°, and 9° BTDC marks. It may take the PCM one engine revolution to determine crankshaft position.

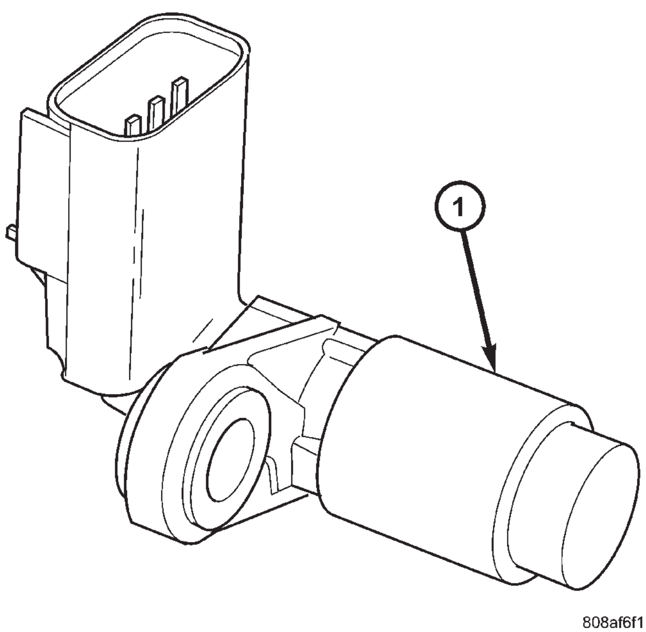


Fig. 7 Crankshaft Position Sensor - 2.7L

1 - CRANKSHAFT POSITION SENSOR
2 - PAPER SPACER

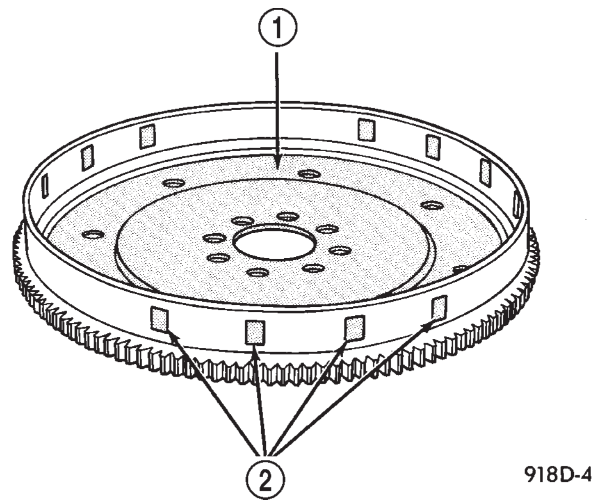


Fig. 8 Timing Slots - 2.7L

1 - TORQUE CONVERTER DRIVE PLATE
2 - SLOTS

The PCM uses crankshaft position reference to determine injector sequence, ignition timing and the presence of misfire. Once the PCM determines crankshaft position, it begins energizing the injectors in sequence.

REMOVAL

REMOVAL - 4 CYLINDER

(1) Disconnect the negative battery cable.
(2) Raise vehicle and support.
(3) Disconnect the electrical connector (Fig. 9).

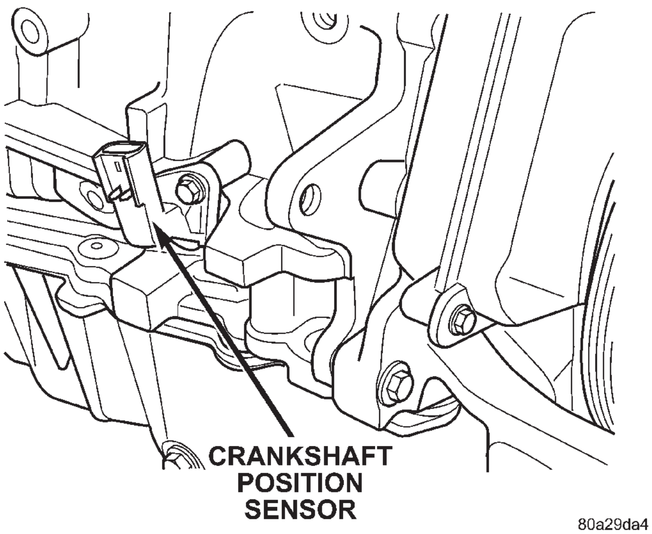


Fig. 9 CRANKSHAFT SENSOR

(4) Remove crankshaft sensor bolt.
(5) Remove the crankshaft sensor.

REMOVAL - 2.7L

(1) Disconnect the negative battery cable.
(2) Remove the air cleaner box.
(3) Disconnect the electrical connector from Crankshaft position sensor (Fig. 10).

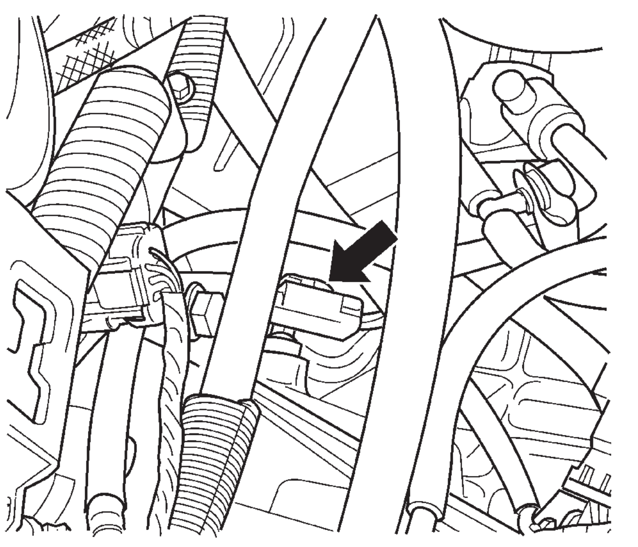


Fig. 10 CRANKSHAFT SENSOR 2.7L

(4) Remove bolt.
(5) Remove sensor.

INSTALLATION

INSTALLATION - 4 CYLINDER

(1) Install the crankshaft sensor.
(2) Install crankshaft sensor bolt and tighten.
(3) Connect the electrical connector (Fig. 9).
(4) Lower vehicle.
(5) Connect the negative battery cable.

INSTALLATION - 2.7L

(1) Install crankshaft sensor (Fig. 10).
(2) Tighten bolt.
(3) Install air cleaner box.
(4) Connect the negative battery cable.

ENGINE SPEED SENSOR

DESCRIPTION

The PCM receives a signal from the TCM and the transaxle output speed sensor over the bus communication line to indicate vehicle speed on automatic transmission cars. On Manual transmission cars (if equipped) vehicle, a dedicated vehicle speed sensor is connected to the PCM.

OPERATION

The Transmission Control Module (TCM) supplies the road speed and distance traveled inputs to the PCM. From these inputs and the throttle position sensor input, the PCM determines when a deceleration condition occurs.

FUEL INJECTOR

DESCRIPTION

The injectors are positioned in the intake manifold or cylinder head with the nozzle ends directly above the intake valve port (Fig. 11).

OPERATION

The fuel injectors are 12 volt electrical solenoids (Fig. 12). The injector contains a pintle that closes off an orifice at the nozzle end. When electric current is supplied to the injector, the armature and needle move a short distance against a spring, allowing fuel to flow out the orifice. Because the fuel is under high pressure, a fine spray is developed in the shape of a hollow cone or two streams. The spraying action atomizes the fuel, adding it to the air entering the

FUEL INJECTOR (Continued)

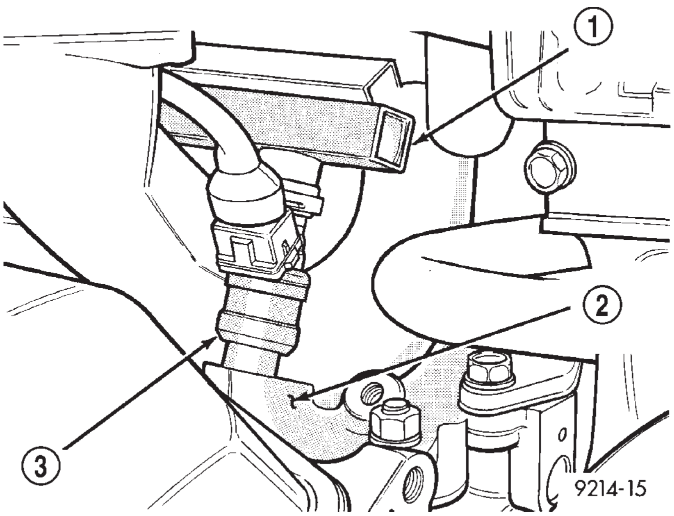


Fig. 11 Fuel Injector Location - Typical

1 - FUEL RAIL
2 - INTAKE MANIFOLD
3 - FUEL INJECTORS

combustion chamber. Fuel injectors are not interchangeable between engines.

The PCM provides battery voltage to each injector through the ASD relay. Injector operation is controlled by a ground path provided for each injector by the PCM. Injector on-time (pulse-width) is variable, and is determined by the PCM processing all the data previously discussed to obtain the optimum injector pulse width for each operating condition. The pulse width is controlled by the duration of the ground path provided.

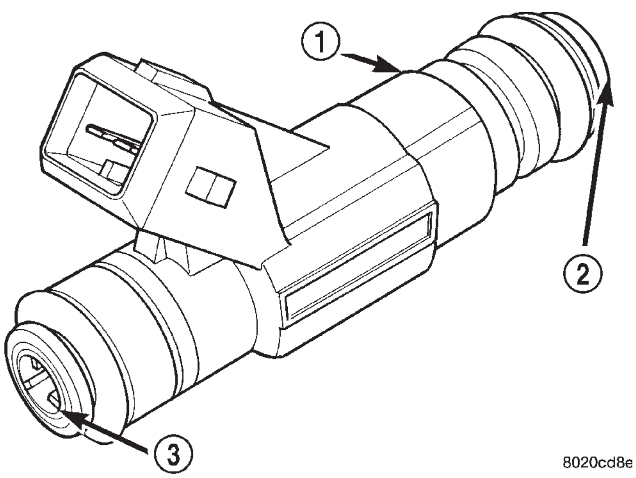


Fig. 12 FUEL INJECTOR - TYPICAL

1 - FUEL INJECTOR
2 - NOZZLE
3 - TOP (FUEL ENTRY)

REMOVAL

REMOVAL - 4 CYLINDER

The fuel rail must be removed first (Fig. 13). Refer to Fuel Rail Removal in this section.

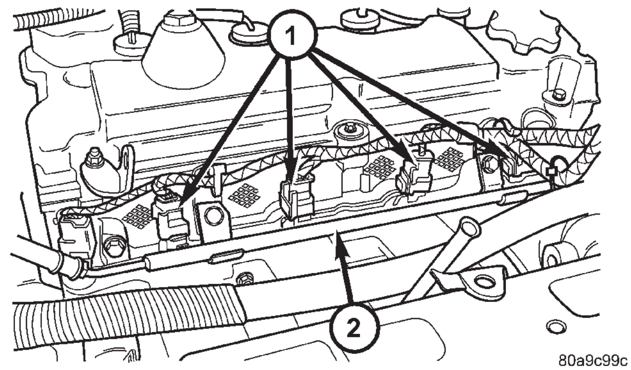


Fig. 13 FUEL RAIL AND INJECTORS

1 - Fuel Injectors
2 - Fuel Rail

(1) Position fuel rail assembly so that the fuel injectors are easily accessible (Fig. 14).

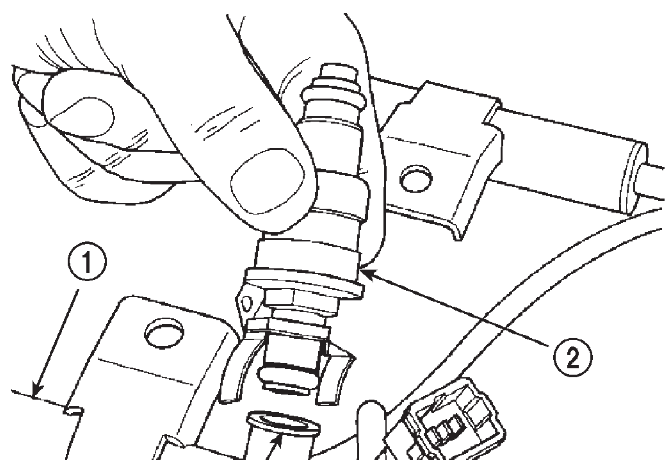


Fig. 14 FUEL INJECTOR AND RAIL - TYPICAL

1 - FUEL RAIL ASSEMBLY
2 - FUEL INJECTOR
3 - FUEL RAIL RECEIVER

(2) Remove injector clip and pull injector out of fuel rail.

(3) Check injector O-ring for damage. If O-ring is damaged, it must be replaced. Replace the injector clip if it is damaged.

(4) Repeat for remaining injectors.

FUEL INJECTOR (Continued)

REMOVAL - 2.7L

(1) Release fuel system pressure. Refer to Fuel System Pressure Release Procedure in this section.

(2) Disconnect negative cable to battery.

(3) Remove the Fuel Rail, refer to Fuel rail removal in this section.

(4) Position the fuel rail assembly so that the fuel injectors are easily accessible.

(5) Remove retaining clips from fuel injectors at fuel rail.

(6) Remove fuel injectors.

(7) Repeat for remaining injectors.

(8) Check injector O-ring for damage. If O-ring is damaged, it must be replaced. Replace the injector clip if it is damaged.

INSTALLATION

INSTALLATION - 4 CYLINDER

(1) Before installing an injector the rubber O-ring must be lubricated with a drop of clean engine oil to aid in installation.

(2) Install injector clip by sliding open end into the top slot of the injector. The edge of the receiver cup will slide into the side slots of clip.

(3) Install injector top end into fuel rail receiver cap. Be careful not to damage O-ring during installation (Fig. 15).

(4) Repeat steps for remaining injectors.

(5) Install the fuel rail, refer to the Fuel Rail Installation in this section.

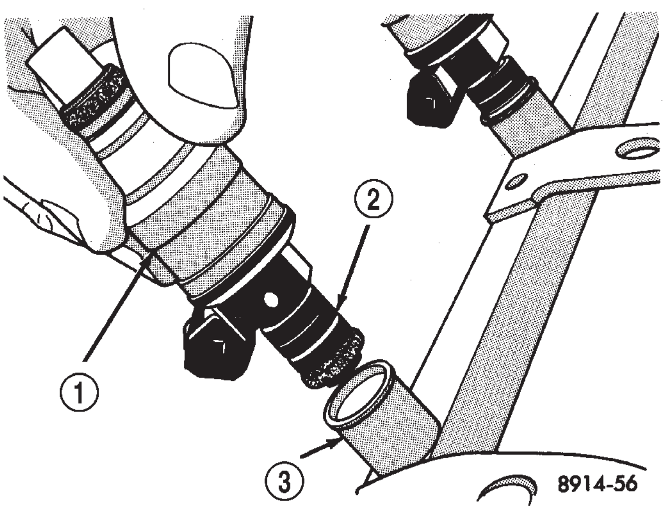


Fig. 15 SERVICING FUEL INJECTOR TYPICAL

1 - FUEL INJECTOR
2 - LOCKING SLOT
3 - FUEL RAIL RECEIVER CUP

INSTALLATION - 2.7L

(1) Check injector o-ring for damage. If o-ring is damaged it must be replaced. Replace injector clip if it is damaged.

(2) Lightly lubricate the fuel injector O-rings with a couple drops of clean engine oil.

(3) Install retaining clips on fuel injectors.

(4) Push injectors into fuel injector rail until clips are in the correct position.

(5) Install the Fuel Rail, refer to the Fuel Rail installation in this section.

FUEL PUMP RELAY

DESCRIPTION

The fuel pump relay is located in the PDC. The inside top of the PDC cover has a label showing relay and fuse location.

OPERATION

The fuel pump relay supplies battery voltage to the fuel pump. A buss bar in the Power Distribution Center (PDC) supplies voltage to the solenoid side and contact side of the relay. The fuel pump relay power circuit contains a fuse between the buss bar in the PDC and the relay. The fuse is located in the PDC. Refer to the Wiring Diagrams for circuit information.

The PCM controls the fuel pump relay by switching the ground path for the solenoid side of the relay on and off. The PCM turns the ground path off when the ignition switch is in the Off position. When the ignition switch is in the On position, the PCM energizes the fuel pump. If the crankshaft position sensor does not detect engine rotation, the PCM de-energizes the relay after approximately one second.

IDLE AIR CONTROL MOTOR

DESCRIPTION

The idle air control motor (IAC) attaches to the throttle body (Fig. 16) or (Fig. 17). It is an electric stepper motor.

OPERATION

The PCM adjusts engine idle speed through the idle air control motor to compensate for engine load, coolant temperature or barometric pressure changes.

The throttle body has an air bypass passage that provides air for the engine during closed throttle idle. The idle air control motor pintle protrudes into the air bypass passage and regulates air flow through it.

The PCM adjusts engine idle speed by moving the IAC motor pintle in and out of the bypass passage. The adjustments are based on inputs the PCM

IDLE AIR CONTROL MOTOR (Continued)

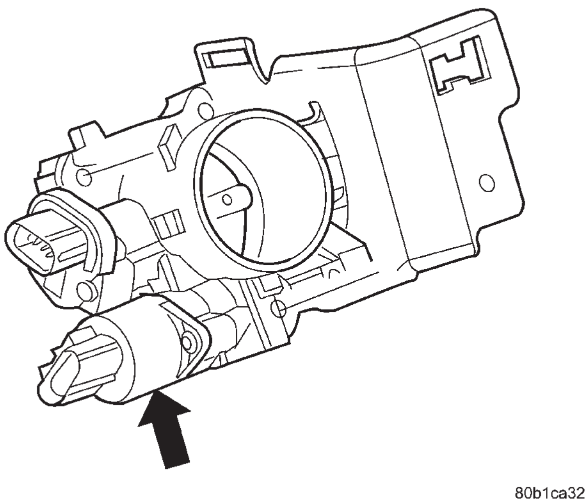


Fig. 16 IAC MOTOR 4 CYLINDER

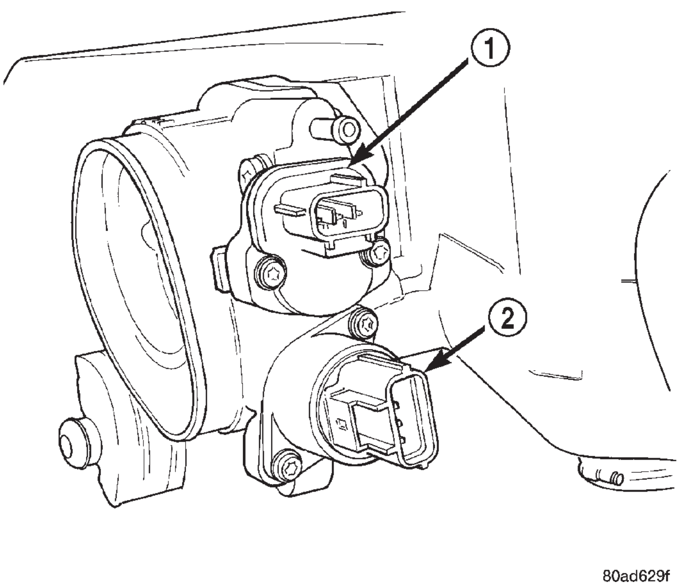


Fig. 17 IDLE AIR CONTROL MOTOR 2.7L

1 - THROTTLE POSITION SENSOR
2 - IDLE AIR CONTROL MOTOR

receives. The inputs are from the throttle position sensor, crankshaft position sensor, coolant temperature sensor, MAP sensor, vehicle speed sensor and various switch operations (brake, park/neutral, air conditioning).

When engine rpm is above idle speed, the IAC is used for the following functions:

- Off-idle dashpot
- Deceleration air flow control
- A/C compressor load control (also opens the passage slightly before the compressor is engaged so that the engine rpm does not dip down when the compressor engages)

Target Idle

Target idle is determined by the following inputs:

- Gear position
- ECT Sensor
- Battery voltage
- Ambient/Battery Temperature Sensor
- VSS
- TPS
- MAP Sensor

REMOVAL

REMOVAL - 4 CYLINDER

When servicing throttle body components, always reassemble components with new O-rings and seals where applicable. Never use lubricants on O-rings or seals, damage may result. If assembly of component is difficult, use water to aid assembly. Use care when removing hoses to prevent damage to hose or hose nipple.

(1) Disconnect negative cable from battery.

(2) Remove electrical connector from idle air control motor.

(3) Remove idle air control motor mounting screws (Fig. 16).

(4) Remove motor from throttle body. Ensure the O-ring is removed with the motor.

REMOVAL - 2.7L

(1) Disconnect the negative battery cable.

(2) Disconnect the IAC electrical connector (Fig. 18).

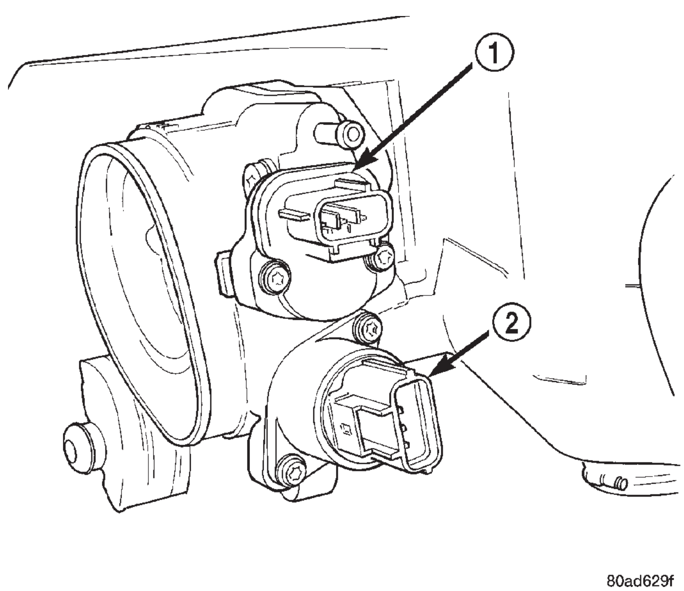


Fig. 18 Idle Air Control Motor

1 - THROTTLE POSITION SENSOR
2 - IDLE AIR CONTROL MOTOR

IDLE AIR CONTROL MOTOR (Continued)

(3) Remove the IAC mounting screws.
(4) Remove the IAC.

INSTALLATION

INSTALLATION - 4 CYLINDER

When servicing throttle body components, always reassemble components with new O-rings and seals where applicable. Never use lubricants on O-rings or seals, damage may result. If assembly of component is difficult, use water to aid assembly. Use care when removing hoses to prevent damage to hose or hose nipple.

(1) The new idle air control motor has a new O-ring installed on it. If pintle measures more than 1 inch (25 mm) it must be retracted. Use the DRB III® Idle Air Control Motor Open/Close Test to retract the pintle (battery must be connected.)
(2) Carefully place idle air control motor into throttle body (Fig. 16).
(3) Install mounting screws. Tighten screws to 4.5 N·m (40 in. lbs.) torque.
(4) Connect electrical connector to idle air control motor
(5) Connect negative cable to battery.

INSTALLATION - 2.7L

(1) Install the IAC to the throttle body (Fig. 18).
(2) Tighten mounting screws to 5.1 N·m (45 in. lbs.) torque.
(3) Attach electrical connector to the IAC.
(4) Connect the negative battery cable.

INLET AIR TEMPERATURE SENSOR

DESCRIPTION

The IAT Sensor is a Negative Temperature Coefficient (NTC) Sensor that provides information to the PCM regarding the temperature of the air entering the intake manifold (Fig. 19).

OPERATION

Inlet/Intake Air Temperature

The inlet air temperature sensor replaces the intake air temperature sensor and the battery temperature sensor. The PCM uses the information from the inlet air temperature sensor to determine values to use as an intake air temperature sensor and a battery temperature sensor.

The Intake Air Temperature (IAT) sensor value is used by the PCM to determine air density.

The PCM uses this information to calculate:

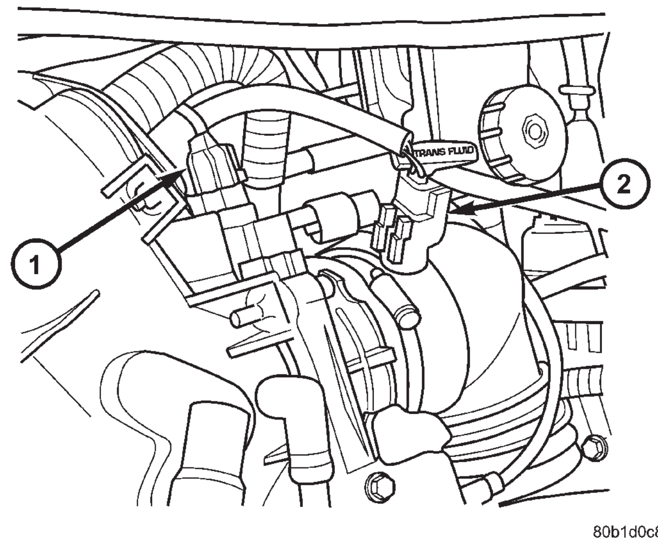


Fig. 19 TPS AND INLET AIR TEMP. SENSOR 2.7L

1 - Throttle Position Sensor
2 - Inlet Air Temperature Sensor

- Injector pulse width
- Adjustment of ignition timing (to prevent spark knock at high intake air temperatures)

Battery Temperature

The inlet air temperature sensor replaces the intake air temperature sensor and the battery temperature sensor. The PCM uses the information from the inlet air temperature sensor to determine values for the PCM to use as an intake air temperature sensor and a battery temperature sensor.

The battery temperature information along with data from monitored line voltage (B+), is used by the PCM to vary the battery charging rate. System voltage will be higher at colder temperatures and is gradually reduced at warmer temperatures.

The battery temperature information is also used for OBD II diagnostics. Certain faults and OBD II monitors are either enabled or disabled depending upon the battery temperature sensor input (example: disable purge, enable LDP). Most OBD II monitors are disabled below 20°F.

MAP SENSOR

DESCRIPTION

The MAP sensor mounts to the driver side of the intake manifold plenum (Fig. 20) or (Fig. 21).

OPERATION

The MAP serves as a PCM input, using a silicon based sensing unit, to provide data on the manifold

MAP SENSOR (Continued)

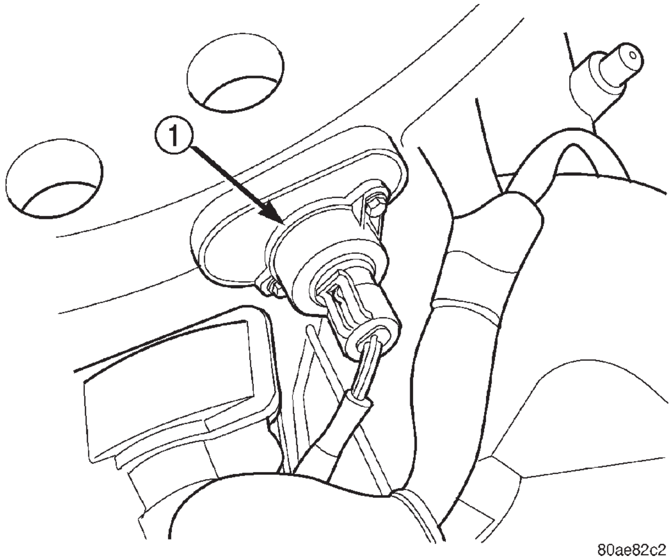


Fig. 20 MAP Sensor 2.7L

1 - MAP SENSOR

vacuum that draws the air/fuel mixture into the combustion chamber. The PCM requires this information to determine injector pulse width and spark advance. When MAP equals Barometric pressure, the pulse width will be at maximum.

Also like the cam and crank sensors, a 5 volt reference is supplied from the PCM and returns a voltage signal to the PCM that reflects manifold pressure. The zero pressure reading is 0.5V and full scale is 4.5V. For a pressure swing of 0 — 15 psi the voltage changes 4.0V. The sensor is supplied a regulated 4.8 to 5.1 volts to operate the sensor. Like the cam and crank sensors ground is provided through the sensor return circuit.

The MAP sensor input is the number one contributor to pulse width. The most important function of the MAP sensor is to determine barometric pressure. The PCM needs to know if the vehicle is at sea level or is it in Denver at 5000 feet above sea level, because the air density changes with altitude. It will also help to correct for varying weather conditions. If a hurricane was coming through the pressure would be very, very low or there could be a real fair weather, high pressure area. This is important because as air pressure changes the barometric pressure changes. Barometric pressure and altitude have a direct inverse correlation, as altitude goes up barometric pressure goes down. The first thing that happens as the key is rolled on, before reaching the crank position, the PCM powers up, comes around and looks at the MAP voltage, and based upon the voltage it sees, it knows the current barometric pressure relative to altitude. Once the engine starts, the PCM looks at the voltage again, continuously every 12 milliseconds, and compares the current voltage to what it was at key on. The difference between current and what it was at key on is manifold vacuum.

During key On (engine not running) the sensor reads (updates) barometric pressure. A normal range can be obtained by monitoring known good sensor in your work area.

As the altitude increases the air becomes thinner (less oxygen). If a vehicle is started and driven to a very different altitude than where it was at key On the barometric pressure needs to be updated. Any time the PCM sees Wide Open throttle, based upon TPS angle and RPM it will update barometric pressure in the MAP memory cell. With periodic updates, the PCM can make its calculations more effectively.

The PCM uses the MAP sensor to aid in calculating the following:

- Barometric pressure
- Engine load
- Manifold pressure
- Injector pulse-width
- Spark-advance programs
- Shift-point strategies (F4AC1 transmissions only, via the CCD bus)
- Idle speed
- Decel fuel shutoff

The MAP sensor signal is provided from a single piezoresistive element located in the center of a diaphragm. The element and diaphragm are both made of silicone. As the pressures changes the diaphragm moves causing the element to deflect which stresses the silicone. When silicone is exposed to stress its resistance changes. As manifold vacuum increases, the MAP sensor input voltage decreases proportionally. The sensor also contains electronics that condition the signal and provide temperature compensation.

The PCM recognizes a decrease in manifold pressure by monitoring a decrease in voltage from the reading stored in the barometric pressure memory cell. The MAP sensor is a linear sensor; as pressure changes, voltage changes proportionately. The range of voltage output from the sensor is usually between 4.6 volts at sea level to as low as 0.3 volts at 26 in. of Hg (Table 1). Barometric pressure is the pressure exerted by the atmosphere upon an object. At sea level on a standard day, no storm, barometric pressure is 29.92 in Hg. For every 100 feet of altitude barometric pressure drops .10 in. Hg. If a storm goes through it can either add, high pressure, or decrease, low pressure, from what should be present for that altitude. You should make a habit of knowing what the average pressure and corresponding barometric pressure is for your area. Always use the Diagnostic Test Procedures Manual for MAP sensor testing.

MAP SENSOR (Continued)

REMOVAL

REMOVAL - 4 CYLINDER

(1) Disconnect the negative battery cable.

(2) Disconnect electrical connector from MAP sensor (Fig. 21).

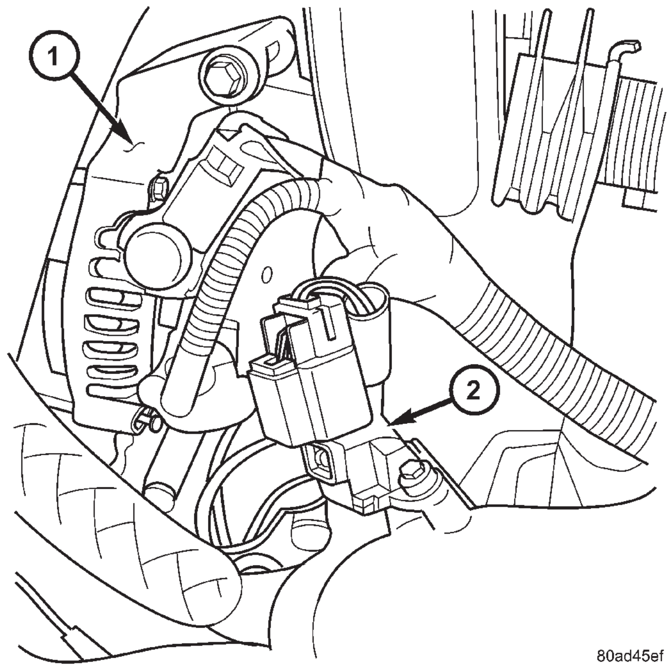


Fig. 21 GENERATOR AND MAP SENSOR

1 - Generator
2 - MAP Sensor

(3) Remove two screws holding sensor to the intake manifold.

REMOVAL - 2.7L

(1) Remove the negative battery cable.

(2) Disconnect the electrical connector from the MAP sensor (Fig. 22).

(3) Remove sensor.

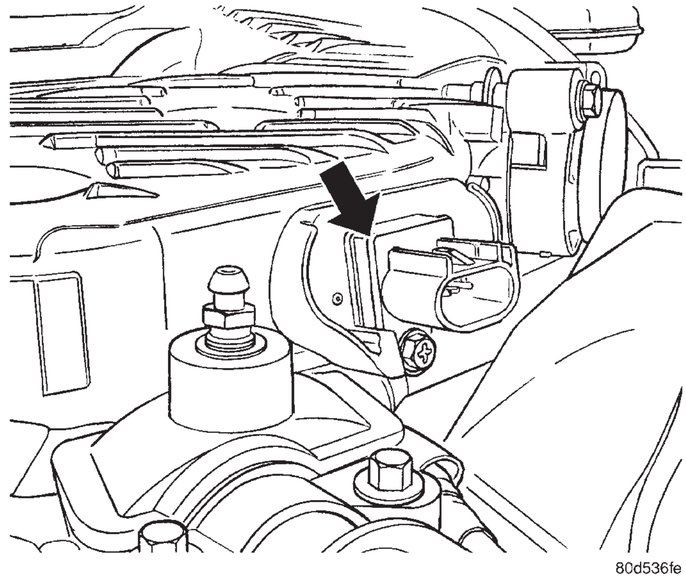


Fig. 22 MAP SENSOR - 2.7L

INSTALLATION

INSTALLATION - 4 CYLINDER

(1) Install sensor.

(2) Install two screws and tighten.

(3) Connect the electrical connector to the MAP sensor (Fig. 21).

(4) Connect the negative battery cable.

INSTALLATION - 2.7L

(1) The sensor mounts onto intake manifold plenum (Fig. 23). Tighten screws to 4.5 N·m (40 in. lbs.) torque.

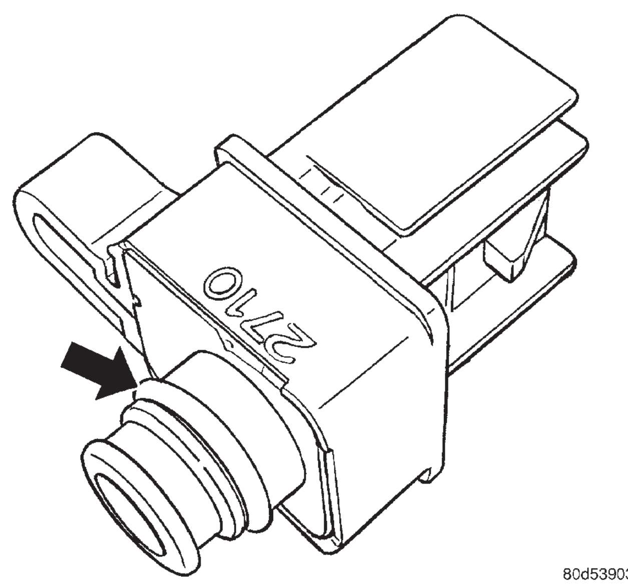


Fig. 23 MAP SENSOR O-RING

(2) Attach electrical connector to sensor (Fig. 22).

(3) Install the negative battery cable.

O2 SENSOR

DESCRIPTION

The upstream oxygen sensor threads into the outlet flange of the exhaust manifold (Fig. 24) or (Fig. 25).

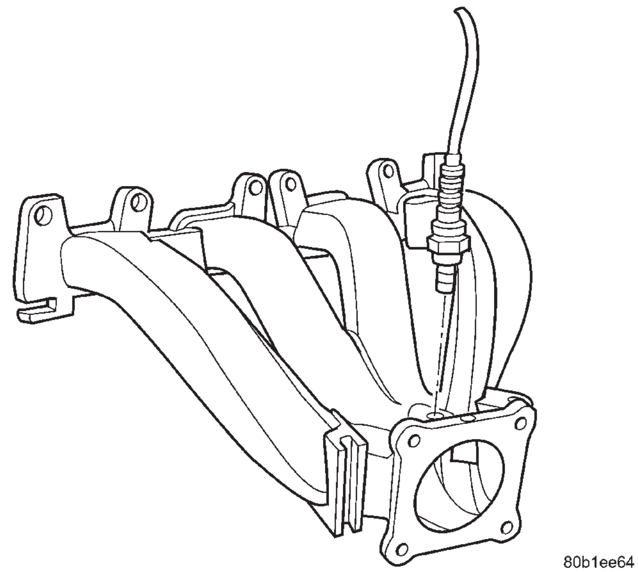


Fig. 24 O2 SENSOR UPSTREAM 1/1 4 CYLINDER

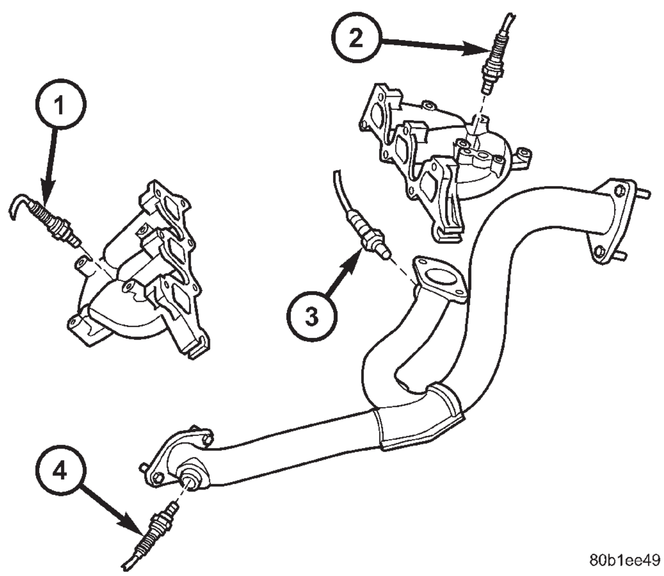


Fig. 25 O2 SENSORS 2.7L

1 - Upstream 2/1
2 - Upstream 1/1
3 - Downstream 1/2
4 - Downstream 2/2

The downstream heated oxygen sensor threads into the outlet pipe at the rear of the catalytic convertor (Fig. 26).

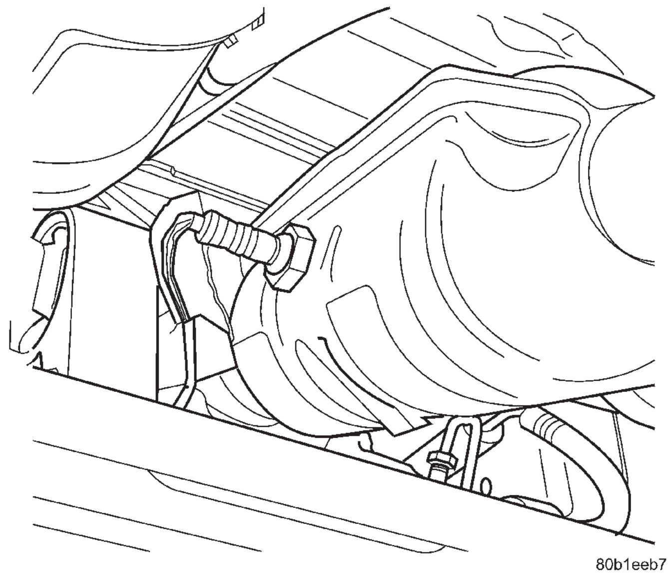


Fig. 26 O2 SENSOR DOWNSTREAM 2/1 4 CYLINDER

OPERATION

A single sensor ground is used for all O2 sensors (2 senors on 4 cyl. vehicles and 4 sensors on 6 cyl. vehicles).

As vehicles accumulate mileage, the catalytic convertor deteriorates. The deterioration results in a less efficient catalyst. To monitor catalytic convertor deterioration, the fuel injection system uses two heated oxygen sensors. One sensor upstream of the catalytic convertor, one downstream of the convertor. The PCM compares the reading from the sensors to calculate the catalytic convertor oxygen storage capacity and converter efficiency. Also, the PCM uses the upstream heated oxygen sensor input when adjusting injector pulse width.

When the catalytic converter efficiency drops below emission standards, the PCM stores a diagnostic trouble code and illuminates the malfunction indicator lamp (MIL).

The O2S produce voltages from 0 to 1 volt, depending upon the oxygen content of the exhaust gas in the exhaust manifold. When a large amount of oxygen is present (caused by a lean air/fuel mixture, can be caused by misfire and exhaust leaks), the sensors produces a low voltage. When there is a lesser amount of oxygen present (caused by a rich air/fuel mixture, can be caused by internal engine problems) it produces a higher voltage. By monitoring the oxygen content and converting it to electrical voltage, the sensors act as a rich-lean switch.

The oxygen sensors are equipped with a heating element that keeps the sensors at proper operating temperature during all operating modes. Maintaining correct sensor temperature at all times allows the system to enter into closed loop operation sooner.

O2 SENSOR (Continued)

Also, it allows the system to remain in closed loop operation during periods of extended idle.

In Closed Loop operation the PCM monitors the O2S input (along with other inputs) and adjusts the injector pulse width accordingly. During Open Loop operation the PCM ignores the O2 sensor input. The PCM adjusts injector pulse width based on preprogrammed (fixed) values and inputs from other sensors.

The Automatic Shutdown (ASD) relay supplies battery voltage to both the upstream and downstream heated oxygen sensors. The oxygen sensors are equipped with a heating element. The heating elements reduce the time required for the sensors to reach operating temperature. The PCM uses pulse width modulation to control the ground side of the heater to regulate the temperature on 4 cyl. upstream O2 heater only. All other 4 cyl. and 6 cyl. O2 heaters do not use pulse width modulation.

UPSTREAM OXYGEN SENSOR

The input from the upstream heated oxygen sensor tells the PCM the oxygen content of the exhaust gas. Based on this input, the PCM fine tunes the air-fuel ratio by adjusting injector pulse width.

The sensor input switches from 0 to 1 volt, depending upon the oxygen content of the exhaust gas in the exhaust manifold. When a large amount of oxygen is present (caused by a lean air-fuel mixture), the sensor produces voltage as low as 0.1 volt. When there is a lesser amount of oxygen present (rich air-fuel mixture) the sensor produces a voltage as high as 1.0 volt. By monitoring the oxygen content and converting it to electrical voltage, the sensor acts as a rich-lean switch.

The heating element in the sensor provides heat to the sensor ceramic element. Heating the sensor allows the system to enter into closed loop operation sooner. Also, it allows the system to remain in closed loop operation during periods of extended idle.

In Closed Loop, the PCM adjusts injector pulse width based on the upstream heated oxygen sensor input along with other inputs. In Open Loop, the PCM adjusts injector pulse width based on preprogrammed (fixed) values and inputs from other sensors.

DOWNSTREAM OXYGEN SENSOR

The downstream heated oxygen sensor input is used to detect catalytic convertor deterioration. As the convertor deteriorates, the input from the downstream sensor begins to match the upstream sensor input except for a slight time delay. By comparing the downstream heated oxygen sensor input to the input from the upstream sensor, the PCM calculates catalytic convertor efficiency. Also used to establish the upstream O2 goal voltage (switching point).

REMOVAL

REMOVAL - DOWNSTREAM 1/2 4 CYLINDER

The O2S are located in the side of the catalytic converter (Fig. 26).

WARNING: THE EXHAUST MANIFOLD, EXHAUST PIPES AND CATALYTIC CONVERTER BECOME VERY HOT DURING ENGINE OPERATION. ALLOW ENGINE TO COOL BEFORE REMOVING OXYGEN SENSOR.

(1) Remove the negative battery cable.
(2) Raise and support the vehicle.
(3) Disconnect the wire connector from the O2S.

CAUTION: When disconnecting the sensor electrical connector, do not pull directly on wire going into sensor.

(4) Remove the O2S. Snap-On oxygen sensor wrench (number YA 8875) may be used for removal and installation.

REMOVAL - Downstream 1/2, 2/2 2.7L

The O2S are located at the outlet ends of the catalytic converter (Fig. 25).

WARNING: THE EXHAUST MANIFOLD, EXHAUST PIPES AND CATALYTIC CONVERTER BECOME VERY HOT DURING ENGINE OPERATION. ALLOW ENGINE TO COOL BEFORE REMOVING OXYGEN SENSOR.

(1) Remove the negative battery cable.
(2) Raise and support the vehicle.
(3) Disconnect the wire connector from the O2S.

CAUTION: When disconnecting the sensor electrical connector, do not pull directly on wire going into sensor.

(4) Remove the O2S. Snap-On oxygen sensor wrench (number YA 8875) may be used for removal and installation.

REMOVAL - Upstream 1/1, 2/1 2.7L

The engines uses two heated oxygen sensors, one in each exhaust manifold (Fig. 25).

CAUTION: When disconnecting the sensor electrical connector, do not pull directly on wire going into sensor.

O2 SENSOR (Continued)

(1) Remove the negative battery cable.
(2) Remove the air cleaner box for the rear O2 sensor.
(3) Disconnect the heated oxygen sensor electrical connector.
(4) Use a Special tool #8439 to remove oxygen sensor.

REMOVAL - UPSTREAM 1/1 4 CYLINDER

The engine uses 1 heated oxygen sensors in the exhaust manifold.

CAUTION: When disconnecting the sensor electrical connector, do not pull directly on wire going into sensor.

(1) Remove the negative battery cable.
(2) Disconnect the heated oxygen sensor electrical connector.
(3) Use a socket such as Snap-On YA8875 or a crow foot wrench to remove oxygen sensor (Fig. 25).

INSTALLATION

INSTALLATION - DOWNSTREAM 1/2 4 CYLINDER

The O2S are located in the side of the catalytic converter (Fig. 26).

(1) After removing the sensor, the exhaust manifold threads must be cleaned with an 18 mm X 1.5 + 6E tap. If reusing the original sensor, coat the sensor threads with an anti-seize compound such as Loctite 771- 64 or equivalent. New sensors have compound on the threads and do not require an additional coating.
(2) Install the O2S. Tighten to 28 N·m (20 ft. lbs.) torque.
(3) Connect the O2S wire connector.
(4) Lower the vehicle.
(5) Install the negative battery cable.

INSTALLATION - Downstream 1/2, 2/2 2.7L

The O2S are located at the outlet ends of the catalytic converter (Fig. 25).

(1) After removing the sensor, the exhaust manifold threads must be cleaned with an 18 mm X 1.5 + 6E tap. If reusing the original sensor, coat the sensor threads with an anti-seize compound such as Loctite 771- 64 or equivalent. New sensors have compound on the threads and do not require an additional coating. Tighten the sensor to 28 N·m (20 ft. lbs.) torque.
(2) Install the O2S. Tighten to 28 N·m (20 ft. lbs.) torque.
(3) Connect the O2S wire connector.
(4) Lower the vehicle.
(5) Install the negative battery cable.

INSTALLATION - Upstream 1/1, 2/1 2.7L

The engines uses two heated oxygen sensors, one in each exhaust manifold (Fig. 25).

(1) After removing the sensor, the exhaust manifold threads must be cleaned with an 18 mm X 1.5 + 6E tap. If reusing the original sensor, coat the sensor threads with an anti-seize compound such as Loctite 771- 64 or equivalent. New sensors have compound on the threads and do not require an additional coating.
(2) Use a Special tool #8439 to install oxygen sensor. Tighten the sensor to 28 N·m (20 ft. lbs.) torque.
(3) Connect the heated oxygen sensor electrical connector.
(4) Install the air cleaner box.
(5) Install the negative battery cable.

INSTALLATION - UPSTREAM 1/1 4 CYLINDER

The engines uses 1 heated oxygen sensors in the exhaust manifold.

(1) After removing the sensor, the exhaust manifold threads must be cleaned with an 18 mm X 1.5 + 6E tap. If reusing the original sensor, coat the sensor threads with an anti-seize compound such as Loctite 771- 64 or equivalent. New sensors have compound on the threads and do not require an additional coating. Tighten the sensor to 28 N·m (20 ft. lbs.) torque.
(2) Connect the heated oxygen sensor electrical connector.
(3) Install the negative battery cable.

THROTTLE BODY

DESCRIPTION

The throttle body is located on the intake manifold (Fig. 27). Fuel does not enter the intake manifold through the throttle body. Fuel is sprayed into the manifold by the fuel injectors.

OPERATION

Filtered air from the air cleaner enters the intake manifold through the throttle body. The throttle body contains an air control passage controlled by an Idle Air Control (IAC) motor. The air control passage is used to supply air for idle conditions. A throttle valve (plate) is used to supply air for above idle conditions.

Certain sensors are attached to the throttle body. The accelerator pedal cable, speed control cable and transmission control cable (when equipped) are connected to the throttle body linkage arm.

A (factory adjusted) set screw is used to mechanically limit the position of the throttle body throttle plate. **Never attempt to adjust the engine idle speed using this screw.** All idle speed functions are controlled by the PCM.

THROTTLE BODY (Continued)

REMOVAL

REMOVAL - 4 CYLINDER

(1) Disconnect negative cable from battery cable.
(2) Remove clean air hose (Fig. 27).

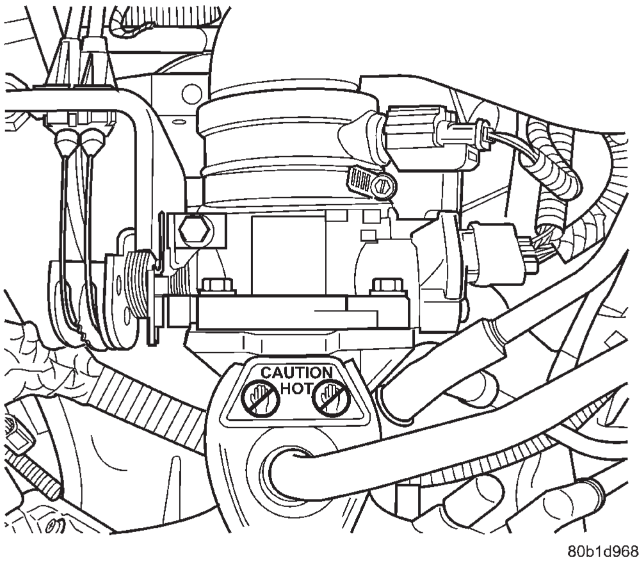


Fig. 27 THROTTLE BODY 4 CYLINDER

(3) Remove the throttle cable shield.
(4) Remove throttle and the speed control (if equipped) cables from lever and bracket.
(5) Disconnect electrical connectors from the idle air control motor and throttle position sensor (TPS).
(6) Remove throttle body to intake manifold attaching bolts (Fig. 28).

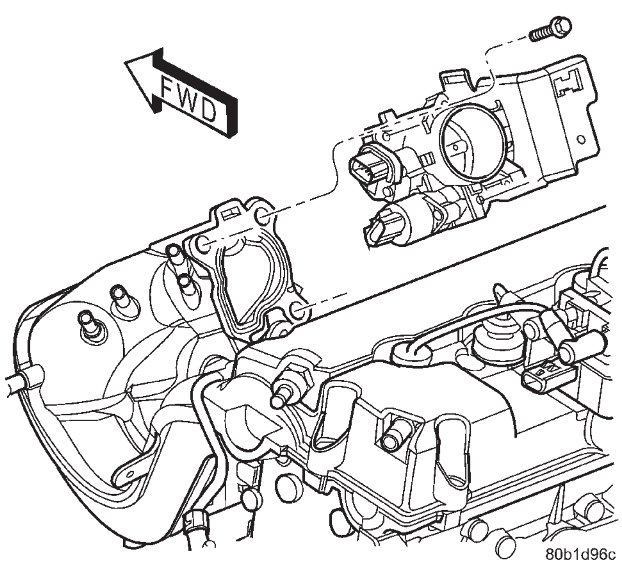


Fig. 28 THROTTLE BODY MOUNTING

(7) Remove the throttle cable bracket (Fig. 29).

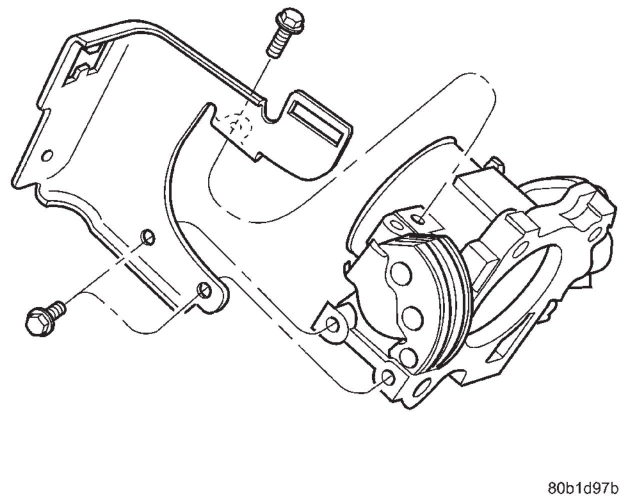


Fig. 29 THROTTLE CABLE BRACKET

(8) Remove throttle body.

REMOVAL - 2.7L

(1) Disconnect negative cable from battery
(2) Disconnect electrical connectors from throttle body (Fig. 30).

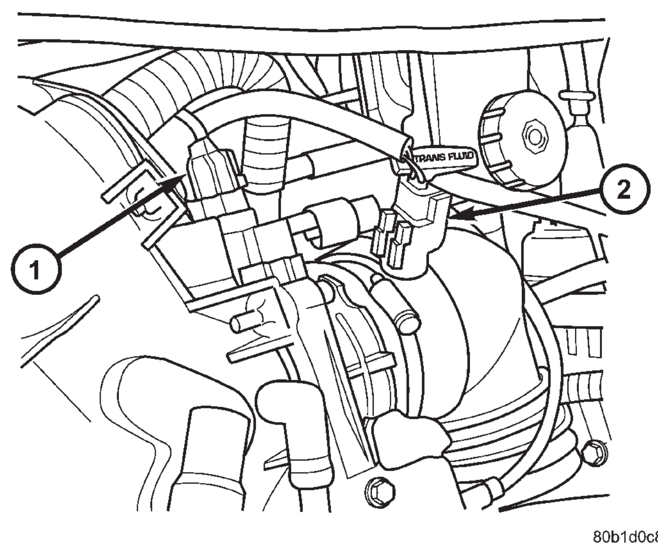


Fig. 30 TPS AND INLET AIR TEMP. SENSOR 2.7L

1 - Throttle Position Sensor
2 - Inlet Air Temperature Sensor

THROTTLE BODY (Continued)

(3) Disconnect clean air hose from throttle body.

(4) Remove the throttle cable shield (Fig. 31).

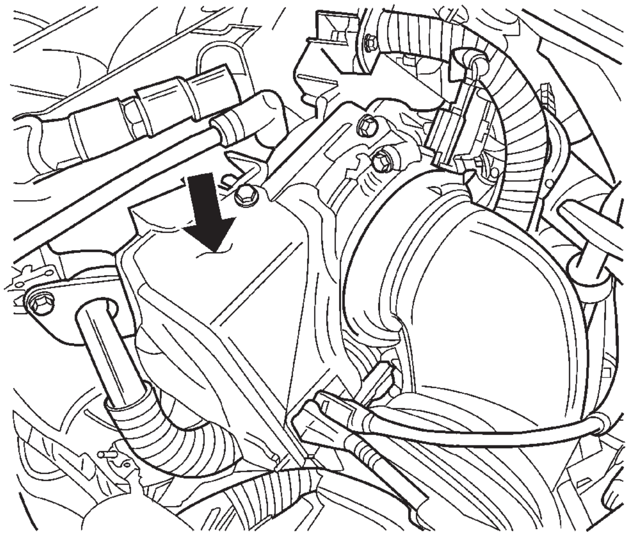


Fig. 31 THROTTLE SHIELD 2.7L

(5) Hold throttle lever in wide open position. Remove throttle cable and speed control cables from throttle arm (Fig. 32).

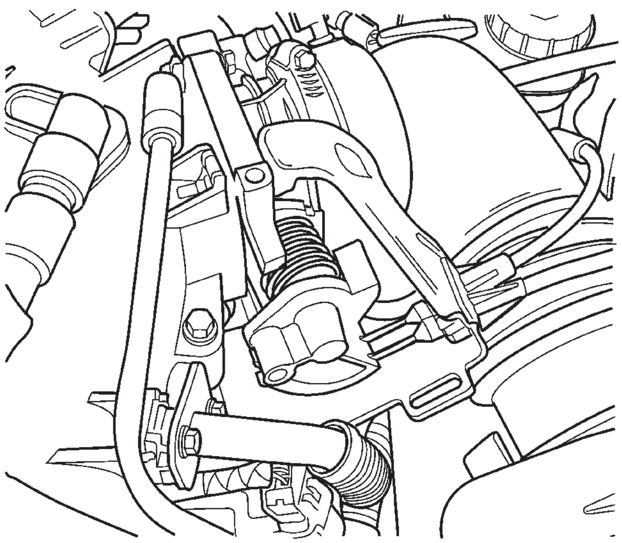


Fig. 32 THROTTLE CABLES 2.7L

(6) Remove throttle cable bracket.

(7) Remove the throttle body support bracket from the bottom of the throttle body (Fig. 33).

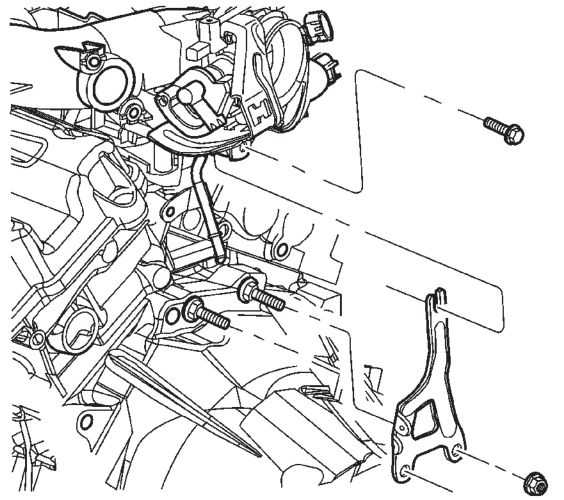


Fig. 33 THROTTLE BODY SUPPORT BRACKET 2.7L

(8) Remove remaining 2 throttle body bolts (Fig. 34).

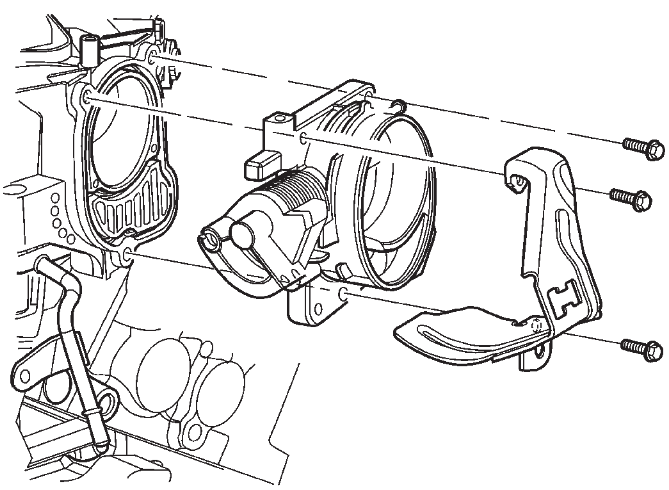


Fig. 34 THROTTLE BODY 2.7L

(9) Remove throttle body.

(10) Clean mating surfaces.

THROTTLE BODY (Continued)

INSTALLATION

INSTALLATION - 4 CYLINDER

(1) Install throttle body (Fig. 28).

(2) Tighten throttle body mounting bolts to 13.6 N·m (120 in. lbs.) torque.

(3) Install the throttle cable bracket (Fig. 29). Tighten throttle cable bracket mounting bolts to 14.1 N·m (125 in. lbs.) torque

(4) Hold throttle lever in the wide open throttle position and install the throttle and speed control cables (if equipped).

(5) Connect electrical connectors to the idle air control motor and throttle position sensor (TPS).

(6) Install the throttle cable shield.

(7) Install clean air hose to throttle body (Fig. 27).

(8) Connect negative cable to battery cable.

INSTALLATION - 2.7L

(1) Loose install 2 throttle body bolts (Fig. 34) (upper right and lower bolt).

(2) Install the throttle cable bracket.

(3) Install the third throttle body bolt and the throttle body support bracket to the bottom of the throttle body (Fig. 33). Tighten the lower support bracket bolts to 31.1 N·m (23 ft. lbs.) torque.

(4) Tighten throttle body bolts to 13.6 N·m (120 in. lbs.) torque.

(5) Hold throttle lever in wide open throttle position. Install throttle cable and speed control cable (Fig. 32).

(6) Install the throttle cable shield (Fig. 31).

(7) Connect electrical connectors to throttle body (Fig. 30).

(8) Install clean air hose to throttle body.

(9) Connect negative cable to battery.

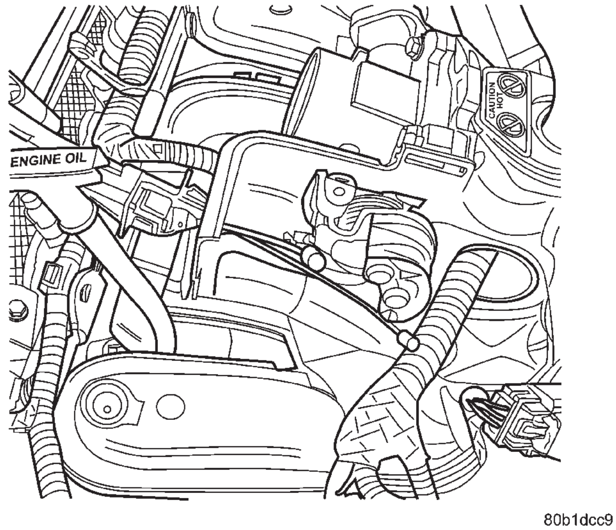


Fig. 35 THROTTLE CABLE 4 CYLINDER

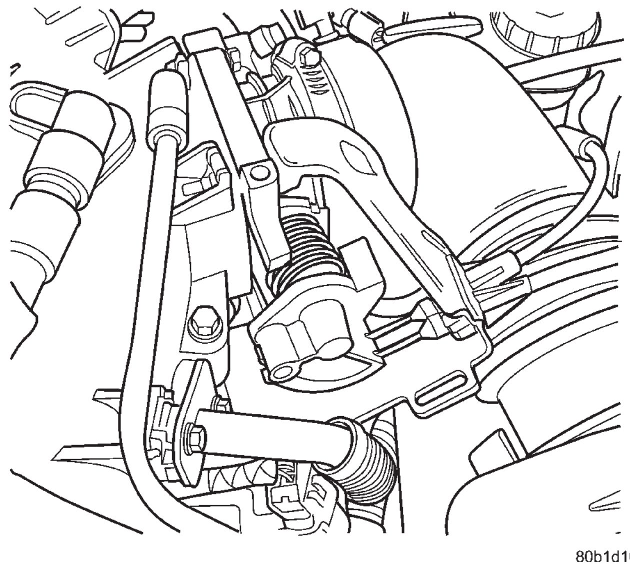


Fig. 36 THROTTLE CABLE 2.7L

THROTTLE CONTROL CABLE

REMOVAL

(1) Working from the engine compartment, hold the throttle body throttle lever in the wide open position.

(2) Remove the throttle cable from the throttle body cam (Fig. 35) or (Fig. 36).

(3) From inside the vehicle, hold up the pedal and remove the pedal retainer and throttle cable from the upper end of the pedal lever.

(4) Remove retainer clip from throttle cable and grommet at dash panel (Fig. 37).

(5) From the engine compartment, pull the throttle cable out of the dash panel grommet. Then remove grommet and cable from dash panel.

(6) Remove the throttle cable from throttle bracket by carefully compressing both retaining ears simultaneously. Then gently pull the throttle cable from throttle bracket.

(7) On 4 cylinder engines remove throttle cable from routing clip on fuel rail, and routing clip on left front shocktower (Fig. 38).

INSTALLATION

(1) From the engine compartment, push the pedal end fitting through the dash panel, seat the grommet, then push the cable dash fitting into the grommet.

(2) Install the cable's throttle body end-fitting into the cable mounting bracket on the engine.

THROTTLE CONTROL CABLE (Continued)

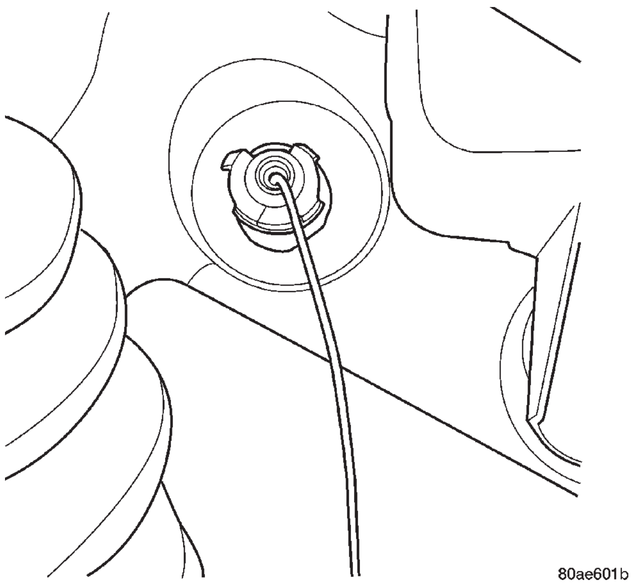


Fig. 37 RETAINER CLIP

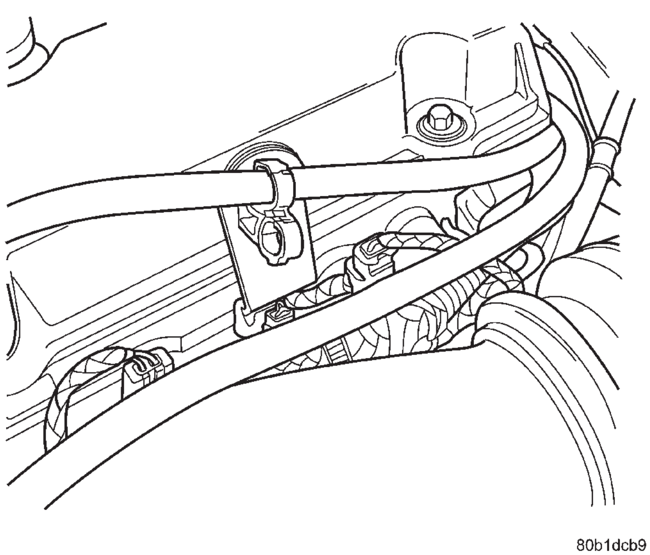


Fig. 38 THROTTLE CABLE BRACKET 4 CYLINDER

(3) On 4 cylinder engines install throttle cable routing clip to bracket on fuel rail (Fig. 38), and other clip to the shocktower.

(4) From inside the vehicle, hold up the pedal and install throttle cable and pedal retainer in the upper end of the pedal lever.

(5) At the dash panel, install the cable retainer clip between the end of the throttle cable dash fitting and grommet (Fig. 37).

(6) From the engine compartment, rotate the throttle lever wide open and install the throttle cable (Fig. 35) or (Fig. 36).

THROTTLE POSITION SENSOR

DESCRIPTION

The throttle position sensor mounts to the side of the throttle body.

The Throttle Position Sensor (TPS) connects to the throttle blade shaft. The TPS is a variable resistor (potentiometer) that provides the PCM with an input signal (voltage). The signal represents throttle blade position. As the position of the throttle blade changes, the resistance of the TPS changes.

OPERATION

The signal represents throttle blade position. As the position of the throttle blade changes, the resistance of the TPS changes.

The PCM supplies approximately 5 volts to the TPS. The TPS output voltage (input signal to the powertrain control module) represents throttle blade position. The TPS output voltage to the PCM varies from approximately 0.6 volt at minimum throttle opening (idle) to a maximum of 4.5 volts at wide open throttle.

Along with inputs from other sensors, the PCM uses the TPS input to determine current engine operating conditions. The PCM also adjusts fuel injector pulse width and ignition timing based on these inputs.

REMOVAL

REMOVAL - 4 CYLINDER

(1) Disconnect the negative battery cable.

(2) Disconnect the electrical connector to throttle position sensor.

(3) Remove the 2 screws for the throttle position sensor.

(4) Remove the throttle position sensor.

REMOVAL - 2.7L

(1) Remove the negative battery cable.

(2) Remove the throttle body (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/THROTTLE BODY - REMOVAL)

(3) Remove the TPS mounting screws (Fig. 39).

(4) Remove the TPS.

INSTALLATION

INSTALLATION - 4 CYLINDER

(1) The throttle shaft end of the throttle body slides into a socket in the TPS. The socket has two tabs inside it. The throttle shaft rests against the tabs. When indexed correctly, the TPS can rotate

THROTTLE POSITION SENSOR (Continued)

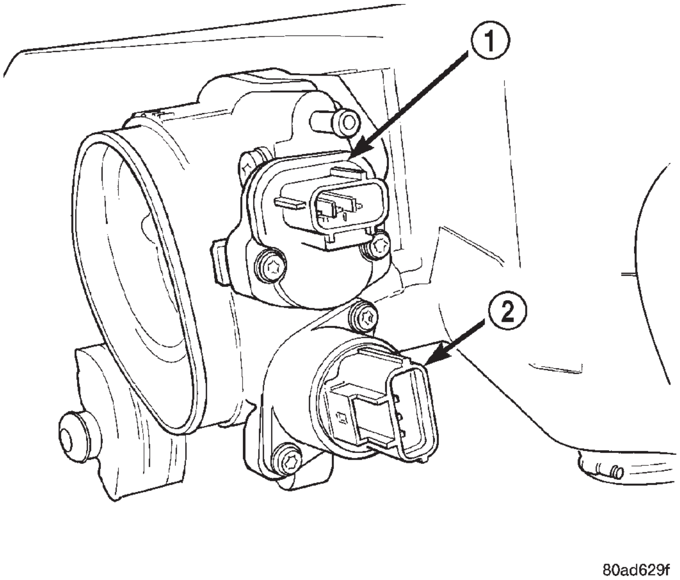


Fig. 39 Idle Air Control Motor and Throttle Position Sensor

1 - THROTTLE POSITION SENSOR
2 - IDLE AIR CONTROL MOTOR

clockwise a few degrees to line up the mounting screw holes with the screw holes in the throttle body. The TPS has slight tension when rotated into position. If it is difficult to rotate the TPS into position, install the sensor with the throttle shaft on the other side of the tabs in the socket. Tighten mounting screws to 5.1 N·m (45 in. lbs.) torque.

(2) After installing the TPS, the throttle plate should be closed. If the throttle plate is open, install the sensor on the other side of the tabs in the socket.

(3) Attach electrical connector to the TPS.

(4) Install the negative battery cable.

INSTALLATION - 2.7L

(1) The throttle shaft end of the throttle body slides into a socket in the TPS. The socket has two tabs inside it. The throttle shaft rests against the tabs. When indexed correctly, the TPS can rotate clockwise a few degrees to line up the mounting screw holes with the screw holes in the throttle body. The TPS has slight tension when rotated into position. If it is difficult to rotate the TPS into position, install the sensor with the throttle shaft on the other side of the tabs in the socket. Tighten mounting screws to 5.1 N·m (45 in. lbs.) torque.

(2) After installing the TPS, the throttle plate should be closed. If the throttle plate is open, install the sensor on the other side of the tabs in the socket.

(3) Install the throttle body (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/THROTTLE BODY - INSTALLATION).

(4) Connect the negative battery cable.

STEERING

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STEERING

DESCRIPTION

This vehicle is equipped with power steering. The power steering system consists of these major components:

- POWER STEERING PUMP
- POWER STEERING GEAR
- POWER STEERING FLUID RESERVOIR
- POWER STEERING FLUID SUPPLY HOSE
- POWER STEERING FLUID PRESSURE HOSE
- POWER STEERING FLUID RETURN HOSE

For information on the first two components, refer to their respective sections within this service manual group. Information on the hoses can be found in POWER STEERING PUMP.

OPERATION

Turning of the steering wheel is converted into linear travel through the meshing of the helical pinion teeth with the rack teeth. Power assist steering is provided by an open center, rotary type control valve. It is used to direct oil from the power steering pump to either side of the integral steering rack piston.

Road feel is controlled by the diameter of a torsion bar which initially steers the vehicle. As steering effort increases as in a turn, the torsion bar twists, causing relative rotary motion between the rotary valve body and valve spool. This movement directs oil behind the integral rack piston, which in turn builds up hydraulic pressure and assists in the turning effort.

WARNING

WARNING: POWER STEERING FLUID, ENGINE COMPONENTS AND EXHAUST SYSTEM MAY BE EXTREMELY HOT IF ENGINE HAS BEEN RUNNING. DO NOT START ENGINE WITH ANY LOOSE OR DISCONNECTED HOSES OR DRIVE BELTS. DO NOT ALLOW HOSES TO TOUCH HOT EXHAUST MANIFOLD OR CATALYST.

CAUTION

CAUTION: During repair procedures requiring the power steering fluid hoses to be disconnected, cap all open ends of the hose connections. This will prevent the entry of foreign material into the components while the power steering hoses are disconnected.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER STEERING FLOW AND PRESSURE TEST

The following procedure is to be used to test the operation of the power steering system on this vehicle. This test will provide the flow rate of the power steering pump along with the maximum relief pressure. This test is to be performed any time a power steering system problem is present to determine if the power steering pump or power steering gear is

STEERING (Continued)

not functioning properly. The following flow and pressure test is performed using the Power Steering Analyzer Kit, Special Tool 6815 (Fig. 1), hoses, Special Tools 6905 and 6959, adapters, Special Tool's 6972 and 8354, and fittings from adapter kit, Special Tool 6893.

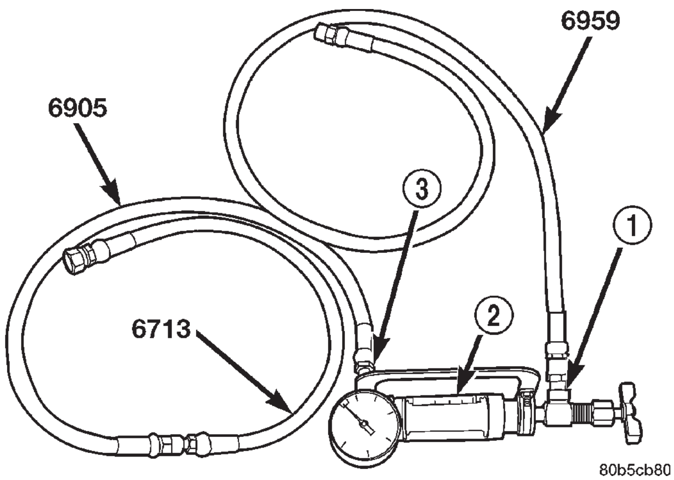


Fig. 1 Power Steering Analyzer With Hoses Installed

1 - OUTLET
2 - SPECIAL TOOL 6815
3 - INLET

(1) Assemble hoses on Power Steering Analyzer, Special Tool 6815, as shown. Install Pressure Hose, Special Tool 6905 (in 6893 kit), in the inlet fitting on Power Steering Analyzer. Install Pressure Hose, Special Tool 6713 (in 6815 kit) on Pressure Hose, Special Tool 6905. Install Pressure Hose, Special Tool 6959, in the outlet fitting on Power Steering Analyzer.

WARNING: To prevent personal injury, safety goggles should be worn at all times when performing any test procedures on the power steering system.

(2) Install the following adapters from Adapter Set, Special Tool 6893 (Fig. 2), on the analyzer hose ends:

• Install Adapter Fitting, Special Tool 6844, on Pressure Hose, Special Tool 6713.

• Install Adapter Fitting, Special Tool 6826, on Pressure Hose, Special Tool 6959.

(3) Disconnect the power steering fluid pressure hose from the power steering pump.

(4) Connect Adapter Fitting, Special Tool 6844, attached to pressure hose from inlet (gauge end) of Power Steering Analyzer to the pressure fitting on the power steering pump.

(5) Connect vehicle power steering fluid pressure hose to Adapter Fitting, Special Tool 6826, which should be already installed in the outlet hose (valve end) of Power Steering Analyzer.

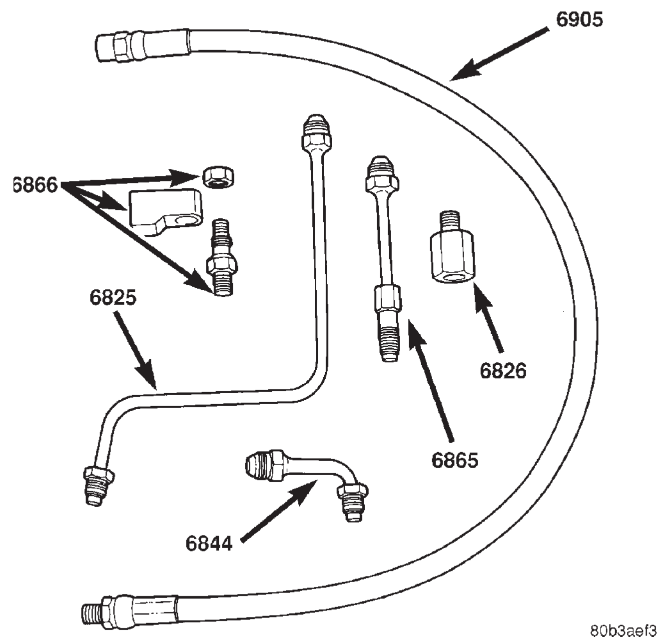


Fig. 2 Power Steering Analyzer Adapters 6893

(6) Perform the following test procedure.

TEST PROCEDURE

(1) Check belt tension and adjust as necessary.

(2) Completely open valve on Power Steering Analyzer.

(3) Start engine and let idle long enough to circulate power steering fluid through the analyzer and hoses, until the air is completely bled out of the fluid. Shut off engine.

(4) Check power steering fluid level and add fluid as necessary. Start engine again and let idle.

(5) The analyzer gauge should read below 862 kPa (125 psi). If above, inspect the hoses for restrictions and repair as necessary. The initial pressure should be in the range of 345-552 kPa (50-80 psi). The flow meter should read between 1.3 and 1.6 GPM.

CAUTION: The following test procedure involves testing maximum pump pressure output and flow control valve operation. Do not leave valve closed for more than five seconds as the pump could be damaged.

(6) Close valve fully three times and record highest pressure indicated each time. **All three readings must be above specifications and within 345 kPa (50 psi) of each other.**

NOTE: Power steering pump maximum relief pressure is 8240 to 8920 kPa (1195 to 1293 psi.).

• Power steering pump pressure's are above specifications, but not within 345 kPa (50 psi) of each other, replace pump.

STEERING (Continued)

• Pressure's are within 345 kPa (50 psi) of each other, but below specifications, replace pump.

CAUTION: Do not force the pump to operate against the stops for more than 2 to 4 seconds at a time because pump damage will result.

(7) Completely open the valve on the Power Steering Analyzer. Turn the steering wheel to the extreme left until the stop in the steering gear is met, then turn the steering wheel to the right until the right stop is met. Record the highest indicated pressure at each position. Compare the recorded readings to the specifications. If the highest output pressures are not the same against either stop, the steering gear is leaking internally and must be replaced.

DIAGNOSIS AND TESTING - STEERING SYSTEM DIAGNOSIS CHARTS

POWER STEERING NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
OBJECTIONABLE HISS OR WHISTLE*	1. Damaged or mispositioned steering column shaft/coupling dash panel seal.	1. Reposition or replace steering column shaft/coupling dash panel seal.
	2. Noisy valve in power steering gear.	2. Replace power steering gear.
RATTLE OR CLUNK	1. Power steering gear loose on front suspension crossmember.	1. Inspect power steering gear mounting bolts. Replace as necessary. Tighten to the specified torque.
	2. Front suspension crossmember mounting fasteners loose at frame.	2. Tighten the front suspension crossmember mounting fasteners to the specified torque.
	3. Loose tie rod (outer or inner).	3. Check tie rod pivot points for wear. Replace worn/loose parts as required.
	4. Loose lower control arm mounting bolts at front suspension crossmember.	4. Tighten control arm mounting bolts to the specified torques.
	5. Loose shock assembly mounting fasteners at shock tower.	5. Tighten shock assembly fasteners to the specified torques.
	6. Power steering fluid pressure hose touching the body of the vehicle.	6. Adjust hose to proper position by loosening, repositioning, and tightening fitting to specified torque. Do not bend tubing.
	7. Internal power steering gear noise.	7. Replace power steering gear.
	8. Damaged front suspension crossmember.	8. Replace front suspension crossmember.
POPPING NOISE	1. Worn outer tie rod.	1. Replace outer tie rod.
CHIRP OR SQUEAL (POWER STEERING PUMP)	1. Loose power steering pump drive belt.	1. Check and adjust power steering pump drive belt to specifications. Replace belt if worn or glazed.
WHINE OR GROWL (POWER STEERING PUMP)**	1. Low fluid level.	1. Fill power steering fluid reservoir to proper level and check for leaks (make sure all air is bled from the system fluid).

STEERING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	2. Power steering hose touching vehicle body or frame.	2. Adjust hose to proper position by loosening, repositioning, and tightening fitting to specified torque. Do not bend tubing. Replace hose if damaged.
	3. Extreme wear of power steering pump internal components.	3. Replace power steering pump and flush system as necessary.
SUCKING AIR SOUND	1. Loose clamp on power steering fluid return hose.	1. Tighten or replace hose clamp.
	2. Missing O-Ring on power steering hose connection.	2. Inspect connection and replace O-Ring as required.
	3. Low power steering fluid level.	3. Fill power steering fluid reservoir to proper level and check for leaks.
	4. Air leak between power steering fluid reservoir and power steering pump.	4. Replace power steering pump (with reservoir).
SQUEAK OR RUBBING SOUND	1. Steering column shroud rubbing.	1. Realign shrouds as necessary.
	2. Steering column shaft rubbing.	2. Move or realign item rubbing shaft.
	3. Clockspring noisy.	3. Remove clockspring. Reinstall wheel. If noise is gone, replace clockspring.
	4. Steering gear internally noisy.	4. Replace steering gear.
SCRUBBING OR KNOCKING NOISE.	1. Incorrect tire or wheel size.	1. Replace incorrect size tire or wheel with size used as original equipment.
	2. Interference between steering gear and other vehicle components.	2. Check for bent or misaligned components and correct as necessary.
	3. Steering gear internal stops worn excessively allowing tires to be steered excessively far.	3. Replace steering gear.

NOTE: * There is some noise in all power steering systems. One of the most common is a hissing sound evident when turning the steering wheel when at a standstill or when parking and the steering wheel is at the end of its travel. Hiss is a very high frequency noise similar to that experienced while slowly closing a water tap. The noise is present in every valve and results when high velocity fluid passes valve orifice edges. There is no relationship between this noise and the performance of the steering system.

NOTE: ** Power steering pump growl results from the development of high pressure fluid flow. Normally this noise level should not be high enough to be objectionable.

STEERING (Continued)

STEERING WHEEL FEEL

CONDITION	POSSIBLE CAUSES	CORRECTION
STEERING WHEEL/ COLUMN CLICKING, CLUNKING OR RATTLING.	1. Steering column preload is not set properly.	1. Loosen steering column coupling pinch bolt to reset steering column preload. Replace pinch bolt and torque to specifications.
	2. Loose steering coupling pinch bolt.	2. Replace pinch bolt and torque to specifications.
	3. Steering column bearings.	3. Replace steering column.
STEERING WHEEL HAS FORE AND AFT LOOSENESS.	1. Steering wheel retaining bolt not properly tightened and torqued.	1. Tighten the steering wheel retaining bolt to its specified torque.
	2. Steering column lower bearing spring retainer slipped on steering column shaft.	2. Replace steering column.
STEERING WHEEL OR DASH VIBRATES DURING LOW SPEED OR STANDSTILL STEERING MANEUVERS.	1. Air in the fluid of the power steering system.	1. Bleed air from system following the power steering pump initial operation service procedure.*
	2. Tires not properly inflated.	2. Inflate tires to the specified pressure.
	3. Excessive engine vibration.	3. Ensure that the engine is running properly.
	4. Loose tie rod end jam nut.	4. Tighten the inner to outer tie rod jam nut to the specified torque.
	5.Overcharged air conditioning system.	5.Check air conditioning pump head pressure and correct as necessary.
STEERING CATCHES, STICKS IN CERTAIN POSITIONS OR IS DIFFICULT TO TURN.	1. Low power steering fluid level.	1. Fill power steering fluid reservoir to specified level and check for leaks.
	2. Tires not inflated to specified pressure.	2. Inflate tires to the specified pressure.
	3. Lack of lubrication in front suspension control arm ball joints.	3. Lubricate ball joints if ball joints are not a lubricated-for-life type ball joint. If ball joint is a lubricated-for-life ball joint, replace ball joint or control arm.
	4. Worn upper or lower control arm ball joint.	4. Replace ball joint or control arm.
	5. Lack of lubrication in steering gear outer tie rod ends.	5. Lubricate tie rod ends if they are not a lubricated-for-life type. If tie rod end is a lubricated-for-life type, replace tie rod end.
	6. Loose power steering pump drive belt.	6. Tighten the power steering pump drive belt to specifications. If drive belt is worn or glazed, replace belt.

STEERING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	7. Faulty power steering pump flow control (Follow Power Steering System Flow and Pressure Test procedure).	7. Replace power steering pump.
	8. Excessive friction in steering column or intermediate shaft.	8. Isolate and correct condition.
	9. Binding upper or lower control arm ball joint.	9. Replace the upper or lower ball joint.
	10. Excessive friction in power steering gear.	10. Replace power steering gear.
STIFF, HARD TO TURN, SURGE, MOMENTARY INCREASE IN EFFORT WHEN TURNING.	1. Tires not properly inflated.	1. Inflate tires to specified pressure.
	2. Low power steering fluid level.	2. Add power steering fluid as required to power steering fluid reservoir to obtain proper level. Check for leaks.
	3. Loose power steering pump drive belt.	3. Tighten the power steering pump drive belt to specifications. If drive belt is worn or glazed, replace belt.
	4. Lack of lubrication in control arm ball joints.	4. Lubricate ball joints if ball joints are not a lubricated-for-life type ball joint. If ball joint is a lubricated-for-life ball joint, replace ball joint or control arm.
	5. Low power steering pump pressure (Follow Power Steering System Flow and Pressure Test procedure).	5. Replace the power steering pump as necessary.
	6. High internal leak in power steering gear (Follow Power Steering System Flow and Pressure Test procedure).	6. Replace power steering gear.
STEERING WHEEL DOES NOT RETURN TO CENTER POSITION.	1. Tires not inflated properly.	1. Inflate tires to specified pressure.
	2. Improper front wheel alignment.	2. Check and adjust wheel alignment as necessary.
	3. Lack of lubrication in front suspension control arm ball joints.	3. Lubricate ball joints if ball joints are not a lubricated for life type of ball joint. If ball joint is a lubricated for life ball joint, replace ball joint or control arm.
	4. Steering wheel rubbing.**	4. Adjust steering column shrouds to eliminate rubbing condition.
	5. Damaged, mis-positioned or un-lubricated steering column coupler to dash seal.**	5. Replace, reposition, or lubricate dash seal.
	6. Binding upper or lower control arm ball joint.	6. Replace the upper or lower control arm ball joint.

STEERING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	7. Tight shaft bearing in steering column.	7. Replace the steering column.
	8. Excessive friction in steering column coupling.	8. Replace steering column coupling.
	9. Excessive friction in power steering gear.	9. Replace power steering gear.
EXCESSIVE STEERING WHEEL KICKBACK OR TOO MUCH STEERING WHEEL FREE PLAY.	1. Air in the fluid of the power steering system.	1. Bleed air from system following the the power steering pump initial operation service procedure.*
	2. Power steering gear loose on front suspension crossmember.	2. Inspect power steering gear mounting bolts. Replace as necessary. Tighten to the specified torque.
	3. Steering column coupling worn, broken or loose.	3. Replace steering column coupling.
	4. Free play in steering column.	4. Check all components of the steering system and repair or replace as required.
	5. Worn control arm ball joints.	5. Replace ball joint or control arm as required.
	6. Loose steering knuckle to ball joint stud pinch bolt.	6. Inspect pinch bolts, replace as necessary, and tighten to specified torque.
	7. Front wheel bearings loose or worn.	7. Replace wheel bearing or knuckle as necessary.
	8. Loose outer tie rod ends.	8. Replace outer tie rod ends that have excessive free play.
	9. Loose inner tie rod ends.	9. Replace power steering gear.
	10 Defective steering gear rotary valve.	10. Replace power steering gear.

NOTE: * Steering shudder can be expected in new vehicles and vehicles with recent steering system repairs. Shudder should dissipate after the vehicle has been driven several weeks.

NOTE: ** To evaluate this condition, it may be necessary to disconnect the coupling at the base of the steering column. Turn the steering wheel and feel or listen for internal rubbing in steering column. To avoid damaging the column clockspring, note the following. Before disconnecting coupling, place tires in the straight-ahead position and center steering wheel. Once disconnected, DO NOT rotate steering wheel more than one revolution in either direction and place steering wheel in original location before reconnecting coupling. If this position is lost, the steering column clockspring must be recentered following the procedure found within the procedure for steering column installation in the steering column section.

STEERING (Continued)

POWER STEERING FLUID

CONDITION	POSSIBLE CAUSES	CORRECTION
LOW FLUID LEVEL WITH VISIBLE LEAK.	1. Loose power steering hose fittings.	1. Tighten the fitting to its specified torque.
	2. Damaged or missing fitting seal, gasket, or O-ring.	2. Replace as necessary.
	3. Power steering pump or power steering gear leaking.	3. Repair or replace the leaking component as required.
AERATED FLUID.	1. Low fluid level.*	1. Fill power steering fluid reservoir to proper level.
	2. Air leak between power steering fluid reservoir and pump.	2. Inspect for proper sealing. Replace the power steering pump (with reservoir).
	3. Cracked power steering pump housing.	3. Replace the power steering pump.
RESERVOIR FLUID OVERFLOW AND FLUID THAT IS MILKY IN COLOR	1. Water contamination.	1. Drain the power steering fluid from the system. Flush the system with fresh clean power steering fluid, drain, then refill to the proper level.

NOTE: * Extremely cold temperatures may cause power steering fluid aeration if the power steering fluid is low.

SPECIFICATIONS

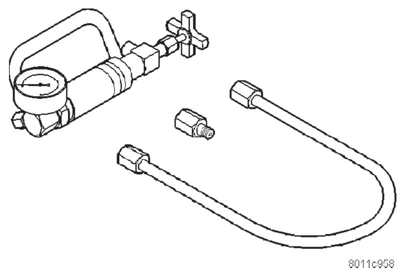
POWER STEERING FASTENER TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Gear Mounting Bolts	68	50	—
Hose Tube Nuts	31	23	275
Pump Discharge Fitting	75	55	—
Pump Front Mounting Bolts	54	40	—
Pump Rear Mounting Bolts	54	40	—
Pump Bracket-To-Engine Mounting Bolts	54	40	—
Reservoir Mounting Screw	6	—	53
Tie Rod Adjustment Jam Nuts	75	55	—
Tie Rod Steering Knuckle Nut	55	40	—

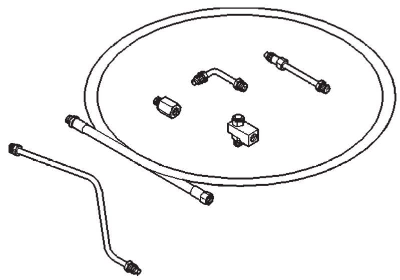
STEERING (Continued)

SPECIAL TOOLS

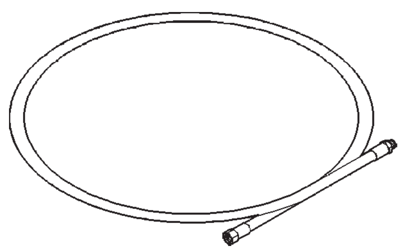
POWER STEERING



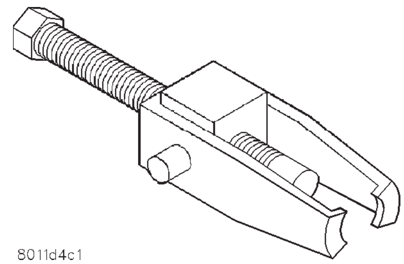
Power Steering Analyzer 6815



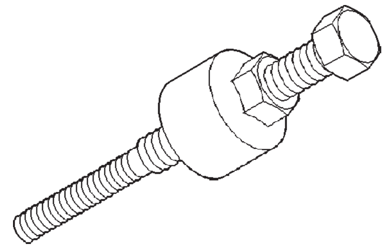
Adapters, Power Steering Analyzer 6893



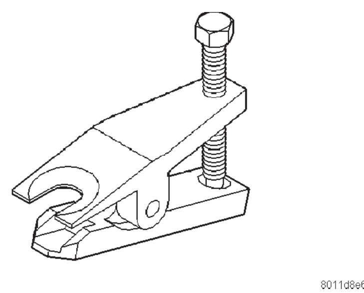
HOSE, POWER STEERING ANALYZER 6959



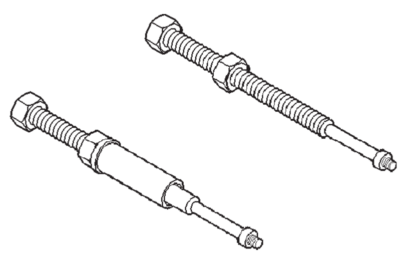
Puller C-4333



Installer C-4063B



Remover MB-991113



Remover/Installer, Steering Shaft Roll Pin 6831A

COLUMN

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COLUMN

DESCRIPTION

The steering column mounted to the underside of the instrument panel is a tilt type (Fig. 1). It has been designed to be serviced only as an assembly if it is determined to be defective. These replaceable components mounted on the steering column can be serviced without removal of the steering column from the vehicle:

- key cylinder
- lock cylinder trim ring
- ignition switch
- multi-function switch
- clockspring
- SKIM module
- trim shrouds, and
- steering wheel

The steering column intermediate shaft can also be serviced separately from the steering column.

The speed control switches and driver airbag mounted on the steering wheel are also serviced separately.

OPERATION

Turning of the steering wheel is transferred through the steering column and intermediate shaft, to the power steering gear pinion shaft. The gear then moves the steering knuckles, steering the vehicle.

WARNING

WARNING: BEFORE BEGINNING ANY SERVICE PROCEDURES THAT INVOLVES REMOVING THE AIR BAG. REMOVE AND ISOLATE THE NEGATIVE (-) BATTERY CABLE (GROUND) FROM THE VEHICLE BATTERY. THIS IS THE ONLY SURE WAY TO DISABLE THE AIR BAG SYSTEM. FAILURE TO DO THIS COULD RESULT IN ACCIDENTAL AIR BAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: WHEN AN UNDEPLOYED AIRBAG MODULE IS TO BE REMOVED FROM THE STEERING WHEEL, DISCONNECT BATTERY GROUND CABLE AND ISOLATE. ALLOW SYSTEM CAPACITOR TO DISCHARGE FOR A MINIMUM OF TWO MINUTES, THEN BEGIN AIRBAG REMOVAL.

COLUMN (Continued)

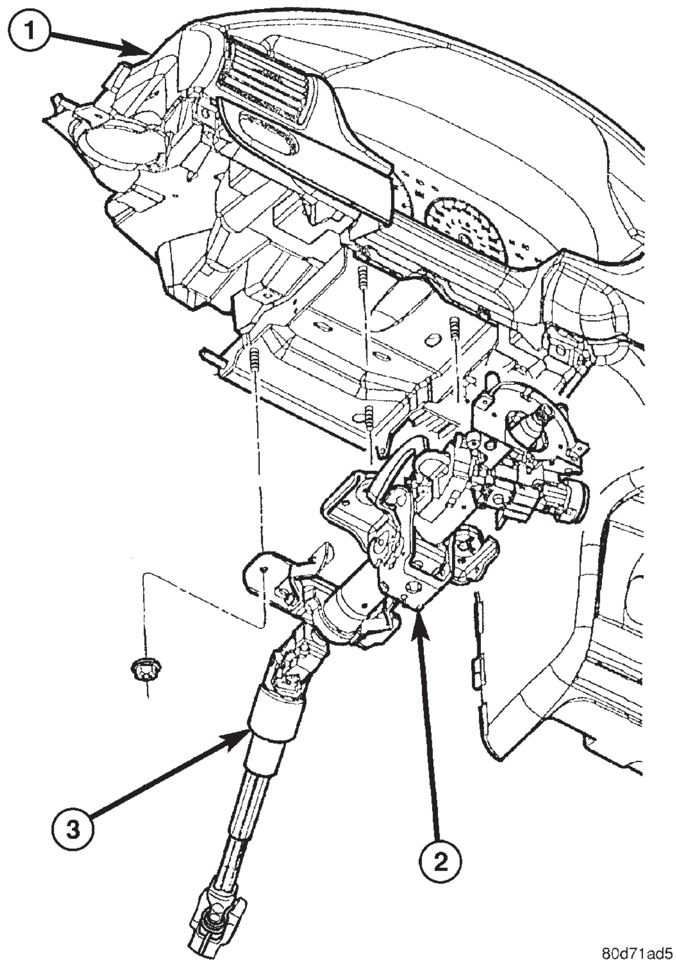

Fig. 1 Steering Column And Intermediate Shaft

1 - INSTRUMENT PANEL
2 - STEERING COLUMN
3 - INTERMEDIATE SHAFT

WARNING: THE AIR BAG SYSTEM IS A SENSITIVE, COMPLEX ELECTRO-MECHANICAL UNIT. BEFORE ATTEMPTING TO DIAGNOSE, REMOVE OR INSTALL THE AIR BAG SYSTEM COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL DEPLOYMENT OF THE AIR BAG AND POSSIBLE PERSONAL INJURY. THE FASTENERS, SCREWS, AND BOLTS, ORIGINALLY USED FOR THE AIR BAG COMPONENTS, HAVE SPECIAL COATINGS AND ARE SPECIFICALLY DESIGNED FOR THE AIR BAG SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. ANYTIME A NEW FASTENER IS NEEDED, REPLACE WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR FASTENERS LISTED IN THE PARTS BOOKS. BEFORE SERVICING A STEERING COLUMN EQUIPPED WITH AN AIR BAG, (Refer to 8 - ELECTRICAL/RESTRAINTS - WARNING)

WARNING: WHEN HANDLING AN UNDEPLOYED AIRBAG MODULE DURING SERVICING OF THE STEERING COLUMN THE FOLLOWING PRECAUTIONS SHOULD BE OBSERVED. AT NO TIME SHOULD ANY SOURCE OF ELECTRICITY BE PERMITTED NEAR THE INFLATOR ON THE BACK OF THE AIRBAG MODULE. WHEN CARRYING A LIVE MODULE, THE TRIM COVER SHOULD BE POINTED AWAY FROM THE BODY TO MINIMIZE INJURY IF MODULE ACCIDENTLY DEPLOYS. IF AIRBAG MODULE IS PLACED ON A BENCH OR OTHER SURFACE, PLASTIC COVER SHOULD BE FACE UP TO MINIMIZE MOVEMENT IN CASE OF ACCIDENTAL DEPLOYMENT.

WARNING: SAFETY GOGGLES SHOULD BE WORN AT ALL TIMES WHEN WORKING ON STEERING COLUMNS.

CAUTION

CAUTION: Disconnect the negative (ground) cable from the battery, before servicing any column component.

CAUTION: Do not attempt to remove the pivot pins to disassemble the tilting mechanism. Damage will occur.

DIAGNOSIS AND TESTING - STEERING COLUMN

For diagnosis of conditions relating to the steering column, (Refer to 19 - STEERING - DIAGNOSIS AND TESTING).

REMOVAL - STEERING COLUMN

NOTE: Before proceeding, review all WARNINGS and CAUTIONS. (Refer to 19 - STEERING/COLUMN - WARNING) (Refer to 19 - STEERING/COLUMN - CAUTION)

(1) Open hood and remove remote ground cable from ground stud on left front shock tower. Isolate ground cable from vehicle by installing cable isolator on ground stud (Fig. 2).

COLUMN (Continued)

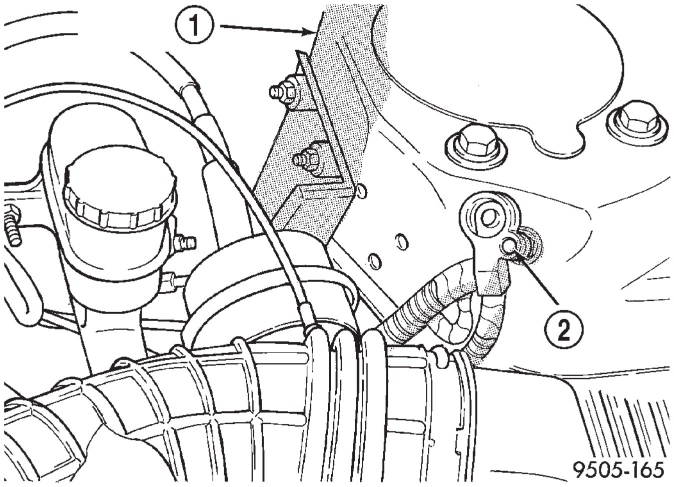

Fig. 2 Correctly Isolated Remote Ground Cable

1 - LEFT STRUT TOWER
2 - GROUND STUD

WARNING: WHEN AN UNDEPLOYED AIRBAG IS TO BE REMOVED FROM THE STEERING WHEEL, DISCONNECT BATTERY GROUND CABLE AND ISOLATE. ALLOW SYSTEM CAPACITOR TO DISCHARGE FOR TWO MINUTES, THEN BEGIN AIRBAG REMOVAL.

(2) Wait for a minimum of 2 minutes before starting to remove air bag from steering wheel. This will allow the airbag system capacitor to de-energize.

(3) Remove fuse panel cover from left end of instrument panel.

(4) Remove center bezel surrounding radio and climate control panel.

(5) Remove screw attaching bezel to instrument panel behind climate control panel. Remove bezel.

(6) Remove outside mirror switch bezel from instrument panel.

(7) Remove silencer panel below steering column knee bolster.

(8) Remove screws attaching knee bolster to instrument panel.

(9) Lower knee bolster and disconnect connectors from rear, then remove bolster.

(10) Position front wheels of vehicle in the **straight-ahead** position.

(11) Remove speed control switches (Fig. 3) from steering wheel. Speed control switches are mounted to steering wheel by two screws (one screw, each switch) which are accessible from back side of steering wheel.

WARNING: WHEN HANDLING AN UNDEPLOYED AIRBAG DURING SERVICING OF THE STEERING COLUMN THE FOLLOWING PRECAUTIONS SHOULD BE OBSERVED. AT NO TIME SHOULD ANY SOURCE OF ELECTRICITY BE PERMITTED NEAR THE INFLATOR ON THE BACK OF THE AIRBAG MODULE. WHEN CARRYING A LIVE MODULE, THE TRIM COVER SHOULD BE POINTED AWAY FROM THE BODY TO MINIMIZE INJURY IF MODULE ACCIDENTLY DEPLOYS. IF AIRBAG MODULE IS PLACED ON A BENCH OR OTHER SURFACE, PLASTIC COVER SHOULD BE FACE UP TO MINIMIZE MOVEMENT IN CASE OF ACCIDENTAL DEPLOYMENT.

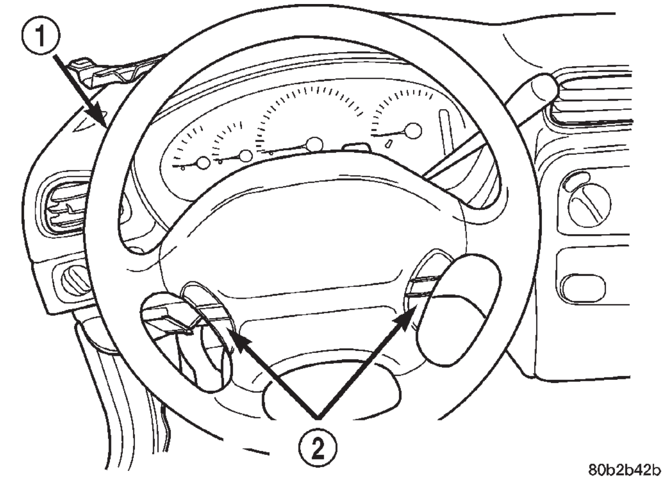

Fig. 3 Speed Control Switches

1 - STEERING WHEEL
2 - SPEED CONTROL SWITCHES

(12) Remove 2 bolts attaching driver airbag to steering wheel (Fig. 4).

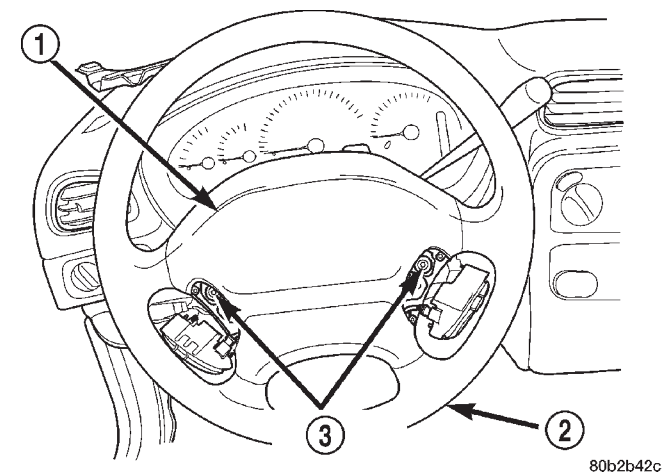

Fig. 4 Airbag Attaching Bolts

1 - AIRBAG
2 - STEERING WHEEL
3 - MOUNTING SCREWS

(13) Lift driver airbag from steering wheel and disconnect electrical connectors from back of driver airbag (Fig. 5). Connectors are removed by compressing

COLUMN (Continued)

latches on sides of connectors and pulling them straight out of airbag. Do not twist the connectors when removing them from airbag.

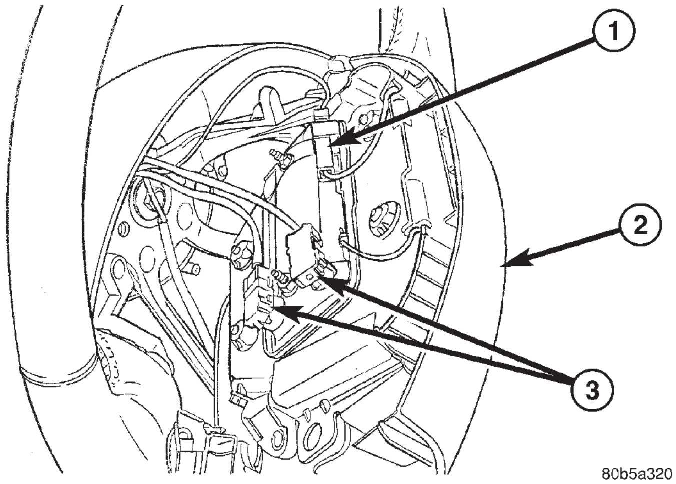

Fig. 5 Airbag Electrical Connections

1 - HORN CONNECTOR
2 - DRIVER AIRBAG
3 - AIRBAG SQUIB CONNECTORS

(14) Remove driver airbag.

NOTE: Before removing steering wheel, verify front wheels and steering wheel are in staight-ahead position.

(15) Remove steering wheel attaching bolt from steering column shaft (Fig. 6).

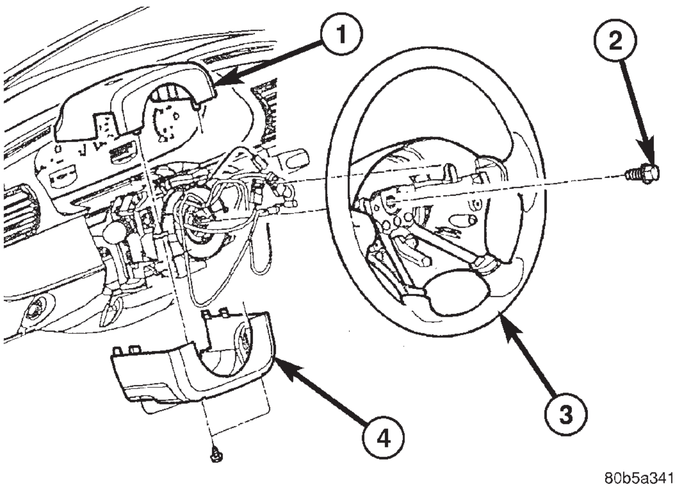

Fig. 6 Steering Wheel And Shroud Mounting

1 - UPPER SHROUD
2 - BOLT
3 - STEERING WHEEL
4 - LOWER SHROUD

CAUTION: When installing wheel puller on steering wheel, be sure puller bolts are fully seated in the threaded holes in the steering wheel. If bolts are not fully seated in the threaded holes, threads may be stripped out when removing the steering wheel.

(16) Install puller on steering wheel as shown (Fig. 7).

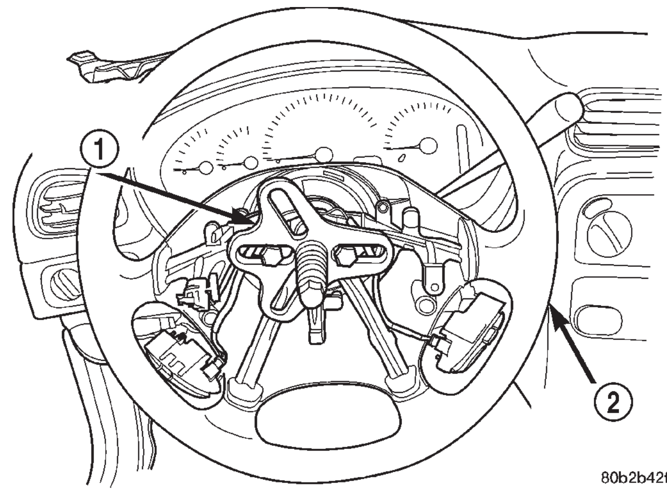

Fig. 7 Puller Installed On Steering Wheel

1 - STEERING WHEEL PULLER
2 - STEERING WHEEL

CAUTION: Do not bump or hammer on steering wheel or steering column shaft when removing steering wheel from steering column.

(17) Remove steering wheel from steering column shaft.

(18) Remove the 2 screws attaching the upper and lower shrouds to the steering column (Fig. 6). First remove upper shroud from steering column by pressing inward on upper shroud just above the parting line while pulling upper and lower shrouds apart. Next, release tilt lever and tilt steering column to its highest point. Then remove lower shroud from steering column.

COLUMN (Continued)

(19) Remove the 2 wiring harness connectors from the clockspring (Fig. 8).

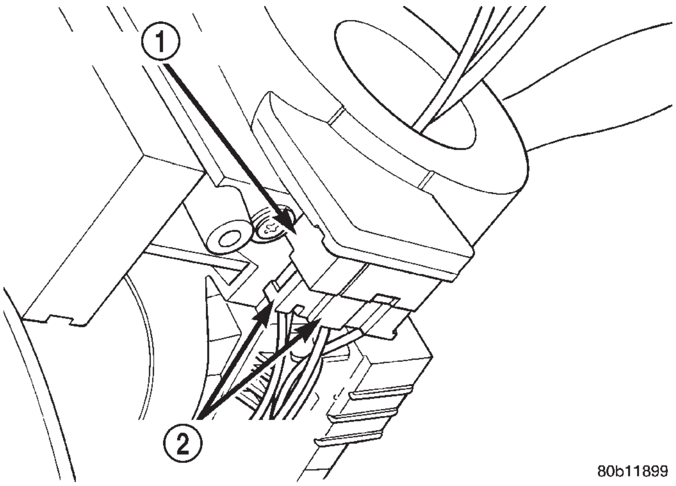

Fig. 8 Wiring Harness Connection To Clock Spring

1 - CLOCK SPRING
2 - WIRING HARNESS CONNECTORS

(20) Remove the 3 wiring harness connectors from the back of the ignition switch (Fig. 9).

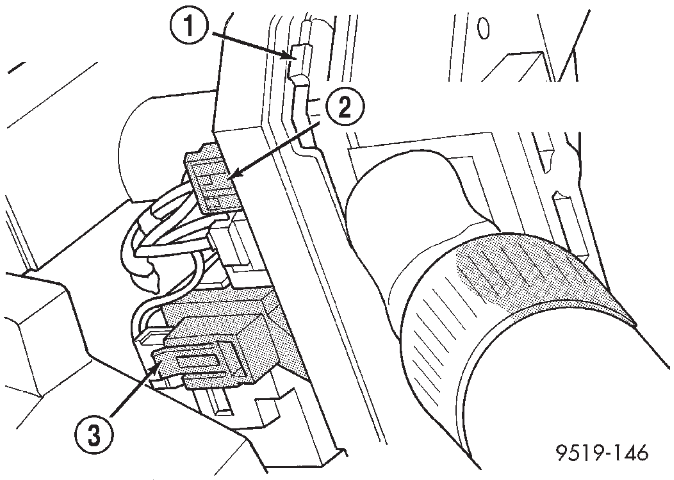

Fig. 9 Wiring Harness Connections To Ignition And Multi-Function Switch

1 - MULTI-FUNCTION SWITCH
2 - MULTI-FUNCTION SWITCH WIRING HARNESS CONNECTOR
3 - IGNITION SWITCH

(21) If equipped, disconnect SKIM connector.

(22) Remove the 2 wiring harness connectors from the multi-function switch (Fig. 9) (Fig. 10).

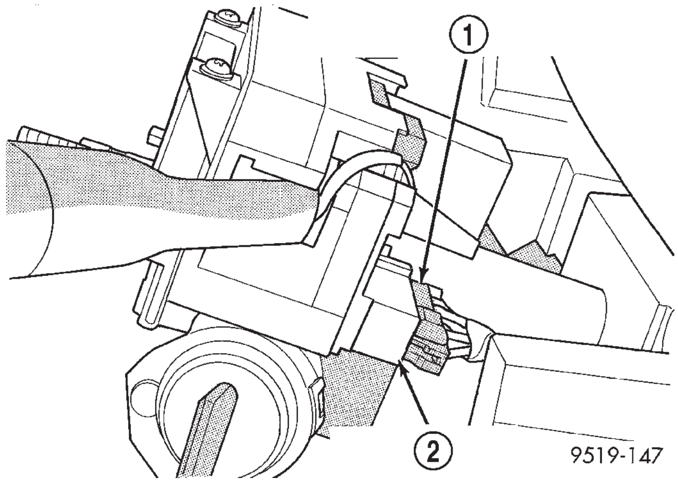

Fig. 10 Wiring Harness Connection To Multi-Function Switch

1 - MULTI-FUNCTION SWITCH WIRING HARNESS CONNECTOR
2 - MULTI-FUNCTION SWITCH

(23) If vehicle is equipped with an automatic transaxle, rotate the key cylinder to the ON position. Depress locking tab on shifter/ignition interlock cable (Fig. 11) and remove the cable from the key lock housing.

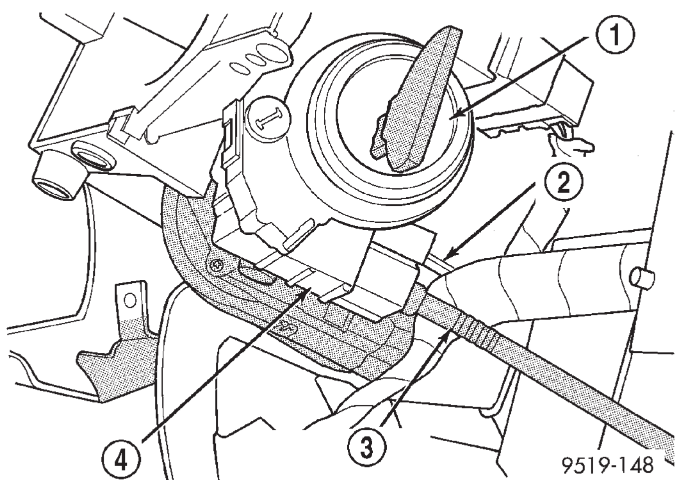

Fig. 11 Shifter/Ignition Cable At Lock Cylinder Housing

1 - KEY CYLINDER
2 - LOCKING TAB
3 - SHIFTER IGNITION INTERLOCK CABLE
4 - KEY LOCK HOUSING

COLUMN (Continued)

(24) Under the instrument panel, disconnect the intermediate shaft from the steering gear shaft. To do so, remove the pinch bolt from the intermediate shaft coupler (Fig. 12), then slide the intermediate shaft up and off the steering gear shaft.

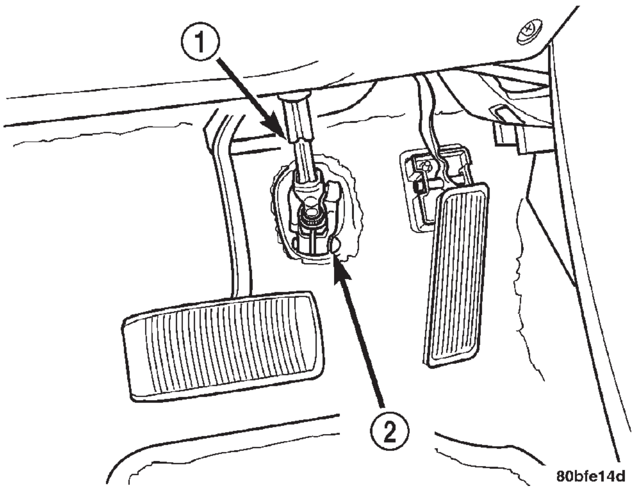

Fig. 12 Intermediate Shaft Attachment

1 - INTERMEDIATE SHAFT
2 - PINCH BOLT

(25) Remove the 2 upper steering column mounting bracket-to-support bracket nuts. Then remove the 2 lower steering column mounting bracket-to-support bracket nuts (Fig. 13).

(26) Remove steering column and intermediate shaft from vehicle passenger compartment. Use care to avoid damaging column harness or interior trim.

(27) If steering column is being replaced, perform the following:

(a) Remove intermediate shaft. (Refer to 19 - STEERING/COLUMN/INTERMEDIATE SHAFT - REMOVAL)

(b) Remove SKIM.

(c) Remove halo ring from around key/lock cylinder.

(d) Remove key cylinder.

(e) Remove multi-function switch.

(f) Remove ignition switch (if required).

INSTALLATION - STEERING COLUMN

(1) If steering column is being replaced, perform the following:

(a) Install ignition switch (if required).

(b) Install multi-function switch.

(c) Install key cylinder.

(d) Install halo ring from around key/lock cylinder.

(e) Install SKIM.

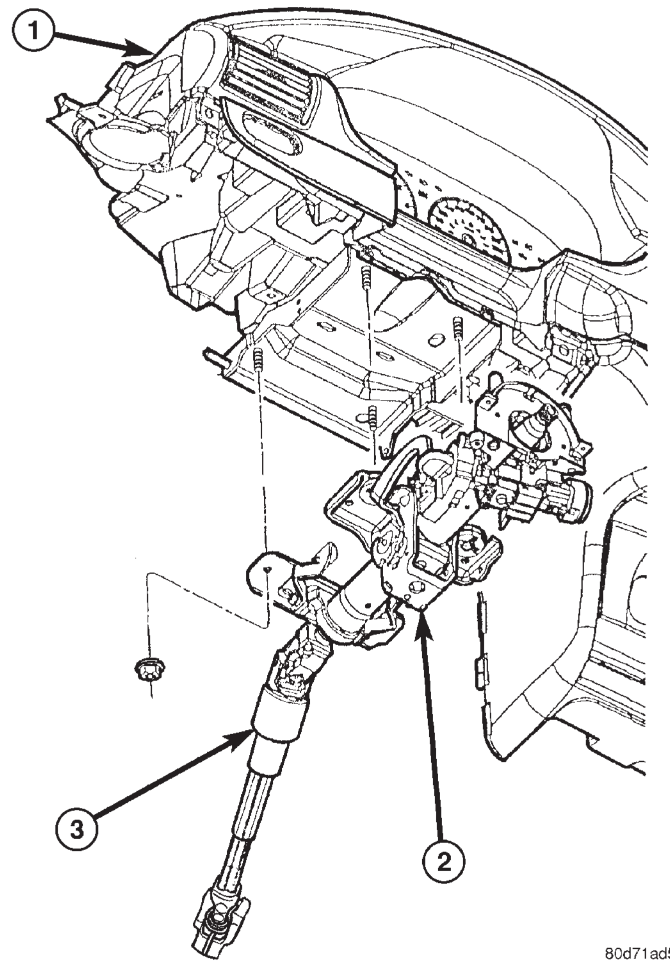

Fig. 13 Steering Column And Intermediate Shaft

1 - INSTRUMENT PANEL
2 - STEERING COLUMN
3 - INTERMEDIATE SHAFT

(f) Install intermediate shaft. (Refer to 19 - STEERING/COLUMN/INTERMEDIATE SHAFT - INSTALLATION)

(2) Install steering column on the studs in the steering column support bracket (Fig. 13). Loosely install the 4 steering column assembly attaching nuts.

(3) Tighten the 2 lower steering column assembly mounting nuts to hold the steering column in place. Be sure both break-away capsules are still fully seated in the slots of the upper steering column mounting bracket and the mounting studs are centered fore-and-aft in the plastic capsules. Then equally tighten both steering column mounting nuts, until upper steering column mounting bracket is seated against support bracket. Tighten the 4 steering column bracket to support bracket nuts to 17 N·m (150 in. lbs.).

COLUMN (Continued)

(4) If a new steering column is being installed in the vehicle, remove the shipping (grenade) pin from steering column.

(5) Ensure front wheels of vehicle are positioned **straight-ahead**, and steering wheel master serration in steering column shaft is positioned at 12 O'clock.

(6) Under the instrument panel, reconnect the intermediate shaft to the steering gear shaft. To do so, align the flats and slide the intermediate shaft onto the steering gear shaft aligning the pinch bolt hole with the notch formed into the steering gear shaft. Install a **new** pinch bolt in the intermediate shaft coupler (Fig. 12), then tighten the pinch bolt to a torque of 44 N·m (32 ft. lbs.).

(7) If vehicle is equipped with an automatic transaxle, install the shifter/ignition interlock cable (Fig. 11) in the lock cylinder housing.

(8) If equipped, connect wiring connector to SKIM.

(9) Install the wiring harness connectors on the back of the ignition switch (Fig. 9).

(10) Install 2 wiring harness connectors to multifunction switch (Fig. 9) (Fig. 10).

(11) Install 2 wiring harness connectors to clockspring (Fig. 8).

(12) Install the upper and lower steering column shrouds onto the lock housing of the steering column. Install and securely tighten the 2 upper to lower steering column shroud to lock housing attaching screws to 1.9 N·m (17 in. lbs.) (Fig. 6).

CAUTION: If any doubt is present as to whether the clockspring is properly centered, this clockspring centering procedure MUST be performed prior to installing the steering wheel. If clockspring is not centered it may be overextended, causing clockspring assembly to become inoperative. The clockspring is centered when the yellow centering indicator is present in the centering window and the arrow on the label points at the locking pin.

(13) Center the clockspring using the following procedure.

(a) Depress the plastic locking pin to disengage clockspring locking mechanism.

(b) Keeping locking mechanism disengaged, rotate the clockspring rotor in the CLOCKWISE direction to the end of the travel. Do not apply excessive torque.

(c) From the end of clockwise travel, slowly rotate the rotor in the COUNTERCLOCKWISE direction until yellow appears in the centering window of clockspring. When yellow appears in the centering window the locking pin on the clockspring rotor will be in front of arrow on clockspring label.

(d) Release the plastic locking pin to engage the clockspring locking mechanism.

CAUTION: Do not install steering wheel by driving it onto the shaft. Pull steering wheel down onto steering column shaft using ONLY the steering wheel retaining bolt.

(14) Feed the clockspring wiring leads through the steering wheel. Position steering wheel on shaft of steering column, making sure the master serration in the wheel hub and on the steering column shaft line up.

(15) Install steering wheel to steering column shaft with bolt and tighten until the steering wheel is fully installed on the shaft. Tighten steering wheel retaining bolt to a torque of 54 N·m (40 ft. lbs.).

(16) Turn the key cylinder to the unlock position, unlocking the steering column shaft.

(17) Connect the horn switch wiring connector from the clockspring to the airbag connector (Fig. 5).

(18) Install the airbag electrical connectors to connectors on rear of driver airbag (Fig. 5). **Be sure electrical connector from clockspring is securely latched into airbag connector.**

CAUTION: The fasteners, screws, and bolts, originally used for the airbag components are specifically designed for the airbag system. They must never be replaced with any substitutes. Anytime a new fastener is needed, replace only with correct fasteners provided in service packages or fasteners listed in the parts book.

NOTE: Make sure steering wheel and airbag module are in the right-side-up position before installing airbag module on steering wheel.

(19) Install the airbag module on steering wheel. Install only the two original or correct replacement airbag module attaching bolts (Fig. 4). Tighten the two airbag module attaching bolts to a torque of 9.6 N·m (85 in. lbs.).

(20) Connect the speed control wiring leads to the speed control switches.

(21) Install the speed control switches in the steering wheel (Fig. 3). Install the screws attaching the speed control switches to the steering wheel. Tighten the screws to a torque of 1.1 N·m (12 in. lbs.).

(22) Install lower instrument panel knee bolster onto the lower instrument panel. Install and securely tighten the knee bolster to instrument panel attaching screws.

(23) Install the mirror switch bezel.

(24) Install fuse panel cover on left end of instrument panel.

COLUMN (Continued)

(25) Install inboard switch bezel. Install mounting screw.

(26) Install center bezel surrounding radio and climate control panel from top cover of instrument panel.

(27) Install silencer panel below steering column knee bolster.

CAUTION: When reconnecting battery on a vehicle that has had the air bag module removed, ensure no occupants are in the vehicle and the following procedure is used.

(28) Reconnect the negative cable to the battery using the steps listed below.

(a) Connect DRBIII® scan tool to diagnostic datalink connector.

(b) Turn ignition key to ON position. Exit vehicle with the DRB scan tool.

(c) Ensuring that their are no occupants in the vehicle, connect negative cable to negative post of the battery.

(d) Using the DRBIII scan tool, read and record active fault codes. Also read and record any stored fault codes. Refer to Appropriate Diagnostic Information if any faults are found.

(e) Erase stored faults if there are no active fault codes. If problems remain, fault codes will not erase.

(f) Reaching through the drivers window, between steering wheel and instrument cluster, turn ignition key to OFF and then ON observing instrument cluster airbag indicator. It should go on for six to eight seconds, then go out. This will indicate that the air bag system is functioning normally.

(29) **If airbag warning indicator fails to light, blinks on and off or goes on and stays on, there is an air bag system malfunction.** Refer to Appropriate Diagnostic Information to diagnose any system malfunction.

(30) Test the operation of the horn, lights and any other functions that are steering column operated. If applicable reset the radio and the clock.

(31) Road test vehicle to ensure proper operation of the steering system and the speed control system.

SPECIFICATIONS

COLUMN FASTENER TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Airbag Module Mounting Bolts	9.6	—	85
Column Mounting Nuts	17	13	150
Intermediate Shaft Pinch Bolt	44	32	—
Speed Control Switch Screws	1.4	—	12
Steering Wheel Retaining Bolt	54	40	—

INTERMEDIATE SHAFT

DESCRIPTION

The steering column intermediate shaft is located between the steering column and the power steering gear. It has a universal joint at each end. It has a slider-stage in the center portion of the shaft.

The steering column intermediate shaft fastens to the steering column's splined shaft using a roll pin. It uses a pinch bolt to secure the shafts to one another at the steering gear (Fig. 14).

OPERATION

The steering column intermediate shaft connects the steering column shaft to the power steering gear's pinion shaft. It's flexible joints allow the shaft to universal when rotating.

DIAGNOSIS AND TESTING - STEERING COLUMN INTERMEDIATE SHAFT

The steering column intermediate shaft and its universal joint couplers (Fig. 1) must be inspected whenever any of the following conditions exist:

- After the vehicle has been involved in a collision which deploys the airbag, regardless of the extent of damage done to the vehicle.
- After the vehicle has been involved in an undercarriage impact which results in any type of damage to the front suspension crossmember.
- Under any conditions which result in the steering column assembly or steering column shaft receiving a force great enough to move the steering column or shaft forward of rearward in a vehicle.

Inspect the intermediate shaft and its universal joint couplers for any of the following conditions:

- seized or binding bearings
- loose bearing stakes

INTERMEDIATE SHAFT (Continued)

- bearings not fully seated in the coupler yoke
- bent intermediate shaft

Presence of any of the above faulty conditions call for replacement of the entire steering column intermediate shaft.

REMOVAL

(1) Remove fuse panel cover from left end of instrument panel.

(2) Remove center bezel surrounding radio and climate control panel.

(3) Remove screw attaching bezel to instrument panel behind climate control panel. Remove bezel.

(4) Remove outside mirror switch bezel from instrument panel.

(5) Remove silencer panel below steering column knee bolster.

(6) Remove screws attaching knee bolster to instrument panel.

(7) Lower knee bolster and disconnect connectors from rear, then remove bolster.

(8) Position front wheels of vehicle in the **straight-ahead** position.

(9) Disconnect the intermediate shaft from the steering gear shaft. To do so, remove the pinch bolt from the intermediate shaft coupler (Fig. 14), then slide the intermediate shaft up and off the steering gear shaft.

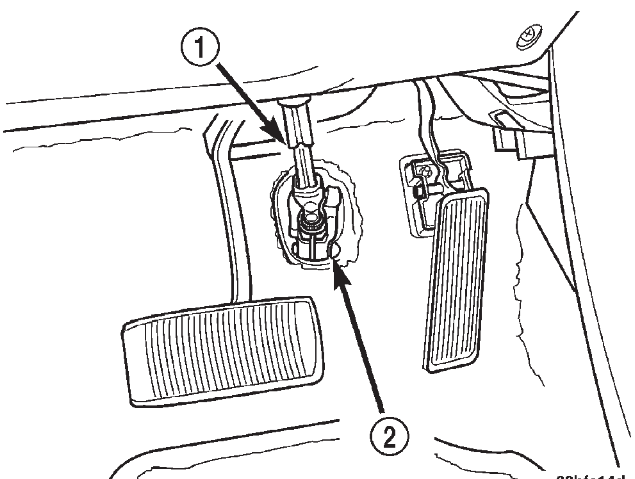

Fig. 14 Intermediate Shaft Attachment

1 - INTERMEDIATE SHAFT
2 - PINCH BOLT

(10) Turn the steering wheel 90° to the **LEFT**. This is done to allow proper roll pin removal tool installation.

(11) Using a steering wheel holder, lock the steering wheel in this position. **This is done to keep the clockspring from turning, losing its center. It will also help hold the shaft steady while removing the roll pin.**

(12) Install Remover/Installer, Special Tool 6831-A, through center of roll pin in intermediate shaft's universal joint and install knurled nut (Fig. 15).

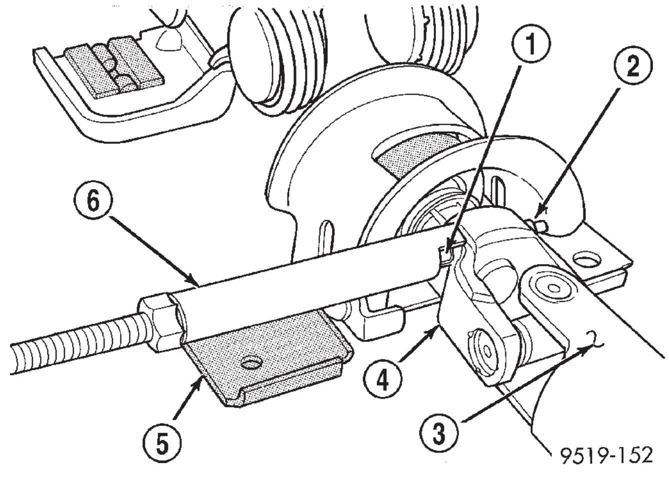

Fig. 15 Removing Roll Pin From Flex Joint (Typical)

1 - ROLL PIN
2 - KNURLED NUT
3 - INTERMEDIATE SHAFT
4 - UNIVERSAL JOINT
5 - STEERING COLUMN LOWER MOUNTING BRACKET
6 - SPECIAL TOOL 6831–A

(13) While holding hex on end threaded rod, tighten the nut on threaded rod of Remover/Installer. This will pull the roll pin out of the intermediate shaft's universal joint.

(14) Using a screwdriver inserted between the shaft's universal joint and the steering column lower mounting bracket, gently pry intermediate shaft off steering column shaft.

INSTALLATION

(1) Start roll pin into universal joint prior to installing intermediate shaft on steering column shaft. Install roll pin into just far enough to square roll pin to hole in universal joint. If roll pin is installed too far, universal joint will not slid onto steering column shaft.

(2) Install intermediate shaft on steering shaft until correctly positioned to allow roll pin to be installed in coupler.

(3) Install Remover/Installer, Special Tool 6831-A, through center of roll pin and install knurled nut as shown (Fig. 16).

(4) Using Remover/Installer (Fig. 16), install roll pin into the coupler until roll pin is fully and evenly installed through both sides of the coupler assembly.

(5) Remove the steering wheel holder and turn the steering wheel 90° to the right so that the steering wheel is back in the **straight-ahead** position. **Do not allow the steering wheel to turn any fur-**

INTERMEDIATE SHAFT (Continued)

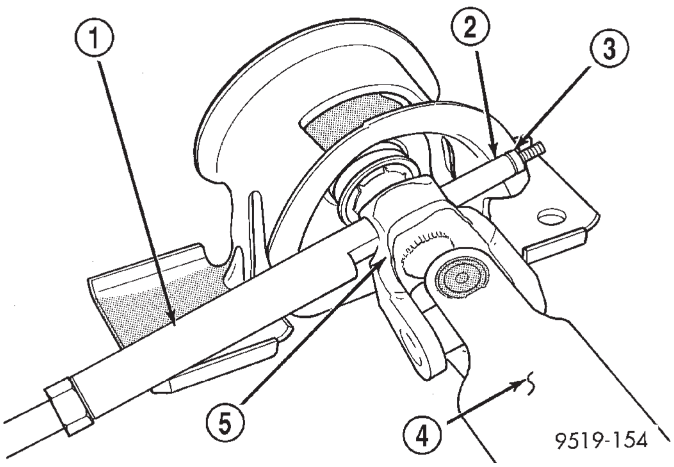

Fig. 16 Tool Set-Up For Installing Roll Pin (Typical)

1 - SPECIAL TOOL 6831–A
2 - ROLL PIN
3 - KNURLED NUT
4 - INTERMEDIATE SHAFT
5 - UNIVERSAL JOINT

ther or in any other direction; clockspring center will be lost and clockspring centering procedure must then be performed (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - STANDARD PROCEDURE)

(6) Under the instrument panel, reconnect the intermediate shaft to the steering gear shaft. To do so, align the flats and slide the intermediate shaft onto the steering gear shaft aligning the pinch bolt hole with the notch formed into the steering gear shaft. Install a **new** pinch bolt in the intermediate shaft coupler (Fig. 14), then tighten the pinch bolt to a torque of 44 N·m (32 ft. lbs.).

(7) Install lower instrument panel knee bolster onto the lower instrument panel. Install and securely tighten the knee bolster to instrument panel attaching screws.

(8) Install the mirror switch bezel.

(9) Install fuse panel cover on left end of instrument panel.

(10) Install inboard switch bezel. Install mounting screw.

(11) Install center bezel surrounding radio and climate control panel from top cover of instrument panel.

(12) Install silencer panel below steering column knee bolster.

(13) Road test vehicle to ensure proper operation of the steering system.

STEERING WHEEL

REMOVAL - STEERING WHEEL

(1) Adjust the steering wheel so that the tires are in the straight ahead position.

(2) Disconnect and isolate the battery negative remote cable.

(3) Remove the speed control switch screws from back of the steering wheel. Pull the switch pods out and disconnect the wires.

(4) Remove the Driver Airbag attaching bolts from steering wheel.

(5) Lift the airbag and disconnect the airbag wire connectors using finger grip. Use care not to pull on wires. Never use a metallic tool to pry on the connector.

(6) Disconnect the horn wire from the airbag mounting bracket. Remove the speed control wires from under the bracket and from the wire guides.

(7) Unscrew the steering wheel retaining bolt almost all the way out (apporximately 15 mm).

(8) Loosen the steering wheel using a wheel puller tool. Remove the tool.

(9) Remmove the retaining bolt, then the steering wheel. Carefully feed all of the wires through the steering wheel armature to avoid damaging wires.

INSTALLATION - STEERING WHEEL

(1) Ensure that the road wheels are in the straight-ahead position.

(2) Ensure that the clockspring is centered by using the centering indicator. Refer to Clockspring Centering Procedure. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - ADJUSTMENTS)

(3) Ensure that the turn signal stalk is in the neutral position.

(4) Carefully route the wires over the top of the steering wheel armature. Install steering wheel and tighten bolt to 54 N·m (40 ft. lbs.) torque.

(a) Ensure that the pocket in the steering wheel hub lines up with the pin on the clockspring rotor.

(b) Ensure that the block tooth in the steering wheel hub lines up with the missing tooth on the steering column shaft.

(5) Route the speed control wires under the horn mechanism and through the speed control switch pockets. Connect the speed control wires to switches and install switches. Tighten screws to 1.4 ± .3 N·m (12 ± 3 in. lbs.) torque.

(6) Connect the horn lead to steering wheel.

(7) Connect the yellow airbag lead to the Driver Airbag. Check that the wires do not get pinched during installation.

(8) Install the airbag bolts and tighten the left side first. Tighten to 9.6 ± 1.0 N·m (85 ± 10 in. lbs.) torque.

(9) Refer to Clockspring - Diagnosis and Testing - Airbag System Test before connecting battery negative remote cable. (Refer to 8 - ELECTRICAL/RESTRAINTS/CLOCKSPRING - DIAGNOSIS AND TESTING)

GEAR

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GEAR

DESCRIPTION

The steering gear on this vehicle is a rack and pinion unit with power assist (Fig. 1). It is mounted on the front suspension crossmember. The steering column connects to the steering gear shaft on top of the gear. The outer tie rod ends of the gear connect to each suspension steering knuckle to steer the vehicle.

OPERATION

Turning of the steering wheel is converted into linear travel through the meshing of the helical pinion teeth with the rack teeth. Power assist steering is provided by an open center, rotary type control valve which directs fluid from the pump to either side of the integral rack piston.

Road feel is controlled by the diameter of a torsion bar which initially steers the vehicle. This movement directs fluid behind the integral rack piston, which, in turn, builds up hydraulic pressure and assists in the turning effort.

The drive tangs on the gear pinion mate loosely with a stub shaft. This is to permit manual steering control to be maintained if the drive belt on the power steering pump should break. However, under these conditions, steering effort will be increased.

REMOVAL

NOTE: Before proceding, review Warnings and Cautions.(Refer to 19 - STEERING - WARNING)(Refer to 19 - STEERING - CAUTION)

(1) Remove remote ground cable from ground stud on left shock tower. Then correctly isolate ground cable from vehicle by installing isolator on stud (Fig. 2).

(2) Siphon as much power steering fluid as possible from the remote power steering fluid reservoir.

(3) Place the steering wheel and front wheels in the STRAIGHT-AHEAD position. Lock the steering wheel in this position using a steering wheel holder.

(4) Under the instrument panel, disconnect the intermediate shaft from the steering gear shaft. To do so, remove the pinch bolt from the intermediate shaft coupler (Fig. 3), then slide the intermediate shaft up and off the steering gear shaft.

(5) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(6) Remove both front wheel and tire assemblies.

(7) Remove fasteners attaching drive belt splash shield to crossmember.

GEAR (Continued)

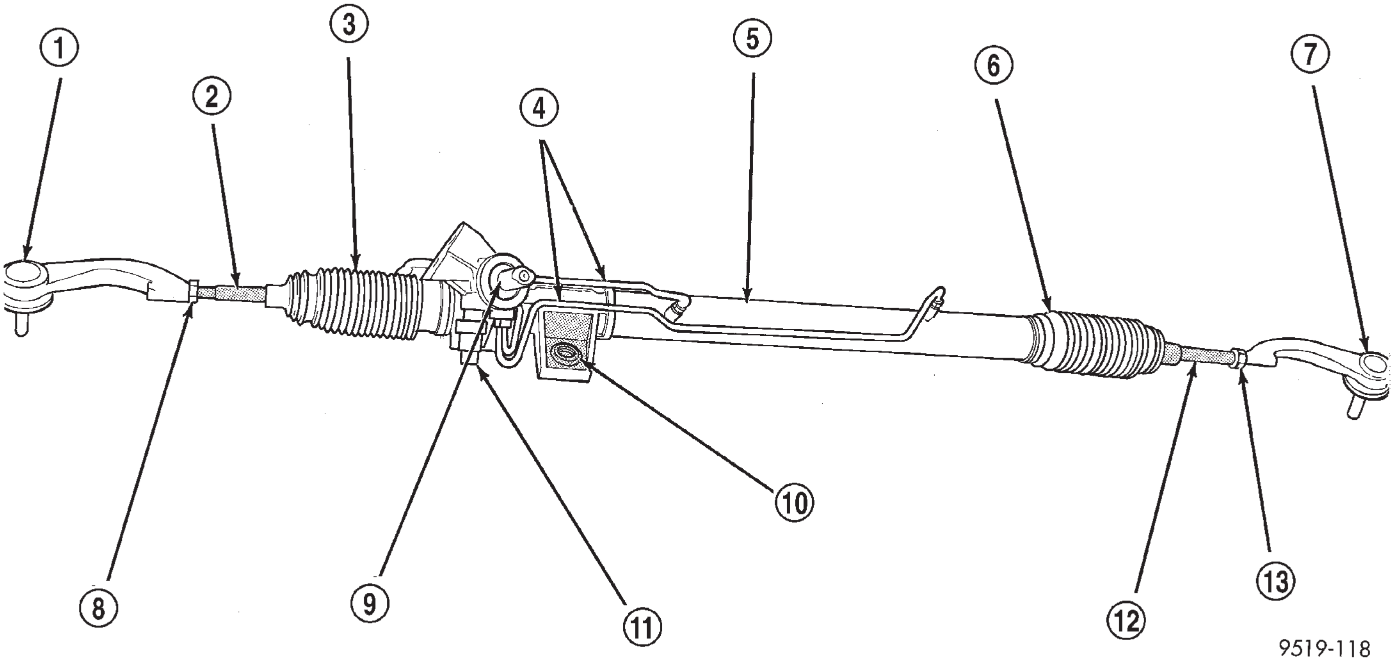

Fig. 1 Power Steering Gear

1 - TIE ROD END
2 - INNER TIE ROD
3 - STEERING GEAR BOOT
4 - STEERING GEAR FLUID LINES
5 - POWER STEERING GEAR HOUSING
6 - STEERING GEAR BOOT
7 - TIE ROD END
8 - JAM NUT
9 - STEERING GEAR SHAFT
10 - MOUNTING BUSHING
11 - POWER STEERING PRESSURE SWITCH
12 - INNER TIE ROD
13 - JAM NUT

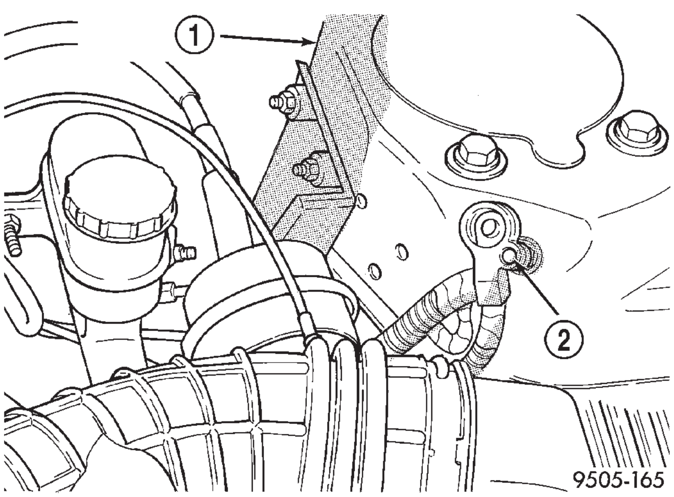

Fig. 2 Correctly Isolated Remote Ground Cable

1 - LEFT STRUT TOWER
2 - GROUND STUD

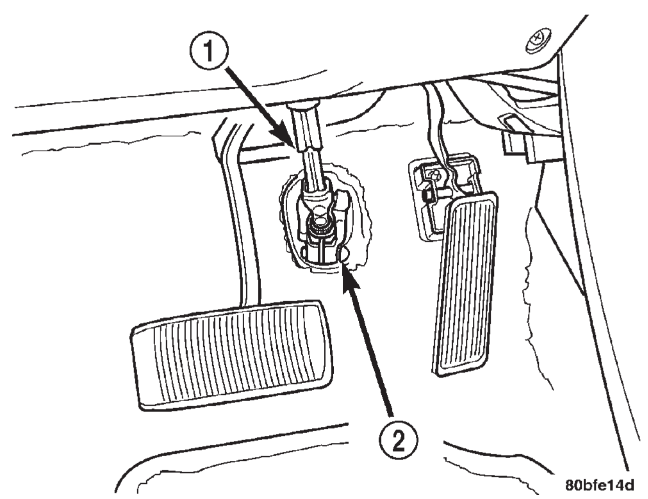

Fig. 3 Later Intermediate Shaft Attachment

1 - INTERMEDIATE SHAFT
2 - PINCH BOLT

GEAR (Continued)

(8) Remove nuts attaching both outer tie rod ends to steering knuckles. **Remove tie rod end nuts by holding tie rod end stud with a socket while loosening and removing nut with wrench (Fig. 4).**

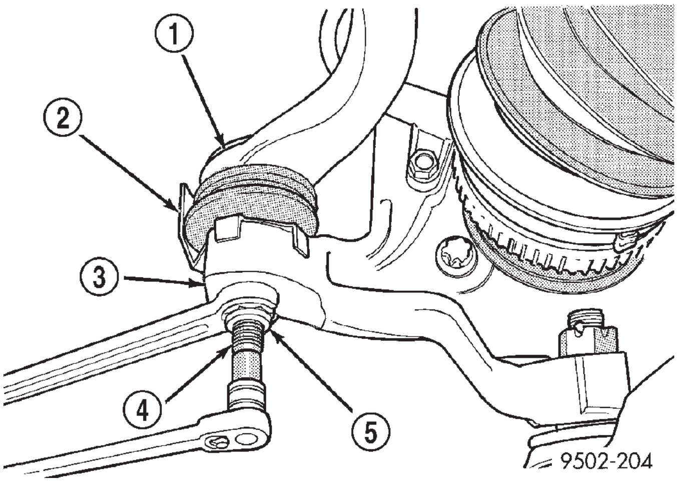

Fig. 4 Removing Tie Rod End Nut

1 - TIE ROD END
2 - HEAT SHIELD
3 - STEERING KNUCKLE
4 - TIE ROD END STUD
5 - NUT

(9) Remove both tie rod end studs from steering knuckles using Remover, Special Tool MB-991113 (Fig. 5).

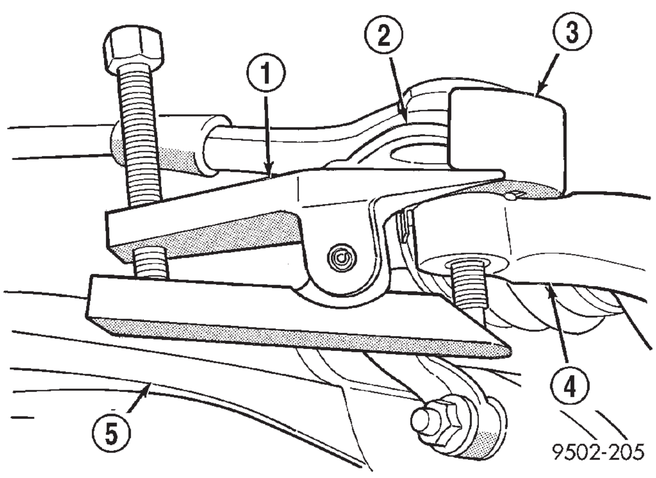

Fig. 5 Tie Rod End Removal From Steering Knuckle

1 - SPECIAL TOOL MB-991113
2 - TIE ROD END
3 - HEAT SHIELD
4 - STEERING KNUCKLE
5 - LOWER CONTROL ARM

CAUTION: This vehicles is designed and assembled using NET BUILD front suspension alignment settings. This means that front suspension alignment settings are determined as the vehicle is designed by the location of front suspension components in relation to the vehicle body. This process is carried out when building the vehicle by accurately locating the front suspension crossmember to master gage holes located in the underbody of the vehicle. Consequently, whenever the front suspension crossmember is removed from a vehicle, it MUST be replaced in the same location on the body of the vehicle it was removed from to keep the alignment settings the same. Therefore, before removing the front suspension crossmember from the vehicle, locating marks for the front suspension crossmember MUST be scribed on the front suspension crossmember and body of vehicle as described in the following steps. If location of front suspension crossmember to body is not maintained when vehicle is assembled, vehicle handling and or tire wear problems may occur.

(10) Using an awl, scribe lines on the body marking the front-to-rear and side-to-side location where the front suspension crossmember is mounted against the body of the vehicle. at all four locations where the crossmember mounts. The line should be scribed at all locations where the crossmember is mounted to the vehicle on each side of the vehicle.

(11) Remove the stabilizer bar bushing clamp**-to-body** attaching bolts (Fig. 6). The stabilizer bar bushing clamp**-to-crossmember** bolts do not need to be removed.

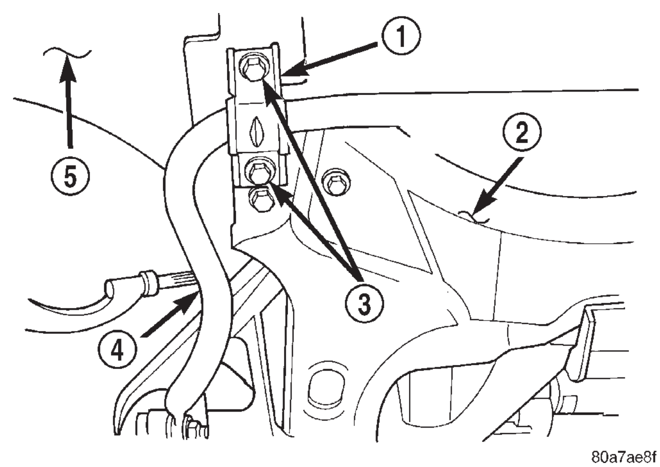

Fig. 6 Stabilizer Bar Bushing Clamp Attaching Bolts

1 - STABILIZER BAR BUSHING CLAMP
2 - FRONT SUSPENSION CROSSMEMBER
3 - ATTACHING BOLTS
4 - STABILIZER BAR
5 - VEHICLE BODY

GEAR (Continued)

(12) Remove the bolts attaching the shock absorber clevis to the left and right lower control arms (Fig. 7).

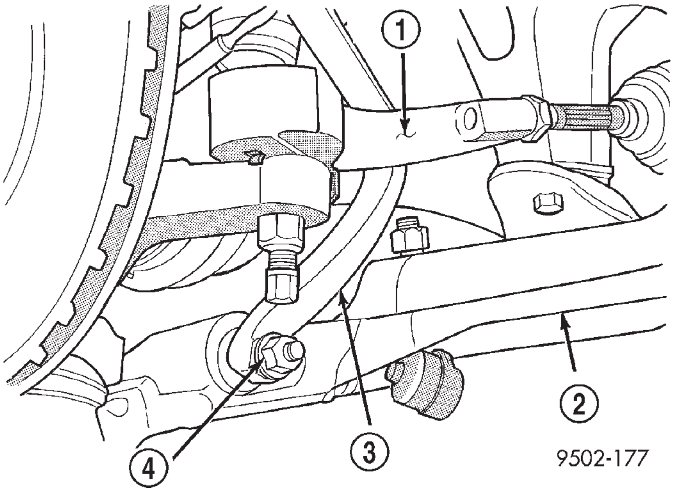

Fig. 7 Shock Clevis To Lower Control Arm Bolts

1 - TIE ROD END
2 - LOWER CONTROL ARM
3 - SHOCK ABSORBER CLEVIS
4 - THRU-BOLT

(13) Remove 3 bolts attaching engine torque mount to crossmember.

(14) Remove screws fastening steering gear heat shield to crossmember (Fig. 8).

(15) Remove screws fastening power steering pressure hose to crossmember (Fig. 8).

(16) Remove brake tube routing bracket from left lower control arm rear mounting bolt.

(17) Disconnect fuel tube bundle routing support above crossmember.

(18) Position transmission jack under center of front suspension crossmember to support it.

(19) On each side of the vehicle, remove the 2 bolts attaching the front and rear of the front suspension crossmember to the frame rails of vehicle (Fig. 9).

(20) Using transmission jack, lower front suspension crossmember enough to allow steering gear to be removed from crossmember. **When lowering front suspension crossmember, do not let crossmember hang from lower control arms, weight of crossmember must be supported by the transmission jack.**

(21) Remove power steering pressure and return hoses from the power steering gear fluid ports (Fig. 10).

(22) Remove wiring harness connector from the power steering fluid pressure switch.

(23) Remove 4 bolts fastening power steering gear to front suspension crossmember. Remove power steering gear from front suspension crossmember.

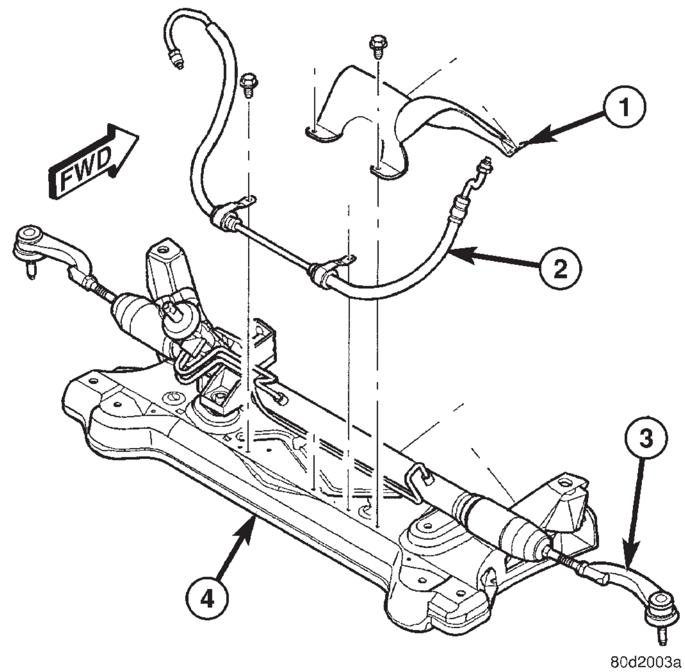

Fig. 8 PRESSURE HOSE MOUNTING TO CROSSMEMBER

1 - HEAT SHIELD (TYPICAL)
2 - PRESSURE HOSE
3 - POWER STEERING GEAR
4 - FRONT SUSPENSION CROSSMEMBER

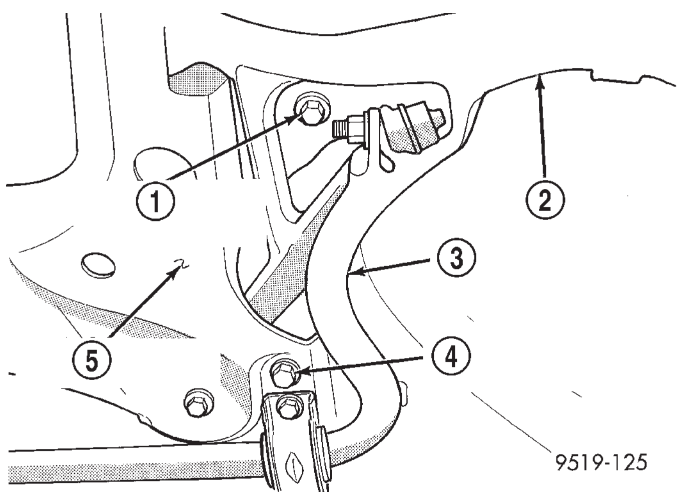

Fig. 9 Crossmember To Body Attaching Bolts

1 - CROSSMEMBER FRONT MOUNTING BOLT
2 - LOWER CONTROL ARM
3 - STABILIZER BAR
4 - CROSSMEMBER REAR MOUNTING BOLT
5 - FRONT SUSPENSION CROSSMEMBER

(24) Transfer required parts from removed gear to the replacement gear if a new gear is being installed.

GEAR (Continued)

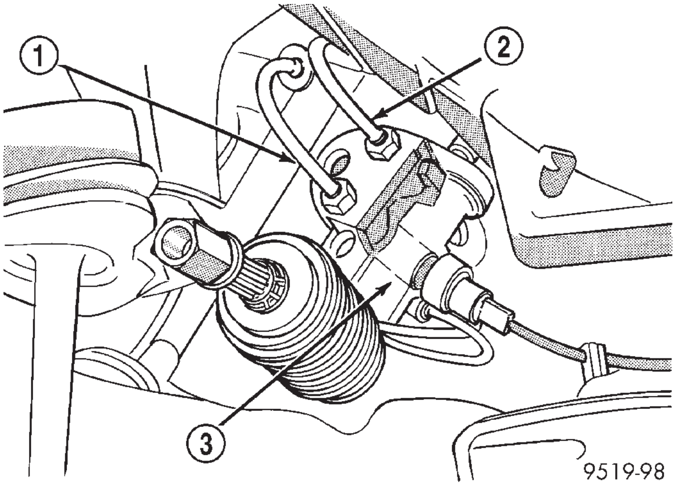

Fig. 10 Power Steering Pressure And Return Hose At Steering Gear

1 - POWER STEERING PRESSURE HOSE
2 - POWER STEERING RETURN HOSE
3 - POWER STEERING GEAR

DISASSEMBLY

(1) Using a screwdriver, pry the sleeve out of the mounting bolt isolator (Fig. 11) .

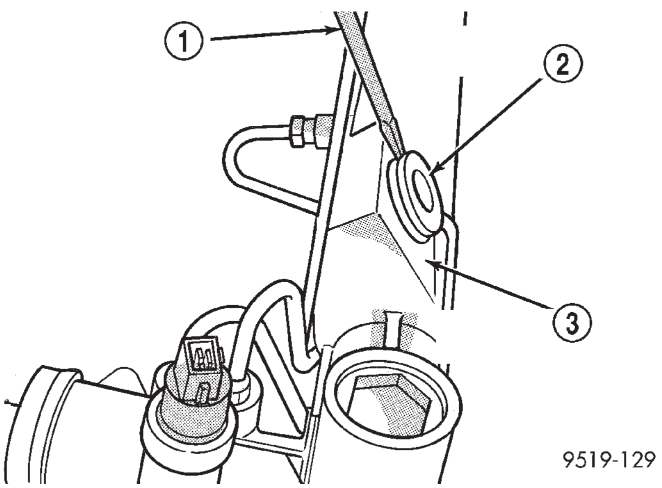

Fig. 11 Mounting Bolt Isolator Sleeve Removal

1 - SCREWDRIVER
2 - ISOLATOR BUSHING SLEEVE
3 - STEERING GEAR MOUNTING BRACKET

(2) Pry the mounting bolt isolator bushing from the steering gear mounting bracket.

ASSEMBLY

(1) Lubricate replacement mounting bolt isolator bushing using Mopar, Silicone Spray Lube or an equivalent.

(2) Install the mounting bolt isolator bushing into the steering gear mounting bracket from the bottom side of the bracket (Fig. 12) .

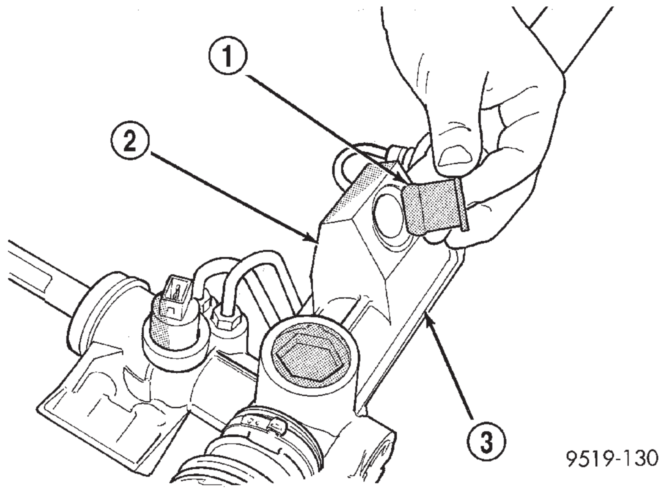

Fig. 12 Installing Mounting Bolt

1 - STEERING GEAR MOUNTING BOLT ISOLATOR BUSHING
2 - STEERING GEAR MOUNTING BRACKET
3 - STEERING GEAR

(3) Install mounting bolt isolator bushing sleeve into isolator bushing by pressing the sleeve into the bushing by hand (Fig. 13) .

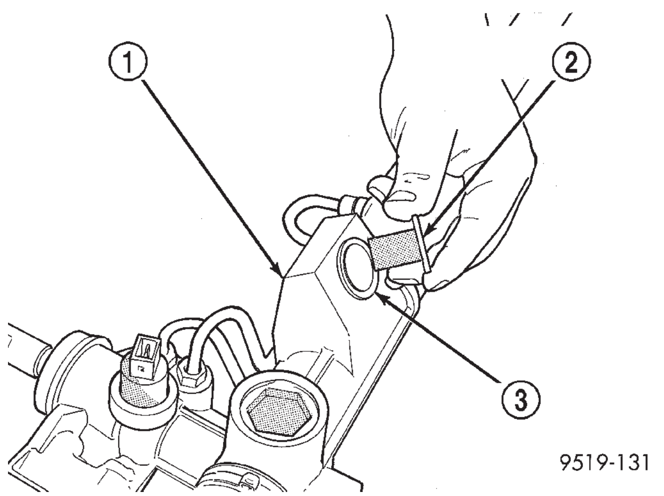

Fig. 13 Mounting Bolt Isolator Sleeve Installation

1 - STEERING GEAR MOUNTING BRACKET
2 - ISOLATOR BUSHING SLEEVE
3 - STEERING GEAR MOUNTING BOLT ISOLATOR BUSHING

GEAR (Continued)

INSTALLATION

(1) Install power steering gear on front suspension crossmember. Install all 4 steering gear mounting bolts. Tighten bolts to a torque of 68 N·m (50 ft. lbs.).

(2) Install power steering fluid pressure and return hoses to the ports of the power steering gear (Fig. 10). Tighten power steering fluid pressure and return hose tube nuts to a torque of 31 N·m (275 in. lbs.).

(3) Using transmission jack, raise front suspension crossmember and steering gear against body of vehicle.

CAUTION: When front suspension crossmember is installed back in vehicle, crossmember MUST be aligned with positioning marks previously scribed into body of vehicle. This MUST be done to maintain NET BUILD front suspension alignment settings.

(4) Start the 2 rear mounting bolts into body tapping plates attaching front suspension crossmember to body of vehicle. Then install the 2 front bolts attaching front suspension crossmember to frame rails of vehicle. Tighten all 4 mounting bolts evenly until front suspension crossmember is against body of vehicle at all 4 mounting points. Tighten bolts to approximately 2 N·m (20 in. lbs.) to hold front suspension crossmember in position. Do not overtighten.

(5) Using a soft face hammer, tap front suspension crossmember into position until it is aligned with the previously scribed positioning marks on body of vehicle.

(6) Once front suspension crossmember is correctly positioned, tighten the 2 rear crossmember mounting bolts to 163 N·m (120 ft. lbs.) torque. Then tighten the 2 front crossmember to frame rail attaching bolts to 163 N·m (120 ft. lbs.) torque.

(7) Lower the transmission jack.

(8) Connect fuel tube bundle routing support above crossmember.

(9) Install brake tube routing bracket onto left lower control arm rear mounting bolt threads.

(10) Install screws fastening power steering pressure hose routing clamps to crossmember (Fig. 8). Tighten screws to 45 N·m (33 ft. lbs.) torque.

(11) Install steering gear heat shield on crossmember (Fig. 8).

(12) Install 3 bolts attaching engine torque mount to crossmember. Tighten bolts to 65 N·m (48 ft. lbs.) torque.

(13) Loosely install the 2 shock absorber clevis-to-lower control arm thru-bolts and nuts (Fig. 7). Do not tighten bolts at this time.

(14) Install tie rod seal boot heat shield on tie rod end (Fig. 5).

(15) Install tie rod end into steering knuckle. Start tie rod end-to-steering knuckle attaching nut onto tie rod stud. While holding stud stationary, tighten nut (Fig. 5). To properly torque the nut, use a crowfoot and socket as shown and tighten the nut to 55 N·m (40 ft. lbs.) torque (Fig. 14).

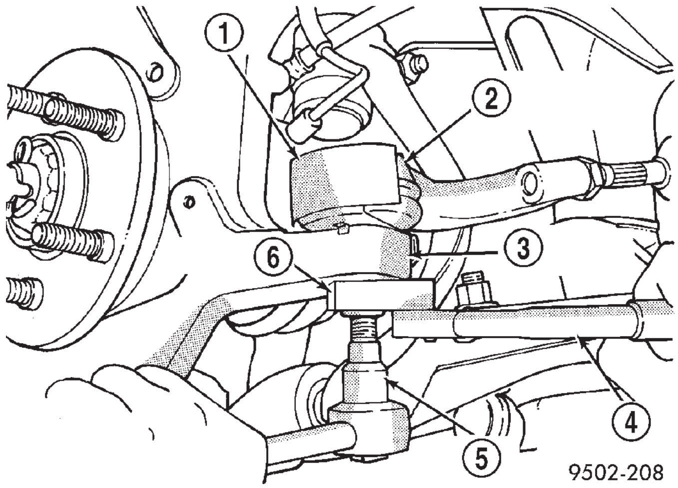

Fig. 14 Torquing Tie Rod End Attaching Nut

1 - HEAT SHIELD
2 - TIE ROD END
3 - STEERING KNUCKLE
4 - TORQUE WRENCH
5 - 11/32 SOCKET
6 - CROWFOOT

(16) Install and tighten the 2 stabilizer bar bushing clamp-to-body attaching bolts to 61 N·m (45 ft. lbs.) torque.

(17) Install fasteners attaching drive-belt splash shield to crossmember.

CAUTION: When supporting lower control arm with jack stand, do not position jack stand under the ball joint cap on the lower control arm. Position in area of lower control arm shown in (Fig. 15).

(18) Lower vehicle and support front end of vehicle by positioning jack stands as shown at each lower control arm as the vehicle is lowered (Fig. 15). Continue to lower vehicle until the total front end weight is supported by the jack stands.

(19) Tighten the shock absorber clevis-to-lower control arm bushing thru-bolts to a torque of 92 N·m (68 ft. lbs.).

(20) Raise the vehicle and remove the jack stands.

(21) Install the wheel and tire assemblies. Progressively tighten the wheel nuts in a criss-cross tightening sequence to 135 N·m (100 ft. lbs.) torque.

GEAR (Continued)

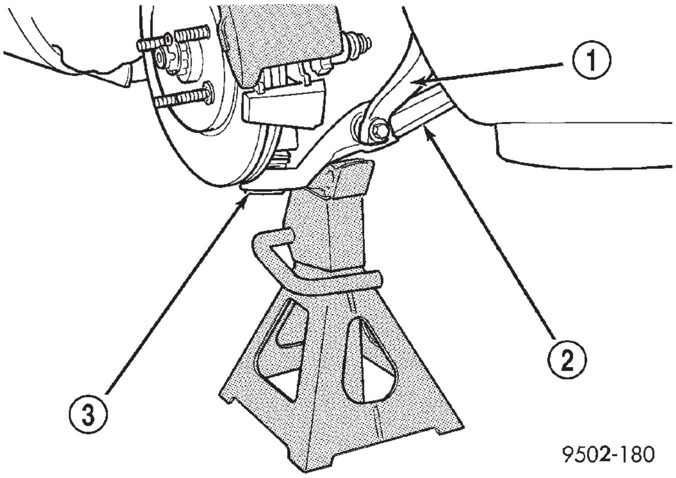

Fig. 15 Lower Control Arm Correctly Supported By Jack Stand

1 - SHOCK ABSORBER CLEVIS
2 - LOWER CONTROL ARM
3 - BALL JOINT CAP

CAUTION: Before connecting the steering column intermediate shaft coupler to the steering gear shaft, position the front wheels STRAIGHT-AHEAD. The steering wheel must also be in the centered position.

(22) Under instrument panel, align splines inside intermediate shaft lower coupling with splines on steering gear shaft and slide intermediate shaft onto steering gear. Install a NEW coupling pinch bolt (Fig. 3) and tighten it to a torque of 44 N·m (32 ft. lbs.).

(23) Remove steering wheel holder.

(24) Fill power steering pump fluid reservoir to the proper level and perform Power Steering Pump Initial Operation standard procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(25) Check for leaks.

(26) Lower vehicle.

(27) Check front wheel alignment and adjust toe setting (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE). Tighten tie rod jam nuts to 74 N·m (55 ft. lbs.) torque.

TIE ROD

REMOVAL - OUTER TIE ROD

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove wheel and tire assembly.

(3) Loosen inner tie rod-to-outer tie rod jam nut (Fig. 16).

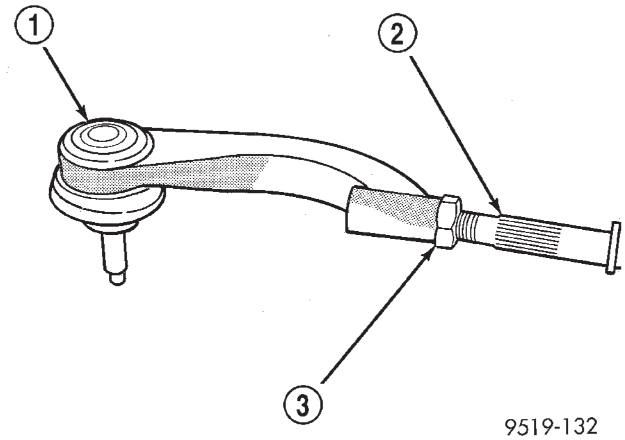

Fig. 16 Tie Rod Jam Nut

1 - OUTER TIE ROD
2 - INNER TIE ROD
3 - JAM NUT

(4) Remove nut attaching outer tie rod end to steering knuckle (Fig. 17). **Nut is to be removed from tie rod end using the following procedure, hold tie rod end stud with a 11/32 socket while loosening and removing nut with wrench.**

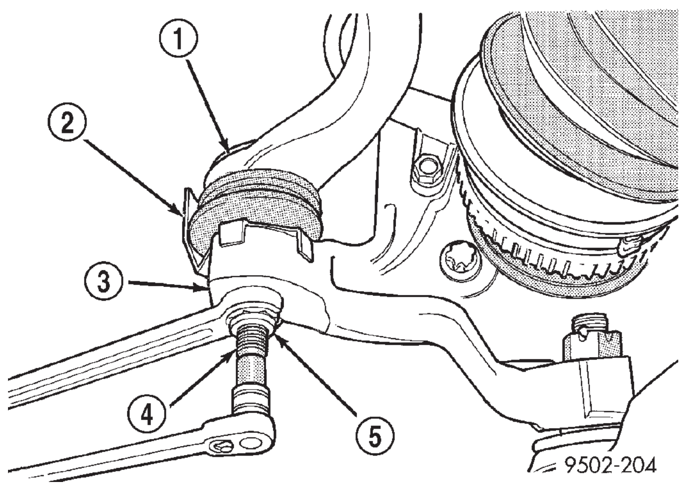

Fig. 17 Removing Tie Rod End Nut

1 - TIE ROD END
2 - HEAT SHIELD
3 - STEERING KNUCKLE
4 - TIE ROD END STUD
5 - NUT

TIE ROD (Continued)

(5) Remove tie rod end stud, from steering knuckle, using Remover, Special Tool MB-991113 (Fig. 18).

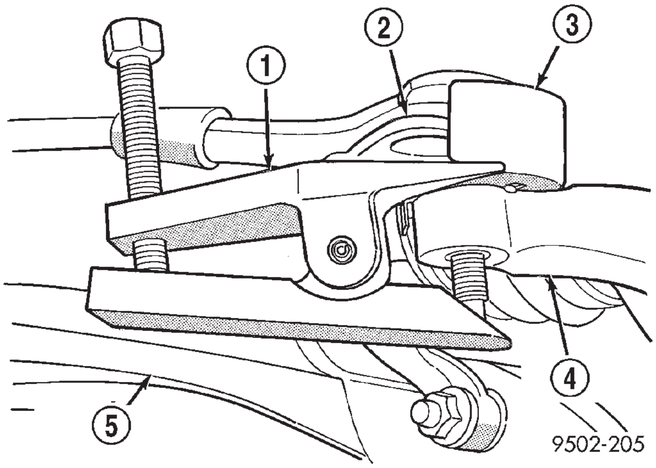

Fig. 18 Tie Rod End Removal From Steering Knuckle

1 - SPECIAL TOOL MB-991113
2 - TIE ROD END
3 - HEAT SHIELD
4 - STEERING KNUCKLE
5 - LOWER CONTROL ARM

(6) Remove outer tie rod end from inner tie rod by un-threading it from the inner tie rod.

INSTALLATION - OUTER TIE ROD

(1) Install outer tie rod onto inner tie rod. **Make sure jam nut is on inner tie rod before installing outer tie rod.** Do not tighten jam nut at this time.

(2) Install tie rod end seal boot heat shield on the tie rod end (Fig. 17).

(3) Install tie rod end into the steering knuckle. Start tie rod end to steering knuckle attaching nut onto stud of tie rod end. While holding stud of tie rod end stationary, tighten tie rod end to steering knuckle attaching nut (Fig. 17). Then using a crowfoot and socket (Fig. 19), torque tie rod end attaching nut to 61 N·m (45 ft. lbs.).

CAUTION: During this procedure do not allow the steering gear boot to become twisted.

(4) Tighten tie rod jam nut (Fig. 16) to 75 N·m (55 ft. lbs.) torque.

(5) Install tire and wheel assembly.

(6) Lower vehicle.

(7) Adjust the front wheel alignment toe setting on the vehicle. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

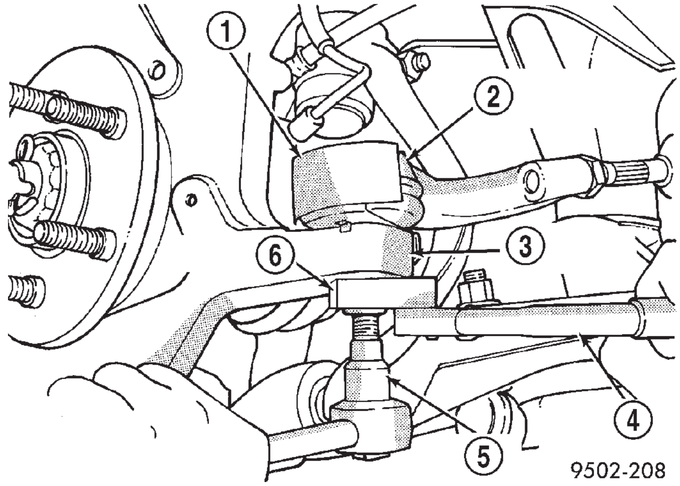

Fig. 19 Torquing Tie Rod End Attaching Nut

1 - HEAT SHIELD
2 - TIE ROD END
3 - STEERING KNUCKLE
4 - TORQUE WRENCH
5 - 11/32 SOCKET
6 - CROWFOOT

POWER STEERING PRESSURE SWITCH

DESCRIPTION

On vehicles equipped with a four cylinder engine, a power steering pressure switch (Fig. 20) is used to improve the vehicle's idle quality when required. When a demand for power assist is put on the power steering system at idle, pump pressure puts additional load on the engine, thus decreasing engine idle speed. The pressure switch improves vehicle idle quality by maintaining the required engine idle speed when the pressure rises in the power steering system.

The power steering pressure switch is mounted directly to the power steering gear (Fig. 20).

OPERATION

The pressure switch functions by signaling the powertrain control module that the power steering system is putting additional load on the engine. This type of condition exists when turning the front tires of the vehicle when the vehicle is stationary and the engine is at idle speed. When this condition is sensed by the power train control module, through a signal from the power steering pressure switch, engine idle speed will be maintained. The maintained engine idle speed compensates for the additional load, thus maintaining the require engine idle speed and idle quality.

POWER STEERING PRESSURE SWITCH (Continued)

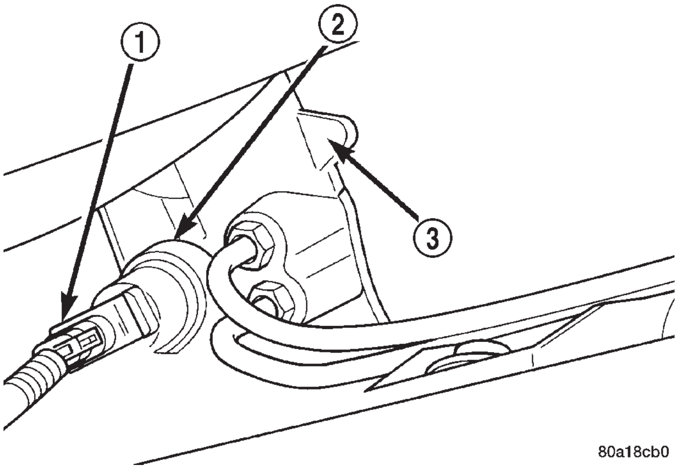

Fig. 20 Power Steering Pressure Switch Location

1 - WIRING HARNESS CONNECTOR
2 - POWER STEERING PRESSURE SWITCH
3 - POWER STEERING GEAR

REMOVAL

(1) Disconnect the negative cable from the battery. Be sure cable is isolated from negative post on battery.

(2) Raise vehicle.

(3) Locate power steering pressure switch on back side of power steering gear (Fig. 20).

(4) Remove the wiring harness connector from the power steering pressure switch.

(5) Using a crow foot and long extension, remove power steering pressure switch, from power steering gear.

INSTALLATION

CAUTION: When tightening the power steering pressure switch after installation in steering gear, do not exceed the torque specification shown in step 1 below. Over-tightening may result in stripping the threads out of the pressure switch port on the steering gear.

(1) Install power steering pressure switch into power steering gear by hand until fully seated. Then using a crow foot and extension, tighten power steering pressure switch to a torque of 16 N·m (12 ft. lbs.).

(2) Install wiring harness connector on power steering pressure switch (Fig. 20). Be sure latch on wiring harness connector is fully engaged with locking tab on power steering pressure switch.

(3) Fill power steering reservoir to correct fluid level.

(4) Connect negative cable back on negative post of battery.

(5) Start engine and turn steering wheel several times from stop to stop to bleed air from fluid in system. Stop engine, check fluid level, and inspect system for leaks.

PUMP

TABLE OF CONTENTS

PUMP

DESCRIPTION

All vehicles are equipped with power steering. The hydraulic pressure for operation of the power steering gear is provided by a belt driven power steering pump (Fig. 1) (Fig. 2). The pump is a constant flow rate and displacement vane type power steering pump.

The power steering pump is mounted on the back side of the engine, above the front suspension crossmember.

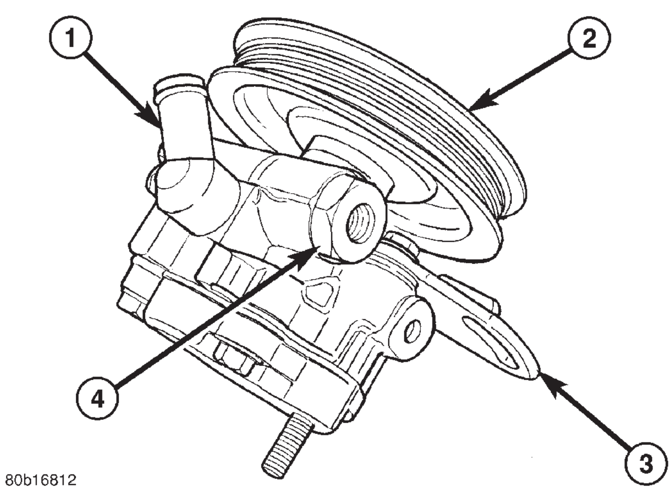

Fig. 1 POWER STEERING PUMP - 2.4L ENGINE

1 - SUPPLY FITTING
2 - PULLEY
3 - MOUNTING BRACKET
4 - PRESSURE FITTING

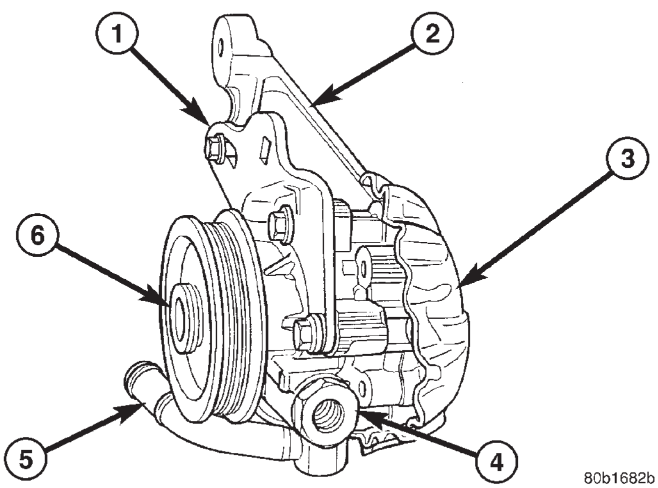

Fig. 2 POWER STEERING PUMP - 2.7L ENGINE

1 - STAMPED MOUNTING BRACKET
2 - CAST MOUNTING BRACKET
3 - HEAT SHIELD
4 - PRESSURE FITTING
5 - SUPPLY FITTING
6 - PULLEY

The power steering pump uses a remote mounted reservoir for storage of the power steering fluid.

Because of unique shaft bearings, flow control levels or pump displacements, power steering pumps may be used only on specific vehicle applications. Be sure that the power steering pump is only replaced with a pump that is the correct replacement for that specific application.

PUMP (Continued)

OPERATION

Hydraulic pressure is provided for operation of the power steering gear by the belt driven power steering pump. The power steering pump is connected to the steering gear by a power steering fluid pressure hose, return hose, power steering fluid cooler and remote power steering fluid reservoir.

Rectangular pumping vanes in the shaft driven rotor move power steering fluid from the intake to the cam ring pressure cavities of the power steering pump. As the rotor begins to turn, centrifugal force throws the vanes against the inside surface of the cam ring to pick up residual oil. This oil is then forced into the high pressure area. As more oil is picked up by the vanes, the additional oil is forced into the cavities of the thrust plate through two crossover holes in the cam ring and pressure plate. The crossover holes empty into the high pressure area between the pressure plate and the housing end cover.

As the high pressure area is filled, oil flows under the vanes in the rotor slots, forcing the vanes to follow the inside surface of the cam ring. As the vanes reach the restricted area of the cam ring, oil is forced out from between the vanes. When excess oil flow is generated during high-speed operation, a regulated amount of oil returns to the pump intake side through a flow control valve. The flow control valve reduces the power required to drive the pump and holds down temperature build-up.

When steering conditions exceed maximum pressure requirements, such as when the wheels are turned against the stops, the pressure built up in the steering gear exerts pressure on the spring end of the flow control valve inside the pump. The high pressure lifts the relief valve ball from its seat and allows oil to flow through a trigger orifice located in the outlet fitting. This reduces pressure on the spring end of the flow control valve which then opens and allows the oil to return to the intake side of the pump. This action limits maximum pressure output of the power steering pump.

Under normal power steering pump operating conditions, pressure requirements of the pump are below maximum, causing the pressure relief valve to remain closed.

In the event of a power steering pump drive belt failure, manual steering control of the vehicle can still be maintained without pump assistance. However, under these conditions, steering effort will be significantly increased.

STANDARD PROCEDURE - POWER STEERING PUMP INITIAL OPERATION

CAUTION: The fluid level should be checked with engine off to prevent injury from moving components. Use only Mopar® ATF+4 Automatic Transmission Fluid (MS-9602). Do not overfill.

(1) Wipe the reservoir fill cap clean before removal.

(2) Fill the pump fluid reservoir to the proper level. The fluid level should be within the “FILL RANGE” listed on the exterior of the reservoir when the fluid is at normal ambient temperature, approximately 21°C to 27°C (70°F to 80°F).

(3) Let the fluid settle in the system for at least two (2) minutes.

(4) Start the engine and let run for a few seconds. Then turn the engine off.

(5) Add fluid if necessary. Repeat the above procedure until the fluid level remains constant after running the engine.

(6) Raise the front wheels off the ground.

(7) Start the engine. Slowly turn the steering wheel right and left, lightly contacting the wheel stops.

(8) Add power steering fluid if necessary.

(9) Lower the vehicle and turn the steering wheel slowly from lock to lock.

(10) Stop the engine. Check the fluid level and refill as required.

(11) If the fluid is extremely foamy, allow the vehicle to stabilize a few minutes, then repeat the above procedure.

REMOVAL

REMOVAL - PUMP (2.0L/2.4L ENGINE)

WARNING: POWER STEERING FLUID, ENGINE COMPONENTS AND EXHAUST SYSTEM MAY BE EXTREMELY HOT IF ENGINE HAS BEEN RUNNING. DO NOT START ENGINE WITH ANY LOOSE OR DISCONNECTED HOSES, OR ALLOW HOSES TO TOUCH HOT EXHAUST MANIFOLD OR CATALYST.

(1) Remove battery cable from negative (-) post on battery and isolate cable.

(2) Siphon as much power steering fluid as possible out of the remote power steering fluid reservoir.

(3) Remove the clamp, then fluid supply hose from fitting on pump. Install a cap on fitting.

(4) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(5) Remove the accessory drive splash shield.

PUMP (Continued)

(6) Remove power steering fluid pressure hose from pressure fitting on power steering pump (Fig. 3). Let power steering fluid drain out of system. **After power steering fluid has drained out of pump and hose, install a cap on the power steering pressure hose and a plug in the power steering pump pressure fitting.**

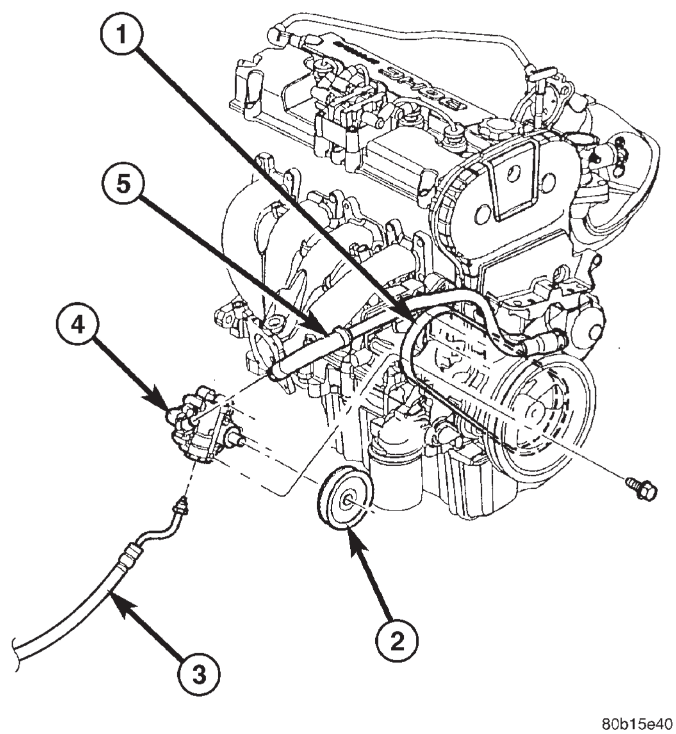

Fig. 3 PUMP MOUNTING TO ENGINE

1 - DRIVE BELT
2 - PULLEY
3 - PRESSURE HOSE
4 - POWER STEERING PUMP
5 - SUPPLY HOSE

(7) Remove bolt at adjustment slot in pump front mounting bracket.

(8) Remove nut at adjustment slot in cast aluminum mounting bracket at rear of pump.

(9) Loosen pump upper pivot bolt.

(10) Remove pump drive belt.

(11) Remove pump upper pivot bolt.

(12) Remove power steering pump and its front mounting bracket as an assembly from the engine through opening above right drive shaft and below right frame rail.

(13) To remove the pulley or bracket, (Refer to 19 - STEERING/PUMP - DISASSEMBLY).

REMOVAL - PUMP (2.7L ENGINE)

WARNING: POWER STEERING FLUID, ENGINE COMPONENTS AND EXHAUST SYSTEM MAY BE EXTREMELY HOT IF ENGINE HAS BEEN RUNNING. DO NOT START ENGINE WITH ANY LOOSE OR DISCONNECTED HOSES, OR ALLOW HOSES TO TOUCH HOT EXHAUST MANIFOLD OR CATALYST.

(1) Remove battery cable from (-) negative post on battery and isolate cable.

(2) Siphon as much power steering fluid as possible out of the remote power steering fluid reservoir.

(3) Remove the power steering fluid supply hose from the power steering pump supply fitting (Fig. 4).

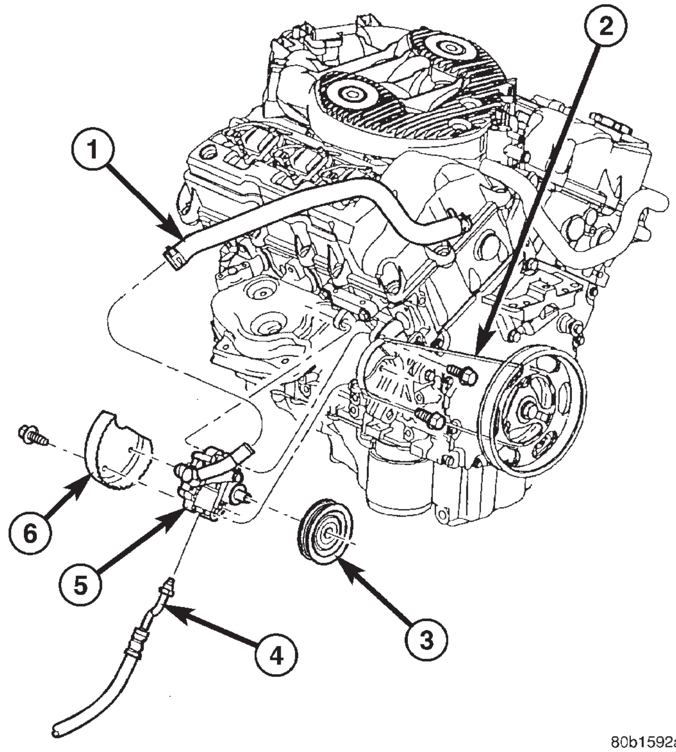

Fig. 4 PUMP MOUNTING TO ENGINE (2.7L)

1 - SUPPLY HOSE
2 - DRIVE BELT
3 - PULLEY
4 - PRESSURE HOSE
5 - POWER STEERING PUMP
6 - HEAT SHIELD

(4) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(5) Remove accessory drive splash shield.

(6) Remove power steering fluid pressure hose from fitting on power steering pump (Fig. 4).

(7) Remove oxygen sensor harness and clip from edge of pump heat shield.

PUMP (Continued)

(8) Completely remove bolt at slot in stamped pump adjuster bracket (Fig. 5) and remove power steering drive belt.

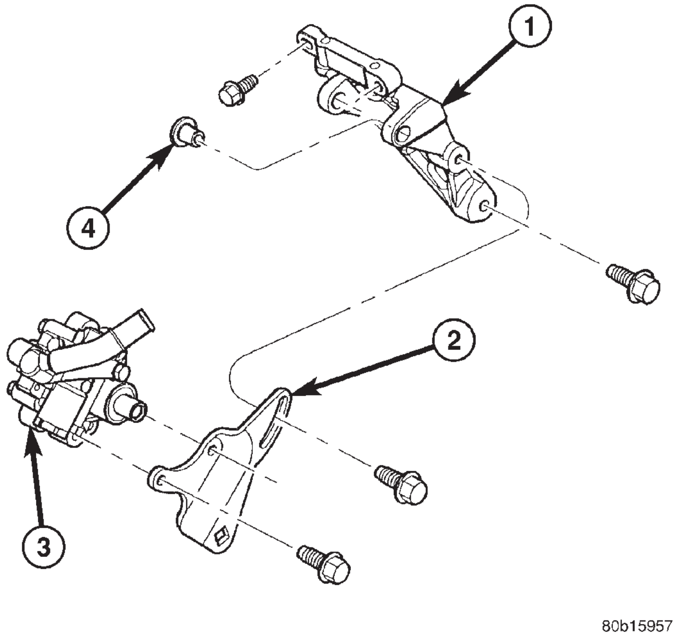

Fig. 5 PUMP BRACKET MOUNTING - 2.7L ENGINE

1 - CAST PUMP MOUNTING BRACKET
2 - STAMPED PUMP ADJUSTER BRACKET
3 - POWER STEERING PUMP
4 - PIVOT BUSHING

(9) Pivot pump out past full-adjust position. This will allow access to two pump bracket-to-engine mounting bolts.

(10) Remove the three bolts fastening the cast power steering pump bracket to the engine (Fig. 5).

(11) Remove power steering pump, pulley and brackets as an assembly from the engine. Remove the pump through opening between frame rail and right driveshaft.

(12) Remove stamped adjuster bracket mounting bolts. Remove bracket from pump.

(13) Remove two pivot bolts. Remove cast mounting bracket from pump.

(14) For removal of pulley, (Refer to 19 - STEERING/PUMP - DISASSEMBLY).

DISASSEMBLY - PUMP (PULLEY)

(1) Remove power steering pump from engine. (Refer to 19 - STEERING/PUMP - REMOVAL)

CAUTION: Do not hammer on power steering pump pulley or shaft to remove power steering pump pulley. This will damage the pulley and the power steering pump.

(2) Mount Puller, Special Tool C-4333, on power steering pump pulley. Mount puller (with power steering pump) in a vise (Fig. 6). This will keep shaft of power steering pump from turning while removing pulley.

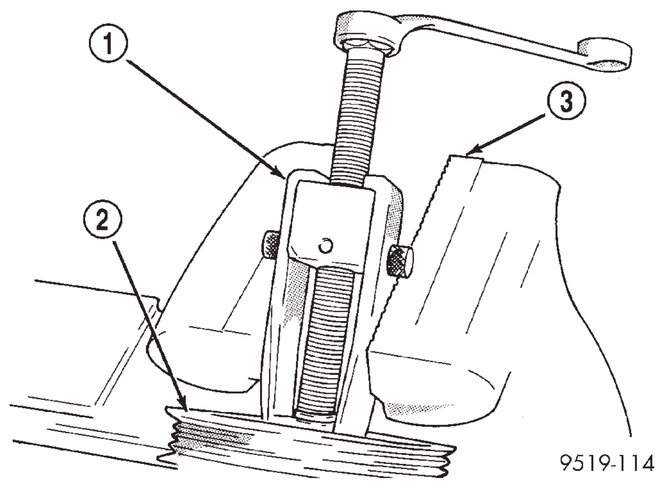

Fig. 6 Removing Pulley From Power Steering Pump Shaft

1 - SPECIAL TOOL C-4333
2 - POWER STEERING PUMP PULLEY
3 - VISE

(3) Tighten puller and remove pulley from shaft of power steering pump.

NOTE: Replace power steering pump pulley if bent, cracked, or loose.

PUMP (Continued)

ASSEMBLY - PUMP (PULLEY)

CAUTION: Do not hammer on power steering pump pulley or shaft to install power steering pump pulley. This will damage the pulley and the power steering pump.

(1) Place power steering pump pulley squarely on end of power steering pump shaft (Fig. 7).

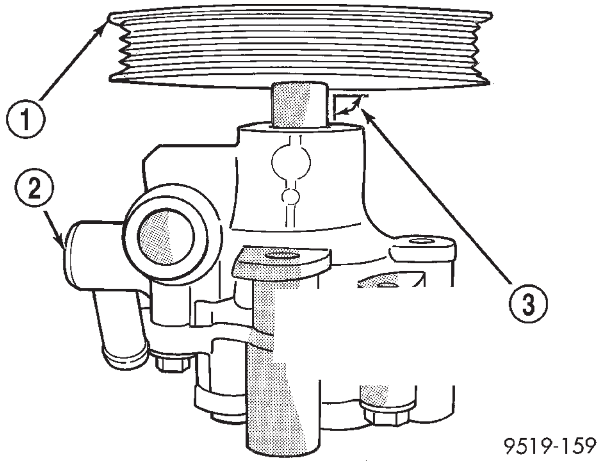

Fig. 7 Pulley Positioned On Shaft Of Power Steering Pump (Typical)

1 - POWER STEERING PUMP PULLEY
2 - POWER STEERING PUMP
3 - POWER STEERING PUMP PULLEY MUST BE STARTED SQUARELY ON SHAFT OF POWER STEERING PUMP AS SHOWN

(2) Place Installation Spacer (Fig. 8), Special Tool 6936, on top of the power steering pump pulley.

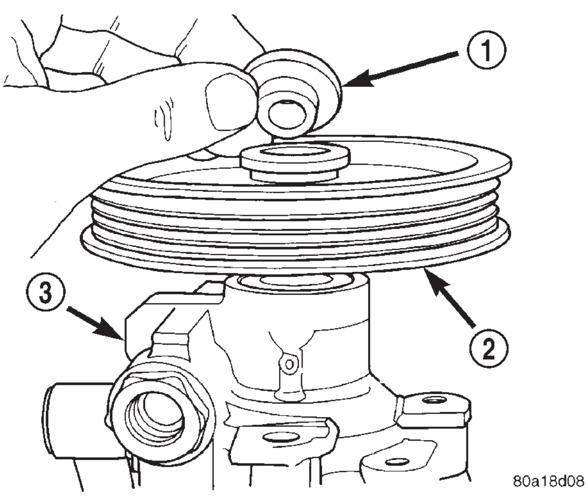

Fig. 8 Special Tool 6936 Installed On Pulley

1 - SPECIAL TOOL 6936
2 - POWER STEERING PUMP PULLEY
3 - POWER STEERING PUMP

(3) Mount Installer, Special Tool C-4063, in internal threads of the power steering pump shaft and against Special Tool 6936 on power steering pump pulley (Fig. 9).

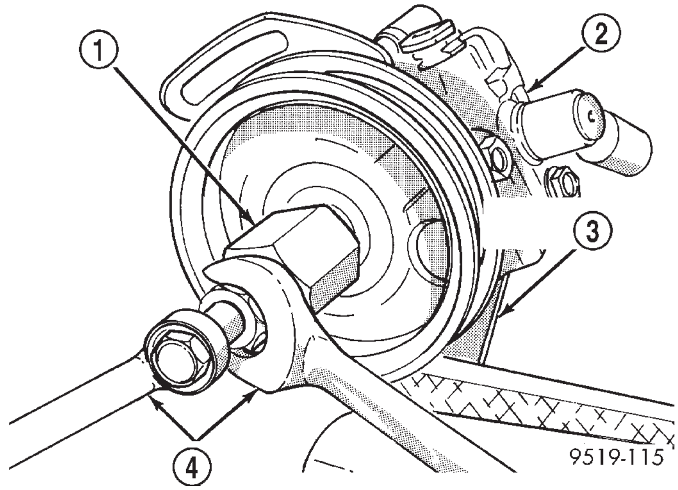

Fig. 9 Installing Pulley On Shaft Of Pump (Typical)

1 - SPECIAL TOOL C-4063
2 - POWER STEERING PUMP
3 - POWER STEERING PUMP BRACKET
4 - WRENCHES

(4) Ensuring that special tool and pulley remain aligned with pump shaft, force pulley onto power steering pump shaft until Special Tool 6936 is against the end of the power steering pump shaft. **When Special Tool 6936 is against the shaft of the power steering pump, Special Tool C-4063 will no longer be able to be turned.**

(5) Remove Installer from power steering pump.

(6) Install power steering pump and mounting bracket back on engine.(Refer to 19 - STEERING/ PUMP - INSTALLATION)

INSTALLATION

INSTALLATION - PUMP (2.0L/2.4L ENGINE)

WARNING: POWER STEERING FLUID, ENGINE COMPONENTS AND EXHAUST SYSTEM MAY BE EXTREMELY HOT IF ENGINE HAS BEEN RUNNING. DO NOT START ENGINE WITH ANY LOOSE OR DISCONNECTED HOSES, OR ALLOW HOSES TO TOUCH HOT EXHAUST MANIFOLD OR CATALYST.

(1) Install power steering pump and front mounting bracket as an assembly back in vehicle, using reverse order of removal.

(2) Install power steering pump and front bracket on the cast aluminum engine bracket. Loosely install the upper mounting pivot bolt.

PUMP (Continued)

(3) Loosely install the pump mounting bolt through the adjustment slot in the front mounting bracket.

(4) Loosely install the nut mounting the power steering pump to its rear mounting bracket adjustment slot.

(5) Install power steering pump drive belt on power steering pump pulley. Install a 1/2 in. breaker bar in the square adjusting hole in the front power steering pump mounting bracket and adjust belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - ADJUSTMENTS)

(6) When correct drive belt tension is obtained, first tighten the two adjusting slot fasteners (one bolt, one nut) to a torque of 54 N·m (40 ft. lbs.). Next, tighten the power steering pump mounting bracket top pivot bolt to a torque of 54 N·m (40 ft. lbs.).

(7) Using a lint free towel, wipe clean all open power steering hose ends, and power steering pump fittings.

(8) Install a new O-ring on end of power steering pressure hose fitting. Lubricate all O-rings using fresh clean power steering fluid.

(9) Install the power steering pressure hose on the power steering pump pressure fitting (Fig. 3). Tighten the tube nut to a torque of 31 N·m (275 in. lbs.).

(10) Install accessory drive splash shield.

(11) Lower vehicle.

(12) Install power steering fluid supply hose on power steering pump supply fitting. Install hose clamp. Be sure hose clamp is installed on hose past upset bead on suction fitting.

(13) Connect negative (-) cable back on negative post of battery.

(14) Fill power steering reservoir to correct fluid level and perform Power Steering Pump Initial Operation standard procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(15) Check for leaks at all hose connections and power steering pump.

INSTALLATION - PUMP (2.7L ENGINE)

(1) If previously removed, install cast mounting bracket on pump using two pivot bolts. Tighten the bolts to a torque of 28 N·m (250 in. lbs.).

(2) If previously removed, install stamped adjuster bracket on pump using its mounting bolts. Tighten the bolts to a torque of 28 N·m (250 in. lbs.).

(3) Install power steering pump, pulley and brackets as an assembly back in vehicle, using the reverse of the removal procedure.

(4) Install the three bolts fastening cast pump mounting bracket to engine (Fig. 5). Tighten the bolts to a torque of 28 N·m (250 in. lbs.).

(5) Loosely install bolt through the stamped adjuster bracket slot and into the cast bracket (Fig. 5).

(6) Using a lint free towel, wipe clean all open power steering hose ends, and power steering pump fittings.

(7) Install power steering pump drive belt on power steering pump pulley.

(8) Install a 1/2 inch breaker bar in the square adjusting hole in the front power steering pump mounting bracket and adjust the belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - ADJUSTMENTS)

(9) When correct drive belt tension is obtained, tighten the adjusting slot bolt to a torque of 28 N·m (250 in. lbs.).

(10) Install a new O-ring on end of power steering pressure hose fitting. Lubricate all O-rings using fresh clean power steering fluid.

(11) Install the power steering pressure hose on the power steering pump pressure fitting (Fig. 4). Tighten the tube nut to a torque of 31 N·m (275 in. lbs.).

(12) Install accessory drive splash shield.

(13) Lower vehicle.

(14) Install power steering fluid supply hose on power steering pump supply fitting (Fig. 4). Install hose clamp on hose. Be sure hose clamp is installed on hose past upset bead on power steering fluid reservoir.

(15) Connect battery cable back on negative (-) post of battery.

(16) Fill power steering reservoir to correct fluid level and perform Power Steering Pump Initial Operation standard procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(17) Check for leaks at all hose connections and power steering pump.

FLUID

STANDARD PROCEDURE - POWER STEERING FLUID LEVEL CHECKING

WARNING: FLUID LEVEL SHOULD BE CHECKED WITH THE ENGINE OFF TO PREVENT INJURY FROM MOVING PARTS.

The fluid level can be read through the exterior of the power steering fluid reservoir. The reservoir exterior is marked “FILL RANGE” and “ADD.” The fluid shows through the reservoir indicating its level. The fluid level should be within the “FILL RANGE” when the fluid is at normal ambient temperature, approximately 21°C to 27°C (70°F to 80°F).

FLUID (Continued)

Before removing the power steering filler cap, wipe the reservoir filler cap free of dirt and debris. Remove the cap and fill as necessary. Do not overfill the power steering system. **Use only Mopar® ATF+4 Automatic Transmission Fluid (MS-9602).**

HOSES

DESCRIPTION

The power steering fluid hoses connect the components of the power steering system (Fig. 10).

The power steering fluid supply hose is a special rubber hose that connects the power steering fluid reservoir to the power steering pump. The hose is secured at each end using a standard adjustable clamp.

The power steering fluid pressure hose is a high pressure hose that connects the power steering pump to the gear. At both ends of the flexible hose portion are steel fittings that are pressure crimped to the flexible hose. A standard tube nut fitting with an O-ring is used at each end to connect it to either the power steering pump or the gear.

The power steering fluid return hose is a special rubber hose that connects the power steering gear to the fluid reservoir. It has a special metal tubing section that acts as cooler running in front of the radiator module. A standard tube nut fitting with an O-ring is used to connect it to the power steering gear. The hose is secured to the reservoir using a standard adjustable clamp.

OPERATION

The power steering fluid hoses transfer fluid from one power steering system component to the next.

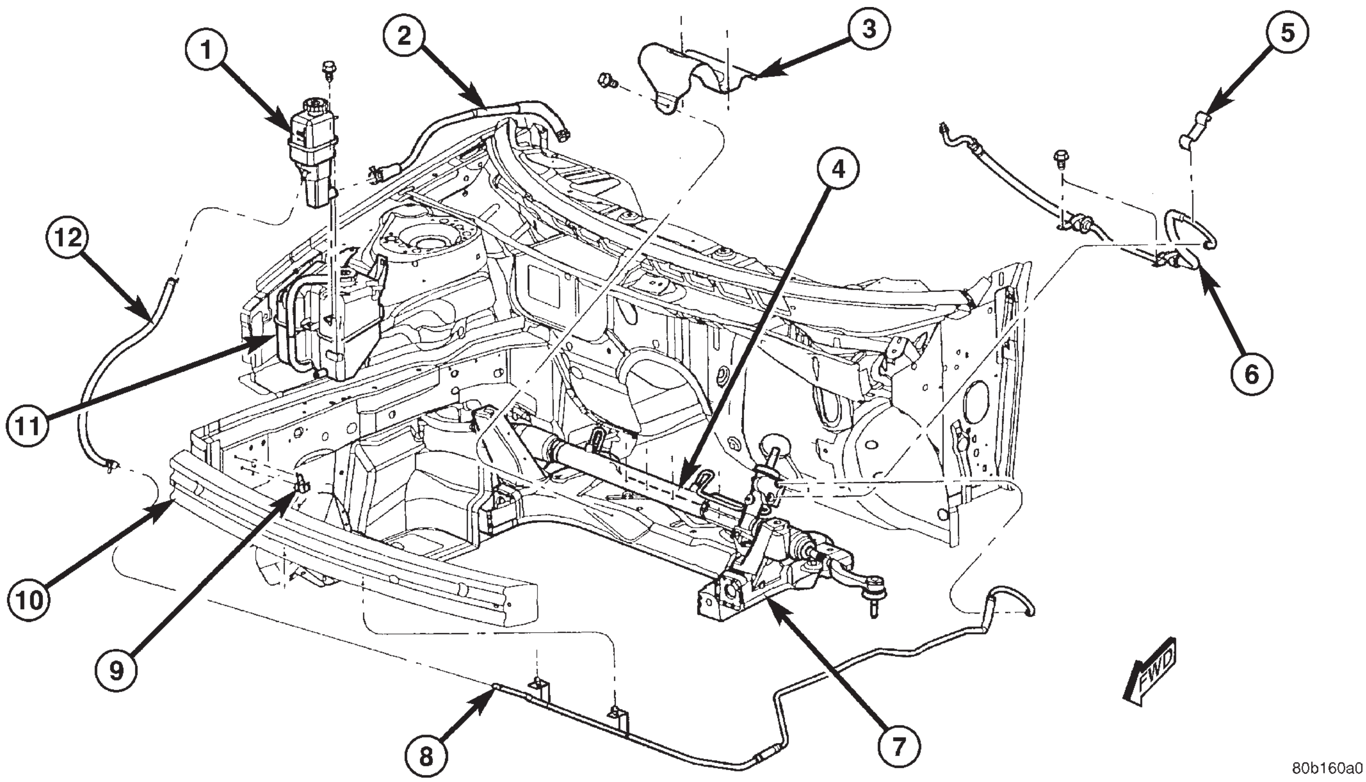

Fig. 10 POWER STEERING HOSES & RESERVOIR

1 - FLUID RESERVOIR
2 - SUPPLY HOSE
3 - STEERING GEAR HEAT SHIELD
4 - POWER STEERING GEAR
5 - CLIP
6 - PRESSURE HOSE
7 - FRONT SUSPENSION CROSSMEMBER
8 - RETURN HOSE WITH TUBE
9 - CLIP
10 - FRONT BUMPER REINFORCEMENT
11- COOLANT RECOVERY BOTTLE
12 - RETURN HOSE

HOSES (Continued)

REMOVAL - RETURN HOSE

WARNING: POWER STEERING FLUID, ENGINE PARTS AND EXHAUST SYSTEM MAY BE EXTREMELY HOT IF ENGINE HAS BEEN RUNNING. DO NOT START ENGINE WITH ANY LOOSE OR DISCONNECTED HOSES. DO NOT ALLOW HOSES TO TOUCH HOT EXHAUST MANIFOLD OR CATALYST.

NOTE: Cap all open ends of hoses, power steering pump fittings and steering gear ports to prevent the entry of foreign material into the components.

The return hose can be serviced as two separate pieces. They are the Return Hose With Tube and the Return Hose To Reservoir.

RETURN HOSE WITH TUBE

(1) Siphon power steering fluid from power steering fluid reservoir.

(2) Remove vehicles front fascia. (Refer to 13 - FRAMES & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL)

(3) If not previously lifted, raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(4) Remove left front wheel and tire assembly.

(5) Remove wheel opening forward splash shield.

(6) Remove power steering fluid pressure hose, then return hose from power steering gear.

(7) Remove air shield below left end of bumper reinforcement.

(8) Remove clamp and return hose (to reservoir) from right end of return hose tube below the bumper reinforcement (Fig. 10).

(9) Remove tube mounting clips from bumper reinforcement (Fig. 10).

(10) Remove the return hose tube from routing clips along left frame rail.

(11) Move the steering gear end of return hose tube to outside of frame rail.

(12) Pull return hose with tube forward, snaking it between ABS ICU and frame rail. Remove return hose from vehicle.

RETURN HOSE TO RESERVOIR

(1) Siphon power steering fluid from power steering fluid reservoir.

(2) Remove screw fastening power steering fluid reservoir to engine coolant recovery bottle.

(3) Lift reservoir off guide on engine coolant recovery bottle.

(4) Remove hose clamp attaching power steering fluid return hose to reservoir.

(5) Remove power steering fluid return hose from reservoir.

(6) Remove vehicles front fascia. (Refer to 13 - FRAMES & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL)

(7) If not previously lifted, raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(8) Remove clamp and return hose (to reservoir) from right end of return hose tube below the bumper reinforcement (Fig. 10).

(9) Remove the return hose from routing clip on inside of right frame rail (Fig. 10).

(10) Remove power steering fluid return hose.

INSTALLATION - RETURN HOSE

WARNING: POWER STEERING FLUID, ENGINE PARTS AND EXHAUST SYSTEM MAY BE EXTREMELY HOT IF ENGINE HAS BEEN RUNNING. DO NOT START ENGINE WITH ANY LOOSE OR DISCONNECTED HOSES. DO NOT ALLOW HOSES TO TOUCH HOT EXHAUST MANIFOLD OR CATALYST.

NOTE: Cap all open ends of hoses, power steering pump fittings and steering gear ports to prevent the entry of foreign material into the components.

The return hose can be serviced as two separate pieces. They are the Return Hose With Tube and the Return Hose To Reservoir.

RETURN HOSE WITH TUBE

(1) Install hose with tube in vehicle using the reverse of removal. Guide return hose with tube rearward, snaking it between ABS ICU and frame rail.

(2) Install the return hose tube into the routing clips along left frame rail.

(3) Install tube along bottom of bumper reinforcement using routing clips (Fig. 10).

(4) Install return hose (to reservoir) on right end of return hose tube below the bumper reinforcement (Fig. 10). Install clamp securing hose in place.

(5) Install air shield below left end of bumper reinforcement.

(6) Using a lint free towel, wipe clean open power steering hose ends and power steering gear port.

(7) Install new O-rings on the power steering hose ends to the steering gear.

(8) Lubricate O-rings using fresh clean power steering fluid.

(9) Install power steering fluid return hose to power steering gear. Tighten tube nut to 31 N·m (275 In. lbs.).

(10) Install power steering fluid pressure hose to power steering gear. Tighten tube nut to 31 N·m (275 In. lbs.).

(11) Install wheel opening forward splash shield.

HOSES (Continued)

(12) Install front fascia. (Refer to 13 - FRAMES & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL)

(13) Install left front wheel and tire assembly. Progressively tighten all wheel lug nuts using a criss-cross pattern to 135 N·m (100 ft. lbs.) torque.

(14) Lower vehicle.

(15) Fill reservoir with fluid and bleed system using Power Steering Pump Initial Operation standard procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(16) Check for leaks.

RETURN HOSE TO RESERVOIR

(1) Install return hose into routing clip on inside of right frame rail (Fig. 10).

(2) Install return hose (to reservoir) on right end of return hose tube below the bumper reinforcement (Fig. 10). Install clamp securing hose in place.

(3) Install front fascia. (Refer to 13 - FRAMES & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL)

(4) Lower vehicle.

(5) Install power steering fluid return hose on power steering fluid reservoir fitting. **Be sure hose clamp is installed on hose past upset bead on power steering reservoir fitting.**

(6) Slide reservoir down over guide on engine coolant recovery bottle.

(7) Install power steering fluid reservoir mounting screw.

(8) Fill reservoir with fluid and bleed system using Power Steering Pump Initial Operation standard procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(9) Check for leaks.

RESERVOIR

DESCRIPTION

All vehicles use a remote mounted power steering fluid reservoir. The reservoir is mounted to the engine coolant recovery bottle on the right side of the engine compartment (Fig. 10). Coolant level is read through the side of the bottle.

OPERATION

The power steering fluid reservoir stores fluid for the power steering system.

REMOVAL

(1) Using a siphon pump, remove as much power steering fluid as possible from the power steering fluid reservoir.

(2) Remove screw fastening reservoir to engine coolant recovery bottle (Fig. 10).

(3) Lift reservoir off guide on engine coolant recovery bottle.

(4) Remove hose clamps attaching power steering fluid supply hose and return hose to reservoir.

(5) Remove power steering fluid supply and return hoses from reservoir and remove reservoir from vehicle.

INSTALLATION

(1) Install power steering fluid return and supply hoses on power steering fluid reservoir fittings (Fig. 10). **Be sure both hose clamps are installed on hose past upset bead on power steering reservoir fittings.**

(2) Slide reservoir down over guide on engine coolant recovery bottle.

(3) Install power steering fluid reservoir mounting screw and tighten to 6 N·m (53 in. lbs.).

(4) Fill power steering pump fluid reservoir to the proper level.

(5) Start the engine and let run for a few seconds, then turn the engine off.

(6) Adjust fluid level if necessary. Repeat steps (5) and (6) until the fluid level remains constant after running the engine. If necessary perform Power Steering Pump Initial Operation standard procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(7) Check for leaks.

TRANSMISSION/TRANSAXLE

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T350 MANUAL TRANSAXLE

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T350 MANUAL TRANSAXLE

DESCRIPTION

This five speed is a constant-mesh manual transaxle. All gear ranges, except reverse, are synchronized. The reverse gear utilizes a brake and blocking ring for shifting ease. The reverse idler gear is supported on a sliding spindle idler shaft. The transaxle case is aluminum with a steel end–plate bearing cover. It is housed in a die-cast aluminum case featuring a two–piece, middle split design (Fig. 1).

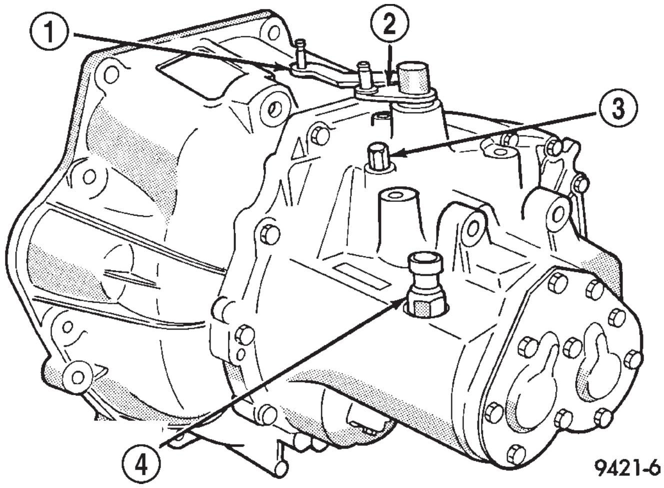


Fig. 1 T350 Manual Transaxle

1 - SHIFT LEVER
2 - CROSSOVER LEVER
3 - VENT
4 - REVERSE LAMP SWITCH

The T350 transaxle internal components can be serviced only by separating the gear case from the bellhousing case.

CAUTION: The transaxle output shaft is serviced as a unit. No disassembly and reassembly is possible. Damage to the transaxle may result.

TRANSAXLE IDENTIFICATION

The transaxle model, assembly number, and build date are on a metal I.D. tag that is attached to the end cover of the transaxle (Fig. 2). This information is also shown on a bar code label that is attached to the front of the transaxle (Fig. 3).

NOTE: Transaxles use various final drive gear ratios in different vehicle applications. Therefore, it is necessary that the correct transaxle assembly number is used when ordering service parts.

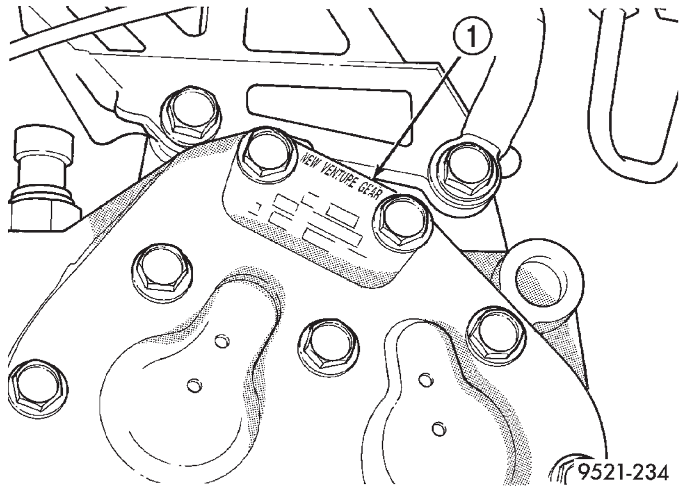


Fig. 2 Metal I.D. Tag

1 - METAL I.D. TAG

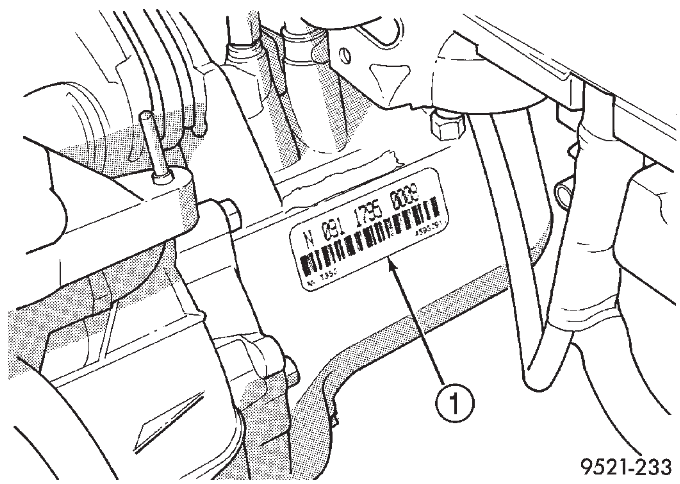


Fig. 3 Bar Code Label

1 - BAR CODE LABEL

GEAR RATIOS

CAUTION: All gears and shafts must not be interchanged with other transaxles; they will not function correctly.

The differential is a conventional arrangement of gears that is supported by tapered roller bearings. The final output gear turns the ring gear and differential assembly, thereby turning the drive axle shafts.

The gear ratios of each transaxle are shown in the following chart. The chart also shows which transaxles are available with the reverse–input shaft brake. This brake allows easier shifting into reverse and helps eliminate reverse gear clash.

T350 MANUAL TRANSAXLE (Continued)

GEAR	
1st	3.50
2nd	1.95
3rd	1.36
4th	0.97
5th	0.81
FINAL DRIVE RATIO	3.94
REVERSE BRAKE	YES
CLUTCH RELEASE SYSTEM	CABLE

GEARSHIFT PATTERN

The T350 transaxle shift pattern is a modified H–pattern (Fig. 4). Overdrive fifth and reverse gears are in–line and outboard of the first through fourth gear positions.

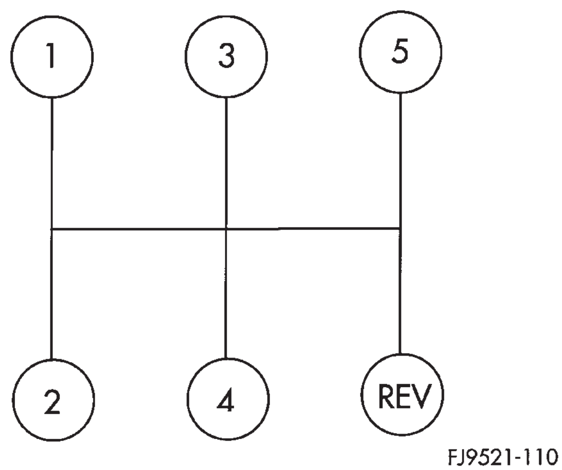


Fig. 4 T350 Transaxle Shift Pattern

LUBRICANT/ADDITIVES

T350 transaxles use Mopar® ATF+4 (Automatic Transmission Fluid—Type 9602).**Hypoid gear lube or engine oil should not be used in this transaxle.** Hard shifting effort, bearing, gear, and/or synchronizer failure may occur if incorrect fluid is used.

The addition of any fluids to the transaxle, other than the fluid listed above, is not recommended. An exception to this policy is the use of special dyes to aid in detecting fluid leaks. The use of transmission sealers should be avoided, since they may adversely affect seals.

SEALANTS

The sealant used to seal the transaxle case halves and input bearing is Mopar® Gasket Maker, Loctite® 518, or equivalent. The sealant used for the bearing end plate cover is Mopar® RTV.

DIAGNOSIS AND TESTING - COMMON PROBLEM CAUSES

The majority of transaxle malfunctions are a result of:

- Insufficient lubrication
- Incorrect lubricant
- Misassembled or damaged internal components
- Improper operation

HARD SHIFTING

Hard shifting may be caused by a misadjusted crossover cable. If hard shifting is accompanied by gear clash, synchronizer clutch and stop rings or gear teeth may be worn or damaged.

Misassembled synchronizer components also cause shifting problems. Incorrectly installed synchronizer sleeves, struts, or springs can cause shift problems.

NOISY OPERATION

Transaxle noise is most often a result of worn or damaged components. Chipped, broken gear or synchronizer teeth, and brinnelled, spalled bearings all cause noise.

Abnormal wear and damage to the internal components is frequently the end result of insufficient lubricant.

SLIPS OUT OF GEAR

Transaxle disengagement may be caused by misaligned or damaged shift components, or worn teeth on the drive gears or synchronizer components. Incorrect assembly also causes gear disengagement.

LOW LUBRICANT LEVEL

Insufficient transaxle lubricant is usually the result of leaks, or inaccurate fluid level check or refill method. Leakage is evident by the presence of oil around the leak point. If leakage is not evident, the condition is probably the result of an underfill.

If air–powered lubrication equipment is used to fill a transaxle, be sure the equipment is properly calibrated. Equipment out of calibration can lead to an underfill condition.

CLUTCH PROBLEMS

Worn, damaged, or misaligned clutch components can cause difficult shifting, gear clash, and noise.

A worn or damaged clutch disc, pressure plate, or release bearing can cause hard shifting and gear clash.

REMOVAL

(1) Raise hood.
(2) Disconnect battery negative cable.
(3) Remove air cleaner assembly.

T350 MANUAL TRANSAXLE (Continued)

(4) Disconnect Vehicle Speed Sensor/Back-up Lamp Switch harness connector.

(5) Remove clutch release access cap.

(6) Disconnect clutch release cable.

(7) Disconnect crossover and selector cables from transaxle.

(8) Remove gearshift cable retainer clips from bracket and position gearshift cables out of way.

(9) Remove starter motor and secure out of way.

(10) Remove three (3) rear mount bracket-to-transaxle bolts.

(11) Raise vehicle on hoist.

(12) Remove halfshafts.

(13) Remove rear mount bracket-to-transaxle horizontal bolt.

(14) Remove rear mount through-bolt.

(15) Remove three (3) rear mount-to-crossmember bolts.

(16) Remove rear mount and bracket.

(17) Remove front mount through bolt.

(18) Remove engine front pencil strut brace.

(19) Remove front mount bracket from engine/transaxle.

(20) Remove structural collar.

(21) Remove bellhousing dust cover.

(22) Remove left wheel opening splash shield.

(23) Remove modular clutch-to-drive plate bolts.

(24) Position screw jack and wood block to oil pan.

(25) Remove transaxle upper mount through bolt.

(26) Lower engine transaxle assembly.

(27) Remove transaxle upper mount.

(28) Obtain helper and transmission jack.

(29) Remove transaxle-to-engine block bolts.

(30) Remove transaxle from engine.

DISASSEMBLY

The T350 transaxle internal components can be serviced only by separating the gear case from the bellhousing case.

CAUTION: The transaxle output shaft is serviced as a unit. No disassembly and reassembly is possible. Damage to the transaxle may result.

(1) Place transaxle on bench.

(2) Remove the clutch release bearing and fork. Move the release fork and bearing to an in-line position. Grasp the release lever with two hands in the pivot stud socket area. Pull with even pressure to release the fork from the pivot stud.

CAUTION: Do not use a screwdriver or pry bar to release the fork as this may cause damage to the fork and/or clip.

(3) Remove shift levers by driving out the roll pins.

(4) Remove transaxle case half bolts (Fig. 5).

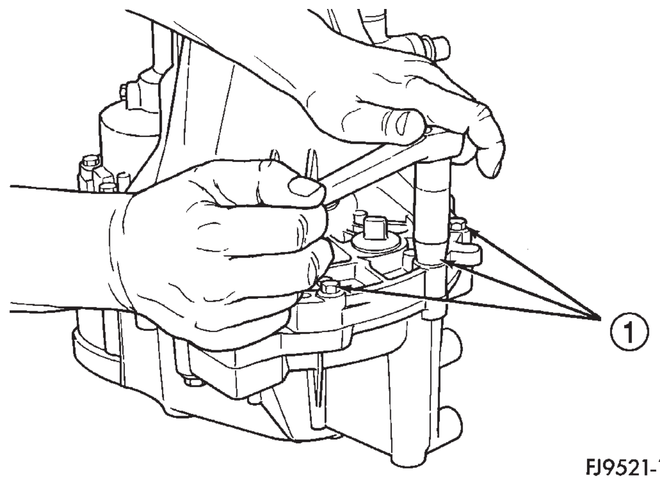


Fig. 5 Case Bolts

1 - CASE BOLTS

(5) Place two screwdrivers into the slots provided in the case halves near the dowels (Fig. 6). Separate the case halves (Fig. 7).

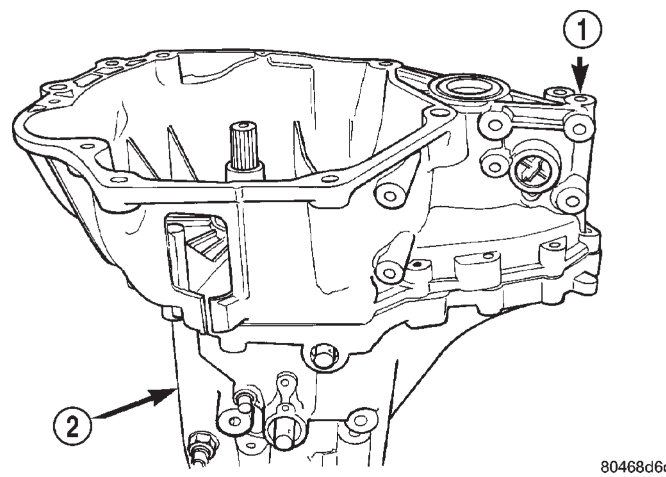


Fig. 6 Transaxle Case Halves

1 - BELLHOUSING HALF

2 - GEAR CASE HALF

T350 MANUAL TRANSAXLE (Continued)

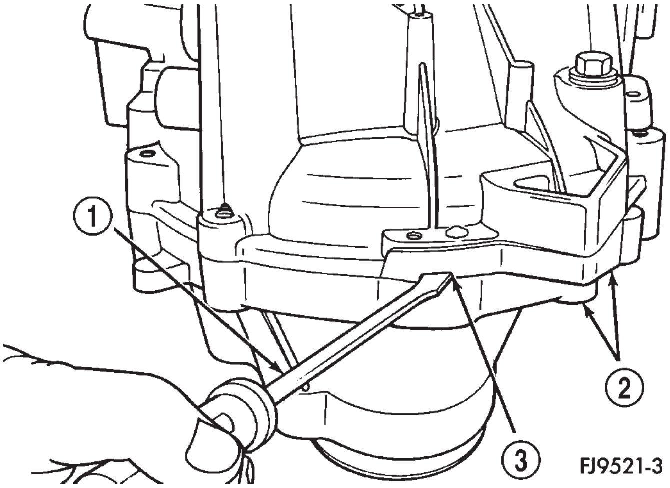


Fig. 7 Separate Case Halves

1 - PRY TOOL
2 - CASE HALVES
3 - PRY SLOT

(6) Remove bellhousing half from gear case half (Fig. 8).

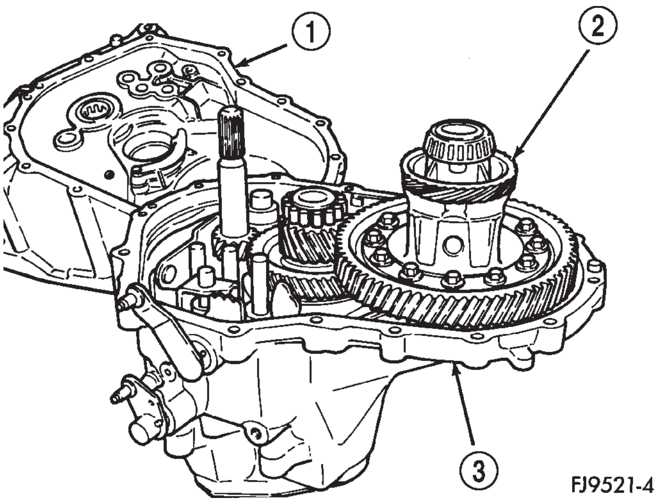


Fig. 8 Bellhousing Case Half Removal

1 - BELLHOUSING CASE HALF
2 - DIFFERENTIAL
3 - GEAR CASE HALF

(7) Remove output shaft roller bearing from output shaft.

(8) Remove differential assembly (Fig. 9).

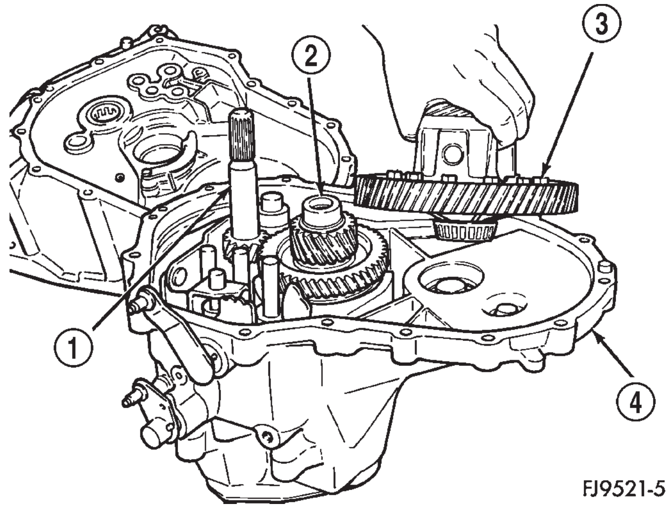


Fig. 9 Differential Assembly Removal

1 - INPUT SHAFT
2 - OUTPUT SHAFT
3 - DIFFERENTIAL
4 - CASE

(9) Remove reverse idler shaft bolt (Fig. 10).

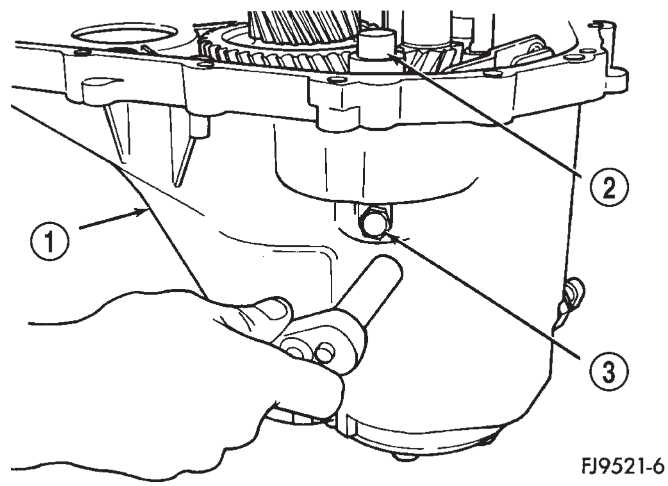


Fig. 10 Reverse Idler Shaft

1 - CASE
2 - REVERSE IDLER SHAFT
3 - REVERSE IDLER SHAFT BOLT

T350 MANUAL TRANSAXLE (Continued)

(10) Remove reverse idler shaft (Fig. 11).

(11) Remove reverse idler gear and spacer (Fig. 12).

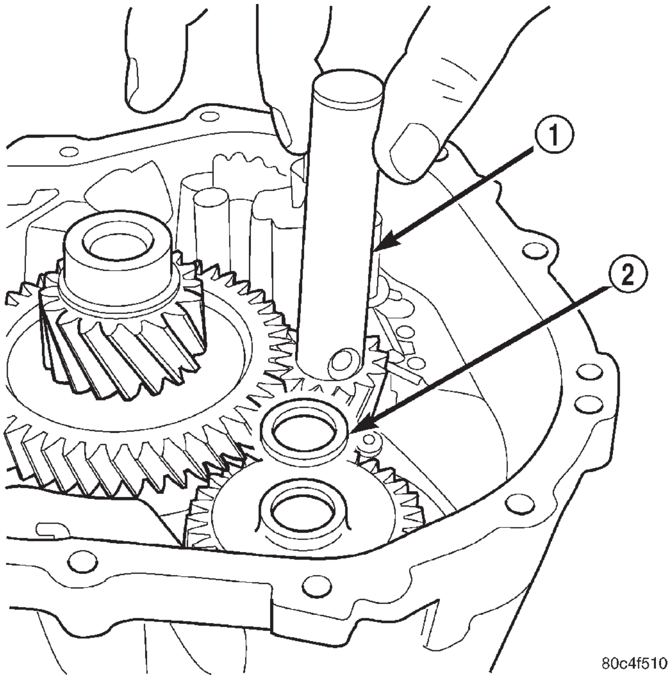


Fig. 11 Reverse Idler Shaft Removal

1 - REVERSE IDLER SHAFT
2 - SPACER

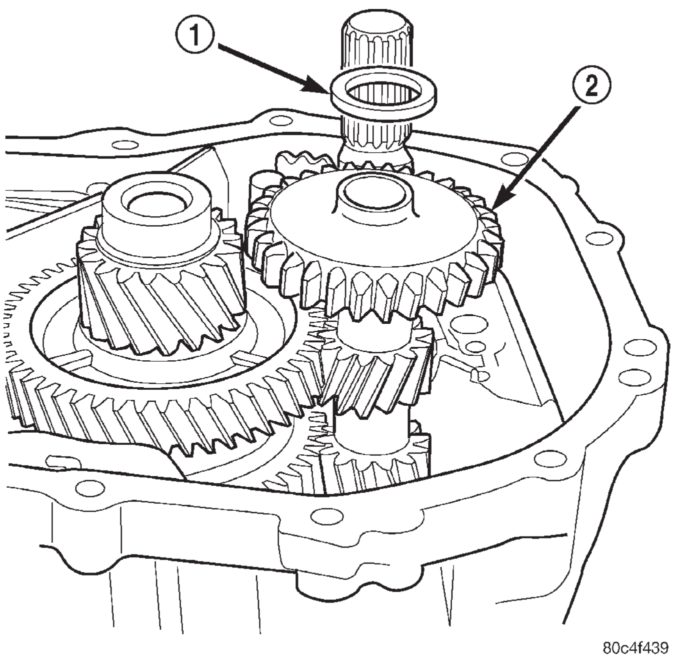


Fig. 12 Reverse Idler Gear and Spacer

1 - SPACER
2 - REVERSE IDLER GEAR

(12) Remove two screws retaining reverse fork bracket (Fig. 13). Remove reverse fork bracket and reverse cam blockout assembly (Fig. 14).

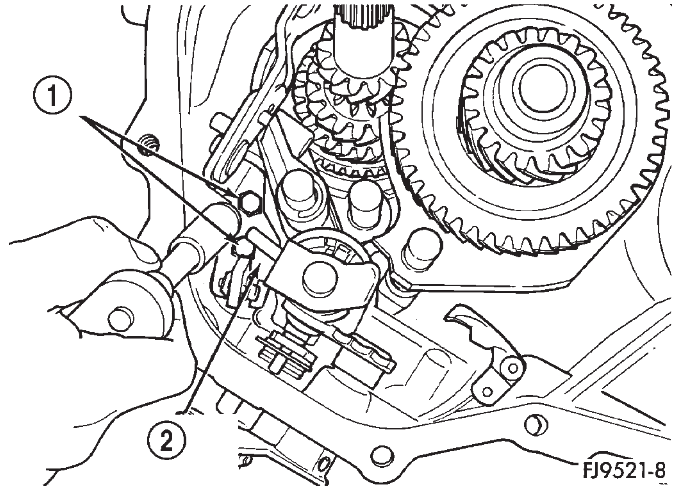


Fig. 13 Screws Retaining Reverse Fork Bracket

1 - SCREWS (2)
2 - REVERSE FORK BRACKET

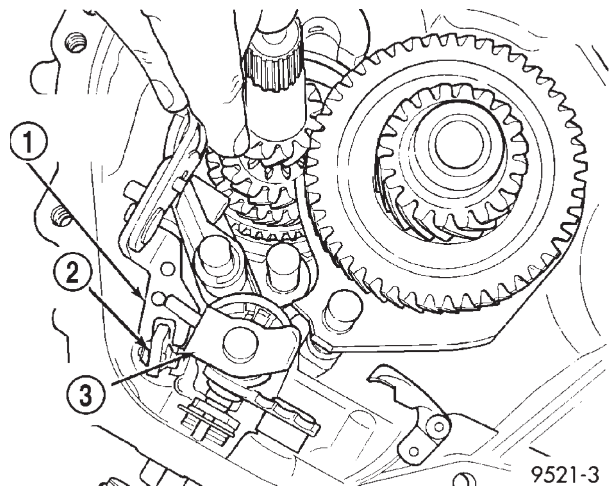


Fig. 14 Remove Reverse Fork Bracket

1 - REVERSE FORK BRACKET
2 - REVERSE CAM BLOCKOUT
3 - SHIFT BLOCKER ASSEMBLY

T350 MANUAL TRANSAXLE (Continued)

(13) Using snap–ring pliers, remove selector shaft spacer (Fig. 15).

(14) Pull the selector shaft shift pin out of the slot in the blocker assembly. Turn selector shaft up and out of the way (Fig. 16).

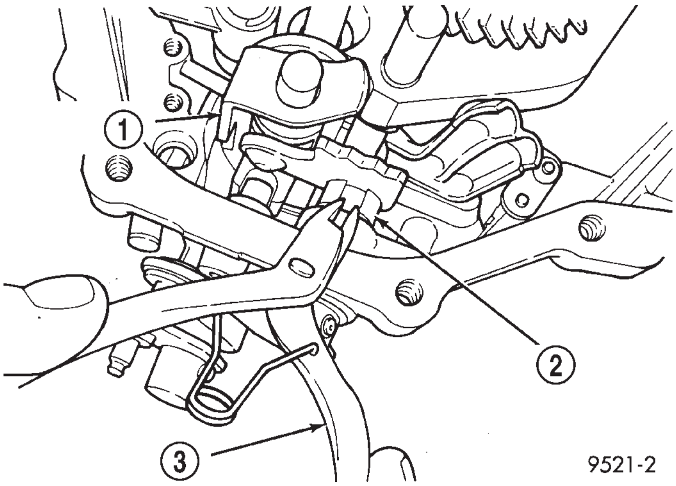


Fig. 15 Remove Selector Shaft Spacer

1 - SHIFT BLOCKER ASSEMBLY
2 - SELECTOR SHAFT SPACER (PLASTIC)
3 - SNAP RING PLIERS

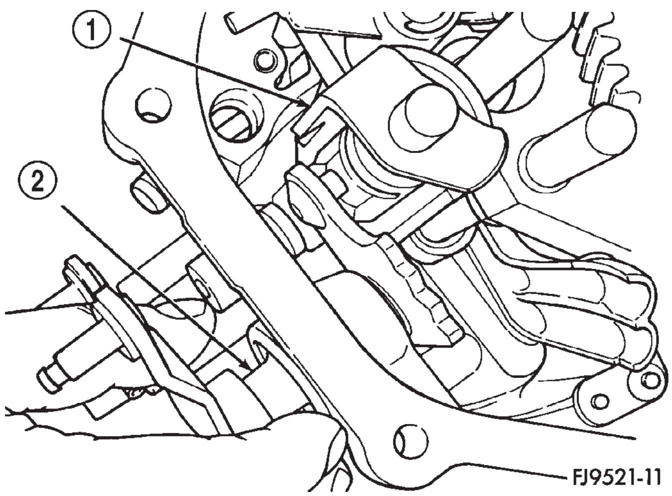


Fig. 16 Selector Shaft

1 - SHIFT ASSEMBLY
2 - SELECTOR SHAFT

(15) Remove transaxle end cover (Fig. 17) (Fig. 18).

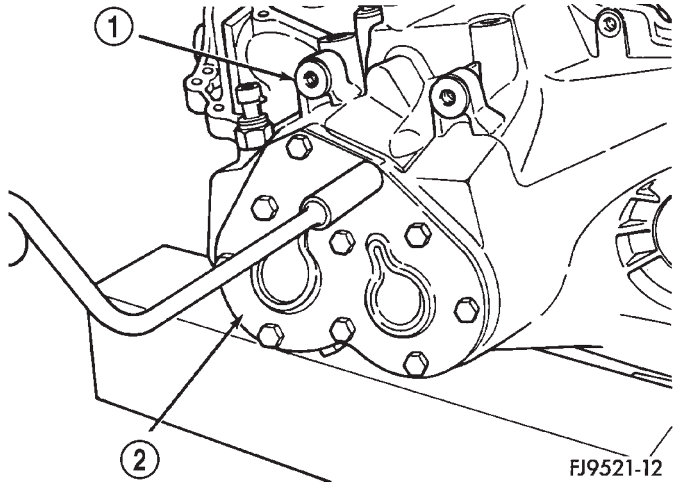


Fig. 17 Transaxle Cover Removal

1 - TRANSAXLE CASE
2 - END COVER

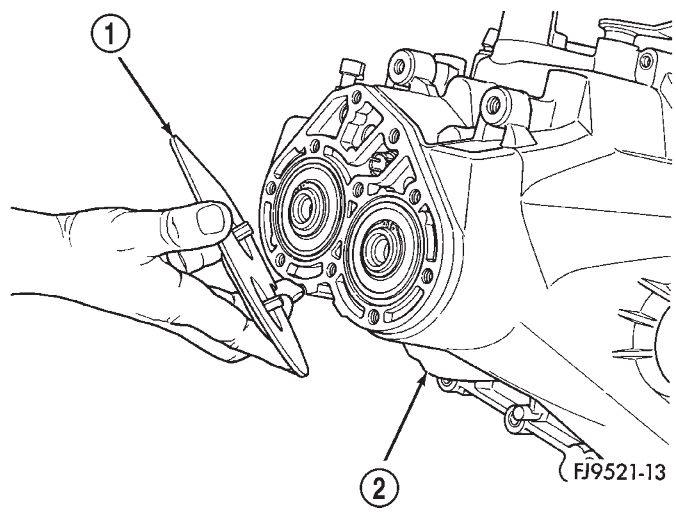


Fig. 18 End Cover

1 - END COVER
2 - CASE

T350 MANUAL TRANSAXLE (Continued)

(16) Remove two snap rings retaining the output shaft and the input shaft to the bearings (Fig. 19).

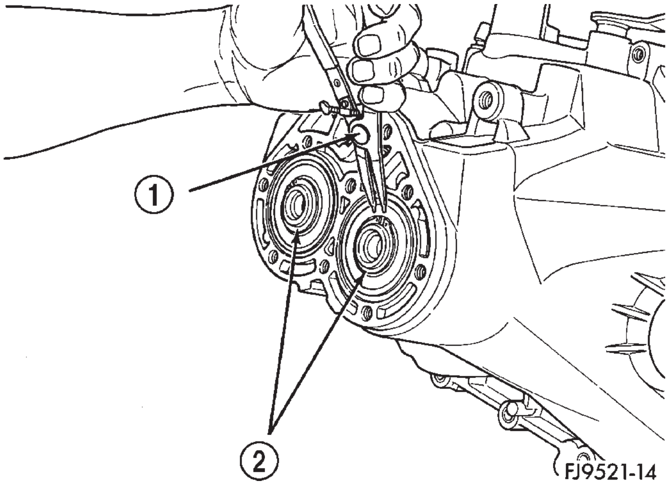


Fig. 19 Snap Rings Retaining Bearings

1 - SNAP RING PLIERS
2 - SNAP RINGS

(17) Using bench fixture and shims provided (Miller tools # 6785, 6785-1, and 6785-2), turn transaxle over. Install transaxle onto bench fixture (Fig. 20). Verify shim spacers are in position on bench fixture. Install transaxle into shop press.

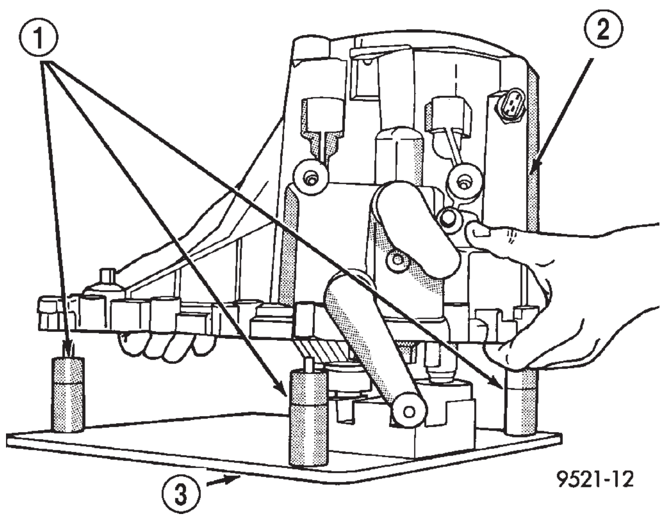


Fig. 20 Bench Fixture

1 - SHIMS
2 - TRANSAXLE
3 - 6785 BENCH FIXTURE

(18) Install bearing fixture Miller tool #6768 onto transaxle end bearings (Fig. 21). Verify tool is properly aligned to input and output shafts.

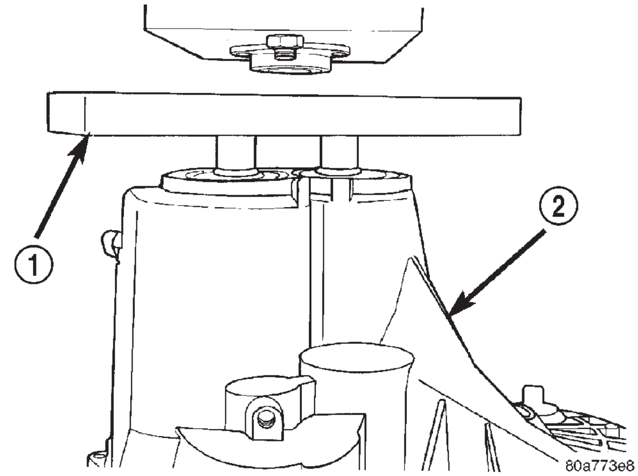


Fig. 21 Bearing Fixture

1 - BEARING FIXTURE
2 - TRANSAXLE CASE

CAUTION: The oil dams in the input and output shafts can be damaged while pressing on the shafts if the bearing fixture is not used properly.

(19) Install transaxle gear case into shop press. Press output and input shaft assemblies out of case (Fig. 22).

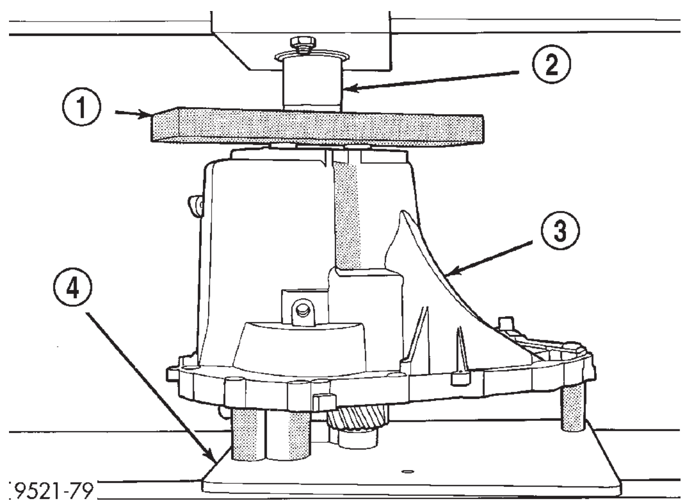


Fig. 22 Pressing Gears Out of Case

1 - BEARING FIXTURE
2 - PRESS RAM
3 - TRANSAXLE CASE
4 - BENCH FIXTURE

T350 MANUAL TRANSAXLE (Continued)

(20) Remove transaxle from press.

(21) Carefully remove transaxle case from the shaft assemblies and bench fixture (Fig. 23). Be sure the oil–feed trough to the end bearings is not damaged (Fig. 24).

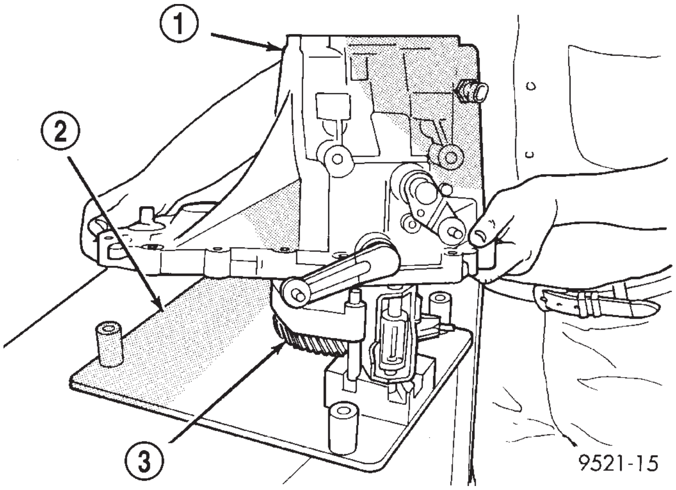


Fig. 23 Transaxle Case Removal

1 - TRANSAXLE CASE
2 - BENCH FIXTURE
3 - GEARTRAIN

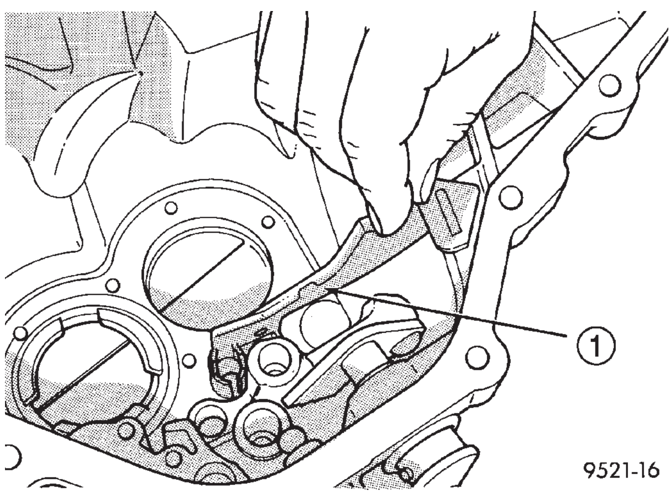


Fig. 24 Oil Feed Trough

1 - OIL FEED TROUGH

(22) Remove the reverse brake blocking ring, shim, reverse brake friction cone, bearing and race from the input shaft assembly (Fig. 25) (Fig. 26) (Fig. 27) (Fig. 28) (Fig. 29).

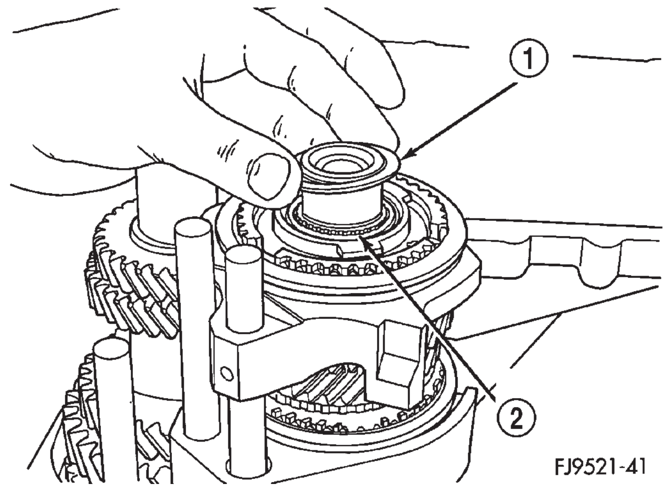


Fig. 25 Reverse Brake Shim

1 - REVERSE BRAKE SHIM
2 - REVERSE BRAKE FRICTION CONE

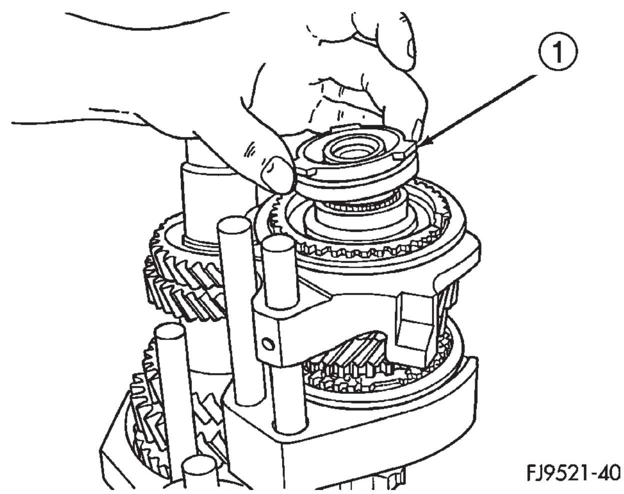


Fig. 26 Reverse Brake Friction Cone

1 - REVERSE BRAKE FRICTION CONE

T350 MANUAL TRANSAXLE (Continued)

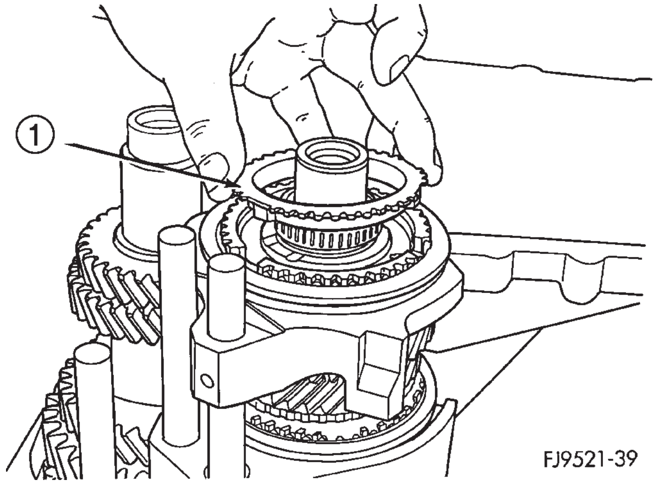


Fig. 27 Reverse Brake Blocking Ring

1 - REVERSE BRAKE BLOCKING RING

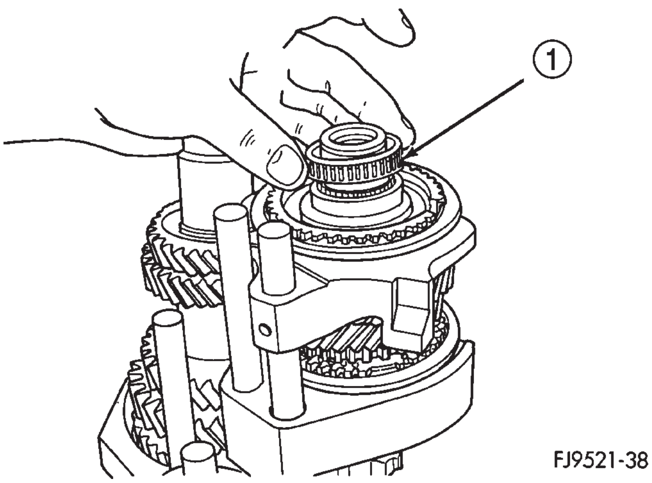


Fig. 28 Reverse Brake Needle Bearing

1 - REVERSE BRAKE NEEDLE BEARING

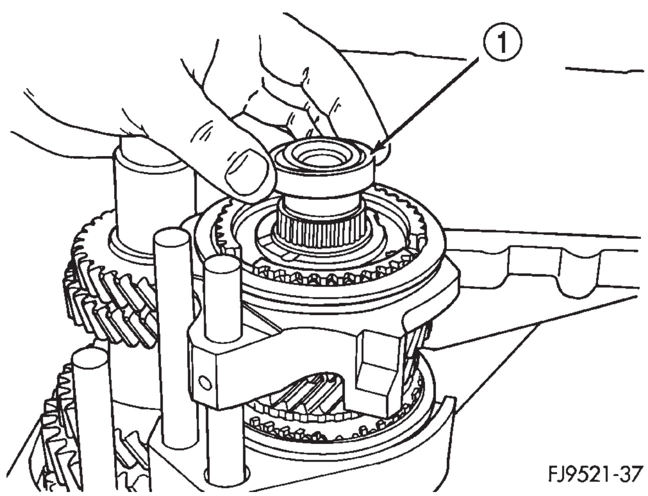


Fig. 29 Reverse Brake Race

1 - REVERSE BRAKE RACE

(23) Remove the shift blocker assembly from the bench fixture (Fig. 30).

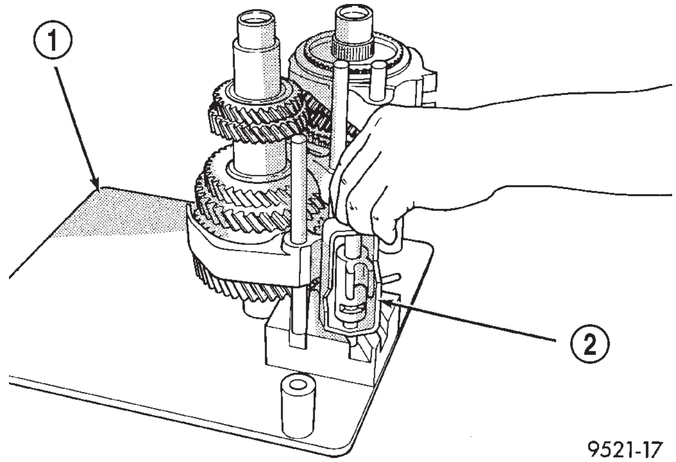


Fig. 30 Shift Blocker Removal

1 - 6785 BENCH FIXTURE
2 - SHIFT BLOCKER ASSEMBLY

(24) Remove the 1-2 shift fork from the output shaft (Fig. 31).

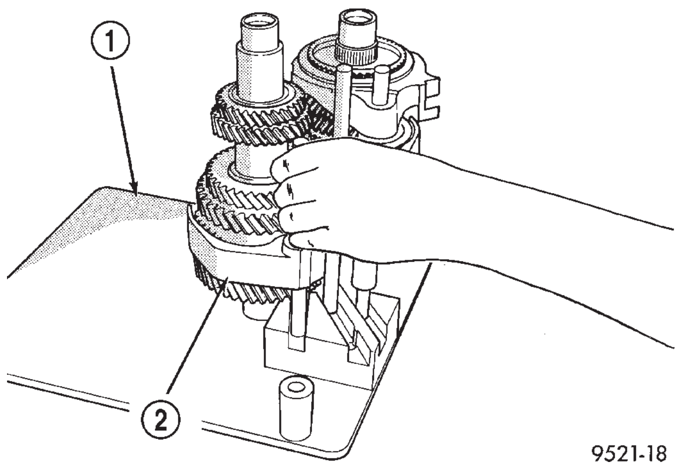


Fig. 31 1–2 Shift Fork Removal

1 - 6785 BENCH FIXTURE
2 - 1–2 SHIFT FORK

T350 MANUAL TRANSAXLE (Continued)

(25) Remove input and output shaft assemblies from bench fixture (Fig. 32).

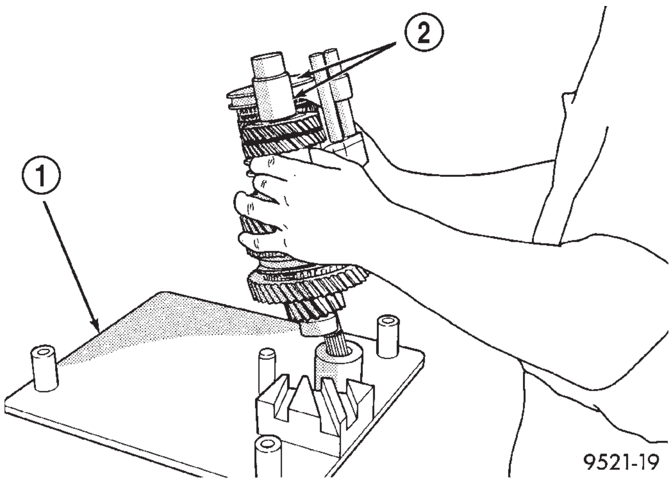


Fig. 32 Gear Train Removal

1 - 6785 BENCH FIXTURE
2 - INPUT AND OUTPUT SHAFTS

CAUTION: The output shaft assembly is serviced as an assembly. Do not try to repair any component on the output shaft. If the 1-2 synchronizer or gear fails, it is necessary to replace the complete output shaft assembly.

CLEANING

Clean the gears, bearings, shafts, synchronizers, thrust washers, oil feeder, shift mechanism, gear case, and bellhousing with solvent. Dry all parts except the bearings with compressed air. Allow the bearings to either air dry or wipe them dry with clean shop towels.

INSPECTION

Inspect the gears, bearings, shafts and thrust washers. Replace the bearings and cups if the rollers are worn, chipped, cracked, flat spotted, or brinnelled, or if the bearing cage is damaged or distorted. Replace the thrust washers if cracked, chipped, or worn. Replace the gears if the teeth are chipped, cracked, or worn thin. Inspect the synchronizers. Replace the sleeve if worn or damaged in any way. Replace the stop rings if the friction material is burned, flaking off, or worn. Check the condition of the synchro keys and springs. Replace these parts if worn, cracked, or distorted.

ASSEMBLY

The T350 transaxle internal components can be serviced only by separating the gear case from the bellhousing case.

CAUTION: The transaxle output shaft is serviced as a unit. No disassembly and reassembly is possible. Damage to the transaxle may result.

The sealant used to seal the transaxle case halves is Mopar® Gasket Maker, Loctite® 518, or equivalent. The sealant used for the bearing end plate cover is Mopar® RTV.

(1) Verify bench fixture shims are removed from bench fixture. Install output and input shafts into bench fixture (Miller tool #6785) (Fig. 33).

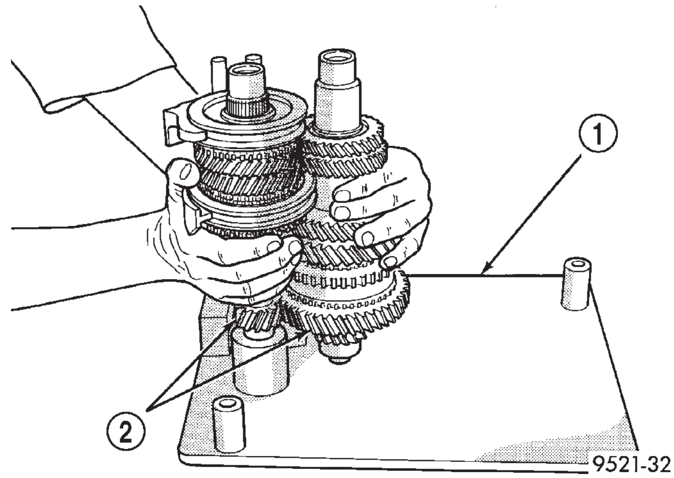


Fig. 33 Bench Fixture

1 - BENCH FIXTURE
2 - GEARTRAIN

(2) Install shift rails and forks into bench fixture (Fig. 34).

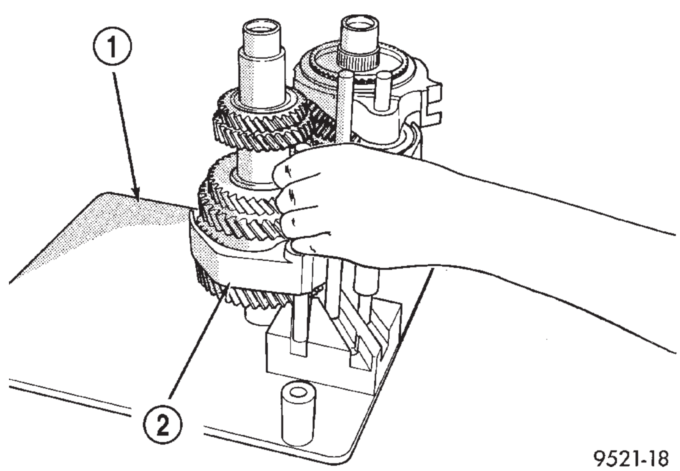


Fig. 34 Shift Rail Installation

1 - 6785 BENCH FIXTURE
2 - 1–2 SHIFT FORK

T350 MANUAL TRANSAXLE (Continued)

(3) Install shift blocker assembly into bench fixture (Fig. 35).

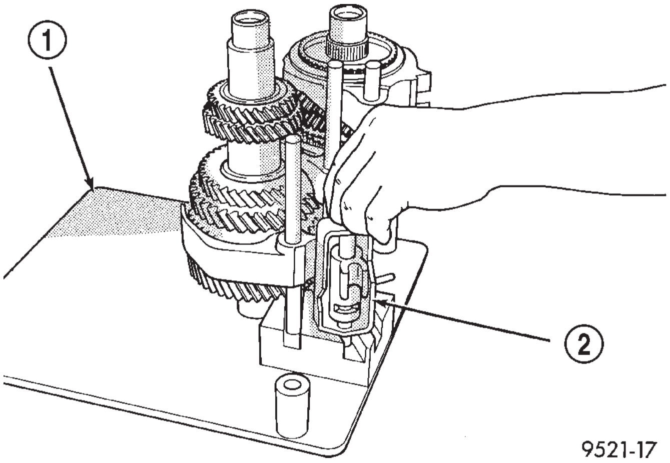


Fig. 35 Shift Blocker Installation

1 - 6785 BENCH FIXTURE
2 - SHIFT BLOCKER ASSEMBLY

(4) Install reverse brake race onto input shaft (Fig. 36).

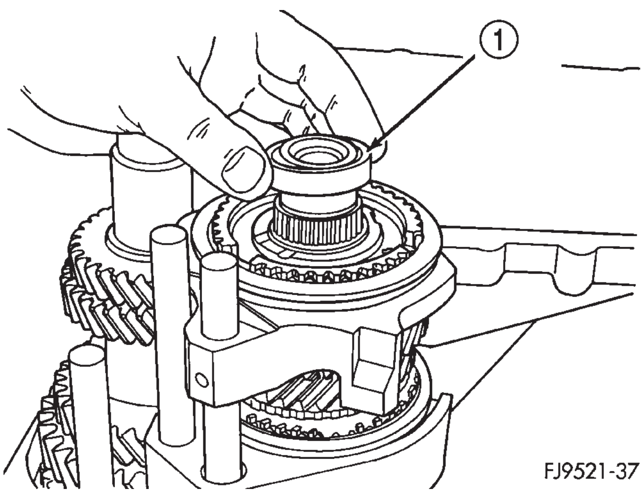


Fig. 36 Reverse Brake Race

1 - REVERSE BRAKE RACE

(5) Install reverse brake needle bearing (Fig. 37).

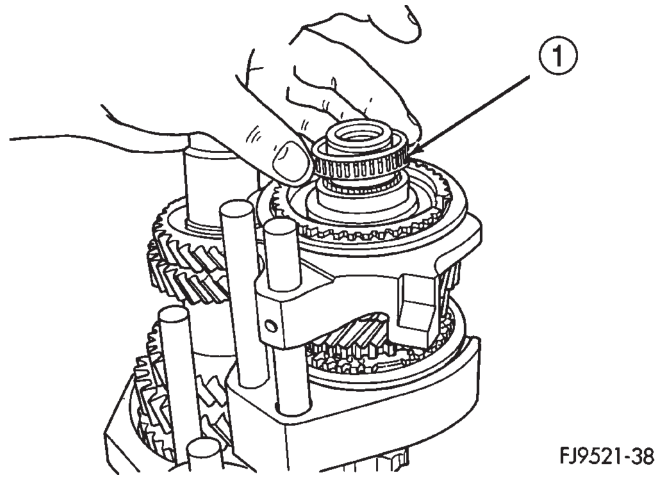


Fig. 37 Reverse Brake Needle Bearing

1 - REVERSE BRAKE NEEDLE BEARING

(6) Install reverse brake blocking ring (Fig. 38).

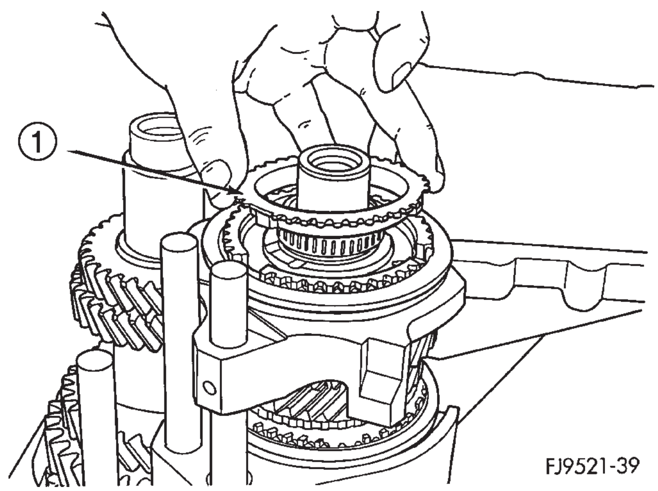


Fig. 38 Reverse Brake Blocking Ring Installation

1 - REVERSE BRAKE BLOCKING RING

T350 MANUAL TRANSAXLE (Continued)

(7) Install reverse brake friction cone (Fig. 39).

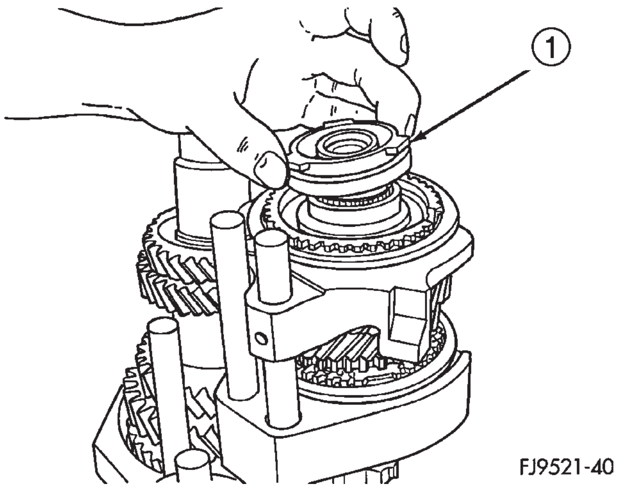


Fig. 39 Reverse Brake Friction Cone Installation

1 - REVERSE BRAKE FRICTION CONE

(8) Install reverse brake shim (Fig. 40). Apply petroleum jelly to shim to hold in place.

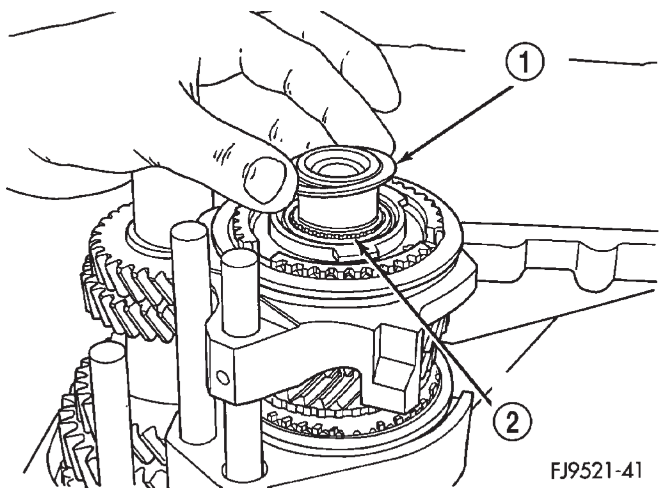


Fig. 40 Reverse Brake Shim

1 - REVERSE BRAKE SHIM
2 - REVERSE BRAKE FRICTION CONE

(9) Install gear–case half over bench fixture (Fig. 41). Line up shift finger over 3-4 lug.

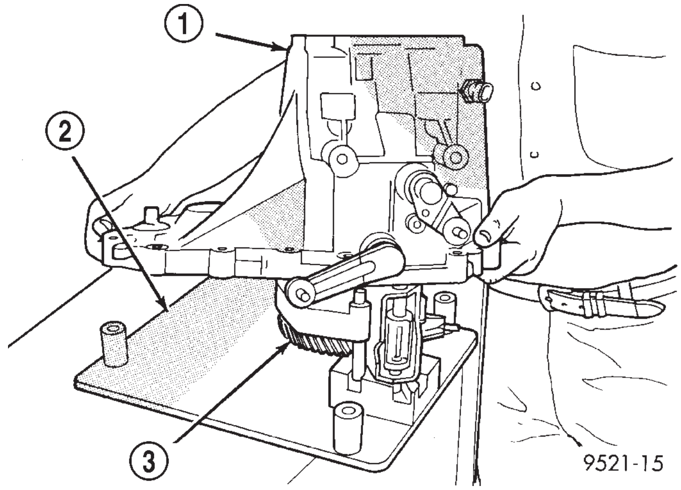


Fig. 41 Gear Case Half

1 - TRANSAXLE CASE
2 - BENCH FIXTURE
3 - GEARTRAIN

(10) Line up reverse brake friction cone lugs to the slots in the gear case (Fig. 42). Verify reverse brake shim is in position.

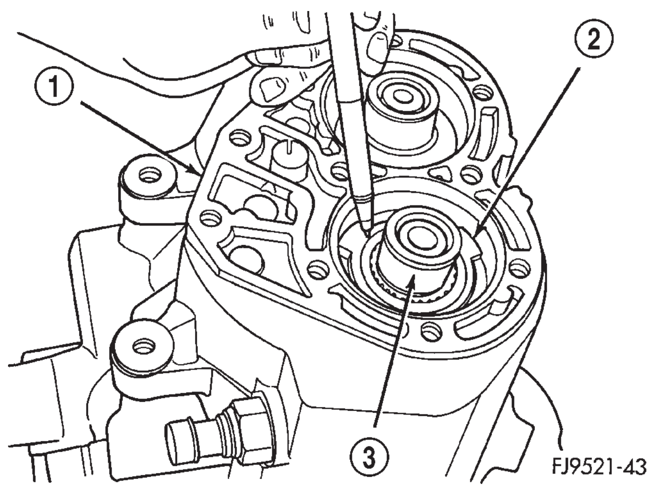


Fig. 42 Friction Cone Lugs

1 - CASE
2 - FRICTION CONE LUGS
3 - INPUT SHAFT

T350 MANUAL TRANSAXLE (Continued)

(11) Position input and output bearings on the shafts. Using Miller tool C-4992-1, press on input and output shaft bearings until they bottom into the case and against the shafts (Fig. 43).

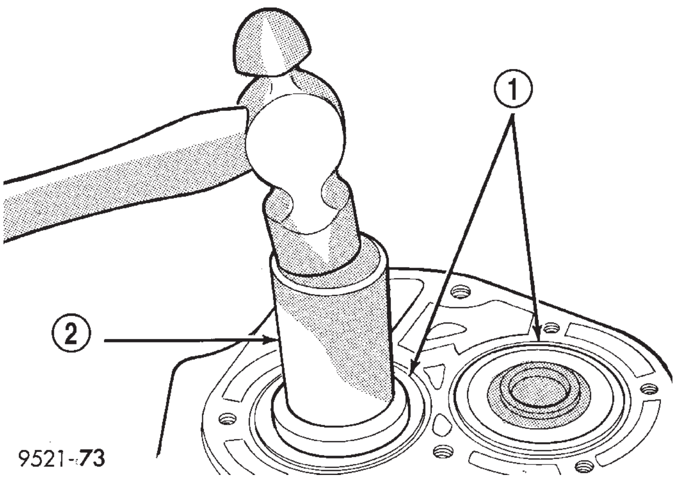


Fig. 43 Installing Input and Output Bearings

1 - INPUT AND OUTPUT BEARINGS
2 - SPECIAL TOOL C-4992-1

(12) Install shaft snap rings at input and output bearings (Fig. 44).

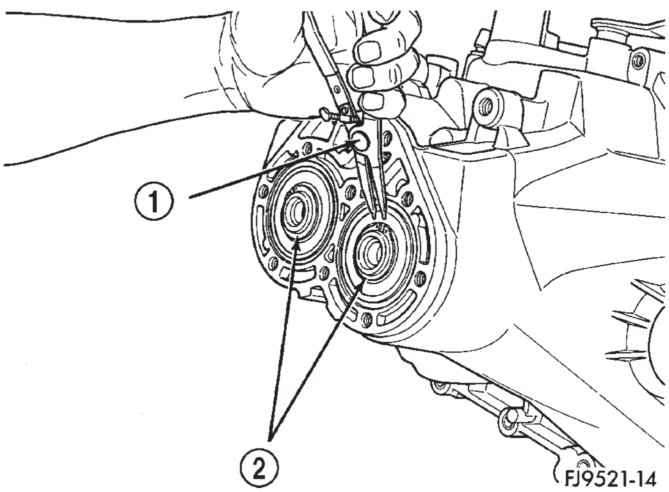


Fig. 44 Snap Rings Retaining Bearings

1 - SNAP RING PLIERS
2 - SNAP RINGS

(13) Apply Mopar® RTV sealant to end–cover outer edge and around bolt holes. Install end–cover onto gear case. Tighten end cover bolts to 29 N·m (21 ft. lbs.) torque (Fig. 45).

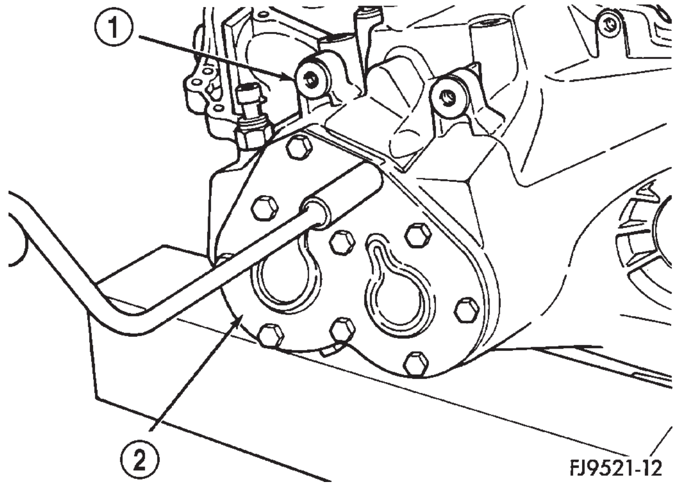


Fig. 45 Transaxle End Cover

1 - TRANSAXLE CASE
2 - END COVER

(14) Remove gear case from bench fixture.

(15) Install gear case in a holding fixture with end cover facing down.

(16) Turn selector shaft into slot on blocker assembly (Fig. 46).

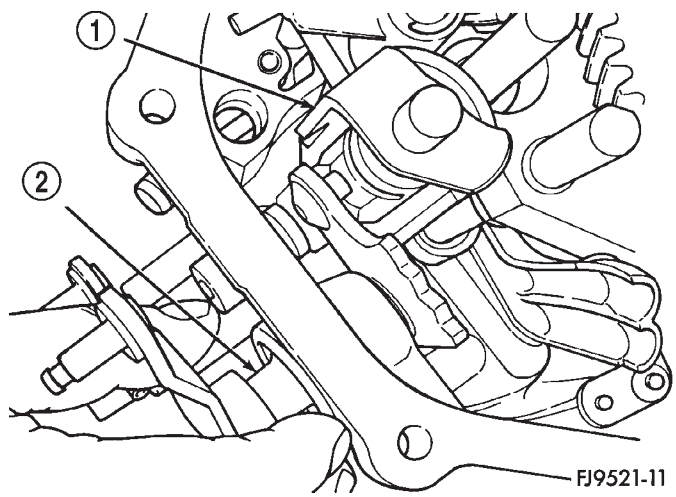


Fig. 46 Selector Shaft

1 - SHIFT ASSEMBLY
2 - SELECTOR SHAFT

(17) Push selector shaft spacer clip onto selector shaft. Install shift levers.

T350 MANUAL TRANSAXLE (Continued)

(18) Install reverse idler gear and spacer as shown in (Fig. 47).

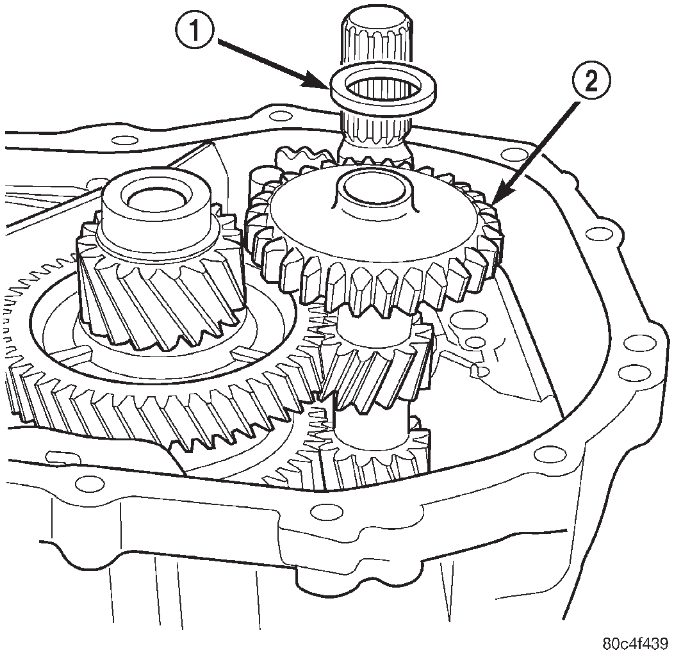


Fig. 47 Reverse Idler Gear and Spacer

1 - SPACER
2 - REVERSE IDLER GEAR

(19) Install reverse idler shaft (Fig. 48).

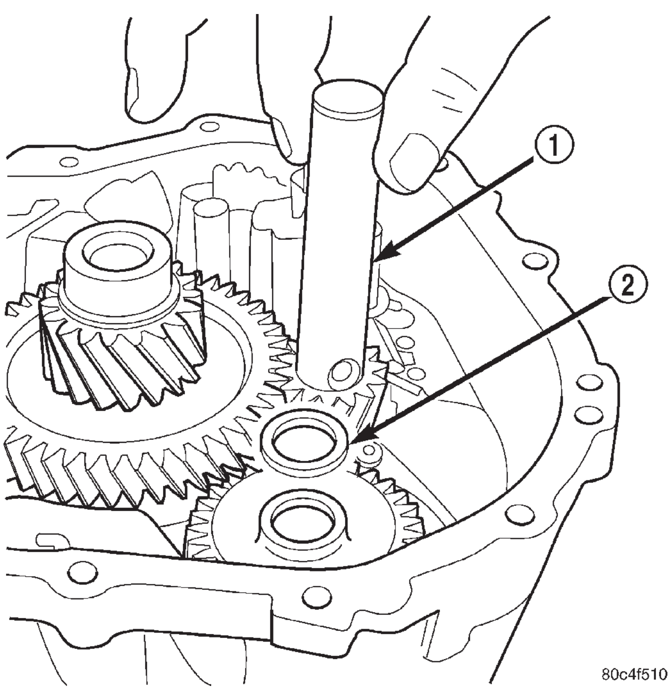


Fig. 48 Reverse Idler Shaft Installation

1 - REVERSE IDLER SHAFT
2 - SPACER

(20) Install bolt into shaft and tighten to 26 N·m (19 ft. lbs.) torque (Fig. 49).

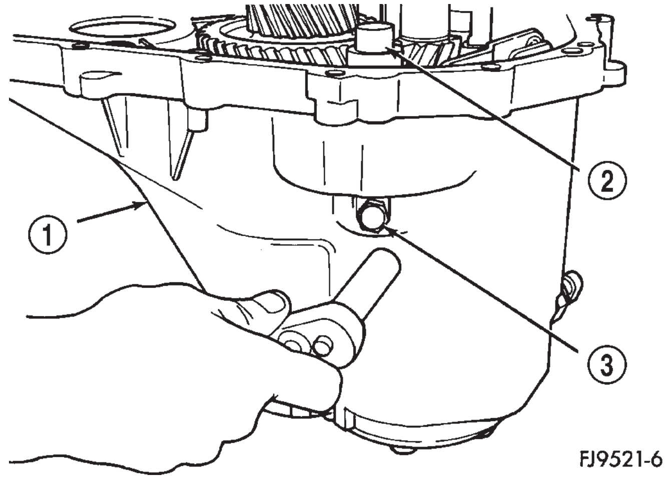


Fig. 49 Reverse Idler Shaft Bolt

1 - CASE
2 - REVERSE IDLER SHAFT
3 - REVERSE IDLER SHAFT BOLT

(21) Install reverse fork bracket and reverse lock-out. Tighten screws to 11 N·m (96 in. lbs.) torque (Fig. 50) (Fig. 51).

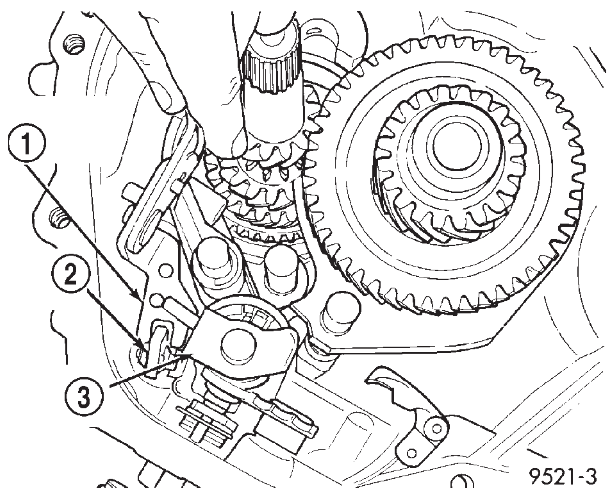


Fig. 50 Reverse Fork Bracket

1 - REVERSE FORK BRACKET
2 - REVERSE CAM BLOCKOUT
3 - SHIFT BLOCKER ASSEMBLY

T350 MANUAL TRANSAXLE (Continued)

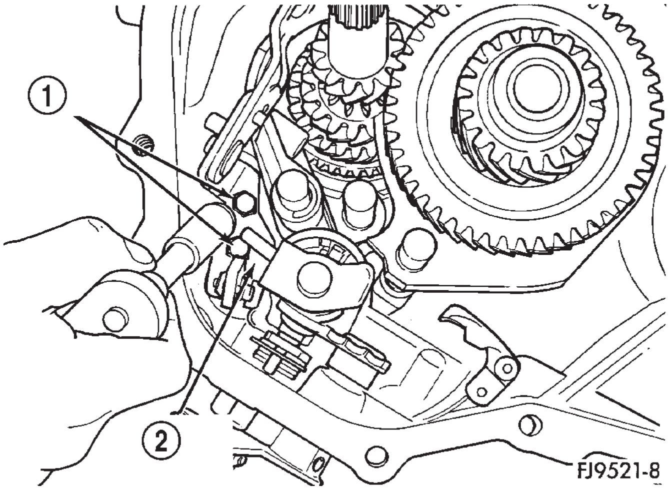


Fig. 51 Reverse Fork Screws

1 - SCREWS (2)
2 - REVERSE FORK BRACKET

(22) Install differential into gear case (Fig. 52).

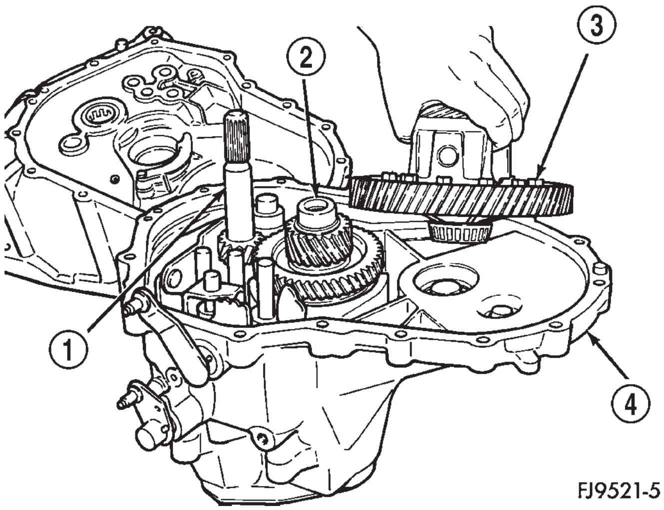


Fig. 52 Differential Assembly

1 - INPUT SHAFT
2 - OUTPUT SHAFT
3 - DIFFERENTIAL
4 - CASE

BEARING ADJUSTMENT PROCEDURE

(1) Use extreme care when removing and installing bearing cups and cones. Use only an arbor press for installation, as a hammer may not properly align the bearing cup or cone. Burrs or nicks on the bearing seat gives a false end–play reading while gauging for proper shims. Improperly seated bearing cups and cones are subject to low–mileage failure.

(2) Bearing cups and cones should be replaced if they show signs of pitting or heat distress. If distress is seen on either the cup or bearing rollers, both cup and cone must be replaced.

(3) Bearing preload and drag torque specifications must be maintained to avoid premature bearing failures. Used (original) bearings may lose up to 50% of the original drag torque after break–in. All bearing adjustments must be made with no other component interference or gear intermesh.

(4) Replace bearings as a pair: If one differential bearing is defective, replace both differential bearings, if one input shaft bearing is defective, replace both input shaft bearings.

(5) Bearing cones must not be reused if removed.

(6) Turning–torque readings should be obtained while smoothly rotating in either direction.

DIFFERENTIAL BEARING PRELOAD ADJUSTMENT

NOTE: True bearing turning–torque readings can be obtained only with the geartrain removed from the case.

(1) Remove bearing cup and existing shim from clutch bellhousing case.

(2) Press in new bearing cup into bellhousing case (or use a cup that has been ground down on the outer edge for ease of measurement).

(3) Press in new bearing cup into gear case side.

(4) Oil differential bearings with transmission fluid. Install differential assembly in transaxle gear case. Install clutch bellhousing over gear case. Install and torque case bolts to 29 N·m (21 ft. lbs.).

(5) Position transaxle with bellhousing facing down on workbench with C-clamps. Position dial indicator.

NOTE: Position of dial indicator in (Fig. 53) is for illustrative purposes only. The dial indicator should be parallel to T-Handle to obtain the most accurate reading.

(6) Apply a medium load to differential with Tool C-4995 and a T-handle, in the downward direction. Roll differential assembly back and forth a number of times. This will settle the bearings. Zero the dial indicator. To obtain end play readings, apply a medium load in an upward direction while rolling differential assembly back and forth (Fig. 53). Record end play.

(7) The shim required for proper bearing preload is the **total of end play, plus (constant) preload of 0.18mm (0.007 in.).** Never combine shims to obtain the required preload.

T350 MANUAL TRANSAXLE (Continued)

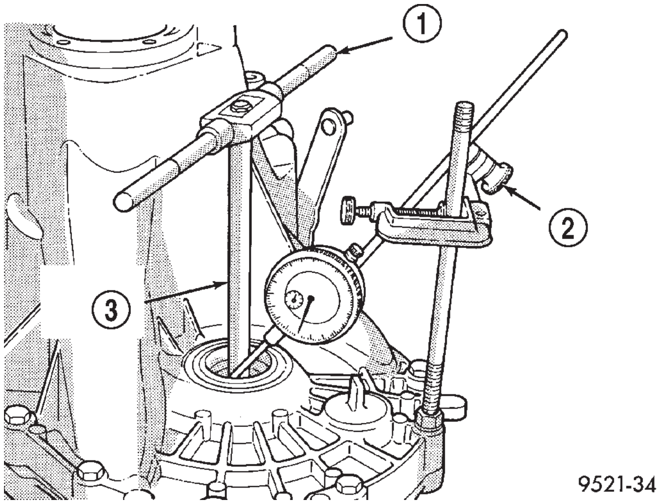


Fig. 53 Checking Differential Bearing End Play To Determine Shim Thickness

1 - T-HANDLE
2 - DIAL INDICATOR SET
3 - SPECIAL TOOL C-4995

(8) Remove case bolts. Remove clutch bellhousing differential bearing cup. Install shim(s) selected in Step 7. Then press the bearing cup into clutch bellhousing.

(9) Install clutch bellhousing. Install and torque case bolts to 26 N·m (19 ft. lbs.).

(10) Using Special Tool C-4995 and an inch-pound torque wrench, check turning torque of the differential assembly (Fig. 54). **The turning torque should be 6 to 12 in. lbs. If the turning torque is too high, install a 0.05mm (0.002 inch) thinner shim. If the turning torque is too low, install a 0.05mm (0.002 inch) thicker shim.**

(11) Recheck turning torque. Repeat Step 10 until the proper turning torque is obtained.

Once proper turning torque has been established, place gear case on the end plate. Draw a bead of Mopar® Gasket Maker, Loctite® 518, or equivalent, on the flat surface of the case mating flange. Install clutch bellhousing onto gear case. Install and tighten case bolts to 29 N·m (21 ft. lbs.).

INSTALLATION

(1) Install modular clutch assembly to transaxle input shaft.

(2) Using a helper and transmission jack, install transaxle to engine.

(3) Install and torque transaxle-to-engine bolts to 95 N·m (70 ft. lbs.).

(4) Install transaxle upper mount bracket and torque bolts to 65 N·m (48 ft. lbs.).

(5) Raise engine/transaxle assembly into position with screw jack.

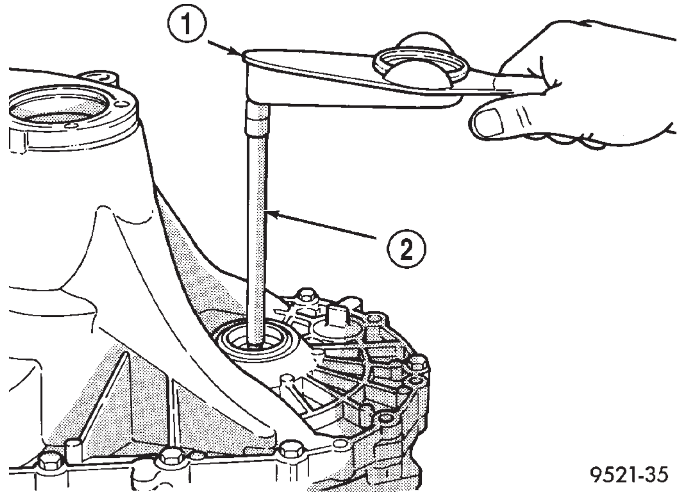


Fig. 54 Checking Differential Bearing Turning Torque

1 - INCH-POUND TORQUE WRENCH
2 - SPECIAL TOOL C-4995

(6) Install and torque transaxle upper mount-to-bracket bolts to 61 N·m (45 ft. lbs.).

(7) Remove screw jack and wood block.

(8) Install modular clutch-to-drive plate bolts and torque to 75 N·m (55 ft. lbs.).

(9) Install bellhousing dust cover.

(10) Install structural collar.

(11) Install left wheel house splash shield.

(12) Install front mount and bracket.

(13) Install rear mount to crossmember.

(14) Install rear mount bracket into position and loosely install horizontal bolt.

(15) Install halfshafts.

(16) Lower vehicle.

(17) Install three (3) rear mount bracket-to-transaxle and torque to 110 N·m (80 ft. lbs.).

(18) Raise vehicle.

(19) Torque rear mount bracket-to-transaxle horizontal bolt to 110 N·m (80 ft. lbs.).

(20) Install rear mount through-bolt and torque to 61 N·m (45 ft. lbs.).

(21) Install starter motor.

(22) Install gearshift cables to bracket and install new retaining clips.

(23) Connect gearshift crossover and selector cable to crossover and selector levers.

(24) Install clutch release cable to release lever and case. Install cap.

(25) Connect Vehicle Speed Sensor and Back-up Lamp Switch harness.

(26) Install air cleaner assembly.

(27) Connect battery negative cables.

(28) Fill transaxle with suitable amount of fluid. (Refer to 21 - TRANSMISSION/TRANSAXLE/MANUAL/FLUID - STANDARD PROCEDURE)

T350 MANUAL TRANSAXLE (Continued)

SPECIFICATIONS

T350 TRANSAXLE

Bolts that have thread sealer or torque lock patches should not be reused. Always install new bolts in these applications.

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Back-up Lamp Switch	24	18	—
Crossover Cable Adj. Screw	8	—	70
Drain Plug	30	—	267
Differential Ring Gear Bolts	81	60	—
Dust Shield to Transaxle	12	—	105
End Plate Cover Bolts	29	21	—
Front Engine Mount to Trans	108	80	—
Front Mount Through Bolt	61	45	—
Front Mount to Engine Bolt	54	40	—
Lateral Bending Strut to Engine	54	40	—
Lateral Bending Strut to Trans.	54	40	—
Left Mount Through Bolt	108	80	—
Left Mount to Transaxle	54	40	—
Output Bearing Race Ret. Strap	11	—	96
Reverse Fork Bracket	11	—	96
Reverse Idler Shaft Bolt	29	19	—
Shift Cable Bracket to Transaxle	28	—	250
Transaxle Case Bolts	29	21	—
Transaxle to Engine Bolt	95	70	—
Vehicle Speed Sensor	7	—	60
Vertical Bending Strut to Engine	108	80	—
Vertical Bending Strut to Trans.	108	80	—

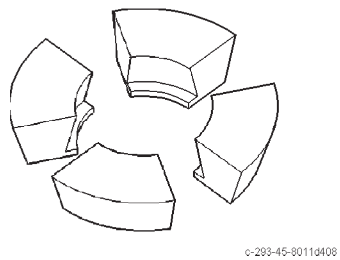
NV T350 (A-578) MANUAL TRANSAXLE FLUID FILL

TRANSAXLE	METRIC MEASURE	U.S. MEASURE
NV T350	2.4-2.7 Liters	2.5-2.8 Quarts

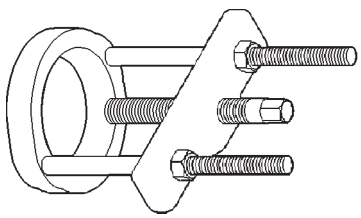
T350 MANUAL TRANSAXLE (Continued)

SPECIAL TOOLS

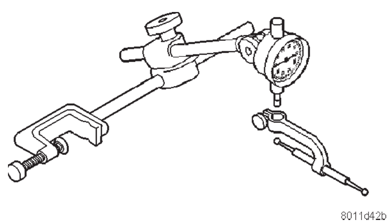
T350 MANUAL TRANSAXLE



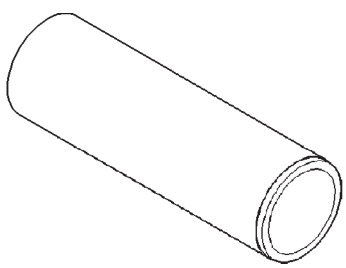
Adapter Blocks C-293–45



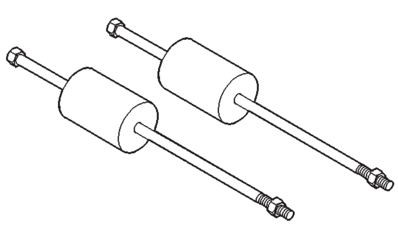
Puller Press C-293–PA



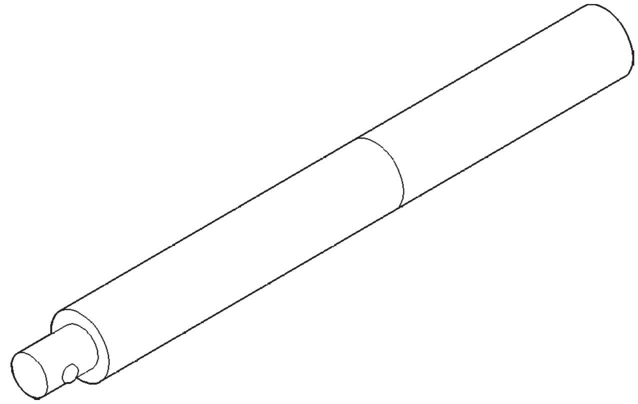
Dial Indicator C-3339



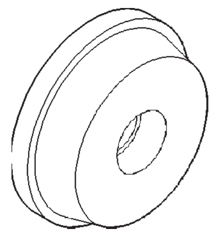
Sleeve C-3717



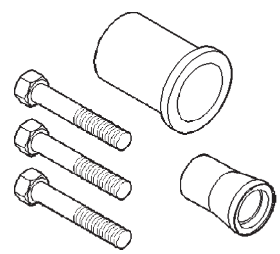
Slide Hammer C-3752



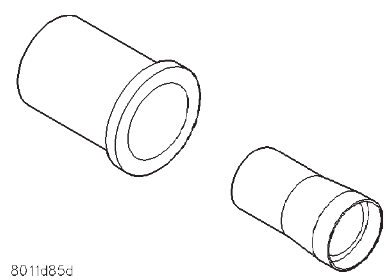
Universal Handle C-4171



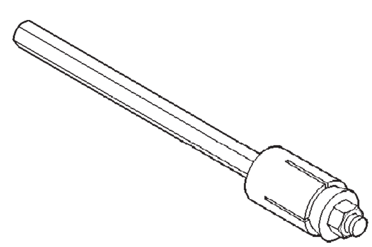
Bearing Installer C-4628



Seal Remover C-4680

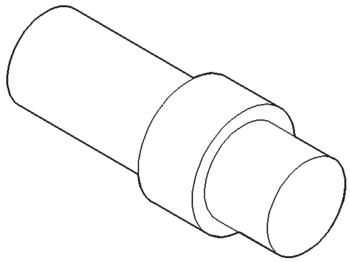


Seal Installer C-4992

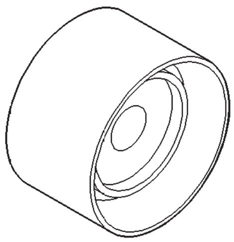


Torque Tool

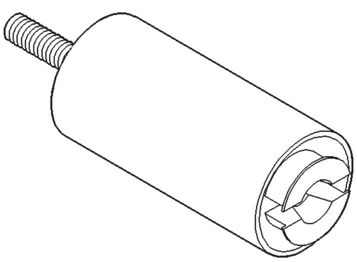
T350 MANUAL TRANSAXLE (Continued)



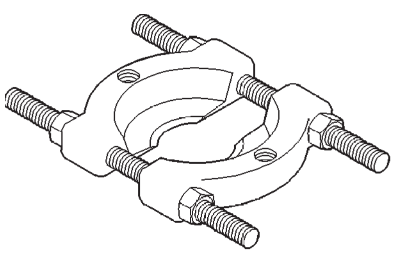
Adapter C-4996



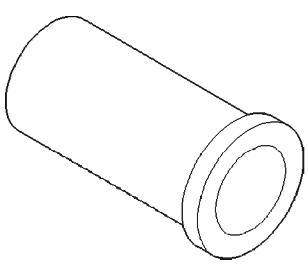
Installer L-4410



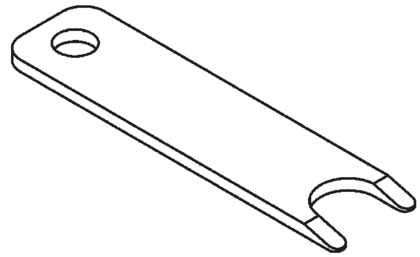
Special Jaw Set L-4518



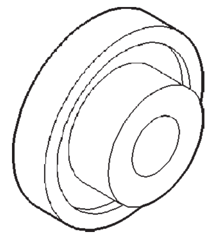
Bearing Splitter 1130



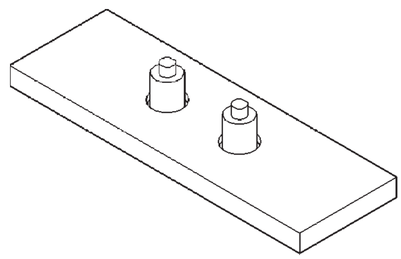
Driver 6342



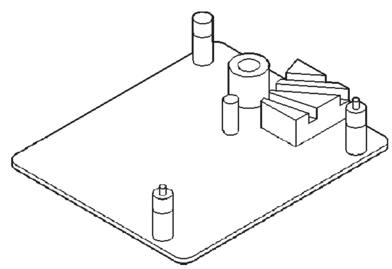
Disconnect Tool 6638A



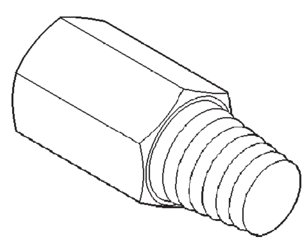
Seal Installer 6709



Bearing Remover 6768

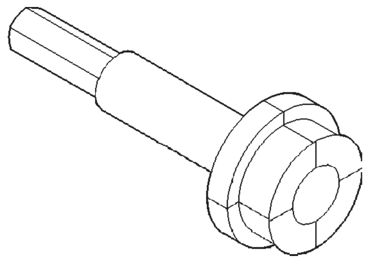


Bench Fixture 6785



Remover 6786

T350 MANUAL TRANSAXLE (Continued)



Remover 6787

BACK-UP LAMP SWITCH

REMOVAL

(1) Lift vehicle on hoist.

(2) From bottom side of vehicle, disconnect back-up lamp switch connector (Fig. 55).

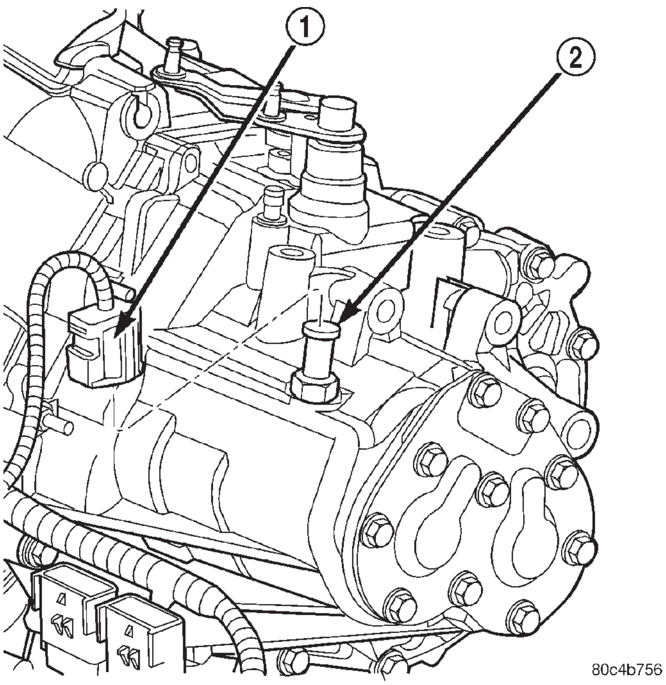


Fig. 55 BACK-UP LAMP SWITCH

1 - CONNECTOR
2 - BACK UP LAMP SWITCH

(3) Unscrew switch from transaxle.

INSTALLATION

(1) Install back-up lamp switch. Teflon tape or equivalent must be used on switch threads. Tighten switch to 24 N·m (18 ft. lbs.) torque.

CAUTION: Do not overtighten switch.

(2) Connect back-up lamp switch connector (Fig. 55) .

(3) Lower vehicle.

(4) Verify back-up lamp operation.

DIFFERENTIAL

DISASSEMBLY

(1) Remove differential bearing cones (ring gear and diff. case side) using Tool C-293-PA, Adapters C-293-45, and Tool 4996 (Fig. 56) (Fig. 57).

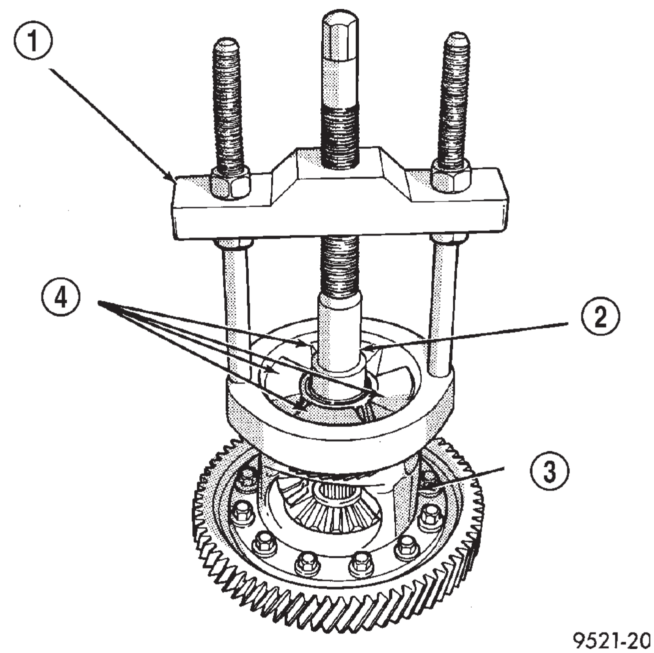


Fig. 56 Remove Differential Bearing Cone from Diff. Case Side

1 - SPECIAL TOOL C-293-PA
2 - SPECIAL TOOL C-4996
3 - DIFFERENTIAL ASSEMBLY
4 - SPECIAL TOOL C-293-45

DIFFERENTIAL (Continued)

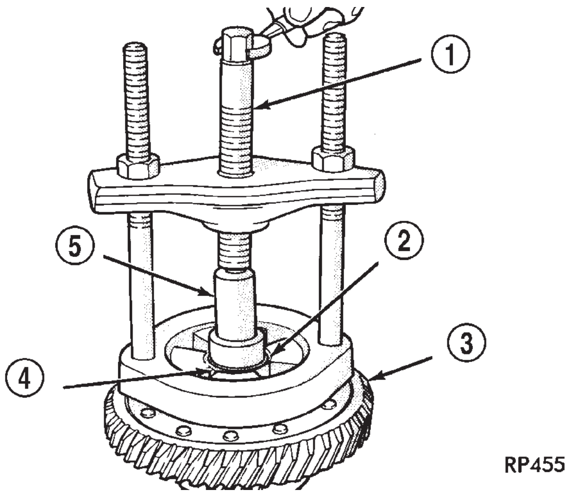


Fig. 57 Remove Differential Bearing Cone from Ring Gear Side

1 - SPECIAL TOOL C-293
2 - SPECIAL TOOL ADAPTER C-293-45 (USE 4 PIECES)
3 - DIFFERENTIAL ASSEMBLY
4 - DIFFERENTIAL BEARING CONE
5 - SPECIAL TOOL C-4996 (NOTE POSITION)

(2) Remove ring gear-to-case bolts (Fig. 58). **Discard and use NEW bolts upon assembly.**

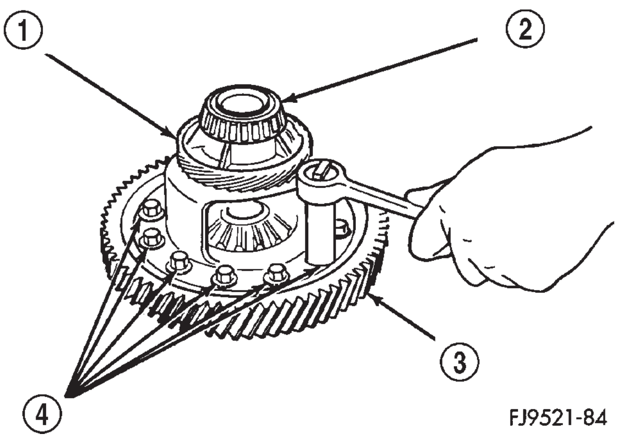


Fig. 58 Remove Ring Gear Bolts and Ring Gear

1 - SPEEDOMETER DRIVE GEAR
2 - BEARING
3 - RING GEAR
4 - RING GEAR BOLTS

(3) Using a suitable screwdriver, pry off speedometer drive gear (Fig. 59) (Fig. 60).

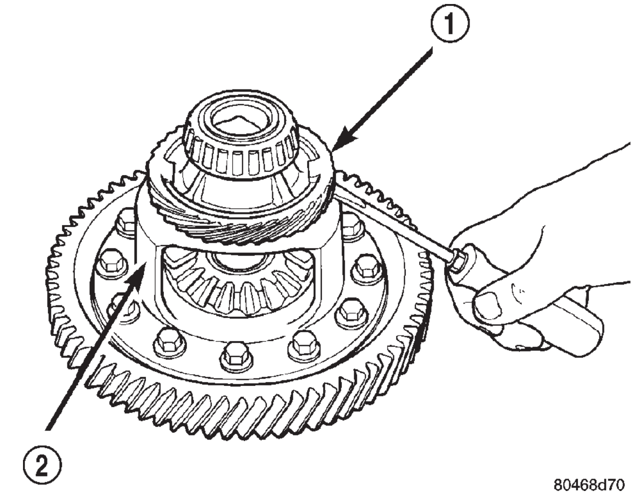


Fig. 59 Pry Off Speedometer Drive Gear

1 - SPEEDOMETER DRIVE GEAR
2 - DIFFERENTIAL ASSEMBLY

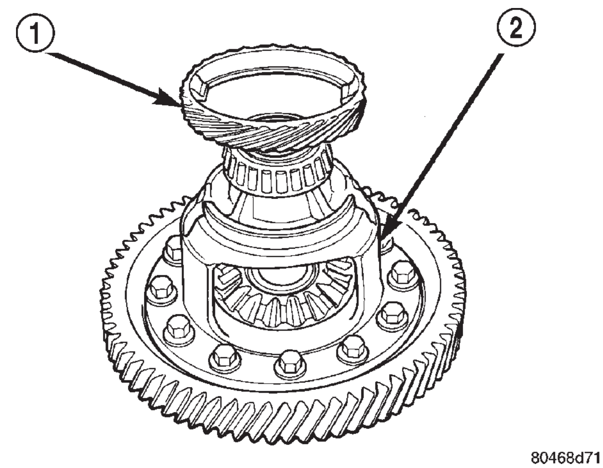


Fig. 60 Speedometer Drive Gear Removed

1 - SPEEDOMETER DRIVE GEAR
2 - DIFFERENTIAL ASSEMBLY

DIFFERENTIAL (Continued)

(4) Using hammer and suitable punch, remove pinion shaft retaining pin (Fig. 61) (Fig. 62).

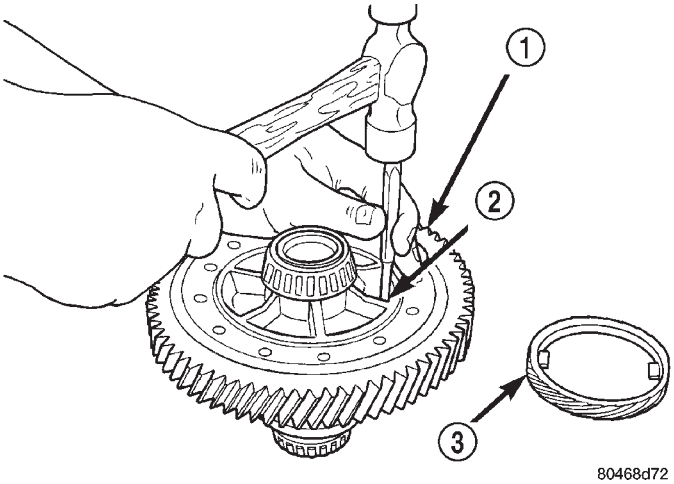


Fig. 61 Remove Pinion Shaft Retaining Pin

1 - RING GEAR
2 - PINION SHAFT RETAINING PIN
3 - SPEEDOMETER DRIVE GEAR

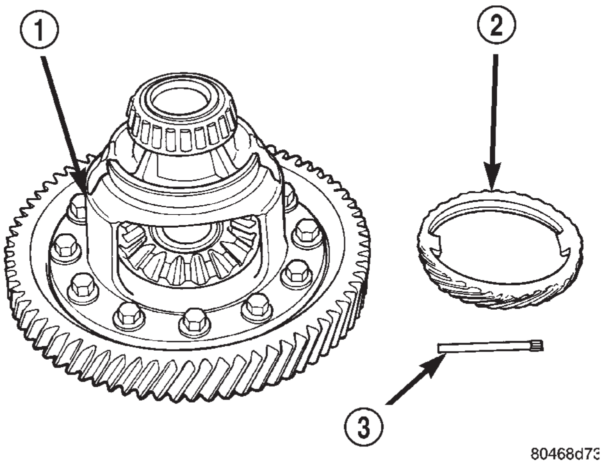


Fig. 62 Retaining Pin Removed

1 - DIFFERENTIAL ASSEMBLY
2 - SPEEDOMETER DRIVE GEAR
3 - PINION SHAFT RETAINING PIN

(5) Remove pinion shaft (Fig. 63).

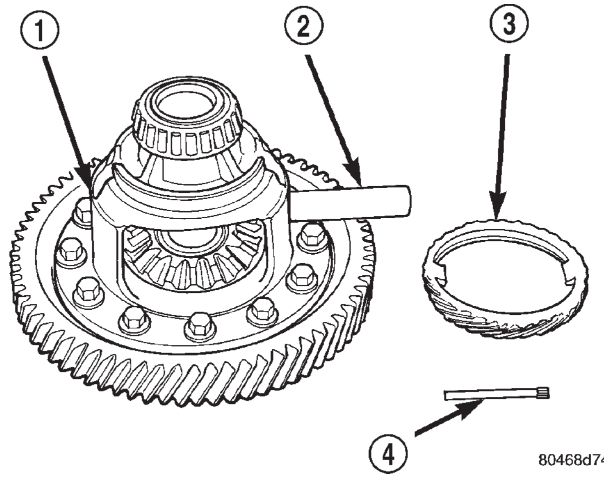


Fig. 63 Pinion Shaft Removal

1 - DIFFERENTIAL ASSEMBLY
2 - PINION SHAFT
3 - SPEEDOMETER DRIVE GEAR
4 - PINION SHAFT RETAINING PIN

(6) Remove pinion gears, side gears, and thrust washers (Fig. 64) (Fig. 65).

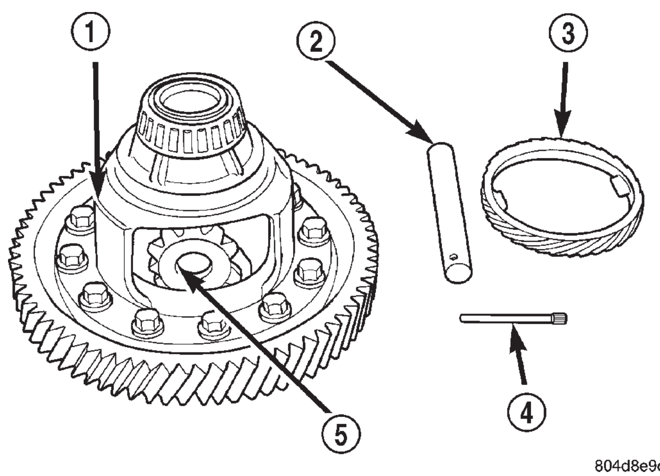


Fig. 64 Remove Pinion Gears, Side Gears, and Thrust Washers

1 - DIFFERENTIAL ASSEMBLY
2 - PINION SHAFT
3 - SPEEDOMETER DRIVE GEAR
4 - PINION SHAFT RETAINING PIN
5 - PINION GEAR (2)

DIFFERENTIAL (Continued)

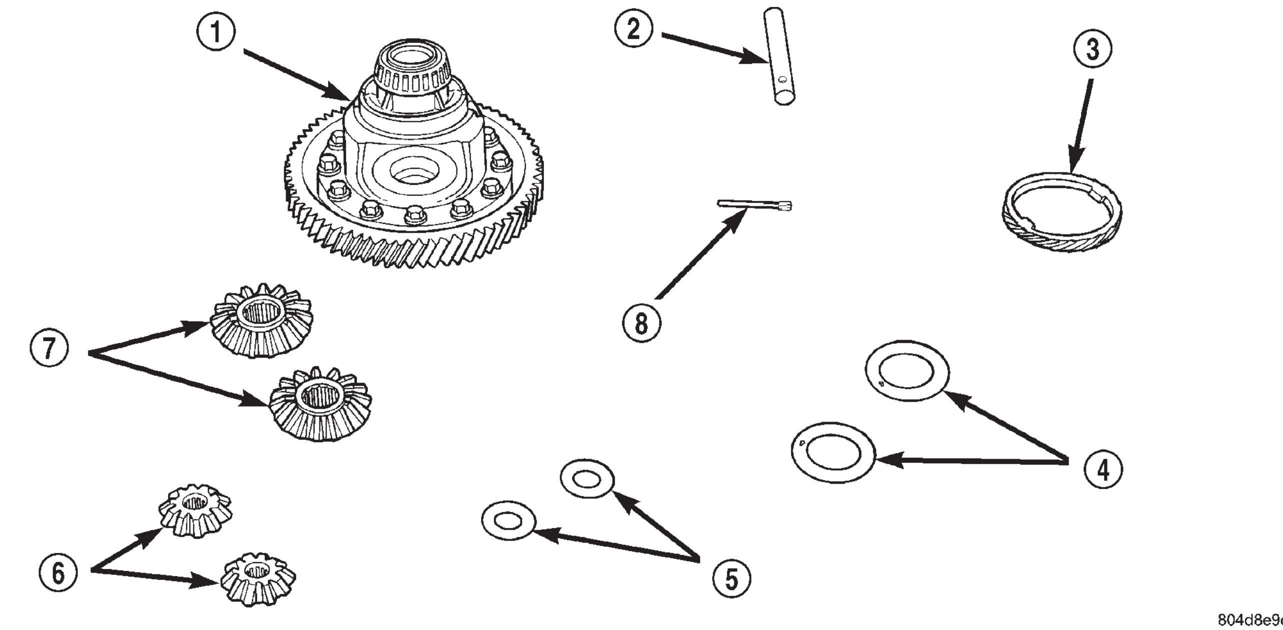


Fig. 65 Differential Components

1 - DIFFERENTIAL ASSEMBLY
2 - PINION SHAFT
3 - SPEEDOMETER DRIVE GEAR
4 - SIDE GEAR THRUST WASHERS (SELECT THICKNESS)
5 - PINION GEAR THRUST WASHERS
6 - PINION GEARS
7 - SIDE GEARS
8 - PINION SHAFT RETAINING PIN

ASSEMBLY

(1) Assemble side gears, pinion gears, and thrust washers (Fig. 65) into case through opening and rotating into position (Fig. 64).

(2) Install pinion shaft (Fig. 63).

(3) Using hammer and suitable punch, install pinion shaft retaining pin (Fig. 66).

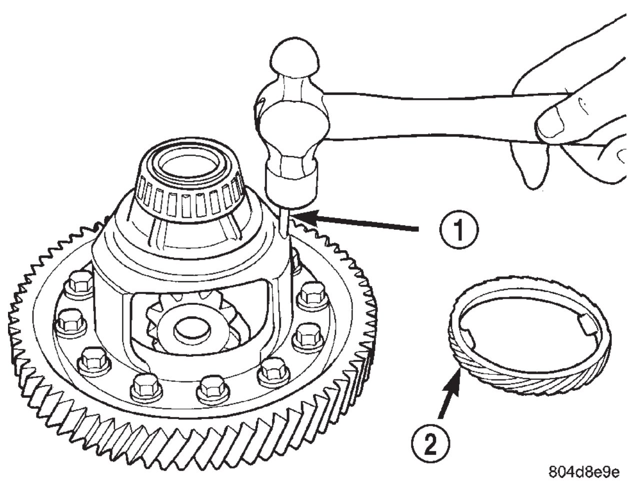


Fig. 66 Install Retaining Pin

1 - PINION SHAFT RETAINING PIN
2 - SPEEDOMETER DRIVE GEAR

(4) Stake case to retain pin as shown in (Fig. 67).

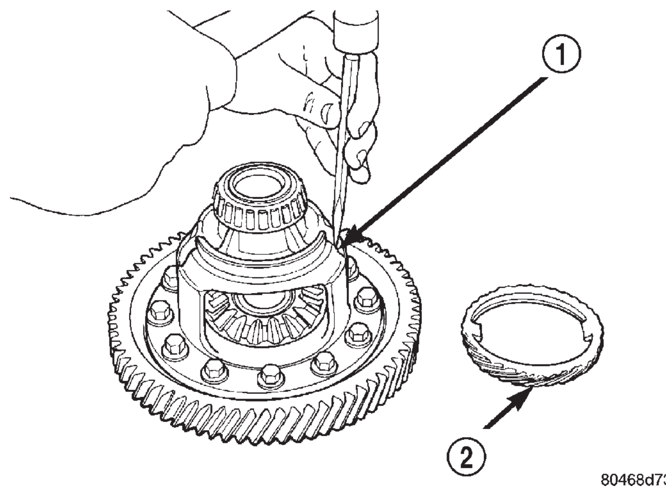


Fig. 67 Staking Retaining Pin

1 - PINION SHAFT RETAINING PIN
2 - SPEEDOMETER DRIVE GEAR

(5) Using an arbor press, Handle C-4171, and Tool L-4410, install differential side bearings to ring gear and case side (Fig. 68) (Fig. 69).

DIFFERENTIAL (Continued)

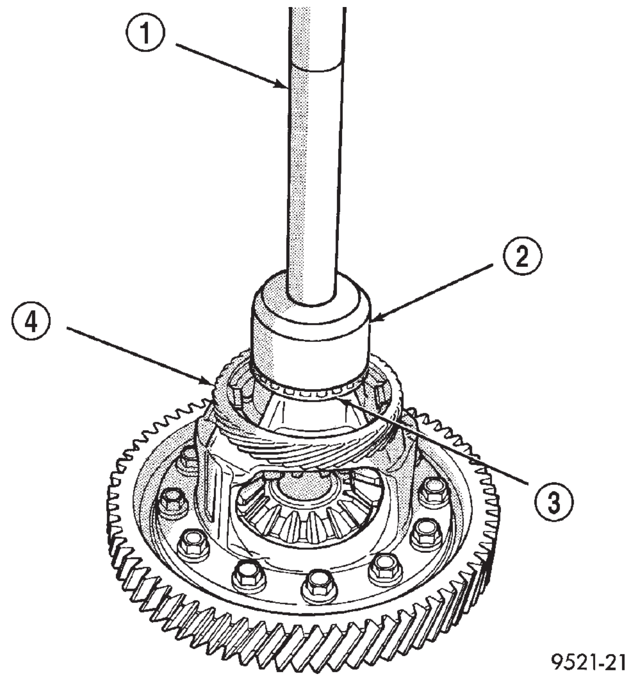


Fig. 68 Install Differential Bearing Cone to Diff. Case Side

1 - SPECIAL TOOL C-4171
2 - SPECIAL TOOL L-4410
3 - BEARING CONE
4 - SPEED SENSOR DRIVE GEAR

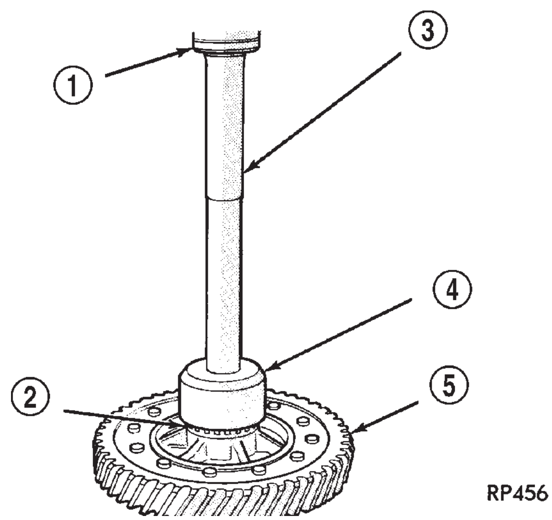


Fig. 69 Install Differential Bearing Cone to Ring Gear Side

1 - ARBOR PRESS RAM
2 - BEARING CONE
3 - SPECIAL TOOL HANDLE C-4171
4 - SPECIAL TOOL L-4410
5 - DIFFERENTIAL ASSEMBLY

(6) Install speedometer drive gear to case (Fig. 70).

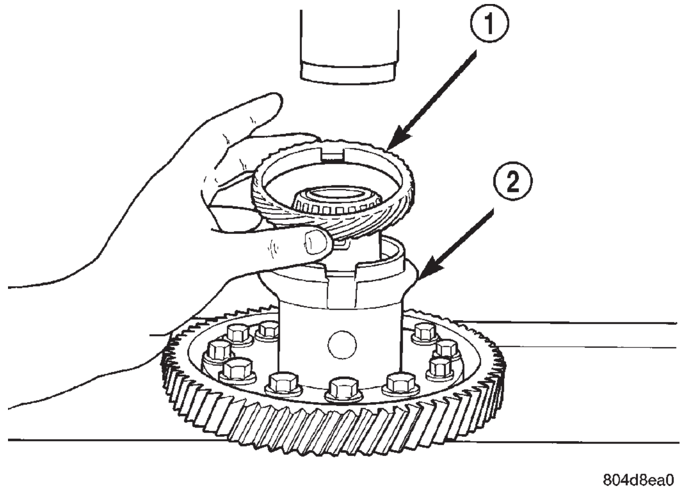


Fig. 70 Speedometer Drive Gear

1 - SPEEDOMETER DRIVE GEAR
2 - DIFFERENTIAL ASSEMBLY

(7) Using an arbor press, steel block, and Tool L-4440, press speedometer drive gear onto differential case (Fig. 71) (Fig. 72).

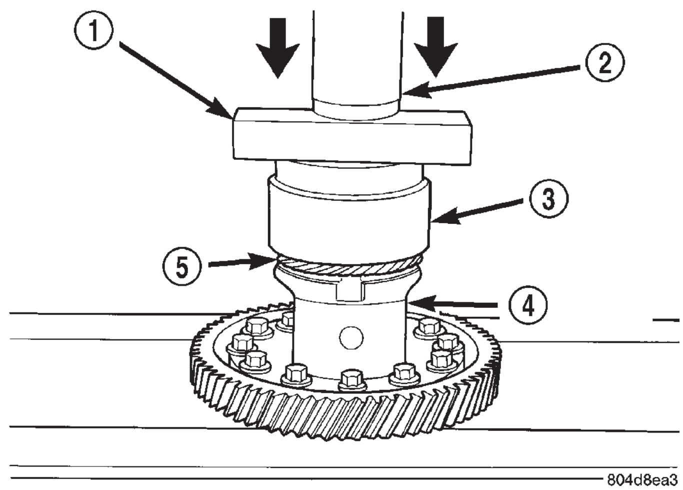


Fig. 71 Press Gear onto Differential

1 - STEEL STOCK
2 - PRESS RAM
3 - SPECIAL TOOL L-4440
4 - DIFFERENTIAL ASSEMBLY
5 - SPEEDOMETER DRIVE GEAR

(8) Install ring gear to differential case. Install new bolts and torque to 81 N·m (60 ft. lbs.) torque (Fig. 73).

DIFFERENTIAL (Continued)

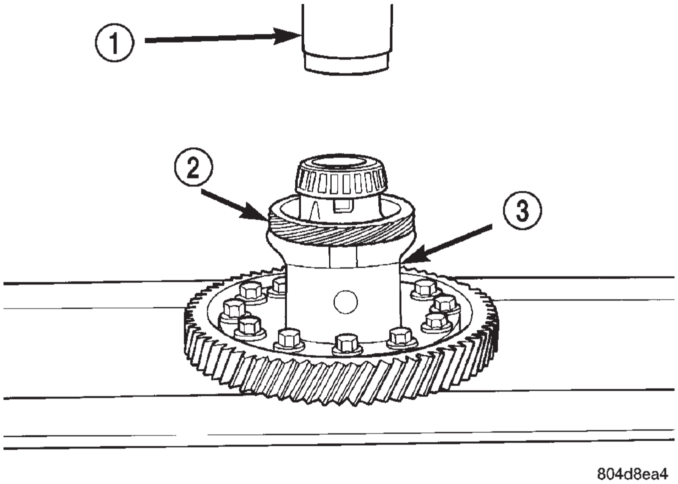


Fig. 72 Drive Gear Pressed onto Differential

1 - PRESS RAM
2 - SPEEDOMETER DRIVE GEAR
3 - DIFFERENTIAL ASSEMBLY

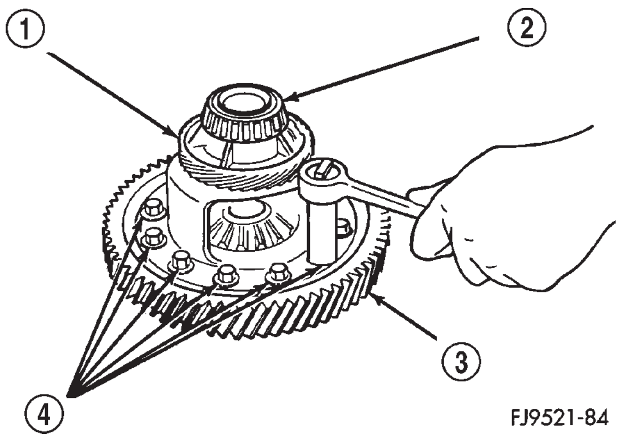


Fig. 73 Install Ring Gear and Bolts

1 - SPEEDOMETER DRIVE GEAR
2 - BEARING
3 - RING GEAR
4 - RING GEAR BOLTS

Measure and Adjust Side Gear End-Play

(1) Rotate the assembly two full revolutions both clockwise and counterclockwise.Set up dial indicator as shown and record end play (Fig. 74) (Fig. 75). Rotate side gear 90 degrees and take another measurement. Again, rotate side gear 90 degrees and record a final measurement.

(2) Using the smallest end play recorded, shim that side gear to within 0.001 to 0.013 inch. The other side gear should be checked using the same procedure.

CAUTION: Side gear end play must be within 0.001 to 0.013 inch. Five select thrust washers are available: 0.027, 0.032, 0.037, 0.042, and 0.047 inch.

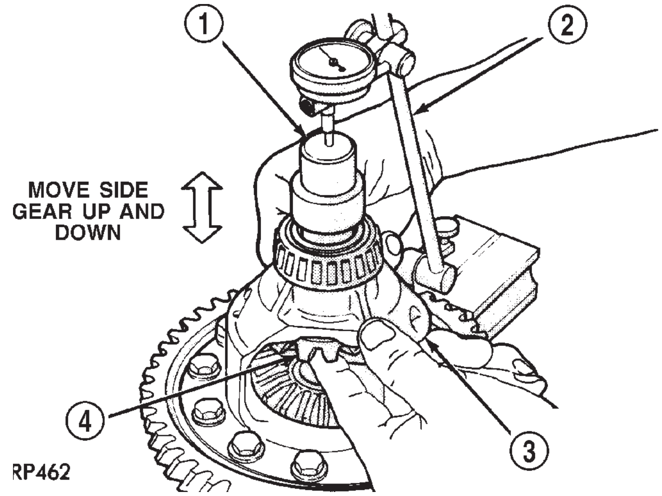


Fig. 74 Checking Side Gear End Play (Typical)

1 - SPECIAL TOOL C-4996 (NOTE POSITION)
2 - DIAL INDICATOR SET
3 - DIFFERENTIAL ASSEMBLY
4 - SIDE GEAR

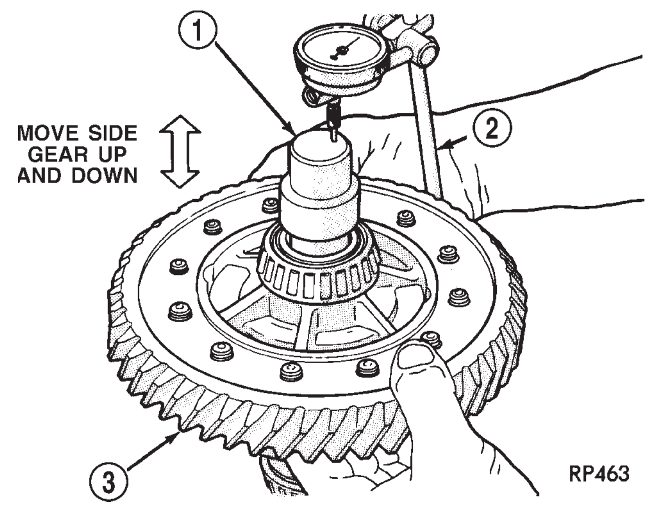


Fig. 75 Checking Side Gear End Play—Typical

1 - SPECIAL TOOL C-4996 (NOTE POSITION)
2 - DIAL INDICATOR SET
3 - DIFFERENTIAL ASSEMBLY

ADJUSTMENTS

DIFFERENTIAL BEARING PRELOAD ADJUSTMENT / SHIM SELECTION

Measure and adjust differential side bearing preload during any transaxle service, especially when the following components are replaced:

- Transaxle gear case
- Clutch bellhousing case
- Differential case
- Differential bearings

DIFFERENTIAL (Continued)

NOTE: True bearing turning torque readings can be obtained only with the geartrain removed from the case.

(1) Remove bearing cup and existing shim from clutch bellhousing case.

(2) Press in new bearing cup into bellhousing case (or use a cup that has been ground down on the outer edge for ease of measurement).

(3) Press in new bearing cup into gear case side.

(4) Oil differential bearings with transmission fluid. Install differential assembly in transaxle gear case. Install clutch bellhousing over gear case. Install and torque case bolts to 29 N·m (21 ft. lbs.).

(5) Position transaxle with bellhousing facing down on workbench with C-clamps. Position dial indicator.

NOTE: Indicator is set up as shown for illustrative purposes only (Fig. 76). Indicator must be parallel to T-Handle to obtain the most accurate reading.

(6) Apply a medium load to differential with Tool C-4995 and a T-handle, in the downward direction. Roll differential assembly back and forth a number of times. This will settle the bearings. Zero the dial indicator. To obtain end play readings, apply a medium load in an upward direction while rolling differential assembly back and forth (Fig. 76). Record end play.

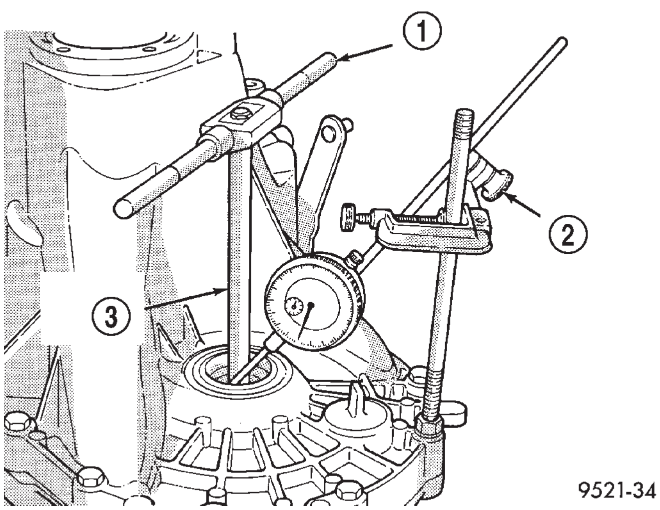


Fig. 76 Checking Differential Bearing End Play to Determine Shim Thickness

1 - T-HANDLE
2 - DIAL INDICATOR SET
3 - SPECIAL TOOL C-4995

(7) The shim required for proper bearing preload is the **total of end play, plus (constant) preload of 0.18 mm (0.007 in.).** Never combine shims to obtain the required preload.

(8) Remove case bolts. Remove clutch bellhousing differential bearing cup. Install shim(s) selected in Step 7. Then press the bearing cup into clutch bellhousing.

(9) Install clutch bellhousing. Install and torque case bolts to 26 N·m (19 ft. lbs.).

(10) Using Special Tool C-4995 and an inch-pound torque wrench, check turning torque of the differential assembly (Fig. 77). **The turning torque should be 6 to 12 in. lbs. If the turning torque is too high, install a 0.05 mm (0.002 inch) thinner shim. If the turning torque is too low, install a 0.05mm (0.002 inch) thicker shim.**

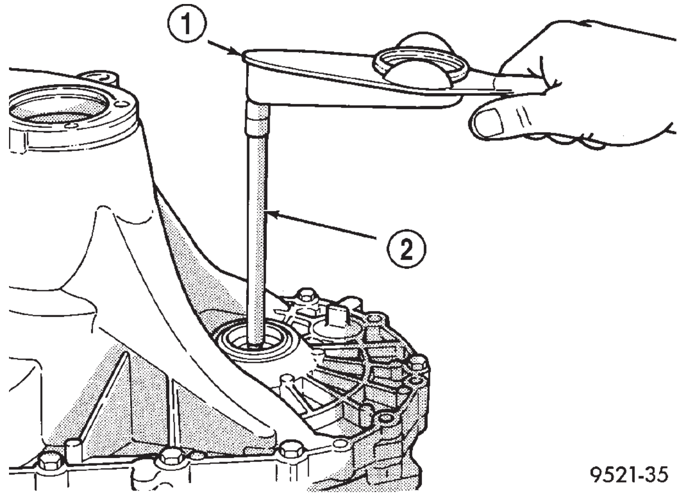


Fig. 77 Checking Differential Bearing Turning Torque

1 - INCH-POUND TORQUE WRENCH
2 - SPECIAL TOOL C-4995

(11) Recheck turning torque. Repeat Step 10 until the proper turning torque is obtained.

DIFFERENTIAL BEARING CUPS

REMOVAL

(1) Remove differential assembly from gear case using the procedure outlined in this group.

(2) Install Miller tool #L-4518 into the differential bearing cup (Fig. 78).

(3) Install the tool cup over the tool (Fig. 79).

(4) Tighten the tool until the race is removed from the case.

INSTALLATION

(1) Position the bearing cup into the case.

(2) Install the bearing cup onto Miller tool #L-4520.

DIFFERENTIAL BEARING CUPS (Continued)

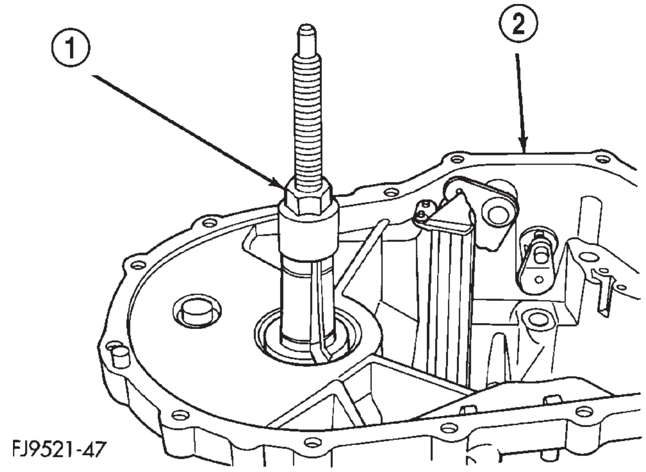


Fig. 78 Tool Installed in Bearing

1 - SPECIAL TOOL L-4518
2 - GEAR CASE

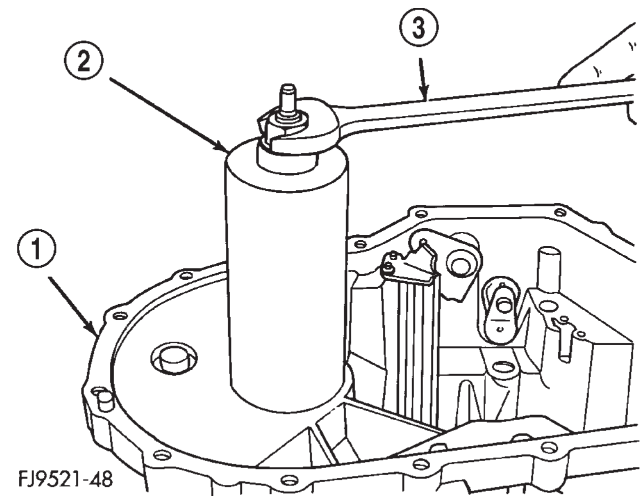


Fig. 79 Tool Cup Installed

1 - GEAR CASE
2 - SPECIAL TOOL L-4518
3 - WRENCH

(3) Using Miller tool #L-4520 and C-4171 driver, install differential bearing cup into the transaxle case.

FLUID

STANDARD PROCEDURE - FLUID DRAIN AND FILL

NOTE: The fluid required in this transaxle is Mopar® ATF+4 (Automatic Transmission Fluid—Type 9602).

All T350 transaxles are equipped with a fill plug. The fill plug is located on the left side of the transaxle differential area (Fig. 80). The fluid level should be within 3/16 inch from the bottom of the transaxle fill hole (vehicle must be level when checking).

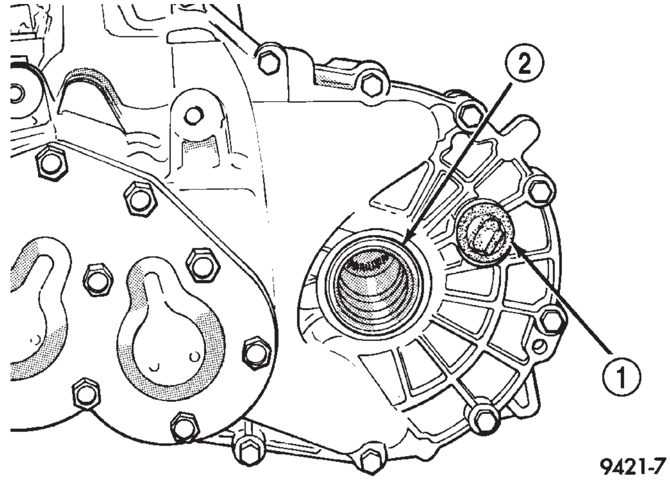


Fig. 80 Fill Plug Location

1 - RUBBER FILL PLUG
2 - LEFT DRIVESHAFT SEAL

All T350 transaxles are equipped with a drain plug. The drain plug is located on the lower right side of the transaxle differential housing (Fig. 81). Tighten drain plug to 28 N·m (250 in. lbs.)

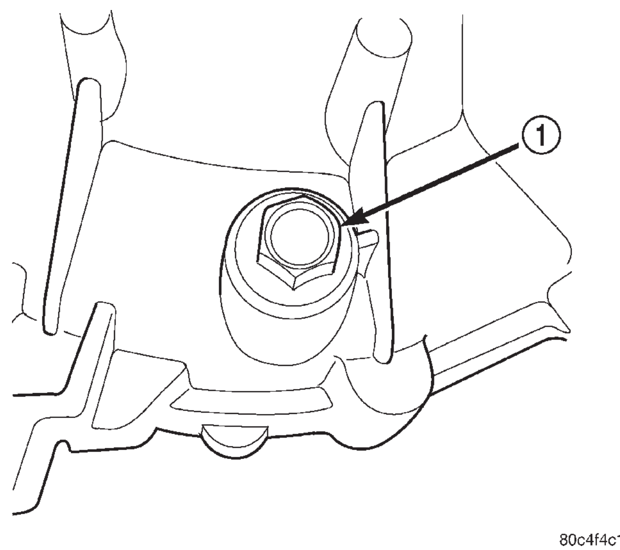


Fig. 81 Drain Plug Location

1 - DRAIN PLUG

Fill transaxle to capacity. Refer to following chart. Wipe the outside of the transaxle if any lubricant spills.

NV T350 MANUAL TRANSAXLE FLUID FILL

TRANSAXLE	METRIC MEASURE	U.S. MEASURE
NV T350	2.4-2.7 Liters	2.5-2.8 Quarts

GEAR SHIFT CABLE

REMOVAL

(1) Disconnect battery negative cable.

(2) Remove gearshift knob/boot assembly. Lift boot off of console and disengage knob retainers to free.

(3) Remove center console assembly (Fig. 82).

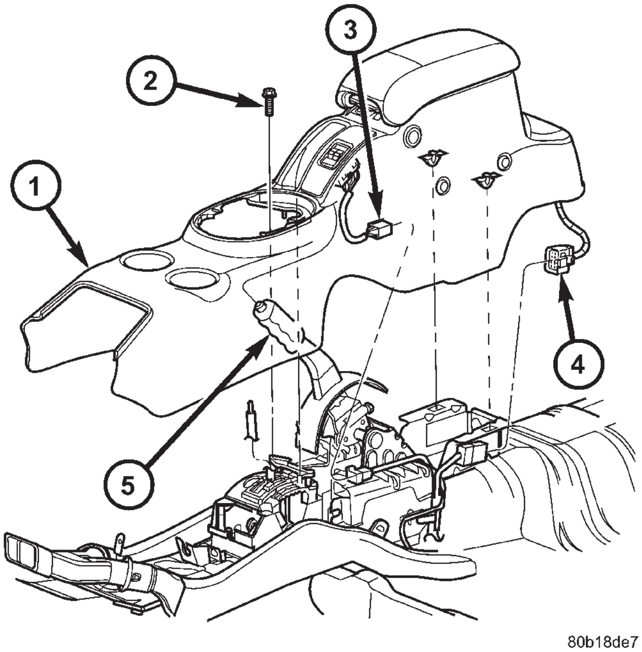


Fig. 82 Center Console Assembly—Typical

1 - CENTER CONSOLE
2 - SCREW
3 - IF EQUIPPED
4 - IF EQUIPPED
5 - PARK BRAKE HANDLE

(4) Disconnect crossover and selector cables from shift mechanism.

(5) Remove crossover and selector cable retaining clips (Fig. 83) from shift mechanism and disconnect cables.

(6) Remove air cleaner assembly.

(7) Disconnect crossover and selector cables from transaxle (Fig. 84).

(8) Remove retainer clips and disengage cables from bracket (Fig. 84).

(9) Raise vehicle on hoist.

(10) Remove cable grommet from floor pan.

(11) Pull cables forward and remove from under vehicle.

INSTALLATION

(1) Install gearshift cable assembly into engine compartment from under vehicle.

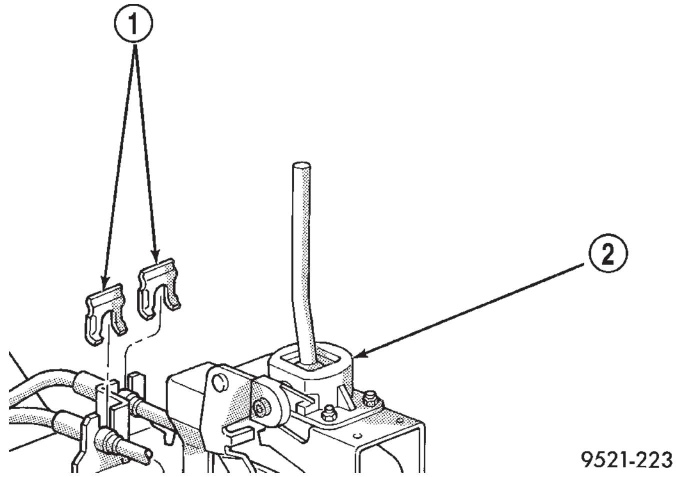


Fig. 83 Cable Retaining Clips

1 - CABLE CLIPS
2 - SHIFTER

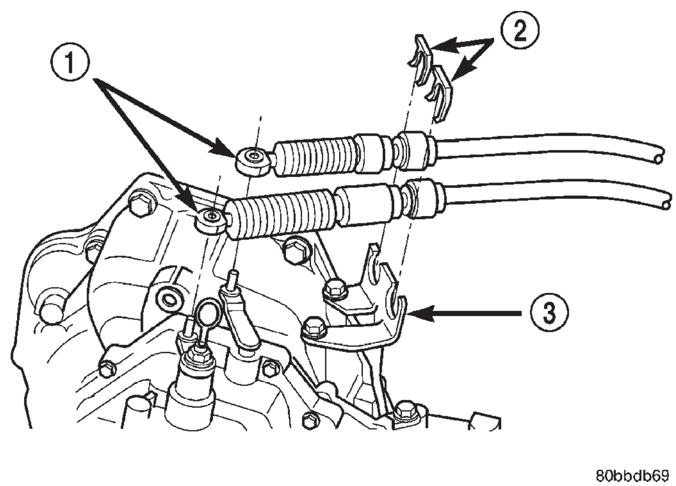


Fig. 84 Shift Cables at Transaxle

1 - SHIFT CABLES
2 - CLIPS
3 - BRACKET

(2) Feed cable assembly through hole in floor pan and secure grommet to floor pan.

(3) Lower vehicle.

(4) Install gearshift cables to mounting bracket (Fig. 84). Secure with new clips.

(5) Connect gearshift cables to transaxle crossover and selector levers (Fig. 84).

(6) Install air cleaner assembly.

(7) Connect crossover and selector cables to mechanism and secure with clips (Fig. 83).

NOTE: Only the crossover cable is adjustable. The selector cable does not have any adjustment capabilities.

(8) **Adjust crossover cable as follows:**

GEAR SHIFT CABLE (Continued)

(a) Loosen adjusting screw on crossover cable at shifter (Fig. 85).

(b) The gearshift mechanism and transaxle crossover lever are spring-loaded and self-centering. Alignment pins used in the past are not required anymore. Allow gearshift mechanism and transaxle crossover lever to relax in their neutral positions. To ensure the gearshift lever is in the proper position, place the shifter in 3rd or 4th gear if necessary. Torque adjustment screw to 8 N·m (70 in. lbs.). Care must be taken to avoid moving the shift mechanism off-center during screw tightening.

(c) Perform functional check by shifting transaxle into all gears.

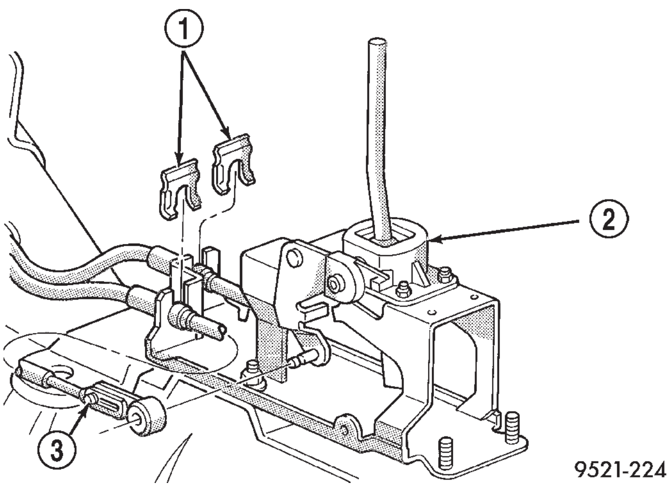


Fig. 85 Crossover and Selector Cables at Shift Mechanism

1 - CABLE CLIPS
2 - SHIFTER
3 - ADJUSTMENT SCREW

(9) Install center console assembly (Fig. 82).

(10) Install gearshift knob/boot assembly. Ensure knob retaining tabs are secured to shift lever. Snap boot to console at retainer locations.

GEAR SHIFT MECHANISM

REMOVAL

(1) Disconnect battery negative cable.

(2) Remove gearshift knob/boot assembly.

(3) Remove center console assembly (Fig. 86).

(4) Disconnect crossover cable from mechanism.

(5) Disconnect selector cable from mechanism.

(6) Remove crossover and selector cable retaining clips (Fig. 87) from mechanism and disconnect cables.

(7) Remove shift mechanism-to-floor pan bolts and remove mechanism (Fig. 88).

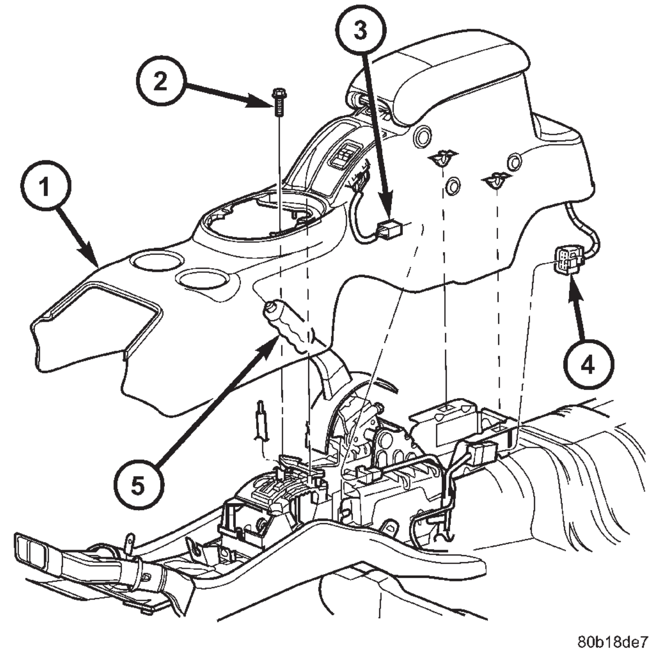


Fig. 86 Center Console Assembly—Typical

1 - CENTER CONSOLE
2 - SCREW
3 - IF EQUIPPED
4 - IF EQUIPPED
5 - PARK BRAKE HANDLE

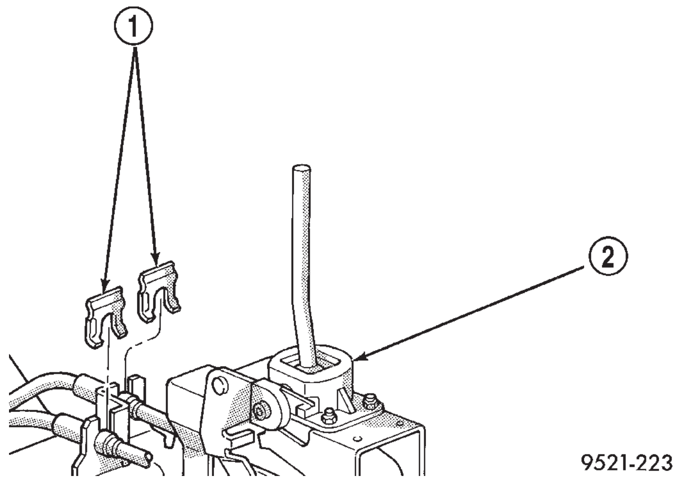


Fig. 87 Cable Retaining Clips

1 - CABLE CLIPS
2 - SHIFTER

INSTALLATION

(1) Install gear shift mechanism to floor pan (Fig. 88). Install and torque four (4) nuts to 25 N·m (18 ft. lbs.).

(2) Install crossover and selector cables into position. Secure with retaining clips (Fig. 89).

GEAR SHIFT MECHANISM (Continued)

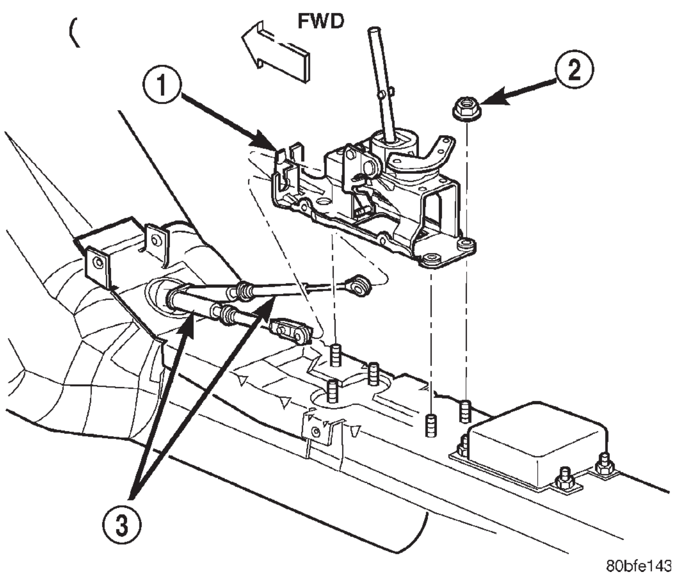


Fig. 88 Gearshift Mechanism

1 - GEARSHIFT MECHANISM
2 - NUT (5)
3 - GEARSHIFT CABLES

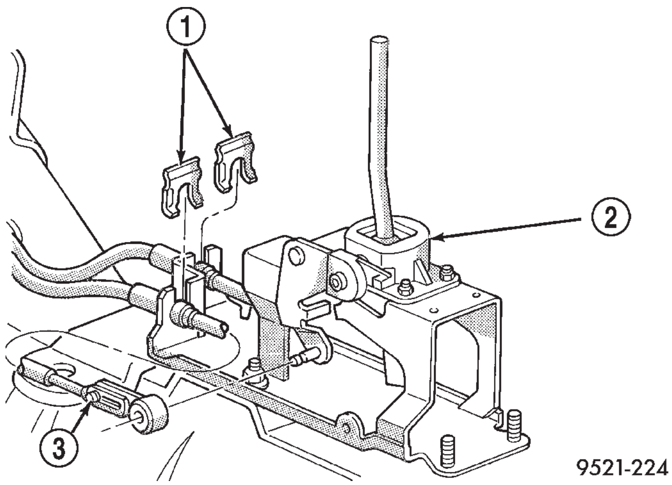


Fig. 89 Crossover and Selector Cables at Shift Mechanism

1 - CABLE CLIPS
2 - SHIFTER
3 - ADJUSTMENT SCREW

NOTE: Only the crossover cable is adjustable. The selector cable does not have any adjustment capabilities.

(3) **Adjust crossover cable as follows:**

(a) Loosen adjusting screw on crossover cable at shifter (Fig. 89).

(b) The gearshift mechanism and transaxle crossover lever are spring-loaded and self-centering. Alignment pins used in the past are not required anymore. Allow gearshift mechanism and transaxle crossover lever to relax in their neutral positions. To ensure the gearshift lever is in the proper position, place the shifter in 3rd or 4th gear if necessary. Torque adjustment screw to 8 N·m (70 in. lbs.). Care must be taken to avoid moving the shift mechanism off-center during screw tightening.

(c) Perform functional check by shifting transaxle into all gears.

(4) Install center console assembly (Fig. 86).

(5) Install gearshift knob/boot assembly. Ensure knob retaining tabs are secured to shift lever. Snap boot to console at retainer locations.

INPUT BEARING AND SLEEVE

REMOVAL

The input bearing is a one–piece bearing and sleeve unit (Fig. 90). The sleeve is the slide point for the clutch–release bearing and lever.

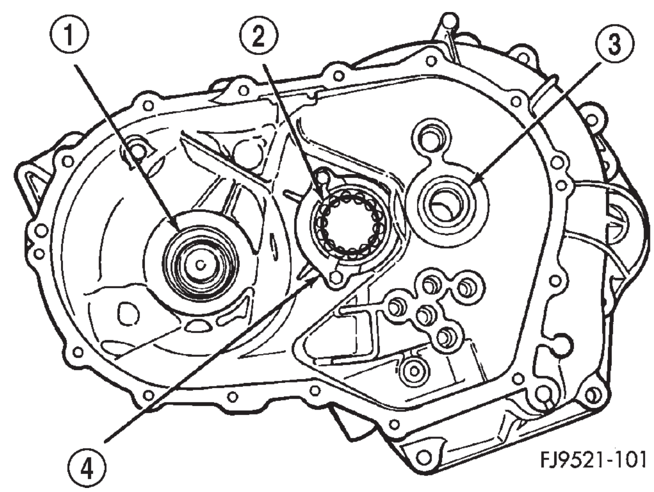


Fig. 90 Input Bearing And Sleeve

1 - DIFFERENTIAL BEARING
2 - OUTPUT BEARING
3 - INPUT BEARING
4 - BEARING RETAINER

(1) Install tool #6342 over input bearing on the gear case side of the transaxle clutch housing.

(2) Press the input bearing out of the housing (Fig. 91).

INSTALLATION

(1) Apply coating of Loctite® sealant on bearing outer diameter. Position sleeve and bearing assembly at input bearing bore.

(2) Install tool #C-4680-1 over input bearing (Fig. 92).

INPUT BEARING AND SLEEVE (Continued)

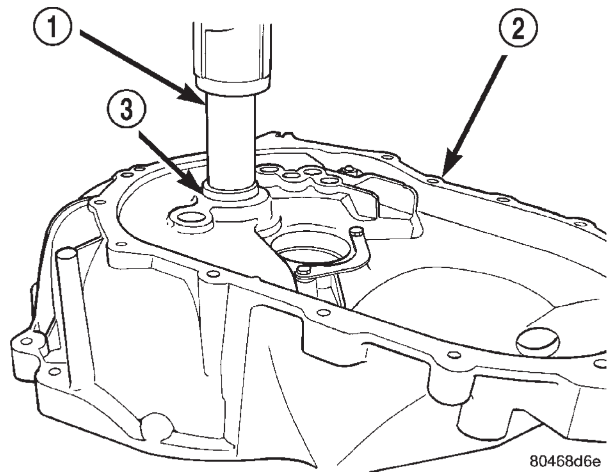


Fig. 91 Input Bearing Removal

1 - SPECIAL TOOL 6342
2 - BELLHOUSING HALF
3 - INPUT BEARING AND SLEEVE

(3) Using the spacer tool #4894 and shop press, install input bearing into bore until it is fully seated (Fig. 93).

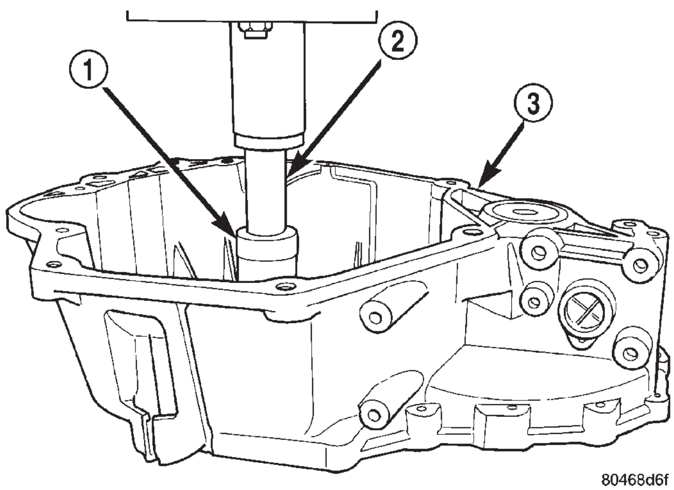


Fig. 92 Input Bearing Tool

1 - SPECIAL TOOL C-4680-1
2 - SPECIAL TOOL 4894
3 - BELLHOUSING HALF

INPUT SHAFT

DISASSEMBLY

Before disassembly of the input shaft, it is necessary to check the synchronizer stop ring gap. Use a feeler gauge to measure the gaps between the stop rings and the speed gears. The correct gaps are listed below:

- 1st - 0.522-2.208 mm (0.021-0.087 in)
- 2nd - 0.522-2.208 mm (0.021-0.087 in)

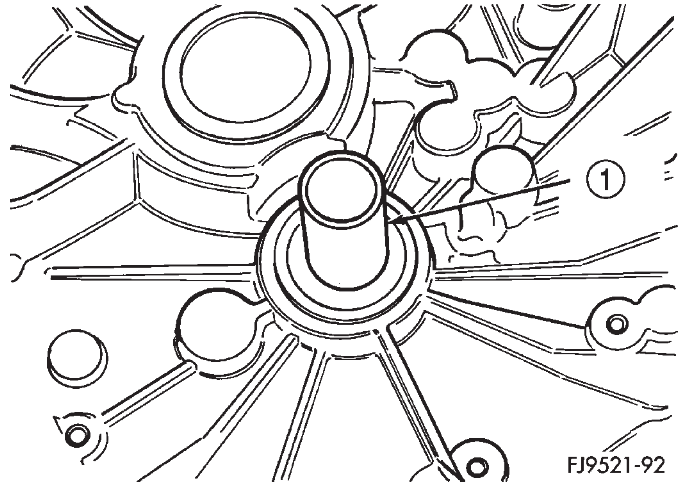


Fig. 93 Input Bearing Installed

1 - SLEEVE AND BEARING ASSEMBLY

- 3rd - 0.73-1.53 mm (0.029-0.060 in)
- 4th - 0.77-1.57 mm (0.030-0.062 in).
- 5th - 0.73-1.53 mm (0.029-0.060 in)

If a stop ring gap does not fall within the specifications, it must be inspected for wear and replaced. If the 1st or 2nd synchronizer stop ring is worn beyond specifications, the complete output shaft assembly must be replaced.

The input shaft incorporates the 3rd, 4th, and 5th speed gears and synchronizers on the assembly (Fig. 94).

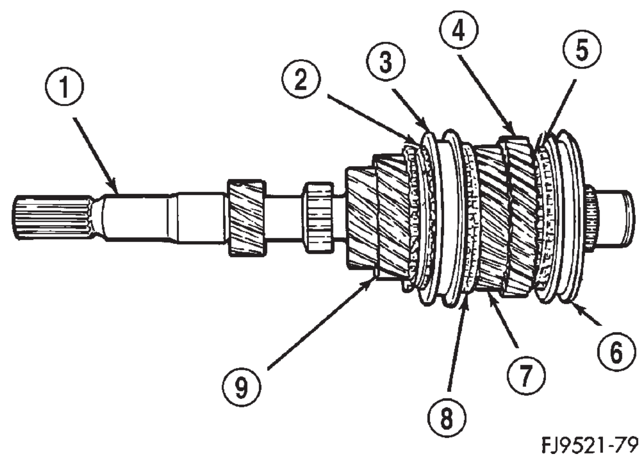


Fig. 94 Input Shaft

1 - INPUT SHAFT
2 - STOP RING
3 - SLEEVE
4 - 5TH SPEED GEAR
5 - STOP RING
6 - SLEEVE
7 - 4TH SPEED GEAR
8 - STOP RING
9 - 3RD SPEED GEAR

INPUT SHAFT (Continued)

(1) Install bearing splitter behind 5th speed gear. Remove snap ring at 5th synchronizer hub on input shaft (Fig. 95).

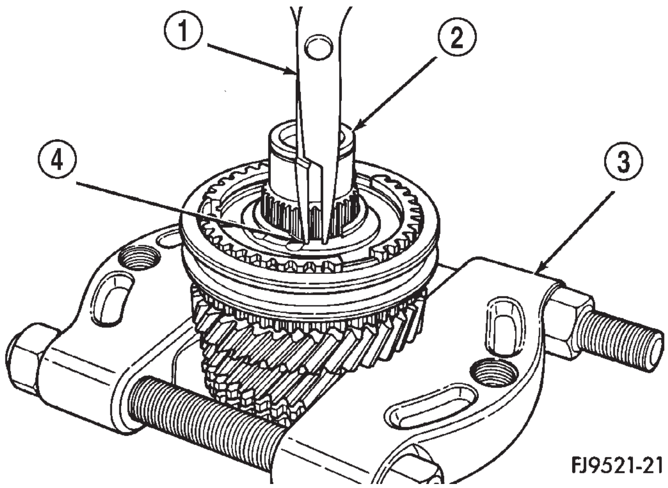


Fig. 95 5th Synchro and Hub Snap Ring Removal

1 - SNAP RING PLIERS
2 - INPUT SHAFT
3 - BEARING SPLITTER
4 - SNAP RING

(2) Remove synchronizer and gear using shop press (Fig. 96).

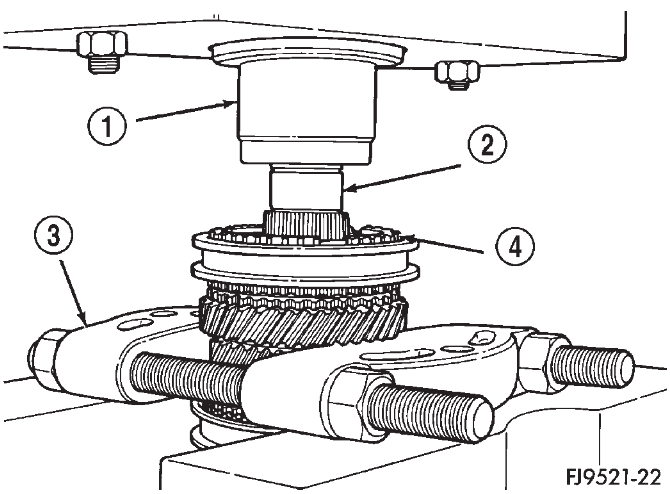


Fig. 96 Remove Synchronizer Using Shop Press

1 - PRESS RAM
2 - INPUT SHAFT
3 - BEARING SPLITTER
4 - SYNCHRONIZER ASSEMBLY

(3) Remove caged needle bearing (Fig. 97).

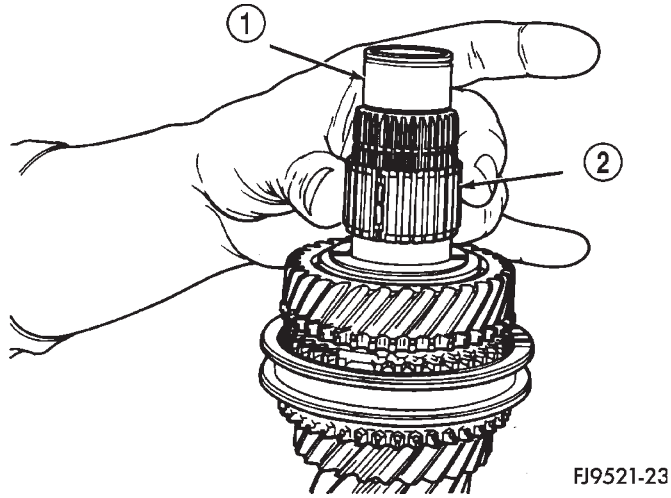


Fig. 97 Caged Needle Bearing Removal

1 - INPUT SHAFT
2 - CAGED NEEDLE BEARING

(4) Remove 4-5 gears split thrust washer ring (Fig. 98).

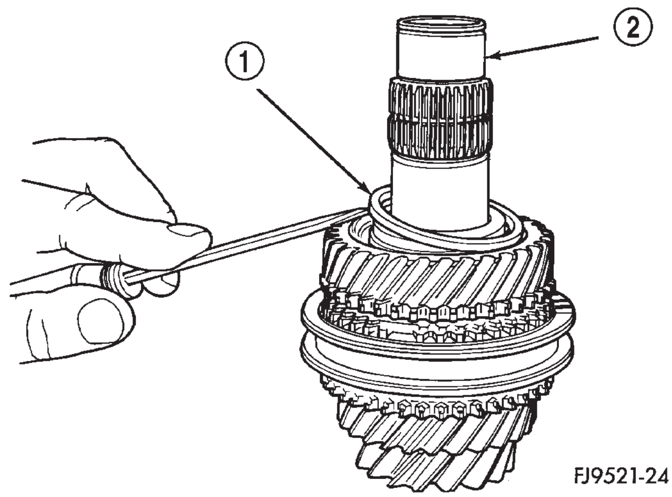


Fig. 98 Split Thrust Washer Ring

1 - SPLIT THRUST WASHER RING
2 - INPUT SHAFT

INPUT SHAFT (Continued)

(5) Remove split thrust washer (Fig. 99).

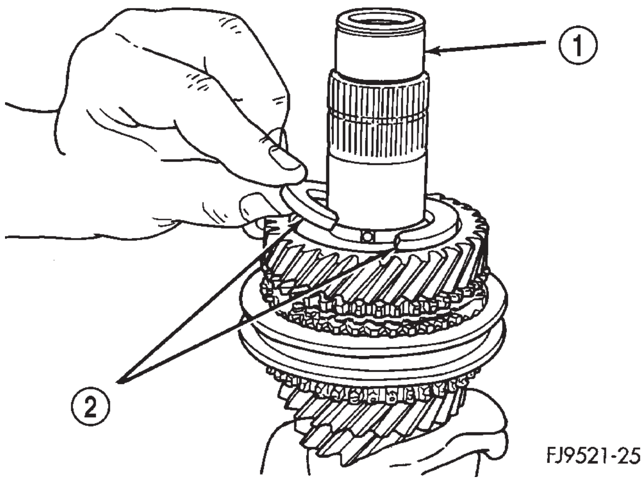


Fig. 99 Split Thrust Washer Removal

1 - INPUT SHAFT
2 - SPLIT THRUST WASHER

(6) Remove split thrust washer separation pin (Fig. 100).

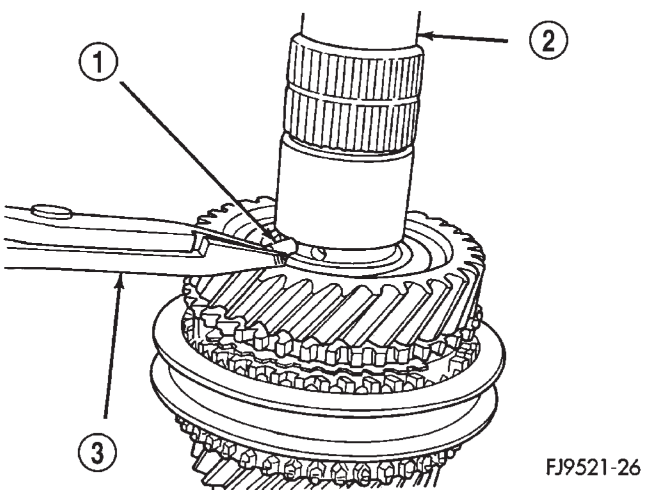


Fig. 100 Split Thrust Washer Separation Pin

1 - SEPARATION PIN
2 - INPUT SHAFT
3 - PLIERS

(7) Remove 4th gear (Fig. 101).

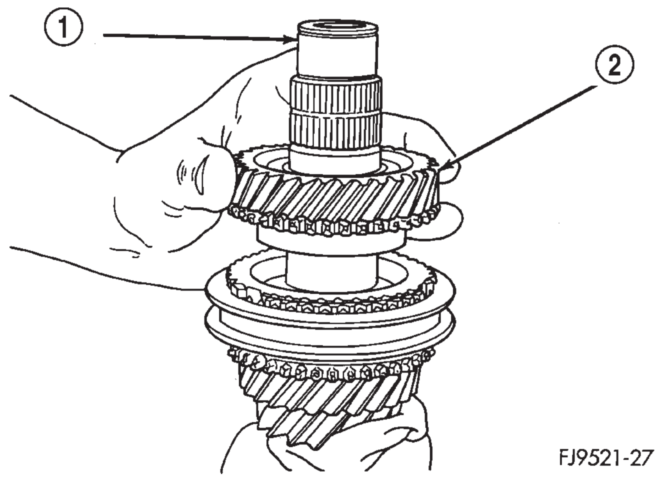


Fig. 101 4th Gear Removal

1 - INPUT SHAFT
2 - 4TH GEAR

(8) Remove 4th gear caged needle bearing (Fig. 102). Check the caged needle bearing for a broken retention spring.

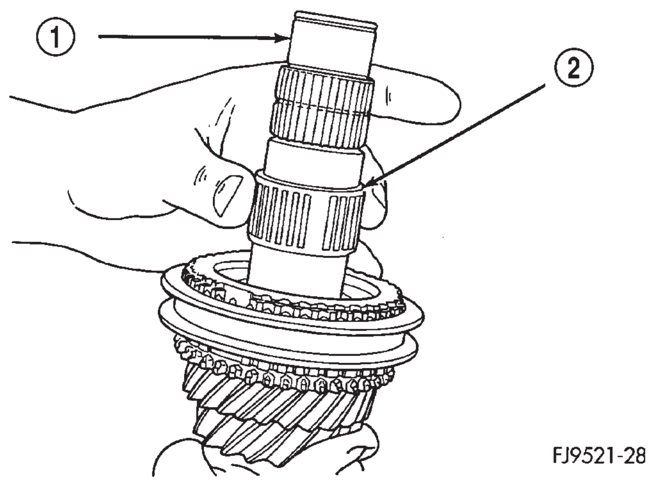


Fig. 102 Caged Needle Bearing Removal

1 - INPUT SHAFT
2 - CAGED NEEDLE BEARING

INPUT SHAFT (Continued)

(9) Remove blocking ring. Remove 3-4 synchronizer hub retaining snap ring (Fig. 103).

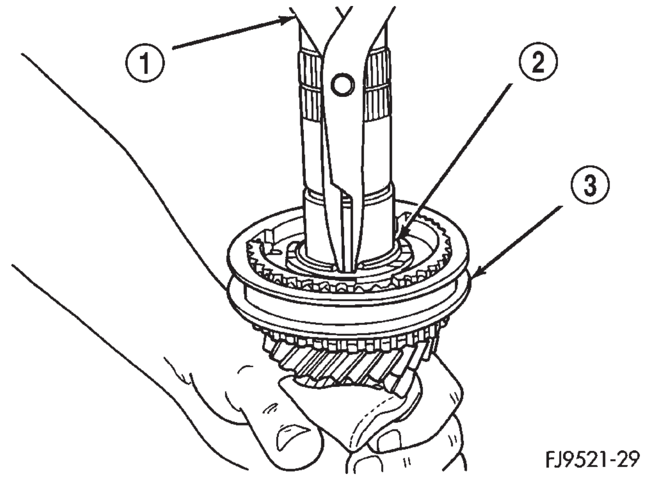


Fig. 103 3-4 Synchronizer Hub Snap Ring

1 - SNAP RING PLIERS
2 - SYNCHRO SNAP RING
3 - SYNCHRONIZER ASSEMBLY

(10) Install input shaft in shop press. Using bearing splitter, remove 3-4 synchronizer and 3rd gear (Fig. 104).

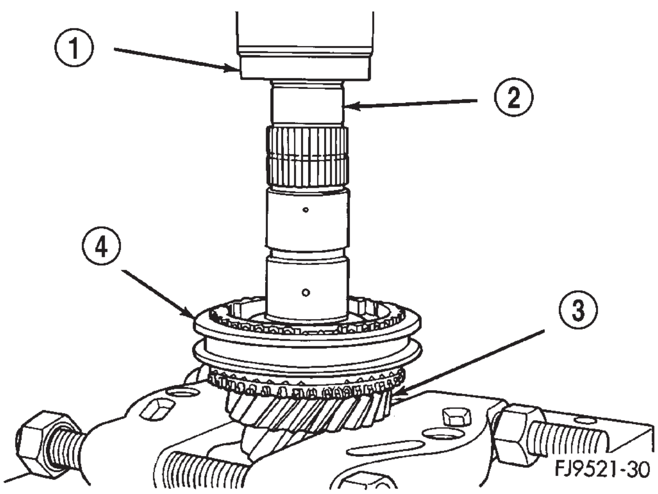


Fig. 104 3rd Gear Removal

1 - PRESS RAM
2 - INPUT SHAFT
3 - 3RD GEAR
4 - SYNCHRONIZER ASSEMBLY

(11) Remove 3rd gear caged needle bearing (Fig. 105). Inspect needle bearing for a broken retention spring

(12) Inspect the input shaft for worn or damaged bearing races or chipped gear teeth. Replace as necessary.

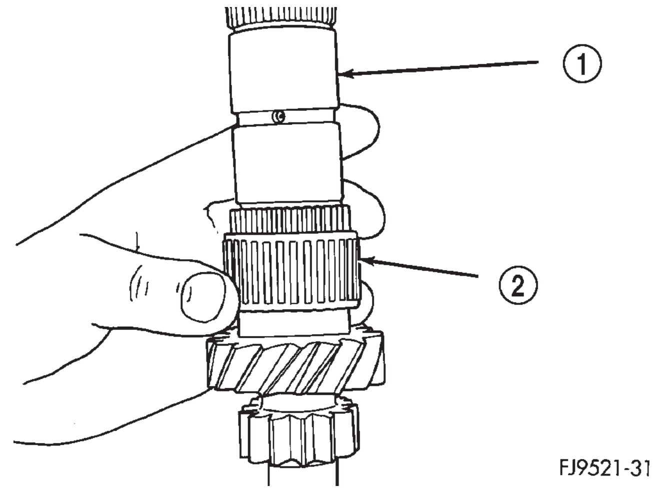


Fig. 105 3rd Gear Caged Needle Bearing

1 - INPUT SHAFT
2 - 3RD GEAR CAGED NEEDLE BEARING

ASSEMBLY

The snap rings that are used on the input shaft are available in select fit sizes. Use the thickest snap ring that fits in each snap ring groove.

(1) Place input shaft into shop press.

(2) Install 3rd gear caged needle bearing (Fig. 106).

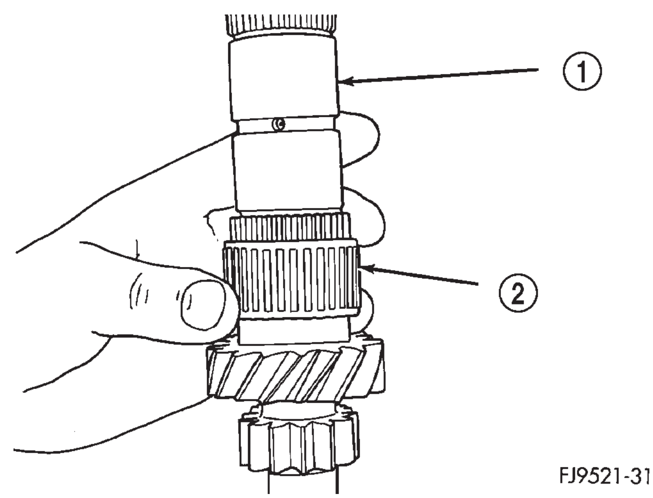


Fig. 106 3rd Gear Caged Needle Bearing

1 - INPUT SHAFT
2 - 3RD GEAR CAGED NEEDLE BEARING

(3) Install 3rd gear and 3-4 synchronizer onto input shaft. Install Tool #C-3717 over input shaft and press on synchronizer hub and 3rd gear (Fig. 107). The synchronizer hub has the letter **U** stamped on the top face of the hub. This designates that the hub must be installed with the **U** facing upward.

(4) Install 3-4 synchronizer snap ring into slot on input shaft.

INPUT SHAFT (Continued)

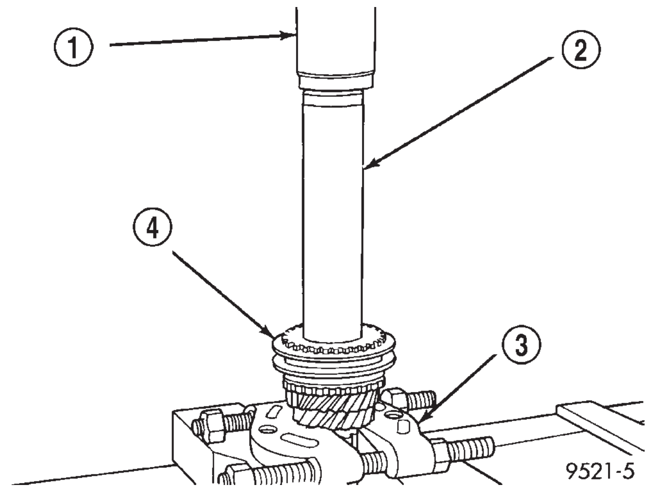


Fig. 107 Press On 3rd Gear Synchronizer Hub

1 - PRESS RAM
2 - SPECIAL TOOL C-3717
3 - BEARING SPLITTER
4 - 3RD GEAR SYNCHRONIZER ASSEMBLY

(5) Install blocking ring into 3-4 synchronizer. Install 4th gear caged needle bearing.

(6) Install 4th gear onto input shaft.

(7) Install 4-5 split thrust washer separation pin (Fig. 108).

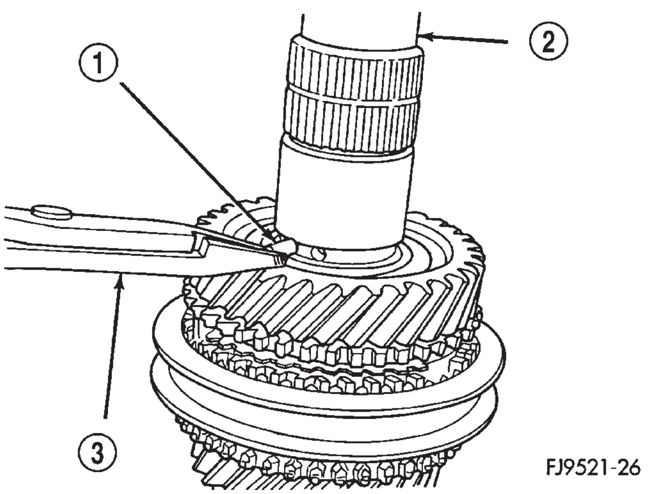


Fig. 108 Split Thrust Washer Separation Pin

1 - SEPARATION PIN
2 - INPUT SHAFT
3 - PLIERS

(8) Install split thrust washer onto input shaft (Fig. 109).

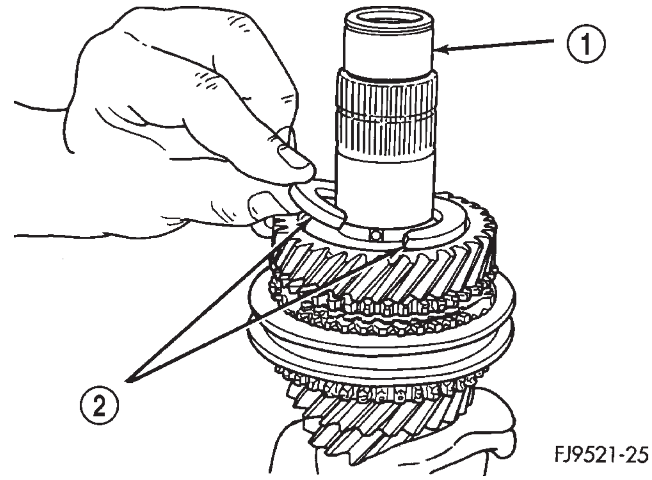


Fig. 109 Split Thrust Washer Installation

1 - INPUT SHAFT
2 - SPLIT THRUST WASHER

(9) Install split thrust washer retaining ring (Fig. 110).

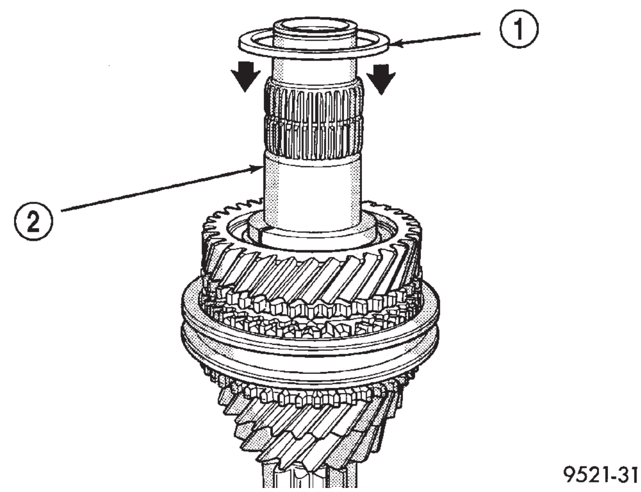


Fig. 110 Retaining Ring Installation

1 - SPLIT THRUST WASHER RING
2 - INPUT SHAFT

INPUT SHAFT (Continued)

(10) Install 5th gear caged needle bearing (Fig. 111).

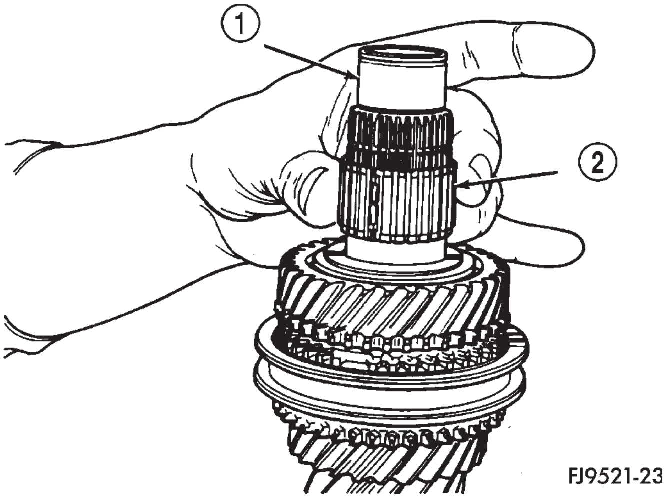


Fig. 111 Caged Needle Bearing Installation

1 - INPUT SHAFT
2 - CAGED NEEDLE BEARING

(11) Using special tool #C-3717, install 5th speed gear and synchronizer (Fig. 112). The 5th gear synchronizer hub has the letter **S** stamped on the top face of the hub. This designates that the hub must be installed with the **S** facing upward.

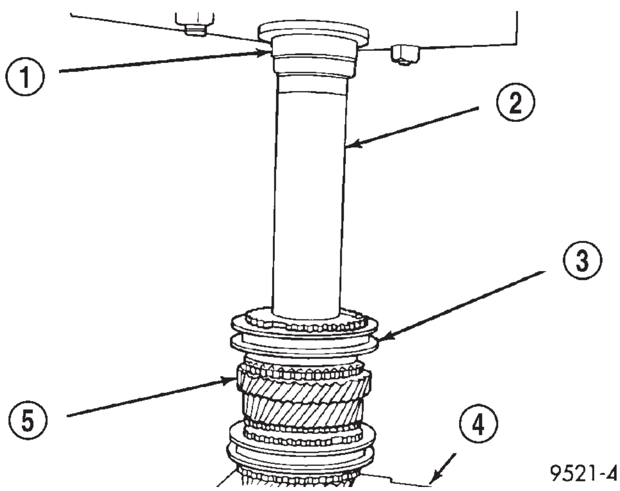


Fig. 112 5th Speed Gear Installation

1 - PRESS RAM
2 - SPECIAL TOOL C-3717
3 - SYNCHRONIZER ASSEMBLY
4 - BEARING SPLITTER
5 - 5TH SPEED GEAR

(12) Install 5th gear synchronizer snap ring (Fig. 113).

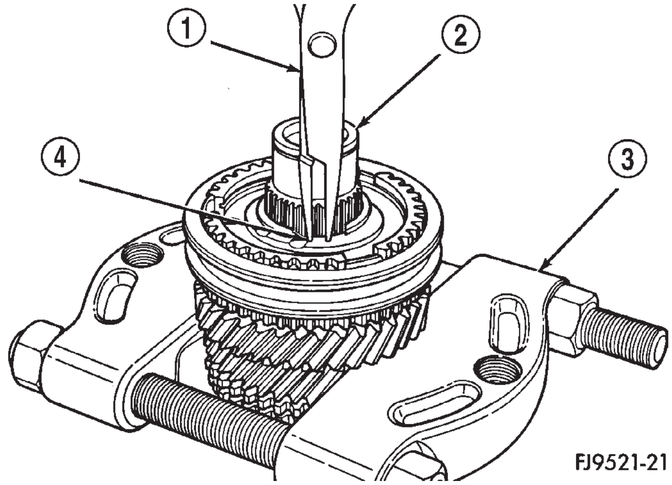


Fig. 113 5th Gear Synchronizer Snap Ring Installation

1 - SNAP RING PLIERS
2 - INPUT SHAFT
3 - BEARING SPLITTER
4 - SNAP RING

OUTPUT BEARING AND RACE

REMOVAL

CAUTION: The position of the output shaft bearing is critical. The bearing is not identical end-to-end. Install bearing with larger diameter cage ring facing out.

(1) Remove caged roller bearing from output bearing race (Fig. 114).

(2) Remove screws at output bearing retainer strap (Fig. 115).

(3) Install tool #6787 and slide hammer (Fig. 116). Tighten tool to output bearing race.

(4) Using slide hammer, remove output bearing race.

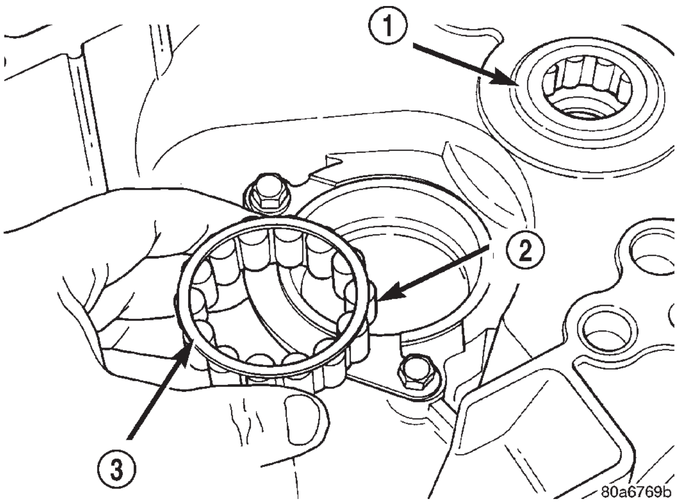


Fig. 114 Output Roller Bearing

1 - INPUT BEARING
2 - OUTPUT BEARING
3 - LARGER DIAMETER CAGE RING

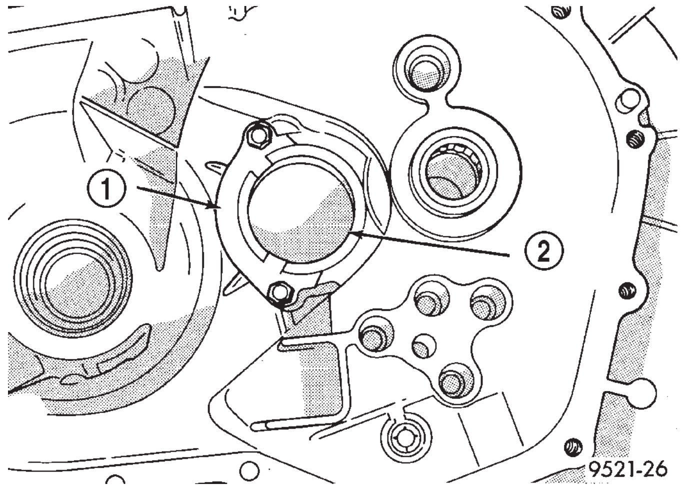


Fig. 115 Output Bearing Strap

1 - BEARING RETAINER
2 - OUTPUT BEARING RACE

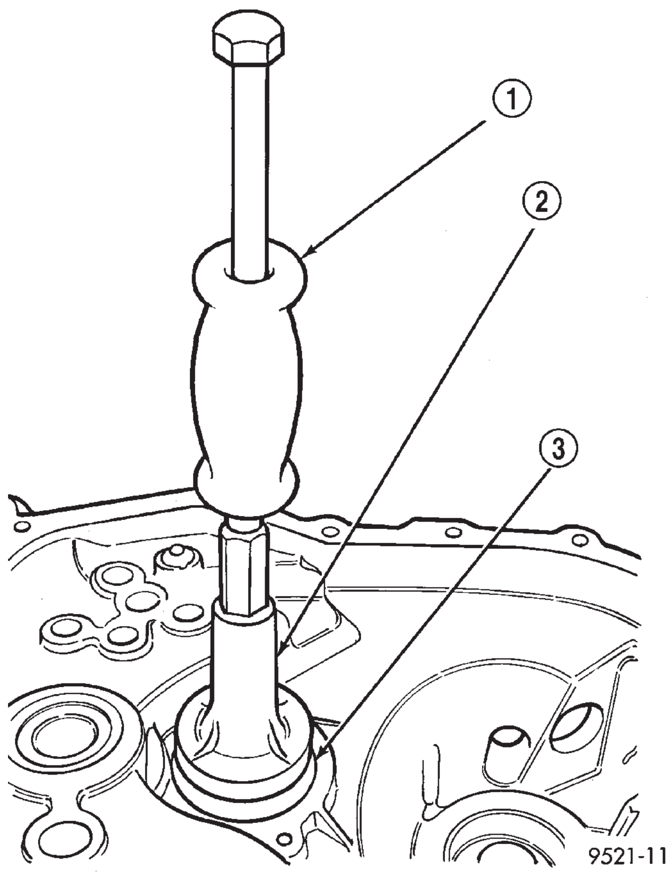


Fig. 116 Output Bearing Race Removal

1 - C-3752
2 - SPECIAL TOOL 6787
3 - OUTPUT SHAFT BEARING RACE

OUTPUT BEARING AND RACE (Continued)

INSTALLATION

(1) Line up output bearing race to race bore.

(2) Insert tool #4628 with C-4171 into output bearing race (Fig. 117). Tap race into bore. Install output bearing into race. Verify that the larger diameter cage is facing outward. Position bearing retaining strap. Tighten bolts to 11 N·m (96 in. lbs.).

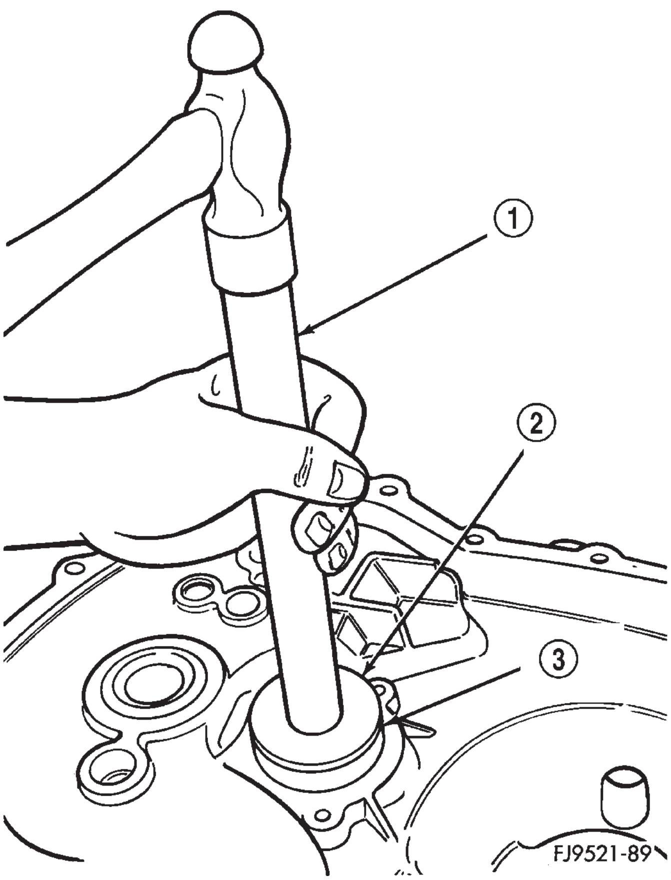


Fig. 117 Output Bearing Race Installation

1 - TOOL C-4171
2 - TOOL C-4628
3 - OUTPUT BEARING RACE

It is necessary to check the synchronizer stop ring gap. Use a feeler gauge to measure the gaps between the stop rings and the speed gears. The correct gaps are listed below:

- 1st—0.522-2.208 mm (0.021-0.087 in)
- 2nd—0.522-2.208 mm (0.021-0.087 in)
- 3rd—0.73-1.53 mm (0.029-0.060 in)
- 4th—0.77-1.57 mm (0.030-0.062 in)
- 5th—0.73-1.53 mm (0.029-0.060 in)

If a stop ring gap does not fall within the specifications it must be inspected for wear and replaced. If the 1st or 2nd synchronizer stop ring is worn beyond specifications, the complete output shaft assembly must be replaced.

The output shaft incorporates the 1st and 2nd gears and synchronizers on the assembly (Fig. 118).

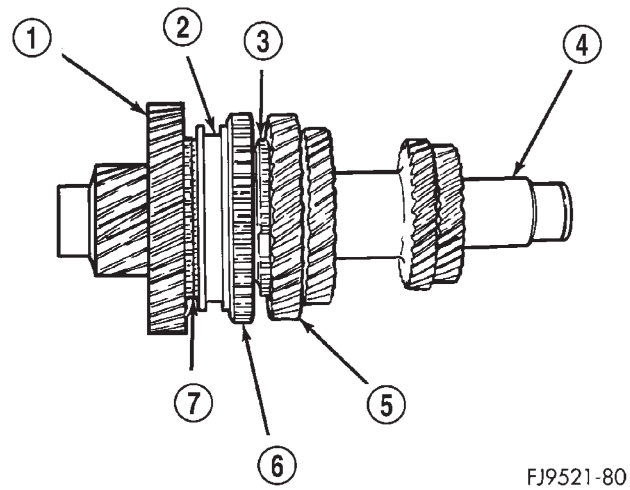


Fig. 118 Output Shaft

1 - 1ST GEAR
2 - SLEEVE
3 - STOP RING
4 - OUTPUT SHAFT
5 - 2ND SPEED GEAR
6 - REVERSE GEAR
7 - STOP RING

OUTPUT SHAFT

DISASSEMBLY

CAUTION: The output shaft is serviced as an assembly. Do not try to repair any component on the output shaft. If the 1-2 synchronizer or gear fails, it is necessary to replace the output shaft assembly.

REAR BEARING OIL FEED TROUGH

REMOVAL

The bearing oil feed trough is retained in the case by a pin that is molded into the case and clips that are part of the trough (Fig. 119).

(1) Using light plier pressure, squeeze the clips together at the rear of the trough.

(2) Slide the trough over the retaining pin that locates the trough in the case.

REAR BEARING OIL FEED TROUGH (Continued)

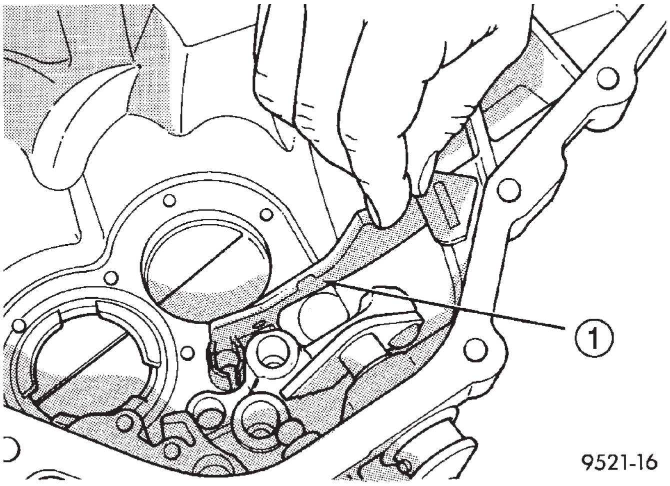


Fig. 119 Oil Feed Trough

1 - OIL FEED TROUGH

INSTALLATION

(1) To install oil feed trough, reverse removal procedure.

SHIFT CROSSOVER SHAFT

REMOVAL

(1) Disassemble transaxle.

(2) With the transaxle disassembled, remove the crossover shaft seal.

(3) Using snap–ring pliers, remove the snap ring at the crossover shaft bore (Fig. 120).

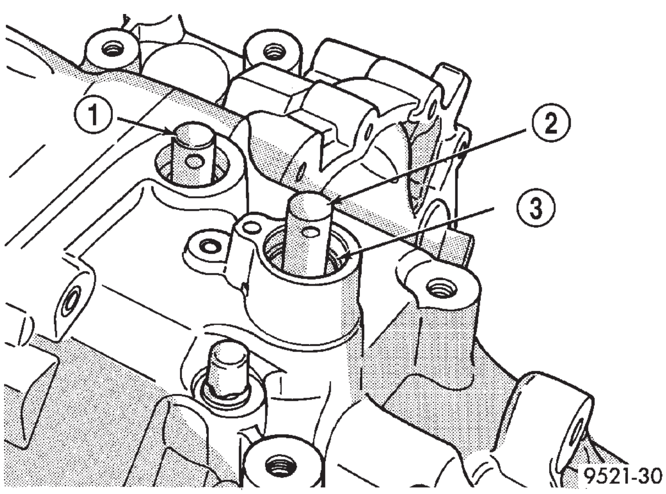


Fig. 120 Crossover Shaft Snap Ring

1 - SELECTOR SHAFT
2 - CROSSOVER SHAFT
3 - SNAP RING

(4) Push the crossover shaft in the case and remove the crossover assembly.

INSTALLATION

(1) Install crossover shaft to case and install snap ring (Fig. 120).

(2) Install the crossover shaft seal.

(3) Assemble transaxle.

SHIFT RAIL BUSHINGS

REMOVAL

(1) Thread tool #6786 into shift rail bushing.

(2) Install slide hammer #3752 onto tool.

(3) Remove bushing using slide hammer and tool assembly (Fig. 121).

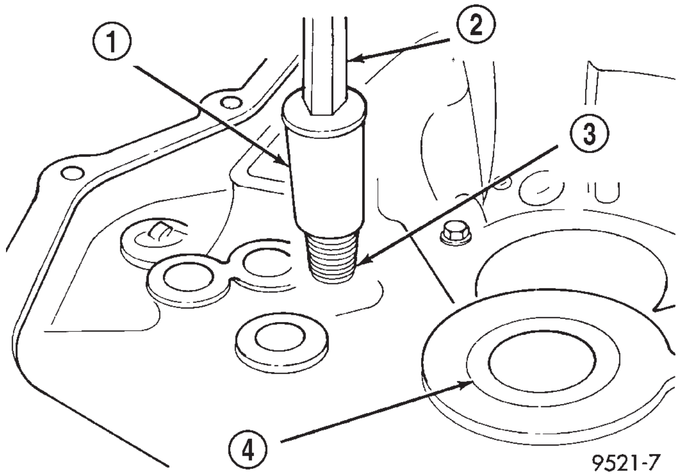


Fig. 121 Shift Rail Bushing Removal

1 - SPECIAL TOOL 6786
2 - SLIDE HAMMER C-3752
3 - SHIFTER RAIL BUSHING
4 - INPUT BEARING

INSTALLATION

(1) Line up replacement bushing in bore.

(2) Using tool #MD998343, tap bushing into bore until flush with the chamfer in the case.

SHIFT SELECTOR SHAFT

REMOVAL

(1) Disassemble transaxle.

(2) With the transaxle disassembled, remove the selector shaft by pushing on the shaft from the outside. Pull shaft out from the inside.

INSTALLATION

(1) Pull selector shaft into position from the outside.

(2) Assemble transaxle.

SHIFT SELECTOR SHAFT BUSHING

REMOVAL

(1) Remove selector shaft using procedure in this group.

(2) Thread tool #6786 into bushing.

(3) Install slide hammer #3752 onto tool and remove bushing using slide hammer (Fig. 122).

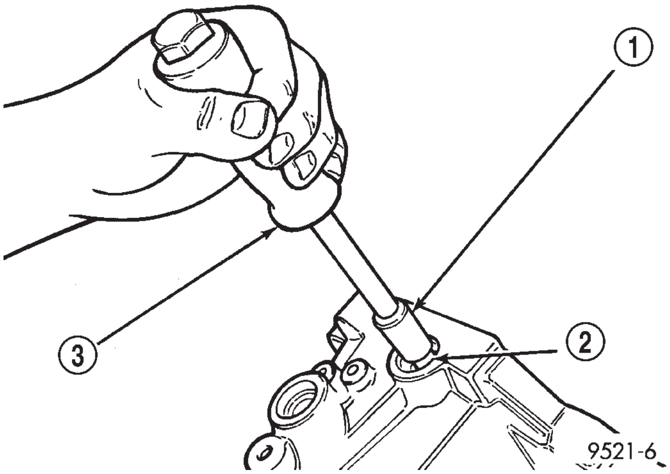


Fig. 122 Selector Shaft Bushing Removal

1 - SPECIAL TOOL 6786
2 - SHIFT SHAFT BUSHING
3 - SLIDE HAMMER C-3752

INSTALLATION

(1) Position replacement bushing over selector shaft bore.

(2) Using an appropriate size deep–well socket, install bushing in selector shaft bore (Fig. 123).

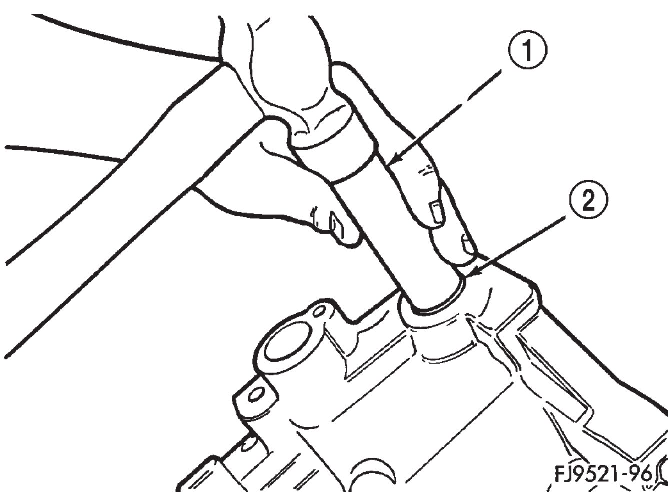


Fig. 123 Selector Shaft Bushing Installation

1 - DEEP WELL SOCKET
2 - SHIFTER SHAFT BUSHING

SHIFT SHAFT SEALS

REMOVAL

It is not necessary to remove the shift shafts from the transaxle to service the shift shaft seals.

(1) Using a pick tool, pry up on the shift shaft seal, and remove seal from bore.

INSTALLATION

(1) Position new shift shaft seal into bore.

(2) Install shift shaft seal into bore using an appropriate size deep-well socket.

SYNCHRONIZER

DISASSEMBLY

Place synchronizer in a clean shop towel and wrap. Press on inner hub. Carefully open up shop towel and remove springs, balls, keys, hub, and sleeve.

CLEANING

CLEAN

Do not attempt to clean the blocking rings in solvent. The friction material will become contaminated. Place synchronizer components in a suitable holder and clean with solvent. Air dry.

INSPECTION

INSPECT

Proper inspection of components involve:

- Teeth, for wear, scuffed, nicked, burred, or broken teeth
- Keys, for wear or distortion
- Balls and springs, for distortion, cracks, or wear

If any of these conditions exist in these components, replace as necessary.

ASSEMBLY

(1) Position synchronizer hub onto a suitable holding fixture (input shaft). The synchronizer hubs are directional. The hubs must be installed with the **U** facing upward.

SYNCHRONIZER (Continued)

(2) Install springs into hub slot (Fig. 124) .

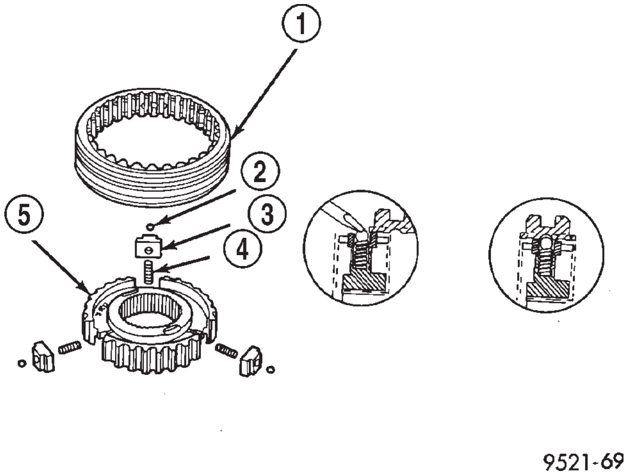


Fig. 124 Synchronizer Assembly

1 - SLEEVE
2 - BALL
3 - KEY
4 - SPRING
5 - HUB

(3) Insert key into hub and spring.

(4) Apply petroleum jelly to the hole in the key. Insert balls into each key (Fig. 125) .

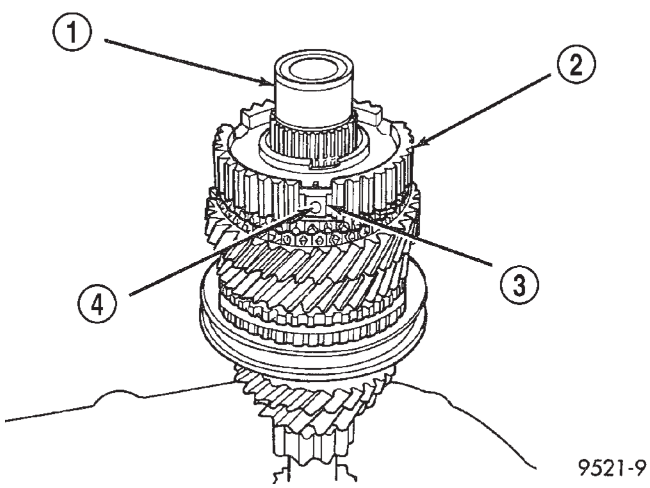


Fig. 125 Synchronizer Balls

1 - INPUT SHAFT
2 - HUB
3 - KEY
4 - BALL

(5) Slide sleeve over the hub and depress balls as you carefully slip the sleeve into position (Fig. 126) .

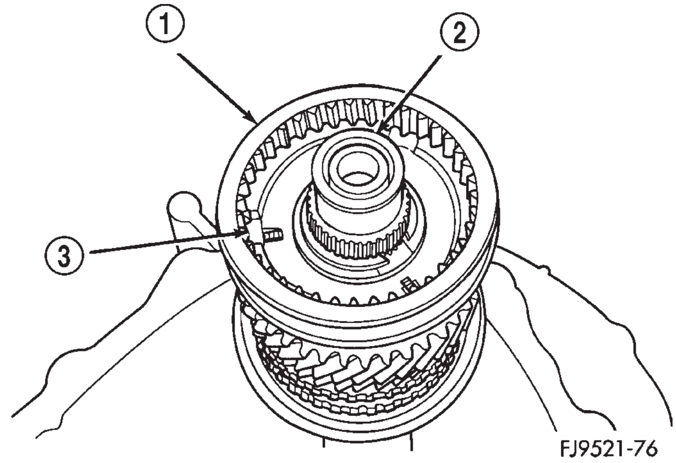


Fig. 126 Synchronizer Sleeve

1 - SLEEVE
2 - INPUT SHAFT
3 - KEY

(6) Line up stop ring tang over the keys in the hub (Fig. 127) . Install stop rings. Center the keys and balls by pushing on both stop rings.

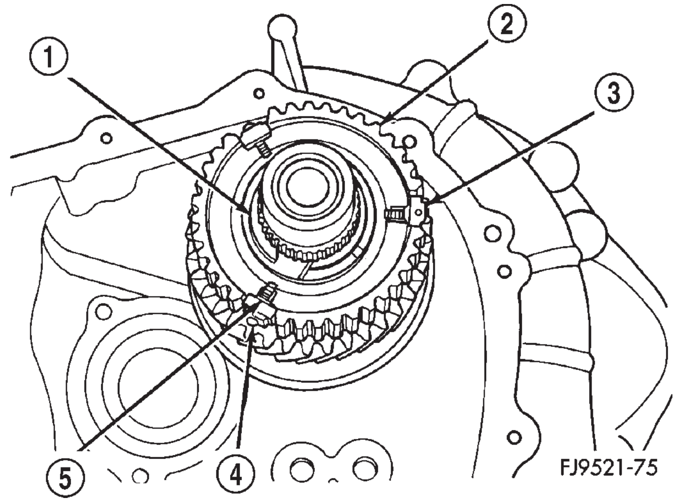


Fig. 127 Keys in Hub

1 - SNAP RING
2 - CLUTCH
3 - KEY
4 - BALL
5 - SPRING

VEHICLE SPEED SENSOR

DESCRIPTION

VEHICLE SPEED SENSOR

The Vehicle Speed Sensor (VSS) is a pulse generator mounted to an adapter near the transmission output shaft. The sensor is driven through the adapter by a speedometer pinion gear. The VSS pulse signal to the speedometer/odometer is monitored by the PCM speed control circuitry to determine vehicle speed and to maintain speed control set speed.

REMOVAL

(1) Raise vehicle on hoist.

(2) Disconnect the speed sensor connector (Fig. 128) .

CAUTION: Clean area around speed sensor before removing to prevent dirt from entering the transaxle during speed sensor removal.

(3) Remove speed sensor retaining bolt (Fig. 128) .

(4) Remove speed sensor from transaxle.

CAUTION: Carefully remove vehicle speed sensor so that sensor drive gear does not fall into transaxle. Should sensor drive gear fall into the transaxle during sensor removal, drive gear must be reattached to sensor.

(5) Remove speed sensor drive gear from speed sensor.

INSTALLATION

(1) Install pinion gear to speed sensor (Fig. 128) .

(2) Using a NEW o-ring, install the speed sensor to the transaxle (Fig. 128) .

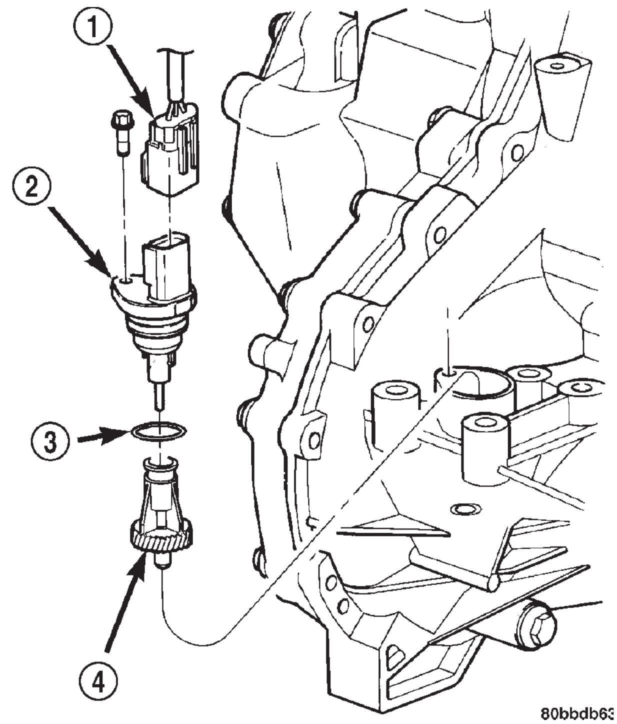


Fig. 128 Speed Sensor and Pinion—Removal/ Installation

1 - CONNECTOR
2 - SENSOR
3 - O-RING
4 - SPEEDO PINION

(3) Install the bolt and torque to 7 N·m (60 in. lbs.).

(4) Connect speed sensor connector (Fig. 128) .

(5) Lower vehicle and road test to verify proper speedometer operation.

T850 MANUAL TRANSAXLE

TABLE OF CONTENTS

T850 MANUAL TRANSAXLE

DESCRIPTION

The NV T850 5-speed transaxle (Fig. 1) is a constant-mesh manual transaxle that is synchronized in all gear ranges, including reverse.

The transaxle consists of three major sub-assemblies: the input shaft, intermediate shaft, and differential assembly. The transaxle shift system consists of a mechanical shift cover, rails, forks, and cables. The unique design of this shift system provides a higher mechanical advantage, resulting in less friction and lower shift cable loads for smoother, more positive operation.

The NV T850 transaxle is available with the 2.7L Gas engine option. Its gear ratios are as follows:

GEAR	RATIO
1st	3.65
2nd	2.05
3rd	1.37
4th	0.97
5th	0.76
Reverse	3.47
Final Drive Ratio	3.77

T850 MANUAL TRANSAXLE (Continued)

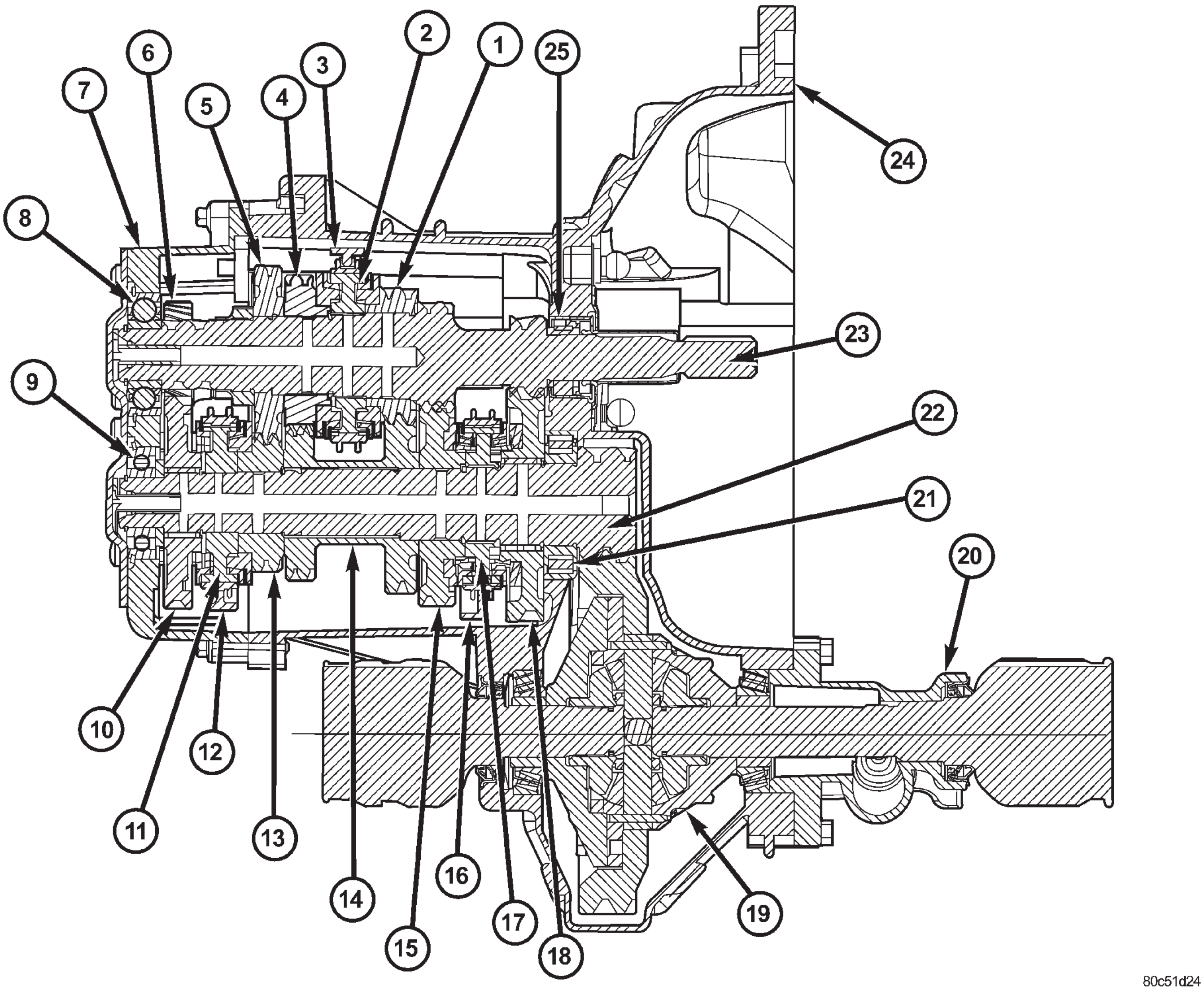


Fig. 1 NV T850 Transaxle

1 - 3RD GEAR (SPEED)
2 - 3/4 SYNCHRONIZER
3 - 3/4 SHIFT FORK
4 - 4TH GEAR (SPEED)
5 - 5TH GEAR (INPUT)
6 - REVERSE IDLER GEAR
7 - END COVER, REAR
8 - INPUT SHAFT BEARING (SEALED BALL)
9 - INTERMEDIATE SHAFT BEARING (SEALED BALL)
10 - REVERSE GEAR
11 - 5/R SYNCHRONIZER
12 - 5/R SHIFT FORK
13 - 5TH GEAR (SPEED)
14 - 3/4 CLUSTER GEAR
15 - 2ND GEAR (SPEED)
16 - 1/2 SHIFT FORK
17 - 1/2 SYNCHRONIZER
18 - 1ST GEAR (SPEED)
19 - DIFFERENTIAL ASSEMBLY
20 - EXTENSION HOUSING
21 - INTERMEDIATE SHAFT BEARING (CAGED ROLLER)
22 - INTERMEDIATE SHAFT
23 - INPUT SHAFT
24 - CASE
25 - INPUT SHAFT BEARING (ROLLER)

T850 MANUAL TRANSAXLE (Continued)

TRANSAXLE IDENTIFICATION

The transaxle model, assembly part number, build date, and final drive ratio (FDR) can be found on a metal tag fastened to the transaxle case on the bell-housing (Fig. 2). A barcode label is also glued to the transaxle bellhousing, and it too includes the trans-axle part number.

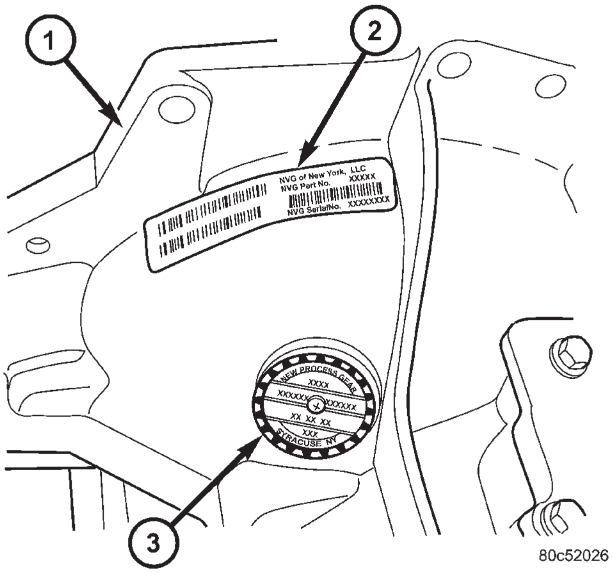


Fig. 2 T850 Transaxle Identification

1 - TRANSAXLE BELLHOUSING
2 - BARCODE LABEL
3 - I.D. TAG

T850 MANUAL TRANSAXLE (Continued)

OPERATION

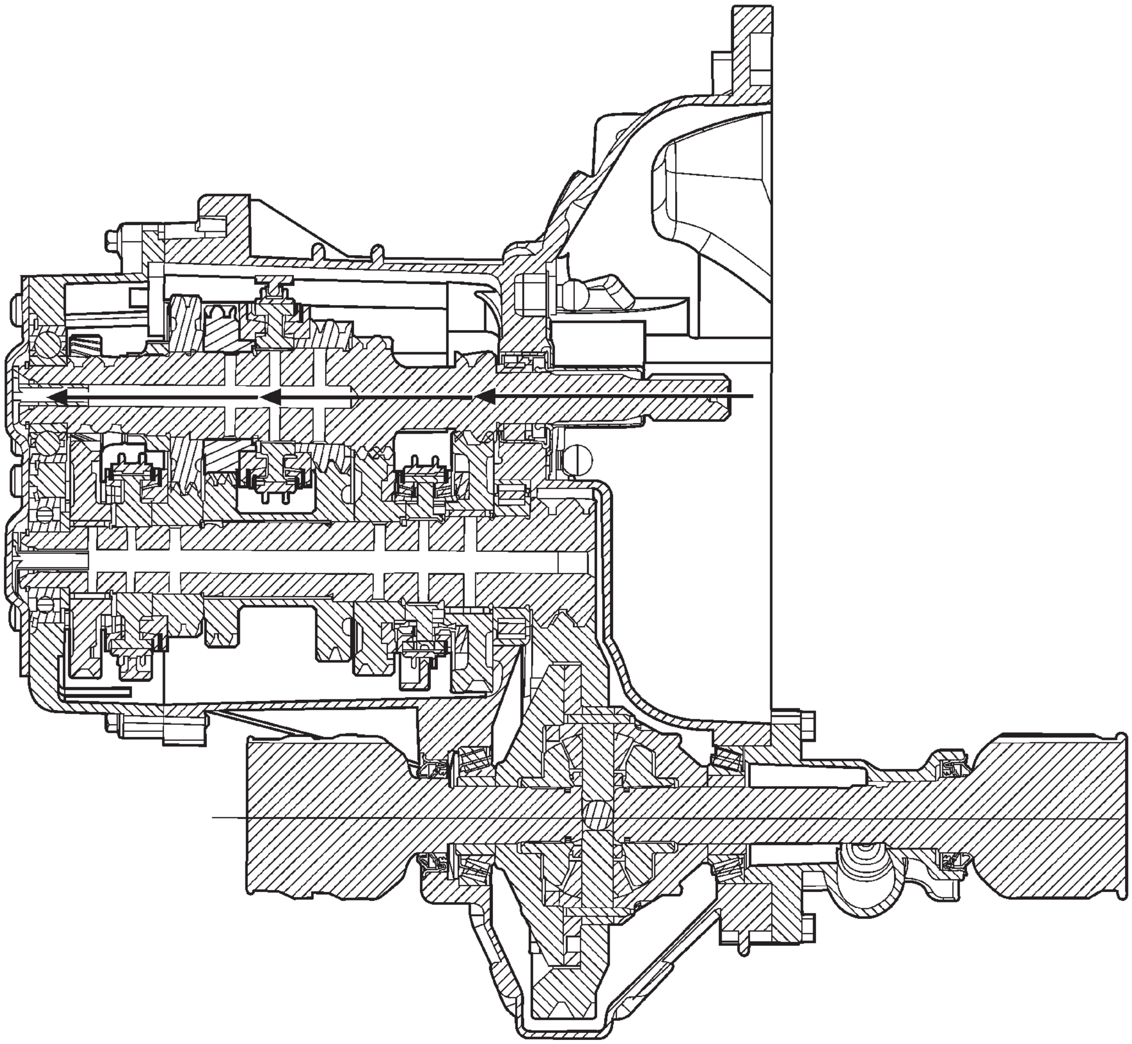


Fig. 3 Neutral Gear Operation

NEUTRAL

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. Since no synchronizers are engaged on either the input or intermediate shafts, power is not transmitted to the intermediate shaft and the differential does not turn (Fig. 3).

T850 MANUAL TRANSAXLE (Continued)

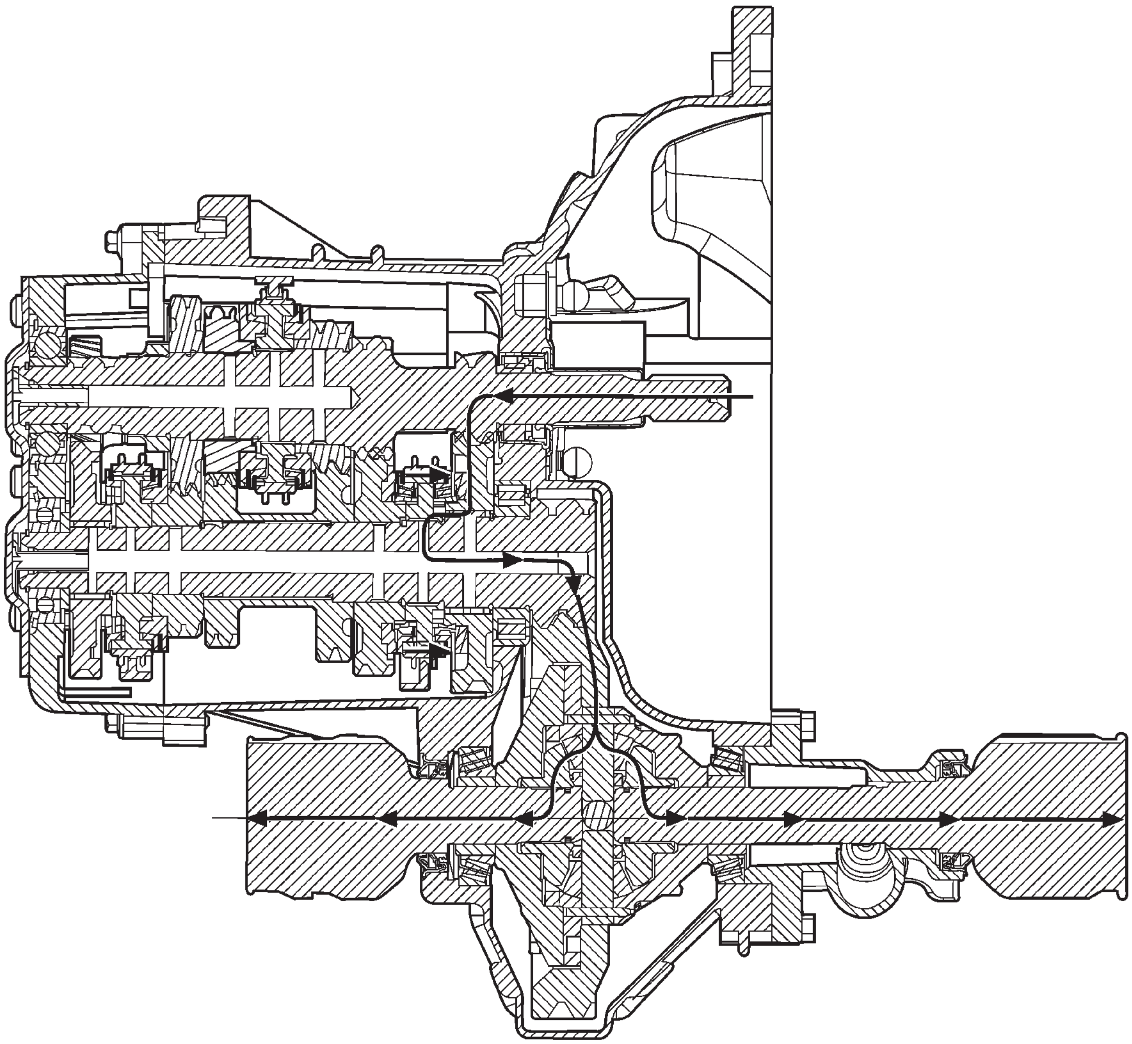


Fig. 4 1st Gear Operation

1ST GEAR

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft first gear is integral to the input shaft, and is in constant mesh with the intermediate shaft first speed gear. Because of this constant mesh, the intermediate shaft first speed gear freewheels until first gear is selected. As the gearshift lever is moved to the first gear position, the 1-2 fork moves the 1-2 synchronizer sleeve towards first gear on the intermediate shaft. The synchronizer sleeve engages the first gear clutch teeth, fixing the gear to the intermediate shaft, and allowing power to transmit through the intermediate shaft to the differential (Fig. 4).

T850 MANUAL TRANSAXLE (Continued)

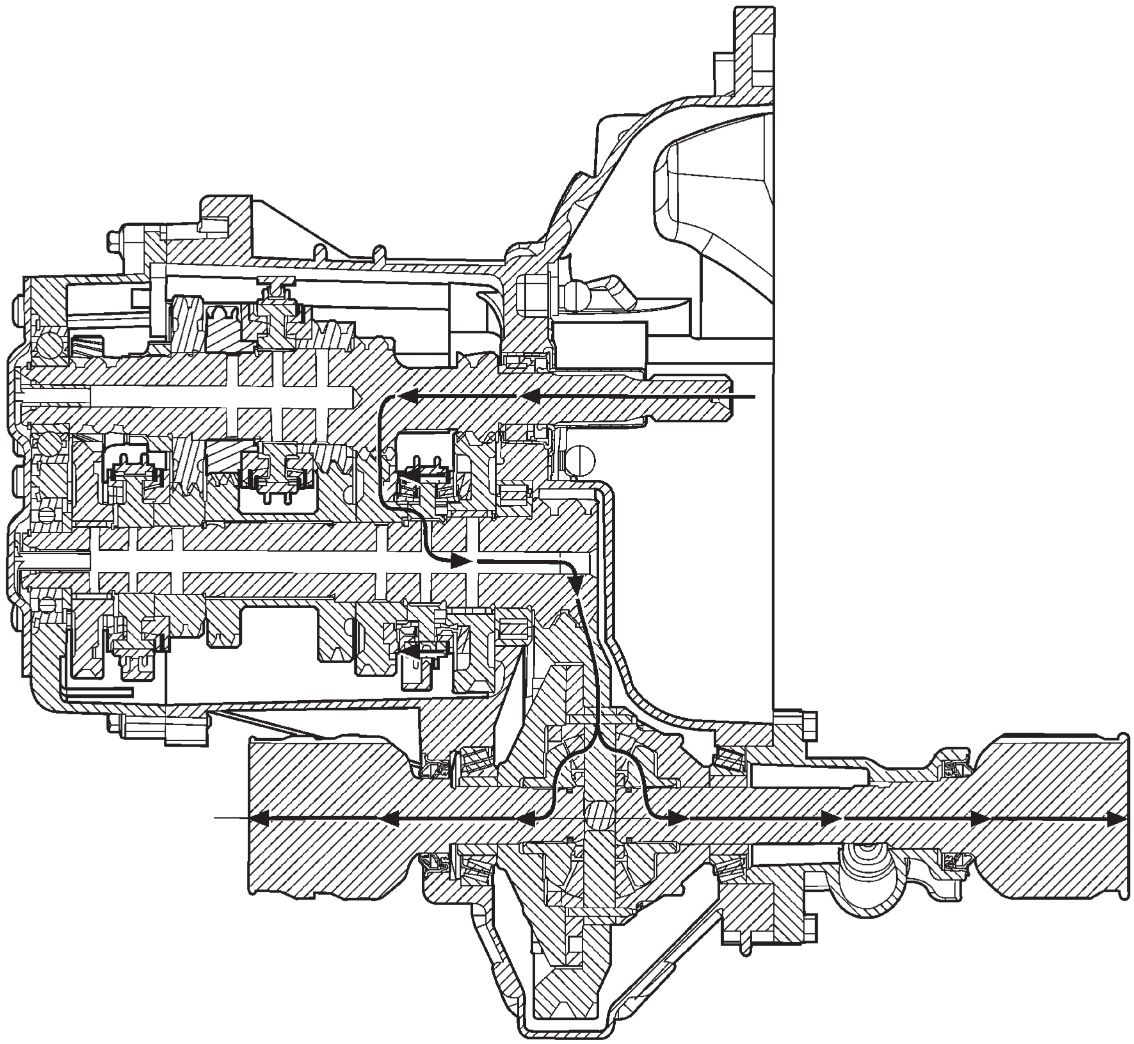


Fig. 5 2nd Gear Operation

2ND GEAR

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft second gear is integral to the input shaft, and is in constant mesh with the intermediate shaft second speed gear. Because of this constant mesh, the intermediate shaft second speed gear freewheels until second gear is selected. As the gearshift lever is moved to the second gear position, the 1-2 fork moves the 1-2 synchronizer sleeve towards second gear on the intermediate shaft. The synchronizer sleeve engages the second gear clutch teeth, fixing the gear to the intermediate shaft, and allowing power to transmit through the intermediate shaft to the differential (Fig. 5).

T850 MANUAL TRANSAXLE (Continued)

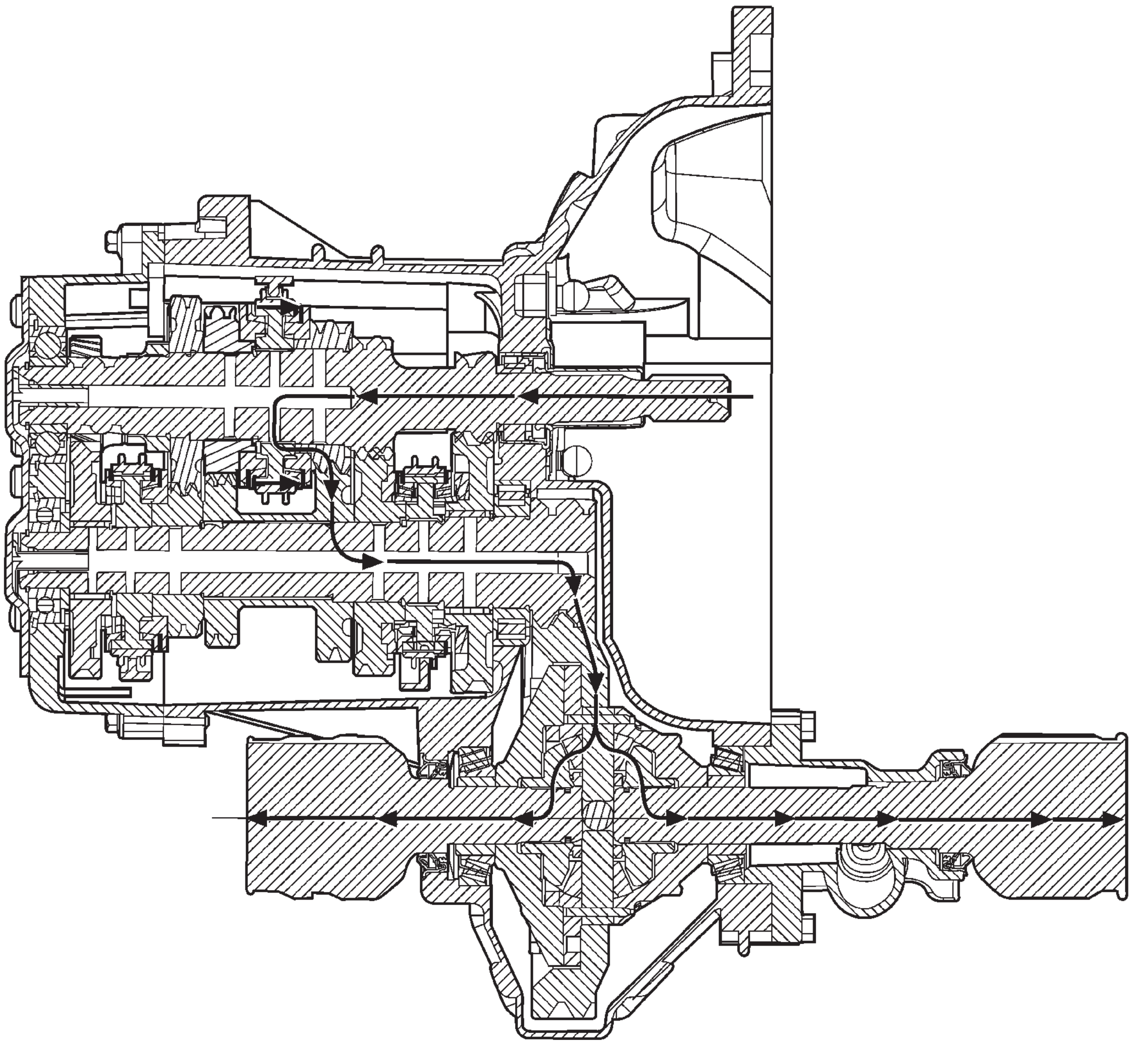


Fig. 6 3rd Gear Operation

3RD GEAR

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft third speed gear is in constant mesh with the intermediate shaft 3-4 cluster gear, which is fixed to the intermediate shaft. Because of this constant mesh, the input shaft third speed gear freewheels until third gear is selected. As the gearshift lever is moved to the third gear position, the 3-4 fork moves the 3-4 synchronizer sleeve towards third gear on the input shaft. The synchronizer sleeve engages the third gear clutch teeth, fixing the gear to the input shaft, and allowing power to transmit through the intermediate shaft to the differential (Fig. 6).

T850 MANUAL TRANSAXLE (Continued)

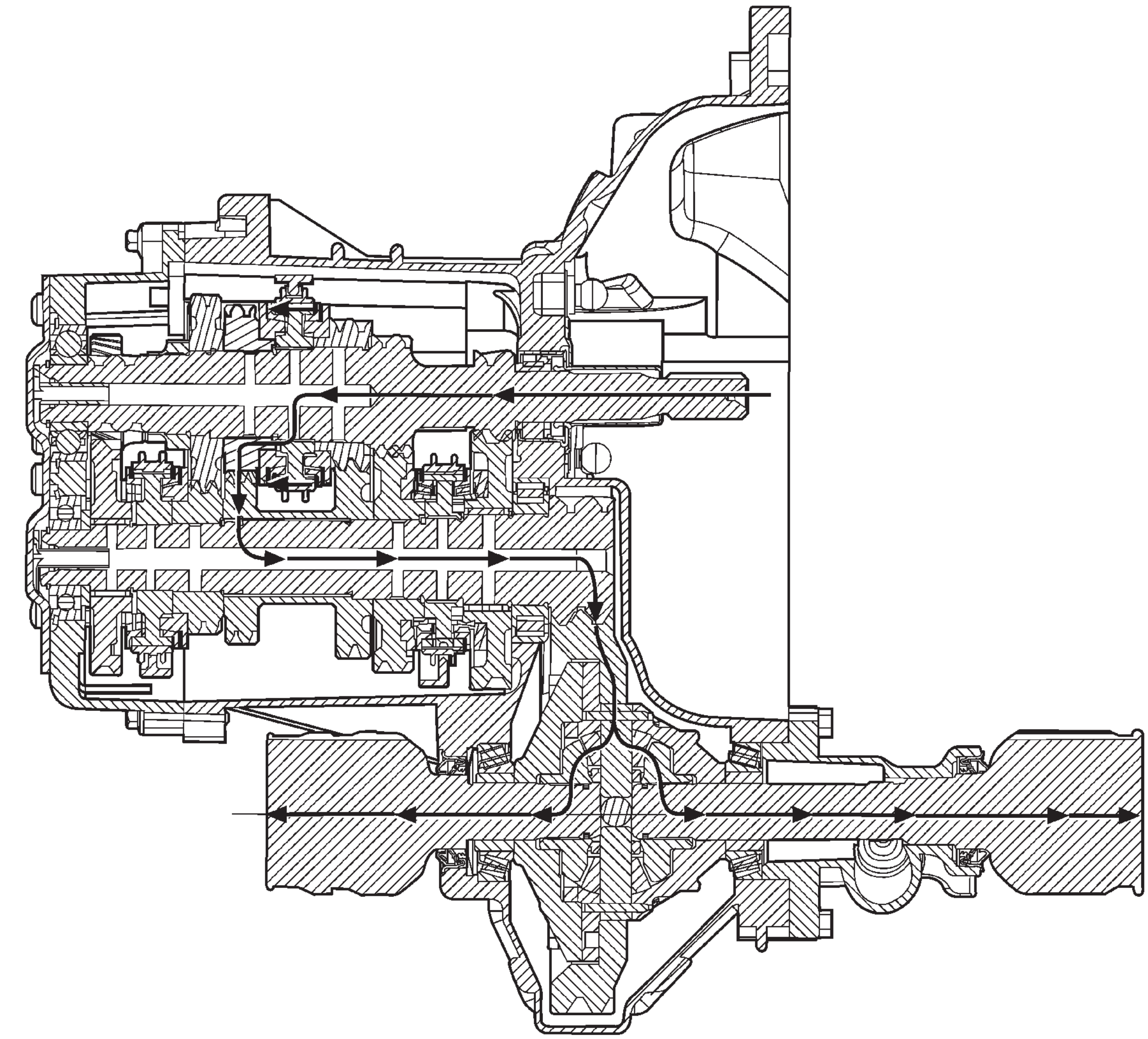


Fig. 7 4th Gear Operation

4TH GEAR

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft fourth speed gear is in constant mesh with the intermediate shaft 3-4 cluster gear, which is fixed to the intermediate shaft. Because of this constant mesh, the input shaft fourth speed gear freewheels until fourth gear is selected. As the gearshift lever is moved to the fourth gear position, the 3-4 fork moves the 3-4 synchronizer sleeve towards fourth gear on the input shaft. The synchronizer sleeve engages the fourth gear clutch teeth, fixing the gear to the input shaft, and allowing power to transmit through the intermediate shaft to the differential (Fig. 7).

T850 MANUAL TRANSAXLE (Continued)

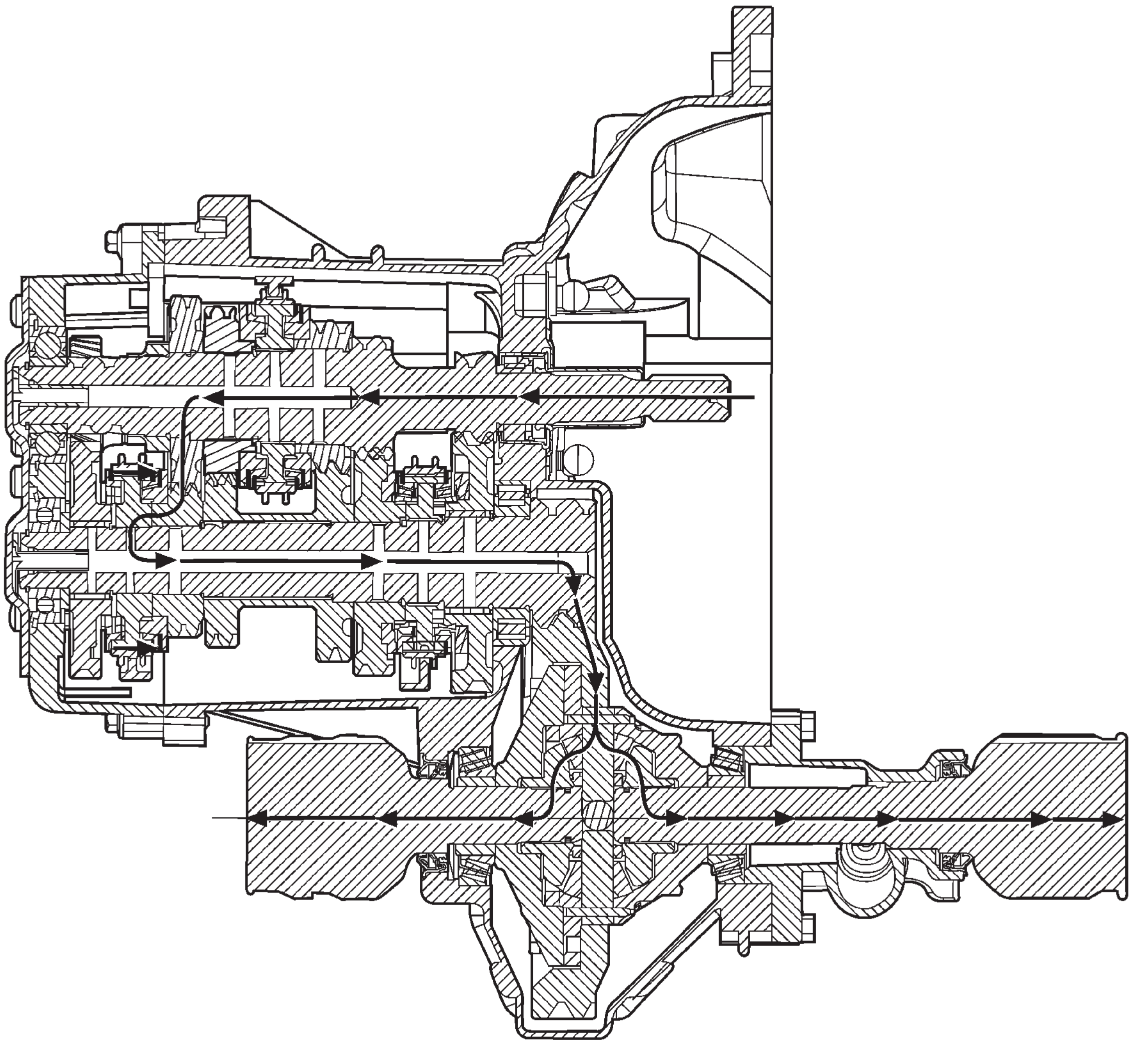


Fig. 8 5th Gear Operation

5TH GEAR

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft fifth gear is pressed on to the input shaft, and is in constant mesh with the intermediate shaft fifth speed gear. Because of this constant mesh, the intermediate shaft fifth speed gear freewheels until fifth gear is selected. As the gearshift lever is moved to the fifth gear position, the 5-R fork moves the 5-R synchronizer sleeve towards the intermediate shaft fifth speed gear. The synchronizer sleeve engages the fifth gear clutch teeth, fixing the gear to the input shaft, and allowing power to transmit through the intermediate shaft to the differential (Fig. 8).

T850 MANUAL TRANSAXLE (Continued)

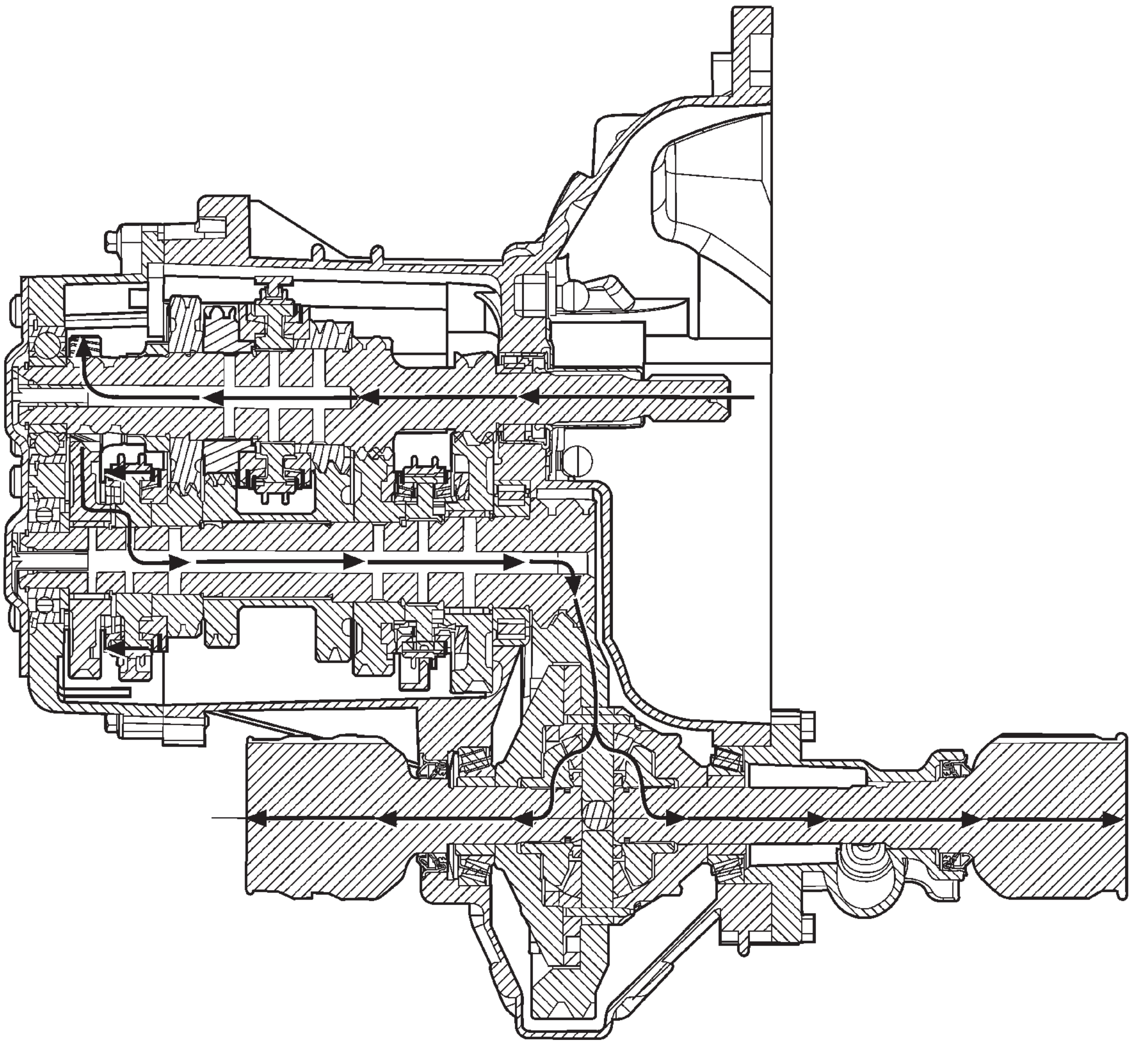


Fig. 9 Reverse Gear Operation

REVERSE GEAR

Engine power is transmitted to the input shaft via the clutch assembly and the input shaft turns. The input shaft reverse gear is integral to the input shaft, and is in constant mesh with the reverse idler gear. The reverse idler gear, which reverses the rotation of the intermediate shaft, is in constant mesh with the intermediate shaft reverse gear. Because of this constant mesh, the intermediate shaft reverse gear freewheels until reverse gear is selected. As the gearshift lever is moved to the reverse gear position, the 5-R fork moves the 5-R synchronizer sleeve towards the intermediate shaft reverse gear. The synchronizer sleeve engages the reverse gear clutch teeth, fixing the gear to the intermediate shaft, and allowing power to transmit through the intermediate shaft to the differential (in reverse) (Fig. 9).

T850 MANUAL TRANSAXLE (Continued)

DIAGNOSIS AND TESTING - COMMON PROBLEM CAUSES

The majority of transaxle malfunctions are a result of:

- Insufficient lubrication
- Incorrect lubricant
- Misassembled or damaged internal components
- Improper operation

HARD SHIFTING

Hard shifting may be caused by a misadjusted crossover cable. If hard shifting is accompanied by gear clash, synchronizer clutch and stop rings or gear teeth may be worn or damaged.

Hard shifting may also be caused by a binding or broken shift cover mechanism. Remove shift cover and verify smooth operation. Replace as necessary.

Misassembled synchronizer components also cause shifting problems. Incorrectly installed synchronizer sleeves, keys, balls, or springs can cause shift problems.

NOISY OPERATION

Transaxle noise is most often a result of worn or damaged components. Chipped, broken gear or synchronizer teeth, and brinnelled, spalled bearings all cause noise.

Abnormal wear and damage to the internal components is frequently the end result of insufficient lubricant.

SLIPS OUT OF GEAR

Transaxle disengagement may be caused by misaligned or damaged shift components, or worn teeth on the drive gears or synchronizer components. Incorrect assembly also causes gear disengagement. Check for missing snap rings.

LOW LUBRICANT LEVEL

Insufficient transaxle lubricant is usually the result of leaks, or inaccurate fluid level check or refill method. Leakage is evident by the presence of oil around the leak point. If leakage is not evident, the condition is probably the result of an underfill.

If air–powered lubrication equipment is used to fill a transaxle, be sure the equipment is properly calibrated. Equipment out of calibration can lead to an underfill condition.

CLUTCH PROBLEMS

Worn, damaged, or misaligned clutch components can cause difficult shifting, gear clash, and noise.

A worn or damaged clutch disc, pressure plate, or release bearing can cause hard shifting and gear clash.

REMOVAL

(1) Disconnect battery negative cable at strut tower.

(2) Remove air cleaner assembly.

(3) Disconnect gearshift cables at transaxle shift mechanism.

(4) Remove gearshift cable retaining clips at mount bracket. Secure cables out of the way.

(5) Remove three (3) rear mount bracket-to-transaxle case (vertical) bolts.

(6) Disconnect crankshaft position sensor connector. Remove sensor from transaxle case.

(7) Remove throttle body support bracket.

(8) Remove upper mount-to-case (vertical) bolt.

(9) Remove front mount bracket/starter upper bolt.

(10) Remove two (2) starter heat shield-to-bracket bolts.

(11) Disconnect oxygen sensor connector from mount bracket. Secure out of way.

(12) Raise vehicle on hoist.

(13) Remove front halfshaft assemblies. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL)

(14) Remove left front wheel splash shield.

(15) Raise vehicle.

(16) Remove structural collar.

(17) Remove clutch/drive plate inspection cover.

(18) Remove modular clutch assembly-to-drive plate bolts.

(19) Remove front mount and bracket.

(20) Disconnect starter wire harness.

(21) Remove starter motor lower bolt. Remove starter motor from vehicle.

(22) Using Tool 6638A, disconnect hydraulic clutch quick-connect fitting.

(23) Remove clutch slave cylinder by lifting nylon tab with a small screwdriver, and then depressing cylinder inward towards case and rotating cylinder 60° counter-clockwise.

(24) Disconnect back-up lamp switch connector.

(25) Position screw jack with wood block under engine oil pan and secure.

(26) Remove upper mount bracket-to-case bolts.

(27) Lower engine/transaxle assembly enough to gain access to transaxle bellhousing-to-block bolts, **but do not remove bolts at this time.**.

(28) Install transmission jack. Secure transaxle to jack.

(29) Remove transaxle bellhousing-to-block bolts and lower transaxle from vehicle. Use helper if necessary.

T850 MANUAL TRANSAXLE (Continued)

DISASSEMBLY

(1) Remove clutch release lever and bearing (Fig. 10). Inspect release lever pivot balls and replace if necessary (Fig. 11). Use slide hammer C-3752 and remover/installer 6891 (Fig. 12) if pivot ball replacement is necessary.

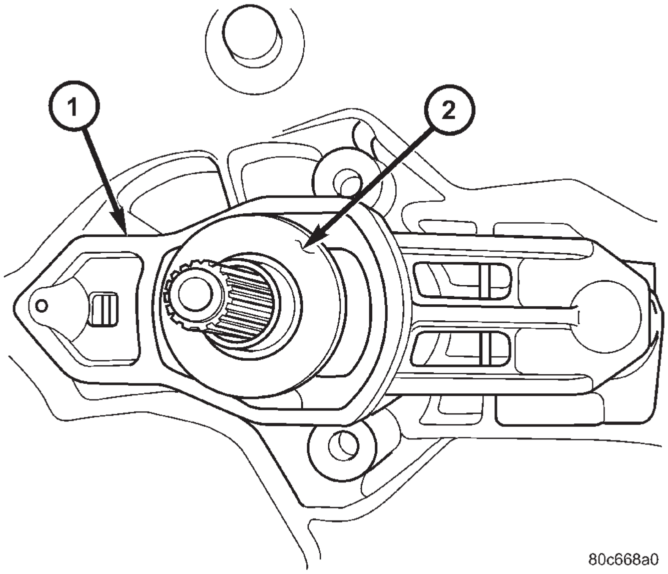


Fig. 10 Release Bearing and Lever

1 - RELEASE LEVER
2 - RELEASE BEARING

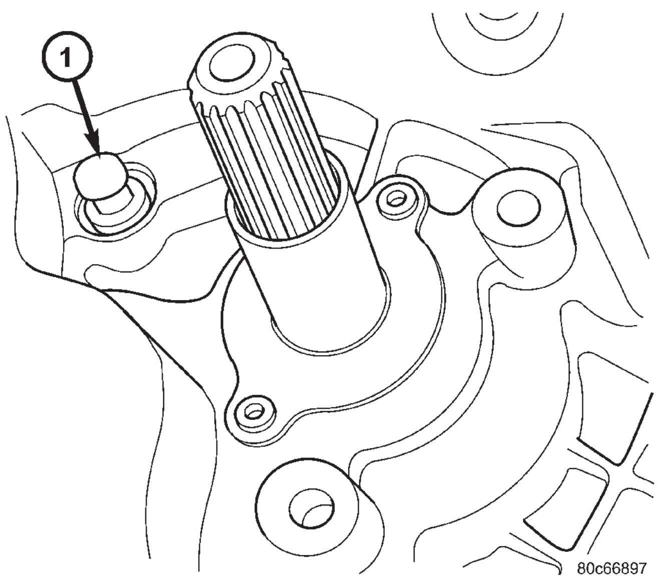


Fig. 11 Pivot Ball Orientation

1 - PIVOT BALL (1)

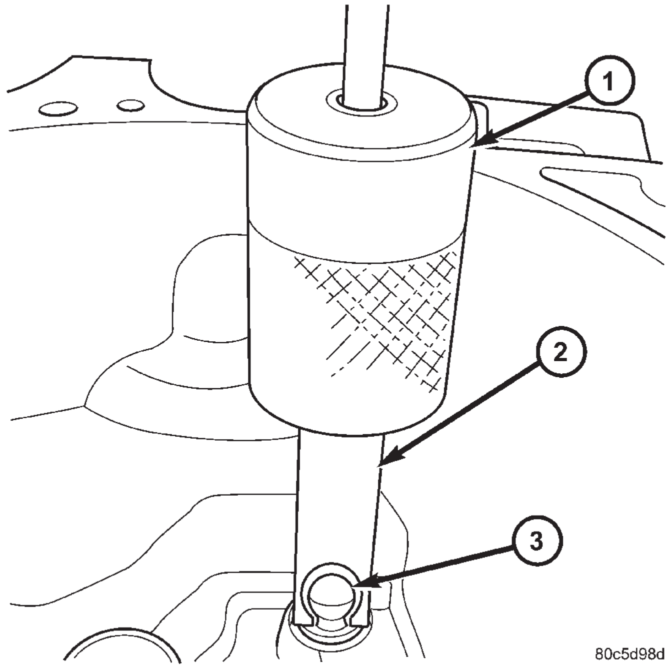


Fig. 12 Pivot Ball Removal/Installation

1 - C-3752 SLIDE HAMMER
2 - REMOVER/INSTALLER 6891
3 - PIVOT BALL

(2) Remove input shaft bearing retainer (Fig. 13).

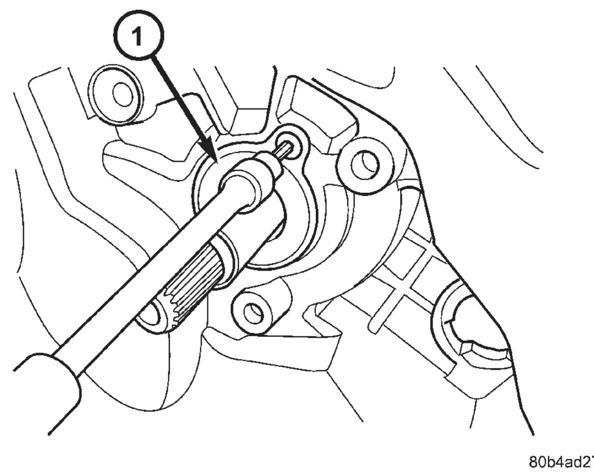


Fig. 13 Input Bearing Retainer

1 - INPUT BEARING RETAINER

NOTE: Place transaxle in neutral before shift cover removal.

T850 MANUAL TRANSAXLE (Continued)

(3) Remove shift cover-to-case bolts and remove shift cover assembly (Fig. 14).

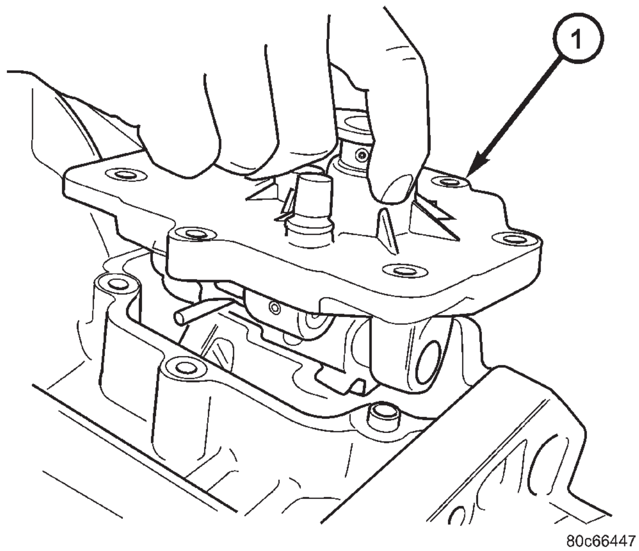


Fig. 14 Shift Cover Removal/Installation

1 - SHIFT COVER ASSEMBLY

(4) Place transaxle with bellhousing surface down.

(5) Remove backup lamp switch (Fig. 15).

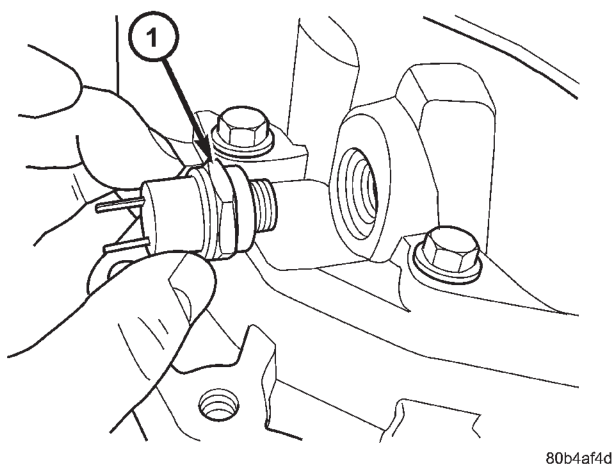


Fig. 15 Back-Up Lamp Switch

1 - BACK-UP LAMP SWITCH

(6) Remove end plate (Fig. 16).

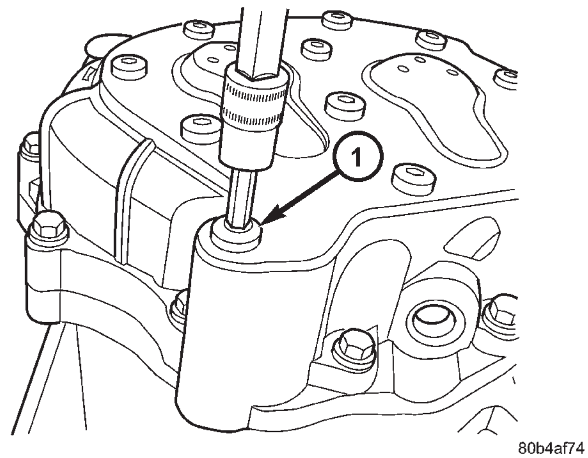


Fig. 16 End Plate Bolts

1 - BOLT (11)

(7) Set up lifting bar (tool 8489) as shown in (Fig. 17).

(8) Lift up on bar (input shaft bearing side) and remove input shaft bearing snap ring.

(9) Lift up on bar (intermediate shaft side) and remove intermediate shaft bearing snap ring.

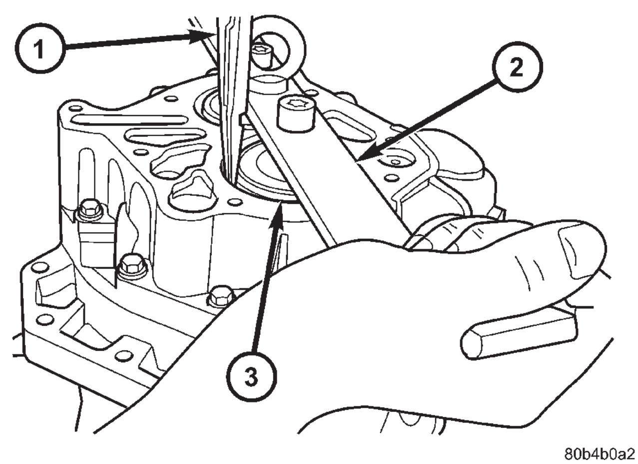


Fig. 17 Input Bearing Snap Ring

1 - SNAP RING PLIERS
2 - LIFTING BAR 8489
3 - SNAP RING

T850 MANUAL TRANSAXLE (Continued)

(10) Remove lifting bar 8489.

(11) Remove end cover-to-case bolts (12) (Fig. 18).

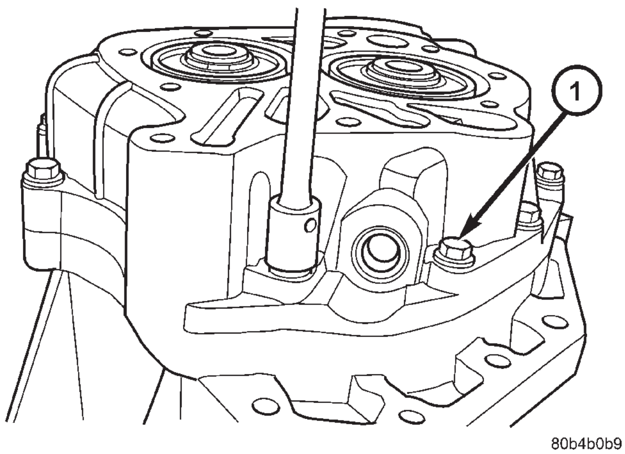


Fig. 18 End Cover Bolts

1 - BOLT (12)

(12) Remove end cover from transaxle (Fig. 19).

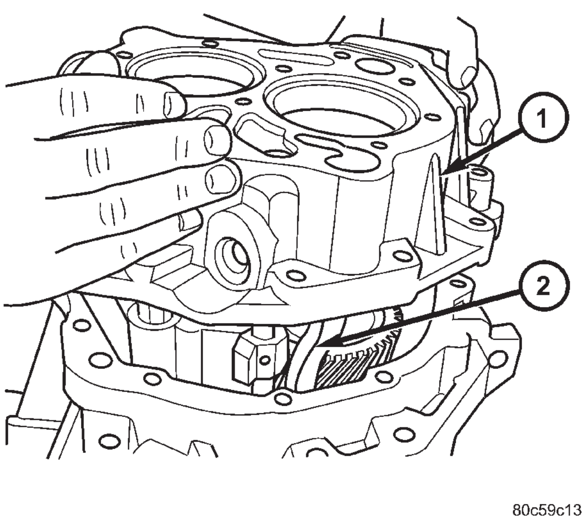


Fig. 19 End Cover Removal/Installation

1 - END COVER
2 - OIL TROUGH

(13) Remove 3/4 shift rail bushing from end cover using slide hammer C-3752 and remover 6786 (Fig. 20).

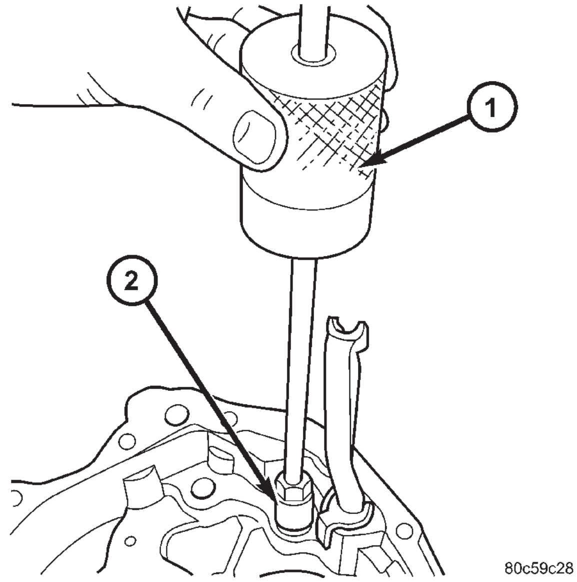


Fig. 20 3/4 Shift Rail Bushing Removal

1 - SLIDE HAMMER C-3752
2 - REMOVER 6786

(14) Remove reverse idler bolt (Fig. 21). Remove reverse idler gear, washers, and shaft upon geartrain removal.

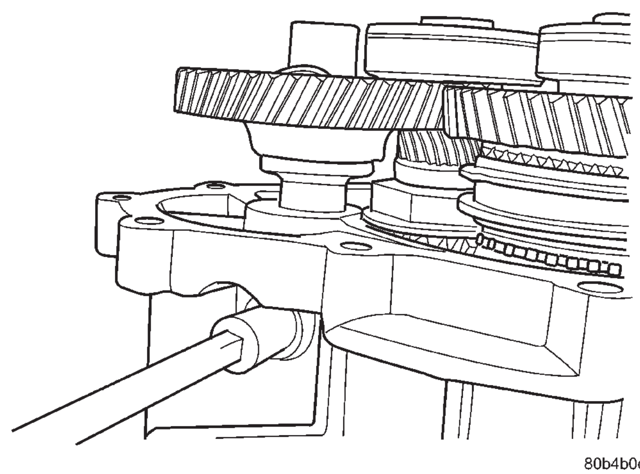


Fig. 21 Reverse Idler Shaft Bolt

T850 MANUAL TRANSAXLE (Continued)

(15) Remove 1-2/5-R shift rail (Fig. 22).

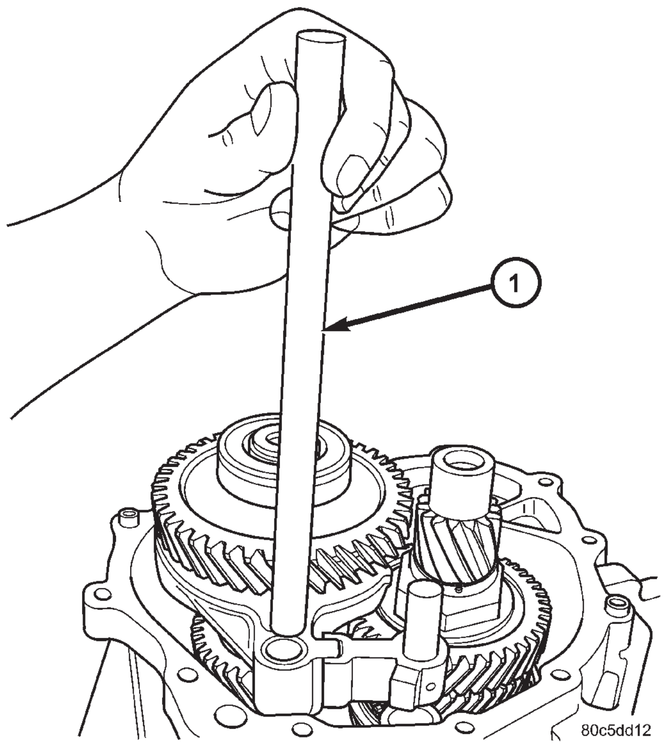


Fig. 22 1/2-5/R Shift Rail Removal/Installation

1 - 1/2-5/R SHIFT RAIL

(16) Install lifting bar 8489.

(17) Lift geartrain (w/reverse idler gear assy.) out of transaxle and install on fixture 8487 (Fig. 23).

(18) Remove remaining shift rail and forks from geartrain (Fig. 23).

(19) Remove lifting bar from geartrain.

NOTE: At this point, differential bearing turning torque should be measured to ensure proper shim selection upon reassembly.

(20) Measure differential turning torque. (Refer to 21 - TRANSMISSION/TRANSAXLE/MANUAL/DIFFERENTIAL - ADJUSTMENTS)

(21) Using a suitable screwdriver, remove extension housing axle oil seal (Fig. 24).

(22) Remove bearing plate-to-case and differential cover bolts (Fig. 25).

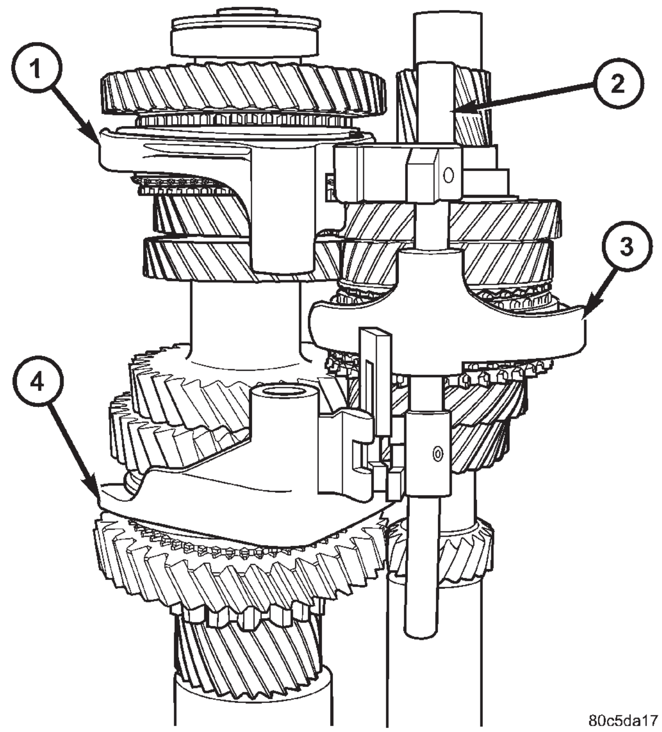


Fig. 23 Shift Fork/Rail Orientation

1 - 5/R FORK
2 - 3/4 RAIL ASSEMBLY
3 - 3/4 FORK
4 - 1/2 FORK

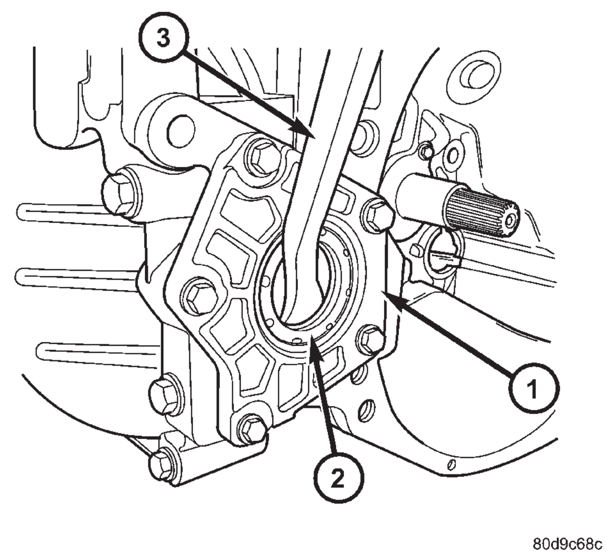


Fig. 24 Axle Seal Removal (Bearing Plate Side)

1 - PLATE
2 - SEAL
3 - SCREWDRIVER

T850 MANUAL TRANSAXLE (Continued)

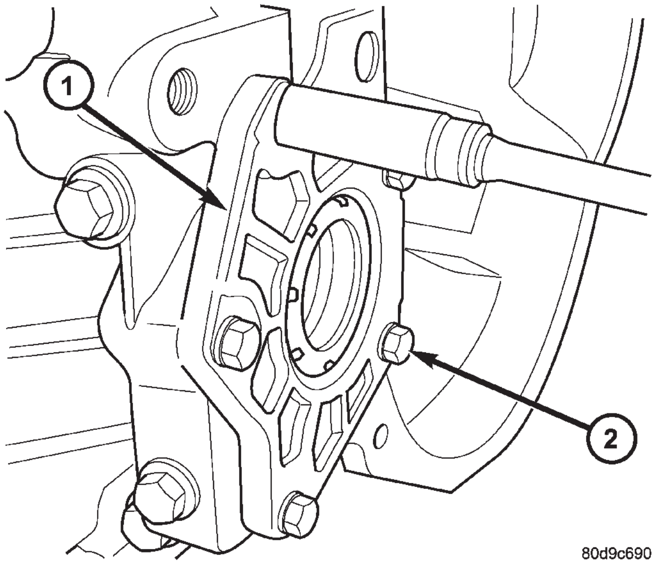


Fig. 25 Bearing Plate-to-Case Bolts

1 - PLATE
2 - BOLT (5)

(23) Remove differential cover bolts.

(24) Remove differential cover and bearing plate. If necessary, use a soft tipped hammer to aid in removal.

(25) Remove differential assembly. Note orientation of shim, oil slinger, and differential side bearing races (Fig. 26).

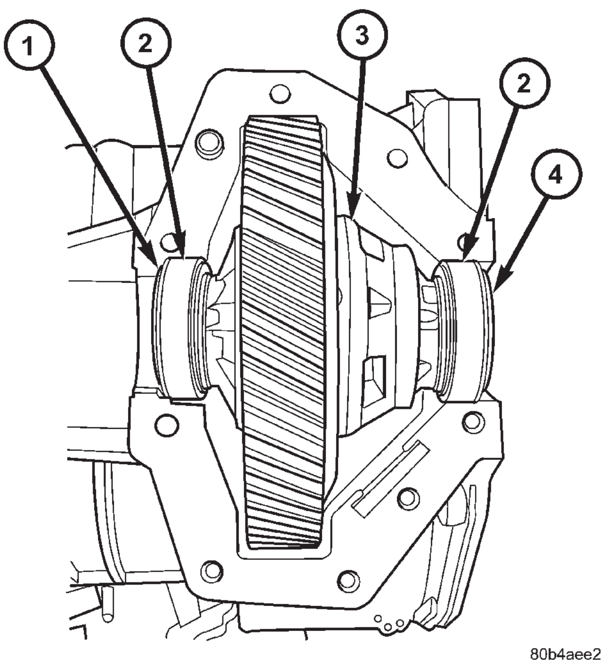


Fig. 26 Differential Shim/Slinger Orientation

1 - SLINGER
2 - BEARING RACE
3 - DIFFERENTIAL ASSEMBLY
4 - SHIM (SELECT)

(26) Remove differential chip collector magnet and clean (Fig. 27). **Magnet is adhered with RTV, and may require force to remove.**

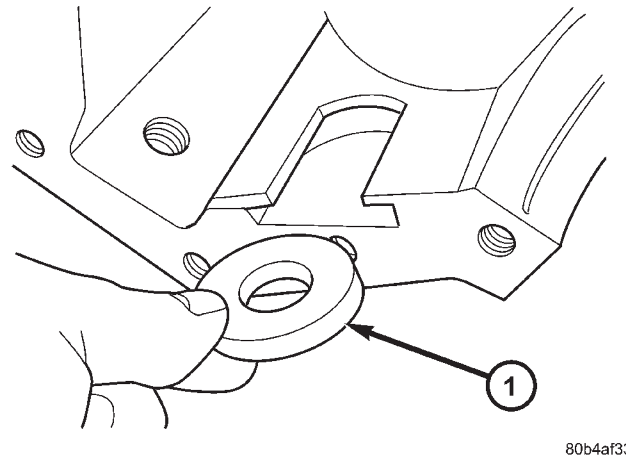


Fig. 27 Differential Magnet

1 - MAGNET

(27) Remove intermediate shaft bearing race with puller 8472 (Fig. 28).

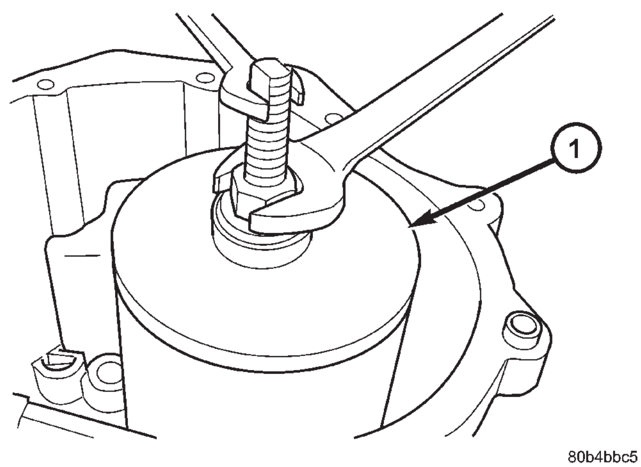


Fig. 28 Intermediate Shaft Bearing Race Removal

1 - REMOVER 8472

T850 MANUAL TRANSAXLE (Continued)

(28) Remove shift rail bushing from case with remover 6786 and slide hammer C-3752 (Fig. 29).

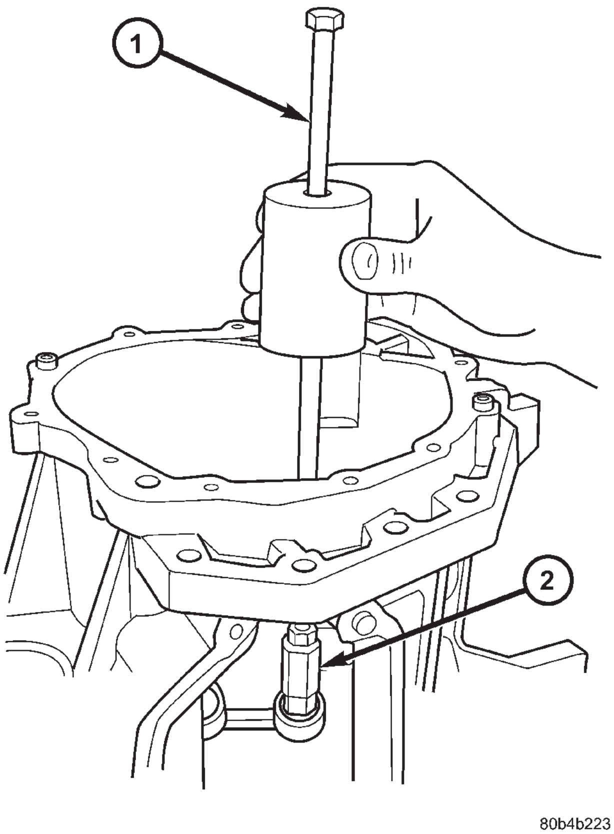


Fig. 29 Shift Rail Bushing Removal

1 - SLIDE HAMMER C-3752
2 - REMOVER 6786

(29) Remove input shaft bearing using an arbor press and tool 8474 (Fig. 30).

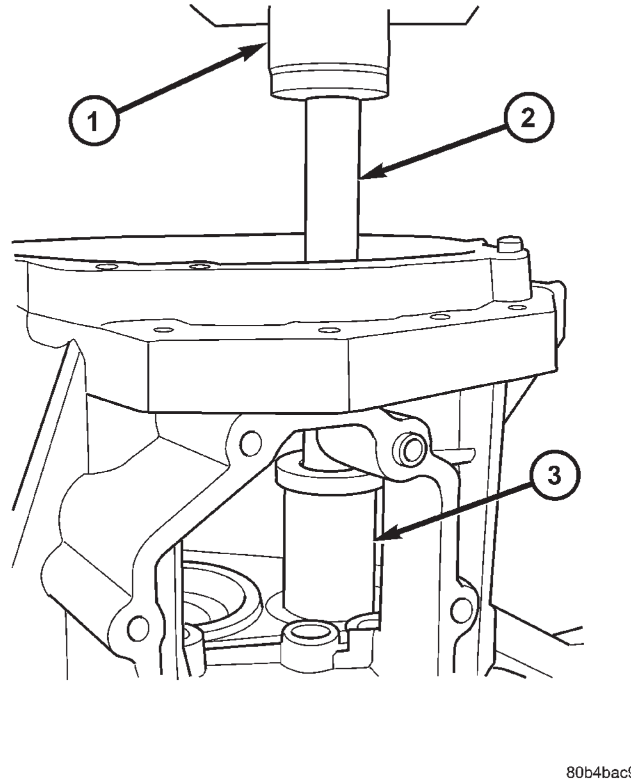


Fig. 30 Input Shaft Bearing Removal

1 - ARBOR PRESS
2 - DRIVER HANDLE C-4171
3 - REMOVER/INSTALLER 8474

ASSEMBLY

NOTE: When assembling this transaxle, always use NEW snap rings.

NOTE: Before assembling transaxle, differential turning torque must be measured and adjusted. (Refer to 21 - TRANSMISSION/TRANSAXLE/MANUAL/DIFFERENTIAL - ADJUSTMENTS). Differential turning torque must be measured with geartrain out of case.

(1) Install input shaft bearing using an arbor press and remover/installer 8474 (Fig. 31).

(2) Install shift shaft bushing to case using installer 8475 (Fig. 32).

T850 MANUAL TRANSAXLE (Continued)

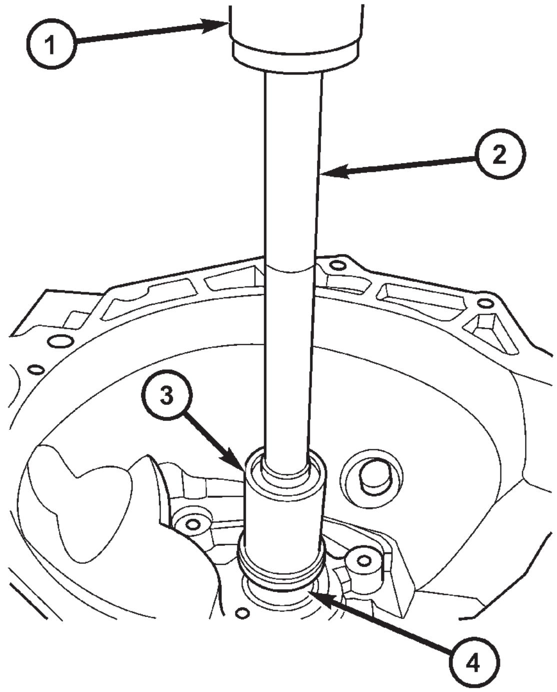


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Fig. 31 Input Shaft Bearing Installation

1 - ARBOR PRESS
2 - C-4171 DRIVER HANDLE
3 - REMOVER/INSTALLER 8474
4 - INPUT SHAFT BEARING

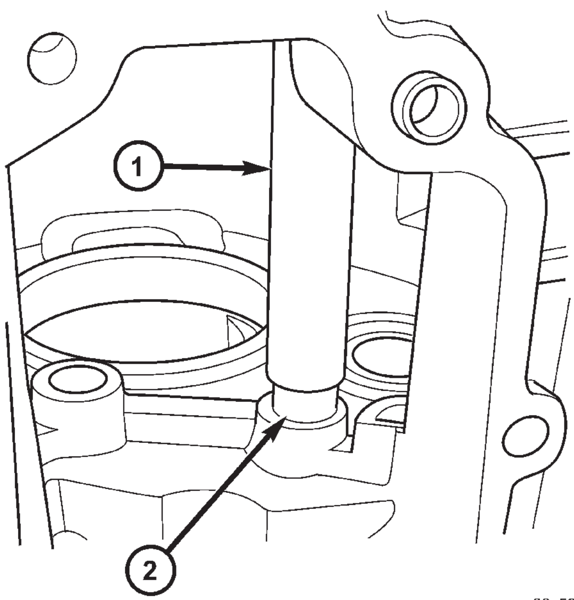

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Fig. 32 Shift Shaft Bushing Installation

1 - INSTALLER 8475
2 - SHIFT SHAFT BUSHING

(3) Install intermediate shaft bearing race to case with an arbor press, driver handle C-4171, and installer 8471 (Fig. 33). Press until installer 8471 bottoms on transaxle case.

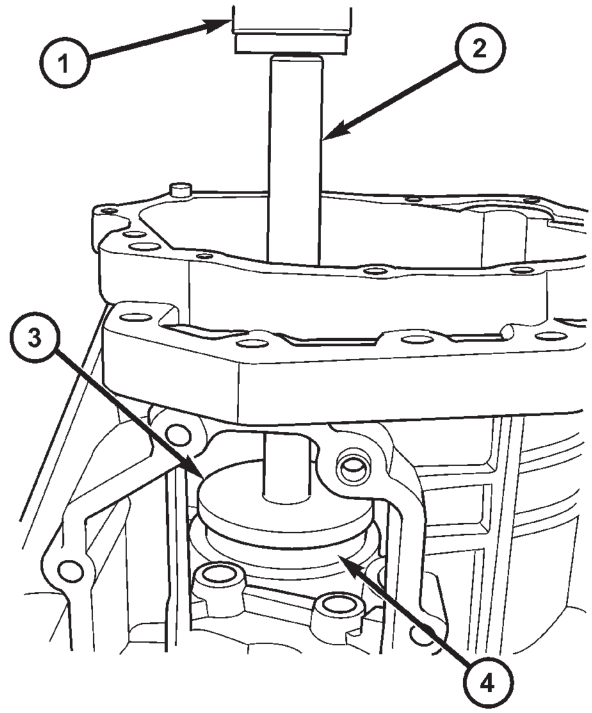

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Fig. 33 Install Intermediate Shaft Bearing Race

1 - ARBOR PRESS
2 - DRIVER HANDLE C-4171
3 - INSTALLER 8471
4 - INTERMEDIATE SHAFT BEARING RACE

(4) Roll transaxle assembly on side.

(5) Install differential chip collector magnet (Fig. 34). Retain to case with a dab of Mopar® Gear Lube RTV.

T850 MANUAL TRANSAXLE (Continued)

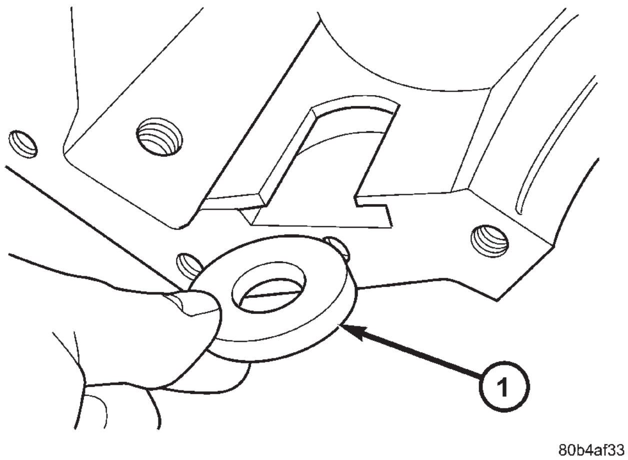


Fig. 34 Differential Magnet

1 - MAGNET

(6) Install differential assembly with bearing races and select shim (Fig. 35). Shim selection was determined before transaxle assembly (Refer to 21 - TRANSMISSION/TRANSAXLE/MANUAL/DIFFERENTIAL - ADJUSTMENTS).

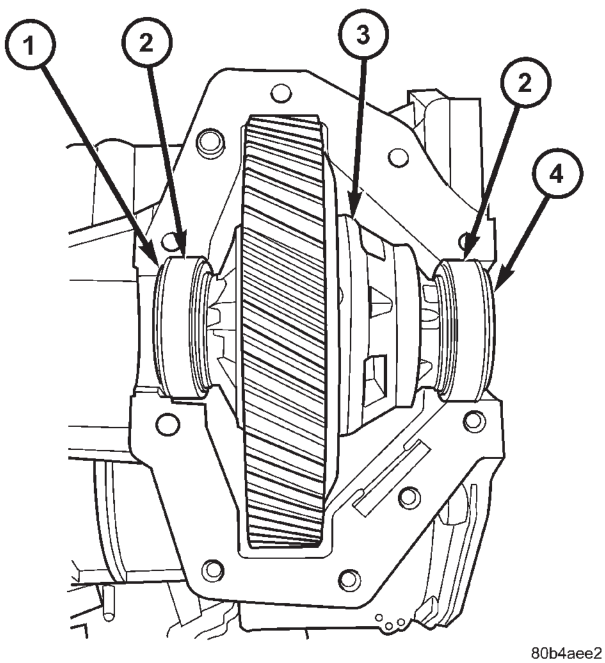


Fig. 35 Differential Shim/Slinger Orientation

1 - SLINGER
2 - BEARING RACE
3 - DIFFERENTIAL ASSEMBLY
4 - SHIM (SELECT)

(7) Install a 1 mm (0.04 in.) bead of Mopar® Gasket Maker to differential cover and install to case. Torque differential cover-to-case bolts to 54 N·m (40 ft. lbs.).

(8) Install a 1 mm (0.04 in.) bead of Mopar® Gasket Maker to bearing plate. Install bearing plate to differential cover and case and torque bolts to 28 N·m (250 in. lbs.) (Fig. 36).

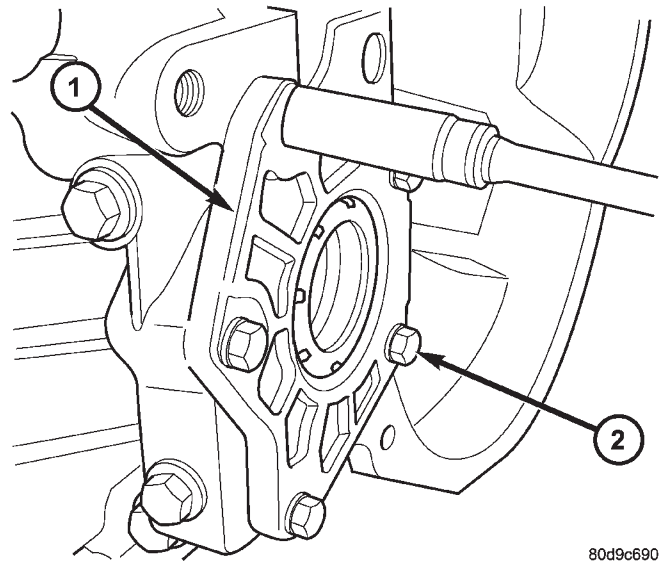


Fig. 36 Bearing Plate-to-Case Bolts

1 - PLATE
2 - BOLT (5)

(9) Verify proper differential turning torque.

(10) Install both axle output shaft seals using driver handle C-4171 and installer 8473 (Fig. 37).

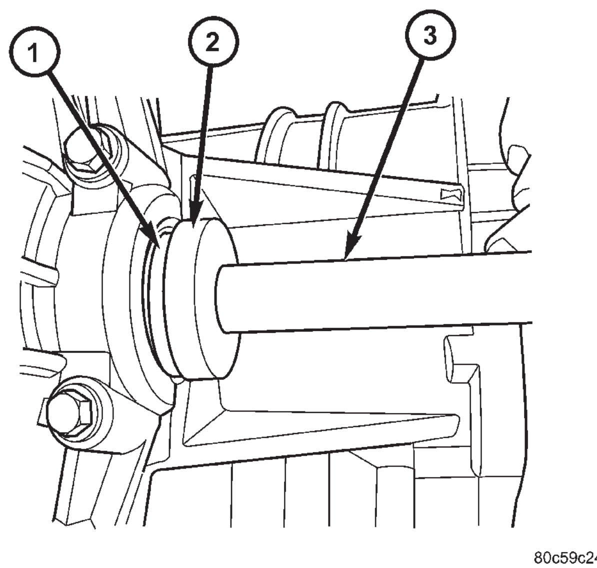


Fig. 37 Axle Seal Installation—Typical

1 - SEAL
2 - INSTALLER 8476
3 - DRIVER HANDLE C-4171

T850 MANUAL TRANSAXLE (Continued)

NOTE: If input shaft assembly was not disassembled, it is necessary to remove input shaft sealed ball bearing before assembling transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/MANUAL/INPUT SHAFT - DISASSEMBLY)

(11) Install assembled input and intermediate shafts to fixture 8487 (Fig. 38).

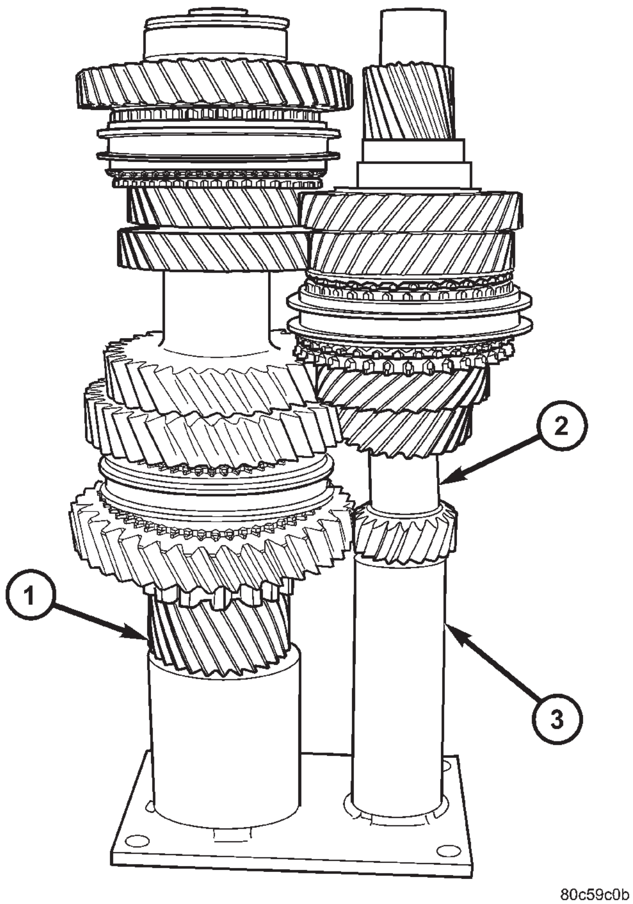


Fig. 38 Install Geartrain to Fixture 8487

1 - INTERMEDIATE SHAFT
2 - INPUT SHAFT
2 - FIXTURE 8487

(12) Install shift forks and 3/4 rail assembly to geartrain as shown in (Fig. 39).

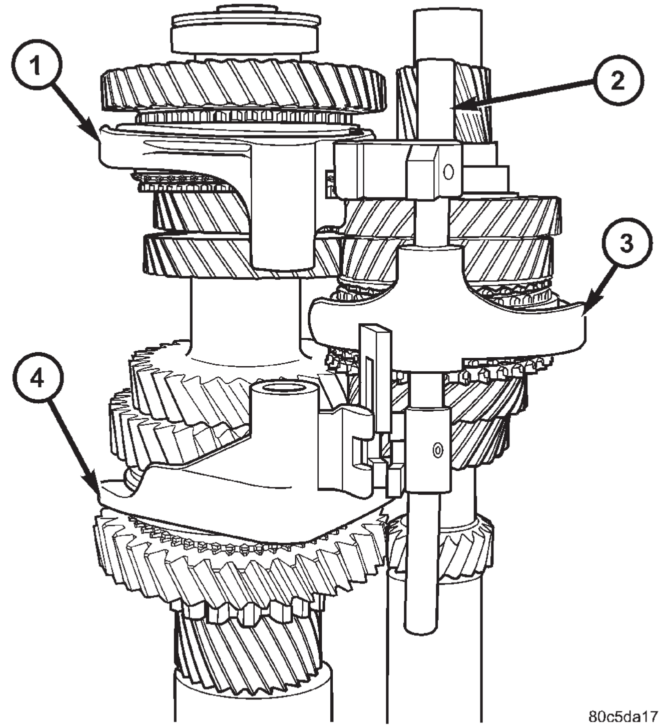


Fig. 39 Shift Fork/Rail Orientation

1 - 5/R FORK
2 - 3/4 RAIL ASSEMBLY
3 - 3/4 FORK
4 - 1/2 FORK

NOTE: Before installing geartrain, make sure that input shaft sealed roller bearing is not installed, otherwise reverse idler assembly installation will be difficult. (Refer to 21 - TRANSMISSION/TRANSAXLE/MANUAL/INPUT SHAFT - DISASSEMBLY)

(13) Install lifting bar 8489 to geartrain. Install geartrain to case. **When installing geartrain to case, use care not to damage bearing surfaces.**

(14) Remove lifting bar 8489 from geartrain.

T850 MANUAL TRANSAXLE (Continued)

(15) Install shift 1/2-5/R rail as shown in (Fig. 40).

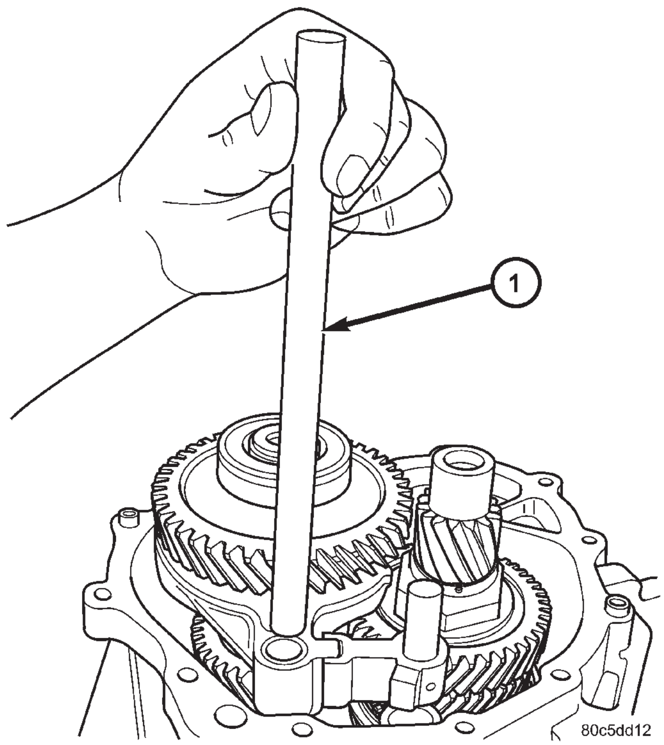


Fig. 40 Shift Rail Installation

1 - 1/2-5/R SHIFT RAIL

(16) Install reverse idler shaft into position (Fig. 41). Install and torque shaft-to-case bolt to 54 N·m (40 ft. lbs.).

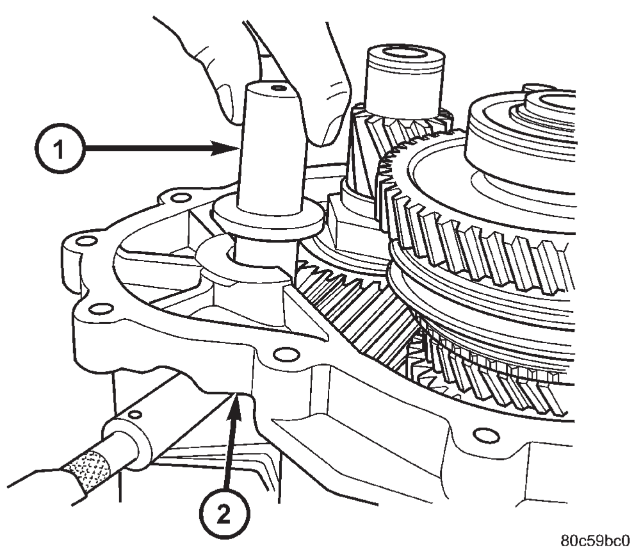


Fig. 41 Install Reverse Idler Shaft

1 - REVERSE IDLER SHAFT
2 - BOLT

(17) Install reverse idler gear bearing (Fig. 42).

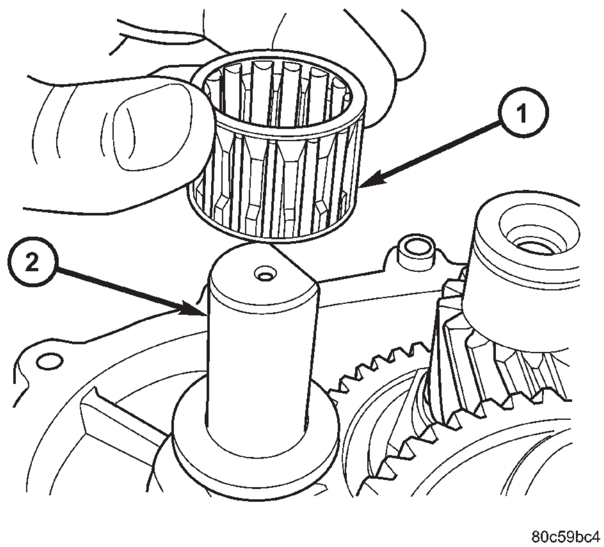


Fig. 42 Install Reverse Idler Gear Bearing

1 - NEEDLE BEARING
2 - REVERSE IDLER SHAFT

(18) Install reverse idler gear with hub down as shown in (Fig. 43).

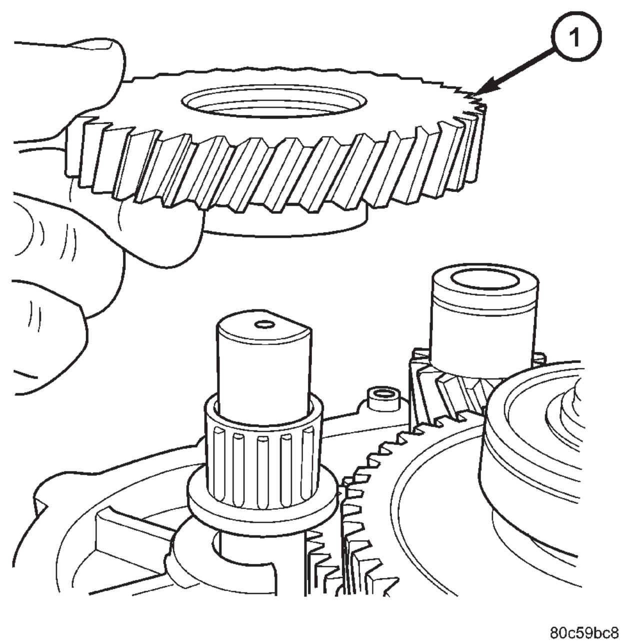


Fig. 43 Install Reverse Idler Gear

1 - REVERSE IDLER GEAR

T850 MANUAL TRANSAXLE (Continued)

(19) Install flat washer (Fig. 44).

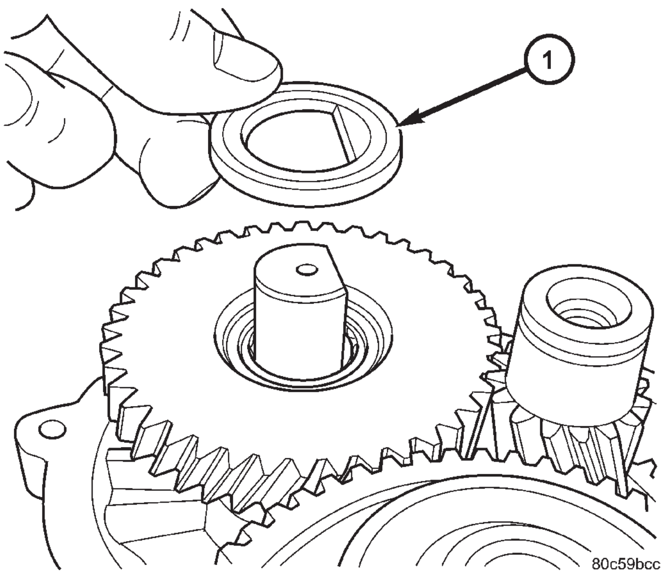


Fig. 44 Install Flat Washer

1 - FLAT WASHER

(20) Install wave washer (Fig. 45).

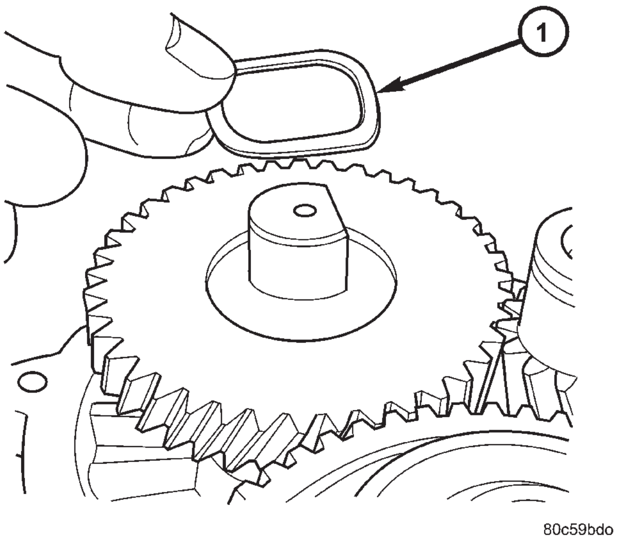


Fig. 45 Install Wave Washer

1 - WAVE WASHER

(21) Install input shaft sealed roller bearing using installer 8482 (Fig. 46).

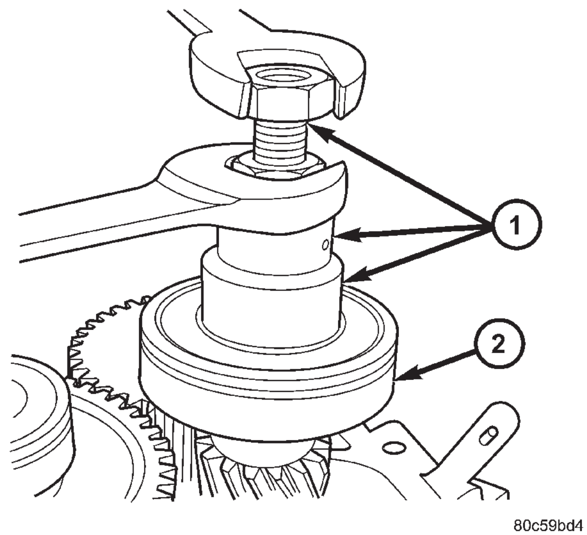


Fig. 46 Install Input Shaft Sealed Roller Bearing

1 - INSTALLER 8482
2 - SEALED ROLLER BEARING

(22) Install **new** input shaft bearing snap ring (Fig. 47).

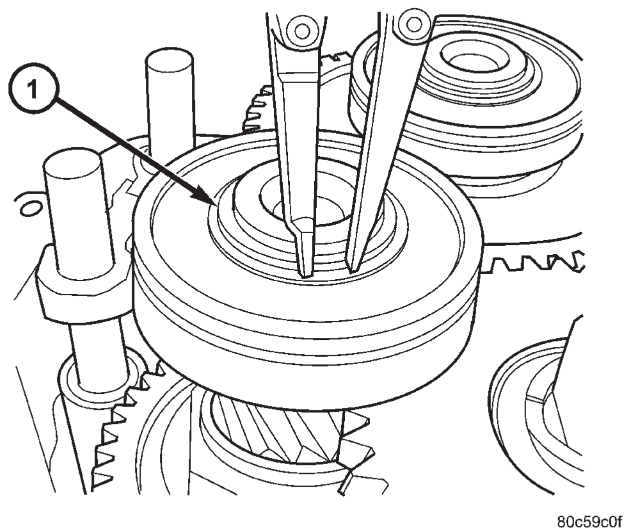


Fig. 47 Input Shaft Bearing Snap Ring

1 - SNAP RING

T850 MANUAL TRANSAXLE (Continued)

(23) Install shift rail bushing to end cover using installer 8475 (Fig. 48).

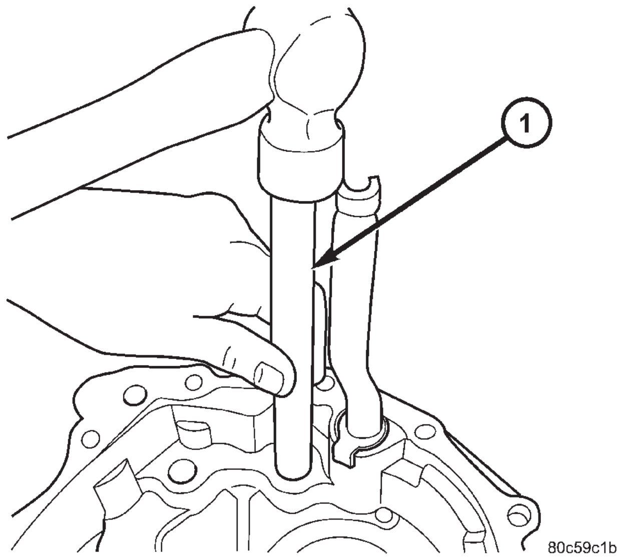


Fig. 48 Shift Rail Bushing Installation

1 - INSTALLER 8475

(24) Apply a 1 mm (0.04 in.) bead of Mopar® Gasket Maker to transaxle end cover and install to transaxle case (Fig. 49). **While installing end cover, be sure to guide oil trough into pocket (Fig. 50).** Torque end cover-to-case bolts to 28 N·m (250 in. lbs.) (Fig. 51).

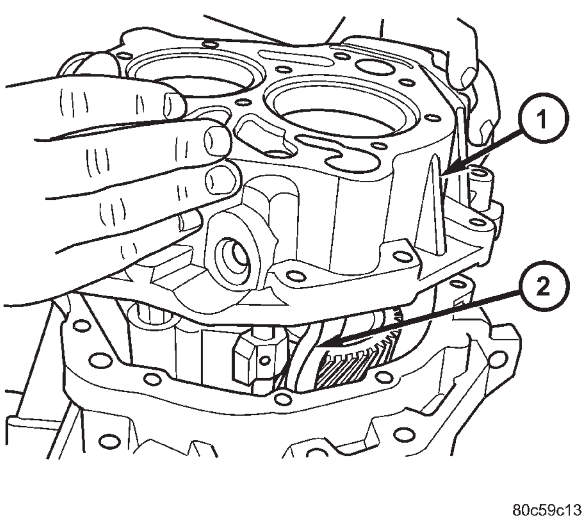


Fig. 49 End Cover Removal/Installation

1 - END COVER
2 - OIL TROUGH

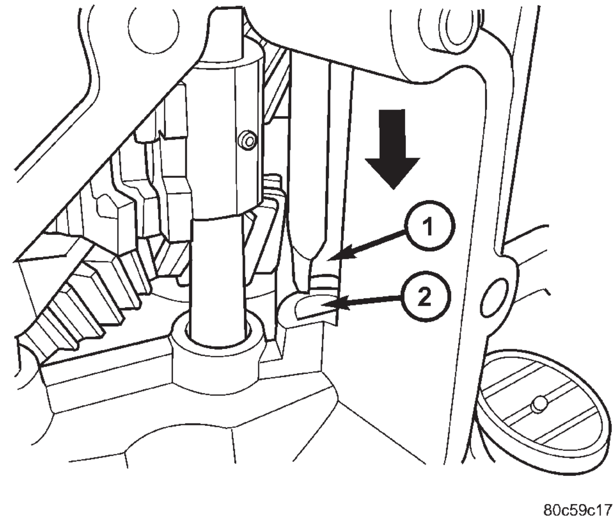


Fig. 50 Oil Trough Pocket

1 - OIL TROUGH
2 - POCKET

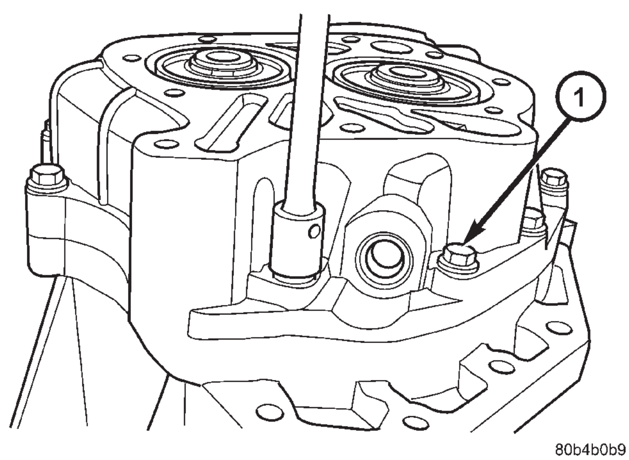


Fig. 51 End Cover Bolts

1 - BOLT (12)

(25) Install lifting bar 8489 to geartrain.

T850 MANUAL TRANSAXLE (Continued)

(26) Lift up on bar (input shaft side) and install input shaft bearing snap ring (Fig. 52).

(27) Lift up on bar (intermediate shaft side) and install intermediate shaft bearing snap ring.

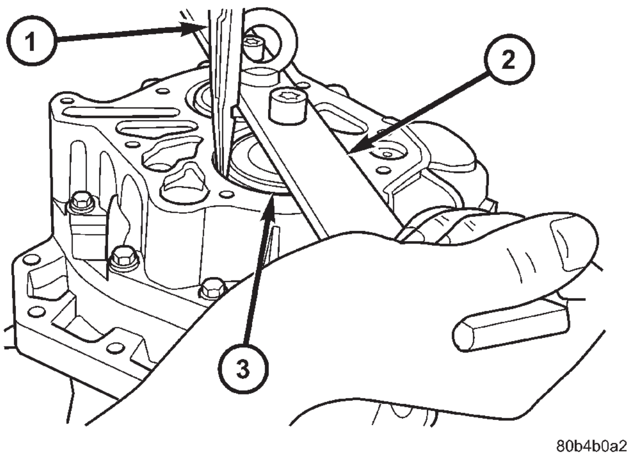


Fig. 52 Input Bearing Snap Ring

1 - SNAP RING PLIERS
2 - LIFTING BAR 8489
3 - SNAP RING

(28) Remove lifting bar 8489.

(29) Install a bead of Mopar® Gear Lube RTV to end plate and immediately install to case. Install and torque bolts to 28 N·m (250 in. lbs.) (Fig. 53).

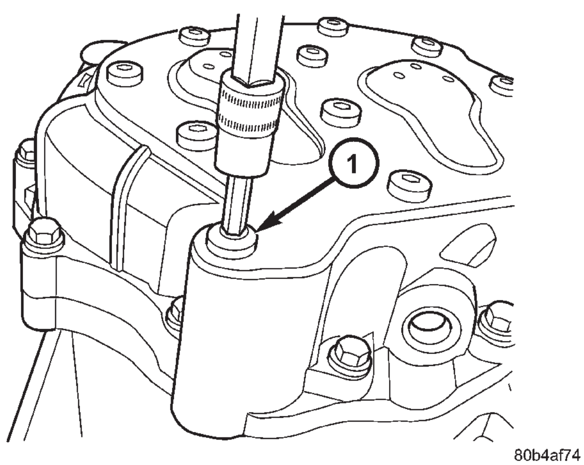


Fig. 53 End Cover Bolts

1 - BOLT (11)

(30) Install back up lamp switch and torque to 23 N·m (17 ft. lbs.) (Fig. 54).

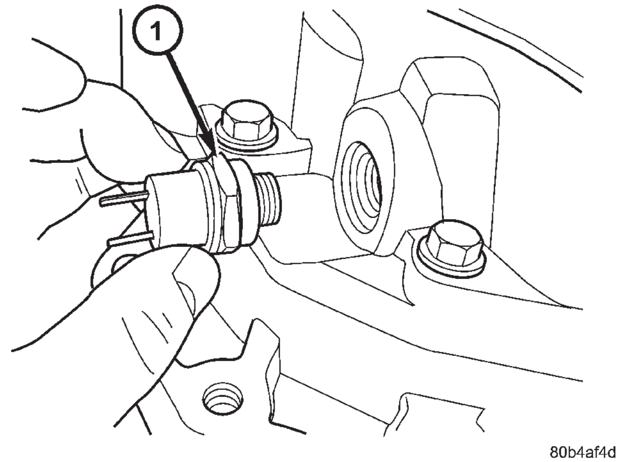


Fig. 54 Back-Up Lamp Switch

1 - BACK-UP LAMP SWITCH

(31) Apply a 1 mm (0.04 in.) bead of Mopar® Gasket Maker to shift cover assembly. Place shift cover and transaxle geartrain into neutral and install shift cover (Fig. 55) and torque bolts to 28 N·m (250 in. lbs.).

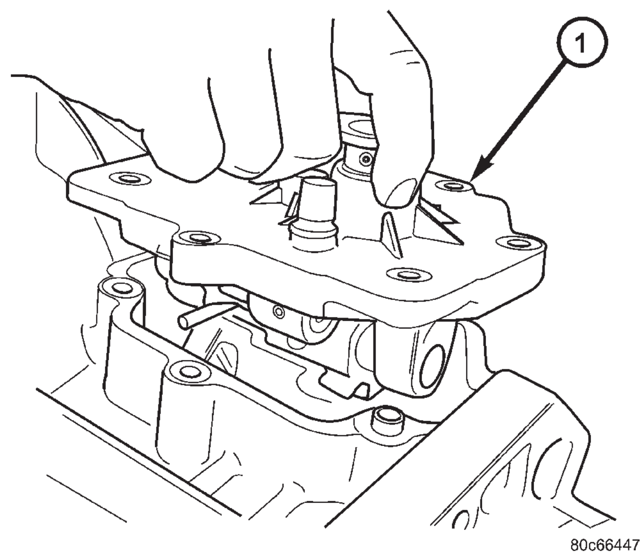


Fig. 55 Shift Cover Removal/Installation

1 - SHIFT COVER ASSEMBLY

T850 MANUAL TRANSAXLE (Continued)

(32) Install input shaft bearing retainer (Fig. 56). Torque bolts to 12 N·m (105 in. lbs.).

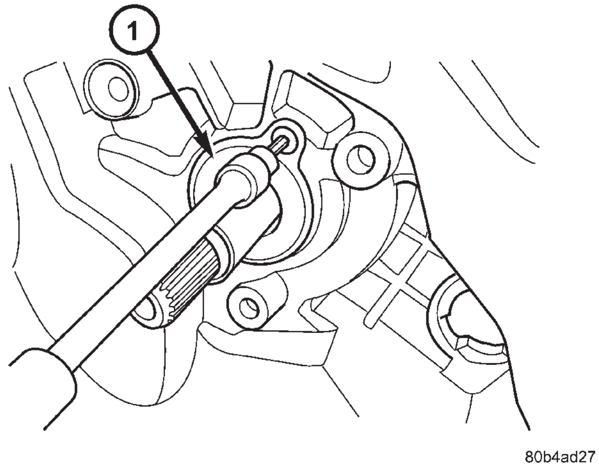


Fig. 56 Input Bearing Retainer

1 - INPUT BEARING RETAINER

(33) If previously removed, install clutch release lever pivot ball(s) using slide hammer C-3752 and remover/installer 6891 (Fig. 57) (Fig. 58).

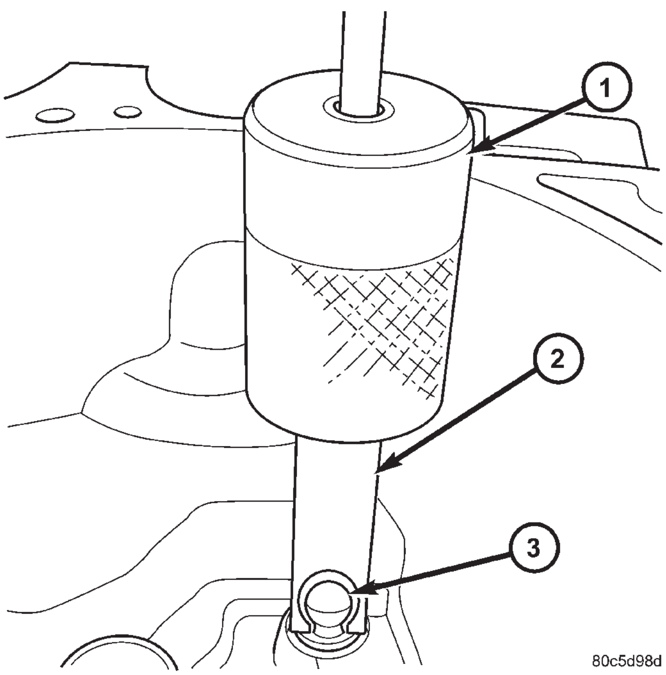


Fig. 57 Pivot Ball Removal/Installation

1 - C-3752 SLIDE HAMMER
2 - REMOVER/INSTALLER 6891
3 - PIVOT BALL

(34) Install clutch release bearing to lever. Apply grease to interface (contact) points. Make sure release bearing retainers engage lever pocket as shown in (Fig. 59).

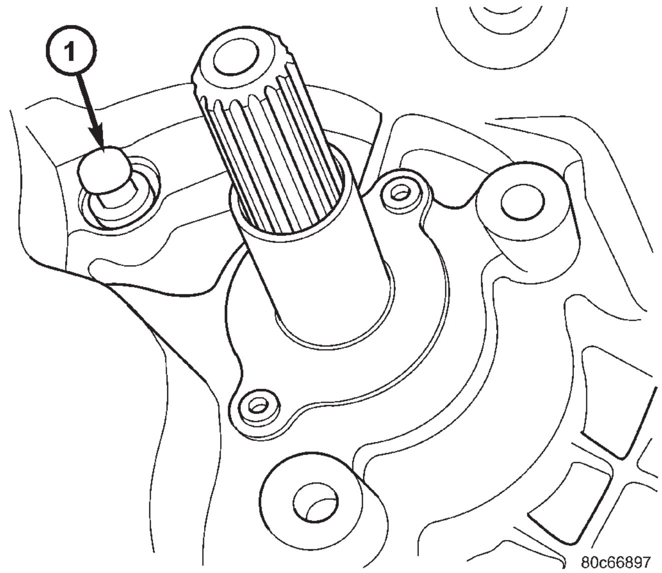


Fig. 58 Pivot Ball Position

1 - PIVOT BALL (1)

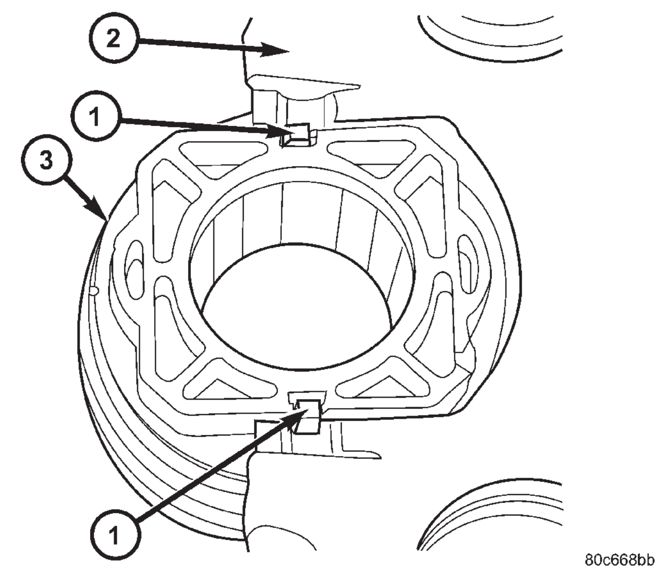


Fig. 59 Release Bearing-to-Lever

1 - RETAINER (2)
2 - RELEASE LEVER
3 - RELEASE BEARING

(35) Apply grease to pivot ball, and on release lever at slave cylinder contact point.

(36) Install clutch release bearing/lever assembly into position by sliding bearing onto input bearing retainer, and using moderate hand pressure to seat release lever to pivot ball (Fig. 60). A “pop” sound should be heard. Verify proper engagement by lightly pulling outward on lever at pivot ball location, and then actuating lever and bearing to ensure proper operation.

T850 MANUAL TRANSAXLE (Continued)

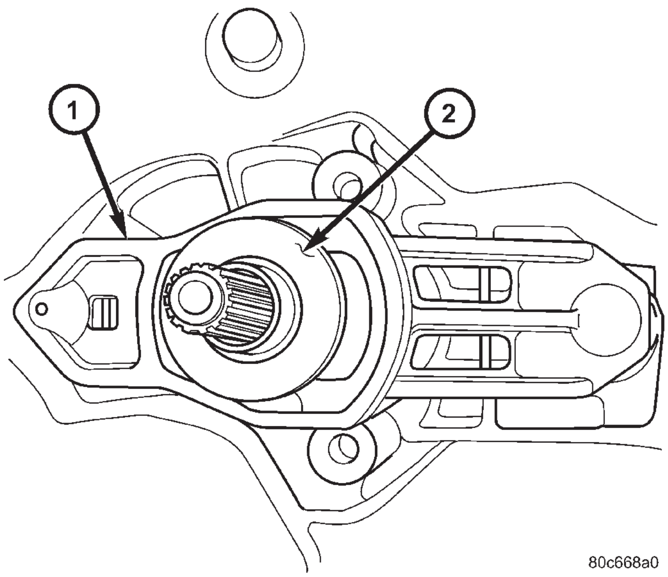


Fig. 60 Release Bearing and Lever

1 - RELEASE LEVER
2 - RELEASE BEARING

INSTALLATION

(1) If previously removed, install modular clutch assembly to input shaft.

(2) Install and secure transaxle to transmission jack, and install transaxle to engine.

(3) Install and torque transaxle bellhousing-to-engine block bolts to 95 N·m (70 ft. lbs.).

(4) Raise engine/transaxle assembly into position. Align transaxle with left mount bracket. Install and torque mount bracket-to-transaxle bolts to 54 N·m (40 ft. lbs.).

(5) Remove transmission jack.

(6) Install and secure ground cable.

(7) Install and torque modular clutch assembly-to-drive plate bolts to 88 N·m (65 ft. lbs.).

(8) Install clutch/drive plate inspection cover.

(9) Install clutch slave cylinder into position, noting orientation of different size lugs. While depressing inward, rotate slave cylinder clockwise until nylon locating tab rests in transaxle case cutout, and the hydraulic tube is vertical.

(10) Install starter motor and install lower bolt. Connect starter motor wire harness.

(11) Connect back-up lamp switch connector.

(12) Install rear mount bracket-to-case bolts. Torque lower (horizontal) bolt to 54 N·m (40 ft. lbs.).

(13) Install front mount/bracket and upper starter bolt.

(14) Install structural collar.

(15) Install halfshaft assemblies. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

(16) Install left wheel opening splash shield.

(17) Check transaxle fluid level. Fill transaxle with suitable amount of Mopar® ATF+4 (Automatic Transmission Fluid—Type 9602). (Refer to 21 - TRANSMISSION/TRANSAXLE/MANUAL/FLUID - STANDARD PROCEDURE)

(18) Lower vehicle.

(19) Connect oxygen sensor harness to front mount bracket.

(20) Torque rear mount bracket-to-case bolts to 54 N·m (40 ft. lbs.).

(21) Install and connect crankshaft position sensor.

(22) Install shift cables to mount perches. Connect to transaxle shift mechanism and install cable retainer clips.

(23) Install throttle body support bracket.

(24) Install air cleaner assembly.

(25) Connect battery negative cable.

T850 MANUAL TRANSAXLE (Continued)

SPECIFICATIONS - T850 MANUAL TRANSAXLE

GENERAL SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Transaxle Type	Constant-mesh, fully synchronized 5-speed with integral differential
Lubrication Method	Splash oil collected in case passage and oil trough and distributed to mainshafts via gravity
Fluid Type	ATF+4 (Automatic Transmission Fluid—Type 9602)

GEAR RATIOS

GEAR	RATIO
1st	3.65
2nd	2.05
3rd	1.37
4th	0.97
5th	0.76
Reverse	3.47
Final Drive Ratio	3.77

INPUT SHAFT

BLOCKER RING WEAR GAP	
3rd Gear	0.856-1.539 mm (0.0338-0.0606 in.)
4th Gear	0.762-1.631 mm (0.030-0.064 in.)
GEAR END PLAY	
3rd Gear	0.099-0.505 mm (0.004-0.020 in.)
4th Gear	0.048-0.457 mm (0.002-0.018 in.)

INTERMEDIATE SHAFT

BLOCKER RING WEAR GAP	
1st Gear	0.66-1.84 mm (0.026-0.072 in.)
2nd Gear	0.66-1.84 mm (0.026-0.072 in.)
5th Gear	0.86-1.54 mm (0.034-0.061 in.)
Reverse	0.77-1.63 mm (0.030-0.064 in.)
GEAR END PLAY	
1st Gear	0.091-0.828 mm (0.004-0.033 in.)
2nd Gear	0.051-0.787 mm (0.002-0.031 in.)
5th Gear	0.102-0.762 mm (0.004-0.030 in.)
Reverse	0.066-0.805 mm (0.003-0.0317 in.)

DIFFERENTIAL

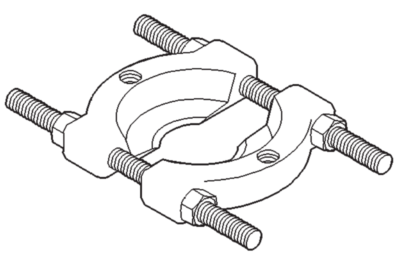
DESCRIPTION	METRIC	STANDARD
Differential Turning Torque	2.3-3.4 N·m	20-30 in. lbs.
Side Gear End Play (each side)	0.025-0.152 mm	0.001-0.006 in.

T850 MANUAL TRANSAXLE (Continued)

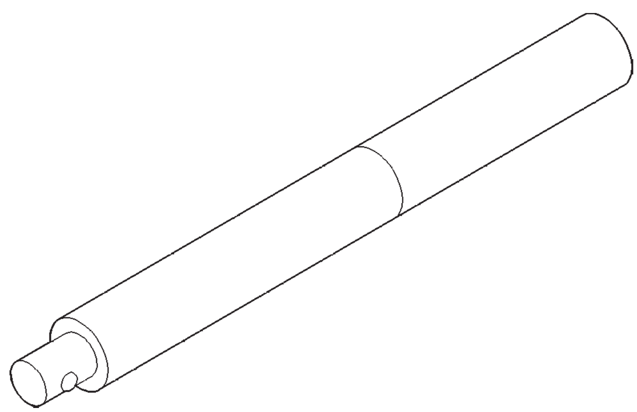
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Bolt, Bearing Plate-to-Case	28	—	250
Bolt, Differential Cover-to-Case	54	40	—
Bolt, End Cover-to-Case	28	—	250
Bolt, End Cover Plate-to-Cover	28	—	250
Bolt, Reverse Idler Shaft-to-Case	54	40	—
Bolt, Ring Gear-to-Differential Case	95	70	—
Bolt, Shift Cover-to-Case	28	—	250
Nut, 5th Gear-to-Input Shaft	200	148	—
Plug, Drain	23	17	—
Screw, Input Bearing Retainer	12	—	105
Switch, Back-Up Lamp	23	17	—
Vent	7	—	60

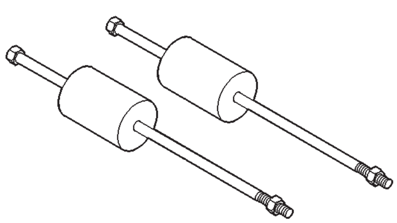
SPECIAL TOOLS - T850 TRANSAXLE



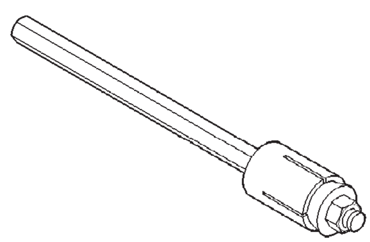
Bearing Splitter, P-334



Universal Handle, C-4171

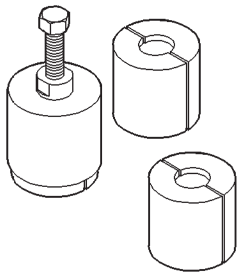


Slide Hammer, C-3752

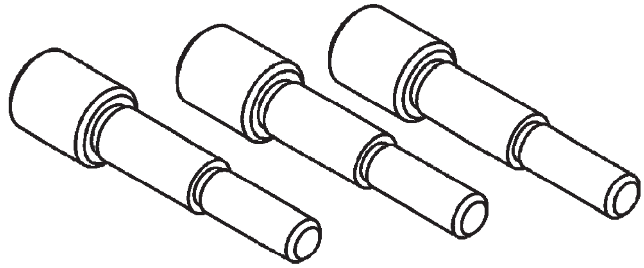


Torque Tool, C-4995

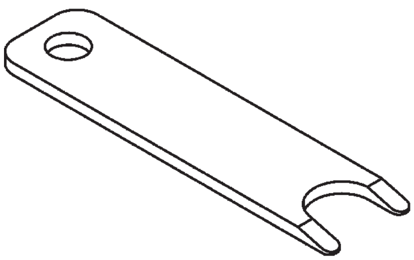
T850 MANUAL TRANSAXLE (Continued)



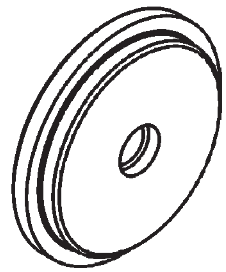
Puller Set, 5048



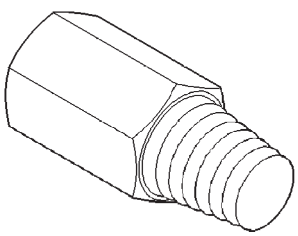
Alignment Pins, 8470



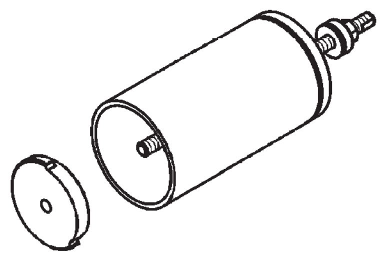
Disconnect Tool, 6638A



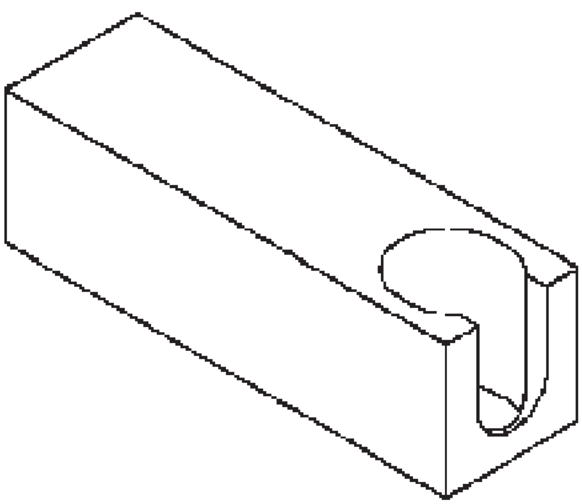
Installer, 8471



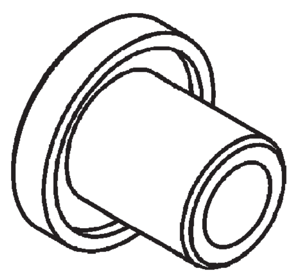
Remover, 6786



Race Remover, 8472

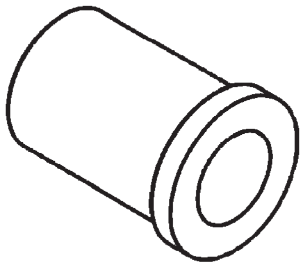


Remover/Installer, 6891

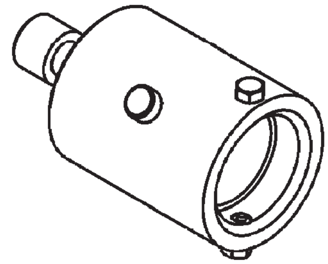


Bearing Installer, 8473

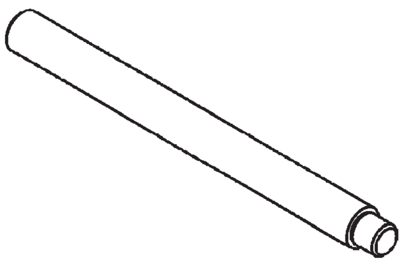
T850 MANUAL TRANSAXLE (Continued)



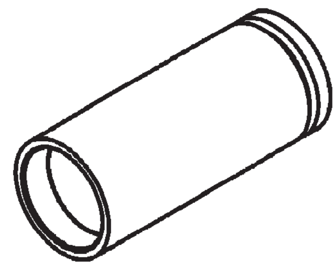
Remover/Installer, 8474



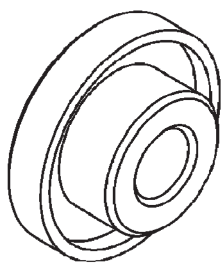
Stake Tool, 8479



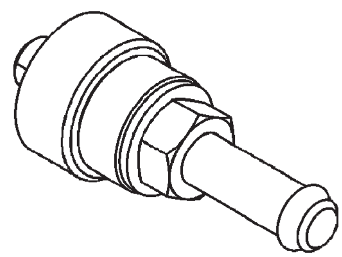
Installer, 8475



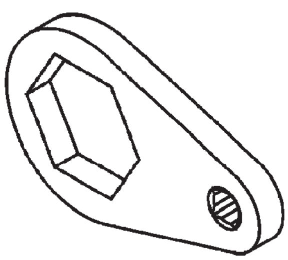
Installer, 8481



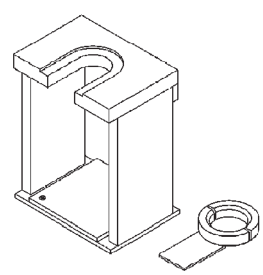
Installer, 8476



Bearing Installer, 8482

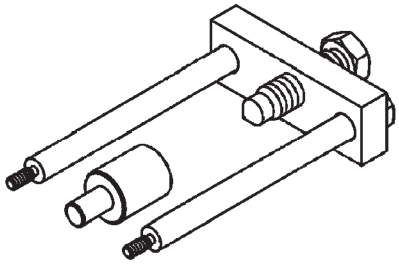


Wrench, 8478

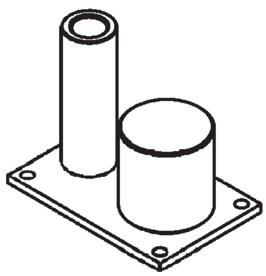


Fixture, 8483

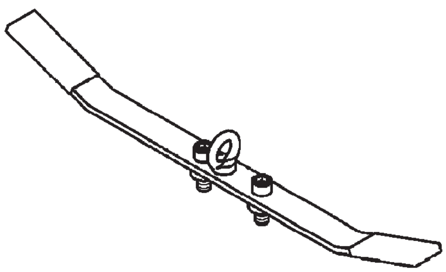
T850 MANUAL TRANSAXLE (Continued)



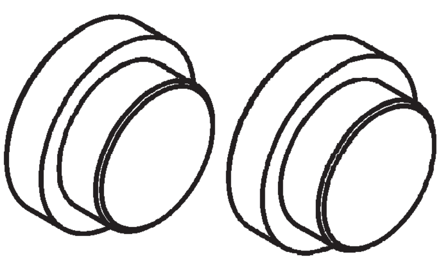
Remover, 8486



Fixture, 8487



Lifting Bar, 8489



Thrust Buttons, 8491

AXLE SEALS

REMOVAL

(1) Raise vehicle on hoist.

(2) Remove one or both front halfshaft assemblies. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL)

(3) Using a suitable screwdriver, remove one or both axle seals (Fig. 61).

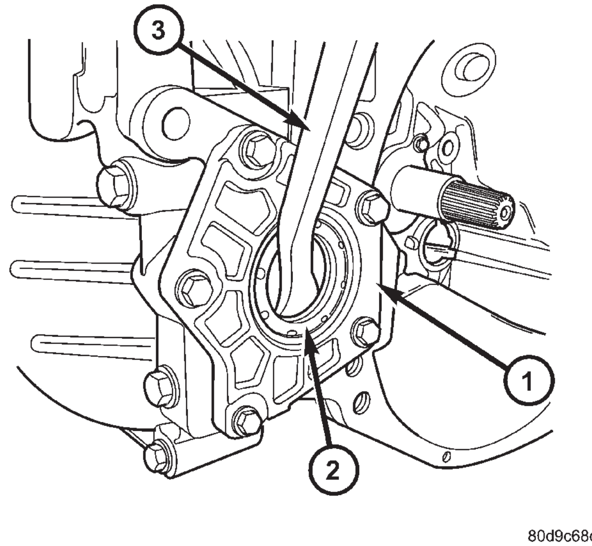


Fig. 61 Axle Seal Removal (Bearing Plate Side)

1 - PLATE
2 - SEAL
3 - SCREWDRIVER

INSTALLATION

(1) Using driver handle C-4171 and installer 8476, install axle seals into position (Fig. 62).

(2) Install one or both front halfshaft assemblies. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

(3) Check transaxle fluid level and adjust if necessary. (Refer to 21 - TRANSMISSION/TRANSAXLE/MANUAL/FLUID - STANDARD PROCEDURE)

(4) Lower vehicle.

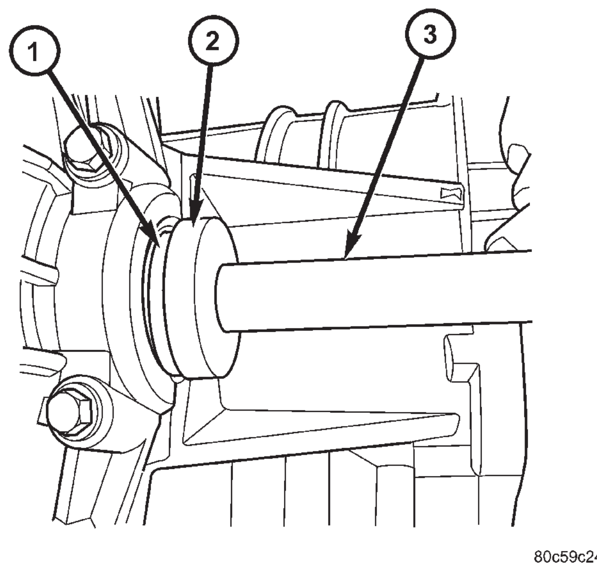


Fig. 62 Axle Seal Installation—Typical

1 - SEAL
2 - INSTALLER 8476
3 - DRIVER HANDLE C-4171

BACK-UP LAMP SWITCH

REMOVAL

(1) Raise vehicle on hoist.
(2) Disconnect back-up lamp switch connector.
(3) Remove back-up lamp switch (Fig. 63).

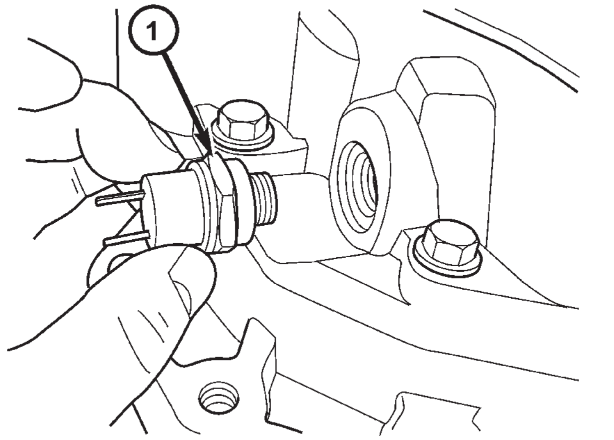


Fig. 63 Back-Up Lamp Switch

1 - BACK-UP LAMP SWITCH

INSTALLATION

(1) Install back-up lamp switch (Fig. 63) and torque to 23 N·m (17 ft. lbs.).
(2) Connect back-up lamp switch connector.
(3) Lower vehicle.

DIFFERENTIAL

DESCRIPTION

The T850 differential is a conventional open design. It consists of a ring gear and a two-piece differential case. The differential case contains the pinion and side gears, three floating pinion shafts, and a pinion shaft retaining ring (Fig. 64). The differential case is supported in the transaxle by tapered roller bearings.

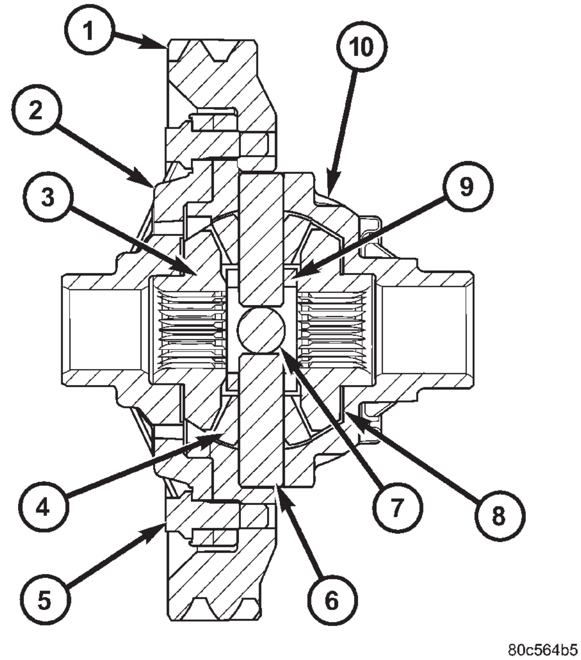


Fig. 64 Differential Assembly

1 - RING GEAR
2 - SUPPORT PLATE
3 - SIDE GEAR (2)
4 - PINION GEAR (4)
5 - BOLT (12)
6 - PINION SHAFT (2-SHORT)
7 - PINION SHAFT (1-LONG)
8 - THRUST WASHER (2)
9 - RETAINING RING
10 - DIFFERENTIAL CASE

OPERATION

The differential assembly is driven by the intermediate shaft via the ring gear. The ring gear drives the differential case, and the case drives the halfshafts through the differential gears. The differential pinion and side gears are supported in the case by pinion shafts and thrust washers. Differential pinion and side gears make it possible for front wheels to rotate at different speeds while cornering.

DIFFERENTIAL (Continued)

DISASSEMBLY

(1) Remove differential side bearings:

(a) Install button 8491-1 to differential case (Fig. 65).

(b) Set up Tool 5048 (5048-1, -4, -6) as shown in (Fig. 66).

(c) Remove differential side bearing (Fig. 67). Same procedure/tools work for both sides.

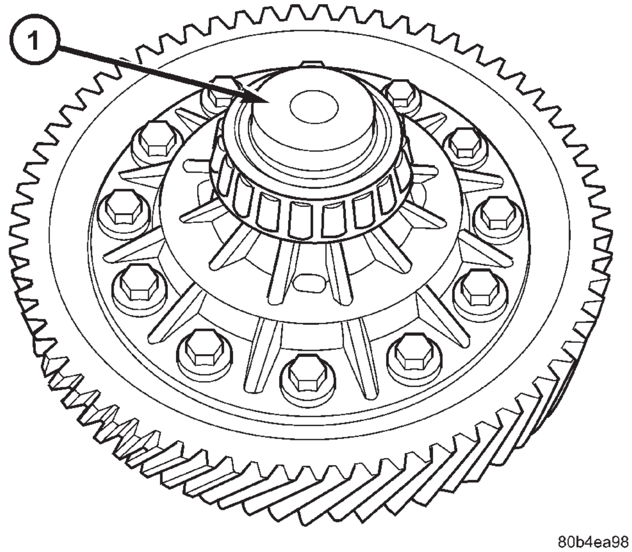


Fig. 65 Tool 8491

1 - TOOL 8491

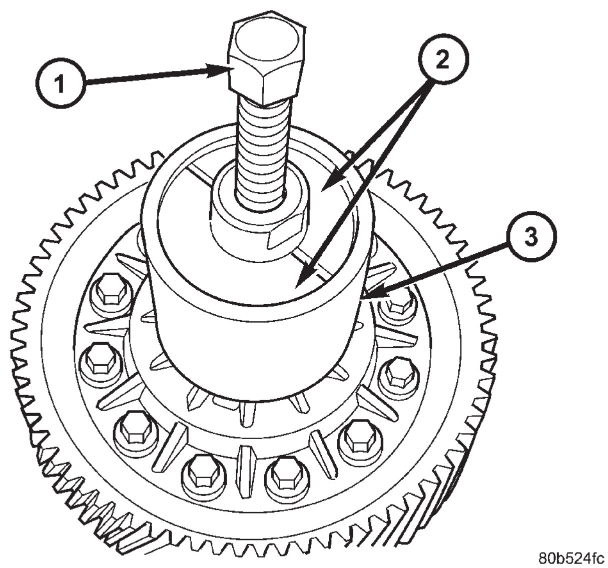


Fig. 66 Puller 5048

1 - 5048-1 FORCING SCREW
2 - 5048-4 COLLETS
3 - 5048-6 SLEEVE

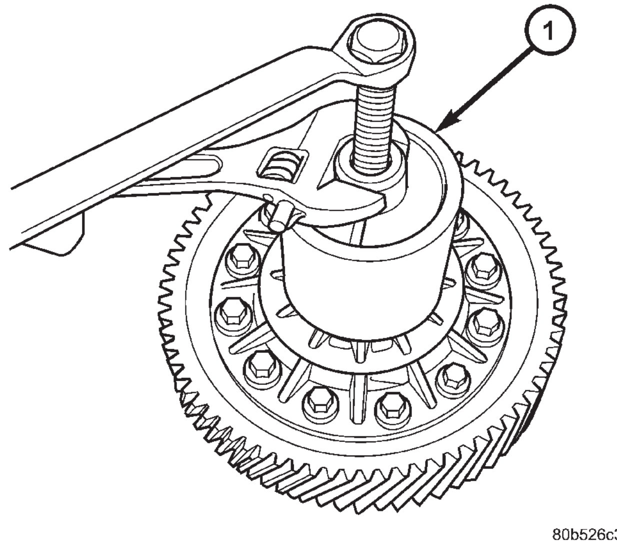


Fig. 67 Differential Side Bearing Removal

1 - TOOL 5048

(2) Remove ring gear-to-case bolts (Fig. 68) and remove ring gear.

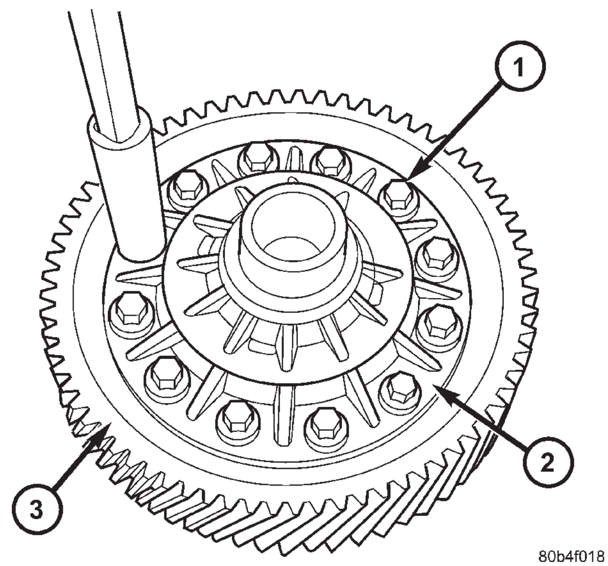


Fig. 68 Ring Gear-to-Differential Case Bolts

1 - BOLT (12)
2 - DIFFERENTIAL SUPPORT
3 - RING GEAR

DIFFERENTIAL (Continued)

(3) Using three ring gear bolts as forcing screws (Fig. 69), separate differential support from case (Fig. 70).

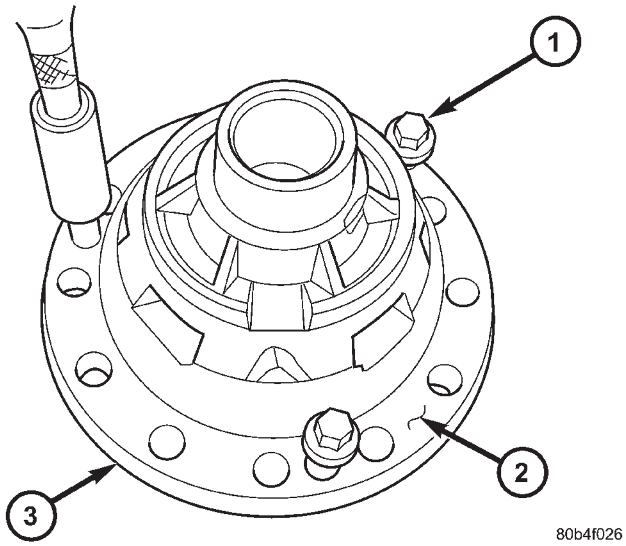


Fig. 69 Separate Differential Case Halves

1 - BOLT (3)
2 - DIFFERENTIAL CASE
3 - DIFFERENTIAL SUPPORT

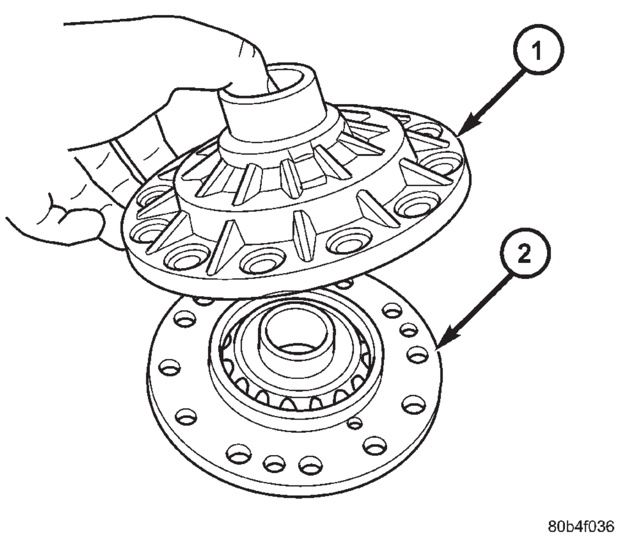


Fig. 70 Differential Support Plate

1 - DIFFERENTIAL SUPPORT PLATE
2 - DIFFERENTIAL CASE

(4) Remove side gear thrust washer (Fig. 71).

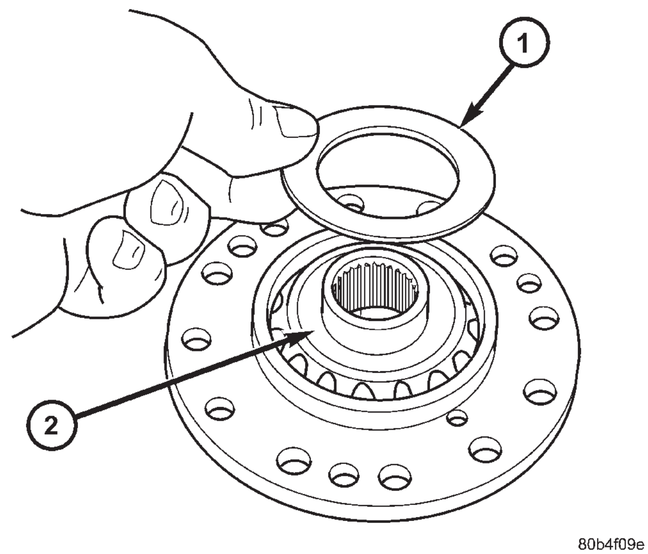


Fig. 71 Side Gear Thrust Washer

1 - SIDE GEAR THRUST WASHER
2 - DIFFERENTIAL SIDE GEAR

(5) Remove side gear (Fig. 72).

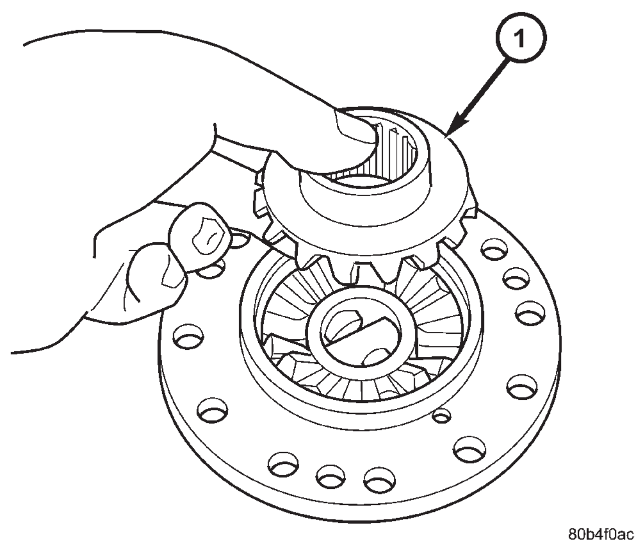


Fig. 72 Differential Side Gear

1 - DIFFERENTIAL SIDE GEAR

DIFFERENTIAL (Continued)

(6) Remove long pinion shaft (Fig. 73).

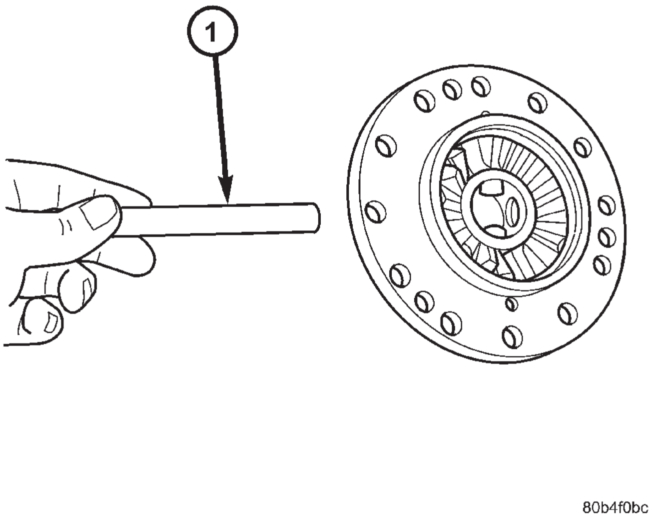


Fig. 73 Long Pinion Shaft

1 - PINION SHAFT (LONG)

(7) Remove both short pinion shafts (Fig. 74).

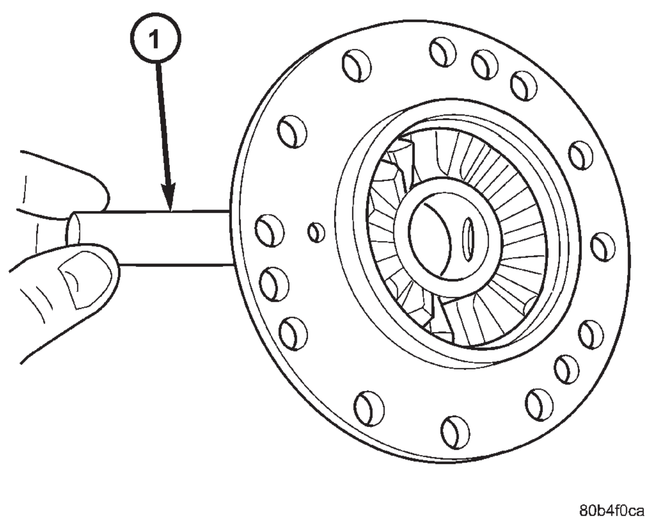


Fig. 74 Short Pinion Shaft (2)

1 - PINION SHAFT (SHORT (2))

(8) Remove pinion shaft retainer (Fig. 75).

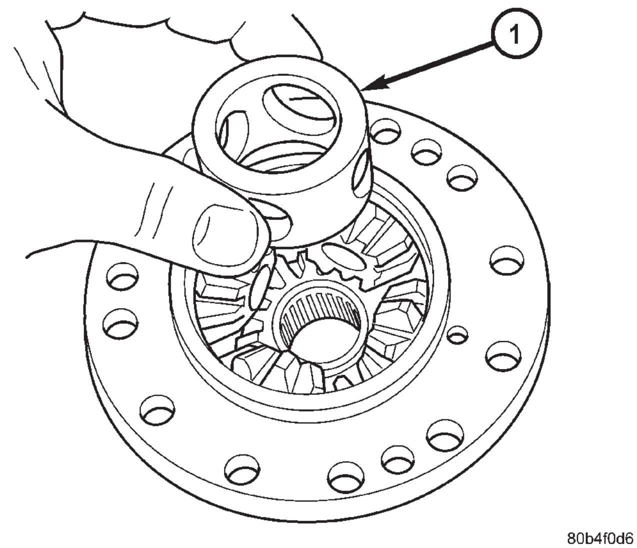


Fig. 75 Pinion Shaft Retaining Ring

1 - RETAINING RING

(9) Remove four pinion gears and thrust washers (Fig. 76).

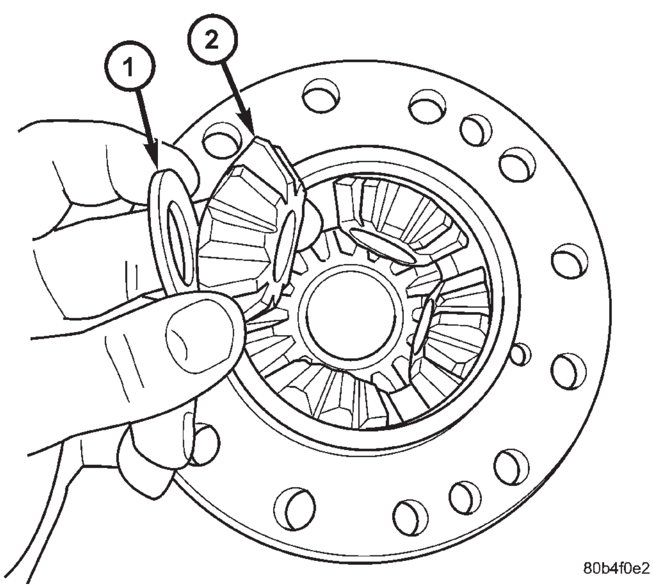


Fig. 76 Pinion Gear and Thrust Washer

1 - THRUST WASHER (4)
2 - PINION GEAR (4)

DIFFERENTIAL (Continued)

(10) Remove side gear (Fig. 77).

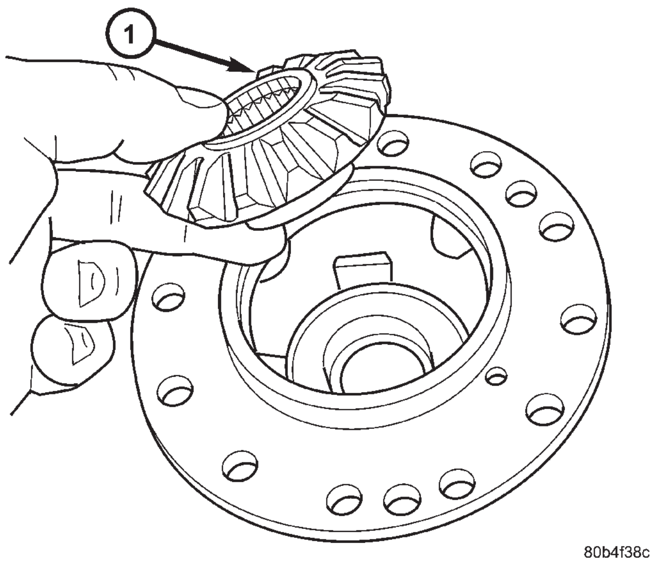


Fig. 77 Differential Side Gear

1 - DIFFERENTIAL SIDE GEAR

(11) Remove side gear thrust washer (Fig. 78).

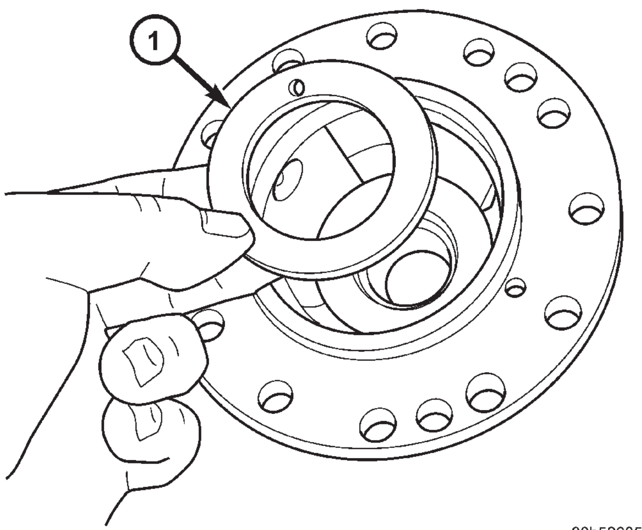


Fig. 78 Side Gear Thrust Washer

1 - SIDE GEAR THRUST WASHER

ASSEMBLY

(1) Install side gear thrust washer (Fig. 79).

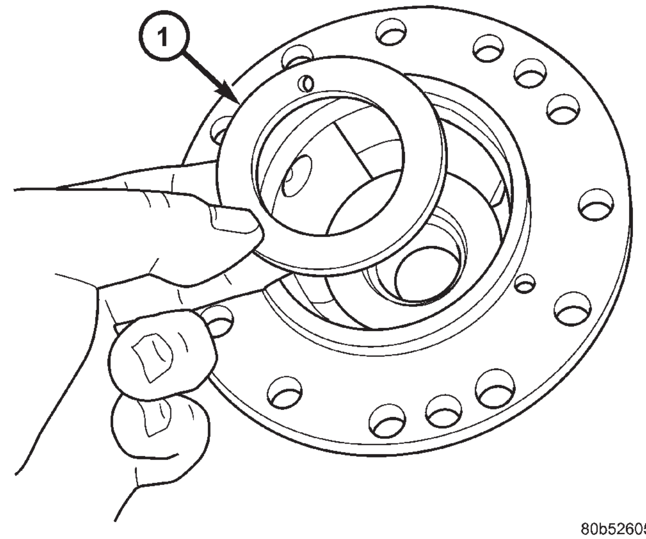


Fig. 79 Side Gear Thrust Washer

1 - SIDE GEAR THRUST WASHER

(2) Install differential side gear (Fig. 80).

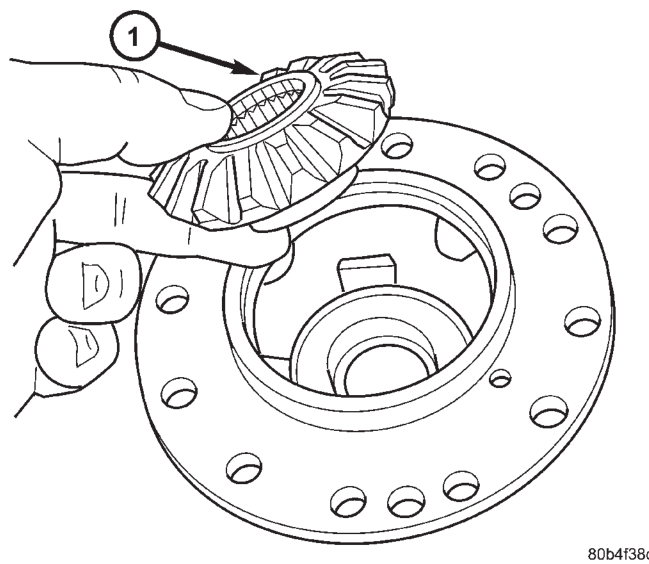


Fig. 80 Differential Side Gear

1 - DIFFERENTIAL SIDE GEAR

DIFFERENTIAL (Continued)

(3) Install four (4) pinion gears and thrust washers (Fig. 81).

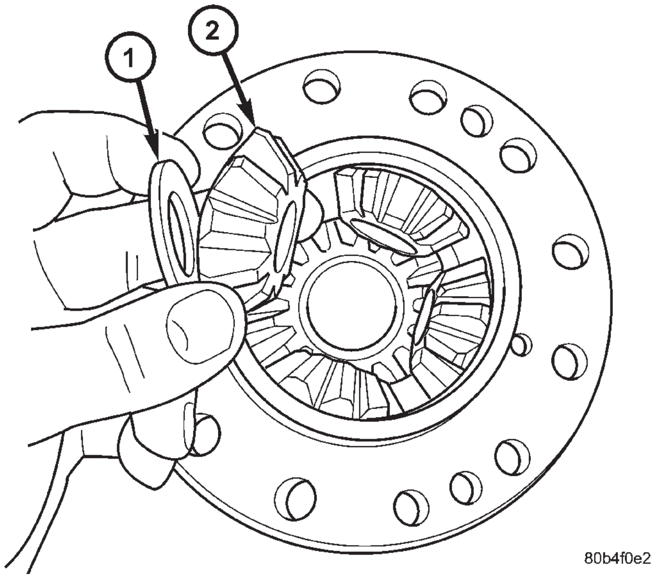


Fig. 81 Pinion Gear and Thrust Washer

1 - THRUST WASHER (4)
2 - PINION GEAR (4)

(4) Install pinion shaft retaining ring (Fig. 82).

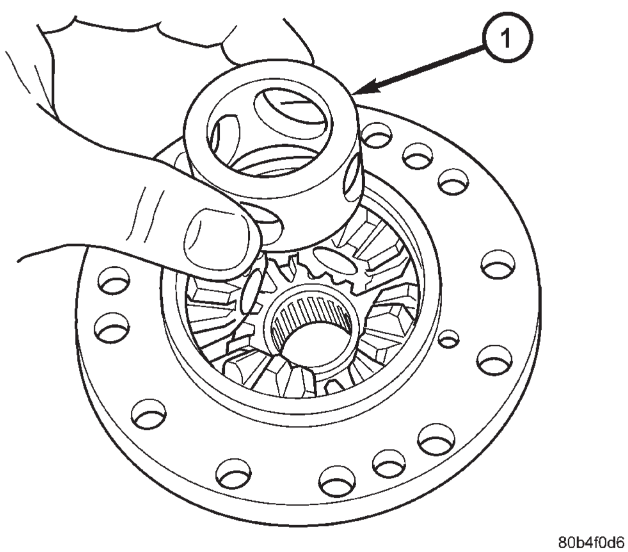


Fig. 82 Pinion Shaft Retaining Ring

1 - RETAINING RING

(5) Install two (2) short pinion shafts (Fig. 83).
(6) Install one (1) long pinion shaft (Fig. 84).

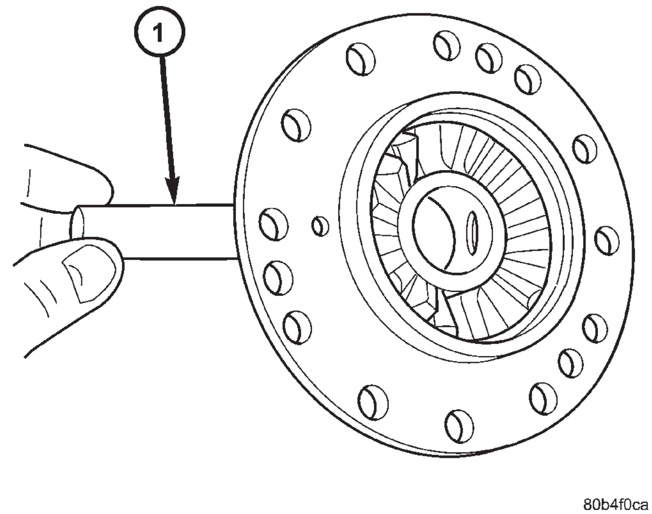


Fig. 83 Short Pinion Shaft (2)

1 - PINION SHAFT (SHORT (2))

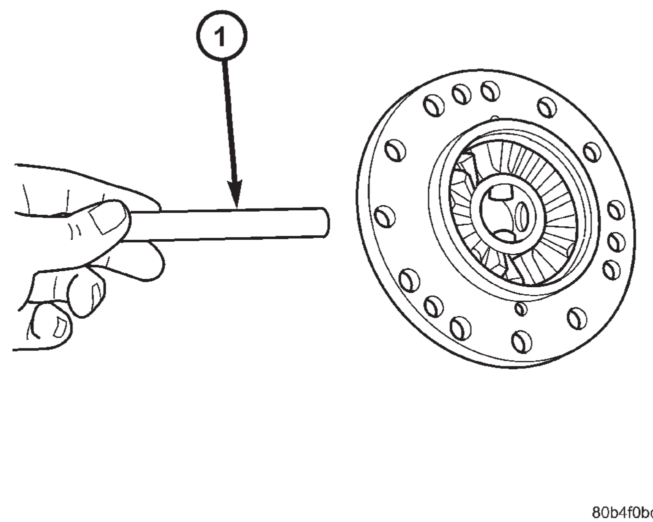


Fig. 84 Long Pinion Shaft

1 - PINION SHAFT (LONG)

(7) Install differential side gear.
(8) Install side gear thrust washer (Fig. 85).
(9) Install differential support plate. Align support plate to differential case with alignment pins 8470 (Fig. 86).
(10) Install thrust buttons 8491 to both bearing journals and press halves together using an arbor press (Fig. 87).
(11) Install ring gear into position, start three ring gear-to-differential case bolts by hand (120° apart), and install alignment pins 8470 (Fig. 88).

DIFFERENTIAL (Continued)

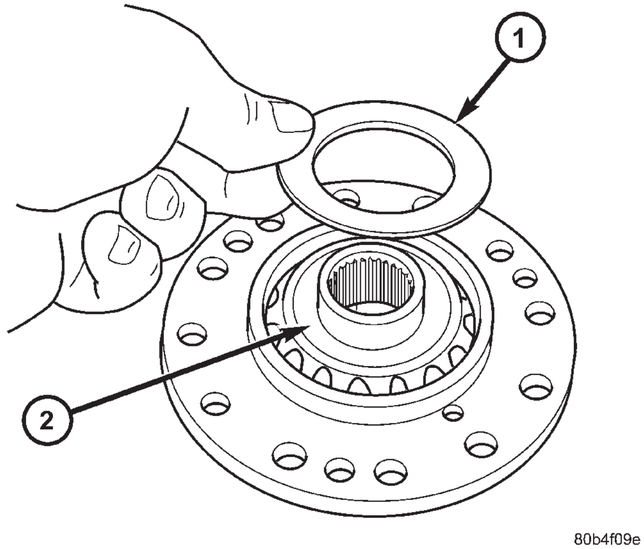


Fig. 85 Side Gear Thrust Washer

1 - SIDE GEAR THRUST WASHER
2 - DIFFERENTIAL SIDE GEAR

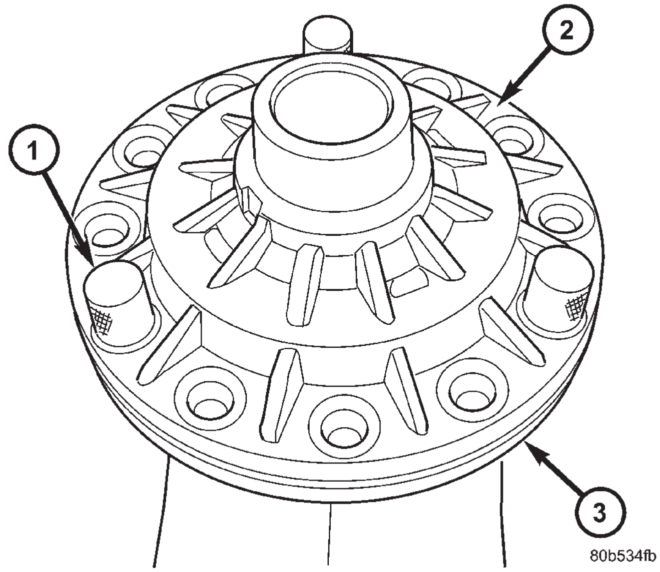


Fig. 86 Align Differential Support to Case

1 - ALIGNMENT PIN 8470
2 - DIFFERENTIAL SUPPORT PLATE
3 - DIFFERENTIAL CASE

(12) Torque three ring gear bolts to draw ring gear into position. Remove alignment pins, install remaining ring gear-to-differential case bolts and torque to 95 N·m (70 ft. lbs.) (Fig. 89).

(13) Install tapered roller bearings using installer 8473 and an arbor press (Fig. 90). Insert button 8491 on opposite journal to protect journal and/or bearing during press operation. Repeat the same operation on opposite side.

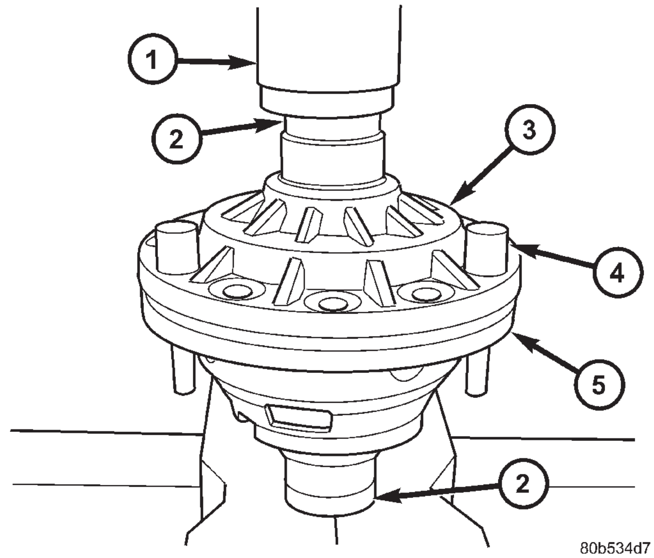


Fig. 87 Installing Differential Support

1 - ARBOR PRESS
2 - BUTTON 8491
3 - DIFFERENTIAL SUPPORT PLATE
4 - ALIGNMENT PIN 8470
5 - DIFFERENTIAL CASE

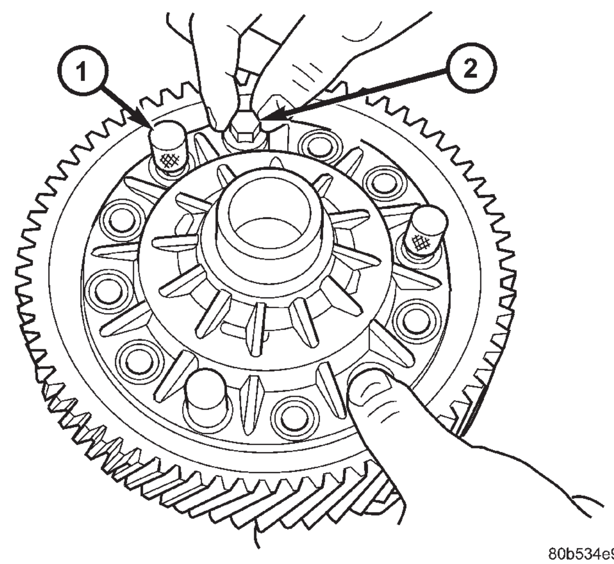


Fig. 88 Ring Gear Alignment/Installation

1 - ALIGNMENT PIN 8470
2 - BOLT

(14) Measure and verify differential side gear end play. (Refer to 21 - TRANSMISSION/TRANSAXLE/MANUAL/DIFFERENTIAL - ADJUSTMENTS).

DIFFERENTIAL (Continued)

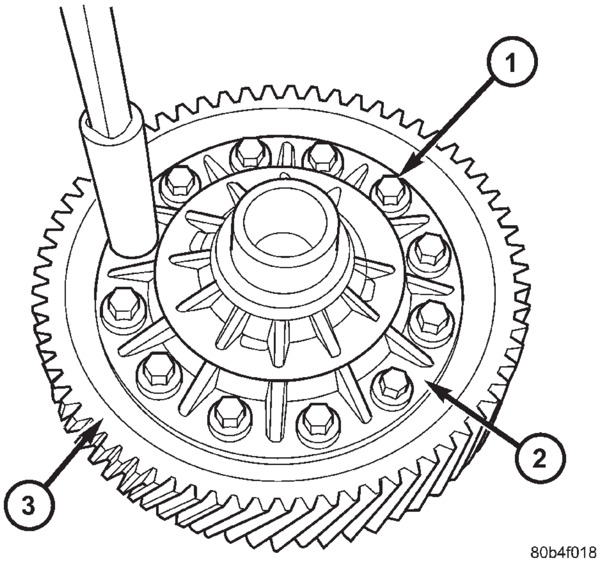


Fig. 89 Ring Gear-to-Differential Case Bolts

1 - BOLT (12)
2 - DIFFERENTIAL SUPPORT
3 - RING GEAR

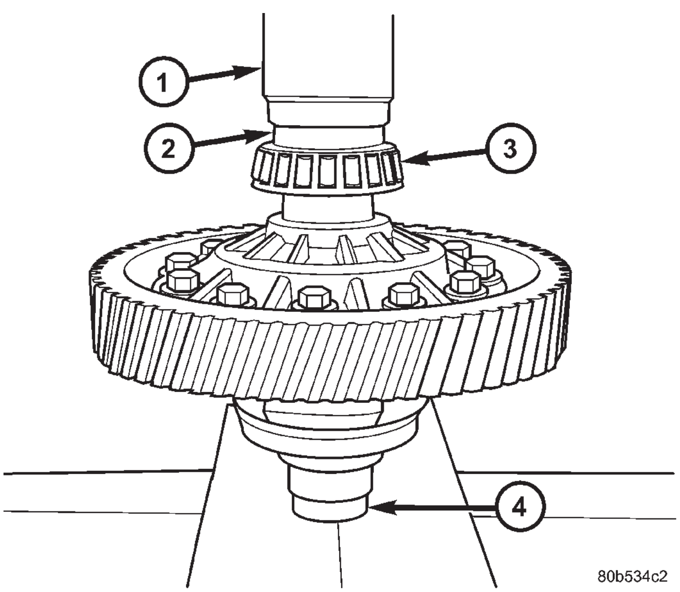


Fig. 90 Differential Side Bearing Installation

1 - ARBOR PRESS
2 - INSTALLER 8473
3 - BEARING
4 - BUTTON 8491

ADJUSTMENTS

ADJUSTMENT - DIFFERENTIAL TURNING TORQUE

NOTE: Differential turning torque should only be measured with the geartrain out of the transaxle. If measurement is taken with transaxle assembled, an inaccurate measurement will result.

NOTE: All differential cover-to-case bolts and bearing plate-to-case bolts must be installed and torqued to obtain accurate measurement.

(1) If transaxle is assembled, remove geartrain and leave differential in place. (Refer to 21 - TRANSMISSION/TRANSAXLE/MANUAL - DISASSEMBLY)

(2) Install differential cover and torque differential cover-to-case bolts to 54 N·m (40 ft. lbs.).

(3) Install extension housing and torque extension housing-to-case bolts to 28 N·m (250 in. lbs.).

(4) Place transaxle on work bench so axle centerline is parallel to the ground.

(5) Install turning torque tool C-4995 to differential at side opposite extension housing.

(6) Using in. lb./N·m dial indicator, rotate differential case multiple times and record measurement (Fig. 91). Differential turning torque should be within 2.3-3.4 N·m (20-30 in. lbs.). Refer to shim chart for proper shim selection. If turning torque measured is less than 2.3 N·m (20 in. lbs.), install a thicker shim. If turning torque measured is greater than 3.4 N·m (30 in. lbs.), install a thinner shim.

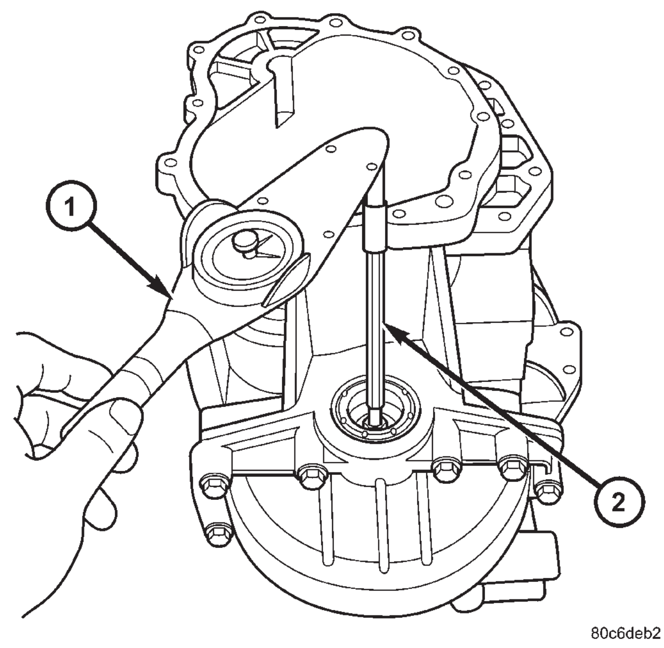


Fig. 91 Differential Turning Torque Measurement

1 - DIAL TORQUE WRENCH
2 - TOOL C-4995

DIFFERENTIAL (Continued)

DIFFERENTIAL BEARING SHIM CHART

PART NUMBER	SHIM THICKNESS	
	METRIC (MM)	STANDARD (STD)
4659242	0.50	0.0197
4659243	0.54	0.0213
4659247	0.58	0.0228
4659248	0.62	0.0244
4659249	0.66	0.0260
4659250	0.70	0.0276
4659251	0.74	0.0291
4659252	0.78	0.0307
4659253	0.82	0.0322
4659254	0.86	0.0339
4659255	0.90	0.0354
4659256	0.94	0.0370
4659257	0.98	0.0386
4659258	1.02	0.0402
4659259	1.06	0.0418
4659260	1.10	0.0434
4659261	1.14	0.0449
4659262	1.18	0.0465
4659263	1.22	0.0481
4659264	1.26	0.0497
4659265	1.30	0.0512
4659266	1.34	0.0528
4659267	1.38	0.0544
4659268	1.42	0.0560
4659269	1.46	0.0575
4659270	1.50	0.0591
4659271	1.54	0.0607
4659272	1.58	0.0623
4659273	1.62	0.0638
4659274	1.66	0.0654
4659275	1.70	0.0670
4659283	2.02	0.0796
4659284	2.06	0.0812

DIFFERENTIAL (Continued)

ADJUSTMENT - DIFFERENTIAL SIDE GEAR END PLAY

Measure side gear end play: Insert feeler gauges 180° apart between differential side gear and thrust washer as shown in (Fig. 92). Measurement taken here applies to both sides. Side gear end play should be between 0.025-0.152 mm (0.001-0.006 in.). If clearance is greater than 0.152 mm (0.006 in.), install a thicker thrust washer (both sides). If clearance is less than 0.025 mm (0.001), install a thinner thrust washer (both sides). Refer to (Fig. 93) for available side gear shim thicknesses.

If end play measurement indicates a thrust washer change is necessary, the differential must be disassembled. (Refer to 21 - TRANSMISSION/TRANSAXLE/MANUAL/DIFFERENTIAL - DISASSEMBLY)

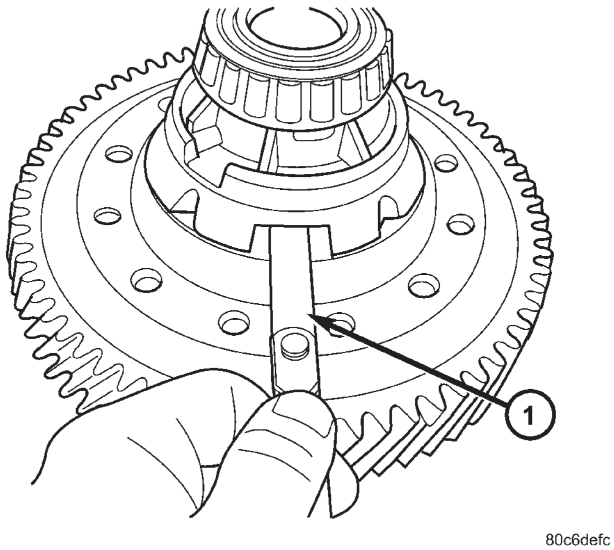


Fig. 92 Side Gear End Play Measurement

1 - FEELER GAUGE

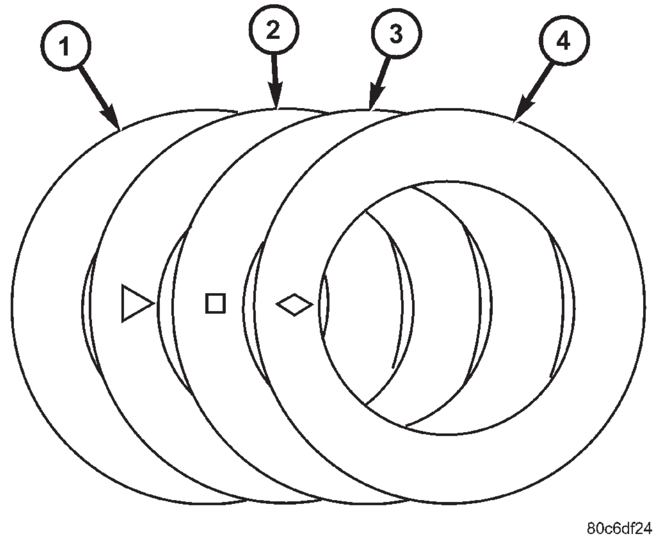


Fig. 93 Available Side Gear Thrust Washers

1 - (PLAIN) 0.79-0.84 mm (0.031-0.033 in.)
2 - (TRIANGLE) 0.91-0.97 mm (0.036-0.038 in.)
3 - (SQUARE) 1.04-1.10 mm (0.041-0.043 in.)
4 - (DIAMOND) 1.17-1.22 mm (0.046-0.048 in.)

FLUID

STANDARD PROCEDURE

STANDARD PROCEDURE - FLUID LEVEL CHECK

NOTE: For proper fluid level check intervals, (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION)

The fluid required in this transaxle is Mopar® ATF+4 (Automatic Transmission Fluid—Type 9602). Use of substitute fluids may result in improper transaxle operation and/or failure.

(1) Raise vehicle on hoist.

(2) Remove transaxle fill plug (Fig. 94).

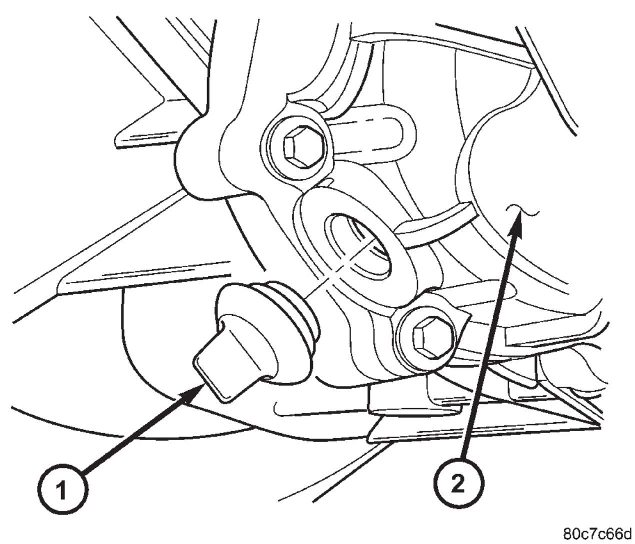


Fig. 94 Transaxle Fill Plug

1 - FILL PLUG
2 - END COVER

(3) Inspect fluid level. Fluid should be within 1/8” below fill hole. Add Mopar® ATF+4 (Automatic Transmission Fluid—Type 9602) as neccessary.

(4) Install fill plug, ensuring it is properly seated.

(5) Lower vehicle.

FLUID (Continued)

STANDARD PROCEDURE - FLUID DRAIN AND FILL

NOTE: For proper fluid change intervals, (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION)

The fluid required in this transaxle is Mopar® ATF+4 (Automatic Transmission Fluid—Type 9602). Use of substitute fluids may result in improper transaxle operation and/or failure.

FLUID DRAIN

(1) Raise vehicle on hoist.

(2) Remove transaxle drain plug (Fig. 95) and drain fluid into suitable container.

(3) Install drain plug and torque to 23 N·m (17 ft. lbs.).

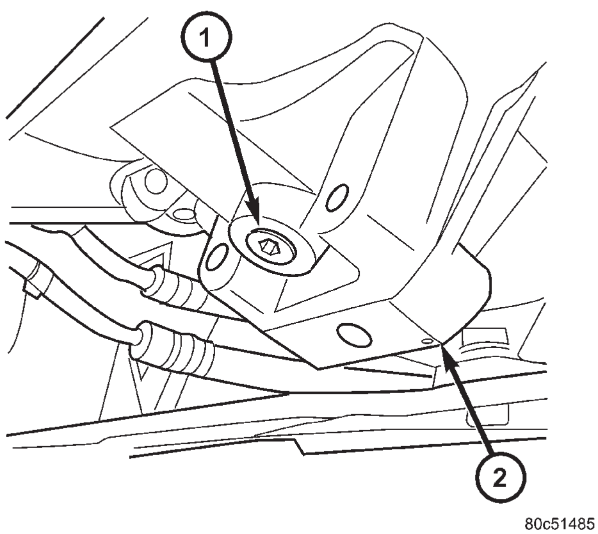


Fig. 95 Transaxle Drain Plug

1 - TRANSAXLE DRAIN PLUG
2 - DIFFERENTIAL COVER

FLUID FILL

(1) Remove transaxle fill plug (Fig. 96).

(2) Add 2.4-2.7L (2.5-2.9 qts.) of Mopar® ATF+4 (Automatic Transmission Fluid—Type 9602) until fluid is within 1/8” below fill hole.

(3) Install fill plug, ensuring it is properly seated.

(4) Lower vehicle.

GEAR SHIFT CABLE

REMOVAL

(1) Disconnect battery negative cable.

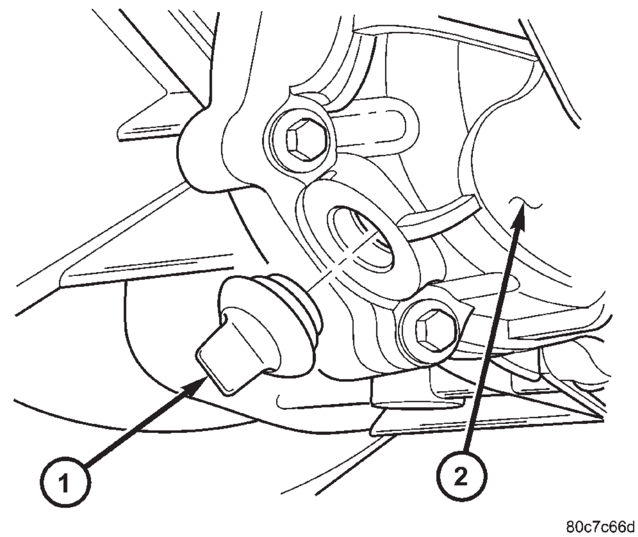


Fig. 96 Transaxle Fill Plug

1 - FILL PLUG
2 - END COVER

(2) Remove gearshift knob/boot assembly. Lift boot off of console and disengage knob retainers to free.

(3) Remove center console assembly (Fig. 97).

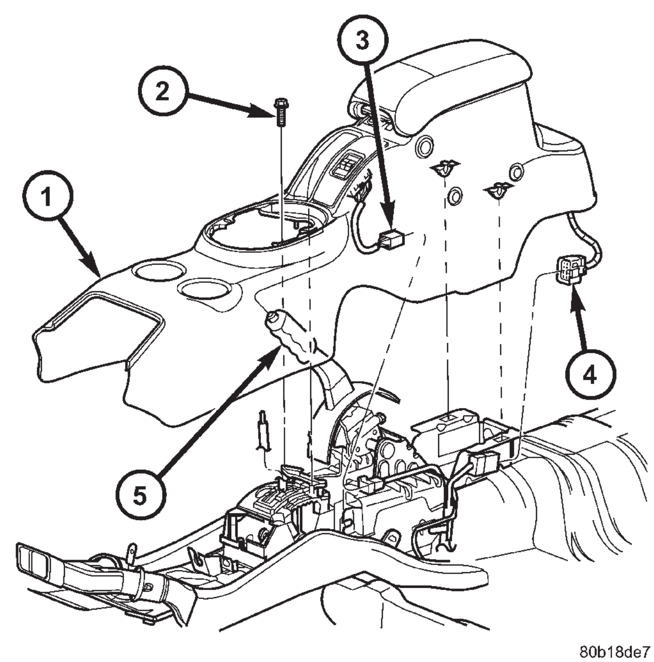


Fig. 97 Center Console Assembly—Typical

1 - CENTER CONSOLE
2 - SCREW
3 - IF EQUIPPED
4 - IF EQUIPPED
5 - PARK BRAKE HANDLE

GEAR SHIFT CABLE (Continued)

(4) Disconnect crossover and selector cables from shift mechanism.

(5) Remove crossover and selector cable retaining clips (Fig. 98) from shift mechanism and disconnect cables.

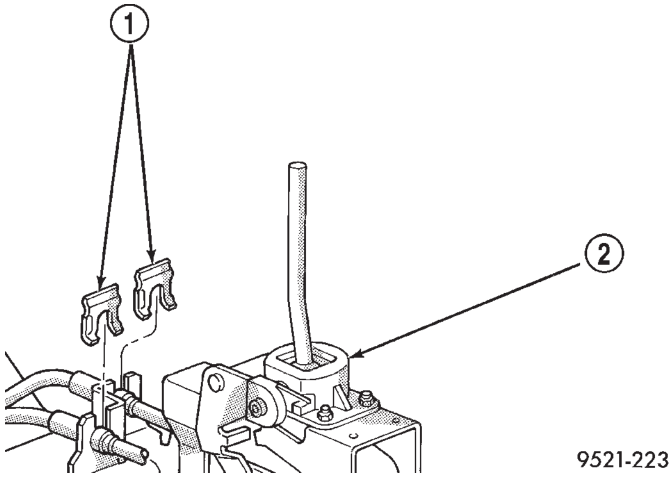


Fig. 98 Cable Retaining Clips

1 - CABLE CLIPS
2 - SHIFTER

(6) Remove air cleaner assembly.

(7) Disconnect crossover and selector cables from transaxle (Fig. 99).

(8) Remove retainer clips and disengage cables from bracket (Fig. 99).

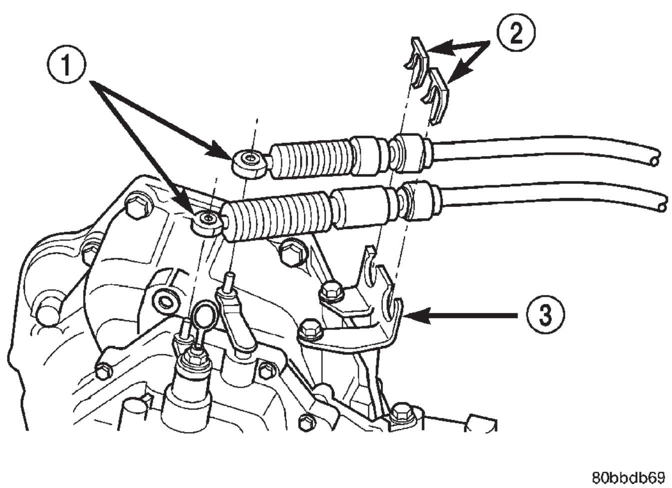


Fig. 99 Shift Cables at Transaxle

1 - SHIFT CABLES
2 - CLIPS
3 - BRACKET

(9) Raise vehicle on hoist.

(10) Remove cable grommet from floor pan.

(11) Pull cables forward and remove from under vehicle.

INSTALLATION

(1) Install gearshift cable assembly into engine compartment from under vehicle.

(2) Feed cable assembly through hole in floor pan and secure grommet to floor pan.

(3) Lower vehicle.

(4) Install gearshift cables to mounting bracket (Fig. 99). Secure with new clips.

(5) Connect gearshift cables to transaxle crossover and selector levers (Fig. 99).

(6) Install air cleaner assembly.

(7) Connect crossover and selector cables to mechanism and secure with clips (Fig. 98).

NOTE: Only the crossover cable is adjustable. The selector cable does not have any adjustment capabilities.

(8) **Adjust crossover cable as follows:**

(a) Loosen adjusting screw on crossover cable at shifter (Fig. 100).

(b) The gearshift mechanism and transaxle crossover lever are spring-loaded and self-centering. Alignment pins used in the past are not required anymore. Allow gearshift mechanism and transaxle crossover lever to relax in their neutral positions. To ensure the gearshift lever is in the proper position, place the shifter in 3rd or 4th gear if necessary. Torque adjustment screw to 8 N·m (70 in. lbs.). Care must be taken to avoid moving the shift mechanism off-center during screw tightening.

(c) Perform functional check by shifting transaxle into all gears.

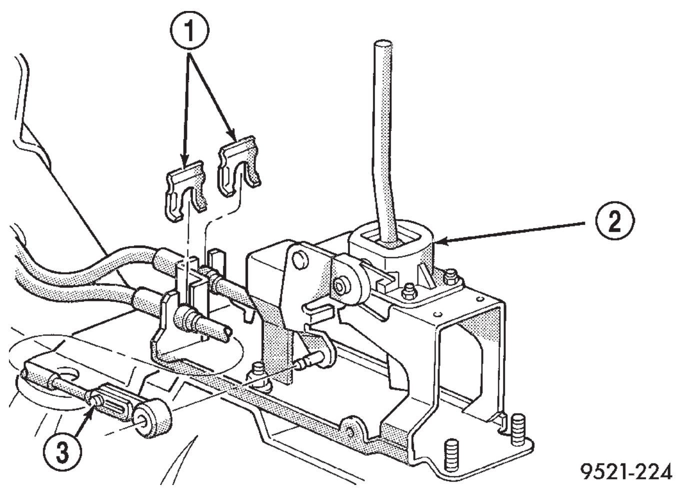


Fig. 100 Crossover and Selector Cables at Shift Mechanism

1 - CABLE CLIPS
2 - SHIFTER
3 - ADJUSTMENT SCREW

GEAR SHIFT CABLE (Continued)

(9) Install center console assembly (Fig. 97).

(10) Install gearshift knob/boot assembly. Ensure knob retaining tabs are secured to shift lever. Snap boot to console at retainer locations.

GEAR SHIFT MECHANISM

REMOVAL

(1) Disconnect battery negative cable.

(2) Remove gearshift knob/boot assembly.

(3) Remove center console assembly (Fig. 101).

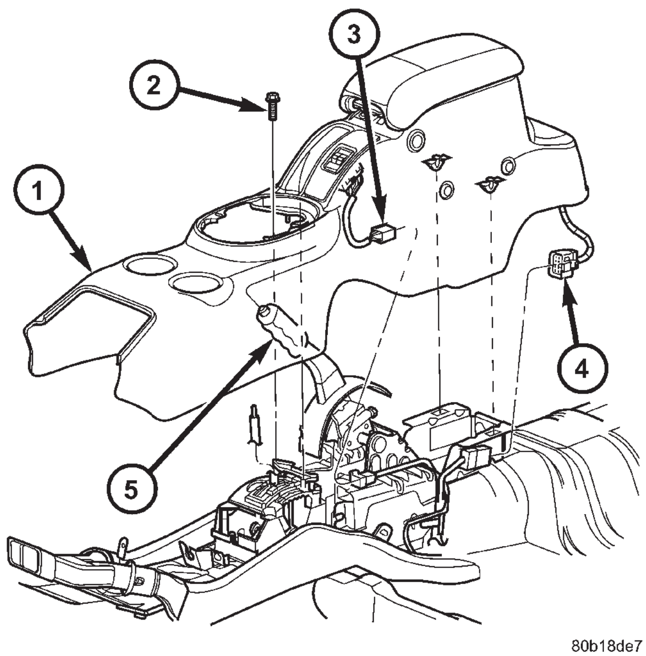


Fig. 101 Center Console Assembly—Typical

1 - CENTER CONSOLE
2 - SCREW
3 - IF EQUIPPED
4 - IF EQUIPPED
5 - PARK BRAKE HANDLE

(4) Disconnect crossover cable from mechanism.

(5) Disconnect selector cable from mechanism.

(6) Remove crossover and selector cable retaining clips (Fig. 102) from mechanism and disconnect cables.

(7) Remove shift mechanism-to-floor pan bolts and remove mechanism (Fig. 103).

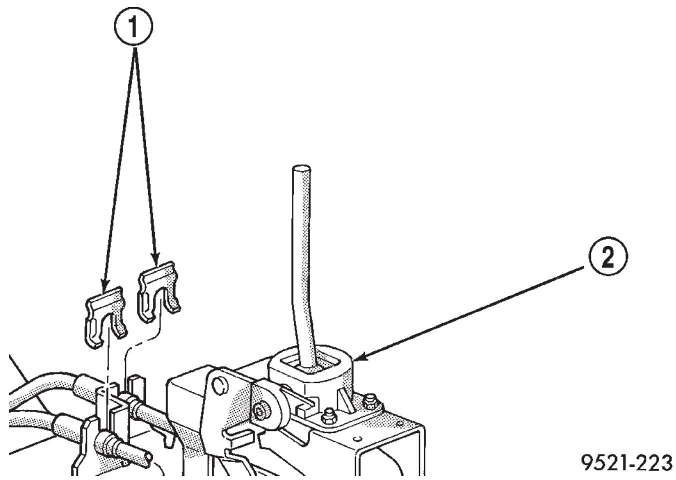


Fig. 102 Cable Retaining Clips

1 - CABLE CLIPS
2 - SHIFTER

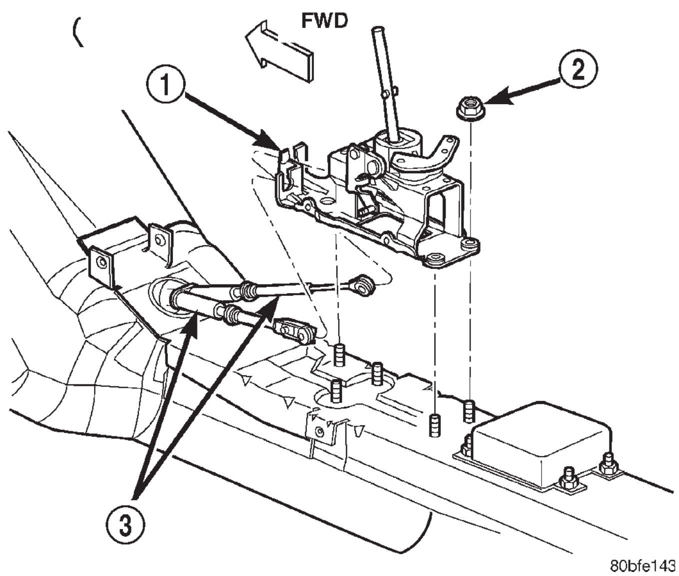


Fig. 103 Gearshift Mechanism

1 - GEARSHIFT MECHANISM
2 - NUT (5)
3 - GEARSHIFT CABLES

GEAR SHIFT MECHANISM (Continued)

INSTALLATION

(1) Install gear shift mechanism to floor pan (Fig. 103). Install and torque four (4) nuts to 25 N·m (18 ft. lbs.).

(2) Install crossover and selector cables into position. Secure with retaining clips (Fig. 104).

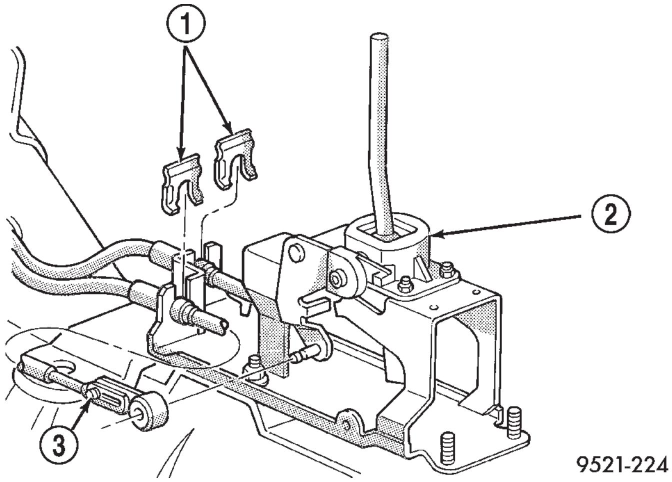


Fig. 104 Crossover and Selector Cables at Shift Mechanism

1 - CABLE CLIPS
2 - SHIFTER
3 - ADJUSTMENT SCREW

NOTE: Only the crossover cable is adjustable. The selector cable does not have any adjustment capabilities.

(3) **Adjust crossover cable as follows:**

(a) Loosen adjusting screw on crossover cable at shifter (Fig. 104).

(b) The gearshift mechanism and transaxle crossover lever are spring-loaded and self-centering. Alignment pins used in the past are not required anymore. Allow gearshift mechanism and transaxle crossover lever to relax in their neutral positions. To ensure the gearshift lever is in the proper position, place the shifter in 3rd or 4th gear if necessary. Torque adjustment screw to 8 N·m (70 in. lbs.). Care must be taken to avoid moving the shift mechanism off-center during screw tightening.

(c) Perform functional check by shifting transaxle into all gears.

(4) Install center console assembly (Fig. 101).

(5) Install gearshift knob/boot assembly. Ensure knob retaining tabs are secured to shift lever. Snap boot to console at retainer locations.

INPUT SHAFT

DESCRIPTION

The input shaft assembly (Fig. 105) is part of the transaxle geartrain, is driven by the clutch assembly, and consists of the following components:

- Input Mainshaft
- 3rd Speed Gear
- 4th Speed Gear
- 3/4 Synchronizer
- 5th Input Gear

The input shaft meshes with the intermediate shaft, and is supported by a needle bearing at the front of the transaxle, and a sealed roller bearing at the rear of the transaxle.

INPUT SHAFT (Continued)

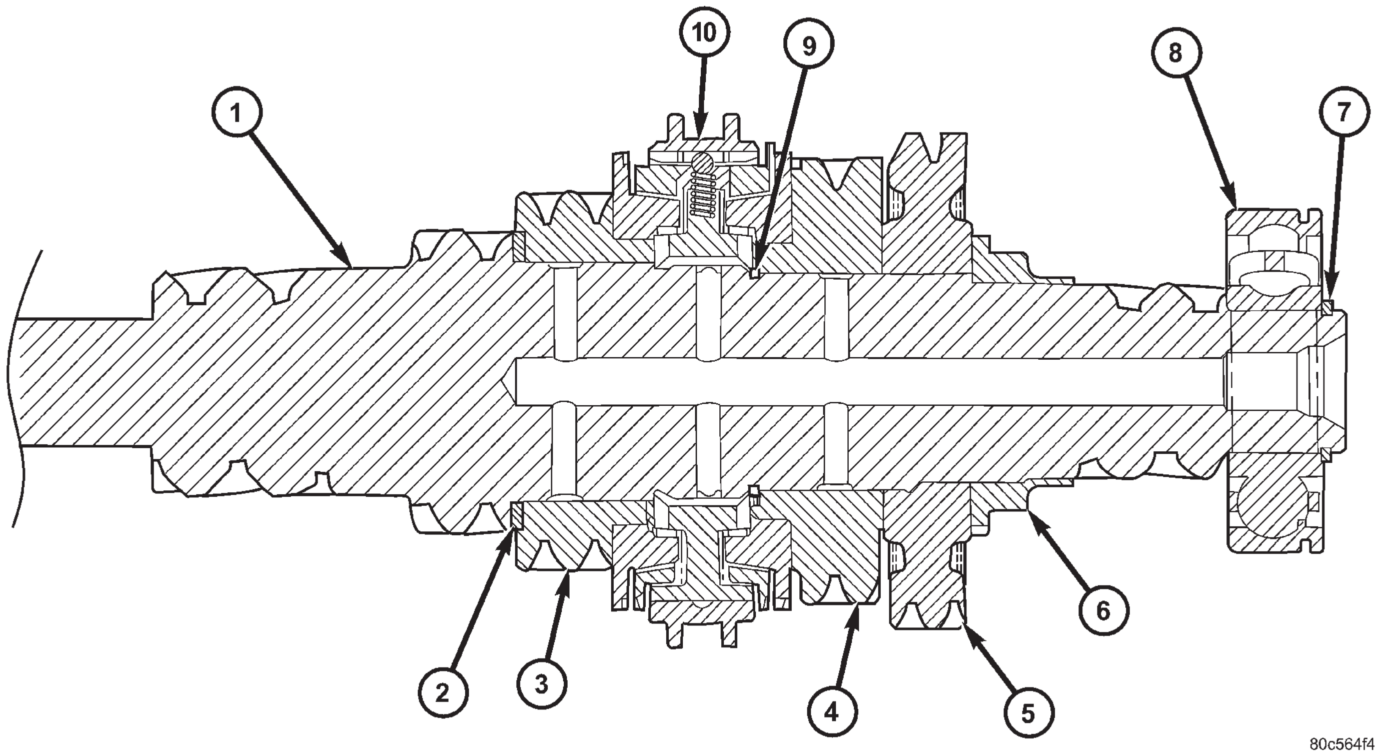


Fig. 105 Input Shaft Assembly

1 - INPUT SHAFT
2 - THRUST WASHER
3 - 3RD GEAR
4 - 4TH GEAR
5 - 5TH GEAR
6 - 5TH GEAR NUT
7 - SNAP RING
8 - INPUT BEARING (SEALED)
9 - SNAP RING
10 - 3/4 SYNCHRONIZER

DISASSEMBLY

NOTE: When servicing the input shaft assembly, all snap rings which are removed MUST be replaced with new snap rings upon reassembly. The 5th gear nut must be replaced also.

(1) Invert input shaft assembly and place in fixture 8487.

(2) Remove input bearing snap ring (Fig. 106).

(3) Remove input bearing. Place input shaft assembly onto arbor press table, with the input bearing supported by bearing splitter (Fig. 107). Using adapter 8486-4, press bearing off of shaft, while helper supports shaft to prevent dropping.

(4) Place input shaft assembly back into fixture 8487. Secure fixture to bench with fasteners, or secure to bench vise.

NOTE: 5th gear nut is staked to the shaft. If necessary, grind stake area to ease removal, but use care not to contact gear.

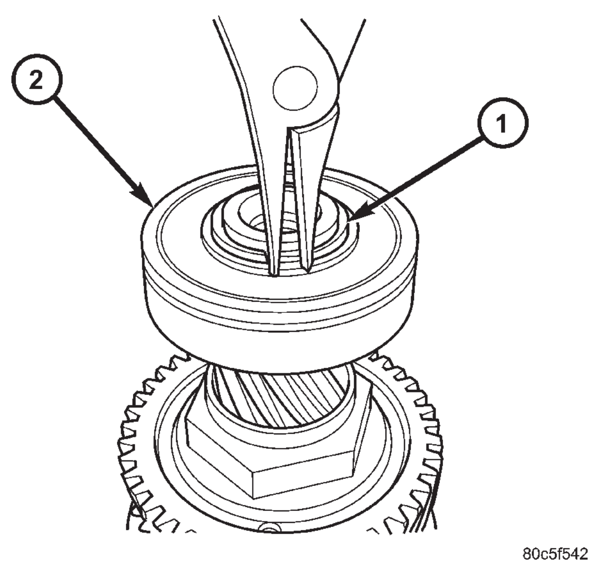


Fig. 106 Input Bearing Snap Ring Removal

1 - SNAP RING
2 - INPUT BEARING

INPUT SHAFT (Continued)

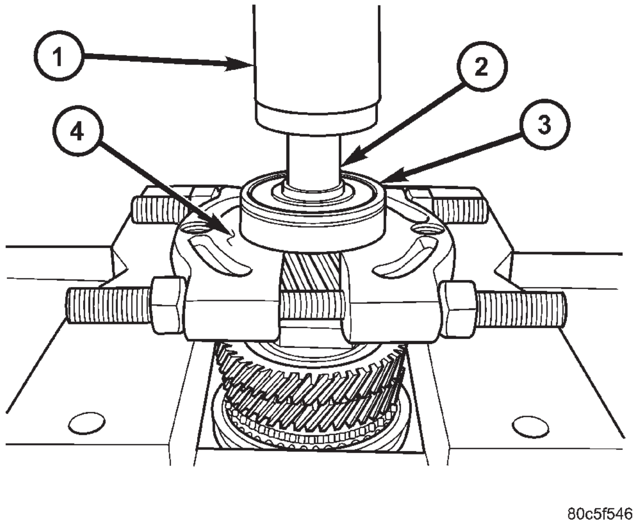


Fig. 107 Input Bearing Removal

1 - ARBOR PRESS RAM
2 - ADAPTER 8486-4
3 - INPUT BEARING
4 - BEARING SPLITTER

(5) Remove 5th gear nut with wrench 8478 (Fig. 108). Discard nut and use a new one upon assembly.

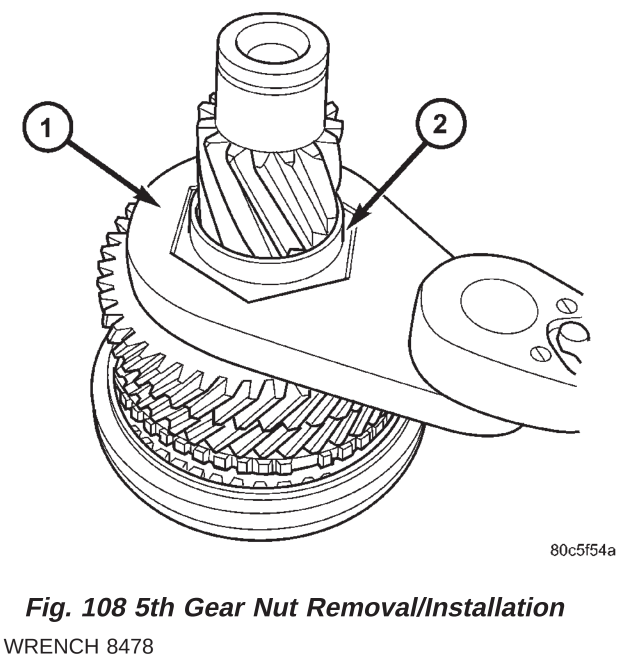


Fig. 108 5th Gear Nut Removal/Installation

1 - WRENCH 8478
2 - 5TH GEAR NUT

(6) Remove 5th gear with remover 8486 (Fig. 109).

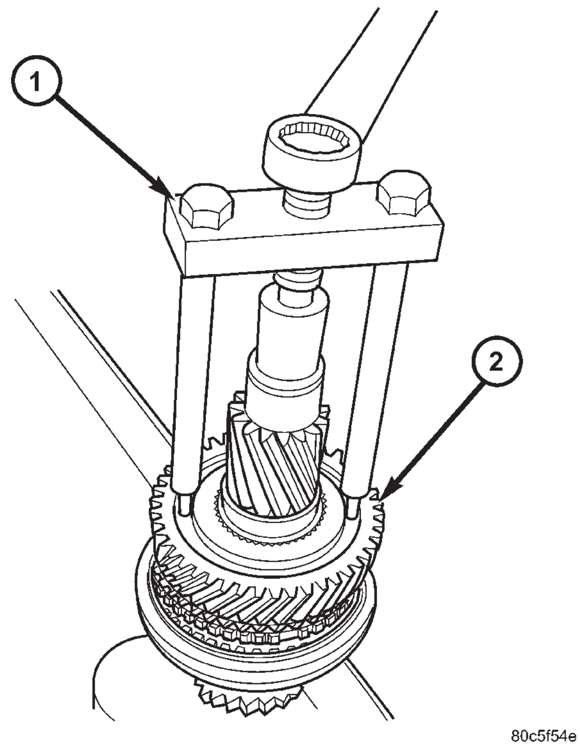


Fig. 109 5th Gear Removal

1 - REMOVER 8486
2 - 5TH GEAR

(7) Remove 4th gear (Fig. 110).

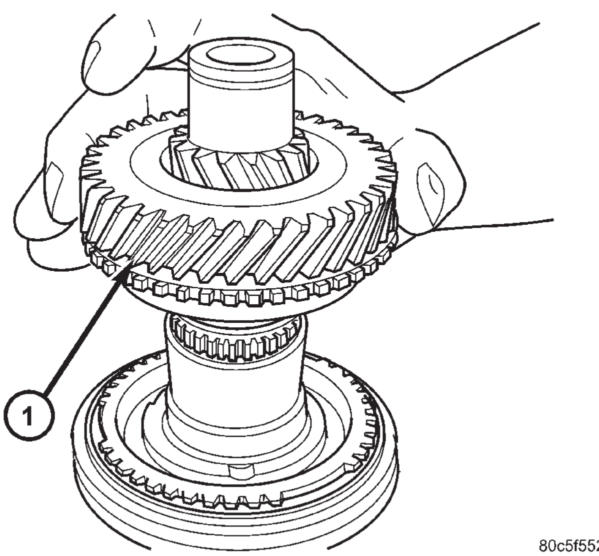


Fig. 110 4th Gear Removal/Installation

1 - 4th GEAR

INPUT SHAFT (Continued)

(8) Remove 4th gear blocker ring (Fig. 111).

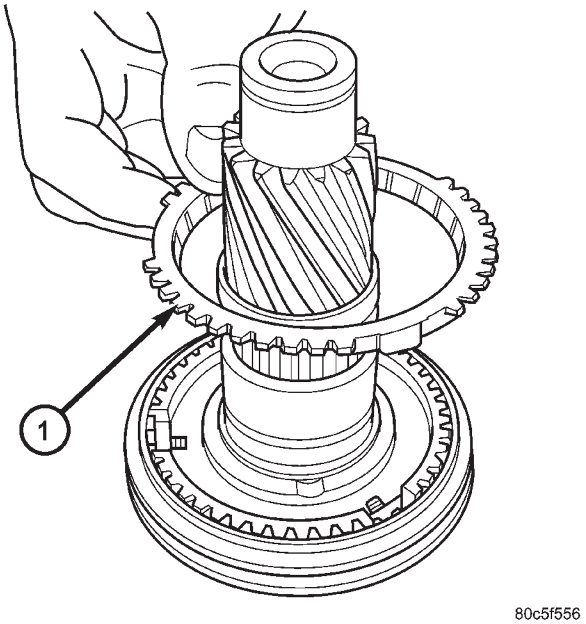


Fig. 111 4th Gear Blocker Ring

1 - 4th GEAR BLOCKER RING

(9) Remove 3/4 synchronizer snap ring (Fig. 112). Discard and replace with new snap ring upon assembly.

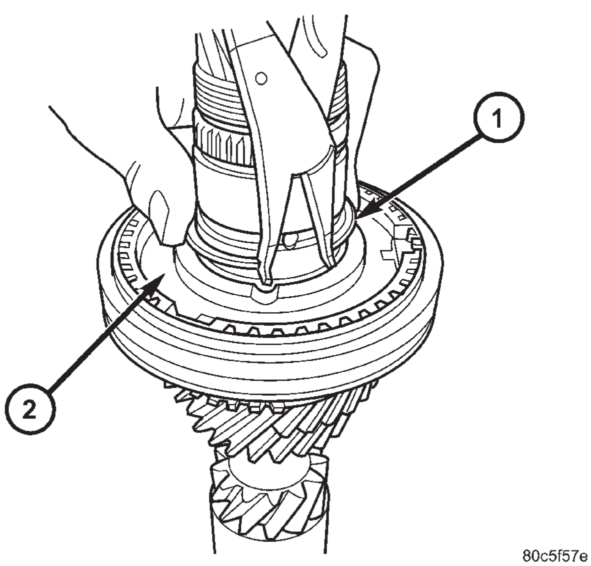


Fig. 112 3/4 Synchro Snap Ring

1 - SNAP RING
2 - 3/4 SYNCHRONIZER

(10) Remove 3/4 synchronizer (Fig. 113).

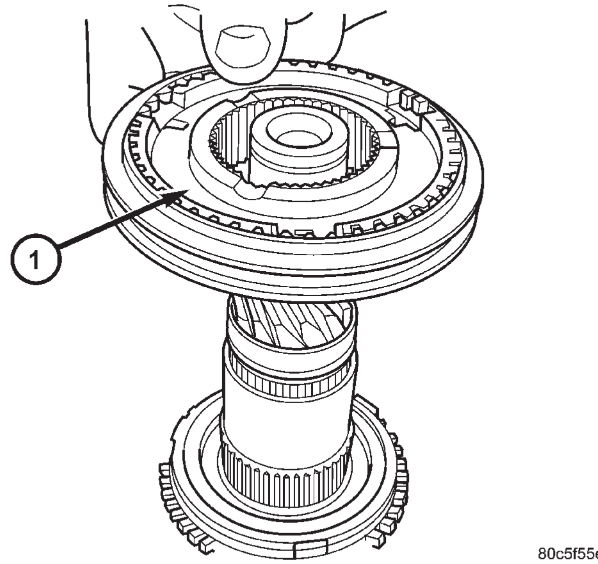


Fig. 113 3/4 Synchro Assembly

1 - 3/4 SYNCHRONIZER

(11) Remove 3rd gear blocker ring (Fig. 114).

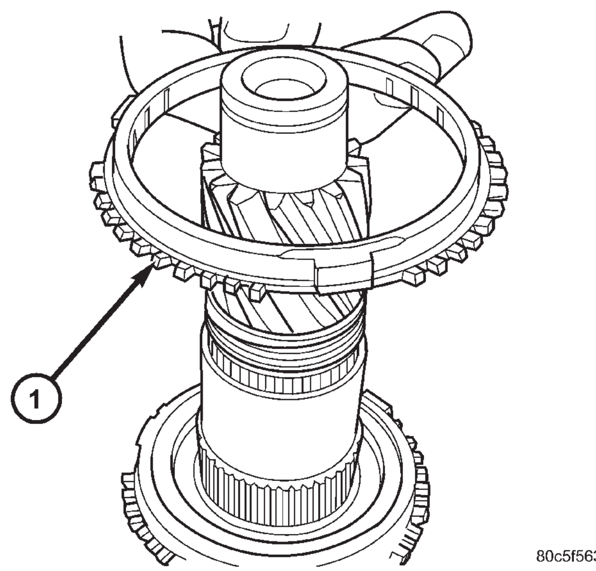


Fig. 114 3rd Gear Blocker Ring

1 - 3RD GEAR BLOCKER RING

(12) Remove 3rd gear (Fig. 115).

(13) Inspect third gear thrust washer for signs of excessive wear. To replace, drive off of input shaft with suitable drift and hammer.

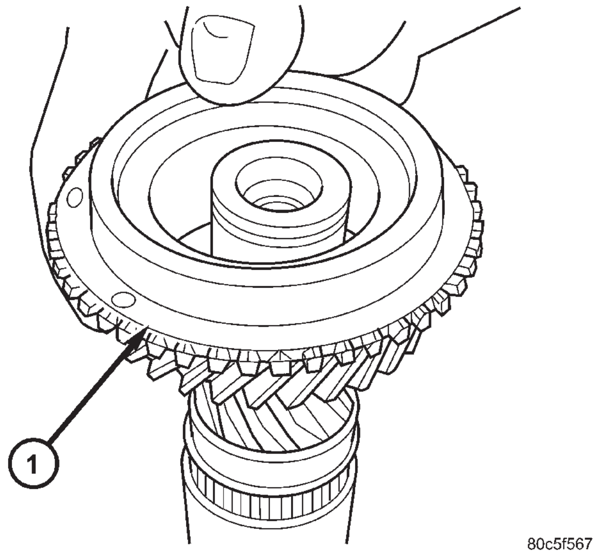


Fig. 115 3rd Gear Removal/Installation

1 - 3RD GEAR

ASSEMBLY

NOTE: When servicing the input shaft assembly, all snap rings MUST be replaced with new ones upon assembly. 5th gear nut must also be replaced.

NOTE: When installing 3/4 synchronizer hub to shaft, make sure to align oil slots on synchronizer hub face with oil hole in the shaft splined hub journal.

NOTE: Refer to (Fig. 116) for input shaft assembly reference.

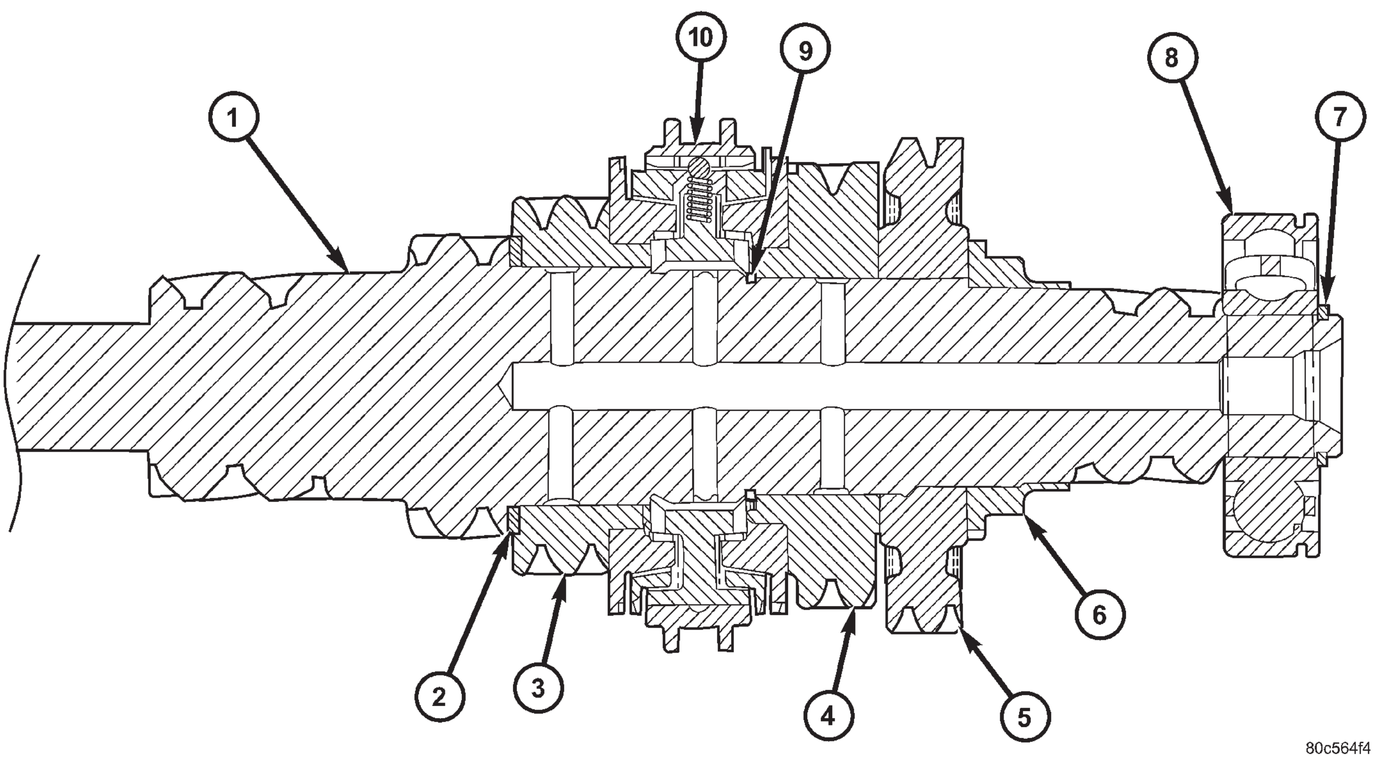


Fig. 116 Input Shaft Assembly

1 - INPUT SHAFT
2 - THRUST WASHER
3 - 3RD GEAR
4 - 4TH GEAR
5 - 5TH GEAR
6 - 5TH GEAR NUT
7 - SNAP RING
8 - INPUT BEARING (SEALED)
9 - SNAP RING
10 - 3/4 SYNCHRONIZER

INPUT SHAFT (Continued)

(1) Install input shaft into fixture 8487.

(2) Install thrust washer if removed upon disassembly.

(3) Install 3rd gear (Fig. 117).

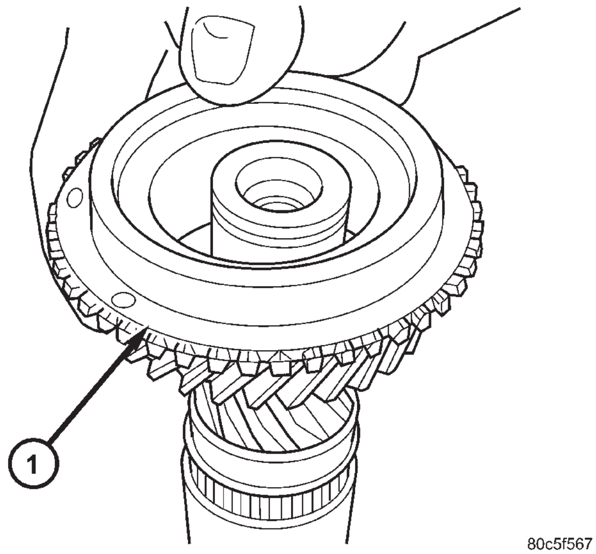


Fig. 117 3rd Gear Removal/Installation

1 - 3RD GEAR

(4) Install 3rd gear blocker ring (Fig. 118).

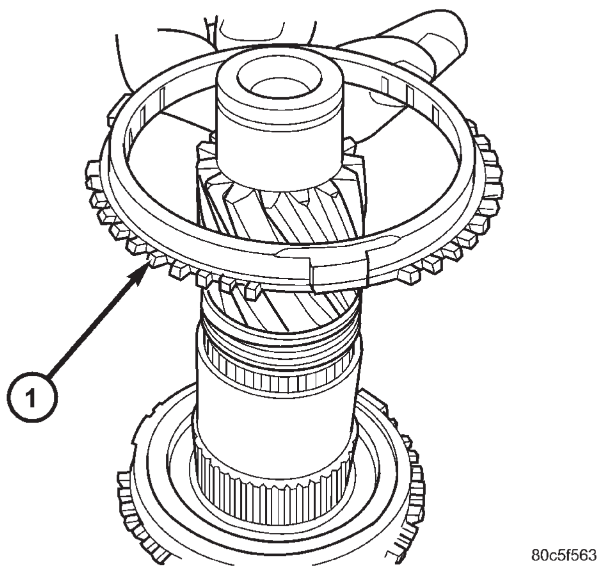


Fig. 118 3rd Gear Blocker Ring

1 - 3RD GEAR BLOCKER RING

(5) Install 3/4 synchronizer (Fig. 119). **When installing 3/4 synchronizer hub to shaft, make sure to align oil slots on synchronizer hub face with oil hole in the shaft splined hub journal.**

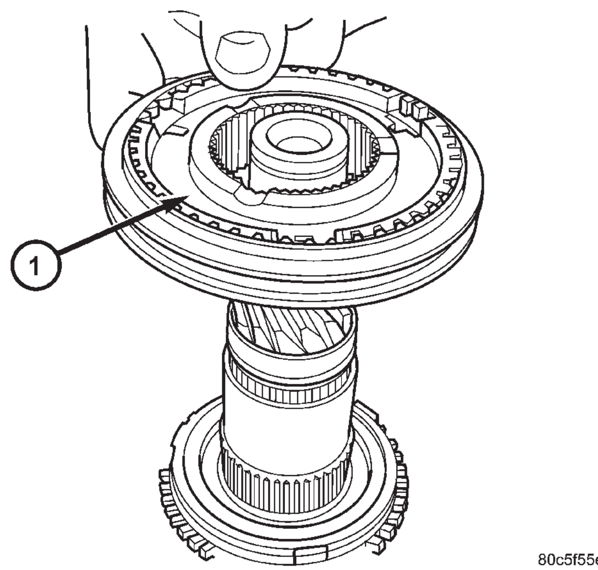


Fig. 119 3/4 Synchro Assembly

1 - 3/4 SYNCHRONIZER

(6) Install **NEW** 3/4 synchronizer snap ring (Fig. 120).

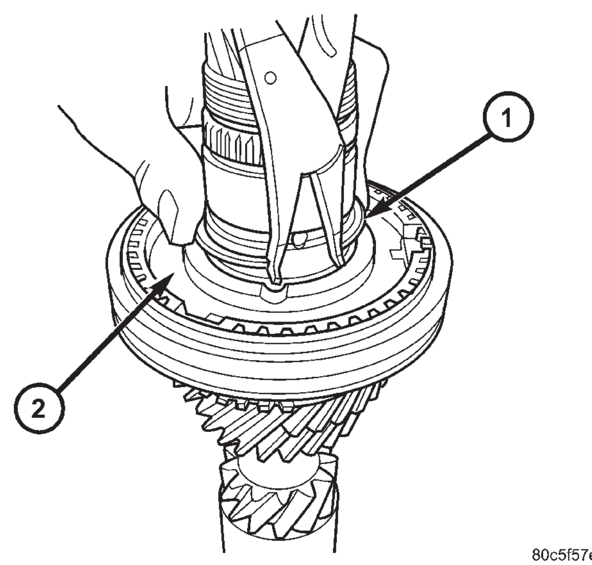


Fig. 120 3/4 Synchro Snap Ring

1 - SNAP RING
2 - 3/4 SYNCHRONIZER

INPUT SHAFT (Continued)

(7) Install 4th gear blocker ring (Fig. 121).

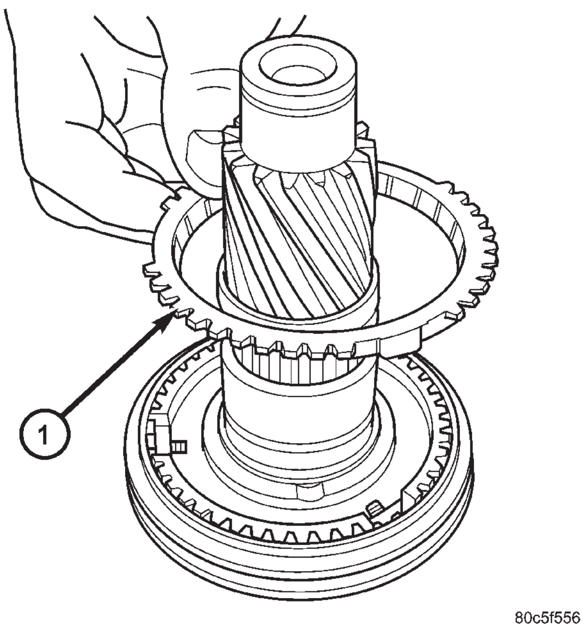


Fig. 121 4th Gear Blocker Ring

1 - 4th GEAR BLOCKER RING

(8) Install 4th gear (Fig. 122).

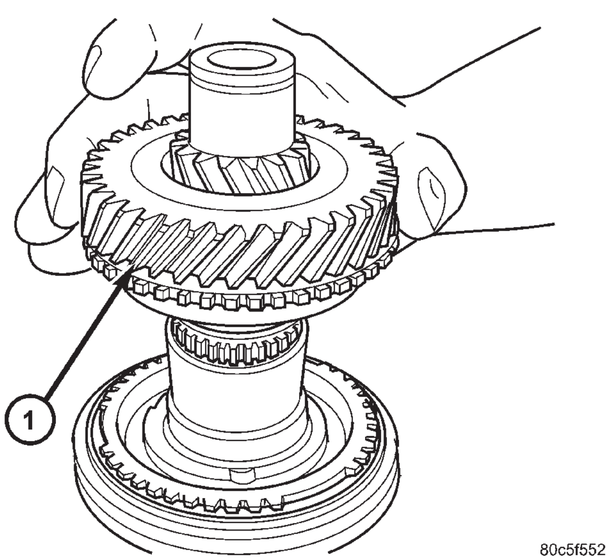


Fig. 122 4th Gear Removal/Installation

1 - 4th GEAR

(9) Install 5th gear and press into position using installer 8481 (Fig. 123).

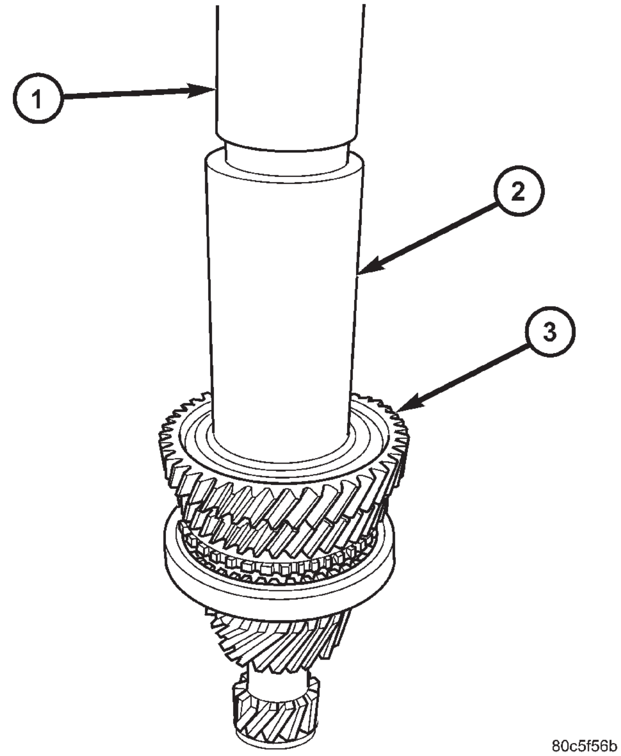


Fig. 123 5th Gear Installation

1 - ARBOR PRESS RAM
2 - INSTALLER 8481
3 - 5TH GEAR

(10) Install **NEW** 5th gear nut and torque to 200 N·m (148 ft. lbs.) using wrench 8478 (Fig. 124).

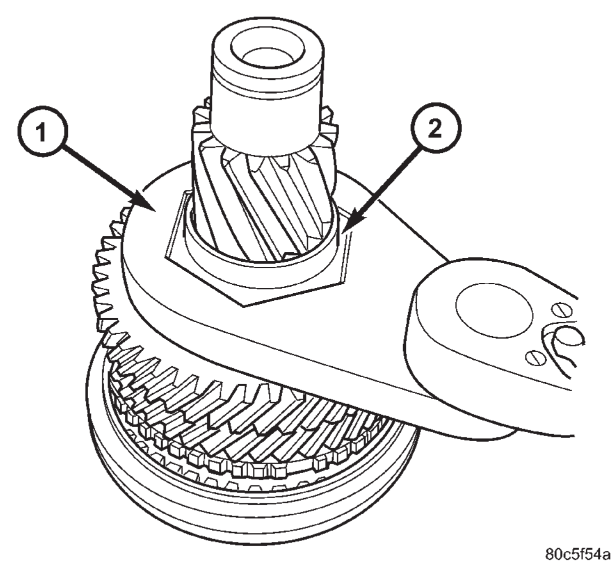


Fig. 124 5th Gear Nut Removal/Installation

1 - WRENCH 8478
2 - 5TH GEAR NUT

INPUT SHAFT (Continued)

(11) Stake 5th Gear nut as follows:

(a) Install staking tool 8479 to 5th gear nut.

(b) Tighten upper thumb screw by hand (Fig. 125).

(c) Tighten two (2) side thumb screws by hand.

(d) Tighten both staking screws until they bottom on tool body (Fig. 126).

(e) Loosen staking screws and thumb screws. Remove tool and visually inspect stake (Fig. 127).

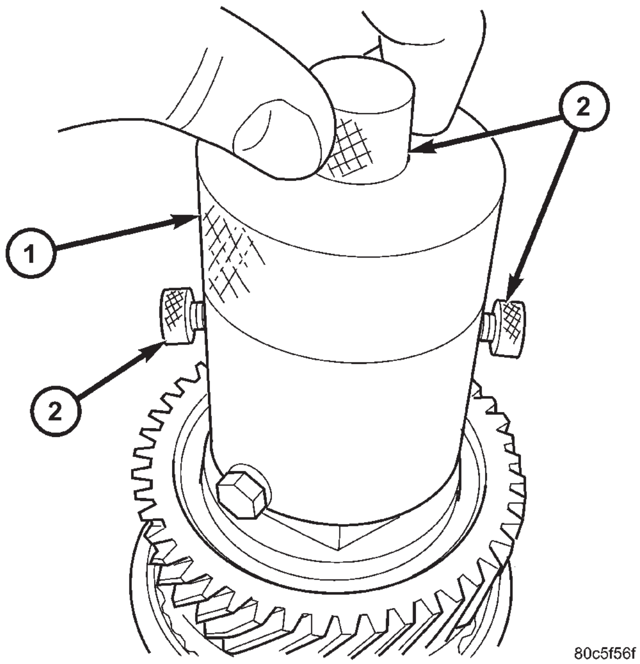


Fig. 125 Staking Tool Set-Up

1 - STAKING TOOL 8479
2 - THUMB SCREWS (3)

NOTE: The input shaft sealed roller bearing and snap ring do not get installed until transaxle assembly to facilitate installation of the reverse idler gear mechanism.

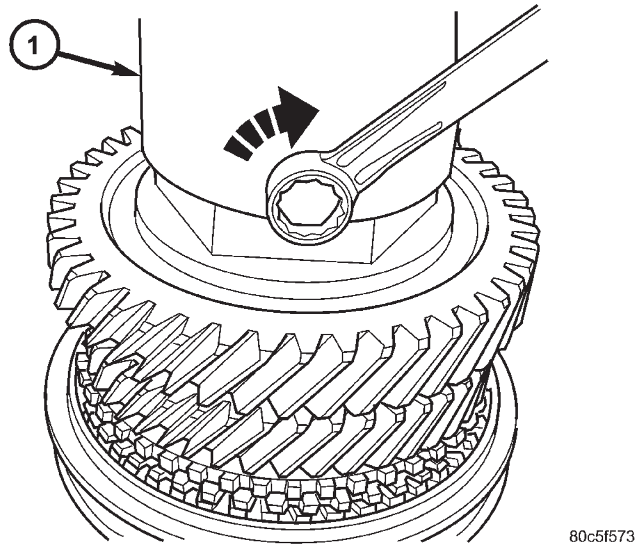


Fig. 126 Tighten Stake Screws

1 - STAKING TOOL 8479

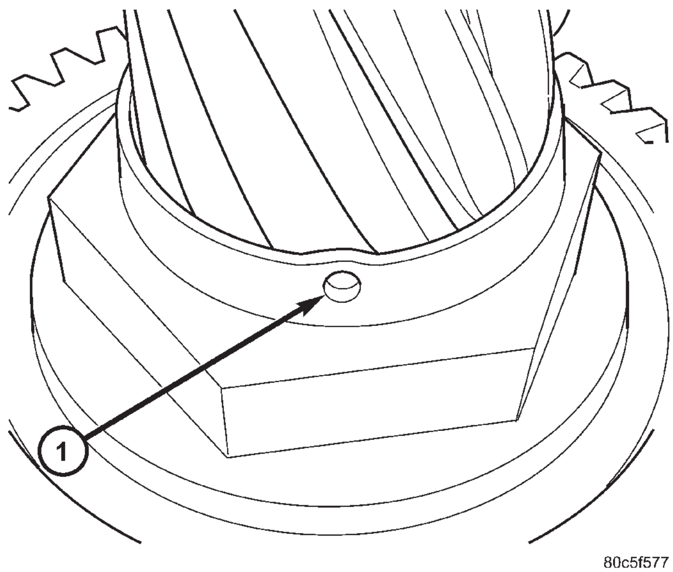


Fig. 127 5th Gear Nut Stake

1 - STAKE
2 - 5TH GEAR NUT

INTERMEDIATE SHAFT

DESCRIPTION

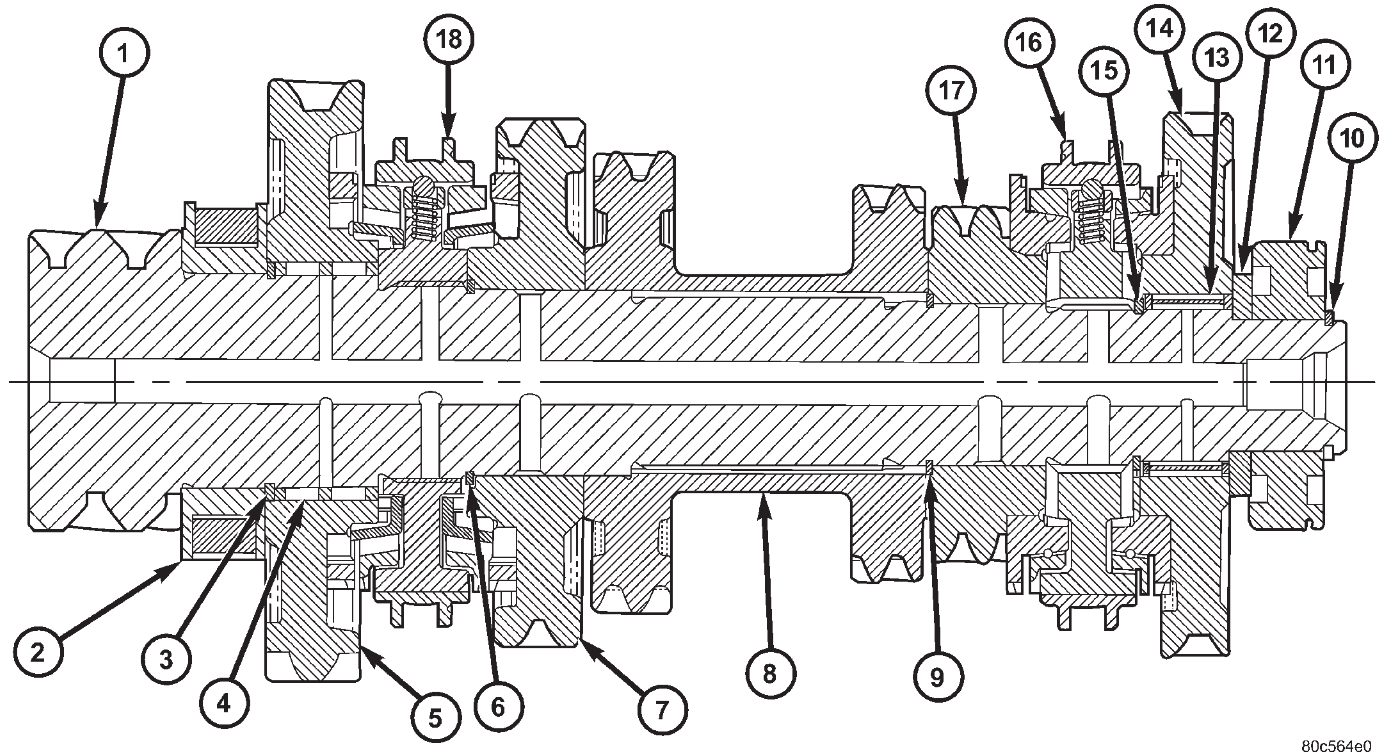


Fig. 128 Intermediate Shaft Assembly

1 - INTERMEDIATE SHAFT
2 - ROLLER BEARING
3 - SNAP RING
4 - NEEDLE BEARING
5 - 1ST SPEED GEAR
6 - SNAP RING
7 - 2ND SPEED GEAR
8 - 3/4 CLUSTER GEAR
9 - SNAP RING
10 - SNAP RING
11 - SEALED ROLLER BEARING
12 - THRUST WASHER
13 - NEEDLE BEARING
14 - REVERSE GEAR
15 - SNAP RING
16 - 5/R SYNCHRO
17 - 5TH SPEED GEAR
18 - 1/2 SYNCHRO

The intermediate shaft assembly (Fig. 128) is part of the transaxle geartrain, meshes with and is driven by the input shaft, drives the differential via an integrated pinion gear, and consists of the following components:

- Intermediate Mainshaft
- 1st Speed Gear
- 2nd Speed Gear
- 3/4 Cluster Gear
- 5th Speed Gear
- Reverse Gear
- 1/2 Synchronizer
- 5/R Synchronizer

The intermediate shaft is supported by a caged roller bearing at the front of the transaxle, and a sealed roller bearing at the rear of the transaxle.

DISASSEMBLY

CAUTION: Do not re-use snap rings when servicing the intermediate shaft assembly. Discard upon disassembly and install new ones provided with available snap ring service kit.

(1) Install intermediate shaft assembly to arbor press table with bearing splitter P-334 under the reverse gear.

(2) Install 8486-4 button to intermediate shaft. Using arbor press ram, press reverse gear and inter-

INTERMEDIATE SHAFT (Continued)

mediate roller bearing off of shaft, while holding remaining assembly with hand (Fig. 129).

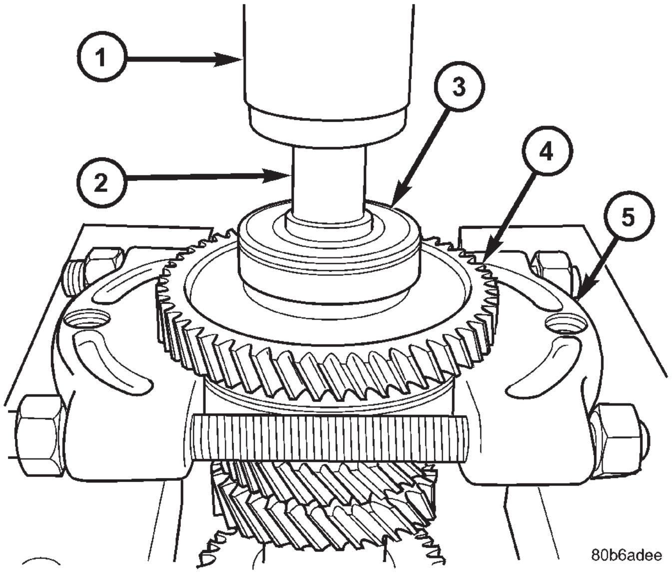


Fig. 129 Bearing and Reverse Gear Removal

1 - ARBOR PRESS RAM
2 - ADAPTER 8486-4
3 - SEALED ROLLER BEARING
4 - REVERSE GEAR
5 - BEARING SPLITTER P-334

(3) Remove reverse gear blocker ring.
(4) Remove reverse gear needle bearing (Fig. 130).

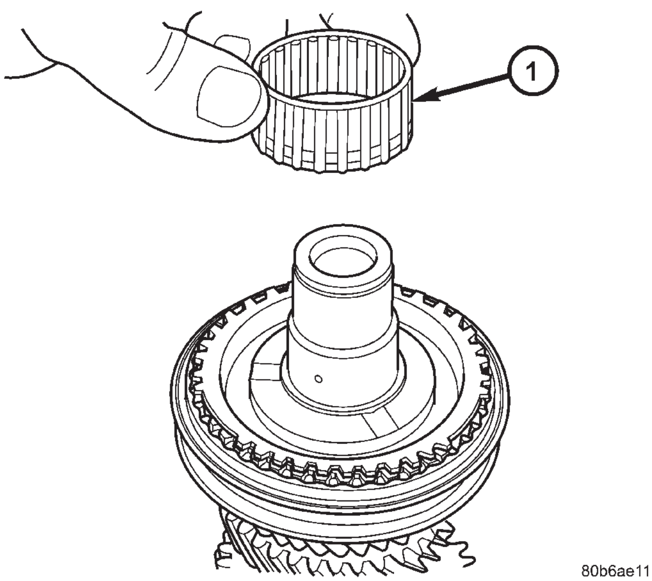


Fig. 130 Reverse Gear Needle Bearing

1 - NEEDLE BEARING

(5) Remove 5/R synchro snap ring (Fig. 131).

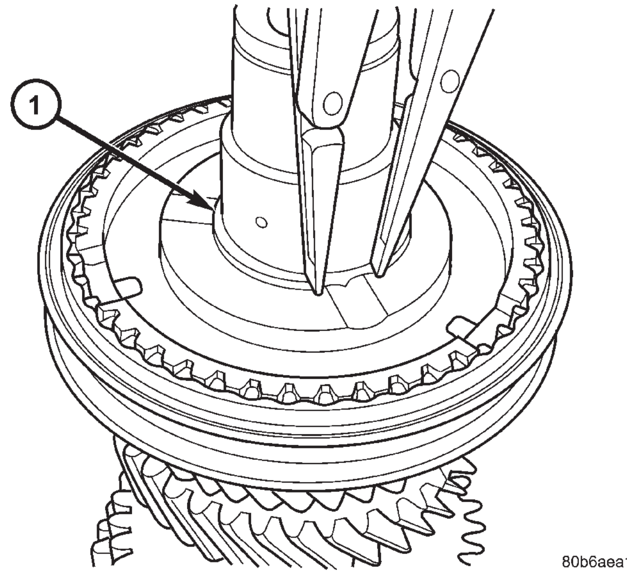


Fig. 131 5/R Synchro Snap Ring

1 - SNAP RING

(6) Remove 5/R synchro (Fig. 132).

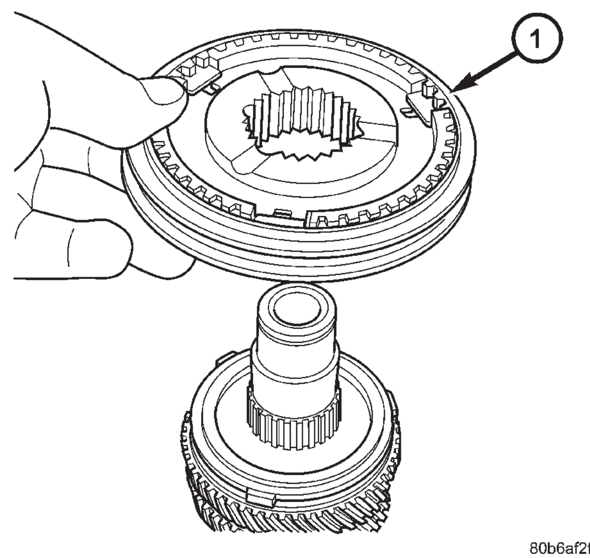


Fig. 132 5/R Synchronizer

1 - 5/R SYNCHRO ASSEMBLY

INTERMEDIATE SHAFT (Continued)

(7) Remove 5th gear blocker ring (Fig. 133).

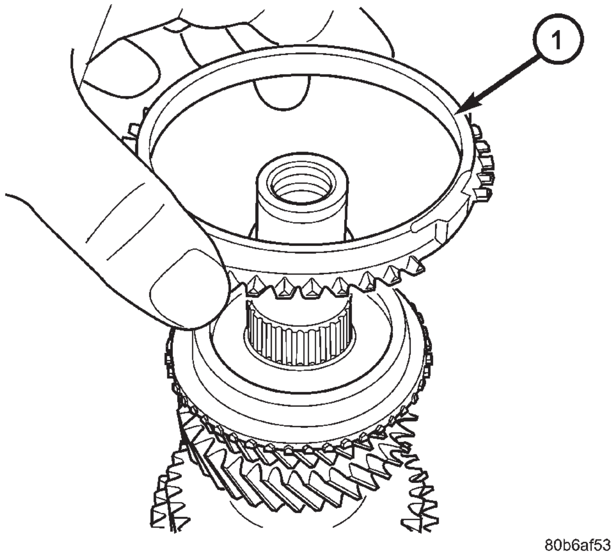


Fig. 133 5th Gear Blocker Ring

1 - 5th GEAR BLOCKER RING

(8) Remove 5th gear (Fig. 134).

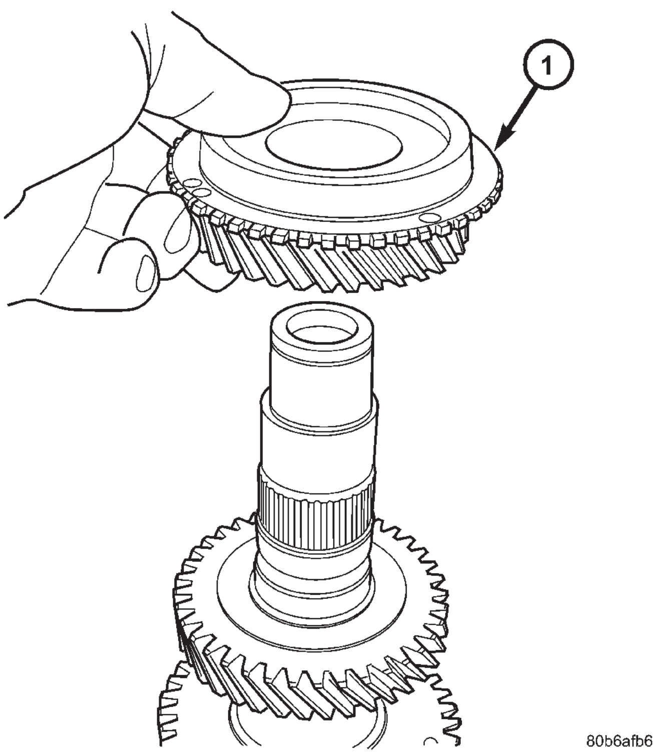


Fig. 134 5th Gear

1 - 5th GEAR

(9) Remove 3/4 cluster gear snap ring (Fig. 135).

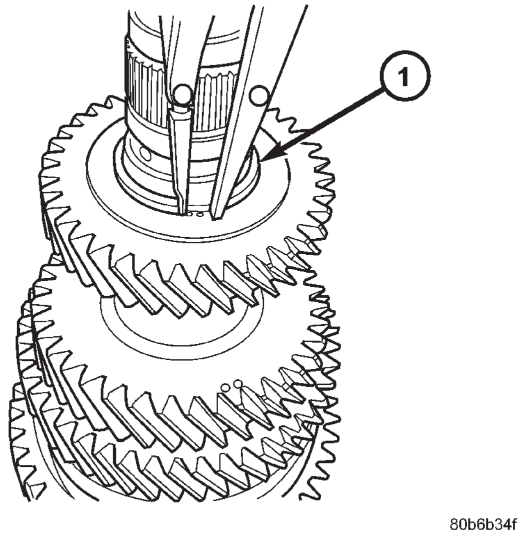


Fig. 135 3/4 Cluster Gear Snap Ring

1 - SNAP RING

(10) Install shaft assembly into fixture 8483, with split collar 8483-3 oriented chamfer side up (Fig. 136). Place 8483-2 into position with chamfer side up (Fig. 137).

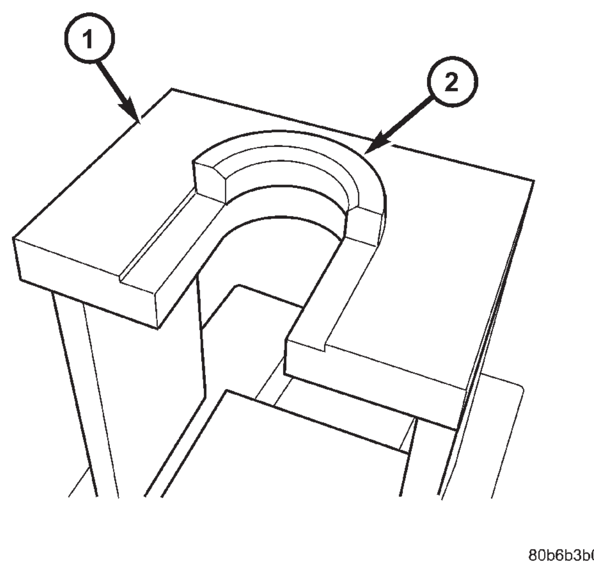


Fig. 136 Fixture 8483

1 - FIXTURE 8483
2 - COLLAR 8483-3

INTERMEDIATE SHAFT (Continued)

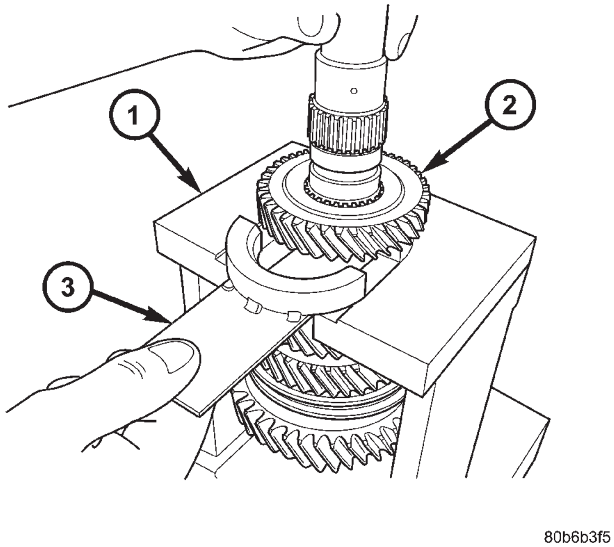


Fig. 137 Loading Intermediate Shaft

1 - FIXTURE 8483
1 - 3/4 CLUSTER GEAR
2 - COLLAR 8483-2

(11) Using an arbor press, press intermediate shaft out of 3/4 cluster gear (Fig. 138).

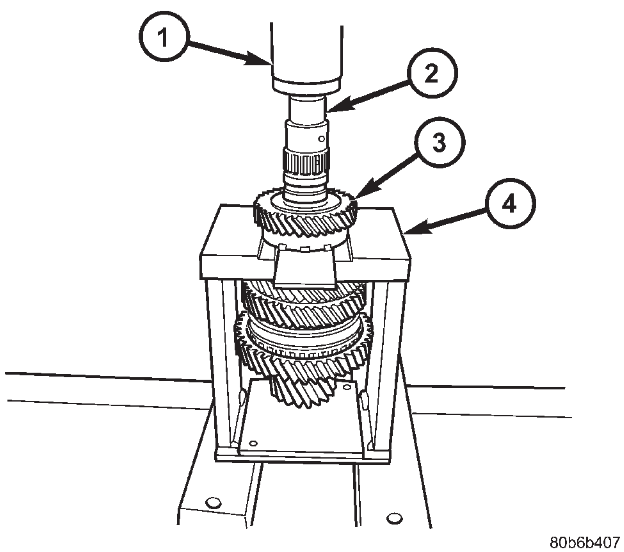


Fig. 138 Press Intermediate Shaft Out of 3/4 Cluster Gear

1 - ARBOR PRESS RAM
2 - INTERMEDIATE SHAFT
3 - 3/4 CLUSTER GEAR
4 - FIXTURE 8483

(12) Remove intermediate shaft from fixture and remove 3/4 cluster gear from shaft (Fig. 139).

(13) Remove 2nd gear from shaft (Fig. 140).

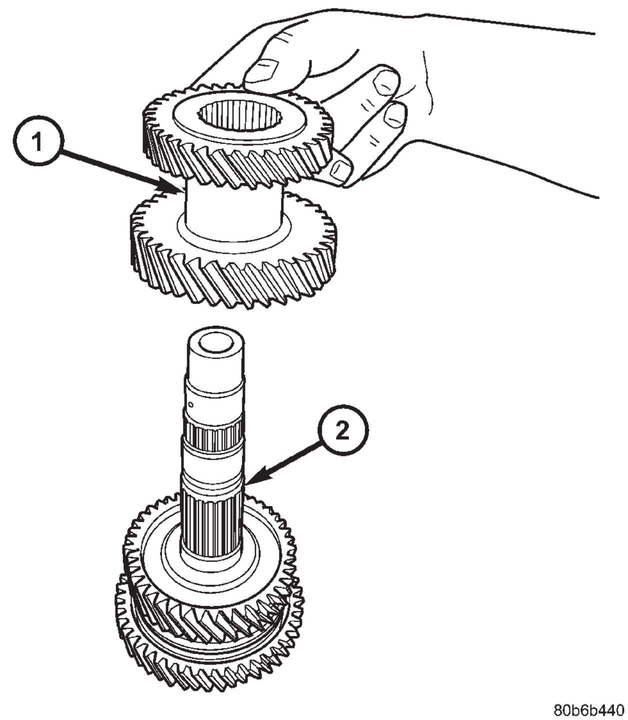


Fig. 139 3/4 Cluster Gear

1 - 3/4 CLUSTER GEAR
2 - INTERMEDIATE SHAFT

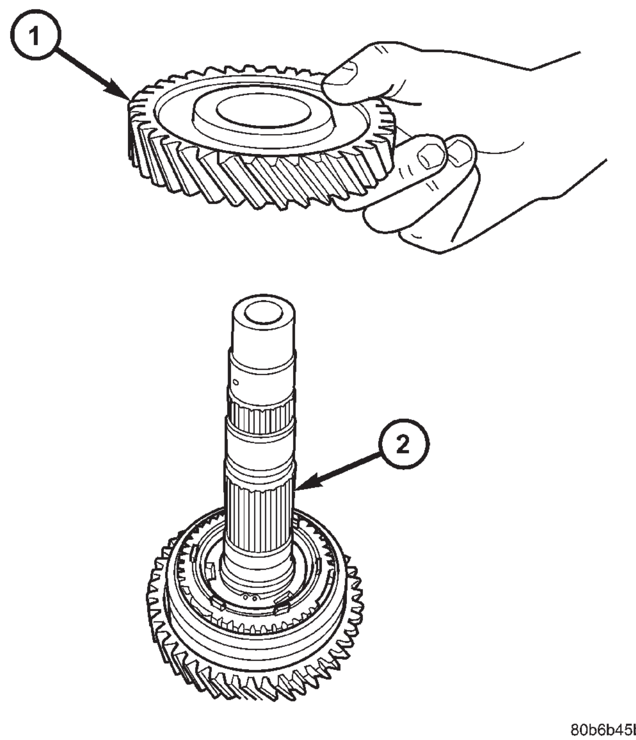


Fig. 140 2nd Gear Removal

1 - 2ND GEAR
2 - INTERMEDIATE SHAFT

INTERMEDIATE SHAFT (Continued)

(14) Remove 2nd gear reactor ring (Fig. 141).

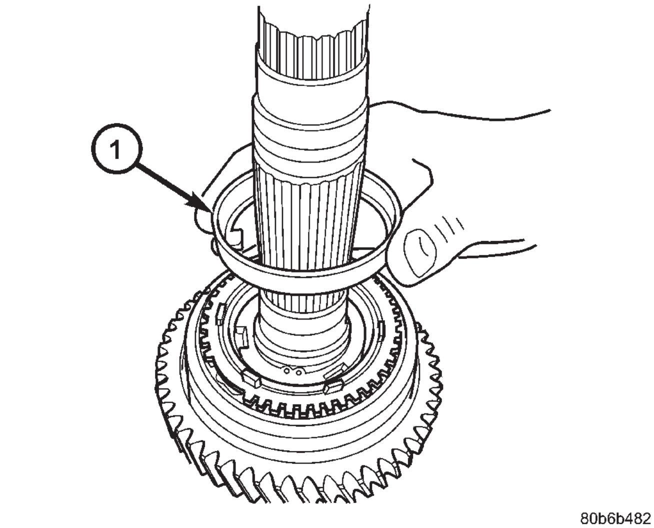


Fig. 141 2nd Gear Reactor Ring

1 - 2ND GEAR REACTOR RING

(15) Remove 2nd gear friction cone (Fig. 142).

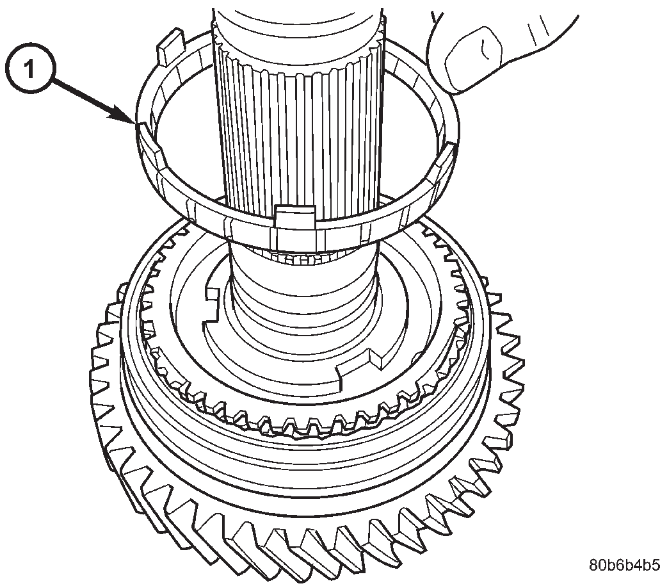


Fig. 142 2nd Gear Friction Cone

1 - 2ND GEAR FRICTION CONE

(16) Remove 2nd Gear outer blocker ring (Fig. 143).

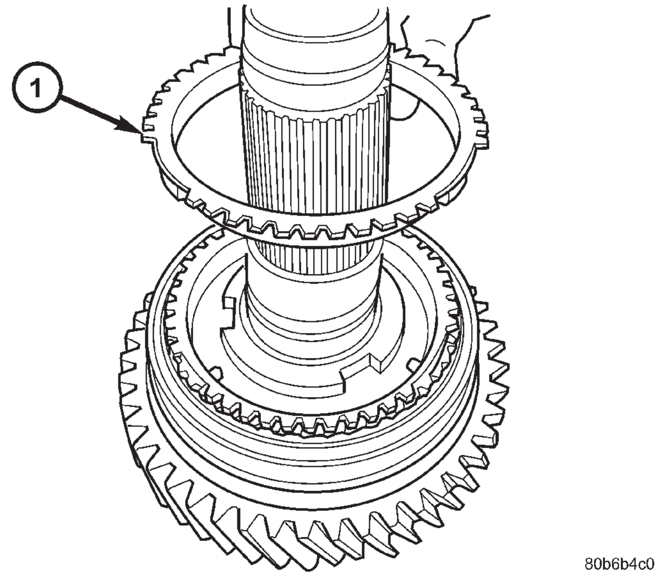


Fig. 143 2nd Gear Outer Blocker Ring

1 - 2ND GEAR BLOCKER RING

(17) Remove 1/2 synchro snap ring (Fig. 144).

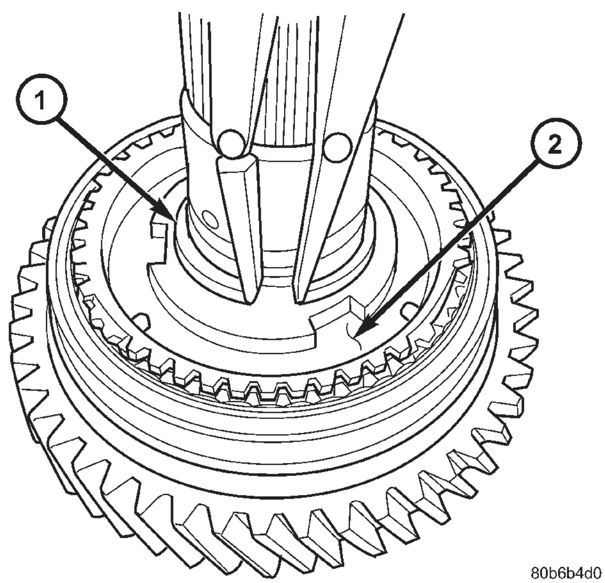


Fig. 144 1/2 Synchro Snap Ring

1 - SNAP RING
2 - 1/2 SYNCHRO HUB

INTERMEDIATE SHAFT (Continued)

(18) Remove 1/2 synchro from shaft (Fig. 145).

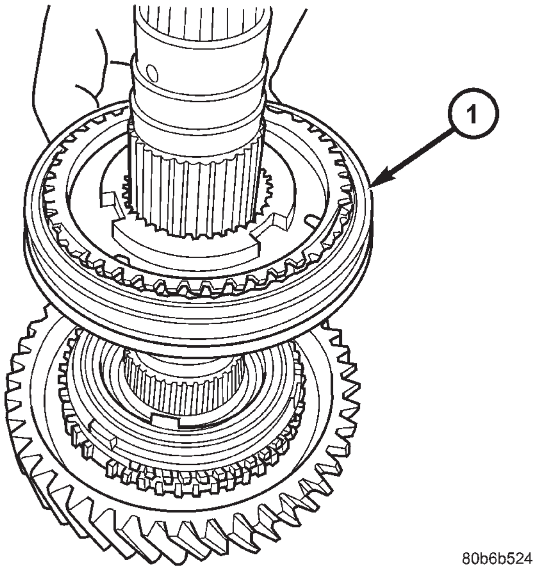


Fig. 145 1/2 Synchronizer

1 - 1/2 SYNCHRONIZER

(19) Remove 1st gear blocker ring (Fig. 146).

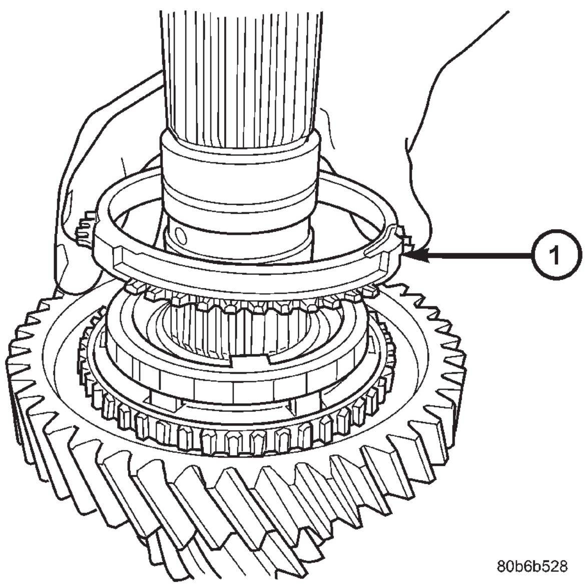


Fig. 146 1st Gear Blocker Ring

1 - 1ST GEAR BLOCKER RING

(20) Remove 1st gear friction cone (Fig. 147).

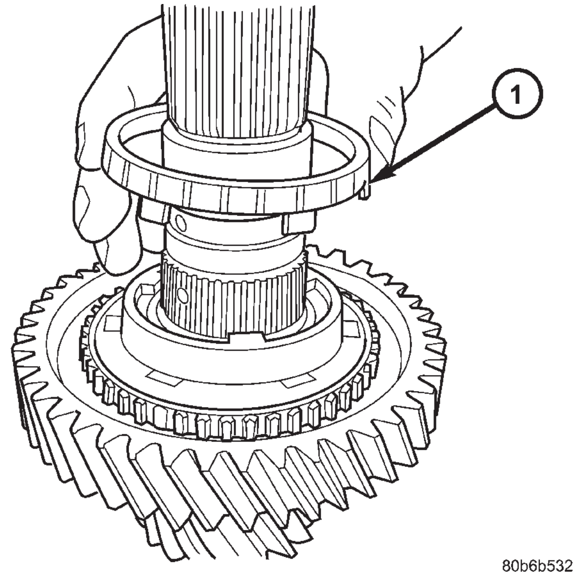


Fig. 147 1st Gear Friction Cone

1 - 1ST GEAR FRICTION CONE

(21) Remove 1st gear reactor ring (Fig. 148).

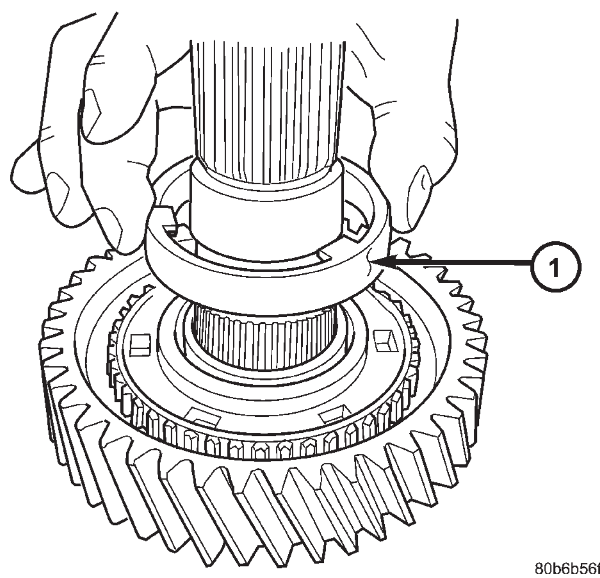


Fig. 148 1st Gear Reactor Ring

1 - 1ST GEAR REACTOR RING

INTERMEDIATE SHAFT (Continued)

(22) Remove 1st gear from shaft (Fig. 149).

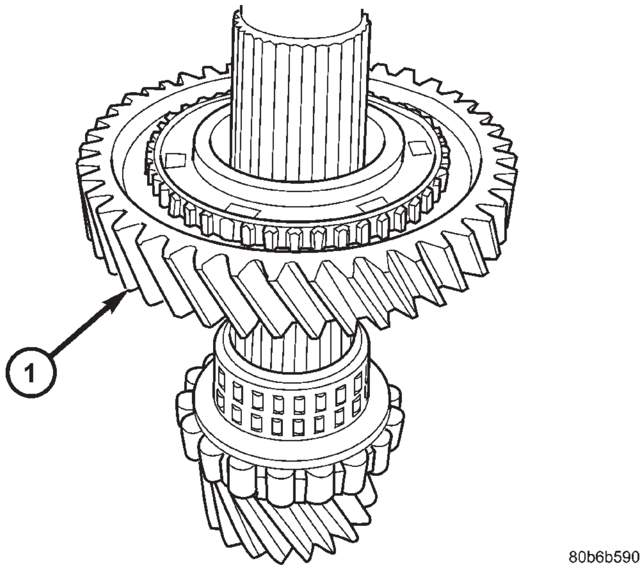


Fig. 149 1st Gear Removal

1 - 1ST GEAR

(23) Remove 1st gear needle bearing (Fig. 150).

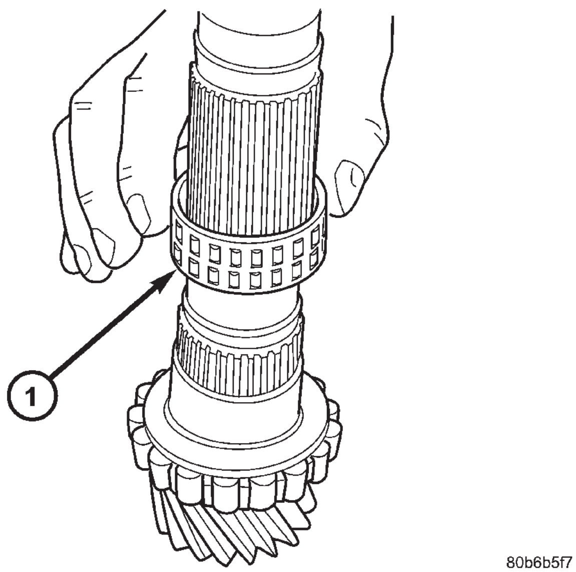


Fig. 150 1st Gear Needle Bearing

1 - 1ST GEAR NEEDLE BEARING

(24) Remove intermediate shaft roller bearing snap ring (Fig. 151).

(25) Press intermediate shaft out of roller bearing supported by bearing splitter P-334 (Fig. 152). **Roller bearing is not re-usable once removed. It is necessary to install a new roller bearing upon re-assembly.**

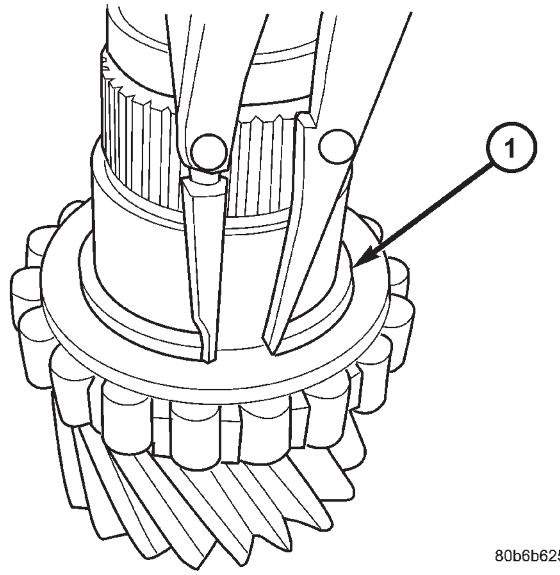


Fig. 151 Intermediate Shaft Roller Bearing Snap Ring

1 - SNAP RING

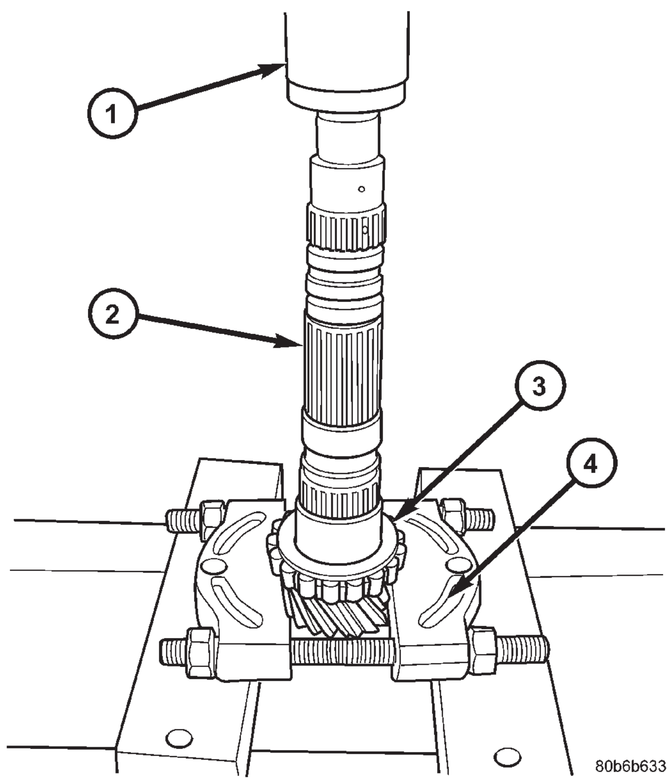


Fig. 152 Intermediate Shaft Roller Bearing Removal

1 - ARBOR PRESS RAM
2 - INTERMEDIATE SHAFT
3 - ROLLER BEARING
4 - BEARING SPLITTER P-334

INTERMEDIATE SHAFT (Continued)

ASSEMBLY

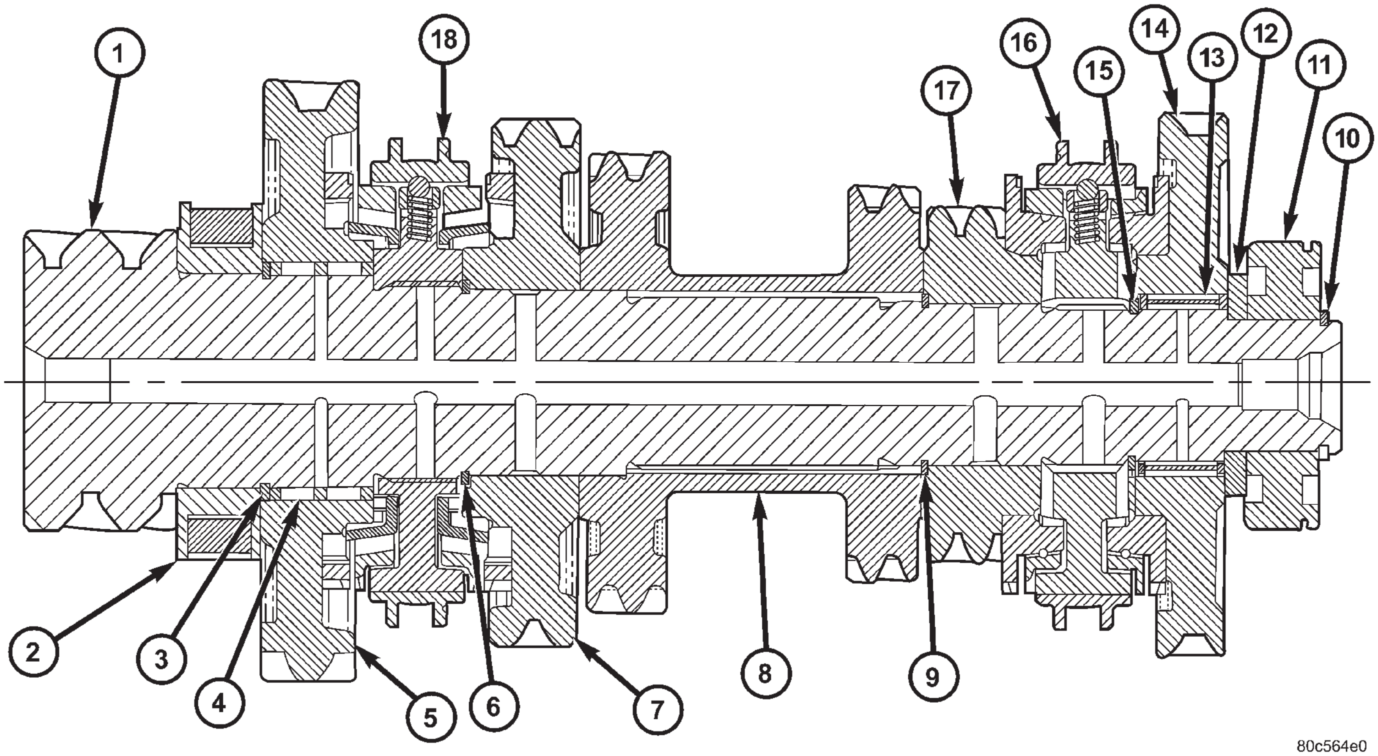


Fig. 153 Intermediate Shaft Assembly

1 - INTERMEDIATE SHAFT	10 - SNAP RING
2 - ROLLER BEARING	11 - SEALED ROLLER BEARING
3 - SNAP RING	12 - THRUST WASHER
4 - NEEDLE BEARING	13 - NEEDLE BEARING
5 - 1ST SPEED GEAR	14 - REVERSE GEAR
6 - SNAP RING	15 - SNAP RING
7 - 2ND SPEED GEAR	16 - 5/R SYNCHRO
8 - 3/4 CLUSTER GEAR	17 - 5TH SPEED GEAR
9 - SNAP RING	18 - 1/2 SYNCHRO

NOTE: Do not re-use snap rings when servicing the intermediate shaft assembly. Discard snap rings and install new ones provided with available snap ring service kit.

NOTE: When installing 1/2 & 5/R synchronizers, make sure to align oil slots on synchronizer hub face with oil hold in the shaft splined hub journal.

NOTE: Refer to (Fig. 153) for intermediate shaft assembly reference.

(1) Press intermediate shaft into NEW roller bearing with arbor press (Fig. 154).

INTERMEDIATE SHAFT (Continued)

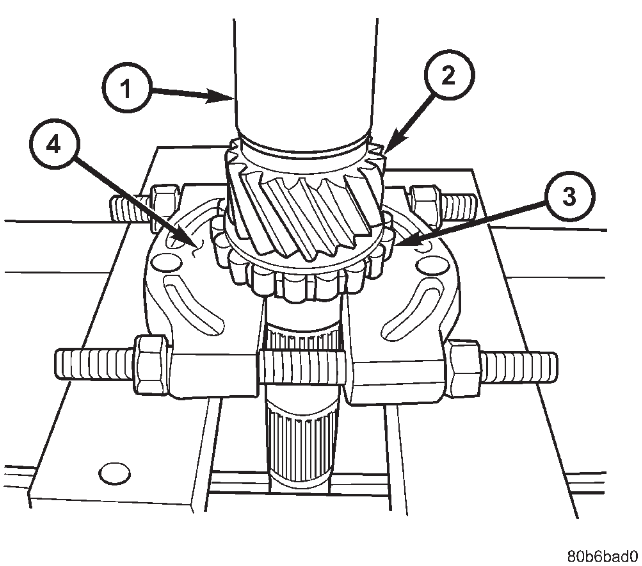


Fig. 154 Intermediate Shaft Bearing Installation

1 - ARBOR PRESS
2 - INTERMEDIATE SHAFT
3 - CAGED ROLLER BEARING
4 - BEARING SPLITTER

(2) Install intermediate shaft roller bearing snap ring (Fig. 155).

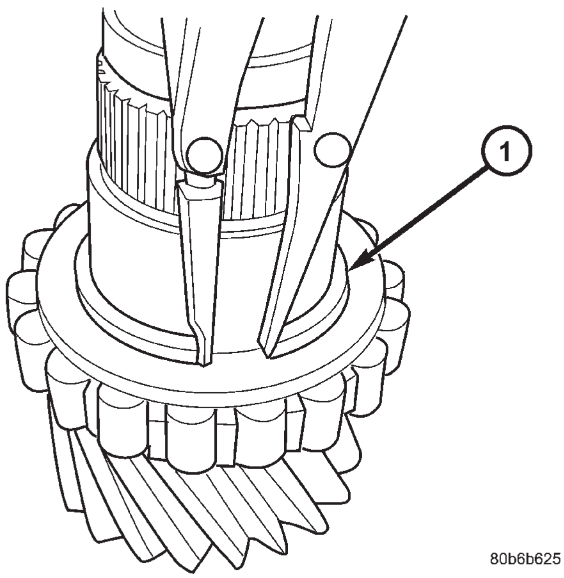


Fig. 155 Intermediate Shaft Roller Bearing Snap Ring

1 - SNAP RING

(3) Install 1st gear roller bearing to intermediate shaft (Fig. 156).

(4) Install 1st gear to intermediate shaft (Fig. 157).

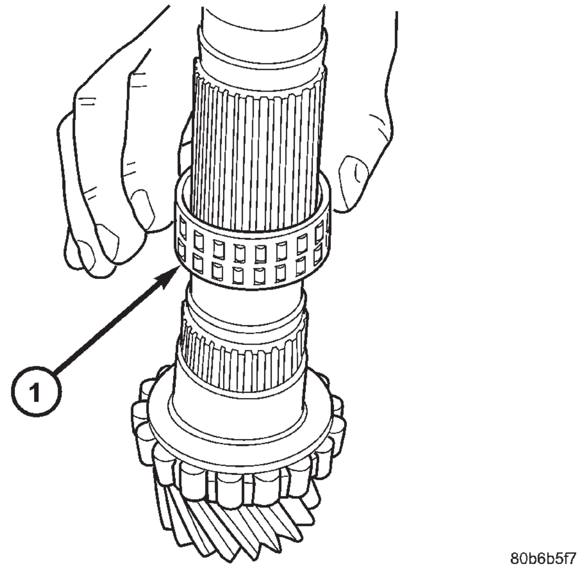


Fig. 156 1st Gear Needle Bearing

1 - 1ST GEAR NEEDLE BEARING

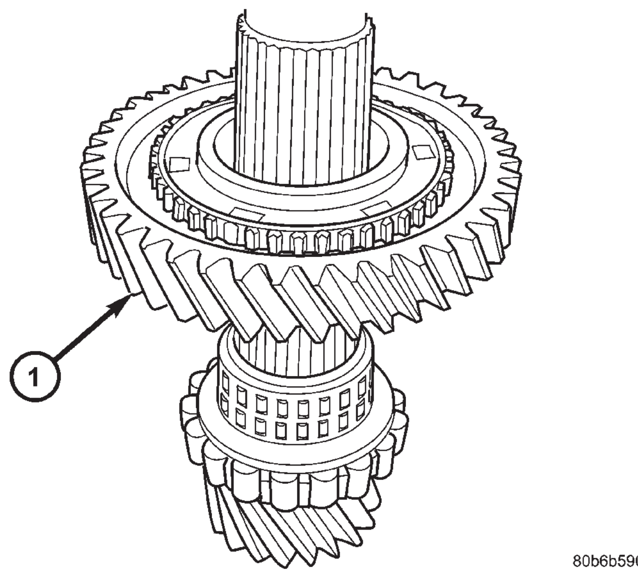


Fig. 157 1st Gear Installation

1 - 1ST GEAR

(5) Install 1/2 synchro to fixture 8483. Insert 1st gear blocker ring, friction cone, and reactor ring as shown in (Fig. 158).

(6) Install intermediate shaft to synchro assembly on fixture (Fig. 159). **When installing 1/2 synchronizer, make sure to align oil slots on synchronizer hub face with oil hole in the shaft splined hub journal.** Line up friction cone and reactor ring tabs to gear slots. Remove shaft assembly from fixture.

(7) Install **NEW** 1/2 synchro snap ring (Fig. 160).

INTERMEDIATE SHAFT (Continued)

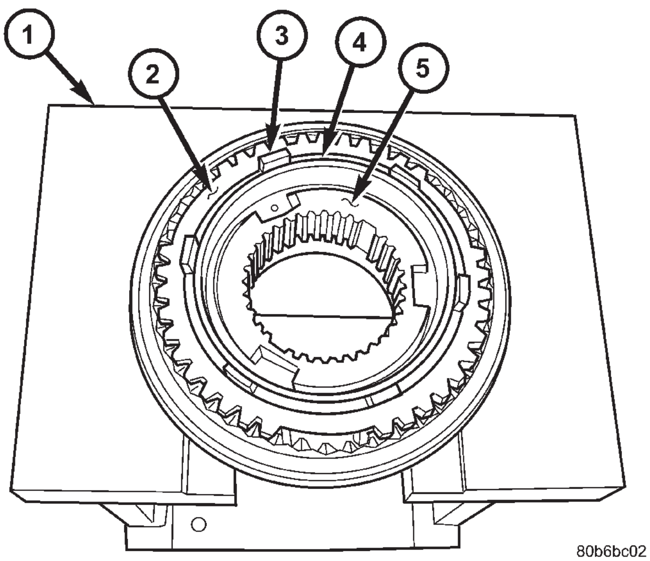


Fig. 158 1/2 Synchro on Fixture 8483

1 - FIXTURE 8483
2 - 1ST GEAR BLOCKER RING
3 - 1ST GEAR FRICTION CONE
4 - 1ST GEAR REACTOR RING
5 - 1/2 SYNCHRONIZER

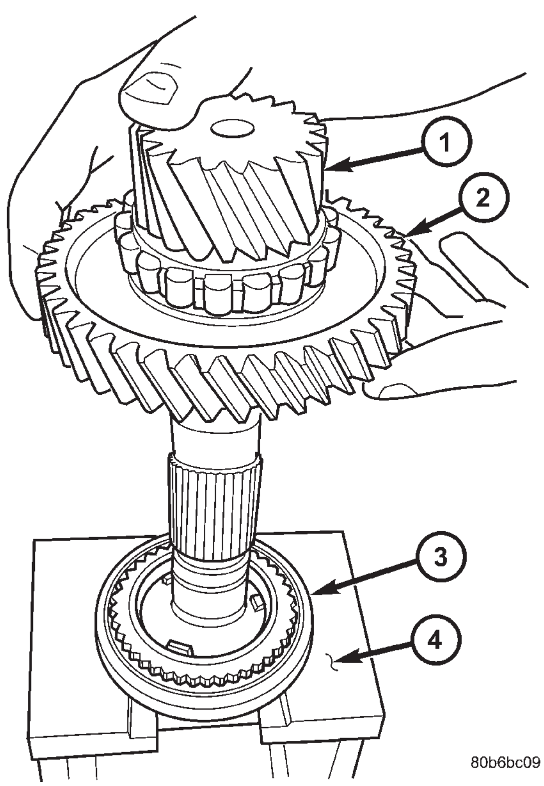


Fig. 159 Install 1/2 Synchro to Intermediate Shaft

1 - INTERMEDIATE SHAFT
2 - 1ST GEAR
3 - 1/2 SYNCHRO ASSEMBLY
4 - FIXTURE 8483

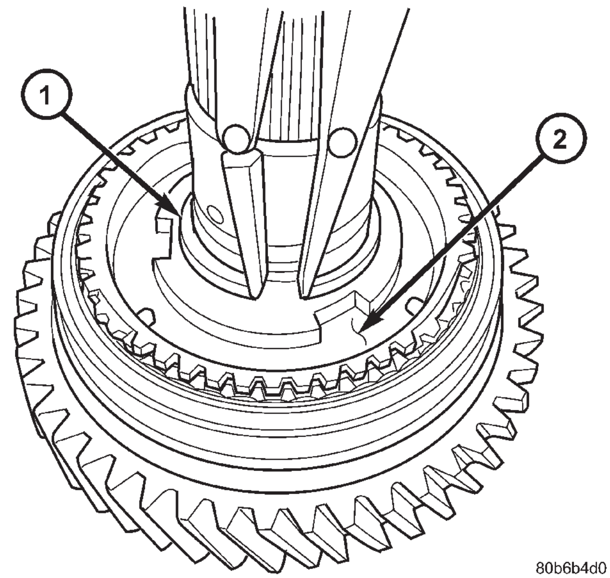


Fig. 160 1/2 Synchro Snap Ring

1 - SNAP RING
2 - 1/2 SYNCHRO HUB

(8) Install 2nd gear blocker ring (Fig. 161).

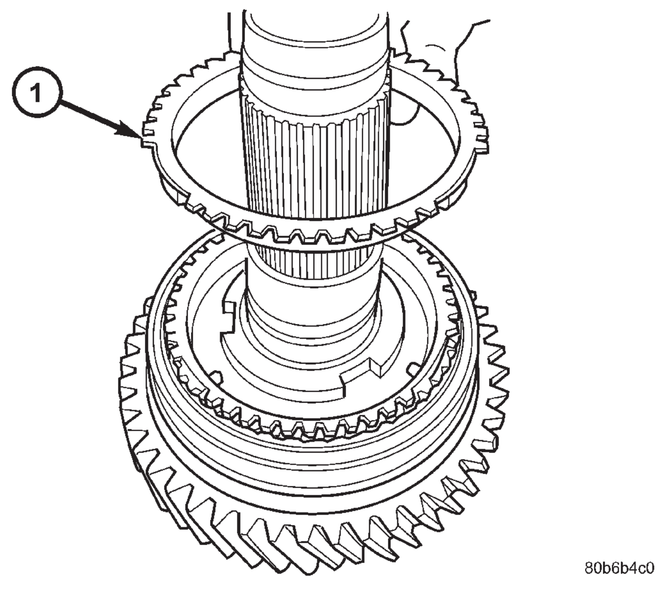


Fig. 161 2nd Gear Blocker Ring

1 - 2ND GEAR BLOCKER RING

INTERMEDIATE SHAFT (Continued)

(9) Install 2nd gear friction cone (Fig. 162).

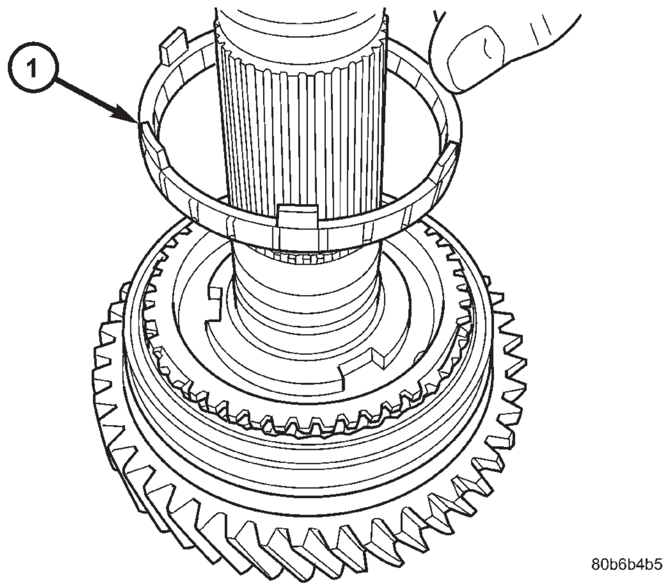


Fig. 162 2nd Gear Friction Cone

1 - 2ND GEAR FRICTION CONE

(10) Install 2nd gear reactor ring (Fig. 163).

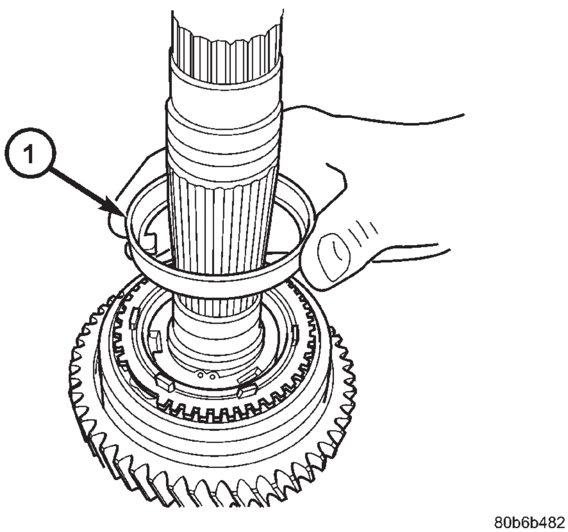


Fig. 163 2nd Gear Reactor Ring

1 - 2ND GEAR REACTOR RING

(11) Install 2nd gear to intermediate shaft (Fig. 164).

(12) Press 3/4 cluster gear onto intermediate shaft using cup 8481 (Fig. 165).

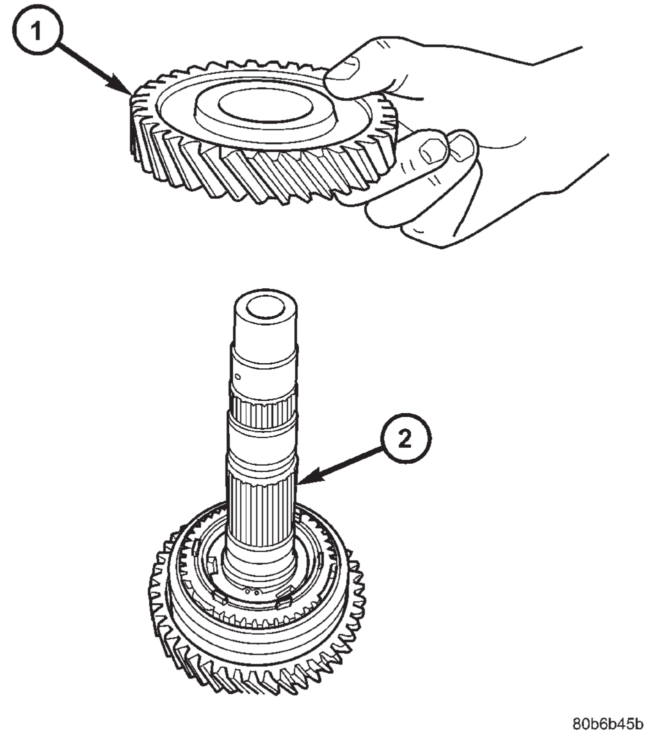


Fig. 164 2nd Gear

1 - 2ND GEAR
2 - INTERMEDIATE SHAFT

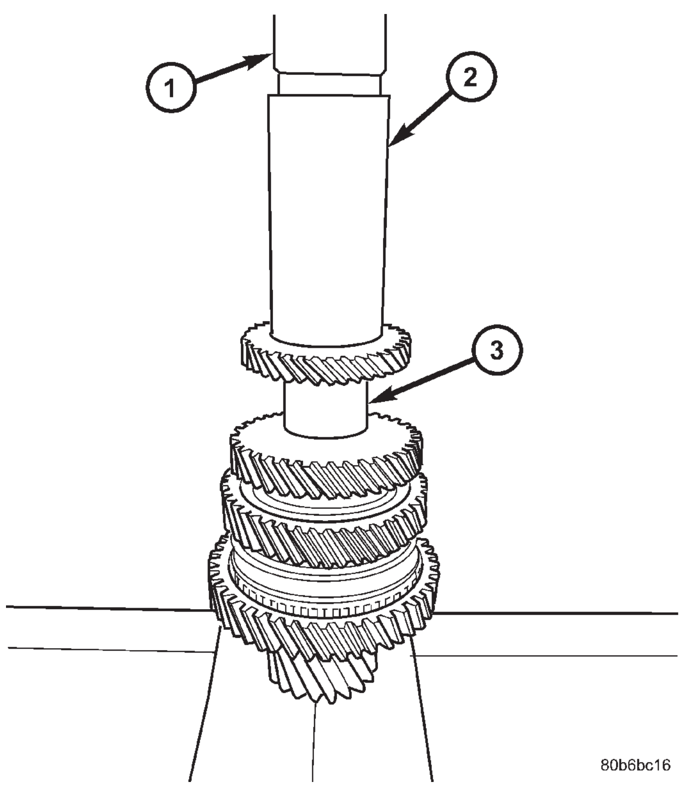


Fig. 165 Install 3/4 Cluster Gear using Tool 8481

1 - ARBOR PRESS
2 - INSTALLER 8481
3 - 3/4 CLUSTER GEAR

INTERMEDIATE SHAFT (Continued)

(13) Install **NEW** 3/4 cluster gear snap ring (Fig. 166).

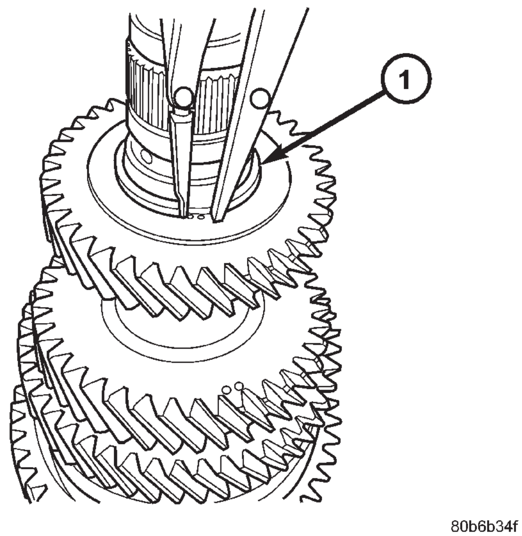


Fig. 166 3/4 Cluster Gear Snap Ring

1 - SNAP RING

(14) Install 5th gear to intermediate shaft (Fig. 167).

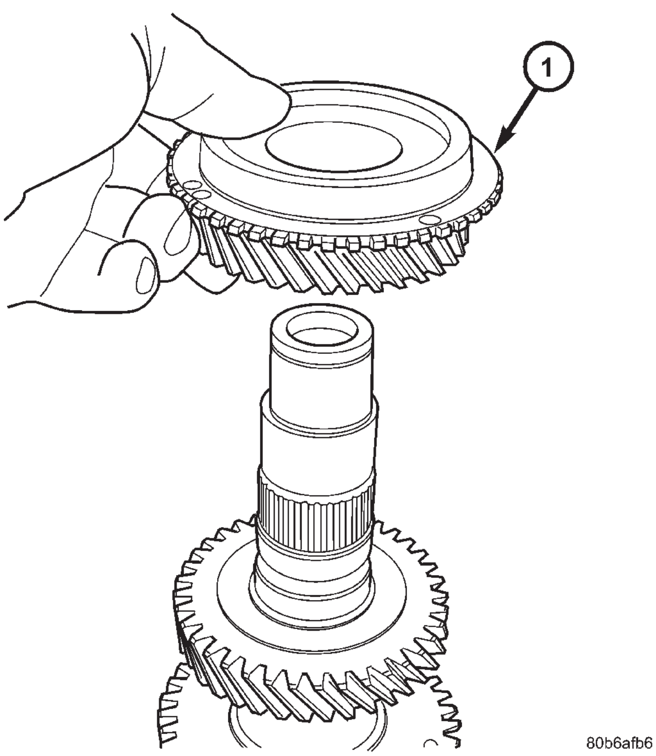


Fig. 167 5th Gear Installation

1 - 5th GEAR

(15) Install 5th gear blocker ring to synchronizer (Fig. 168).

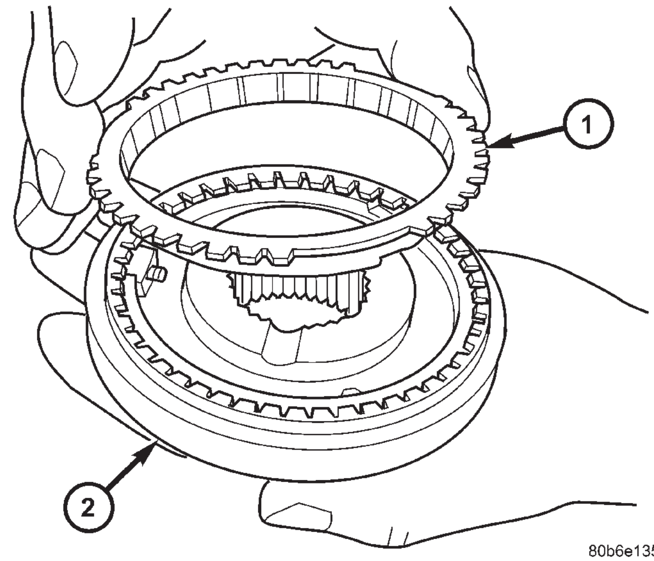


Fig. 168 5th Gear Blocker Ring to Synchro

1 - 5th GEAR BLOCKER RING
2 - 5/R SYNCHRONIZER

(16) Install 5th gear synchronizer assembly to intermediate shaft (Fig. 169). **When installing 5/R synchronizer, make sure to align oil slots on synchronizer hub face with oil hole in the shaft splined hub journal.**

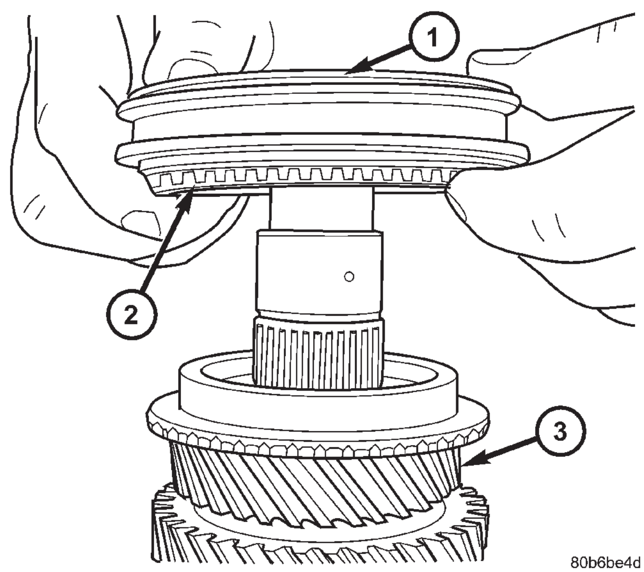


Fig. 169 Install 5/R Synchro and 5th Blocker Ring to 5th Gear

1 - 5/R SYNCHRONIZER
2 - 5TH GEAR BLOCKER RING
3 - 5TH GEAR

INTERMEDIATE SHAFT (Continued)

(17) Install **NEW** 5/R synchro snap ring (Fig. 170).

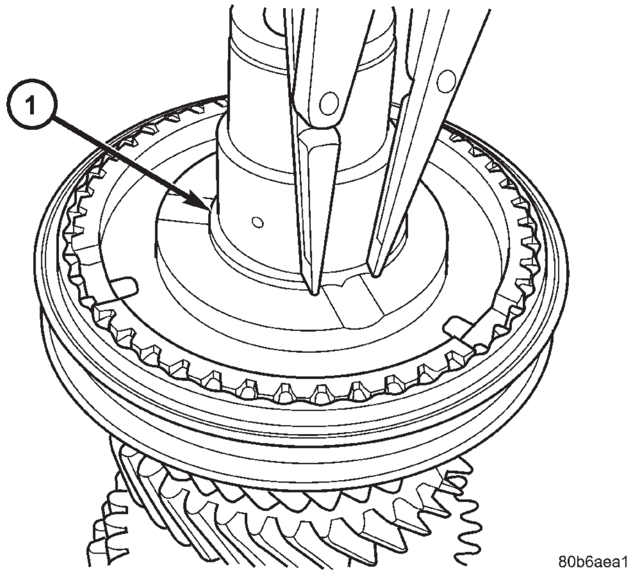


Fig. 170 5/R Synchro Snap Ring

1 - SNAP RING

(18) Install reverse gear blocker ring (Fig. 171).

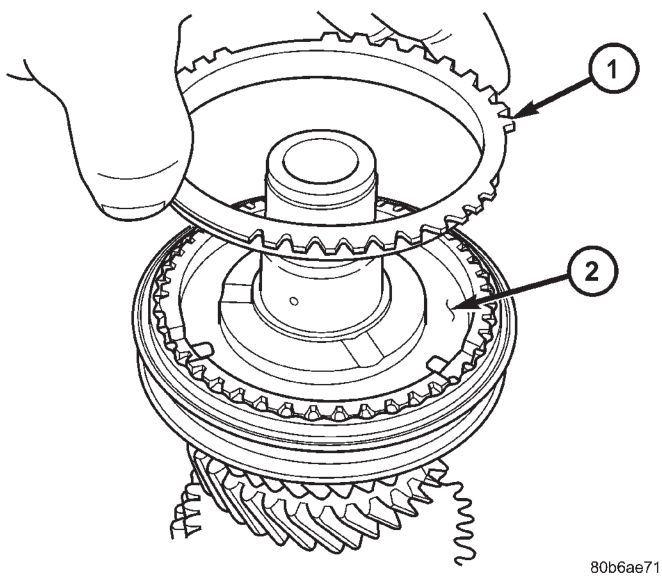


Fig. 171 Reverse Gear Blocker Ring

1 - REVERSE BLOCKER RING
2 - 5/R SYNCHRONIZER

(19) Install reverse gear needle bearing (Fig. 172).
(20) Install reverse gear to intermediate shaft.
(21) Install intermediate shaft sealed roller bearing and thrust washer using installer 8482 (Fig. 173).

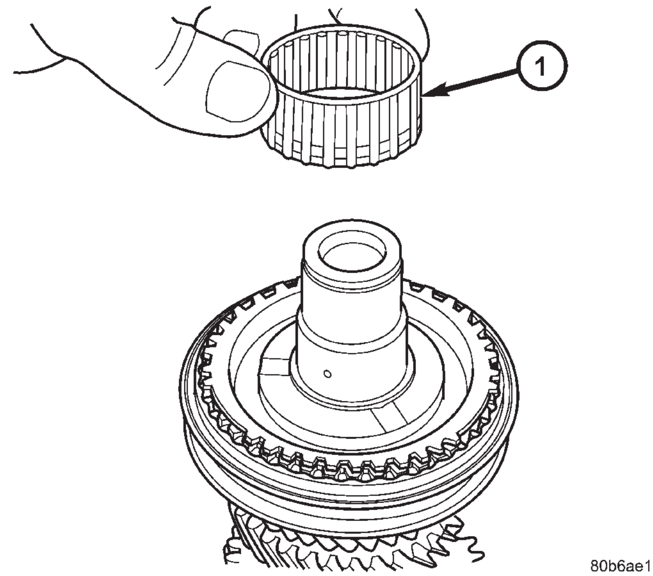


Fig. 172 Reverse Gear Needle Bearing

1 - NEEDLE BEARING

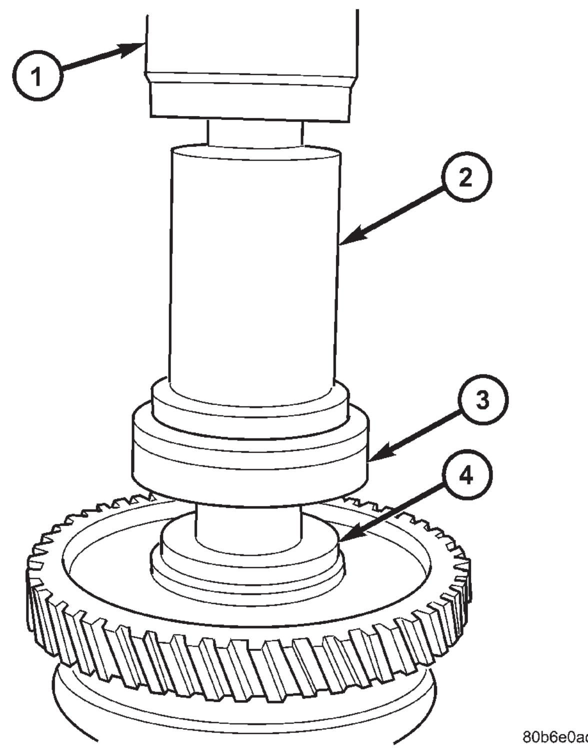


Fig. 173 Sealed Roller Bearing Installatiion

1 - ARBOR PRESS
2 - REMOVER/INSTALLER 8482
3 - SEALED ROLLER BEARING
4 - THRUST WASHER

INTERMEDIATE SHAFT (Continued)

(22) Install **NEW** intermediate shaft sealed bearing snap ring (Fig. 174).

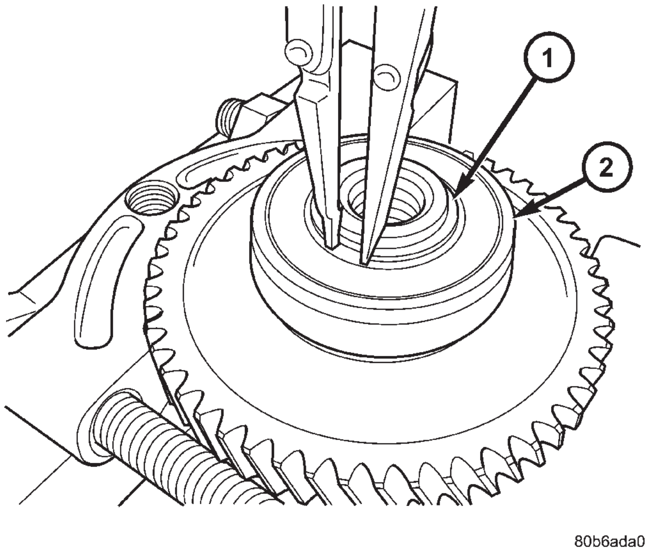


Fig. 174 Intermediate Shaft Bearing Snap Ring

1 - SNAP RING
2 - BEARING

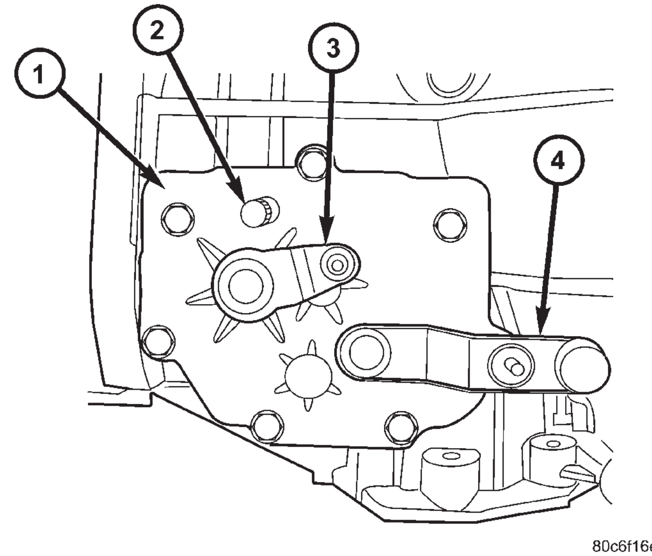


Fig. 175 Shift Lever Identification

1 - SHIFT COVER ASSEMBLY
2 - VENT
3 - CROSSOVER LEVER
4 - SELECTOR LEVER

SHIFT COVER

DESCRIPTION

The shift cover assembly (Fig. 175) (Fig. 176) is operated by the gearshift crossover and selector cables, and operates the shift fork/shaft system. It consists of crossover and selector lever mechanisms, transaxle vent, a main shift selector shaft, and the 5-R blockout mechanism. The shift cover is only serviced as an assembly.

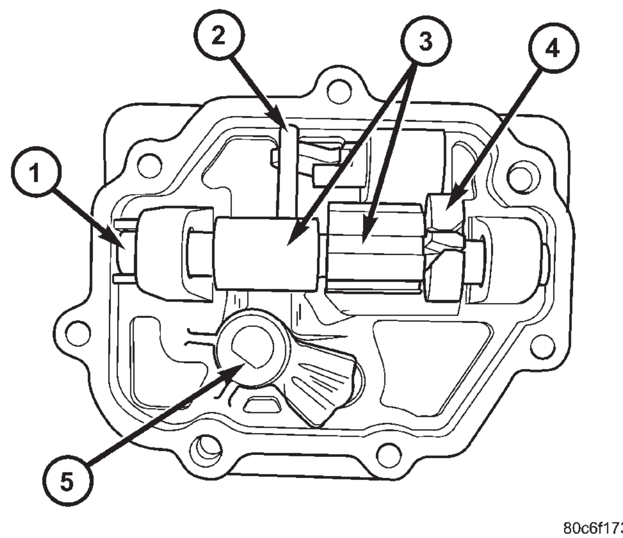


Fig. 176 Shift Cover Assembly Components

1 - SHAFT
2 - 5-R BLOCKOUT PIN/CAM
3 - SHIFT SELECTOR
4 - SHIFT BLOCKER
5 - SELECTOR LEVER/DETENT

SHIFT FORK AND SHAFT

DESCRIPTION

The T850 utilizes a unique shift fork and shaft arrangement consisting of three shift forks and two shafts as shown in (Fig. 177). This system is operated by the shift cover assembly, which combined with a unique gearshift cable design, offers a higher mechanical advantage over traditional shift systems. This arrangement results in less friction and lower shift cable loads for smoother, more positive operation. The shift fork assemblies are constructed of brass, float about the shafts with the aid of needle bearings, and are serviced only as fork/bearing assemblies.

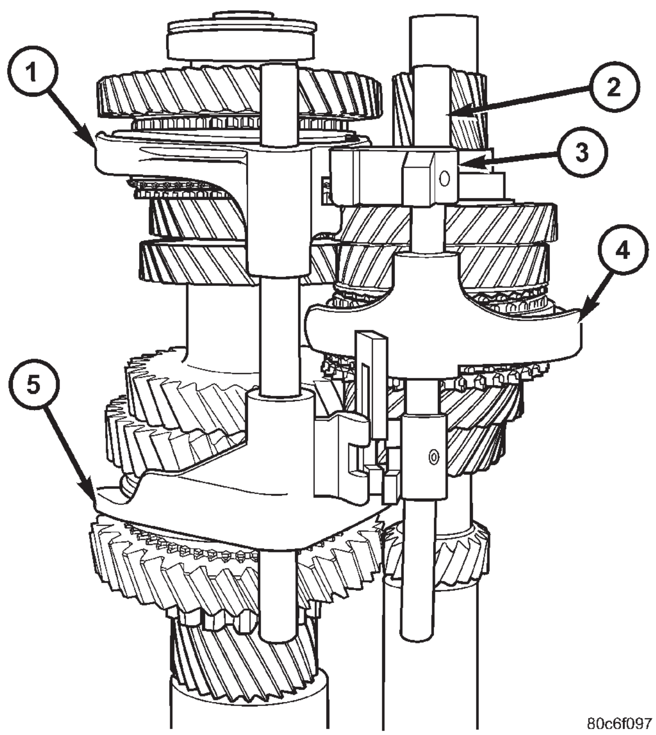


Fig. 177 Shift Fork/Shaft Components

1 - 5/R FORK
2 - SHAFT/LINK ASSEMBLY
3 - LINK
4 - 3/4 FORK
5 - 1/2 FORK

SYNCHRONIZER

DESCRIPTION

The T850 transaxle uses two styles of synchronizer assemblies; a conventional single-cone style is used for the 5th/Reverse and 3rd/4th applications (Fig. 178), and a dual-cone style for the 1st/2nd gear application (Fig. 179).

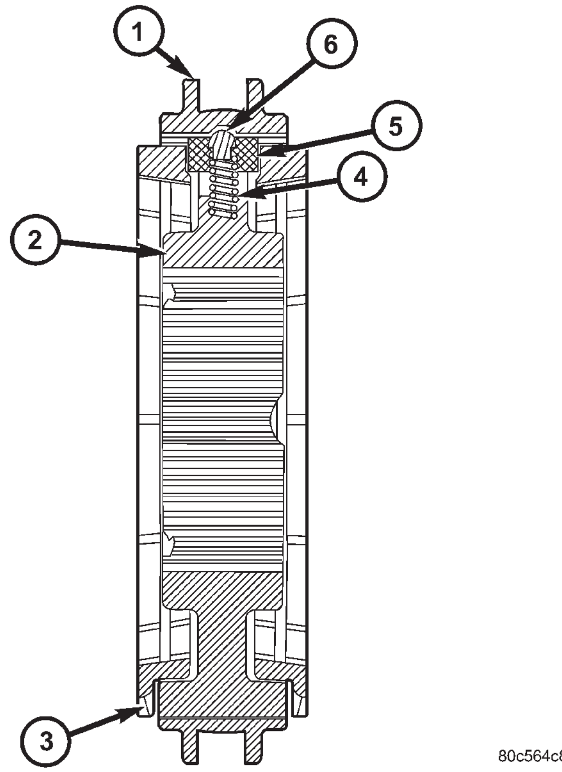


Fig. 178 3/4-5/R Synchronizer Assembly

1 - SLEEVE
2 - HUB
3 - BLOCKER RING (2)
4 - SPRING (3)
5 - KEY (3)
6 - BALL (3)

SYNCHRONIZER (Continued)

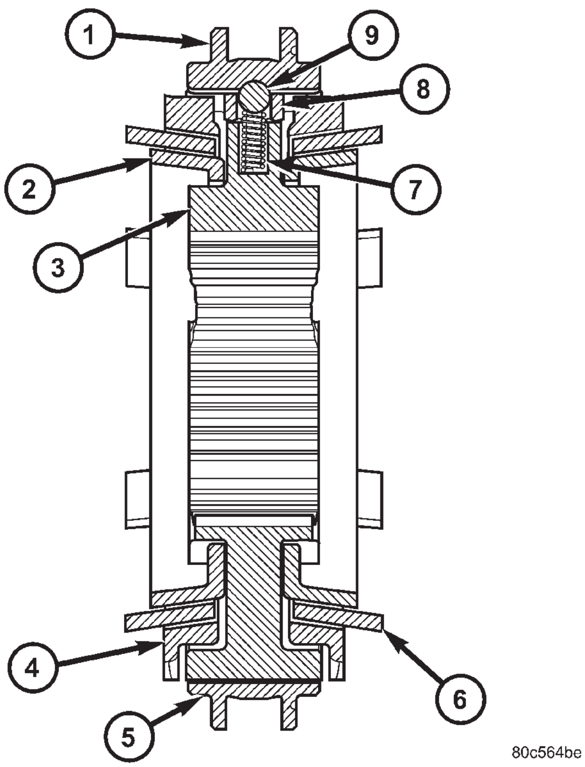


Fig. 179 1/2 Synchronizer Assembly

1 - SLEEVE
2 - REACTOR RING (2)
3 - HUB
4 - BLOCKER RING (2)
5 - FRICTION CONE (2)
6 - SPRING (3)
7 - KEY (3)
8 - BALL (3)

DISASSEMBLY

Place synchronizer in a clean shop towel and wrap. Press on inner hub. Carefully open up shop towel and remove springs, balls, keys, hub, and sleeve.

CLEANING

CLEAN

Do not attempt to clean the blocking rings in solvent. The friction material will become contaminated. Place synchronizer components in a suitable holder and clean with solvent. Air dry.

INSPECTION

INSPECT

Proper inspection of components involve:

- Teeth, for wear, scuffed, nicked, burred, or broken teeth
- Keys, for wear or distortion
- Balls and springs, for distortion, cracks, or wear

If any of these conditions exist in these components, replace as necessary.

ASSEMBLY

(1) Position synchronizer hub onto work bench. Hub is non-directional.

(2) Install springs into hub slot.

(3) Insert key into hub and spring.

(4) Apply petroleum jelly to the hole in the key. Insert balls into each key.

(5) Slide sleeve over the hub and depress balls as you carefully slip the sleeve into position.

41TE AUTOMATIC TRANSAXLE

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41TE AUTOMATIC TRANSAXLE

DESCRIPTION

The 41TE (Fig. 1) is a four-speed transaxle that is a conventional hydraulic/mechanical assembly with an integral differential, and is controlled with adaptive electronic controls and monitors. The hydraulic system of the transaxle consists of the transaxle fluid, fluid passages, hydraulic valves, and various line pressure control components. An input clutch assembly which houses the underdrive, overdrive, and reverse clutches is used. It also utilizes separate holding clutches: 2nd/4th gear and Low/Reverse. The primary mechanical components of the transaxle consist of the following:

- Three multiple disc input clutches
- Two multiple disc holding clutches
- Four hydraulic accumulators
- Two planetary gear sets
- Hydraulic oil pump
- Valve body
- Solenoid/Pressure switch assembly
- Integral differential assembly

Control of the transaxle is accomplished by fully adaptive electronics. Optimum shift scheduling is accomplished through continuous real-time sensor feedback information provided to the Transmission Control Module (TCM).

The TCM is the heart of the electronic control system and relies on information from various direct and indirect inputs (sensors, switches, etc.) to determine driver demand and vehicle operating conditions. With this information, the TCM can calculate and perform timely and quality shifts through various output or control devices (solenoid pack, transmission control relay, etc.).

The TCM also performs certain self-diagnostic functions and provides comprehensive information (sensor data, DTC's, etc.) which is helpful in proper diagnosis and repair. This information can be viewed with the DRB scan tool.

41TE AUTOMATIC TRANSAXLE (Continued)

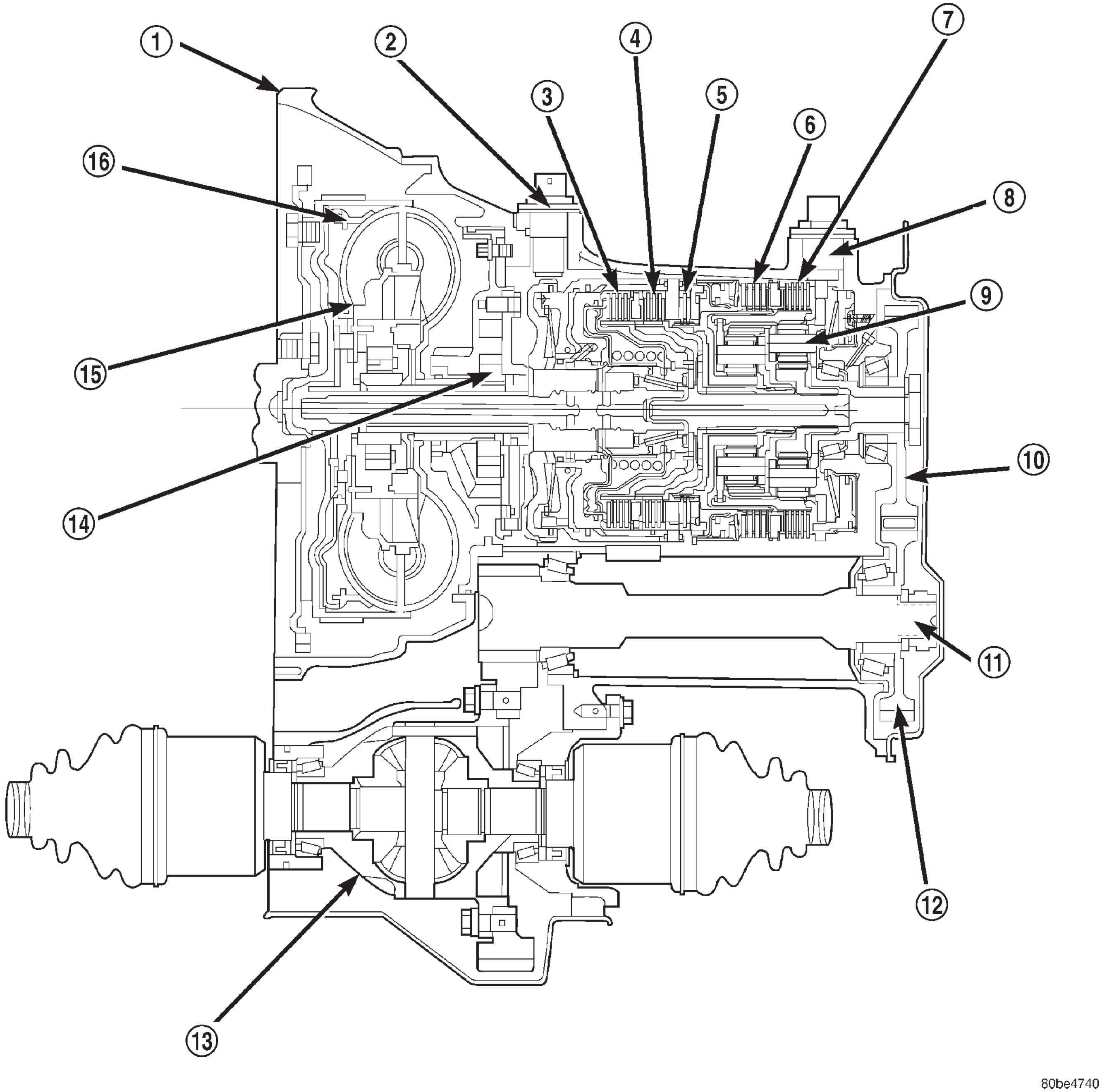


Fig. 1 41TE Transaxle

1 - CASE	7 - LOW/REVERSE CLUTCH	13 - DIFFERENTIAL
2 - INPUT SPEED SENSOR	8 - OUTPUT SPEED SENSOR	14 - OIL PUMP
3 - UNDERDRIVE CLUTCH	9 - PLANETARY GEAR SET	15 - TORQUE CONVERTER
4 - OVERDRIVE CLUTCH	10 - OUTPUT SHAFT GEAR	16 - TORQUE CONVERTER CLUTCH
5 - REVERSE CLUTCH	11 - TRANSFER SHAFT	
6 - 2/4 CLUTCH	12 - TRANSFER SHAFT GEAR	

41TE AUTOMATIC TRANSAXLE (Continued)

TRANSAXLE IDENTIFICATION

The 41TE transaxle is identified by a barcode label that is fixed to the transaxle case as shown in (Fig. 2).

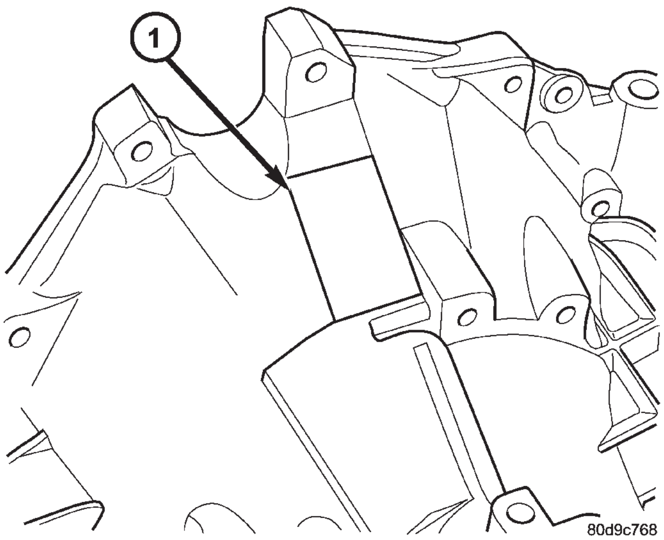


Fig. 2 Transaxle Identification Label

1 - IDENTIFICATION LABEL

The label contains a series of digits that can be translated into useful information such as transaxle part number, date of manufacture, manufacturing origin, plant shift number, build sequence number, etc. Refer to (Fig. 3) for identification label breakdown.

If the tag is not legible or missing, the “PK” number, which is stamped into the transaxle case behind the transfer gear cover, can be referred to for identification. This number differs slightly in that it contains the entire transaxle part number, rather than the last three digits.

OPERATION

Transmission output is directed to an integral differential by a transfer gear system in the following input-to-output ratios:

First . . . . 2.84 : 1
Second . . . . 1.57 : 1
Third . . . . 1.00 : 1
Overdrive . . . . 0.69 : 1
Reverse . . . . 2.21 : 1

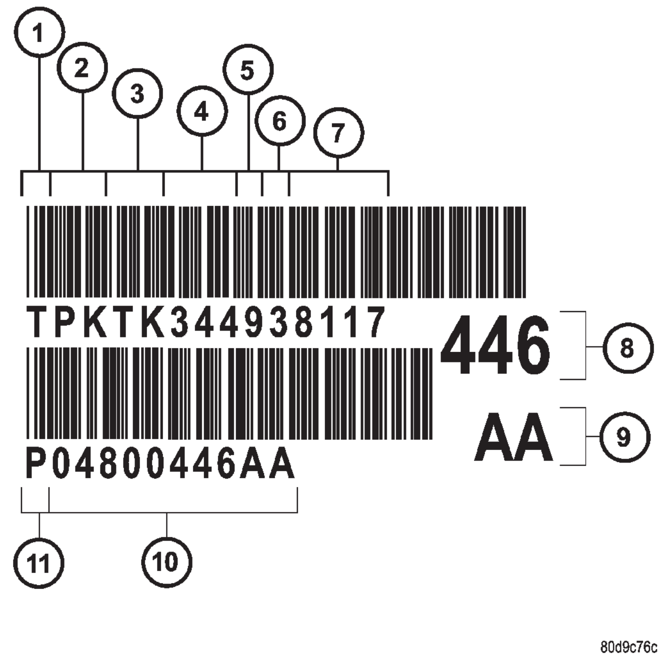


Fig. 3 Identification Label Breakdown

1 - T=TRACEABILITY
2 - SUPPLIER CODE (PK=KOKOMO)
3 - COMPONENT CODE (TK=KOKOMO TRANSMISSION)
4 - BUILD DAY (344=DEC. 9)
5 - BUILD YEAR (9=1999)
6 - LINE/SHIFT CODE (3=3RD SHIFT)
7 - BUILD SEQUENCE NUMBER
8 - LAST THREE OF P/N
9 - NIK
10 - TRANSAXLE PART NUMBER
11 - P=PART NUMBER

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - 41TE TRANSAXLE GENERAL DIAGNOSIS

NOTE: Before attempting any repair on a 41TE four-speed automatic transaxle, check for diagnostic trouble codes (DTC’s) using the DRB scan tool. Refer to the Transmission Diagnostic Procedures Manual.

41TE AUTOMATIC TRANSAXLE (Continued)

Transaxle malfunctions may be caused by these general conditions:

- Poor engine performance
- Improper adjustments
- Hydraulic malfunctions
- Mechanical malfunctions
- Electronic malfunctions

Diagnosis of these problems should always begin by checking the easily accessible variables: fluid level and condition, gearshift cable adjustment. Then perform a road test to determine if the problem has been corrected or that more diagnosis is necessary. If the problem persists after the preliminary tests and corrections are completed, hydraulic pressure checks should be performed.

DIAGNOSIS AND TESTING - ROAD TEST

Prior to performing a road test, verify that the fluid level, fluid condition, and linkage adjustment have been approved.

During the road test, the transaxle should be operated in each position to check for slipping and any variation in shifting.

If the vehicle operates properly at highway speeds, but has poor acceleration, the converter stator overrunning clutch may be slipping. If acceleration is normal, but high throttle opening is needed to maintain highway speeds, the converter stator clutch may have seized. Both of these stator defects require replacement of the torque converter and thorough transaxle cleaning.

Slipping clutches can be isolated by comparing the “Elements in Use” chart with clutch operation encountered on a road test. This chart identifies which clutches are applied at each position of the selector lever.

A slipping clutch may also set a DTC and can be determined by operating the transaxle in all selector positions.

ELEMENTS IN USE AT EACH POSITION OF SELECTOR LEVER

Shift Lever Position	INPUT CLUTCHES			HOLDING CLUTCHES	
	Underdrive	Overdrive	Reverse	2/4	Low/Reverse
P - PARK					X
R - REVERSE			X		X
N - NEUTRAL					X
OD - OVERDRIVE First	X				X
Second	X			X	
Direct	X	X			
Overdrive		X		X	
D - DRIVE* First	X				X
Second	X			X	
Direct	X	X			
L - LOW* First	X				X
Second	X			X	
Direct	X	X			
* Vehicle upshift and downshift speeds are increased when in these selector positions.					

41TE AUTOMATIC TRANSAXLE (Continued)

The process of elimination can be used to detect any unit which slips and to confirm proper operation of good units. Road test analysis can diagnose slipping units, but the cause of the malfunction cannot be determined. Practically any condition can be caused by leaking hydraulic circuits or sticking valves.

DIAGNOSIS AND TESTING - HYDRAULIC PRESSURE TESTS

Pressure testing is a very important step in the diagnostic procedure. These tests usually reveal the cause of most hydraulic transaxle problems.

Before performing pressure tests, be certain that fluid level and condition, and shift cable adjustments have been checked and approved. Fluid must be at operating temperature (150 to 200 degrees F.).

Install an engine tachometer, raise vehicle on hoist which allows front wheels to turn, and position tachometer so it can be read.

Attach 300 psi gauge (C-3293SP) to port(s) required for test(s) being conducted. Use adapter set L-4559 to adapt gauge(s) to transaxle.

Test port locations are shown in (Fig. 4).

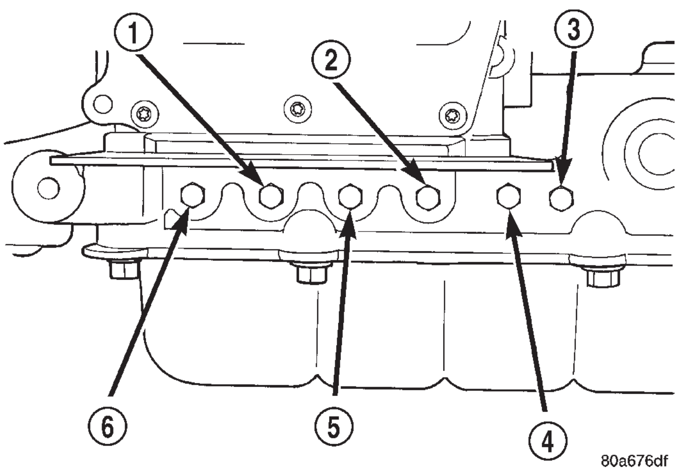


Fig. 4 Pressure Taps

1 - OVERDRIVE CLUTCH
2 - TORQUE CONVERTER OFF
3 - LOW/REVERSE CLUTCH
4 - 2/4 CLUTCH
5 - REVERSE CLUTCH
6 - UNDERDRIVE CLUTCH

TEST ONE-SELECTOR IN LOW (1st GEAR)

(1) Attach pressure gauge to the low/reverse clutch tap.

(2) Move selector lever to the (L) position.

(3) Allow vehicle wheels to turn and increase throttle opening to achieve an indicated vehicle speed to 20 mph.

(4) Low/reverse clutch pressure should read 115 to 145 psi.

(5) This test checks pump output, pressure regulation and condition of the low/reverse clutch hydraulic circuit and shift schedule.

TEST TWO-SELECTOR IN DRIVE (2nd GEAR)

NOTE: This test checks the underdrive clutch hydraulic circuit as well as the shift schedule.

(1) Attach gauge to the underdrive clutch tap.

(2) Move selector lever to the 3 position.

(3) Allow vehicle wheels to turn and increase throttle opening to achieve an indicated vehicle speed of 30 mph.

(4) In second gear the underdrive clutch pressure should read 110 to 145 psi.

TEST TWO A–SELECTOR IN OD (4th Gear)

NOTE: This test checks the underdrive clutch hydraulic circuit as well as the shift schedule.

(1) Attach gauge to the underdrive clutch tap.

(2) Move selector lever to the (OD) position.

(3) Allow wheels to rotate freely and increase throttle opening to achieve an indicated speed of 40 mph.

(4) Underdrive clutch pressure should read below 5 psi. If not, then either the solenoid assembly or TCM is at fault.

TEST THREE-OVERDRIVE CLUTCH CHECK (3rd and 2nd Gear)

(1) Attach gauge to the overdrive clutch tap.

(2) Move selector lever to the (OD) position.

(3) Allow vehicle wheels to turn and increase throttle opening to achieve an indicated vehicle speed of 20 mph. Vehicle should be in 3rd gear.

(4) Overdrive clutch pressure should read 74 to 95 psi.

(5) Move selector lever to the (3) position and increase indicated vehicle speed to 30 mph.

(6) The vehicle should be in second gear and overdrive clutch pressure should be less than 5 psi.

(7) This test checks the overdrive clutch hydraulic circuit as well as the shift schedule.

TEST FOUR-SELECTOR IN OVERDRIVE (4th Gear)

(1) Attach gauge to the 2/4 clutch tap.

(2) Move selector lever to the (OD) position.

(3) Allow vehicle front wheels to turn and increase throttle opening to achieve an indicated vehicle speed of 30 mph. Vehicle should be in 4th gear.

(4) The 2/4 clutch pressure should read 75 to 95 psi.

(5) This test checks the 2/4 clutch hydraulic circuit.

41TE AUTOMATIC TRANSAXLE (Continued)

TEST FIVE-SELECTOR IN OVERDRIVE (4th Gear-CC on)

(1) Attach gauge to the torque converter clutch off pressure tap.

(2) Move selector lever to the (OD) position.

(3) Allow vehicle wheels to turn and increase throttle opening to achieve an indicated vehicle speed of 50 mph. Vehicle should be in 4th gear, CC on.

CAUTION: Both wheels must turn at the same speed.

(4) Torque converter clutch off pressure should be less than 5 psi.

(5) This test checks the torque converter clutch hydraulic circuit.

TEST SIX-SELECTOR IN REVERSE

(1) Attach gauges to the reverse and LR clutch tap.

(2) Move selector lever to the (R) position.

(3) Read reverse clutch pressure with output stationary (foot on brake) and throttle opened to achieve 1500 rpm.

(4) Reverse and LR clutch pressure should read 165 to 235 psi.

(5) This test checks the reverse clutch hydraulic circuit.

TEST RESULT INDICATIONS

(1) If proper line pressure is found in any one test, the pump and pressure regulator are working properly.

(2) Low pressure in all positions indicates a defective pump, a clogged filter, or a stuck pressure regulator valve.

(3) Clutch circuit leaks are indicated if pressures do not fall within the specified pressure range.

(4) If the overdrive clutch pressure is greater than 5 psi in Step 4 of Test Three, a worn reaction shaft seal ring or a defective solenoid assembly is indicated.

(5) If the underdrive clutch pressure is greater than 5 psi in Step 4 of Test Two A, a defective solenoid assembly or TCM is the cause.

PRESSURE CHECK SPECIFICATIONS

Gear Selector Position	Actual Gear	Pressure Taps					
		Underdrive Clutch	Overdrive Clutch	Reverse Clutch	Torque Converter Clutch Off	2/4 Clutch	Low/ Reverse Clutch
Park * 0 mph	PARK	0-2	0-5	0-2	60-110	0-2	115-145
REVERSE * 0 mph	REVERSE	0-2	0-7	165-235	50-100	0-2	165-235
NEUTRAL * 0 mph	NEUTRAL	0-2	0-5	0-2	60-110	0-2	115-145
L # 20 mph	FIRST	110-145	0-5	0-2	60-110	0-2	115-145
3 # 30 mph	SECOND	110-145	0-5	0-2	60-110	115-145	0-2
3 # 45 mph	DIRECT	75-95	75-95	0-2	60-90	0-2	0-2
OD # 30 mph	OVERDRIVE	0-2	75-95	0-2	60-90	75-95	0-2
OD # 50 mph	OVERDRIVE WITH TCC	0-2	75-95	0-2	0-5	75-95	0-2

*** Engine speed at 1500 rpm**

 # CAUTION: Both front wheels must be turning at the same speed.

41TE AUTOMATIC TRANSAXLE (Continued)

DIAGNOSIS AND TESTING - CLUTCH AIR PRESSURE TESTS

Inoperative clutches can be located using a series of tests by substituting air pressure for fluid pressure (Fig. 5) (Fig. 6). The clutches may be tested by applying air pressure to their respective passages. The valve body must be removed and Tool 6056 installed. To make air pressure tests, proceed as follows:

NOTE: The compressed air supply must be free of all dirt and moisture. Use a pressure of 30 psi.

Remove oil pan and valve body. See Valve body removal.

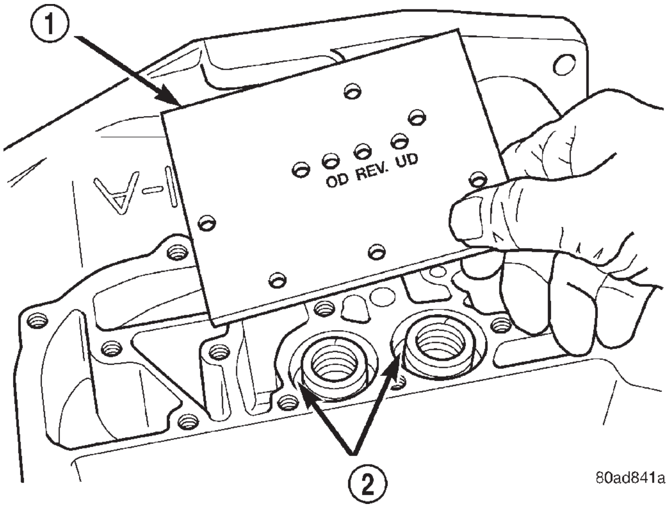


Fig. 5 Air Pressure Test Plate

1 - TOOL 6056
2 - ACCUMULATORS

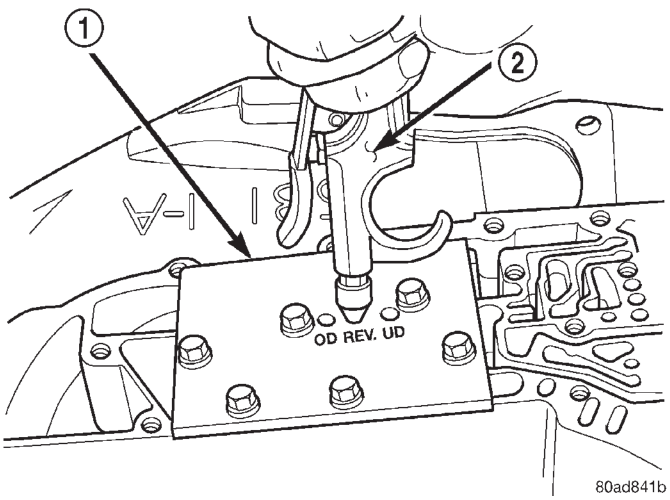


Fig. 6 Testing Reverse Clutch

1 - TOOL 6056
2 - AIR NOZZLE

OVERDRIVE CLUTCH

Apply air pressure to the overdrive clutch apply passage and watch for the push/pull piston to move forward. The piston should return to its starting position when the air pressure is removed.

REVERSE CLUTCH

Apply air pressure to the reverse clutch apply passage and watch for the push/pull piston to move rearward. The piston should return to its starting position when the air pressure is removed.

2/4 CLUTCH

Apply air pressure to the feed hole located on the 2/4 clutch retainer. Look in the area where the 2/4 piston contacts the first separator plate and watch carefully for the 2/4 piston to move rearward. The piston should return to its original position after the air pressure is removed.

LOW/REVERSE CLUTCH

Apply air pressure to the low/reverse clutch feed hole (rear of case, between 2 bolt holes). Then, look in the area where the low/reverse piston contacts the first separator plate. Watch carefully for the piston to move forward. The piston should return to its original position after the air pressure is removed.

UNDERDRIVE CLUTCH

Because this clutch piston cannot be seen, its operation is checked by function. Air pressure is applied to the low/reverse and the 2/4 clutches. This locks the output shaft. Use a piece of rubber hose wrapped around the input shaft and a pair of clamp-on pliers to turn the input shaft. Next apply air pressure to the underdrive clutch. The input shaft should not rotate with hand torque. Release the air pressure and confirm that the input shaft will rotate.

DIAGNOSIS AND TESTING - TORQUE CONVERTER HOUSING FLUID LEAKAGE

When diagnosing converter housing fluid leaks, three actions must be taken before repair:

(1) Verify proper transmission fluid level.

(2) Verify that the leak originates from the converter housing area and is transmission fluid.

(3) Determine the true source of the leak.

Fluid leakage at or around the torque converter area may originate from an engine oil leak (Fig. 7). The area should be examined closely. Factory fill fluid is red and, therefore, can be distinguished from engine oil.

41TE AUTOMATIC TRANSAXLE (Continued)

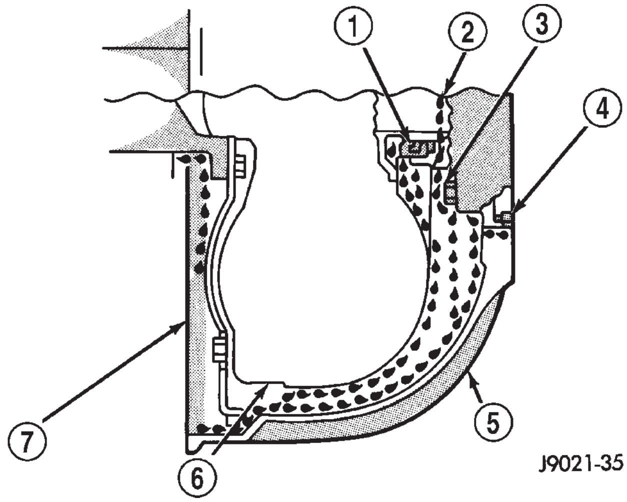


Fig. 7 Converter Housing Leak Paths

1 - PUMP SEAL
2 - PUMP VENT
3 - PUMP BOLT
4 - PUMP GASKET
5 - CONVERTER HOUSING
6 - CONVERTER
7 - REAR MAIN SEAL LEAK

Some suspected converter housing fluid leaks may not be leaks at all. They may only be the result of residual fluid in the converter housing, or excess fluid spilled during factory fill, or fill after repair. Converter housing leaks have several potential sources. Through careful observation, a leak source can be identified before removing the transmission for repair.

Pump seal leaks tend to move along the drive hub and onto the rear of the converter (Fig. 7). Pump o-ring or pump body leaks follow the same path as a seal leak. Pump attaching bolt leaks are generally deposited on the inside of the converter housing and not on the converter itself. Pump seal or gasket leaks usually travel down the inside of the converter housing (Fig. 7).

TORQUE CONVERTER LEAKAGE

Possible sources of torque converter leakage are:

- Torque converter weld leaks at the outside diameter weld (Fig. 8).
- Torque converter hub weld (Fig. 8).

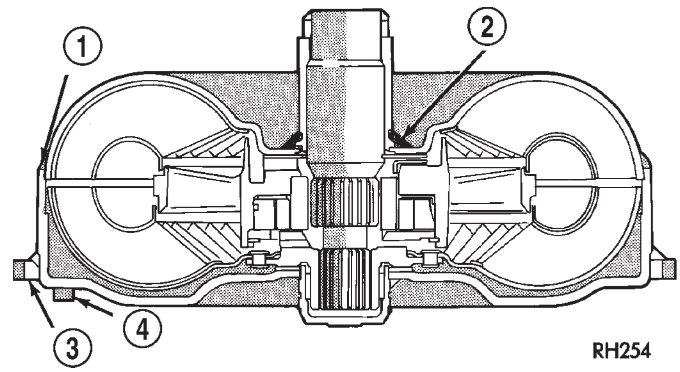


Fig. 8 Converter Leak Points - Typical

1 - OUTSIDE DIAMETER WELD
2 - TORQUE CONVERTER HUB WELD
3 - STARTER RING GEAR
4 - LUG

REMOVAL

NOTE: If transaxle assembly is being replaced or overhauled (clutch and/or seal replacement), it is necessary to perform the TCM Quick Learn Procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Disconnect battery cable.
(2) Remove air cleaner assembly.
(3) Remove dipstick tube. Plug hole to prevent debris from entering transaxle.
(4) Using a blade or suitable hose cutter, cut transaxle oil cooler lines off flush with fittings. Plug lines and fittings to prevent debris from entering transaxle or cooler circuit. A service splice kit will be installed upon reassembly.
(5) Disconnect Solenoid/Pressure Switch Assy. connector.
(6) Disconnect Transmission Range Sensor connector.
(7) Disconnect Input Speed Sensor connector.
(8) Disconnect Output Speed Sensor connector.
(9) Disconnect shift cable from manual valve lever and bracket.
(10) Disconnect Crankshaft Position Sensor.
(11) Remove throttle body support bracket.
(12) Disconnect Oxygen Sensor harness retainer from transaxle case.

41TE AUTOMATIC TRANSAXLE (Continued)

(13) Remove rear mount bracket-to-transaxle case bolts.

(14) Remove starter upper bracket-to-block bolt.

(15) Raise vehicle.

(16) Remove halfshafts. Refer to Differential and Driveline.

(17) Remove rear mount bracket lower bolt.

(18) Remove rear mount thru-bolt.

(19) Remove rear mount-to-cross member bolts.

(20) Remove rear mount and bracket.

(21) Remove front mount thru-bolt.

(22) Remove front mount to radiator lower cross-member bolts.

(23) Remove front mount bracket to block and transaxle.

(24) Remove front mount bracket and mount.

(25) Remove starter lower bolt and starter motor assembly.

(26) Remove converter dust shield.

(27) Remove torque converter bolts.

(28) Support engine/transaxle with screw jack and wood block on engine oil pan.

(29) Remove left mount bracket-to-transaxle bolts.

(30) Carefully lower engine/transaxle assembly to gain access to and remove transaxle-to-engine bolts.

(31) With aid of helper or transmission jack, remove transaxle assembly from vehicle.

DISASSEMBLY

CAUTION: If transaxle failure has occurred, it is necessary to flush the transaxle oil cooler and lines to remove debris and particles that could contaminate and/or fail a new or rebuilt unit. (Refer to 7 - COOLING/TRANSMISSION - STANDARD PROCEDURE)

NOTE: If transaxle is being overhauled (clutch and/or seal replacement) or replaced, it is necessary to perform the TCM Quick Learn Procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

NOTE: This procedure does not include final drive (differential) disassembly.

(1) Remove input and output speed sensors.

(2) Remove three (3) solenoid/pressure switch assembly-to-case bolts.

(3) Remove solenoid/pressure switch assembly and gasket (Fig. 9).

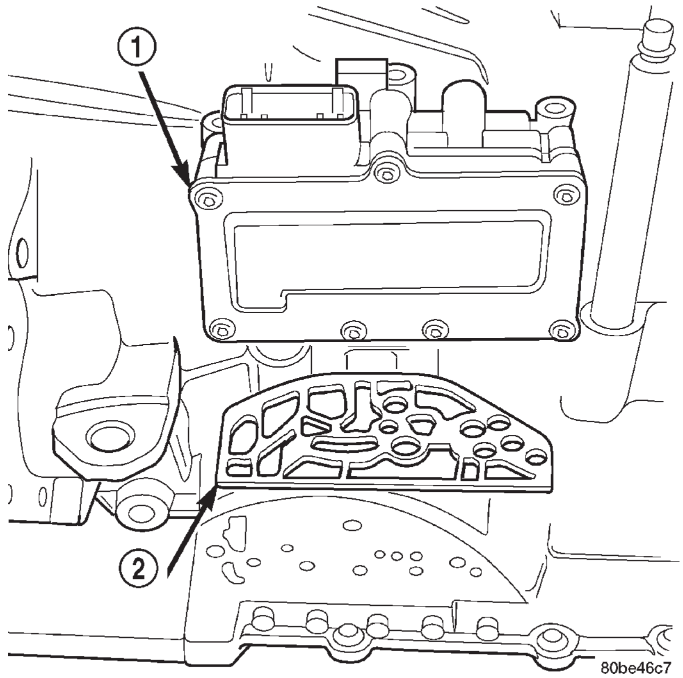


Fig. 9 Solenoid/Pressure Switch Assembly and Gasket

1 - SOLENOID/PRESSURE SWITCH ASSEMBLY
2 - GASKET

(4) Remove oil pan-to-case bolts (Fig. 10).

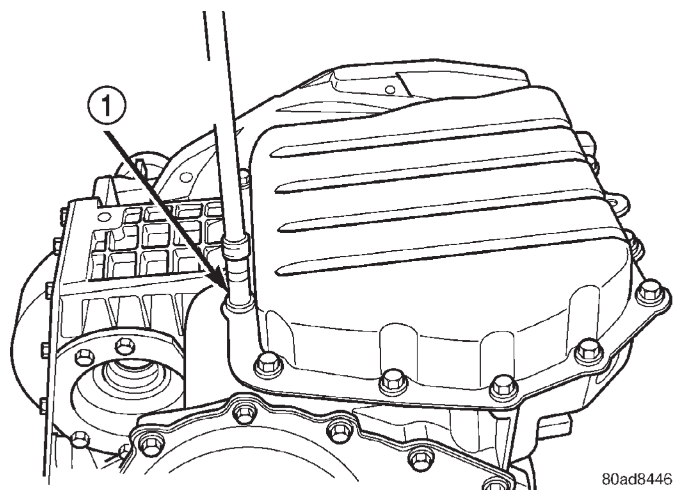


Fig. 10 Remove Oil Pan Bolts

1 - OIL PAN BOLTS (USE RTV UNDER BOLT HEADS)

41TE AUTOMATIC TRANSAXLE (Continued)

(5) Remove oil pan (Fig. 11).

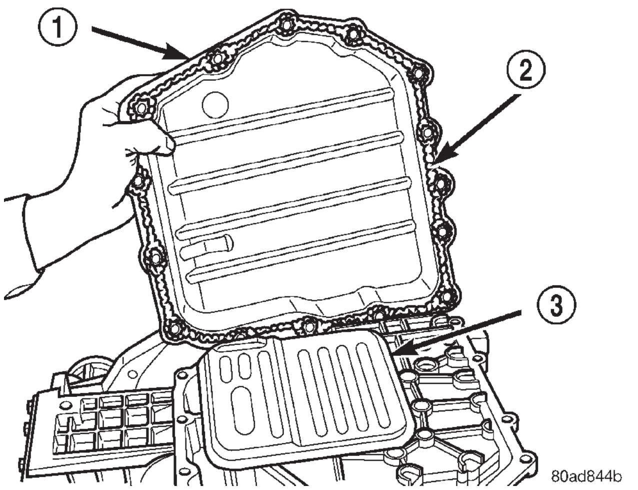


Fig. 11 Remove Oil Pan

1 - OIL PAN
2 - 1/8 INCH BEAD OF MOPAR® ATF RTV (MS-GF41)
3 - OIL FILTER

(6) Remove oil filter (Fig. 12).

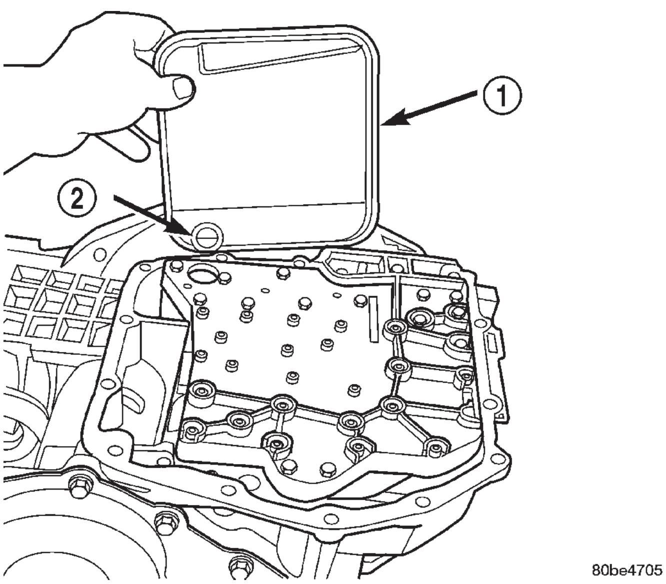


Fig. 12 Remove Oil Filter

1 - OIL FILTER
2 - O-RING

(7) Turn manual valve fully clock-wise to get park rod into position for removal.

(8) Remove valve body-to-case bolts (Fig. 13).

CAUTION: Do not handle the valve body assembly from the manual valve. Damage can result.

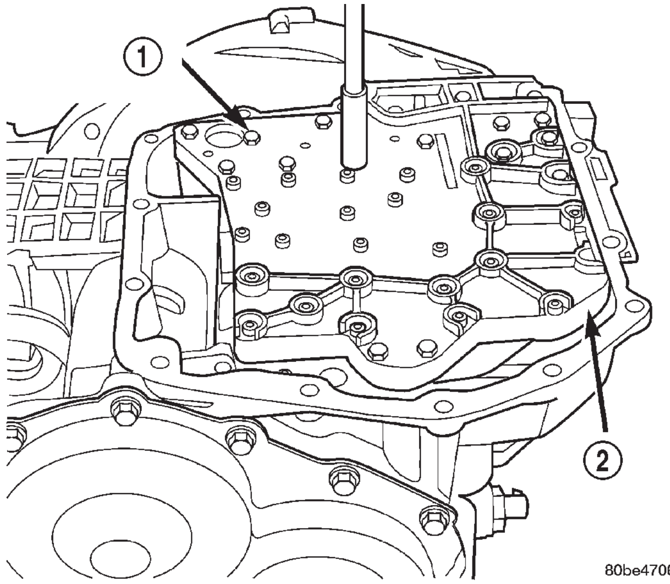


Fig. 13 Remove Valve Body Attaching Bolts

1 - VALVE BODY ATTACHING BOLTS (18)
2 - VALVE BODY

(9) Using a screwdriver, push park rod rollers away from guide bracket (Fig. 14) and remove valve body assembly (Fig. 15).

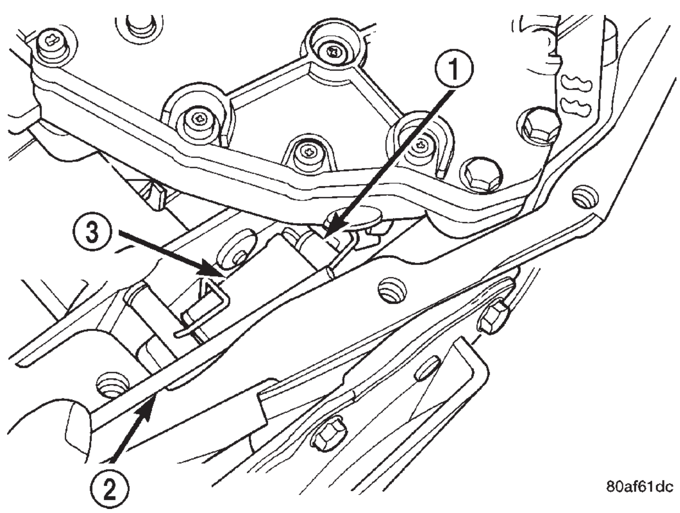


Fig. 14 Push Park Rod Rollers from Guide Bracket

1 - PARK SPRAG ROLLERS
2 - SCREWDRIVER
3 - PARK SPRAG GUIDE BRACKET

NOTE: Depending on engine application, some accumulators will have two springs and others will have one spring. The springs are color-coded according to application and year. When disassembling, mark accumulator spring location to ease assembly.

41TE AUTOMATIC TRANSAXLE (Continued)

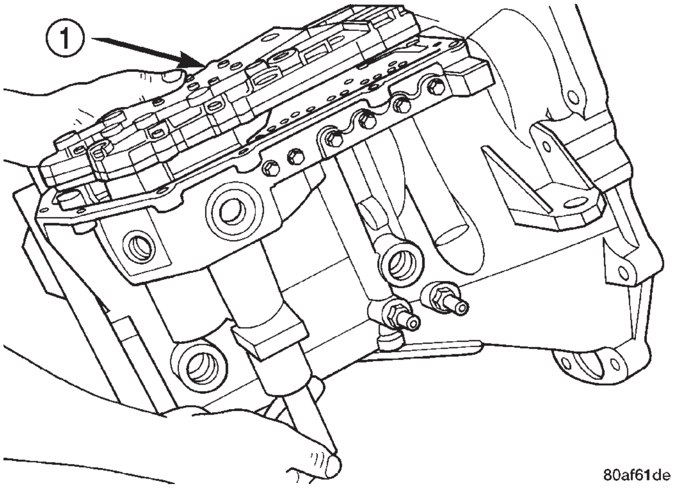


Fig. 15 Remove Valve Body

1 - VALVE BODY

(10) Remove underdrive and overdrive accumulators (Fig. 16) (Fig. 17) (Fig. 18).

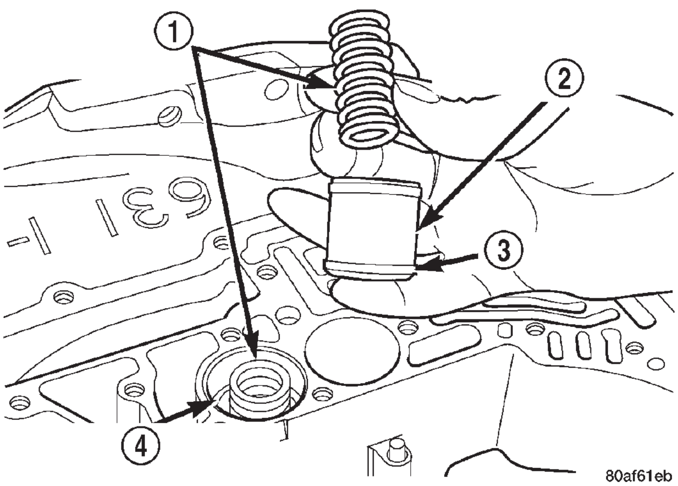


Fig. 16 Remove Underdrive and Overdrive Accumulators

1 - RETURN SPRING
2 - UNDERDRIVE CLUTCH ACCUMULATOR
3 - SEAL RING (2)
4 - OVERDRIVE CLUTCH ACCUMULATOR

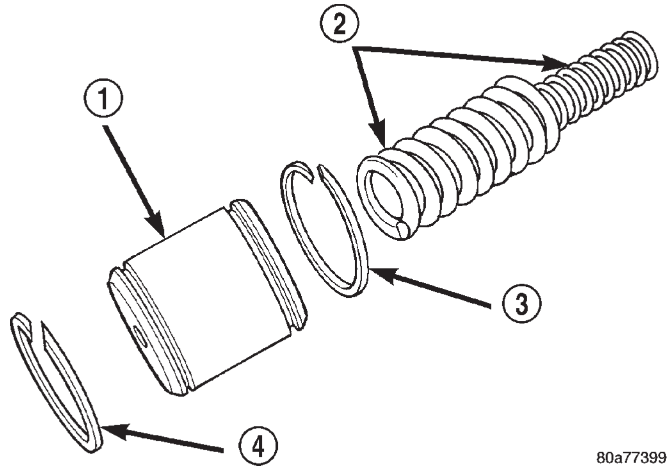


Fig. 17 Accumulator (Underdrive)

1 - ACCUMULATOR PISTON (UNDERDRIVE)
2 - RETURN SPRINGS
3 - SEAL RING
4 - SEAL RING

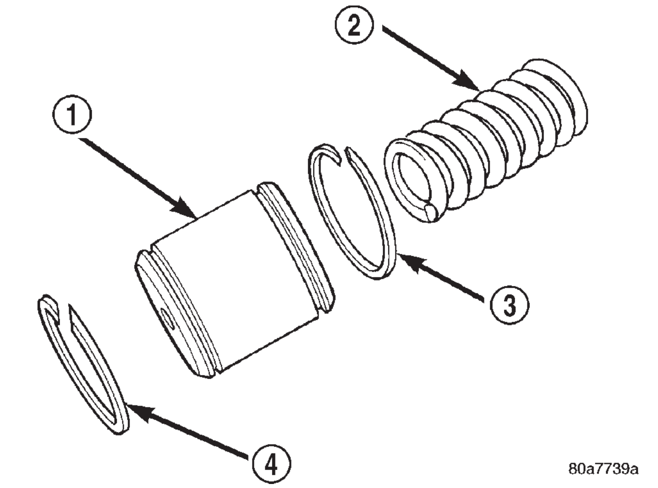


Fig. 18 Accumulator (Overdrive)

1 - ACCUMULATOR PISTON (OVERDRIVE)
2 - RETURN SPRING
3 - SEAL RING
4 - SEAL RING

41TE AUTOMATIC TRANSAXLE (Continued)

(11) Remove low/reverse accumulator snap ring (Fig. 19).

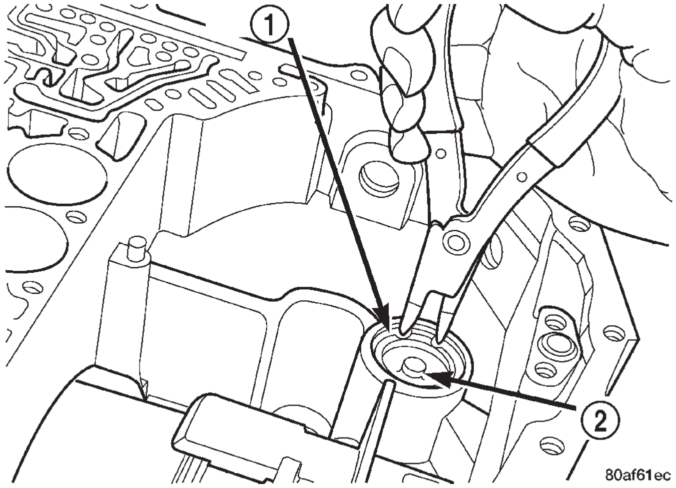


Fig. 19 Remove Low/Reverse Accumulator Snap Ring

1 - SNAP RING
2 - PLUG

(12) Remove low/reverse accumulator plug (Fig. 20).

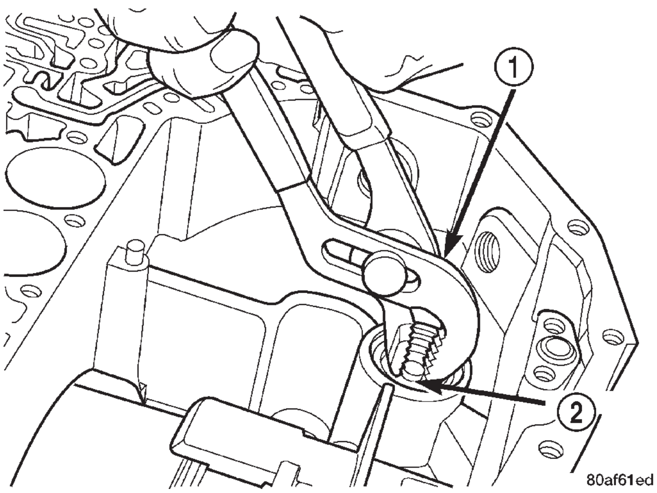


Fig. 20 Remove Low/Reverse Accumulator Plug (Cover)

1 - ADJUSTABLE PLIERS
2 - PLUG

(13) Remove low/reverse accumulator piston using petrolatum and a suitable tool (Fig. 21).

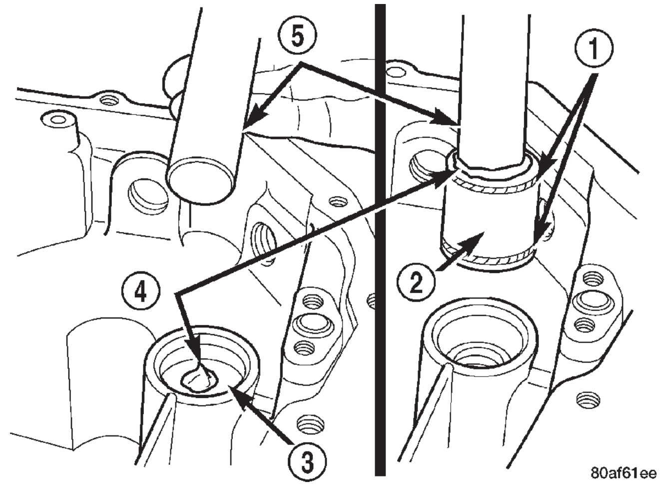


Fig. 21 Remove Low/Reverse Accumulator Piston

1 - SEAL RINGS
2 - PISTON
3 - PISTON
4 - PETROLATUM
5 - SUITABLE TOOL

(14) Remove low/reverse accumulator (Fig. 22).

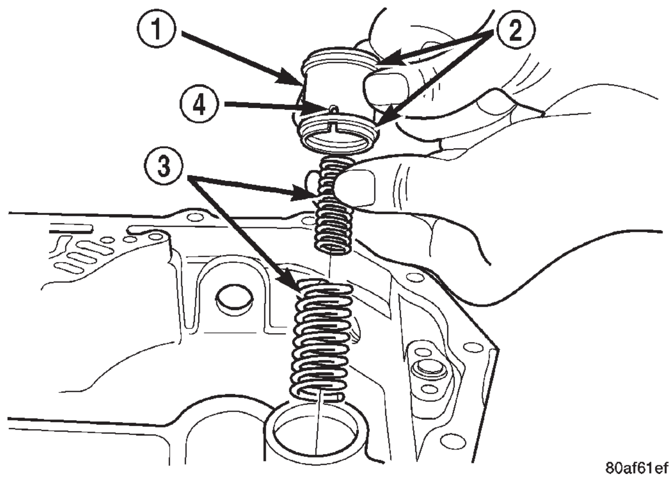


Fig. 22 Remove Low/Reverse Accumulator

1 - ACCUMULATOR PISTON
2 - SEAL RINGS
3 - RETURN SPRINGS
4 - (NOTE NOTCH)

41TE AUTOMATIC TRANSAXLE (Continued)

(15) Measure input shaft end play. Place transaxle so input shaft is vertical. Set up end play set and dial indicator as shown in (Fig. 23). **Input shaft end play should be within 0.13-0.64 mm (0.005-0.025 in.)** If outside of this range, a #4 thrust plate change is required. Record indicator reading for reference upon reassembly.

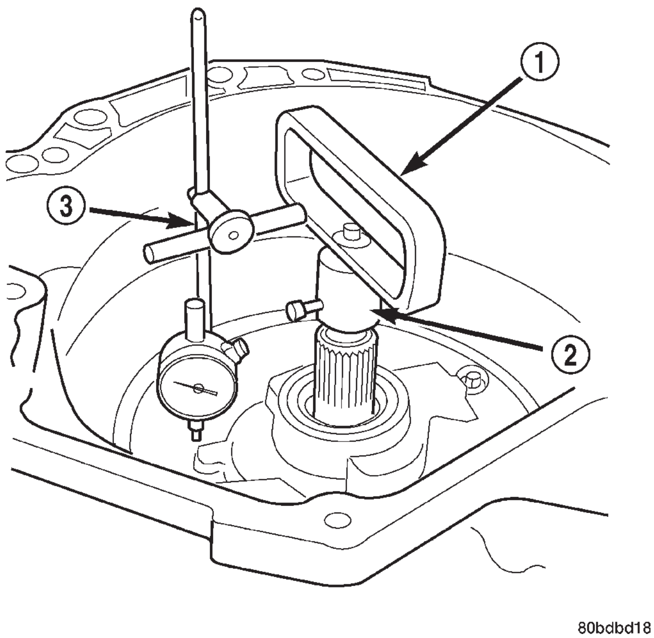


Fig. 23 Measure Input Shaft End Play Using End Play Set 8266

1 - TOOL 8266–8
2 - TOOL 8266–2
3 - TOOL C-3339

(16) Remove oil pump-to-case bolts (Fig. 24).

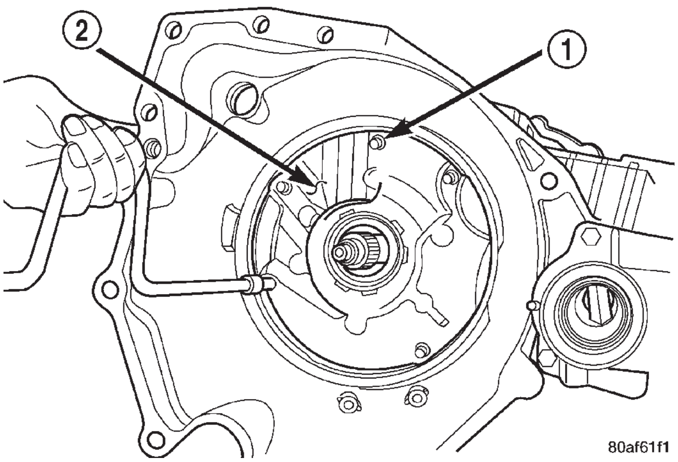


Fig. 24 Remove Pump Attaching Bolts

1 - PUMP ATTACHING BOLTS
2 - PUMP HOUSING

CAUTION: Be sure input speed sensor is removed before removing oil pump.

(17) Install pullers Tool C-3752 as shown in (Fig. 25).

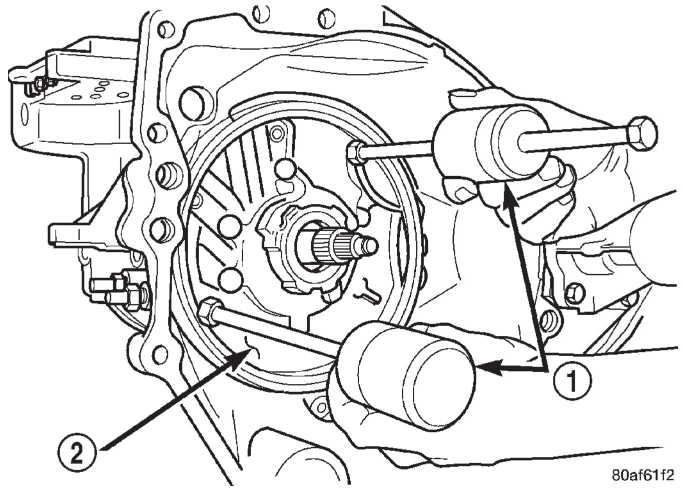


Fig. 25 Install Tool C-3752

1 - PULLERS TOOL C-3752
2 - PUMP

(18) Remove oil pump assembly (Fig. 26) (Fig. 27).

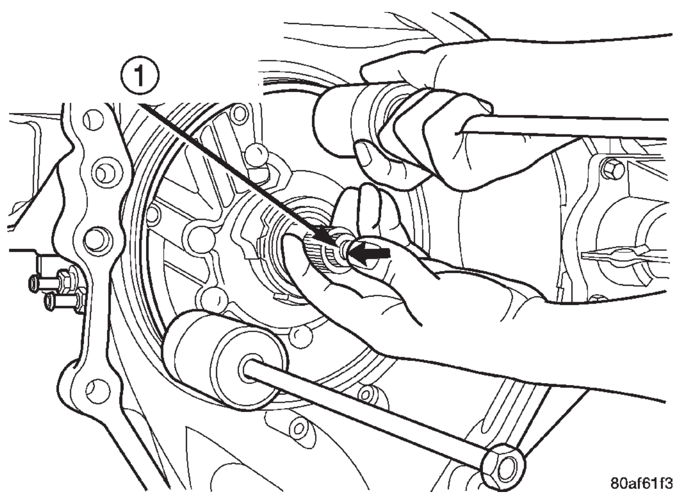


Fig. 26 Remove Oil Pump

1 - “PUSH IN” ON INPUT SHAFT WHILE REMOVING PUMP

41TE AUTOMATIC TRANSAXLE (Continued)

(19) Remove oil pump gasket (Fig. 28).

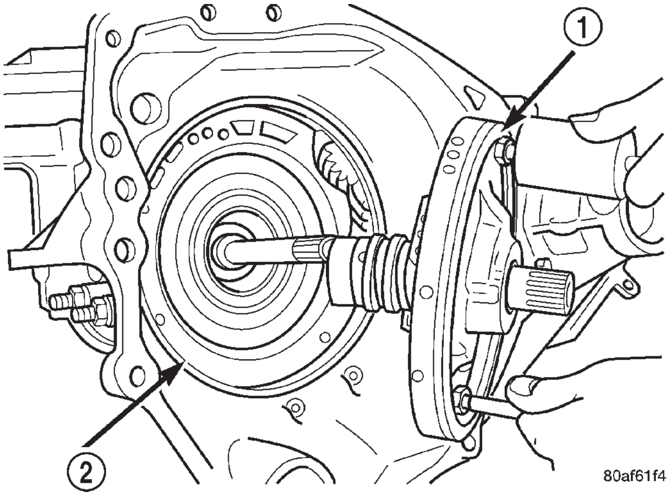


Fig. 27 Oil Pump Removed

1 - OIL PUMP
2 - GASKET

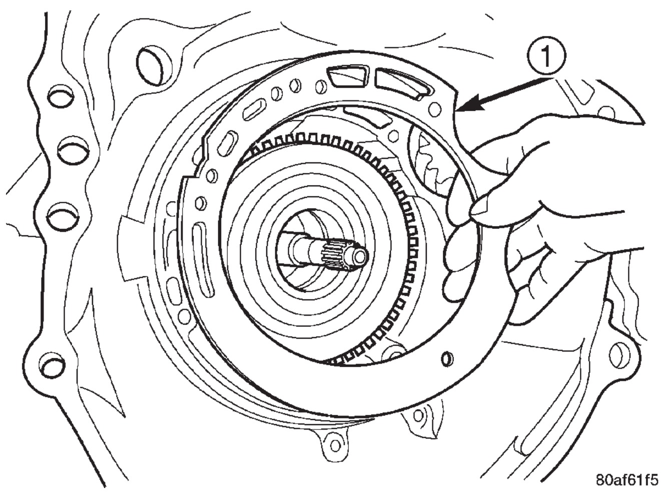


Fig. 28 Remove Oil Pump Gasket

1 - PUMP GASKET

CAUTION: If transaxle failure has occurred, the cooler bypass valve must be replaced. Do not re-use or attempt to clean valve.

(20) Remove cooler bypass valve (Fig. 29).

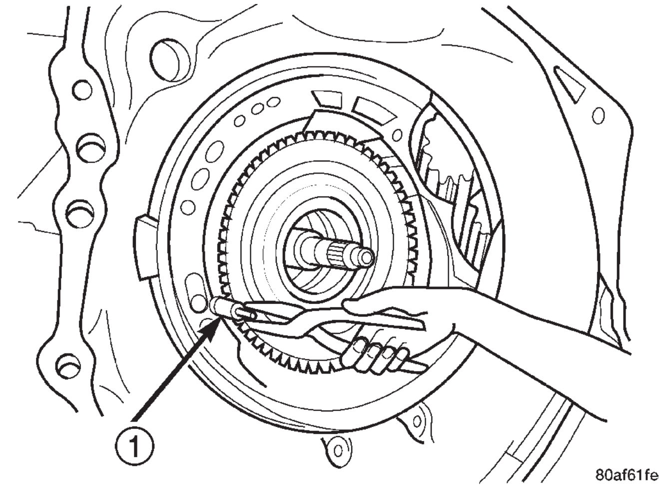


Fig. 29 Remove Bypass Valve

1 - COOLER BYPASS VALVE

(21) Remove #1 needle bearing (Fig. 30).

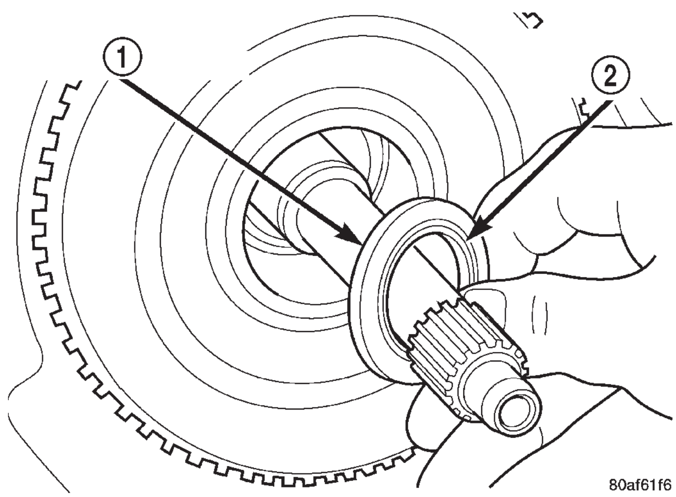


Fig. 30 Remove Caged Needle Bearing

1 - #1 CAGED NEEDLE BEARING
2 - NOTE: TANGED SIDE OUT

41TE AUTOMATIC TRANSAXLE (Continued)

(22) Remove input clutch assembly (Fig. 31).

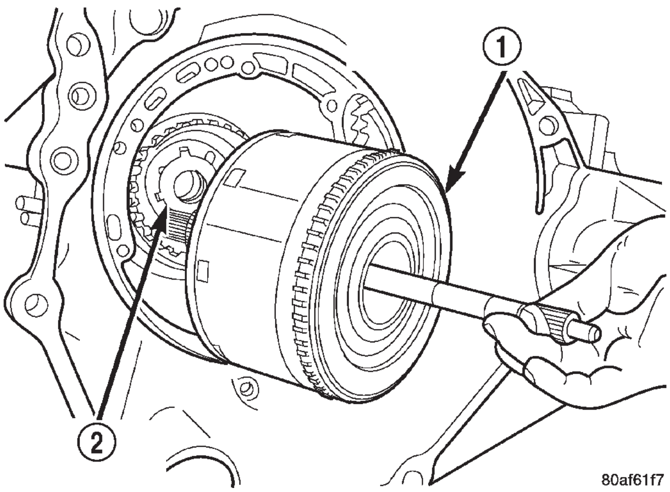


Fig. 31 Remove Input Clutch Assembly

1 - INPUT CLUTCH ASSEMBLY
2 - #4 THRUST WASHER

(23) Remove #4 thrust plate (Fig. 32).

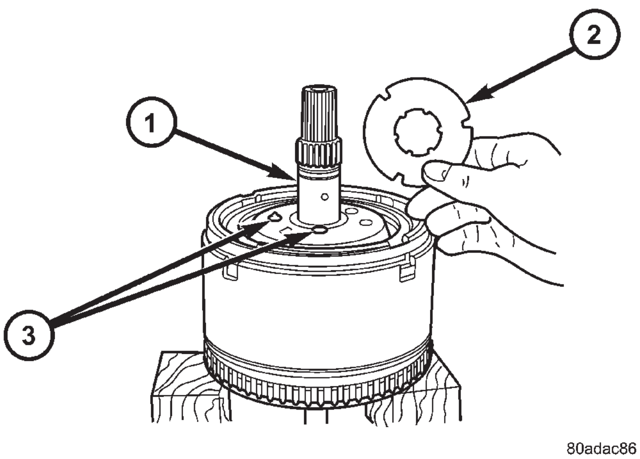


Fig. 32 No. 4 Thrust Plate

1 - OVERDRIVE SHAFT ASSEMBLY
2 - #4 THRUST PLATE (SELECT)
3 - 3 DABS OF PETROLATUM FOR RETENTION

(24) Remove front sun gear assembly and #4 thrust washer (Fig. 33).

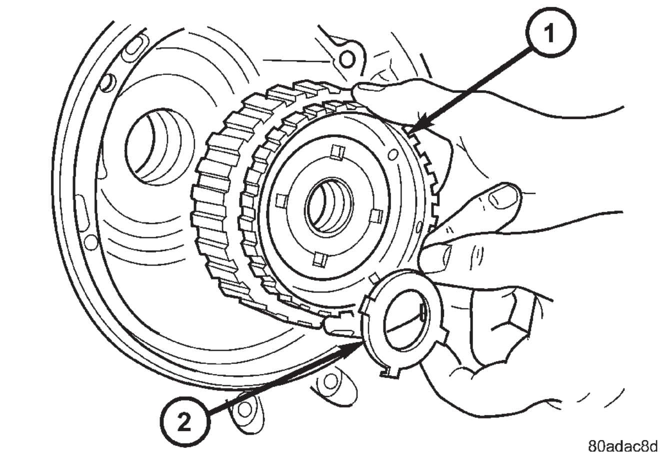


Fig. 33 Remove Front Sun Gear Assembly

1 - FRONT SUN GEAR ASSEMBLY
2 - #4 THRUST WASHER (FOUR TABS)

(25) Remove front carrier/rear annulus assembly and #6 needle bearing (Fig. 34).

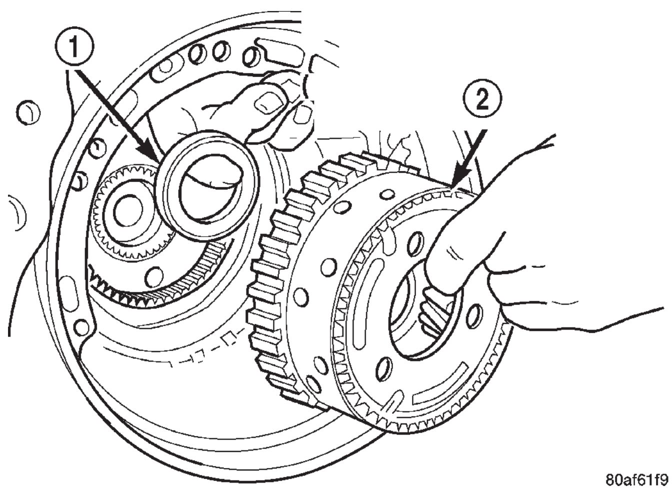


Fig. 34 Remove Front Carrier and Rear Annulus Assembly

1 - #6 NEEDLE BEARING
2 - FRONT CARRIER AND REAR ANNULUS ASSEMBLY (TWIST AND PULL OR PUSH TO REMOVE OR INSTALL).

41TE AUTOMATIC TRANSAXLE (Continued)

(26) Remove rear sun gear and #7 needle bearing (Fig. 35).

NOTE: The number 7 needle bearing has three anti-reversal tabs and is common with the number five and number two position. The orientation should allow the bearing to seat flat against the rear sun gear (Fig. 36). A small amount of petrolatum can be used to hold the bearing to the rear sun gear.

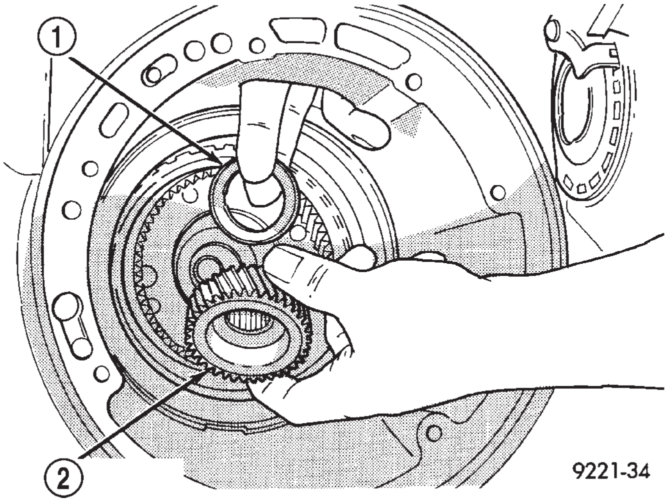


Fig. 35 Remove Rear Sun Gear

1 - #7 NEEDLE BEARING
2 - REAR SUN GEAR

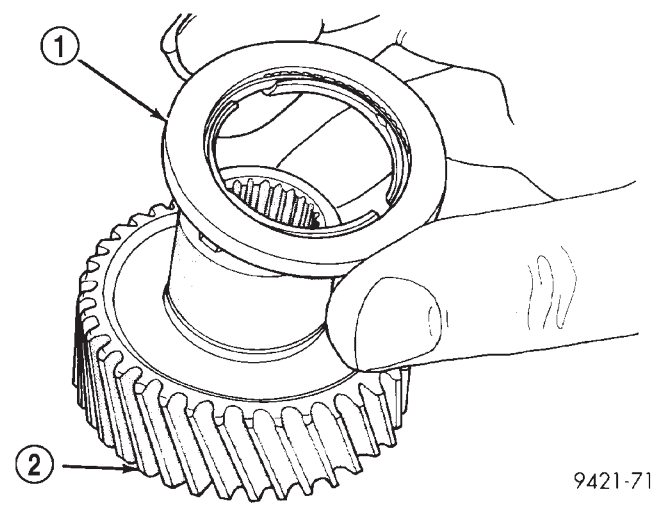


Fig. 36 Number 7 Bearing

1 - #7 NEEDLE BEARING
2 - REAR SUN GEAR

(27) Setup tool 5058 as shown in (Fig. 37). Compress 2/4 clutch return spring (just enough to remove snap ring) and remove snap ring.

NOTE: Verify that Tool 5058 is centered properly over the 2/4 clutch retainer before compressing. If necessary, fasten the 5058 bar to the bellhousing flange with any combination of locking pliers and bolts to center the tool properly.

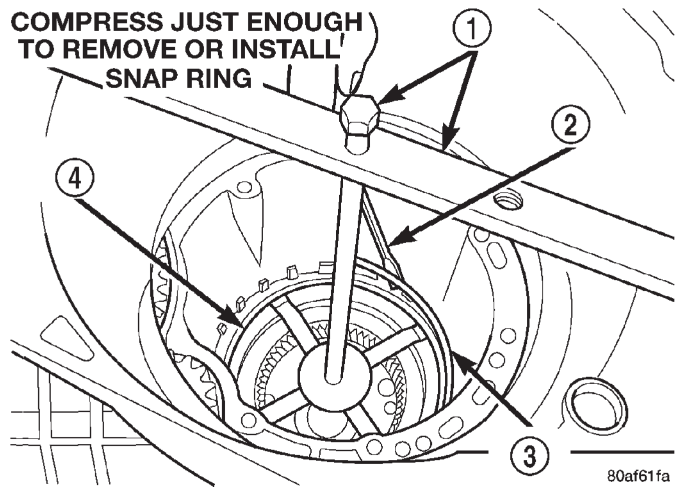


Fig. 37 Remove 2/4 Clutch Retainer Snap Ring

1 - TOOL 5058
2 - SCREWDRIVER
3 - SNAP RING
4 - 2/4 CLUTCH RETAINER

(28) Remove 2/4 clutch retainer (Fig. 38).

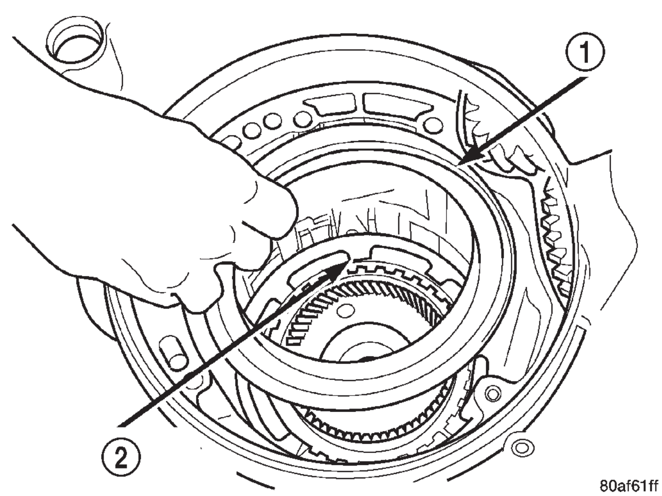


Fig. 38 2/4 Clutch Retainer

1 - 2/4 CLUTCH RETAINER
2 - 2/4 CLUTCH RETURN SPRING

41TE AUTOMATIC TRANSAXLE (Continued)

(29) Remove 2/4 clutch return spring (Fig. 39).

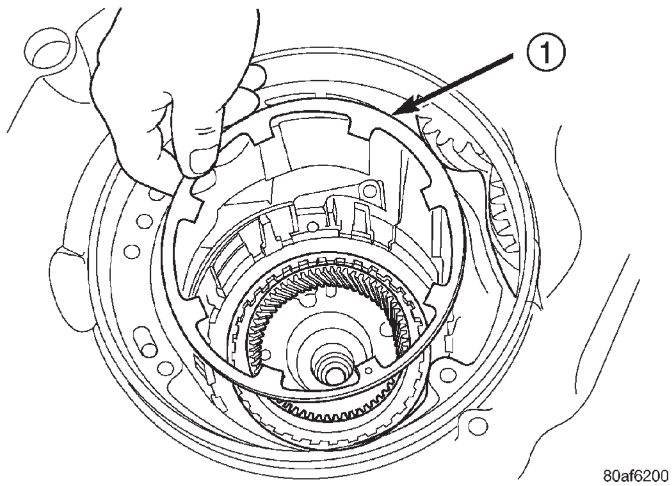


Fig. 39 Remove 2/4 Clutch Return Spring

1 - 2/4 CLUTCH RETURN SPRING

(30) Remove 2/4 clutch pack (Fig. 40). **Tag 2/4 clutch pack for reassembly identification.**

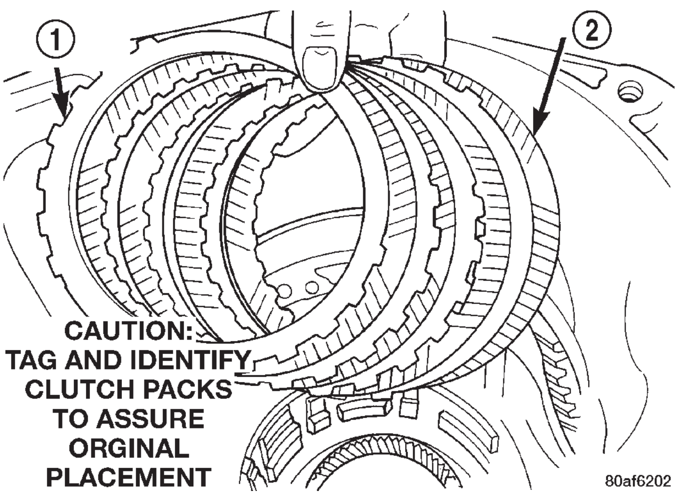


Fig. 40 Remove 2/4 Clutch Pack

1 - CLUTCH PLATE (4)
2 - CLUTCH DISC (4)

(31) Remove tapered snap ring (Fig. 41).

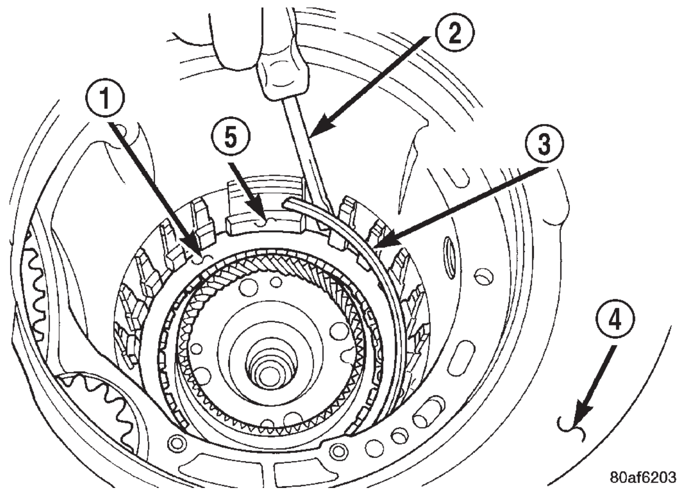


Fig. 41 Remove Tapered Snap Ring

1 - LOW/REVERSE CLUTCH REACTION PLATE
2 - SCREWDRIVER
3 - LOW/REVERSE TAPERED SNAP RING (TAPERED SIDE UP)
4 - OIL PAN FACE
5 - LONG TAB

(32) Remove low/reverse reaction plate (Fig. 42).

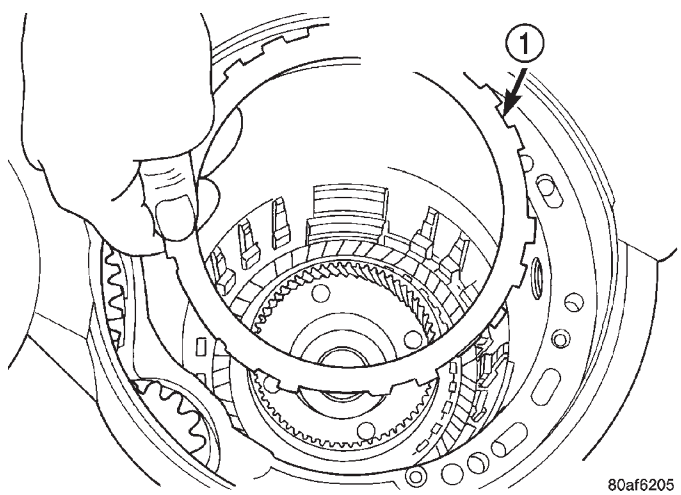


Fig. 42 Remove Low/Reverse Reaction Plate

1 - LOW/REVERSE REACTION PLATE (FLAT SIDE UP)

41TE AUTOMATIC TRANSAXLE (Continued)

(33) Remove one low/reverse clutch disc (Fig. 43).

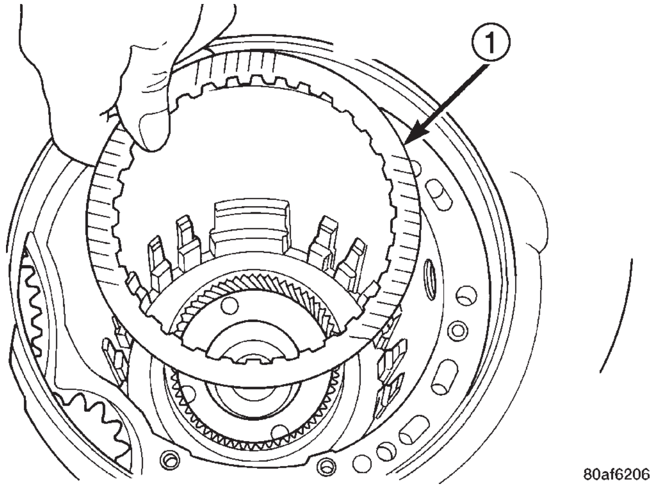


Fig. 43 Remove One Disc

1 - ONE DISC FROM LOW/REVERSE CLUTCH

(34) Remove low/reverse reaction plate snap ring (Fig. 44).

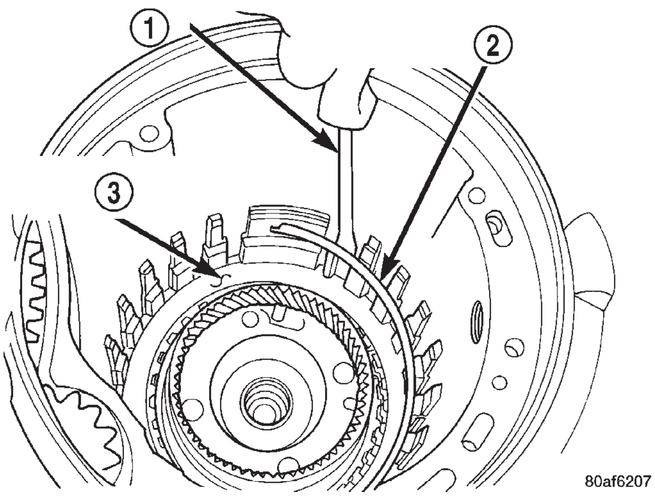


Fig. 44 Remove Low/Reverse Reaction Plate Snap Ring

1 - SCREWDRIVER
2 - LOW/REVERSE REACTION PLATE FLAT SNAP RING
3 - DO NOT SCRATCH CLUTCH PLATE

(35) Remove low/reverse clutch pack (Fig. 45).

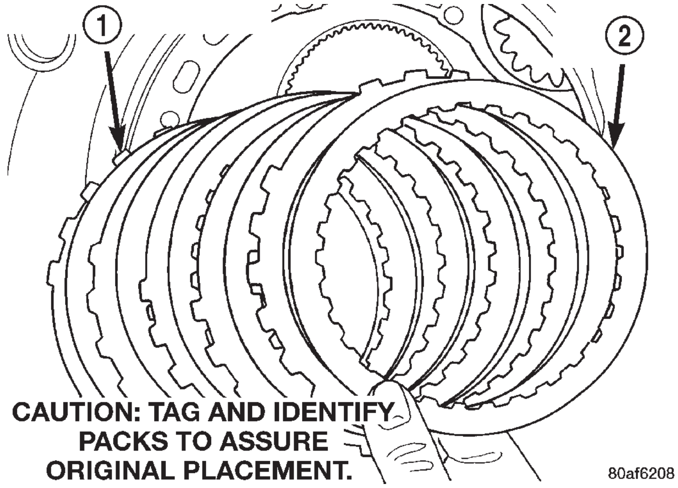


Fig. 45 Remove Low/Reverse Clutch Pack

1 - CLUTCH PLATES (5)
2 - CLUTCH DISCS (5)

(36) Remove transfer gear cover-to-case bolts (Fig. 46).

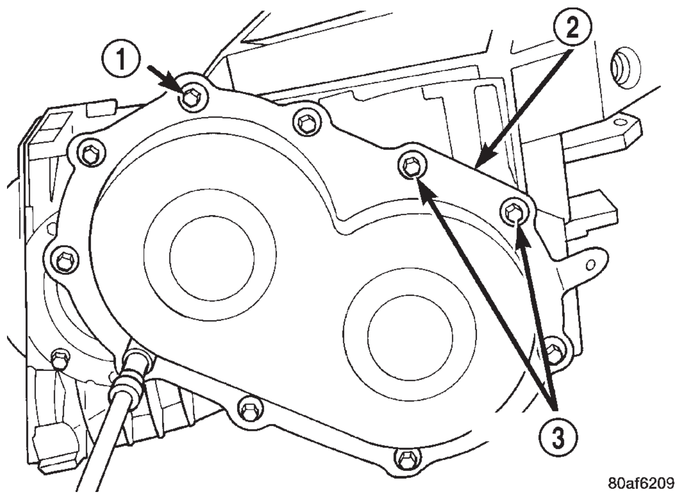


Fig. 46 Remove Rear Cover Bolts

1 - REAR COVER BOLTS
2 - REAR COVER
3 - USE SEALANT ON BOLTS

41TE AUTOMATIC TRANSAXLE (Continued)

(37) Remove transfer gear cover (Fig. 47).

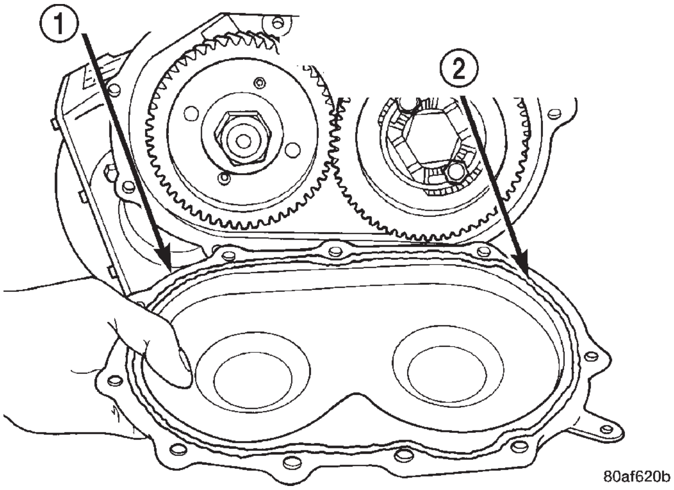


Fig. 47 Remove Rear Cover

1 - REAR COVER
2 - 1/8 INCH BEAD OF MOPAR® ATF RTV (MS-GF41) AS SHOWN

(38) Using Tool 6259, remove transfer shaft gear-to-shaft nut and coned washer (Fig. 48) (Fig. 49).

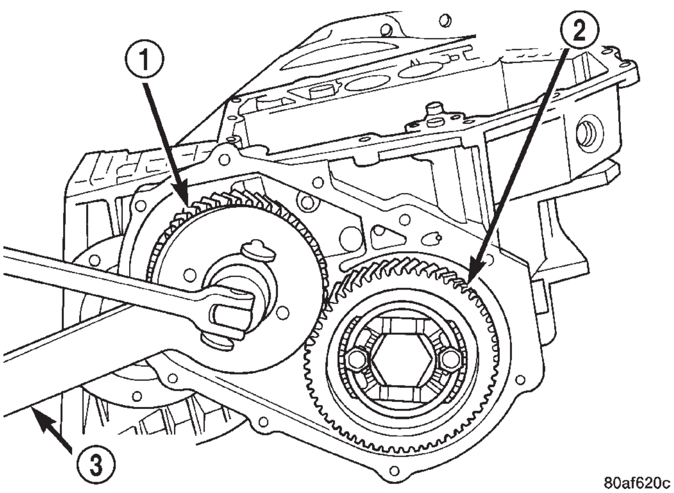


Fig. 48 Remove Transfer Shaft Gear Nut

1 - TRANSFER SHAFT GEAR
2 - OUTPUT GEAR
3 - SPECIAL TOOL 6259

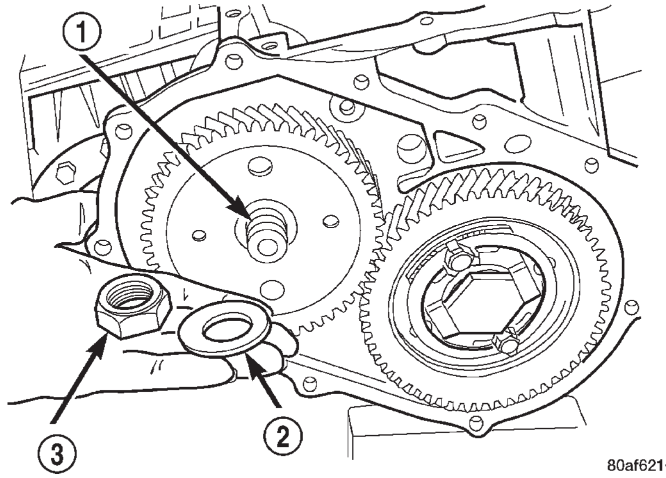


Fig. 49 Transfer Shaft Gear Nut and Coned Washer

1 - TRANSFER SHAFT
2 - LOCK WASHER
3 - NUT

(39) Using tool L-4407A, remove transfer shaft gear (Fig. 50).

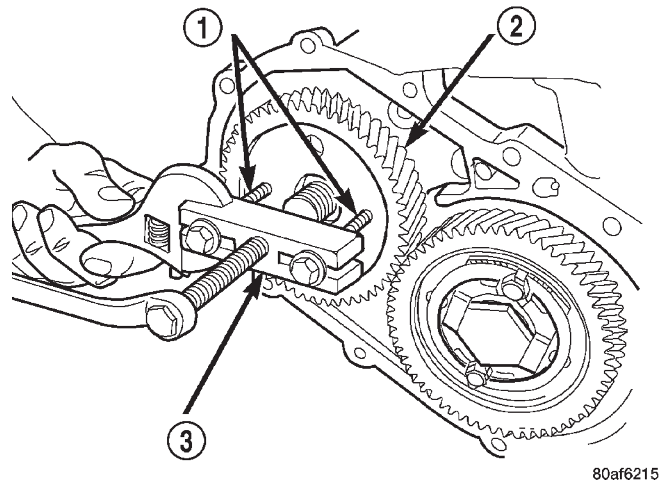


Fig. 50 Remove Transfer Shaft Gear

1 - SPECIAL TOOL L4407-6
2 - TRANSFER SHAFT GEAR
3 - SPECIAL TOOL L4407A

41TE AUTOMATIC TRANSAXLE (Continued)

(40) Remove transfer gear shim (select) (Fig. 51).

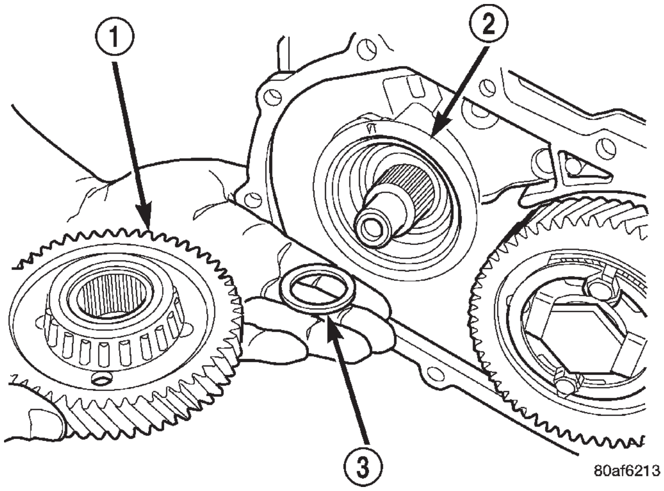


Fig. 51 Remove Transfer Shaft Gear and (Select) Shim

1 - TRANSFER SHAFT GEAR
2 - BEARING CUP RETAINER
3 - SHIM (SELECT)

(41) Remove bearing cup retainer (Fig. 52).

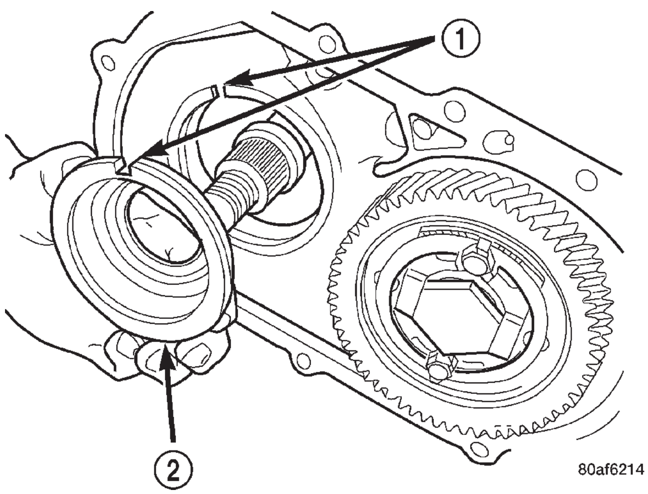


Fig. 52 Remove Bearing Cup Retainer

1 - ALIGN INDEXING TAB TO SLOT
2 - BEARING CUP RETAINER

(42) Remove transfer gear bearing cone using setup shown in (Fig. 53).

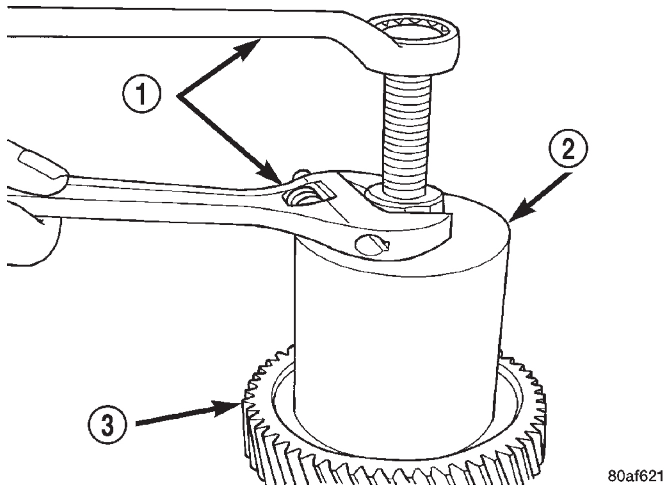


Fig. 53 Remove Transfer Gear Bearing Cone

1 - WRENCHES
2 - TOOL 5048 WITH JAWS TOOL 5048–4 AND BUTTON TOOL L-4539–2
3 - TRANSFER SHAFT GEAR

(43) Remove transfer shaft bearing cup from retainer using Tool 6062 (Fig. 54).

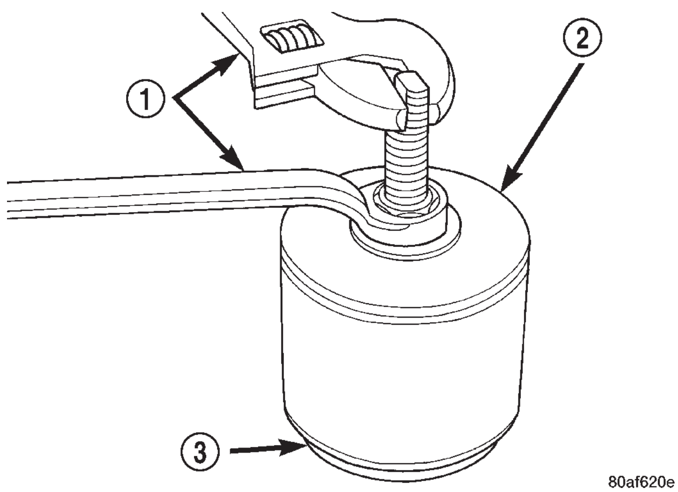


Fig. 54 Remove Transfer Shaft Bearing Cup

1 - WRENCHES
2 - TOOL 6062
3 - TRANSFER SHAFT BEARING CUP RETAINER

41TE AUTOMATIC TRANSAXLE (Continued)

(44) Using Tool 6051, remove transfer shaft bearing snap ring (Fig. 55).

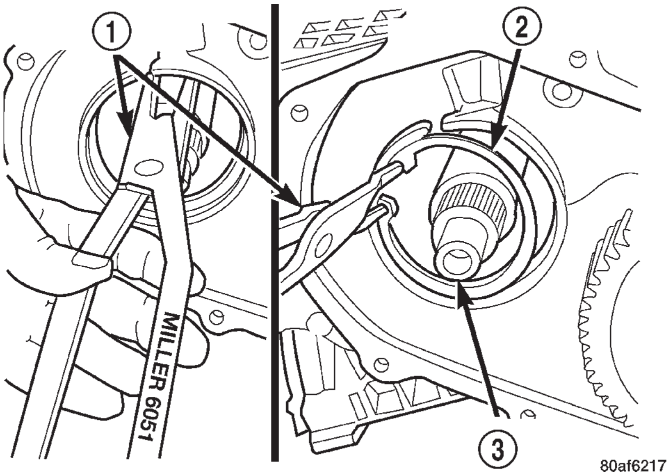


Fig. 55 Remove Transfer Shaft Bearing Snap Ring

1 - SNAP RING PLIERS TOOL 6051
2 - TRANSFER SHAFT BEARING SNAP RING
3 - TRANSFER SHAFT

(45) Using tool 5049A, remove transfer shaft from transaxle (Fig. 56).

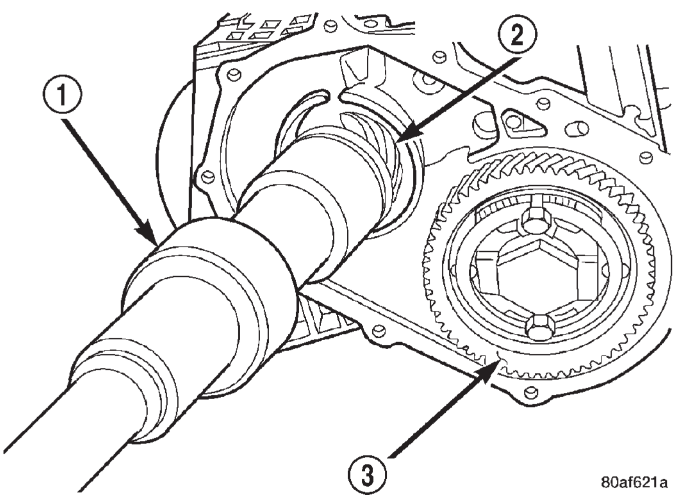


Fig. 56 Remove Transfer Shaft

1 - SPECIAL TOOL 5049–A
2 - TRANSFER SHAFT
3 - OUTPUT GEAR

(46) Slip bearing cup retainer and oil baffle off of shaft (Fig. 57).

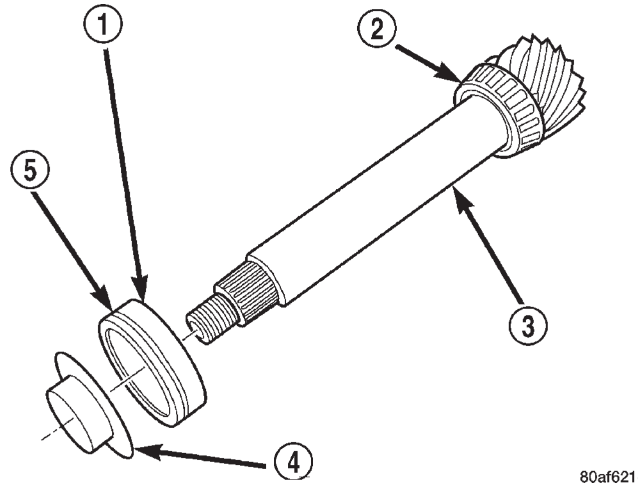


Fig. 57 Bearing Cup Removed

1 - BEARING CUP
2 - BEARING CONE
3 - TRANSFER SHAFT
4 - OIL BAFFLE
5 - O-RING

(47) Using tool P-334, press transfer shaft bearing cone off of shaft (Fig. 58).

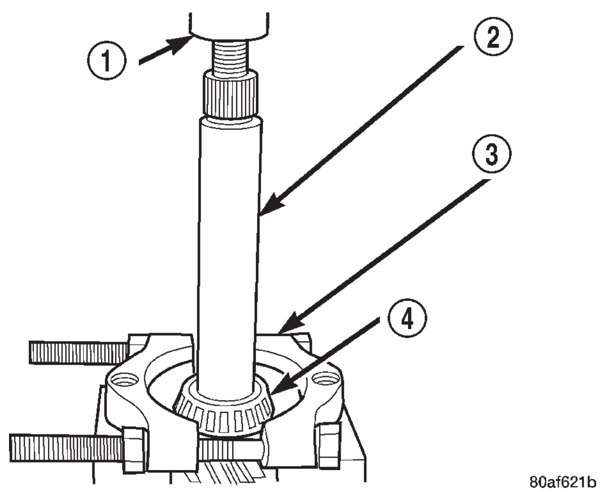


Fig. 58 Remove Transfer Shaft Bearing Cone

1 - ARBOR PRESS RAM
2 - TRANSFER SHAFT
3 - TOOL P-334
4 - BEARING CONE

41TE AUTOMATIC TRANSAXLE (Continued)

(48) Bend output gear retaining strap ears flat to allow bolt removal.

(49) Remove output shaft stirrup strap bolts (Fig. 59).

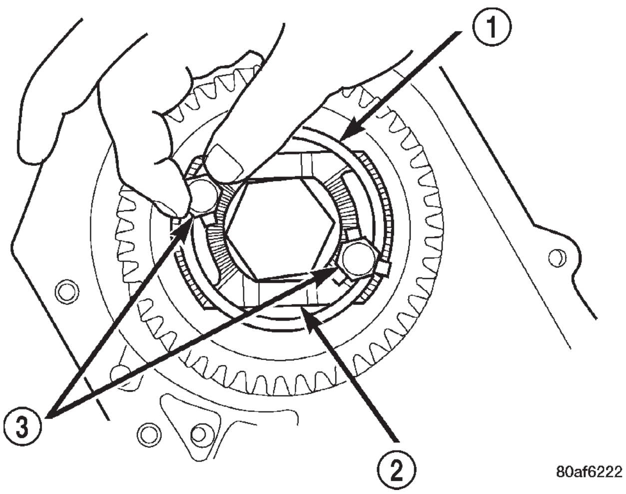


Fig. 59 Remove Strap Bolts

1 - RETAINING STRAP
2 - STIRRUP
3 - RETAINING STRAP BOLTS

(50) Remove stirrup and strap (Fig. 60).

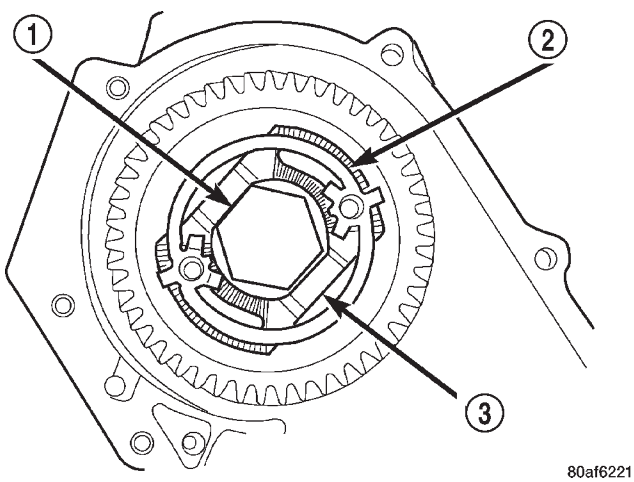


Fig. 60 Remove Stirrup Strap

1 - OUTPUT GEARBOLT
2 - RETAINING STRAP
3 - STIRRUP

(51) Using Tool 6259 (Fig. 61), remove output shaft gear-to-shaft bolt and washer (Fig. 62).

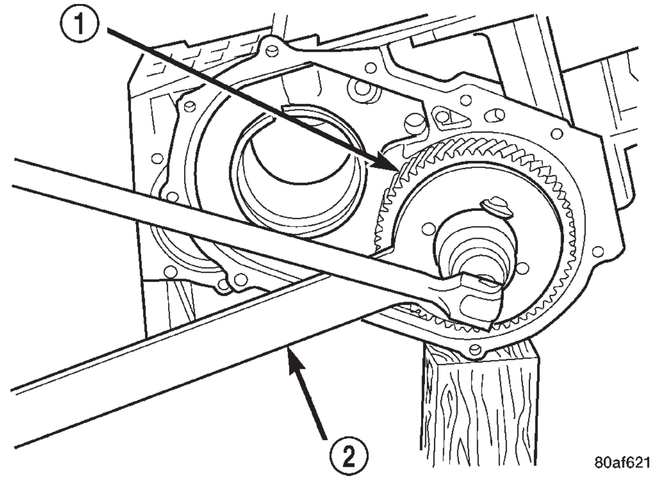


Fig. 61 Remove Output Gear Bolt

1 - OUTPUT GEAR
2 - TOOL 6259

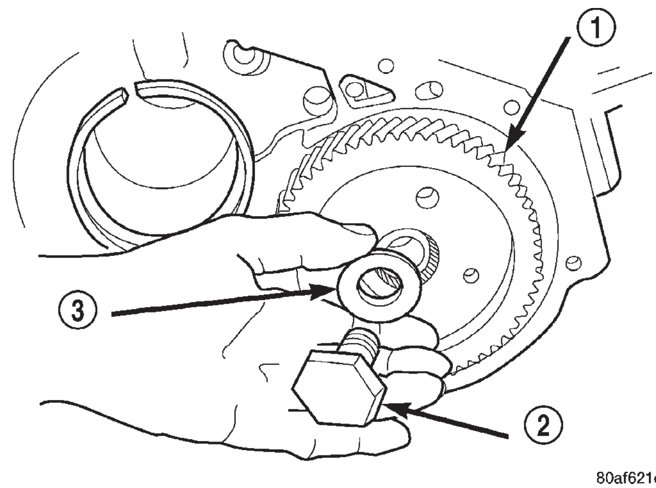


Fig. 62 Output Gear Bolt and Washer

1 - OUTPUT GEAR
2 - BOLT
3 - CONED LOCK WASHER

41TE AUTOMATIC TRANSAXLE (Continued)

(52) Using Tool L4407A, and button 6055, remove output gear from shaft (Fig. 63).

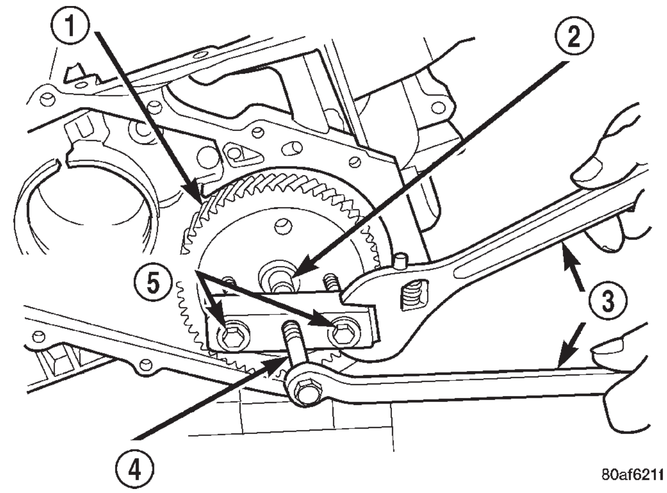


Fig. 63 Remove Output Gear

1 - OUTPUT GEAR
2 - BUTTON TOOL 6055
3 - WRENCHES
4 - TOOL L4407A
5 - BOLTS TOOL L4407–6

(53) Remove output gear bearing shim (select) (Fig. 64).

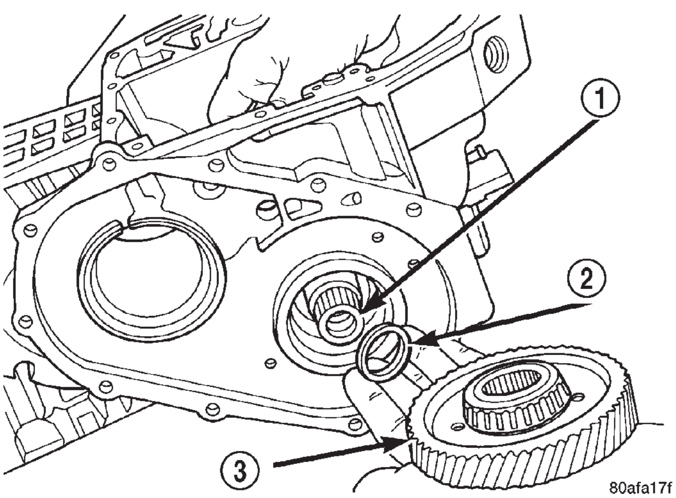


Fig. 64 Output Gear and (Select) Shim

1 - REAR CARRIER ASSEMBLY
2 - SHIM (SELECT)
3 - OUTPUT GEAR

(54) Using setup as shown in (Fig. 65), remove output gear bearing cone.

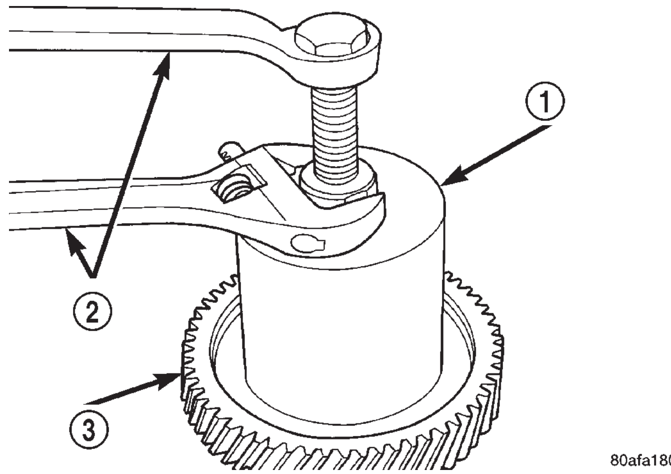


Fig. 65 Remove Bearing Cone

1 - TOOL 5048 WITH JAWS 5048–5 AND BUTTON L-4539–2
2 - WRENCHES
3 - OUTPUT GEAR

(55) Remove rear carrier assembly from transaxle (Fig. 66).

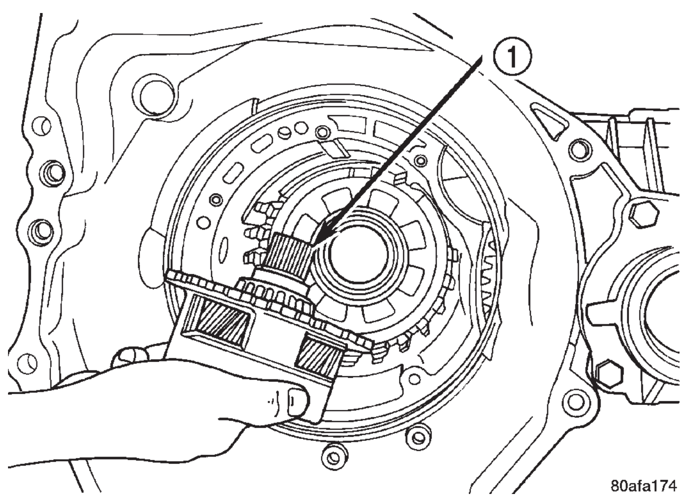


Fig. 66 Remove Rear Carrier Assembly

1 - REAR CARRIER ASSEMBLY

41TE AUTOMATIC TRANSAXLE (Continued)

(56) Remove rear carrier assembly bearing cone using setup shown in (Fig. 67).

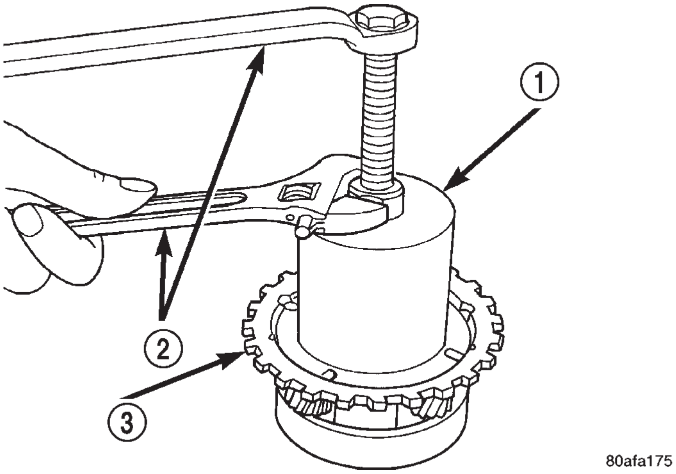


Fig. 67 Remove Rear Carrier Bearing Cone

1 - TOOL 5048 WITH JAWS 5048–3 AND BUTTON 6055
2 - WRENCHES
3 - REAR CARRIER ASSEMBLY

(57) Install low/reverse spring compressor tool as shown in (Fig. 68) (Fig. 69).

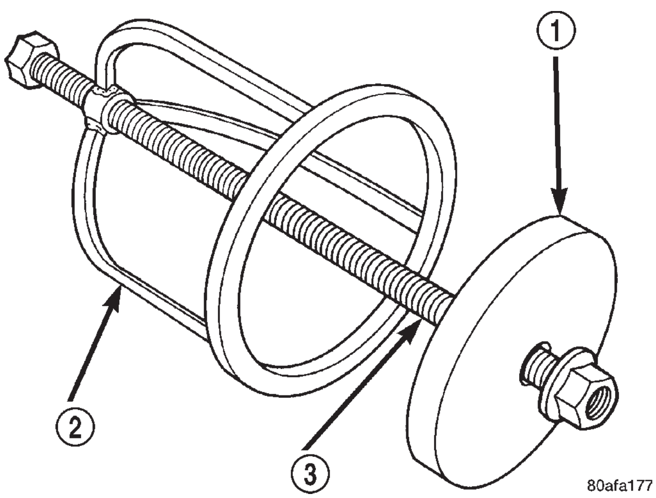


Fig. 68 Low/Reverse Spring Compressor Tool

1 - TOOL 6057
2 - TOOL 5059
3 - TOOL 5058–3

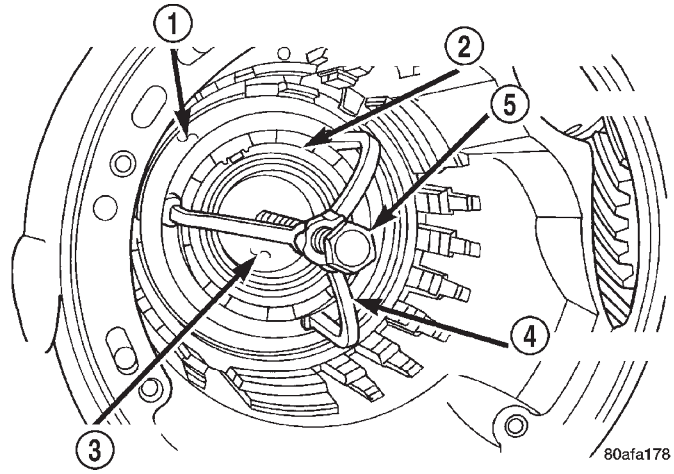


Fig. 69 Compressor Tool in Use

1 - LOW/REVERSE CLUTCH RETURN SPRING
2 - SNAP RING (INSTALL AS SHOWN)
3 - TOOL 6057
4 - TOOL 5059
5 - TOOL 5058–3

(58) Compress low/reverse piston return spring and remove snap ring (Fig. 70).

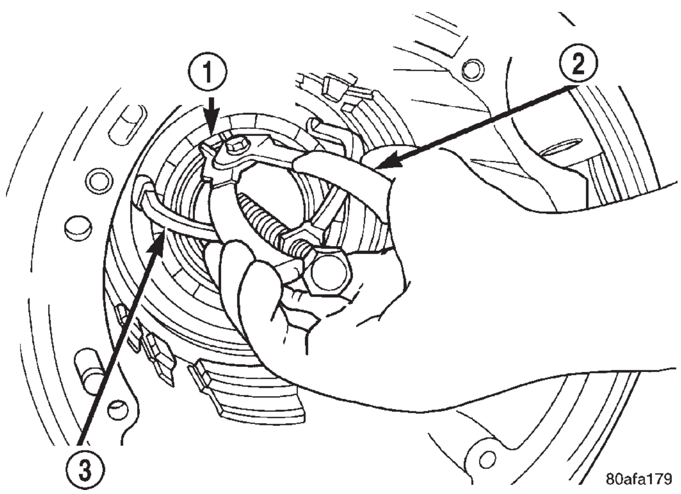


Fig. 70 Remove Snap Ring

1 - SNAP RING OPENING MUST BE BETWEEN SPRING LEVERS (AS SHOWN)
2 - SNAP RING PLIERS
3 - TOOL 6057

41TE AUTOMATIC TRANSAXLE (Continued)

(59) Remove low/reverse spring compressor tool and low reverse piston return spring (Fig. 71).

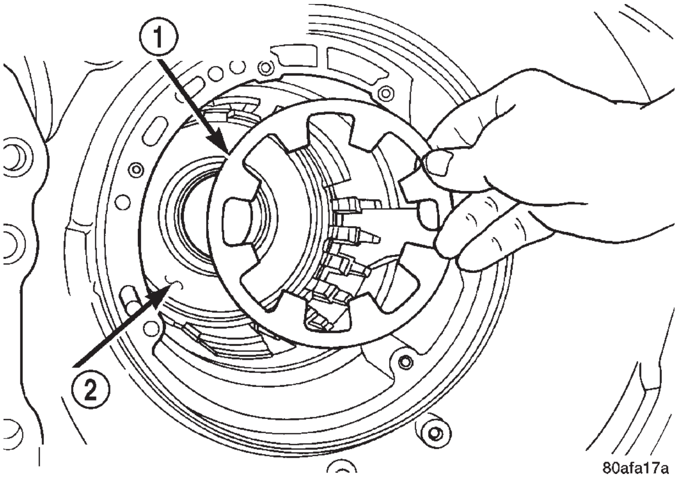


Fig. 71 Low/Reverse Piston Return Spring

1 - LOW/REVERSE PISTON RETURN SPRING
2 - PISTON

(60) Using a suitable punch , drive out park guide bracket pivot shaft plug (Fig. 72).

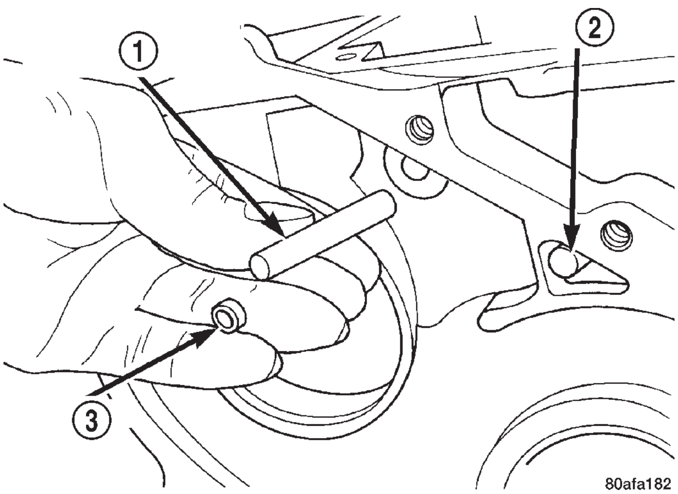


Fig. 72 Remove Anchor Shaft and Plug

1 - GUIDE BRACKET ANCHOR SHAFT
2 - PIVOT SHAFT
3 - ANCHOR SHAFT PLUG

(61) Using ordinary pliers, remove pivot shaft and guide bracket assembly (Fig. 73).

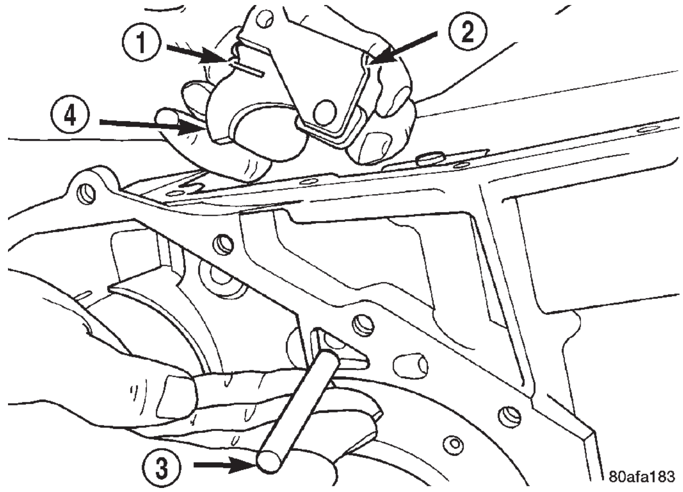


Fig. 73 Pivot Shaft and Guide Bracket

1 - ANTIRACHET SPRING
2 - GUIDE BRACKET
3 - PIVOT SHAFT
4 - PAWL

(62) Inspect guide bracket components for excessive wear and replace if necessary (Fig. 74).

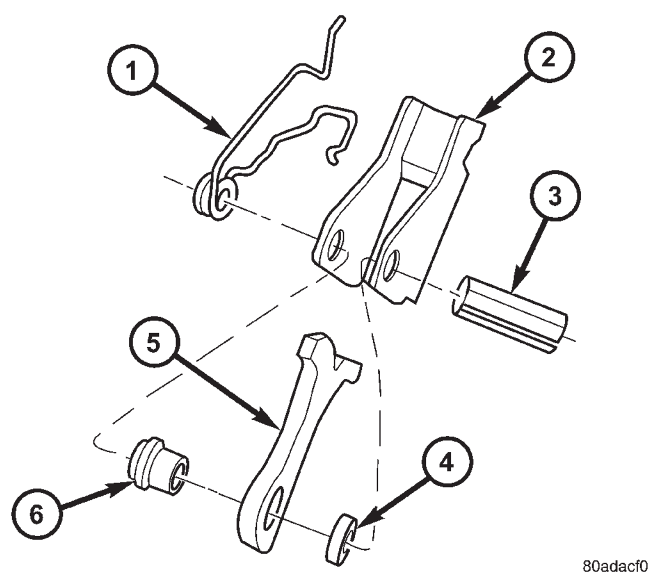


Fig. 74 Guide Bracket Disassembled

1 - ANTIRATCHET SPRING
2 - GUIDE BRACKET
3 - SPLIT SLEEVE
4 - SPACER
5 - PAWL
6 - STEPPED SPACER

41TE AUTOMATIC TRANSAXLE (Continued)

(63) Remove low/reverse clutch piston (Fig. 75).

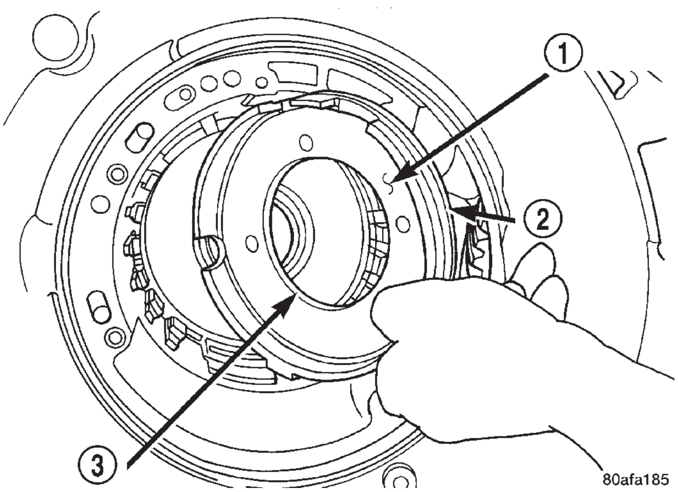


Fig. 75 Remove Low/Reverse Clutch Piston

1 - LOW/REVERSE CLUTCH PISTON
2 - D-RING SEAL
3 - D-RING SEAL

(64) Remove low/reverse piston retainer-to-case screws (Fig. 76).

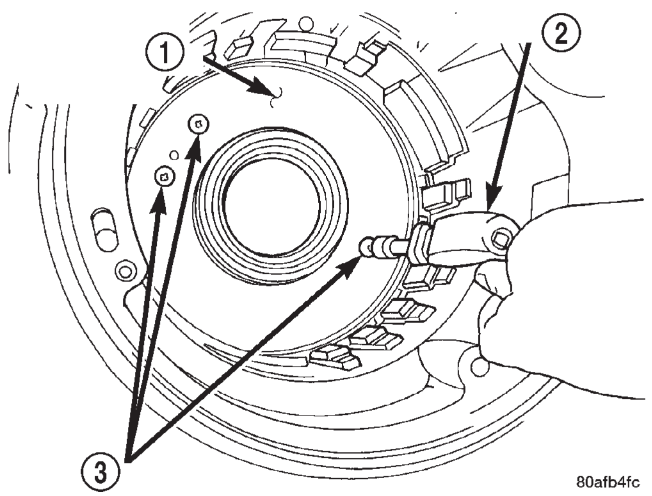


Fig. 76 Remove Piston Retainer Attaching Screws

1 - LOW/REVERSE CLUTCH PISTON RETAINER
2 - SCREWDRIVER
3 - TORX-LOC SCREWS

(65) Remove low/reverse piston retainer (Fig. 77).

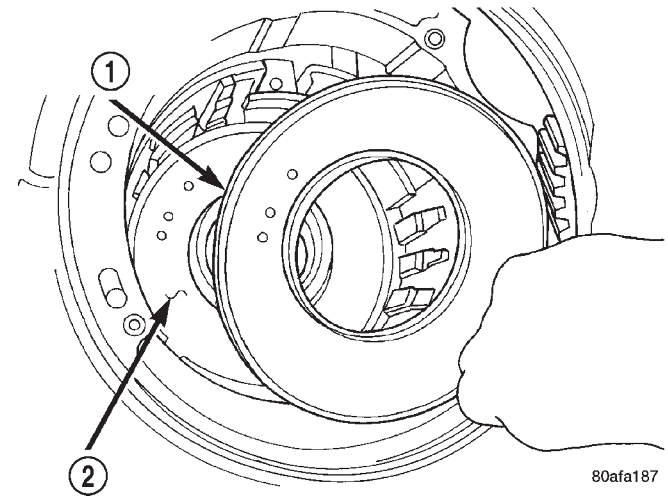


Fig. 77 Remove Piston Retainer

1 - LOW/REVERSE CLUTCH PISTON RETAINER
2 - GASKET

(66) Remove low/reverse piston retainer-to-case gasket (Fig. 78).

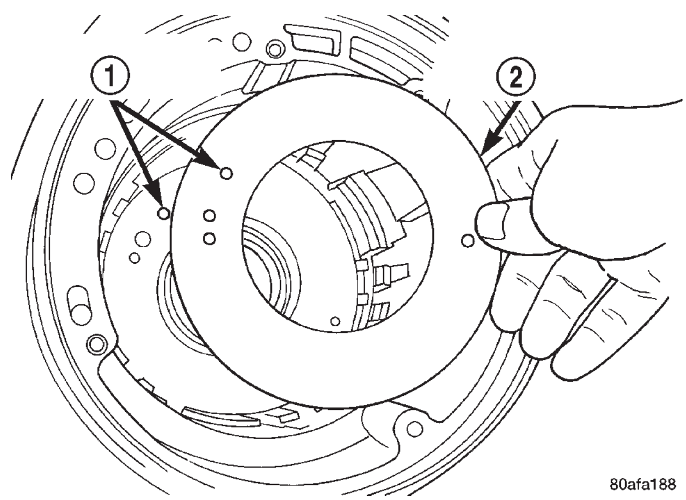


Fig. 78 Remove Piston Retainer Gasket

1 - GASKET HOLES MUST LINE UP
2 - LOW/REVERSE CLUTCH PISTON RETAINER GASKET

41TE AUTOMATIC TRANSAXLE (Continued)

(67) Using a hammer and suitable drift, drive out inner output bearing cup (Fig. 79).

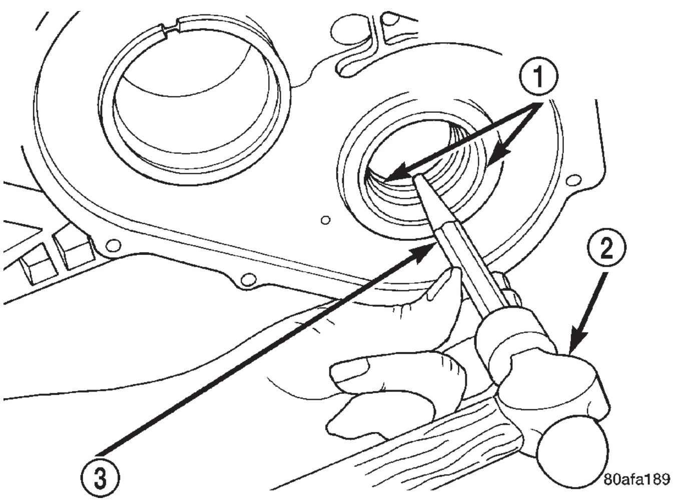


Fig. 79 Remove Output Bearing Inner Cup

1 - OUTPUT BEARING CUPS (REPLACE IN PAIRS)
2 - HAMMER
3 - BRASS DRIFT

(68) Using tool 6062, remove outer output bearing cup (Fig. 80).

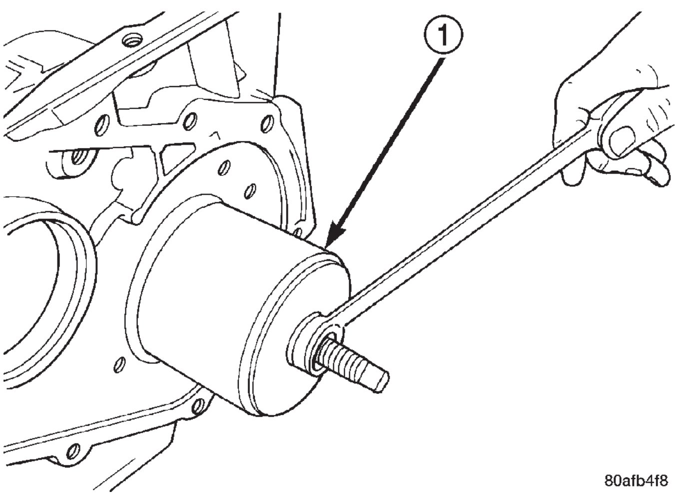


Fig. 80 Remove Output Bearing Outer Cup

1 - TOOL 6062

ASSEMBLY

CAUTION: If transaxle failure has occurred, it is necessary to flush the transaxle oil cooler and lines to remove debris and particles that could contaminate and/or fail a new or rebuilt unit. (Refer to 7 - COOLING/ TRANSMISSION - STANDARD PROCEDURE)

CAUTION: The cooler bypass valve must be replaced if transaxle failure has occurred. Do not attempt to reuse or clean old valve.

NOTE: If transaxle is being overhauled (clutch and/or seal replacement), the TCM Quick Learn procedure must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Install both output bearing cups using Tool 5050 (Fig. 81).

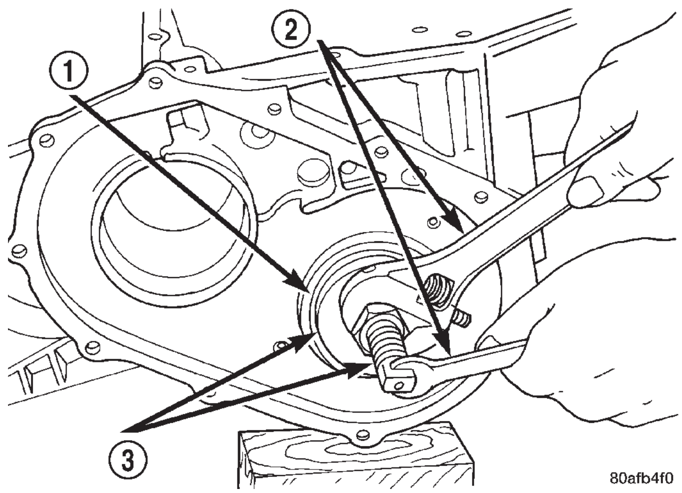


Fig. 81 Install Both Output Bearing Cups

1 - OUTPUT BEARING CUPS
2 - WRENCHES
3 - TOOL 5050

(2) Install low/reverse piston retainer gasket (Fig. 82). Make sure gasket holes line up with case.

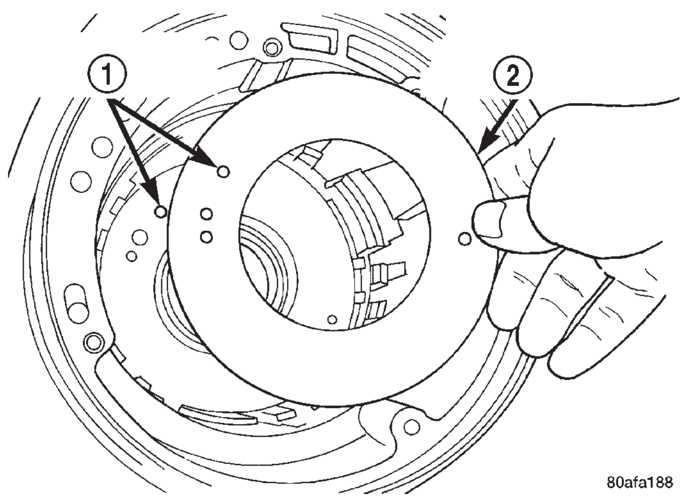


Fig. 82 Install Piston Retainer Gasket

1 - GASKET HOLES MUST LINE UP
2 - LOW/REVERSE CLUTCH PISTON RETAINER GASKET

41TE AUTOMATIC TRANSAXLE (Continued)

(3) Install low/reverse piston retainer (Fig. 83).

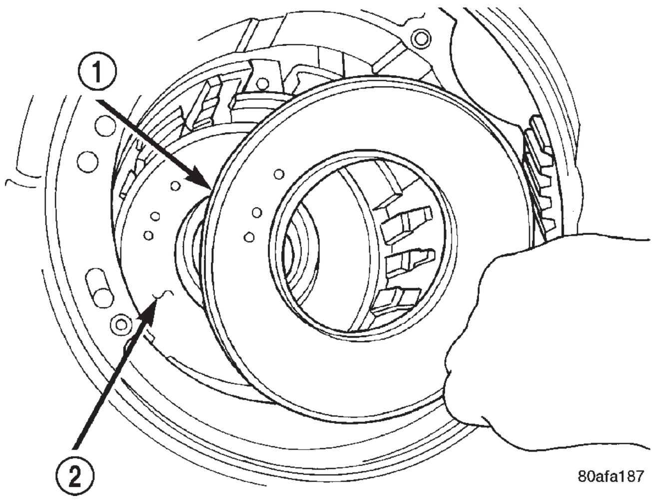


Fig. 83 Install Piston Retainer

1 - LOW/REVERSE CLUTCH PISTON RETAINER
2 - GASKET

(4) Install low/reverse piston retainer-to-case bolts (Fig. 84) and torque to 5 N·m (45 in. lbs.).

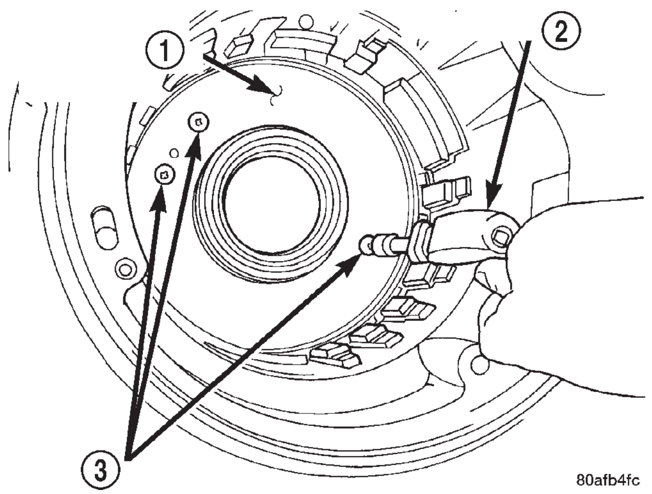


Fig. 84 Install Piston Retainer Attaching Screws

1 - LOW/REVERSE CLUTCH PISTON RETAINER
2 - SCREWDRIVER
3 - TORX-LOC SCREWS

(5) Install low/reverse clutch piston (Fig. 85).

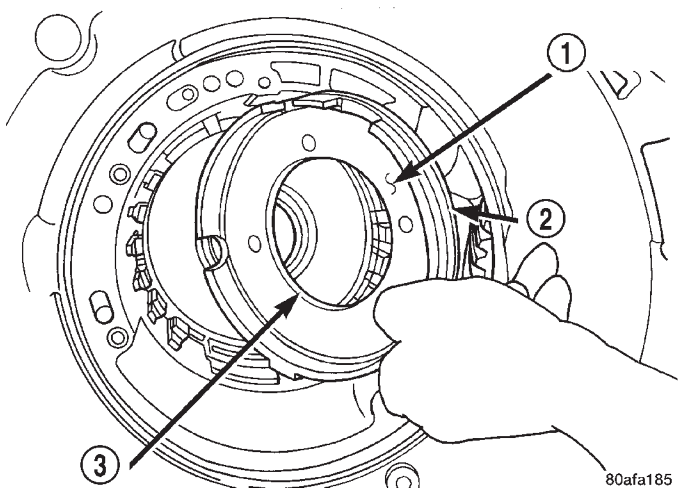


Fig. 85 Install Low/Reverse Clutch Piston

1 - LOW/REVERSE CLUTCH PISTON
2 - D-RING SEAL
3 - D-RING SEAL

(6) Assemble park guide bracket assembly (Fig. 87) (Fig. 86).

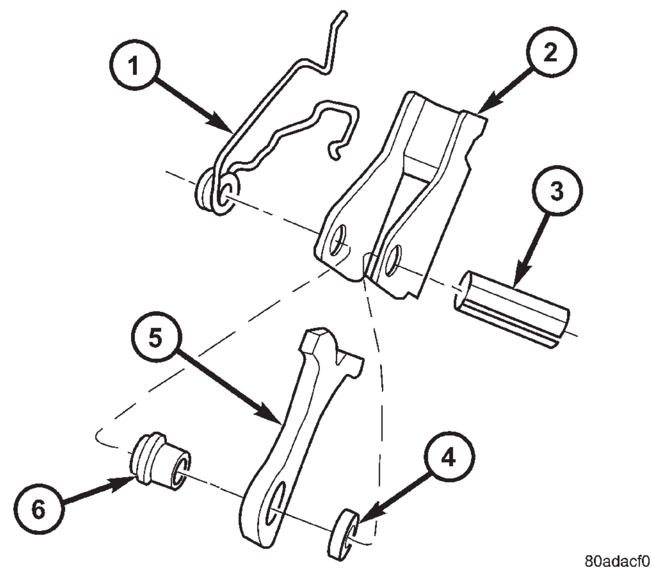


Fig. 86 Guide Bracket Disassembled

1 - ANTIRATCHET SPRING
2 - GUIDE BRACKET
3 - SPLIT SLEEVE
4 - SPACER
5 - PAWL
6 - STEPPED SPACER

41TE AUTOMATIC TRANSAXLE (Continued)

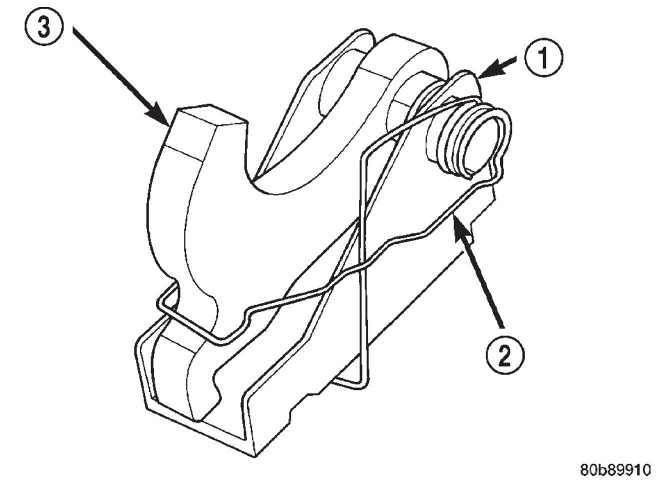


Fig. 87 Guide Bracket

1 - GUIDE BRACKET
2 - ANTIRATCHET SPRING (MUST BE ASSEMBLED AS SHOWN)
3 - PAWL

(7) Install guide bracket into position and insert pivot shaft (Fig. 88).

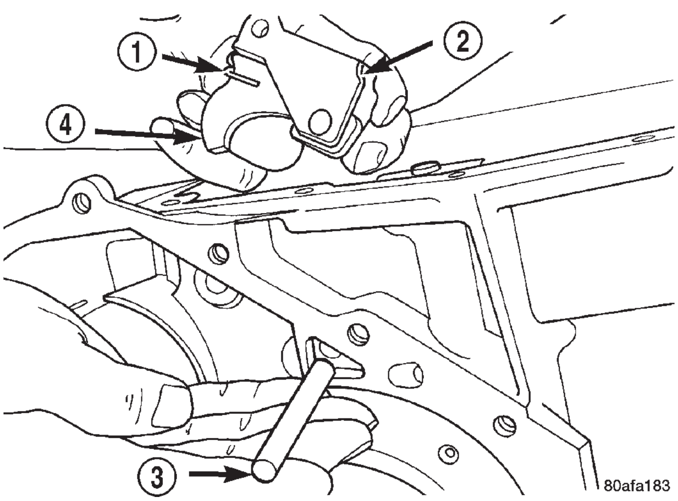


Fig. 88 Pivot Shaft and Guide Bracket

1 - ANTIRACHET SPRING
2 - GUIDE BRACKET
3 - PIVOT SHAFT
4 - PAWL

(8) Install anchor shaft and plug (Fig. 89). Make sure guide bracket and split sleeve are in contact with the rear of the transaxle case.

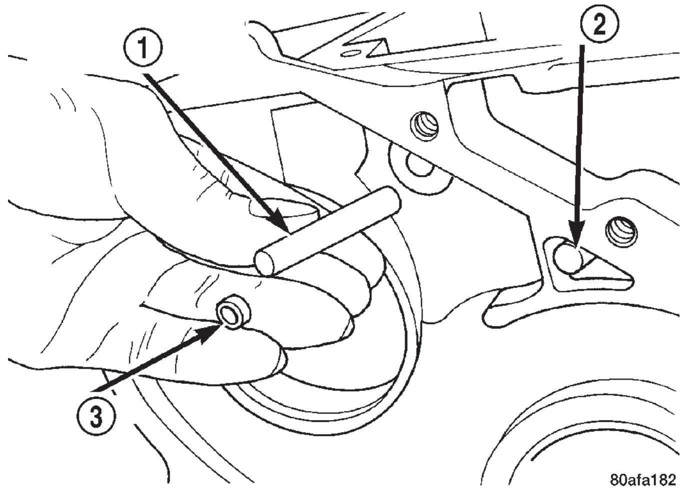


Fig. 89 Install Anchor Shaft and Plug

1 - GUIDE BRACKET ANCHOR SHAFT
2 - PIVOT SHAFT
3 - ANCHOR SHAFT PLUG

(9) Install low/reverse piston return spring (Fig. 90).

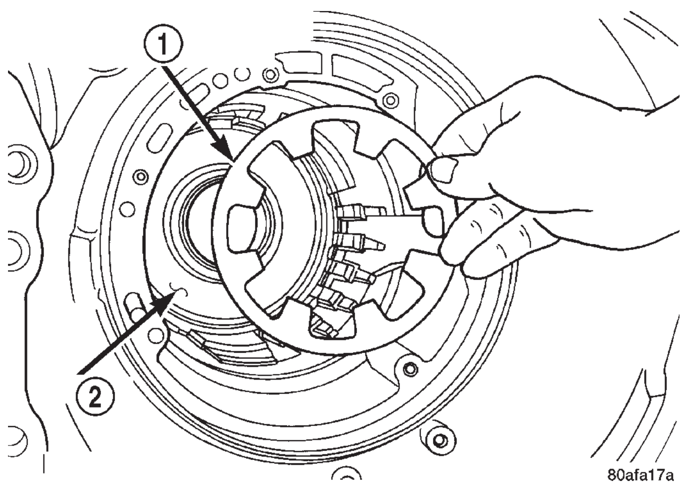


Fig. 90 Low/Reverse Piston Return Spring

1 - LOW/REVERSE PISTON RETURN SPRING
2 - PISTON

41TE AUTOMATIC TRANSAXLE (Continued)

(10) Install low/reverse spring compressor into position (Fig. 91). Compress low/reverse piston and install snap ring as shown in (Fig. 92).

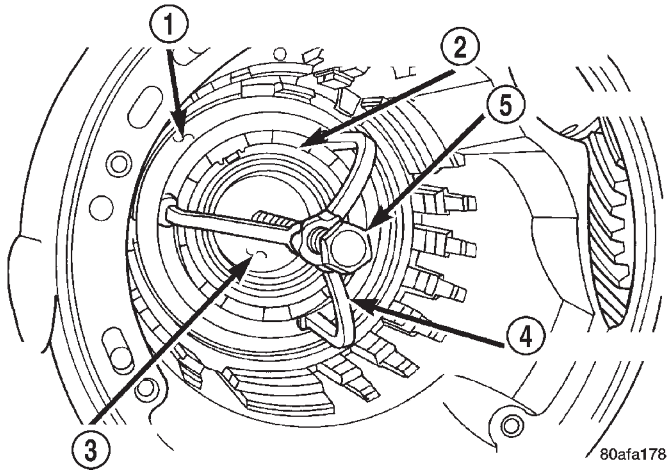


Fig. 91 Compressor Tool in Use

1 - LOW/REVERSE CLUTCH RETURN SPRING
2 - SNAP RING (INSTALL AS SHOWN)
3 - TOOL 6057
4 - TOOL 5059
5 - TOOL 5058–3

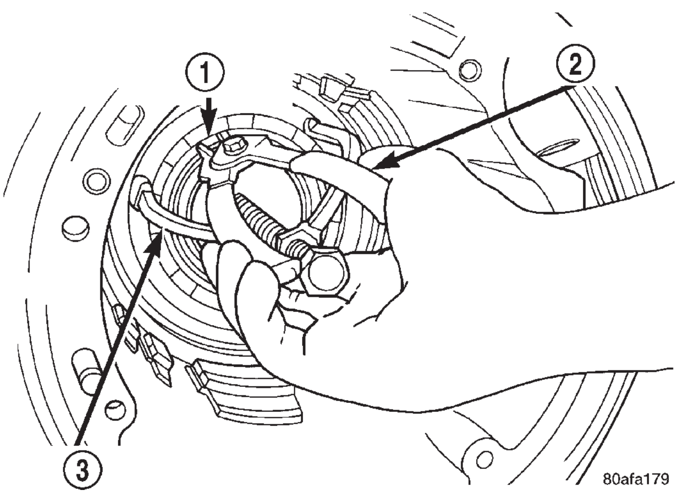


Fig. 92 Install Snap Ring

1 - SNAP RING OPENING MUST BE BETWEEN SPRING LEVERS (AS SHOWN)
2 - SNAP RING PLIERS
3 - TOOL 6057

(11) Install rear carrier bearing cone using Tool 6053 (Fig. 93).

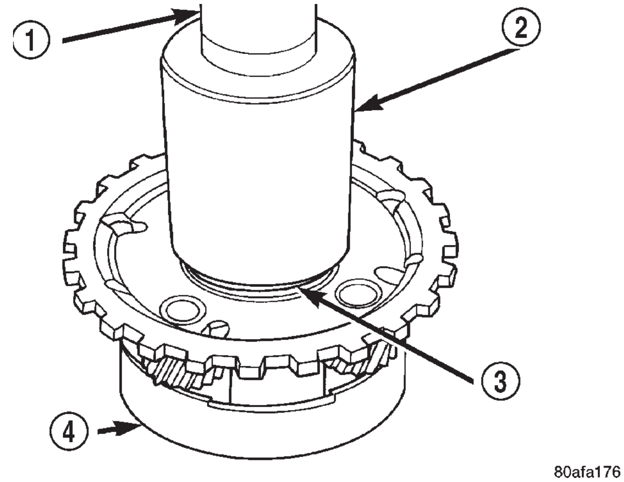


Fig. 93 Install Rear Carrier Bearing Cone

1 - ARBOR PRESS RAM
2 - TOOL 6053
3 - NEW BEARING CONE
4 - REAR CARRIER ASSEMBLY

(12) Install rear carrier assembly to transaxle case (Fig. 94).

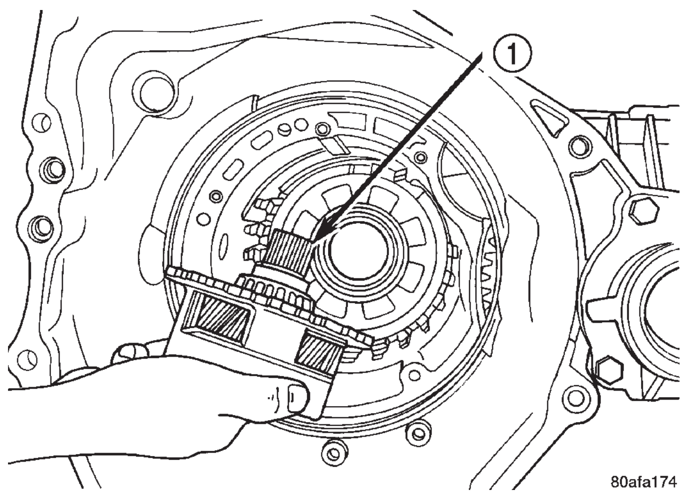


Fig. 94 Install Rear Carrier Assembly

1 - REAR CARRIER ASSEMBLY

41TE AUTOMATIC TRANSAXLE (Continued)

(13) Install output gear bearing cone using Tool 5052 (Fig. 95).

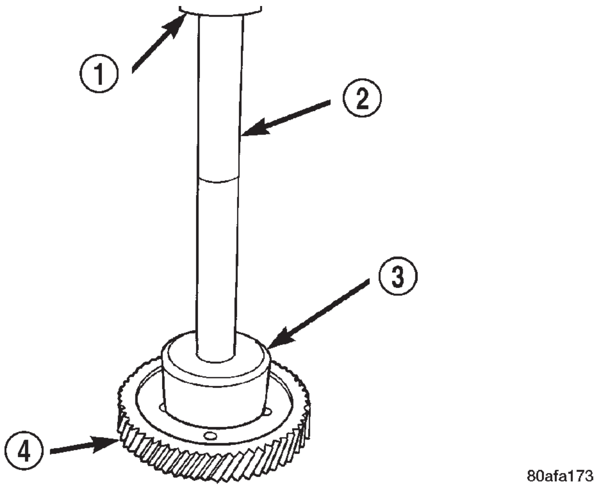


Fig. 95 Install Output Gear Bearing Cone

1 - ARBOR PRESS RAM
2 - HANDLE C-4171
3 - TOOL 5052
4 - OUTPUT GEAR

(14) **OUTPUT GEAR BEARING ADJUSTMENT:**

(a) With output gear removed, install a 4.50 mm (0.177 in.) gauging shim (Fig. 97) on the rear carrier assembly hub, using grease to hold the shim in place.

(b) Using Tool 6259, install output gear and bearing assembly. Torque to 271 N·m (200 ft. lbs.).

(c) Measure bearing end play. Attach Tool L-4432 to the gear (Fig. 96).

(d) Push and pull the gear while rotating back and forth to ensure seating of bearing rollers.

(e) Using a dial indicator mounted to the transaxle case, measure output gear end play as shown in (Fig. 96).

(f) Refer to the output gear bearing shim chart for the required shim to obtain proper bearing setting.

(g) Use Tool 6259 to remove the output gear retaining bolt and washer. To remove the output gear, use Tool L4407A.

(h) Remove the gauging shim and install the proper shim determined by the chart. Use grease to hold the shim in place.

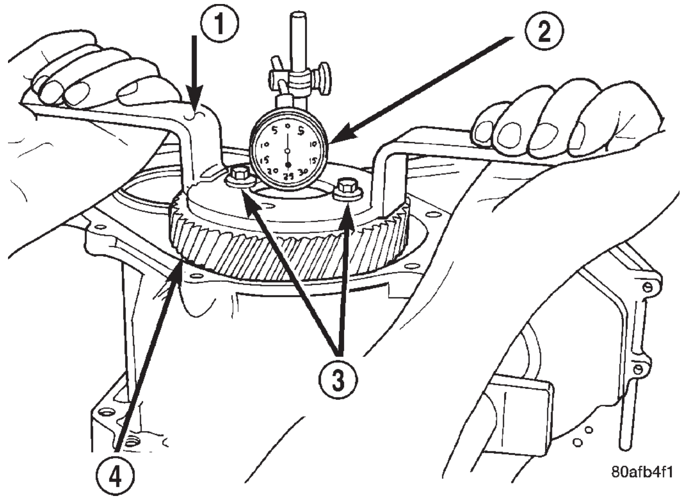


Fig. 96 Checking Output Gear Bearings End Play

1 - TOOL L-4432
2 - DIAL INDICATOR
3 - SPECIAL SCREWS TOOL 6260
4 - OUTPUT GEAR

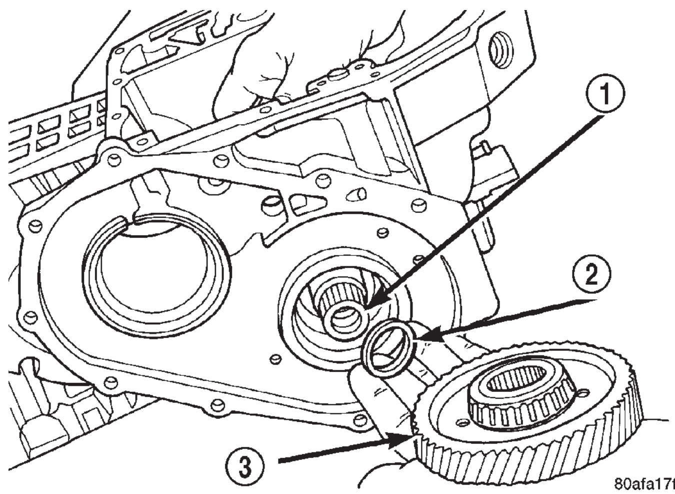


Fig. 97 Output Gear and (Select) Shim

1 - REAR CARRIER ASSEMBLY
2 - SHIM (SELECT)
3 - OUTPUT GEAR

41TE AUTOMATIC TRANSAXLE (Continued)

OUTPUT GEAR BEARING SHIM CHART

End Play	Shim Needed	Part Number		End Play	Shim Needed	Part Number
0.05mm (0.002 in.)	4.42mm (0.174 in.)	4412830AB		0.53mm (0.021 in.)	3.94mm (0.155 in.)	4412818AB
0.08mm (0.003 in.)	4.38mm (0.172 in.)	4412829AB		0.56mm (0.022 in.)	3.90mm (0.154 in.)	4412817AB
0.10mm (0.004 in.)	4.38mm (0.172 in.)	4412829AB		0.58mm (0.023 in.)	3.90mm (0.154 in.)	4412817AB
0.13mm (0.005 in.)	4.34mm (0.171 in.)	4412828AB		0.61mm (0.024 in.)	3.86mm (0.152 in.)	4412816AB
0.15mm (0.006 in.)	4.30mm (0.169 in.)	4412827AB		0.64mm (0.025 in.)	3.82mm (0.150 in.)	4412815AB
0.18mm (0.007 in.)	4.30mm (0.169 in.)	4412827AB		0.66mm (0.026 in.)	3.82mm (0.150 in.)	4412815AB
0.20mm (0.008 in.)	4.26mm (0.168 in.)	4412826AB		0.69mm (0.027 in.)	3.78mm (0.149 in.)	4412814AB
0.23mm (0.009 in.)	4.22mm (0.166 in.)	4412825AB		0.71mm (0.028 in.)	3.74mm (0.147 in.)	4412813AB
0.25mm (0.010 in.)	4.22mm (0.166 in.)	4412825AB		0.74mm (0.029 in.)	3.74mm (0.147 in.)	4412813AB
0.28mm (0.011 in.)	4.18mm (0.165 in.)	4412824AB		0.76mm (0.030 in.)	3.70mm (0.146 in.)	4412812AB
0.30mm (0.012 in.)	4.14mm (0.163 in.)	4412823AB		0.79mm (0.031 in.)	3.66mm (0.144 in.)	4412811AB
0.33mm (0.013 in.)	4.14mm (0.163 in.)	4412823AB		0.81mm (0.032 in.)	3.66mm (0.144 in.)	4412811AB
0.36mm (0.014 in.)	4.10mm (0.161 in.)	4412822AB		0.84mm (0.033 in.)	3.62mm (0.143 in.)	4412810AB
0.38mm (0.015 in.)	4.10mm (0.161 in.)	4412822AB		0.86mm (0.034 in.)	3.62mm (0.143 in.)	4412810AB
0.41mm (0.016 in.)	4.06mm (0.160 in.)	4412821AB		0.89mm (0.035 in.)	3.58mm (0.141)	4412809AB
0.43mm (0.017 in.)	4.02mm (0.158 in.)	4412820AB		0.91mm (0.036in.)	3.54mm (0.139 in.)	4412808AB
0.46mm (0.018 in.)	4.02mm (0.158 in.)	4412820AB		0.94mm (0.037 in.)	3.54mm (0.139 in.)	4412808AB
0.48mm (0.019 in.)	3.98mm (0.157 in.)	4412819AB		0.97mm (0.038 in.)	3.50mm (0.138 in.)	4412807AB
0.51mm (0.020 in.)	3.94mm (0.155 in.)	4412818AB				

41TE AUTOMATIC TRANSAXLE (Continued)

(15) Install the output gear and bearing assembly using Tool 6261 (Fig. 98).

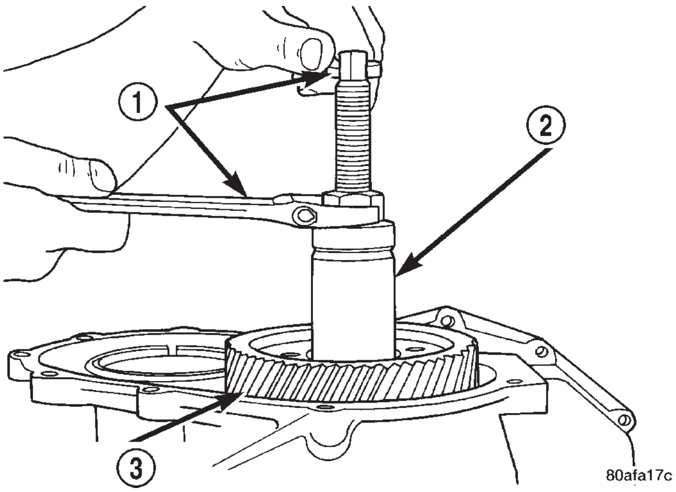


Fig. 98 Install Output Gear

1 - WRENCHES
2 - TOOL 6261 WITH STUD
3 - OUTPUT GEAR

(16) Install NEW output gear retaining bolt and washer (Fig. 99). Using Tool 6259, torque output gear retaining bolt to 271 N·m (200 ft. lbs.) (Fig. 100).

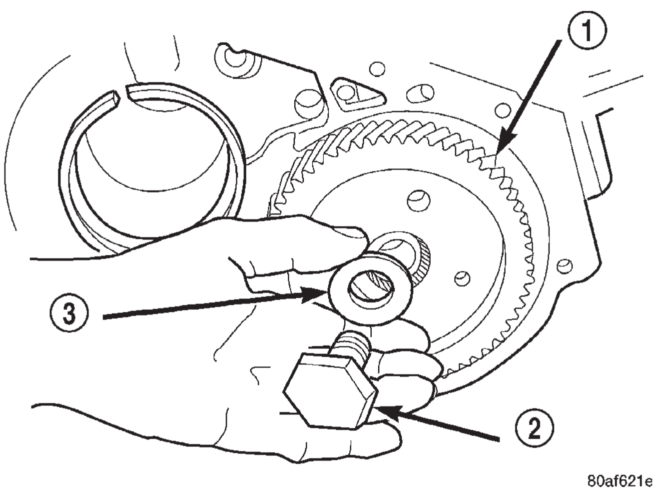


Fig. 99 Output Gear Bolt and Washer

1 - OUTPUT GEAR
2 - BOLT
3 - CONED LOCK WASHER

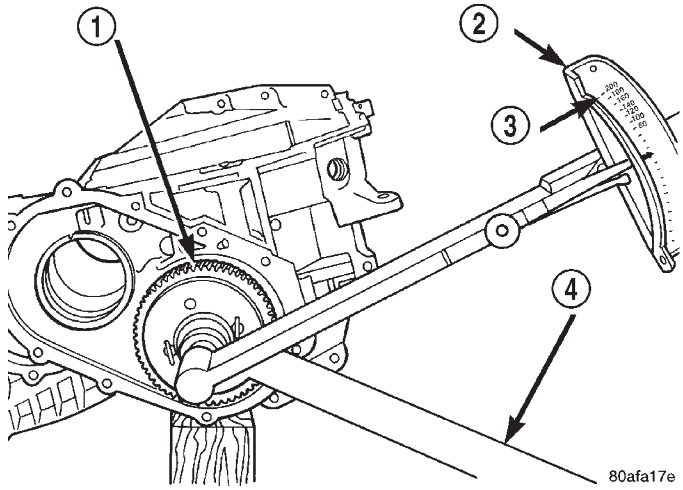


Fig. 100 Tighten Output Gear to 271 N•m (200 ft. lbs.)

1 - OUTPUT GEAR
2 - TORQUE WRENCH
3 - 200 FT. LBS.
4 - TOOL 6259

(17) Using an inch pound torque wrench (Fig. 101), check output shaft turning torque. **Output shaft turning torque should be within 3-8 in. lbs.** If the turning torque is too high, install a 0.04 mm (0.0016 in.) thicker shim. If the turning torque is too low, install a 0.04 mm (0.0016 in.) thinner shim. Repeat until the proper turning torque of 3-8 in. lbs. is obtained.

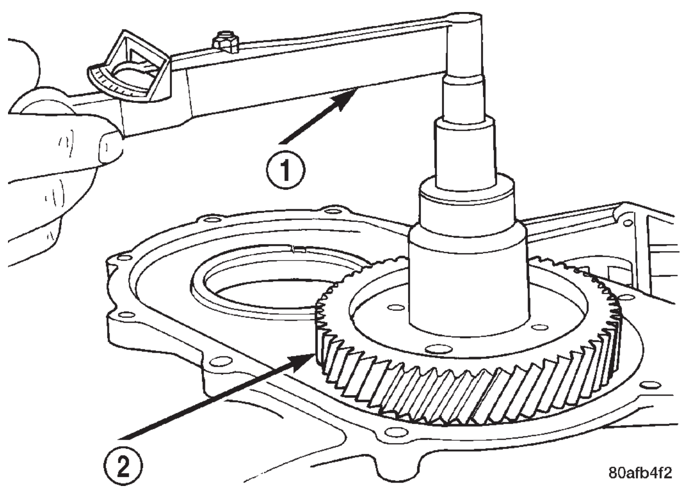


Fig. 101 Check Output Gear Bearings Turning Torque

1 - INCH-POUND TORQUE WRENCH
2 - OUTPUT GEAR

41TE AUTOMATIC TRANSAXLE (Continued)

(18) Install output gear stirrup with serrated side out (Fig. 102).

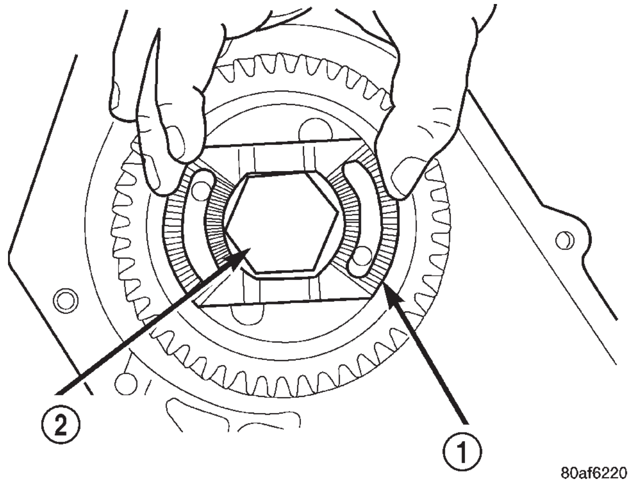


Fig. 102 Install Stirrup

1 - STIRRUP
2 - OUTPUT GEAR RETAINING BOLT

(19) Install retaining strap.

(20) Install strap bolts but do not tighten at this time (Fig. 103).

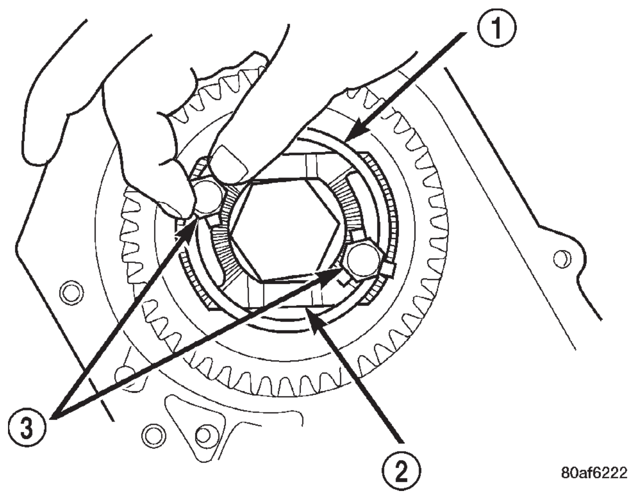


Fig. 103 Install Strap Bolts

1 - RETAINING STRAP
2 - STIRRUP
3 - RETAINING STRAP BOLTS

(21) Rotate stirrup clockwise against flats of retaining bolt (Fig. 104).

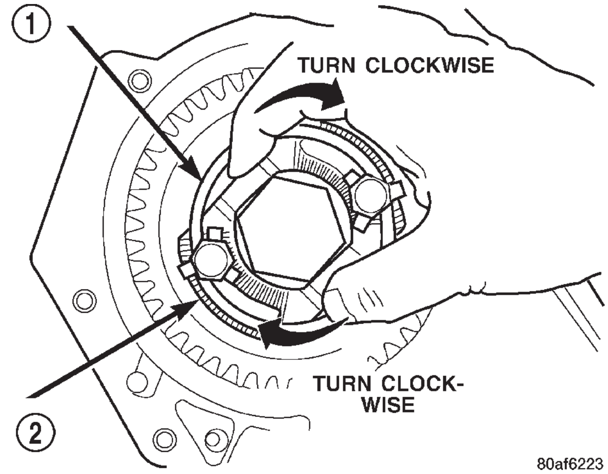


Fig. 104 Turn Stirrup Clockwise Against Bolt Flats

1 - RETAINING STRAP
2 - STIRRUP

(22) Torque stirrup strap bolts to 23 N·m (200 in. lbs.) (Fig. 105).

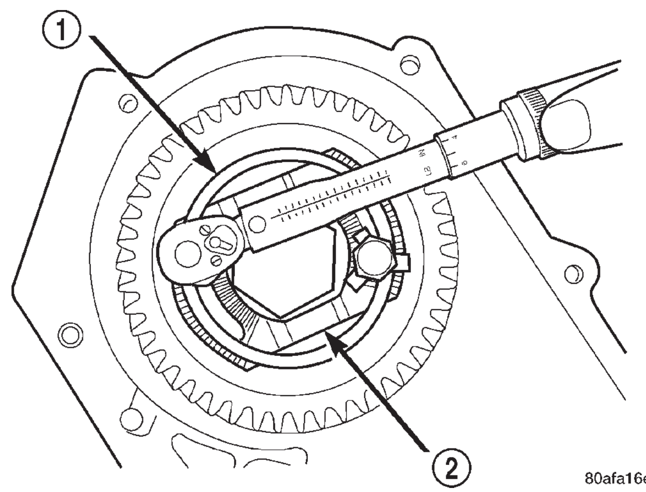


Fig. 105 Tighten Stirrup Strap Bolts To 23 N·m (200 in.) lbs.)

1 - RETAINING STRAP
2 - STIRRUP

41TE AUTOMATIC TRANSAXLE (Continued)

(23) Bend tabs on strap up against flats of bolts (Fig. 106).

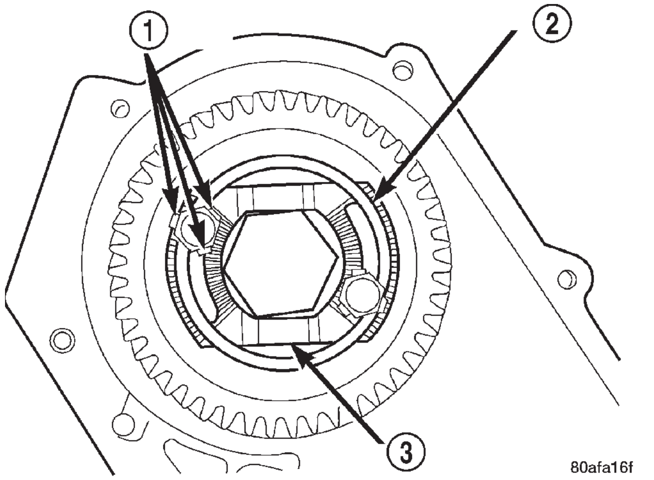


Fig. 106 Bend Tabs On Strap Up Against Flats Of Bolts

1 - RETAINING STRAP TABS
2 - RETAINING STRAP
3 - STIRRUP

(24) Install transfer shaft bearing cone using Tool 6052 (Fig. 107).

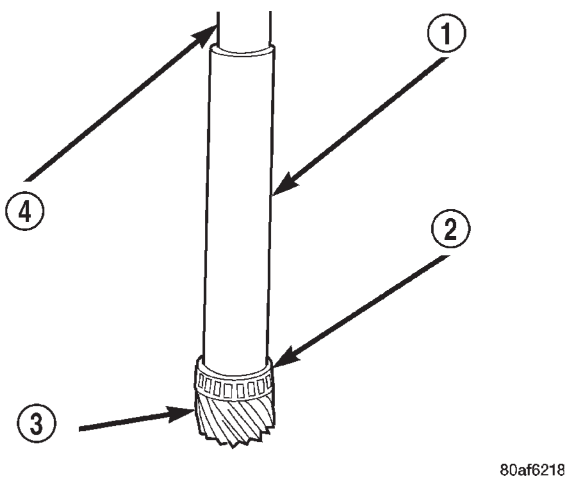


Fig. 107 Install Transfer Shaft Bearing Cone

1 - TOOL 6052
2 - NEW BEARING CONE
3 - TRANSFER SHAFT
4 - ARBOR PRESS RAM

(25) Install bearing cup and oil baffle to transfer shaft (Fig. 108).

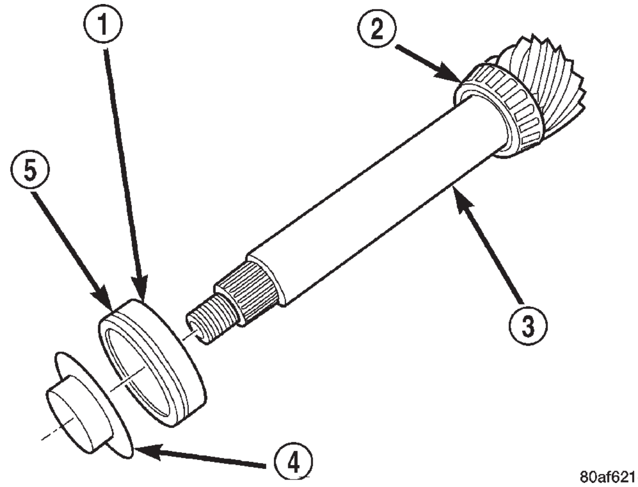


Fig. 108 Install Bearing Cup to Shaft

1 - BEARING CUP
2 - BEARING CONE
3 - TRANSFER SHAFT
4 - OIL BAFFLE
5 - O-RING

(26) Using Tool 5049A, install transfer shaft (Fig. 109).

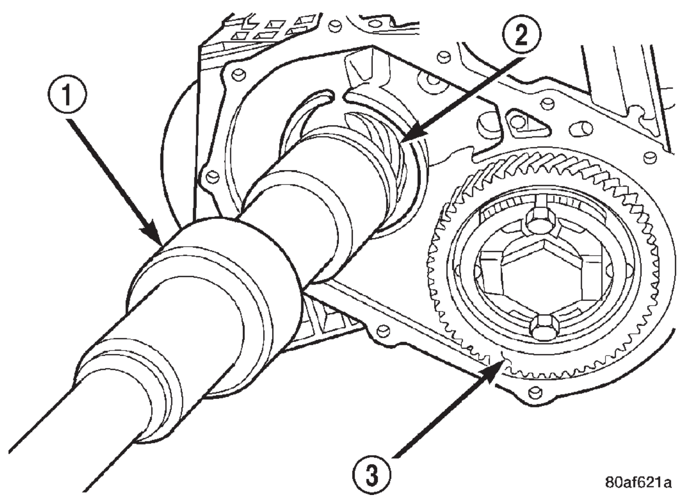


Fig. 109 Install Transfer Shaft

1 - SPECIAL TOOL 5049–A
2 - TRANSFER SHAFT
3 - OUTPUT GEAR

41TE AUTOMATIC TRANSAXLE (Continued)

(27) Using Tool 6051, install transfer shaft bearing snap ring (Fig. 110).

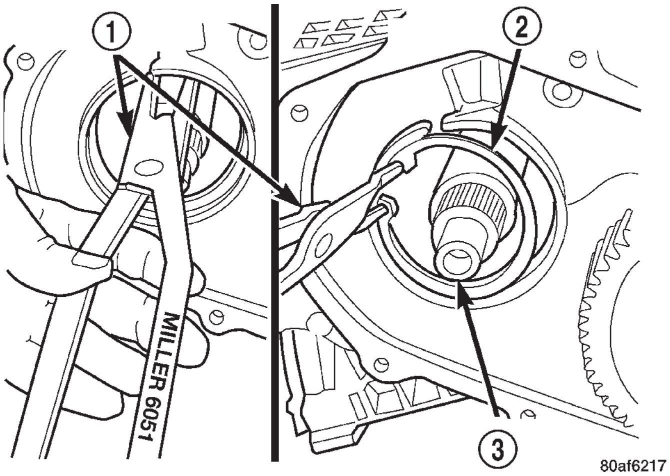


Fig. 110 Install Transfer Shaft Bearing Snap Ring

1 - SNAP RING PLIERS TOOL 6051
2 - TRANSFER SHAFT BEARING SNAP RING
3 - TRANSFER SHAFT

(28) Install transfer shaft bearing cup into retainer using Tool 6061 (Fig. 111).

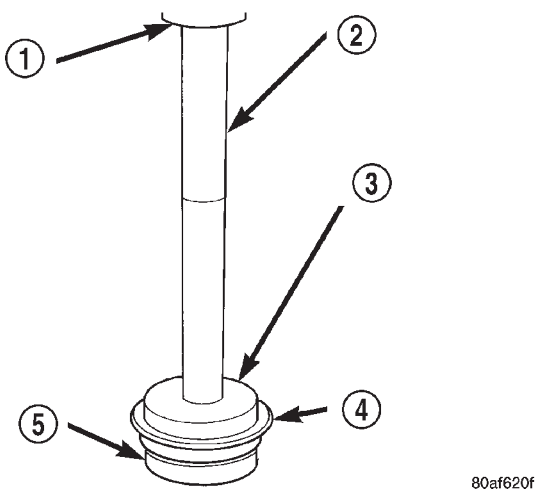


Fig. 111 Install Transfer Shaft Bearing Cup Into Retainer

1 - ARBOR PRESS RAM
2 - HANDLE C-4171
3 - TOOL 6061
4 - TRANSFER SHAFT BEARING CUP RETAINER
5 - USE REMOVED BEARING CUP TO SUPPORT RETAINER

(29) Install bearing cup retainer to transaxle (Fig. 112).

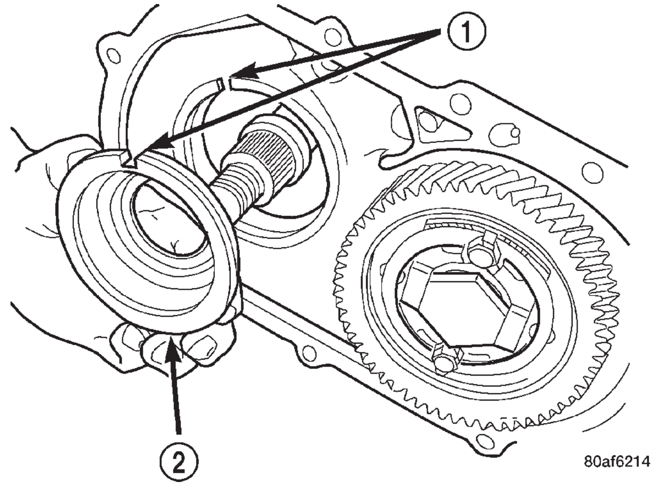


Fig. 112 Remove Bearing Cup Retainer

1 - ALIGN INDEXING TAB TO SLOT
2 - BEARING CUP RETAINER

(30) Install transfer gear bearing cone to transfer gear using Tool 5052 (Fig. 113).

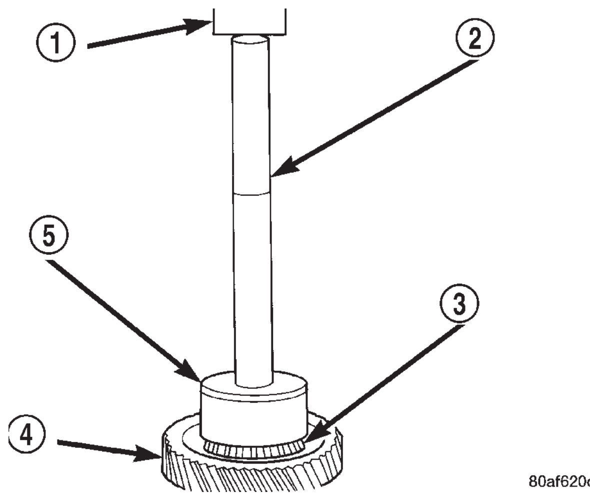


Fig. 113 Install Transfer Gear Bearing Cone

1 - ARBOR PRESS RAM
2 - HANDLE C-4171
3 - NEW BEARING CONE
4 - TRANSFER SHAFT GEAR
5 - TOOL 5052

41TE AUTOMATIC TRANSAXLE (Continued)

(31) **TRANSFER GEAR BEARING ADJUSTMENT:**

(a) Install a 4.66 mm (0.184 in.) gauging shim on the transfer shaft (Fig. 114).

(b) Install transfer shaft gear using Tool 6261. Using Tool 6259, install transfer shaft gear retaining nut to 271 N·m (200 ft. lbs.).

(c) Measure end play. Attach Tool L4432 to the transfer gear.

(d) Mount a steel ball with grease into the end of the transfer shaft.

(e) Push and pull the gear while rotating back and forth to ensure seating of the bearing rollers.

(f) Using a dial indicator, measure transfer shaft end play.

(g) Refer to the transfer shaft bearing shim chart for the required shim combination to obtain the proper bearing setting.

(h) Use Tool 6259 to remove the retaining nut and washer. Remove the transfer shaft gear using Tool L4407A.

(i) Remove the gauging shim (Fig. 114) and install the proper shim indicated by the chart.

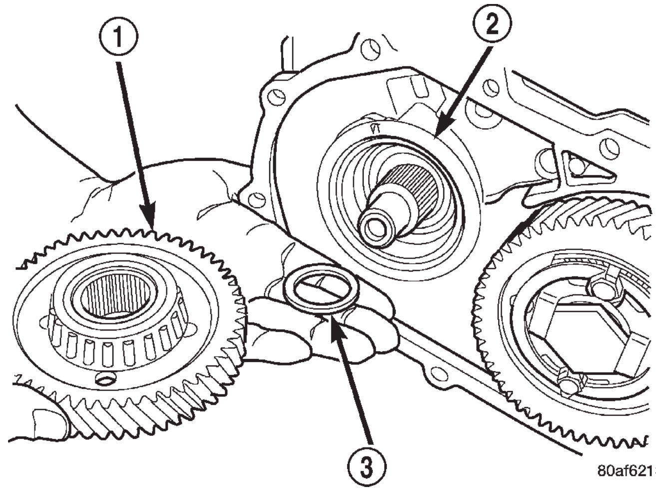


Fig. 114 Install Transfer Shaft Gear and (Select) Shim

1 - TRANSFER SHAFT GEAR
2 - BEARING CUP RETAINER
3 - SHIM (SELECT)

TRANSFER SHAFT BEARING SHIM CHART

End Play	Shim Needed	Part Number	End Play	Shim Needed	Part Number
0.05mm (0.002 in.)	4.66mm (0.183 in.)	4505588AB	0.76mm (0.030 in.)	3.94mm (0.155 in.)	4412818AB
0.08mm (0.003 in.)	4.62mm (0.182 in.)	4412835AB	0.79mm (0.031 in.)	3.90mm (0.154 in.)	4412817AB
0.10mm (0.004 in.)	4.58mm (0.180 in.)	4412834AB	0.81mm (0.032 in.)	3.90mm (0.154 in.)	4412817AB
0.13mm (0.005 in.)	4.58mm (0.180 in.)	4412834AB	0.84mm (0.033 in.)	3.86mm (0.152 in.)	4412816AB
0.15mm (0.006 in.)	4.54mm (0.178 in.)	4412833AB	0.86mm (0.034 in.)	3.82mm (0.150 in.)	4412815AB
0.18mm (0.007 in.)	4.50mm (0.177 in.)	4412832AB	0.89mm (0.035 in.)	3.82mm (0.150 in.)	4412815AB
0.20mm (0.008 in.)	4.50mm (0.177 in.)	4412832AB	0.91mm (0.036 in.)	3.78mm (0.149 in.)	4412814AB
0.23mm (0.009 in.)	4.46mm (0.175 in.)	4412831AB	0.94mm (0.037 in.)	3.74mm (0.147 in.)	4412813AB
0.25mm (0.010 in.)	4.46mm (0.175 in.)	4412831AB	0.97mm (0.038 in.)	3.74mm (0.147 in.)	4412813AB
0.28mm (0.011 in.)	4.42mm (0.174 in.)	4412830AB	0.99mm (0.039 in.)	3.70mm (0.146 in.)	4412812AB
0.30mm (0.012 in.)	4.38mm (0.172 in.)	4412829AB	1.02mm (0.040 in.)	3.66mm (0.144 in.)	4412811AB
0.33mm (0.013 in.)	4.38mm (0.172 in.)	4412829AB	1.04mm (0.041 in.)	3.66mm (0.144 in.)	4412811AB
0.36mm (0.014 in.)	4.34mm (0.171 in.)	4412828AB	1.07mm (0.042 in.)	3.62mm (0.143 in.)	4412810AB
0.38mm (0.015 in.)	4.30mm (0.169 in.)	4412827AB	1.08mm (0.043 in.)	3.62mm (0.143 in.)	4412810AB
0.41mm (0.016 in.)	4.30mm (0.169 in.)	4412827AB	1.12mm (0.044 in.)	3.58mm (0.141)	4412809AB
0.43mm (0.017 in.)	4.26mm (0.168 in.)	4412826AB	1.14mm (0.045 in.)	3.54mm (0.139 in.)	4412808AB
0.46mm (0.018 in.)	4.22mm (0.166 in.)	4412825AB	1.17mm (0.046 in.)	3.54mm (0.139 in.)	4412808AB
0.48mm (0.019 in.)	4.22mm (0.166 in.)	4412825AB	1.19mm (0.047 in.)	3.50mm (0.138 in.)	4412807AB
0.50mm (0.020 in.)	4.18mm (0.165 in.)	4412824AB	1.22mm (0.048 in.)	3.46mm (0.136 in.)	4412806AB
0.53mm (0.021 in.)	4.18mm (0.165 in.)	4412824AB	1.24mm (0.049 in.)	3.46mm (0.136 in.)	4412806AB

41TE AUTOMATIC TRANSAXLE (Continued)

End Play	Shim Needed	Part Number	End Play	Shim Needed	Part Number
0.56mm (0.022 in.)	4.14mm (0.163 in.)	4412823AB	1.27mm (0.050 in.)	3.42mm (0.135 in.)	4412805AB
0.58mm (0.023 in.)	4.10mm (0.161 in.)	4412822AB	1.30mm (0.051 in.)	3.38mm (0.133 in.)	4412804AB
0.61mm (0.024 in.)	4.10mm (0.161 in.)	4412822AB	1.32mm (0.052 in.)	3.38mm (0.133 in.)	4412804AB
0.64mm (0.025 in.)	4.06mm (0.160 in.)	4412821AB	1.35mm (0.053 in.)	3.34mm (0.132 in.)	4412803AB
0.66mm (0.026 in.)	4.02mm (0.158 in.)	4412820AB	1.37mm (0.054 in.)	3.34mm (0.132 in.)	4412803AB
0.69mm (0.027 in.)	4.02mm (0.158 in.)	4412820AB	1.40mm (0.055 in.)	3.30mm (0.130 in.)	4412802AB
0.71mm (0.028 in.)	3.98mm (0.157 in.)	4412819AB	1.45mm (0.057 in	3.26mm (0.128 in.)	4412801AB
0.74mm (0.029 in.)	3.94mm (0.155 in.)	4412818AB	1.47mm (0.058 in.)	2.22mm (0.127 in.)	4505570AB

(32) Install the transfer shaft gear using Tool 6261 (Fig. 115).

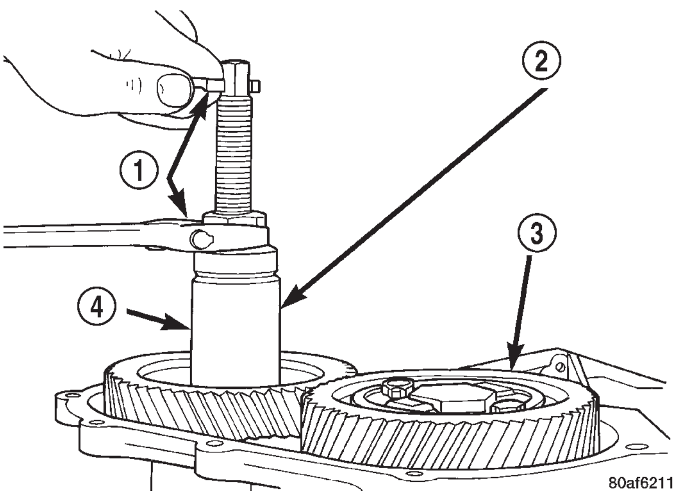


Fig. 115 Install Transfer Shaft Gear

1 - WRENCHES
2 - SPECIAL TOOL 6261
3 - OUTPUT GEAR
4 - TRANSFER SHAFT GEAR

CAUTION: Install a NEW retaining nut, as the original nut MUST NOT be reused.

(33) Install the new retaining nut and washer.

(34) Using Tool 6259, torque transfer gear retaining nut to 271 N·m (200 ft. lbs.) (Fig. 116).

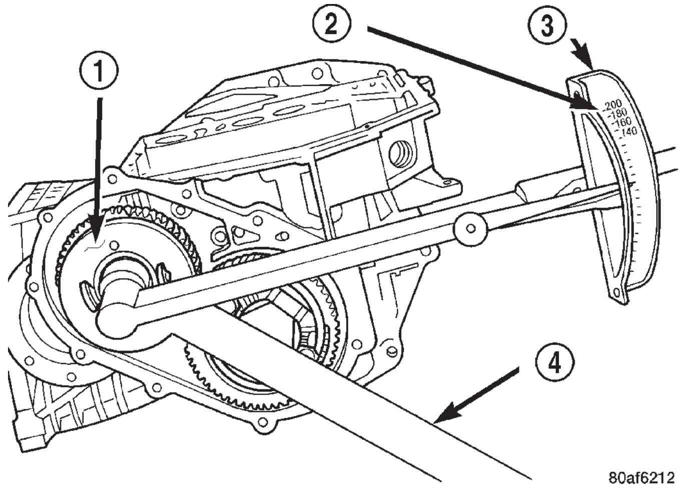


Fig. 116 Tighten Transfer Gear Nut to 271 N•m (200 ft. lbs.)

1 - TRANSFER SHAFT GEAR
2 - 200 FT. LBS.
3 - TORQUE WRENCH
4 - SPECIAL TOOL 6259

41TE AUTOMATIC TRANSAXLE (Continued)

(35) Measure transfer shaft end play. **Transfer shaft end play should be within 0.05-0.10 mm (0.002-0.004 in.).** If the end play is too high, install a 0.04 mm (0.0016 in.) thicker shim. If the end play is too low, install a 0.04 mm (0.0016 in.) thinner shim. Repeat until 0.05-0.10 mm (0.002-0.004 in.) end play is obtained.

(36) Install a bead of Mopar® ATF RTV (MS-GF41) to transfer gear cover (Fig. 117).

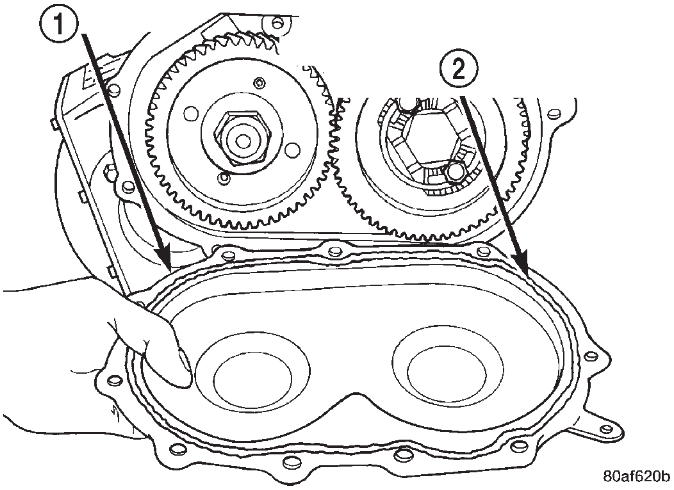


Fig. 117 Install Rear Cover

1 - REAR COVER
2 - 1/8 INCH BEAD OF MOPAR® ATF RTV (MS-GF41) AS SHOWN

(37) Install transfer gear cover-to-case bolts and torque to 20 N·m (175 in. lbs.) torque (Fig. 118).

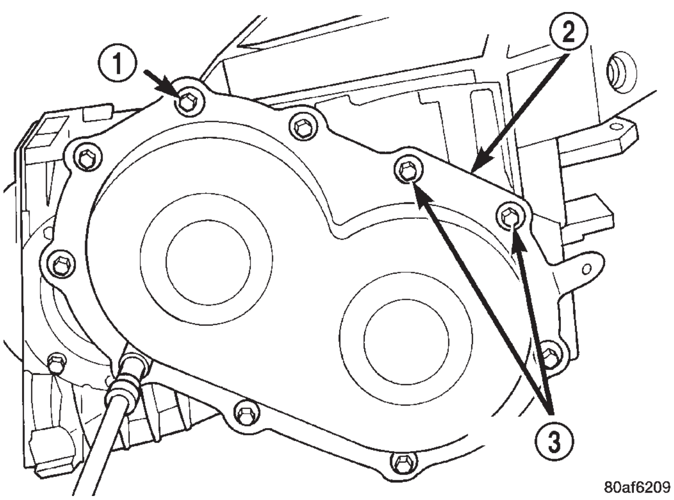


Fig. 118 Install Rear Cover Bolts

1 - REAR COVER BOLTS
2 - REAR COVER
3 - USE SEALANT ON BOLTS

(38) Install low/reverse clutch pack (Fig. 119). Leave uppermost disc out until snap ring is installed.

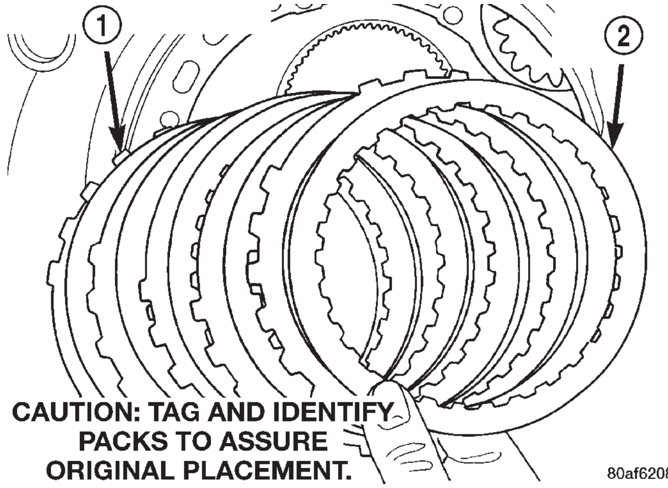


Fig. 119 Install Low/Reverse Clutch Pack

1 - CLUTCH PLATES (5)
2 - CLUTCH DISCS (5)

(39) Install low/reverse reaction plate flat snap ring (Fig. 120).

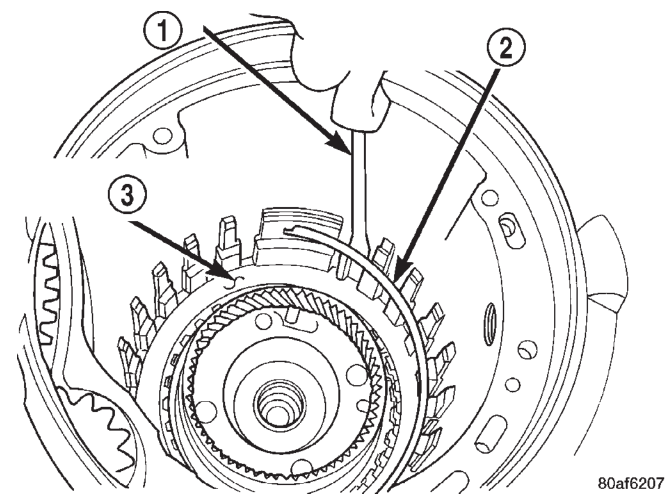


Fig. 120 Install Low/Reverse Reaction Plate Snap Ring

1 - SCREWDRIVER
2 - LOW/REVERSE REACTION PLATE FLAT SNAP RING
3 - DO NOT SCRATCH CLUTCH PLATE

41TE AUTOMATIC TRANSAXLE (Continued)

(40) Install remaining low/reverse clutch disc (Fig. 121).

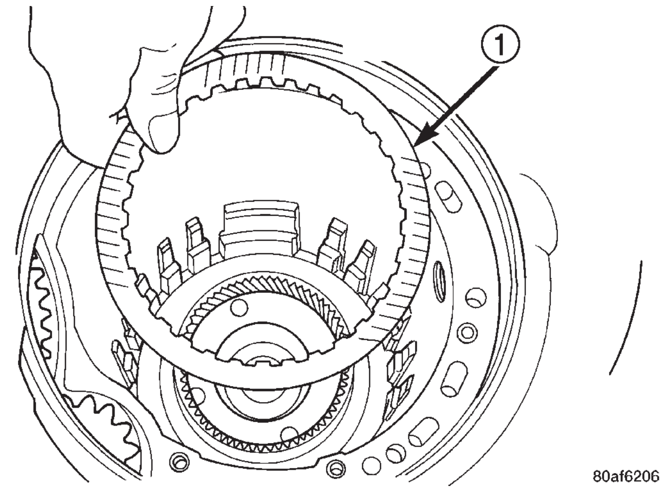


Fig. 121 Install One Disc

1 - ONE DISC FROM LOW/REVERSE CLUTCH

(41) Install low/reverse reaction plate with flat side up (Fig. 122).

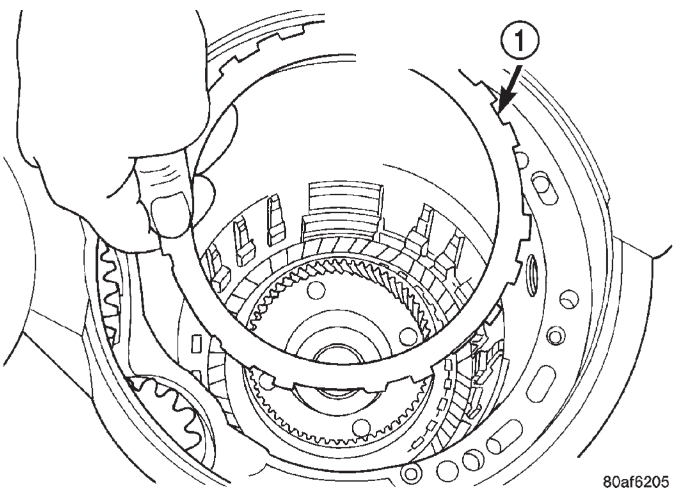


Fig. 122 Install Low/Reverse Reaction Plate

1 - LOW/REVERSE REACTION PLATE (FLAT SIDE UP)

(42) Install tapered snap ring (with tapered side up) as shown in (Fig. 123) (Fig. 124).

(43) Set up dial indicator as shown in (Fig. 125) to measure low/reverse clutch clearance. Press down on clutch pack with finger and zero dial indicator. **Low/Reverse clutch pack clearance is 0.89-1.47 mm (0.035-0.058 in.)**. Set up indicator and record measurement in four (4) places. Take average of readings and select the proper low/reverse reaction plate to achieve specifications.

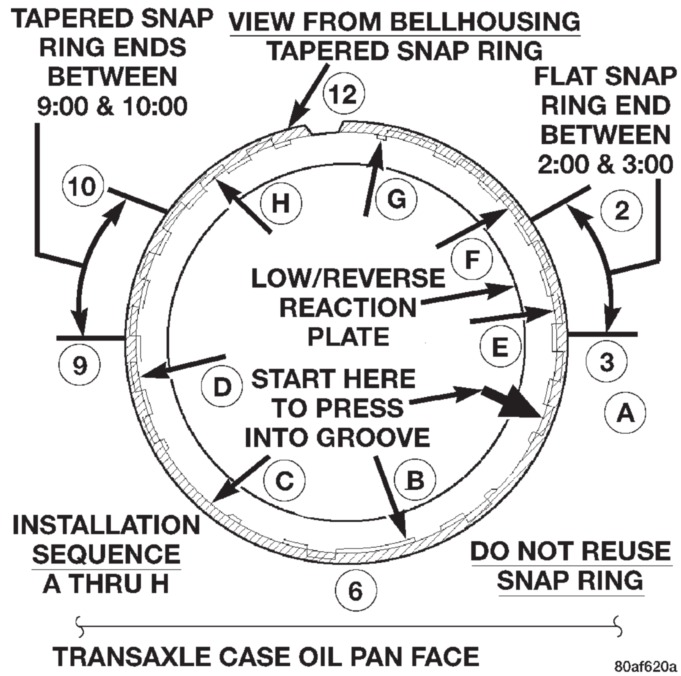


Fig. 123 Tapered Snap Ring Instructions

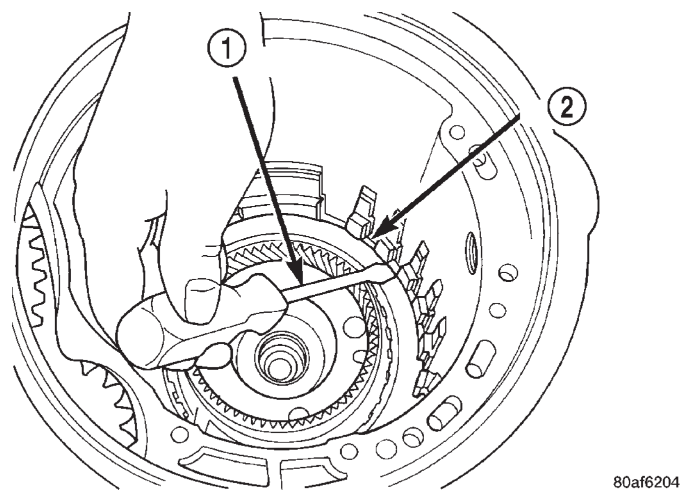


Fig. 124 Snap Ring Installed

1 - SCREWDRIVER
2 - TAPERED SNAP RING (INSTALL AS SHOWN)

LOW/REVERSE REACTION PLATE CHART

PART NUMBER	THICKNESS
4799846AA	5.88 mm (0.232 in.)
4799847AA	6.14 mm (0.242 in.)
4799848AA	6.40 mm (0.252 in.)
4799849AA	6.66 mm (0.262 in.)
4799855AA	6.92 mm (0.273 in.)

41TE AUTOMATIC TRANSAXLE (Continued)

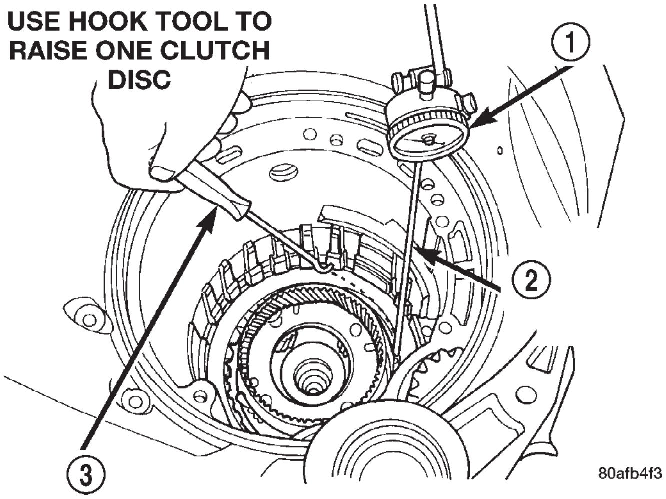


Fig. 125 Check Low/Reverse Clutch Clearance

1 - DIAL INDICATOR
2 - DIAL INDICATOR TIP TOOL 6268
3 - HOOK TOOL

(44) Install 2/4 clutch pack (Fig. 126), staggering clutch plate pads as shown in (Fig. 127).

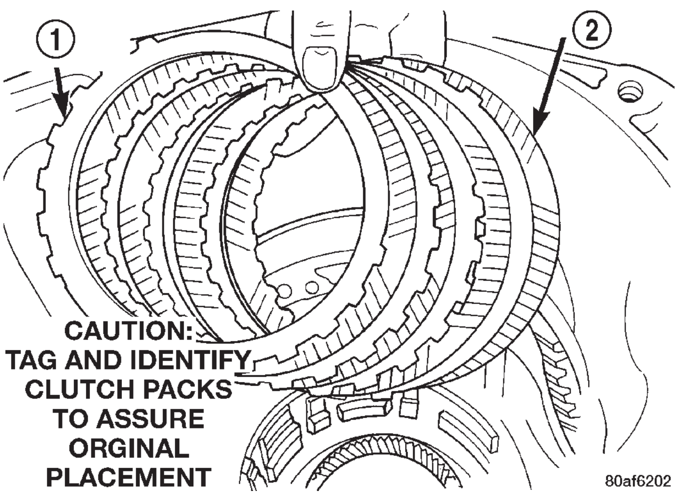


Fig. 126 Install 2/4 Clutch Pack

1 - CLUTCH PLATE (4)
2 - CLUTCH DISC (4)

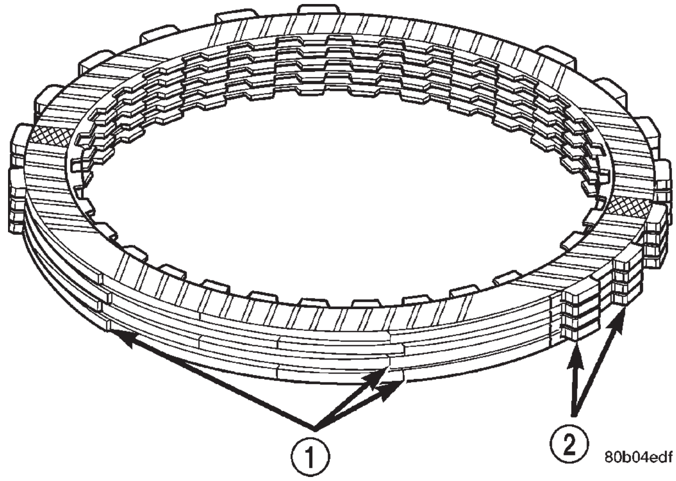


Fig. 127 Stagger 2/4 Clutch Plate Pads

1 - PILOT PADS
2 - LUGS

(45) Orient 2/4 clutch return spring to retainer as shown in (Fig. 128), and install to transaxle (Fig. 129).

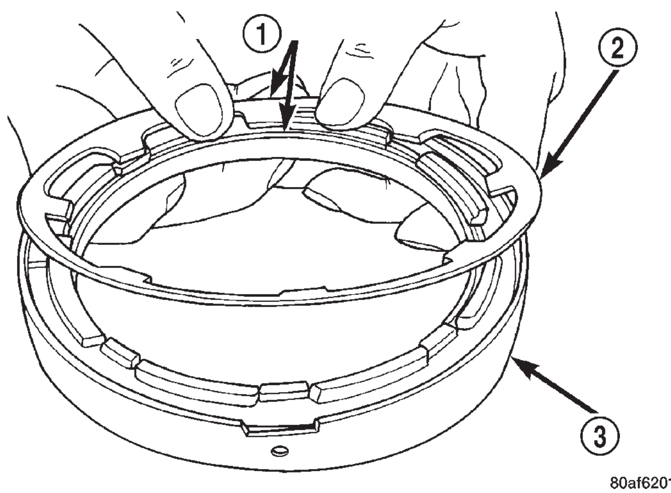


Fig. 128 Proper Orientation of 2/4 Clutch Retainer and Spring

1 - NOTE POSITION
2 - RETURN SPRING
3 - 2/4 CLUTCH RETAINER

41TE AUTOMATIC TRANSAXLE (Continued)

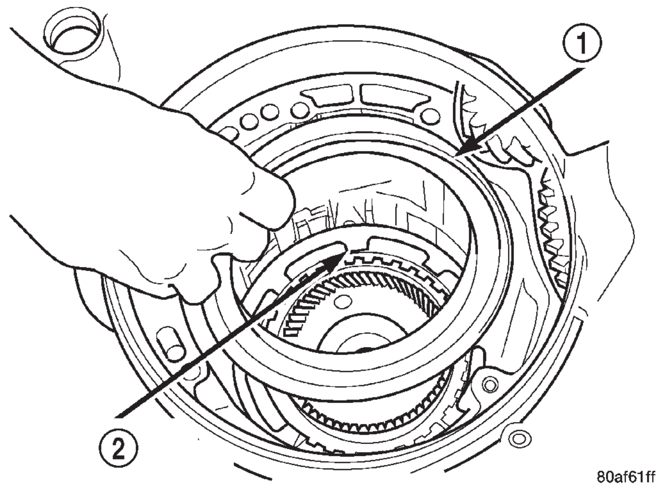


Fig. 129 2/4 Clutch Retainer

1 - 2/4 CLUTCH RETAINER
2 - 2/4 CLUTCH RETURN SPRING

(46) Using tool 5058, compress 2/4 clutch return spring just enough to install snap ring (Fig. 130).

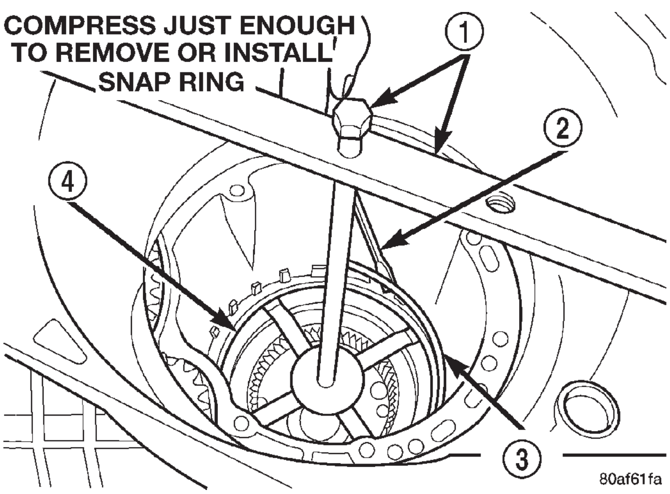


Fig. 130 Install 2/4 Clutch Retainer Snap Ring

1 - TOOL 5058
2 - SCREWDRIVER
3 - SNAP RING
4 - 2/4 CLUTCH RETAINER

(47) Install snap ring.

(48) Set up dial indicator as shown in (Fig. 131) and measure 2/4 clutch clearance. Press down on clutch pack with finger and zero dial indicator. **2/4 clutch pack clearance is 0.76-2.64 mm (0.030-0.104 in.).** Set up indicator and record measurement in four (4) places. Take average of readings. If clearance is outside this range, the clutch is assembled improperly. **There is no adjustment for 2/4 clutch clearance.**

(49) Install rear sun gear and #7 needle bearing (Fig. 133).

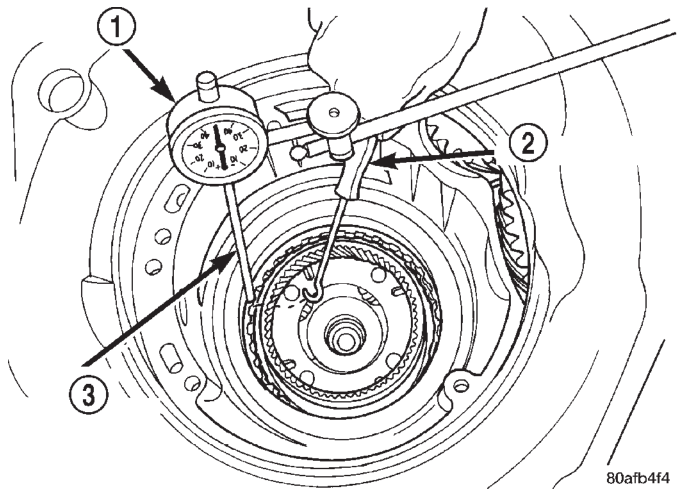


Fig. 131 Check 2/4 Clutch Clearance

1 - DIAL INDICATOR
2 - HOOK TOOL
3 - DIAL INDICATOR TIP TOOL 6268

NOTE: The number seven needle bearing has three anti-reversal tabs and is common with the number five and number two position. The orientation should allow the bearing to seat flat against the rear sun gear (Fig. 132). A small amount of petrolatum can be used to hold the bearing to the rear sun gear.

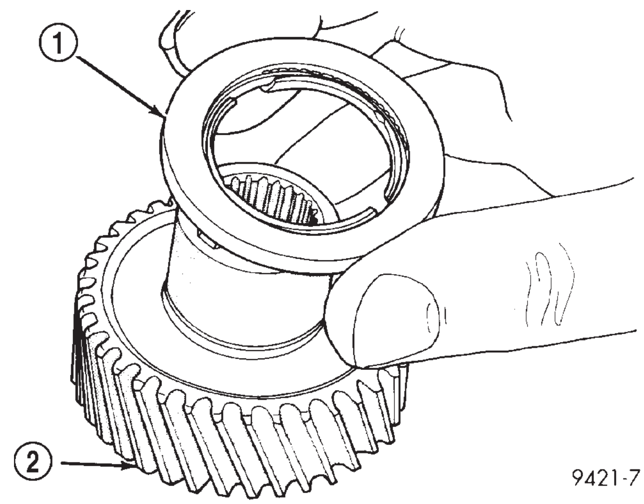


Fig. 132 Number 7 Bearing

1 - #7 NEEDLE BEARING
2 - REAR SUN GEAR

(50) Install front carrier/rear annulus assembly and #6 needle bearing (Fig. 134).

(51) Install front sun gear assembly and #4 thrust washer (Fig. 135).

41TE AUTOMATIC TRANSAXLE (Continued)

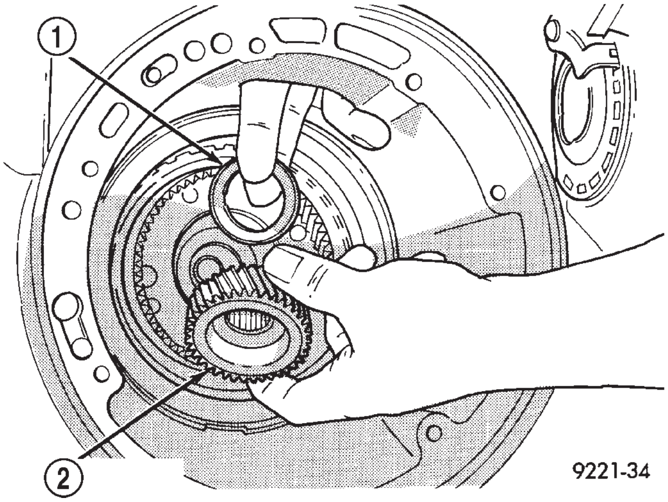


Fig. 133 Install Rear Sun Gear and #7 Needle Bearing

1 - #7 NEEDLE BEARING
2 - REAR SUN GEAR

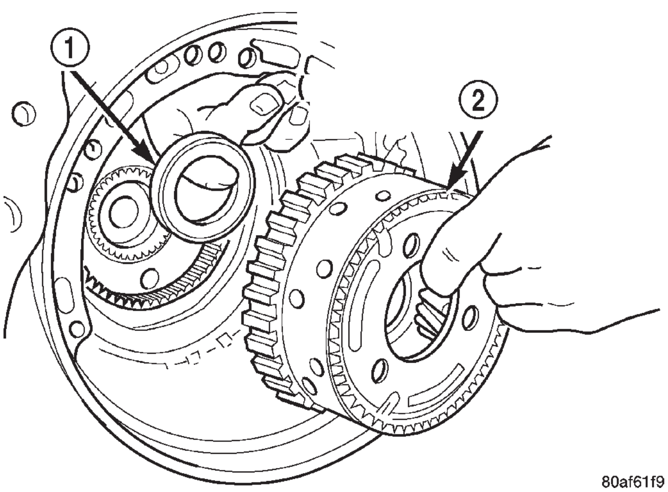


Fig. 134 Install Front Carrier and Rear Annulus Assembly

1 - #6 NEEDLE BEARING
2 - FRONT CARRIER AND REAR ANNULUS ASSEMBLY (TWIST AND PULL OR PUSH TO REMOVE OR INSTALL).

(52) **DETERMINING #4 THRUST PLATE THICKNESS / INPUT SHAFT END PLAY:**

(a) Select the thinnest #4 thrust plate thickness and install to input clutch assembly (Fig. 136). Use petrolatum to retain.

(b) Install input clutch assembly into position and verify that it is completely seated by viewing through input speed sensor hole. If view through input speed sensor hole is not as shown in (Fig. 137), the input clutch assembly is not seated properly.

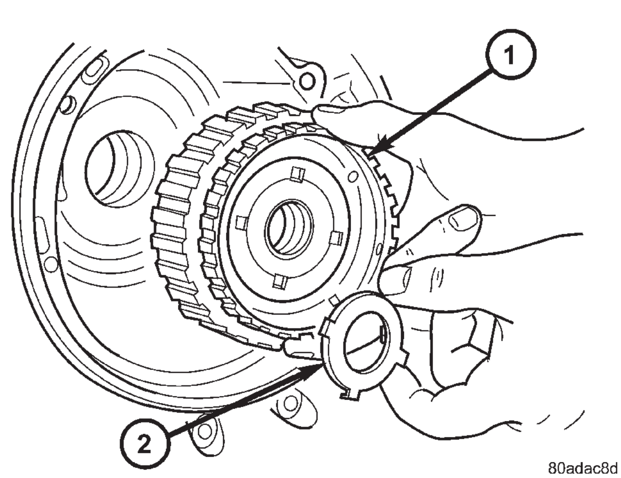


Fig. 135 Install Front Sun Gear Assembly

1 - FRONT SUN GEAR ASSEMBLY
2 - #4 THRUST WASHER (FOUR TABS)

(c) Remove oil pump o-ring (Fig. 138). **Be sure to reinstall oil pump o-ring after selecting the proper #4 thrust plate.**

(d) Set up input shaft for measurement with Indicator Set C3339 and End Play Set 8266 as shown in (Fig. 139).

(e) Measure the input shaft end play with the transaxle in the vertical position. **Input shaft end play must be within 0.005 to 0.025 inch.** For example, if end play reading is 0.055 inch, select No. 4 Thrust Plate which is 0.071 to 0.074 thick. This should provide an input shaft end play reading of 0.020 inch which is within specifications.

(f) Refer to the No. 4 thrust plate chart to select the proper No. 4 thrust plate:

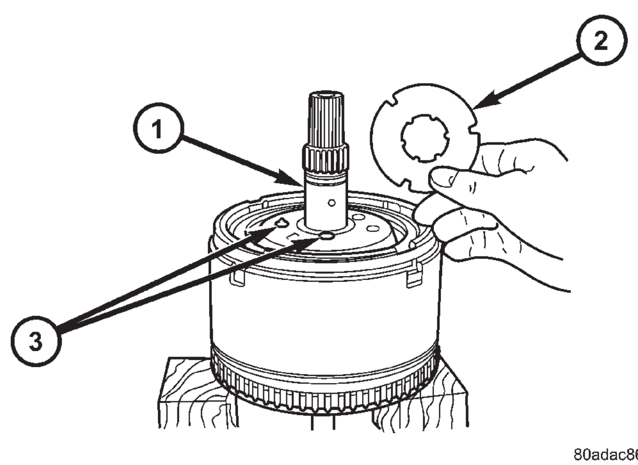


Fig. 136 Select Thinnest No. 4 Thrust Plate

1 - OVERDRIVE SHAFT ASSEMBLY
2 - #4 THRUST PLATE (SELECT)
3 - 3 DABS OF PETROLATUM FOR RETENTION

41TE AUTOMATIC TRANSAXLE (Continued)

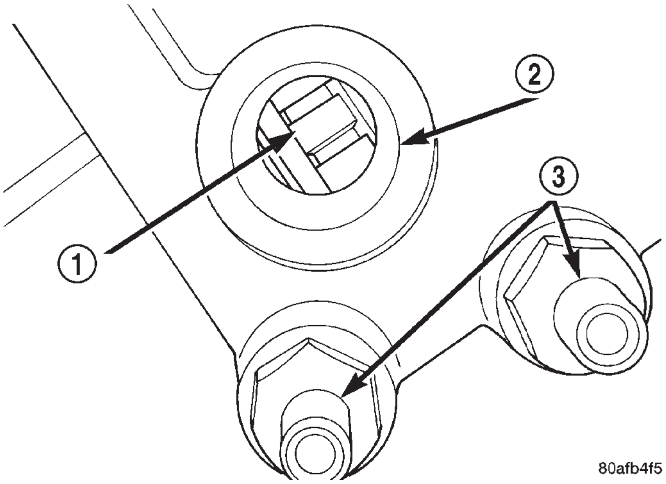


Fig. 137 View Through Input Speed Sensor Hole

1 - INPUT CLUTCH RETAINER
2 - INPUT SPEED SENSOR HOLE
3 - OIL COOLER FITTINGS

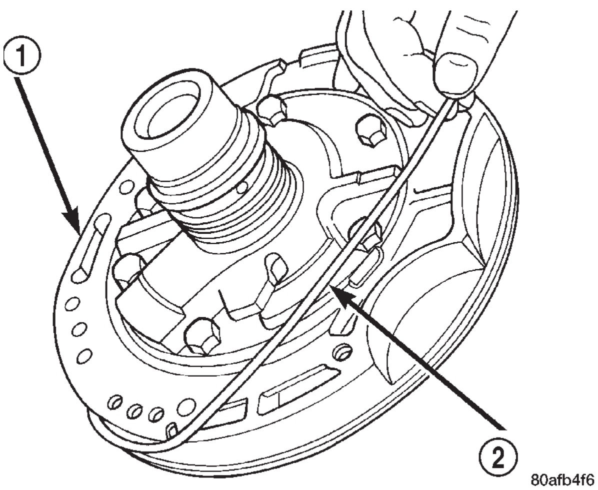


Fig. 138 Remove Oil Pump O-Ring

1 - OIL PUMP ASSEMBLY
2 - O-RING

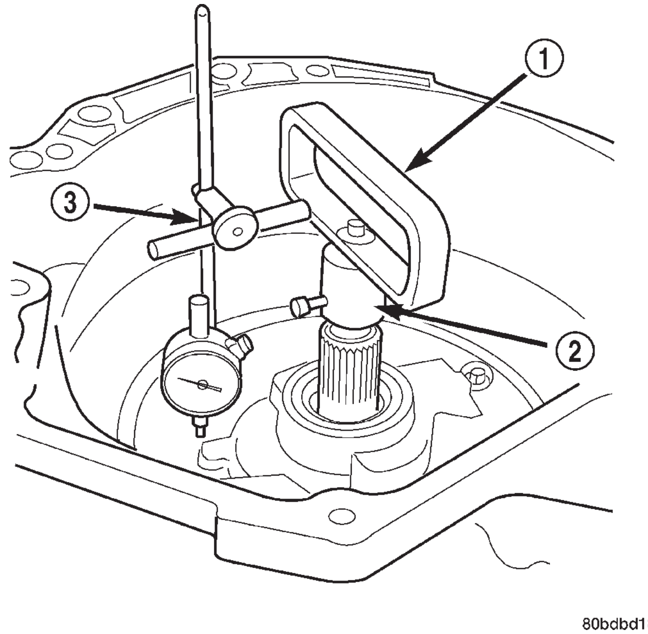


Fig. 139 Measure Input Shaft End Play Using End Play Set 8266

1 - TOOL 8266–8
2 - TOOL 8266–2
3 - TOOL C-3339

NO. 4 THRUST PLATE CHART

PART NUMBER	THICKNESS
4431665AB	1.60mm (0.063 in.)
3836237AB	1.73mm (0.068 in.)
4431666AB	1.80mm (0.071 in.)
3836238AB	1.96mm (0.077 in.)
4431667AB	2.03mm (0.080 in.)
3836239AB	2.16mm (0.085 in.)
4431668AB	2.24mm (0.088 in.)
3836240AB	2.39mm (0.094 in.)
4431669AB	2.46mm (0.097 in.)
3836241AB	2.62mm (0.103 in.)
4446670AB	2.67mm (0.105 in.)
4446671AB	2.90mm (0.114 in.)

41TE AUTOMATIC TRANSAXLE (Continued)

(53) Install input clutch assembly (Fig. 140).

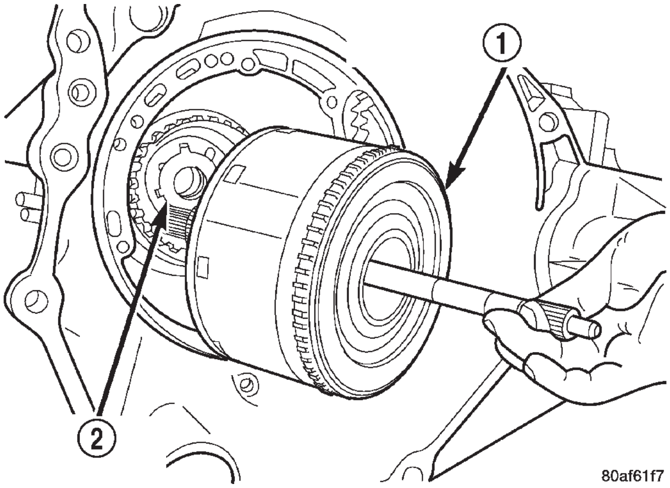


Fig. 140 Install Input Clutch Assembly

1 - INPUT CLUTCH ASSEMBLY
2 - #4 THRUST WASHER

(54) Install #1 caged needle bearing (Fig. 141).

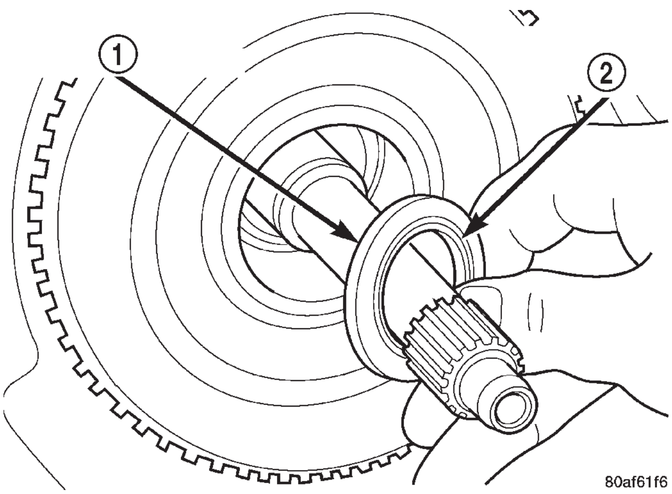


Fig. 141 Install Caged Needle Bearing

1 - #1 CAGED NEEDLE BEARING
2 - NOTE: TANGED SIDE OUT

CAUTION: The cooler bypass valve must be replaced if transaxle failure has occurred. Do not attempt to reuse or clean old valve.

(55) Install cooler bypass valve with o-ring end towards rear of case (Fig. 142).

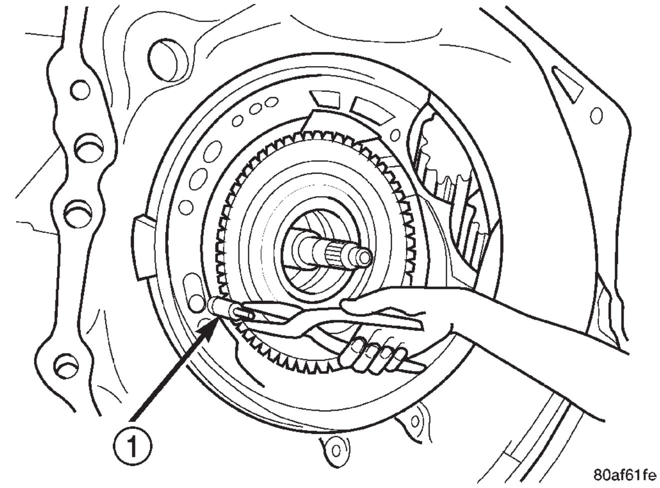


Fig. 142 Install Cooler Bypass Valve

1 - COOLER BYPASS VALVE

(56) Install oil pump gasket (Fig. 143).

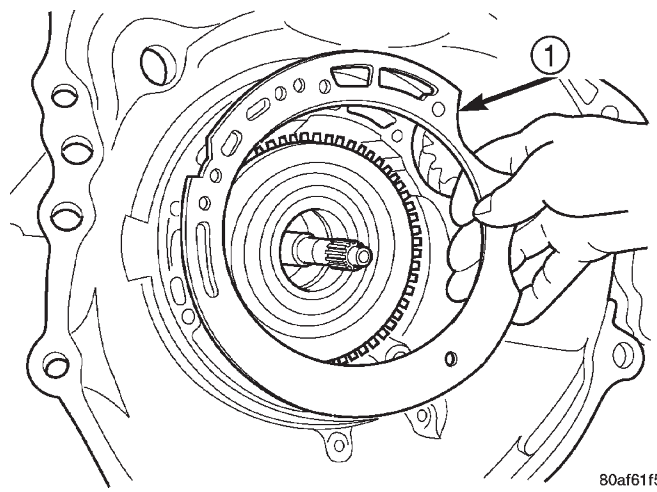


Fig. 143 Install Oil Pump Gasket

1 - PUMP GASKET

41TE AUTOMATIC TRANSAXLE (Continued)

(57) Install oil pump assembly (Fig. 144).

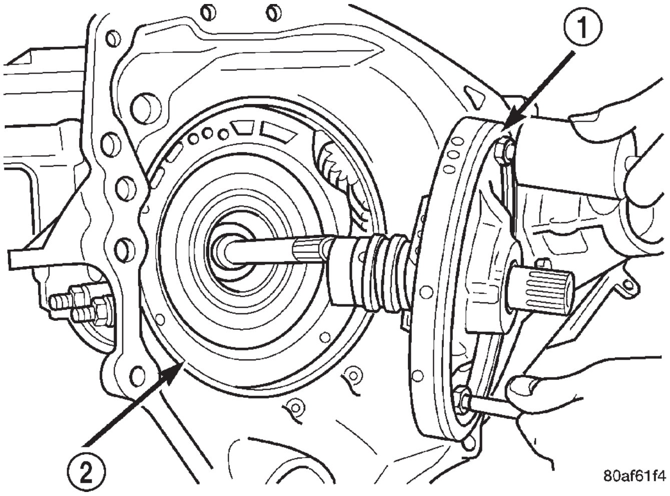


Fig. 144 Install Oil Pump

1 - OIL PUMP
2 - GASKET

(58) Install oil pump-to-case bolts and torque to 27 N·m (20 ft. lbs.) (Fig. 145).

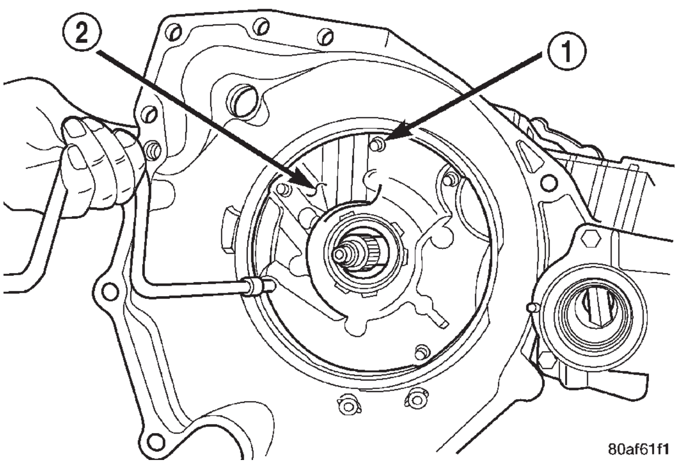


Fig. 145 Install Pump-to-Case Bolts

1 - PUMP ATTACHING BOLTS
2 - PUMP HOUSING

(59) Install low/reverse accumulator (Fig. 146).

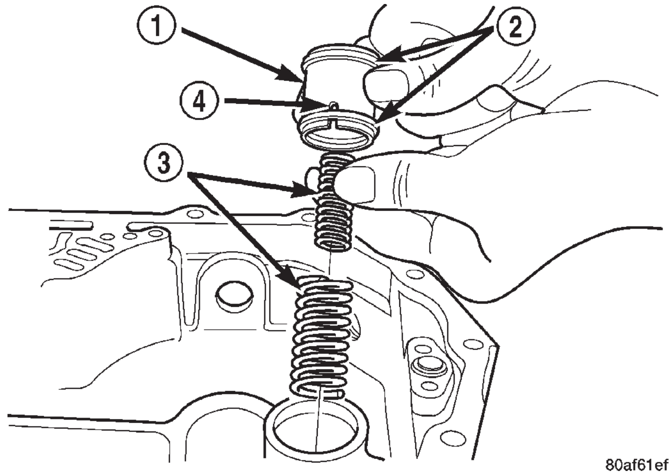


Fig. 146 Install Low/Reverse Accumulator

1 - ACCUMULATOR PISTON
2 - SEAL RINGS
3 - RETURN SPRINGS
4 - (NOTE NOTCH)

(60) Install low/reverse accumulator plug (Fig. 147).

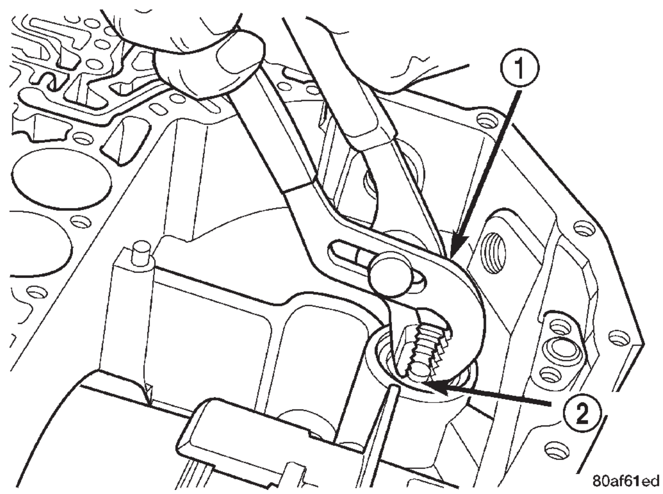


Fig. 147 Install Low/Reverse Accumulator Plug (Cover)

1 - ADJUSTABLE PLIERS
2 - PLUG

41TE AUTOMATIC TRANSAXLE (Continued)

(61) Install low/reverse accumulator snap ring (Fig. 148).

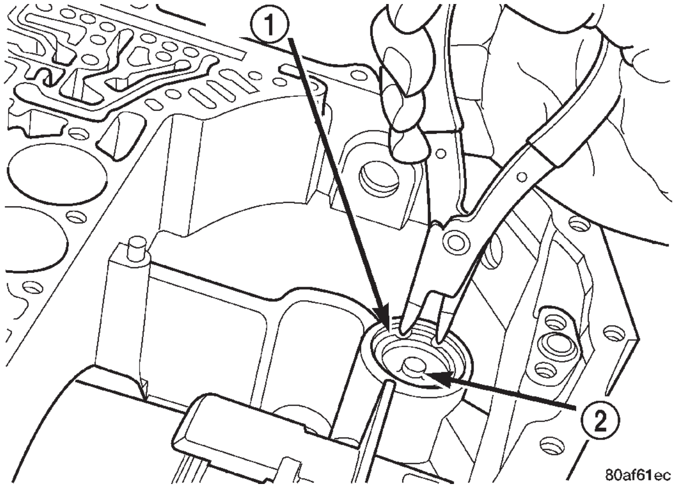


Fig. 148 Install Low/Reverse Accumulator Snap Ring

1 - SNAP RING
2 - PLUG

NOTE: Depending on engine application, some accumulators will have two springs, and others will have one spring. The springs are color-coded for application and year.

(62) Install underdrive and overdrive accumulators (Fig. 149) (Fig. 150) (Fig. 151).

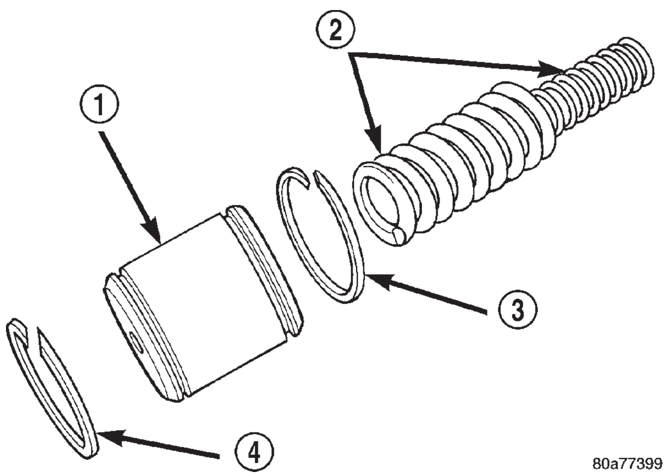


Fig. 149 Accumulator (Underdrive)

1 - ACCUMULATOR PISTON (UNDERDRIVE)
2 - RETURN SPRINGS
3 - SEAL RING
4 - SEAL RING

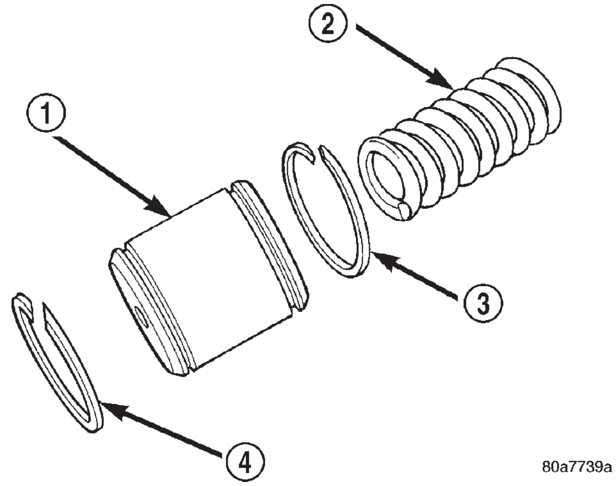


Fig. 150 Accumulator (Overdrive)

1 - ACCUMULATOR PISTON (OVERDRIVE)
2 - RETURN SPRING
3 - SEAL RING
4 - SEAL RING

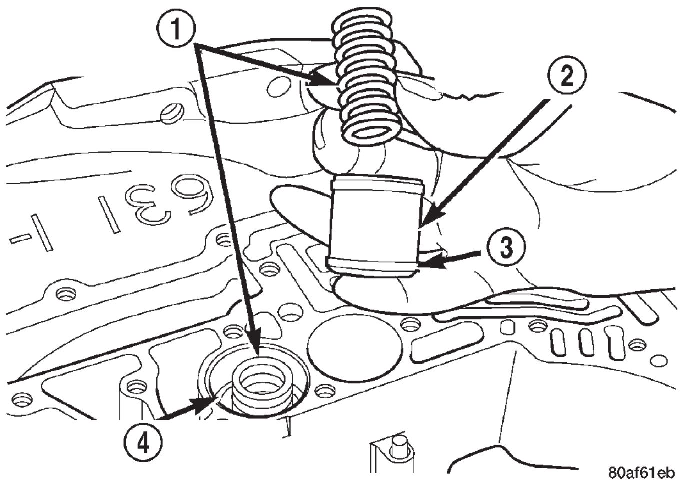


Fig. 151 Install Underdrive and Overdrive Accumulators

1 - RETURN SPRING
2 - UNDERDRIVE CLUTCH ACCUMULATOR
3 - SEAL RING (2)
4 - OVERDRIVE CLUTCH ACCUMULATOR

41TE AUTOMATIC TRANSAXLE (Continued)

(63) Install valve body to transaxle (Fig. 152). Rotate manual valve shaft fully clockwise to ease installation. Make sure park rod rollers are positioned within park guide bracket.

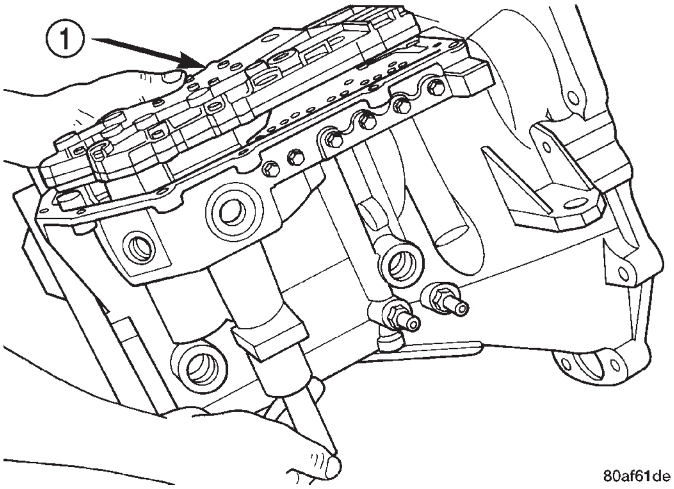


Fig. 152 Install Valve Body

1 - VALVE BODY

(64) Install and torque valve body-to-case bolts to 12 N·m (105 in. lbs.) (Fig. 153).

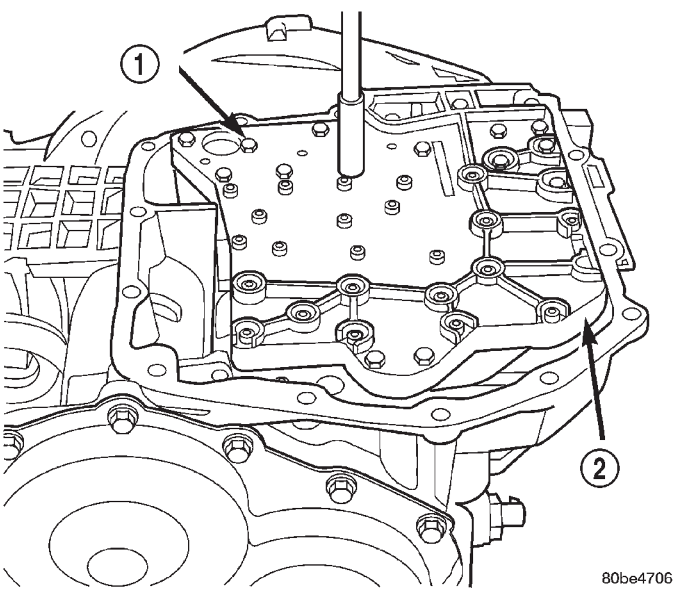


Fig. 153 Install Valve Body-to-Case Bolts

1 - VALVE BODY ATTACHING BOLTS (18)
2 - VALVE BODY

(65) Install oil filter and new o-ring (Fig. 154).

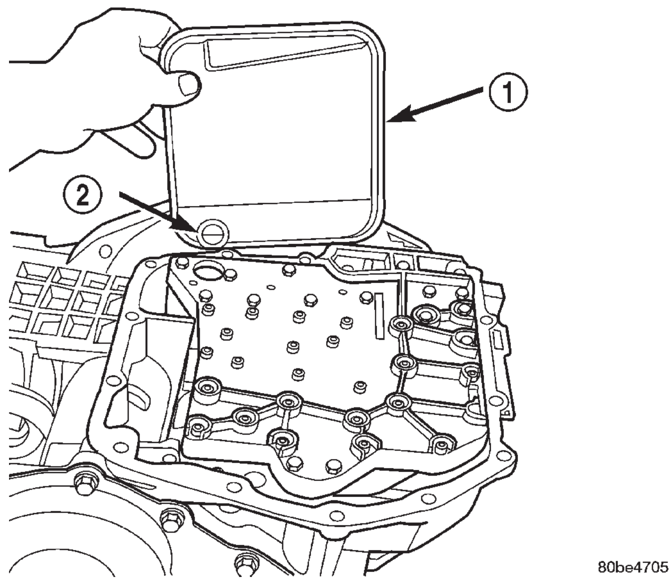


Fig. 154 Install Oil Filter

1 - OIL FILTER
2 - O-RING

(66) Apply an 1/8" bead of Mopar® ATF RTV (MS-GF41) to oil pan and immediately install to case (Fig. 155).

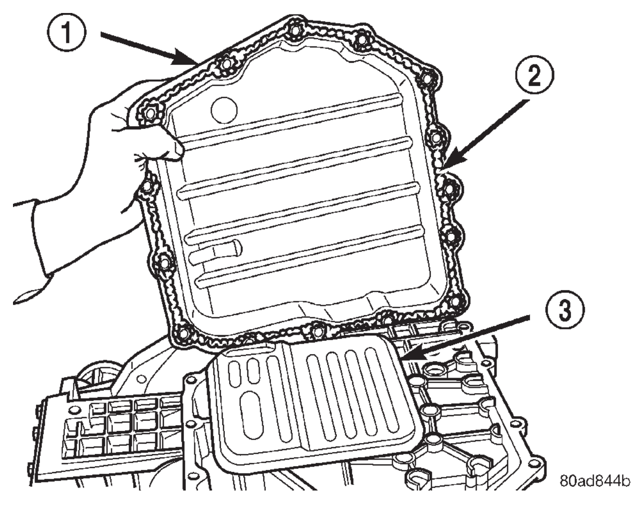


Fig. 155 Install Oil Pan

1 - OIL PAN
2 - 1/8 INCH BEAD OF MOPAR® ATF RTV (MS-GF41)
3 - OIL FILTER

(67) Install oil pan-to-case bolts and torque to 19 N·m (165 in. lbs.).

41TE AUTOMATIC TRANSAXLE (Continued)

(68) Install solenoid/pressure switch assembly and gasket to case (Fig. 156).

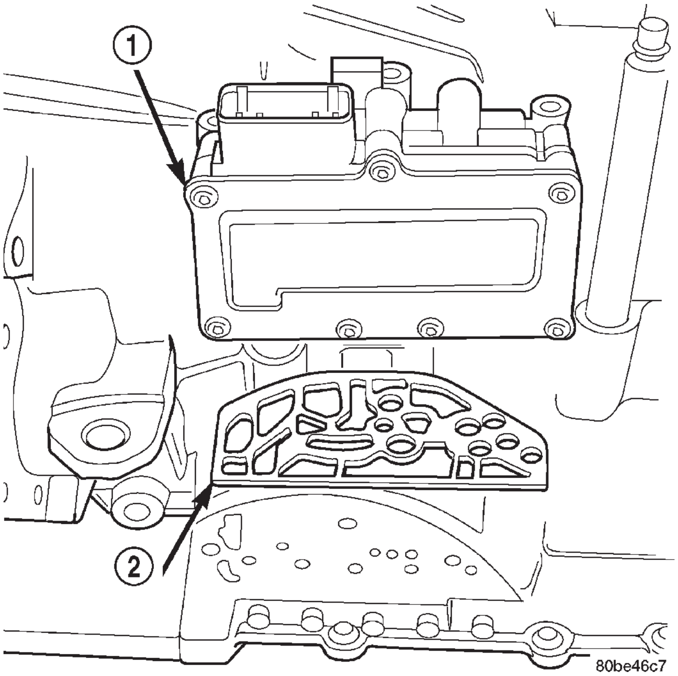


Fig. 156 Solenoid/Pressure Switch Assembly and Gasket

1 - SOLENOID/PRESSURE SWITCH ASSEMBLY
2 - GASKET

(69) Install and tighten solenoid/pressure switch assembly-to-transaxle case bolts to 12 N·m (110 in. lbs.) (Fig. 157).

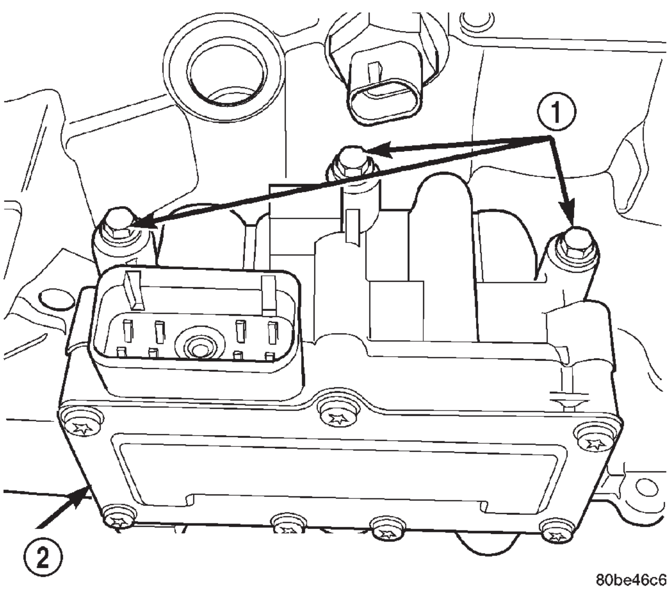


Fig. 157 Attaching Bolts

1 - BOLTS
2 - SOLENOID AND PRESSURE SWITCH ASSEMBLY

(70) Install and torque input and output speed sensors to case to 27 N·m (20 ft. lbs.).

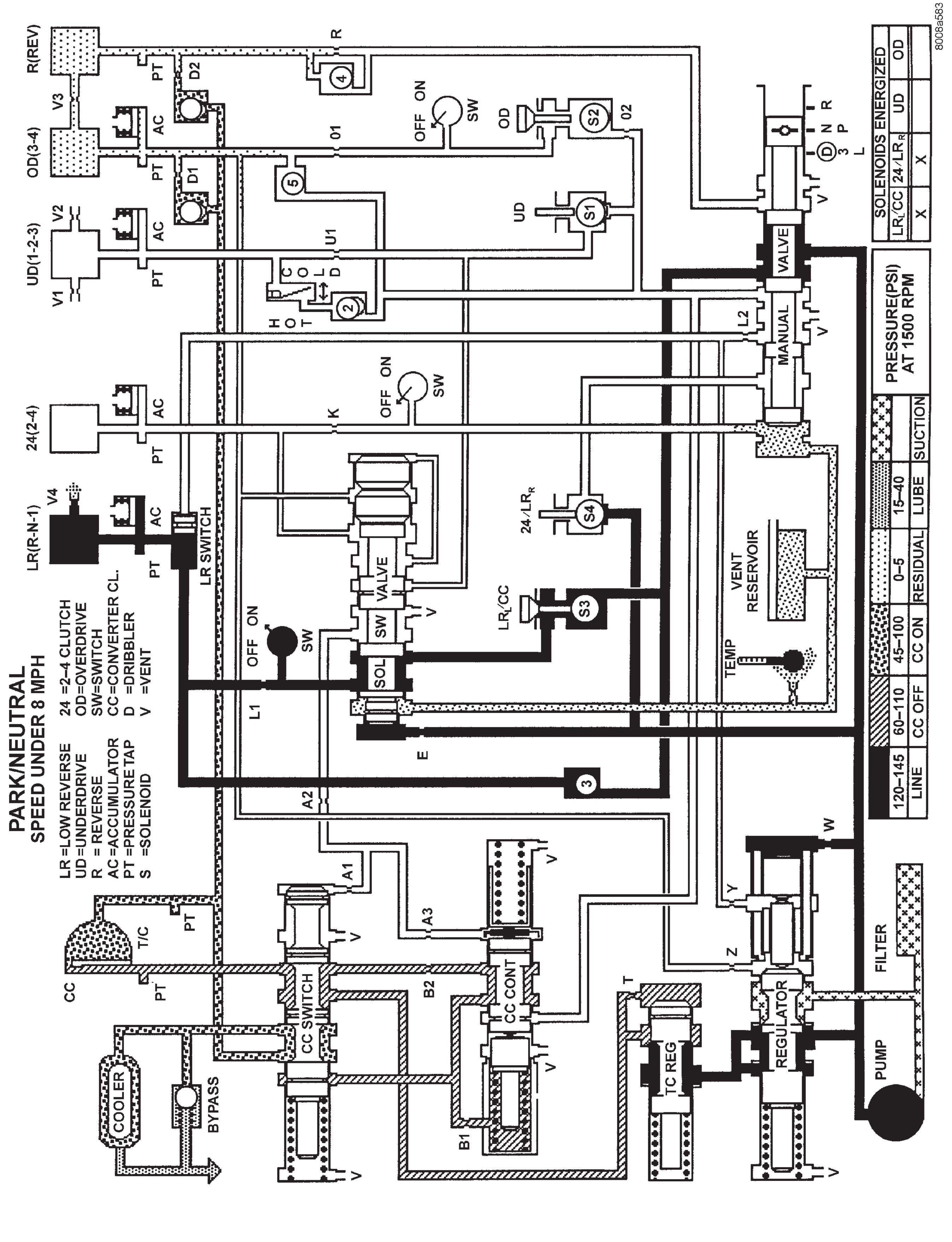
INSTALLATION

(1) Install transaxle to engine. Install and torque transaxle-to-engine bolts to 95 N·m (70 ft. lbs.).
(2) Install upper mount to transaxle.
(3) Raise engine/transaxle assembly into position and install thru bolt. Torque thru bolt to 70 N·m (55 ft. lbs.).
(4) Remove transmission jack and screw jack.
(5) Install torque converter bolts.
(6) Install torque converter dust shield.
(7) Install starter motor assembly and lower bolt.
(8) Install front mount/bracket assembly.
(9) Install rear mount/bracket assembly.
(10) Install halfshafts. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)
(11) Lower vehicle.
(12) Install starter upper bracket-to-block bolt.
(13) Connect oxygen sensor harness connector.
(14) Install throttle body support bracket (if equipped).
(15) Connect crankshaft position sensor connector (if equipped).
(16) Connect gearshift cable to manual valve lever.
(17) Connect output speed sensor connector.
(18) Connect input speed sensor connector.
(19) Connect transmission range sensor connector.
(20) Connect solenoid/pressure switch assembly connector.
(21) Connect transaxle oil cooler lines using service splice kit. Refer to instructions provided with kit.
(22) Install dipstick tube.
(23) Install air cleaner assembly.
(24) Connect battery negative cable.

41TE AUTOMATIC TRANSAXLE (Continued)

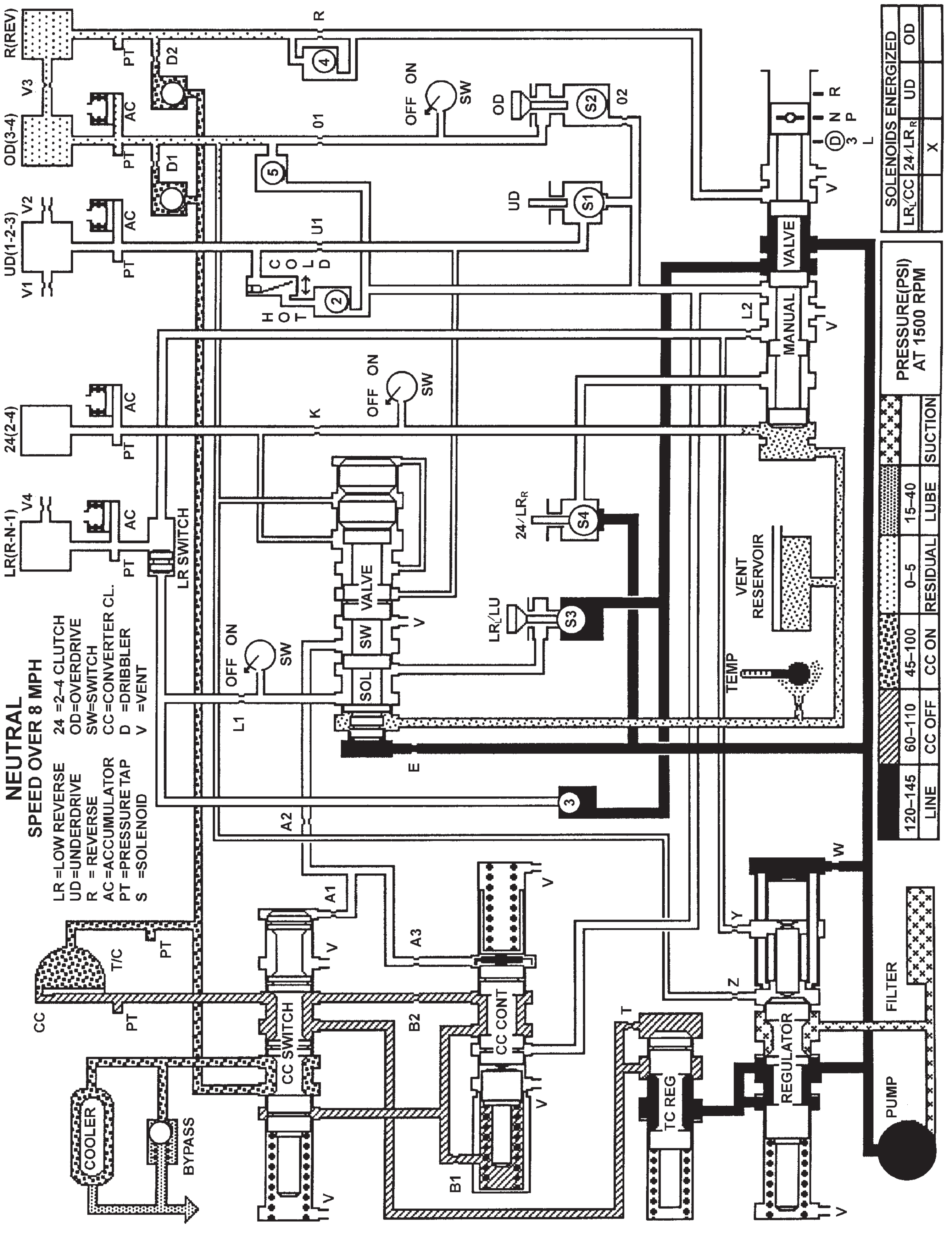
SCHEMATICS AND DIAGRAMS

41TE TRANSAXLE HYDRAULIC SCHEMATICS



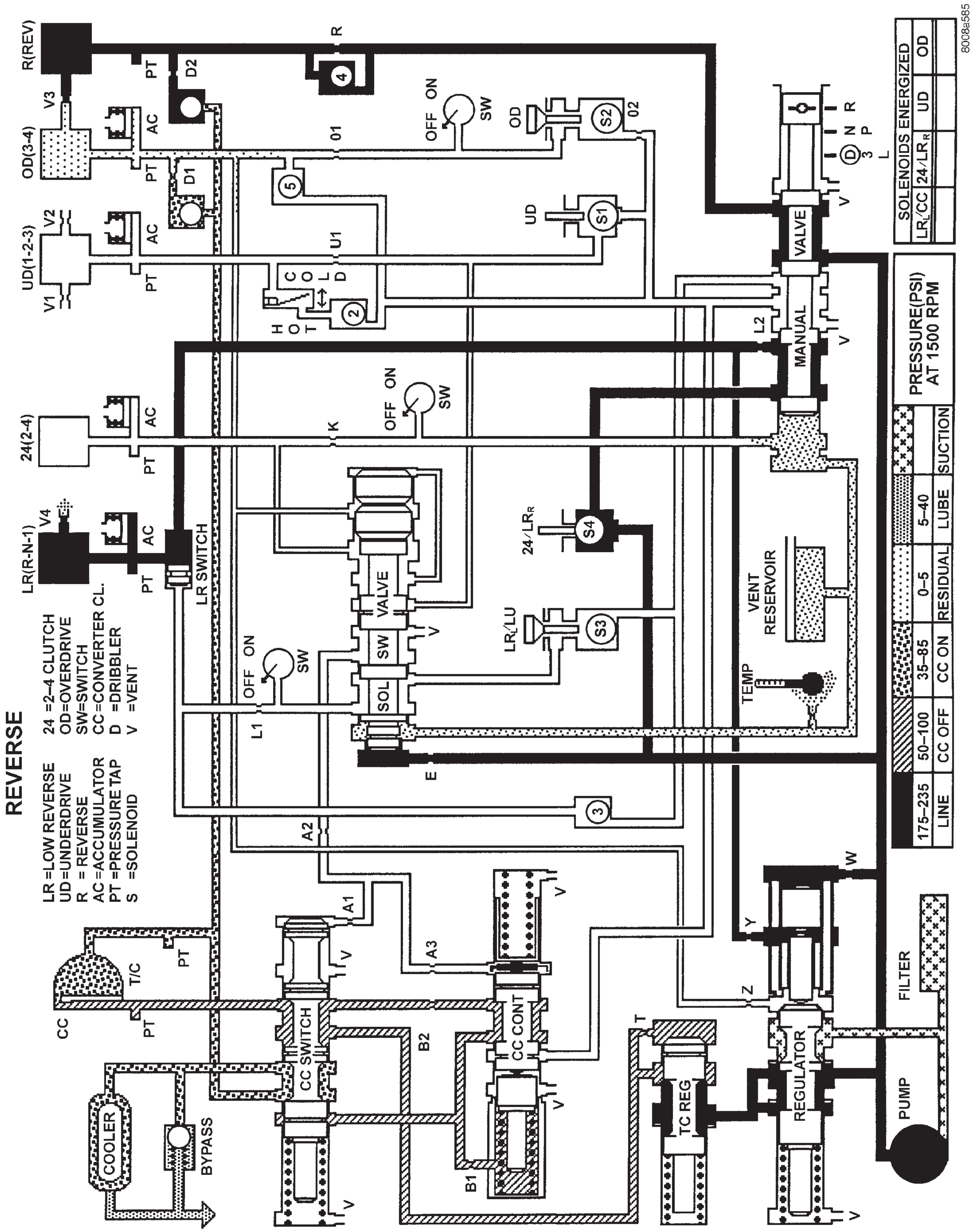
Park/Neutral (Speed Under 8 MPH)

41TE AUTOMATIC TRANSAXLE (Continued)



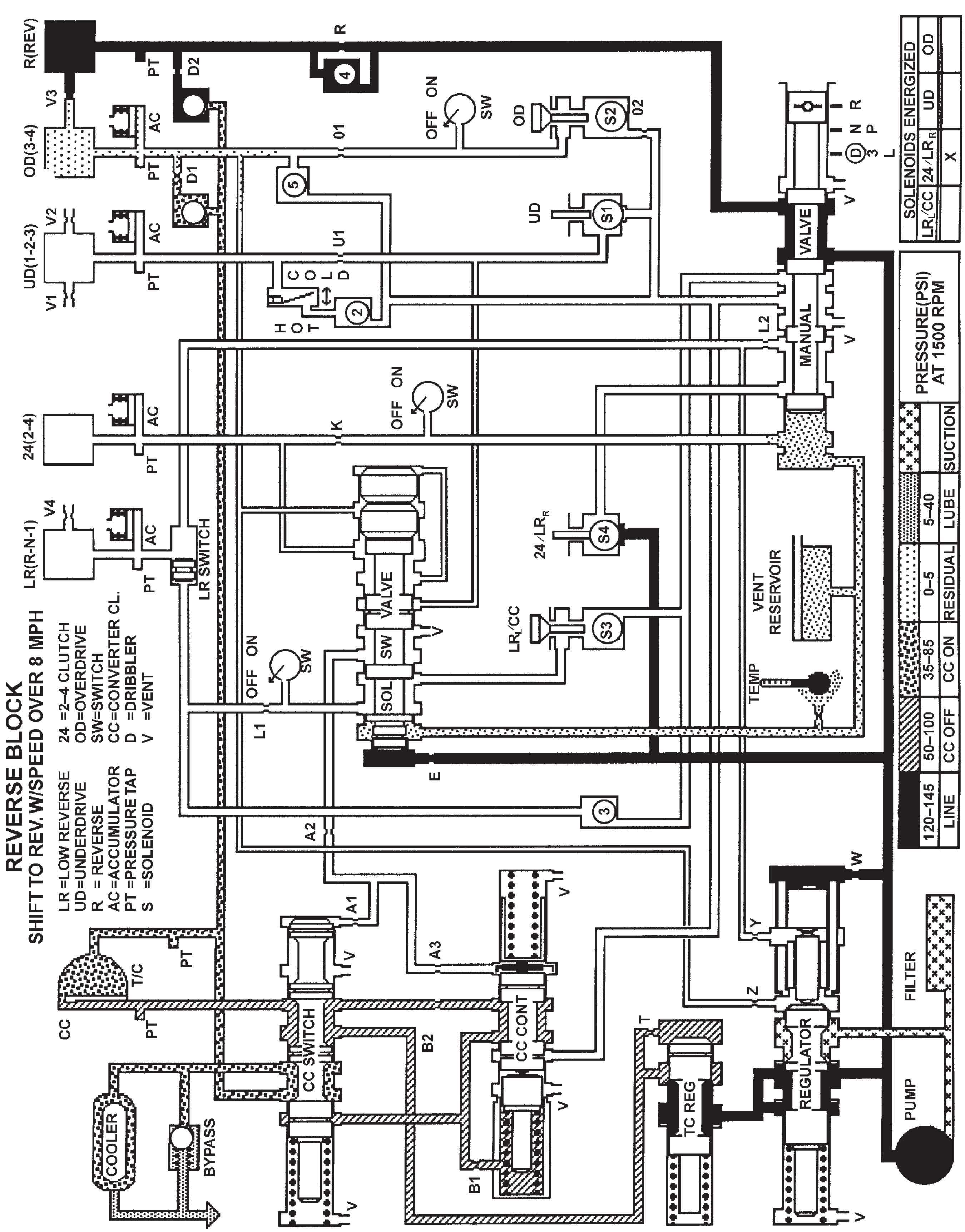
Neutral (Speed Over 8 MPH)

41TE AUTOMATIC TRANSAXLE (Continued)



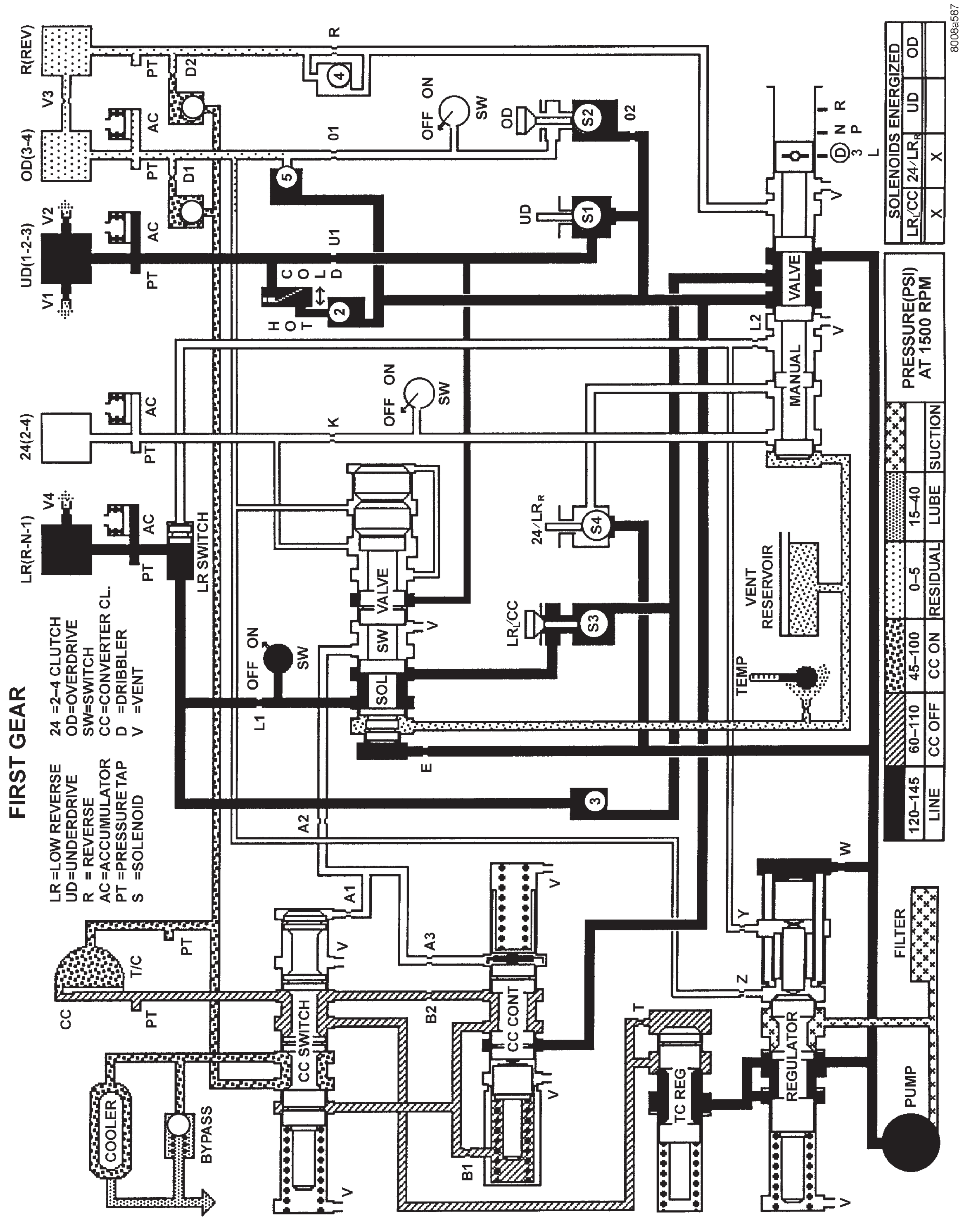
Reverse

41TE AUTOMATIC TRANSAXLE (Continued)



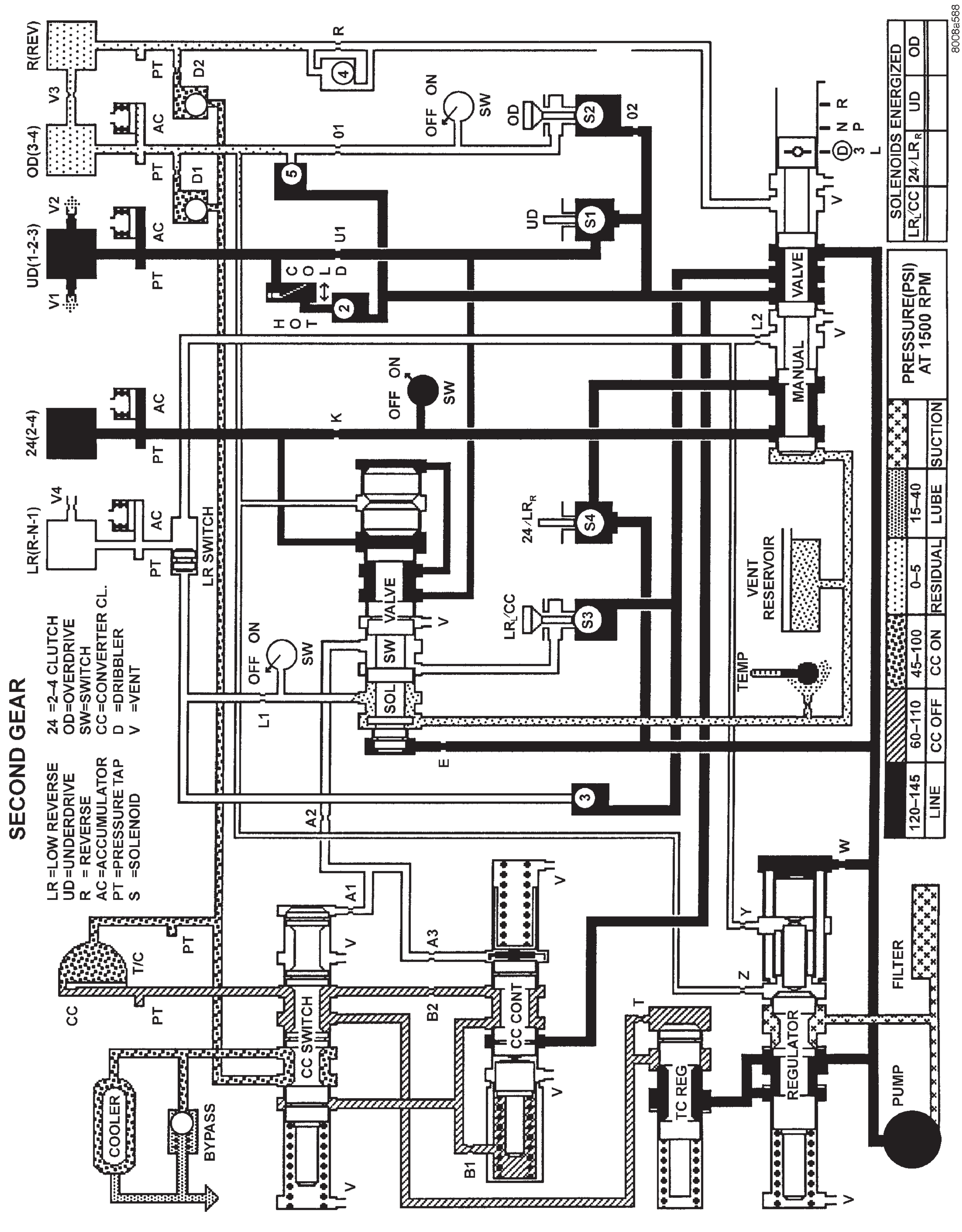
Reverse Block (Shift to Reverse W/Speed Over 8 mph)

41TE AUTOMATIC TRANSAXLE (Continued)



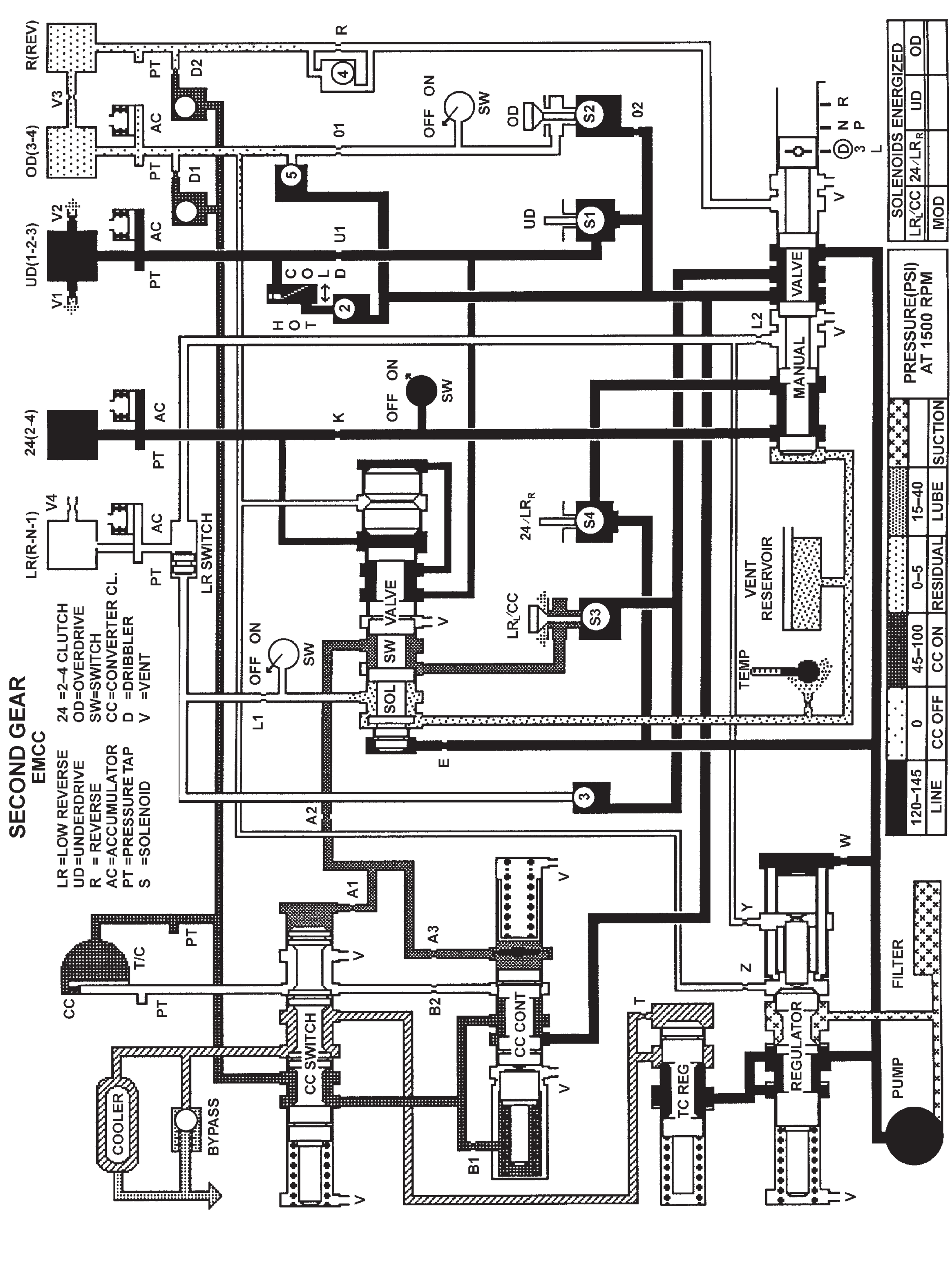
First Gear

41TE AUTOMATIC TRANSAXLE (Continued)



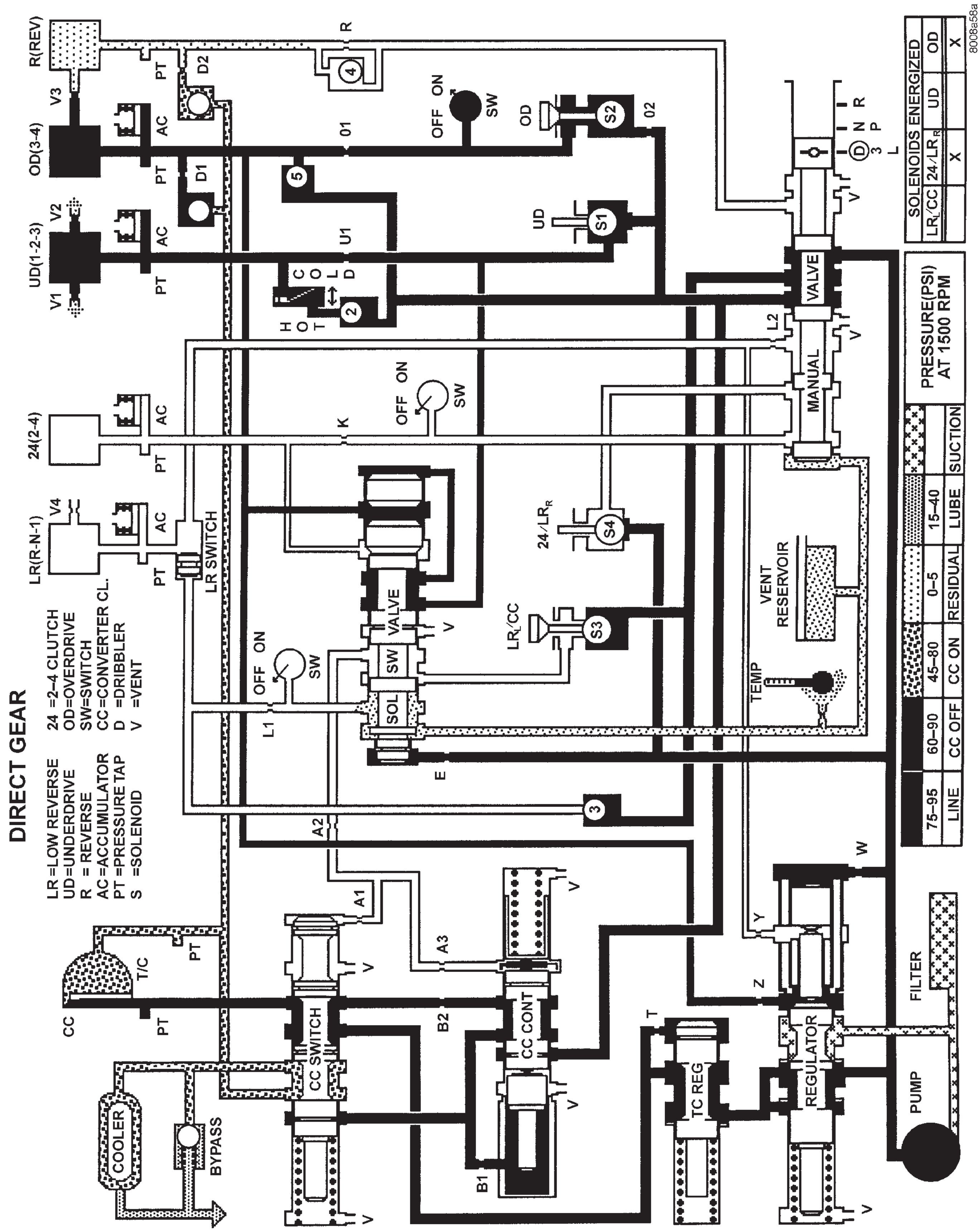
Second Gear

41TE AUTOMATIC TRANSAXLE (Continued)



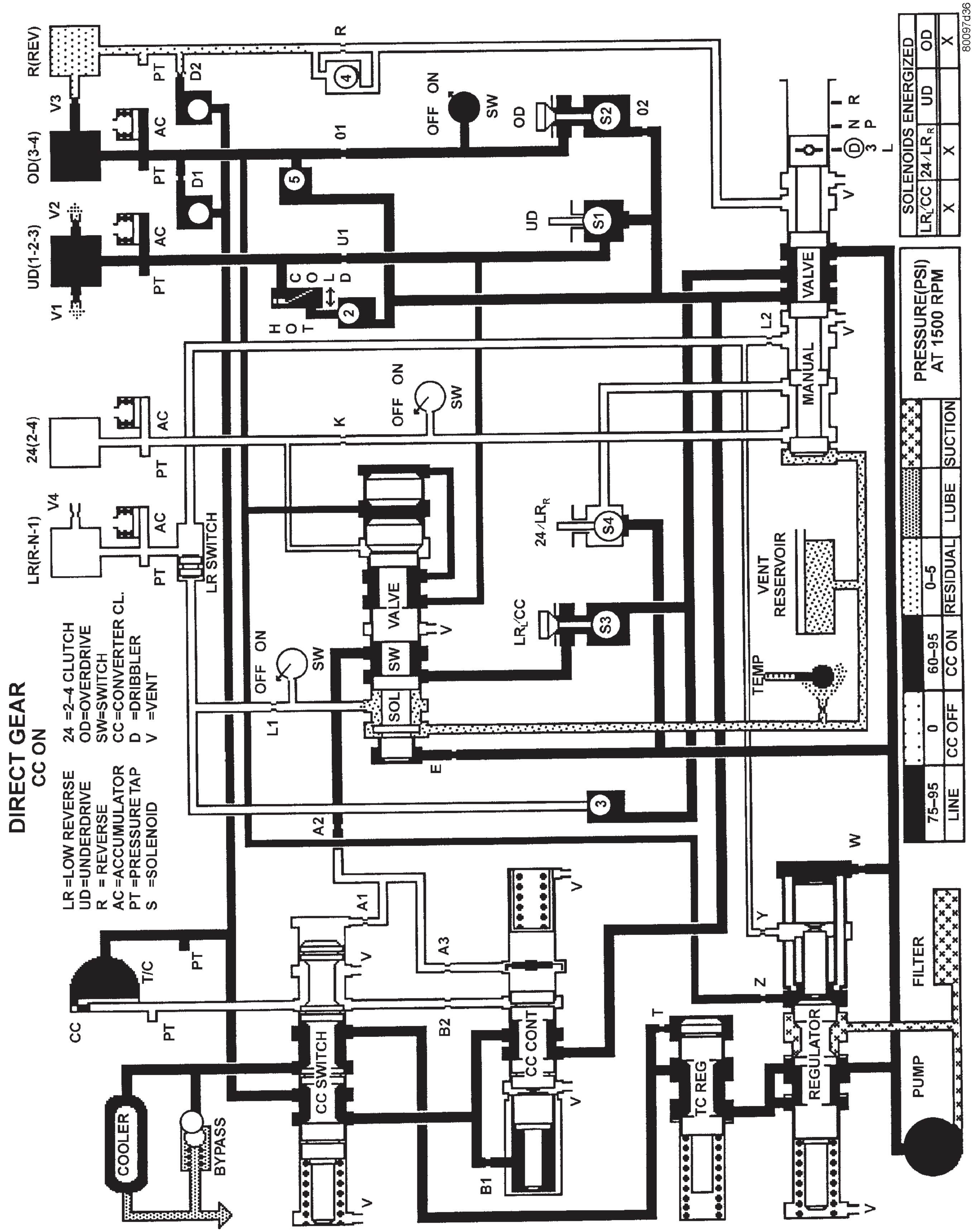
Second Gear (EMCC)

41TE AUTOMATIC TRANSAXLE (Continued)



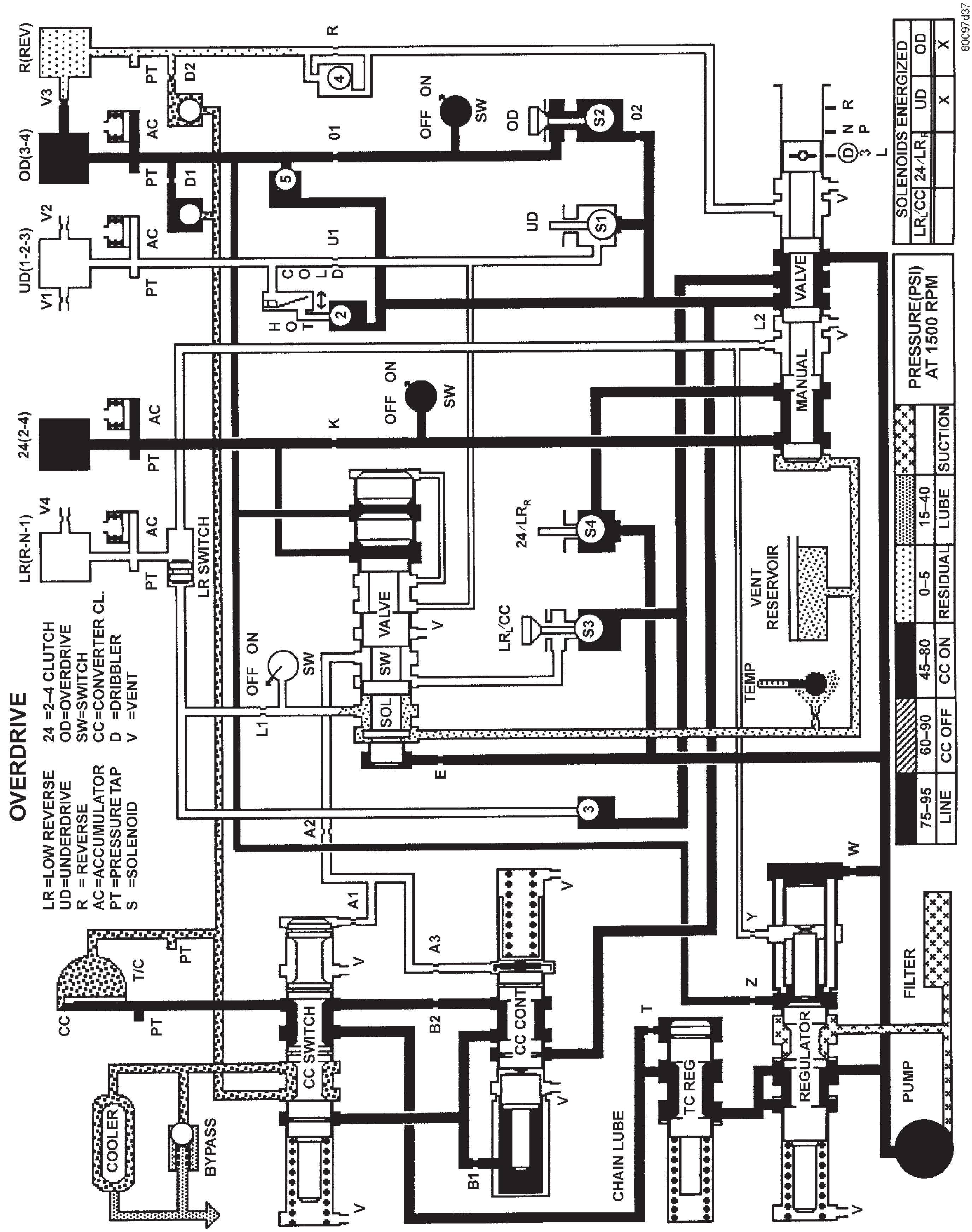
Direct Gear

41TE AUTOMATIC TRANSAXLE (Continued)



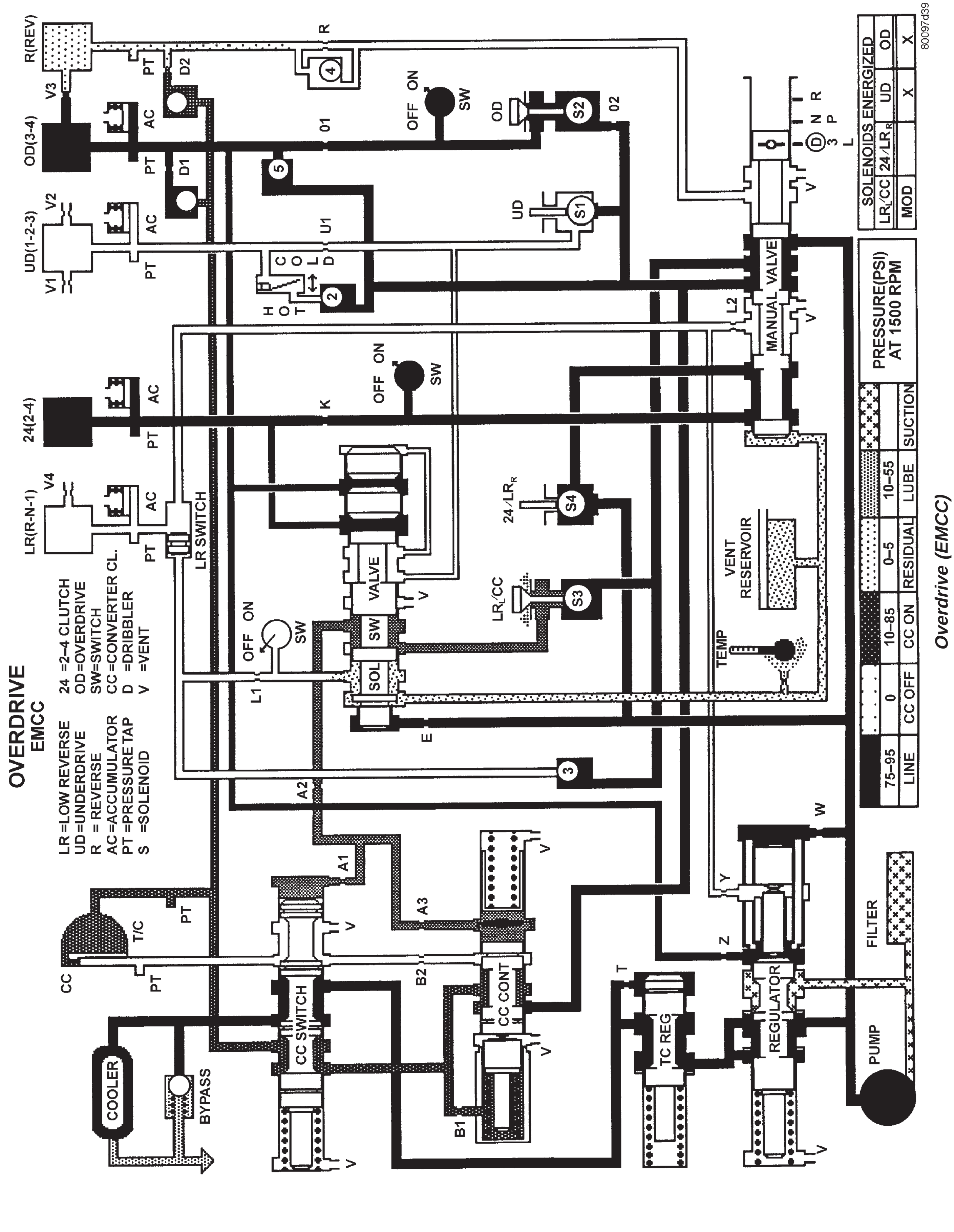
Direct Gear (CC On)

41TE AUTOMATIC TRANSAXLE (Continued)



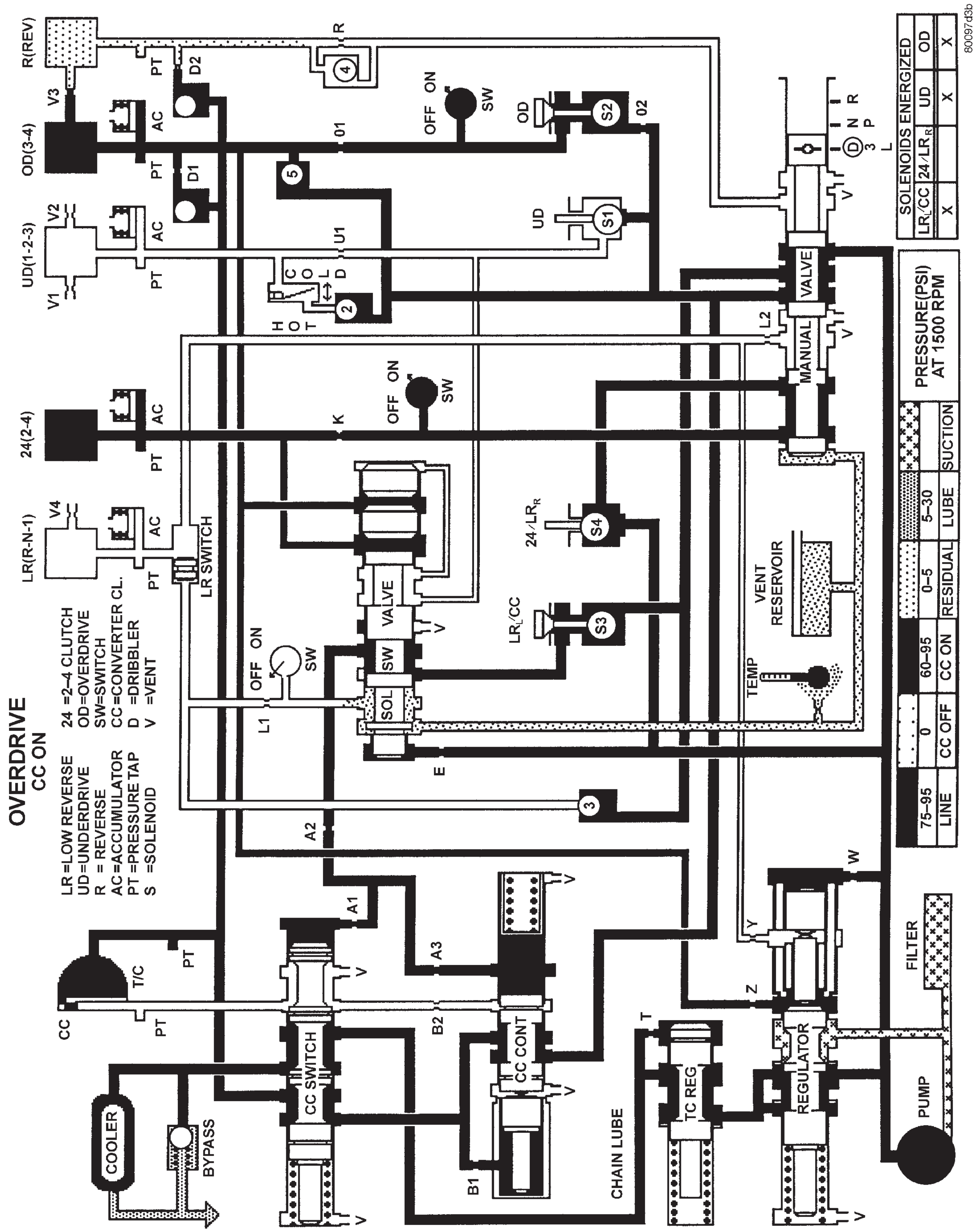
Overdrive

41TE AUTOMATIC TRANSAXLE (Continued)



Overdrive (EMCC)

41TE AUTOMATIC TRANSAXLE (Continued)



Overdrive (CC On)

41TE AUTOMATIC TRANSAXLE (Continued)

SPECIFICATIONS - 41TE TRANSAXLE

GENERAL SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Transaxle Type	Fully adaptive, electronically controlled, four speed automatic with torque converter and integral differential
Cooling Method	Air-to-oil heat exchanger
Lubrication	Pump (internal-external gear-type

GEAR RATIOS

DESCRIPTION	SPECIFICATION
First Gear	2.84
Second Gear	1.57
Direct Gear	1.00
Overdrive Gear	0.69
Reverse Gear	2.21

BEARING SETTINGS (END PLAY & TURNING TORQUE)

DESCRIPTION	METRIC	STANDARD
Differential Assembly	0.6-2 N·m	5-18 in. lbs.
Output Hub	0.3-2 N·m	3-8 in. lbs.
Transfer Shaft (End Play)	0.051-0.102 mm	0.002-0.004 in.
Overall Drag At Output Hub	0.3-1.9 N·m	3-16 in. lbs.

CLUTCH CLEARANCES

DESCRIPTION	METRIC	STANDARD
Low/Rev Clutch (Select Reaction Plate)	0.89-1.47 mm	0.035-0.058 in.
Two/Four Clutch (No Selection)	0.76-2.64 mm	0.030-0.104 in.
Reverse Clutch (Select Snap Ring)	0.89-1.37 mm	0.035-0.054 in.
Overdrive Clutch (No Selection)	1.07-3.25 mm	0.042-0.128 in.
Underdrive Clutch (Select Pressure Plate)	0.94-1.50 mm	0.037-0.059 in.

OIL PUMP CLEARANCES

DESCRIPTION	METRIC	STANDARD
Outer Gear-to-Crescent	0.060-0.298 mm	0.0023-0.0117 in.
Inner Gear-to-Crescent	0.093-0.385 mm	0.0036-0.0151 in.
Outer Gear-to-Pocket	0.089-0.202 mm	0.0035-0.0079 in.
Outer Gear Side Clearance	0.020-0.046 mm	0.0008-0.0018 in.
Inner Gear Side Clearance	0.020-0.046 mm	0.0008-0.0018 in.

41TE AUTOMATIC TRANSAXLE (Continued)

INPUT SHAFT

DESCRIPTION	METRIC	SPECIFICATION
End Play	0.127-0.635mm	0.005-0.025 in.

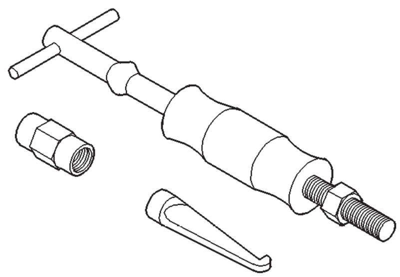
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Bolt, Differential Cover-to-Case	19	—	165
Bolt, Differential Ring Gear-to-Case	95	70	—
Bolt, Differential Bearing Retainer-to-Case	28	21	—
Bolt, Driveplate-to-Crankshaft	95	70	—
Bolt, Extension Housing/ Plate-to-Case	28	21	—
Bolt, Oil Pan-to-Case	19	—	165
Bolt, Output Gear	271	200	—
Bolt, Output Gear Stirrup/Strap	23	17	—
Bolt, Oil Pump-to-Case	27	20	—
Bolt, Reaction Support-to-Case	27	20	—
Bolt, Solenoid/Pressure Switch Assy.-to-Case	12	—	110
Bolt, Torque Converter-to-Driveplate	75	55	—
Bolt, Transfer Gear Cover	20	—	175
Bolt, Valve Body-to-Case	12	—	105
Fitting, Oil Cooler Line	12	—	105
Nut, Tranfer Gear	271	200	—
Tap, Transaxle Pressure	5	—	45
Screw, L/R Clutch Retainer	5	—	45
Screw, Solenoid/Pressure Switch Assy. Connector	4	—	35
Screw, Valve Body-to-Transfer Plate	5	—	45
Sensor, Input Speed	27	20	—
Sensor, Output Speed	27	20	—
Sensor, Transmission Range Sensor	5	—	45

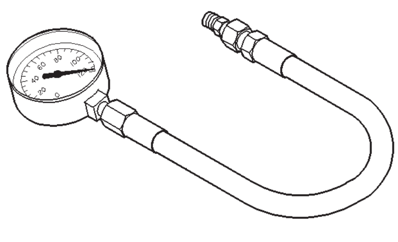
41TE AUTOMATIC TRANSAXLE (Continued)

SPECIAL TOOLS

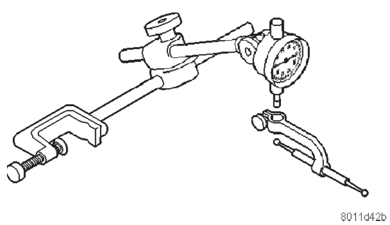
41TE AUTOMATIC TRANSAXLE



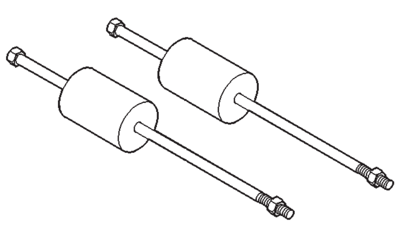
Puller C-637



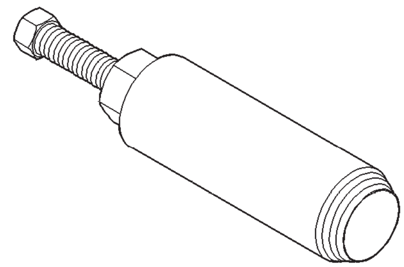
Pressure Gauge (High) C-3293SP



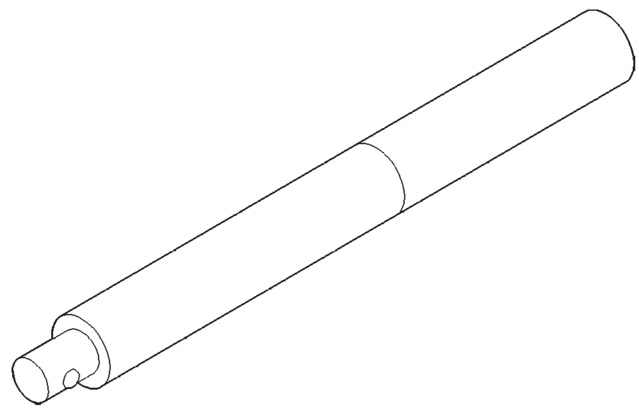
Dial Indicator C-3339



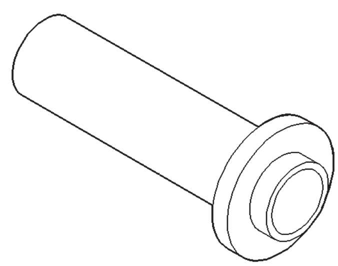
Oil Pump Puller C-3752



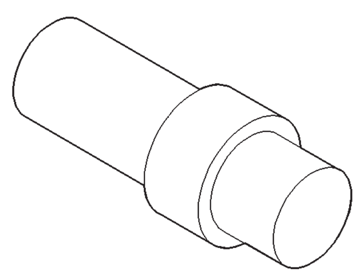
Seal Puller C-3981B



Universal Handle C-4171

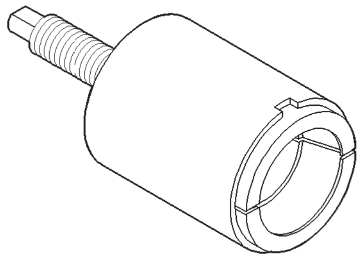


Seal Installer C-4193A

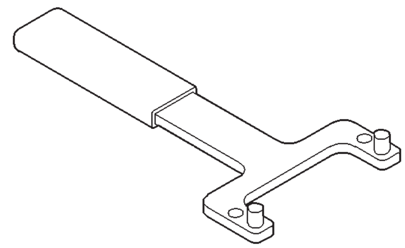


Adapter C-4996

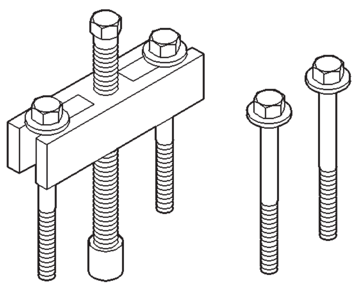
41TE AUTOMATIC TRANSAXLE (Continued)



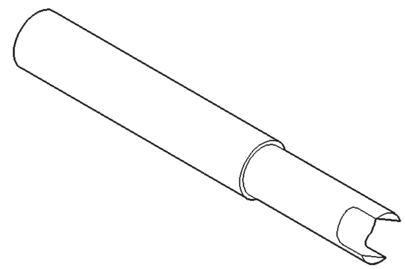
Remover Kit L-4406



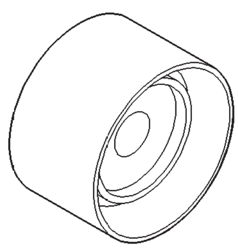
Bearing Puller L-4435



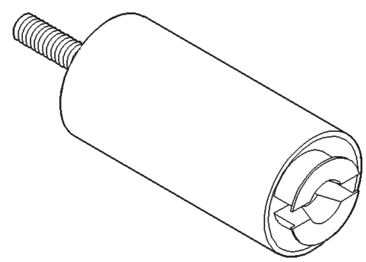
Gear Puller L-4407A



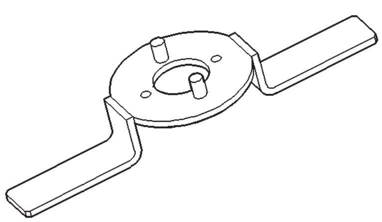
Differential Tool L-4436A



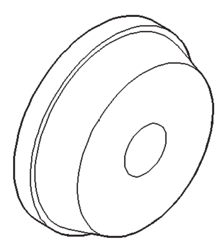
Bearing Installer L-4410



Special Jaw Set L-4518

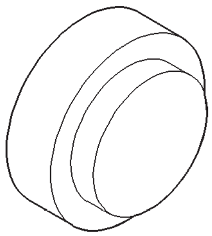


Gear Checking Plate L-4432

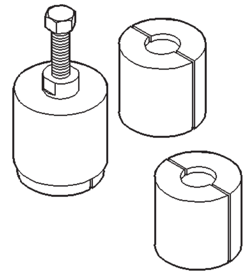


Installer L-4520

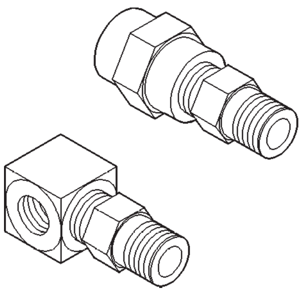
41TE AUTOMATIC TRANSAXLE (Continued)



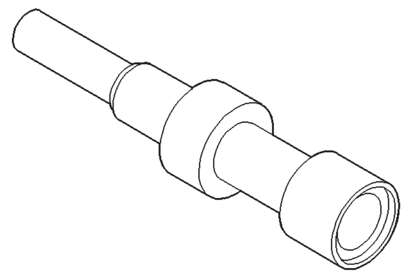
Thrust Button L-4539-2



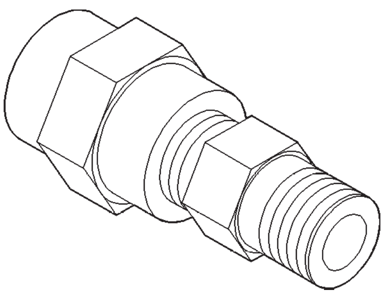
Puller Set 5048



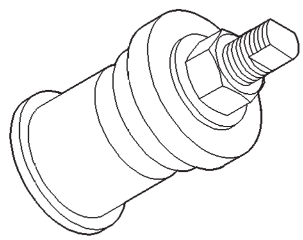
Adapter L-4559



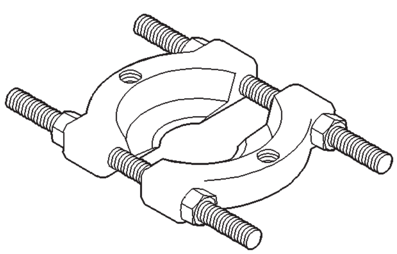
Remover/Installer 5049-A



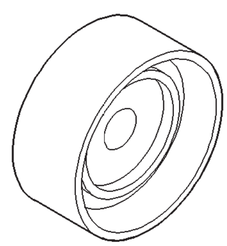
Adapter L-4559-2



Installer 5050A

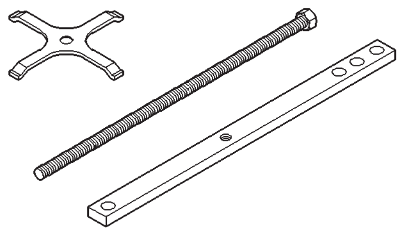


Bearing Splitter P-334

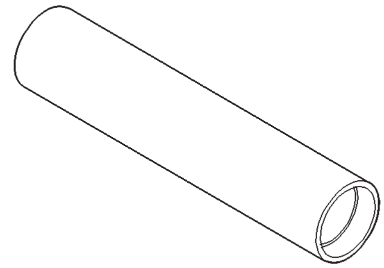


Installer 5052

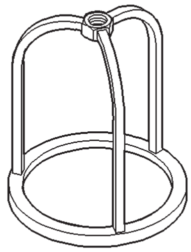
41TE AUTOMATIC TRANSAXLE (Continued)



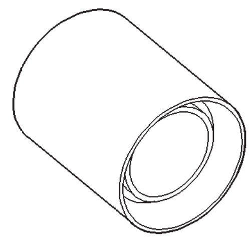
Compressor 5058A



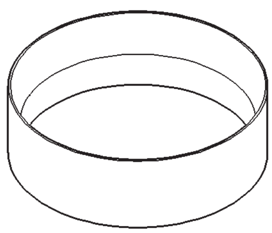
Installer 6052



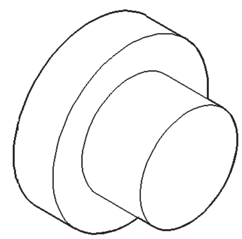
Compressor 5059-A



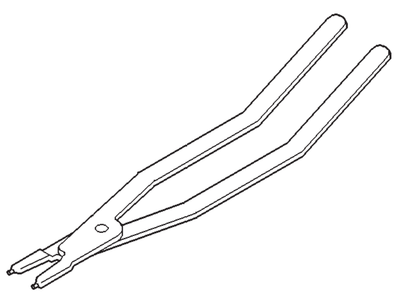
Installer 6053



Installer 5067



Button 6055



Pliers 6051

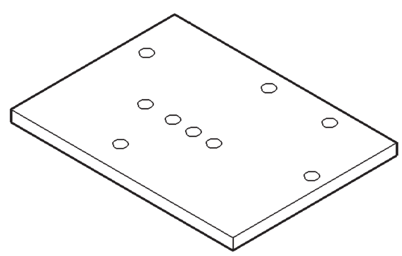
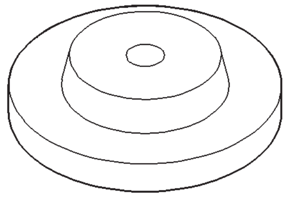
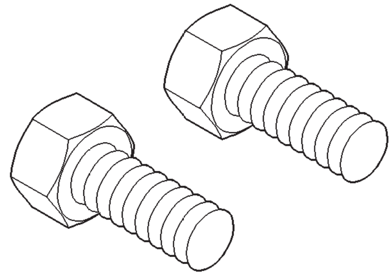


Plate 6056

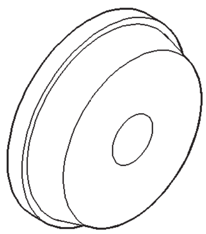
41TE AUTOMATIC TRANSAXLE (Continued)



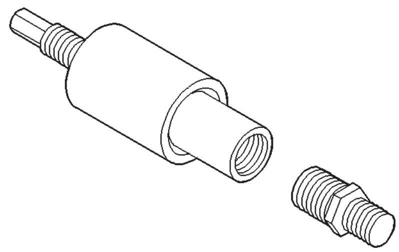
Disk 6057



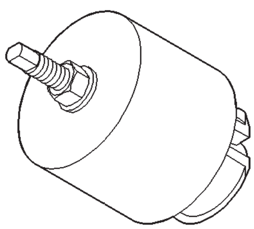
Bolt 6260



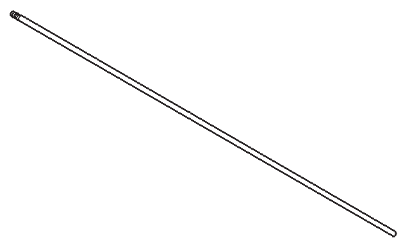
Installer 6061



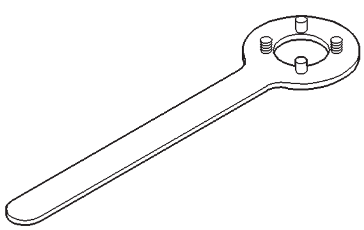
Installer 6261



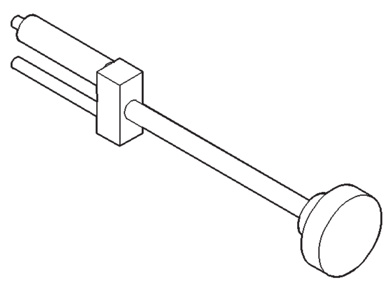
Remover 6062-A



Tip 6268

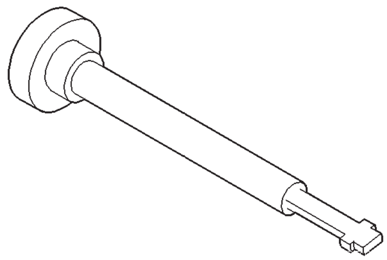


Holder 6259

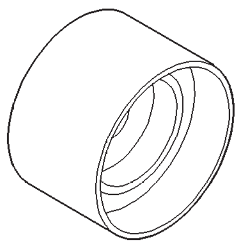


Remover/Installer 6301

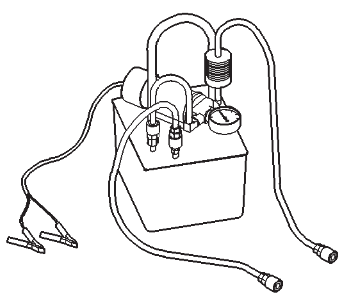
41TE AUTOMATIC TRANSAXLE (Continued)



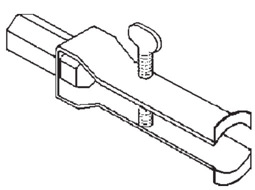
Remover/Installer 6302



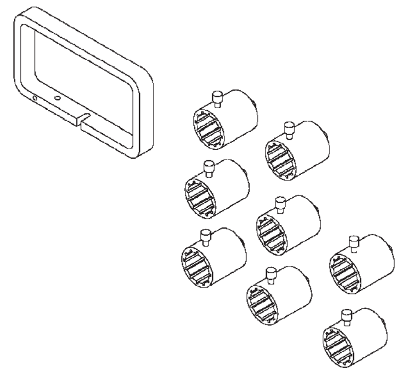
Installer 6536-A



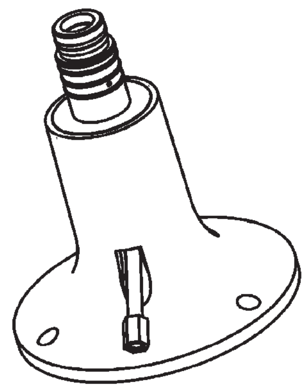
Cooler Flusher 6906A



Puller 7794-A



End Play Socket Set 8266



Input Clutch Pressure Fixture 8391

ACCUMULATOR

DESCRIPTION

The 41te underdrive, overdrive, low/reverse, and 2/4 clutch hydraulic circuits each contain an accumulator. An accumulator typically consists of a piston, seals, return spring(s), and a cover or plug. The overdrive and underdrive accumulators are located within the transaxle case, and are retained by the valve body (Fig. 158) .

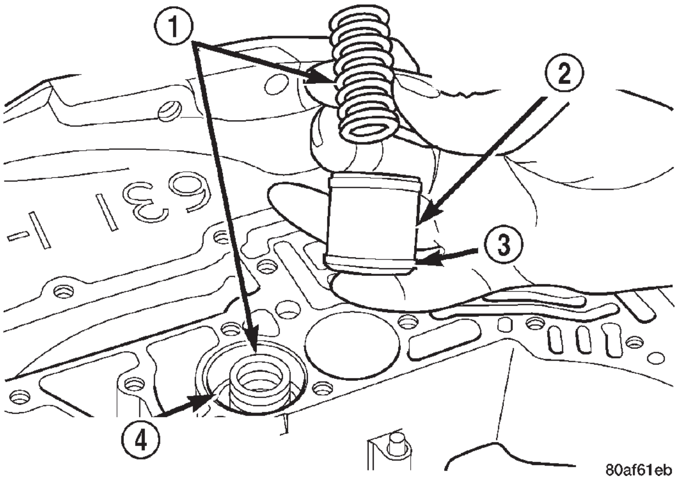


Fig. 158 Underdrive and Overdrive Accumulators

1 - RETURN SPRING
2 - UNDERDRIVE CLUTCH ACCUMULATOR
3 - SEAL RING (2)
4 - OVERDRIVE CLUTCH ACCUMULATOR

The low reverse accumulator (Fig. 159) is also located within the transaxle case, but the assembly is retained by a cover and a snap-ring.

The 2/4 accumulator is located in the valve body. It is retained by a cover and retaining screws (Fig. 160).

OPERATION

The function of an accumulator is to cushion the application of a frictional clutch element. When pressurized fluid is applied to a clutch circuit, the application force is dampened by fluid collecting in the respective accumulator chamber against the piston and spring(s). The intended result is a smooth, firm clutch application.

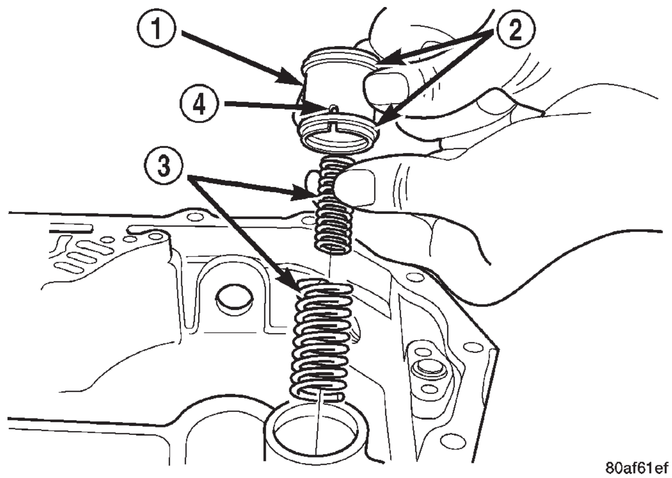


Fig. 159 Low/Reverse Accumulator Assembly

1 - ACCUMULATOR PISTON
2 - SEAL RINGS
3 - RETURN SPRINGS
4 - (NOTE NOTCH)

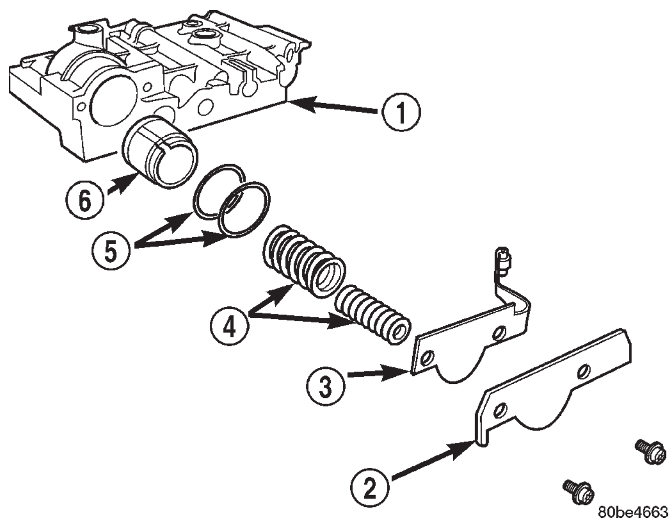


Fig. 160 2/4 Accumulator Assembly

1 - VALVE BODY
2 - RETAINER PLATE
3 - DETENT SPRING
4 - SPRINGS
5 - SEALS
6 - PISTON

AUTOSTICK SWITCH

DESCRIPTION

Autostick is a driver–interactive transaxle feature that offers manual gear shifting capability of an automatic transaxle.

OPERATION

When the shifter is moved into the Autostick position, the transaxle remains in whatever gear it was using before Autostick was activated. Moving the shifter to the left (towards the driver) causes a downshift and moving to the right (towards the passenger) causes an upshift. The instrument cluster will illuminate the selected gear. The vehicle can be launched in 1st, 2nd, or 3rd gear while in the Autostick mode. The speed control is operable in 3rd and 4th gear Autostick mode. Speed control will be deactivated if the transaxle is shifted to 2nd gear. Shifting into OD position cancels the Autostick mode, and the transaxle resumes the OD shift schedule.

AUTOMATIC OVERRIDES

For safety, durability, and driveability, some shifts are executed automatically or prevented.

AUTOMATIC SHIFTS WILL OCCUR UNDER THE FOLLOWING CONDITIONS

TYPE OF SHIFT	APPROXIMATE SPEED
4-3 coast downshift	13 mph
3-2 coast downshift	9 mph
2-1 coast downshift	5 mph
1-2 upshift	6300 engine rpm
2-3 upshift	6300 engine rpm
4-3 kickdown shift	13-47 mph w/sufficient throttle

MANUAL SHIFTS ARE NOT PERMITTED UNDER THE FOLLOWING CONDITIONS

TYPE OF SHIFT	APPROXIMATE SHIFT POINT
3-4 upshift	Below 15 mph
3-2 downshift	Above 74 mph @ closed throttle or 70 mph otherwise
2-1 downshift	Above 41 mph @ closed throttle or 38 mph otherwise

DRIVING CLUTCHES

DESCRIPTION

Three hydraulically applied input clutches are used to drive planetary components. The underdrive, overdrive, and reverse clutches are considered input clutches and are contained within the input clutch assembly (Fig. 161). The input clutch assembly also contains:

- Input shaft
- Input hub
- Clutch retainer
- Underdrive piston
- Overdrive/reverse piston
- Overdrive hub
- Underdrive hub

OPERATION

The three input clutches are responsible for driving different components of the planetary geartrain.

NOTE: Refer to the “Elements In Use” chart in Diagnosis and Testing for a collective view of which clutch elements are applied at each position of the selector lever.

UNDERDRIVE CLUTCH

The underdrive clutch is hydraulically applied in first, second, and third (direct) gears by pressurized fluid against the underdrive piston. When the underdrive clutch is applied, the underdrive hub drives the rear sun gear.

DRIVING CLUTCHES (Continued)

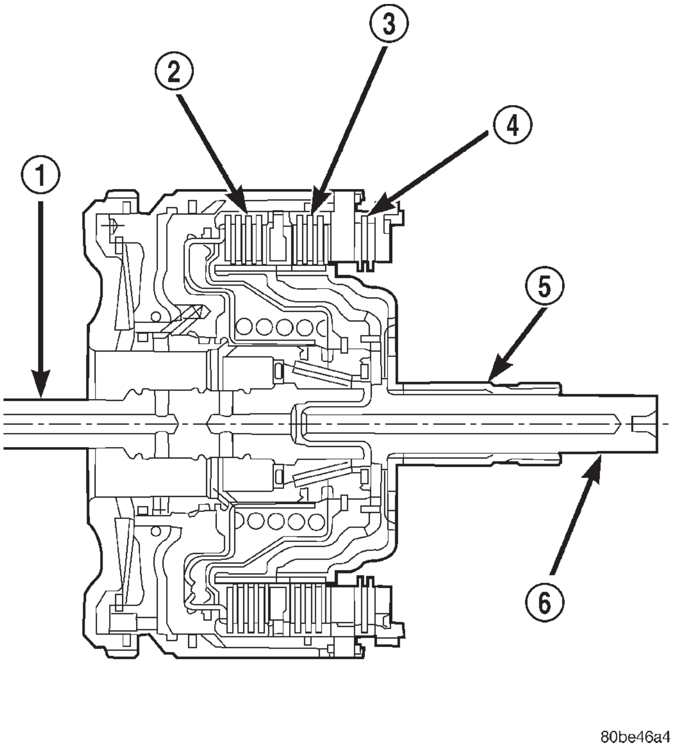


Fig. 161 Input Clutch Assembly

1 - INPUT SHAFT
2 - UNDERDRIVE CLUTCH
3 - OVERDRIVE CLUTCH
4 - REVERSE CLUTCH
5 - OVERDRIVE SHAFT
6 - UNDERDRIVE SHAFT

OVERDRIVE CLUTCH

The overdrive clutch is hydraulically applied in third (direct) and overdrive gears by pressurized fluid against the overdrive/reverse piston. When the overdrive clutch is applied, the overdrive hub drives the front planet carrier.

REVERSE CLUTCH

The reverse clutch is hydraulically applied in reverse gear only by pressurized fluid against the overdrive/reverse piston. When the reverse clutch is applied, the front sun gear assembly is driven.

FINAL DRIVE

DESCRIPTION

The 41TE differential is a conventional open design. It consists of a ring gear and a differential case. The differential case consists of pinion and side gears, and a pinion shaft. The differential case is supported in the transaxle by tapered roller bearings (Fig. 162).

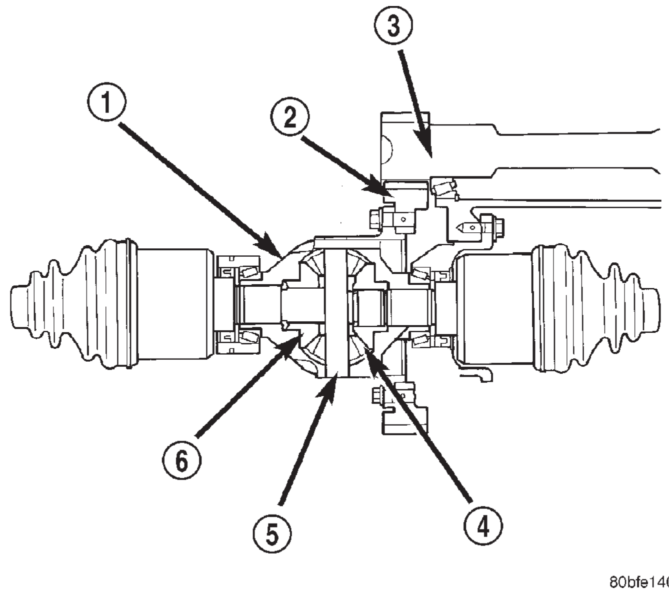


Fig. 162 Differential Assembly

1 - DIFFERENTIAL CASE
2 - RING GEAR
3 - TRANSFER SHAFT
4 - PINION GEAR
5 - PINION SHAFT
6 - SIDE GEAR

OPERATION

The differential assembly is driven by the transfer shaft by way of the differential ring gear. The ring gear drives the differential case, and the case drives the driveshafts through the differential gears. The differential pinion and side gears are supported in the case by thrust washers and a pinion shaft. Differential pinion and side gears make it possible for front tires to rotate at different speeds while cornering.

FINAL DRIVE (Continued)

DISASSEMBLY

NOTE: The differential is serviced as an assembly. The only parts that are serviceable within the differential are the differential bearing cups and cones. If any other part fails within the differential, you must replace the differential assembly along with the transfer shaft.

The transfer shaft should be removed for differential repair and bearing turning torque checking.

(1) Remove the differential cover and bolts (Fig. 163) (Fig. 164).

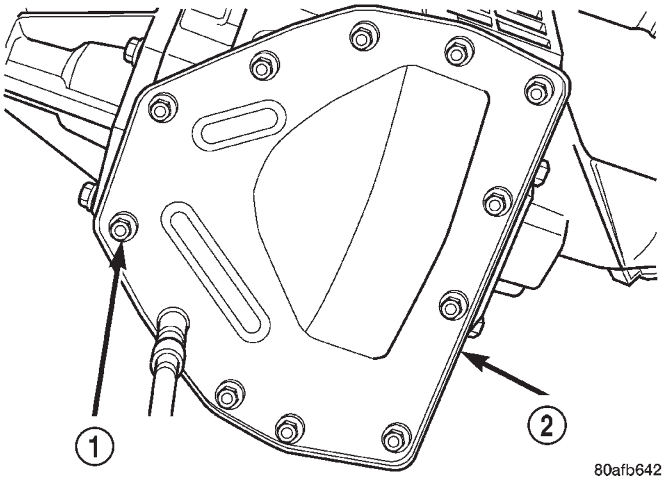


Fig. 163 Differential Cover Bolts

1 - DIFFERENTIAL COVER BOLTS
2 - DIFFERENTIAL COVER

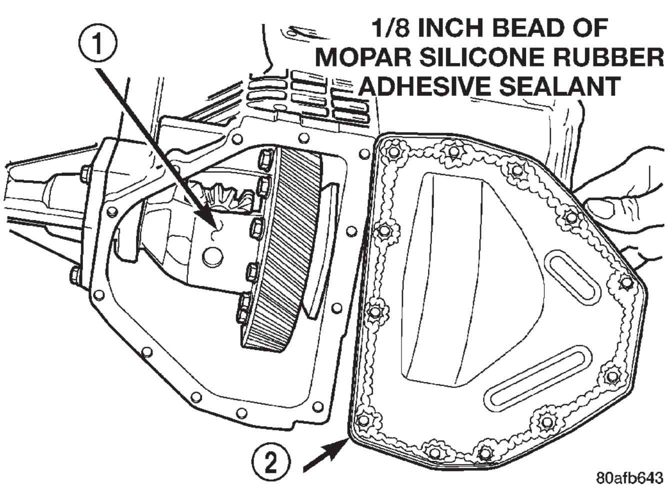


Fig. 164 Remove Differential Cover

1 - DIFFERENTIAL ASSEMBLY
2 - DIFFERENTIAL COVER

(2) Remove the differential bearing retainer and bolts (Fig. 165) (Fig. 166).

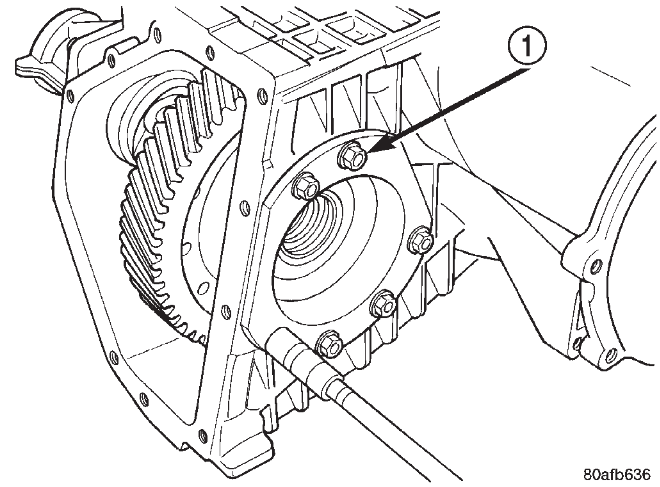


Fig. 165 Differential Retainer Bolts

1 - DIFFERENTIAL RETAINER BOLTS

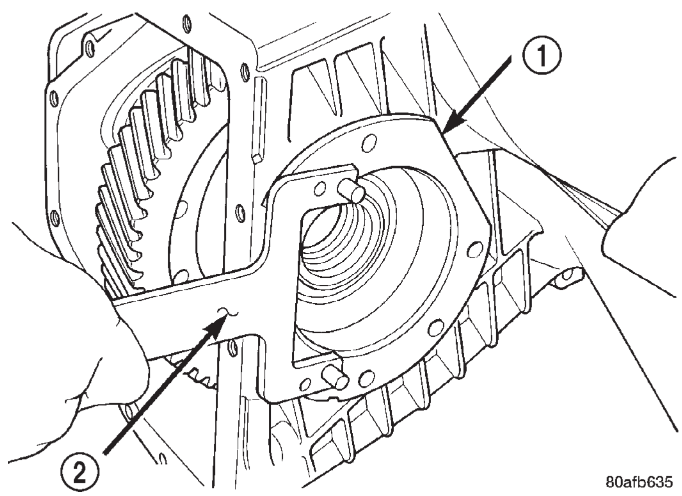


Fig. 166 Remove Bearing Retainer

1 - DIFFERENTIAL BEARING RETAINER
2 - TOOL L-4435

(3) Using a plastic hammer, remove extension housing/adapter plate on the right side of the transaxle.

WARNING: HOLD ONTO DIFFERENTIAL ASSEMBLY TO PREVENT IT FROM ROLLING OUT OF HOUSING.

FINAL DRIVE (Continued)

(4) Remove differential assembly.

(5) Set up dial indicator set C-3339 and tool C-4996 as shown in (Fig. 167) (Fig. 168) to measure side gear end play. **Side gear end play must be within 0.001-0.013 in.**

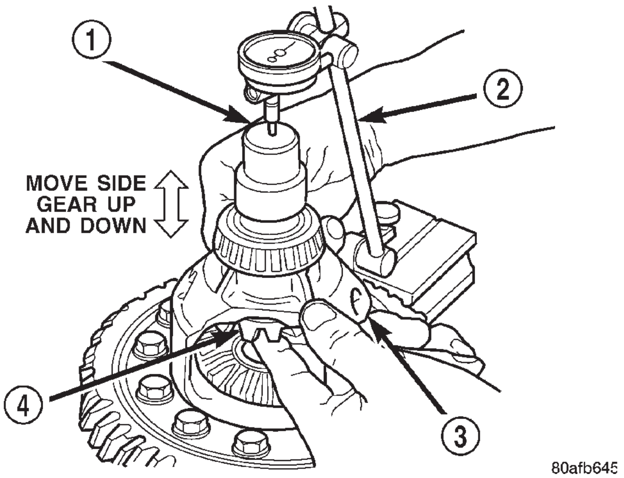


Fig. 167 Checking Side Gear End Play (Extension Housing Side)

1 - SPECIAL TOOL C-4996 (NOTE POSITION)
2 - DIAL INDICATOR SET
3 - DIFFERENTIAL ASSEMBLY
4 - SIDE GEAR

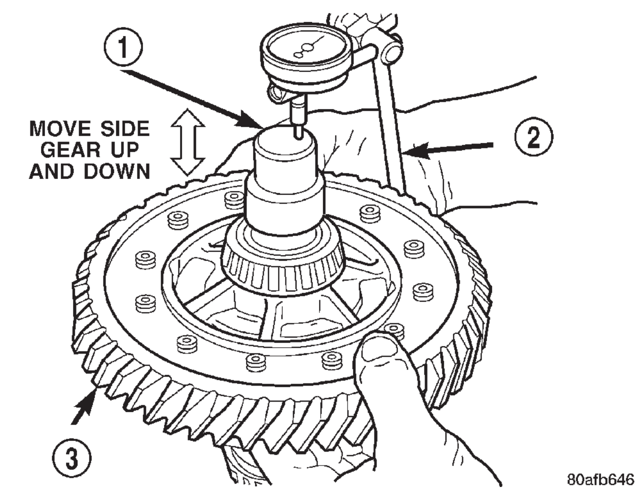


Fig. 168 Checking Side Gear End Play (Ring Gear Side)

1 - SPECIAL TOOL C-4996 (NOTE POSITION)
2 - DIAL INDICATOR SET
3 - DIFFERENTIAL ASSEMBLY

(6) Use Miller Special Tool 5048, 5048-3 Collets, and L-4539-2 Button to remove the differential bearing cone on the extension housing side.

(7) Use Miller Special Tool 5048, 5048-4 Collets, and L-4539-2 Button to remove the differential bearing cone on the bearing retainer side (Fig. 169) (Fig. 170) (Fig. 171).

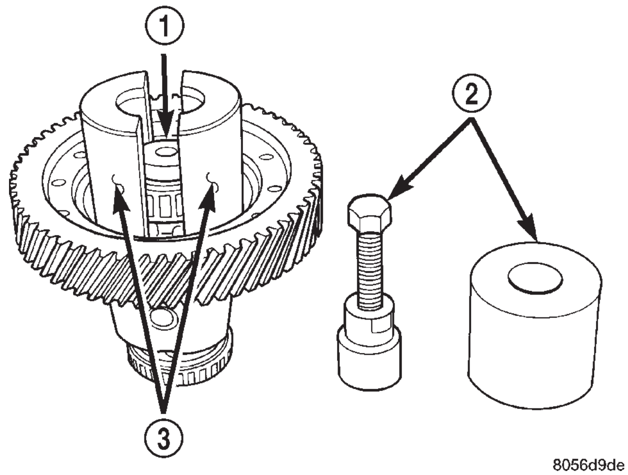


Fig. 169 Position Button and Collets Onto Differential and Bearing (Ring Gear Side)

1 - SPECIAL TOOL L-4539-2
2 - SPECIAL TOOL 5048
3 - SPECIAL TOOL 5048-4

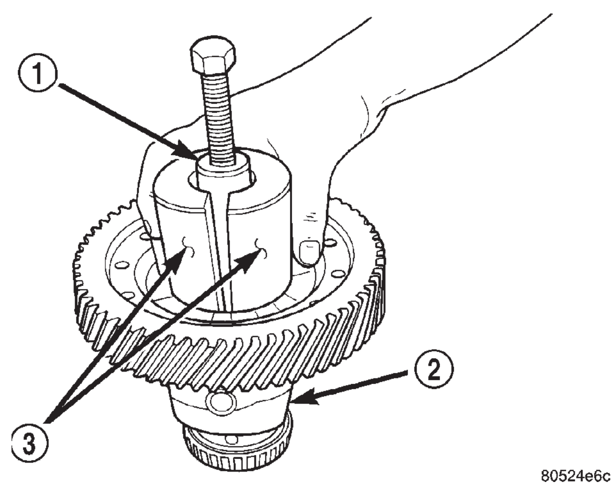


Fig. 170 Position Tool 5048 Over Button and Collets at Differential Bearing (Ring Gear Side)

1 - SPECIAL TO0L 5048
2 - DIFFERENTIAL
3 - SPECIAL TOOL 5048-4

FINAL DRIVE (Continued)

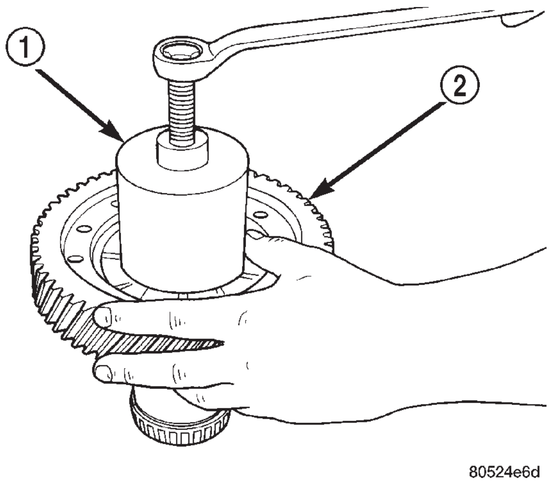


Fig. 171 Remove Differential Bearing Cone (Ring Gear Side)

1 - SPECIAL TOOL 5048
2 - RING GEAR

(8) Using Miller Special Tool L-4518, remove the differential bearing race from the extension housing/adapter plate.

(9) Using Miller Special Tool 6062A, remove the differential bearing race from the bearing retainer (Fig. 172) (Fig. 173).

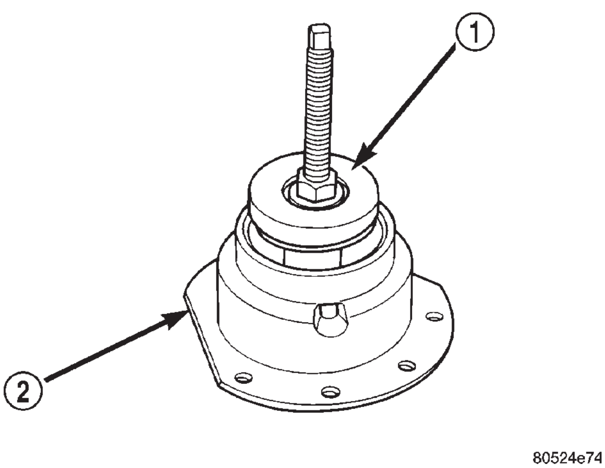


Fig. 172 Position Bearing Cup Remover Tool in Retainer

1 - SPECIAL TOOL 6062A
2 - DIFFERENTIAL BEARING RETAINER

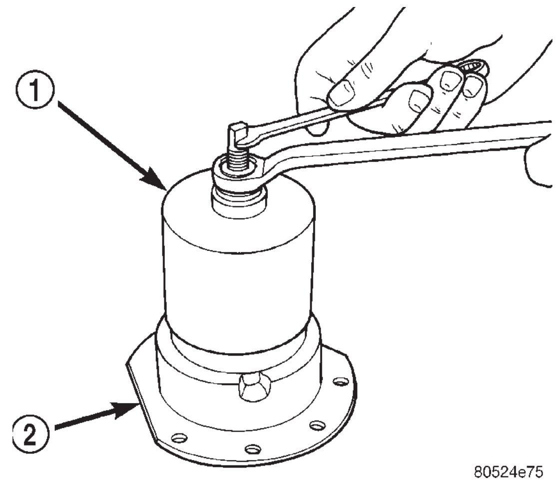


Fig. 173 Remove Bearing Cup

1 - SPECIAL TOOL 6062A
2 - DIFFERENTIAL BEARING RETAINER

DIFFERENTIAL SERVICE TOOLS

COMPONENT	REMOVER	INSTALLER
Diff. Bear. On Retainer Side	5048, 5048-4 Collets, L-4539-2 Button	5052, C-4171
Diff. Bear. On Ext. Hous. Side	5048, 5048-3 Collets, L-4539-2 Button	L-4410, C-4171
Diff. Race. On Retainer Side	6062-A	6061, C-4171
Diff. Race. On Ext. Hous. Side	L-4518	L-4520, C-4171
Extension Housing Seal	7794-A, C-637 Slide Hammer	L-4520, C-4171
Bearing Retainer Seal	794-A, C-637 Slide Hammer	L-4520, C-4171

ASSEMBLY

NOTE: The differential is serviced as an assembly. The only parts that are serviceable within the differential are the differential bearing cups and cones. If any other part fails within the differential, you must replace the differential assembly along with the transfer shaft.

NOTE: Use Mopar® ATF RTV (MS-GF41), or equivalent, on retainer and extension housing/adapter plate to seal to case.

FINAL DRIVE (Continued)

(1) Using Miller Special Tool L-4410, and C-4171, install differential bearing to differential (extension housing side) (Fig. 174).

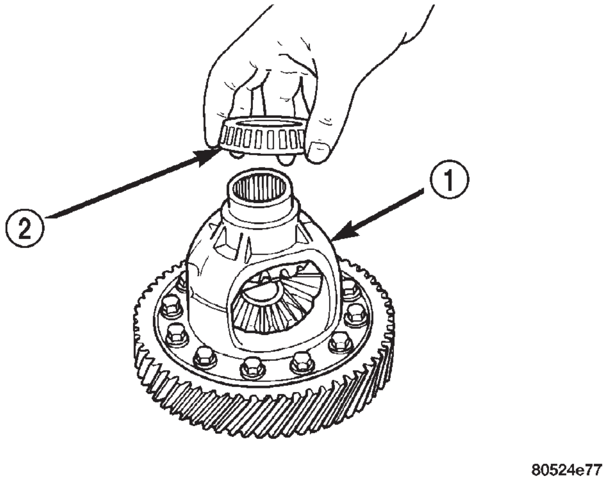


Fig. 174 Position Bearing Cone Onto Differential

1 - DIFFERENTIAL ASSEMBLY
2 - DIFFERENTIAL BEARING

(2) Using Miller Special Tool 5052 and C-4171, install differential bearing to differential (bearing retainer side).

(3) Using Miller Special Tool 6061 and C-4171, install differential bearing race to bearing retainer (Fig. 175).

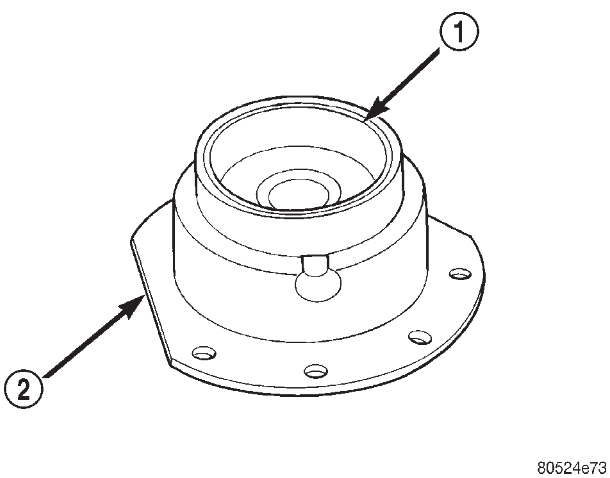


Fig. 175 Differential Bearing Retainer

1 - DIFFERENTIAL BEARING CUP
2 - DIFFERENTIAL BEARING RETAINER

(4) Using Miller Special Tool L–4520 and C-4171, install differential bearing cup to extension housing.

(5) Measure and adjust differential bearing preload (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/FINAL DRIVE - ADJUSTMENTS) .

(6) Install differential assembly to case. Install extension housing/adapter plate and bearing retainer.

(7) Install bearing retainer with a bead of Mopar® ATF RTV (MS-GF41) and torque bolts (Fig. 176) to 28 N·m (250 in. lbs.).

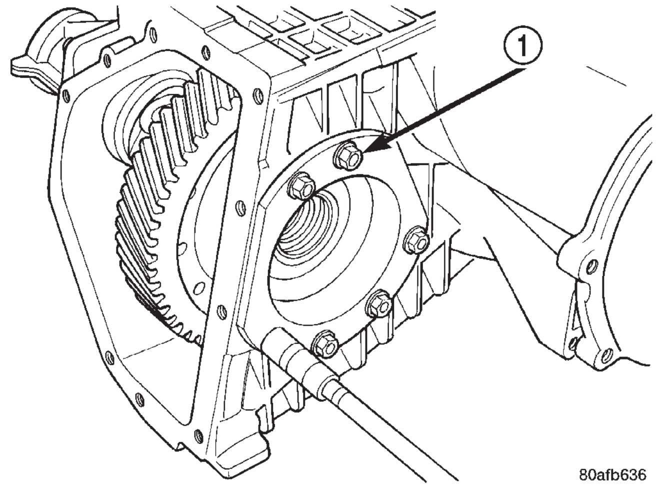


Fig. 176 Differential Retainer Bolts

1 - DIFFERENTIAL RETAINER BOLTS

(8) Install extension housing/adapter plate with a bead of Mopar® ATF RTV (MS-GF41) and torque bolts to 28 N·m (250 in. lbs.).

(9) Install differential cover with a bead of Mopar® ATF RTV (MS-GF41) (Fig. 177) and torque bolts (Fig. 178) to 28 N·m (250 in. lbs.).

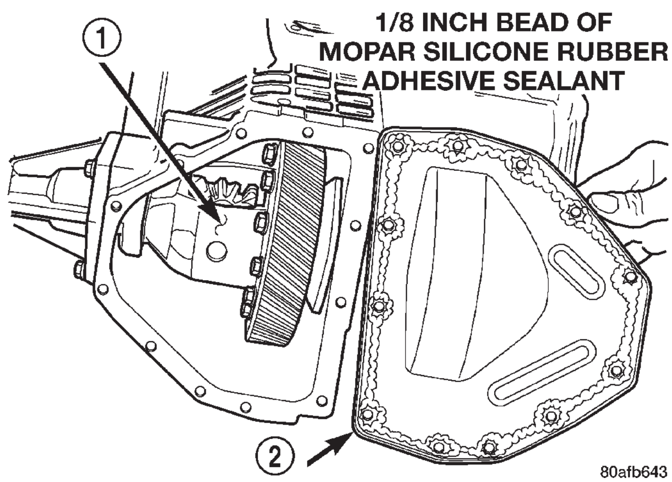


Fig. 177 Install Differential Cover

1 - DIFFERENTIAL ASSEMBLY
2 - DIFFERENTIAL COVER

FINAL DRIVE (Continued)

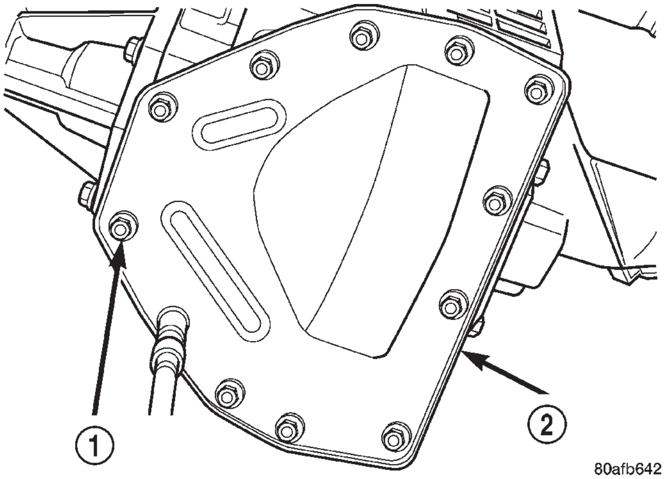


Fig. 178 Differential Cover Bolts

1 - DIFFERENTIAL COVER BOLTS
2 - DIFFERENTIAL COVER

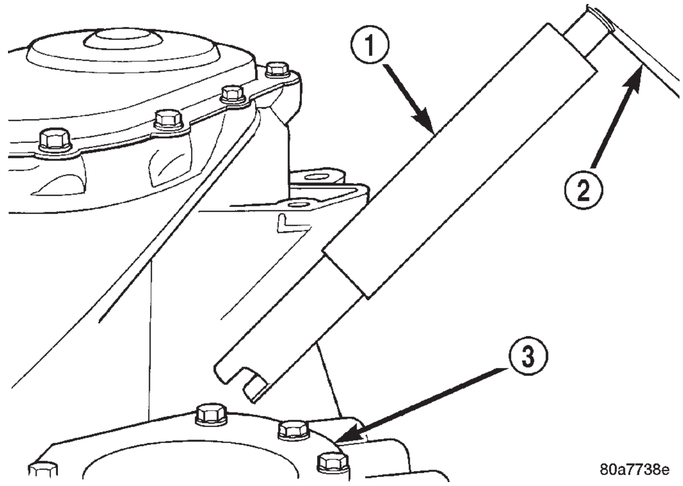


Fig. 179 Tool L-4436 and Torque Wrench

1 - SPECIAL TOOL L-4436–A
2 - TORQUE WRENCH
3 - DIFFERENTIAL BEARING RETAINER

ADJUSTMENTS

DIFFERENTIAL BEARING PRELOAD MEASUREMENT AND ADJUSTMENT

NOTE: Perform all differential bearing preload measurements with the transfer shaft and gear removed.

DIFFERENTIAL BEARING PRELOAD ADJUSTMENT USING EXISTING SHIM

(1) Position the transaxle assembly vertically on the support stand, differential bearing retainer side up.

(2) Install Tool L-4436A into the differential and onto the pinion mate shaft (Fig. 179).

(3) Rotate the differential at least one full revolution to ensure the tapered roller bearings are fully seated.

(4) Using Tool L-4436A and an inch-pound torque wrench, check the turning torque of the differential (Fig. 180). **The turning torque should be between 5 and 18 inch-pounds.**

(5) If the turning torque is within specifications, remove tools. Setup is complete.

(6) If turning torque is not within specifications proceed with the following steps.

(a) Remove differential bearing retainer from the transaxle case.

(b) Remove the bearing cup from the differential bearing retainer using Tool 6062A.

(c) Remove the existing shim from under the cup.

(d) Measure the existing shim.

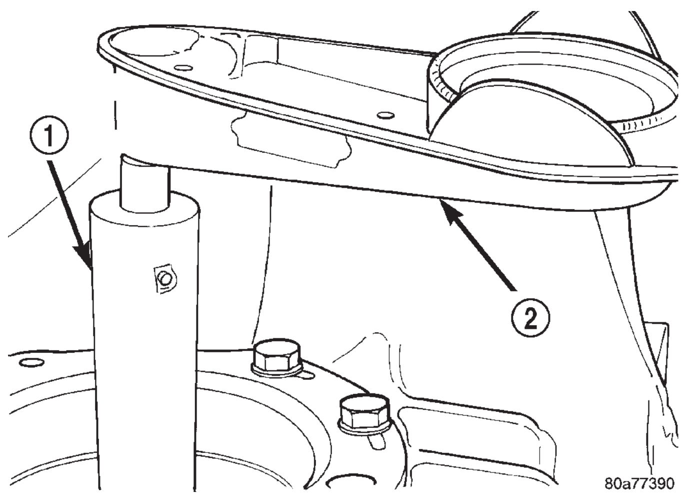


Fig. 180 Checking Differential Bearings Turning Torque

1 - SPECIAL TOOL L-4436–A
2 - TORQUE WRENCH

(e) If the turning torque was too high when measured, install a 0.05 mm (0.002 inch) thinner shim. If the turning torque is was too low, install a 0.05 mm (0.002 inch) thicker shim. Repeat until 5 to 18 inch-pounds turning torque is obtained. Oil Baffle is not required to be installed when making shim selection.

(f) Install the proper shim under the bearing cup. Make sure the oil baffle is installed properly in the bearing retainer, below the bearing shim and cup.

FINAL DRIVE (Continued)

(g) Install the differential bearing retainer using Tool 5052 and C-4171. Seal the retainer to the housing with MOPAR® Adhesive Sealant and torque bolts to 28 N·m (250 in. lbs.).

(7) Using Tool L-4436A and an inch-pound torque wrench, recheck the turning torque of the differential (Fig. 180). **The turning torque should be between 5 and 18 inch-pounds.**

Shim thickness need be determined only if any of the following parts are replaced:

- Transaxle case
- Differential carrier
- Differential bearing retainer
- Extension housing
- Differential bearing cups and cones

DIFFERENTIAL BEARING SHIM CHART

PART NUMBER	SHIM THICKNESS	
	MM	INCH
4659257	.980	0.0386
4659258	1.02	0.0402
4659259	1.06	0.0418
4659260	1.10	0.0434
4659261	1.14	0.0449
4659262	1.18	0.0465
4659263	1.22	0.0481
4659264	1.26	0.0497
4659265	1.30	0.0512
4659266	1.34	0.0528
4659267	1.38	0.0544
4659268	1.42	0.0560
4659269	1.46	0.0575
4659270	1.50	0.0591
4659271	1.54	0.0607
4659272	1.58	0.0623
4659273	1.62	0.0638
4659274	1.66	0.0654
4659275	1.70	0.0670
4659283	2.02	0.0796
4659284	2.06	0.0812

PRELOAD ADJUSTMENT W/O SHIM

(1) Remove the bearing cup from the differential bearing retainer using Miller special Tool 6062A.

(2) Remove existing shim from under bearing cup.

(3) Reinstall the bearing cup into the retainer using Miller Special Tool 6061, and C-4171.

NOTE: Oil baffle is not required when making the shim calculation.

(4) Install the bearing retainer into the case. Torque bolts to 28 N•m (250 in. lbs.).

(5) Position the transaxle assembly vertically on the support stand and install Miller Special Tool L-4436-A into the bearing retainer.

(6) Rotate the differential at least one full revolution to ensure the tapered roller bearings are fully seated.

(7) Attach a dial indicator to the case and zero the dial. Place the tip on the end of Special Tool L-4436-A.

(8) Place a large screwdriver to each side of the ring gear and lift. Check the dial indicator for the amount of end play.

FINAL DRIVE (Continued)

CAUTION: Do not damage the transaxle case and/or differential retainer sealing surface.

(9) Using the end play measurement that was determined, add 0.18mm (0.007 inch). This should give you between 5 and 18 inch pounds of bearing preload. Refer to the Differential Bearing Shim Chart to determine which shim to use.

(10) Remove the differential bearing retainer. Remove the bearing cup.

(11) Install the oil baffle. Install the proper shim combination under the bearing cup.

(12) Install the differential bearing retainer. Seal the retainer to the housing with Mopar® Silicone Rubber Adhesive Sealant. Torque bolts to 28 N•m (250 in. lbs.).

(13) Using Miller Special Tool L-4436-A and an inch-pound torque wrench, check the turning torque of the differential (Fig. 180). The turning torque should be between 5-18 inch-pounds.

NOTE: If turning torque is too high install a 0.05mm (0.002 inch) thicker shim. If the turning torque is too low, install a 0.05mm (0.002 inch) thinner shim. Repeat until 5-18 inch-pounds of turning torque is obtained.

FLUID

STANDARD PROCEDURE

FLUID LEVEL AND CONDITION CHECK

NOTE: Only transmission fluid of the type labeled Mopar ATF+4 (Automatic Transmission Fluid–Type 9602) should be used in this transaxle.

FLUID LEVEL CHECK

The transmission sump has a fluid level indicator (dipstick) to check oil similar to most automatic transmissions. It is located on the left side of the engine. Be sure to wipe all dirt from dipstick handle before removing.

The torque converter fills in both the P Park and N Neutral positions. Place the selector lever in P Park to be sure that the fluid level check is accurate. **The engine should be running at idle speed for at least one minute, with the vehicle on level ground.** At normal operating temperature 82° C (180° F), the fluid level is correct if it is in the HOT region on the oil level indicator (Fig. 181). The fluid level should be within the COLD region of the dipstick at 27° C (80° F) fluid temperature.

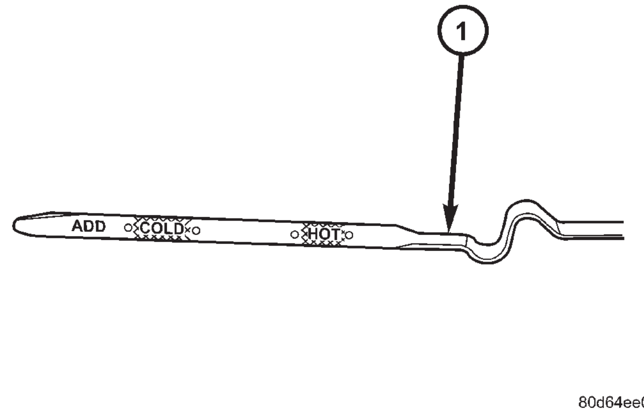


Fig. 181 Fluid Level Indicator

1 - FLUID LEVEL INDICATOR

FLUID LEVEL CHECK USING DRB

NOTE: Engine and Transaxle should be at normal operating temperature before performing this procedure.

(1) Start engine and apply parking brake.

(2) Hook up DRB scan tool and select transmission.

(3) Select sensors.

(4) Read the transmission temperature value.

(5) Compare the fluid temperature value with the fluid temperature chart (Fig. 182).

(6) Adjust transmission fluid level shown on the indicator according to the chart.

(7) Check transmission for leaks.

Low fluid level can cause a variety of conditions because it allows the pump to take in air along with the fluid. As in any hydraulic system, air bubbles make the fluid spongy, therefore, pressures will be low and build up slowly.

Improper filling can also raise the fluid level too high. When the transaxle has too much fluid, the gears churn up foam and cause the same conditions which occur with a low fluid level.

In either case, air bubbles can cause overheating and/or fluid oxidation, and varnishing. This can interfere with normal valve, clutch, and accumulator operation. Foaming can also result in fluid escaping from the transaxle vent where it may be mistaken for a leak.

FLUID (Continued)

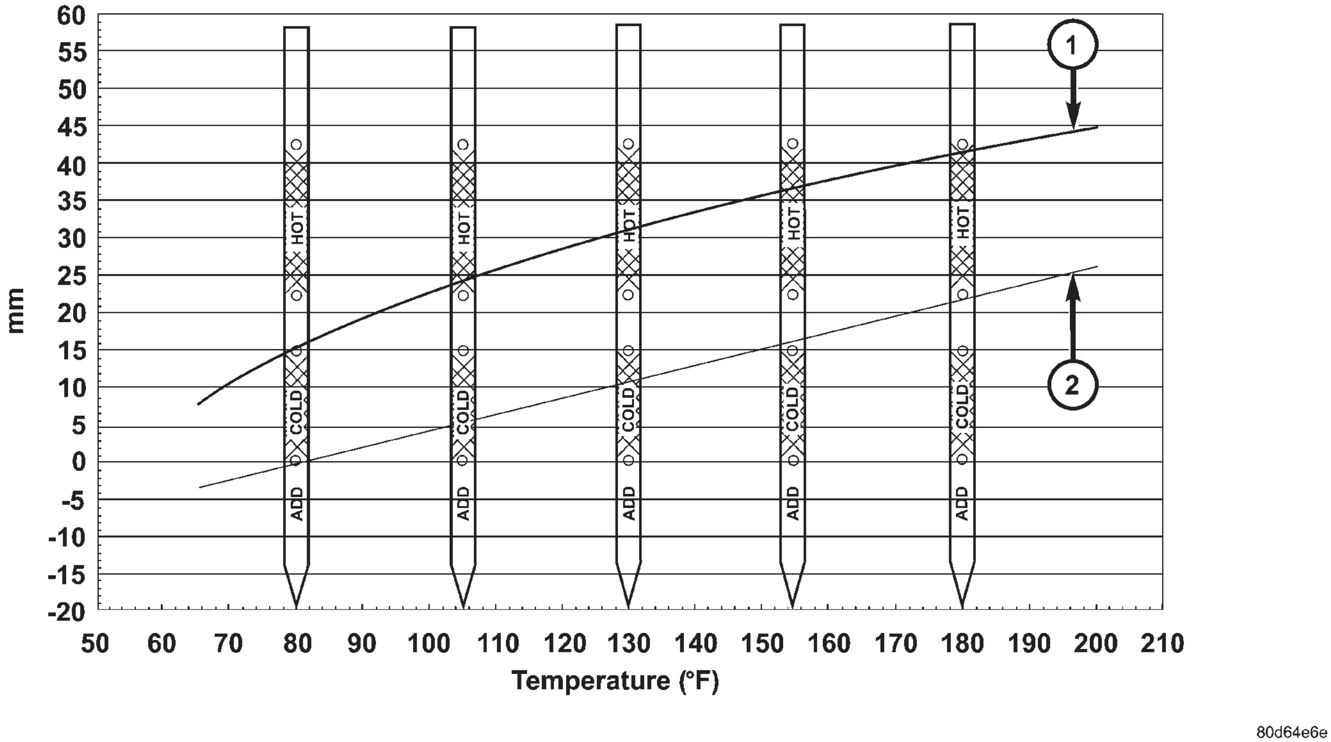


Fig. 182 Transmission Fluid Temperature Chart

1 - MAX. LEVEL
2 - MIN. LEVEL

FLUID CONDITION

Along with fluid level, it is important to check the condition of the fluid. When the fluid smells burned, and is contaminated with metal or friction material particles, a complete transaxle recondition is probably required. Be sure to examine the fluid on the dipstick closely. If there is any doubt about its condition, drain out a sample for a double check.

Mopar® ATF+4 (Automatic Transmission Fluid-Type 9602) when new is red in color. The ATF is dyed red so it can be identified from other fluids used in the vehicle such as engine oil or antifreeze. The red color is not permanent and is not an indicator of fluid condition. As the vehicle is driven, the ATF will begin to look darker in color and may eventually become brown. This is normal. A dark brown/black fluid accompanied with a burnt odor and/or deterioration in shift quality may indicate fluid deterioration or transmission component failure.

After the fluid has been checked, seat the dipstick fully to seal out water and dirt.

STANDARD PROCEDURE - FLUID AND FILTER SERVICE

NOTE: Refer to the maintenance schedules in LUBRICATION and MAINTENANCE, or the vehicle owner's manual, for the recommended maintenance (fluid/filter change) intervals for this transaxle.

NOTE: Only fluids of the type labeled Mopar® ATF+4 (Automatic Transmission Fluid) Type 9602 should be used. A filter change should be made at the time of the transmission oil change. The magnet (on the inside of the oil pan) should also be cleaned with a clean, dry cloth.

NOTE: If the transaxle is disassembled for any reason, the fluid and filter should be changed.

FLUID/FILTER SERVICE (RECOMMENDED)

(1) Raise vehicle on a hoist. Refer to LUBRICATION and MAINTENANCE for proper procedures.

FLUID (Continued)

Place a drain container with a large opening, under transaxle oil pan.

(2) Loosen pan bolts and tap the pan at one corner to break it loose allowing fluid to drain, then remove the oil pan.

(3) Install a new filter and o-ring on bottom of the valve body (Fig. 183).

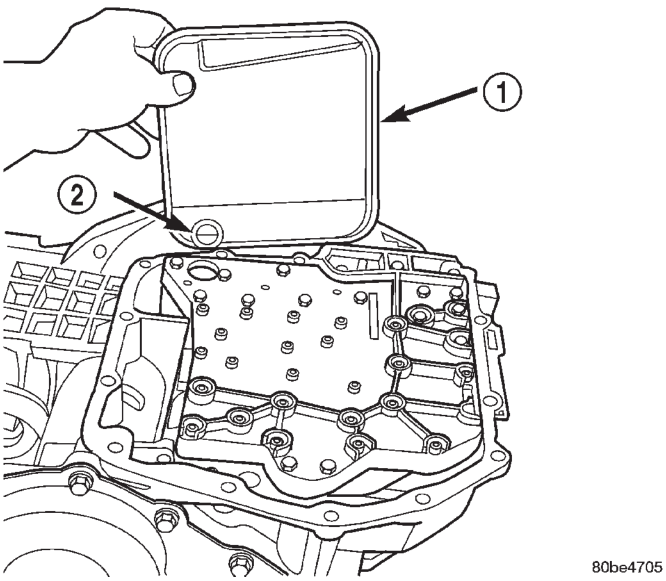


Fig. 183 Filter and O-Ring

1 - OIL FILTER
2 - O-RING

(4) Clean the oil pan and magnet. Reinstall pan using new Mopar Silicone Adhesive sealant. Tighten oil pan bolts to 19 N·m (165 in. lbs.).

(5) Pour four quarts of Mopar® ATF+4 (Automatic Transmission Fluid) Type 9602 through the dipstick opening.

(6) Start engine and allow to idle for at least one minute. Then, with parking and service brakes applied, move selector lever momentarily to each position, ending in the park or neutral position.

(7) Check the transaxle fluid level and add an appropriate amount to bring the transaxle fluid level to 3mm (1/8 in.) below the lowest mark on the dipstick (Fig. 184).

(8) Recheck the fluid level after the transaxle has reached normal operating temperature (180°F.). Refer to Fluid Level and Condition Check for the proper fluid fill procedure.

(9) To prevent dirt from entering transaxle, make certain that dipstick is fully seated into the dipstick opening.

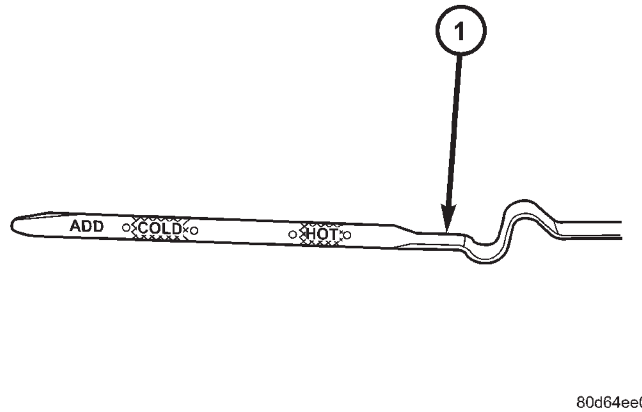


Fig. 184 Fluid Level Indicator

1 - FLUID LEVEL INDICATOR

DIPSTICK TUBE FLUID SUCTION METHOD (ALTERNATIVE)

(1) When performing the fluid suction method, make sure the transaxle is at full operating temperature.

(2) To perform the dipstick tube fluid suction method, use a suitable fluid suction device (Vacula™ or equivalent).

(3) Insert the fluid suction line into the dipstick tube.

NOTE: Verify that the suction line is inserted to the lowest point of the transaxle oil pan. This will ensure complete evacuation of the fluid in the pan.

(4) Follow the manufacturers recommended procedure and evacuate the fluid from the transaxle.

(5) Remove the suction line from the dipstick tube.

(6) Pour four quarts of Mopar® ATF+4 (Automatic Transmission Fluid) Type 9602 through the dipstick opening.

(7) Start engine and allow to idle for at least one minute. Then, with parking and service brakes applied, move selector lever momentarily to each position, ending in the park or neutral position.

(8) Check the transaxle fluid level and add an appropriate amount to bring the transaxle fluid level to 3mm (1/8 in.) below the lowest mark on the dipstick (Fig. 184).

(9) Recheck the fluid level after the transaxle has reached normal operating temperature (180°F.). (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/FLUID - STANDARD PROCEDURE)

(10) To prevent dirt from entering transaxle, make certain that dipstick is fully seated into the dipstick opening.

GEARSHIFT CABLE

REMOVAL

(1) Place transaxle in PARK.

(2) Disconnect battery negative cable at left strut tower.

(3) Remove air cleaner assembly.

(4) Using a pry tool, pry up on cable at manual valve lever and remove cable from lever (Fig. 185).

(5) Remove the screw from the cable bracket at the transaxle (Fig. 185).

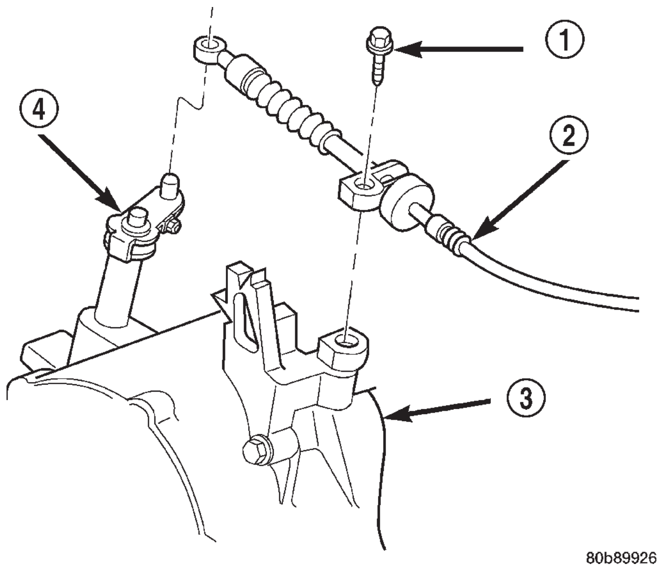


Fig. 185 Gearshift Cable at Transaxle

1 - SCREW
2 - CABLE
3 - TRANSAXLE
4 - SHIFT LEVER

(6) Remove the gearshift knob set screw and knob (Fig. 186).

(7) Remove gearshift bezel (Fig. 187). Disconnect range indicator lamp connector.

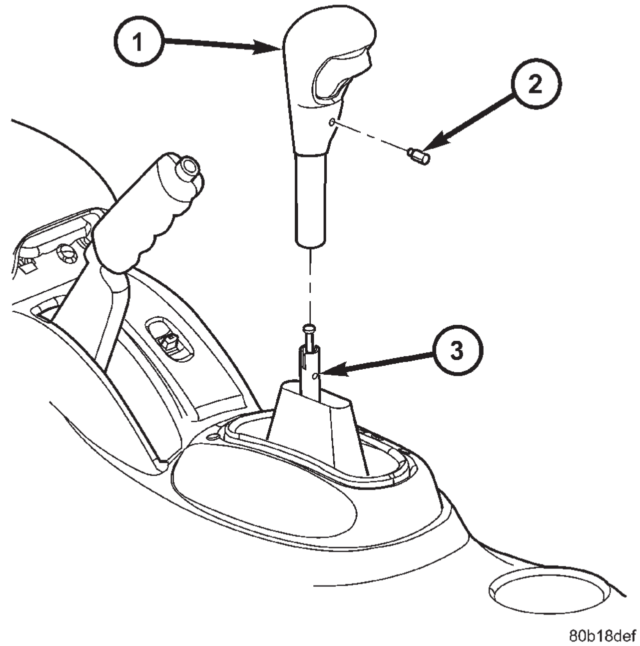


Fig. 186 Gearshift Knob

1 - GEARSHIFT KNOB
2 - SET SCREW
3 - GEARSHIFT MECHANISM

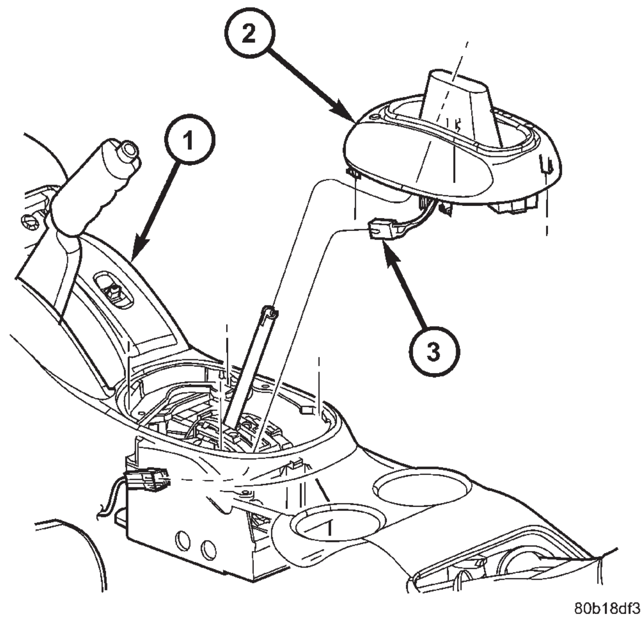


Fig. 187 Gearshift Bezel

1 - CENTER CONSOLE ASSEMBLY
2 - GEARSHIFT BEZEL
3 - LAMP CONNECTOR

GEARSHIFT CABLE (Continued)

(8) Remove center console assembly (Fig. 188).

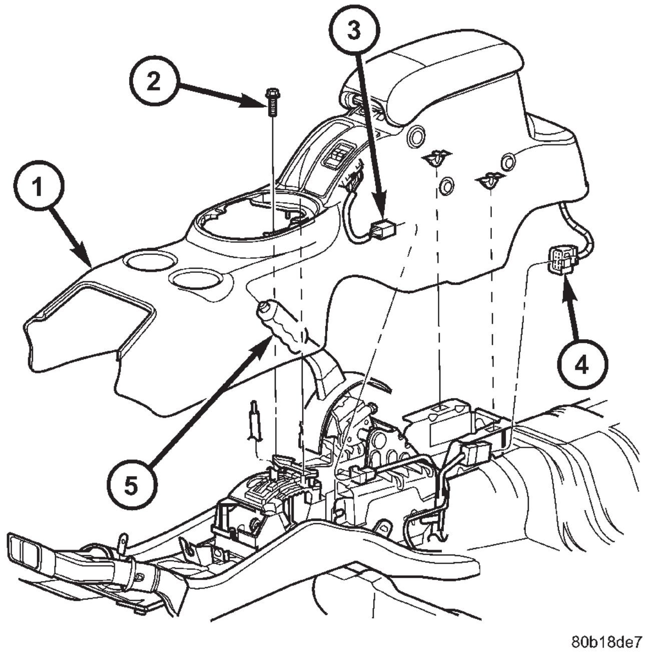


Fig. 188 Center Console Assembly

1 - CENTER CONSOLE
2 - SCREW
3 - IF EQUIPPED
4 - IF EQUIPPED
5 - PARK BRAKE HANDLE

(9) Loosen nut on shift cable adjust lever (Fig. 189).

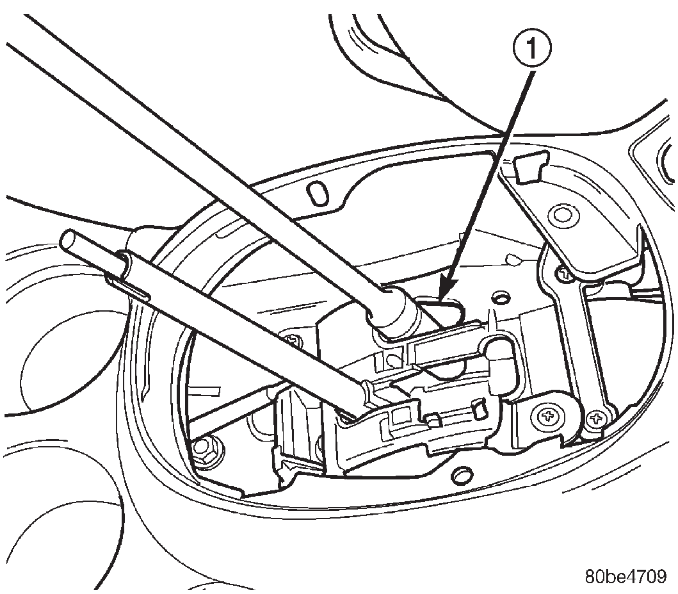


Fig. 189 Shift Cable Adjust Lever Nut—Typical

1 - ACCESS HOLE

(10) Using a flat blade pry tool, remove the shifter cable core end from the shift lever pin (Fig. 190).

(11) Using a flat blade pry tool, pry the cable conduit clip up from the shifter bracket. Pull up on the cable conduit and remove from bracket (Fig. 190).

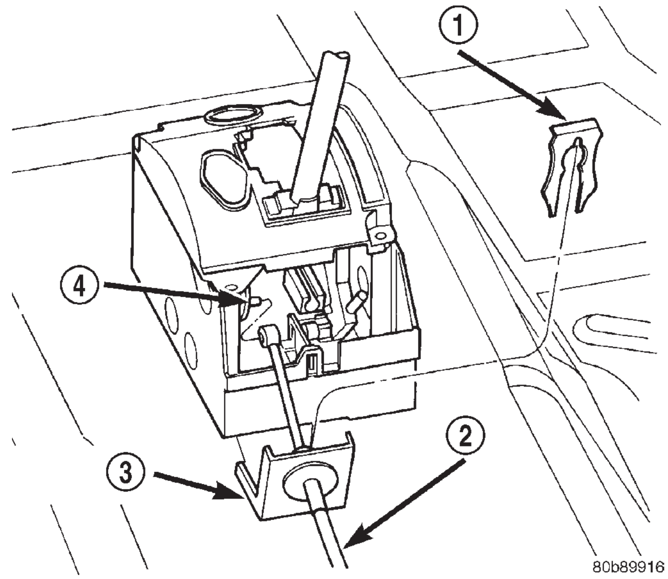


Fig. 190 Gearshift Cable at Floor Shifter

1 - CLIP
2 - CABLE
3 - CONDUIT BRACKET
4 - SHIFT PIN

(12) Raise vehicle on hoist.

(13) Remove the cable grommet from the floor pan area (Fig. 191).

(14) Carefully remove the cable from the underbody by unfolding the cable retainer clip (Fig. 191) as you go along.

INSTALLATION

(1) Install cable assy. into floor pan tunnel hole and secure grommet. If necessary, use a synthetic based lubricant to aid in grommet installation.

(2) Position cable into retainer clip (Fig. 191) and tighten clip to secure cable. Route cable up towards transaxle shift lever.

(3) Lower vehicle.

(4) Install cable to transaxle and tighten screw to 14 N·m (125 in. lbs.) (Fig. 185).

(5) Install cable to transaxle shift lever (Fig. 185).

(6) Connect cable to shifter conduit bracket and shift pin. Install cable retaining clip (Fig. 190).

(7) Verify transaxle shift lever and floor shifter lever are in the PARK position.

(8) Tighten cable adjuster nut (Fig. 189) to 23 N·m (200 in. lbs.).

(9) Install center console assembly (Fig. 188).

(10) Install gearshift bezel (Fig. 187).

GEARSHIFT CABLE (Continued)

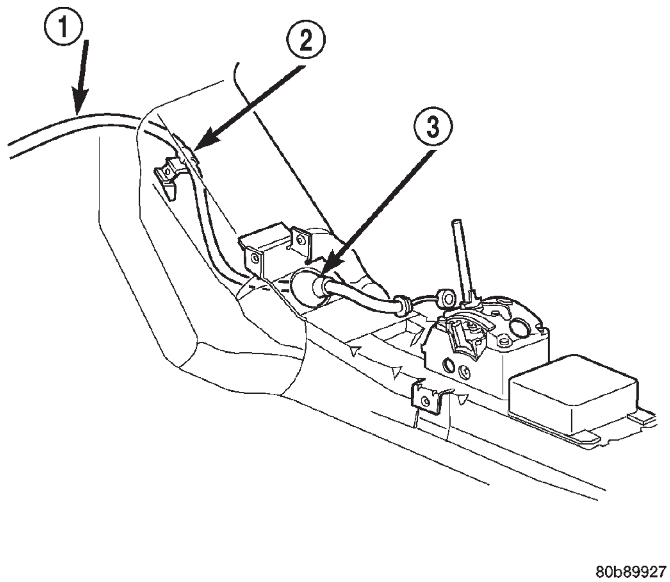


Fig. 191 Gearshift Cable Routing

1 - CABLE
2 - RETAINER CLIP
3 - GROMMET

(11) Install gearshift knob (Fig. 186) and tighten set screw to 2 N·m (20 in.lbs.).

(12) Verify proper cable adjustment. Engine starter should only engage in PARK and NEUTRAL gear shifter positions. If adjustment is required, (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/GEAR SHIFT CABLE - ADJUSTMENTS)

ADJUSTMENTS

GEARSHIFT LINKAGE ADJUSTMENT

Normal operation of the Park/Neutral Position Switch provides a quick check to confirm proper linkage adjustment.

Move the selector level slowly forward until it clicks into the (P) Park position. The starter should operate.

After checking the (P) position, move selector slowly toward the (N) Neutral position until lever is in the (N) position. If the starter will also operate at this point the gearshift linkage is properly adjusted. If the starter fails to operate in either position, linkage adjustment is required.

ADJUSTMENT

(1) Set parking brake.

(2) Remove the gearshift knob set screw and knob.

(3) Remove gearshift selector bezel and lamp wiring.

(4) Install the gearshift knob set screw and knob.

(5) Place gearshift lever in the (P) (PARK) position.

(6) Loosen the gearshift cable adjuster nut at the shifter assembly (Fig. 192) .

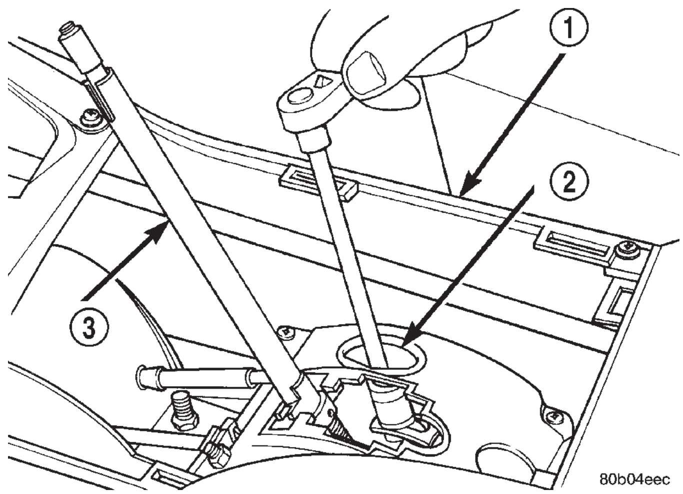


Fig. 192 Shift Cable Adjust Lever Nut

1 - CONSOLE
2 - ACCESS HOLE
3 - SHIFTER HANDLE

(7) Move the gearshift lever on the transaxle to the park position.

(8) Verify the shift lever and transaxle are in park position. Tighten the gearshift cable adjuster nut at the shifter assembly. The gearshift linkage should now be properly adjusted.

(9) Check adjustment as follows:

- Detent position for neutral and drive should be within limits of hand lever gate stops.
- Key start must occur only when shift lever is in park or neutral positions.

GEARSHIFT MECHANISM

REMOVAL

(1) Disconnect negative battery cable and isolate.

(2) Remove the gearshift knob set screw and knob (Fig. 193).

(3) Remove gearshift bezel (Fig. 194). Disconnect range indicator lamp connector.

(4) Remove center console assembly (Fig. 195).

(5) Loosen nut on shift cable adjust lever.

GEARSHIFT MECHANISM (Continued)

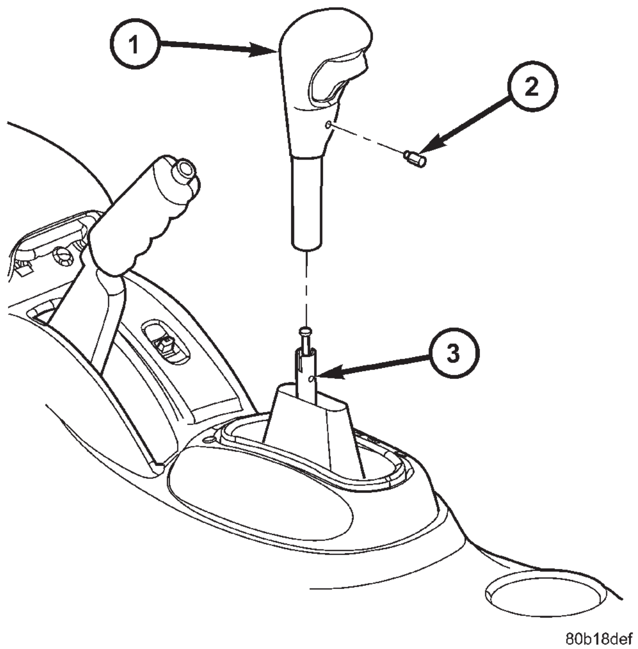


Fig. 193 Gearshift Knob

1 - GEARSHIFT KNOB
2 - SET SCREW
3 - GEARSHIFT MECHANISM

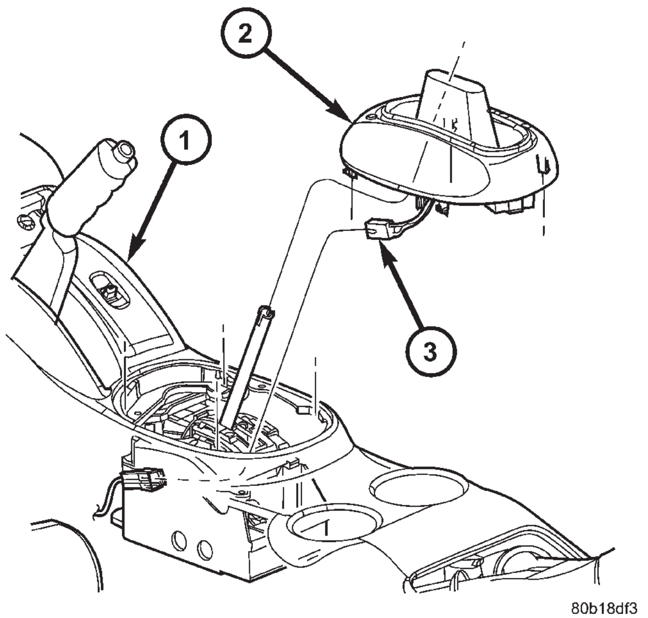


Fig. 194 Gearshift Bezel

1 - CENTER CONSOLE ASSEMBLY
2 - GEARSHIFT BEZEL
3 - LAMP CONNECTOR

(6) Using a flat blade pry tool, remove the shifter cable core end from the shift lever pin (Fig. 196).

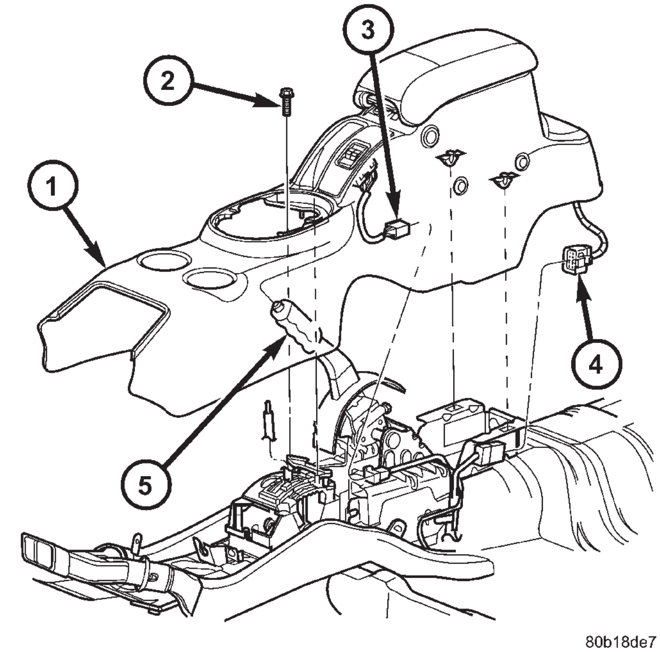


Fig. 195 Center Console Assembly

1 - CENTER CONSOLE
2 - SCREW
3 - IF EQUIPPED
4 - IF EQUIPPED
5 - PARK BRAKE HANDLE

(7) Using a flat blade pry tool, pry the cable conduit clip up from the shifter bracket. Pull up on the cable conduit and remove from bracket (Fig. 196).

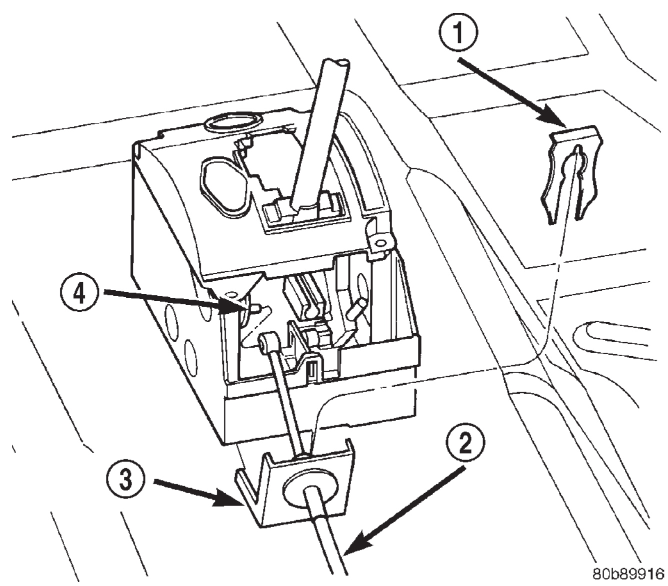


Fig. 196 Gearshift Cable at Floor Shifter—Typical

1 - CLIP
2 - CABLE
3 - CONDUIT BRACKET
4 - SHIFT PIN

GEARSHIFT MECHANISM (Continued)

(8) Release interlock cable adjuster end by inserting pointed object into shift bracket to disengage lock (Fig. 197). Unsnap the shifter/ignition interlock cable adjuster end from the slot in the gearshift mechanism bracket and disconnect cable core from shifter assembly (Fig. 198).

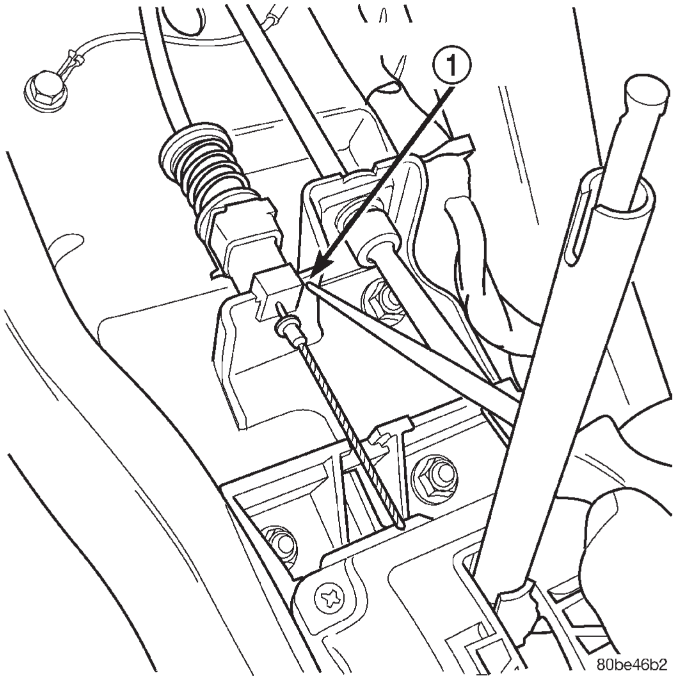


Fig. 197 Release Cable from Bracket at Retainer Lock

1 - RELEASE CABLE HERE

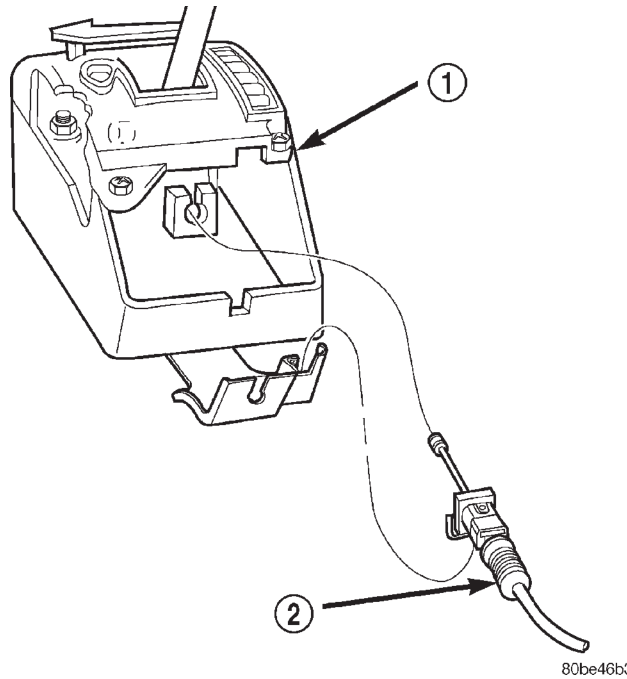


Fig. 198 Interlock Cable at Floor Shifter Assembly

1 - SHIFTER ASSEMBLY
2 - INTERLOCK CABLE

(9) Disconnect Autostick connector (if equipped) (Fig. 199).

(10) Remove the five nuts at the base of the shifter assembly. Remove assembly from vehicle (Fig. 200).

INSTALLATION

(1) Install shifter mechanism (Fig. 200). mechanism-to-floor pan nuts to 17 N·m (150 in. lbs.).

(2) Install gearshift cable into conduit bracket and onto shift pin. Install retainer clip (Fig. 196).

(3) Tighten cable adjuster nut to 23 N·m (200 in. lbs.).

(4) Insert interlock cable core wire into interlock adjustment lever groove. Make sure the interlock cable slug is seated in the groove (Fig. 198).

(5) Insert interlock cable adjuster end into bracket and snap into place (Fig. 198).

(6) Adjust the gearshift and interlock cables. Refer to Adjustments in this group.

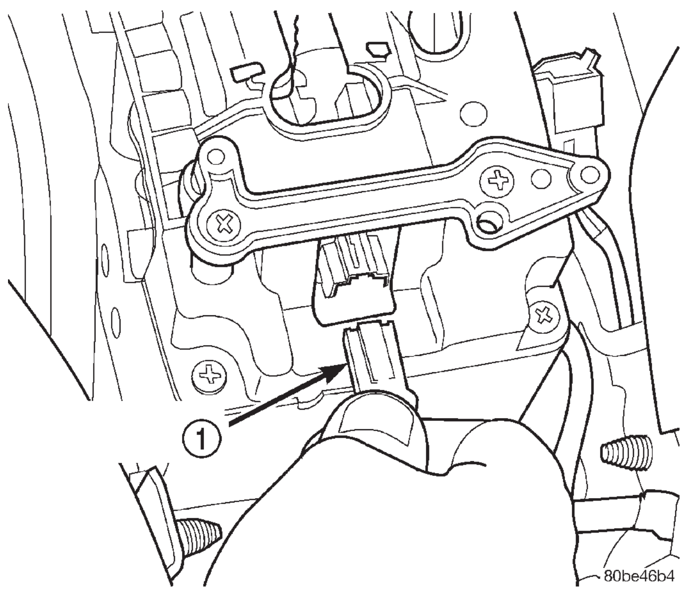


Fig. 199 Autostick Connector (if equipped)

1 - AUTOSTICK CONNECTOR

GEARSHIFT MECHANISM (Continued)

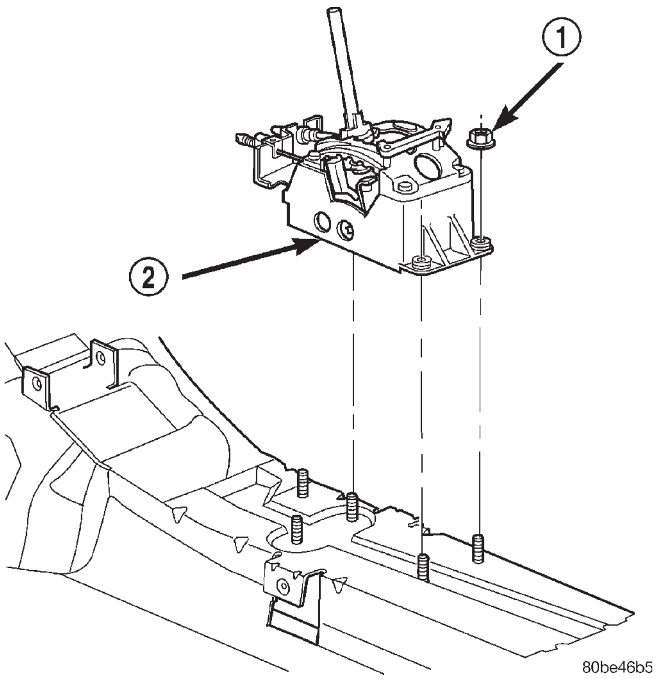


Fig. 200 Shifter Assembly

1 - NUTS (5)
2 - SHIFTER ASSEMBLY

NOTE: Gearshift and Interlock cables MUST be adjusted. Refer to the Adjustments section in this group for proper procedures.

(7) If equipped with Autostick, connect the Autostick connector (Fig. 199).

(8) Install center console assembly (Fig. 195).

(9) Connect range indicator lamp and install gearshift bezel (Fig. 194).

(10) Install the gearshift knob and tighten set screw (Fig. 193) to 2 N·m (20 in.lbs.).

(11) Connect the battery negative cable.

HOLDING CLUTCHES

DESCRIPTION

Two hydraulically applied multi-disc clutches are used to hold planetary geartrain components stationary while the input clutches drive others. The 2/4 and Low/Reverse clutches are considered holding clutches and are contained at the rear of the transaxle case. (Fig. 201) .

OPERATION

NOTE: Refer to the “Elements In Use” chart in Diagnosis and Testing for a collective view of which clutch elements are applied at each position of the selector lever.

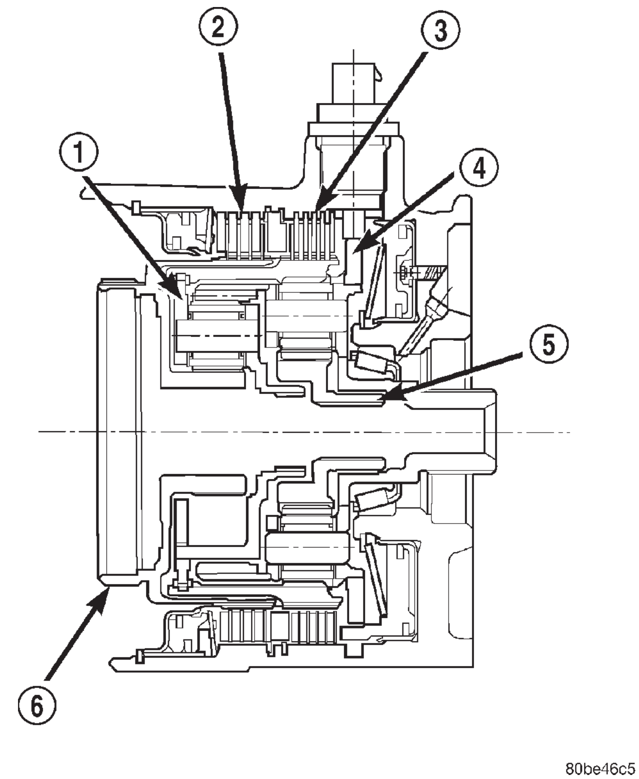


Fig. 201 2/4 and Low/Reverse Clutches

1 - FRONT PLANET CARRIER/REAR ANNULUS
2 - 2/4 CLUTCH
3 - L/R CLUTCH
4 - REAR PLANET CARRIER/FRONT ANNULUS
5 - REAR SUN GEAR
6 - FRONT SUN GEAR ASSEMBLY

2/4 CLUTCH

The 2/4 clutch is hydraulically applied in second and fourth gears by pressurized fluid against the 2/4 clutch piston. When the 2/4 clutch is applied, the front sun gear assembly is held or grounded to the transaxle case.

LOW/REVERSE CLUTCH

The Low/Reverse clutch is hydraulically applied in park, reverse, neutral, and first gears by pressurized fluid against the Low/Reverse clutch piston. When the Low/Reverse clutch is applied, the front planet carrier/rear annulus assembly is held or grounded to the transaxle case.

INPUT CLUTCH ASSEMBLY

DISASSEMBLY

(1) Mount input clutch assembly to Input Clutch Pressure Fixture (Tool 8391).

(2) Tap down reverse clutch reaction plate to release pressure from snap ring (Fig. 202).

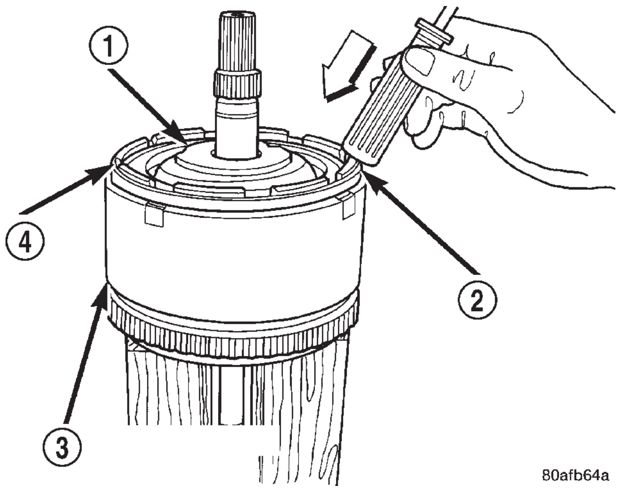


Fig. 202 Tapping Reaction Plate

1 - #4 THRUST PLATE (SELECT)
2 - TAP DOWN REVERSE CLUTCH REACTION PLATE TO REMOVE OR INSTALL SNAP RING
3 - INPUT SHAFT CLUTCHES RETAINER ASSEMBLY
4 - REVERSE CLUTCH REACTION PLATE

(3) Remove reverse clutch snap ring (Fig. 203).

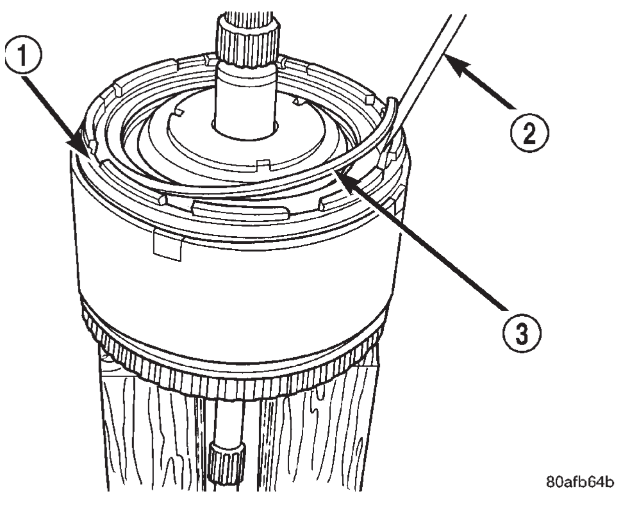


Fig. 203 Reverse Clutch Snap Ring

1 - REACTION PLATE
2 - SCREWDRIVER
3 - REVERSE CLUTCH SNAP RING (SELECT)

(4) Pry up and remove reverse clutch reaction plate (Fig. 204) (Fig. 205).

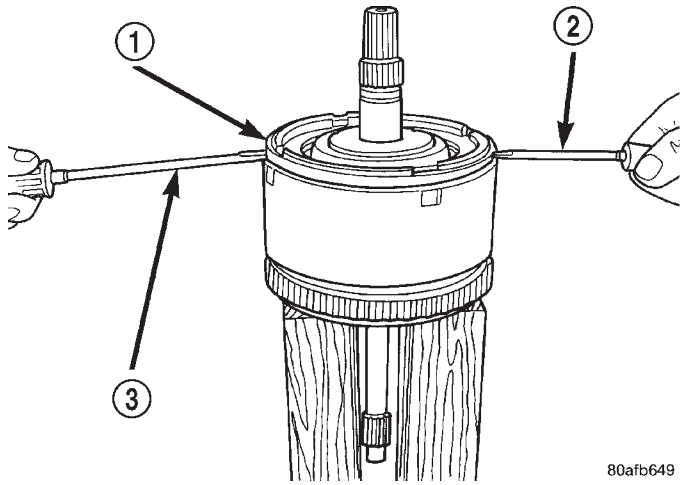


Fig. 204 Pry Reverse Clutch Reaction Plate

1 - REVERSE CLUTCH REACTION PLATE
2 - SCREWDRIVER
3 - SCREWDRIVER

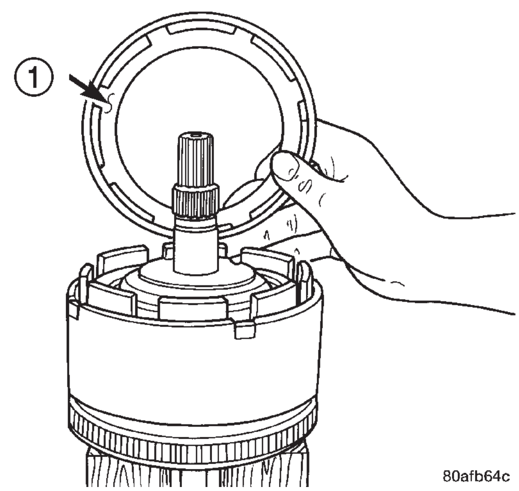


Fig. 205 Reverse Clutch Reaction Plate

1 - REVERSE CLUTCH REACTION PLATE (INSTALL FLAT SIDE DOWN)

(5) Remove the reverse clutch pack (two fibers/one steel) (Fig. 206).

NOTE: Tag reverse clutch pack for reassembly identification.

INPUT CLUTCH ASSEMBLY (Continued)

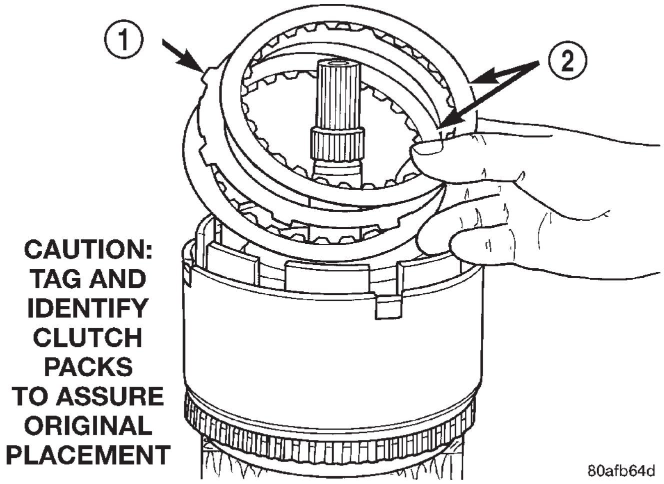


Fig. 206 Reverse Clutch Pack

1 - REVERSE CLUTCH PLATE
2 - REVERSE CLUTCH DISC

(6) Remove the OD/Reverse pressure plate snap ring (Fig. 207).

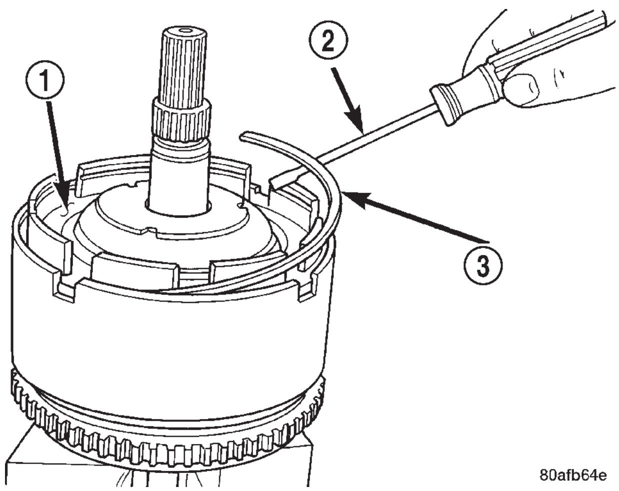


Fig. 207 OD/Reverse Pressure Plate Snap Ring

1 - OD/REVERSE PRESSURE PLATE
2 - SCREWDRIVER
3 - OD/REVERSE PRESSURE PLATE SNAP RING

(7) Remove OD/Reverse pressure plate (Fig. 208).

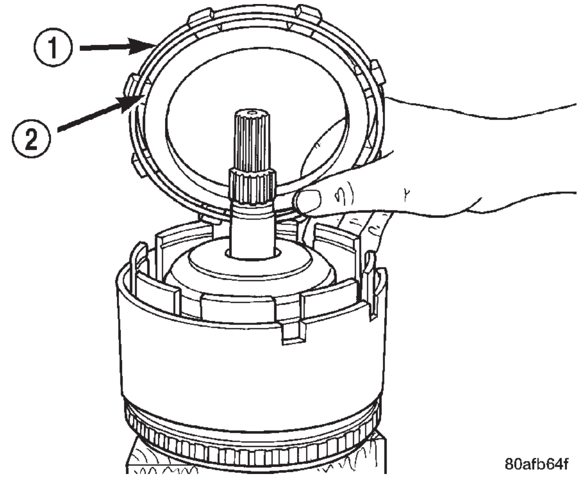


Fig. 208 OD/Reverse Pressure Plate

1 - OD/REVERSE PRESSURE PLATE (STEP SIDE DOWN)
2 - (STEP SIDE DOWN)

(8) Remove OD/Reverse pressure plate wave snap ring (Fig. 209).

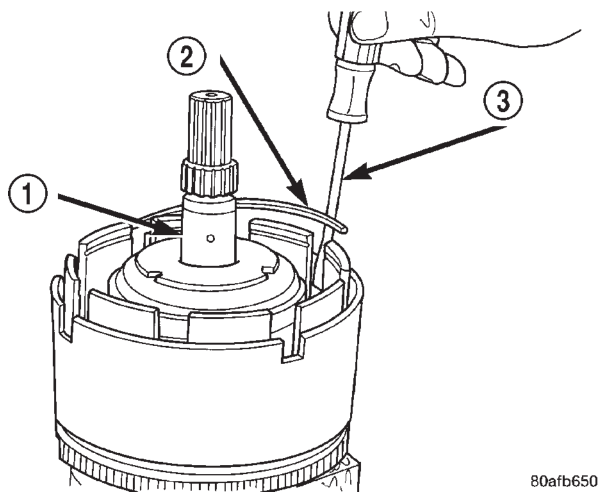


Fig. 209 Waved Snap Ring

1 - OVERDRIVE SHAFT ASSEMBLY
2 - OD/REVERSE CLUTCH WAVED SNAP RING
3 - SCREWDRIVER

INPUT CLUTCH ASSEMBLY (Continued)

(9) Remove OD shaft/hub and OD clutch pack (Fig. 210) (Fig. 211).

NOTE: Tag overdrive clutch pack for reassembly identification.

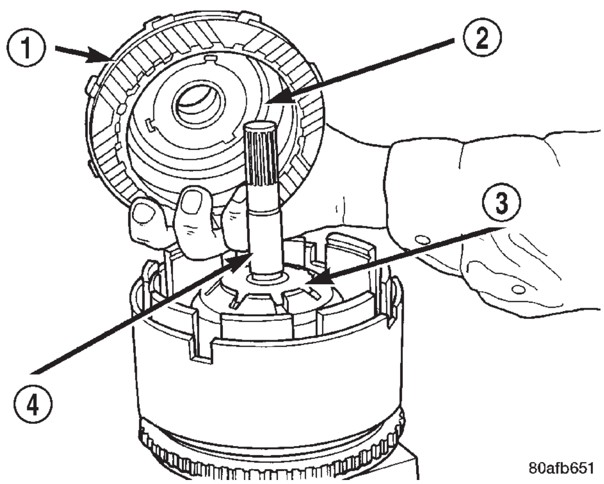


Fig. 210 Remove OD Clutch Pack

1 - OVERDRIVE SHAFT ASSEMBLY AND OD CLUTCH PACK
2 - #3 THRUST PLATE
3 - #3 THRUST WASHER
4 - UNDERDRIVE SHAFT ASSEMBLY

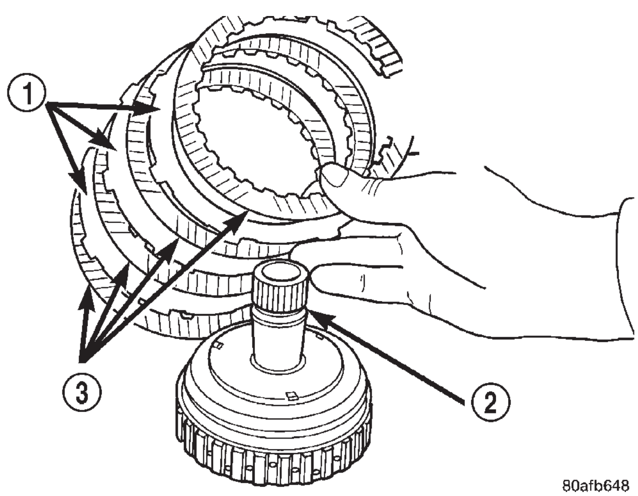


Fig. 211 Overdrive Clutch Pack

1 - OVERDRIVE CLUTCH PLATE
2 - OVERDRIVE SHAFT ASSEMBLY
3 - OVERDRIVE CLUTCH DISC

(10) Remove and inspect #3 & #4 thrust washers (Fig. 212).

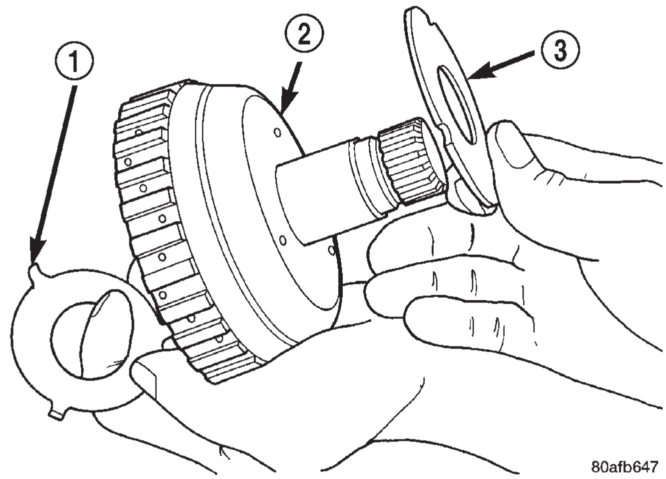


Fig. 212 #3&4 Thrust Washers

1 - #3 THRUST PLATE (3 TABS)
2 - OD SHAFT ASSEMBLY
3 - #4 THRUST PLATE (3 SLOTS)

(11) Remove the underdrive shaft assembly (Fig. 213).

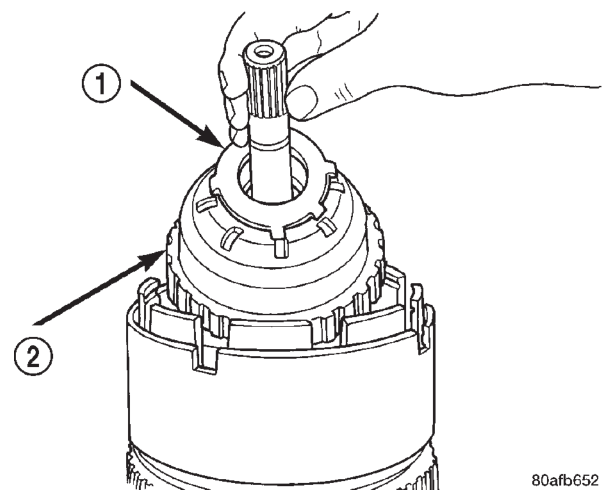


Fig. 213 Underdrive Shaft Assembly

1 - #3 THRUST WASHER (5 TABS)
2 - UNDERDRIVE SHAFT ASSEMBLY

INPUT CLUTCH ASSEMBLY (Continued)

(12) Remove the #2 needle bearing (Fig. 214).

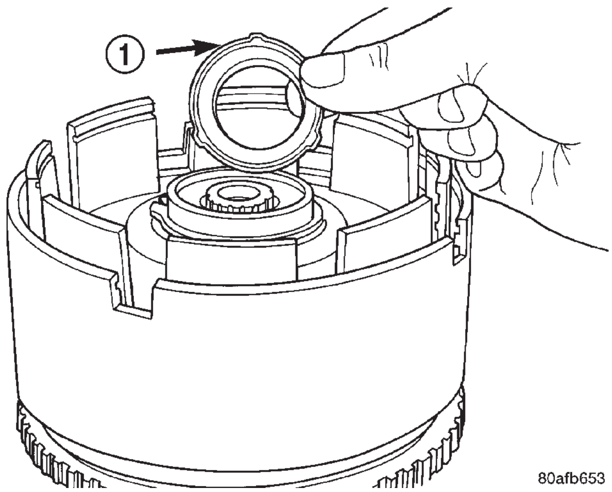


Fig. 214 No. 2 Needle Bearing

1 - #2 NEEDLE BEARING (NOTE 3 TABS)

(13) Remove the OD/UD reaction plate tapered snap ring (Fig. 215).

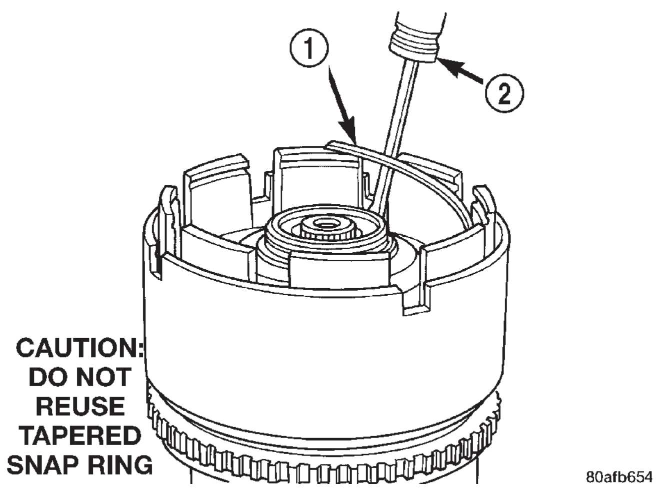


Fig. 215 OD/UD Reaction Plate Tapered Snap Ring

1 - OVERDRIVE/UNDERDRIVE CLUTCHES REACTION PLATE TAPERED SNAP RING
2 - SCREWDRIVER (DO NOT SCRATCH REACTION PLATE)

NOTE: The OD/UD clutch reaction plate has a step on both sides. Install the OD/UD clutches reaction plate tapered step side up.

(14) Remove the OD/UD reaction plate (Fig. 216).

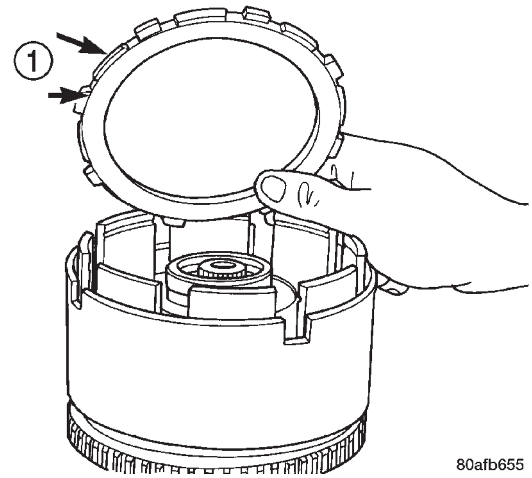


Fig. 216 OD/UD Reaction Plate

1 - OD/UD CLUTCH REACTION PLATE (TAPERED STEP SIDE UP)

(15) Remove the first UD clutch disc (Fig. 217).

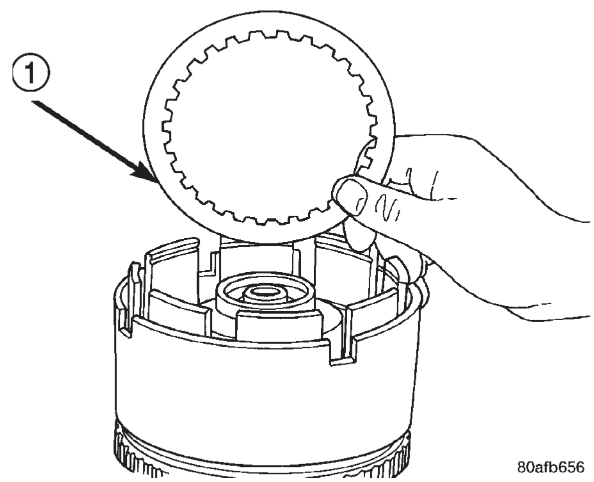


Fig. 217 Remove One UD Clutch Disc

1 - ONE UNDERDRIVE CLUTCH DISC

INPUT CLUTCH ASSEMBLY (Continued)

(16) Remove the UD clutch flat snap ring (Fig. 218).

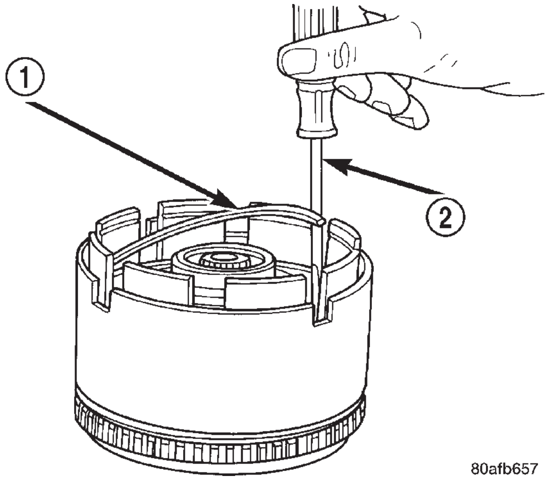


Fig. 218 UD Clutch Flat Snap Ring

1 - UNDERDRIVE CLUTCH REACTION PLATE FLAT SNAP RING
2 - SCREWDRIVER

NOTE: Tag underdrive clutch pack for reassembly identification.

(17) Remove the UD clutch pack (Fig. 219).

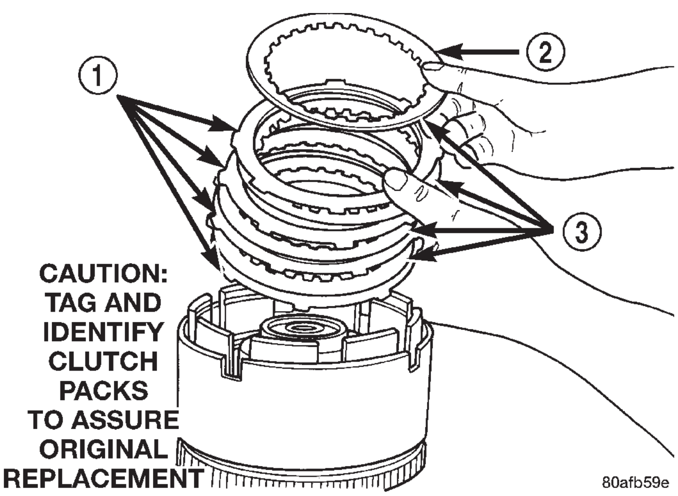


Fig. 219 Underdrive Clutch Pack

1 - CLUTCH PLATE
2 - ONE UD CLUTCH DISC
3 - CLUTCH DISC

CAUTION: Compress return spring just enough to remove or install snap ring.

(18) Using Tool 5059A and an arbor press, compress UD clutch piston enough to remove snap ring (Fig. 220) (Fig. 221).

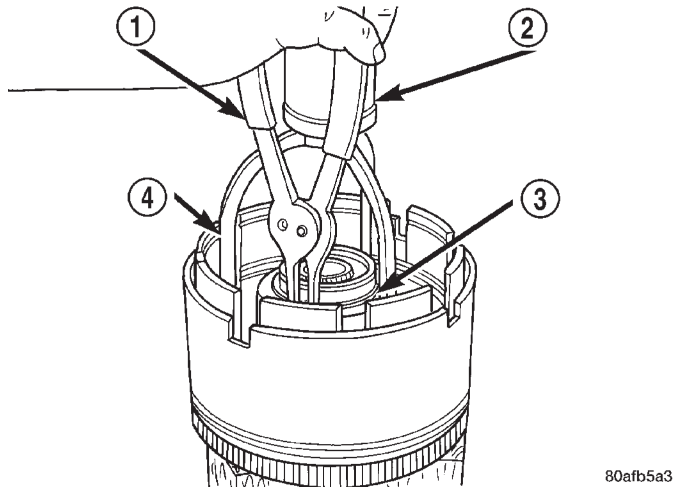


Fig. 220 UD Spring Retainer Snap Ring

1 - SNAP RING PLIERS
2 - ARBOR PRESS RAM
3 - SNAP RING
4 - SPECIAL TOOL 5059A

(19) Remove spring retainer (Fig. 221).

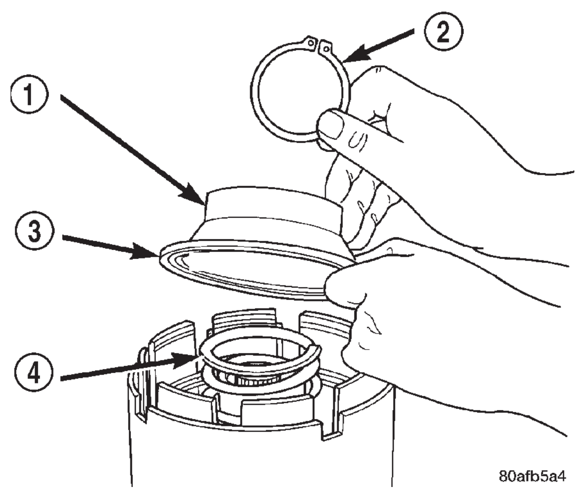


Fig. 221 UD Return Spring and Retainer

1 - UNDERDRIVE SPRING RETAINER
2 - SNAP RING
3 - SEAL
4 - PISTON RETURN SPRING

INPUT CLUTCH ASSEMBLY (Continued)

(20) Remove UD clutch piston (Fig. 222).

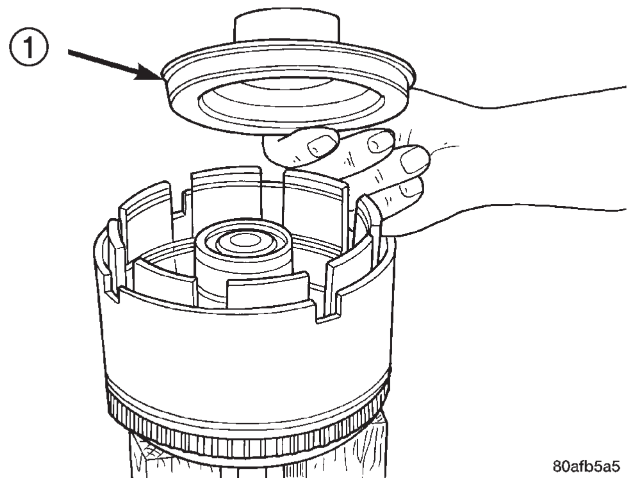


Fig. 222 Underdrive Clutch Piston

1 - PISTON

(21) Remove input hub tapered snap ring (Fig. 223).

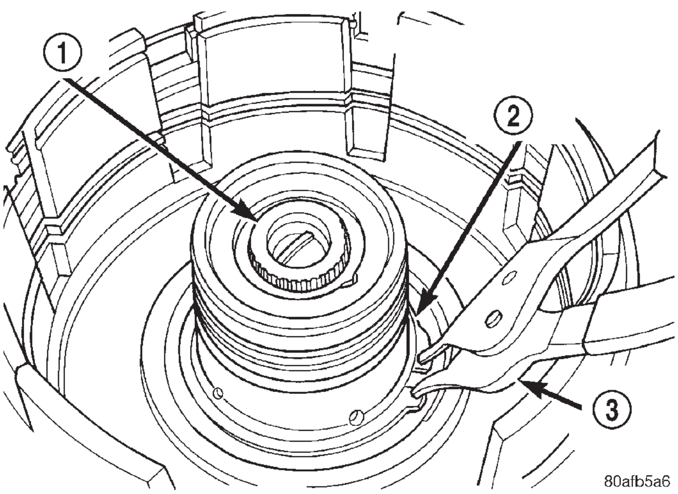


Fig. 223 Input Hub Tapered Snap Ring

1 - INPUT SHAFT
2 - INPUT HUB SNAP RING (TAPERED SIDE UP WITH TABS IN CAVITY)
3 - SNAP RING PLIERS

(22) Tap on input hub with soft faced hammer and separate input hub from OD/Reverse piston and clutch retainer (Fig. 224) (Fig. 225).

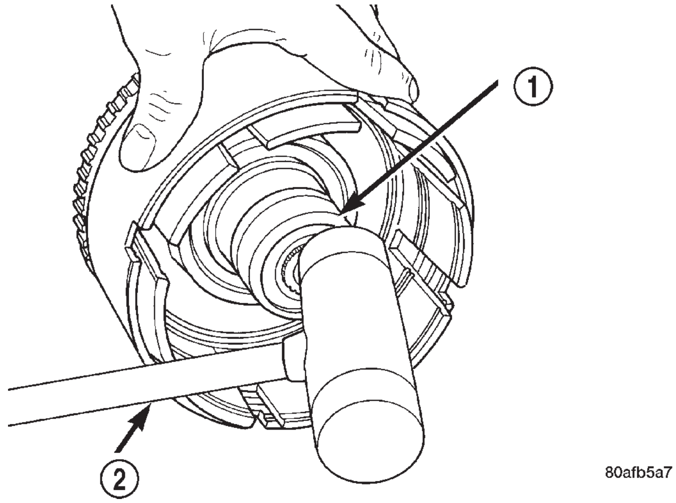


Fig. 224 Tap on Input Hub

1 - INPUT SHAFT AND HUB ASSEMBLY
2 - PLASTIC HAMMER

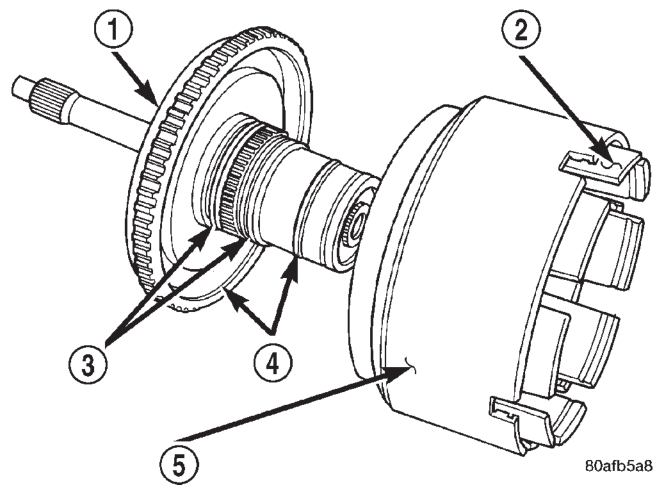


Fig. 225 Input Hub Removed

1 - INPUT SHAFT AND HUB ASSEMBLY
2 - INPUT CLUTCHES RETAINER
3 - O-RING
4 - SEAL
5 - OVERDRIVE/REVERSE PISTON

INPUT CLUTCH ASSEMBLY (Continued)

(23) Separate clutch retainer from OD/Reverse piston (Fig. 226).

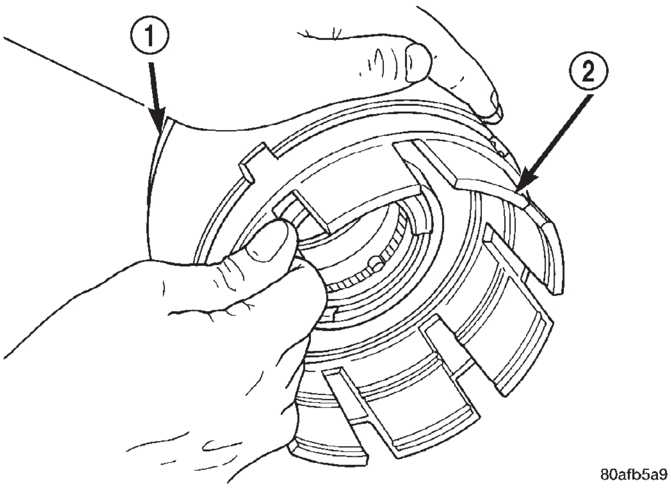


Fig. 226 Pull Retainer from Piston

1 - OVERDRIVE/REVERSE PISTON
2 - INPUT CLUTCHES RETAINER

(24) Using Tool 6057 and an arbor press, compress return OD/Reverse piston return spring just enough to remove snap ring (Fig. 227) (Fig. 228).

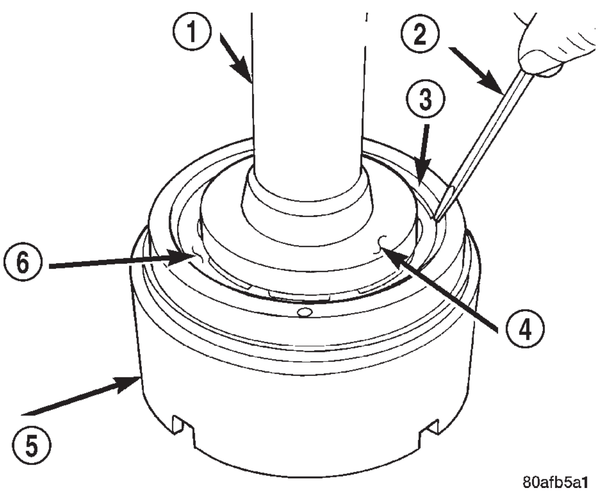


Fig. 227 Remove Snap Ring

1 - ARBOR PRESS RAM (COMPRESS RETURN SPRING JUST ENOUGH TO REMOVE OR INSTALL SNAP RING)
2 - SCREWDRIVER
3 - SNAP RING
4 - SPECIAL TOOL 6057
5 - OD/REVERSE PISTON
6 - RETURN SPRING

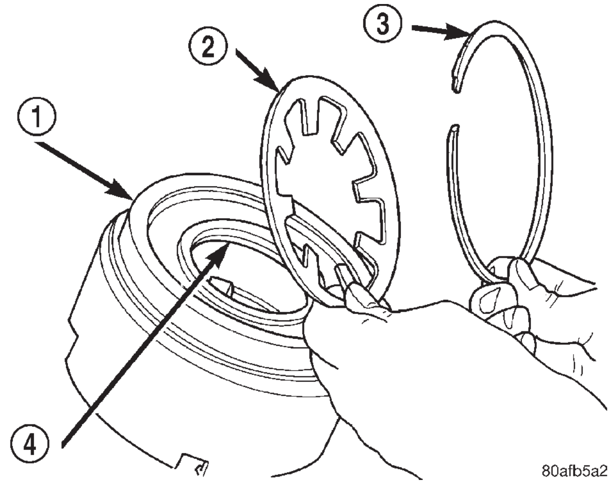


Fig. 228 Snap Ring and Return Spring

1 - OD/REVERSE PISTON
2 - RETURN SPRING
3 - SNAP RING
4 - O-RING

(25) Remove input shaft to input clutch hub snap ring (Fig. 229).

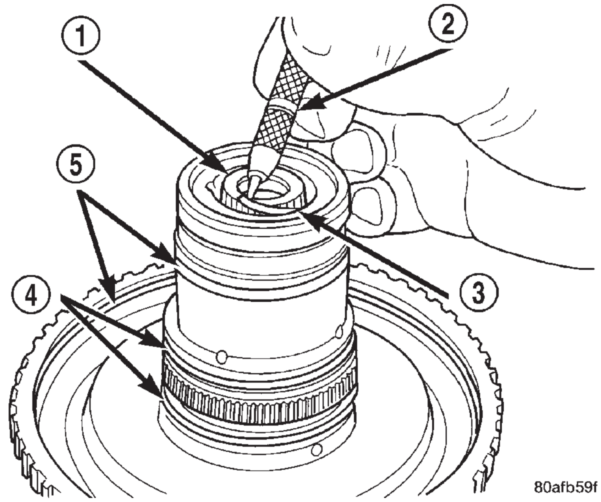


Fig. 229 Remove Input Shaft Snap Ring

1 - INPUT SHAFT
2 - SHARP-POINTED TOOL
3 - SNAP RING
4 - O-RINGS
5 - SEALS

INPUT CLUTCH ASSEMBLY (Continued)

(26) Using a suitably sized socket and an arbor press, remove input shaft from input shaft hub (Fig. 230).

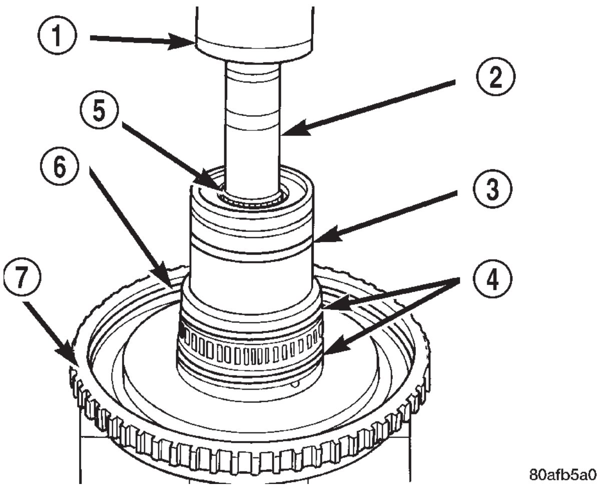


Fig. 230 Remove Input Shaft

1 - ARBOR PRESS RAM
2 - SOCKET
3 - SEAL
4 - O-RINGS
5 - INPUT SHAFT
6 - SEAL
7 - INPUT SHAFT HUB ASSEMBLY

ASSEMBLY

Use petrolatum on all seals to ease assembly of components.

(1) Using an arbor press, install input shaft to input shaft hub (Fig. 231).

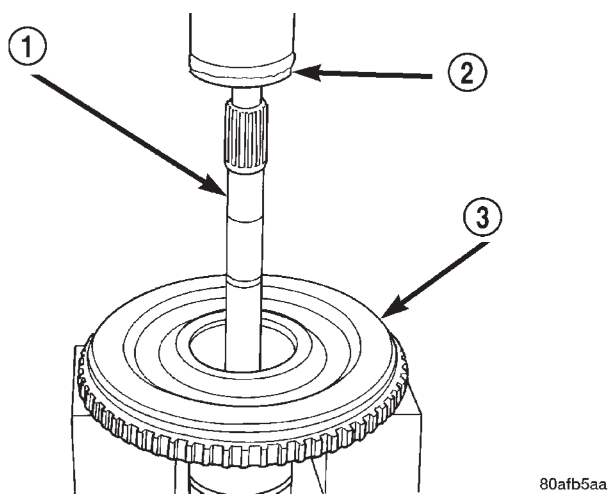


Fig. 231 Install Input Shaft

1 - INPUT SHAFT
2 - ARBOR PRESS RAM
3 - INPUT SHAFT HUB ASSEMBLY

(2) Install input shaft snap ring (Fig. 232).

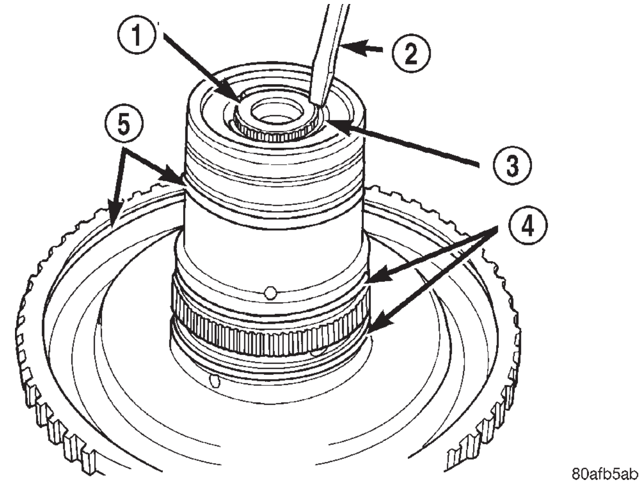


Fig. 232 Install Input Shaft Snap Ring

1 - INPUT SHAFT
2 - SCREWDRIVER (DO NOT SCRATCH BEARING SURFACE)
3 - SNAP RING
4 - O-RINGS
5 - SEALS

(3) Using an arbor press and Tool 6057, Install OD/Reverse piston return spring and snap ring (Fig. 233) (Fig. 234).

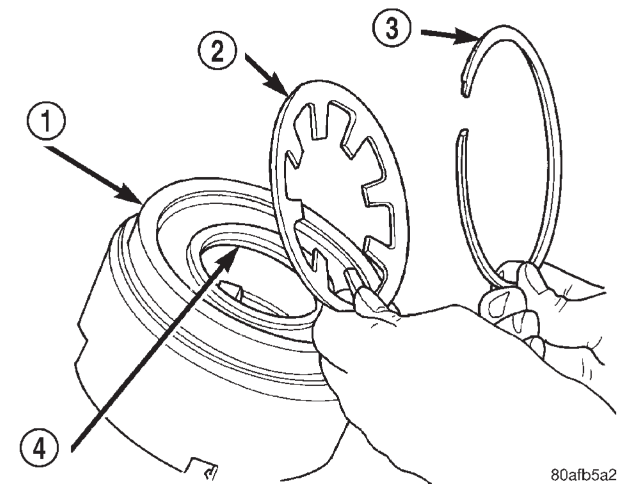


Fig. 233 Return Spring and Snap Ring

1 - OD/REVERSE PISTON
2 - RETURN SPRING
3 - SNAP RING
4 - O-RING

INPUT CLUTCH ASSEMBLY (Continued)

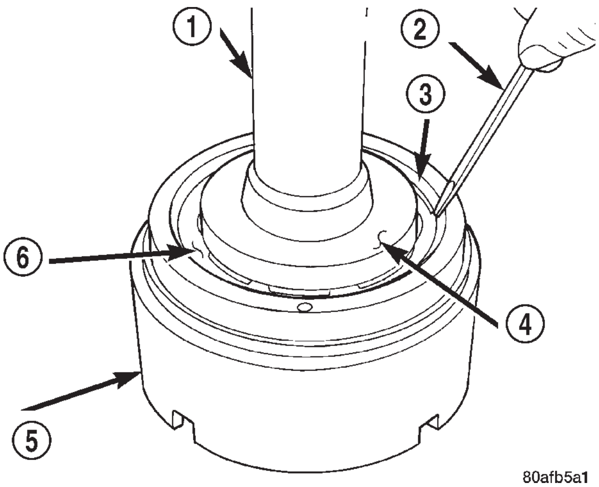


Fig. 234 Install Snap Ring

1 - ARBOR PRESS RAM (COMPRESS RETURN SPRING JUST ENOUGH TO REMOVE OR INSTALL SNAP RING)
2 - SCREWDRIVER
3 - SNAP RING
4 - SPECIAL TOOL 6057
5 - OD/REVERSE PISTON
6 - RETURN SPRING

(4) Install the OD/Reverse piston assembly to the input clutch retainer as shown in (Fig. 235).

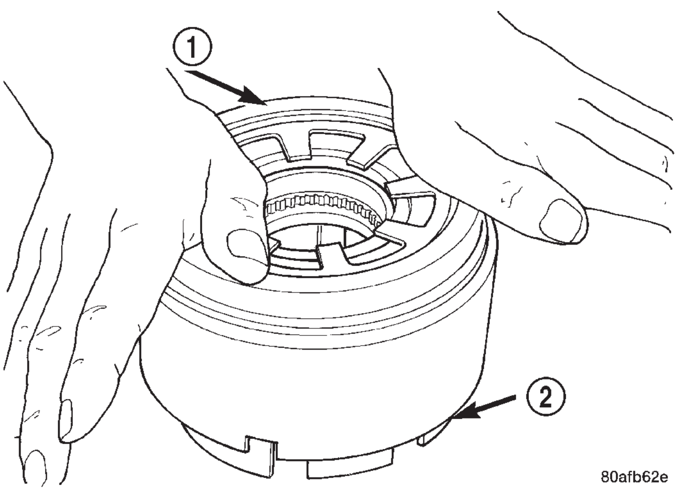


Fig. 235 Install OD/Reverse Piston

1 - PUSH DOWN TO INSTALL OVERDRIVE/REVERSE PISTON
2 - INPUT CLUTCHES RETAINER

(5) Install the input hub/shaft assy. to the OD/Reverse piston/clutch retainer assy. (Fig. 236).

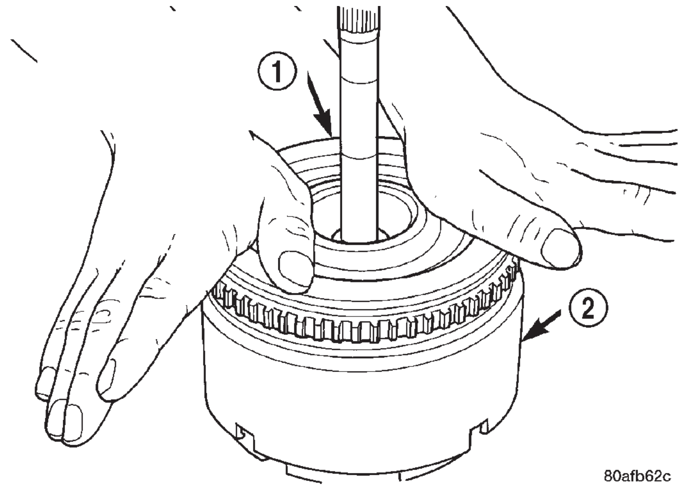


Fig. 236 Install Input Shaft Hub Assembly

1 - PUSH DOWN TO INSTALL INPUT SHAFT HUB ASSEMBLY (ROTATE TO ALIGN SPLINES)
2 - OD/REV. PISTON

(6) Install input hub tapered snap ring (Fig. 237).

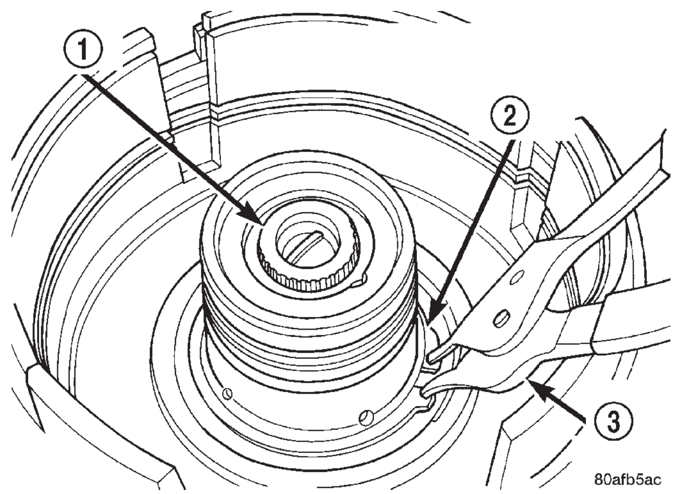


Fig. 237 Install Input Hub Tapered Snap Ring

1 - INPUT SHAFT
2 - INPUT HUB SNAP RING (TAPERED SIDE UP WITH TABS IN CAVITY)
3 - SNAP RING PLIERS

INPUT CLUTCH ASSEMBLY (Continued)

(7) Install UD clutch piston (Fig. 238).

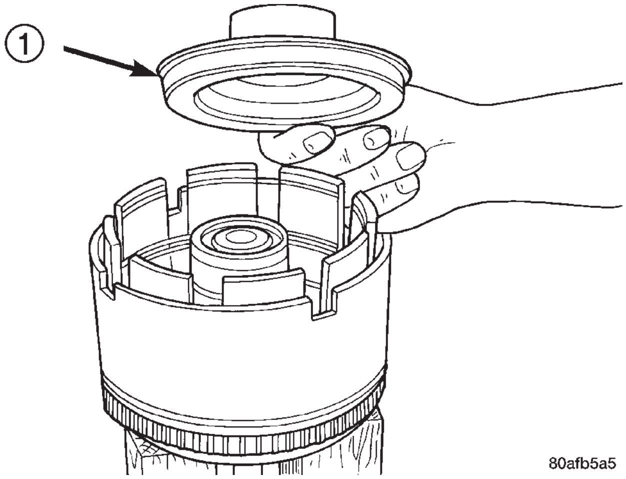


Fig. 238 Underdrive Clutch Piston

1 - PISTON

(8) Install UD piston return spring and Tool 5067 as shown in (Fig. 239).

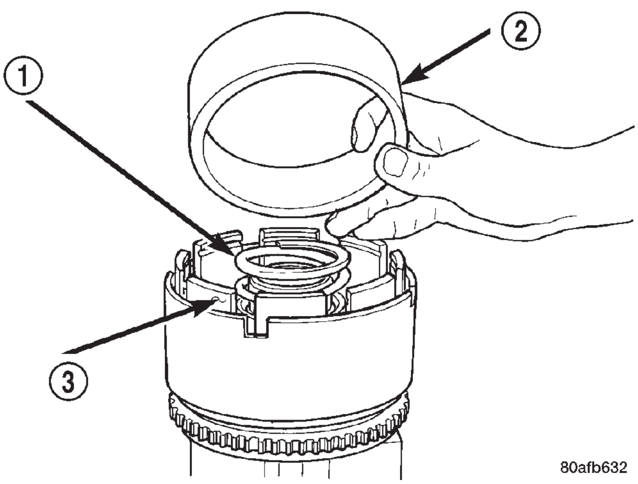


Fig. 239 Seal Compressor Special Tool 5067

1 - PISTON RETURN SPRING
2 - SPECIAL TOOL 5067
3 - INPUT SHAFT CLUTCHES RETAINER ASSEMBLY

(9) Using Tool 5059A and an arbor press, Install the UD spring retainer and snap ring. (Fig. 240) (Fig. 241) Compress just enough to install snap ring.

CAUTION: Compress return spring just enough to install snap ring.

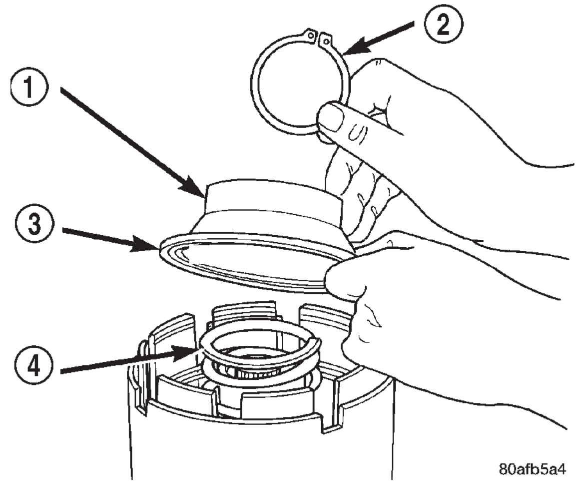


Fig. 240 UD Return Spring and Retainer

1 - UNDERDRIVE SPRING RETAINER
2 - SNAP RING
3 - SEAL
4 - PISTON RETURN SPRING

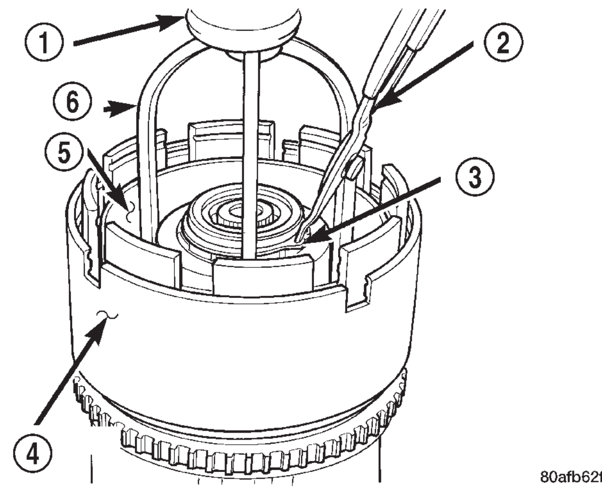


Fig. 241 Install UD Spring Retainer and Snap Ring

1 - ARBOR PRESS RAM
2 - SNAP RING PLIERS
3 - SNAP RING
4 - OD/REVERSE PISTON
5 - TOOL 5067
6 - TOOL 5059A

INPUT CLUTCH ASSEMBLY (Continued)

(10) Install the UD clutch pack. Leave out upper disc, until snap ring is installed (Fig. 242).

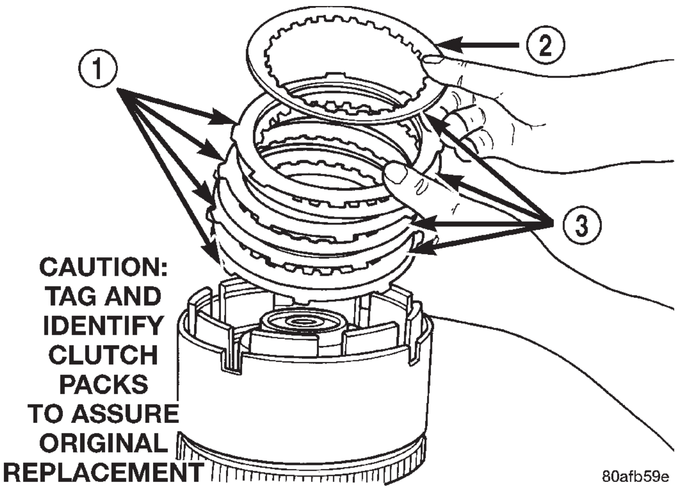


Fig. 242 Underdrive Clutch Pack

1 - CLUTCH PLATE
2 - ONE UD CLUTCH DISC
3 - CLUTCH DISC

(11) Install the UD clutch flat snap ring (Fig. 243).

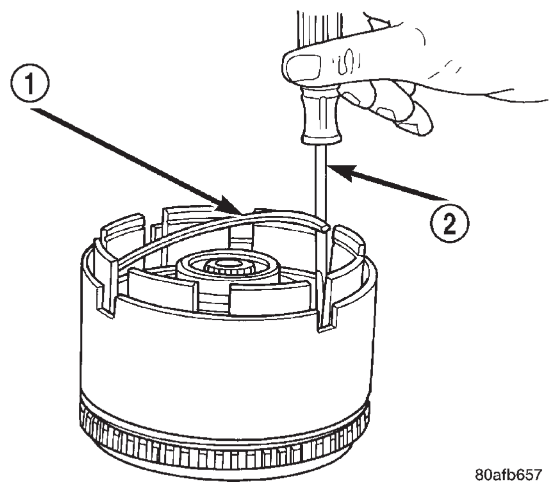


Fig. 243 UD Clutch Flat Snap Ring

1 - UNDERDRIVE CLUTCH REACTION PLATE FLAT SNAP RING
2 - SCREWDRIVER

(12) Install the last UD clutch disc (Fig. 244).

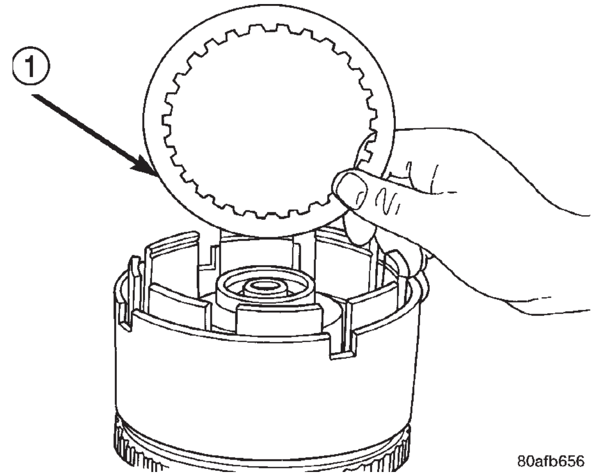


Fig. 244 Install Last UD Clutch Disc

1 - ONE UNDERDRIVE CLUTCH DISC

(13) Install the OD/UD clutch reaction plate and snap ring (Fig. 245) (Fig. 246). The OD/UD clutches reaction plate has a step on both sides. Install the OD/UD clutches reaction plate tapered step side up.

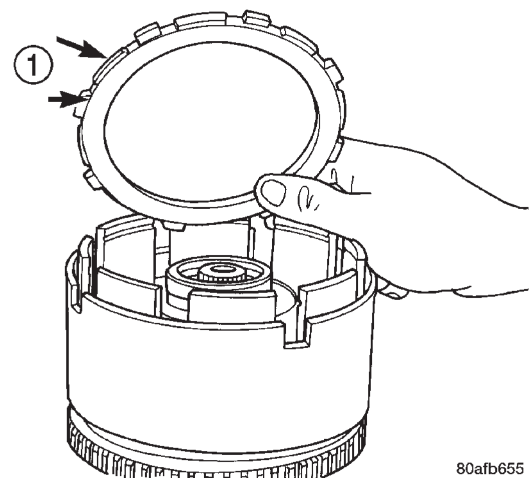


Fig. 245 OD/UD Reaction Plate

1 - OD/UD CLUTCH REACTION PLATE (TAPERED STEP SIDE UP)

NOTE: Snap ring ends must be located within one finger of the input clutch hub. Be sure that snap ring is fully seated, by pushing with screwdriver, into snap ring groove all the way around.

INPUT CLUTCH ASSEMBLY (Continued)

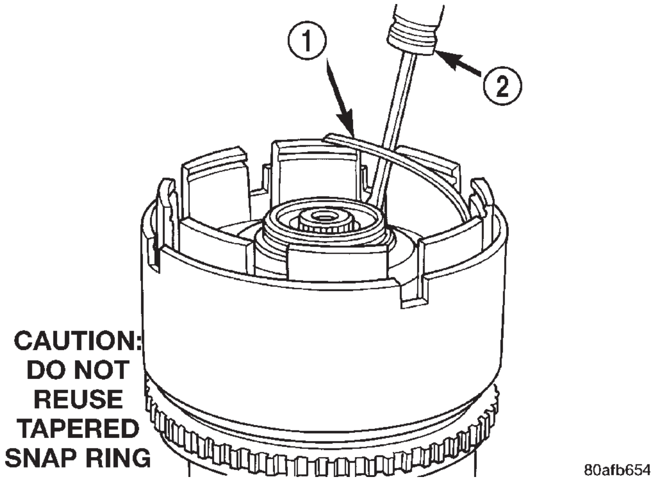


Fig. 246 Tapered Snap Ring

1 - OVERDRIVE/UNDERDRIVE CLUTCHES REACTION PLATE TAPERED SNAP RING
2 - SCREWDRIVER (DO NOT SCRATCH REACTION PLATE)

(14) Seat tapered snap ring to ensure proper installation (Fig. 247).

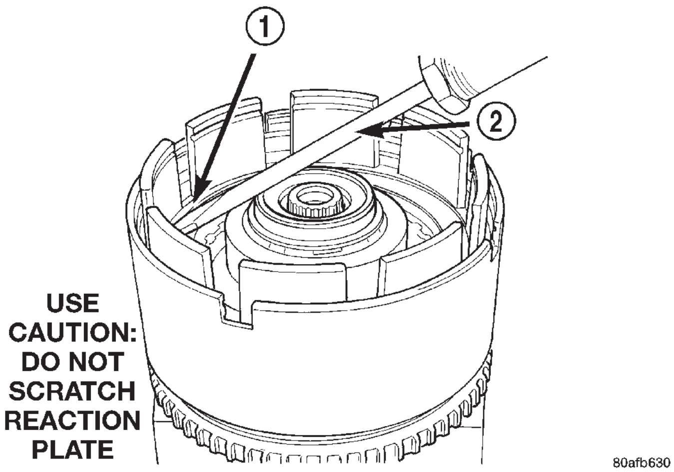


Fig. 247 Seating Tapered Snap Ring

1 - OVERDRIVE/UNDERDRIVE CLUTCHES REACTION PLATE TAPERED SNAP RING
2 - SCREWDRIVER

(15) Install input clutch assembly to the Input Clutch Pressure Fixture–Tool 8391 (Fig. 248).

(16) Set up dial indicator on the UD clutch pack as shown in (Fig. 249).

(17) Using moderate pressure, press down and hold (near indicator) the UD clutch pack with screwdriver or suitable tool and zero dial indicator (Fig. 250). When releasing pressure on clutch pack, indicator reading should advance 0.005–0.010.

CAUTION: Do not apply more than 30 psi (206 kPa) to the underdrive clutch pack.

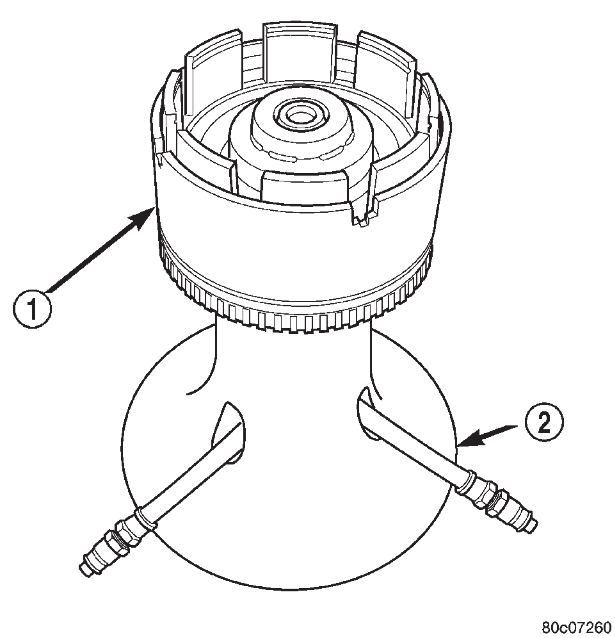


Fig. 248 Input Clutch Assembly on Pressure Fixture Tool 8391

1 - INPUT CLUTCH ASSEMBLY
2 - INPUT CLUTCH PRESSURE FIXTURE 8391

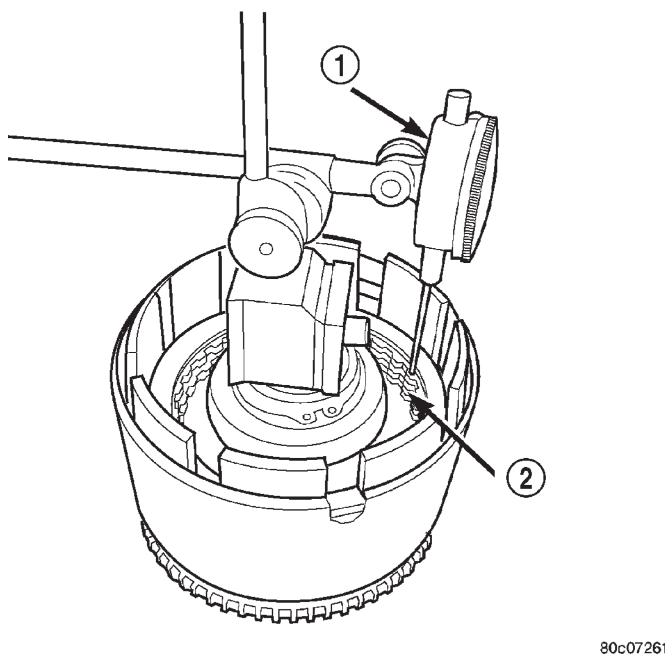


Fig. 249 Set Up Dial Indicator to Measure UD Clutch Clearance

1 - DIAL INDICATOR
2 - UNDERDRIVE CLUTCH

INPUT CLUTCH ASSEMBLY (Continued)

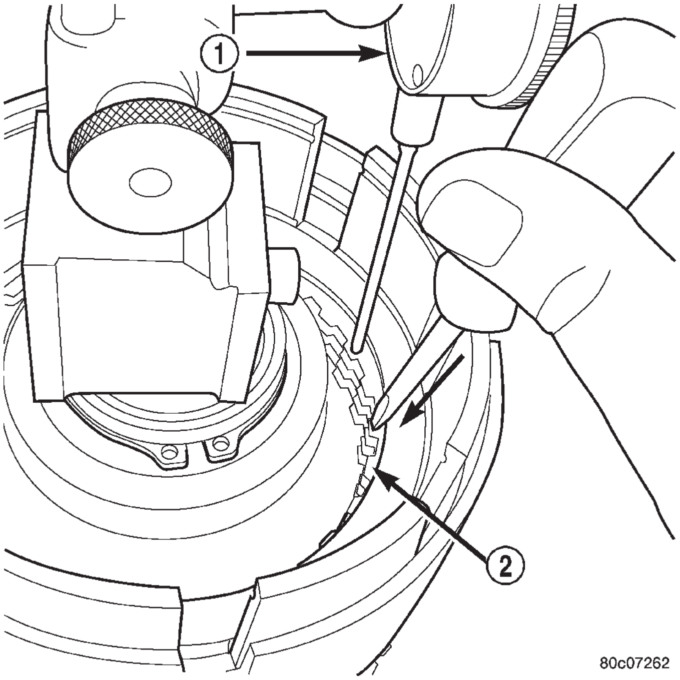


Fig. 250 Press Down on UD Clutch Pack and Zero Dial Indicator

1 - DIAL INDICATOR
2 - UNDERDRIVE CLUTCH

(18) Apply 30 psi (206 kPa) to the underdrive hose on Tool 8391 and measure UD clutch clearance. Measure and record UD clutch pack measurement in four (4) places, 90° apart.

(19) Take average of four measurements and compare with UD clutch pack clearance specification. **Underdrive clutch pack clearance must be 0.94-1.50 mm (0.037-0.059 in.).**

(20) If necessary, select the proper reaction plate to achieve specifications:

UNDERDRIVE REACTION PLATE THICKNESS	
4659939AB	5.837-5.937 mm (0.230-0.234 in.)
4659940AB	6.147-6.248 mm (0.242-0.246 in.)
4659941AB	6.457-6.557 mm (0.254-0.258 in.)

(21) Install the OD clutch pack (four frictions/three steels) (Fig. 251).

(22) Install OD pressure plate waved snap ring (Fig. 252).

(23) Install the OD/Reverse pressure plate with large step down (towards OD clutch pack) (Fig. 253).

(24) Install OD pressure plate flat snap ring (Fig. 254).

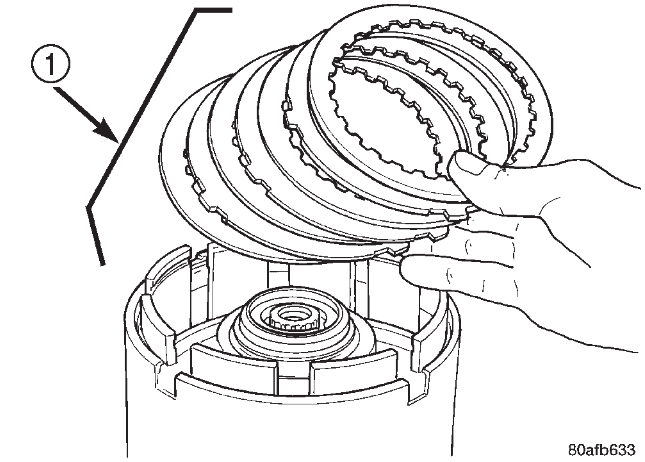


Fig. 251 Install OD Clutch Pack

1 - OVERDRIVE CLUTCH PACK

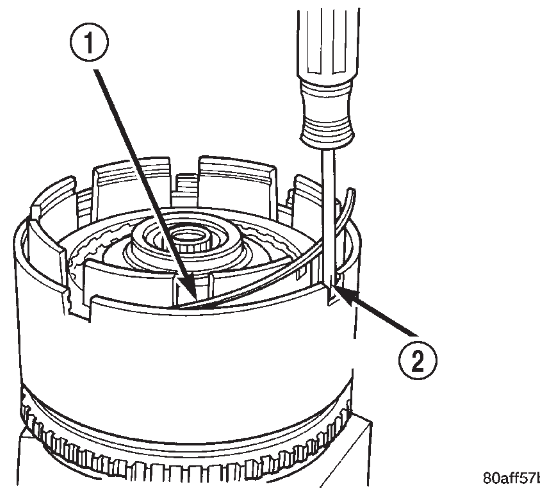


Fig. 252 Install Waved Snap Ring

1 - OVERDRIVE PRESSURE PLATE WAVED SNAP RING
2 - SCREWDRIVER

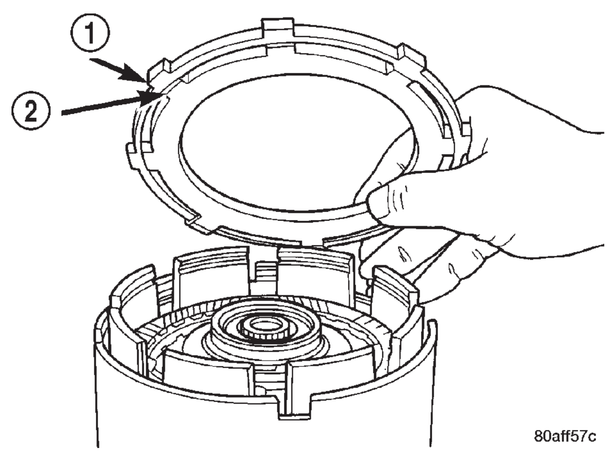


Fig. 253 OD/Reverse Pressure Plate

1 - OVERDRIVE/REVERSE PRESSURE PLATE
2 - (STEP SIDE DOWN)

INPUT CLUTCH ASSEMBLY (Continued)

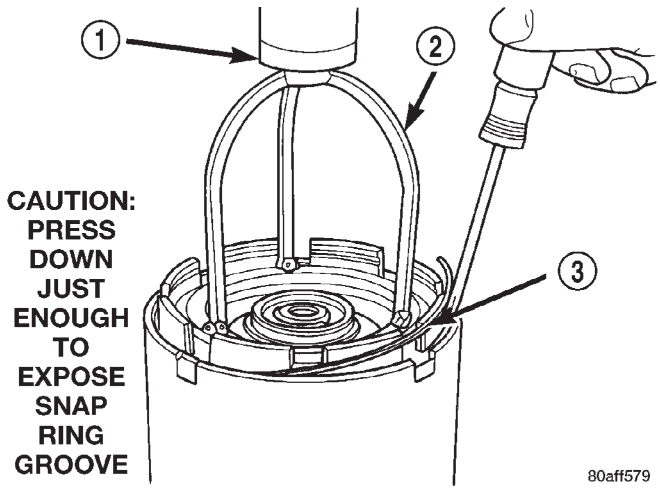


Fig. 254 Install Flat Snap Ring

1 - ARBOR PRESS RAM
2 - TOOL 5059A
3 - FLAT SNAP RING

(25) Measure OD clutch pack clearance. Set up dial indicator on top of the OD/Reverse pressure plate as shown in (Fig. 255).

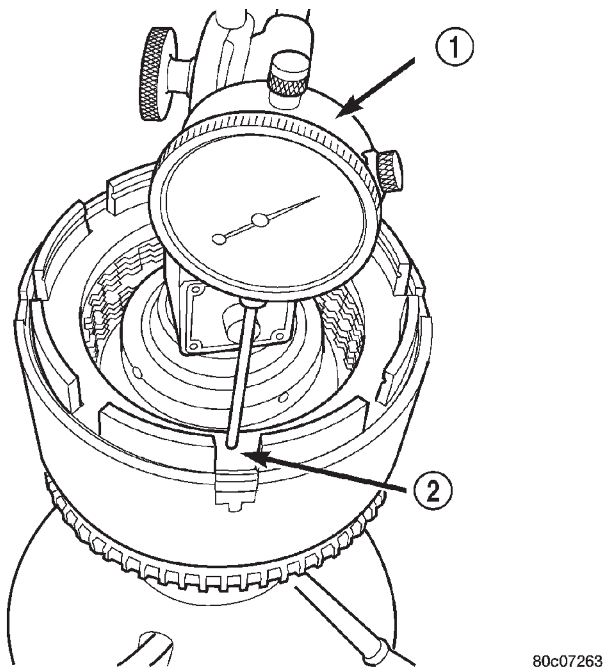


Fig. 255 Measure OD Clutch Pack Clearance

1 - DIAL INDICATOR
2 - OD/REVERSE REACTION PLATE

(26) Zero dial indicator and apply 30 psi (206 kPa) air pressure to the overdrive clutch hose on Tool 8391. Measure and record OD clutch pack measurement in four (4) places, 90° apart.

(27) Take average of four measurements and compare with OD clutch pack clearance specification. **The overdrive (OD) clutch pack clearance is 1.07-3.25 mm (0.042-0.128 in.).**

If not within specifications, the clutch is not assembled properly. There is no adjustment for the OD clutch clearance.

(28) Install reverse clutch pack (two frictions/one steel) (Fig. 256).

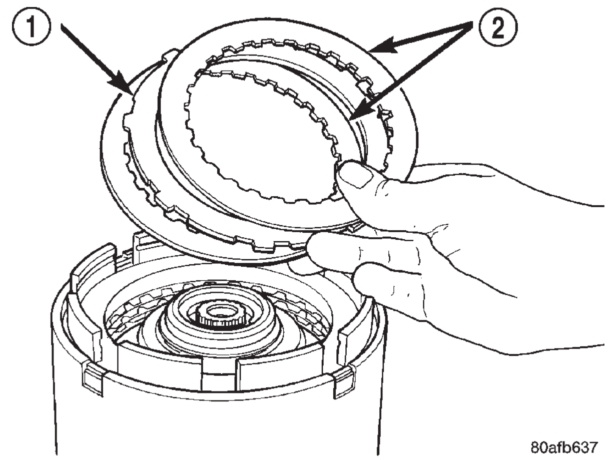


Fig. 256 Install Reverse Clutch Pack

1 - REVERSE CLUTCH PLATE
2 - REVERSE CLUTCH DISCS

(29) Install reverse clutch reaction plate with the flat side down towards reverse clutch (Fig. 257).

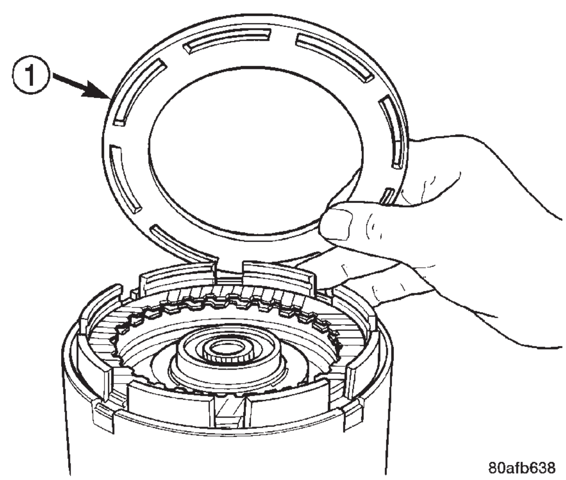


Fig. 257 Install Reaction Plate

1 - REVERSE CLUTCH REACTION PLATE (FLAT SIDE DOWN)

INPUT CLUTCH ASSEMBLY (Continued)

(30) Tap reaction plate down to allow installation of the reverse clutch snap ring. Install reverse clutch snap ring (Fig. 258).

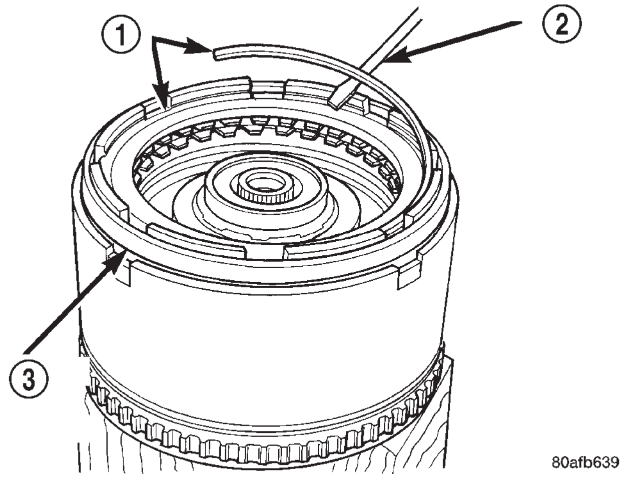


Fig. 258 Install Reverse Clutch Snap Ring

1 - REVERSE CLUTCH SNAP RING (SELECT)
2 - SCREWDRIVER
3 - REVERSE CLUTCH REACTION PLATE

(31) Pry up reverse reaction plate to seat against snap ring (Fig. 259).

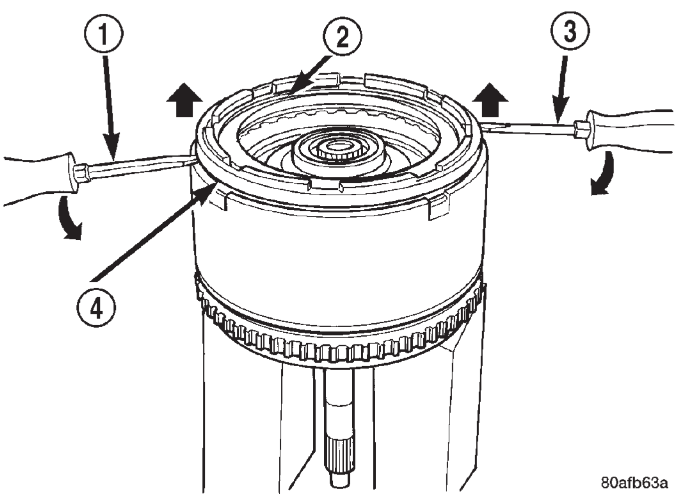


Fig. 259 Pry Up Reaction Plate to Seat Against Snap Ring

1 - SCREWDRIVER
2 - SNAP RING
3 - SCREWDRIVER
4 - MUST RAISE REVERSE REACTION PLATE TO RAISE SNAP RING

(32) Set up a dial indicator on the reverse clutch pack as shown in (Fig. 260).

(33) Using moderate pressure, press down and hold (near indicator) reverse clutch disc with screwdriver or suitable tool and zero dial indicator (Fig. 261). When releasing pressure, indicator should advance 0.005-0.010. as clutch pack relaxes.

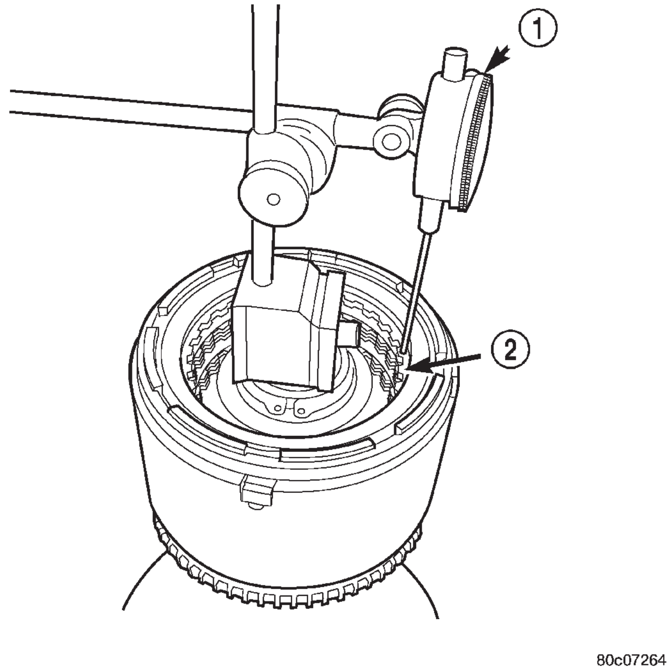


Fig. 260 Measure Reverse Clutch Pack Clearance

1 - DIAL INDICATOR
2 - REVERSE CLUTCH

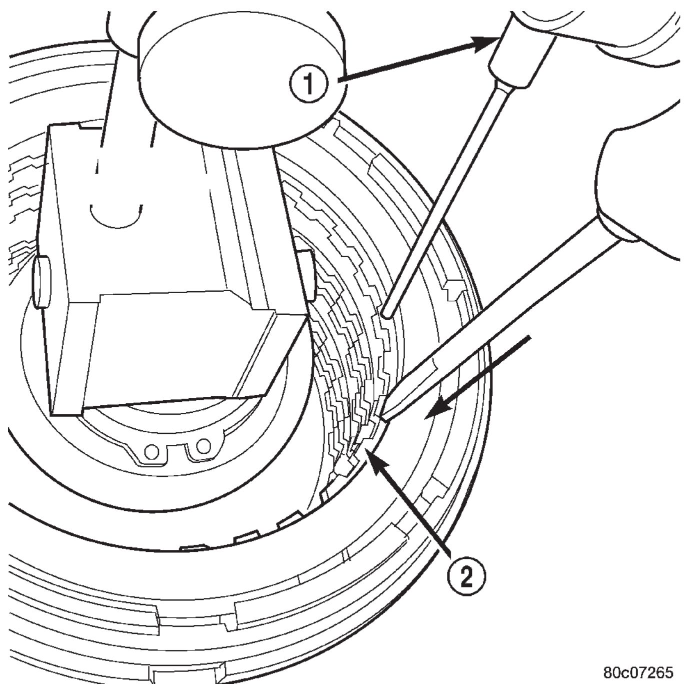


Fig. 261 Press Down on Reverse Clutch and Zero Indicator

1 - DIAL INDICATOR
2 - REVERSE CLUTCH

INPUT CLUTCH ASSEMBLY (Continued)

(34) Apply 30 psi (206 kPa) air pressure to the reverse clutch hose on Tool 8391. Measure and record reverse clutch pack measurement in four (4) places, 90° apart.

(35) Take average of four measurements and compare with reverse clutch pack clearance specification. **The reverse clutch pack clearance is 0.89-1.37 mm (0.035-0.054 in.).** Select the proper reverse clutch snap ring to achieve specifications:

REVERSE CLUTCH SNAP RING THICKNESS	
4377195	1.53-1.58 mm (0.060-0.062 in.)
4412871	1.77-1.83 mm (0.070-0.072 in.)
4412872	2.02-2.07 mm (0.080-0.082 in.)
4412873	2.27-2.32 mm (0.090-0.091 in.)

(36) To complete the assembly, reverse clutch and overdrive clutch must be removed.

(37) Install the #2 needle bearing (Fig. 262).

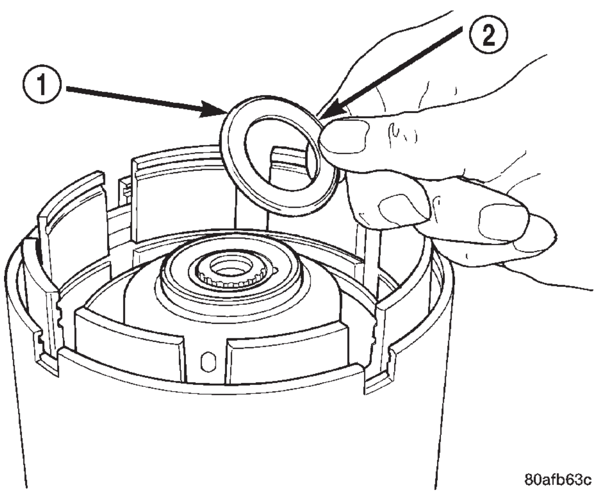


Fig. 262 Install No. 2 Needle Bearing

1 - #2 NEEDLE BEARING (NOTE 3 SMALL TABS)
2 - TABS UP

(38) Install the underdrive shaft assembly (Fig. 263).

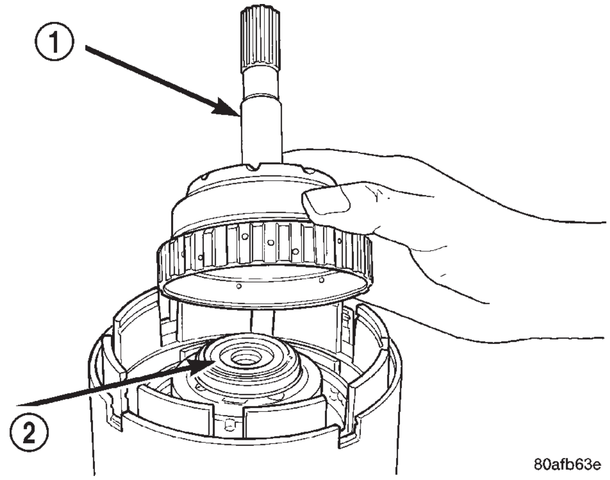


Fig. 263 Install Underdrive Shaft Assembly

1 - UNDERDRIVE SHAFT ASSEMBLY
2 - #2 NEEDLE BEARING

(39) Install the #3 thrust washer to the underdrive shaft assembly. Be sure five tabs are seated properly (Fig. 264).

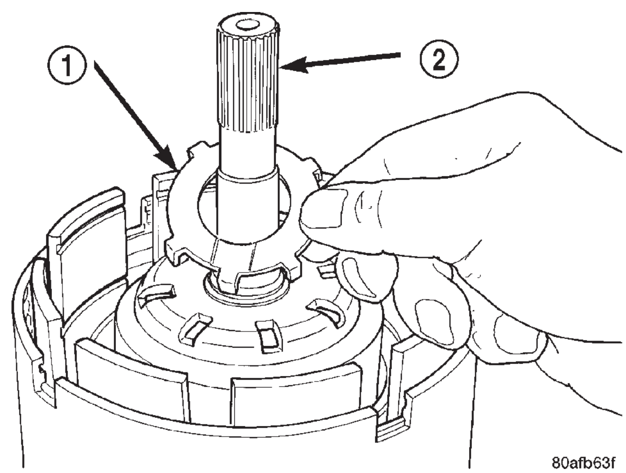


Fig. 264 Install No. 3 Thrust Washer

1 - #3 THRUST WASHER (NOTE 5 TABS)
2 - UNDERDRIVE SHAFT ASSEMBLY

INPUT CLUTCH ASSEMBLY (Continued)

(40) Install the #3 thrust plate to the bottom of the overdrive shaft assembly. Retain with petrolatum or transmission assembly gel (Fig. 265).

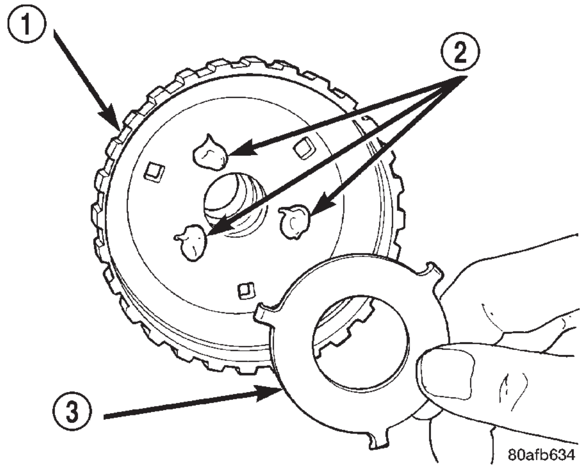


Fig. 265 Install No. 3 Thrust Plate

1 - OVERDRIVE SHAFT ASSEMBLY
2 - DABS OF PETROLATUM (FOR RETENTION)
3 - #3 THRUST PLATE (NOTE 3 TABS)

(41) Install the overdrive shaft assembly (Fig. 266).

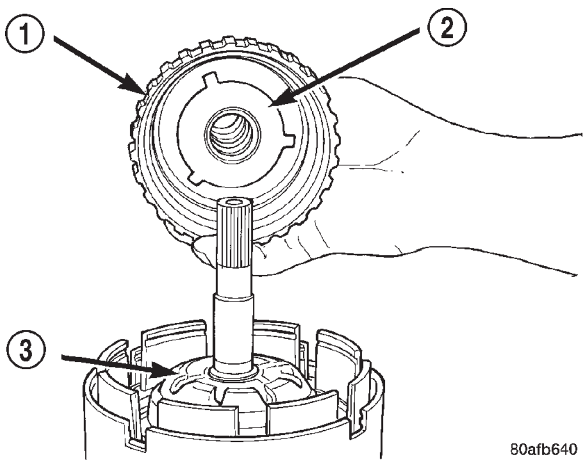


Fig. 266 Install Overdrive Shaft Assembly

1 - OVERDRIVE SHAFT ASSEMBLY
2 - #3 THRUST PLATE
3 - #3 THRUST WASHER

(42) Reinstall overdrive and reverse clutch as shown. **Rechecking these clutch clearances is not necessary.**

OIL PUMP

DESCRIPTION

The oil pump is located in the pump housing inside the bell housing of the transaxle case (Fig. 267). The oil pump consists of an inner and outer gear, a housing, and a cover that also serves as the reaction shaft support.

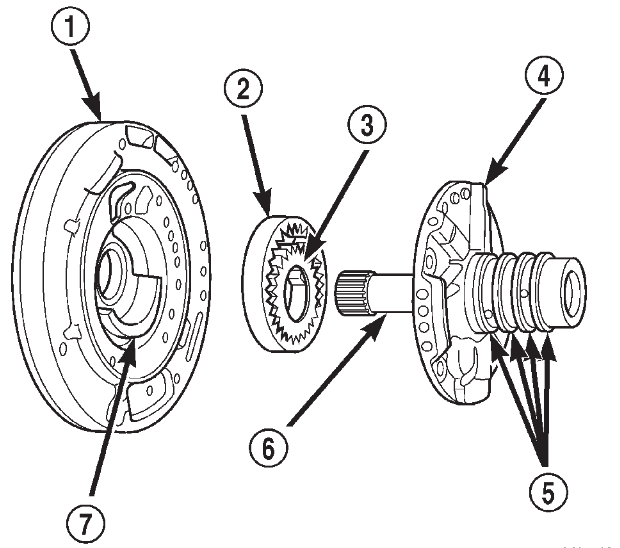


Fig. 267 Oil Pump Assembly

1 - PUMP HOUSING
2 - OUTER PUMP GEAR
3 - INNER PUMP GEAR
4 - REACTION SHAFT SUPPORT
5 - SEAL RINGS (4)
6 - REACTION SHAFT
7 - CRESCENT

OPERATION

As the torque converter rotates, the converter hub rotates the inner and outer gears. As the gears rotate, the clearance between the gear teeth increases in the crescent area, and creates a suction at the inlet side of the pump. This suction draws fluid through the pump inlet from the oil pan. As the clearance between the gear teeth in the crescent area decreases, it forces pressurized fluid into the pump outlet and to the valve body.

STANDARD PROCEDURE - OIL PUMP VOLUME CHECK

Measuring oil pump output volume will determine if sufficient flow to the transmission oil cooler exists, and whether or not an internal transmission failure is present.

OIL PUMP (Continued)

Verify that transmission fluid is at the proper level. If adding fluid is necessary, fill to the proper level with Mopar® ATF+4 (Automatic Transmission Fluid–Type 9602). The following procedure is to check oil pump output volume:

(1) Using hose cutters or a suitable blade, cut the “to cooler” (Fig. 268) line off flush with the cooler inlet fitting and place a collection container under the open line.

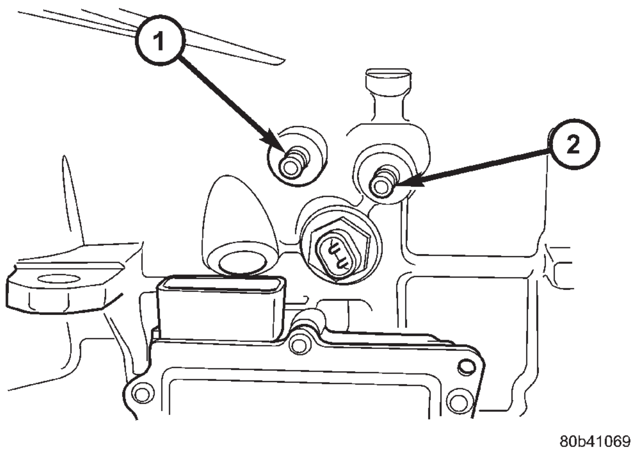


Fig. 268 Transaxle Oil Cooler Fittings

1 - FROM COOLER
2 - TO COOLER

CAUTION: With the fluid set at the proper level, fluid collection should not exceed (1) quart or internal damage to the transmission may occur.

(2) Start engine and run **at curb idle speed**, with the shift selector in neutral.

(3) If one quart of ATF is collected in 20 seconds or less, flow is within acceptable limits. If fluid flow is intermittent or it takes more than 20 seconds to collect one quart of ATF, (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - DIAGNOSIS AND TESTING).

(4) Inspect the cooler hose for damage. Replace if necessary.

(5) Re-connect the to cooler line to the transmission using a service splice kit. Refer to instructions inclued with the kit.

(6) Refill the transaxle to proper level with Mopar® ATF+4 (Automatic Transmission Fluid–Type 9602).

DISASSEMBLY

When disassembling the transaxle it is necessary to inspect the oil pump for wear and damage.

(1) Remove the reaction shaft support bolts.

(2) Remove reaction shaft support from pump housing (Fig. 269).

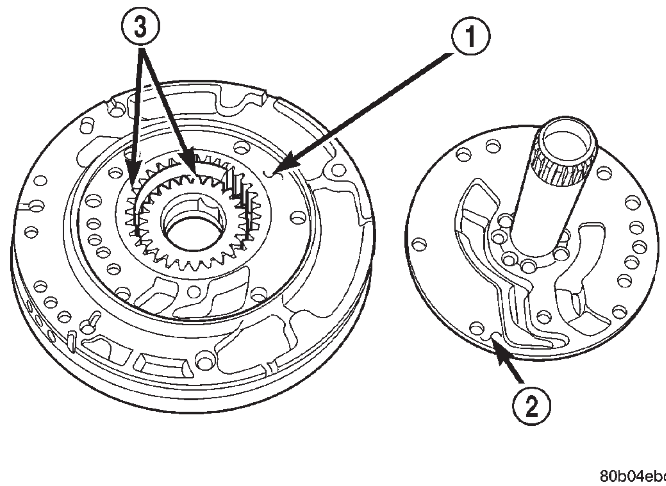


Fig. 269 Reaction Shaft Support

1 - PUMP HOUSING
2 - REACTION SHAFT SUPPORT
3 - PUMP GEARS

(3) Remove the pump gears (Fig. 270) and check for wear and damage on pump housing and gears.

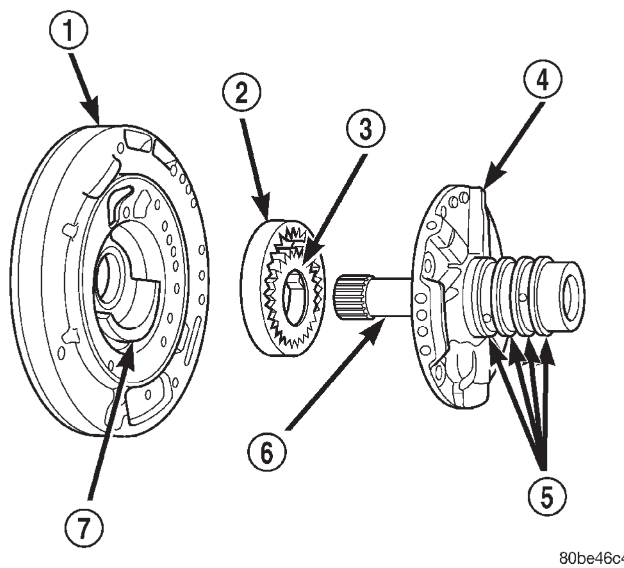


Fig. 270 Oil Pump Assembly

1 - PUMP HOUSING
2 - OUTER PUMP GEAR
3 - INNER PUMP GEAR
4 - REACTION SHAFT SUPPORT
5 - SEAL RINGS (4)
6 - REACTION SHAFT
7 - CRESCENT

(4) Re-install the gears and check clearances.

(5) Measure the clearance between the outer gear and the pump pocket (Fig. 271). Clearance should be 0.089–0.202 mm (0.0035-0.0079 in.).

OIL PUMP (Continued)

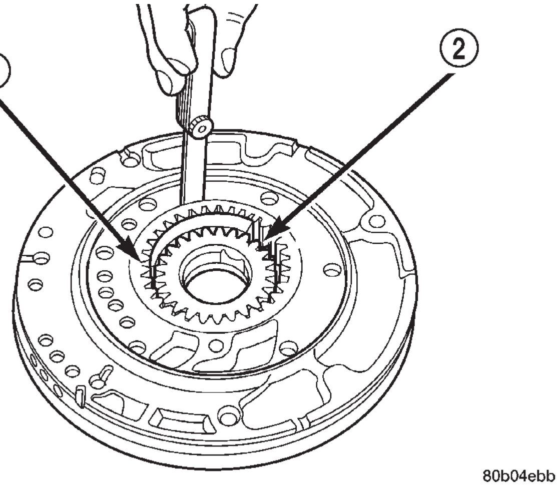


Fig. 271 Measure Outer Gear to Pocket

1 - OUTER GEAR
2 - POCKET

(6) Measure clearance between outer gear and crescent. Clearance should be 0.060-0.298 mm (0.0023-0.0117 in.).

(7) Measure clearance between inner gear and crescent. Clearance should be 0.093-0.385 mm (0.0036-0.0151 in.).

(8) Position an appropriate piece of Plastigage across both pump gears.

(9) Align the Plastigage to a flat area on the reaction shaft support housing.

(10) Install the reaction shaft to the pump housing. Tighten the bolts to 27 N·m (20 ft. lbs.).

(11) Remove bolts and carefully separate the housings. Measure the Plastigage following the instructions supplied.

(12) Clearance between outer gear side and the reaction shaft support should be 0.020-0.046 mm (0.0008-0.0018 in.). Clearance between inner gear side and the reaction shaft support should be 0.020-0.046 mm (0.0008-0.0018 in.).

ASSEMBLY

(1) Assemble oil pump as shown in (Fig. 272)

(2) Install and torque reaction shaft support-to-oil pump housing bolts to 28 N·m (20 ft. lbs.) torque.

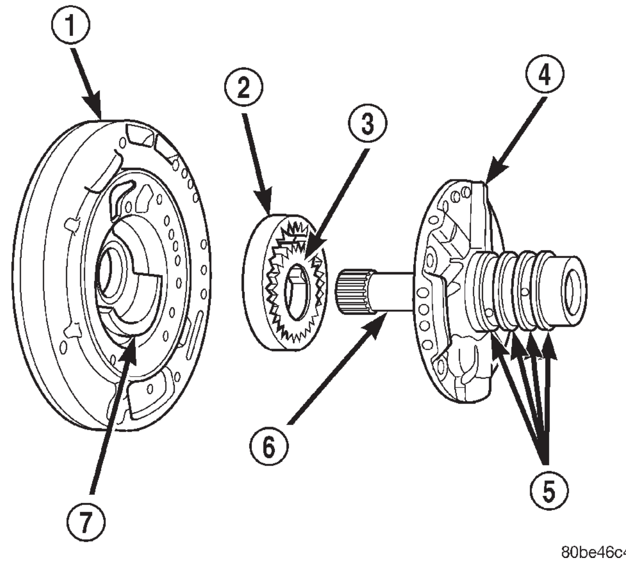


Fig. 272 Oil Pump Assembly

1 - PUMP HOUSING
2 - OUTER PUMP GEAR
3 - INNER PUMP GEAR
4 - REACTION SHAFT SUPPORT
5 - SEAL RINGS (4)
6 - REACTION SHAFT
7 - CRESCENT

PLANETARY GEARTRAIN

DESCRIPTION

The planetary geartrain is located between the input clutch assembly and the rear of the transaxle case. The planetary geartrain consists of two sun gears, two planetary carriers, two annulus (ring) gears, and one output shaft (Fig. 273).

OPERATION

The planetary geartrain utilizes two planetary gear sets that connect the transmission input shaft to the output shaft. Input and holding clutches drive or lock different planetary members to change output ratio or direction.

PLANETARY GEARTRAIN (Continued)

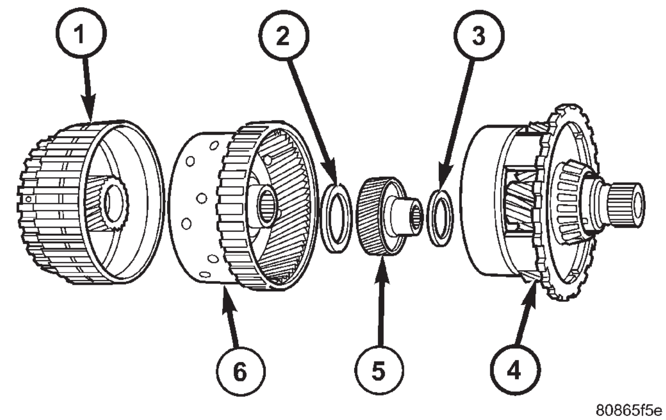


Fig. 273 Planetary Geartrain

1 - FRONT SUN GEAR ASSEMBLY
2 - #6 THRUST BEARING
3 - #7 THRUST BEARING
4 - REAR CARRIER/FRONT ANNULUS ASSEMBLY
5 - REAR SUN GEAR
6 - FRONT CARRIER/REAR ANNULUS ASSEMBLY

SEAL - OIL PUMP

REMOVAL

(1) Remove transaxle from vehicle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - REMOVAL).

(2) Using Tool C-3981-B, remove oil pump seal (Fig. 274).

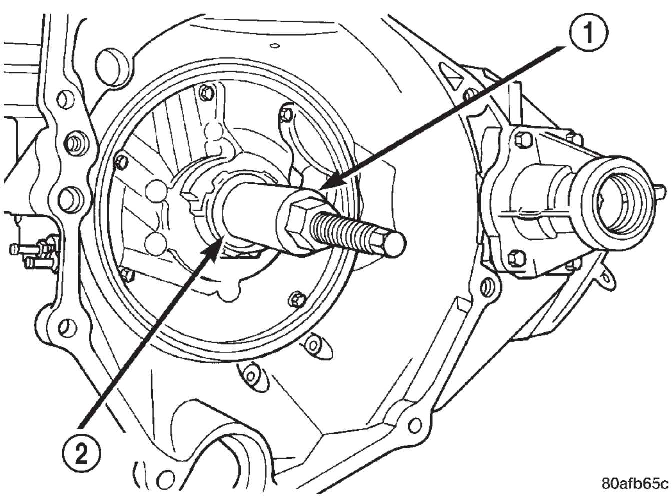


Fig. 274 Remove Oil Pump Seal

1 - TOOL C-3981–B
2 - OIL PUMP SEAL

INSTALLATION

(1) Using Tool C-4193, install oil pump seal (Fig. 275).

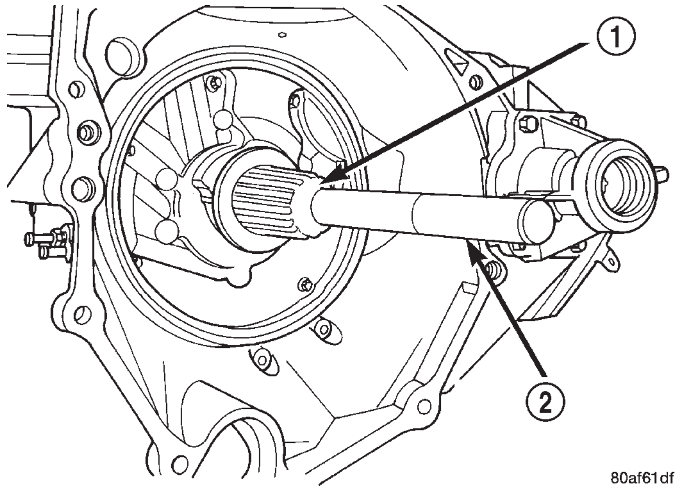


Fig. 275 Install Oil Pump Seal

1 - TOOL C-4193
2 - HANDLE TOOL C-4171

(2) Install transaxle to vehicle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - INSTALLATION).

SHIFT INTERLOCK CABLE

DESCRIPTION

The Brake Transmission Shifter/Ignition Interlock (BTSI) is a cable and solenoid operated system that prevents the transmission gear shifter from being moved out of PARK without a driver in place.

Refer to the following chart that expected shifter response, depending on ignition key/switch (Fig. 276) and brake pedal positions.

OPERATION

The Brake Transmission Shifter/Ignition Interlock (BTSI) is engaged whenever the ignition switch is in the LOCK or ACCESSORY position (Fig. 276) . An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed at least one-half inch. A magnetic holding device integral to the interlock cable is energized when the ignition is in the ON/RUN position. When the key is in the ON/RUN position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK or ACCESSORY position, unless the shifter is in the gated PARK position.

SHIFT INTERLOCK CABLE (Continued)

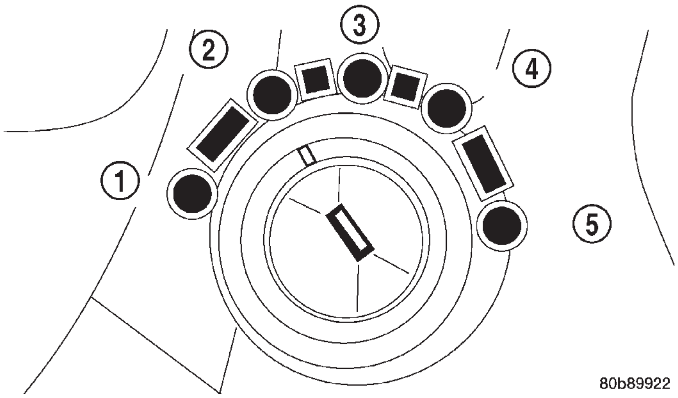


Fig. 276 Ignition Key/Switch Positions

1 - ACC
2 - LOCK
3 - OFF
4 - ON/RUN
5 - START

The following chart describes the normal operation of the Brake Transmission Shift Interlock (BTSI) system. If the "expected response" differs from the vehicle's response, then system repair and/or adjustment is necessary.

ACTION	EXPECTED RESPONSE
1. Turn key to the ″OFF″ position.	1. Shifter CAN be shifted out of park.
2. Turn key to the ″ON/RUN″ position.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the ″ON/RUN″ position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear and try to return key to the ″LOCK″ or ″ACC″ position.	4. Key cannot be returned to the ″LOCK″ or ″ACC″ position.
5. Return shifter to ″PARK″ and try to remove the key.	5. Key can be removed (after returning to ″LOCK″ position).
6. With the key removed, try to shift out of ″PARK″.	6. Shifter cannot be shifted out of ″PARK″.
NOTE: Any failure to meet these expected responses requires system adjustment or repair.	

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the gearshift knob set screw and knob (Fig. 277).

(3) Remove gearshift bezel (Fig. 278).

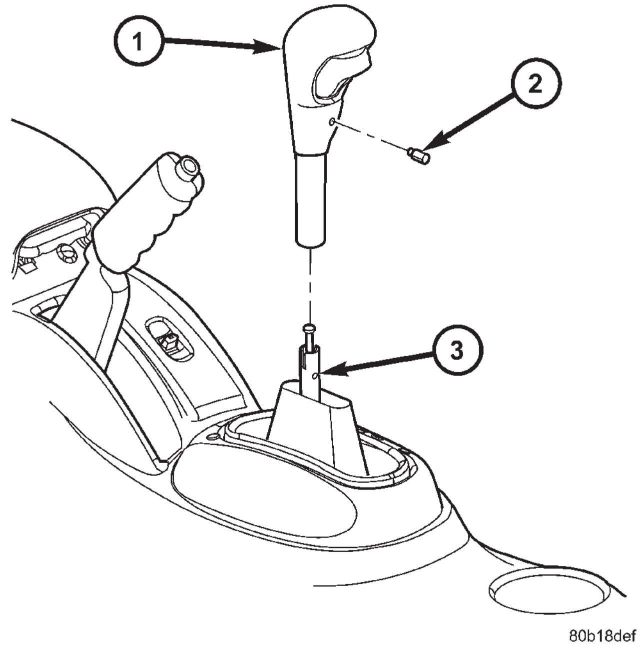


Fig. 277 Gearshift Knob

1 - GEARSHIFT KNOB
2 - SET SCREW
3 - GEARSHIFT MECHANISM

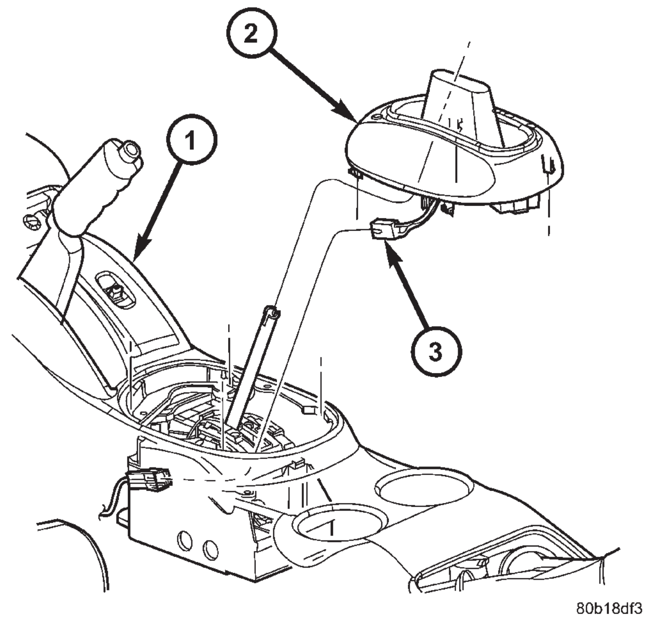


Fig. 278 Gearshift Bezel

1 - CENTER CONSOLE ASSEMBLY
2 - GEARSHIFT BEZEL
3 - LAMP CONNECTOR

SHIFT INTERLOCK CABLE (Continued)

(4) Remove center console assembly (Fig. 279).

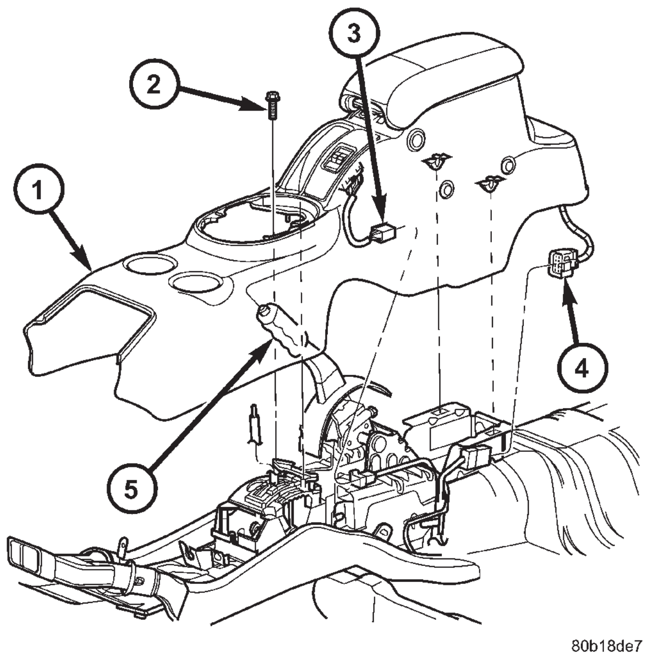


Fig. 279 Center Console Assembly

1 - CENTER CONSOLE
2 - SCREW
3 - IF EQUIPPED
4 - IF EQUIPPED
5 - PARK BRAKE HANDLE

(5) Release interlock cable adjuster end by inserting pointed object into shift bracket to disengage lock (Fig. 280). Unsnap the shifter/ignition interlock cable adjuster end from the slot in the gearshift mechanism bracket and disconnect cable core from shifter assembly (Fig. 281).

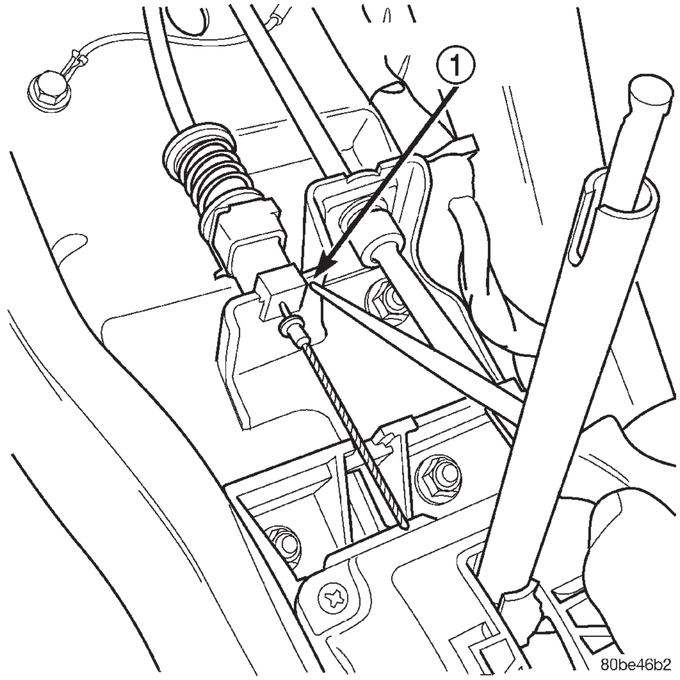


Fig. 280 Release Cable from Bracket at Retainer Lock

1 - RELEASE CABLE HERE

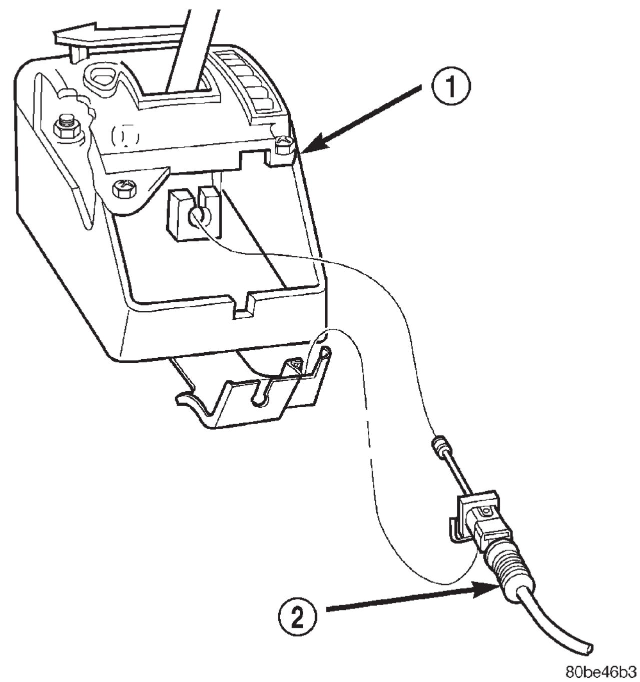


Fig. 281 Interlock Cable at Floor Shifter Assembly

1 - SHIFTER ASSEMBLY
2 - INTERLOCK CABLE

SHIFT INTERLOCK CABLE (Continued)

(6) Remove fuse panel cover from left end of instrument panel. Remove screw holding end of instrument panel top cover (Fig. 282).

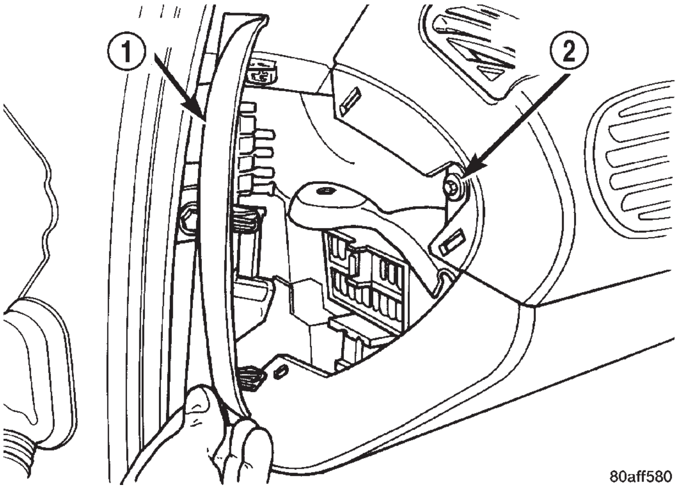


Fig. 282 Instrument Panel Top

1 - FUSE PANEL COVER
2 - SCREW

(7) Remove lower knee bolster screws and knee bolster.

(8) Remove steering column lower shroud (Fig. 283).

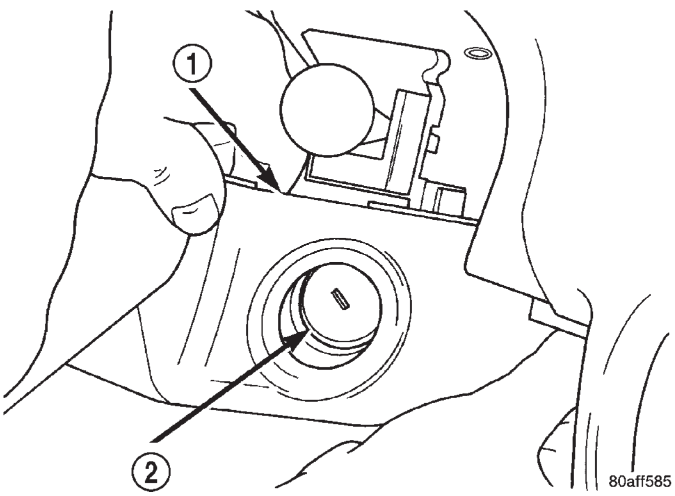


Fig. 283 Steering Column Lower Shroud

1 - STEERING COLUMN LOWER SHROUD
2 - IGNITION CYLINDER

(9) Tilt wheel to full down position and remove upper steering column shroud.

(10) Disconnect interlock solenoid connector.

(11) Disconnect nylon cable retainer from lower column mounting stud.

(12) Place the ignition key in the ON/RUN position (Fig. 284). Grasp the interlock cable clip and connector. Remove the cable from the interlock housing (Fig. 285).

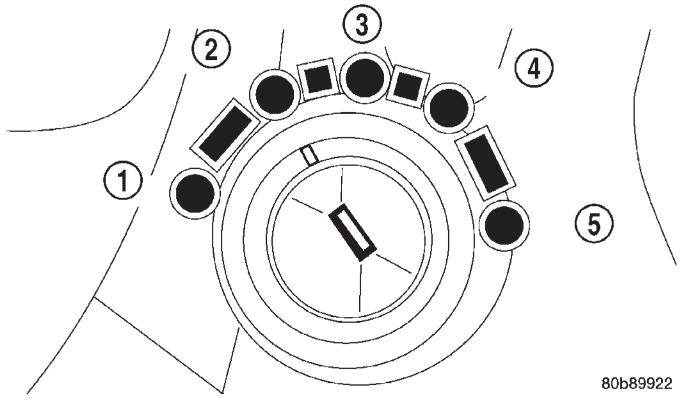


Fig. 284 Ignition Key/Switch Positions

1 - ACC
2 - LOCK
3 - OFF
4 - ON/RUN
5 - START

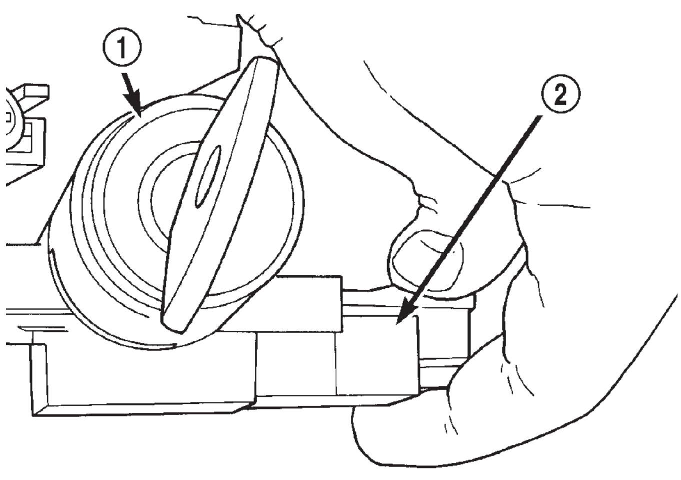


Fig. 285 Interlock Cable and Connector

1 - IGNITION LOCK CYLINDER
2 - INTERLOCK CABLE

(13) Remove interlock cable from underside of instrument panel.

SHIFT INTERLOCK CABLE (Continued)

INSTALLATION

CAUTION: When installing interlock cable assembly, care must be taken not to bend exposed cable wire and slug at shifter end of cable.

(1) Route interlock cable into lower dash panel and towards console as removed.

(2) Turn the ignition switch to the ON/RUN position (Fig. 284).

(3) Install the interlock cable into the interlock housing at the steering column (Fig. 286). Verify the cable snaps into the housing.

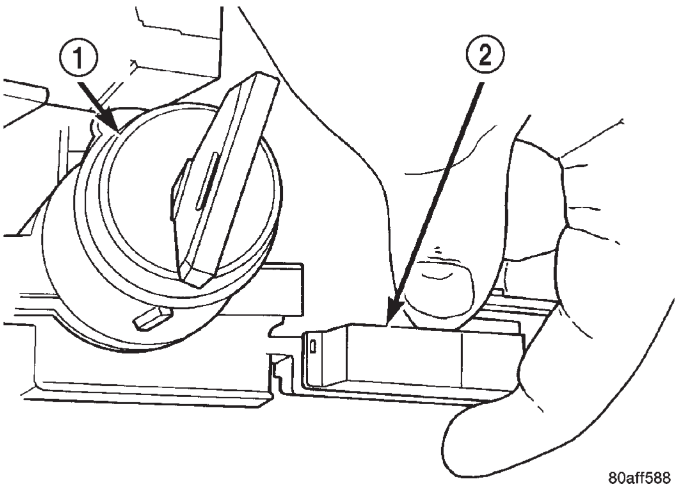


Fig. 286 Interlock Cable At Housing

1 - IGNITION LOCK CYLINDER
2 - INTERLOCK CABLE

(4) Install nylon cable retainer to lower column mounting stud.

(5) Connect BTSI solenoid connector.

(6) Insert interlock cable core wire into interlock adjustment lever groove. Make sure the interlock cable slug is seated in the groove (Fig. 281).

(7) Insert interlock cable adjuster end into bracket and snap into place (Fig. 281).

NOTE: The Interlock Cable MUST be adjusted. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/SHIFT INTERLOCK CABLE - ADJUSTMENTS)

(8) Install center console assembly (Fig. 279).

(9) Install gearshift bezel (Fig. 277).

(10) Install the gearshift knob and tighten set screw (Fig. 277) to 2 N·m (20 in.lbs.).

(11) Tilt wheel to full down position and install upper steering column shroud.

(12) Install steering column lower shroud (Fig. 283).

(13) Install lower knee bolster screws and knee bolster.

(14) Install fuse panel cover (Fig. 282).

(15) Connect the battery negative cable.

ADJUSTMENTS

BRAKE/TRANSMISSION SHIFT INTERLOCK CABLE VERIFICATION AND ADJUSTMENT

VERIFICATION

The following chart describes the normal operation of the Brake Transmission Shift Interlock (BTSI) system. If the “expected response” differs from the vehicle’s response, then system repair and/or adjustment is necessary. Refer to the following chart that expected shifter response, depending on ignition key/switch (Fig. 287) and brake pedal positions.

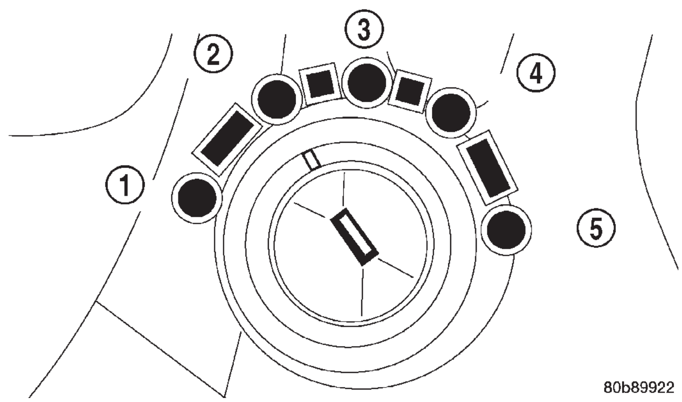


Fig. 287 Ignition Key/Switch Positions

1 - ACC
2 - LOCK
3 - OFF
4 - ON/RUN
5 - START

SHIFT INTERLOCK CABLE (Continued)

ACTION	EXPECTED RESPONSE
1. Turn key to the ″OFF″ position.	1. Shifter CAN be shifted out of park.
2. Turn key to the ″ON/RUN″ position.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the ″ON/RUN″ position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear and try to return key to the ″LOCK″ or ″ACC″ position.	4. Key cannot be returned to the ″LOCK″ or ″ACC″ position.
5. Return shifter to ″PARK″ and try to remove the key.	5. Key can be removed (after returning to ″LOCK″ position).
6. With the key removed, try to shift out of ″PARK″.	6. Shifter cannot be shifted out of ″PARK″.
NOTE: Any failure to meet these expected responses requires system adjustment or repair.	

ADJUSTMENT

(1) Disconnect and isolate, the battery negative cable.

(2) Remove the gearshift knob set screw and knob (Fig. 288).

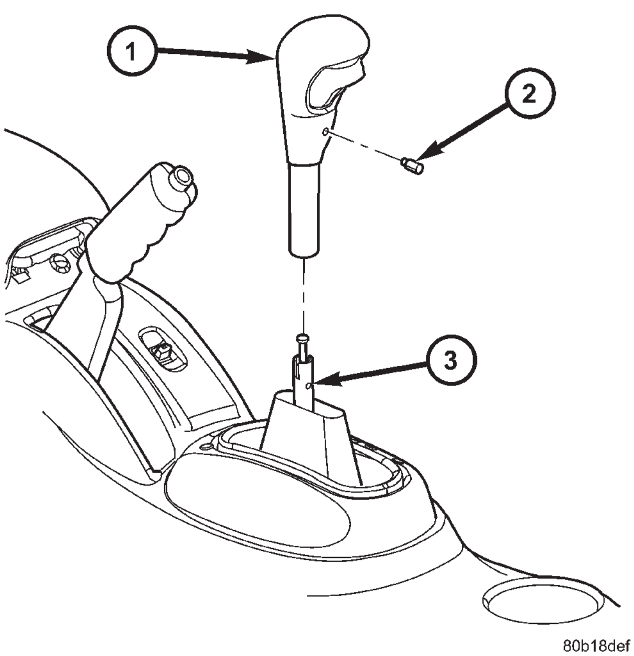


Fig. 288 Gearshift Knob

1 - GEARSHIFT KNOB
2 - SET SCREW
3 - GEARSHIFT MECHANISM

(3) Remove the gearshift bezel to gain access to the interlock cable adjuster lock (Fig. 289).

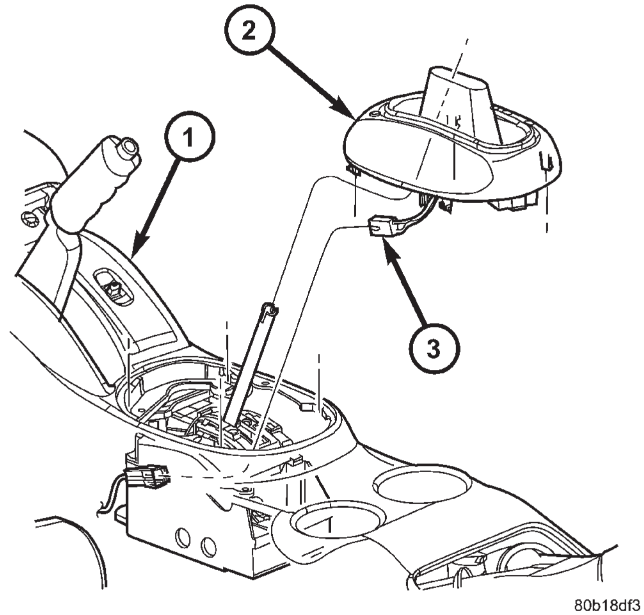


Fig. 289 Gearshift Bezel

1 - CENTER CONSOLE ASSEMBLY
2 - GEARSHIFT BEZEL
3 - LAMP CONNECTOR

(4) Re-install the gearshift knob set screw and knob (Fig. 288).

(5) Place the shift lever in PARK. Move the Ignition key to the LOCK position (Fig. 287) and remove the key.

(6) If the interlock cable is being replaced, remove the lock pin (Fig. 290). This will allow the cable to “self adjust” to the correct position. Tighten the locking clip by pushing it down (Fig. 291).

(7) If the interlock cable **is not** being replaced, the lock pin will not exist. Pull outward on cable locking clip to allow cable to self adjust. Press clip down to lock in place (Fig. 291).

(8) Verify Brake/Transmission Shift Interlock system operation. Refer to operation chart in “Verification.”

(9) Install the gearshift bezel (Fig. 289).

(10) Install the gearshift knob and tighten set screw (Fig. 288) to 2 N·m (20 in. lbs.).

(11) Connect the battery negative cable.

SHIFT INTERLOCK CABLE (Continued)

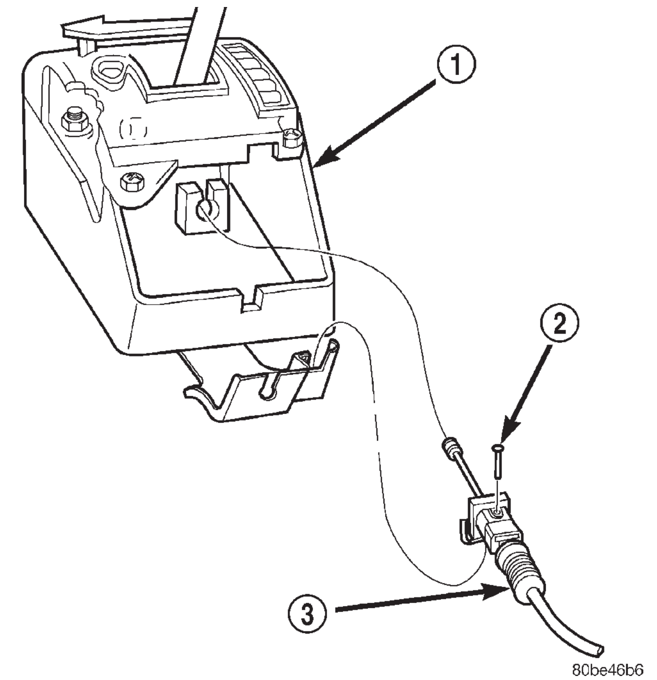


Fig. 290 Interlock Cable Locking Pin

1 - SHIFT MECHANISM
2 - LOCKING PIN
3 - INTERLOCK CABLE

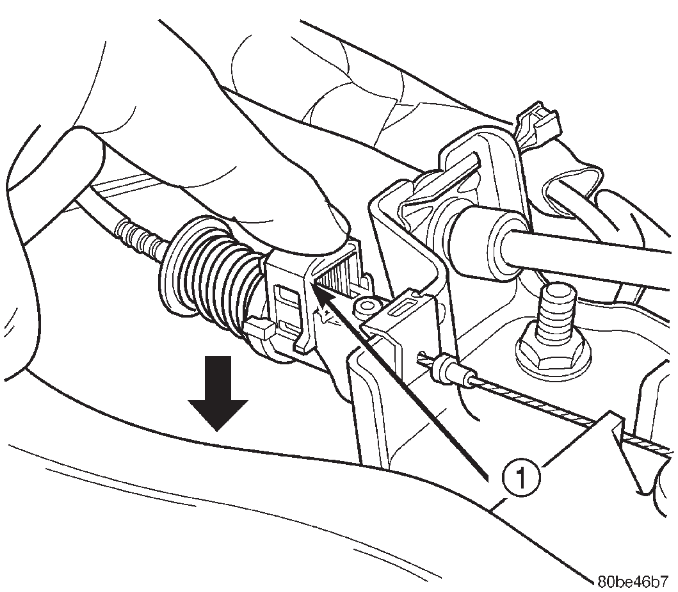


Fig. 291 Locking Clip

1 - LOCKING CLIP

SHIFT INTERLOCK MECHANISM

REMOVAL

(1) Remove steering column upper and lower shrouds.

(2) Grasp the interlock cable and connector firmly. Remove the interlock cable.

(3) Remove the two interlock mechanism to steering column attaching screws (Fig. 292). Remove the interlock mechanism.

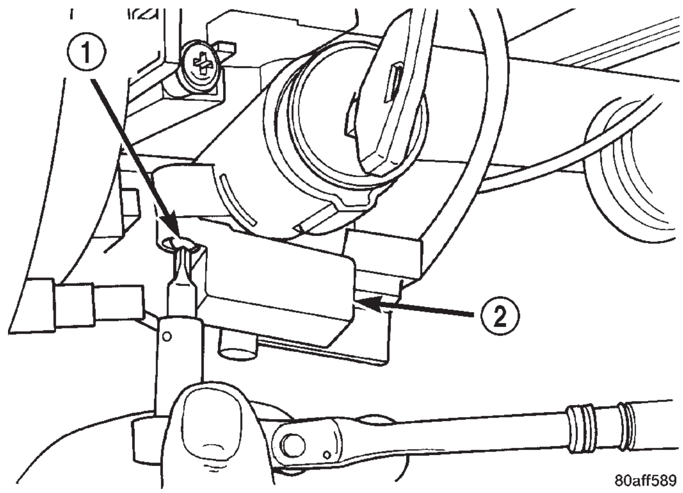


Fig. 292 Interlock Mechanism

1 - MOUNTING SCREW
2 - INTERLOCK MECHANISM

INSTALLATION

(1) Position the interlock housing at steering column. Install the two interlock mechanism to steering column attaching screws (Fig. 292). Torque screws to 3 N·m (21 in. lbs.).

(2) Snap the interlock cable into the housing.

(3) Install the lower column covers, shrouds and knee bolster.

SOLENOID/PRESSURE SWITCH ASSY

DESCRIPTION

The Solenoid/Pressure Switch Assembly (Fig. 293) is external to the transaxle and mounted to the transaxle case. The assembly consists of four solenoids that control hydraulic pressure to the LR/CC, 2/4, OD, and UD friction elements. The reverse clutch is controlled by line pressure from the manual valve in the valve body. The solenoids are contained within the Solenoid/Pressure Switch Assembly, and can only be serviced by replacing the assembly.

The solenoid assembly also contains pressure switches that monitor and send hydraulic circuit information to the TCM. Likewise, the pressure switches can only be service by replacing the assembly.

SOLENOID/PRESSURE SWITCH ASSY (Continued)

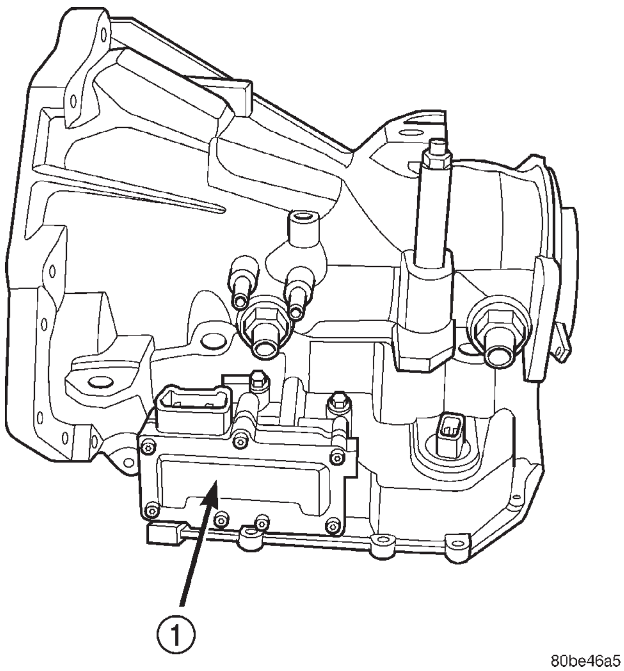


Fig. 293 Solenoid/Pressure Switch Assembly

1 - SOLENOID AND PRESSURE SWITCH ASSEMBLY

OPERATION

SOLENOIDS

The solenoids receive electrical power from the Transmission Control Relay through a single wire. The TCM energizes or operates the solenoids individually by grounding the return wire of the solenoid needed. When a solenoid is energized, the solenoid valve shifts, and a fluid passage is opened or closed (vented or applied), depending on its default operating state. The result is an apply or release of a frictional element.

The 2/4 and UD solenoids are normally applied, which by design allow fluid to pass through in their relaxed or "off" state. This allows transaxle limp-in (P,R,N,2) in the event of an electrical failure.

The continuity of the solenoids and circuits are periodically tested. Each solenoid is turned on or off depending on its current state. An inductive spike should be detected by the TCM during this test. It no spike is detected, the circuit is tested again to verify the failure. In addition to the periodic testing, the solenoid circuits are tested if a speed ratio or pressure switch error occurs.

PRESSURE SWITCHES

The TCM relies on three pressure switches to monitor fluid pressure in the L/R, 2/4, and OD hydraulic circuits. The primary purpose of these switches is to help the TCM detect when clutch circuit hydraulic failures occur. The range for the pressure switch closing and opening points is 11-23 psi. Typically the switch opening point will be approximately one psi lower than the closing point. For example, a switch may close at 18 psi and open at 17 psi. The switches are continuously monitored by the TCM for the correct states (open or closed) in each gear as shown in the following chart:

PRESSURE SWITCH STATES

GEAR	L/R	2/4	OD
R	OP	OP	OP
P/N	CL	OP	OP
1st	CL	OP	OP
2nd	OP	CL	OP
D	OP	OP	CL
OD	OP	CL	CL

OP = OPEN

CL = CLOSED

A Diagnostic Trouble Code (DTC) will set if the TCM senses any switch open or closed at the wrong time in a given gear.

The TCM also tests the 2/4 and OD pressure switches when they are normally off (OD and 2/4 are tested in 1st gear, OD in 2nd gear, and 2/4 in 3rd gear). The test simply verifies that they are operational, by looking for a closed state when the corresponding element is applied. Immediately after a shift into 1st, 2nd, or 3rd gear with the engine speed above 1000 rpm, the TCM momentarily turns on element pressure to the 2/4 and/or OD clutch circuits to identify that the appropriate switch has closed. If it doesn't close, it is tested again. If the switch fails to close the second time, the appropriate Diagnostic Trouble Code (DTC) will set.

REMOVAL

NOTE: If solenoid/pressure switch assembly is being replaced, it is necessary to perform the TCM Quick Learn Procedure. (Refer to 8 - ELECTRICAL/ ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Disconnect battery negative cable.

(2) Remove air cleaner assembly.

(3) Disconnect solenoid/pressure switch assembly connector.

(4) Disconnect input speed sensor connector.

(5) Remove input speed sensor (Fig. 294).

(6) Remove three (3) solenoid/pressure switch assembly-to-transaxle case bolts (Fig. 295).

SOLENOID/PRESSURE SWITCH ASSY (Continued)

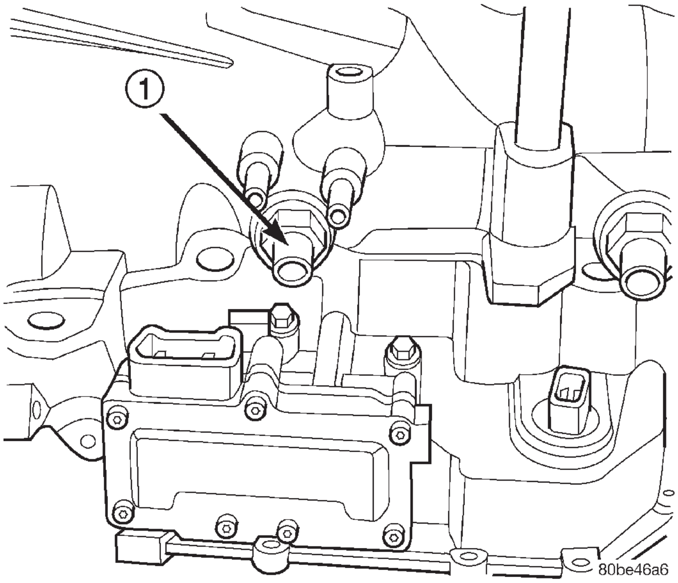


Fig. 294 Input Speed Sensor

1 - INPUT SPEED SENSOR

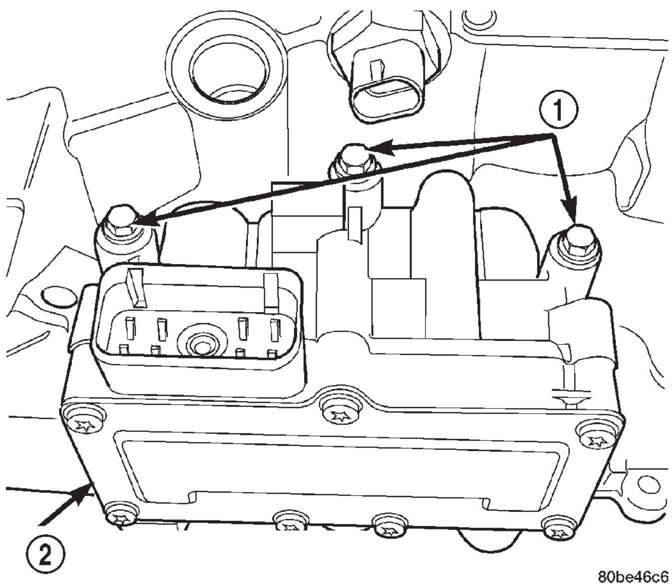


Fig. 295 Solenoid/Pressure Switch Assembly-to-Case Bolts

1 - BOLTS
2 - SOLENOID AND PRESSURE SWITCH ASSEMBLY

(7) Remove solenoid/pressure switch assembly and gasket (Fig. 296). Use care to prevent gasket material and foreign objects from become lodged in the transaxle case ports.

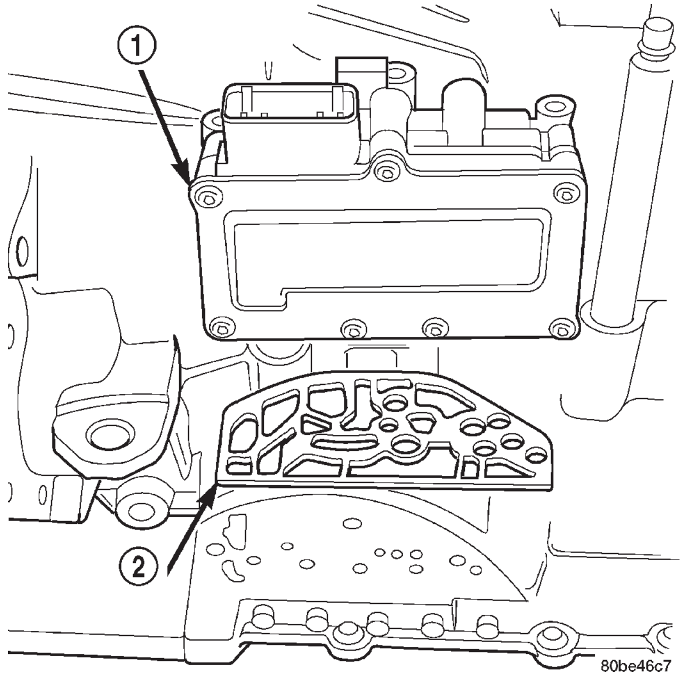


Fig. 296 Solenoid/Pressure Switch Assembly and Gasket

1 - SOLENOID/PRESSURE SWITCH ASSEMBLY
2 - GASKET

INSTALLATION

NOTE: If solenoid/pressure switch assembly is being replaced, it is necessary to perform the TCM Quick Learn Procedure. (Refer to 8 - ELECTRICAL/ ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Install solenoid/pressure switch assembly and new gasket to transaxle (Fig. 296).

(2) Install and torque three (3) bolts (Fig. 295) to 13 N·m (110 in. lbs.).

(3) Install input speed sensor (Fig. 294) and torque to 27 N·m (20 ft. lbs.).

(4) Connect input speed sensor connector.

(5) Install solenoid/pressure switch 8-way connector and torque to 4 N·m (35 in. lbs.).

(6) Install air cleaner assembly.

(7) Connect battery negative cable.

(8) If solenoid/pressure switch assembly was replaced, perform TCM Quick Learn procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

SPEED SENSOR - INPUT

DESCRIPTION

The Input Speed Sensor is a two-wire magnetic pickup device that generates AC signals as rotation occurs. It is threaded into the transaxle case (Fig. 297) , sealed with an o-ring (Fig. 298), and is considered a primary input to the Transmission Control Module (TCM).

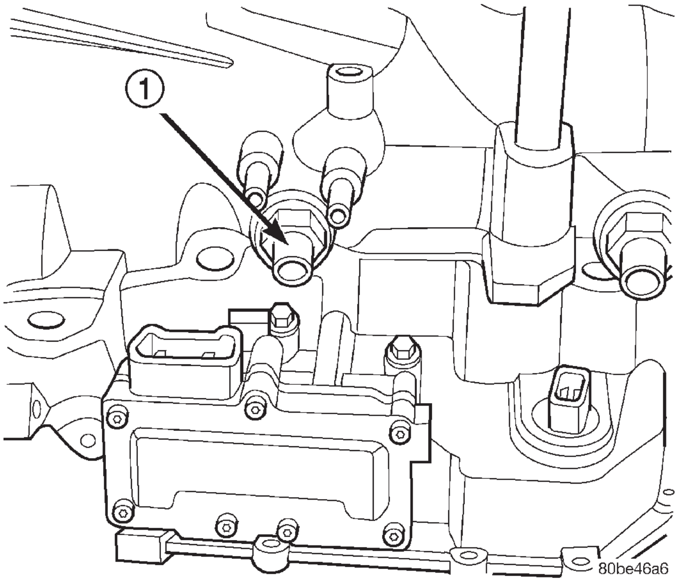


Fig. 297 Input Speed Sensor Location

1 - INPUT SPEED SENSOR

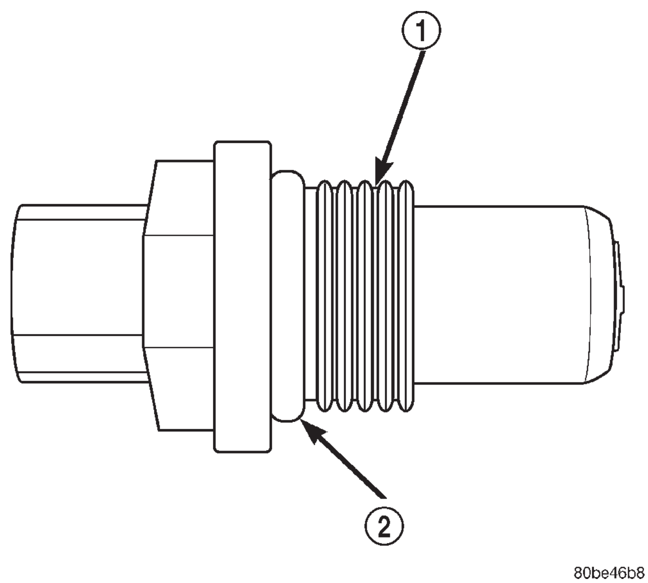


Fig. 298 O-Ring Location

1 - INPUT SPEED SENSOR
2 - O-RING

OPERATION

The Input Speed Sensor provides information on how fast the input shaft is rotating. As the teeth of the input clutch hub pass by the sensor coil (Fig. 299), an AC voltage is generated and sent to the TCM. The TCM interprets this information as input shaft rpm.

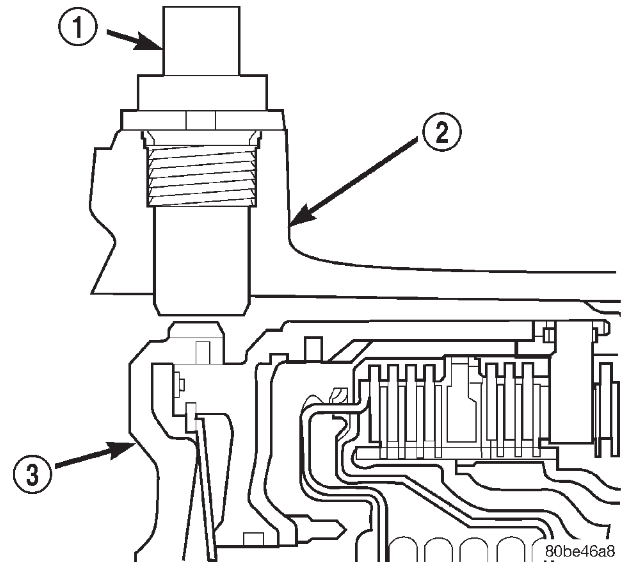


Fig. 299 Sensor Relation to Input Clutch Hub

1 - INPUT SPEED SENSOR
2 - TRANSAXLE CASE
3 - INPUT CLUTCH HUB

The TCM compares the input speed signal with output speed signal to determine the following:

- Transmission gear ratio
- Speed ratio error detection
- CVI calculation

The TCM also compares the input speed signal and the engine speed signal to determine the following:

- Torque converter clutch slippage
- Torque converter element speed ratio

REMOVAL

(1) Disconnect battery negative cable.

(2) If necessary, disconnect and cap off transmission oil cooler lines.

(3) Disconnect input speed sensor connector.

(4) Unscrew and remove input speed sensor (Fig. 300).

(5) Inspect speed sensor o-ring (Fig. 301) and replace if necessary.

SPEED SENSOR - INPUT (Continued)

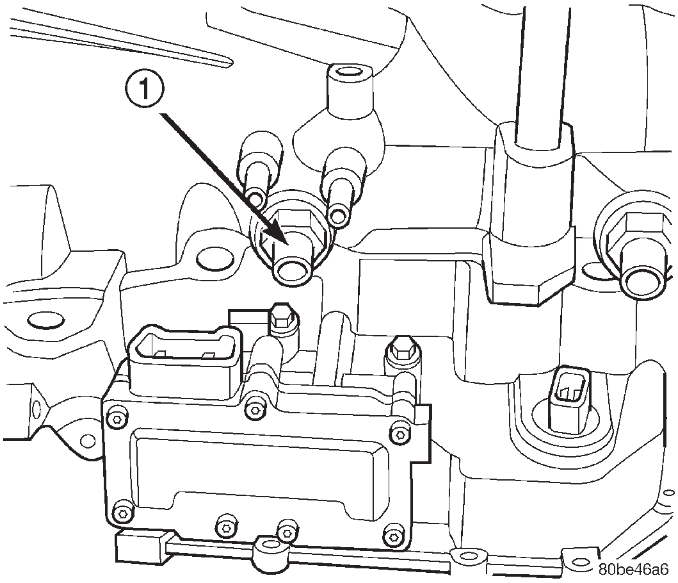


Fig. 300 Input (Turbine) Speed Sensor

1 - INPUT SPEED SENSOR

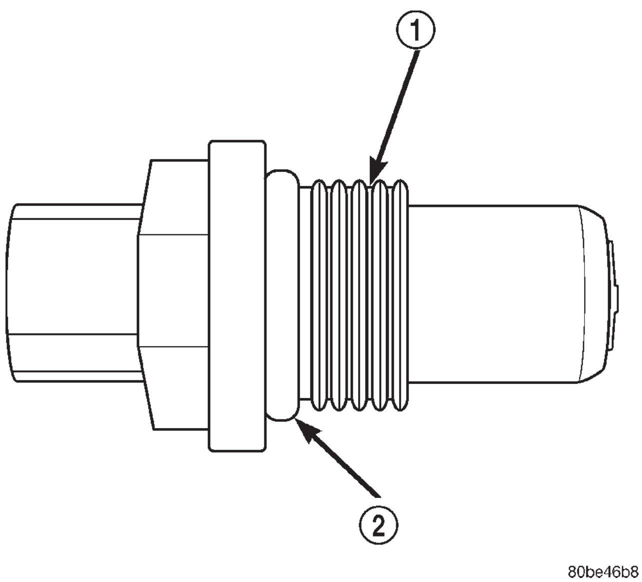


Fig. 301 O-ring Location

1 - INPUT SPEED SENSOR
2 - O-RING

INSTALLATION

(1) Verify o-ring is installed into position.

(2) Install and tighten input speed sensor to 27 N·m (20 ft. lbs.).

(3) Connect speed sensor connector.

(4) Connect battery negative cable.

SPEED SENSOR - OUTPUT

DESCRIPTION

The Output Speed Sensor is a two-wire magnetic pickup device that generates an AC signal as rotation occurs. It is threaded into the transaxle case (Fig. 302) , sealed with an o-ring (Fig. 303), and is considered a primary input to the Transmission Control Module (TCM).

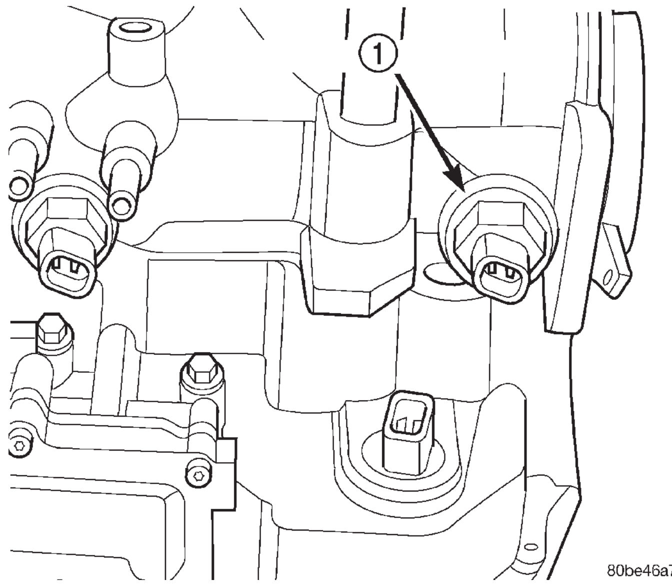


Fig. 302 Output Speed Sensor

1 - OUTPUT SPEED SENSOR

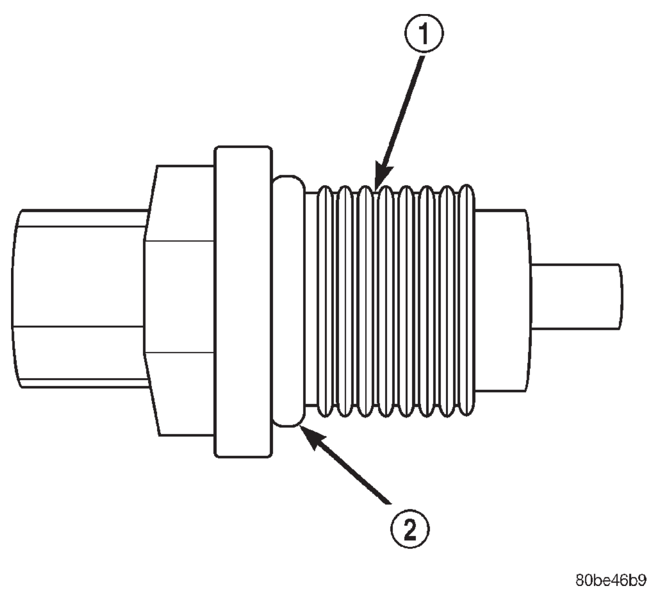


Fig. 303 O-Ring Location

1 - OUTPUT SPEED SENSOR
2 - O-RING

SPEED SENSOR - OUTPUT (Continued)

OPERATION

The Output Speed Sensor provides information on how fast the output shaft is rotating. As the rear planetary carrier park pawl lugs pass by the sensor coil (Fig. 304), an AC voltage is generated and sent to the TCM. The TCM interprets this information as output shaft rpm.

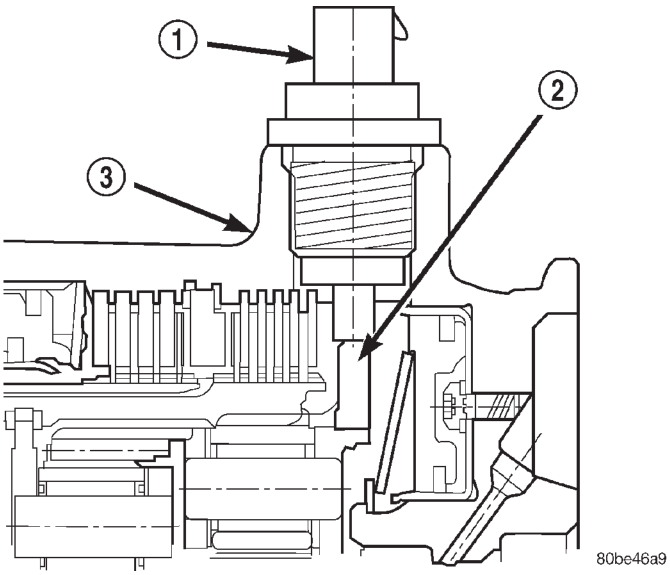


Fig. 304 Sensor Relation to Planet Carrier Park Pawl

1 - OUTPUT SPEED SENSOR
2 - REAR PLANET CARRIER/OUTPUT SHAFT ASSEMBLY
3 - TRANSAXLE CASE

The TCM compares the input and output speed signals to determine the following:

- Transmission gear ratio
- Speed ratio error detection
- CVI calculation

VEHICLE SPEED SIGNAL

The vehicle speed signal is taken from the Output Speed Sensor. The TCM converts this signal into a pulse per mile signal and sends it to the PCM. The PCM, in turn, sends the vehicle speed message across the communication bus to the BCM. The BCM sends this signal to the Instrument Cluster to display vehicle speed to the driver. The vehicle speed signal pulse is roughly 8000 pulses per mile.

REMOVAL

(1) Disconnect battery negative cable.
(2) Raise vehicle on hoist.
(3) Disconnect output speed sensor connector.
(4) Unscrew and remove output speed sensor (Fig. 305).
(5) Inspect speed sensor o-ring (Fig. 306) and replace if necessary.

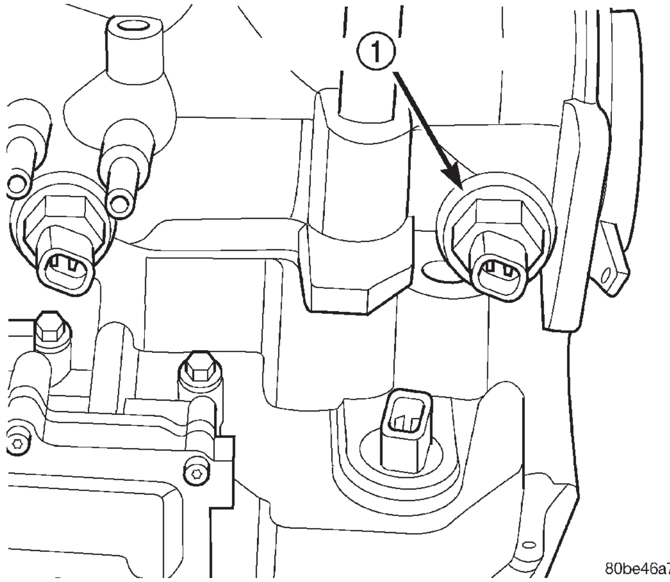


Fig. 305 Output Speed Sensor

1 - OUTPUT SPEED SENSOR

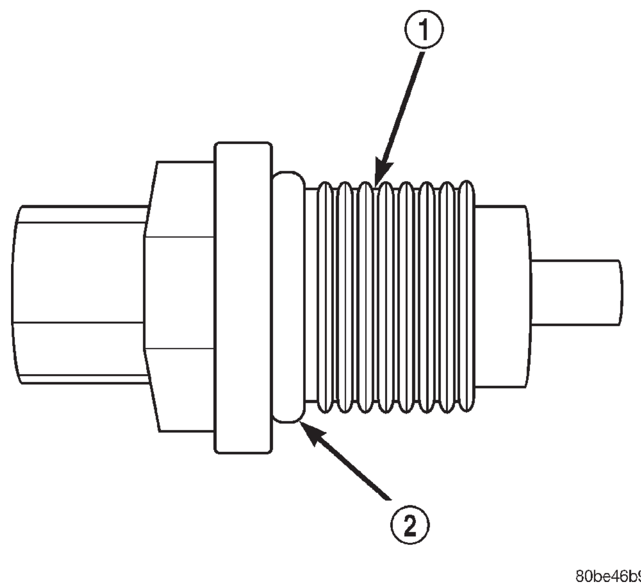


Fig. 306 O-ring Location

1 - OUTPUT SPEED SENSOR
2 - O-RING

INSTALLATION

(1) Verify o-ring is installed into position (Fig. 306).
(2) Install and tighten input speed sensor to 27 N·m (20 ft. lbs.).
(3) Connect speed sensor connector.
(4) Connect battery negative cable.

TORQUE CONVERTER

DESCRIPTION

The torque converter (Fig. 307) is a hydraulic device that couples the engine crankshaft to the transmission. The torque converter consists of an outer shell with an internal turbine, a stator, an overrunning clutch, an impeller and an electronically applied converter clutch. The converter clutch provides reduced engine speed and greater fuel economy when engaged. Clutch engagement also provides reduced transmission fluid temperatures. The converter clutch engages in third gear. The torque converter hub drives the transmission oil (fluid) pump.

The torque converter is a sealed, welded unit that is not repairable and is serviced as an assembly.

CAUTION: The torque converter must be replaced if a transmission failure resulted in large amounts of metal or fiber contamination in the fluid. If the fluid is contaminated, flush the fluid cooler and lines.

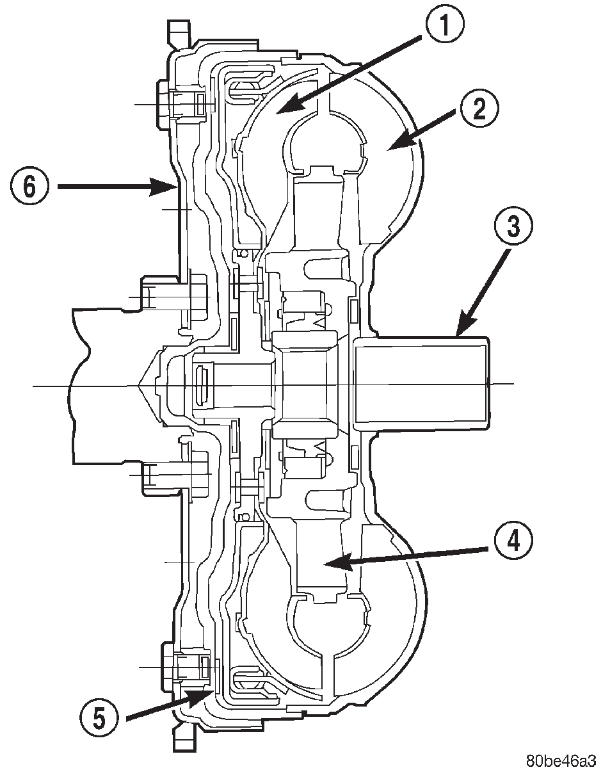


Fig. 307 Torque Converter Assembly

1 - TURBINE
2 - IMPELLER
3 - HUB
4 - STATOR
5 - CONVERTER CLUTCH DISC
6 - DRIVE PLATE

TORQUE CONVERTER (Continued)

IMPELLER

The impeller (Fig. 308) is an integral part of the converter housing. The impeller consists of curved blades placed radially along the inside of the housing on the transmission side of the converter. As the converter housing is rotated by the engine, so is the impeller, because they are one and the same and are the driving member of the system.

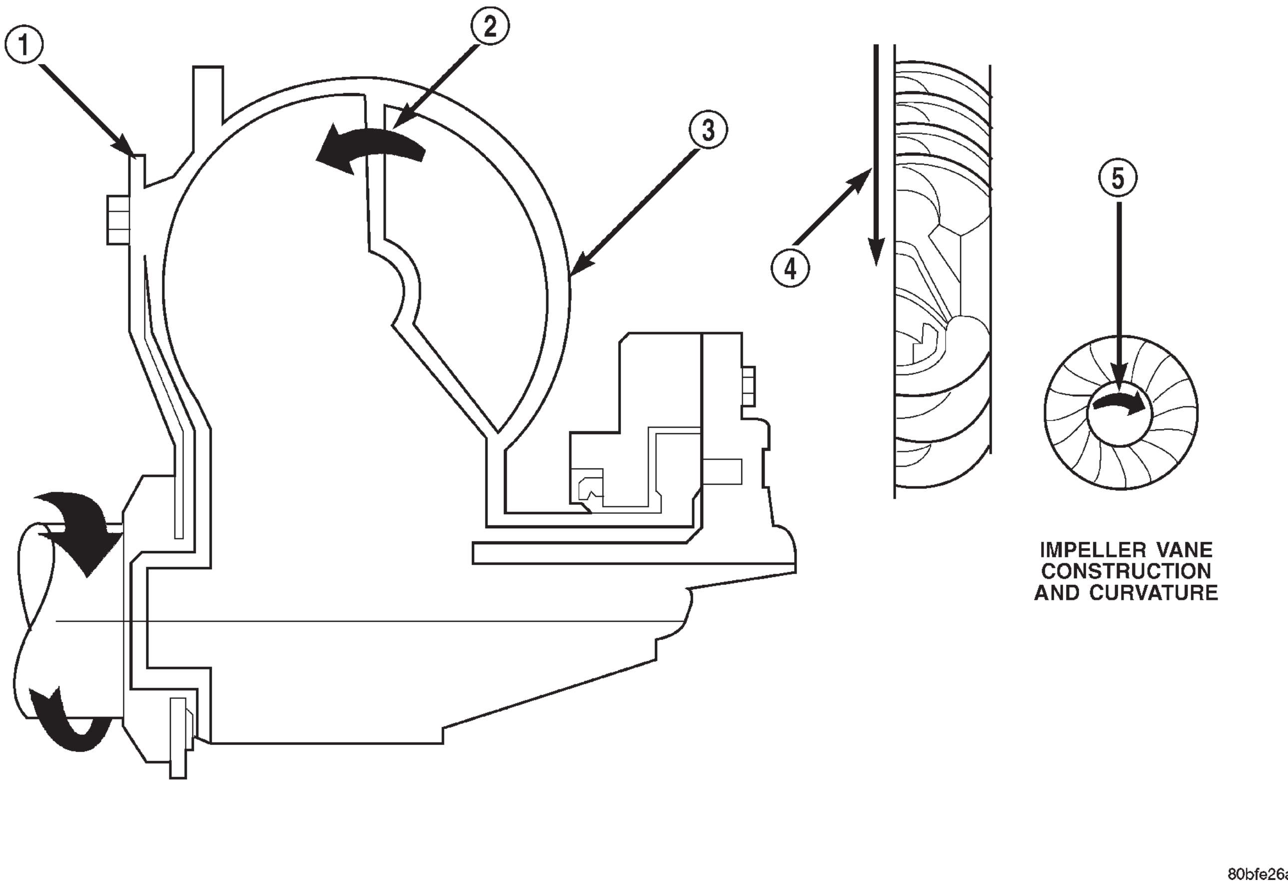


Fig. 308 Impeller

1 - ENGINE FLEXPLATE
2 - OIL FLOW FROM IMPELLER SECTION INTO TURBINE SECTION
3 - IMPELLER VANES AND COVER ARE INTEGRAL
4 - ENGINE ROTATION
5 - ENGINE ROTATION

TORQUE CONVERTER (Continued)

TURBINE

The turbine (Fig. 309) is the output, or driven, member of the converter. The turbine is mounted within the housing opposite the impeller, but is not attached to the housing. The input shaft is inserted through the center of the impeller and splined into the turbine. The design of the turbine is similar to the impeller, except the blades of the turbine are curved in the opposite direction.

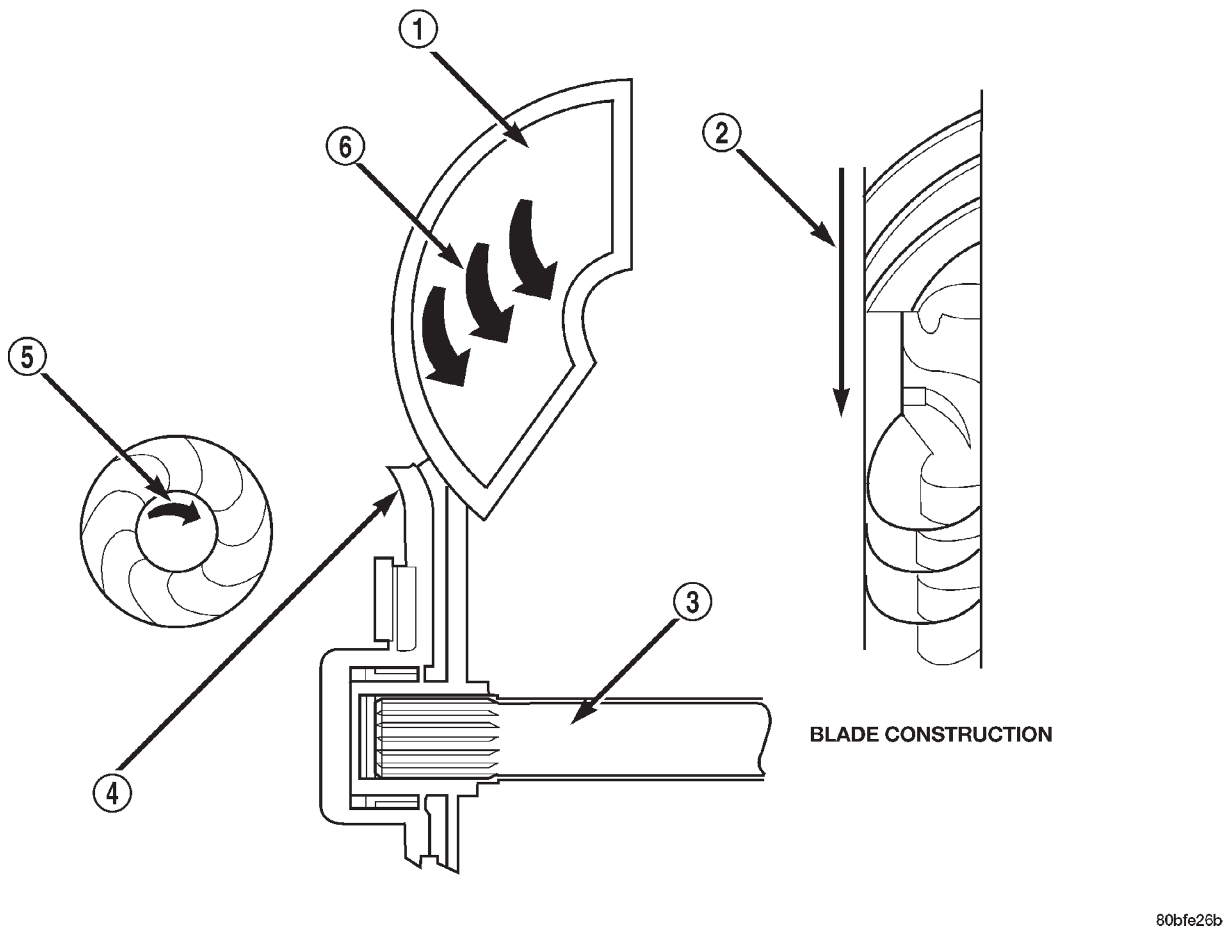


Fig. 309 Turbine

1 - TURBINE VANE
2 - ENGINE ROTATION
3 - INPUT SHAFT
4 - PORTION OF TORQUE CONVERTER COVER
5 - ENGINE ROTATION
6 - OIL FLOW WITHIN TURBINE SECTION

TORQUE CONVERTER (Continued)

STATOR

The stator assembly (Fig. 310) is mounted on a stationary shaft which is an integral part of the oil pump. The stator is located between the impeller and turbine within the torque converter case (Fig. 311). The stator contains an over-running clutch, which allows the stator to rotate only in a clockwise direction. When the stator is locked against the over-running clutch, the torque multiplication feature of the torque converter is operational.

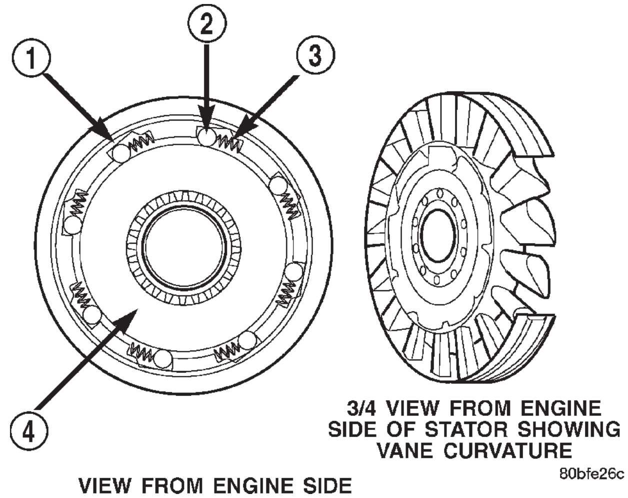


Fig. 310 Stator Components

1 - CAM (OUTER RACE)
2 - ROLLER
3 - SPRING
4 - INNER RACE

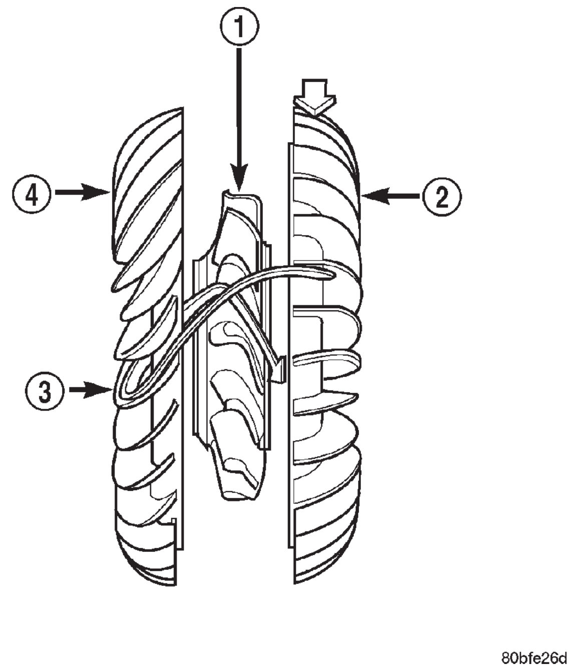


Fig. 311 Stator Location

1 - STATOR
2 - IMPELLER
3 - FLUID FLOW
4 - TURBINE

TORQUE CONVERTER CLUTCH (TCC)

The TCC (Fig. 312) was installed to improve the efficiency of the torque converter that is lost to the slippage of the fluid coupling. Although the fluid coupling provides smooth, shock–free power transfer, it is natural for all fluid couplings to slip. If the impeller and turbine were mechanically locked together, a zero slippage condition could be obtained. A hydraulic piston was added to the turbine, and a friction material was added to the inside of the front cover to provide this mechanical lock-up.

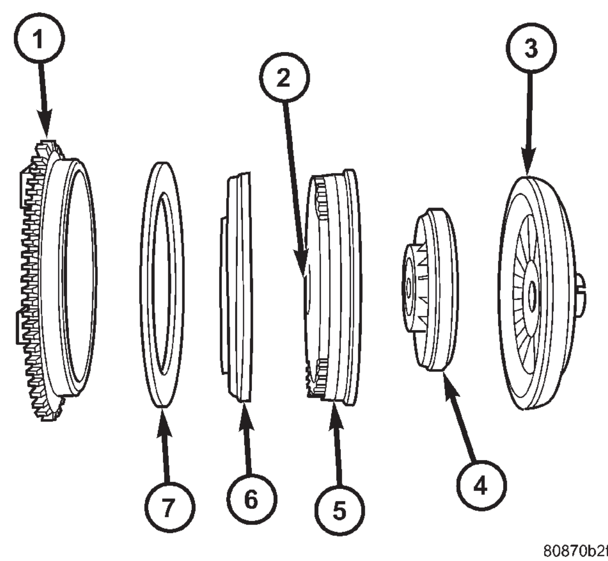


Fig. 312 Torque Converter Clutch (TCC)

1 - IMPELLER FRONT COVER
2 - THRUST WASHER ASSEMBLY
3 - IMPELLER
4 - STATOR
5 - TURBINE
6 - PISTON
7 - FRICTION DISC

OPERATION

The converter impeller (Fig. 313) (driving member), which is integral to the converter housing and bolted to the engine drive plate, rotates at engine speed. The converter turbine (driven member), which reacts from fluid pressure generated by the impeller, rotates and turns the transmission input shaft.

TORQUE CONVERTER (Continued)

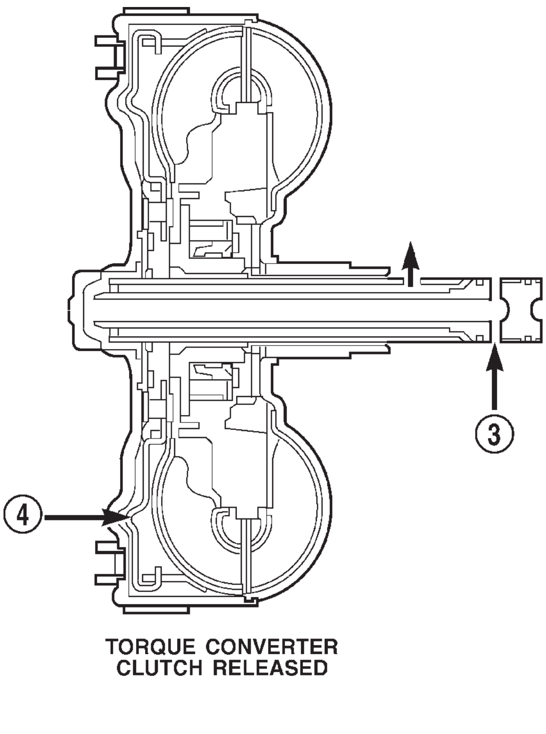


Fig. 313 Torque Converter Fluid Operation

1 - APPLY PRESSURE
2 - THE PISTON MOVES SLIGHTLY FORWARD
3 - RELEASE PRESSURE
4 - THE PISTON MOVES SLIGHTLY REARWARD

TURBINE

As the fluid that was put into motion by the impeller blades strikes the blades of the turbine, some of the energy and rotational force is transferred into the turbine and the input shaft. This causes both of them (turbine and input shaft) to rotate in a clockwise direction following the impeller. As the fluid is leaving the trailing edges of the turbine's blades it continues in a "hindering" direction back toward the impeller. If the fluid is not redirected before it strikes the impeller, it will strike the impeller in such a direction that it would tend to slow it down.

STATOR

Torque multiplication is achieved by locking the stator's over-running clutch to its shaft (Fig. 314). Under stall conditions (the turbine is stationary), the oil leaving the turbine blades strikes the face of the stator blades and tries to rotate them in a counterclockwise direction. When this happens the over–running clutch of the stator locks and holds the stator from rotating. With the stator locked, the oil strikes the stator blades and is redirected into a "helping" direction before it enters the impeller. This circulation of oil from impeller to turbine, turbine to stator, and stator to impeller, can produce a maximum torque multiplication of about 2.4:1. As the turbine begins to match the speed of the impeller, the fluid that was hitting the stator in such as way as to cause it to lock–up is no longer doing so. In this condition of operation, the stator begins to free wheel and the converter acts as a fluid coupling.

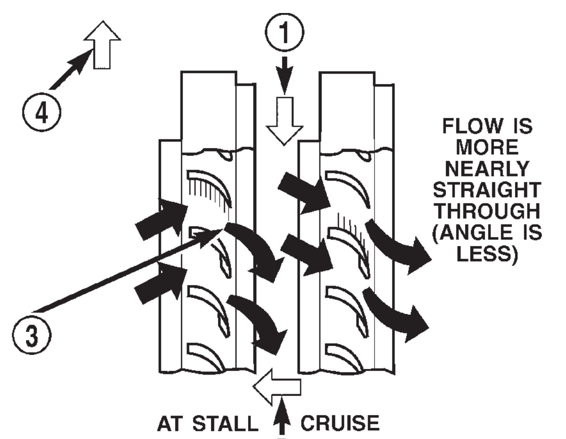


Fig. 314 Stator Operation

1 - DIRECTION STATOR WILL FREE WHEEL DUE TO OIL PUSHING ON BACKSIDE OF VANES
2 - FRONT OF ENGINE
3 - INCREASED ANGLE AS OIL STRIKES VANES
4 - DIRECTION STATOR IS LOCKED UP DUE TO OIL PUSHING AGAINST STATOR VANES

TORQUE CONVERTER CLUTCH (TCC)

In a standard torque converter, the impeller and turbine are rotating at about the same speed and the stator is freewheeling, providing no torque multiplication. By applying the turbine's piston to the front cover's friction material, a total converter engagement can be obtained. The result of this engagement is a direct 1:1 mechanical link between the engine and the transmission.

The engagement and disengagement of the TCC are automatic and controlled by the Powertrain Control Module (PCM). The engagement cannot be activated in the lower gears because it eliminates the torque multiplication effect of the torque converter necessary for acceleration. Inputs that determine clutch engagement are: coolant temperature, vehicle speed and throttle position. The torque converter clutch is engaged by the clutch solenoid on the valve body. The clutch will engage at approximately 56 km/h (35 mph) with light throttle, after the shift to third gear.

REMOVAL

(1) Remove transmission and torque converter from vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - REMOVAL)

(2) Place a suitable drain pan under the converter housing end of the transmission.

CAUTION: Verify that transmission is secure on the lifting device or work surface, the center of gravity of the transmission will shift when the torque converter is removed creating an unstable condition. The torque converter is a heavy unit. Use caution when separating the torque converter from the transmission.

(3) Pull the torque converter forward until the center hub clears the oil pump seal.

(4) Separate the torque converter from the transmission.

INSTALLATION

Check converter hub and drive notches for sharp edges, burrs, scratches, or nicks. Polish the hub and notches with 320/400 grit paper or crocus cloth if necessary. The hub must be smooth to avoid damaging the pump seal at installation.

(1) Lubricate converter hub and oil pump seal lip with transmission fluid.

(2) Place torque converter in position on transmission.

CAUTION: Do not damage oil pump seal or bushing while inserting torque converter into the front of the transmission.

(3) Align torque converter to oil pump seal opening.

(4) Insert torque converter hub into oil pump.

(5) While pushing torque converter inward, rotate converter until converter is fully seated in the oil pump gears.

(6) Check converter seating with a scale and straightedge (Fig. 315). Surface of converter lugs should be 1/2 in. to rear of straightedge when converter is fully seated.

(7) If necessary, temporarily secure converter with C-clamp attached to the converter housing.

(8) Install the transmission in the vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE - INSTALLATION)

(9) Fill the transmission with the recommended fluid. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/FLUID - STANDARD PROCEDURE)

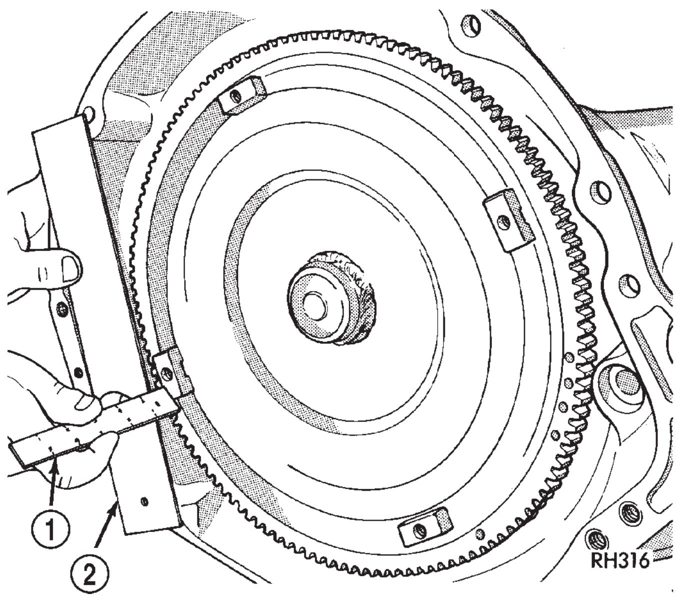


Fig. 315 Checking Torque Converter Seating

1 - SCALE
2 - STRAIGHTEDGE

TRANSMISSION CONTROL RELAY

DESCRIPTION

The transmission control relay (Fig. 316) is located in the Power Distribution Center (PDC), which is located on the left side of the engine compartment.

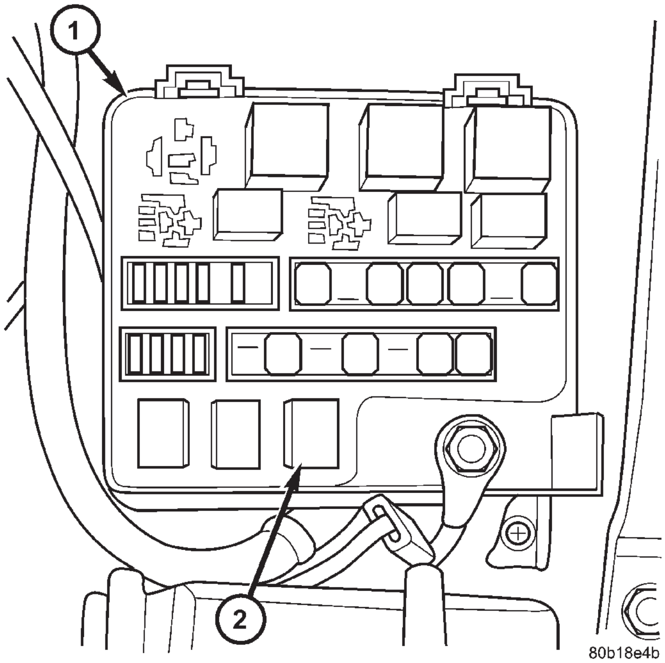


Fig. 316 Transmission Control Relay Location

1 - POWER DISTRIBUTION CENTER (PDC)
2 - TRANSMISSION CONTROL RELAY

OPERATION

The relay is supplied fused B+ voltage, energized by the TCM, and is used to supply power to the solenoid pack when the transmission is in normal operating mode. When the relay is “off”, no power is supplied to the solenoid pack and the transmission is in “limp-in” mode. After a controller reset (ignition key turned to the “run” position or after cranking engine), the TCM energizes the relay. Prior to this, the TCM verifies that the contacts are open by checking for no voltage at the switched battery terminals. After this is verified, the voltage at the solenoid pack pressure switches is checked. After the relay is energized, the TCM monitors the terminals to verify that the voltage is greater than 3 volts.

TRANSMISSION RANGE SENSOR

DESCRIPTION

The Transmission Range Sensor (TRS) is mounted to the top of the valve body inside the transaxle and can only be serviced by removing the valve body. The electrical connector extends through the transaxle case (Fig. 317) .

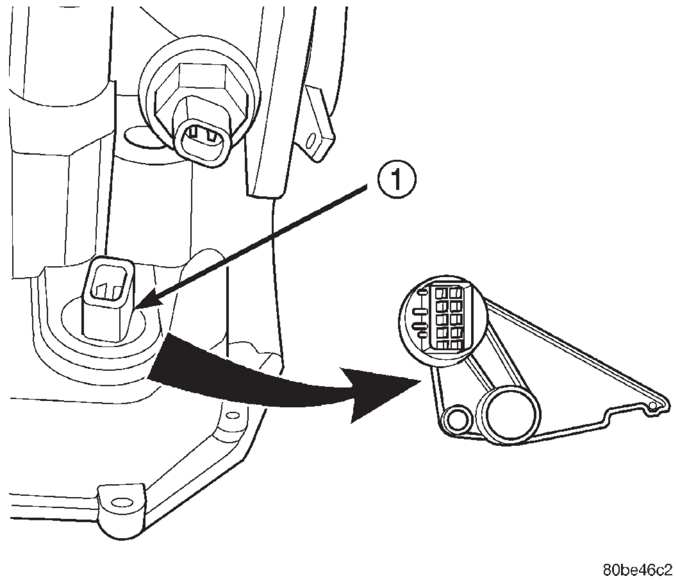


Fig. 317 Transmission Range Sensor (TRS) Location

1 - TRANSMISSION RANGE SENSOR

The Transmission Range Sensor (TRS) has four switch contacts that monitor shift lever position and send the information to the TCM.

The TRS also has an integrated temperature sensor (thermistor) that communicates transaxle temperature to the TCM and PCM (Fig. 318).

OPERATION

The Transmission Range Sensor (TRS) (Fig. 317) communicates shift lever position (SLP) to the TCM as a combination of open and closed switches. Each shift lever position has an assigned combination of switch states (open/closed) that the TCM receives from four sense circuits. The TCM interprets this information and determines the appropriate transaxle gear position and shift schedule.

TRANSMISSION RANGE SENSOR (Continued)

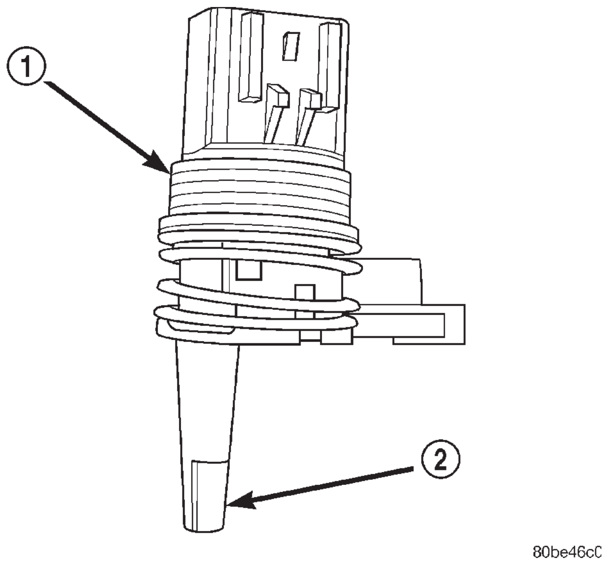


Fig. 318 Transmission Temperature Sensor

1 - TRANSMISSION RANGE SENSOR
2 - TEMPERATURE SENSOR

Since there are four switches, there are 16 possible combinations of open and closed switches (codes). Seven of these codes are related to gear position and three are recognized as "between gear" codes. This results in six codes which should never occur. These are called "invalid" codes. An invalid code will result in a DTC, and the TCM will then determine the shift lever position based on pressure switch data. This allows reasonably normal transmission operation with a TRS failure.

TRS SWITCH STATES

SLP	T42	T41	T3	T1
P	CL	CL	CL	OP
R	CL	OP	OP	OP
N	CL	CL	OP	CL
OD	OP	OP	OP	CL
3	OP	OP	CL	OP
L	CL	OP	CL	CL

TRANSMISSION TEMPERATURE SENSOR

The TRS has an integrated thermistor (Fig. 318) that the TCM uses to monitor the transmission's sump temperature. Since fluid temperature can affect transmission shift quality and convertor lock up, the TCM requires this information to determine which shift schedule to operate in. The PCM also monitors this temperature data so it can energize the vehicle cooling fan(s) when a transmission "overheat" condition exists. If the thermistor circuit fails, the TCM will revert to calculated oil temperature usage.

CALCULATED TEMPERATURE

A failure in the temperature sensor or circuit will result in calculated temperature being substituted for actual temperature. Calculated temperature is a predicted fluid temperature which is calculated from a combination of inputs:

- Battery (ambient) temperature
- Engine coolant temperature
- In-gear run time since start-up

REMOVAL

(1) Remove valve body assembly from transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/VALVE BODY - REMOVAL)

(2) Remove transmission range sensor retaining screw and remove sensor from valve body (Fig. 319).

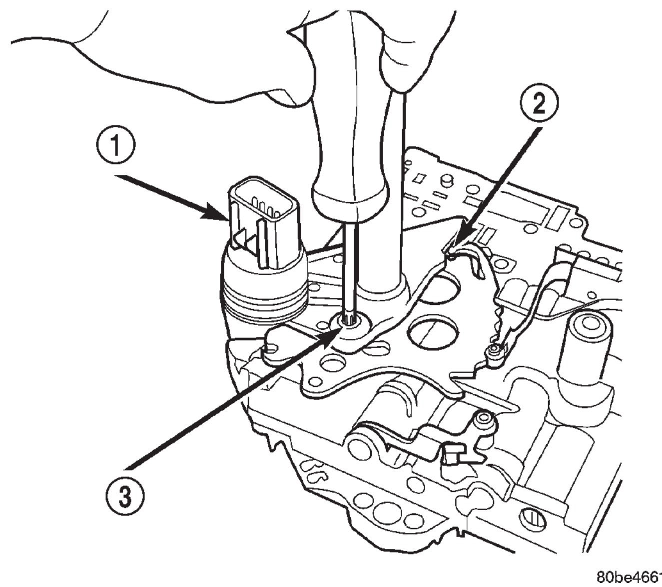


Fig. 319 Remove Transmission Range Sensor

1 - TRANSMISSION RANGE SENSOR
2 - MANUAL VALVE CONTROL PIN
3 - RETAINING SCREW

(3) Remove TRS from manual shaft.

INSTALLATION

(1) Install transmission range sensor (TRS) to the valve body and torque retaining screw (Fig. 319) to 5 N·m (45 in. lbs.).

(2) Install valve body to transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/VALVE BODY - INSTALLATION)

TRD LINK

DESCRIPTION

The Torque Reduction Link (TRD) is a wire between the PCM and TCM that is used by the TCM to request torque management. Torque management controls or reduces torque output of the engine during certain shift sequences, reducing torque applied to the transaxle clutches.

OPERATION

The torque management signal is basically a 12-volt pull-up supplied by the PCM to the TCM over the torque reduction link (TRD). Torque management is requested when the TCM pulses this signal to ground. The PCM recognizes this request and responds by retarding ignition timing, killing fuel injectors, etc. The PCM sends a confirmation of the request to the TCM via the communication bus. Torque reduction is not noticable by the driver, and usually lasts for a very short period of time.

If the confirmation signal is not received by the TCM after two sequential request messages, a diagnostic trouble code will be set.

VALVE BODY

DESCRIPTION

The valve body assembly consists of a cast aluminum valve body, a separator plate, and transfer plate. The valve body contains valves and check balls that control fluid delivery to the torque converter clutch, solenoid/pressure switch assembly, and frictional clutches. The valve body contains the following components (Fig. 320):

- Regulator valve
- Solenoid switch valve
- Manual valve
- Converter clutch switch valve
- Converter clutch control valve
- Torque converter regulator valve
- Low/Reverse switch valve

In addition, the valve body also contains the thermal valve, #2,3&4 check balls, the #5 (overdrive) check valve and the 2/4 accumulator assembly. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/VALVE BODY - DISASSEMBLY)

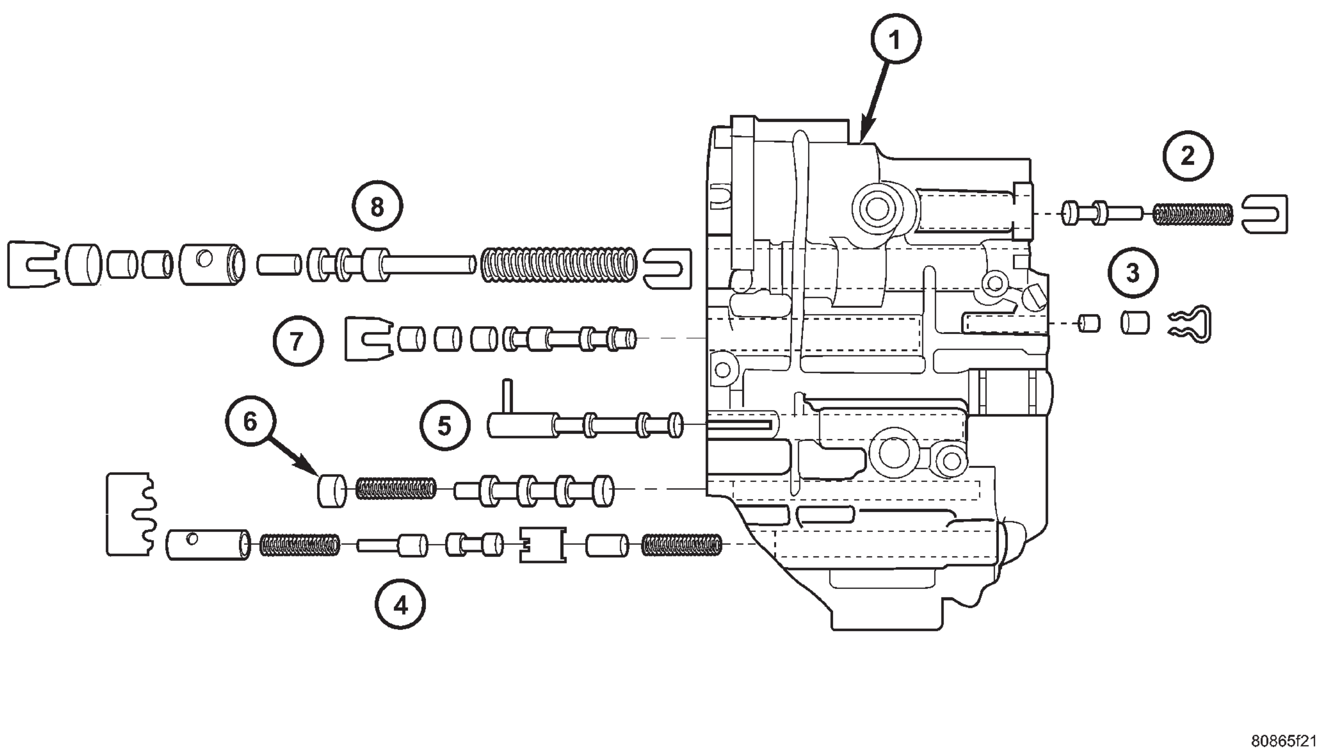


Fig. 320 Valve Body Assembly

1 - VALVE BODY
2 - T/C REGULATOR VALVE
3 - L/R SWITCH VALVE
4 - CONVERTER CLUTCH CONTROL VALVE
5 - MANUAL VALVE
6 - CONVERTER CLUTCH SWITCH VALVE
7 - SOLENOID SWITCH VALVE
8 - REGULATOR VALVE

VALVE BODY (Continued)

OPERATION

NOTE: Refer to the Hydraulic Schematics for a visual aid in determining valve location, operation and design.

REGULATOR VALVE

The regulator valve controls hydraulic pressure in the transaxle. It receives unregulated pressure from the pump, which works against spring tension to maintain oil at specific pressures. A system of sleeves and ports allows the regulator valve to work at one of three predetermined pressure levels. Regulated oil pressure is also referred to as “line pressure.”

SOLENOID SWITCH VALVE

The solenoid switch valve controls line pressure from the LR/CC solenoid. In one position, it allows the low/reverse clutch to be pressurized. In the other, it directs line pressure to the converter control and converter clutch valves.

MANUAL VALVE

The manual valve is operated by the mechanical shift linkage. Its primary responsibility is to send line pressure to the appropriate hydraulic circuits and solenoids. The valve has three operating ranges or positions.

CONVERTER CLUTCH SWITCH VALVE

The main responsibility of the converter clutch switch valve is to control hydraulic pressure applied to the front (off) side of the converter clutch piston. Line pressure from the regulator valve is fed to the torque converter regulator valve, where it passes through the valve, and is slightly regulated. The pressure is then directed to the converter clutch switch valve and to the front side of the converter clutch piston. This pressure pushes the piston back and disengages the converter clutch.

CONVERTER CLUTCH CONTROL VALVE

The converter clutch control valve controls the back (on) side of the torque converter clutch. When the TCM energizes or modulates the LR/CC solenoid to apply the converter clutch piston, both the converter clutch control valve and the converter control valve move, allowing pressure to be applied to the back side of the clutch.

T/C REGULATOR VALVE

The torque converter regulator valve slightly regulates the flow of fluid to the torque converter.

LOW/REVERSE SWITCH VALVE

The low/reverse clutch is applied from different sources, depending on whether low (1st) gear or reverse is selected. The low/reverse switch valve alternates positions depending on from which direction fluid pressure is applied. By design, when the valve is shifted by fluid pressure from one channel, the opposing channel is blocked. The switch valve alienates the possibility of a sticking ball check, thus providing consistent application of the low/reverse clutch under all operating conditions.

REMOVAL

NOTE: If valve body is replaced or reconditioned, the TCM Quick Learn Procedure must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Disconnect battery negative cable.
(2) Remove air cleaner assembly.
(3) Disconnect gearshift cable from manual valve lever.
(4) Remove manual valve lever from manual shaft.
(5) Disconnect transmission range sensor (TRS).
(6) Raise vehicle on hoist.
(7) Remove oil pan bolts (Fig. 321).

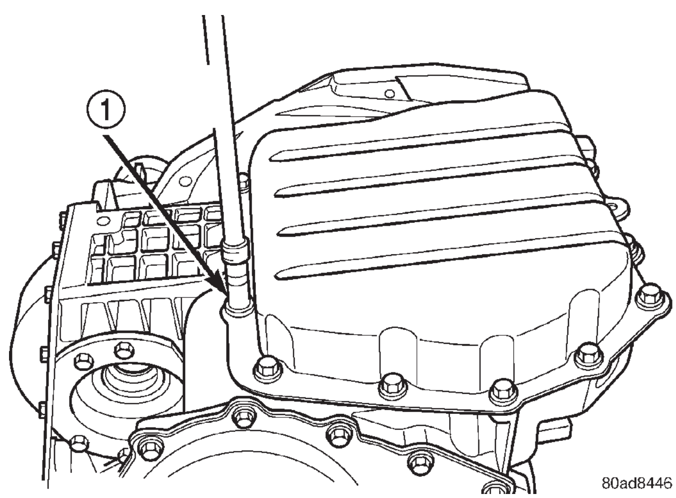


Fig. 321 Oil Pan Bolts

1 - OIL PAN BOLTS (USE RTV UNDER BOLT HEADS)

VALVE BODY (Continued)

(8) Remove oil pan (Fig. 322).

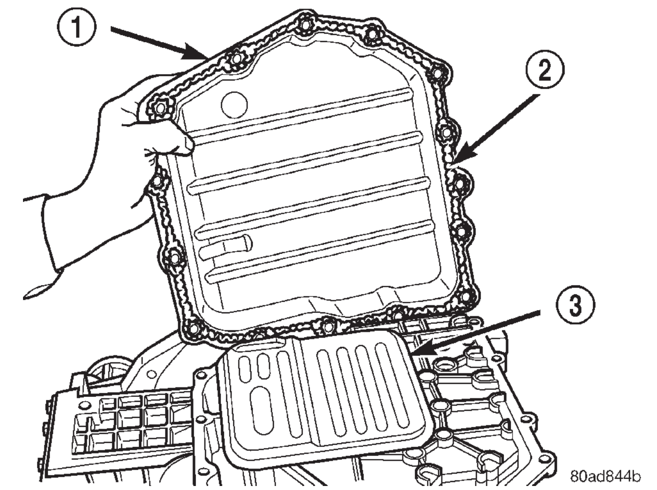


Fig. 322 Oil Pan

1 - OIL PAN
2 - 1/8 INCH BEAD OF RTV SEALANT
3 - OIL FILTER

(9) Remove oil filter (Fig. 323).

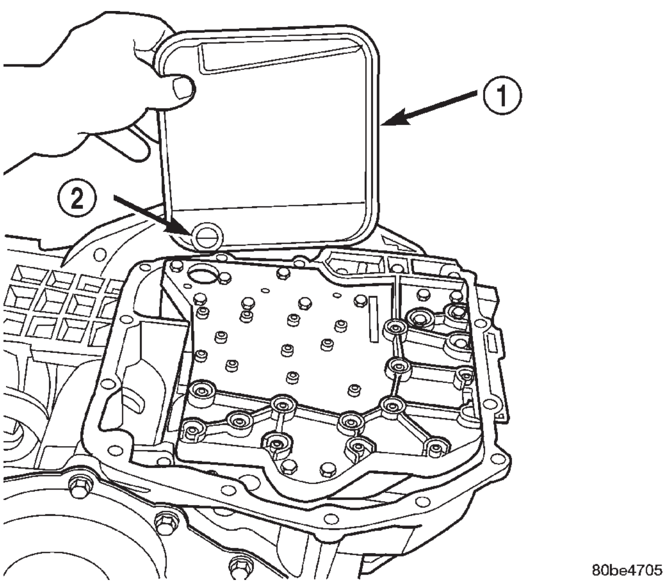


Fig. 323 Oil Filter

1 - OIL FILTER
2 - O-RING

(10) Remove the valve body-to-transaxle case bolts (Fig. 324).

NOTE: To ease removal of the valve body, turn the manual valve lever fully clockwise to low or first gear.

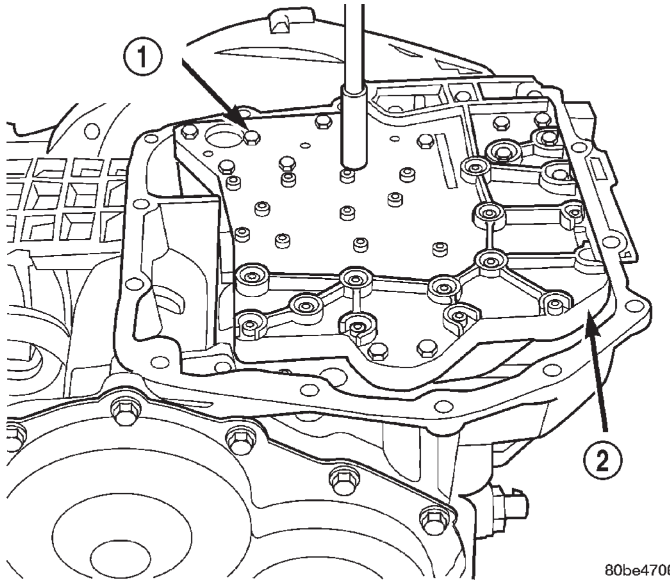


Fig. 324 Valve Body Attaching Bolts

1 - VALVE BODY ATTACHING BOLTS (18)
2 - VALVE BODY

(11) Remove park rod rollers from guide bracket and remove valve body from transaxle (Fig. 325) (Fig. 326).

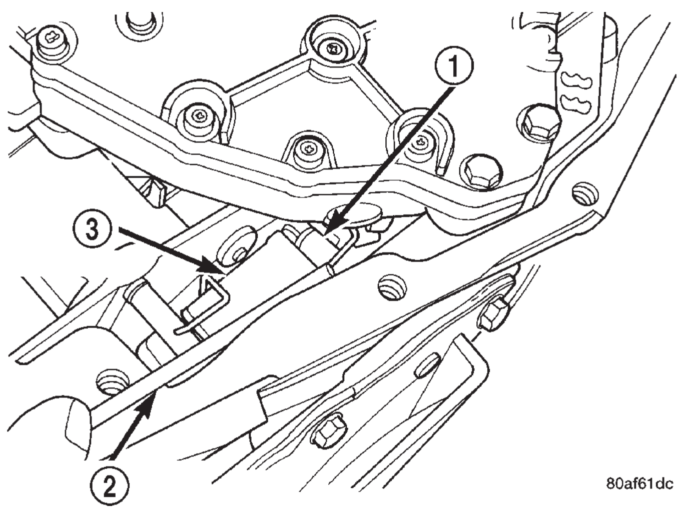


Fig. 325 Push Park Rod Rollers from Guide Bracket

1 - PARK SPRAG ROLLERS
2 - SCREWDRIVER
3 - PARK SPRAG GUIDE BRACKET

CAUTION: The valve body manual shaft pilot may distort and bind the manual valve if the valve body is mishandled or dropped.

VALVE BODY (Continued)

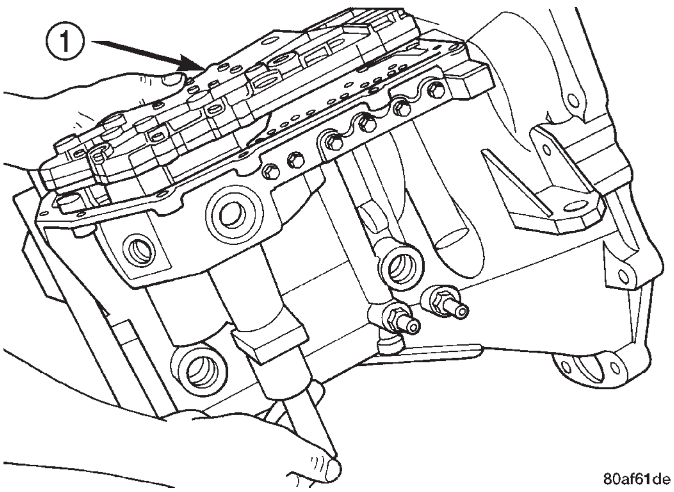


Fig. 326 Valve Body Removal/Installation

1 - VALVE BODY

DISASSEMBLY

NOTE: If valve body assembly is being reconditioned, the TCM Quick Learn Procedure must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Remove manual shaft seal (Fig. 327).

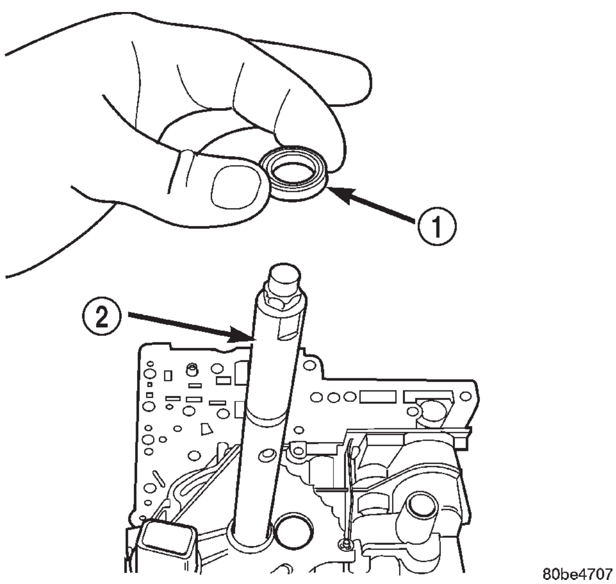


Fig. 327 Manual Shaft Seal

1 - SEAL
2 - MANUAL SHAFT

(2) Remove Transmission Range Sensor retaining screw (Fig. 328).

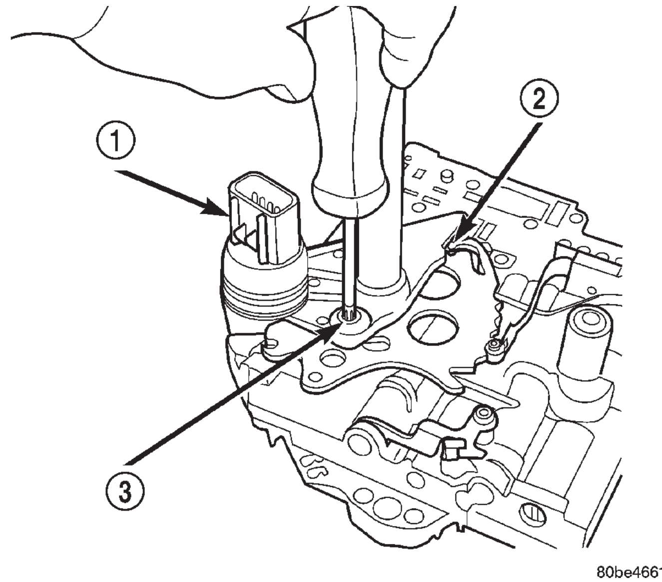


Fig. 328 Remove Transmission Range Sensor

1 - TRANSMISSION RANGE SENSOR
2 - MANUAL VALVE CONTROL PIN
3 - RETAINING SCREW

(3) Remove Manual Shaft/Rooster Comb and Transmission Range Sensor (Fig. 329).

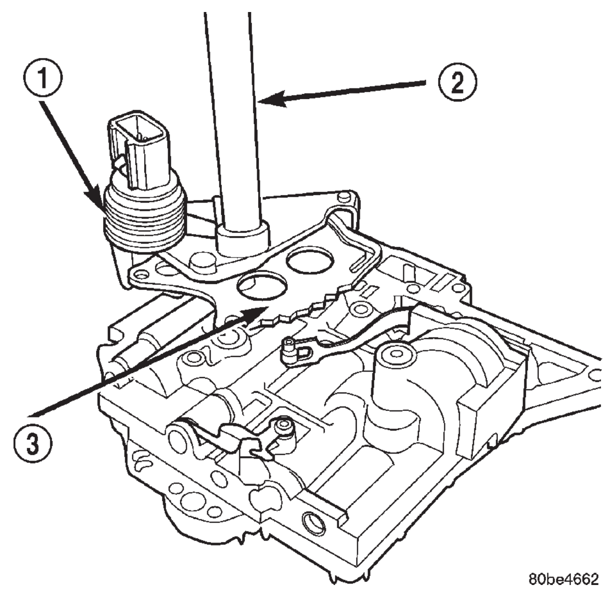


Fig. 329 Manual Shaft/Rooster Comb and Transmission Range Sensor

1 - TRANSMISSION RANGE SENSOR
2 - MANUAL SHAFT
3 - ROOSTER COMB

VALVE BODY (Continued)

(4) Remove 2/4 Accumulator Retaining Plate (Fig. 330).

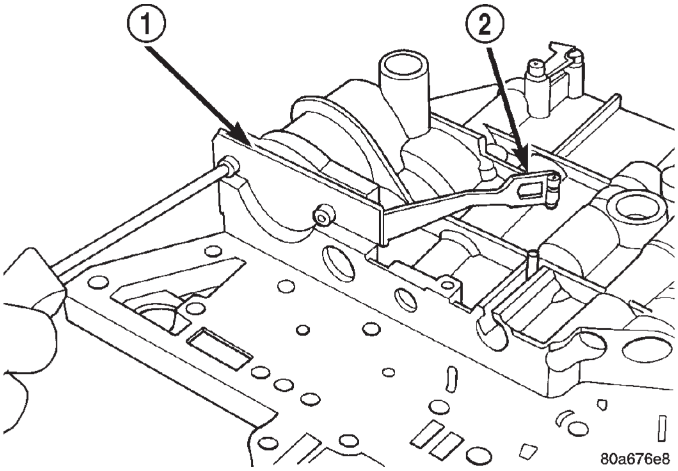


Fig. 330 2/4 Accumulator Retaining Plate

1 - 2–4 ACCUMULATOR RETAINING PLATE
2 - DETENT SPRING

(5) Remove 2/4 Accumulator components as shown in (Fig. 331).

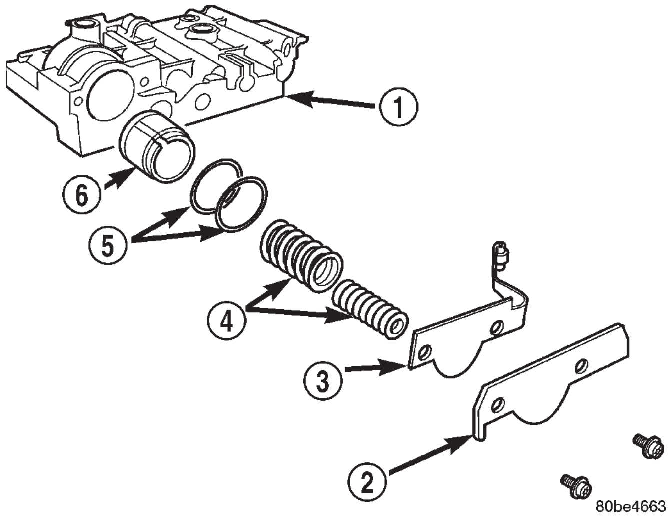


Fig. 331 2/4 Accumulator Assembly

1 - VALVE BODY
2 - RETAINER PLATE
3 - DETENT SPRING
4 - SPRINGS
5 - SEALS
6 - PISTON

(6) Remove Valve Body to Transfer Plate screws (Fig. 332).

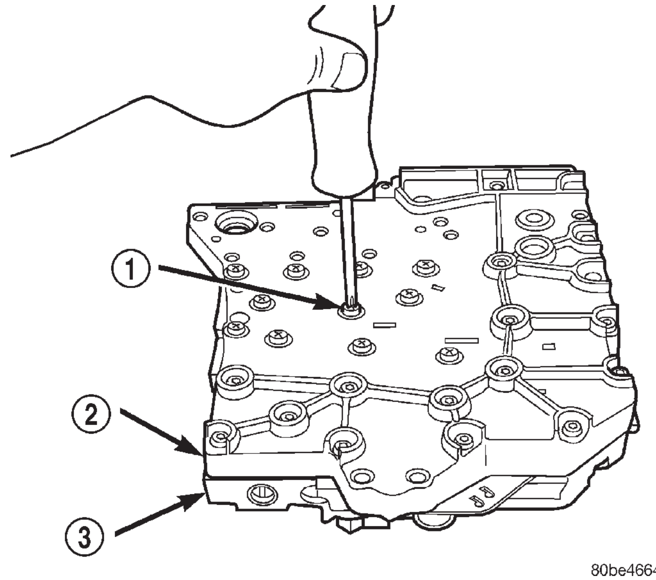


Fig. 332 Remove Valve Body to Transfer Plate Screws

1 - SCREW (24)
2 - TRANSFER PLATE
3 - VALVE BODY

(7) Invert assembly and remove Transfer Plate (Fig. 333). Beware of loose check balls.

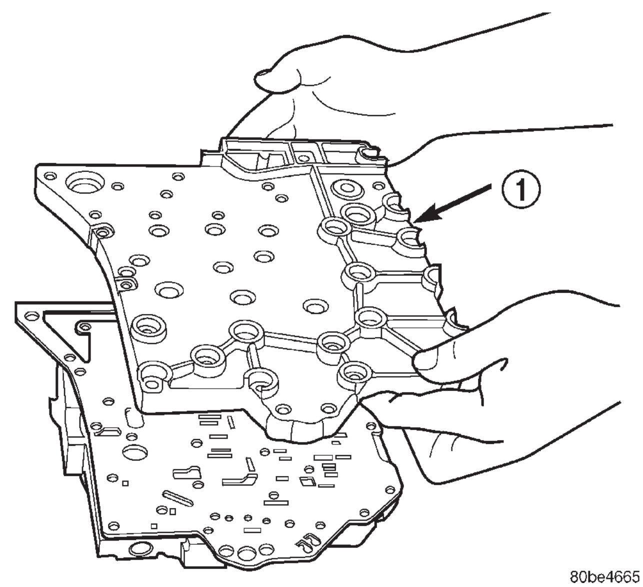


Fig. 333 Remove Transfer Plate

1 - TRANSFER PLATE

VALVE BODY (Continued)

(8) Remove oil screen (Fig. 334).

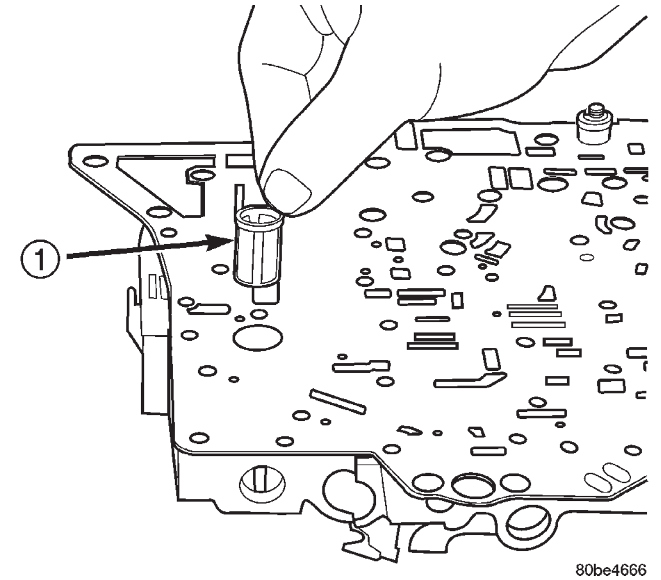


Fig. 334 Remove Oil Screen

1 - OIL SCREEN

(9) Remove the overdrive clutch (#5) check valve (Fig. 335)

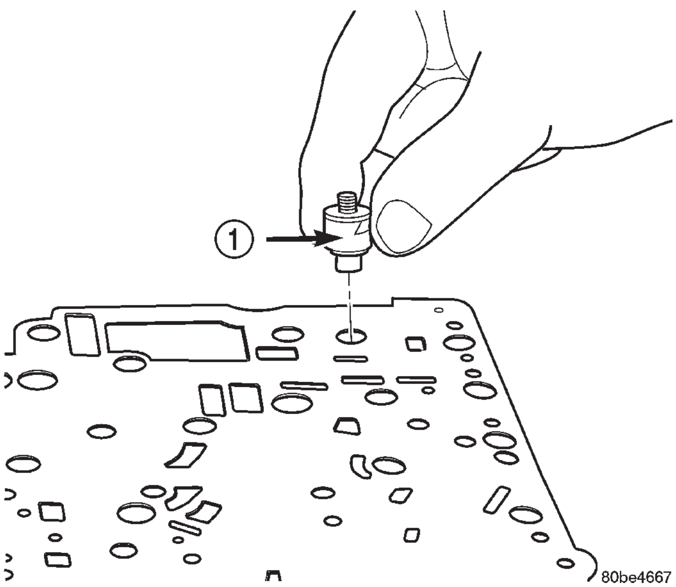


Fig. 335 Remove Overdrive Clutch (#5) Check Valve

1 - OVERDRIVE CLUTCH (#5) CHECK VALVE

(10) Remove separator plate (Fig. 336).

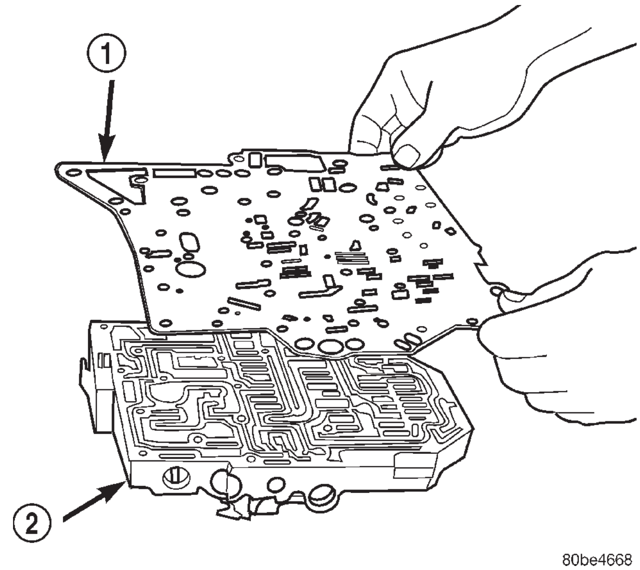


Fig. 336 Remove Separator Plate

1 - SEPARATOR PLATE
2 - VALVE BODY

(11) Remove thermal valve (Fig. 337).

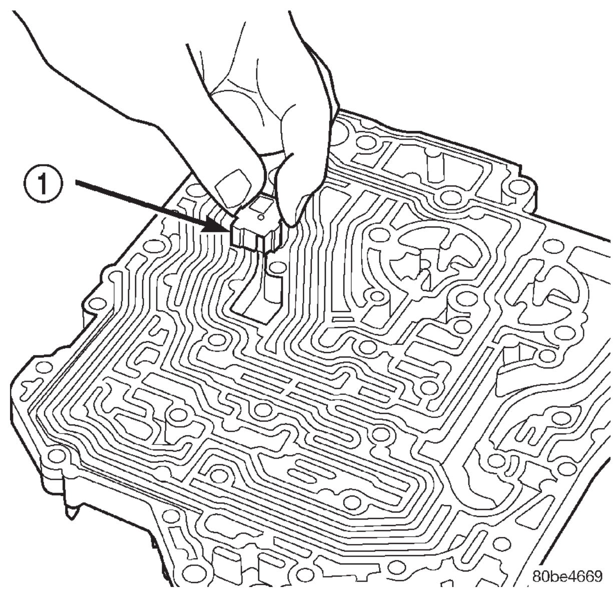


Fig. 337 Remove Thermal Valve

1 - THERMAL VALVE

(12) Remove check balls (Fig. 338).

NOTE: Tag all valve/spring assemblies for reassembly identification.

VALVE BODY (Continued)

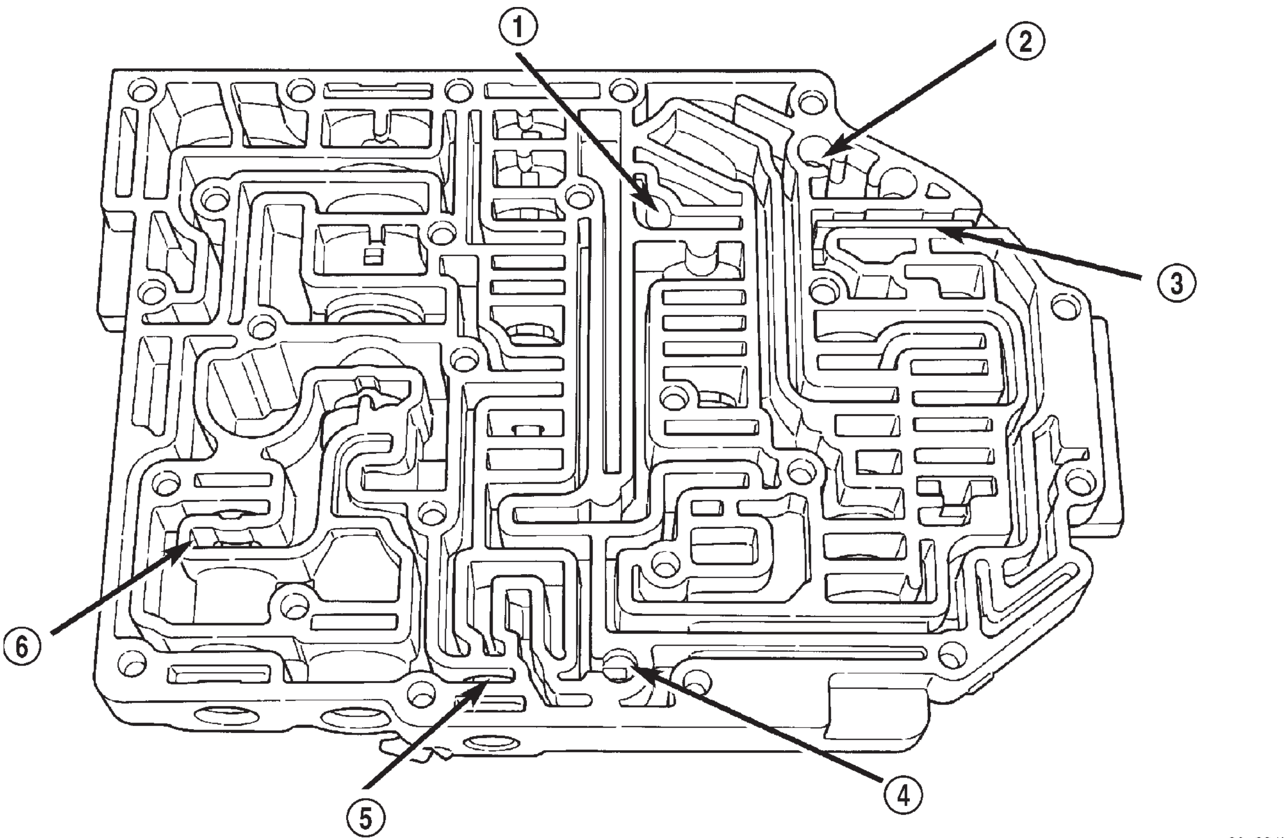


Fig. 338 Ball Check Location

1 - (#4) BALL CHECK LOCATION
2 - (#2) BALL CHECK LOCATION
3 - RETAINER
4 - (#3) BALL CHECK LOCATION
5 - LOW/REVERSE SWITCH VALVE
6 - T/C LIMIT VALVE

(13) Remove dual retainer plate using Tool 6301 (Fig. 339).

(14) Remove regulator valve spring retainer (Fig. 340).

(15) Remove remaining retainers as shown in (Fig. 341).

(16) Remove valves and springs as shown in (Fig. 342).

NOTE: Refer to Valve Body Cleaning and Inspection for cleaning procedures.

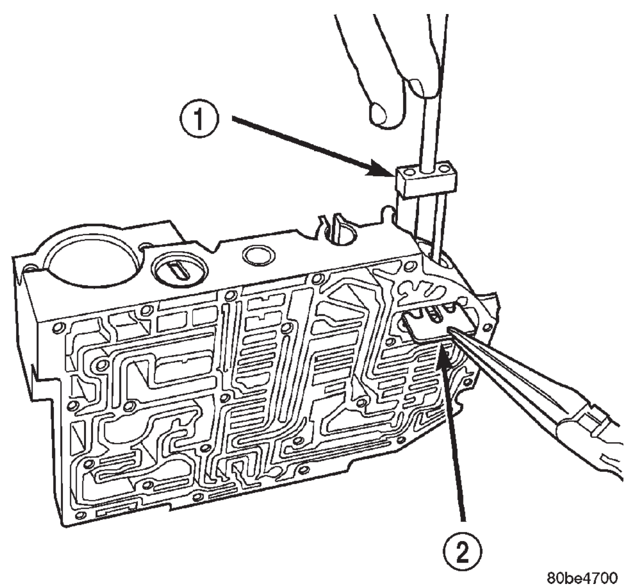


Fig. 339 Remove Dual Retainer Plate using Tool 6301

1 - TOOL 6301
2 - RETAINER

VALVE BODY (Continued)

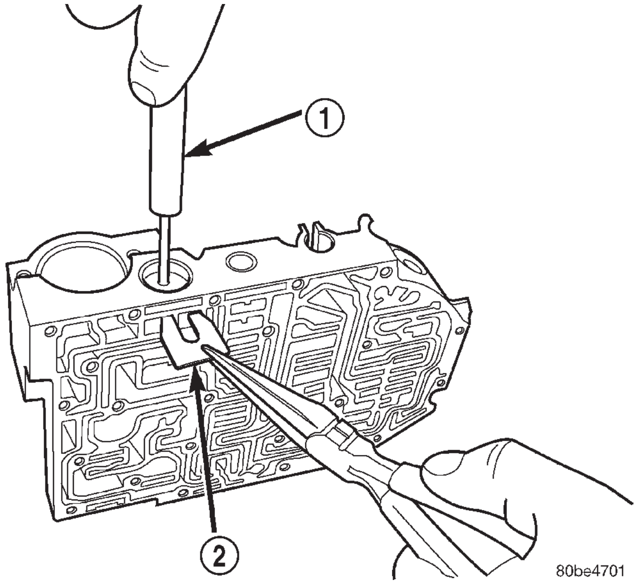


Fig. 340 Remove Regulator Valve Spring Retainer using Tool 6302

1 - TOOL 6302
2 - RETAINER

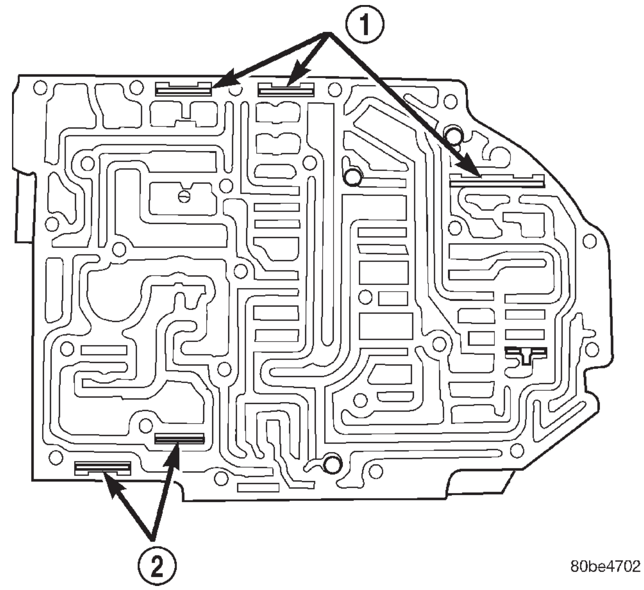


Fig. 341 Valve Retainer Location

1 - RETAINER
2 - RETAINER

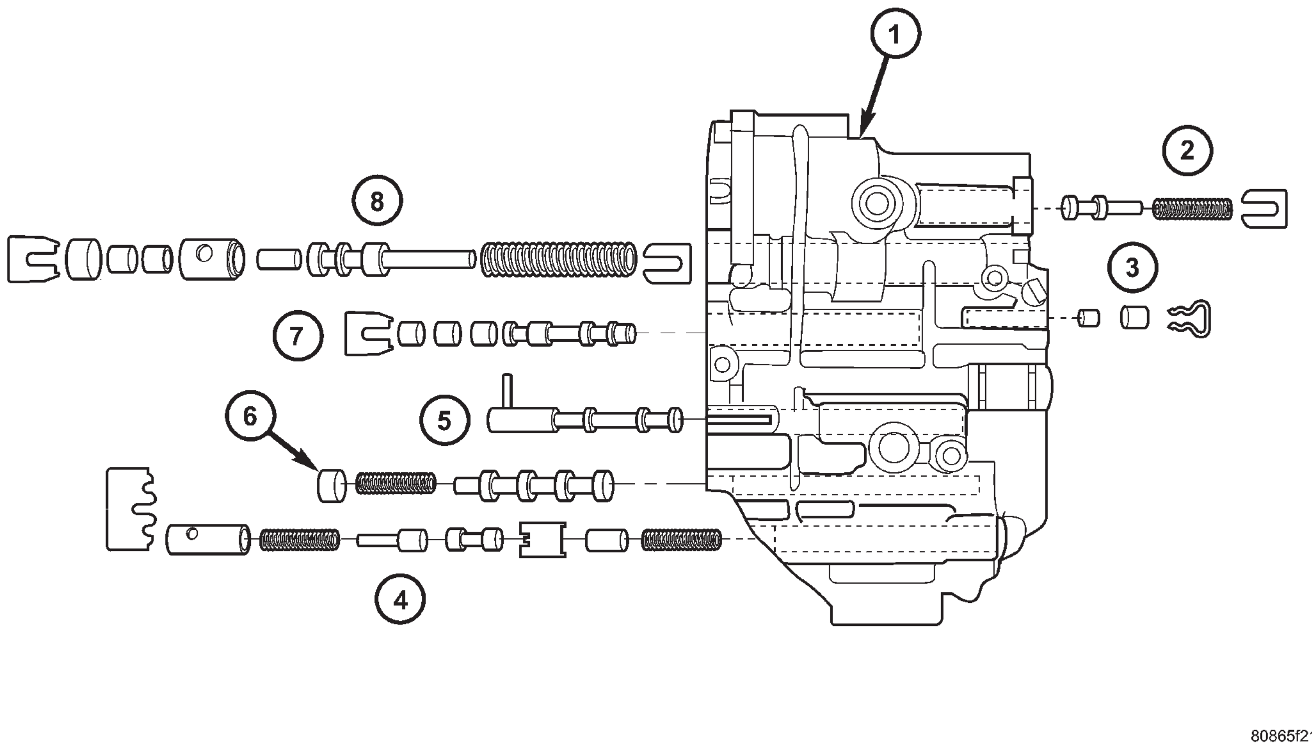


Fig. 342 Springs and Valves Location

1 - VALVE BODY
2 - T/C REGULATOR VALVE
3 - L/R SWITCH VALVE
4 - CONVERTER CLUTCH CONTROL VALVE
5 - MANUAL VALVE
6 - CONVERTER CLUTCH SWITCH VALVE
7 - SOLENOID SWITCH VALVE
8 - REGULATOR VALVE

VALVE BODY (Continued)

ASSEMBLY

NOTE: If valve body assembly is reconditioned, the TCM Quick Learn Procedure must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Install valves and springs as shown in (Fig. 342).

(2) Install regulator valve spring retainer (Fig. 343).

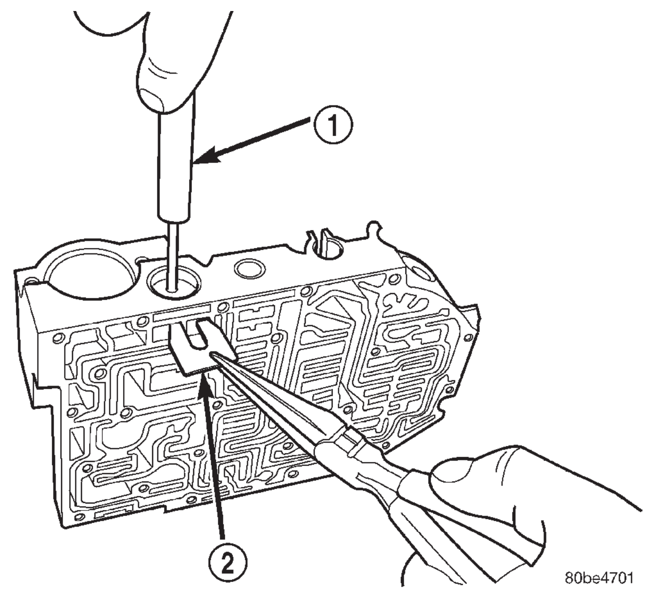


Fig. 343 Install Regulator Valve Spring Retainer using Tool 6302

1 - TOOL 6302
2 - RETAINER

(3) Install dual retainer plate using Tool 6301 (Fig. 344).

(4) Verify that all retainers are installed as shown in (Fig. 345). Retainers should be flush or below valve body surface.

(5) Install check balls into position as shown in (Fig. 346). If necessary, secure them with petrolatum or transmission assembly gel for assembly ease.

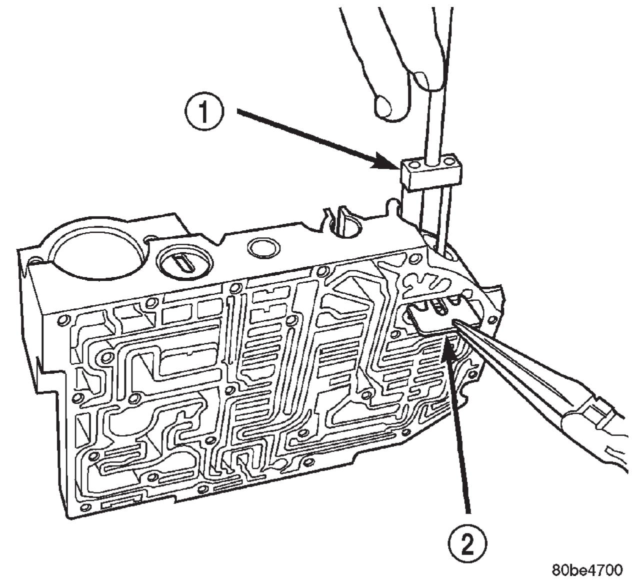


Fig. 344 Install Dual Retainer Plate using Tool 6301

1 - TOOL 6301
2 - RETAINER

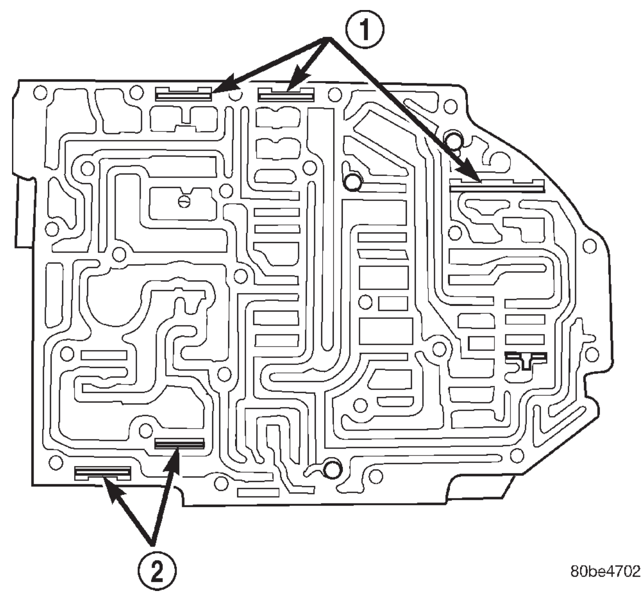


Fig. 345 Valve Retainer Location

1 - RETAINER
2 - RETAINER

VALVE BODY (Continued)

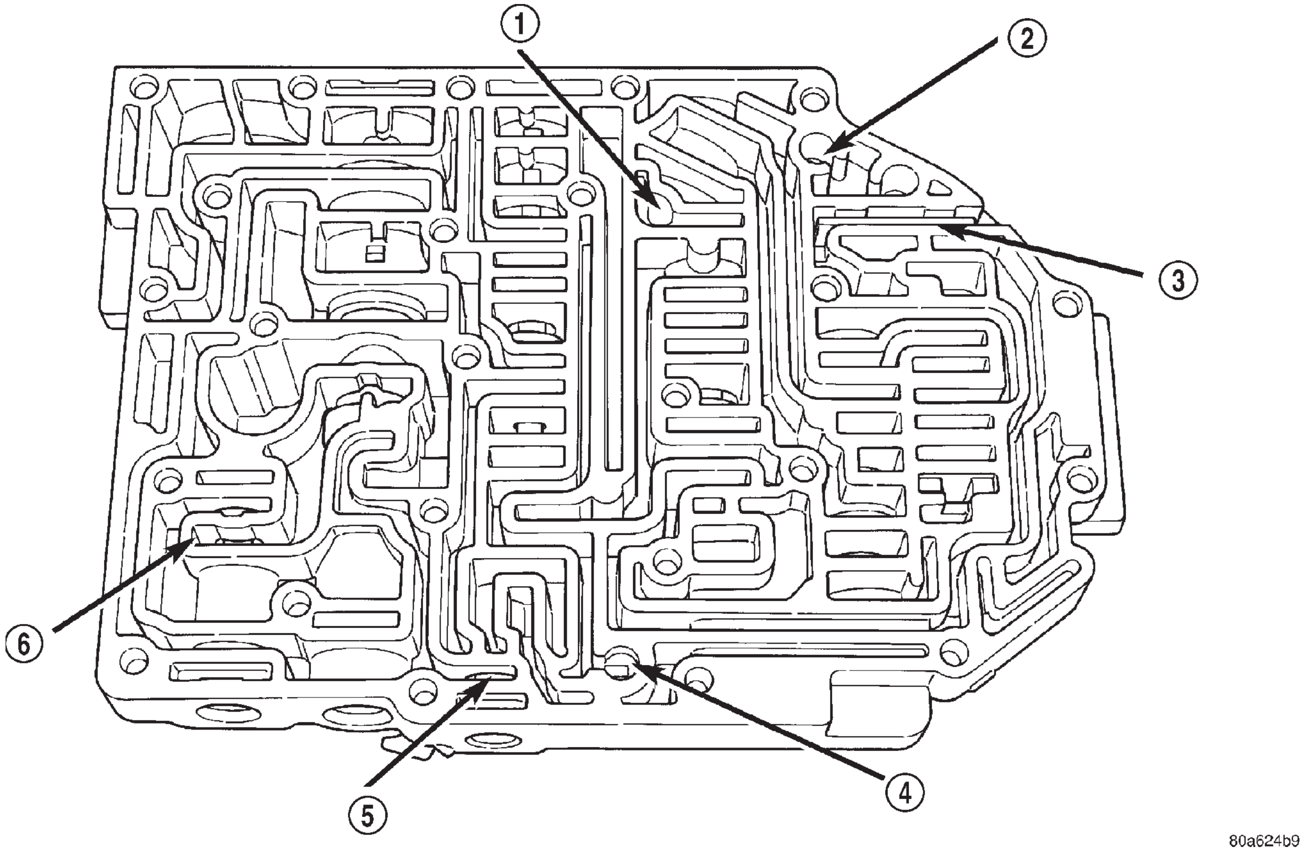


Fig. 346 Ball Check Location

1 - (#4) BALL CHECK LOCATION
2 - (#2) BALL CHECK LOCATION
3 - RETAINER
4 - (#3) BALL CHECK LOCATION
5 - LOW/REVERSE SWITCH VALVE
6 - T/C LIMIT VALVE

VALVE BODY (Continued)

(6) Install thermal valve into transfer plate (Fig. 347).

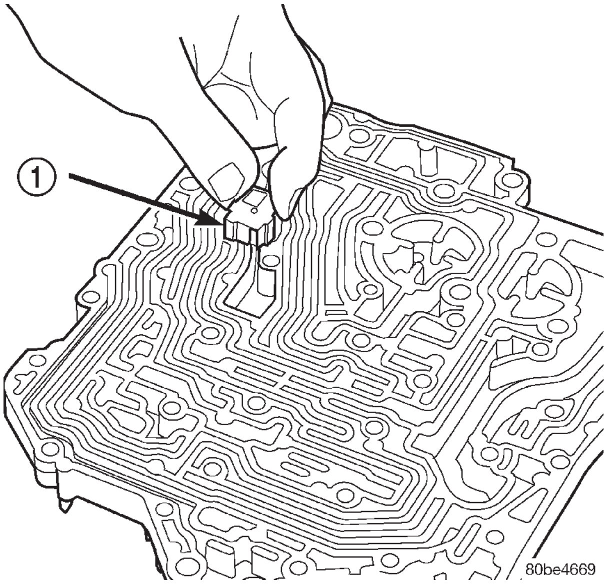


Fig. 347 Install Thermal Valve

1 - THERMAL VALVE

(7) Install separator plate to valve body (Fig. 348).

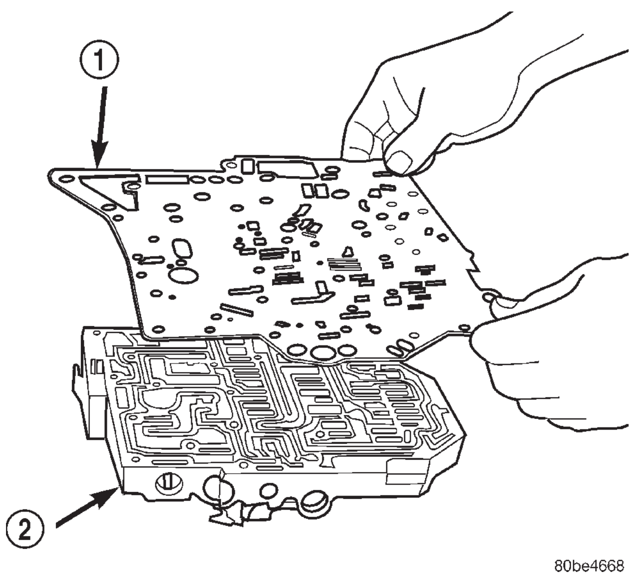


Fig. 348 Install Separator Plate

1 - SEPARATOR PLATE
2 - VALVE BODY

(8) Install the overdrive clutch (#5) check valve to separator plate (Fig. 349)

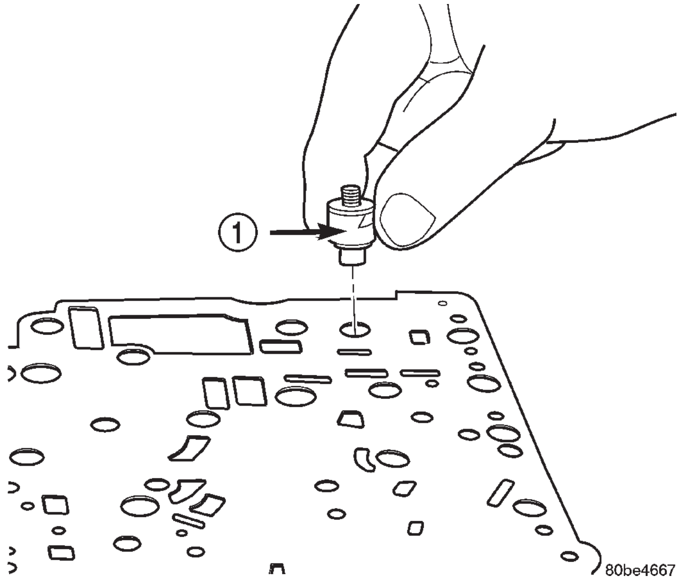


Fig. 349 Install Overdrive Clutch (#5) Check Valve

1 - OVERDRIVE CLUTCH (#5) CHECK VALVE

(9) Install oil screen to separator plate (Fig. 350).

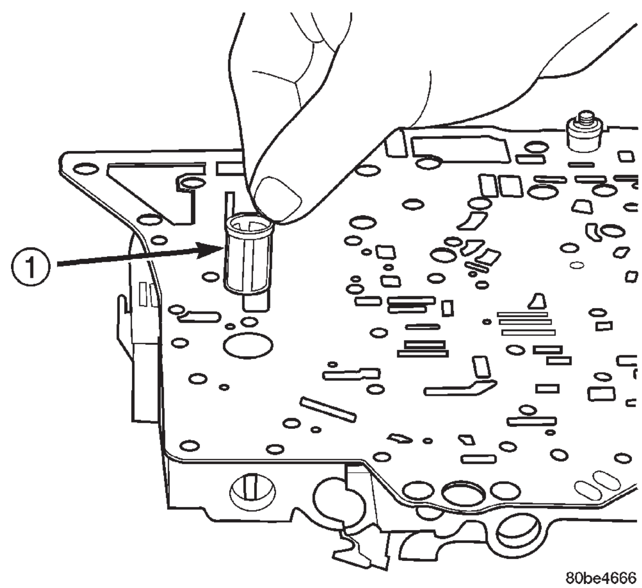


Fig. 350 Install Oil Screen

1 - OIL SCREEN

VALVE BODY (Continued)

(10) Install transfer plate to valve body and separator plate. Make sure oil screen and #5 check valve do not bind (Fig. 351).

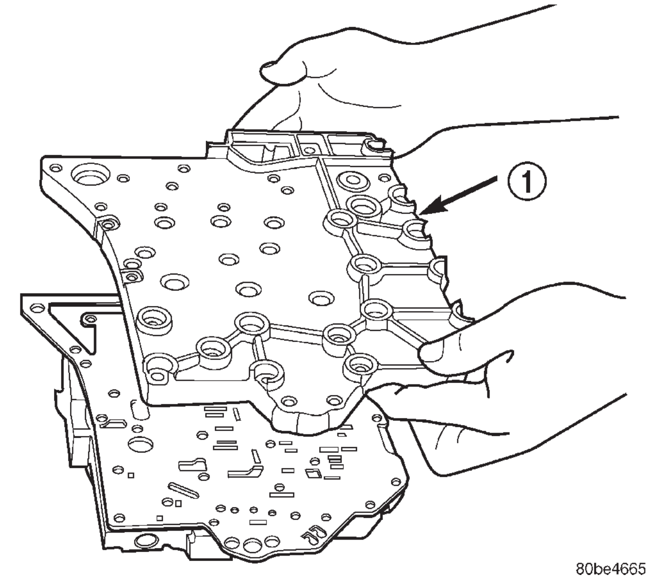


Fig. 351 Install Transfer Plate

1 - TRANSFER PLATE

(11) Install twenty-four transfer plate to valve body screws (Fig. 352) and torque to 5 N·m (45 in. lbs.).

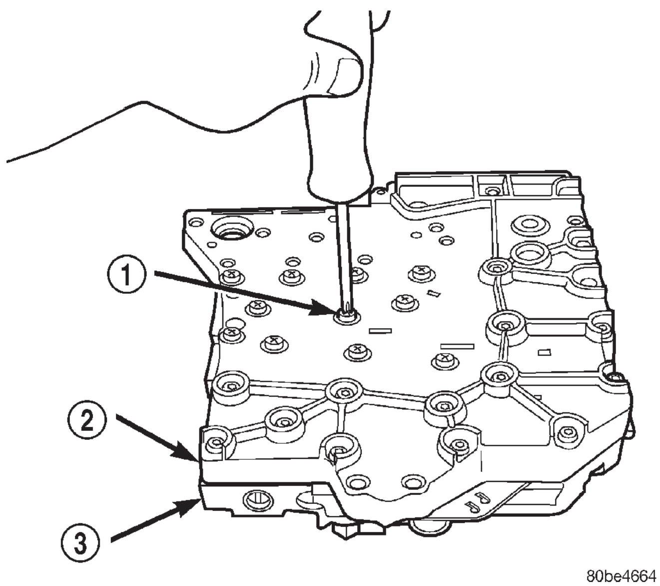


Fig. 352 Install Valve Body to Transfer Plate Screws

1 - SCREW (24)
2 - TRANSFER PLATE
3 - VALVE BODY

(12) Install 2/4 Accumulator components as shown in (Fig. 353).

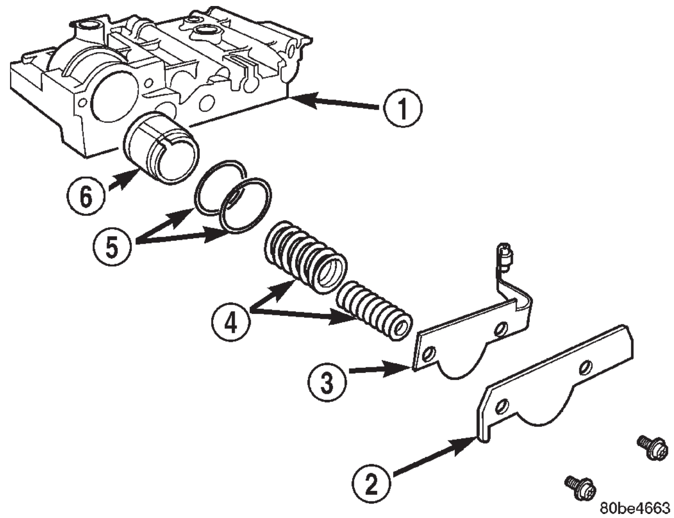


Fig. 353 2/4 Accumulator Assembly

1 - VALVE BODY
2 - RETAINER PLATE
3 - DETENT SPRING
4 - SPRINGS
5 - SEALS
6 - PISTON

(13) Torque 2/4 Accumulator retainer to 5 N·m (45 in. lbs.) (Fig. 354).

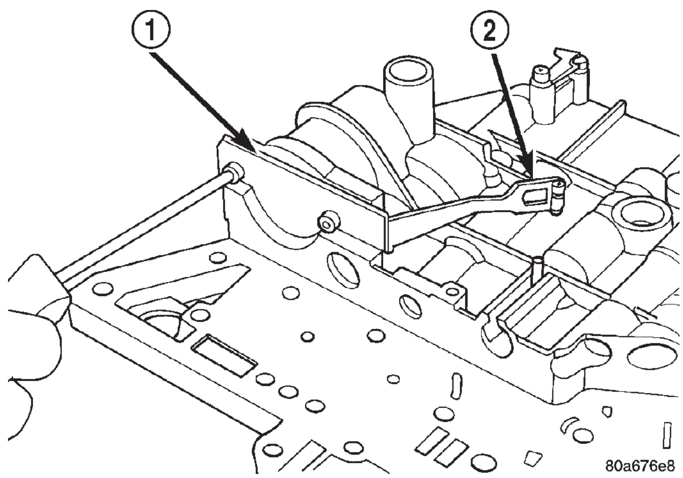


Fig. 354 2/4 Accumulator Retaining Plate

1 - 2–4 ACCUMULATOR RETAINING PLATE
2 - DETENT SPRING

VALVE BODY (Continued)

(14) Install Manual Shaft/Rooster Comb and Transmission Range Sensor (Fig. 355).

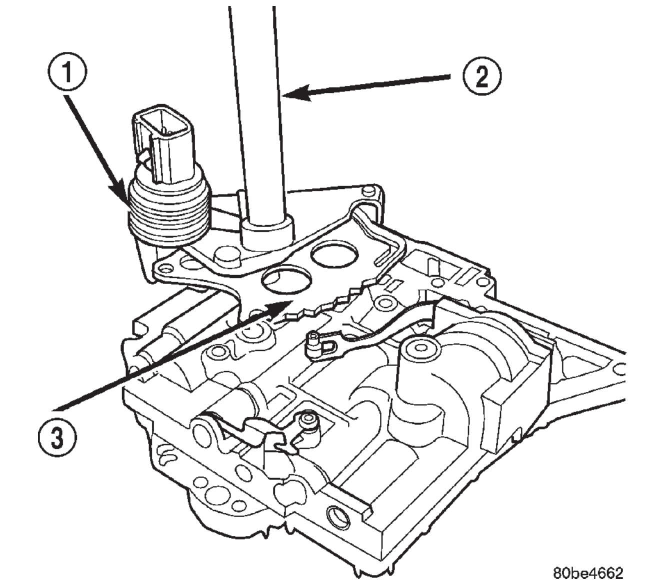


Fig. 355 Install Manual Shaft/Rooster Comb and Transmission Range Sensor

1 - TRANSMISSION RANGE SENSOR
2 - MANUAL SHAFT
3 - ROOSTER COMB

(15) Make sure Manual Valve control pin is contained within the rooster comb slot (Fig. 356). Install Transmission Range Sensor retaining screw (Fig. 356) and torque to 5 N·m (45 in. lbs.).

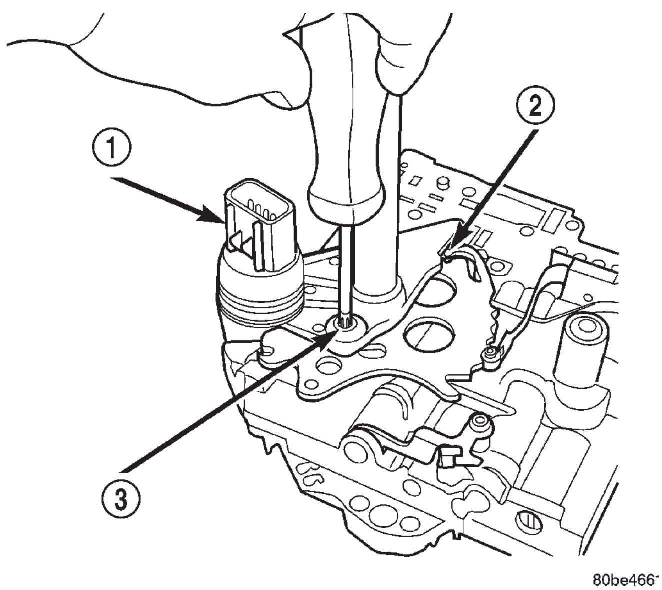


Fig. 356 Install Transmission Range Sensor Retaining Screw

1 - TRANSMISSION RANGE SENSOR
2 - MANUAL VALVE CONTROL PIN
3 - RETAINING SCREW

(16) Install manual shaft seal (Fig. 357).

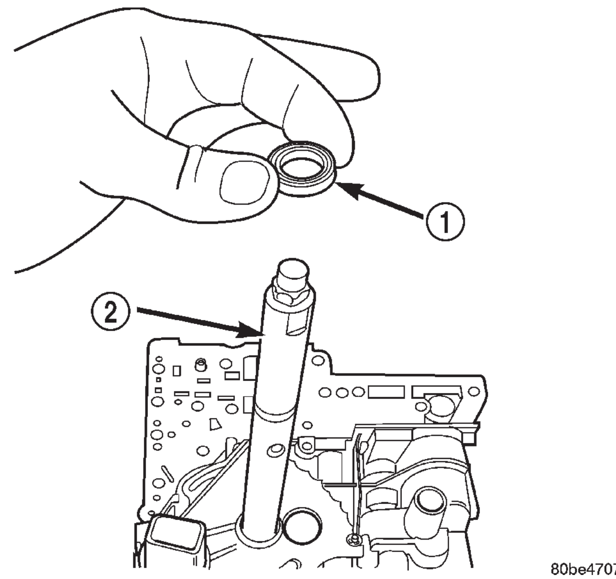


Fig. 357 Manual Shaft Seal

1 - SEAL
2 - MANUAL SHAFT

INSTALLATION

NOTE: If valve body assembly is being replaced or reconditioned, it is necessary to perform the TCM Quick Learn Procedure. (Refer to 8 - ELECTRICAL/ ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Install valve body assembly to transaxle (Fig. 358). Install and torque valve body-to-transaxle case bolts (Fig. 359) to 12 N·m (105 in. lbs.).

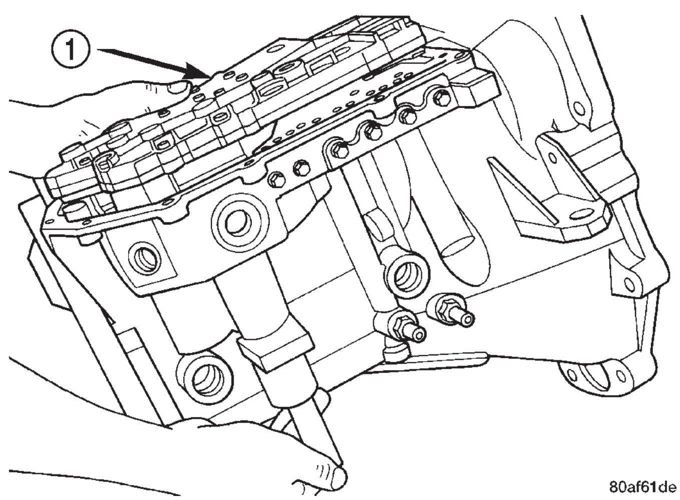


Fig. 358 Valve Body Removal/Installation

1 - VALVE BODY

VALVE BODY (Continued)

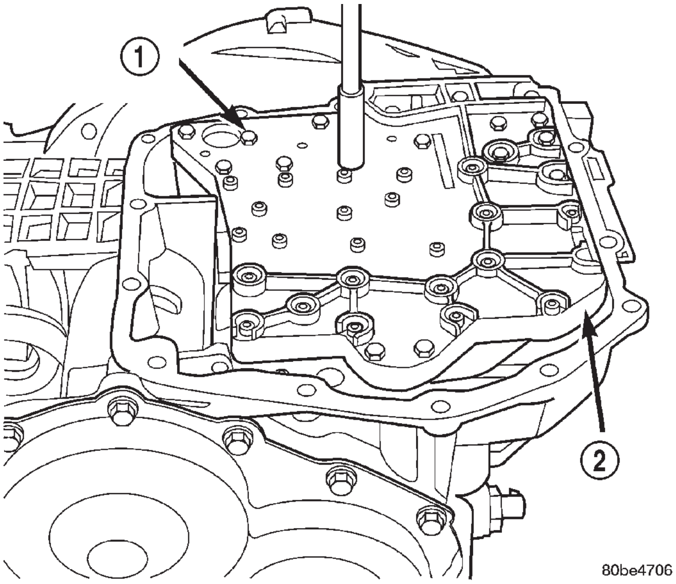


Fig. 359 Valve Body Attaching Bolts

1 - VALVE BODY ATTACHING BOLTS (18)
2 - VALVE BODY

(2) Install transaxle oil filter (Fig. 360). Inspect the o-ring and replace if necessary.

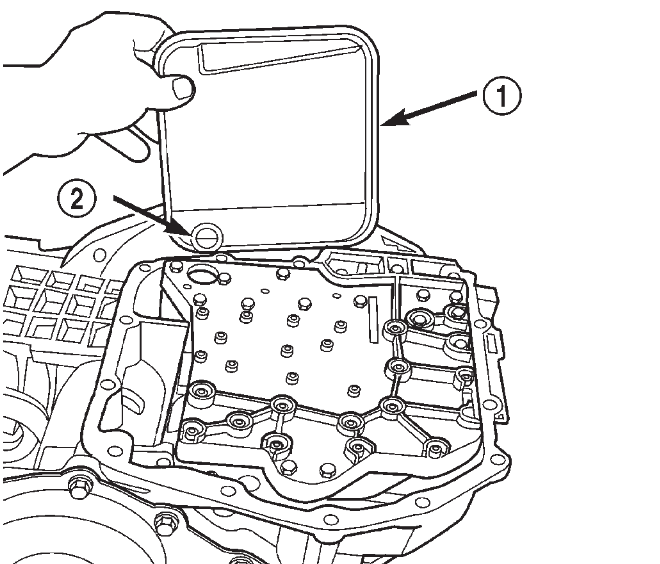


Fig. 360 Oil Filter

1 - OIL FILTER
2 - O-RING

(3) Ensure the transaxle oil pan and transaxle case sealing surfaces are clean and dry. Install an 1/8” bead of Mopar® ATF RTV (MS-GF41) to the oil pan and install (Fig. 361). Torque oil pan-to-transaxle case bolts (Fig. 362) to 19 N·m (165 in. lbs.).

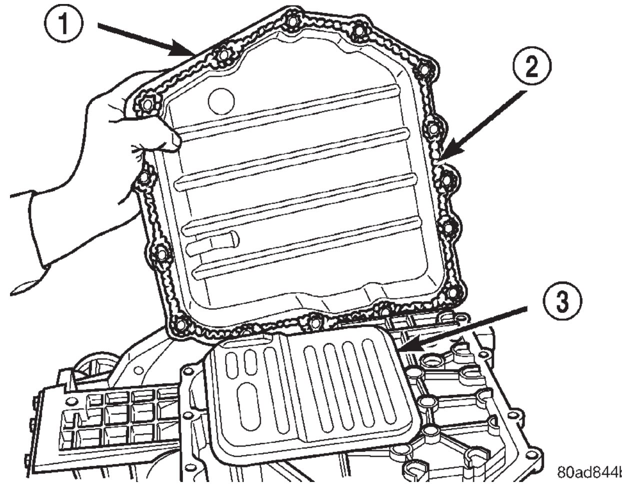


Fig. 361 Oil Pan

1 - OIL PAN
2 - 1/8 INCH BEAD OF MOPAR ATF RTV (MS-GF41)
3 - OIL FILTER

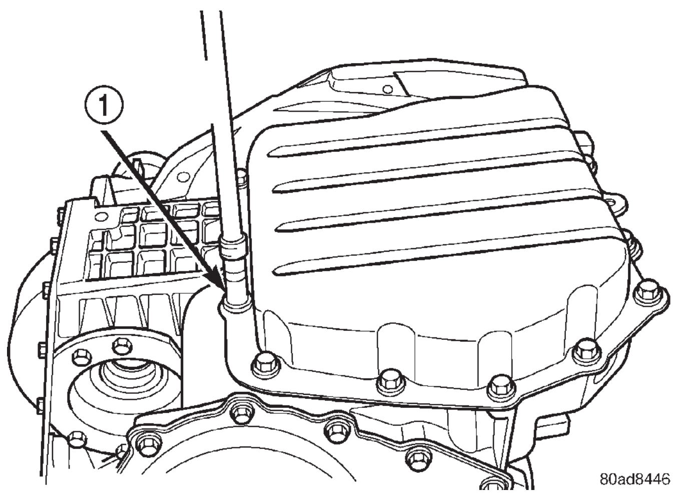


Fig. 362 Oil Pan Bolts

1 - OIL PAN BOLTS (USE RTV UNDER BOLT HEADS)

(4) Lower vehicle.
(5) Connect transmission range sensor connector.
(6) Install manual valve lever to manual shaft.
(7) Install gearshift cable to manual valve lever.
(8) Connect battery negative cable.
(9) Fill transaxle with Mopar® ATF +4 Transmission fluid. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 41TE/FLUID - STANDARD PROCEDURE)

TIRES/WHEELS

TABLE OF CONTENTS

TIRES/WHEELS

DIAGNOSIS AND TESTING - TIRE AND WHEEL VIBRATION

Tire and wheel imbalance, runout and force variation can cause vehicles to exhibit steering wheel vibration.

VISUAL INSPECTION

Visual inspection of the vehicle is recommended prior to road testing or performing any other procedure. Raise vehicle on a suitable hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

Inspect for the following:

- Verify correct (OEM) wheel and tire, as well as correct wheel weights. Aluminum wheels require unique wheel weights. They are designed to fit the contour of the wheel (Fig. 1).
- Inspect tires and wheels for damage, mud packing and unusual wear; correct as necessary.
- Check and adjust tire air pressure to the pressure listed on the label attached to the rear face of the driver's door.

ROAD TEST

Road test vehicle on a smooth road for a least five miles to warm tires (remove any flat spots). Lightly place hands on steering wheel at the 10:00 and 2:00 positions while slowly sweeping up and down from 90 to 110 km/h (55 to 70 mph) where legal speed limits allow.

Observe the steering wheel for:

- Visual Nibble (oscillation: clockwise/counterclockwise, usually due to tire imbalance)
- Visual Buzziness (high frequency, rapid vibration up and down)

To rule out vibrations due to brakes or powertrain:

- Lightly apply brakes at speed; if vibration occurs or is enhanced, vibration is likely due to causes other than tire and wheel assemblies.
- Shift transmission into neutral while vibration is occurring; if vibration is eliminated, vibration is likely due to causes other than tire and wheel assemblies.

TIRES/WHEELS (Continued)

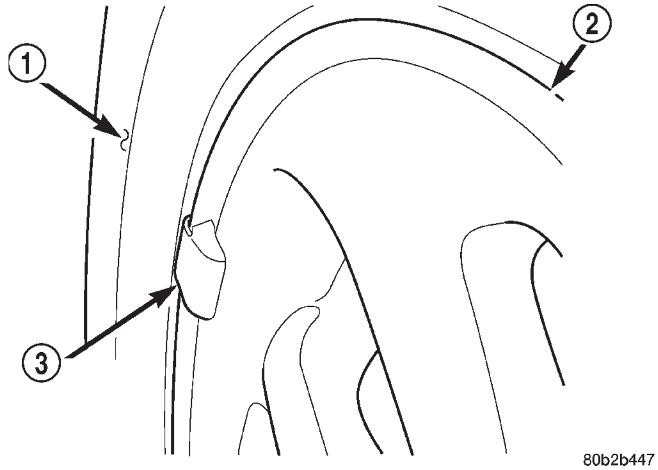


Fig. 1 Aluminum Wheel Weight

1 - TIRE
2 - WHEEL
3 - WHEEL WEIGHT

For brake vibrations, (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/ROTORS - DIAGNOSIS AND TESTING).

For powertrain vibrations, (Refer to 3 - DIFFERENTIAL & DRIVELINE - DIAGNOSIS AND TESTING).

For tire and wheel assembly vibrations, continue with this diagnosis and testing procedure.

TIRE AND WHEEL BALANCE

(1) Balance the tire and wheel assemblies as necessary following the wheel balancer manufacturer's instructions and using the information listed in Standard Procedure - Tire And Wheel Balance. (Refer to 22 - TIRES/WHEELS - STANDARD PROCEDURE)

(2) Road test the vehicle for at least 5 miles, following the format described in Road Test.

(3) If the vibration persists, continue with this diagnosis and testing procedure.

TIRE AND WHEEL RUNOUT/MATCH MOUNTING

(1) **System Radial Runout.** This on-the-vehicle system check will measure the radial runout including the hub, wheel and tire.

(a) Raise vehicle so tires clear floor. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(b) Apply masking tape around the circumference of the tire in the locations to be measured (Fig. 2). Do not overlap the tape.

(c) Check system runout using Dial Indicator Set, Special Tool C-3339A with 25-W wheel, or equivalent. Place the end of the indicator against each taped area (one at a time) (Fig. 2) and rotate the tire and wheel. System radial runout should not exceed 0.76 mm (0.030 inch) with no tread "dips" or "steps." Tread "dips" and "steps" can be identified by spikes of the dial indicator gauge.

• Tread ″dips″; Rapid decrease then increase in dial indicator reading over 101.6 mm (4.0 inch) of tread circumference.

• Tread ″steps″; Rapid decrease or increase in dial indicator reading over 101.6 mm (4.0 inch) of tread circumference.

(d) If system runout is excessive, re-index the tire and wheel assembly on the hub. Remove assembly from vehicle and install it back on the hub two studs over from original mounting position. If re-indexing the tire and wheel assembly corrects or reduces system runout, check hub runout and repair as necessary (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/ROTORS - DIAGNOSIS AND TESTING).

(e) If system runout is still excessive, continue with this diagnosis and testing procedure.

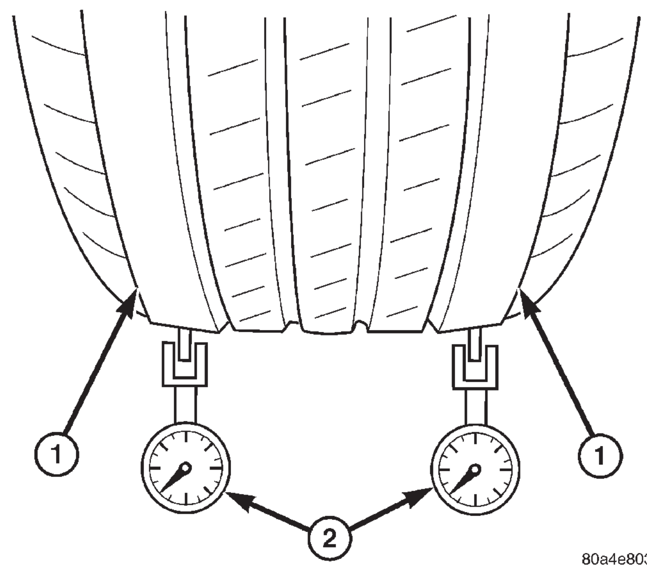


Fig. 2 Radial Runout Measurement

1 - MASKING TAPE
2 - DIAL INDICATOR

(2) **Tire and Wheel Assembly Radial Runout.** This radial runout check is performed with the tire and wheel assembly off the vehicle.

(a) Remove tire and wheel assembly from vehicle and install it on a suitable wheel balancer.

(b) Check system runout using Dial Indicator Set, Special Tool C-3339A with 25-W wheel, or equivalent. Place the end of the indicator against each taped area (one at a time) (Fig. 2) and rotate the tire and wheel. Radial runout should not exceed 0.76 mm (0.030 inch) with no tread "dips" or "steps." Tread "dips" and "steps" can be identified by spikes of the dial indicator gauge.

TIRES/WHEELS (Continued)

(c) If runout exceeds limits, mark the original location of the tire on the wheel at the valve stem (Fig. 3). Also, mark the tire and wheel to indicate the original high spot of the assembly and record the runout measurement.

(d) If runout exceeds limits, the tire will need to be dismounted from the wheel to verify wheel vs. tire contribution. Refer to Wheel Runout below.

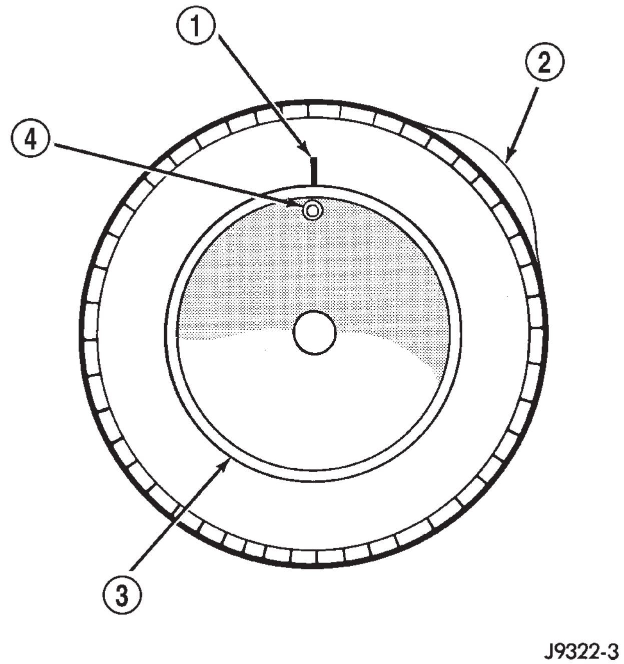


Fig. 3 Marking Tire

1 - REFERENCE MARK
2 - EXAMPLE HIGH SPOT ON TIRE
3 - WHEEL
4 - VALVE STEM

(3) **Lateral Runout.** Lateral runout for the vehicle system as well as the tire and wheel assembly should be less than 0.76 mm (0.030 inch). The same procedure and theory described for radial runout can also be applied to identify and reduce lateral runout.

(4) **Wheel Runout.** This runout check is performed as follows:

(a) Dismount the tire from the wheel.

(b) Mount the wheel back on the wheel balancer.

(c) Measure radial runout of the wheel at the tire bead seat (Fig. 4). Runout should not exceed 0.254 mm (0.010 inch) for aluminum wheels and 0.508 mm (.020 inch) for steel wheels. Replace the wheel if it exceeds the limit.

(d) Measure lateral runout of the wheel at the tire bead seat (Fig. 5). Runout should not exceed 0.762 mm (0.030 inch) for all wheels. Replace the wheel if it exceeds the limit.

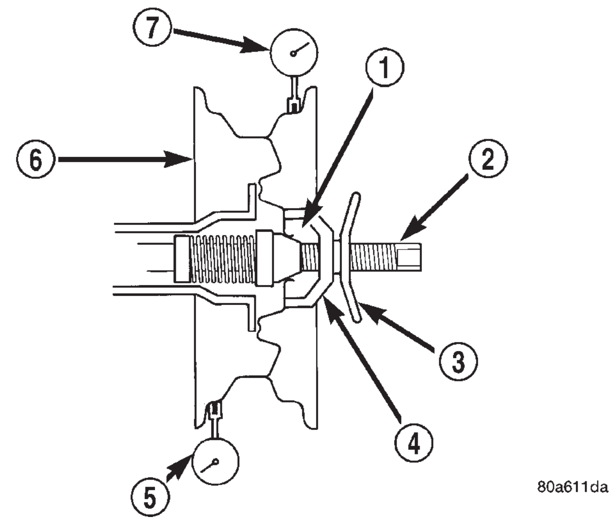


Fig. 4 Checking Radial Runout Of Wheel

1 - MOUNTING CONE
2 - SPINDLE SHAFT
3 - WING NUT
4 - PLASTIC CUP
5 - DIAL INDICATOR
6 - WHEEL
7 - DIAL INDICATOR

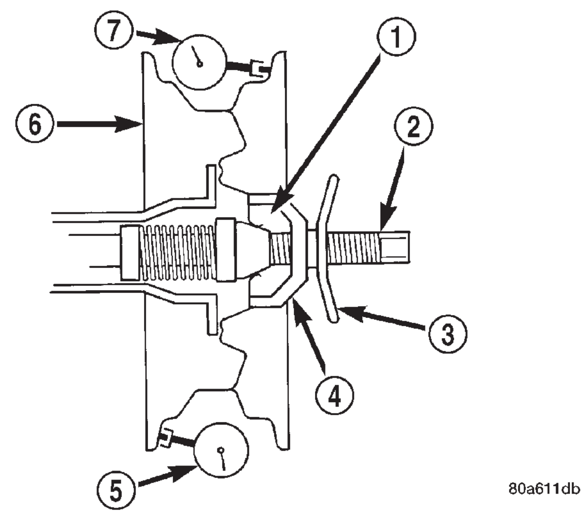


Fig. 5 Checking Lateral Runout Of Wheel

1 - MOUNTING CONE
2 - SPINDLE SHAFT
3 - WING NUT
4 - PLASTIC CUP
5 - DIAL INDICATOR
6 - WHEEL
7 - DIAL INDICATOR

TIRES/WHEELS (Continued)

(5) **Match Mounting.** If the wheel runout is within specifications, tire and wheel assembly runout can be improved by re-indexing (match mounting) the tire to the wheel as described below.

(a) Remount the tire on the rim 180 degrees from its original location (Fig. 6). Ensure the tire bead is properly seated.

(b) Re-measure the total runout. Mark the tire at the high spot and record the measurement.

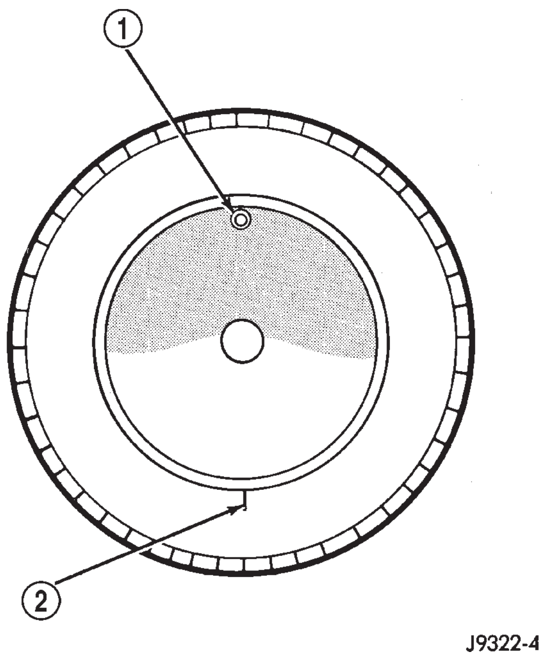


Fig. 6 Remount Tire 180 Degrees

1 - VALVE STEM
2 - REFERENCE MARK

If runout is still excessive, perform the following:

- If the new high spot is within 102 mm (4.0 inch) of the first high spot on the tire, replace the tire.
- If the new high spot is within 102 mm (4.0 inch) of the first high spot on the wheel, the wheel may be out of specification. Refer to Wheel Runout above.
- If the new high spot is NOT within 102 mm (4.0 inch) of either high spot, draw an arrow on the tread from new high spot toward the original (Fig. 7). Break down the tire and remount it 90 degrees on rim in that direction, then re-measure runout. This will normally reduce the runout to an acceptable amount.

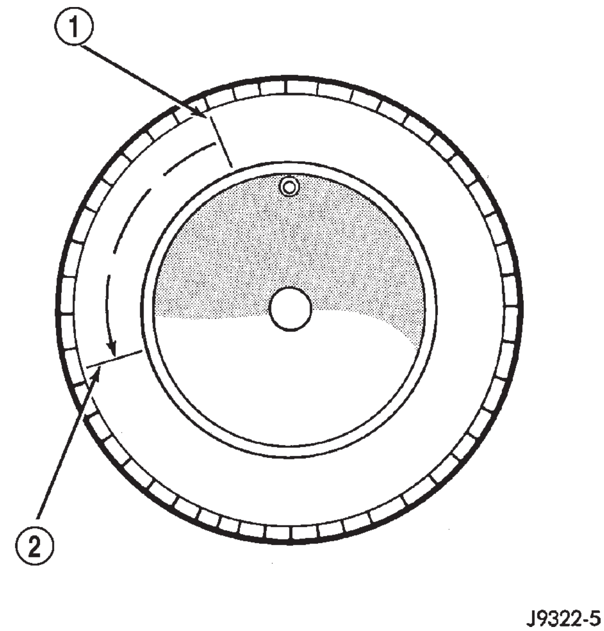


Fig. 7 Remount Tire 90 Degrees In Direction of Arrow

1 - 2ND HIGH SPOT ON TIRE
2 - 1ST HIGH SPOT ON TIRE

(6) Once back together, road test the vehicle for at least 5 miles, following the format described in Road Test. If vibration persists, and all components tested are within specification, the tires may have an excessive radial force condition. Radial force variation can only be checked as indicated below. If this equipment is not available, consult with the tire manufacturer.

RADIAL FORCE VARIATION

Radial Force Variation can be checked using the Hunter GSP 9700 Vibration Control System (Wheel Balancer) or equivalent, if available. This type of equipment helps to correct ride disturbances by reducing the radial force variation of an assembly through re-indexing of the tire to wheel.

The equipment manufacturer or DaimlerChrysler Corporation may supply reference values as guidelines. Radial force measurements above the reference value may not always result in a ride disturbance, nor do they automatically mean the assembly components are out of specification. Do not replace components based on radial force values alone. Balancing, runout diagnosis, re-indexing, and subjective road testing must be performed as outlined in previous sections of this diagnosis and testing procedure.

TIRES/WHEELS (Continued)

Use the Radial Force equipment to identify suspect assemblies and minimize the radial forces. After all suspect assemblies are optimized, reinstall the assemblies and road test the vehicle. If a disturbance still exists and all other vibration diagnostic procedures have been completed, replace one tire or one wheel at a time, starting with the assembly having the highest force variation. Be sure to minimize each new assembly. Road test the vehicle following each replacement. Continue this process until the disturbance is resolved.

NOTE: When using Radial Force equipment, it is critically important to set proper tire inflation pressure and ensure centering of the wheel on the equipment spindle.

RADIAL FORCE VARIATION REFERENCE VALUES

DESCRIPTION	SPECIFICATION
Total Radial Force Variation (RFV)	Less Than 22 Lbs. ± 2 Lbs.
Radial First Harmonic (R1H)	Less Than 16 Lbs. ± 2 Lbs.
Radial Second Harmonic (R2H)	Less Than 12 Lbs. ± 2 Lbs.

STANDARD PROCEDURE

STANDARD PROCEDURE - TIRE AND WHEEL BALANCE

NOTE: Balance equipment must be calibrated and maintained per equipment manufacturer's specifications.

Wheel balancing can be accomplished with either on-vehicle or off-vehicle equipment.

NOTE: If using on-vehicle balancing equipment, on the driving axle, remove the opposite wheel and tire assembly.

It is recommended that a two-plane dynamic balancer be used when a wheel and tire assembly requires balancing. A static balancer should only be used when a two-plane balancer is not available.

Balance wheel and tire assemblies dynamically and statically to less than 0.25 (¼) ounce.

For static balancing, find location of heavy spot causing imbalance. Counter balance wheel directly opposite the heavy spot. Determine weight required to counterbalance the area of imbalance. Place half of this weight on the **inner** rim flange and the other half on the **outer** rim flange (Fig. 8).

For dynamic balancing, the balance equipment is designed to indicate the location and amount of weight to be applied to both the inner and outer rim flanges (Fig. 9).

The aluminum wheels on this vehicle use a unique wheel weight (Fig. 10). This wheel weight is designed to fit the contoured surface of the wheel (Fig. 10). When balancing an aluminum wheel, this wheel weight must be used. Do not use any other type of wheel weight. It will not properly fit the contour of the wheel.

Always verify the Balance. When using off-vehicle equipment, rotate assembly 180 degrees on balance equipment to verify balance. Variation should not be more than 0.125 (⅛) ounce. If variation is more than 0.125 ounce, balancing equipment could be malfunctioning.

If difficult to balance, break down the wheel and tire assembly and check for loose debris inside tire. Prior to disassembly, mark (index) the tire at the valve stem. Use this mark in order to remount the tire in its original orientation with respect to the wheel.

STANDARD PROCEDURE - TIRE AND WHEEL MATCH MOUNTING

Wheels and tires are match mounted at the factory. This means that the high spot of the tire is matched to the low spot on the wheel rim. This technique is used to reduce runout in the wheel and tire assembly. The high spot on the tire is marked with a paint mark or a bright colored adhesive label on the outboard sidewall. The low spot on the wheel is identified with a label on the outside of the rim and a dot or line in the drop well area of the rim (inside where the tire mounts). If the outside label has been removed, the tire will have to be removed to locate the dot or line on the inside of the rim. The tire can then be match mounted to the tire.

Information on match mounting the tire to the wheel can be found in Tire and Wheel Runout/Match Mounting, items (2) through (5), within Diagnosis And Testing - Tire And Wheel Vibration. (Refer to 22 - TIRES/WHEELS - DIAGNOSIS AND TESTING)

TIRES/WHEELS (Continued)

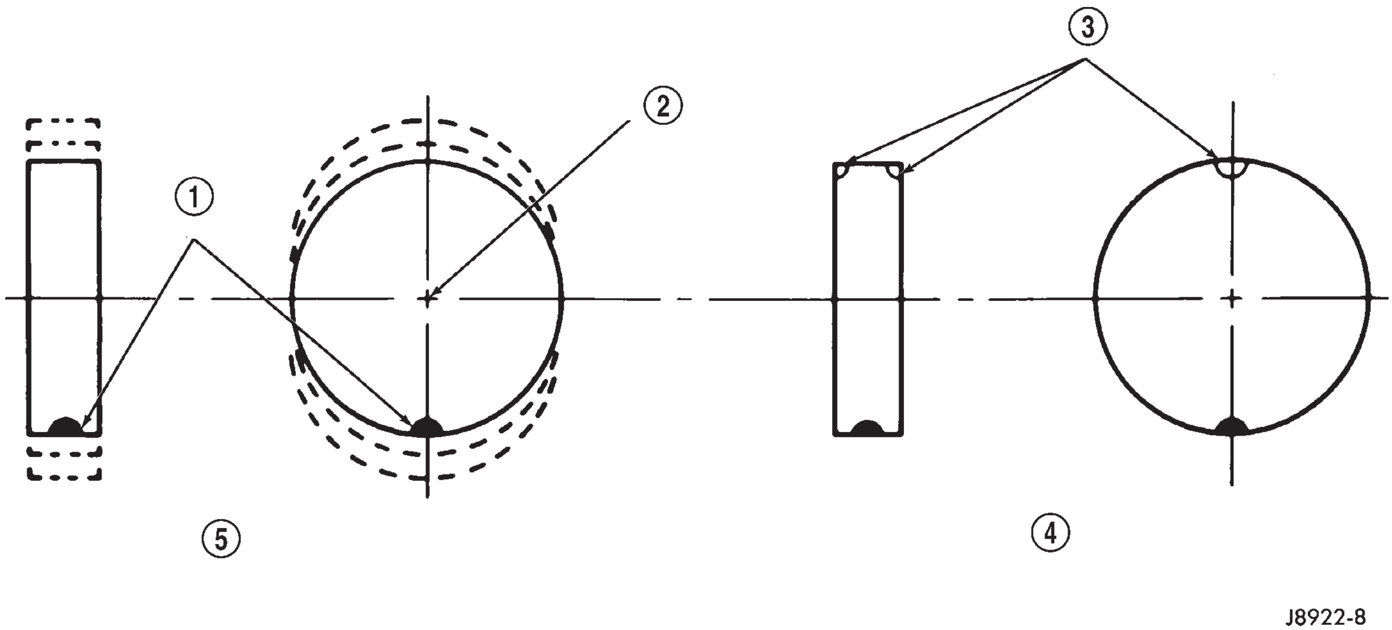


Fig. 8 Static Unbalance & Balance

1 - HEAVY SPOT
2 - CENTER LINE OF SPINDLE
3 - ADD BALANCE WEIGHTS HERE
4 - CORRECTIVE WEIGHT LOCATION
5 - TIRE OR WHEEL TRAMP, OR WHEEL HOP

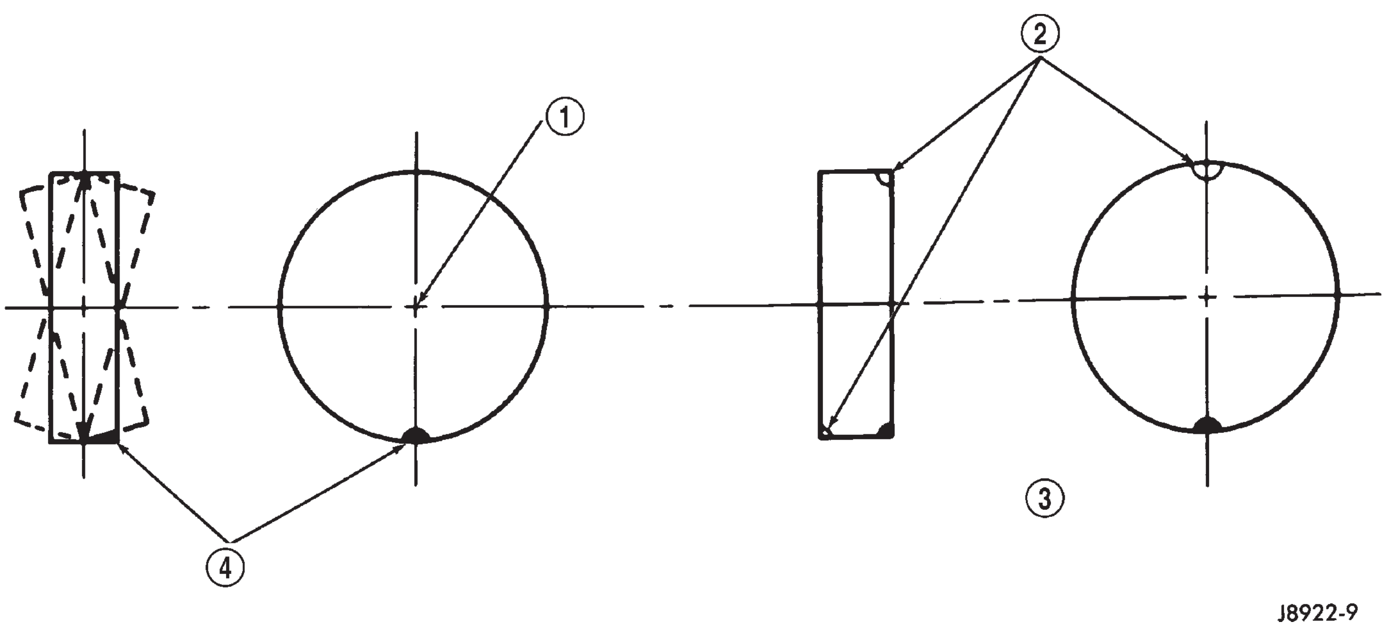


Fig. 9 Dynamic Unbalance & Balance

1 - CENTER LINE OF SPINDLE
2 - ADD BALANCE WEIGHTS HERE
3 - CORRECTIVE WEIGHT LOCATION
4 - HEAVY SPOT WHEEL SHIMMY AND VIBRATION

TIRES/WHEELS (Continued)

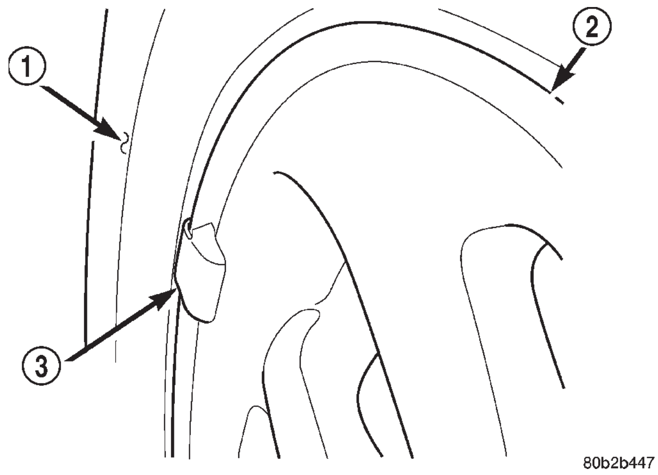


Fig. 10 Aluminum Wheel Weight

1 - TIRE
2 - WHEEL
3 - WHEEL WEIGHT

STANDARD PROCEDURE - TIRE AND WHEEL ROTATION

NON-DIRECTIONAL TREAD PATTERN TIRES

Tires on the front and rear axles operate at different loads and perform different functions. For these reasons, they wear at unequal rates, and tend to develop irregular wear patterns. These effects can be reduced by timely rotation of tires. The benefits of rotation are especially worthwhile. Rotation will increase tread life, help to maintain mud, snow, and wet traction levels, and contribute to a smooth, quiet ride.

The suggested rotation method is the forward-cross tire rotation method (Fig. 11). This method takes advantage of current tire industry practice which allows rotation of radial-ply tires. Other rotation methods may be used, but may not have all the benefits of the recommended method.

NOTE: Only the 4 tire rotation method may be used if the vehicle is equipped with a low mileage or temporary spare tire.

DIRECTIONAL TREAD PATTERN TIRES

Some vehicles are fitted with special high-performance tires having a directional tread pattern. These tires are designed to improve traction on wet pavement. To obtain the full benefits of this design, the tires must be installed so that they rotate in the correct direction. This is indicated by arrows on the tire sidewalls.

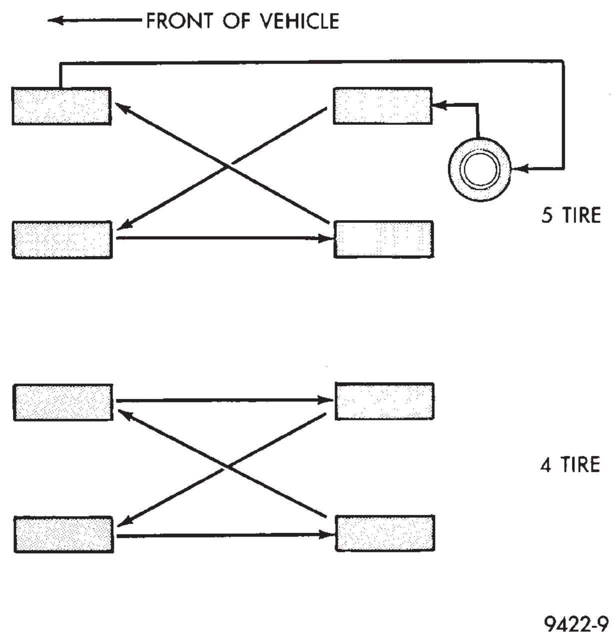


Fig. 11 Forward-Cross Tire Rotation Method

When wheels and tires are being installed, extra care is needed to ensure that this direction of rotation is maintained.

Refer to Owner's Manual for rotation schedule.

REMOVAL - TIRE AND WHEEL ASSEMBLY

(1) Raise the vehicle so the tires clear ground level. (Refer to LUBRICATION & MAINTENANCE/ HOISTING - STANDARD PROCEDURE)

(2) If the vehicle is equipped with wheel covers, remove the cover from the wheel by prying it off with an appropriate wheel cover removal tool.

(3) Remove the wheel mounting (lug) nuts from the studs.

(4) Remove the tire and wheel assembly from the hub.

INSTALLATION - TIRE AND WHEEL ASSEMBLY

(1) To install the tire and wheel assembly, first position it properly on the studs and hub mounting surface using the hub pilot as a guide.

CAUTION: Never apply oil or grease to the wheel mounting studs or nuts.

(2) Install and progressively tighten the five wheel mounting (lug) nuts in the proper sequence (Fig. 12) until half the specified torque is reached. Repeat the sequence, tightening the wheel mounting (lug) nuts to a final torque of 135 N·m (100 ft. lbs.).

TIRES/WHEELS (Continued)

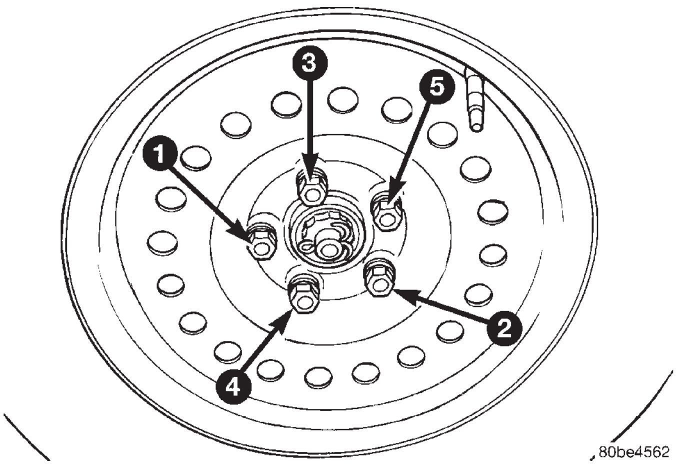


Fig. 12 Wheel Nut Tightening Sequence

(3) If equipped with wheel covers, align the valve stem notch in the wheel cover with the valve stem on the wheel. By hand, tap the wheel cover onto the wheel until it is fully seated against the wheel.

(4) Lower the vehicle.

TIRES

DESCRIPTION

DESCRIPTION - TIRE

Tires are designed and engineered for each specific vehicle. They provide the best overall performance for normal operation. The ride and handling characteristics match the vehicle's requirements. With proper care they will give excellent reliability, traction, skid resistance, and tread life.

Driving habits have more effect on tire life than any other factor. Careful drivers will obtain, in most cases, much greater mileage than severe use or careless drivers. A few of the driving habits which will shorten the life of any tire are:

- Rapid acceleration
- Severe application of brakes
- High-speed driving
- Taking turns at excessive speeds
- Striking curbs and other obstacles
- Operating vehicle with over or under inflated tire pressures

Radial ply tires are more prone to irregular tread wear. It is important to follow the tire rotation interval shown in the section on Tire Rotation. This will help to achieve a greater tread-life potential.

TIRE IDENTIFICATION

Tire type, size, load index and speed rating are encoded in the letters and numbers imprinted on the side wall of the tire. Refer to the chart to decipher the tire identification code (Fig. 13). An All Season type tire will have either M + S, M & S or M - S (indicating mud and snow traction) imprinted on the side wall. An Extra or Light Load marking "XL" or "LL" may also be listed on the sidewall. The absence of an "XL" or "LL" marking infers a standard load tire.

Consult the tire manufacturer regarding any questions on tire specifications or capabilities.

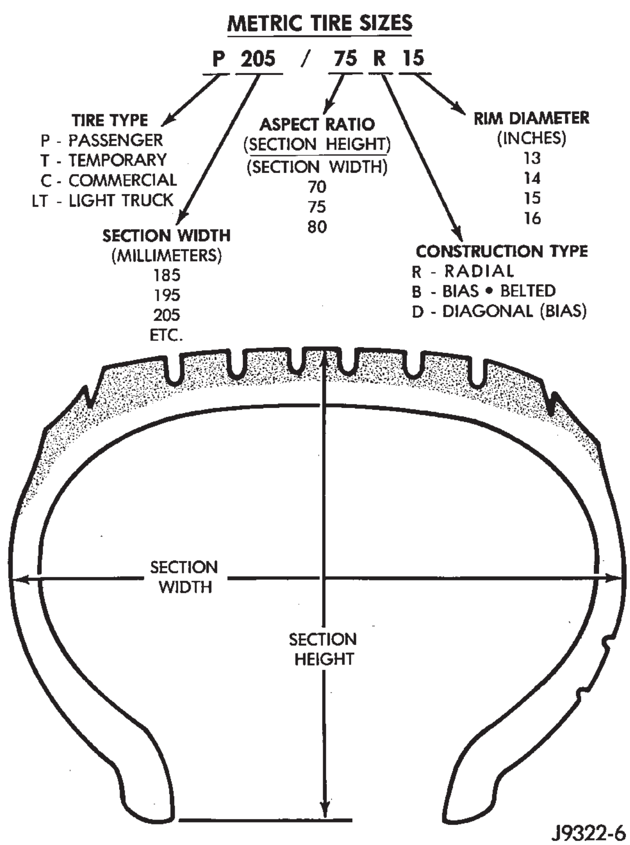


Fig. 13 Tire Identification (Typical)

TIRE CHAINS

Refer to the owners manual supplied with the vehicle to determine whether the use of tire chains is permitted on this vehicle.

DESCRIPTION - RADIAL-PLY TIRES

Radial-ply tires improve handling, tread life and ride quality, and decrease rolling resistance.

Radial-ply tires must always be used in sets of four. Under no circumstances should they be used on the front only. They may be mixed with temporary spare tires when necessary. A maximum speed of 80 km/h (50 mph) is recommended while a temporary spare is in use.

Radial-ply tires have the same load-carrying capacity as other types of tires of the same size. They also use the same recommended inflation pressures.

TIRES (Continued)

The use of oversized tires, either in the front or rear of the vehicle, can cause vehicle drive train failure. This could also cause inaccurate wheel speed signals when the vehicle is equipped with Antilock Brakes.

The use of tires from different manufactures on the same vehicle is NOT recommended. The proper tire pressure should be maintained on all four tires.

DESCRIPTION - REPLACEMENT TIRES

WARNING: FAILURE TO EQUIP THE VEHICLE WITH TIRES HAVING ADEQUATE SPEED CAPABILITY CAN RESULT IN SUDDEN TIRE FAILURE.

It is recommended that tires equivalent to the original equipment tires be used when replacement is needed.

Failure to use equivalent replacement tires may adversely affect the safety and handling of the vehicle.

The original equipment tires provide a proper combination of many characteristics such as:

- Ride
- Noise
- Handling
- Durability
- Tread life
- Traction
- Rolling resistance
- Speed capability

The use of tires smaller than the minimum tire size approved for the vehicle can result in tire overloading and failure.

Use tires that have the approved load rating for the vehicle and never overload them. Failure to equip the vehicle with tires having adequate speed capability can result in sudden tire failure and loss of vehicle control.

The use of oversize tires may cause interference with vehicle components. Under extremes of suspension and steering travel, interference with vehicle components may cause tire damage.

DESCRIPTION - SPARE TIRE (TEMPORARY)

The compact temporary spare tire is designed for emergency use only. The original tire should be repaired or replaced at the first opportunity, then reinstalled. Do not exceed speeds of 80 km/h (50 mph) when using the temporary spare tire. Refer to Owner's Manual for complete details.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - TIRE NOISE

Unusual tire noise can be associated with tire and wheel vibration or irregular tire wear. For vibration, (Refer to 22 - TIRES/WHEELS - DIAGNOSIS AND TESTING). For irregular tire wear, (Refer to 22 - TIRES/WHEELS/TIRES - DIAGNOSIS AND TESTING).

DIAGNOSIS AND TESTING - TIRE/VEHICLE LEAD

(Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - DIAGNOSIS AND TESTING)

DIAGNOSIS AND TESTING - TIRE WEAR PATTERNS

Under inflation will cause wear on the shoulders of tire. Over inflation will cause wear at the center of tire.

Excessive camber causes the tire to run at an angle to the road. One side of tread is then worn more than the other (Fig. 14).

Excessive toe-in or toe-out causes wear on the tread edges and a feathered effect across the tread (Fig. 14).

DIAGNOSIS AND TESTING - TREAD WEAR INDICATORS

Tread wear indicators are molded into the bottom of the tread grooves. When tread depth is 1.6 mm (1/16 in.), the tread wear indicators will appear as a 13 mm (1/2 in.) band (Fig. 15).

Tire replacement is necessary when indicators appear in two or more grooves or if localized balding occurs.

STANDARD PROCEDURE

STANDARD PROCEDURE - TIRE INFLATION PRESSURES

The specified tire pressures have been chosen to provide safe operation, vehicle stability, and a smooth ride. The proper tire pressure specification can be found on the Tire Inflation Pressure Label provided with the vehicle (usually on the rear face of the driver's door).

A quality air pressure gauge is recommended to check tire air pressure. Tire pressure should be checked cold once per month. Check tire pressure more frequently when the weather temperature varies widely. Tire pressure will decrease when the outdoor temperature drops. After checking the air pressure, replace valve cap finger tight.

TIRES (Continued)

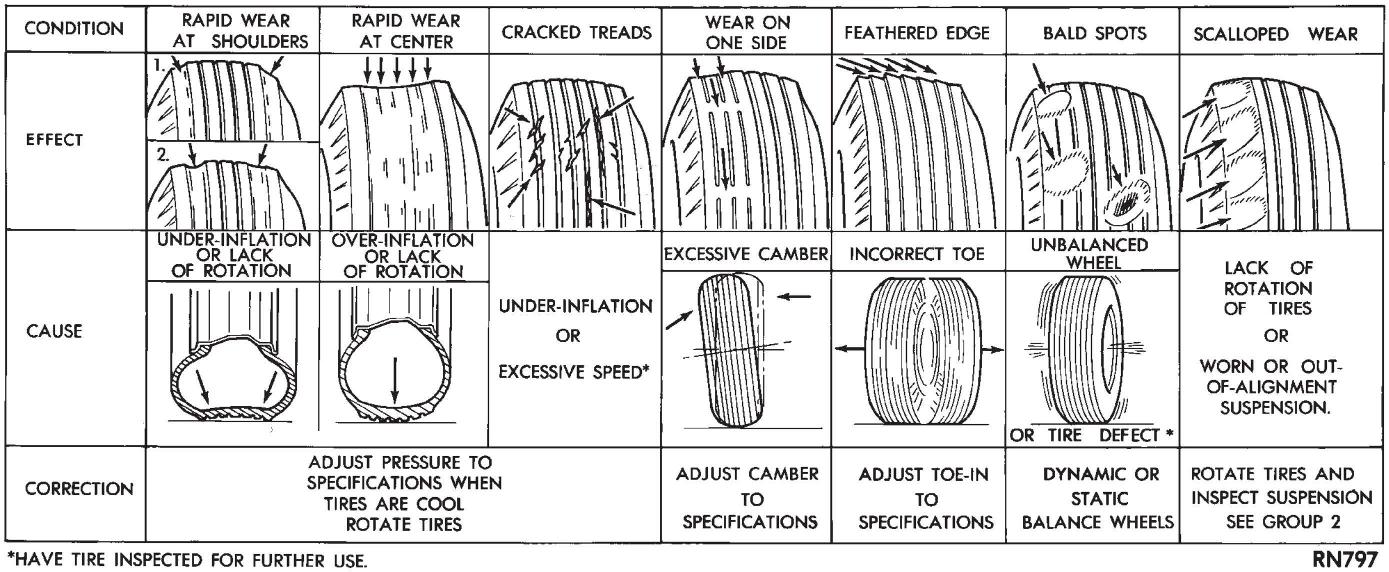


Fig. 14 Tire Wear Patterns

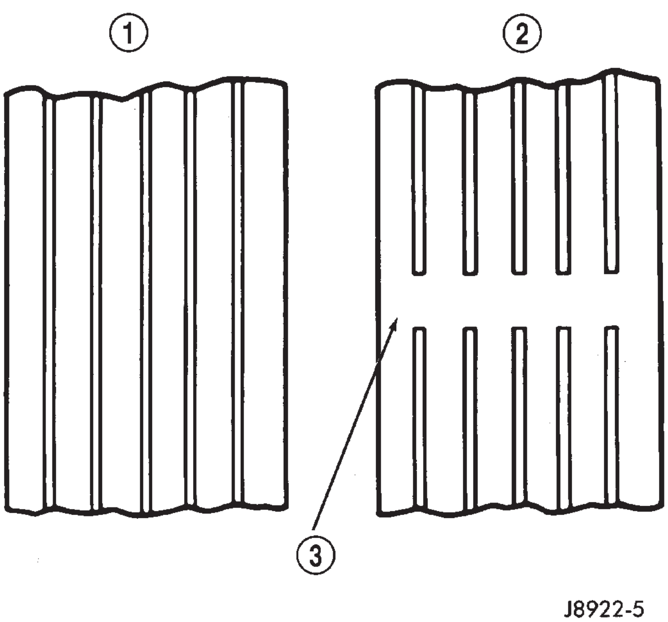


Fig. 15 Tread Wear Indicators

1 - TREAD ACCEPTABLE
2 - TREAD UNACCEPTABLE
3 - WEAR INDICATOR

Inflation pressures specified on the Tire Inflation Pressure Label are always the cold inflation pressure of the tire. Cold inflation pressure is obtained after the vehicle has not been operated for at least 3 hours, or the vehicle is driven less than one mile after being inoperative for 3 hours. Tire inflation pressures may increase from 2 to 6 pounds per square inch (psi) during operation. Do not reduce this normal pressure buildup.

Improper inflation can cause:

- Uneven wear patterns
- Reduced tread life
- Reduced fuel economy
- Unsatisfactory ride
- The vehicle to drift.

WARNING: OVER OR UNDER INFLATED TIRES CAN AFFECT VEHICLE HANDLING. THE TIRE CAN FAIL SUDDENLY, RESULTING IN LOSS OF VEHICLE CONTROL.

Under inflation causes rapid shoulder wear, tire flexing, and can result in tire failure (Fig. 16).

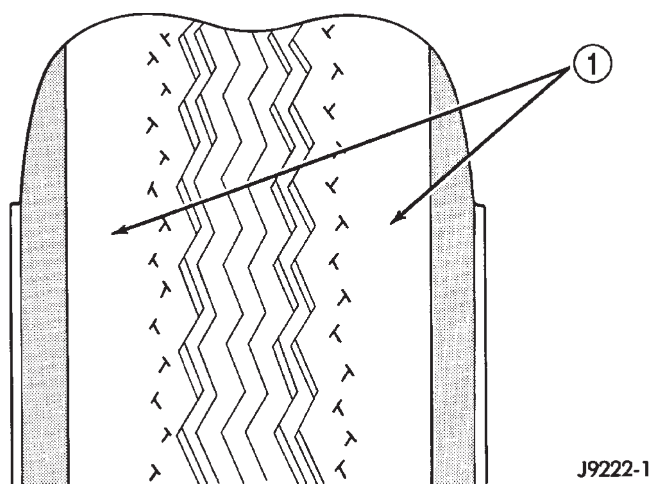


Fig. 16 Under Inflation Wear

1 - THIN TIRE TREAD AREAS

Over inflation causes rapid center wear and loss of the tire's ability to cushion shocks (Fig. 17).

TIRES (Continued)

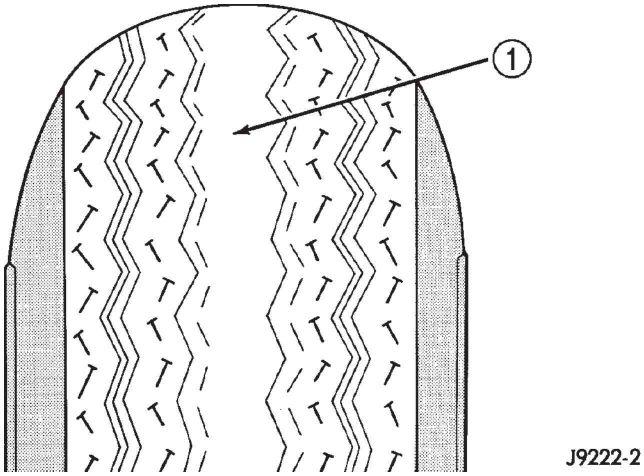


Fig. 17 Over Inflation Wear

1 - THIN TIRE TREAD AREA

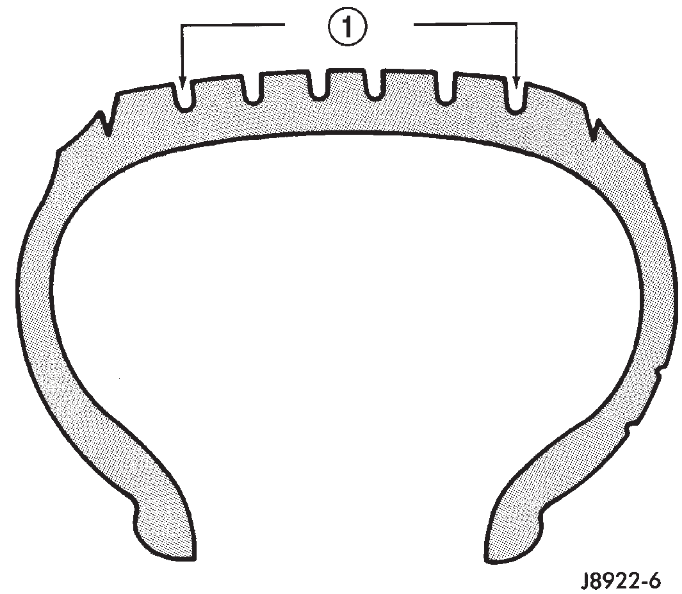


Fig. 18 Tire Repair Area

1 - REPAIRABLE AREA

STANDARD PROCEDURE - TIRE PRESSURE FOR HIGH SPEED OPERATION

DaimlerChrysler Corporation advocates driving at safe speeds within posted speed limits. Speed capacity of a tire is a function of the tire speed rating, inflation pressure and vehicle axle weight. Where speed limits allow the vehicle to be driven at high speeds, correct tire inflation pressure is very important. Vehicles loaded to maximum capacity should not be driven at continuous speeds over 120 km/h (75 mph). Never exceed the maximum speed capacity of the tire. For information on tire identification and speed ratings, (Refer to 22 - TIRES/WHEELS/TIRES - DESCRIPTION).

STANDARD PROCEDURE - TIRE LEAK REPAIRING

For proper repairing, a radial tire must be removed from the wheel. Repairs should only be made if the defect, or puncture, is in the tread area (Fig. 18). The tire should be replaced if the puncture is located in the sidewall.

Deflate tire completely before attempting to dismount the tire from the wheel. **Use a lubricant such as a mild soap solution when dismounting or mounting tire.** Use tools free of burrs or sharp edges which could damage the tire or wheel rim.

Before mounting tire on wheel, make sure all rust is removed from the rim bead and repaint if necessary.

Install wheel on vehicle, and progressively tighten the 5 wheel nuts to a torque of 135 N·m (100 ft. lbs.).

CLEANING - TIRES

Before delivery of a vehicle, remove the protective coating on the tires with white sidewalls or raised white letters. To remove the protective coating, apply warm water and let it soak for a few minutes. Afterwards, scrub the coating away with a soft bristle brush. Steam cleaning may also be used to remove the coating.

CAUTION: DO NOT use gasoline, mineral oil, oil-based solvent or a wire brush for cleaning.

WHEELS

DESCRIPTION

Original equipment wheels are designed for proper operation at all loads up to the specified maximum vehicle capacity.

All models use steel or cast aluminum drop center wheels. Every wheel has raised sections between the rim flanges and rim drop well called safety humps (Fig. 19) .

Initial inflation of the tires forces the bead over these raised sections. In case of air loss the raised sections help hold the tire in position on the wheel until the vehicle can be brought to a safe stop.

Cast aluminum wheels require special balance weights to fit on the rim flange of the wheel and special wheel clamps for the alignment equipment.

WHEELS (Continued)

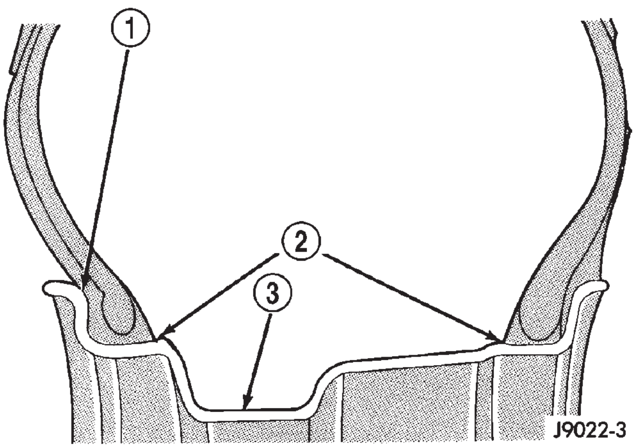


Fig. 19 Safety Rim

1 - FLANGE
2 - RIDGE
3 - WELL

The wheel studs and nuts are designed for specific wheel applications and must be replaced with equivalent parts. Do not use replacement parts of lesser quality or of a substitute design. All aluminum and some steel wheels have wheel stud nuts with an enlarged nose. This enlarged nose is necessary to ensure proper retention of the wheels.

Before installing a wheel, remove any buildup of corrosion on the wheel mounting surface.

WARNING: INSTALLING WHEELS WITHOUT GOOD METAL-TO-METAL CONTACT COULD CAUSE LOOSENING OF WHEEL LUG NUTS. THIS COULD ADVERSELY AFFECT THE SAFETY AND HANDLING OF YOUR VEHICLE.

DIAGNOSIS AND TESTING - WHEEL INSPECTION

Inspect wheels for:

- Excessive runout
- Dents, cracks or irregular bends
- Damaged wheel stud (lug) holes
- Air Leaks

NOTE: Do not attempt to repair a wheel by hammering, heating or welding.

If a wheel is damaged, an original equipment replacement wheel should be used. When obtaining replacement wheels, they must be equivalent in load carrying capacity. The diameter, width, offset, pilot hole and bolt circle of the wheel should be the same as the original wheel.

WARNING: FAILURE TO USE EQUIVALENT REPLACEMENT WHEELS MAY ADVERSELY AFFECT THE SAFETY AND HANDLING OF THE VEHICLE.

WARNING: REPLACEMENT WITH USED WHEELS IS NOT RECOMMENDED. THE SERVICE HISTORY OF THE WHEEL MAY HAVE INCLUDED SEVERE TREATMENT OR VERY HIGH MILEAGE. THE RIM COULD FAIL WITHOUT WARNING.

CLEANING - ALUMINUM WHEEL CARE

Chrome plated and painted aluminum wheels should be cleaned regularly using mild soap and water to maintain their luster and to prevent corrosion.

Care must be taken in the selection of tire and wheel cleaning chemicals and equipment to prevent damage to the wheels. Any of the “DO NOT USE” items listed below WILL damage chrome plated and painted aluminum wheels.

DO NOT USE:

- any abrasive metal cleaner
- any abrasive cleaning pad or brush
- any cleaner that contains an acid (this will immediately react with and discolor the chromium surface)
- chrome polish (unless it is buffed off immediately after application)
- oven cleaner
- a car wash that uses carbide-tipped wheel cleaning brushes

SPECIFICATIONS

WHEEL

SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Wheel Mounting (Lug) Nut Hex Size	19 mm
Wheel Mounting Stud Size	M12 x 1.5 mm

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Wheel Mounting (Lug) Nut	135	100	—

WHEEL MOUNTING STUDS - FRONT

REMOVAL

CAUTION: If a wheel mounting stud needs to be replaced in the hub and bearing assembly, DO NOT hammer the studs out of the hub flange. If a stud is removed by hammering it out of the bearing flange, damage to the hub and bearing assembly will occur leading to premature bearing failure.

(1) Raise vehicle on jackstands or centered on a frame contact type hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - SERVICE PROCEDURE).

(2) Remove the front wheel and tire assembly from the vehicle.

(3) Remove front disc brake caliper and adapter as an assembly. Refer to Brakes.

(4) Remove any retainer clips, then remove brake rotor form hub.

(5) Install a lug nut on wheel stud to be removed from hub and bearing assembly, (Fig. 20) so threads on stud are even with end of lug nut. Rotate hub so stud requiring removal is aligned with notch cast into front of steering knuckle. Install Remover, Special Tool C-4150 on hub and bearing assembly flange and wheel stud (Fig. 20).

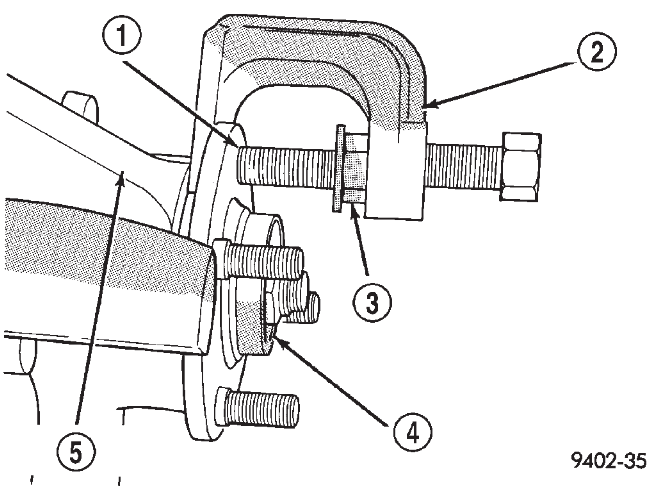


Fig. 20 Removing Wheel Stud From Hub And Bearing

1 - WHEEL STUD
2 - SPECIAL TOOL C-4150A
3 - LUG NUT
4 - FRONT HUB
5 - STEERING KNUCKLE

(6) Tighten down on special tool, this will push the wheel stud out of the hub and bearing flange.

INSTALLATION

CAUTION: If a wheel mounting stud needs to be replaced in the hub and bearing assembly, DO NOT hammer the studs out of the hub flange. If a stud is removed by hammering it out of the bearing flange, damage to the hub and bearing assembly will occur leading to premature bearing failure.

(1) Install replacement wheel stud into flange of hub and bearing assembly. Install washers on wheel stud, then install a wheel lug nut on stud with flat side of lug nut against washers (Fig. 21).

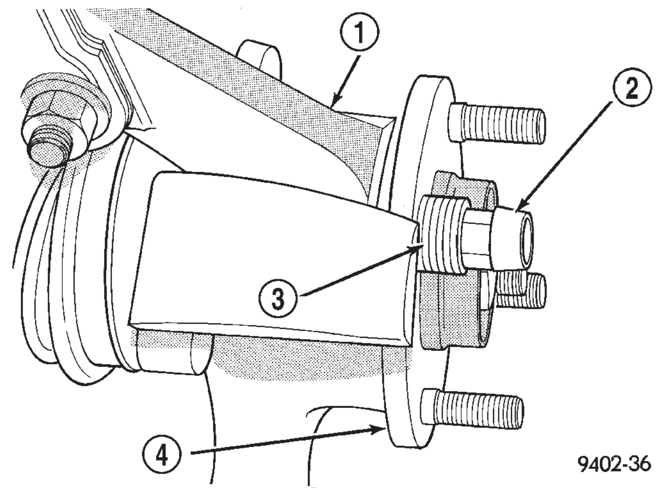


Fig. 21 Installing Wheel Stud Into Hub (Typical)

1 - STEERING KNUCKLE
2 - WHEEL LUG NUT
3 - WASHERS
4 - FRONT HUB

(2) Tighten the wheel lug nut, pulling the wheel stud into the flange of the hub and bearing assembly. When the head of the stud is fully seated against the bearing flange, remove lug nut and washers from wheel stud.

(3) Install brake rotor on front hub.

(4) Install disc brake caliper and adapter as an assembly on knuckle. Refer to Brakes.

(5) Install front wheel and tire assembly. Install front wheel lug nuts and torque to 135 N·m (100 ft. lbs.).

(6) Lower vehicle.

WHEEL MOUNTING STUDS - REAR

REMOVAL

CAUTION: DO NOT hammer studs out of the hub flange. If a stud is removed by hammering it out of the bearing flange, damage to the hub and bearing assembly will occur leading to premature bearing failure.

(1) Remove the hub and bearing from the vehicle. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - REMOVAL)

CAUTION: Take care to keep hub and bearing assembly from falling during stud removal. Damage to the hub and bearing could result.

(2) Position the hub and bearing assembly under a hydraulic press ram, supported by a 21 mm deep-well impact socket under the stud to be replaced (Fig. 22).

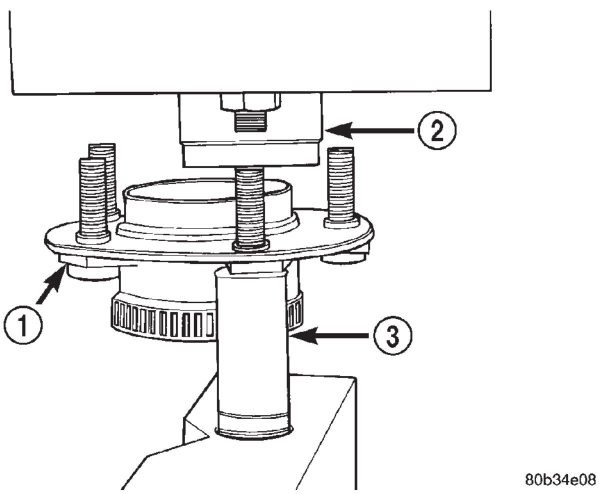


Fig. 22 Wheel Stud Removal

1 - HUB AND BEARING ASSEMBLY
2 - PRESS RAM
3 - 21mm IMPACT SOCKET

(3) Press the stud out of the hub flange and into the socket well.
(4) Remove the hub and bearing assembly from the press.
(5) Remove the stud from the socket.

INSTALLATION

CAUTION: DO NOT hammer studs into the hub flange. If a stud is installed in such a manner, damage to the hub and bearing assembly may occur leading to premature bearing failure.

(1) Install wheel stud into stud hole in hub and bearing assembly.
(2) Position the hub and bearing assembly face down with stud pointing down into the well of the 21 mm socket. The hydraulic press ram must line up with the stud (Fig. 23).

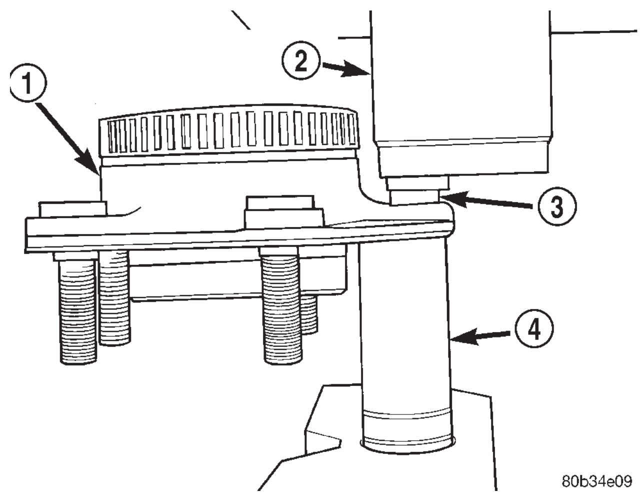


Fig. 23 Wheel Stud Installation

1 - HUB AND BEARING ASSEMBLY
2 - PRESS RAM
3 - WHEEL STUD
4 - 21mm IMPACT SOCKET

(3) Press the stud into the hub flange until it bottoms.
(4) Remove the hub and bearing assembly from the press.
(5) Install the hub and bearing on the vehicle. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - INSTALLATION)

BODY

TABLE OF CONTENTS

BODY

DESCRIPTION

DESCRIPTION – VEHICLE IDENTIFICATION

Throughout this group, references to the DaimlerChrysler Corporation vehicle family identification code are used when describing a procedure that is unique to that vehicle. (Refer to VEHICLE DATA/VEHICLE INFORMATION/VEHICLE IDENTIFICATION NUMBER - DESCRIPTION). If a procedure is common to all vehicles covered in this manual, no reference will be made to a vehicle family code.

WARNING

SAFETY PRECAUTIONS AND WARNINGS

WARNING: USE A OSHA APPROVED BREATHING FILTER WHEN SPRAYING PAINT OR SOLVENTS IN A CONFINED AREA. PERSONAL INJURY CAN RESULT.
AVOID PROLONGED SKIN CONTACT WITH PETROLEUM OR ALCOHOL – BASED CLEANING SOLVENTS. PERSONAL INJURY CAN RESULT.
DO NOT STAND UNDER A HOISTED VEHICLE THAT IS NOT PROPERLY SUPPORTED ON SAFETY STANDS. PERSONAL INJURY CAN RESULT.

CAUTION: When holes must be drilled or punched in an inner body panel, verify depth of space to the outer body panel, electrical wiring, or other components. Damage to vehicle can result.
Do not weld exterior panels unless combustible material on the interior of vehicle is removed from the repair area. Fire or hazardous conditions, can result.
Always have a fire extinguisher ready for use when welding.
Disconnect the negative (-) cable clamp from the battery when servicing electrical components that are live when the ignition is OFF. Damage to electrical system can result.
Do not use abrasive chemicals or compounds on painted surfaces. Damage to finish can result.
Do not use harsh alkaline based cleaning solvents on painted or upholstered surfaces. Damage to finish or color can result.
Do not hammer or pound on plastic trim panel when servicing interior trim. Plastic panels can break.

BODY (Continued)

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - WATER LEAKS

Water leaks can be caused by poor sealing, improper body component alignment, body seam porosity, missing plugs, or blocked drain holes. Centrifugal and gravitational force can cause water to drip from a location away from the actual leak point, making leak detection difficult. All body sealing points should be water tight in normal wet-driving conditions. Water flowing downward from the front of the vehicle should not enter the passenger or luggage compartment. Moving sealing surfaces will not always seal water tight under all conditions. At times, side glass or door seals will allow water to enter the passenger compartment during high pressure washing or hard driving rain (severe) conditions. Overcompensating on door or glass adjustments to stop a water leak that occurs under severe conditions can cause premature seal wear and excessive closing or latching effort. After completing a repair, water test vehicle to verify leak has stopped before returning vehicle to use.

VISUAL INSPECTION BEFORE WATER LEAK TESTS

Verify that floor and body plugs are in place, body drains are clear, and body components are properly aligned and sealed. If component alignment or sealing is necessary, refer to the appropriate section of this group for proper procedures.

WATER LEAK TESTS

WARNING: DO NOT USE ELECTRIC SHOP LIGHTS OR TOOLS IN WATER TEST AREA. PERSONAL INJURY CAN RESULT.

When the conditions causing a water leak have been determined, simulate the conditions as closely as possible.

- If a leak occurs with the vehicle parked in a steady light rain, flood the leak area with an open-ended garden hose.
- If a leak occurs while driving at highway speeds in a steady rain, test the leak area with a reasonable velocity stream or fan spray of water. Direct the spray in a direction comparable to actual conditions.
- If a leak occurs when the vehicle is parked on an incline, hoist the end or side of the vehicle to simulate this condition. This method can be used when the leak occurs when the vehicle accelerates, stops or turns. If the leak occurs on acceleration, hoist the front of the vehicle. If the leak occurs when braking, hoist the back of the vehicle. If the leak occurs on left turns, hoist the left side of the vehicle. If the leak occurs on right turns, hoist the right side of the vehicle. For hoisting recommendations (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

WATER LEAK DETECTION

To detect a water leak point-of-entry, do a water test and watch for water tracks or droplets forming on the inside of the vehicle. If necessary, remove interior trim covers or panels to gain visual access to the leak area. If the hose cannot be positioned without being held, have someone help do the water test.

Some water leaks must be tested for a considerable length of time to become apparent. When a leak appears, find the highest point of the water track or drop. The highest point usually will show the point of entry. After leak point has been found, repair the leak and water test to verify that the leak has stopped.

Locating the entry point of water that is leaking into a cavity between panels can be difficult. The trapped water may splash or run from the cavity, often at a distance from the entry point. Most water leaks of this type become apparent after accelerating, stopping, turning, or when on an incline.

MIRROR INSPECTION METHOD

When a leak point area is visually obstructed, use a suitable mirror to gain visual access. A mirror can also be used to deflect light to a limited-access area to assist in locating a leak point.

BRIGHT LIGHT LEAK TEST METHOD

Some water leaks in the luggage compartment can be detected without water testing. Position the vehicle in a brightly lit area. From inside the darkened luggage compartment inspect around seals and body seams. If necessary, have a helper direct a drop light over the suspected leak areas around the luggage compartment. If light is visible through a normally sealed location, water could enter through the opening.

PRESSURIZED LEAK TEST METHOD

When a water leak into the passenger compartment cannot be detected by water testing, pressurize the passenger compartment and soap test exterior of the vehicle. To pressurize the passenger compartment, close all doors and windows, start engine, and set heater control to high blower in HEAT position. If engine can not be started, connect a charger to the battery to ensure adequate voltage to the blower. With interior pressurized, apply dish detergent solution to suspected leak area on the exterior of the vehicle. Apply detergent solution with spray device or soft bristle brush. If soap bubbles occur at a body seam, joint, seal or gasket, the leak entry point could be at that location.

BODY (Continued)

DIAGNOSIS AND TESTING - WIND NOISE

Wind noise is the result of most air leaks. Air leaks can be caused by poor sealing, improper body component alignment, body seam porosity, or missing plugs in the engine compartment or door hinge pillar areas. All body sealing points should be airtight in normal driving conditions. Moving sealing surfaces will not always seal airtight under all conditions. At times, side glass or door seals will allow wind noise to be noticed in the passenger compartment during high cross winds. Over compensating on door or glass adjustments to stop wind noise that occurs under severe conditions can cause premature seal wear and excessive closing or latching effort. After a repair procedure has been performed, test vehicle to verify noise has stopped before returning vehicle to use.

VISUAL INSPECTION BEFORE TESTS

Verify that floor and body plugs are in place and body components are aligned and sealed. If component alignment or sealing is necessary, refer to the appropriate section of this group for proper procedures.

ROAD TESTING WIND NOISE

(1) Drive the vehicle to verify the general location of the wind noise.

(2) Apply 50 mm (2 in.) masking tape in 150 mm (6 in.) lengths along weatherstrips, weld seams or moldings. After each length is applied, drive the vehicle. If noise goes away after a piece of tape is applied, remove tape, locate, and repair defect.

POSSIBLE CAUSE OF WIND NOISE

- Moldings standing away from body surface can catch wind and whistle.
- Gaps in sealed areas behind overhanging body flanges can cause wind-rushing sounds.
- Misaligned movable components.
- Missing or improperly installed plugs in pillars.
- Weld burn through holes.

STANDARD PROCEDURE

STANDARD PROCEDURE - PLASTIC BODY PANEL REPAIR

There are many different types of plastics used in today's automotive environment. We group plastics in three different categories: Rigid, Semi-Rigid, and Flexible. Any of these plastics may require the use of an adhesion promoter for repair. These types of plastic are used extensively on DaimlerChrysler Motors vehicles. Always follow repair material manufacturer's plastic identification and repair procedures.

Rigid Plastics:

Examples of rigid plastic use: Fascias, Hoods, Doors, and other Body Panels, which include SMC, ABS, and Polycarbonates.

Semi-Rigid Plastics:

Examples of semi-rigid plastic use: Interior Panels, Under Hood Panels, and other Body Trim Panels.

Flexible Plastics:

Examples of flexible plastic use: Fascias, Body Moldings, and upper and lower Fascia Covers.

Repair Procedure:

The repair procedure for all three categories of plastics is basically the same. The one difference is the material used for the repair. The materials must be specific for each substrate, rigid repair material for rigid plastic repair, semi-rigid repair material for semi-rigid plastic repair and flexible repair material for flexible plastic repair.

Adhesion Promoter/Surface Modifier:

Adhesion Promoters/Surface Modifiers are required for certain plastics. All three categories may have plastics that require the use of adhesion promoter/ surface modifiers. Always follow repair material manufacturer's plastic identification and repair procedures.

SAFETY PRECAUTION AND WARNINGS

WARNING:

- **EYE PROTECTION SHOULD BE USED WHEN SERVICING COMPONENTS. PERSONAL INJURY CAN RESULT.**
- **USE AN OSHA APPROVED BREATHING MASK WHEN MIXING EPOXY, GRINDING, AND SPRAYING PAINT OR SOLVENTS IN A CONFINED AREA. PERSONAL INJURY CAN RESULT.**
- **AVOID PROLONGED SKIN CONTACT WITH RESIN, PETROLEUM, OR ALCOHOL BASED SOLVENTS. PERSONAL INJURY CAN RESULT.**
- **DO NOT VENTURE UNDER A HOISTED VEHICLE THAT IS NOT PROPERLY SUPPORTED ON SAFETY STANDS. PERSONAL INJURY CAN RESULT.**

NOTE:

- **When holes must be drilled or cut in body panels, verify locations of internal body components and electrical wiring. Damage to vehicle can result.**
- **Do not use abrasive chemicals or compounds on undamaged painted surfaces around repair areas. Damage to finish can result.**

BODY (Continued)

RIGID, SEMI-RIGID, AND FLEXIBLE PLASTIC PARTS TYPES

CODE	FAMILY NAME	COMMON TRADE NAME	TYPICAL APPLICATION
ASA	ACRYLONITRILE STYRENE ACRYLITE	LURAN S	CONSOLES, GRILLES
ABS	ACRYLONITRILE BUTADIENE STYRENE	TERLURAN	″A″ PILLARS, CONSOLES, GRILLES
ABS/PC	ABS/PC ALLOY	PULSE, PROLOY, BAYBLEND	DOORS, INSTRUMENT PANELS
ABS/PVC	ABS/PV ALLOY	PROLOY, PULSE, LUSTRAN, CYCLOVIN	DOOR PANELS, GRILLES, TRIM
BMC	BULK MOLDING COMPOUND	BMC	FENDER EXTENSIONS
EMA	EHTYLENE METHYL ACRYLATE/IONOMER	SURLYN, EMA, IONOMER	BUMPER GUARDS, PADS
METTON	METTON	METTON	GRILLES, KICK PANELS, RUNNING BOARDS
MPPO	MODIFIED POLYPHENYLENE OXIDE	MPPO	SPOILER ASSEMBLY
PA	POLYAMID	ZYTEL, VYDYNE, PA, MINLON	FENDERS, QUARTER PANELS
PET	THERMOPLASTIC POLYESTER	RYNITE	TRIM
PBT/PPO	PBT/PPO ALLOY	GERMAX	CLADDINGS
PBTP	POLYBUTYLENE THEREPTHALATE	PBT, PBTP, POCAN, VALOX	WHEEL COVERS, FENDERS, GRILLES
PBTP/EEBC	POLYBUTYLENE THEREPTHALATE/EEBC ALLOY	BEXLOY, ″M″, PBTP/EEBC	FASCIAS, ROCKER PANEL, MOLDINGS
PC	POLYCARBONATE	LEXAN, MERLON, CALIBRE, MAKROLON PC	TAIL LIGHT LENSES, IP TRIM, VALANCE PANELS
PC/ABS	PC/ABS ALLOY	GERMAX, BAY BLENDS, PULSE	DOORS, INSTRUMENT PANELS
PPO	POLYPHENYLENE OXIDE	AZDEL, HOSTALEN, MARLEX, PRFAX, NORYL, GTX, PPO	INTERIOR TRIM, DOOR PANELS, SPLASH SHIELDS, STEERING COLUMN SHROUD
PPO/PA	POLYPHENYLENE/ POLYAMID	PPO/PA, GTX 910	FENDERS, QUARTER PANELS
PR/FV	FIBERGLASS REINFORCED PLASTIC	FIBERGLASS, FV, PR/FV	BODY PANELS
PS	POLYSTYRENE	LUSTREX, STYRON, PS	DOOR PANELS, DASH PANELS
RTM	RESIN TRANSFER MOLDING COMPOUND	RTM	BODY PANELS
SMC	SHEET MOLDED COMPOUND	SMC	BODY PANELS

BODY (Continued)

CODE	FAMILY NAME	COMMON TRADE NAME	TYPICAL APPLICATION
TMC	TRANSFER MOLDING COMPOUND	TMC	GRILLES
UP	UNSATURATED POLYESTER (THERMOSETTING)	SMC, BMC, TMC, ZMC, IMC, XSMC, UP	GRILLE OPENING PANEL, LIFTGATES, FLARESIDE FENDERS, FENDER EXTENSIONS
EEBC	ETHER/ESTER BLOCKED CO-POLYMER	EEBC	BUMPERS
EEBC/PBTP	EEBC/POLYBUTYLENE TEREPTHALATE	EEBC, PBTP, BEXLOY	BUMPER, ROCKER PANELS
EMPP	ETHYLENE MODIFIED POLYPROPYLENE	EMPP	BUMPER COVERS
EPDM	ETHYLENE/ PROPROPYLENE DIENE MONOMER	EPDM, NORDEL, VISTALON	BUMPERS
EPM	ETHYLENE/ PROPROPYLENE CO-POLYMER	EPM	FENDERS
MPU	FOAM POLYURETHANE	MPU	SPOILERS
PE	POLYETHYLENE	ALATHON, DYLAN, LUPOLEN, MARLEX	-
PP	POLYPROPYLENE (BLENDS)	NORYL, AZDEL, MARLOX, DYLON, PRAVEX	INNER FENDER, SPOILERS, KICK PANELS
PP/EPDM	PP/EPDM ALLOY	PP/EPDM	SPOILERS, GRILLES
PUR	POLYURETHANE	COLONELS, PUR, PU	FASCIAS, BUMPERS
PUR/PC	PUR/PC ALLOY	TEXIN	BUMPERS
PVC	POLYVINYL CHLORIDE	APEX, GEON, VINYLITE	BODY MOLDINGS, WIRE INSULATION, STEERING WHEELS
RIM	REACTION INJECTED MOLDED POLYURETHANE	RIM, BAYFLEX	FRONT FASCIAS, MODULAR WINDOWS
RRIM	REINFORCED REACTION INJECTED MOLDED	PUR, RRIM	FASCIAS, BODY PANELS, BODY TRIMS
TPE	THERMO POLYETHYLENE	TPE, HYTREL, BEXLOY-V	FASCIAS, BUMPERS, CLADDINGS
TPO	THERMOPOLYOLEFIN	POLYTROPE, RENFLEX, SANTOPRENE, VISAFLEX, ETA, APEX, TPO, SHIELDS, CLADDINGS	BUMPERS, END CAPS, TELCAR, RUBBER, STRIPS, SIGHT, INTERIOR B POST
TPP	THERMO-POLYPROPYLENE	TPP	BUMPERS
TPU	THERMOPOLYURETHANE, POLYESTER	TPU, HYTREL, TEXIN, ESTANE	BUMPERS, BODY SIDE, MOLDINGS, FENDERS, FASCIAS

BODY (Continued)

PANEL SECTIONING

If it is required to section a large panel for a plastic repair, it will be necessary to reinforce the panel (Fig. 1). To bond two plastic panels together, a reinforcement must overlap both panels. The panels must be "V'd" at a 20 degree angle. The area to be reinforced should be washed, then sanded. Be sure to wipe off any excess soap and water when finished. Lightly sand or abrade the plastic with an abrasive pad or sandpaper. Blow off any dust with compressed air or wipe with a clean dry rag.

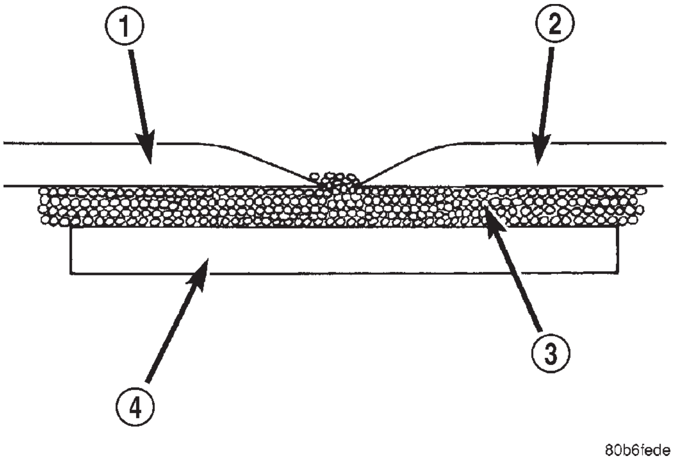


Fig. 1 Panel Sectioning

1 - EXISTING PANEL
2 - NEW PANEL
3 - PANEL ADHESIVE
4 - BONDING STRIP

When bonding plastic panels, Follow repair material manufacturers recommendations. Be sure that enough adhesive has been applied to allow squeeze out and to fill the full bond line. Once the pieces have been brought together, do not move them until the adhesive is cured. The assembly can be held together with clamps, rivets, etc. A faster cure can be obtained by heating with a heat lamp or heat gun. After the parts have been bonded and have had time to cure, rough sand the seam and apply the final adhesive filler to the area being repaired. Smooth the filler with a spreader, wooden tongue depressor, or squeegee. For fine texturing, a small amount of water can be applied to the filler surface while smoothing. The cured filler can be sanded as necessary and, as a final step, cleanup can be done with soapy water. Wipe the surface clean with a dry cloth allowing time for the panel to dry before moving on with the repair.

PANEL REINFORCEMENT

Structural repair procedures for rigid panels with large cracks and holes will require a reinforcement backing. Reinforcements can be made with several applications of glass cloth saturated with structural adhesive. Semi-rigid or flexible repair materials should be used for semi-rigid or flexible backing reinforcement (Fig. 2) and (Fig. 3). Open meshed fiberglass dry wall tape can be used to form a reinforcement. The dry wall tape allows the resin to penetrate through and make a good bond between the panel and the adhesive. Structurally, the more dry wall tape used, the stronger the repair.

Another kind of repair that can be done to repair large cracks and holes is to use a scrap piece of similar plastic and bond with structural adhesive. The reinforcement should cover the entire break and should have a generous amount of overlap on either side of the cracked or broken area.

When repairing plastic, the damaged area is first "V'd" out, or beveled. Large bonding areas are desirable when repairing plastic because small repairs are less likely to hold permanently. Beveling the area around a crack at a 20 degree angle will increase the bonding surface for a repair (Fig. 4). It is recommended that sharp edges be avoided because the joint may show through after the panel is refinished.

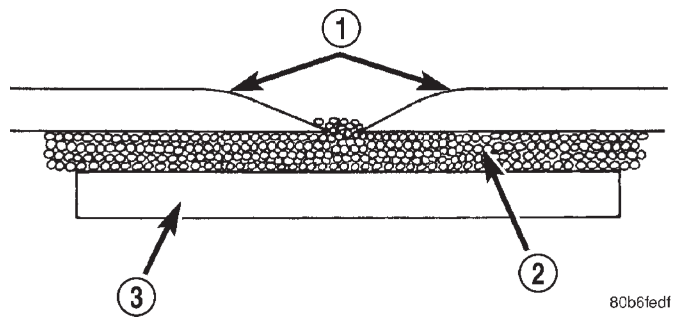


Fig. 2 Softened Edges

1 - SOFTENED EDGES
2 - PANEL ADHESIVE
3 - BONDING STRIP

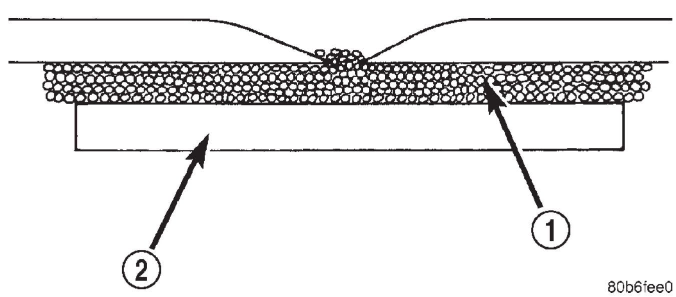


Fig. 3 Panel Reinforcement

1 - PANEL ADHESIVE
2 - REINFORCEMENT

BODY (Continued)

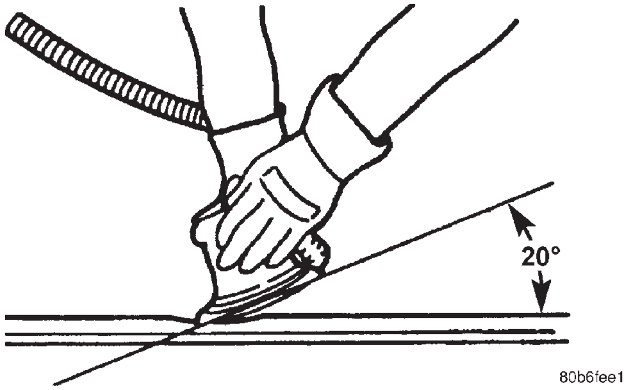


Fig. 4 Beveling Angle – 20 Degree

- Panel repair for both flexible and rigid panels are basically the same. The primary difference between flexible panel repair and rigid panel repair is in the adhesive materials used (Fig. 5).
- The technician should first decide what needs to be done when working on any type of body panel. One should determine if it is possible to return the damage part to its original strength and appearance without exceeding the value of the replacement part.
- When plastic repairs are required, it is recommended that the part be left on the vehicle when every possible. That will save time, and the panel will remain stationary during the repair. Misalignment can cause stress in the repair areas and can result in future failure.

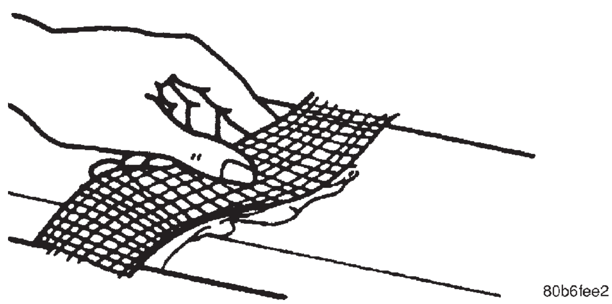


Fig. 5 Fiberglass Tape

VISUAL INSPECTION

Composite materials can mask the severity of an accident. Adhesive bond lines, interior structure of the doors, and steel structures need to be inspected carefully to get a true damage assessment. Close inspection may require partial removal of interior trim or inner panels.

Identify the type of repair: Puncture or Crack - Damage that has penetrated completely through the panel. Damage is confined to one general area; a panel section is not required. However, a backer panel, open fiberglass tape, or matted material must be bonded from behind (Fig. 7) (Fig. 6).

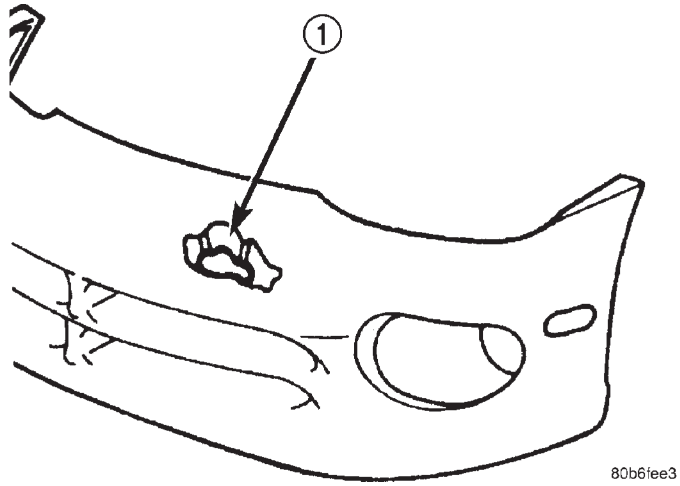


Fig. 6 Damage Component

1 - PUNCTURE

PANEL SURFACE PREPARATION

If a body panel has been punctured, cracked, or crushed, the damaged area must be removed from the panel to achieve a successful repair. All spider web cracks leading away from a damaged area must be stopped or removed. To stop a running crack in a panel, drill a 6 mm (0.250 in.) hole at the end of the crack farthest away from the damage. If spider web cracks can not be stopped, the panel would require replacement. The surfaces around the damaged area should be stripped of paint and freed from wax and oil. Scuff surfaces around repair area with 360 grit wet/dry sandpaper, or equivalent, to assure adhesion of repair materials.

PATCHING PANELS

An panel that has extensive puncture type damage can be repaired by cutting out the damaged material (Fig. 7). Use a suitable reciprocating saw or cut off wheel to remove the section of the panel that is damaged. The piece cut out can be used as a template to shape the new patch. It is not necessary to have access to the back of the panel to install a patch. Bevel edges of cutout at 20 degrees to expose a larger bonding area on the outer side. This will allow for an increased reinforcement areas.

PANEL PATCH FABRICATIONS

A patch can be fabricated from any rigid fiberglass panel that has comparable contour with the repair area. Lift gates and fenders can be used to supply patch material. If existing material is not available or compatible, a patch can be constructed with adhesive and reinforcement mesh (dry wall tape). Perform the following operation if required:

BODY (Continued)

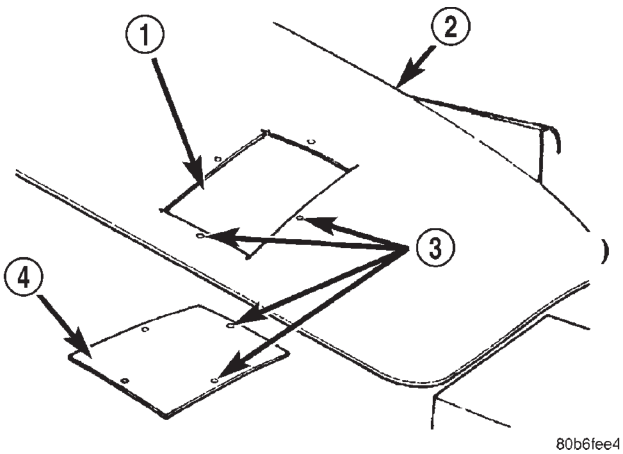


Fig. 7 Damaged Panel Cutout and Patch

1 - CUTOUT
2 - DAMAGED BODY PANEL
3 - 4 MM (0.160 IN.) HOLES
4 - PATCH CUT TO SIZE

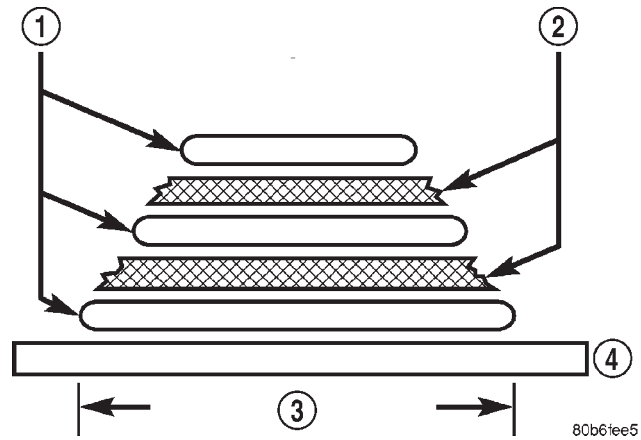


Fig. 8 Fabricated Panel

1 - STRUCTURAL ADHESIVE
2 - FIBERGLASS CLOTH OR FIBERGLASS MESH TAPE
3 - WIDTH OF V-GROOVE
4 - WAXED PAPER

(1) Cover waxed paper or plastic with adhesive backed nylon mesh (dry wall tape) larger than the patch required (Fig. 8).

(2) Tape waxed paper or plastic sheet with mesh to a surface that has a compatible contour to the repair area.

(3) Apply a liberal coat of adhesive over the reinforcement mesh (Fig. 8). If necessary apply a second or third coat of adhesive and mesh after firs coat has cured. The thickness of the patch should be the same as the repair area.

(4) After patch has cured, peel waxed paper or plastic from the back of the patch.

(5) If desired, a thin film coat of adhesive can be applied to the back of the patch to cover mesh for added strength.

PANEL PATCH INSTALLATION

(1) Make a paper or cardboard pattern the size and shape of the cutout hole in the panel.

(2) Trim 3 mm (0.125 in.) from edges of pattern so patch will have a gap between connecting surfaces.

(3) Using the pattern as a guide, cut the patch to size.

(4) Cut scrap pieces of patch material into 50 mm (2 in.) squares to use as patch supports to sustain the patch in the cutout.

(5) Drill 4 mm (0.160 in.) holes 13 mm (0.5 in.) in from edge of cutout hole (Fig. 7).

(6) Drill 4 mm (0.160 in.) holes 13 mm (0.5 in.) away from edge of patch across from holes drilled around cutout.

(7) Drill 3 mm (0.125 in.) holes in the support squares 13 mm (0.5 in.) from the edge in the center of one side.

(8) Scuff the backside of the body panel around the cutout hole with a scuff pad or sandpaper.

(9) Mix enough adhesive to cover one side of all support squares.

(10) Apply adhesive to cover one side of all support squares.

(11) Using number 8 sheet metal screws, secure support squares to back side of body panel with adhesive sandwiched between the panel and squares (Fig. 9).

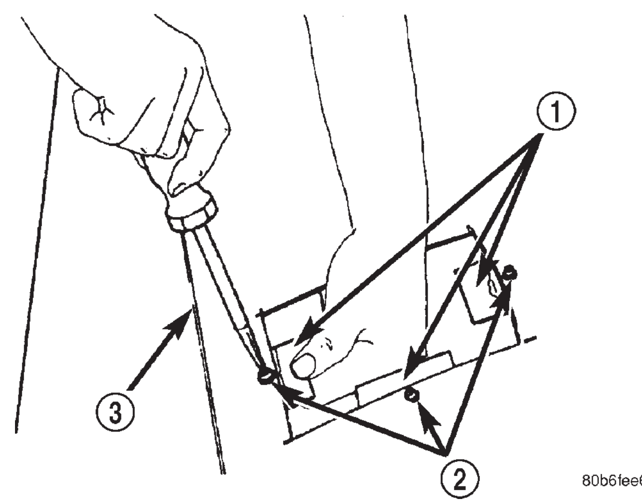


Fig. 9 Secure Support Squares To Body Panel

1 - SUPPORT SQUARES
2 - SCREWS
3 - DAMAGED BODY PANEL

BODY (Continued)

(12) 2Position patch in cutout against support squares and adjust patch until the gap is equal along all sides (Fig. 10).

(13) Drill 3 mm (0.125 in.) holes in the support squares through the pre-drilled holes in the patch.

(14) Apply a coat of adhesive to the exposed ends of the support squares (Fig. 11).

(15) Install screws to hold the patch to support squares (Fig. 12). Tighten screws until patch surface is flush with panel surface.

(16) Allow adhesive to cure, and remove all screws.

(17) Using a 125 mm (5 in.) 24 grit disc grinder, grind a 50 mm (2 in.) to 75 mm (3 in.) wide and 2 mm (0.080 in.) deep path across the gaps around the patch (Fig. 13). With compressed air, blow dust from around patch.

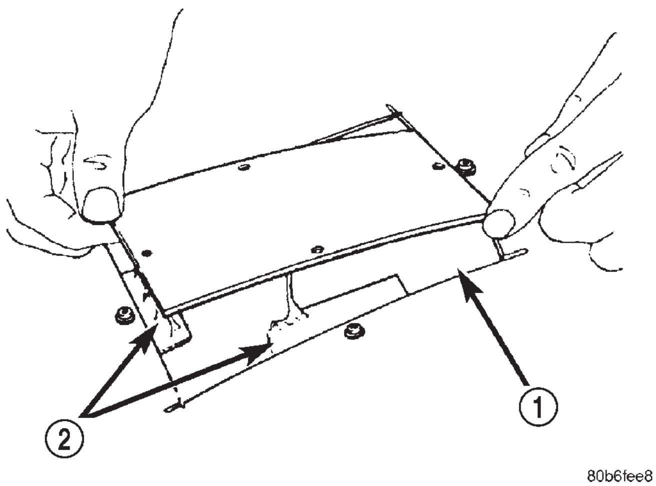


Fig. 10 Position Patch In Cutout And Align

1 - CUTOUT
2 - SUPPORT SQUARES

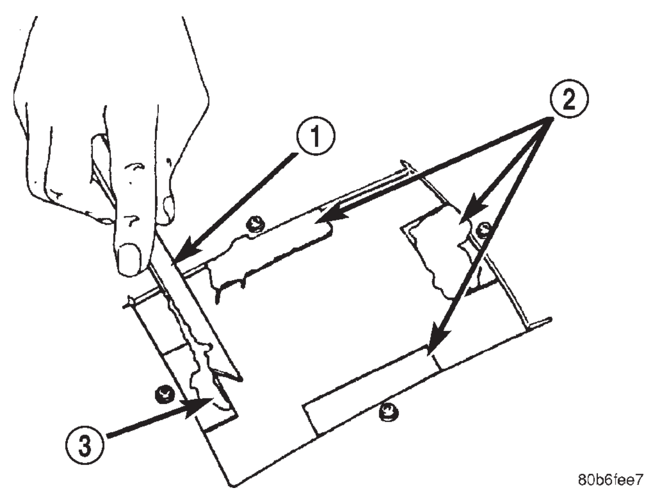


Fig. 11 Apply Adhesive To Support Squares

1 - APPLICATOR
2 - SUPPORT SQUARES
3 - ADHESIVE

(18) Apply adhesive backed nylon mesh (dry wall tape) over gaps around patch (Fig. 14).

(19) Mix enough adhesive to cover the entire patch area.

(20) Apply adhesive over the mesh around patch, and smooth epoxy with a wide spreader to reduce finish grinding. Use two to three layers of mesh and adhesive to create a stronger repair (Fig. 15).

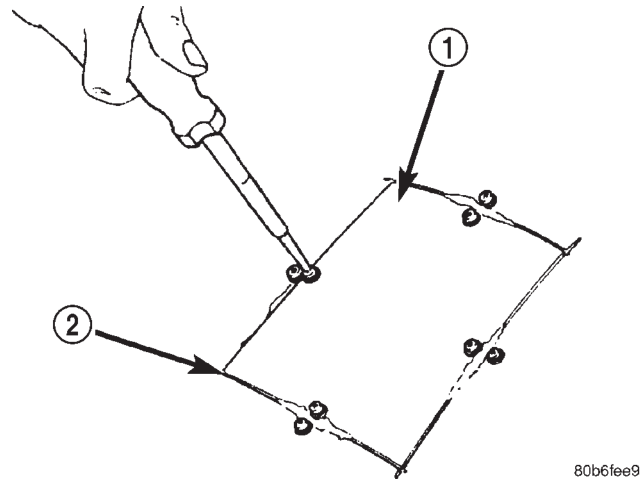


Fig. 12 Install Screws

1 - PATCH
2 - GAP

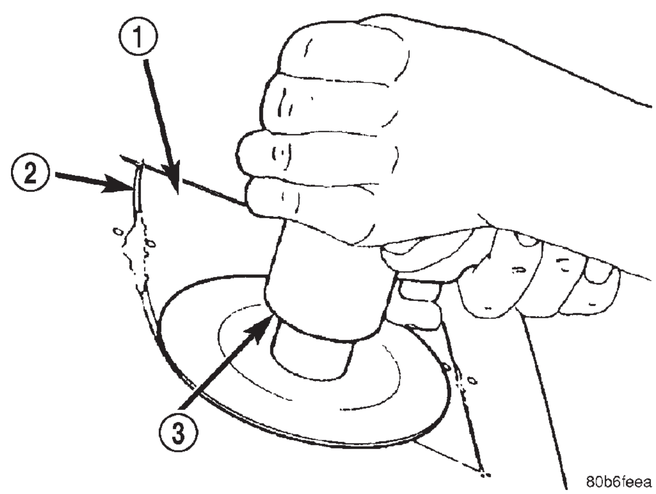


Fig. 13 Grind Surface

1 - PATCH
2 - GAP
3 - DISC GRINDER

BODY (Continued)

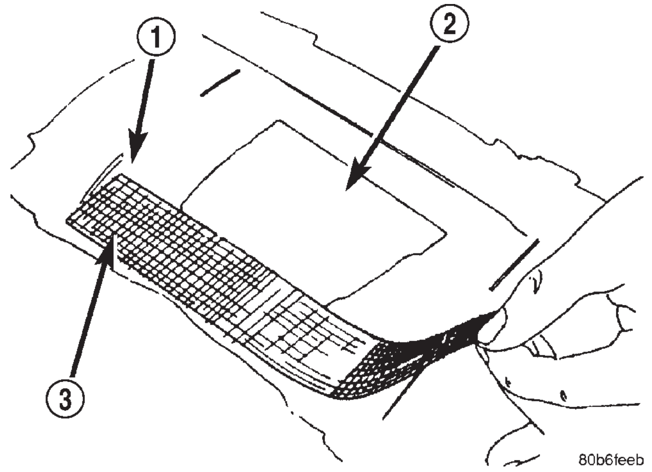


Fig. 14 Cover Gaps With Mesh

1 - GROUND DOWN AREA
2 - PATCH
3 - MESH

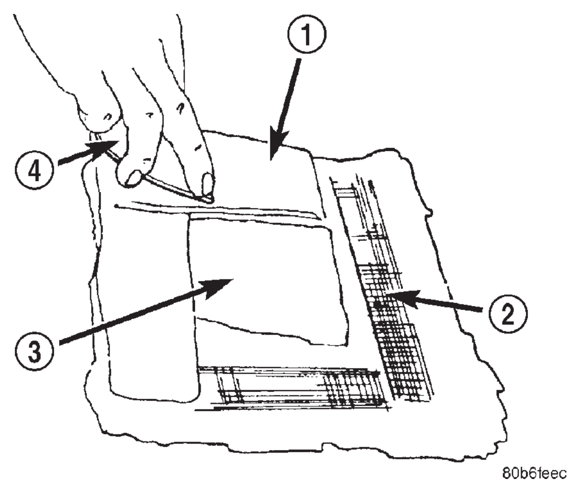


Fig. 15 Cover Mesh With Adhesive

1 - ADHESIVE
2 - MESH
3 - PATCH
4 - SPREADER

PATCHED PANEL SURFACING

After patch panel is installed, the patch area can be finished using the same methods as finishing other types of body panels. If mesh material is exposed in the patched area, grind surface down, and apply a coat of high quality rigid plastic body filler. Prime, block sand, and paint as required.

STANDARD PROCEDURE - HEAT STAKING

(1) Remove trim panel.

(2) Bend or move the trim panel components at the heat staked joints. Observe the heat staked locations and/or component seams for looseness.

(3) Heat stake the components.

(a) If the heat staked or component seam location is loose, hold the two components tightly together and using a soldering gun with a flat tip, melt the material securing the components together. Do not over heat the affected area, damage to the exterior of the trim panel may occur.

(b) If the heat staked material is broken or missing, use a hot glue gun to apply new material to the area to be repaired. The panels that are being heat staked must be held together while the applying the glue. Once the new material is in place, it may be necessary to use a soldering gun to melt the newly applied material. Do not over heat the affected area, damage to the exterior of the trim panel may occur.

(4) Allow the repaired area to cool and verify the repair.

(5) Install trim panel.

SPECIFICATIONS

BODY LUBRICATION

LUBRICATION REQUIREMENTS

Body mechanisms and linkages should be inspected, cleaned, and lubricated, as required, to maintain ease of operation and to provide protection against rust and wear. When performing other under hood services, the hood latch release mechanism and safety catch should be inspected, cleaned, and lubricated. During the winter season, external door lock cylinders should be lubricated to assure proper operation when exposed to water and ice.

Prior to the application of any lubricant, the parts concerned should be wiped clean to remove dust and grit. If necessary, a suitable solvent can be used to clean the item to be lubricated. After lubricating a component, any excess oil or grease should be removed.

LUBRICANT APPLICATION

DOOR LOCK CYLINDERS

(1) Apply a small amount of lubricant directly into the lock cylinder.

(2) Apply a small amount of lubricant to the key.

(3) Insert key into lock cylinder and cycle the mechanism from the locked to the unlocked position.

NOTE: Do not add more lubricant.

BODY (Continued)

(4) Cycle the lock cylinder mechanism several times to allow the lubricant to flow throughout the cylinder.

(5) Wipe all lubricant from exterior of lock cylinder and key.

ALL OTHER BODY MECHANISMS

(1) Clean component as described above.

(2) Apply specified lubricant to all pivoting and sliding contact areas of component.

LUBRICANT USAGE

ENGINE OIL

- Door Hinges – Hinge Pin and Pivot Contact Areas
- Hood Hinges – Pivot Points
- Liftgate Hinges

MOPAR® SPRAY WHITE LUBE OR EQUIVALENT

- Door Check Straps
- Liftgate Latches
- Liftgate Prop Pivots
- Ash Receiver
- Fuel Filler Door Remote Control Latch Mechanism
- Parking Brake Mechanism
- Sliding Seat Tracks
- Liftgate Latch

MOPAR® Multipurpose GREASE OR EQUIVALENT

- All Other Hood Mechanisms

MOPAR® LOCK CYLINDER LUBRICANT OR EQUIVALENT

- Door Lock Cylinders
- Liftgate Lock Cylinder

SPECIFICATIONS - TORQUE

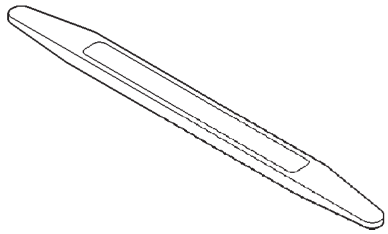
TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Front seat track to floor pan bolts	61	45	—
Front seat inboard pivot bolt	40	30	—
Front seat recliner to seat cushion frame	12	9	—
Front seat track to cushion frame bolts	12	9	—
Front seat back	45	34	—
Front seat back recliner to seat back	12	9	—
Front seat belt buckle anchor nut	40	29	—
Front seat belt retractor bolt	38	28	—
Front seat belt buckle anchor bolt	40	29	—
Front door hinge to hinge pillar bolts	28	20	—
Front door hinge to door nuts	28	20	—
Front door latch striker	28	20	—
Front seat rear outboard seat track to floor pan bolts	28	20	—
Decklid latch striker	22	16	—
Rear door glass to regulator bolt	11	—	100
Rear door hinge to B-pillar bolt	28	20	—
Rear door hinge to door bolt	28	20	—
Rear door latch striker	28	20	—
Rear seat back outer bracket nuts	61	45	—
Shifter nob set screw	3	—	23
Sunroof module to roof panel	11	—	100

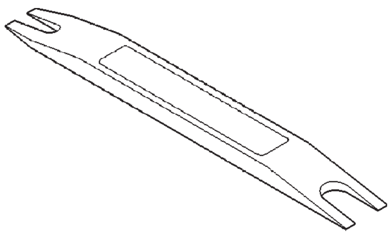
BODY (Continued)

SPECIAL TOOLS

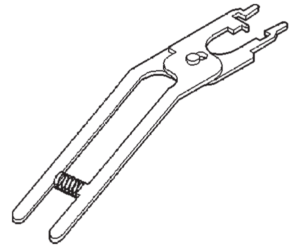
BODY



STICK, TRIM C 4755



Remover, Moldings C-4829



Pliers, Headliner Clip 6967

CONVERTIBLE TOP

TABLE OF CONTENTS

CONVERTIBLE TOP

DIAGNOSIS AND TESTING - HYDRAULIC SYSTEMS

The power convertible top hydraulic system consists of:

- Two hydraulic cylinders
- Hydraulic lines
- Electric hydraulic pump and reservoir
- Dual relays

HYDRAULIC SYSTEM TESTS

NOTE: The convertible top will raise slowly or make abnormal noise if the hydraulic fluid level is low.

(1) Remove rear seat cushion and back.

(2) With the top down, remove motor/pump assembly from the floor panel.

(3) Remove the reservoir fill plug

(4) Visually inspect fluid level. The fluid level should be at least at the bottom edge of fill hole, when motor bracket is held on a level (flat) surface. If low, inspect for leak in hydraulic system.

(5) Motor/Pump:

(a) Put reservoir fill plug back in place. Apply power to the motor and listen for operation. If the motor fails to run, check the voltage to the connector 10.5 to 16 volts required. Voltage below 12.6 volts will cause top to operate slowly.

(b) Check the motor/pump for evidence of fluid leak. If leakage is seen and fitting, hoses, and cylinders don't have any leaks, then replace the motor/pump.

(6) Cylinders:

(a) Check cylinder tubes for dents.

(b) Check cylinders for leaks. Leaks are indicated by hydraulic fluid running down the cylinders. Small oil residue accumulation at seal is normal.

(7) Repair or replace components, as necessary.

(8) Secure motor/pump assembly into floor panel mounts.

(9) Connect pump wire connector.

(10) Connect battery negative terminal.

(11) Bleed the motor/pump and fill and verify operation of hydraulic pump (Refer to 23 - BODY/CONVERTIBLE TOP - ADJUSTMENTS - HYDRAULIC MOTOR/PUMP BLEEDING PROCEDURES).

(12) Install rear seat cushion and rear seat back. Ensure the rear seat back will not pinch and/or kinks the hydraulic lines.

(13) Verify system operation.

(14) Install quarter trim panel.

(15) Install rear seat cushion and rear seat back. Ensure the rear seat back will not pinch and/or kinks the hydraulic lines.

CONVERTIBLE TOP (Continued)

ADJUSTMENTS

ADJUSTMENT - CONVERTIBLE TOP

Refer to (Fig. 1) to determine which adjustment is required. Refer to the appropriate procedure for more information.

ADJUSTMENT - HYDRAULIC MOTOR/PUMP BLEEDING PROCEDURES

After replacing any component of the power lift mechanism or if convertible top does not start to raise within 2 seconds after the switch is activated, bleed the convertible top motor/pump assembly.

(1) Lower the top to the full down position.

(2) Remove the rear seat cushion, seat back and inner quarter trim panels.

(3) Completely detach cylinders from attaching points (mounting bracket nuts and pivot bolts attaching cylinder shafts to top linkage).

(4) Remove motor from floor pan.

(5) Hold cylinders upside down (cylinder rod pointing down).

(6) Hold motor/pump assembly with reservoir up. The rubber fill plug will be at the top.

(7) Raise motor/pump fitting to at least 2 inches above the horizontal rear seat back reinforcement.

(8) Cycle system at lease once, making sure cylinders can extend without obstruction. Allow for two to three seconds stall. There may be a percolating or gurgling sound, which indicates that the procedure is working.

(9) Hold cylinders in normal position and cycle system at lease once, making sure cylinders can extend without obstruction. Allow for two to three seconds stall. There may be a percolating or gurgling sound, which indicates that the procedure is working. At this point, any air in the system has migrated to the reservoir.

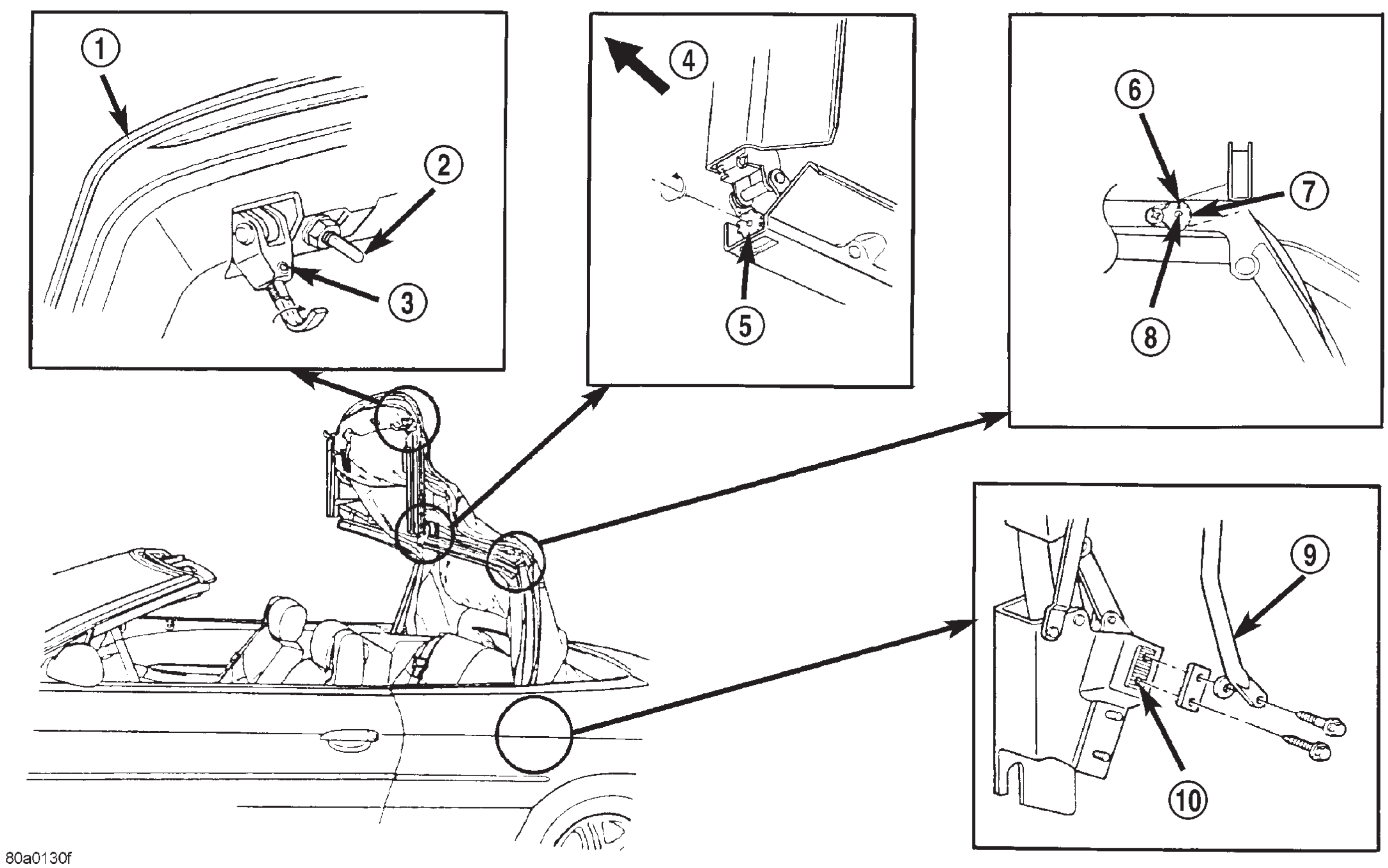


Fig. 1 ADJUSTMENT LOCATIONS

1 - TOP HEADER
2 - DOWEL PIN
3 - SET SCREW
4 - FRONT
5 - FRONT-TO-CENTER RAIL ADJUSTING SCREW
6 - TURN DART TOWARD REAR (HEADER MOVES FORWARD AND UP)
7 - CAM
8 - TURN DART TOWARD FRONT (HEADER MOVES REARWARD AND UP)
9 - BALANCE LINK
10 - SERRATED PLATE

CONVERTIBLE TOP (Continued)

(10) Rotate and raise the motor/pump assembly so the reservoir is in the up position. The rubber filler plug will be at the top.

(11) Remove the rubber fill plug from reservoir. Fluid level may be low.

CAUTION: THE MOTOR/PUMP ASSEMBLY MUST REMAIN IN THE CURRENT POSITION UNTIL THE RUBBER FILLER PLUG IS REINSTALLED.

(12) Fill the hydraulic system by adding Dexron III Automatic Transmission Fluid to the reservoir. The fluid level should be 13 to 20 mm (½ to ¾ inch) below the top of the reservoir.

CAUTION: DO NOT OPERATE THE FOLDING TOP SWITCH WHILE FILL PLUG IS NOT INSTALLED ON MOTOR ASSEMBLY.

(13) Install rubber fill plug.

(14) Secure motor/pump assembly into floor mounts.

(15) Place the cylinders into original position with hose pointing fitting rearward.

(16) Install pivot bolt attaching cylinder shaft to top linkage. Ensure all rod eye components are present (foam, plastic bushing and plastic lock washer).

(17) Install cylinder mounting bracket and nuts. Ensure all trunnion split bushings are present. Tap folding top switch to adjust cylinder length, if needed.

WARNING: HYDRAULIC CYLINDERS PRODUCE ENOUGH FORCE TO PRODUCE SEVERE INJURY IN CASE OF PUNCHING. KEEP HANDS AND FINGERS AWAY FROM MOVING HYDRAULIC CYLINDERS.

(18) Install all hydraulic lines clips and secure hydraulic lines to body.

(19) Verify system operation.

(20) Install the inner quarter panels.

(21) Install rear seat back and cushion and ensure that the seat back/seat cushion do not pinch or kick the lines.

(22) Verify system operation.

ADJUSTMENT - TOP FRAME CAM

The top frame cam changes forward or rearward position of the top header in relation to the windshield header. The cam turns inside the rear side rail and thrust link (Fig. 2). It may be necessary to lengthen the balance links 1 or 2 serrations after a cam adjustment. The position of the cam high side determines the angle between the center and rear side rails. When the high side is fully forward, the angle is at a minimum, and when turned rearward, the angle is increased. An increased angle increases the forward movement of the top. The cam high side is indicated by a arrow on the cam threaded end.

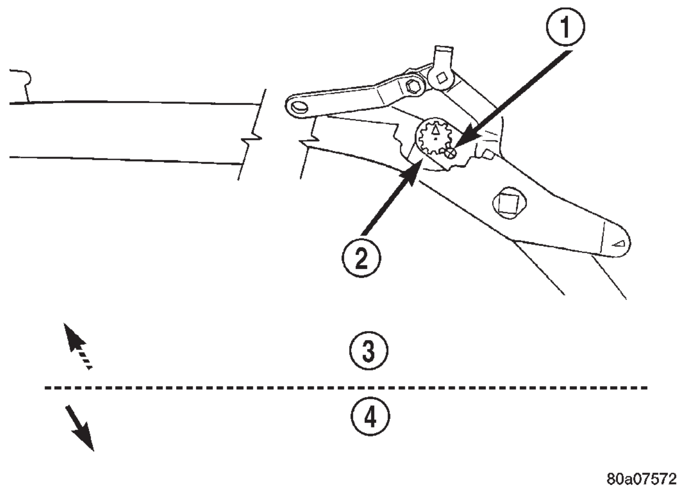


Fig. 2 CAM ASSEMBLY

1 - TORX SCREW
2 - CAM
3 - TURN DART TOWARDS REAR OF CAR HEADER MOVES IN THIS DIRECTION
4 - TURN DART TOWARDS FRONT OF CAR HEADER MOVES IN THIS DIRECTION

TO ADJUST CAM SETTING

(1) Lower top to half down position to remove all possible strain from the cam.

(2) Remove Torx head screw.

(3) Using appropriate Torx bit, rotate cam as necessary and secure set screw. Tighten Torx bit screw to 5.2 to 7.2 N·m (43 to 67 in. lbs.) torque

CONVERTIBLE TOP (Continued)

ADJUSTMENT - BALANCE LINK

WARNING: DO NOT PLACE HANDS OVER GAPS IN MOVABLE CONVERTIBLE TOP COMPONENTS DURING SERVICING. PERSONAL INJURY CAN RESULT.

(1) Remove quarter trim panel to gain access to balance link bolts.

(2) With the top latched in up position, loosen both bolts just enough to permit moving link up or down (Fig. 3).

(3) Push upward in the area of the front to center rail joint. Push rails up by hand as far as possible.

(4) With the balance link adjusting bolts loosened, allow the balance link to seek proper position.

(5) Tighten top link bolt while rail is held in position to 11.7 to 17.7 N·m (105 to 155 in. lbs.) torque.

(6) Tighten bottom link bolt while rail is held in position to 22 to 32 N·m (192 to 288 in. lbs.) torque.

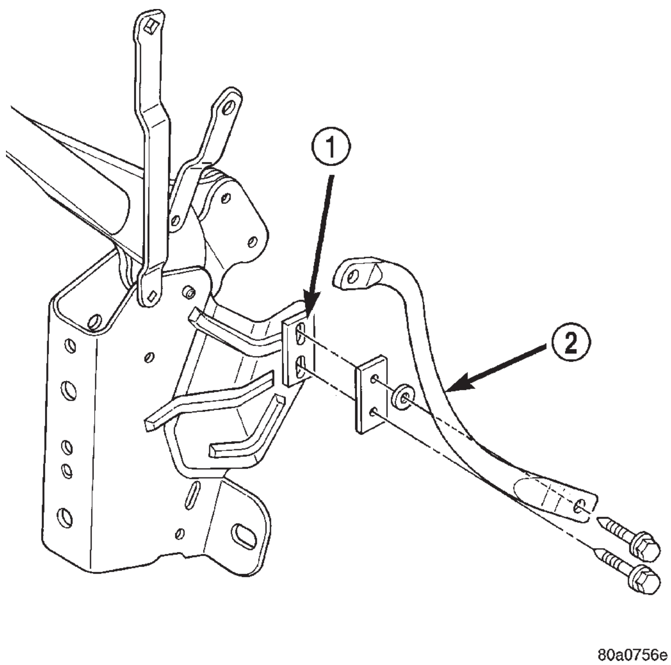


Fig. 3 BALANCE LINK ADJUSTMENT

1 - SERRATED PLATE
2 - BALANCE LINK

ADJUSTMENTS - DOWEL PIN

(1) Loosen dowel pins (Fig. 4).

(2) Position dowel pins to the center of the receiver holes in the windshield header.

(3) Tighten dowel pins and verify adjustment.

NOTE: Refer to Cam Adjustment or Balance Link Adjustment paragraphs of this section to adjust forward or rearward position of the top header.

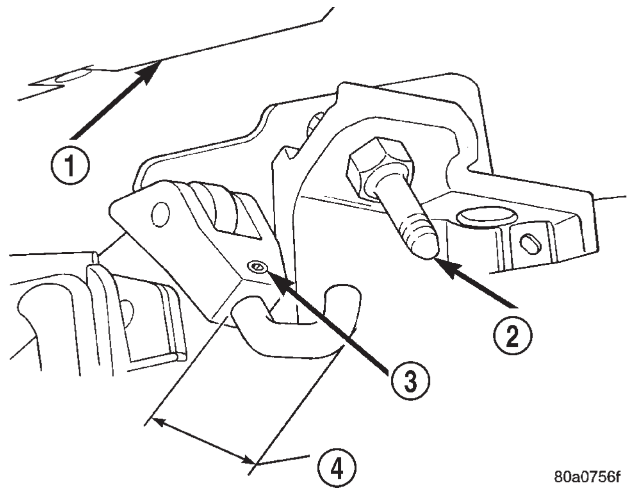


Fig. 4 ROOF LATCH AND GUIDE DOWEL PIN

1 - HEADER
2 - DOWEL PIN
3 - SET SCREW
4 - 25.4 mm MIN 35.56 mm MAX

CONVERTIBLE TOP (Continued)

SPECIFICATIONS - CONVERTIBLE TOP TORQUE

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
SEAL RETAINER TO CASTINGS	2.8 TO 4	25 TO 35	-
BOWS TO BRACKETS	8.2 TO 12.2	70 TO 110	-
DOWEL PIN	11.7 TO 17.7	104 TO 156	-
SET SCREW (LATCH HOOK)	2.4 TO 4.4	21 TO 39	-
BALANCE LINK - TOP	11.7 TO 17.7	105 TO 155	-
BALANCE LINK - BOTTOM	22 TO 32	192 TO 288	-
CAM ASSEMBLY - TORX SCREW	5.2 TO 7.2	43 TO 67	-
LATCH ASSEMBLY	10 TO 14	85 TO 125	-
CASTING (DOWEL PIN RECEIVER)	22 TO 28	195 TO 147	-
CYLINDER - ROD END	22 TO 28	195 TO 147	-
CYLINDER - LOWER PIVOT	22 TO 28	195 TO 147	-
PIVOT BRACKET (TOP ASSEMBLY TO BODY)	22 TO 28	195 TO 147	-
TACK STRIP	12 TO 18	180 TO 132	-

FOLDING TOP COVER

REMOVAL

(1) Release folding top latches and allow top cover to relax.

(2) Remove tack strip trim panel.

(3) Remove headlining screw to tack strip.

(4) Remove all convertible top storage area sections.

(5) Remove nuts holding tack strip to deck panel.

(6) Remove tack strip from deck panel.

CAUTION: Cover all painted and upholstered surfaces to avoid damage while performing the following operations.

(7) Reposition tack strip above rear deck and quarter panels.

(8) Using a grease pencil, mark location of outer top cover on rear tack strip to aid installation.

(9) Remove staples holding top cover to rear tack strip.

(10) Fold rear of top cover, tack strips and rear window up and over the third (rear) roof bow.

(11) Remove screws holding roof rail tension cable springs to rear rail behind quarter glass opening.

(12) Pull side rail rear weatherstrips from weatherstrip retainer channels.

(13) Remove screws holding rear weatherstrip retainer channels to convertible top mechanism.

(14) Separate rear weatherstrip retainer channels from vehicle.

(15) Remove top cover listing from adhesive on roof rail.

(16) Raise folding top to the mid point.

(17) Remove screws holding convertible top header feature strip to header panel.

(18) Mark location of top cover on top header.

(19) Remove staples holding top cover to header.

(20) Remove screws in end of roof bow.

(21) Slide convertible top plastic retainer strips from channels in roof bows.

(22) Close folding top, do not latch.

(23) Slide tension cable out of cable pocket.

(24) Disengage roof rail tension cables from header.

(25) Remove top cover from vehicle.

INSTALLATION

(1) Position convertible top cover on vehicle.

(2) Slide tension cable through cable pocket.

(3) Install rubber plugs holding roof rail tension cable ends into key hole slots in roof rails.

(4) Install roof bows to convertible top mechanism.

(5) Snap convertible top plastic retainer strips into channels in roof bows, starting at rear bow and working forward.

(6) Install screws at ends of roof bows.

(7) Raise convertible top to mid point.

(8) Align top cover to mark made previously on header.

(9) Install staples to hold top cover to header. The header uses both 3/16 and 1/4 inch staples. The 3/16 staples are used everywhere except the outboard cor-

FOLDING TOP COVER (Continued)

ners where the blinding wraps around, at that point the 1/4 inch staple is used.

(10) Install screws holding convertible top header feature strip to header panel.

(11) Install screws holding roof rail tension cable springs to roof rear roof rail behind quarter glass opening.

(12) Align mark made on rear of top cover and rear window to tack strip.

(13) Install staples holding rear of top cover and rear window to tack strip.

(14) Position tack strip to rear deck panel.

(15) Install nuts holding tack strip to rear deck panel.

(16) Install headlining screw to tack strip.

(17) Install all convertible top storage area sections.

(18) Install tack strip trim panel.

(19) Lower quarter glass.

(20) Lower and secure convertible top.

(21) Apply suitable adhesive to side rail rear section to attach top cover listing.

(22) Pull top cover listing taunt and secure to adhesive on rear side rail.

(23) Install side rail rear weatherstrip retainer channels.

(24) Install side rail rear weatherstrips.

(25) Verify fit and operation. Adjust as necessary.

TOP HEADLINING

REMOVAL

(1) Raise convertible top to midway position.

(2) Remove convertible top header trim panel.

(3) Remove screws attaching headlining to convertible top header panel.

(4) Remove push in fasteners attaching headlining to convertible top mechanism rearward of quarter window.

(5) Remove tack strip trim panel.

(6) Remove shock cords along both sides of headlining.

(7) Remove roof bows from convertible top mechanism.

(8) Slide roof bows from convertible top cover and headlining.

(9) Remove nuts holding headlining straps to tack strip.

(10) Disengage hook and loop fasteners holding headlining above rear window.

(11) Remove headlining from vehicle.

INSTALLATION

(1) Position headlining from vehicle.

(2) Engage hook and loop fasteners holding headlining above rear window.

(3) Install nuts attaching headlining straps to tack strip.

(4) Install roof bows from convertible top mechanism.

(5) Snap plastic retainer strips on headlining and convertible top cover into channels on roof bows, working from rear bow forward.

(6) Install shock cords along both sides of headlining.

(7) Install tack strip trim panel.

(8) Install push in fasteners attaching headlining to convertible top mechanism rearward of quarter window.

(9) Install screws attaching headlining to convertible top header panel.

(10) Install convertible top header trim panel.

(11) Lower and secure convertible top.

HYDRAULIC CYLINDER

REMOVAL

(1) Disconnect battery negative terminal.

(2) Remove rear seat cushion and rear seat back.

(3) Remove quarter trim panel.

(4) Remove cylinder mounting bracket and nut (Fig. 5).

(5) Remove pivot bolt attaching cylinder shaft to top linkage.

(6) Remove motor from floor panel. Holding motor/pump assembly with reservoir up, squeeze fill plug to release any air pressure from system.

(7) Disconnect hydraulic lines from the cylinder.

(8) Remove cylinder from vehicle.

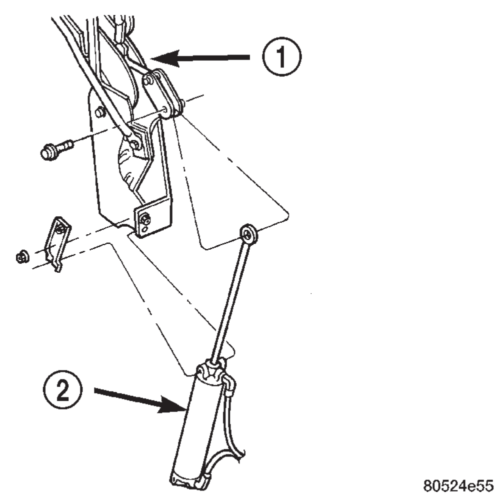


Fig. 5 HYDRAULIC CYLINDER

1 - CONVERTIBLE TOP LOWER PIVOT
2 - HYDRAULIC CYLINDER

HYDRAULIC CYLINDER (Continued)

INSTALLATION

(1) Place cylinder into position.

(2) Connect hydraulic lines to the cylinder. Tighten fittings to 8.5 to 9.5 N·m (75 to 84 in. lbs.) torque.

(3) Install pivot bolt attaching cylinder shaft to top linkage. Tighten pivot bolt to 22 to 28 N·m (195 to 147 in. lbs.) torque.

(4) Install cylinder mounting bracket and nut. Tighten bracket nut to 22 to 28 N·m (195 to 147 in. lbs.) torque.

(5) Bleed the motor/pump and fill hydraulic system and check for proper operation.

(6) Connect battery negative terminal.

(7) Apply power and lower the top to about half way down position.

(8) Holding motor/pump assembly with the reservoir up, squeeze fill plug to release any air pressure from the system. Lower top all the way down and release air pressure again by squeeze fill plug.

(9) Bleed system (Refer to 23 - BODY/CONVERTIBLE TOP - ADJUSTMENTS - HYDRAULIC MOTOR/PUMP BLEEDING PROCEDURES).

(10) Secure motor/pump assembly into floor panel mounts.

(11) Verify system operation.

(12) Install quarter trim panel.

(13) Install rear seat cushion and rear seat back. Ensure the rear seat back will not pinch and/or kinks the hydraulic lines.

HYDRAULIC LINES

REMOVAL

(1) Move top to the down position

(2) Disconnect battery negative terminal.

(3) Remove rear seat cushion and rear seat back.

(4) Disconnect pump wire connector connection.

(5) Remove motor from floor panel. Holding motor assembly with reservoir up, squeeze fill plug to release any air pressure from system.

(6) Disconnect hydraulic line from hydraulic cylinders.

(7) Disconnect hydraulic line from hydraulic pump.

(8) Remove hydraulic line from vehicle. Carefully drain hydraulic line and properly dispose of fluid and component.

INSTALLATION

(1) Position hydraulic line to vehicle.

(2) Connect hydraulic line to hydraulic pump. Tighten fittings to 11 to 12 N·m (98 to 106 in. lbs.) torque.

(3) Connect hydraulic line to hydraulic cylinders. Tighten fittings to 8.5 to 9.5 N·m (75 to 84 in. lbs.) torque.

(4) Connect battery negative terminal.

(5) Bleed the motor/pump and fill and verify operation of hydraulic pump(Refer to 23 - BODY/CONVERTIBLE TOP - ADJUSTMENTS - HYDRAULIC MOTOR/PUMP BLEEDING PROCEDURES).

(6) Verify system operation.

(7) Install quarter trim panels.

(8) Install rear seat cushion and rear seat back. Ensure the rear seat back will not pinch and/or kinks the hydraulic lines.

HYDRAULIC MOTOR/PUMP ASSEMBLY

REMOVAL

(1) Move top to the down position

(2) Disconnect battery negative terminal.

(3) Remove rear seat cushion and rear seat back.

(4) Disconnect pump wire connector connection (Fig. 6).

(5) Remove motor from floor panel. Holding motor assembly with reservoir up, squeeze fill plug to release any air pressure from system.

(6) Mark connections and disconnect hydraulic lines from pump.

(7) Remove motor pump assembly from vehicle.

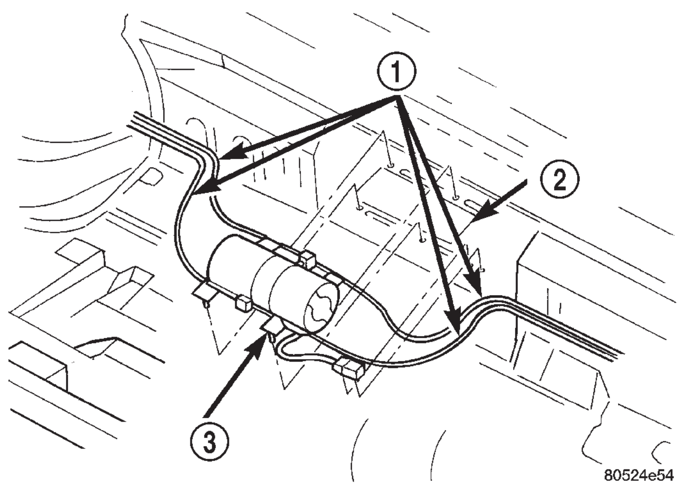


Fig. 6 HYDRAULIC PUMP ASSEMBLY

1 - HYDRAULIC LINES
2 - MOUNTING BRACKET
3 - HYDRAULIC PUMP ASSEMBLY

INSTALLATION

(1) Position hydraulic motor in vehicle.

(2) Connect hydraulic lines to pump. Tighten fittings to 11 to 12 N·m (98 to 106 in. lbs.) torque.

(3) Connect pump wire connector.

(4) Connect battery negative terminal.

HYDRAULIC MOTOR/PUMP ASSEMBLY (Continued)

(5) Bleed the motor/pump and fill and verify operation of hydraulic pump (Refer to 23 - BODY/CONVERTIBLE TOP - ADJUSTMENTS - HYDRAULIC MOTOR/PUMP BLEEDING PROCEDURES).

(6) Press hydraulic motor into mounts.

(7) Install rear seat cushion and rear seat back. Ensure the rear seat back will not pinch and/or kinks the hydraulic lines.

CONVERTIBLE TOP REAR WINDOW

REMOVAL

(1) Release folding top latches and allow top cover to relax.

(2) Lift shower curtain and remove push in nuts holding curtain to the studs.

CAUTION: Take precautions not to tear curtain on the boot shelf during removal.

(3) Disengage the headliner at the rear sail panels.

(4) Disconnect wire connectors from terminals on heated rear window.

(5) Pull wire harness from sleeves at each side of the rear window.

(6) Remove nuts attaching belt line tack strips to vehicle.

NOTE: Support top 12 inches above windshield header.

(7) Remove the five piece belt line tack strips.

(8) Disengage elastic strap from the third roof bow, if equipped.

(9) Remove antenna mast.

(10) Place protective padding over the entire rear deck area to protect paint. Move tack strips to top of deck opening onto protective padding.

(11) Mark the outer sail panels along the top edges and down the seams between the outer and second tack strips from the outside of top (Fig. 7).

NOTE: Reference marks will be used to reinstall the new rear window assembly.

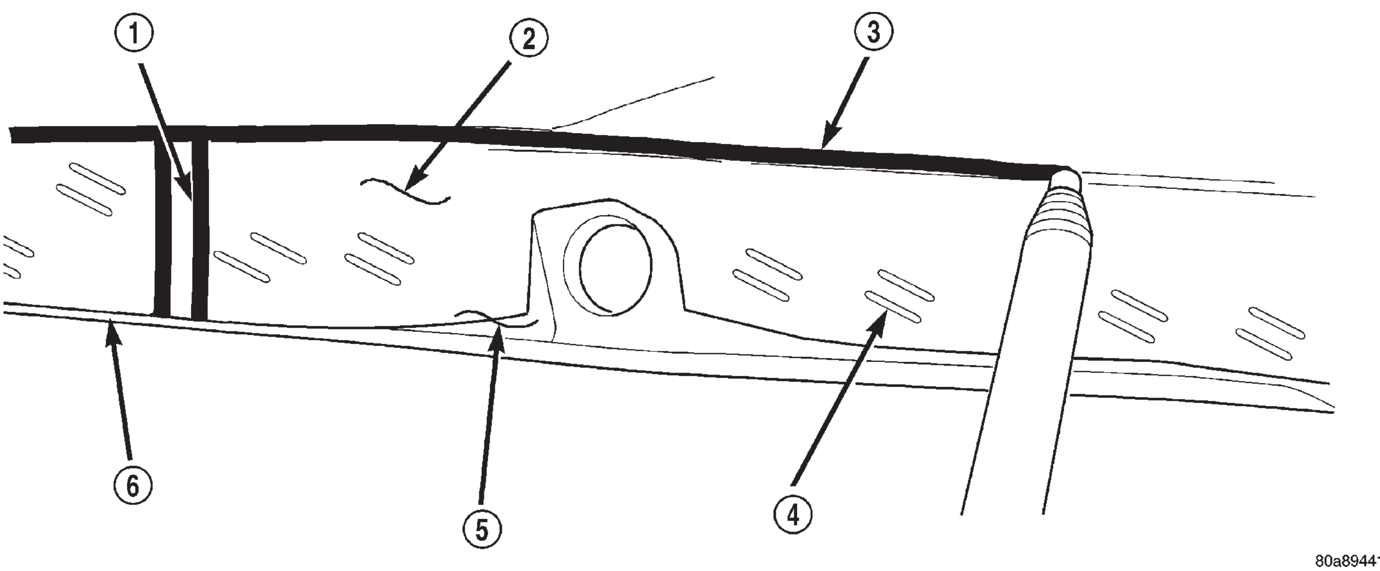


Fig. 7 SAIL PANEL REFERENCE MARKS

1 - SEAM REFERENCE MARK
2 - COVER ASSEMBLY
3 - REFERENCE MARK
4 - STAPLES
5 - OUTER TACK STRIP
6 - SECOND TACK STRIP

CONVERTIBLE TOP REAR WINDOW (Continued)

(12) Remove sail panel springs on both sides at the front corners of the cover assembly (Fig. 8).

(13) Remove all staples from the cover assembly.

CAUTION: Be careful not to tear or damage the cover assembly.

(14) Fold the cover assembly up over the top.

(15) Remove tape and foam at the end of the third roof bow, save if reusable.

(16) Remove the rearmost stop screw on the number three bow, either driver's or passenger's side (Fig. 9).

(17) Slide the old rear window assembly off the number three bow.

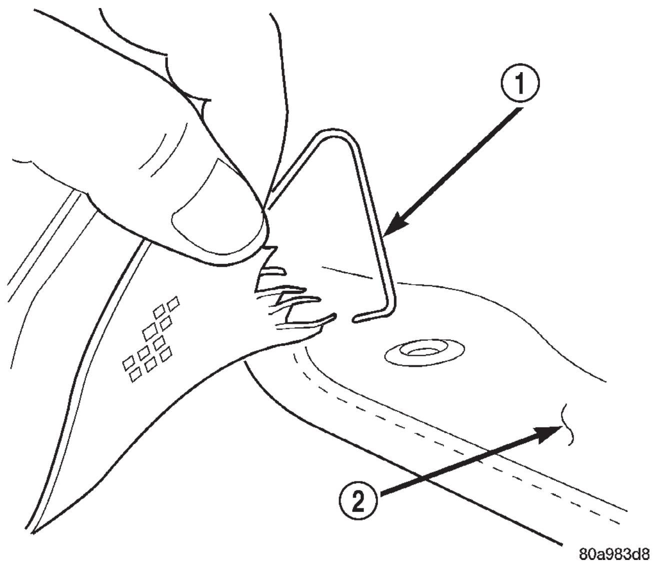


Fig. 8 SAIL SPRINGS

1 - SAIL SPRING
2 - COVER ASSEMBLY

INSTALLATION

NOTE: To support the new Rear Window assembly for stapling purposes, remove the new rear window from packaging and place shipping box across the top opening, resting on the back seat and decklid.

(1) Remove the boot shelf and two sail springs from the old rear window assembly and install onto the new rear window assembly.

(2) Place rear window locking strip on third bow.

(3) Insert the locking strip into the channel of the number three roof bow. A rubber mallet may be required to set locking strip into channel (Fig. 10).

CAUTION: Do not slide or pull the locking strip onto the number three bow.

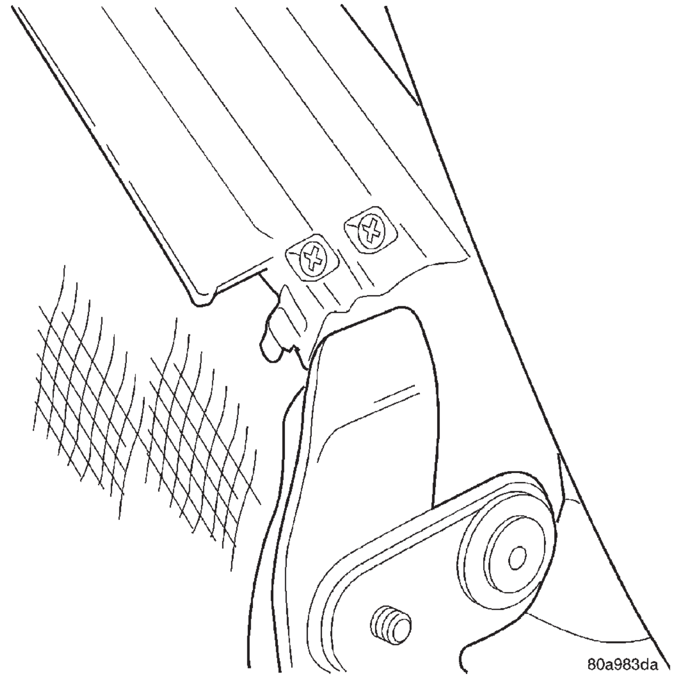


Fig. 9 REAR WINDOW REAR STOP SCREW

NOTE: To ensure rear window is snapped into number three bow, flip assembly onto top to inspect snap in feature.

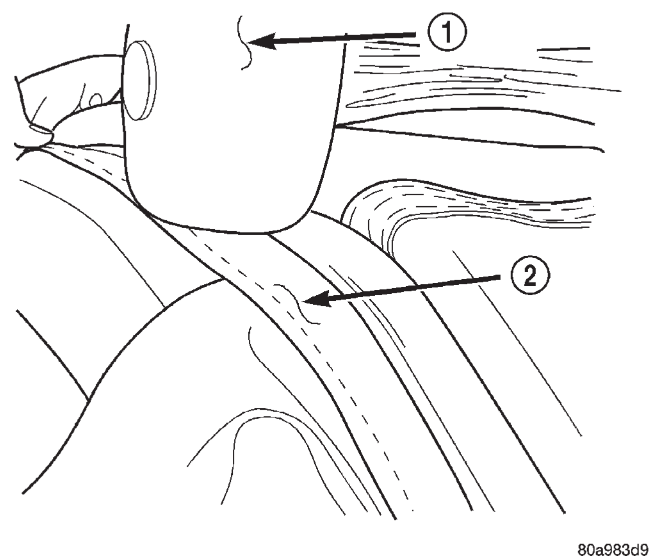


Fig. 10 REAR WINDOW LOCKING STRIP

1 - RUBBER MALLET
2 - LOCKING STRIP

(4) Install existing or new foam on the end of the bow using 1 in. black tape to secure foam to bow.

(5) Install the rearmost stop screw on the number three bow.

(6) Starting from the right side of the vehicle, locate the front edge of the cover assembly to the tacking strip (use measurements located in the

CONVERTIBLE TOP REAR WINDOW (Continued)

Remove procedures(Refer to 23 - BODY/CONVERTIBLE TOP/REAR WINDOW - REMOVAL) and pull cover down until marking is one eighth of an inch below the top edge of the tacking strips.

NOTE: 1/8 inch measurement should be constant when stapling the cover assembly to prevent wrinkles.

(7) Continue to staple right hand cover assembly to tacking strips. Work from the outboard to center line of the vehicle.

(8) Repeat Step 6 for left side of the vehicle.

(9) Install sail panel springs to front of cover assembly.

(10) Install antenna mast.

(11) Engage rear window elastic strap to number three roof bow.

(12) Using the nuts, install the belt line tacking strips, starting with the center tack strip and working outboard.

(13) Feed rear window defogger wire harness through the sleeves at each side of the rear window.

(14) Connect rear window defogger wire connectors to terminals.

(15) Engage the headliner at the rear sail panel.

(16) Install shower curtain with push on nuts.

CAUTION: Make sure top well is not trapped under the tack strips.

(17) Latch top and inspect for wrinkles.

CONVERTIBLE TOP STORAGE

REMOVAL

(1) Raise and secure convertible top.

(2) Remove screws attaching headliner to top well.

(3) Remove push in fasteners attaching convertible top storage section to rear of storage area (Fig. 11).

(4) Remove push in fasteners attaching storage area below seat belt bezel.

(5) Pull rear of storage area upward and disengage front of storage area from beauty bar.

(6) Remove storage area from vehicle.

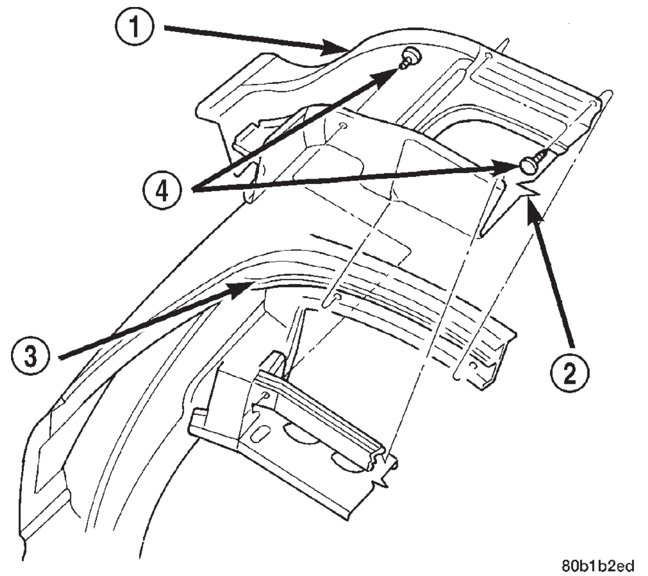


Fig. 11 CENTER CONVERTIBLE TOP STORAGE

1 - CONVERTIBLE TOP STORAGE
2 - REAR DECK PANEL
3 - TACK STRIP
4 - PUSH-IN FASTENER

INSTALLATION

(1) Position convertible top storage area in vehicle.

(2) Engage front of storage area under beauty bar and push rear of storage area downward into position.

(3) Install push in fasteners attaching convertible top storage section to rear of storage area.

(4) Install push in fasteners to attach storage areas below seat belt bezel.

(5) Install screws attaching headliner to top well.

DECKLID/HATCH/LIFTGATE/TAILGATE

TABLE OF CONTENTS

DECKLID

REMOVAL

(1) Release decklid latch and open decklid.

(2) Mark outline of hinge on decklid to aid in installation (Fig. 1).

(3) Disconnect all wire connectors from decklid latch and disconnect wire harness from decklid.

(4) Place suitable padding between decklid and deck panel to protect paint finish.

(5) With aid of a helper, remove bolts attaching decklid to decklid hinge.

(6) Remove decklid from vehicle.

INSTALLATION

(1) Position decklid on vehicle.

(2) With aid of a helper, loosely install bolts attaching decklid to decklid hinge.

(3) Align marks made on decklid previously to decklid hinge.

(4) Tighten bolts attaching decklid to decklid hinge to 22.5 N·m (200 in. lbs.) torque.

(5) Connect all wire connectors to decklid latch and install wire harness to decklid.

(6) Verify fit of decklid to deck panel. Adjust as necessary.

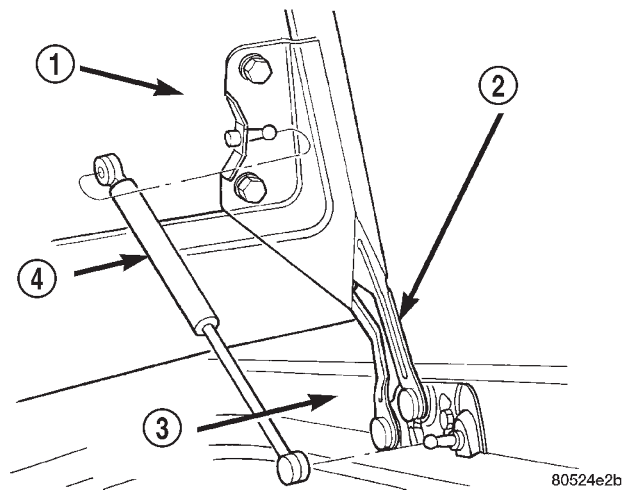


Fig. 1 Decklid Hinge And Gas Support Cylinder

1 - TRUNK LID
2 - TRUNK HINGE
3 - QUARTER PANEL TROUGH
4 - GAS SUPPORT CYLINDER

GAS PROP

REMOVAL

(1) Open decklid.
(2) Remove the gas prop-rod lock caps (Fig. 2).
(3) Remove prop-rod from mounting studs.

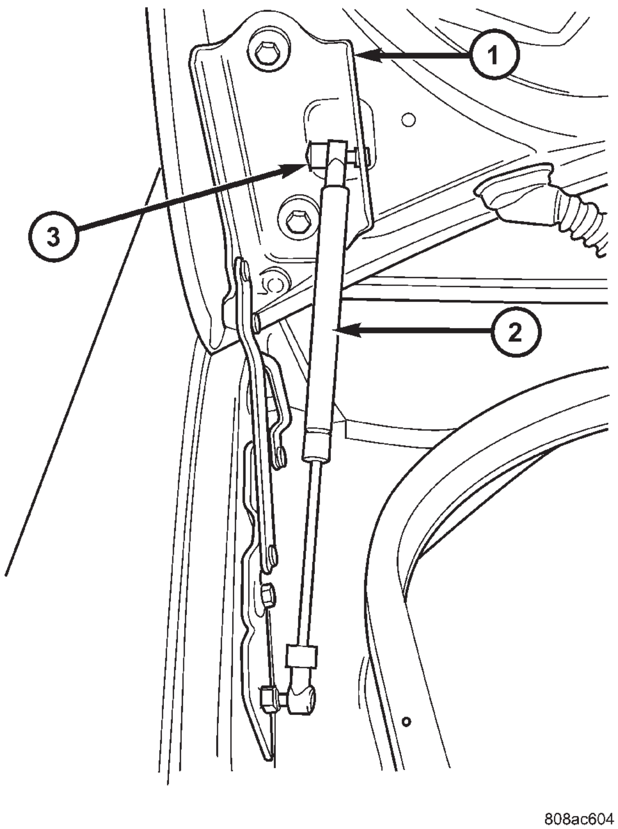


Fig. 2 Gas Prop-Rod Lock Cap

1 - DECKLID HINGE
2 - GAS PROP
3 - GAS PROP-ROD LOCK CAP

INSTALLATION

(1) Install prop-rod to mounting studs.
(2) Install the gas prop-rod lock caps.
(3) Close decklid.

HINGE

REMOVAL

(1) Open decklid.
(2) Mark outline of hinge on quarter panel trough and inside of decklid to aid installation.
(3) Place a padded block between the deck panel and the decklid.
(4) Remove the gas prop-rod lock caps (Fig. 2).
(5) Remove prop-rod from mounting studs.
(6) Remove bolts attaching hinge to decklid.
(7) Place decklid against padded block and hold it steady.
(8) Remove bolts attaching hinge to quarter panel trough.
(9) Remove hinge from vehicle.

INSTALLATION

(1) Place hinge in the mark outline of hinge on quarter panel trough and inside of decklid to aid in positioning hinge.
(2) Install hinge to vehicle.
(3) Install bolts attaching hinge to quarter panel trough.
(4) Tighten bolts to 22.5 N·m (200 in. lbs.) torque.
(5) Place decklid against padded block and hold it steady.
(6) Install bolts attaching hinge to decklid.
(7) Tighten bolts to 22.5 N·m (200 in. lbs.) torque.
(8) Install prop-rod to mounting studs.
(9) Install the gas prop-rod lock caps.
(10) Remove the padded block between the deck panel and the decklid.
(11) Close decklid.

DECKLID LATCH

REMOVAL

(1) Release decklid latch and open decklid.
(2) Mark outline of decklid latch on decklid to aid in installation.
(3) Disconnect wire connectors to remote release solenoid, if so equipped (Fig. 3).
(4) Remove bolts attaching decklid latch to decklid.
(5) Remove decklid latch from vehicle.

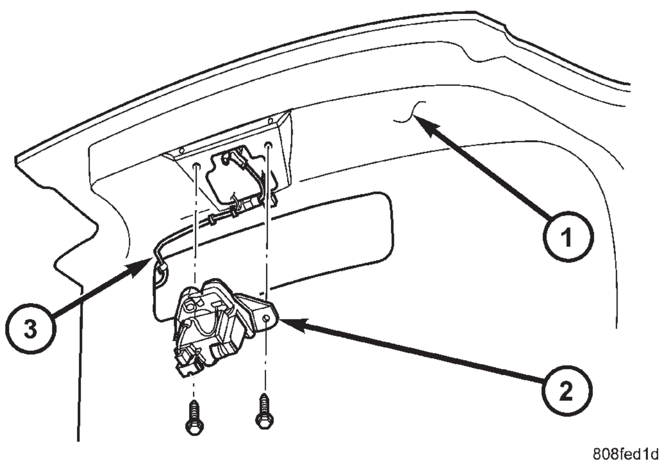


Fig. 3 DECKLID LATCH

1 - DECKLID
2 - DECKLID LATCH
3 - WIRE HARNESS

INSTALLATION

(1) Position decklid latch on vehicle.
(2) Loosely install bolts attaching decklid latch to decklid.
(3) Tighten bolts to 12 N·m (106 in. lbs.) torque.
(4) Align decklid latch to marks made previously on decklid and tighten bolts.
(5) Connect wire connectors to remote release solenoid, if so equipped.
(6) Verify fit of decklid to deck panel and decklid latch operation. Adjust as necessary.

DECKLID LATCH STRIKER

REMOVAL

(1) Release decklid latch and open decklid.
(2) Mark outline of decklid latch striker on rear closure panel to aid in installation.
(3) Remove bolts attaching decklid latch striker to rear closure panel (Fig. 4).
(4) Remove striker from vehicle.

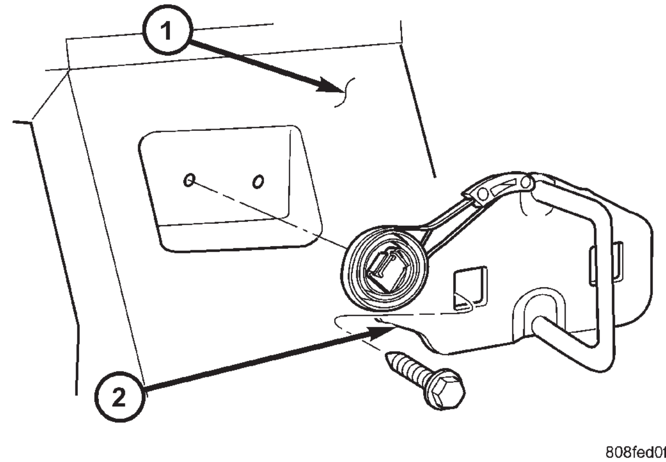


Fig. 4 DECKLID LATCH STRIKER

1 - REAR CLOSURE PANEL
2 - TRUNK LATCH STRIKER

INSTALLATION

(1) Position striker in vehicle.
(2) Loosely install bolts attaching decklid latch striker to rear closure panel.
(3) Align decklid latch striker to marks made previously on rear closure panel.
(4) Tighten bolts to 12 N·m (106 in. lbs.) torque.
(5) Verify fit of decklid to deck panel and operation of decklid latch. Adjust as necessary.

DECKLID LOCK CYLINDER

REMOVAL

(1) Release decklid latch and open decklid.
(2) Remove decklid latch.
(3) Remove clip attaching decklid lock cylinder to security alarm switch, if so equipped (Fig. 5).
(4) Remove security alarm switch, if so equipped.
(5) Remove clip attaching decklid lock cylinder to decklid.
(6) Remove decklid lock cylinder from vehicle.

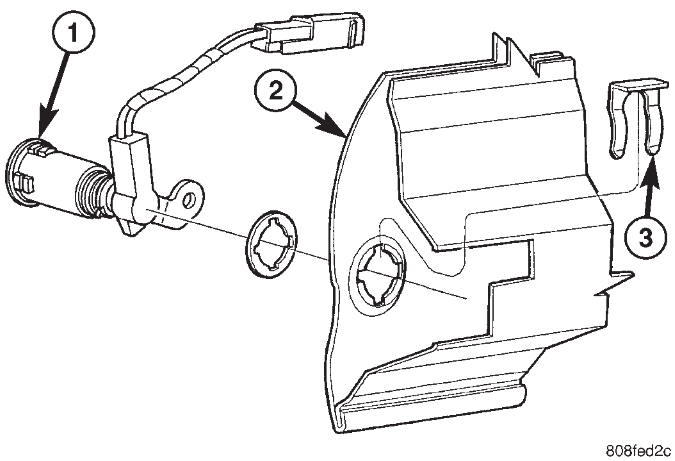


Fig. 5 DECKLID LOCK CYLINDER

1 - DECKLID LOCK CYLINDER
2 - DECKLID
3 - RETAINER CLIP

INSTALLATION

(1) Position decklid lock cylinder on vehicle.
(2) Install clip holding decklid lock cylinder to decklid.
(3) Install security alarm switch, if so equipped.
(4) Install clip attaching decklid lock cylinder to security alarm switch, if so equipped.
(5) Install decklid latch.

EMERGENCY RELEASE CABLE

REMOVAL

(1) Remove the decklid latch cover (Fig. 6).

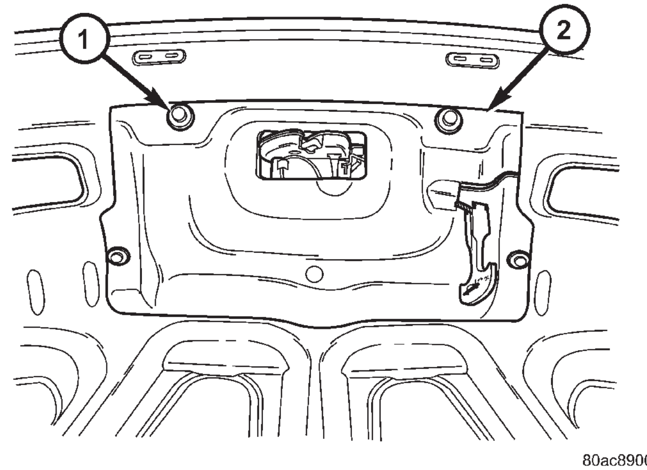


Fig. 6 DECKLID LATCH COVER

1 - Push pin
2 - Decklid latch cover

(2) Unclip cable and handle assembly (Fig. 7).

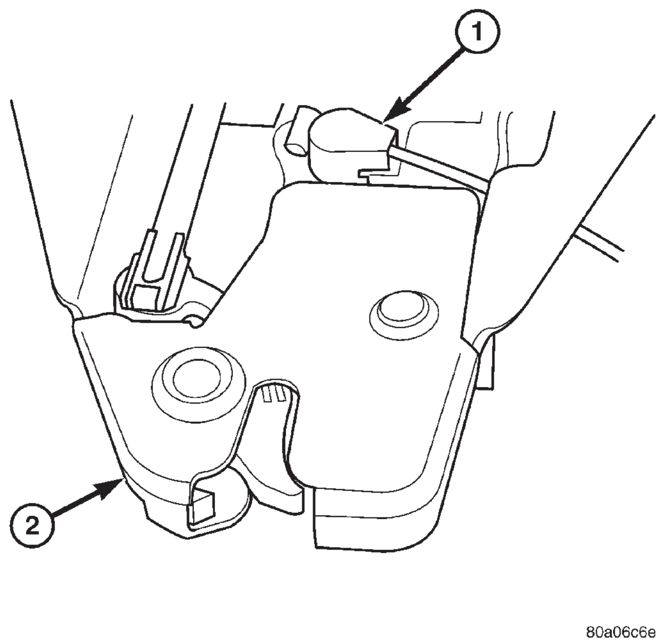


Fig. 7 EMERGENCY RELEASE CABLE

1 - Release Cable Clip
2 - Decklid Latch

INSTALLATION

(1) Clip emergency release cable onto the latch.
(2) Install the decklid latch cover.

DOOR - FRONT

TABLE OF CONTENTS

CHECK STRAP

REMOVAL

(1) Remove door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(2) Remove water dam as necessary to gain access (Refer to 23 - BODY/DOOR - FRONT/WATERDAM - REMOVAL).

(3) Remove bolts attaching check strap to lower A–pillar.

(4) Remove bolts attaching check strap to door end frame (Fig. 1).

(5) Remove door check strap from vehicle.

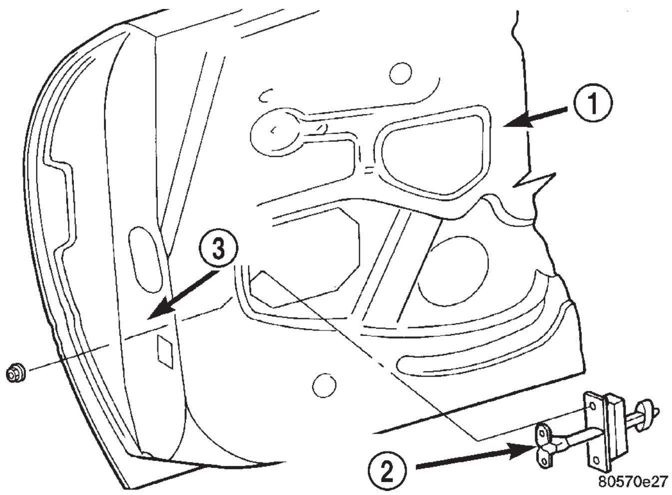


Fig. 1 Front Door Check Strap

1 - FRONT DOOR
2 - DOOR CHECK STRAP
3 - DOOR FACE

INSTALLATION

(1) Position door check strap on vehicle (Fig. 1).

(2) Install bolts attaching check strap to door end frame.

(3) Install bolts attaching check strap to lower A-pillar.

(4) Install water dam (Refer to 23 - BODY/DOOR - FRONT/WATERDAM - INSTALLATION).

(5) Install door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

DOOR

REMOVAL

REMOVAL

(1) Open and support door on a suitable lifting device.

(2) Mark all bolt and hinge attachment locations with a grease pencil or other suitable device to aid installation.

(3) Disengage wire connector at hinge pillar.

(4) Remove bolts attaching door check strap to hinge pillar (Fig. 2).

(5) Remove the nuts attaching the door to the door hinges and remove the door from the vehicle.

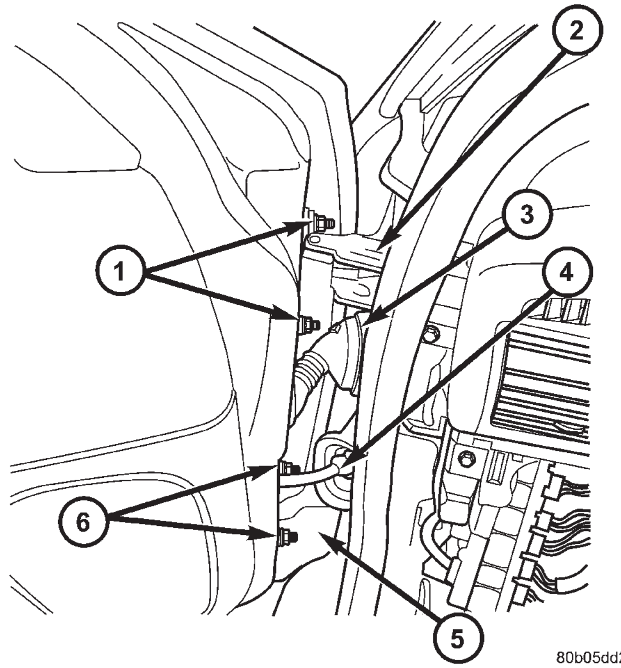


Fig. 2 FRONT DOOR HINGES

1 - UPPER DOOR HINGE NUTS
2 - UPPER DOOR HINGE
3 - ELECTRICAL CONNECTIONS
4 - CHECK STRAP
5 - LOWER HINGE
6 - LOWER HINGE NUTS

DOOR (Continued)

REMOVAL - JR-27 ONLY

NOTE: The retaining clips used on the door hinge pins are not to be reused. Verify availability prior to proceeding.

(1) Open and support front door on a suitable lifting device.
(2) Disconnect wire connector at hinge pillar.
(3) Remove bolts attaching door check strap to hinge pillar.
(4) Remove clip attaching hinge pin in lower door hinge.
(5) Remove pin from lower hinge (Fig. 3).
(6) Remove clip attaching hinge pin in upper hinge.
(7) Remove pin from upper hinge (Fig. 3).
(8) Remove door from vehicle.

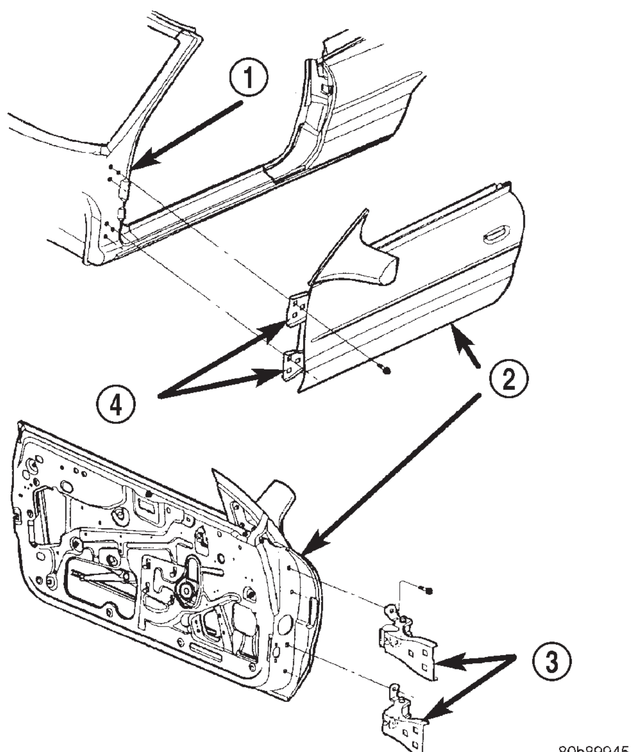


Fig. 3 Front Door

1 - HINGE PILLAR
2 - FRONT DOOR
3 - HINGES
4 - HINGES

INSTALLATION

INSTALLATION

(1) Position door onto the door hinges and install the nuts.
(2) Install bolts attaching door check strap to hinge pillar.
(3) Connect wire connector at hinge pillar.
(4) Verify door fit and operation. Adjust the door for flushness and parallel gaps as necessary.

INSTALLATION - JR-27 ONLY

(1) Apply Mopar® Multi-mileage Grease to inside of door hinge bushings.
(2) Position front door on vehicle and install pin in upper hinge. Align knurling on hinge pin with the grooves in the door hinge prior to driving in the hinge pin.
(3) Install pin in lower hinge.

NOTE: Verify that head of each hinge pin is fully seated into door hinge.

(4) Install new clip attaching hinge pin in upper hinge.
(5) Install new clip attaching pin in lower hinge.
(6) Install bolts attaching door check strap to hinge pillar.
(7) Connect wire connector at hinge pillar.

DOOR GLASS

REMOVAL

REMOVAL

(1) Remove door trim panel and inner belt weatherstrip.
(2) Connect power window switch or install crank and lower window to 50 mm (2 in.) from bottom of travel.
(3) Loosen screws attaching regulator roller channel to glass.
(4) Slide roller channel rearward to allow screw heads to pass through key hole slots in channel.
(5) Remove glass from roller channel.
(6) Raise glass upward and out of the opening at top of door (Fig. 4).

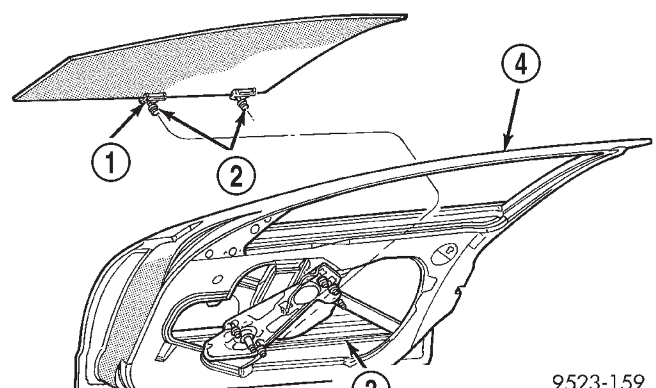


Fig. 4 Front Door Glass

1 - DOOR GLASS
2 - SCREWS
3 - ROLLER CHANNEL
4 - FRONT DOOR

DOOR GLASS (Continued)

REMOVAL - JR-27 ONLY

(1) Remove door trim panel and watershield.
(2) Remove inner door belt weatherstrip.
(3) Loosen inner belt stabilizer (Fig. 5).
(4) Remove door speaker, if so equipped.
(5) Lower door glass to access glass attachment bolts.
(6) Remove bolts attaching regulator lift channel to door glass (Fig. 6).
(7) Remove bolts attaching rear guide plate to door glass (Fig. 7).
(8) Remove rear guide plate from door glass.
(9) Lift door glass upward and out of opening at top of door (Fig. 6).

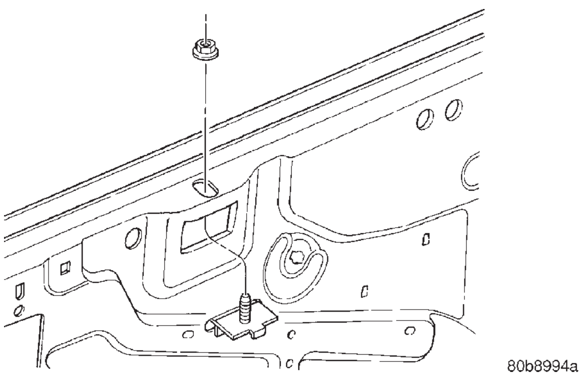


Fig. 5 Inner Belt Stabilizer

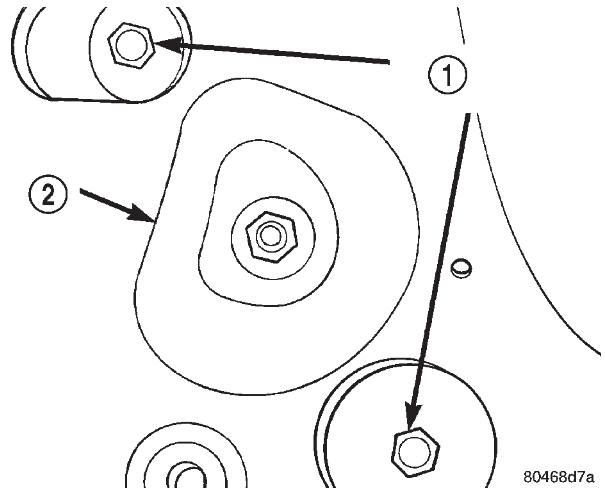


Fig. 7 Rear Guide Bolts

1 - REAR GUIDE BOLTS
2 - INNER DOOR PANEL

INSTALLATION

INSTALLATION

(1) Lower glass down and in the opening at top of door.
(2) Position glass on roller channel.
(3) Slide roller channel forward to allow screw heads to engage key hole slots in channel.

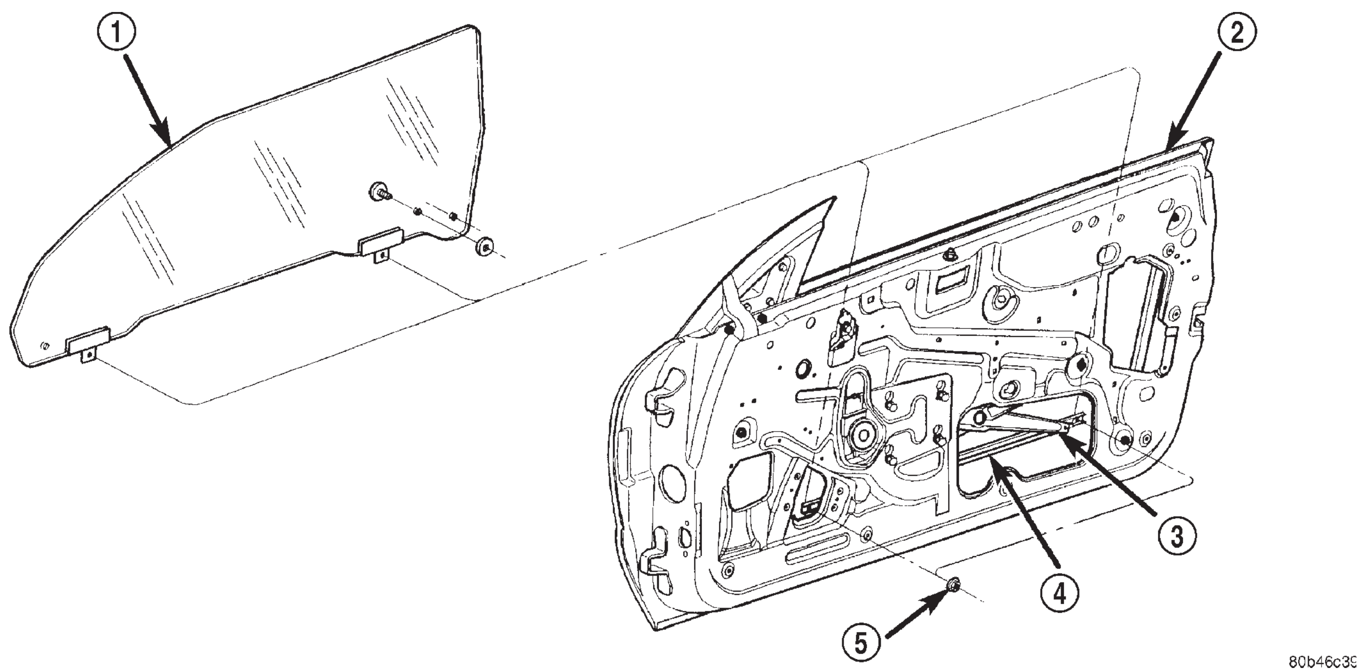


Fig. 6 Regulator Lift Channel

1 - DOOR GLASS
2 - DOOR
3 - WINDOW REGULATOR
4 - LIFT CHANNEL
5 - ROLLER CHANNEL NUT

DOOR GLASS (Continued)

(4) Tighten screws attaching regulator roller channel to glass.
(5) Install door trim panel and inner belt weatherstrip.

INSTALLATION - JR-27 ONLY

(1) Carefully lower door glass through opening in top of door. Verify that the front edge of the glass is in the mirror flag glass channel.
(2) Position rear guide plate onto door glass and install bolts.
(3) Install nuts attaching regulator lift channel to door glass.
(4) Tighten all door glass fasteners.
(5) Install door speaker, if so equipped.
(6) Tighten window inner belt stabilizer.
(7) Install inner door belt weatherstrip.
(8) Install door trim panel and watershield.

ADJUSTMENTS

ADJUSTMENT - JR-27 ONLY

NOTE: Verify that the door is properly adjusted to the body prior to adjusting the door glass.

NOTE: Lower quarter glass to the full down position while making door glass adjustments, unless otherwise instructed.

UP-STOP ADJUSTMENTS

(1) Remove door trim panel.
(2) Remove water shield as necessary to gain access to adjuster.
(3) Loosen up stop nut (Fig. 8) and bolt (Fig. 9).
(4) Remove weatherstrip from location to be adjusted.

NOTE: Remove only one weatherstrip section at a time or the glass to weatherstrip retainer measurements will not be accurate.

(5) Close door and raise door glass.
(6) Slide up stop to achieve proper glass to weatherstrip retainer gap. Refer to Front Door Glass Adjustment Table.
(7) Tighten all fasteners.
(8) Verify that forward up stop fully contacts hook on glass. Adjust contact bolt on forward up stop as necessary.

TOP OF GLASS – INBOARD/OUTBOARD ADJUSTMENTS

(1) Remove door trim panel.

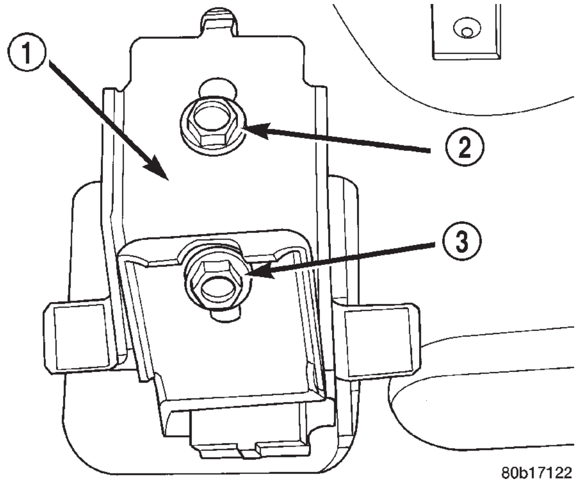


Fig. 8 Forward Up Stop Adjustment

1 - FORWARD UPSTOP
2 - ADJUSTMENT BOLT
3 - CONTACT BOLT

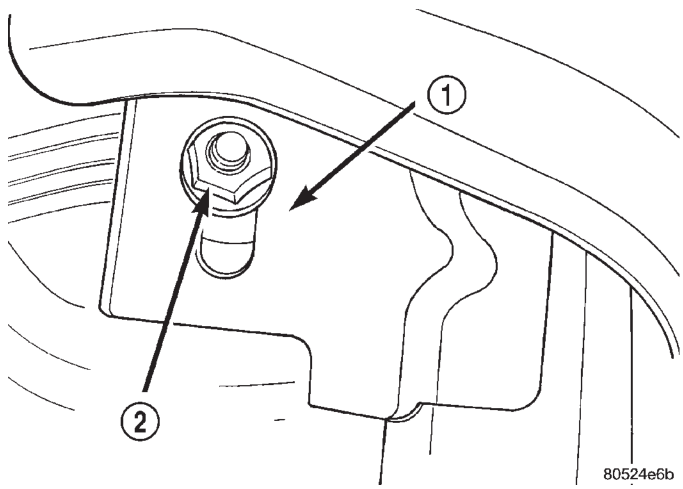


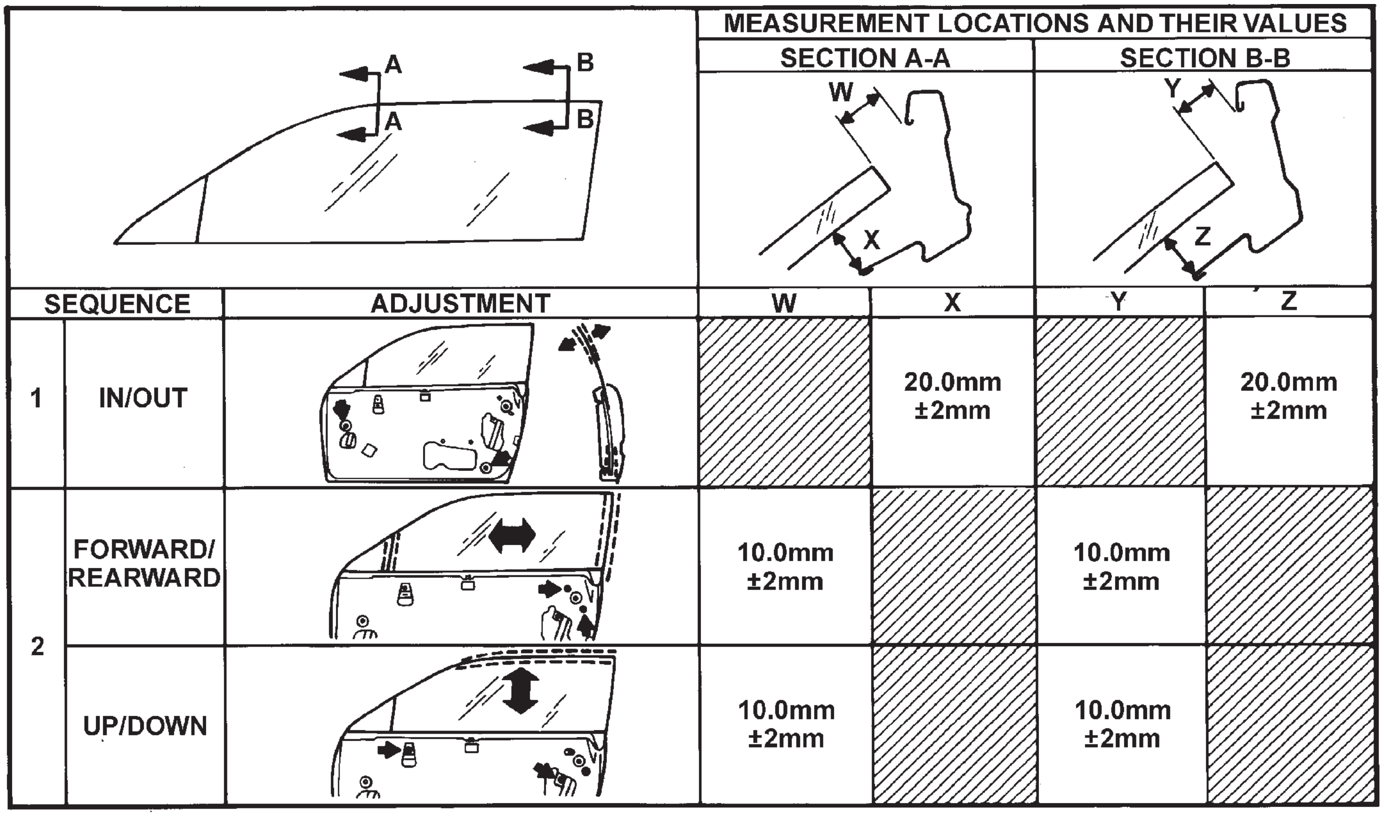
Fig. 9 Rear Up Stop Adjustment

1 - REAR UPSTOP
2 - UPSTOP ADJUSTMENT NUT

(2) Remove water shield as necessary to gain access to adjusters.
(3) Using a suitable wrench, loosen the lower jack screw jam nuts (Fig. 10).
(4) Remove weatherstrip from side rail weatherstrip retainer at point to be adjusted.
(5) Close door and raise glass.
(6) Using a suitable allen wrench, rotate jack screws to achieve the proper gap between the door glass weatherstrip retainer strip. Refer to Front Door Glass Adjustment Table.

NOTE: Remove only one weatherstrip section at a time or the glass to weatherstrip retainer measurements will not be accurate.

DOOR GLASS (Continued)



SEQUENCE		ADJUSTMENT	W	X	Y	Z
1	IN/OUT			20.0mm ±2mm		20.0mm ±2mm
2	FORWARD/ REARWARD		10.0mm ±2mm		10.0mm ±2mm	
	UP/DOWN		10.0mm ±2mm		10.0mm ±2mm	

NOTE: Forward / Rearward and Up/Down adjustment are to be made at the same time.

FRONT DOOR GLASS ADJUSTMENT SPECIFICATIONS

(7) Verify that the top edge of the door glass is beneath the lip of the weatherstrip.

(8) Tighten all fasteners.

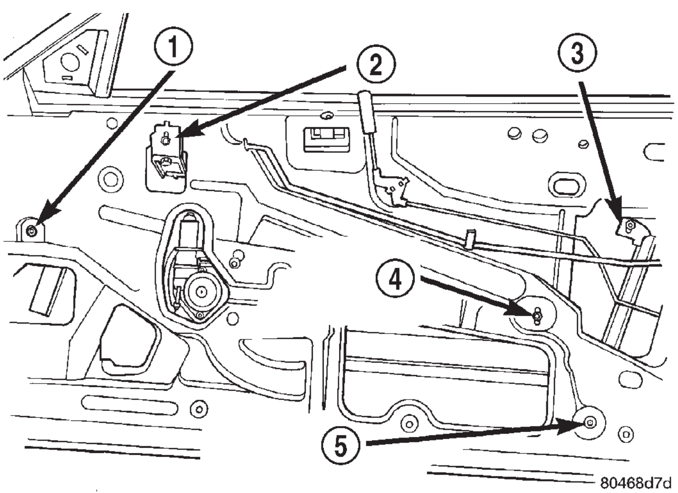


Fig. 10 Inboard/Outboard Glass Adjustment

1 - IN/OUT JACK SCREW
2 - FORWARD UP-STOP
3 - REAR UP-STOP
4 - ROLLER CHANNEL ADJUSTMENT
5 - IN/OUT JACK SCREW

GLASS – FRONT/REAR ADJUSTMENT

(1) Remove door trim panel and water shield.

(2) Lower door glass to gain access to glass attachments.

(3) Loosen three glass attachment bolts.

(4) Raise door glass and position correctly (Fig. 11).

(5) Tighten the two accessible glass fasteners in the full up position.

(6) Lower door glass and tighten the remaining glass fastener.

(7) Raise glass to top of travel and verify positioning. Refer to Front Door Glass Adjustment Table and (Fig. 11).

(8) To verify proper fit of the door glass to the header/A-pillar weatherstrip,

(a) Lower door glass slightly.

(b) Place a paper strip between the glass and weatherstrip near mirror flag and another near the front upper corner of the door glass.

(c) Raise glass to full up position.

(d) Pull the strip from between the door glass and the weatherstrip. There should be slight tension on the paper.

DOOR GLASS (Continued)

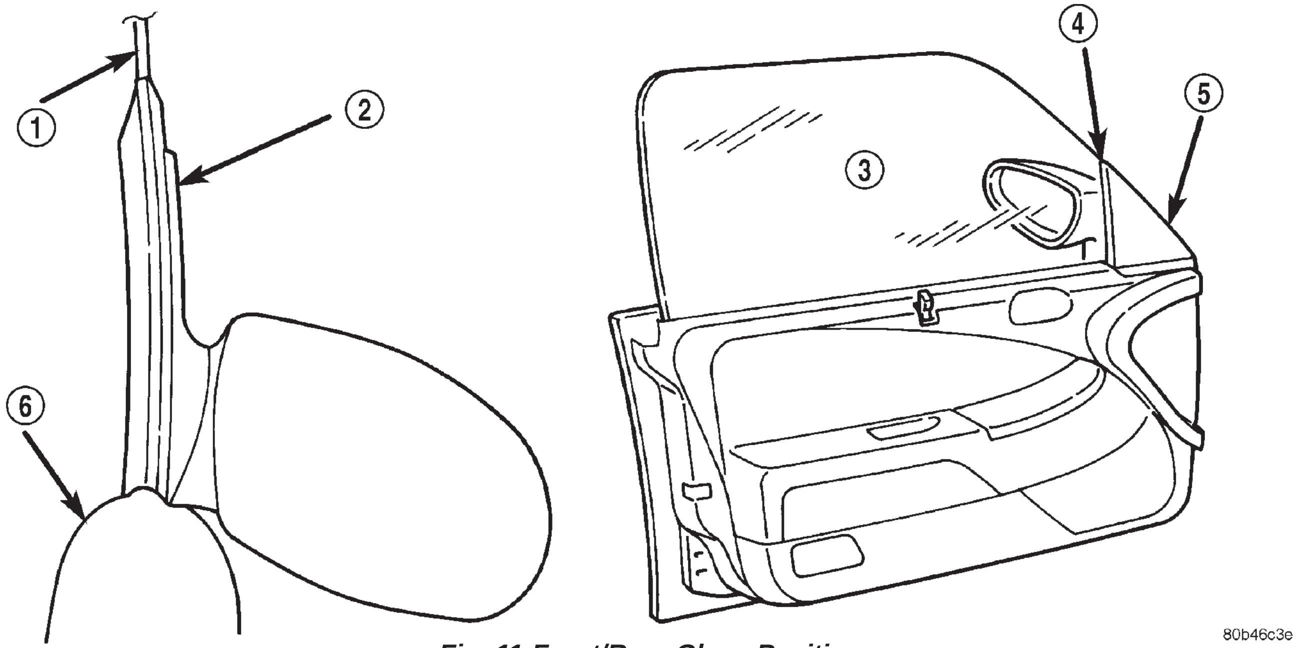


Fig. 11 Front/Rear Glass Position

1 - DOOR GLASS
2 - MIRROR STANCHION
3 - DOOR GLASS
4 - FLUSH
5 - MIRROR STANCHION
6 - DOOR

DOOR GLASS ALIGNMENT VERIFICATION

NOTE: Door Glass Alignment Verification procedure must be done whenever the door glass is adjusted and after all adjustments are made.

(1) Raise quarter glass to full up position.

(2) Close door and cycle door glass between full up and full down positions.

(3) Verify that door glass operates smoothly and maintains correct alignment to convertible top and quarter glass.

(4) Verify that quarter glass weatherstrip fully contacts door glass.

(5) Verify that no scissoring of the door glass and weatherstrip occurs.

(6) If any of the above conditions are found,

(a) Adjust quarter glass (Refer to 23 - BODY/ ADJUSTABLE QUARTER GLASS - ADJUSTMENTS).

(b) Readjust the door glass as necessary to cure the condition.

DOOR GLASS INNER BELT STABILIZER

REMOVAL

(1) Remove door trim panel.

(2) Remove nut attaching inner belt stabilizer to door panel.

(3) Remove inner belt stabilizer from door (Fig. 12).

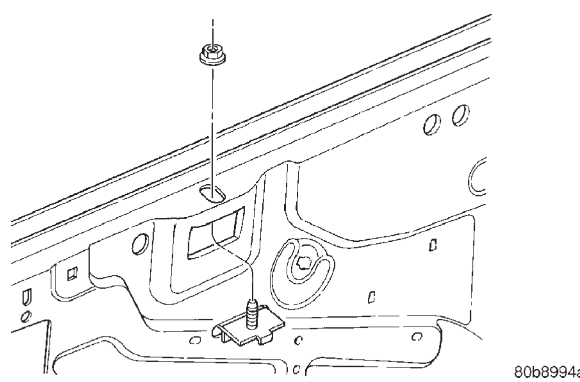


Fig. 12 Inner Belt Stabilizer

INSTALLATION

(1) Place inner belt stabilizer into position.

(2) Install nut attaching inner belt stabilizer to door panel. Adjust inner belt stabilizer against glass with enough tension to allow free up and down movement.

(3) Install door trim panel.

EXTERIOR HANDLE

REMOVAL

(1) Remove door trim panel(Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(2) Raise door glass.

(3) Remove water dam as necessary to gain access-(Refer to 23 - BODY/DOOR - FRONT/WATERDAM - REMOVAL).

(4) Disconnect latch rod at door latch.

(5) Remove nuts attaching door handle to outer door panel (Fig. 13).

(6) Remove outside door handle from door.

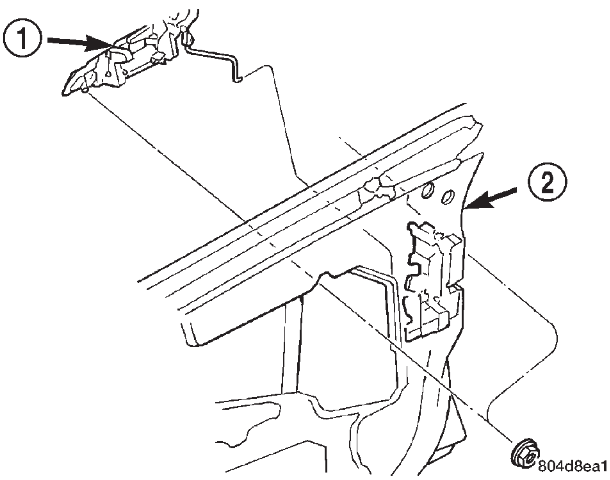


Fig. 13 OUTSIDE DOOR HANDLE - JR27 ONLY

1 - OUTSIDE DOOR HANDLE
2 - DOOR

INSTALLATION

(1) Position outside door handle on door (Fig. 13).

(2) Install nuts attaching door handle to outer door panel.

(3) Connect latch rod at door latch.

(4) Install water dam (Refer to 23 - BODY/DOOR - FRONT/WATERDAM - INSTALLATION).

(5) Install door trim panel(Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

(6) Verify door handle operation. Adjust door latch as necessary.

HINGE

REMOVAL

(1) Open and support door on a suitable lifting device.

(2) Remove bolts attaching door check strap to lower A–pillar for greater access, if necessary.

(3) Mark position of hinge on both the door end frame and lower A–pillar with a grease pencil or other suitable device to ease installation.

(4) Remove bolts attaching hinge to door end frame (Fig. 14).

(5) Remove bolts attaching hinge to lower A–pillar and remove the hinge.

(6) Remove door hinge from vehicle.

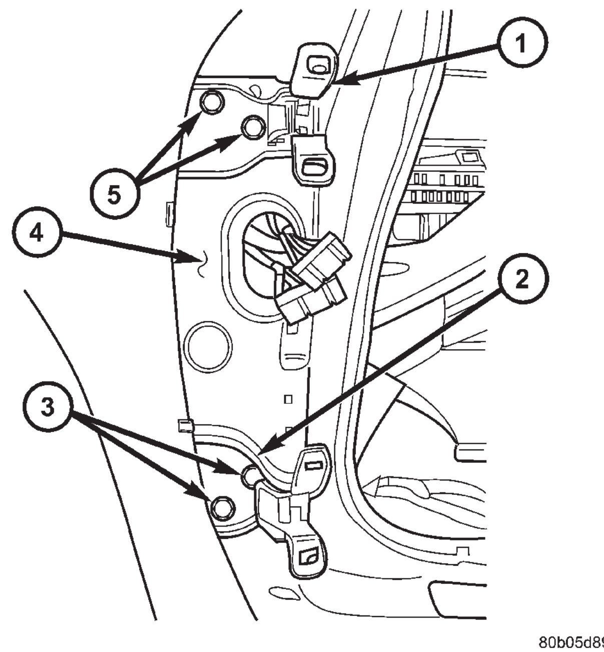


Fig. 14 FRONT DOOR HINGES

1 - UPPER HINGE
2 - LOWER HINGE
3 - LOWER HINGE BOLTS
4 - A-PILLAR
5 - UPPER HINGE BOLTS

INSTALLATION

(1) If necessary, paint new door hinge prior to installation.

(2) Loosely install bolts attaching hinge to lower A–pillar (Fig. 14).

(3) Door on a suitable lifting device position door to the hinge on vehicle.

(4) Loosely install bolts attaching hinge to door end frame.

(5) Align hinge to marks made previously and tighten all bolts.

(6) Install bolts attaching door check strap to lower A-pillar.

(7) Verify door fit and operation. Adjust door hinge for proper door alignment, if necessary.

LATCH

REMOVAL

(1) Remove door trim panel and watershield.
(2) Raise door glass.
(3) Disconnect lock rod from lock button bellcrank.
(4) Disengage lock and latch rods from clips on inner door panel (Fig. 15) or (Fig. 16).
(5) Disconnect lock and latch rods from outside door handle and key cylinder at door latch (Fig. 17).
(6) Disconnect wire connector from power door lock motor.
(7) Remove screws attaching door latch to door end frame (Fig. 18).
(8) Remove door latch from vehicle.

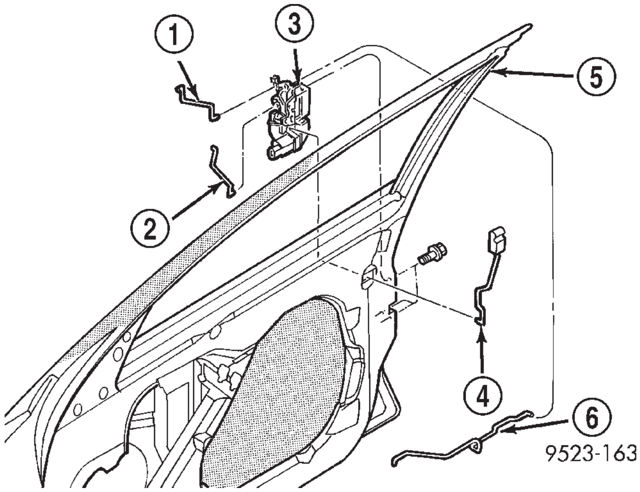


Fig. 15 Front Door Latch

1 - LATCH LINKAGE
2 - LOCK LINKAGE
3 - LATCH
4 - LOCK BUTTON
5 - FRONT DOOR
6 - LATCH RELEASE LINKAGE

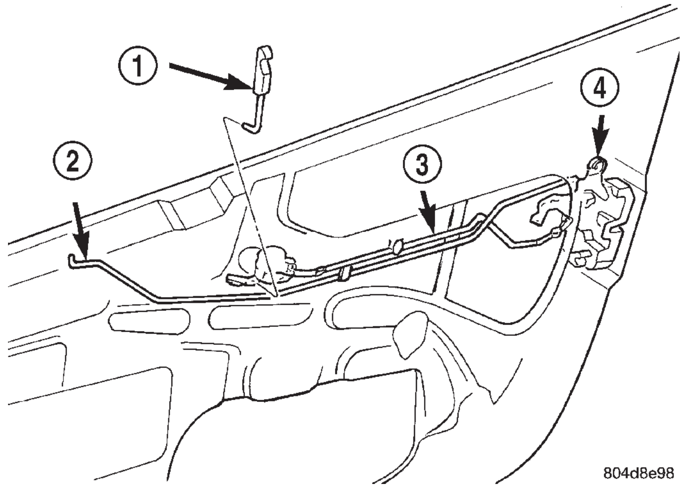


Fig. 16 Latch and Lock Rod Clips

1 - INSIDE LOCK BUTTON
2 - LATCH ROD
3 - LOCK ROD
4 - DOOR LATCH

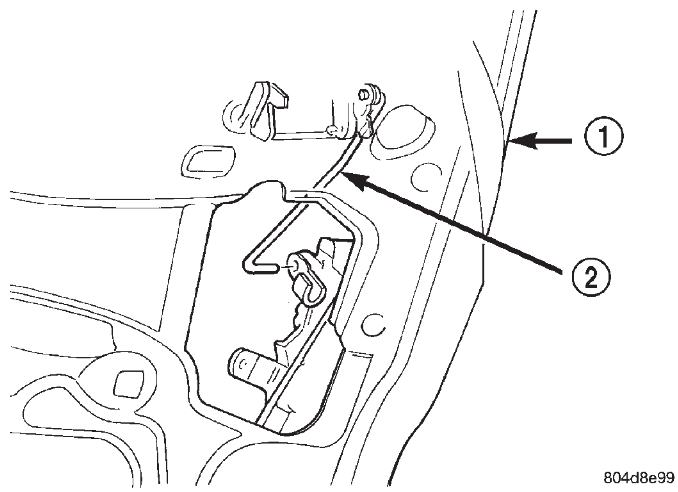


Fig. 17 Lock and Latch Rods At Door Latch

1 - DOOR
2 - DOOR LATCH ROD

INSTALLATION

CAUTION: Do not close door before adjusting the door latch. Door may fail to reopen.

(1) Position door latch on vehicle.
(2) Install screws attaching door latch to door end frame.
(3) Connect wire connector to power door lock motor.
(4) Connect lock and latch rods from outside door handle and key cylinder at door latch.
(5) Engage lock and latch rods to clips on inner door panel.
(6) Connect lock rod from lock button bellcrank.
(7) Adjust door latch.
(8) Verify operation of door latch. Readjust if necessary.
(9) Install door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION) and water dam (Refer to 23 - BODY/DOOR - FRONT/WATERDAM - INSTALLATION).

LATCH (Continued)

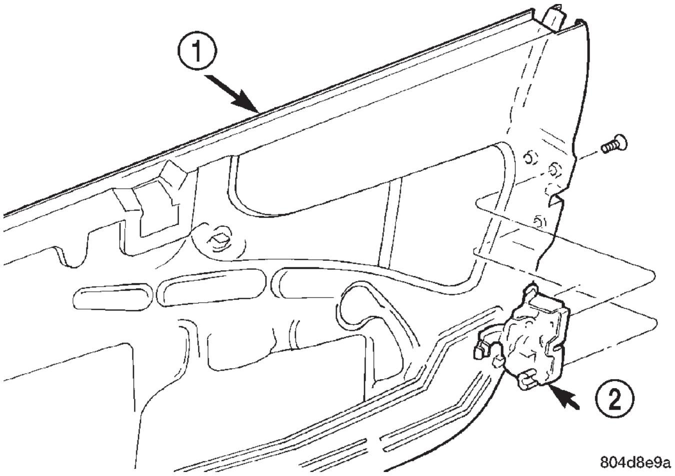


Fig. 18 Door Latch

1 - DOOR
2 - DOOR LATCH

ADJUSTMENTS

ADJUSTMENT

(1) Insert a suitable allen wrench through elongated slot in door end frame and loosen bolt 1/2 to one full turn (Fig. 19).

(2) Cycle outside door handle twice.

(3) Tighten adjusting screw to 3.4 N·m (30 in. lbs.) torque.

(4) Verify latch operation.

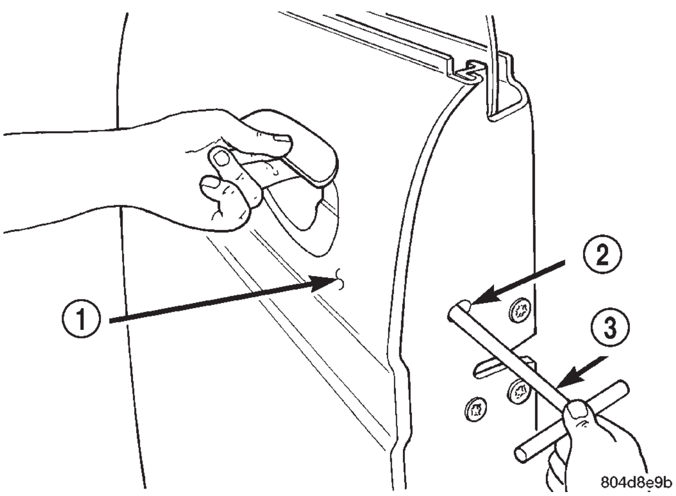


Fig. 19 Door Latch Adjustment

1 - DOOR
2 - SLOT
3 - ALLEN WRENCH

LATCH STRIKER

REMOVAL

(1) Mark outline of door latch striker on B-pillar to aid in installation.

(2) Remove screws attaching door latch striker to B-pillar (Fig. 20).

(3) Remove latch striker from vehicle.

NOTE: Be sure to check for any shims between door latch striker and B-pillar. If any shims are found, they must be reinstalled with the new door latch striker to maintain proper door operation.

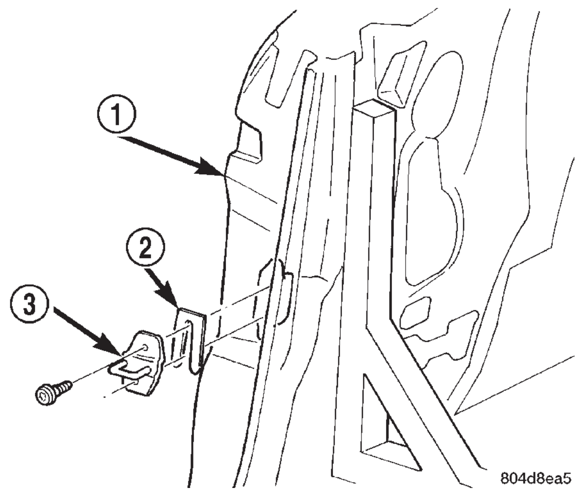


Fig. 20 Door Latch Striker

1 - B-PILLAR
2 - SHIM
3 - DOOR LATCH STRIKER

INSTALLATION

(1) Position door latch striker and any shims on vehicle.

(2) Loosely install screws attaching latch striker to B-pillar.

(3) Align latch striker to marks on B-pillar made previously.

(4) Tighten all fasteners.

(5) Verify door fit and operation. Adjust door latch striker as necessary.

LOCK BUTTON BELL CRANK

REMOVAL

(1) Remove door trim panel.

(2) Disengage clip holding lock linkage to bell crank.

(3) Rotate bell crank until retaining ears align with slots in door panel.

(4) Remove bell crank from door (Fig. 21).

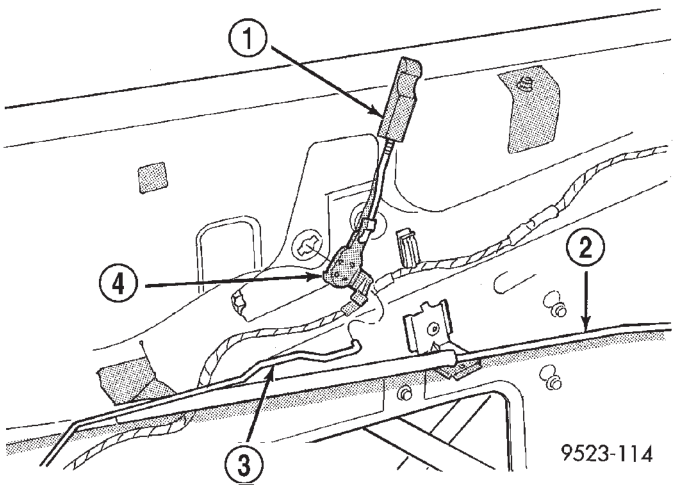


Fig. 21 Lock Button Bell Crank – Typical

1 - LOCK BUTTON
2 - LATCH LINKAGE
3 - LOCK LINKAGE
4 - BELL-CRANK

INSTALLATION

(1) Place bell crank into position.

(2) Rotate bell crank until retaining ears align with slots in door panel.

(3) Engage clip attaching lock linkage to bell crank.

(4) Install door trim panel.

LOCK CYLINDER

DESCRIPTION

Ignition, door, deck lid, and rear hatch lock cylinders are all codable to the key. Lock barrels, tumblers, and tumbler springs are available to allow the technician to change replacement locks cylinders to match the customer's original key set. See the appropriate section in this manual for lock cylinder removal. See the Mopar® catalogue for part numbers and lock coding procedures.

REMOVAL

(1) Remove outside door handle.

(2) Remove clip attaching lock cylinder to outside door panel (Fig. 22).

(3) Disengage clip attaching link to key cylinder.

(4) Remove lock cylinder from outer door panel.

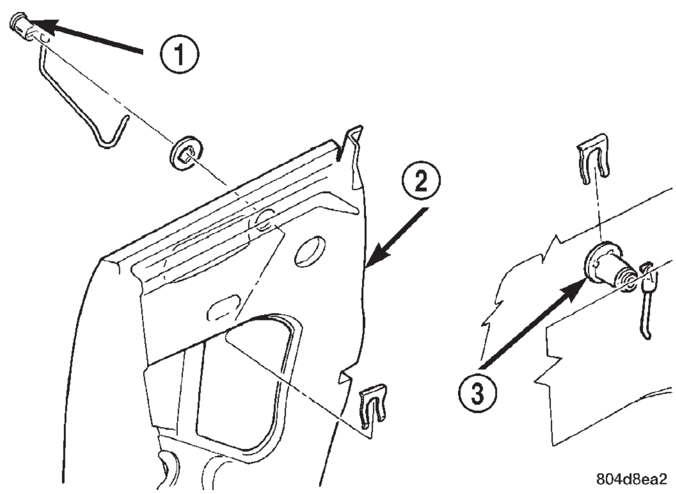


Fig. 22 Door Lock Cylinder

1 - DOOR LOCK CYLINDER
2 - DOOR
3 - DOOR LOCK CYLINDER

INSTALLATION

(1) Position lock cylinder and gasket in door outer panel.

(2) Install clip attaching lock cylinder to outside door panel.

(3) Engage link to key cylinder.

(4) Install outside door handle.

SIDE VIEW MIRROR FLAG/ DOOR GLASS CHANNEL

REMOVAL

(1) Remove side view mirror (Refer to 23 - BODY/ EXTERIOR/SIDE VIEW MIRROR - REMOVAL).

(2) Partially lower the door glass.

(3) Remove inner seal.

(4) Remove attaching fasteners (Fig. 23).

(5) Remove the adjustment stud. Count the number of turns to aid installation.

(6) Remove mirror flag.

INSTALLATION

(1) Align glass into the guide and position the mirror flag on door (Fig. 16).

(2) Install the adjustment stud and tighten the number of turns counted in the removal procedure.

(3) Install attaching fasteners.

(4) Install the inner glass seal.

SIDE VIEW MIRROR FLAG/DOOR GLASS CHANNEL (Continued)

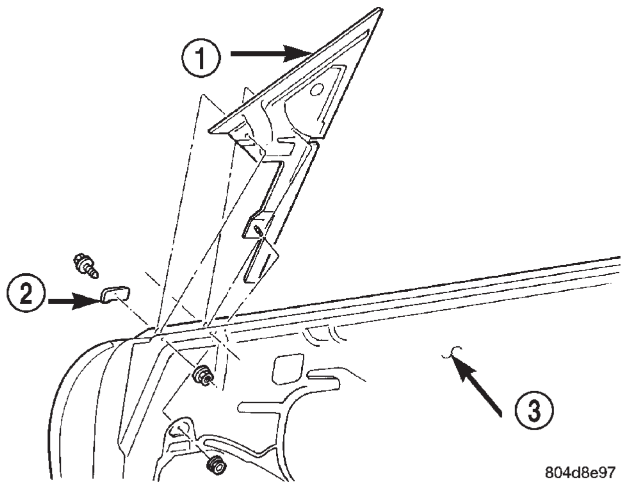


Fig. 23 Side View Mirror Flag/Door Glass Channel

1 - MIRROR FLAG/GLASS CHANNEL
2 - CLIP
3 - DOOR

(5) Install side view mirror (Refer to 23 - BODY/EXTERIOR/SIDE VIEW MIRROR - INSTALLATION).

(6) Verify glass fit and operation. Adjust door glass as necessary.

(7) Install door trim panel.

TRIM PANEL

REMOVAL

(1) Roll door glass down.

(2) Disengage two clips attaching speaker grille to door trim panel. They are at the front of the grille, one near the top, and the other one at the bottom.

(3) Remove three large washer-headed screws surrounding the speaker (Fig. 24).

(4) Remove access cover at front of door trim panel. Remove by prying at its rear edge (Fig. 25).

(5) Remove red courtesy reflector from lower tail or door. Disengage by prying at screwdriver notch at bottom of reflector.

(6) Remove flag trim panel from door by prying off at two attachment clips points (Fig. 25).

(7) Remove seven screws attaching door trim panel to door: (Fig. 24) and (Fig. 25).

(a) One screw is located at lower rear screw pocket.

(b) Three screws located along the bottom of door.

(c) One screw located inside handle opening.

(d) One screw located at the upper front.

(e) One screw in the pull cup.

(8) Disengage two hidden clips attaching at the rear of the trim panel, by prying off at two attachment clip points.

(9) Lift trim panel upward and away from door, disengage trim panel from upper retainer channel.

(10) Disengage clip attaching latch linkage to back door handle.

(11) Disconnect electrical connectors as necessary, including lower foot light, If equipped.

(12) Remove door trim panel from door.

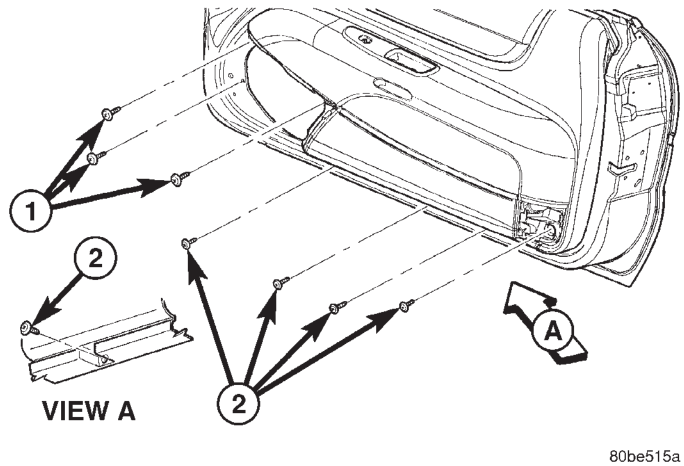


Fig. 24 Lower Door Trim Panel Removal

1 - SCREWS AT SPEAKER LOCATION
2 - BOTTOM OF DOOR TRIM PANEL

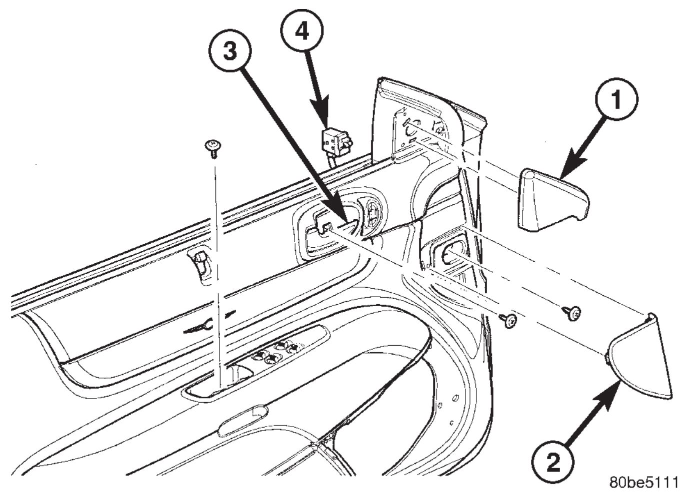


Fig. 25 Mirror Bezel and Door Trim Access Cover

1 - FLAG TRIM PANEL
2 - DOOR TRIM ACCESS COVER
3 - INSIDE REMOTE HANDLE
4 - POWER DOOR LOCK SWITCH

TRIM PANEL (Continued)

INSTALLATION

(1) Position door trim panel near to door.

(2) Connect electrical connectors as necessary, including foot light, if so equipped.

(3) Engage clip attaching latch linkage to inside door handle.

(4) Lift the door trim slightly to get the lock knob into its bezel opening on the panel.

(5) Place front portion of upper trim strip flange into retainer channel, while seating white forward locator pin into mating hole in sheetmetal at front of door.

(6) Drive screw into forward locator cup.

(7) With rear of panel slightly lifted, engage remainder of trim strip flange into retainer channel, working from front to back, pressing down firmly.

(8) Engage two hidden clips attaching rear of door trim to thier mating (green) grommet holes in the door. Press the rear of the panel firmly in toward the door, listening for engagement clicking sounds at BOTH of the clips.

(9) Install seven screws attaching door trim panel to door: (Fig. 24) and (Fig. 25).

(a) One screw in the pull cup.

(b) One screw located inside handle opening.

(c) One screw located at the upper front.

(d) One screw is located at lower rear screw pocket.

(e) Three screws located along the bottom of door.

(10) Snap screw covers closed.

(11) Install three large washer headed screws surrounding the speaker (Fig. 24).

(12) Install speaker grille by first engaging rear edge hinge flaps to mating slots, then pressing grille on to seat the two clips at front.

(13) Install red courtesy reflector by first engaging rear edge hinge flaps to mating slots, then snap front in to position.

(14) Install access cover at front of door trim panel. First engage slots at front, then snap in at rear edge (Fig. 25).

(15) Place flag trim panel into position and engage clips (Fig. 25).

(16) Close door window.

REAR VERTICAL GUIDE BAR

REMOVAL

(1) Remove door trim panel and watershield.

(2) Remove nut attaching top of guide bar to inner door panel.

(3) Using a suitable allen wrench, hold jack screw stationary while removing nut attaching bottom of guide bar to inner door panel.

(4) Remove guide bar from vehicle and remove through access hole in inner door panel (Fig. 26).

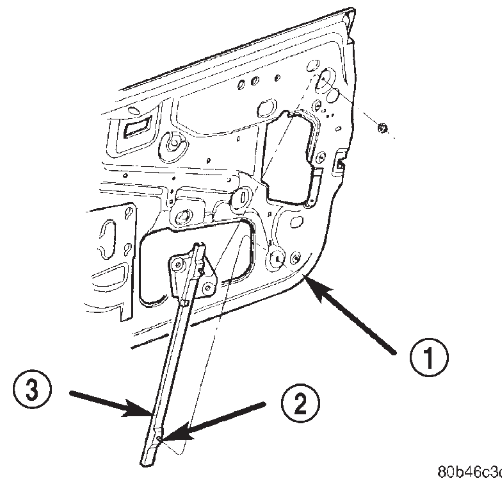


Fig. 26 Rear Vertical Guide Bar

1 - DOOR
2 - JACK SCREW
3 - REAR VERTICAL GUIDE BAR

INSTALLATION

(1) If a new guide bar is being installed, preset bottom jack screw using old guide bar as a reference.

(2) Position rear guide bar on vehicle.

(3) Using a suitable allen wrench, hold jack screw stationary while installing nut attaching bottom of guide bar to inner door panel.

(4) Install nut attaching top of rear guide bar to inner door panel.

(5) Verify glass fit and operation. Adjust door glass as necessary.

(6) Install door trim panel and watershield.

WATERDAM

REMOVAL

(1) Remove door trim panel.
(2) Remove door speaker, if equipped.
(3) Remove door trim pull cup mount bracket.
(4) Disengage clip attaching lock linkage to lock button bell crank.
(5) Peel water dam away from adhesive around perimeter of inner door panel (Fig. 27).

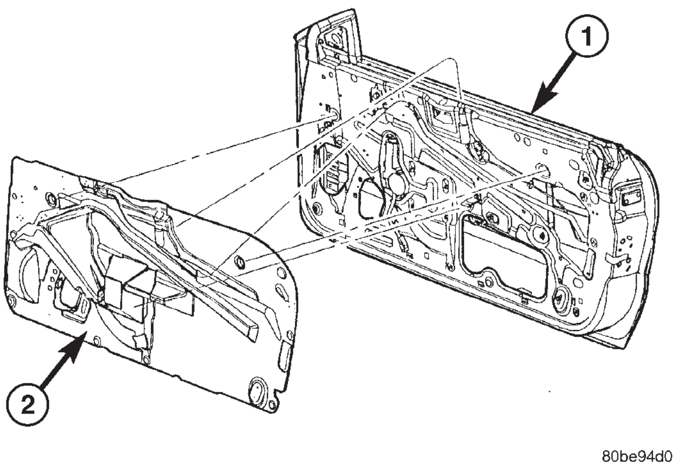


Fig. 27 DOOR WATER DAM

1 - DOOR
2 - WATER DAM

INSTALLATION

(1) Insure that enough adhesive remains to securely retain the water dam. Replace as necessary.
(2) Place the water dam into position and press securely to adhesive making sure to properly route wiring and linkages.
(3) Engage clip attaching lock linkage to lock button bell crank.
(4) Install door trim pull cup mount bracket.
(5) Install door speaker, if equipped.
(6) Install door trim panel.

WINDOW REGULATOR

REMOVAL

REMOVAL

NOTE: For power window motor removal procedures, (Refer to 8 - ELECTRICAL/POWER WINDOWS/WINDOW MOTOR - REMOVAL).

(1) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL)
(2) Remove glass from regulator roller channel. Secure glass in the up position in the door frame.
(3) Disconnect power window motor wire connector.
(4) Loosen screw attaching regulator scissor channel to door panel.
(5) Remove screw and bolt heads from keyhole slots in door panel.
(6) Loosen bolts attaching regulator to door panel.
(7) Remove regulator from door panel (Fig. 28).
(8) Slide regulator rearward and rotate forward end of roller channel through access hole in door panel.

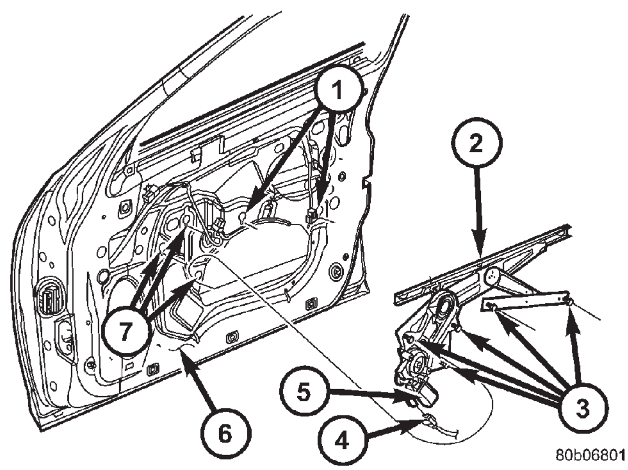


Fig. 28 FRONT DOOR REGULATOR

1 - MOUNTING SLOTS
2 - REGULATOR
3 - MOUNTING BOLTS
4 - ELECTRICAL CONNECTOR
5 - REGULATOR
6 - INNER DOOR
7 - MOUNTING SLOTS

WINDOW REGULATOR (Continued)

REMOVAL- JR-27 ONLY

NOTE: For power window motor removal procedures,(Refer to 8 - ELECTRICAL/POWER WINDOWS/ WINDOW MOTOR - REMOVAL).

(1) Remove door trim panel and water shield.
(2) Disconnect wire connector to power window motor.
(3) Remove nuts attaching regulator lift channel to door glass(Refer to 23 - BODY/DOOR - FRONT/ DOOR GLASS - REMOVAL).
(4) Secure door glass in upward position.
(5) Mark position of rear bolt of roller channel to inner door panel to aid in installation.
(6) Remove bolt attaching rear of roller channel to door panel.
(7) Loosen bolt attaching front of roller channel to door panel.
(8) Remove roller channel from door panel (Fig. 29).
(9) Loosen bolts attaching window regulator to inner door panel reinforcement.
(10) Remove bolt heads from key hole slots in inner door panel.
(11) Remove window regulator through large hole in inner door panel (Fig. 29).
(12) Remove power window motor from regulator (Refer to 8 - ELECTRICAL/POWER WINDOWS/ WINDOW MOTOR - REMOVAL).

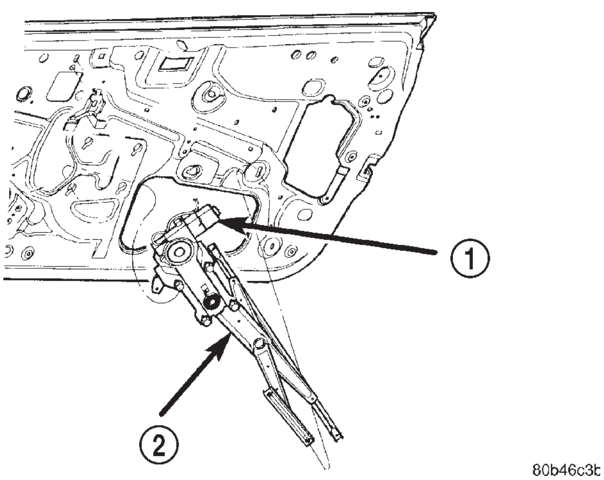


Fig. 29 Power Window Regulator

1 - POWER WINDOW MOTOR
2 - POWER WINDOW REGULATOR

INSTALLATION

INSTALLATION

NOTE: For power window motor service procedures (Refer to 8 - ELECTRICAL/POWER WINDOWS/WINDOW MOTOR - INSTALLATION).

(1) Position regulator in door through access hole in door panel.
(2) Position regulator on door panel.
(3) Tighten bolts attaching regulator to door panel.
(4) Position screw and bolt heads in keyhole slots in door panel.
(5) Tighten screw attaching regulator scissor channel to door panel.
(6) Connect power window motor wire electrical connector.
(7) Position glass in regulator roller channel.
(8) Tighten fasteners attaching door glass to roller channel.
(9) Install door trim panel. (Refer to 23 - BODY/ DOOR - FRONT/TRIM PANEL - INSTALLATION)

INSTALLATION - JR-27 ONLY

NOTE: For power window motor installation procedures, (Refer to 8 - ELECTRICAL/POWER WINDOWS/WINDOW MOTOR - INSTALLATION).

(1) Install power window motor on regulator (Refer to 8 - ELECTRICAL/POWER WINDOWS/WINDOW MOTOR - INSTALLATION).
(2) Move window regulator into position in door and engage bolt heads into key hole slots in inner door panel reinforcement and tighten bolts.
(3) Install roller channel to door panel.
(4) Install bolt at rear of roller channel. Make sure that bolt is aligned to mark on inner door panel made previously.
(5) Tighten front and rear bolts of roller channel.
(6) Install nuts attaching regulator lift channel to door glass.
(7) Verify glass fit and operation. Adjust door glass, if necessary.
(8) Connect wire connector to power window motor.
(9) Install door water dam (Refer to 23 - BODY/ DOOR - FRONT/WATERDAM - INSTALLATION) and trim panel (Refer to 23 - BODY/DOOR - FRONT/ TRIM PANEL - INSTALLATION).

APPLIQUE

REMOVAL

(1) Pull the glass run weatherstrip away from the window opening to access the applique screws. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FDR GLASS RUN WEATHERSTRIP - REMOVAL)

(2) Remove the screws and remove the applique (Fig. 30).

INSTALLATION

(1) Install the applique and install the screws.

(2) Position the glass run weatherstrip back into position. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/FRONT DOOR GLASS RUN WEATHERSTRIP - INSTALLATION)

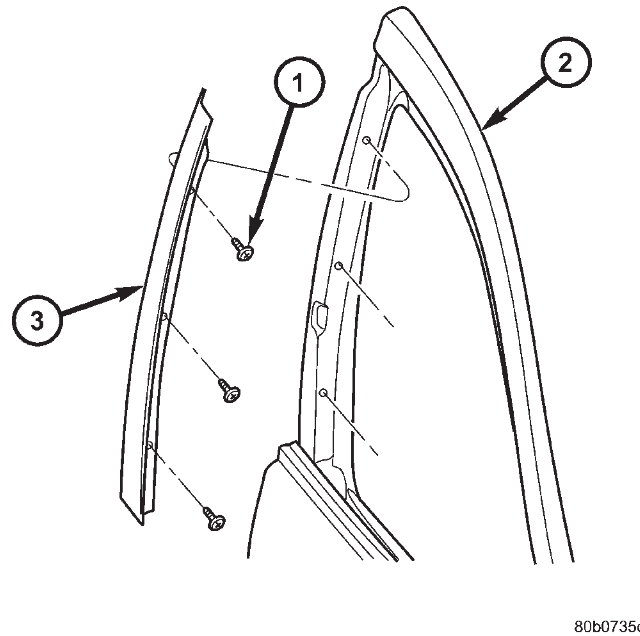


Fig. 30 01 FRONT DOOR APPLIQUE

1 - SCREWS
2 - FRONT DOOR
3 - APPLIQUE

DOORS - REAR

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DOORS - REAR

REMOVAL

(1) Remove rear door trim panel.
(2) Remove bolt attaching check strap to hinge pillar.
(3) Remove bolt attaching check strap to inner door panel (Fig. 1).
(4) Remove bolts attaching check strap to door end frame.
(5) Remove check strap from vehicle.

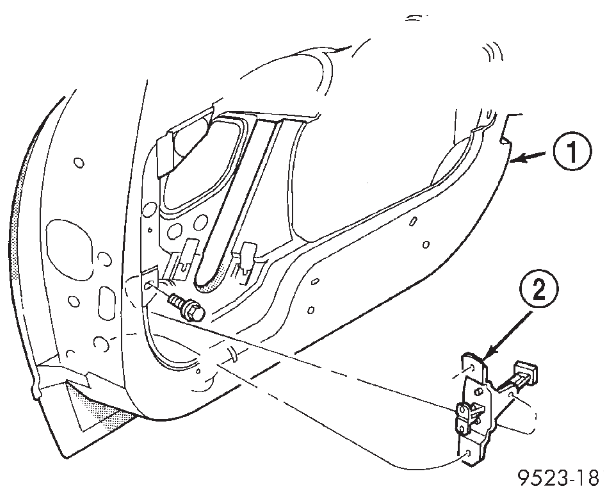

Fig. 1 Rear Door Check Strap

1 - REAR DOOR
2 - CHECK STRAP

APPLIQUE

REMOVAL

(1) Pull the glass run weatherstrip away from the window opening to access the applique screws. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR GLASS RUN WEATHERSTRIP - REMOVAL)

(2) Remove the screws under the glass run weatherstrip (Fig. 2).

(3) Remove the upper push-pin fastener.

(4) Remove the lower inner screw and remove the applique.

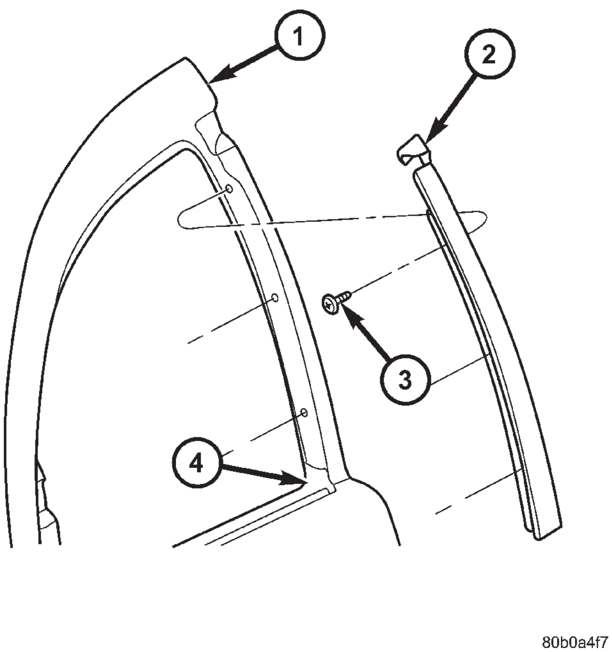

Fig. 2 REAR DOOR APPLIQUE

1 - DOOR
2 - APPLIQUE
3 - SCREWS
4 - INNER SCREW

INSTALLATION

(1) Install the applique and the screws.

(2) Install the upper push-in fastener.

(3) Install the lower screw.

(4) Position the glass run weatherstrip back into position. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/REAR DOOR GLASS RUN WEATHERSTRIP - INSTALLATION)

REAR CHECK STRAP

INSTALLATION

(1) Place check strap into position.

(2) Install bolts attaching check strap to door end frame.

(3) Install bolt attaching check strap to inner door panel.

(4) Install bolt attaching check strap to hinge pillar.

(5) Install rear door trim panel.

DOOR

REMOVAL

(1) Open and support door on a suitable lifting device.

(2) Mark all bolt and hinge attachment locations with a grease pencil or other suitable device to aid installation.

(3) Disengage wire connector at hinge pillar (Fig. 3).

(4) Remove bolts attaching door check strap to B-pillar.

(5) Remove the nuts and remove the door from vehicle.

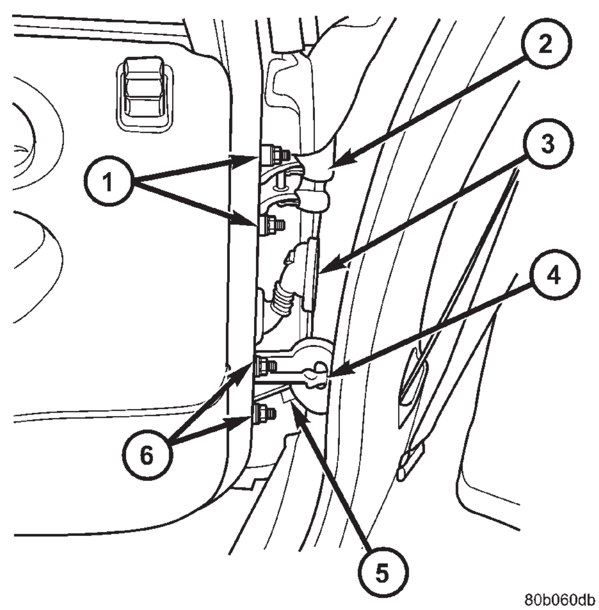

Fig. 3 REAR DOOR/HINGES

1 - UPPER HINGE NUTS
2 - UPPER HINGE
3 - ELECTRICAL CONNECTOR
4 - CHECK STRAP
5 - LOWER HINGE
6 - LOWER HINGE NUTS

DOOR (Continued)

INSTALLATION

(1) Position door onto the door hinges and install the nuts.

(2) Install bolts holding door check strap to hinge pillar.

(3) Engage wire connector at hinge pillar.

(4) Verify door fit and operation. Adjust the door for flushness and parallel gaps as necessary.

DOOR GLASS

REMOVAL

(1) Remove door trim panel and inner belt weatherstrip.

(2) Connect power window switch or install crank and lower window to 50 mm (2 in.) from bottom of travel.

(3) Loosen bolts holding rear lower run channel to inner door panel (Fig. 4).

(4) Separate rear run channel from door.

(5) Loosen screws holding regulator roller channel to glass.

(6) Slide roller channel rearward to allow screw heads to pass through key hole slots in channel.

(7) Separate glass from roller channel.

(8) Lift glass upward and out of the opening at top of door.

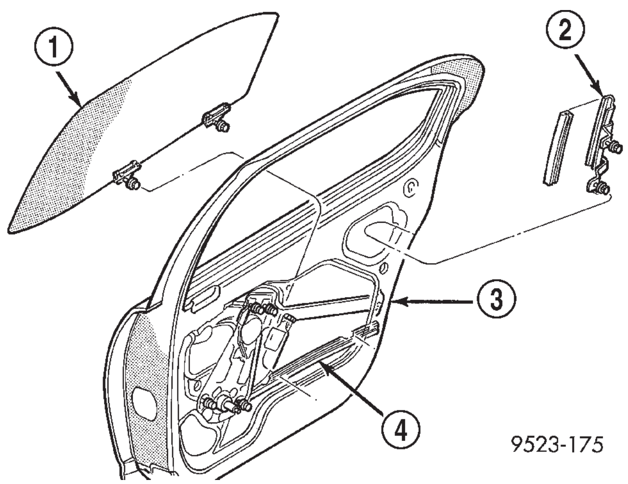

Fig. 4 Rear Door Glass

1 - REAR DOOR GLASS
2 - LOWER RUN CHANNEL
3 - REAR DOOR
4 - LIFT CHANNEL

INSTALLATION

(1) Lower door glass through opening at top of door.

(2) Position door glass onto roller channel.

(3) Slide roller channel forward to allow screw heads to engage key hole slots in channel.

(4) Tighten screws holding regulator roller channel to glass.

(5) Position rear run channel on door.

(6) Tighten bolts holding rear lower run channel to inner door panel.

(7) Install door trim panel and inner belt weatherstrip.

EXTERIOR HANDLE

REMOVAL

(1) Remove rear door trim panel.

(2) Close door glass.

(3) Disengage clip holding linkage to outside handle.

(4) Remove linkage from outside handle (Fig. 5).

(5) Remove nuts holding outside handle to outer door panel.

(6) Remove outside door handle from vehicle.

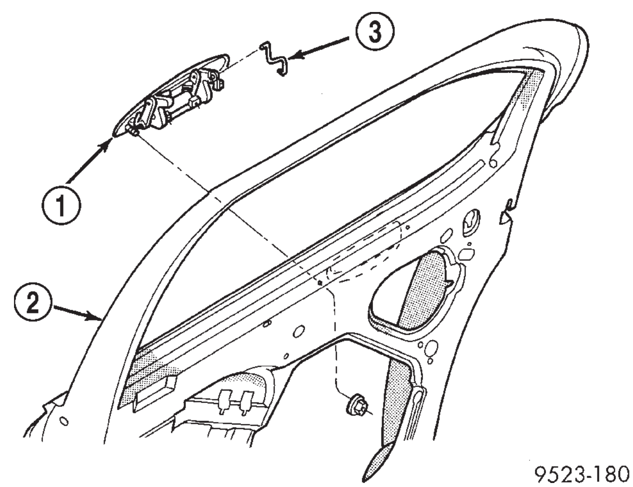

Fig. 5 Rear Door Outside Handle

1 - OUTSIDE DOOR HANDLE
2 - REAR DOOR
3 - LINKAGE

INSTALLATION

(1) Position outside door handle from vehicle.

(2) Install nuts attaching outside handle to outer door panel.

(3) Connect linkage to outside handle (Fig. 5).

(4) Connect clip holding linkage to outside handle.

(5) Replace the clips attaching trim panel to perimeter of door.

(6) Install rear door trim panel.

HINGE

REMOVAL

(1) Remove the door. (Refer to 23 - BODY/DOORS - REAR/DOOR - REMOVAL)

(2) Mark all bolt and hinge attachment locations with a grease pencil or other suitable device to aid installation.

(3) Remove the bolts and remove the hinges (Fig. 6).

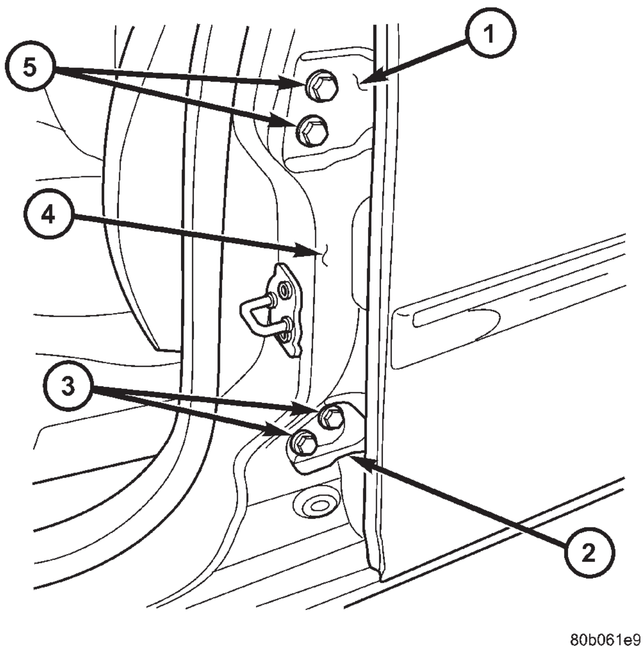

Fig. 6 REAR DOOR HINGES

1 - UPPER HINGE
2 - LOWER HINGE
3 - LOWER HINGE BOLTS
4 - B-PILLAR
5 - UPPER HINGE BOLTS

INSTALLATION

(1) If necessary, paint new door hinge prior to installation.

(2) Position door hinge on vehicle.

(3) Loosely install bolts attaching hinge to lower A–pillar.

(4) Align hinge to marks made previously and tighten all bolts.

(5) Install the door. (Refer to 23 - BODY/DOORS - REAR/DOOR - INSTALLATION)

LATCH

REMOVAL

(1) Remove rear door trim panel.

(2) Close door glass.

(3) Remove lower rear run channel.

(4) Disengage clips attaching linkage rods to door latch.

(5) Remove linkage rods from latch (Fig. 7).

(6) Remove screws attaching latch to door end frame.

(7) Remove latch from door.

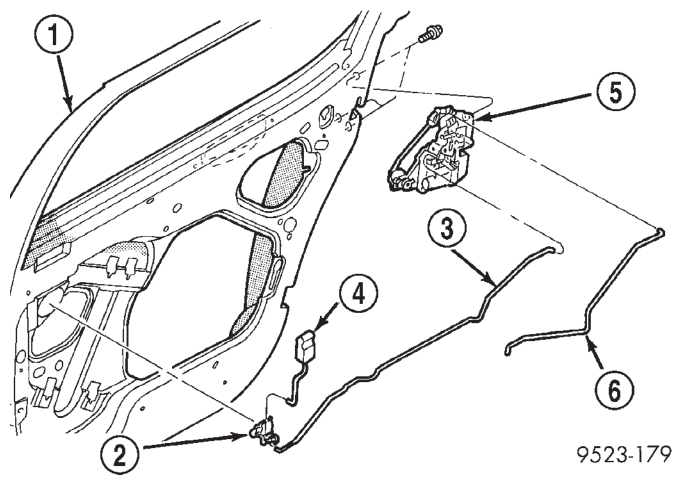

Fig. 7 Rear Door Latch

1 - REAR DOOR
2 - BELL CRANK
3 - LOCK LINKAGE
4 - LOCK BUTTON
5 - LATCH
6 - LATCH LINKAGE

INSTALLATION

CAUTION: Do not close door before adjusting the door latch, door may fail to open.

(1) Place rear door latch into position.

(2) Install screws attaching latch to door end frame.

(3) Install linkage rods from latch.

(4) Engage clips attaching linkage rods to door latch.

(5) Install lower rear run channel.

(6) Open door glass.

(7) Install rear door trim panel.

LATCH STRIKER

REMOVAL

(1) Mark outline of door latch striker on C-pillar to aid installation.

(2) Remove screws attaching door latch striker to C-pillar (Fig. 8).

(3) Remove door latch striker from vehicle.

NOTE: Be sure to check for any shims between door latch striker and C-pillar. If any shims are found, they must be reinstalled with the new door latch striker to maintain proper door operation.

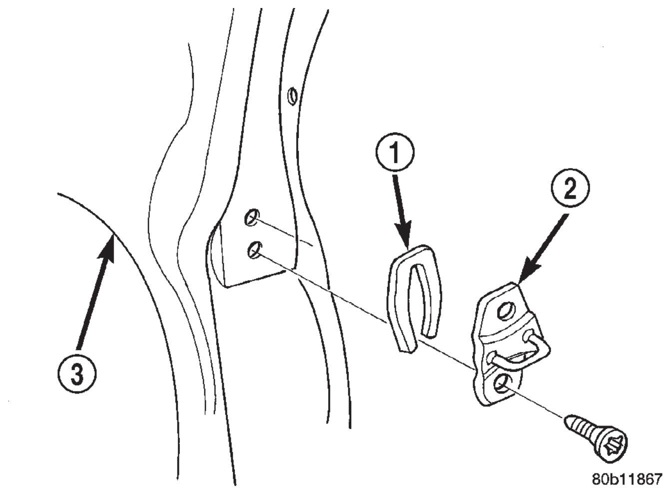

Fig. 8 Rear Door Latch Striker

1 - SHIM
2 - STRIKER
3 - QUARTER PANEL

INSTALLATION

(1) Position door latch striker and any shims on vehicle.

(2) Loosely install screws attaching latch striker to C-pillar.

(3) Align latch striker to marks on C-pillar made previously.

(4) Tighten all fasteners.

(5) Verify door fit and operation. Adjust door latch striker as necessary.

TRIM PANEL

REMOVAL

(1) Open rear door.

(2) Lower window.

(3) Open the screw cap from bottom of arm rest pull cup and remove the screw (Fig. 9).

(4) Open the screw cap from behind door latch handle and remove the screw.

(5) Remove the screws along the bottom of the trim panel.

(6) Using a trim stick C-4755 or equivalent, disengage clips holding perimeter of trim panel to rear door.

(7) Remove trim panel from inner belt weatherstrip at top of door.

(8) Disconnect wiring harness at door opening.

(9) Remove top of trim panel from door.

(10) Disengage clip holding linkage to latch handle (Fig. 10).

(11) Remove linkage from latch handle.

(12) Lift trim up and off lock button.

(13) Remove rear door trim panel from vehicle.

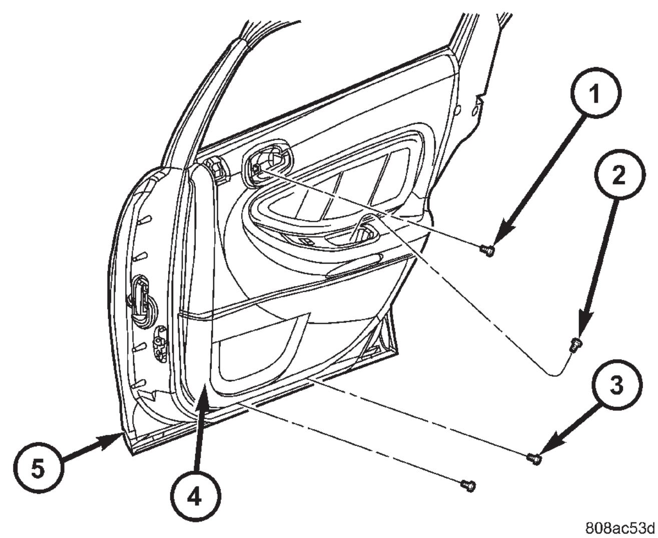

Fig. 9 Rear Door Trim Panel

1 - SCREW
2 - SCREW
3 - SCREW
4 - REAR DOOR TRIM PANEL
5 - REAR DOOR

INSTALLATION

(1) Position rear door trim panel on vehicle.

(2) Connect linkage to latch handle.

(3) Engage clip holding linkage to latch handle.

(4) Connect wiring harness at door opening.

(5) Position the lock knob through the trim panel and engage trim panel from inner belt weatherstrip at top of door.

(6) Align the clips attaching perimeter of trim panel to rear door with the grommets and engage.

(7) Install screws attaching door trim panel to door. (Fig. 9)

(8) Install screw holding door latch handle to door and close the screw cap.

TRIM PANEL (Continued)

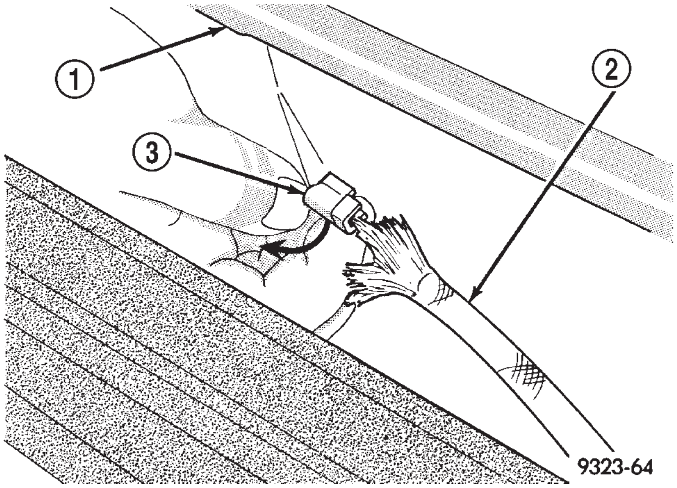

Fig. 10 Linkage Clip

1 - DOOR TRIM PANEL
2 - LATCH RELEASE ROD
3 - CLIP

(9) Install screw from bottom of arm rest pull cup and close the screw cap.

(10) Connect battery.

WATERDAM

REMOVAL

(1) Remove door trim panel.

(2) Remove door speaker, if equipped.

(3) Disconnect clip attaching lock linkage to lock button bell crank.

(4) Peel water dam away from adhesive around perimeter of inner door panel.

INSTALLATION

(1) Insure that enough adhesive remains to securely retain the water dam. Replace as necessary.

(2) Place the water dam into position and press securely to adhesive making sure to properly route wiring and linkages.

(3) Connect clip attaching lock linkage to lock button bell crank.

(4) Install door speaker, if equipped.

(5) Install door trim panel.

WINDOW REGULATOR

REMOVAL

(1) Remove door waterdam. (Refer to 23 - BODY/DOORS - REAR/WATERDAM - REMOVAL)

(2) Remove glass from regulator roller channel. Secure glass in the up position in the door frame.

(3) Disconnect power window motor wire connector, if equipped.

(4) Loosen screw attaching regulator scissor channel to door panel (Fig. 11).

(5) Remove screw and bolt heads from keyhole slots in door panel.

(6) Loosen bolts attaching regulator to door panel.

(7) Remove regulator from door panel.

(8) Slide regulator rearward and rotate forward end of roller channel through access hole in door panel.

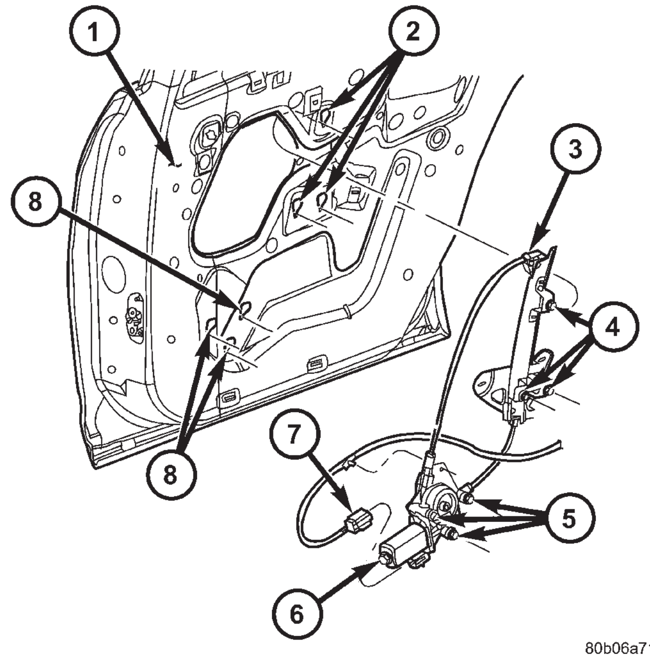

Fig. 11 REAR DOOR REGULATOR

1 - REAR DOOR
2 - MOUNTING SLOTS
3 - REAGULATOR
4 - BOLTS
5 - BOLTS
6 - MOTOR
7 - ELECTRICAL CONNECTOR
8 - MOUNTING SLOTS

INSTALLATION

(1) Position regulator on door panel through access hole in door panel.

(2) Tighten bolts attaching regulator to door panel.

(3) Install screw and bolt heads on scissor channel to keyhole slots in door panel.

(4) Tighten screw attaching regulator scissor channel to door panel.

(5) Connect power window motor wire connector, if equipped.

(6) Position glass to regulator roller channel.

(7) Tighten fasteners attaching door glass to roller channel.

(8) Install door waterdam. (Refer to 23 - BODY/DOORS - REAR/WATERDAM - INSTALLATION)

EXTERIOR

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ACCESSORY DRIVE BELT SPLASH SHIELD

REMOVAL

(1) Remove the right front wheelhouse splash shield. (Refer to 23 - BODY/EXTERIOR/RIGHT FRONT WHEELHOUSE SPLASH SHIELD - REMOVAL)

(2) Remove the six push-in fasteners attaching accessory drive belt splash shield to frame rail (Fig. 1).

(3) Remove accessory drive belt splash shield from vehicle.

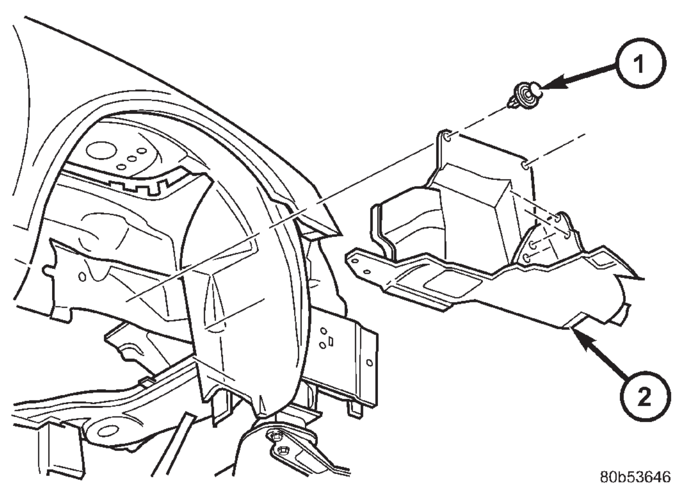

Fig. 1 ACCESSORY DRIVE BELT SPLASH SHIELD

1 - PUSH-PIN FASTENERS
2 - SPLASH SHIELD

INSTALLATION

(1) Install splash shield and install the six push-in fasteners attaching accessory drive belt splash shield to frame rail.

(2) Install the right front wheelhouse splash shield. (Refer to 23 - BODY/EXTERIOR/RF WHEELHOUSE SPLASH SHIELD - INSTALLATION)

BATTERY SPLASH SHIELD

REMOVAL

(1) Remove the three push-pin fasteners and remove the splash shield (Fig. 2).

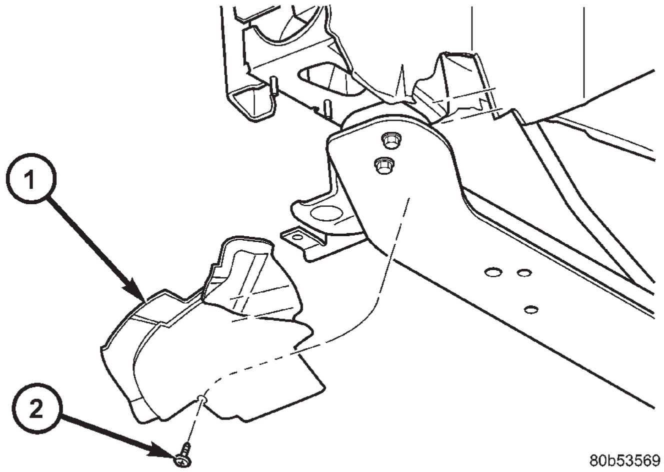

Fig. 2 BATTERY SPLASH SHIELD

1 - SPLASH SHIELD
2 - PUSH-PIN FASTENERS

INSTALLATION

(1) Install the splash shield and install the 3 push-pin fasteners.

BODY SIDE MOLDINGS

REMOVAL

(1) Warm the affected body side molding and body metal to approximately 38° C (100° F) using a suitable heat lamp or heat gun.

(2) Pull body side molding from vehicle (Fig. 3).

(3) Remove adhesive tape residue from surface of vehicle.

INSTALLATION

(1) If molding is to be reused, remove tape residue from molding. Clean back of molding with Mopar® Super Kleen solvent or equivalent. Wipe molding dry with lint free cloth. Apply new body side molding (two sided adhesive) tape to back of molding.

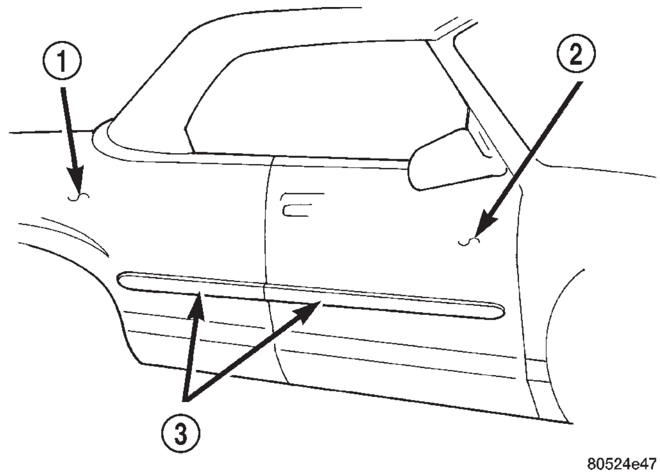

Fig. 3 Body Side Molding

1 - QUARTER PANEL
2 - DOOR
3 - BODYSIDE MOLDING

(2) Clean body surface with Mopar® Super Kleen solvent or equivalent. Wipe surface dry with a lint free cloth.

(3) Apply a length of masking tape on the body parallel to the top edge of the molding to use as a guide, if necessary.

(4) Remove protective cover from tape on back of molding. Apply molding to body below the masking tape guide.

(5) Remove masking tape guide. Heat body metal and body side molding to approximately 38° C (100° F) using a suitable heat lamp or heat gun.

(6) Firmly press body side molding to body surface to insure adhesion.

COWL COVER

REMOVAL

(1) Release hood latch and open hood.

(2) Remove windshield wiper arms(Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - REMOVAL).

(3) Remove screws attaching cowl cover to cowl (Fig. 4).

(4) Remove the seal, cowl screen to hood inner panel.

(5) Remove clips attaching cowl cover to cowl plenum under hood to cowl bulb seal.

(6) Remove cowl cover from vehicle.

COWL COVER (Continued)

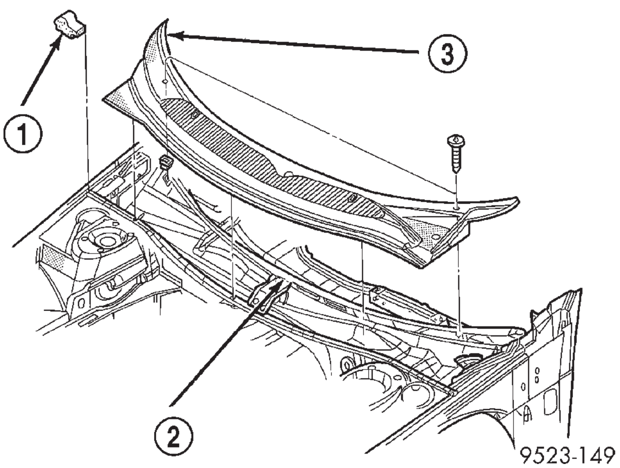

Fig. 4 Cowl Cover

1 - SEAL
2 - COWL
3 - COWL COVER

INSTALLATION

(1) Position cowl cover to vehicle.
(2) Install clips attaching cowl cover to cowl plenum.
(3) Install the seal, cowl screen to hood inner panel.
(4) Install screws attaching cowl cover to cowl.
(5) Install windshield wiper arms (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - INSTALLATION).

EXTERIOR NAME PLATES

REMOVAL - FOAM TAPE

(1) Mark reference points before removing.
(2) Using a heat gun gently apply heat in a circular motion to loosen the adhesive bond.
(3) Using a trim stick C 4755 or equivalent, gently pry up at corners and remove.
(4) Clean off all traces of adhesive or double sided tape from the panel with a general purpose adhesive remover.

INSTALLATION - FOAM TAPE

(1) Clean panel surface with isopropyl alcohol.
(2) Align badging to reference points.
(3) Install and press securely to full adhesive contact
(4) Clean away any reference points.

FRONT FENDER

REMOVAL

(1) Remove headlamp housing.
(2) Remove mud guard.
(3) Remove inner splash shield.
(4) Remove fender to fascia bolt (Fig. 5) or (Fig. 6).
(5) Remove fender bolt to lower rocker panel.
(6) Remove fender bolt to lower cowl.
(7) Pull fascia away from fender.
(8) Remove bolts attaching fender to upper rail.
(9) Remove fender from vehicle.

INSTALLATION

(1) Place fender in position on vehicle.
(2) Start the center upper rail bolt (Fig. 5) or (Fig. 6).

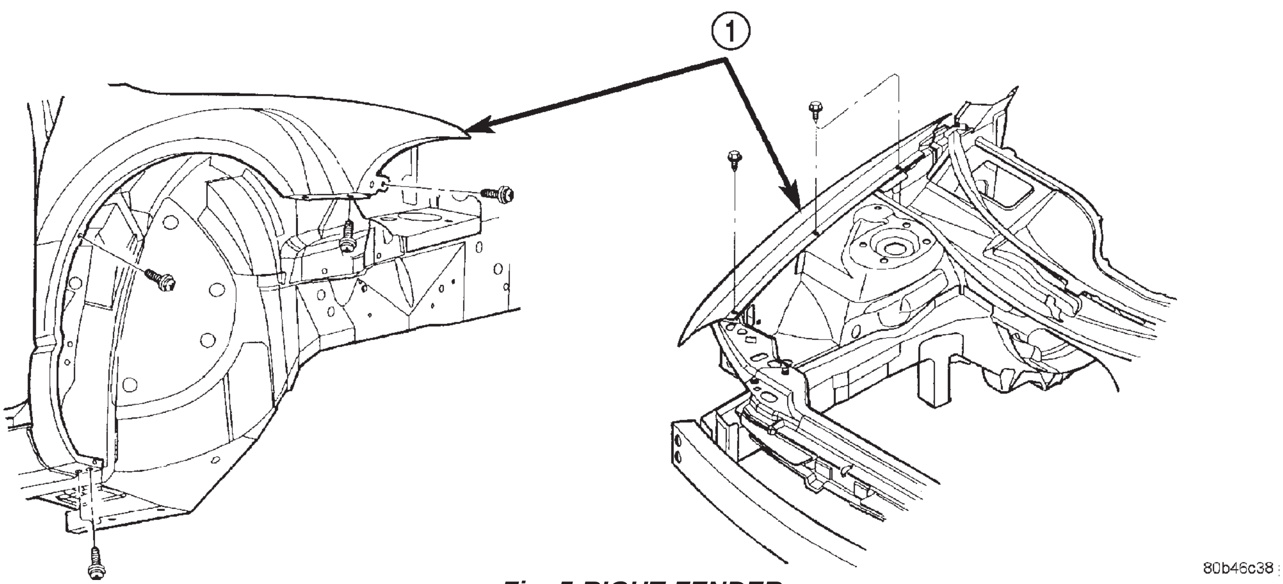

Fig. 5 RIGHT FENDER

1 - FRONT FENDER

FRONT FENDER (Continued)

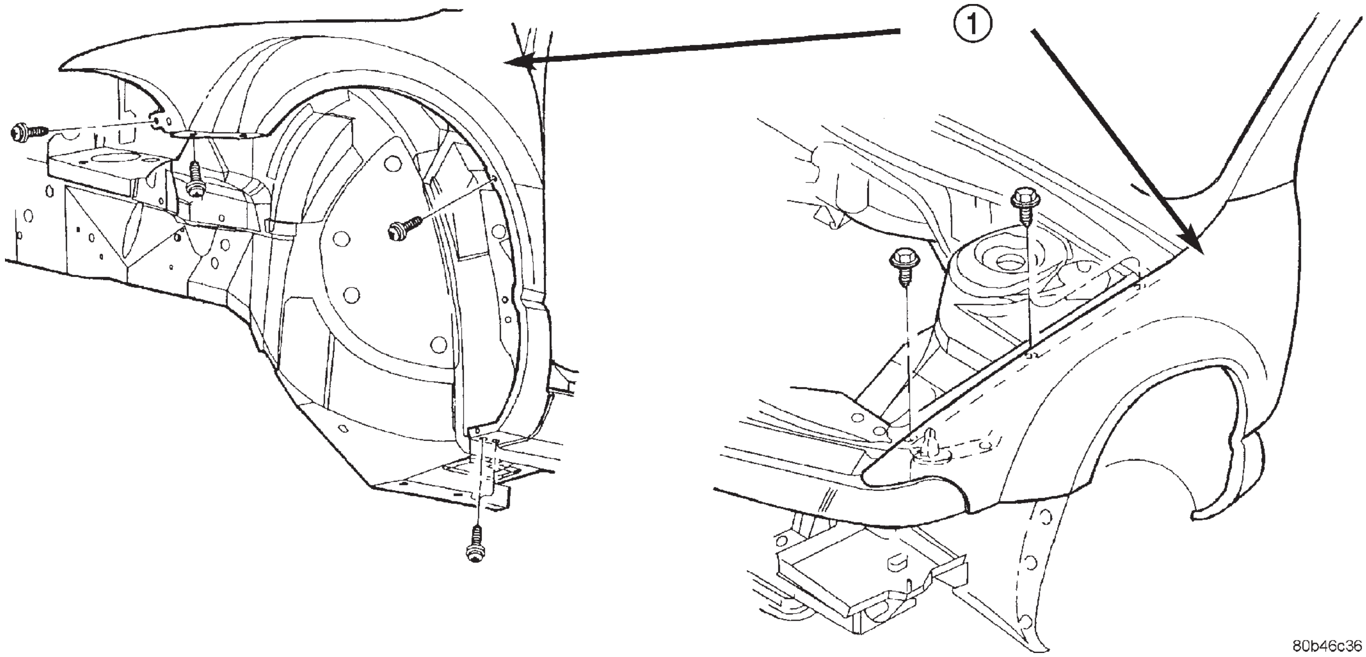

Fig. 6 LEFT FENDER

1 - FENDER

(3) From inside engine compartment, start the center upper rail bolt. Install all the bolts attaching fender to upper rail and tighten.
(4) Install fender to lower cowl panel bolt.
(5) Install fender to rocker panel bolt.
(6) Place fascia into position.
(7) Install fender to fascia bolt.
(8) Install inner splash shield.
(9) Install mud guard.
(10) Install headlamp assembly.
(11) Check fender for flush and gap.

FUEL FILL DOOR

REMOVAL

(1) Open fuel filler door.
(2) Remove the two torx screws (Fig. 7).
(3) Remove fuel filler door from vehicle.

INSTALLATION

(1) Place fuel filler door into position.
(2) Install the two torx screws.
(3) Ensure that door operates properly.

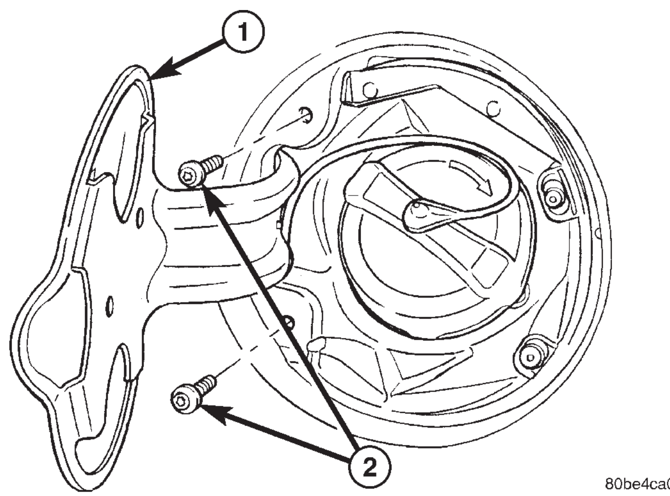

Fig. 7 Fuel Filler Door

1 - FUEL FILLER DOOR
2 - TORX SCREWS

GRILLE

REMOVAL

REMOVAL

(1) Remove front bumper fascia, (Refer to 13 - FRAMES & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL).

(2) Remove fascia from the vehicle.

(3) Separate foam impact bar from fascia.

(4) Remove clips attaching grille (Fig. 8) or (Fig. 9).

(5) Remove grille from fascia.

(6) Transfer medallion.

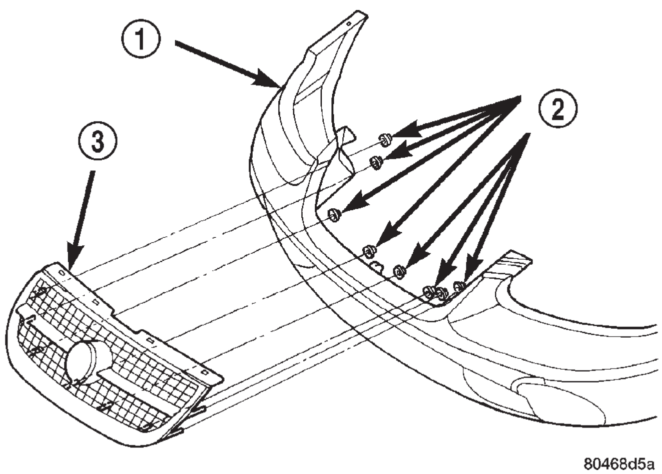

Fig. 8 Grille

1 - FASCIA
2 - PUSH NUTS
3 - GRILLE

REMOVAL - JR-27

(1) Remove front bumper fascia, (Refer to 13 - FRAMES & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL).

(2) Remove fascia from the vehicle.

(3) Remove foam impact bar from fascia.

(4) Remove clips attaching grille (Fig. 10).

(5) Remove grille from fascia.

(6) Transfer medallion.

(7) Remove grille from fascia.

INSTALLATION

INSTALLATION

(1) Position grille on fascia.

(2) Install clips attaching grille to fascia.

(3) Install foam impact bar to fascia.

(4) Place fascia into position.

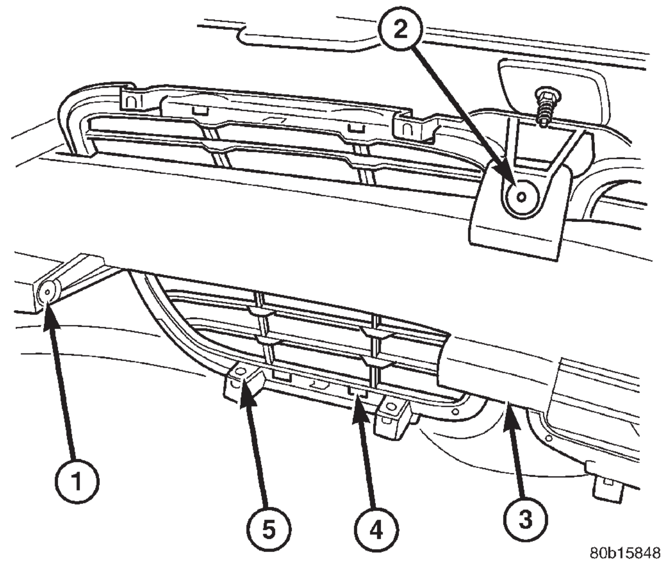

Fig. 9 GRILLE – STRATUS

1 - FASTENER
2 - FASTENER
3 - REINFORCEMENT
4 - GRILLE
5 - FASTENER

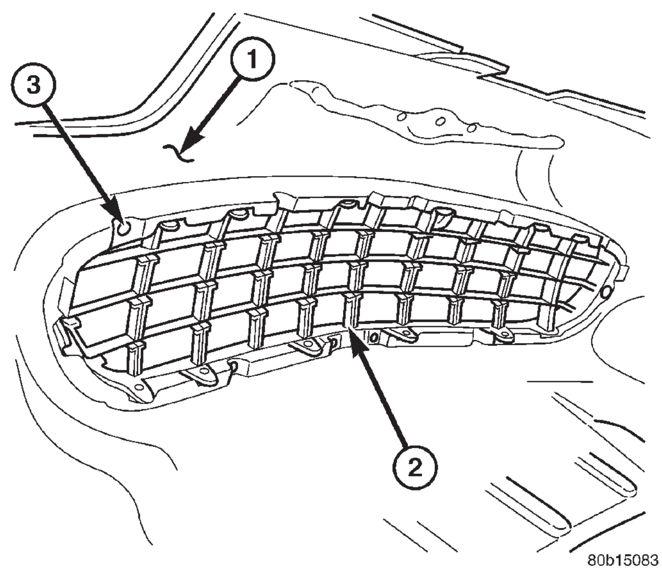

Fig. 10 REAR OF GRILLE

1 - FRONT FASCIA
2 - FRONT GRILLE
3 - FASTENER

(5) Install front bumper fascia, (Refer to 13 - FRAMES & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION).

GRILLE (Continued)

INSTALLATION - JR-27

(1) Position grille on fascia.
(2) Install clips attaching grille to fascia (Fig. 10).
(3) Install foam impact bar to fascia.
(4) Place fascia into position.
(5) Install front bumper fascia, (Refer to 13 - FRAMES & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION).

LEFT FRONT WHEELHOUSE SPLASH SHIELD

REMOVAL

(1) Remove left front wheel. (Refer to 22 - TIRES/WHEELS - REMOVAL)
(2) Remove the fender trim (Fig. 11).
(3) Remove the six push pins fasteners and remove the transmission splash shield (Fig. 12).
(4) Remove the four push pin fasteners and remove the wheelhouse splash shield (Fig. 13).

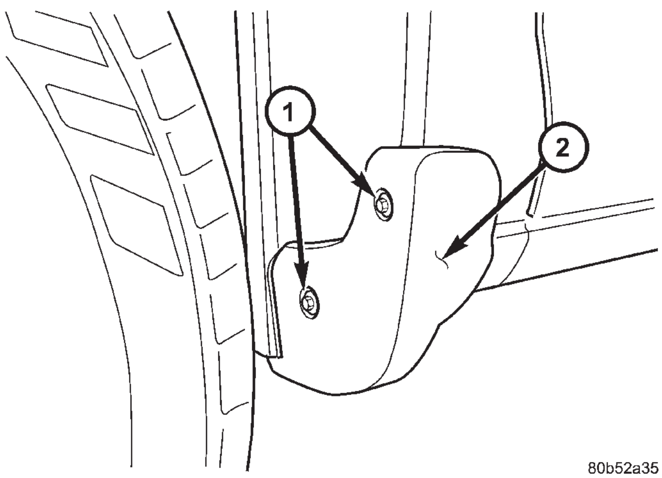

Fig. 11 FENDER TRIM – TYPICAL

1 - SCREWS
2 - FENDER TRIM

INSTALLATION

(1) Install the wheelhouse splash shield and install the 4 push pin fasteners.
(2) Install the transmission splash shield and install the six push pin fasteners.
(3) Install the fender trim and the trim screws.
(4) Install the wheel assembly. (Refer to 22 - TIRES/WHEELS - INSTALLATION)

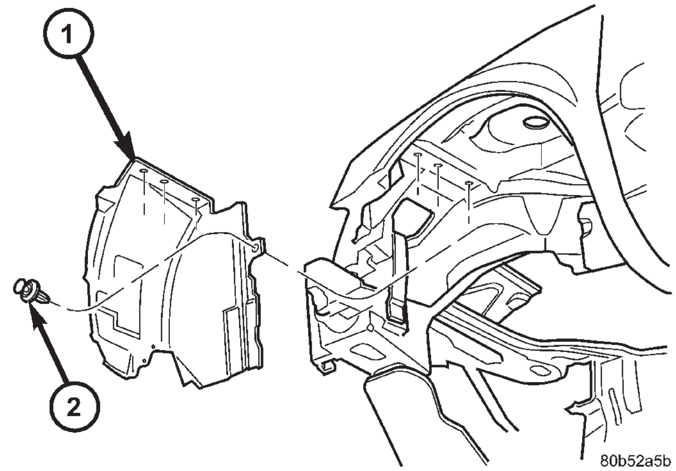

Fig. 12 TRANSMISSION SPLASH SHIELD

1 - SPLASH SHIELD
2 - PUSH PIN FASTENERS

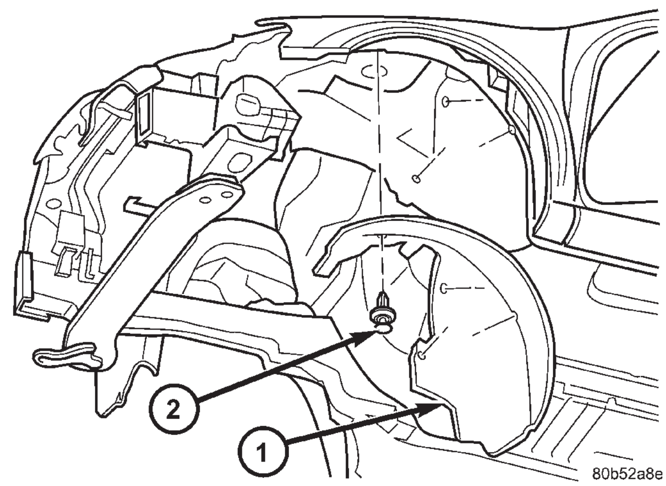

Fig. 13 WHEELHOUSE SPLASH SHIELD

1 - WHEELHOUSE SPLASH SHIELD
2 - PUSH PIN FASTENERS

RADIATOR SUPPORT CROSSMEMBER

REMOVAL

(1) Release hood latch and open hood.

(2) Remove push-in fasteners attaching fascia/ grille to radiator support crossmember.

(3) Remove bolts attaching support braces to bottom of radiator support crossmember.

(4) Remove bolts attaching crossmember to radiator closure panel.

(5) Remove nuts attaching hood latch to radiator support crossmember.

(6) Remove radiator support crossmember from vehicle.

INSTALLATION

(1) Install radiator support crossmember to vehicle.

(2) Install nuts attaching hood latch to radiator support crossmember.

(3) Install bolts attaching crossmember to radiator closure panel.

(4) Install bolts attaching support braces to bottom of radiator support crossmember.

(5) Install push-in fasteners attaching fascia/grille to radiator support crossmember.

(6) Close hood.

REAR WHEELHOUSE SPLASH SHIELD

REMOVAL

(1) Remove the wheel. (Refer to 22 - TIRES/ WHEELS - REMOVAL)

(2) Remove the six push pin fasteners and remove the wheelhouse splash shield (Fig. 14).

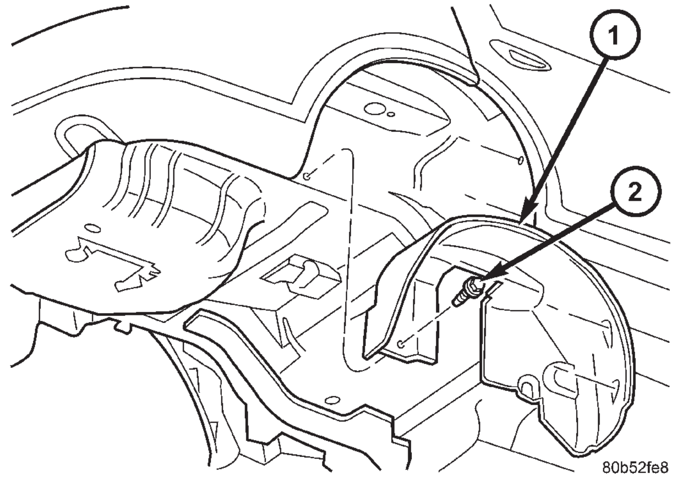

Fig. 14 WHEELHOUSE SPLASH SHIELD

1 - SPLASH SHIELD
2 - PUSH PIN FASTENERS

INSTALLATION

(1) Position the splash shield and install the six push pin fasteners.

(2) Install the wheel. (Refer to 22 - TIRES/ WHEELS - INSTALLATION)

RIGHT FRONT WHEELHOUSE SPLASH SHIELD

REMOVAL

(1) Remove the screws and remove the fender trim (Fig. 11).

(2) Remove right front wheel. (Refer to 22 - TIRES/WHEELS - REMOVAL)

(3) Remove the four push pin fasteners and remove the splash shield. (Fig. 15).

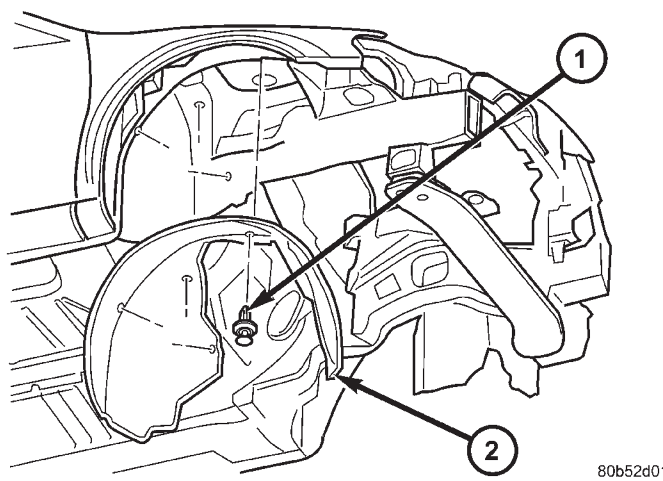

Fig. 15 SPLASH SHIELD

1 - PUSH PIN FASTENERS
2 - SPLASH SHIELD

INSTALLATION

(1) Install the wheelhouse splash shield and install the four push pin fasteners.

(2) Install the wheel assembly. (Refer to 22 - TIRES/WHEELS - INSTALLATION)

SIDE VIEW MIRROR

REMOVAL

(1) Remove side view mirror cover (Fig. 16).

(2) Remove the door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).

(3) Disconnect power window mirror motor wire connector, if so equipped.

(4) Disengage wire harness grommet from mirror flag, if so equipped.

(5) Remove nuts attaching side view mirror to mirror flag (Fig. 17).

(6) Remove side view mirror from vehicle.

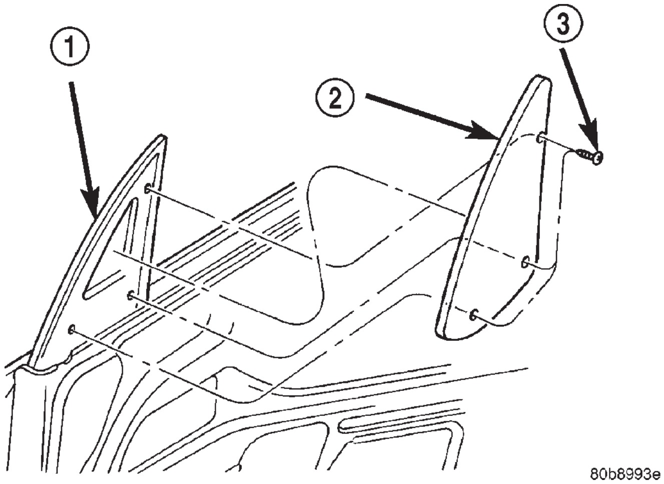

Fig. 16 Side View Mirror Cover

1 - MIRROR FLAG
2 - SIDE VIEW MIRROR COVER
3 - FASTENERS

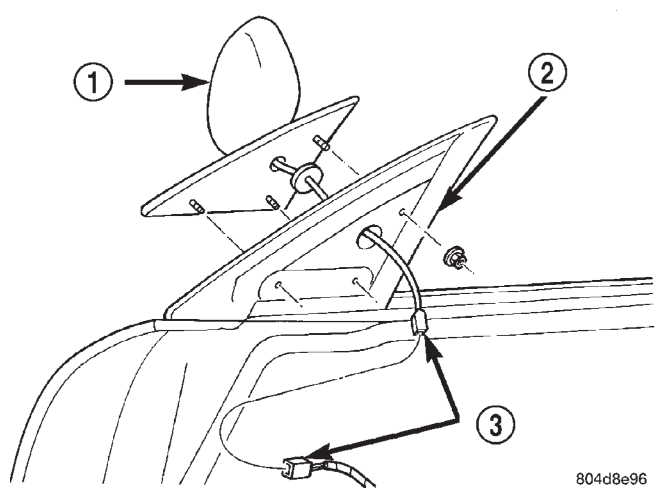

Fig. 17 Side View Mirror

1 - SIDE VIEW MIRROR
2 - MIRROR FLAG/GLASS CHANNEL
3 - WIRE CONNECTOR

INSTALLATION

(1) Feed power mirror wire harness through hole in mirror flag and seat grommet. Do not pull on wire harness to seat grommet.

(2) Position side view mirror to vehicle.

(3) Install nuts attaching side view mirror to mirror flag.

(4) Engage push in fastener attaching power mirror wire connector to inner door panel, if so equipped.

(5) Engage power mirror motor wire connector.

(6) Install door trim panel (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).

(7) Install side view mirror cover.

SIDE VIEW MIRROR GLASS

REMOVAL

WARNING: ALWAYS WEAR EYE AND HAND PROTECTION WHEN SERVICING THE MIRROR ASSEMBLY. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY FROM BROKEN GLASS.

(1) Carefully pull/pry the broken glass holder from the mirror assembly.

(2) Disconnect the heated mirror electrical connectors from the terminals on the mirror glass holder, if equipped.

INSTALLATION

CAUTION: It is important to make sure the motor is square to the glass holder (attaching fingers) prior to glass holder attachment, otherwise the glass holder could be installed incorrectly causing poor retention and possible repeat failure.

(1) Position the new mirror glass holder to the mirror assembly.

NOTE: Position the mirror glass holder so that the moisture drain hole on the mirror glass holder assembly is facing downward.

(2) Align the mirror glass holder's attaching fingers to the mirror motor housing.

NOTE: Ensure that the protective rubber cover of the mirror motor housing is positioned correctly around the bottom of the fingers area.

(3) Using one hand, firmly press the mirror glass holder assembly into place while at the same time supporting the housing assembly from the backside with the other hand.

SIDE VIEW MIRROR GLASS (Continued)

NOTE: Pressure must be applied equally over the center portion of the mirror to engage the mirror glass holder's attaching fingers to the corresponding fingers on the housing assembly. One or more clicks may be heard when finger engagement takes place.

(4) Verify retention of the mirror glass holder assembly by gently pulling outward on the mirror glass holder.

SPOILER

REMOVAL

(1) Remove the decklid cover. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/COVER - REMOVAL)

(2) Remove the four nuts and remove the spoiler (Fig. 18).

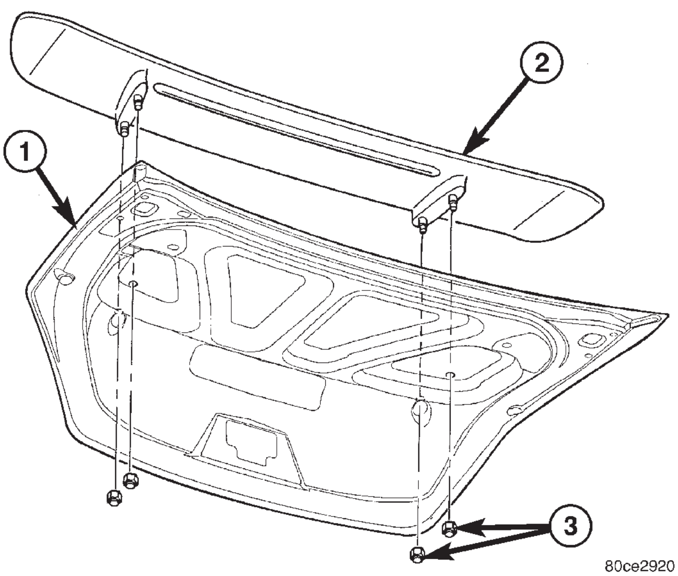

Fig. 18 SPOILER

1 - DECKLID
2 - SPOILER
3 - NUTS

INSTALLATION

(1) Install the spoiler and nuts (Fig. 18).

(2) Tighten nuts to 3 N·m (30 in. lbs.).

(3) Install the decklid cover. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/COVER - INSTALLATION)

TAPE STRIPE

REMOVAL - ADHESIVES

(1) Mark reference points before removing.

(2) Using a heat gun gently apply heat in a circular motion to loosen the adhesive bond.

(3) Using the trim stick C 4755 or equivalent, lift up and peel away badging /tape from panel, using a heat gun as you go.

(4) Clean off all traces of adhesive from the panel(s) with a general purpose adhesive remover.

INSTALLATION - ADHESIVES

(1) Clean panel surface with isopropyl alcohol.

(2) Remove paper carrier and align badging/tape to reference points or adjacent panel.

(3) Install and press securely, using a plastic spreader to eliminate all air bubbles.

(4) Remove top protective carrier.

(5) Clean away any reference points.

HOOD

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ADJUSTER BUMPER

REMOVAL

(1) Release hood latch and open hood.

(2) Rotate hood adjuster bumper counterclockwise.

(3) Remove hood adjuster bumper from headlamp reinforcement (Fig. 1).

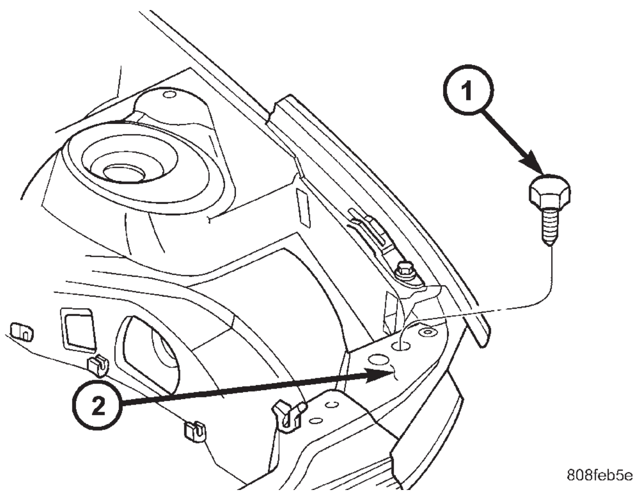

Fig. 1 HOOD ADJUSTER BUMPER

1 - HOOD ADJUSTER BUMPER
2 - HEADLAMP REINFORCEMENT

INSTALLATION

(1) Ensure that hood overslam bumpers proper position (Fig. 2).

(2) Start hood adjuster bumper into headlamp reinforcement (Fig. 1).

(3) Rotate hood adjuster bumper clockwise. Adjust hood adjuster bumper to achieve a hood height that is flush across the top surfaces along fenders.

(4) Close hood.

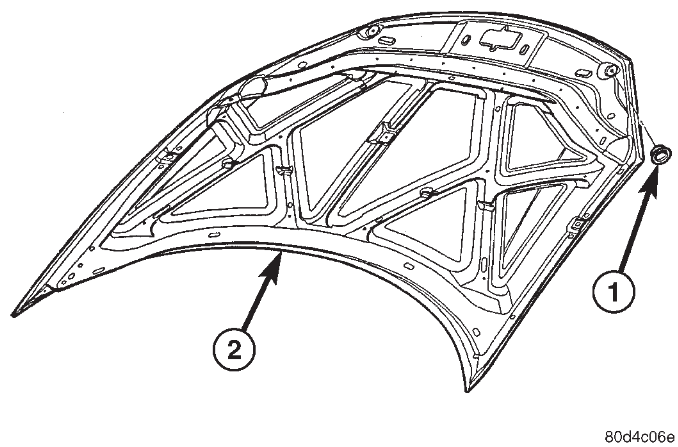

Fig. 2 HOOD OVERSLAM BUMPER

1 - OVERSLAM BUMPER
2 - HOOD

HINGE

REMOVAL

(1) Support hood on the side that requires hinge replacement.

(2) Mark hinge attachment locations with a grease pencil or other suitable device to aid installation.

(3) Remove cowl cover(Refer to 23 - BODY/EXTERIOR/COWL GRILLE - REMOVAL).

(4) Remove bolts attaching hood to hinge.

(5) Remove bolts attaching hood hinge to load beam inner and remove hinge from vehicle.

INSTALLATION

(1) If necessary, paint new hinge before installation.

(2) Place hinge in position on vehicle.

(3) Install bolts to attach hood hinge to load beam inner.

HINGE (Continued)

(4) Install bolts to attach hood to hinge.
(5) Align all marks and secure bolts.
(6) Tighten bolts to 28 N·m (20 ft. lbs.) torque.
(7) The hood should be aligned to 4 mm (0.160 in.) gap to the front fenders and flush across the top surfaces along fenders. Shims can be added or removed under hood hinge to achieve proper hood height.
(8) Install cowl cover(Refer to 23 - BODY/EXTERIOR/COWL GRILLE - INSTALLATION).
(9) Verify hood latch operation. Adjust as necessary.

HOOD

REMOVAL

(1) Open hood.
(2) Mark outline of hinges on inside of hood to aid installation.
(3) Remove the top bolts attaching hood to hinge and loosen the bottom bolts until they can be removed by hand.
(4) With assistance from a helper at the opposite side of the vehicle to support the hood, remove bottom bolts attaching hood to hinge.
(5) Remove the hood from the vehicle.

INSTALLATION

(1) With assistance from a helper, place hood in position on vehicle.
(2) Install bottom bolts to attach hood to hinge finger tight.
(3) Install top bolts to attach hood to hinge finger tight.
(4) Position bolts at outline marks and tighten bolts. The hood should be aligned to 4 mm (0.160 in.) gap to the front fenders and flush across the top surfaces along fenders.
(5) Connect under hood lamp wire connector to engine compartment wire harness, if equipped.
(6) Verify hood latch operation and alignment. Adjust as necessary.

LATCH

REMOVAL

(1) Release hood latch and open hood.
(2) Support hood on prop rod.
(3) Mark outline of hood latch on radiator support crossmember with a grease pencil or other suitable device to aid installation.
(4) Remove nuts attaching hood latch to upper radiator support crossmember (Fig. 3).
(5) Remove hood latch from vehicle.
(6) Disengage remote release cable from hood latch (Fig. 4).

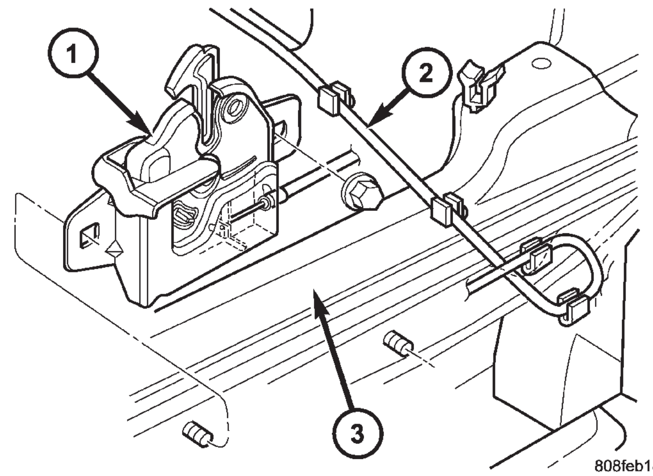

Fig. 3 HOOD LATCH

1 - HOOD LATCH
2 - HOOD RELEASE CABLE
3 - RADIATOR SUPPORT CROSSMEMBER

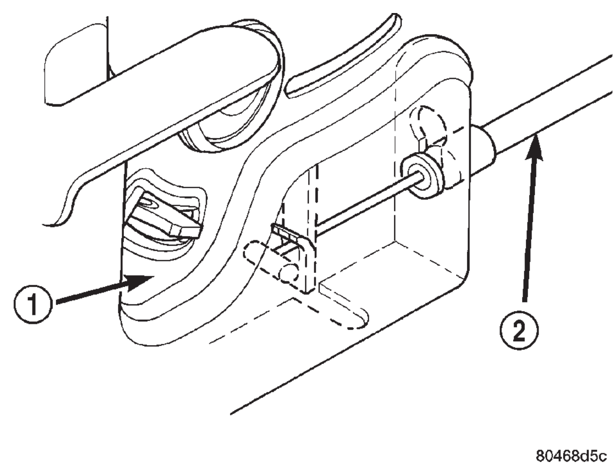

Fig. 4 HOOD LATCH RELEASE CABLE

1 - HOOD LATCH
2 - HOOD RELEASE CABLE

INSTALLATION

(1) Engage remote release cable into hood latch (Fig. 4).
(2) Position hood latch on vehicle.
(3) Install nuts attaching hood latch onto upper radiator support crossmember.
(4) Tighten nut to 28 N·m (20 ft. lbs.) torque.
(5) Verify operation. Adjust as necessary.

LATCH RELEASE CABLE

REMOVAL

(1) Remove hood latch(Refer to 23 - BODY/HOOD/LATCH - REMOVAL).
(2) Remove left front cowl trim panel.

LATCH RELEASE CABLE (Continued)

(3) Remove screws attaching hood release handle to inner cowl panel (Fig. 5).

(4) Release clips attaching hood release cable to left inner frame rail (Fig. 6).

(5) Disengage rubber grommet at lower dash panel.

(6) Disengage push-in fastener attaching hood release cable to dash panel.

(7) Remove hood release cable from vehicle.

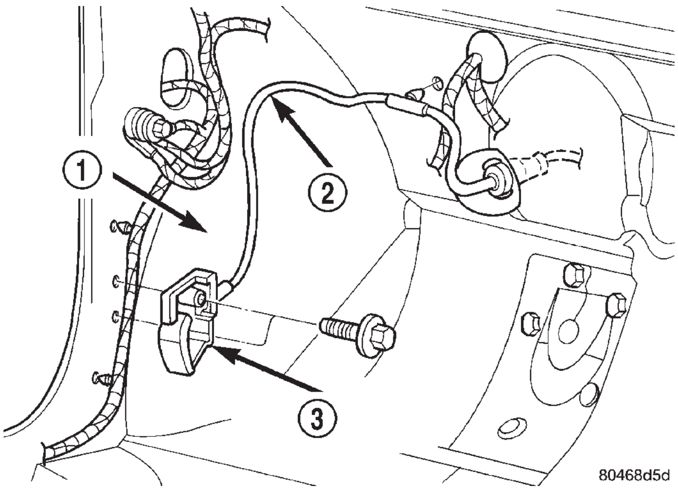

Fig. 5 Hood Release Cable Handle

1 - COWL PANEL
2 - HOOD RELEASE CABLE
3 - HOOD RELEASE HANDLE

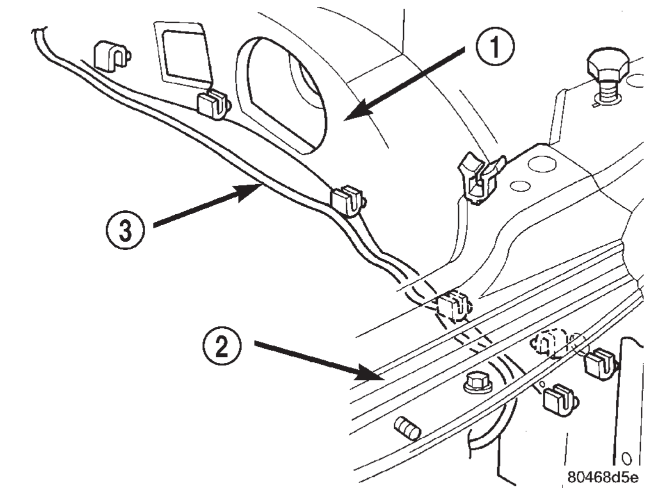

Fig. 6 Hood Release Cable Routing

1 - FRAME RAIL
2 - UPPER RADIATOR SUPPORT CROSSMEMBER
3 - HOOD RELEASE CABLE

INSTALLATION

(1) Route hood release cable through hole in lower dash panel and along inner frame rail.

(2) Engage rubber grommet to lower dash panel.

(3) Engage push-in fastener attaching hood release cable to lower dash panel.

(4) Install screws attaching hood release cable handle to inner cowl panel.

(5) Tighten screws to 1.8 N·m (16 in. lbs.) torque.

(6) Install left front cowl trim panel.

(7) Engage hood release cable into clips along inner frame rail (Fig. 6).

(8) Install hood latch(Refer to 23 - BODY/HOOD/LATCH - INSTALLATION).

PROP ROD

REMOVAL

(1) Release hood latch and open hood.

CAUTION: Do not place prop-rod or substitute against outer hood panel, damage to exterior finish will result.

(2) Prop hood open using a length of wooden dowel rod, ex (Broomstick).

(3) Disengage prop-rod from retainer attaching prop-rod to radiator closure panel (Fig. 7).

(4) Remove prop-rod from vehicle.

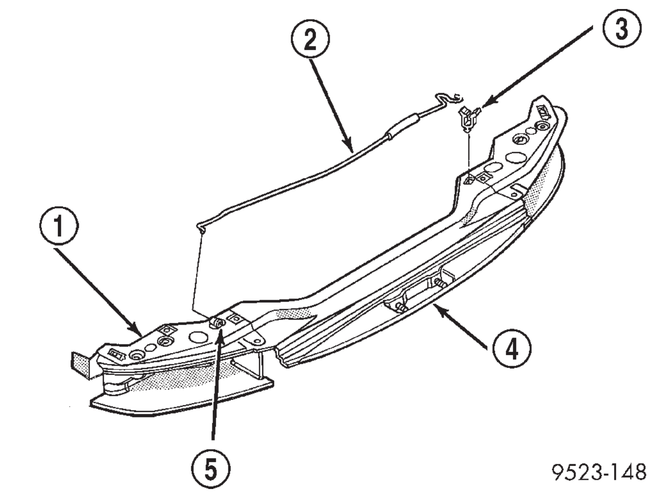

Fig. 7 Hood Prop Rod

1 - RADIATOR CLOSURE PANEL
2 - HOOD PROP-ROD
3 - CLIP
4 - RADIATOR SUPPORT CROSSMEMBER
5 - RETAINER

INSTALLATION

CAUTION: Do not place prop-rod or substitute against outer hood panel, damage to exterior finish will result.

(1) Place prop-rod into position.

(2) Engage prop-rod from retainer attaching prop-rod to radiator closure panel.

(3) Remove temporary hood prop rod.

(4) Close hood.

INSTRUMENT PANEL

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CD CHANGER TRIM BEZEL

REMOVAL

(1) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on the CD changer trim bezel and remove from the vehicle (Fig. 1).

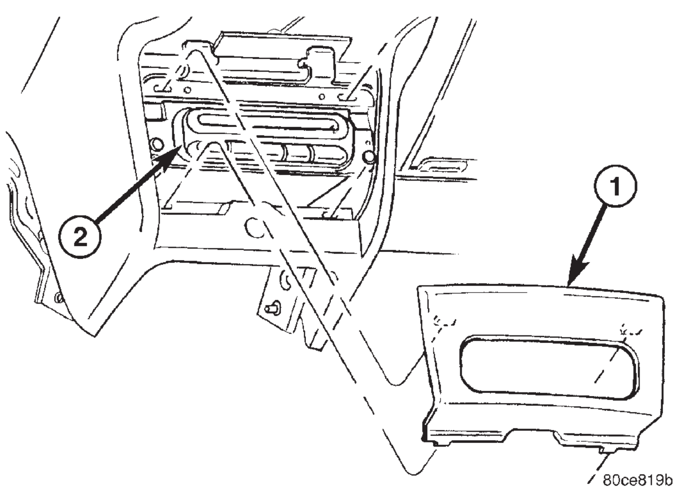

Fig. 1 CD CHANGER TRIM BEZEL

1 - CD CHANGER TRIM BEZEL
2 - CD CHANGER

INSTALLATION

(1) Position CD changer trim bezel over the retaining slots and firmly snap into place (Fig. 1).

GLOVE BOX

REMOVAL

(1) Open glove box.
(2) Push in on sides of glove box bin and lower door.
(3) Pivot glove box downward and disengage hinge hooks from instrument panel.
(4) Remove glove box.

INSTALLATION

(1) Place glove box in position.
(2) Engage hinge hooks into instrument panel and pivot glove box upward.
(3) Push in sides of glove box bin and snap glove box assembly into instrument panel.
(4) Close glove box door.

GLOVE BOX LATCH

REMOVAL

(1) Open glove box.
(2) Push in on sides of glove box bin and lower door.
(3) Pivot glove box downward and disengage hinge hooks from instrument panel.
(4) Remove glove box.
(5) Remove the assembly screws.
(6) Disassemble the glove box.
(7) Separate the latch from the glove box assembly.

INSTALLATION

(1) Install the latch onto the glove box assembly.
(2) Assemble the glove box.
(3) Install the assembly screws.
(4) Engage hinge hooks into instrument panel and pivot glove box upward.
(5) Push in sides of glove box bin and snap glove box assembly into instrument panel.
(6) Close glove box door.

INSTRUMENT PANEL ASSEMBLY

REMOVAL

The Instrument Panel and HVAC assemblies are removed together as one assembly. If service is required to the individual unit, separation might be required.

(1) Recover the A/C refrigerant(Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).
(2) Partially drain the coolant(Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE).
(3) Remove one bolt retaining the A/C lines to the right strut tower.
(4) Remove the two top HVAC housing retaining nuts in engine compartment (Fig. 2).
(5) Hoist vehicle and remove the lower HVAC housing retaining nut.
(6) Lower vehicle from hoist.
(7) Remove the driver and passenger seats(Refer to 23 - BODY/SEATS/SEAT - REMOVAL).
(8) Disconnect and isolate the battery negative remote cable.
(9) Remove one screw to shift knob and transmission range indicator bezel from floor console.
(10) Remove floor center console. Remove two mounting screws in the front and two mounting screws inside console storage bin (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).

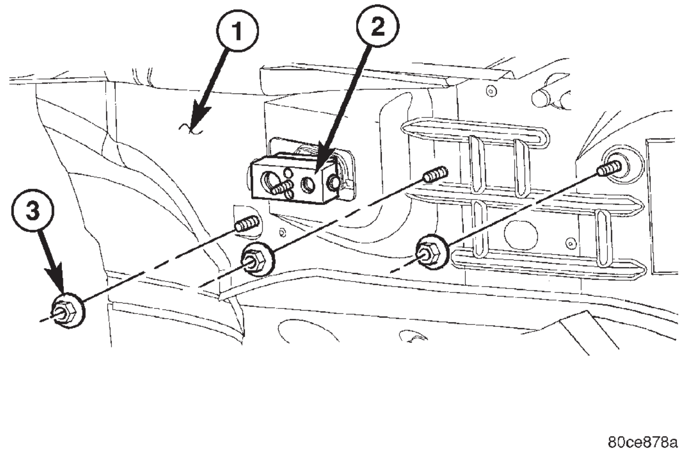

Fig. 2 HVAC HOUSING RETAINING NUTS

1 - BULKHEAD
2 - EXPANSION VALVE
3 - NUT

(11) Remove the amplifier(Refer to 8 - ELECTRICAL/AUDIO/AMPLIFIER - REMOVAL).
(12) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on the left and right rear floor heat ducts and remove (Fig. 3).

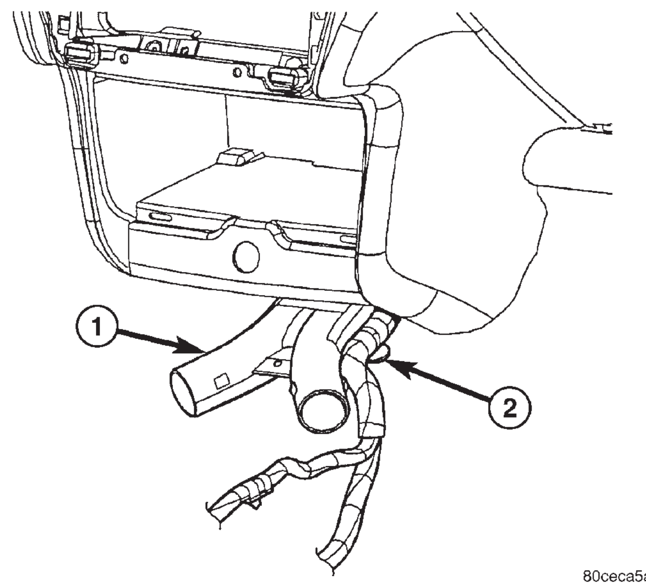

Fig. 3 REAR HEAT DUCT

1 - REAR HEAT DUCT
2 - LOCATING CLIP

(13) Disconnect the console wiring connectors and unclip the push in fasteners.
(14) Using a trim stick or equivalent, gently pry up on and remove the right sill plate.

INSTRUMENT PANEL ASSEMBLY (Continued)

(15) Remove the two screws to the right cowl kick panel and remove from vehicle (Refer to 23 - BODY/INTERIOR/COWL TRIM - REMOVAL).

(16) Using a trim stick or equivalent, gently pry out on the right end cover and remove from vehicle (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - REMOVAL).

(17) Using a trim stick or equivalent, gently pry out on the right A-pillar trim and remove from vehicle (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - REMOVAL).

(18) Open the glove box. Pinch in on the sides and drop to the floor. Pull down to disengage hinges.

(19) Disconnect the right door harness connectors located within the A-pillar.

(20) Remove the four right A-pillar instrument panel retainers.

(21) Remove the right silencer.

(22) Remove the one right side, center instrument panel support bolt.

(23) Using a trim stick or equivalent, gently pry up on and remove the left sill plate(Refer to 23 - BODY/INTERIOR/DOOR SILL TRIM - REMOVAL).

(24) Remove the two screws to the left cowl kick panel and remove from vehicle.

(25) Using a trim stick or equivalent, gently pry out on the left end cover and remove from vehicle (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - REMOVAL).

(26) Using a trim stick or equivalent, gently pry out on the left A-pillar trim and remove from vehicle (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - REMOVAL).

(27) Disconnect the left door harness connectors located within the A-pillar.

(28) Remove the four left A-pillar instrument panel retainers.

(29) Remove five screws and one wire connector to left lower instrument panel trim bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TRIM - REMOVAL).

(30) Remove the left silencer.

(31) Remove the one left side, center instrument panel support bolt.

(32) Remove one bolt to the left side support strut to bulkhead.

(33) Disconnect the junction block wiring connectors.

(34) Remove two screws to the steering column shrouds and remove.

(35) Disconnect all the column wiring and unclip the harness from the steering column.

(36) Disconnect the transmission shift interlock and wire connector.

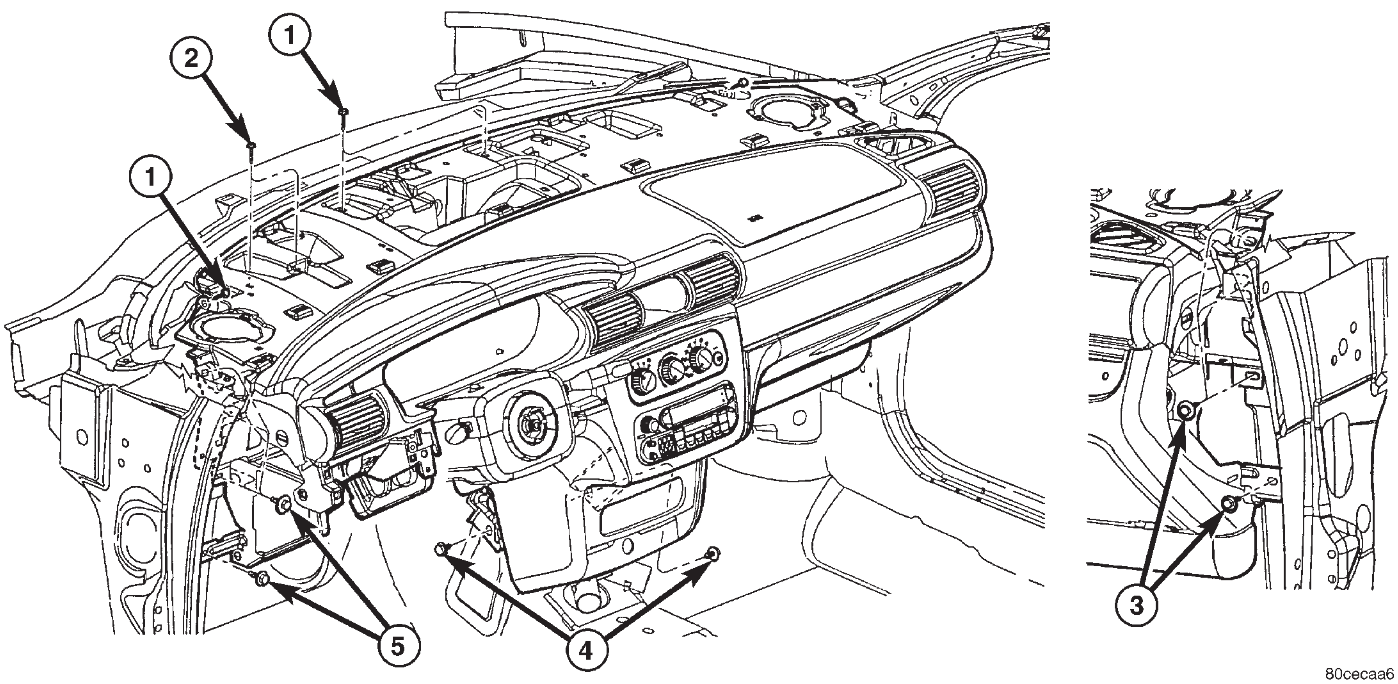

Fig. 4 INSTRUMENT PANEL REMOVAL

1 - INSTRUMENT PANEL TO PLENUM SCREW
2 - INSTRUMENT PANEL STEERING COLUMN TO COWL PLENUM SCREW
3 - RIGHT COWL SIDE BOLTS
4 - INSTRUMENT PANEL CENTER BRACE TO FLOOR
5 - LEFT COWL SIDE BOLTS

INSTRUMENT PANEL ASSEMBLY (Continued)

(37) Remove the four steering column retaining bolts and drop column to floor.

(38) Using a trim stick or equivalent, pry up on the rear of the top cover and pull rearward as you lift off of instrument panel(Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP PAD - REMOVAL).

(39) Remove instrument panel pad.

(40) Remove seven bolts and five screws attaching instrument panel to fence line and cowl side.

(41) With the help of an assistant, lift up instrument panel and move rearward to remove. Tilt the panel rearward to prevent the coolant from leaking out.

If replacing the instrument panel, transfer all non damaged parts and wiring harness to the new instrument panel assembly.

TO SEPARATE THE INSTRUMENT PANEL AND HVAC UNIT HOUSINGS

- Disconnect the HVAC wiring connector to the instrument panel wire harness.
- Remove the two bolts and two nuts holding the HVAC housing to the instrument panel.
- Lift the instrument panel off the HVAC housing to separate.

INSTALLATION

The Instrument Panel and HVAC assemblies are installed together as one assembly. They must be reconnected before installation.

TO CONNECT THE INSTRUMENT PANEL AND HVAC UNIT HOUSINGS

- Place the instrument panel on the HVAC housing.
- Install the two bolts and two nuts holding the HVAC housing to the instrument panel.
- Connect the HVAC wiring connector to the instrument panel wire harness.

If replacing the instrument panel, transfer all non damaged parts and wiring harness to the new instrument panel assembly.

(1) With the help of an assistant, place the instrument panel in the vehicle, carefully guiding the HVAC housing studs through the bulkhead and into position.

(2) Install the seven bolts and five screws attaching instrument panel to fence line and cowl side (Fig. 4).

(3) Place instrument panel pad into position.

(4) Install the instrument panel top cover(Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP PAD - INSTALLATION).

(5) Install the four steering column retaining bolts.

(6) Connect the transmission shift interlock and wire connector.

(7) Connect all the column wiring and clip the harness to the steering column.

(8) Install two screws to the steering column shrouds.

(9) Connect the junction block wiring connectors.

(10) Install one bolt to the left side support strut to bulkhead.

(11) Install five screws and one wire connector to left lower instrument panel trim bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TRIM - INSTALLATION).

(12) Install the one left side, center instrument panel support bolt.

(13) Install the left silencer.

(14) Install the four left A-pillar instrument panel retainers.

(15) Connect the right door harness connectors located within the A-pillar.

(16) Install the right A-pillar trim (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - INSTALLATION).

(17) Install the left end cover (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - INSTALLATION).

(18) Install the two screws to the left cowl trim panel (Refer to 23 - BODY/INTERIOR/COWL TRIM - INSTALLATION).

(19) Install the left door sill plate (Refer to 23 - BODY/INTERIOR/DOOR SILL TRIM - INSTALLATION).

(20) Install the one right side, center instrument panel support bolt.

(21) Install the right silencer.

(22) Install the four right A-pillar instrument panel retainers.

(23) Connect the right door harness connectors located within the A-pillar.

(24) Install the glove box.

(25) Install the right A-pillar trim (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - INSTALLATION).

(26) Install the right end cover (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - INSTALLATION).

(27) Install the two screws to the right cowl trim panel (Refer to 23 - BODY/INTERIOR/COWL TRIM - INSTALLATION).

(28) Install the right door sill plate (Refer to 23 - BODY/INTERIOR/DOOR SILL TRIM - INSTALLATION).

(29) Connect the console wiring connectors and clip the push in fasteners in.

(30) Install the left and right rear floor heat ducts (Fig. 3).

INSTRUMENT PANEL ASSEMBLY (Continued)

(31) Connect the two harness connectors to the amplifier.

(32) Install the amplifier (Refer to 8 - ELECTRICAL/AUDIO/AMPLIFIER - INSTALLATION).

(33) Install floor center console. Install two mounting screws in the front and two mounting screws inside console storage bin (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION).

(34) Install the transmission range indicator bezel and one screw to shift knob.

(35) Connect the battery negative remote cable.

(36) Install the driver and passenger seats (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).

(37) Hoist vehicle and install the lower HVAC housing retaining nut.

(38) Lower vehicle from hoist.

(39) Install the two top HVAC housing retaining nuts in engine compartment (Fig. 2).

(40) Install one bolt retaining the A/C lines to the right strut tower.

(41) Top off the coolant (Refer to 7 - COOLING/ENGINE/COOLANT - STANDARD PROCEDURE).

(42) Recharge the A/C refrigerant with specified amount. Refer to placard in engine compartment (Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

INSTRUMENT PANEL CENTER BEZEL

REMOVAL

(1) Disconnect and isolate the battery negative remote cable.

(2) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on the edge of the instrument panel center bezel and pull outward (Fig. 5).

(3) Disconnect the wire connector to the HVAC control.

(4) Remove the instrument panel center bezel from the vehicle.

INSTALLATION

The HVAC control is mounted to the instrument panel center bezel. If replacing the center bezel or the HVAC control, it must be removed from the center bezel. Remove the six retaining screws to the HVAC control.

(1) Connect the wire connectors to the HVAC control.

(2) Position the center bezel over the retaining slots and firmly snap the instrument panel center bezel into place (Fig. 5).

(3) Connect the battery negative remote cable.

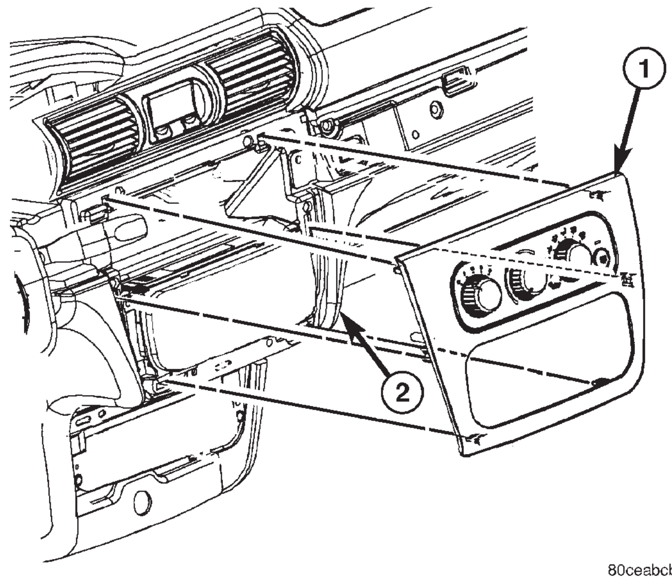

Fig. 5 INSTRUMENT PANEL CENTER BEZEL

1 - CENTER BEZEL
2 - INSTRUMENT PANEL

INSTRUMENT PANEL CLUSTER BEZEL

REMOVAL

(1) Disconnect and isolate the battery negative remote cable.

(2) Remove left end cover.

(3) Using a trim stick (special tool #C-4755) or equivalent, gently pry up on the power mirror switch. Disconnect the switch and remove.

(4) Using a trim stick or equivalent, gently pry up on instrument panel center trim bezel.

(5) Disconnect the HVAC control connector.

(6) Remove the one screw from the passenger side trim bezel and remove trim by unsnapping clips.

(7) Remove five screws to left lower instrument panel trim.

(8) Remove the five screws to the cluster bezel (Fig. 6). Using a trim stick or equivalent, gently pry out the cluster bezel.

(9) If the vehicle is equipped with a Compass Mini-Trip Computer (CMTC/Traveler), disconnect the module and then remove the cluster bezel assembly.

INSTALLATION

(1) Position the cluster bezel and if so equipped, connect the traveler connector, then snap the cluster bezel into position (Fig. 6).

(2) Install the five screws to the cluster bezel.

(3) Install the five screws to the left lower instrument panel trim.

INSTRUMENT PANEL CLUSTER BEZEL (Continued)

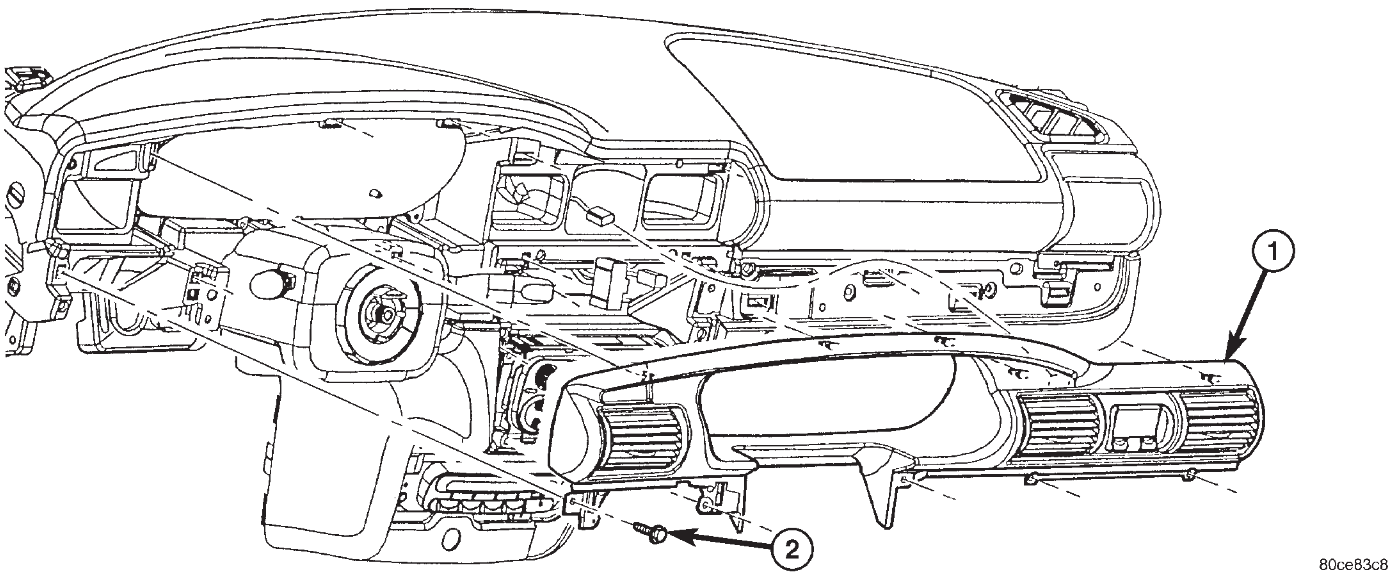

Fig. 6 INSTRUMENT PANEL CLUSTER BEZEL

1 - INSTRUMENT PANEL CLUSTER BEZEL
2 - SCREW

(4) Connect the mirror switch connector and firmly snap it into place.

(5) Install the one screw to the trim bezel to the right side of the steering column.

(6) Firmly snap into place and then install one screw to the passenger side trim bezel.

(7) Connect the HVAC control connectors.

(8) Position the center bezel over the retaining slots and firmly snap instrument panel center bezel into place.

(9) Install the left end cover.

(10) Connect the battery negative cable.

INSTRUMENT PANEL END COVER

REMOVAL

(1) Open front door.

(2) Using a trim stick (special tool #C-4755) or equivalent, disengage clips holding end cover to instrument panel (Fig. 7).

INSTALLATION

(1) Position end cover over retaining slots and firmly snap into place (Fig. 7).

(2) Close front door.

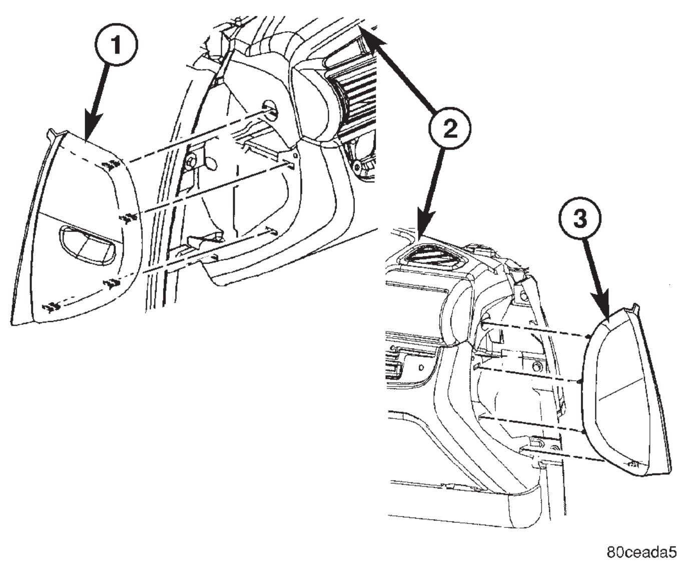

Fig. 7 INSTRUMENT PANEL END COVER

1 - LEFT END COVER
2 - INSTRUMENT PANEL
3 - RIGHT END COVER

INSTRUMENT PANEL INBOARD BEZEL

REMOVAL

(1) Remove instrument panel center bezel. Refer to Body, Instrument Panel, Instrument Panel Center Bezel, Removal.

(2) Remove the one retaining screw located on the left side of the center stack, behind the center bezel (Fig. 8).

(3) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on the instrument panel inboard bezel and remove.

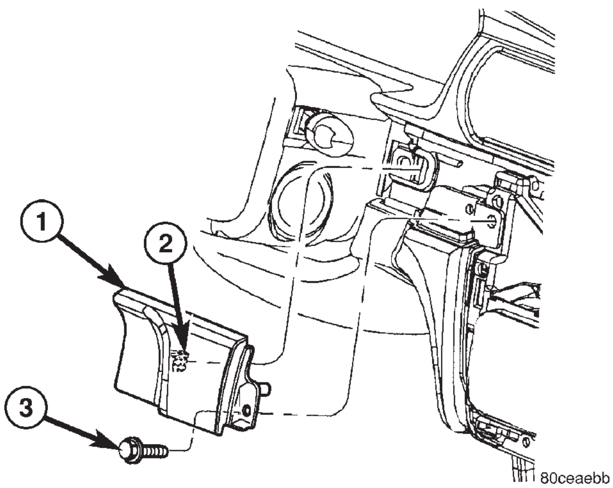

Fig. 8 INSTRUMENT PANEL INBOARD BEZEL

1 - INBOARD BEZEL
2 - CLIP
3 - SCREW

INSTALLATION

(1) Position the instrument panel inboard bezel over the retaining slots and firmly snap into place (Fig. 8).

(2) Install the one retaining screw located on the left side of the center stack, behind the center bezel.

(3) Install the instrument panel center bezel. Refer to Body, Instrument Panel, Instrument Panel Center Bezel, Installation.

INSTRUMENT PANEL OUTBOARD BEZEL

REMOVAL

(1) Disconnect and isolate the battery negative remote cable.

(2) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on the instrument panel outboard switch bezel (Fig. 9).

(3) Disconnect the wire connector.

(4) Remove bezel from vehicle.

(5) Push in the sides of the power mirror switch to release it from the bezel.

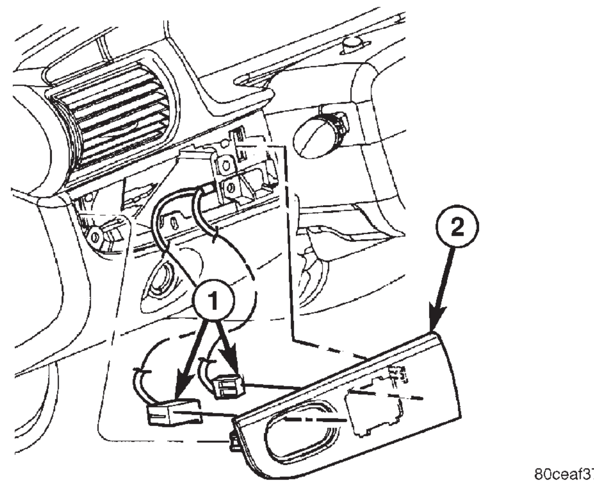

Fig. 9 INSTRUMENT PANEL OUTBOARD SWITCH BEZEL

1 - WIRE CONNECTORS
2 - OUTBOARD SWITCH BEZEL

INSTALLATION

(1) Place the power mirror switch into the outboard switch bezel and firmly snap into place (Fig. 9).

(2) Connect the wire connector.

(3) Position the instrument panel outboard switch bezel over retaining slots and firmly snap into place.

(4) Connect the battery negative remote cable.

INSTRUMENT PANEL TOP COVER

REMOVAL

(1) Remove A-pillar trim. Using a trim stick (special tool #C-4755) or equivalent, gently pry out and remove.

(2) Using a trim stick, disengage clips holding rear edge of top cover to instrument panel (Fig. 10).

NOTE: The Instrument Panel Top Cover may be hard to unsnap from the instrument panel. Be sure not to mar, scuff, or damage the instrument panel pad.

(3) Pull top cover rearward to disengage hooks holding front of top cover to instrument panel.

(4) Remove top cover from vehicle.

INSTRUMENT PANEL TOP COVER (Continued)

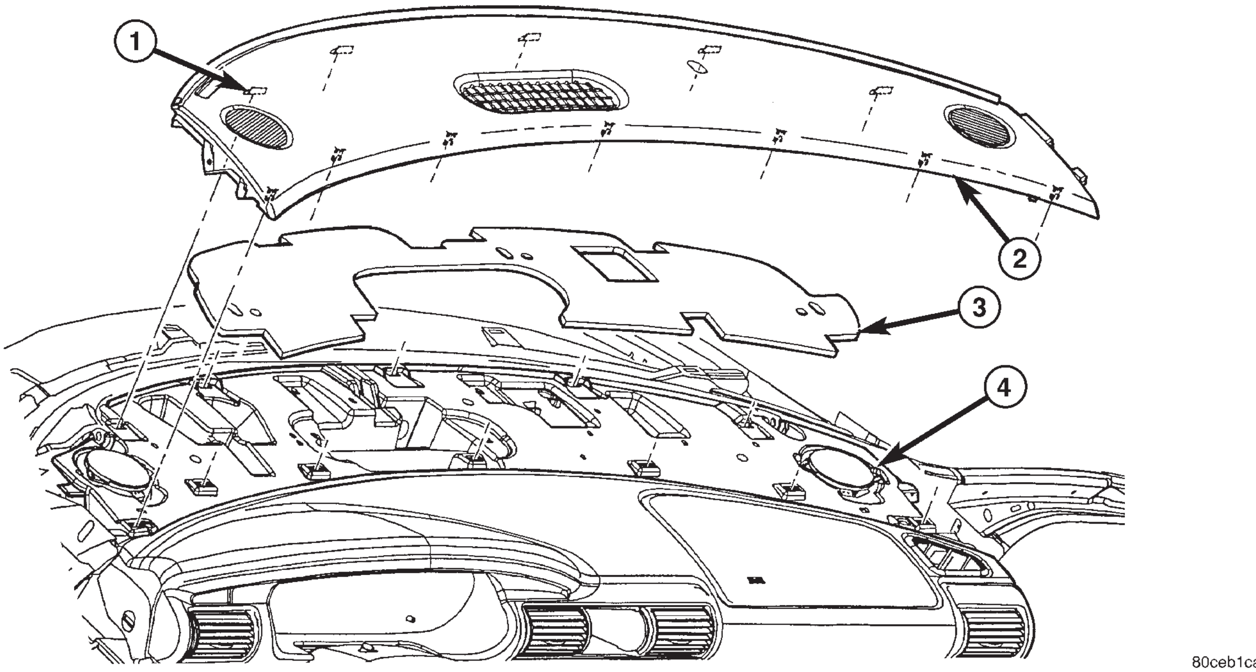

Fig. 10 INSTRUMENT PANEL TOP COVER

1 - CLIPS
2 - INSTRUMENT PANEL TOP COVER
3 - INSTRUMENT PANEL PAD
4 - INSTRUMENT PANEL ASSEMBLY

INSTALLATION

(1) Place instrument panel top cover in position on vehicle (Fig. 10).

(2) Push top cover forward to engage hooks to hold front of top cover to instrument panel.

(3) Engage clips to hold rear edge of top cover to instrument panel.

(4) Pull top cover rearward as you firmly push down and snap into place.

(5) Install A-pillar trim.

LEFT LOWER INSTRUMENT PANEL TRIM

REMOVAL

(1) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on the left instrument panel end cover and remove from vehicle (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - REMOVAL).

(2) Using a trim stick or equivalent, gently pry out on the power mirror switch bezel, disconnect the switch connector and remove.

(3) Remove the five screws to the left lower instrument panel trim, Disengage one wiring connector to deck lid release and remove bezel from vehicle.

INSTALLATION

(1) Connect the deck lid release switch connector.

(2) Position the left lower instrument panel trim over the retaining slots and firmly push into place.

(3) Install the five screws to the left lower instrument panel trim.

(4) Connect the power mirror switch connector and position the bezel over the retaining slots and firmly snap into place.

(5) Position the left instrument panel end cover over the retaining slots and firmly snap into place (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL END CAP - INSTALLATION).

LEFT LOWER INSTRUMENT SILENCER PANEL

REMOVAL

(1) Remove end cap.

(2) Remove power mirror switch bezel.

(3) Disconnect wirer connector from power mirror switch.

(4) Remove five screws to the left lower instrument panel trim and disconnect wire connector.

(5) Remove push in fastener and stamp nut (Fig. 11)

(6) Using rearward motion pull the left lower silencer panel from the instrument panel and remove.

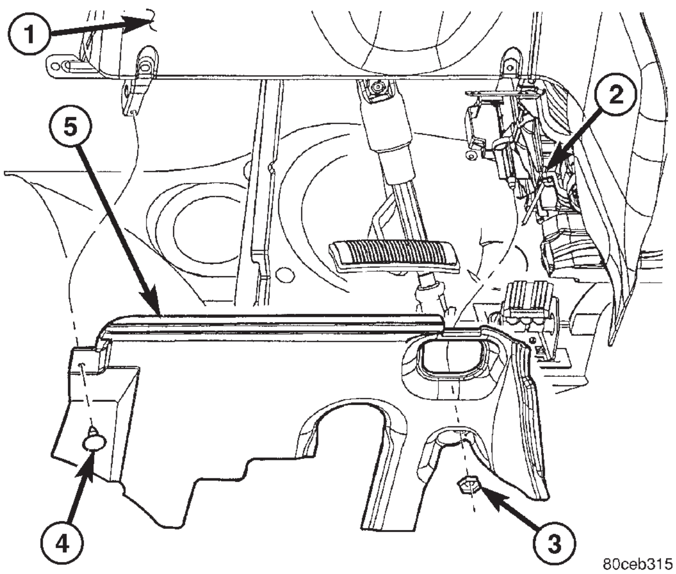

Fig. 11 LEFT LOWER SILENCER PANEL

1 - LEFT LOWER INSTRUMENT PANEL TRIM
2 - HVAC SILENCER ATTACHING STUD
3 - STAMP NUT
4 - PUSH IN FASTENER
5 - LEFT LOWER SILENCER PANEL

INSTALLATION

(1) Position silencer panel over HVAC stud (Fig. 11).

(2) Install stamp nut and install push in fastener.

(3) Connect deck lid release wire connector.

(4) Position the left lower instrument panel trim over the retaining slots and firmly push into place.

(5) Install five screws attaching left lower instrument panel trim.

(6) Connect power mirror switch wire connector.

(7) Install instrument panel bezel.

(8) Install end cap.

RIGHT LOWER SILENCER PANEL

REMOVAL

(1) Remove the attaching stamp nut (Fig. 12).

(2) Using a trim stick gently pry out silencer panel from lower right trim bezel.

(3) Remove panel from the instrument panel.

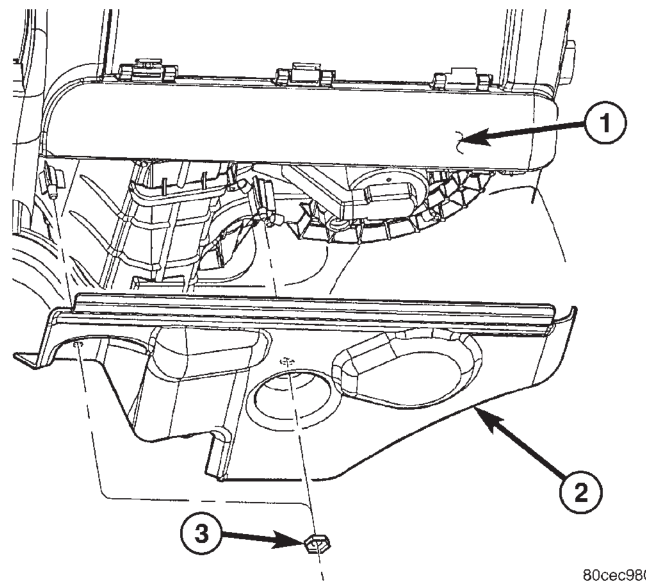

Fig. 12 RIGHT LOWER SILENCER PANEL

1 - RIGHT LOWER TRIM BEZEL
2 -RIGHT LOWER SILENCER PANEL
3 - STAMP NUT

INSTALLATION

(1) Place right lower silencer panel into position (Fig. 12).

(2) Push firmly into place.

(3) Install attaching stamp nut.

RIGHT INSTRUMENT PANEL TRIM BEZEL

REMOVAL

(1) Remove instrument panel center bezel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL)

(2) Remove the one retaining screw located on the right side of the center stack, behind the center bezel (Fig. 13).

(3) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on the right instrument panel trim bezel and remove.

INSTALLATION

(1) Position the right instrument panel trim bezel over retaining slots and firmly snap into place (Fig. 13).

(2) Install the one retaining screw located on the right side of the center stack, behind the center bezel.

(3) Install the instrument panel center bezel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).

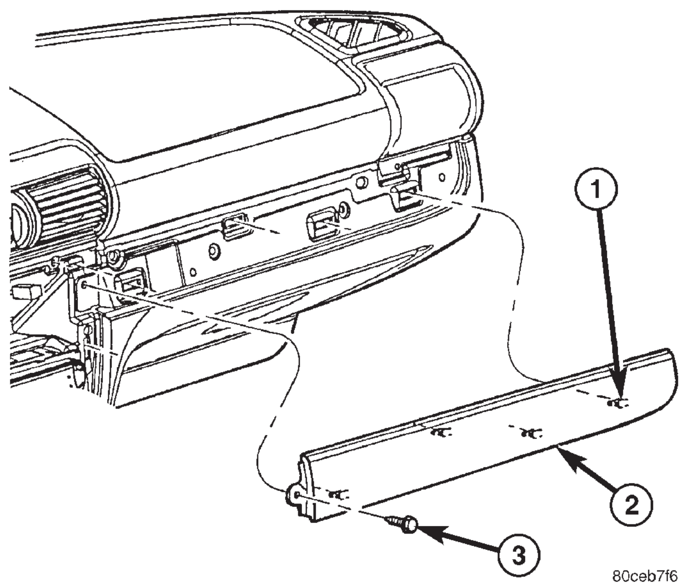

Fig. 13 RIGHT INSTRUMENT PANEL TRIM BEZEL

1 - CLIP
2 - RIGHT INSTRUMENT PANEL TRIM PANEL
3 - SCREW

INTERIOR

TABLE OF CONTENTS

A-PILLAR TRIM

REMOVAL

REMOVAL

(1) Remove the front door opening weatherstrip along the A-pillar. (Refer to 23 - BODY/WEATHER-STRIP/SEALS/DOOR OPENING WEATHERSTRIP - REMOVAL)

(2) Disengage clips attaching A-pillar trim to A-pillar (Fig. 1).

(3) Remove A-pillar trim from vehicle.

REMOVAL- JR-27 ONLY

(1) Remove header molding panel (Refer to 23 - BODY/INTERIOR/INTERIOR TRIM PANELS - REMOVAL).

(2) Disengage clips attaching A-pillar trim panel to A-pillar.

(3) Remove trim panel from vehicle (Fig. 2).

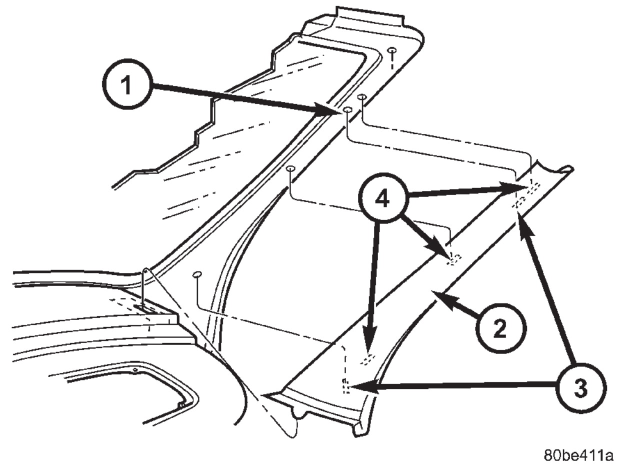

Fig. 2 A-Pillar Trim Panel

1 - A-PILLAR
2 - A-PILLAR TRIM PANEL
3 - LOCATOR(S)
4 - CLIP(S)

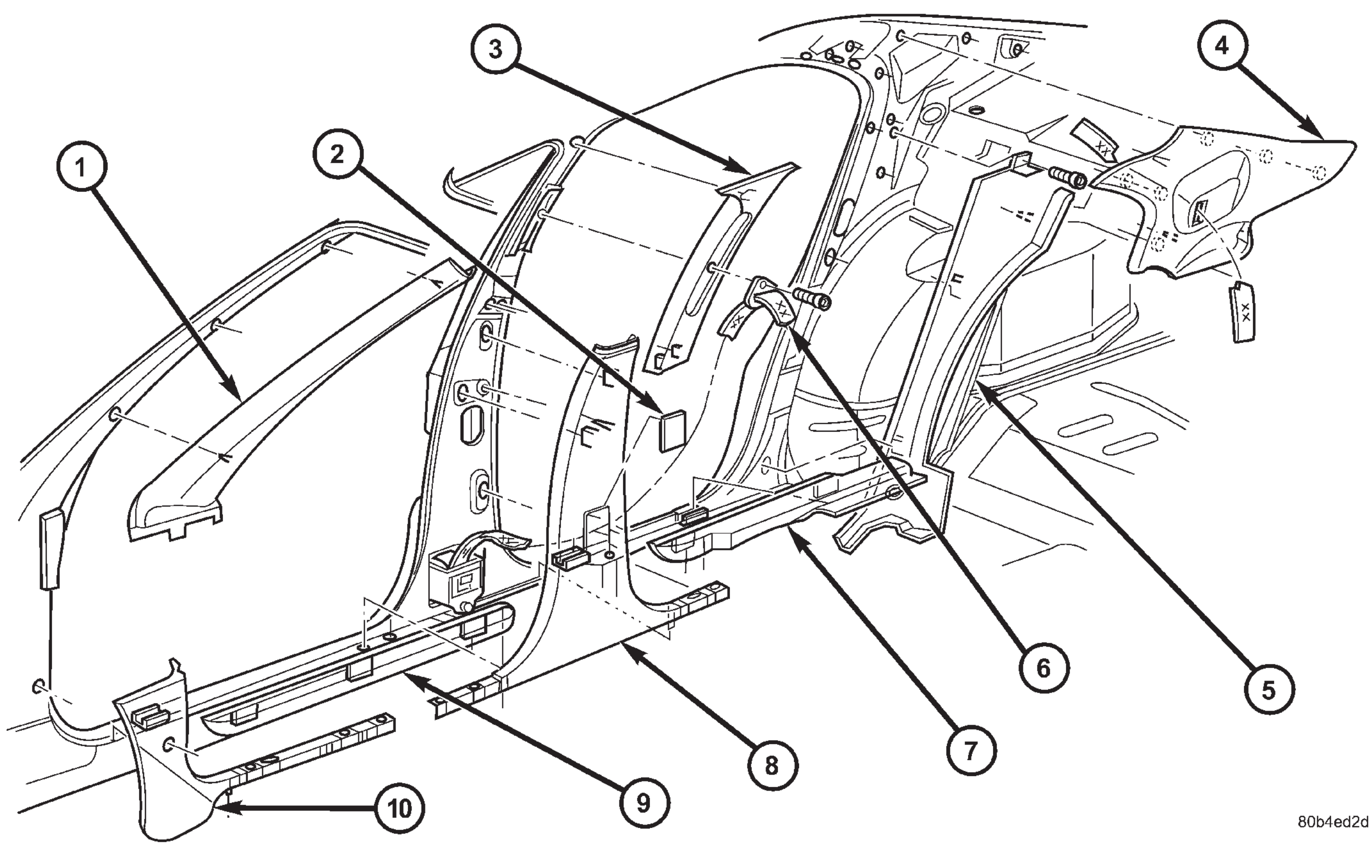

Fig. 1 INTERIOR TRIM PANELS

1 - A-PILLAR TRIM
2 - BEZEL - B-PILLAR LOWER
3 - UPPER B-PILLAR TRIM
4 - UPPER QUARTER TRIM
5 - LOWER QUARTER TRIM
6 - SEAT BELT
7 - SCUFF PLATE
8 - LOWER B-PILLAR TRIM
9 - SCUFF PLATE
10 - COWL TRIM

INSTALLATION

INSTALLATION

(1) Place A-pillar trim into position.

(2) Engage clips attaching A-pillar trim to A-pillar.

(3) Install the door opening weatherstrip to the A-pillar. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/DOOR OPENING WEATHERSTRIP - INSTALLATION)

INSTALLATION - JR-27 ONLY

(1) Position trim panel near A-pillar.

(2) Align locating pins on back side of trim panel to holes in A-pillar.

(3) Press clips on A-pillar trim panel into slots in A-pillar.

(4) Install header molding panel(Refer to 23 - BODY/INTERIOR/INTERIOR TRIM PANELS - INSTALLATION).

B-PILLAR LOWER TRIM

REMOVAL

(1) Remove upper B-pillar trim. (Refer to 23 - BODY/INTERIOR/UPPER B-PILLAR TRIM - REMOVAL)

(2) Disengage clips attaching seat belt access panel to lower B-pillar trim (Fig. 1).

(3) Remove scuff plates. (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - REMOVAL)

(4) Remove the screws attaching the trim to the door sills.

(5) Disengage clips attaching lower B-pillar trim to B-pillar.

(6) Route seat belt webbing through access hole in lower B-pillar trim.

(7) Remove lower B-pillar trim from vehicle.

INSTALLATION

(1) Place lower B-pillar trim into position.

(2) Route seat belt webbing through access hole in lower B-pillar trim.

(3) Engage clips attaching lower B-pillar trim to B-pillar.

(4) Install the screws attaching the trim to the door sills.

(5) Install scuff plates. (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - INSTALLATION)

(6) Engage clips attaching seat belt access panel to lower B-pillar trim.

(7) Install upper B-pillar trim. (Refer to 23 - BODY/INTERIOR/UPPER B-PILLAR TRIM - INSTALLATION)

CARPETS AND FLOOR MATS

REMOVAL

REMOVAL

(1) Remove door sill scuff plates. (Refer to 23 - BODY/INTERIOR/DOOR SILL SCUFF PLATE - REMOVAL)

(2) Remove rear seat cushion. (Refer to 23 - BODY/SEATS/SEAT CUSHION - REMOVAL)

(3) Remove front seats. (Refer to 23 - BODY/SEATS/SEAT - REMOVAL)

(4) Remove amplifier on passenger side of floor pan, if equipped.

(5) Remove bolts attaching front seat belts to floor.

(6) Remove lower B-pillar trim panels as necessary to clear carpet.

(7) Remove cowl trim panels. (Refer to 23 - BODY/INTERIOR/COWL TRIM - REMOVAL)

(8) Remove floor console. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL)

(9) Remove forward instrument panel console. (Refer to 23 - BODY/INTERIOR/FORWARD INSTRUMENT PANEL CONSOLE - REMOVAL)

(10) Remove push pin fasteners (Fig. 3).

(11) Pull carpet from behind brake pedal, accelerator pedal, and HVAC.

(12) Fold carpet to center of vehicle.

(13) Remove carpet from vehicle through passenger door opening.

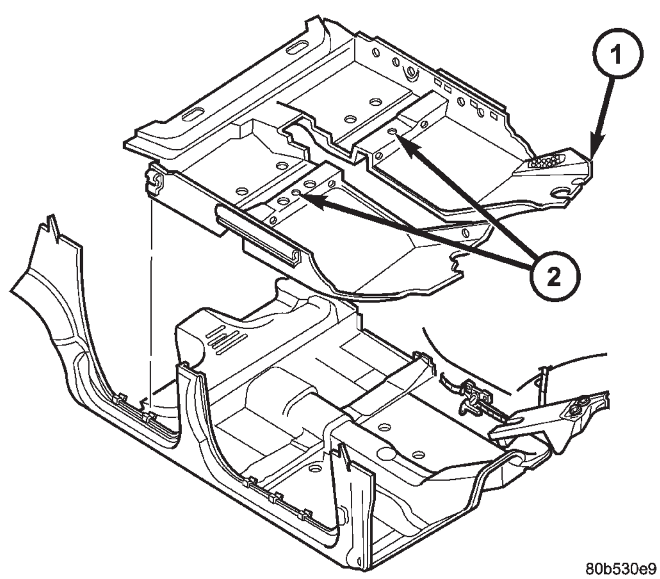

Fig. 3 FLOOR CARPET

1 - FLOOR CARPET
2 - PUSH-PIN FASTENERS

CARPETS AND FLOOR MATS (Continued)

REMOVAL - JR-27 ONLY

(1) Lower convertible top to full down position.
(2) Remove front seats.
(3) Remove rear seat cushion.
(4) Remove floor console and center instrument panel console.
(5) Remove door sill trim panels.
(6) Remove cowl trim panels.
(7) Remove quarter trim panels.
(8) Remove amplifier on passenger side of floor pan, if so equipped.
(9) Remove wiring troughs holding carpet at outboard ends of rear seat crossmember.
(10) Remove accelerator pedal.
(11) Remove instrument panel hush panels.
(12) Remove push-in fasteners from rear of carpet attaching carpet to rear seat crossmember (Fig. 4).
(13) Remove plastic sill retainers from metal clips along door sill panel.
(14) Remove carpet from vehicle.

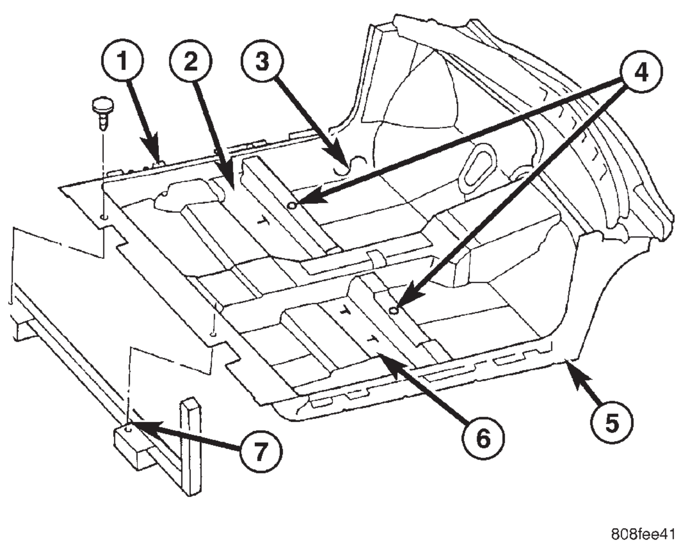

Fig. 4 FLOOR CARPET JR-27

1 - DOOR SILL
2 - SEAT WIRING SLIT
3 - CARPET
4 - PUSH-PIN FASTENERS
5 - DOOR SILL
6 - AMPLIFIER WIRING SLIT
7 - REAR SEAT CROSSMEMBER

INSTALLATION

INSTALLATION

(1) Install carpet into vehicle through passenger door opening.
(2) Unfold carpet into position.
(3) Install carpet behind brake pedal, accelerator pedal, and HVAC.
(4) Install the tunnel push pin fastener.
(5) Install the front seat and crossmember push pin fasteners.
(6) Install the two push pin fasteners into the floor pan.
(7) Install forward instrument panel console. (Refer to 23 - BODY/INTERIOR/FORWARD INSTRUMENT PANEL CONSOLE - INSTALLATION)
(8) Install floor console. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION)
(9) Install cowl trim panels. (Refer to 23 - BODY/INTERIOR/COWL TRIM - INSTALLATION)
(10) Install lower B-pillar trim panels as necessary. (Refer to 23 - BODY/INTERIOR/B-PILLAR LOWER TRIM - INSTALLATION)
(11) Install bolts attaching front seat belts to floor.
(12) Install amplifier on passenger side of floor pan, if equipped.
(13) Install front seats. (Refer to 23 - BODY/SEATS/SEAT - REMOVAL)
(14) Install rear seat cushion. (Refer to 23 - BODY/SEATS/SEAT CUSHION - INSTALLATION)
(15) Install the eight push pin fasteners into the door opening sills.
(16) Install door opening sill plates.

INSTALLATION - JR-27 ONLY

(1) Position carpet in vehicle (Fig. 4).
(2) Install push in fasteners from rear of carpet attaching carpet to rear seat crossmember.
(3) Install front seat push pin fasteners.
(4) Feed wiring connectors for the seats and amplifier, if equipped, through slits in carpet.
(5) Install plastic sill retainers in metal clips along door sill panel.
(6) Install wiring troughs attaching carpet at outboard ends of rear seat crossmember.
(7) Install amplifier on passenger side of floor pan, if so equipped.
(8) Install quarter trim panels.
(9) Install cowl trim panels.
(10) Install door sill trim panels.
(11) Install instrument panel hush panel.
(12) Install accelerator pedal.
(13) Install floor console and center instrument panel console.
(14) Install rear seat cushion.
(15) Install front seats.
(16) Raise and secure convertible top.

CENTER HEADER TRIM PANEL

REMOVAL

REMOVE

(1) Remove both sun visor support centers (Refer to 23 - BODY/INTERIOR/SUN VISOR - REMOVAL).
(2) Pull trim rearward to disengage clips attaching header trim panel to header panel (Fig. 5).
(3) Remove header trim panel from vehicle.

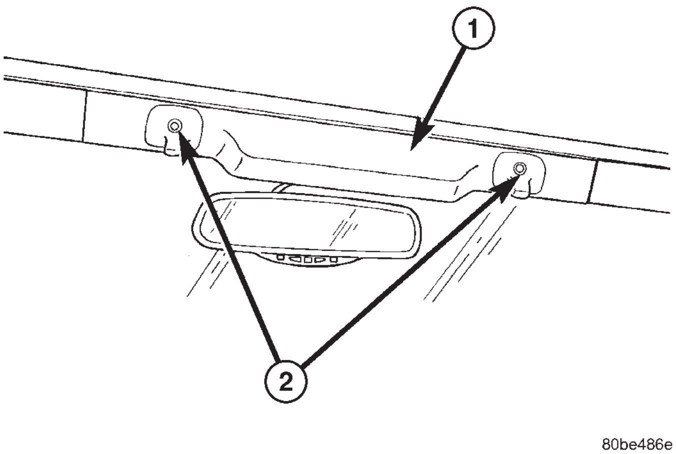

Fig. 5 Center Header Trim Panel

1 - CENTER HEADER TRIM PANEL
2 - SUN VISOR SUPPORT CENTER

INSTALLATION

(1) Position header trim panel on vehicle.
(2) Align the two locating pins on back of header trim panel to holes in header panel.
(3) Engage the two clips on header trim panel to slots in header panel.
(4) Attach the two sun visor support centers (Refer to 23 - BODY/INTERIOR/SUN VISOR - INSTALLATION).

COWL TRIM PANEL

REMOVAL

(1) Remove door sill trim panel.
(2) Remove screws attaching cowl trim panel to inner cowl panel.
(3) Remove cowl trim panel from vehicle (Fig. 6).

INSTALLATION

(1) Position cowl trim panel to vehicle.
(2) Install screws attaching cowl trim panel to inner cowl panel.
(3) Install door sill trim panel.

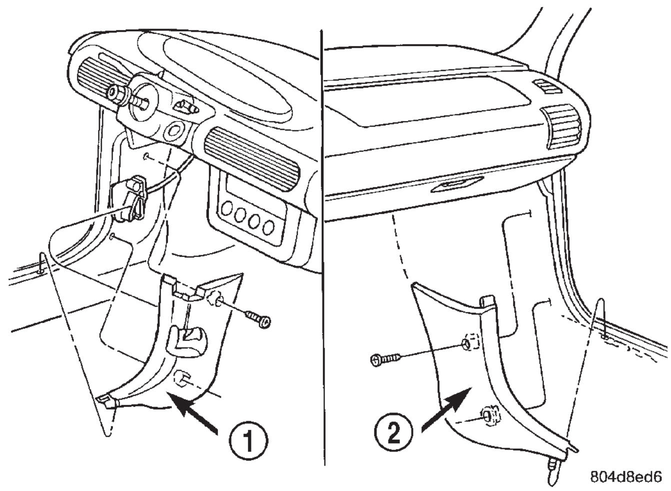

Fig. 6 Cowl Trim Panel

1 - LEFT COWL TRIM PANEL
2 - RIGHT COWL TRIM PANEL

DOOR SILL TRIM PANEL

REMOVAL

(1) Using a fork type prying tool, disengage clips holding door sill trim panel to door sill (Fig. 7).
(2) Starting at one end of sill trim panel, pull upward on sill trim panel in order to disengage clips attaching sill trim panel to door opening flange.
(3) Remove door sill trim panel from vehicle.

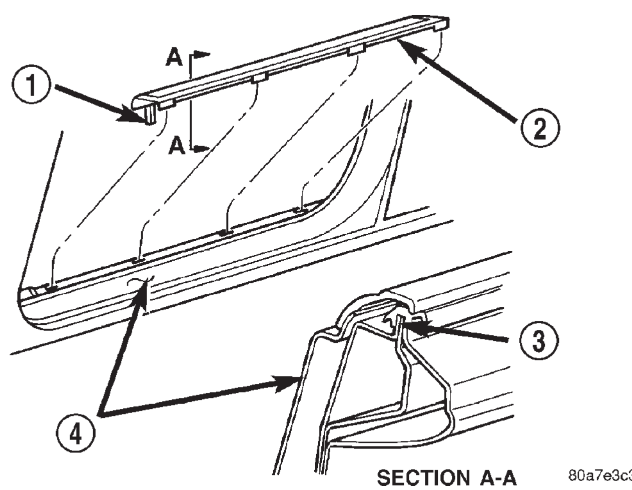

Fig. 7 Door Sill Trim Panel

1 - LOCATING TAB
2 - DOOR SILL TRIM PANEL
3 - DOOR OPENING FLANGE
4 - DOOR SILL

INSTALLATION

(1) Position door sill trim panel on vehicle.
(2) Align locating rib to net against cowl trim panel.

DOOR SILL TRIM PANEL (Continued)

(3) Engage clips on sill trim panel to door opening flange.

NOTE: Check that header/A-pillar and quarter panel weatherstrips are properly positioned. Incorrect positioning will interfere with clip engagement to door opening flange and damage door sill trim panel.

(4) Engage clips attaching sill trim panel to door sill.

FLOOR CONSOLE

REMOVAL

(1) Raise parking brake lever as high as possible.
(2) Move transmission shifter to neutral position.
(3) Loosen set screw on front of shifter knob and remove shift lever knob.
(4) Remove lighted transmission range indicator letter bezel (Fig. 8).
(5) Disconnect transmission range indicator bezel wire connector at the shifter mechanism.
(6) Remove screws, next to floor shifter and in console storage compartment, attaching floor console to brackets on floor pan (Fig. 9).
(7) Disconnect wire connector for floor console accessories at floor pan.
(8) Remove console from vehicle.

NOTE: The grip portion of the parking brake lever will only fit through the wider lower portion of the slot in the floor console.

INSTALLATION

(1) Position console in vehicle.
(2) Connect wire connector for floor console accessories at floor pan.
(3) Verify that the rear locator pin on the bottom of the storage bin is engaged to the slot in the body bracket and the front pin is engaged to the shift mechanism (Fig. 8).
(4) Install screws, next to floor shifter and in console storage compartment, holding floor console to brackets on floor pan.
(5) Connect transmission range indicator bezel wire connector on shifter mechanism.
(6) Install lighted transmission range indicator letter bezel.
(7) Install shift lever knob and tighten set screw on front of shifter knob.

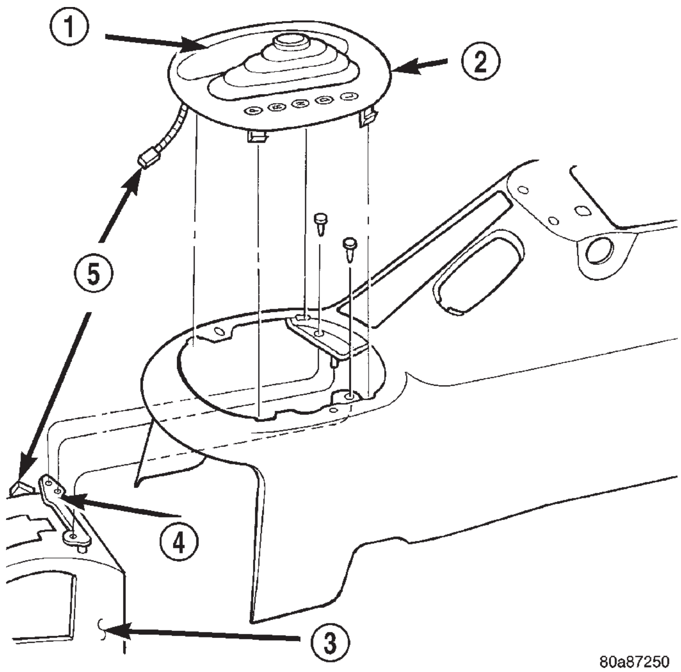

Fig. 8 Transmission Range Indicator Bezel

1 - BEZEL BOOT
2 - PRNDL BEZEL
3 - SHIFTER MECHANISM
4 - LOCATOR PIN
5 - WIRING CONNECTOR

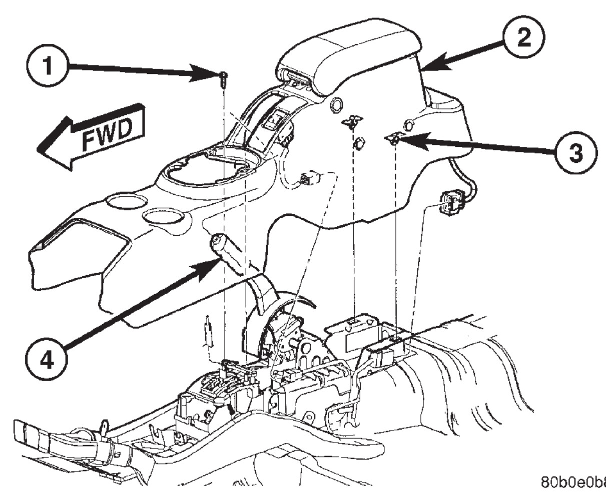

Fig. 9 FLOOR CONSOLE

1 - SCREWS
2 - FLOOR CONSOLE
3 - CLIPS
4 - PARK BRAKE LEVER

FORWARD INSTRUMENT PANEL CONSOLE

REMOVAL

(1) Remove floor console.

(2) Remove instrument panel cluster hood (Refer to 23 - BODY/INSTRUMENT PANEL/CLUSTER BEZEL - REMOVAL).

(3) Remove instrument panel center bezel.

(4) Remove left knee bolster.

(5) Release glove box door catches and allow to hang downward.

(6) Remove screws holding storage bin to forward instrument panel console (Fig. 10).

(7) Remove storage bin from forward instrument panel console.

(8) Remove screws holding forward instrument console to shifter mounting bracket.

(9) Remove screws attaching forward instrument panel console to instrument panel at sides of storage bin area.

(10) Remove screws attaching forward instrument panel console to instrument panel support braces.

(11) Remove forward instrument panel console from vehicle.

INSTALLATION

(1) Position forward instrument panel console to vehicle.

(2) Install screws attaching forward instrument panel console to instrument panel support braces.

(3) Install screws attaching forward instrument panel console to instrument panel at sides of storage bin area.

(4) Install screws attaching forward instrument panel console to shifter mounting bracket.

(5) Install storage bin from forward instrument panel console.

(6) Install screws attaching storage bin to forward instrument panel console.

(7) Release glove box door catches and allow to hang downward.

(8) Install left knee bolster.

(9) Install instrument panel center bezel.

(10) Install instrument panel cluster hood.

(11) Install floor console.

HEADLINER

REMOVAL

CAUTION: Special Tool 6967 is needed to remove the rear locating clip attached to the headlining just forward of the rear window.

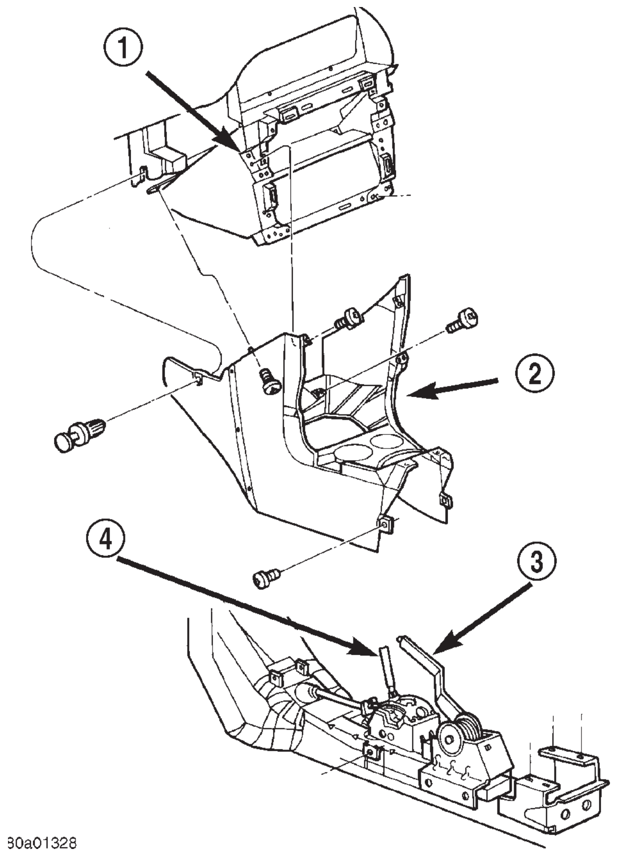

Fig. 10 Forward Instrument Panel Console

1 - INSTRUMENT PANEL
2 - FORWARD INSTRUMENT PANEL CONSOLE
3 - PARK BRAKE
4 - GEAR SHIFTER

(1) Remove the door opening weatherstrips. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/DOOR OPENING WEATHERSTRIP - REMOVAL)

(2) Remove instrument panel end cap/fuse cover.

(3) Remove the sun visors. (Refer to 23 - BODY/INTERIOR/SUN VISOR - REMOVAL)

(4) Remove sun visor supports. (Refer to 23 - BODY/INTERIOR/SUN VISOR SUPPORT - REMOVAL)

(5) Remove left A-pillar trim. (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - REMOVAL)

(6) Remove front/rear assist handles and/or coat hooks.

(7) Remove right and left upper B-pillar trim. (Refer to 23 - BODY/INTERIOR/UPPER B-PILLAR TRIM - REMOVAL)

(8) Remove upper quarter trim, as necessary. (Refer to 23 - BODY/INTERIOR/UPPER QUARTER TRIM - REMOVAL)

(9) Disconnect headliner electrical connector along instrument panel bracket.

(10) Disconnect headliner electrical connector from fuse panel (Fig. 11).

HEADLINER (Continued)

(11) Pull down on the rear of the map lamp and sun roof switch to disengage clips from roof panel, if equipped.

(12) Using Special Tool 6967, disengage headline rear locating clip holding headlining to roof above rear window (Fig. 12).

(13) Pull down on headliner around sun roof to disengage hook and loop fastener, if equipped.

(14) Disconnect the sunroof module electrical connector, if equipped.

(15) Recline front seats.

(16) Tilt steering wheel fully up.

(17) Move shifter fully rearward.

(18) Lower headliner.

(19) Remove headliner through passenger front door opening.

INSTALLATION

NOTE: Do not remove the cardboard light blocker from the reading lamp.

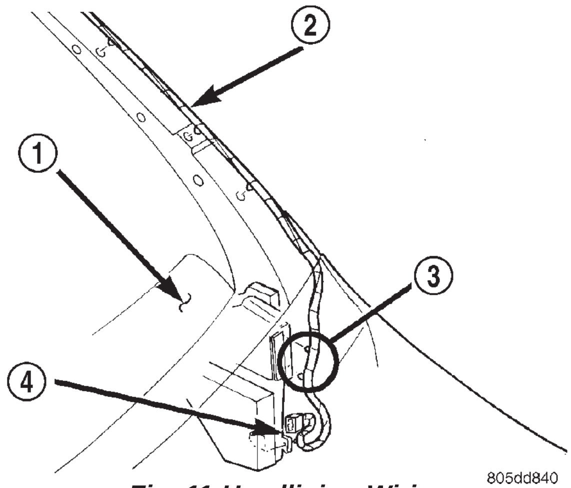

Fig. 11 Headlining Wiring

1 - INSTRUMENT PANEL
2 - LEFT A-PILLAR
3 - WRAP FASTENERS WITH FOAM
4 - FUSE PANEL

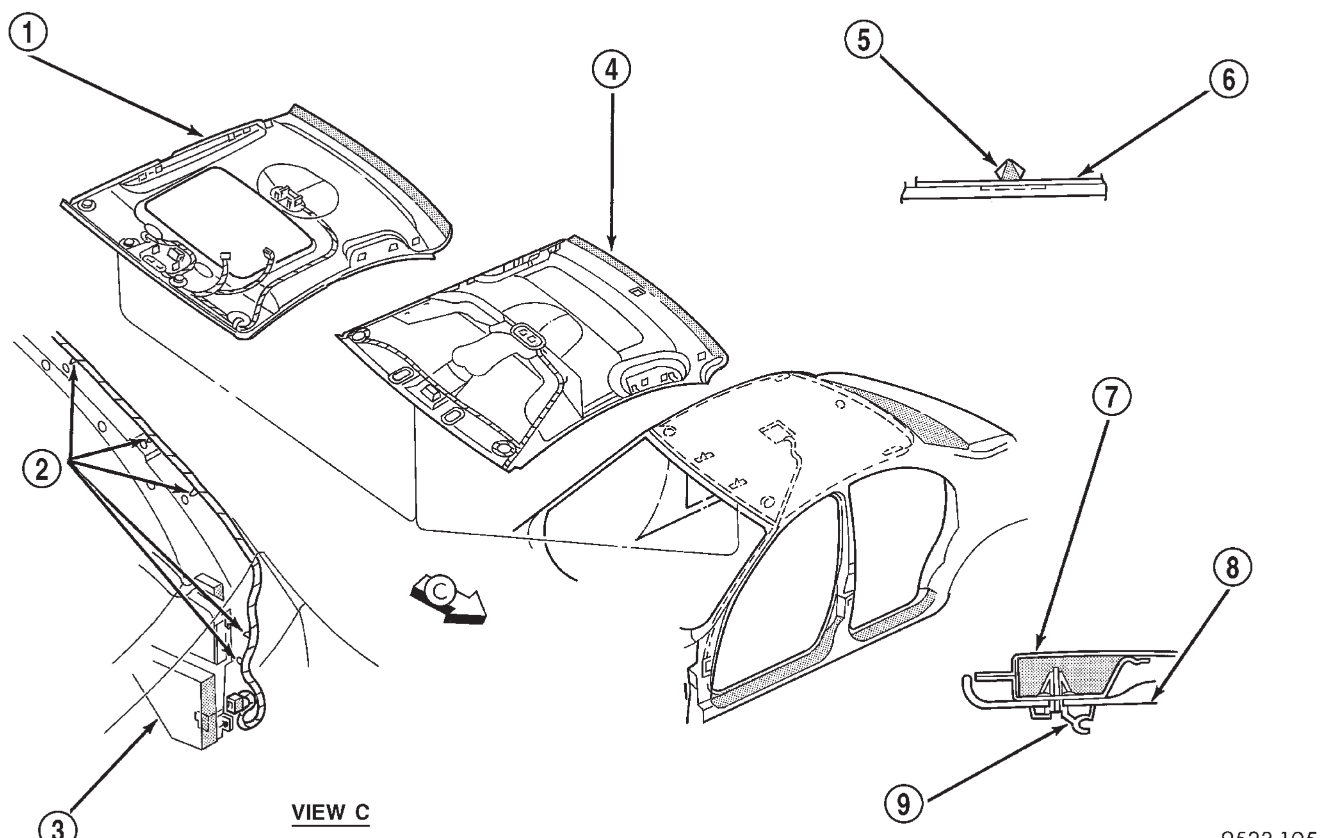

Fig. 12 Headlining

1 - HEADLINING W/SUNROOF
2 - PUSH-IN FASTENERS
3 - JUNCTION BLOCK
4 - HEADLINING
5 - CLIP
6 - REAR WINDOW HEADER
7 - WINDSHIELD HEADER
8 - HEADLINING
9 - SUNVISOR SUPPORT

HEADLINER (Continued)

(1) Transfer front map lamp and bracket.
(2) Transfer sunroof switch.
(3) Transfer rear dome lamp.
(4) Fully recline both front seats.
(5) Tilt steering wheel fully up.
(6) Move shifter fully rearward.
(7) Move headliner into vehicle through front passenger door.
(8) Lay headlining wiring harness out along A–pillar to prevent capturing between headlining and roof.
(9) Install left inboard sun visor support.
(10) Align rear locator with mating hole in roof bow and press upward on headlining until rear locator engages.
(11) Install coat hooks.
(12) Install assist handles.
(13) Install sun visors. (Refer to 23 - BODY/INTERIOR/SUN VISOR - INSTALLATION)
(14) Connect electrical connector to sunroof switch, if equipped.
(15) Push upward on sunroof switch to engage into switch retainer, if equipped.
(16) Push upward on headlining around sunroof opening to engage hook and loop fasteners, if equipped.
(17) Connect map lamp electrical connector, if equipped.
(18) Confirm the headliner is not hung up on the side air bag deployment ramp.
(19) Push upward on map lamp to engage lamp to headlining, if equipped.
(20) Connect dome lamp wire connector to dome lamp.
(21) Install sunroof opening trim lace. (Refer to 23 - BODY/SUNROOF/OPENING TRIM LACE - INSTALLATION)
(22) Install headlining wiring harness to A–pillar and fuse panel.
(23) Install upper quarter trim as necessary. (Refer to 23 - BODY/INTERIOR/UPPER QUARTER TRIM - INSTALLATION)
(24) Install right and left B-pillar trim. (Refer to 23 - BODY/INTERIOR/UPPER B-PILLAR TRIM - INSTALLATION)

NOTE: It is not possible to reinstall the push in fasteners holding the wiring harness to the instrument panel bracket and to the fuse panel area. Wrap these two fasteners with foam tape to prevent buzz, squeak, and rattle complaints (Fig. 11).

(25) Install the A-pillar trim. (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - INSTALLATION)
(26) Install the weatherstrip on to door opening. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/DOOR OPENING WEATHERSTRIP - INSTALLATION)
(27) Verify that the door opening weatherstrip lip overlaps the edge of the headlining and trim panels.

HEADER TRIM PANEL - RIGHT OR LEFT

REMOVAL - JR-27 ONLY

(1) Remove sun visor(s) (Refer to 23 - BODY/INTERIOR/SUN VISOR - REMOVAL).
(2) Remove center header trim panel (Refer to 23 - BODY/INTERIOR/INTERIOR TRIM PANELS - REMOVAL).
(3) Disengage clip attaching header trim panel to header panel.
(4) Remove header trim panel from vehicle (Fig. 13).

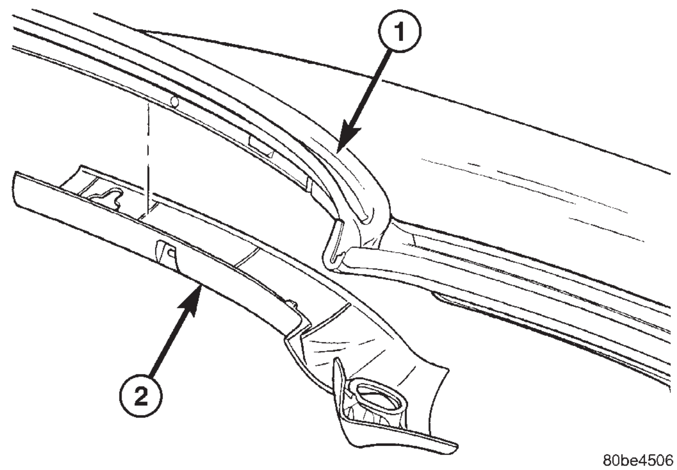

Fig. 13 Header Trim Panel (Right Side)

1 - HEADER WEATHERSTRIP
2 - HEADER TRIM PANEL

INSTALLATION - JR-27 ONLY

(1) Position header trim panel on vehicle.
(2) Align locating pins on back side of trim panel to holes in header panel.
(3) Engage clip on trim panel to slots in header panel.
(4) Install center header trim panel(Refer to 23 - BODY/INTERIOR/INTERIOR TRIM PANELS - INSTALLATION).
(5) Install sun visor (Refer to 23 - BODY/INTERIOR/INTERIOR TRIM PANELS - INSTALLATION).

LOWER QUARTER TRIM

REMOVAL

(1) Remove upper quarter trim panels. (Refer to 23 - BODY/INTERIOR/UPPER QUARTER TRIM - REMOVAL)

(2) Remove the puch pins from the lower quarter trim flange.

(3) Disengage the clips attaching the lower quarter trim to the body.

(4) Remove lower quarter trim from vehicle (Fig. 1).

INSTALLATION

(1) Place lower quarter trim into position.

(2) Engage the clips attaching the lower quarter trim to the body.

(3) Install the push pins into the lower quarter trim flange.

(4) Install the upper quarter trim panel. (Refer to 23 - BODY/INTERIOR/UPPER QUARTER TRIM - INSTALLATION)

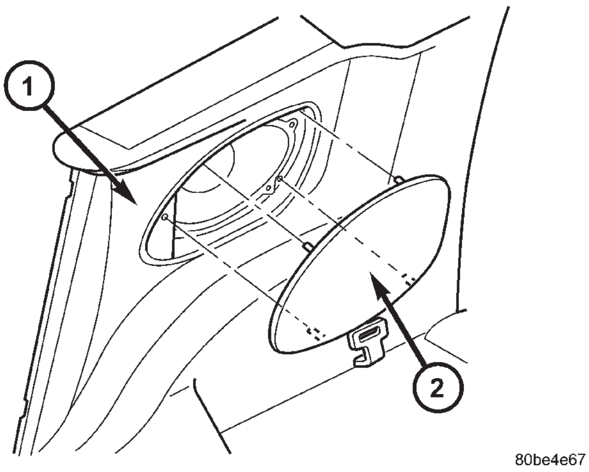

Fig. 14 Speaker Grille

1 - QUARTER TRIM PANEL
2 - SPEAKER GRILLE

QUARTER TRIM PANEL

REMOVAL

(1) Lower convertible top.

(2) Remove rear seat cushion and rear seat back.

(3) Remove door sill trim panel.

(4) Remove speaker grille (Fig. 14).

(5) Remove vertical screws and inboard screw attaching quarter trim panel to inner quarter panel (Fig. 15).

(6) Remove screws attaching quarter trim panel to inner quarter panel through the speaker opening.

(7) Lift metal retainer blade at the front out of clip.

(8) Pull trim panel from inner quarter panel and disconnect speaker wiring connector.

(9) Remove quarter trim panel from vehicle.

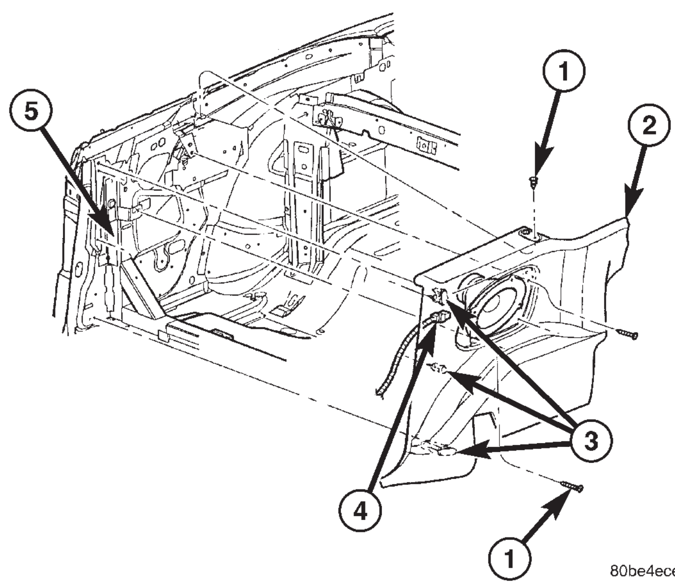

Fig. 15 Quarter Trim Panel

1 - SCREWS
2 - QUARTER TRIM PANEL
3 - LOCATING PINS
4 - SPEAKER WIRE AND CONNECTOR
5 - INNER QUARTER PANEL

INSTALLATION

(1) Replace push in fasteners.

(2) Position quarter trim panel on vehicle.

(3) Connect speaker wiring connector.

(4) Install screws attaching quarter trim panel to inner quarter panel through the speaker opening.

(5) Install vertical screws and inboard screw attaching quarter trim panel to inner quarter panel.

(6) Place toe blade into slotted sill clip.

(7) Install door sill trim panel.

(8) Install speaker grille.

(9) Install rear seat cushion and rear seat back.

REAR SHELF TRIM PANEL

REMOVAL

(1) Remove upper quarter trim panels as necessary. (Refer to 23 - BODY/INTERIOR/UPPER QUARTER TRIM - REMOVAL)

(2) Fold seat backs down.

(3) Remove the center plug (Fig. 16).

(4) Remove close out panel trim.

(5) Remove push-in fasteners attaching rear shelf trim to shelf panel (Fig. 17).

(6) Disconnect the center shoulder belt at the base. (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT & RETRACTOR - REMOVAL)

(7) Pull trim forward to disengage clip attaching trim to shelf panel.

(8) Feed seat belt through the seat belt opening in the shelf panel.

CAUTION: Do not pull on child tether covers or use as a handle for removal of panel.

(9) Remove shelf trim from vehicle.

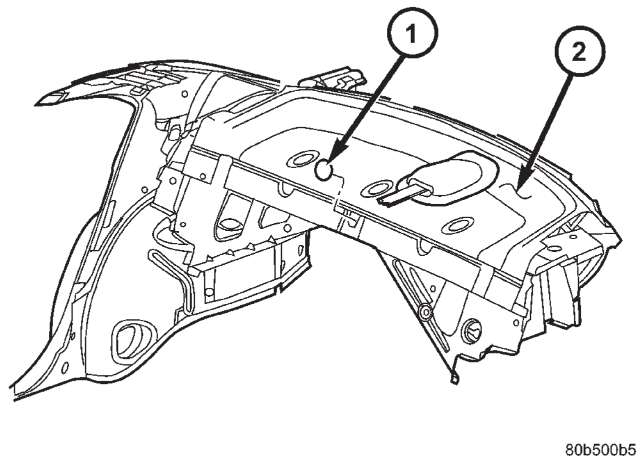

Fig. 16 REAR SHELF CENTER PLUG

1 - CENTER PLUG
2 - REAR SHELF TRIM

INSTALLATION

(1) Feed center shoulder belt through opening in shelf panel.

(2) Place rear shelf trim into position.

(3) Push trim rearward to engage clip attaching rear shelf trim to shelf panel.

(4) Install push-in fasteners attaching rear shelf trim to shelf panel.

CAUTION: Do not pull on child tether covers or use as a handle for installation of panel.

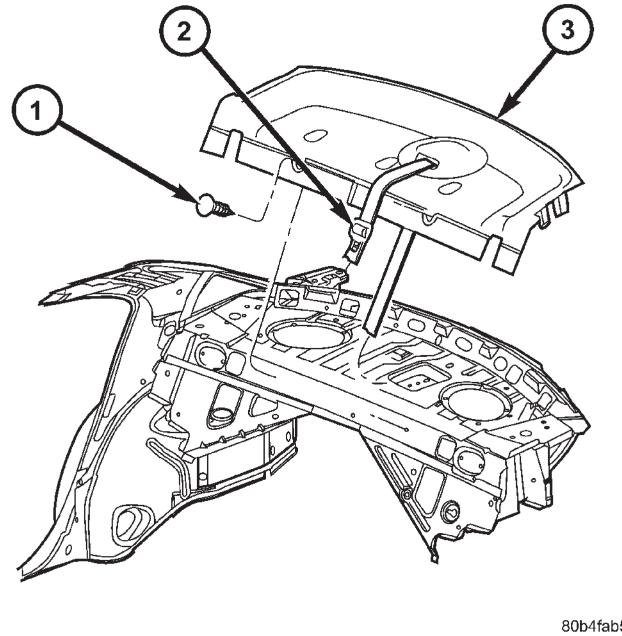

Fig. 17 REAR SHELF TRIM

1 - PUSH-IN FASTENERS
2 - CENTER SHOULDER BELT
3 - SHELF TRIM PANEL

(5) Install close out trim panel.

(6) Install center plug.

(7) Install upper quarter trim panels. (Refer to 23 - BODY/INTERIOR/UPPER QUARTER TRIM - INSTALLATION)

(8) Connect the center shoulder seat belt. (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT & RETRACTOR - INSTALLATION)

(9) Fold seat backs up.

REAR VIEW MIRROR

REMOVAL

REMOVAL

(1) Remove screws attaching inside rear view mirror to header panel.

(2) Disconnect wire connector to rear view mirror, if so equipped.

(3) Remove rear view mirror from vehicle (Fig. 18)

REMOVAL - JR-27 ONLY

All vehicles with driver and passenger side airbags must have a colored coded five Bullet point airbag warning label applied to the sun visor, verify label availability and ensure the label is installed.

(1) Disengage sun visor from sun visor support.

REAR VIEW MIRROR (Continued)

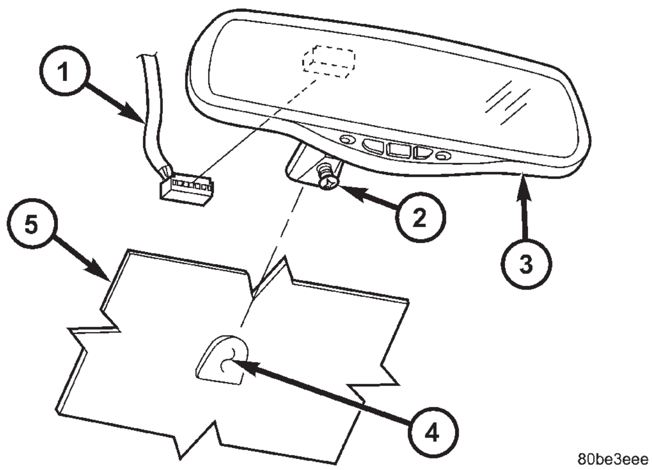

Fig. 18 Inside Rear View Mirror

1 - MIRROR WIRE CONNECTOR
2 - SET SCREW
3 - REAR VIEW MIRROR
4 - SUPPORT BUTTON
5 - WINDSHIELD

(2) Remove screws attaching sun visor to header panel.

(3) Disconnect lighted vanity mirror wiring.

(4) Remove sun visor from vehicle (Fig. 19).

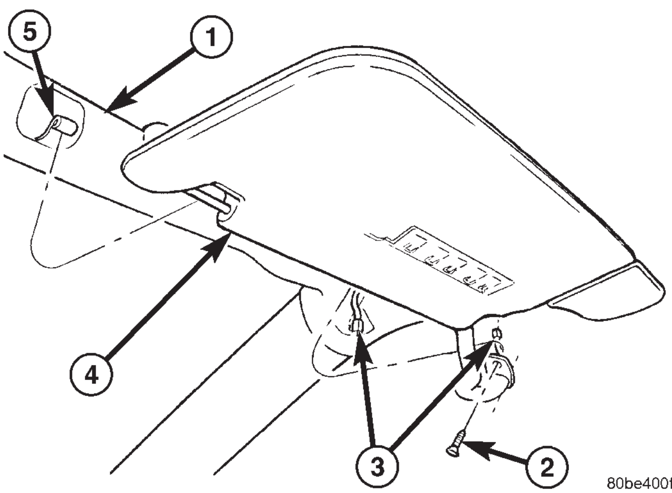

Fig. 19 Sun Visor

1 - Header Panel
2 - Attaching Screw(s)
3 - Vanity Wire Connectors
4 - Sun Visor
5 - Support Visor Center

INSTALLATION

INSTALLATION

(1) Position inside rear view mirror to vehicle.

(2) Connect wire connector to rear view mirror, if so equipped.

(3) Install screws attaching rear view mirror to header panel.

INSTALLATION - JR-27 ONLY

All vehicles with driver and passenger side airbags must have a colored coded five Bullet point airbag warning label applied to the sun visor, verify label availability and ensure the label is installed.

(1) Position sun visor to vehicle.

(2) Connect lighted vanity mirror wire connector.

(3) Install screws attaching sun visor to header panel.

(4) Engage sun visor to sun visor support.

SHIFT BOOT

REMOVAL

(1) Remove the shifter nob set screw and pull knob off of the shifter (Fig. 20).

(2) Using a trim stick C 4755 or equivalent, pop shift bezel boot assembly out of the floor console (Fig. 21).

(3) Disconnect the electrical connector, if equipped, and remove the shift boot.

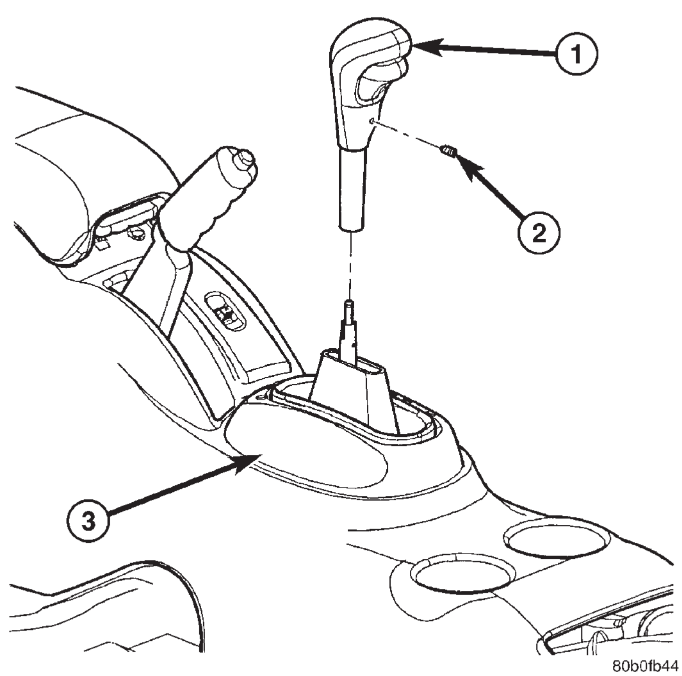

Fig. 20 SHIFT KNOB – AUTOMATIC TRANS

1 - SHIFTER KNOB
2 - SET SCREW

SHIFT BOOT (Continued)

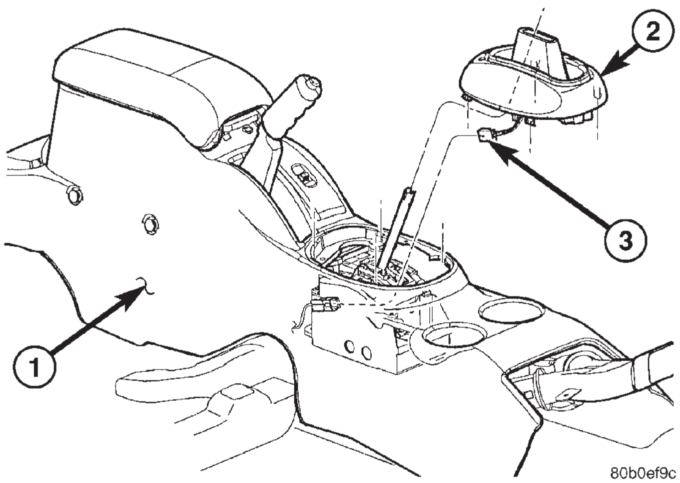

Fig. 21 SHIFT BOOT – TYPICAL

1 - FLOOR CONSOLE
2 - SHIFT BOOT
3 - ELECTRICAL CONNECTOR

INSTALLATION

(1) Connect the electrical connector, if equipped.

(2) Slide the shift boot bezel over the shifter and install into the floor console.

(3) Install the shifter nob and tighten the set screw to 3 N·m (23 in. lbs.).

SUN VISOR

REMOVAL

(1) Disengage sun visor from center support (Fig. 22).

(2) Remove screws attaching sun visor to roof header.

(3) Remove sun visor from header.

(4) If equipped, disconnect wire connector from body harness.

(5) Remove sun visor from vehicle.

INSTALLATION

(1) Place sun visor into position.

(2) If equipped, connect wire connector to body harness.

(3) Install screw attaching sun visor to header.

(4) Install screws attaching sun visor to roof header.

(5) Connect sun visor to center support.

SUN VISOR SUPPORT

REMOVAL

(1) Disengage sun visor from center support.

(2) Remove screw attaching support to roof header,

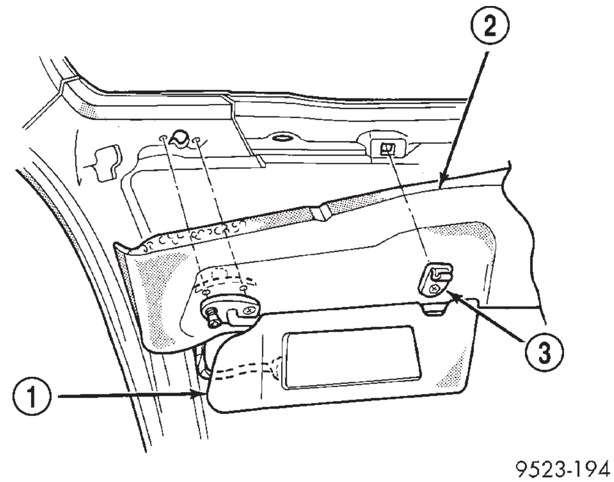

Fig. 22 Sun Visor

1 - SUN VISOR
2 - HEADLINING
3 - SUPPORT

(3) Remove support from vehicle.

INSTALLATION

(1) Place support into position.

(2) Install screw attaching support to roof header,

(3) Engage sun visor to center support.

UPPER B-PILLAR TRIM

REMOVAL

(1) Remove the door opening weatherstrips. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/DOOR OPENING WEATHERSTRIP - REMOVAL)

(2) Pry shoulder belt knob straight off height adjuster using a trim stick (C-4755).

(3) Remove seat belt turning loop cover.

(4) Remove bolt attaching turning loop to height adjuster.

(5) Remove bolt attaching seat belt lower anchor to floor.

(6) Disengage clips attaching upper B-pillar trim to B-pillar.

(7) Remove upper B-pillar trim from vehicle (Fig. 1).

INSTALLATION

(1) Place upper B-pillar trim into position.

(2) Engage clips attaching upper B-pillar trim to B-pillar.

(3) Install bolt attaching seat belt lower anchor to floor.

(4) Install bolt attaching turning loop to height adjuster.

(5) Install seat belt turning loop cover.

UPPER B-PILLAR TRIM (Continued)

(6) Push shoulder belt knob straight on height adjuster.

(7) Install the door opening weatherstrips. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/DOOR OPENING WEATHERSTRIP - INSTALLATION)

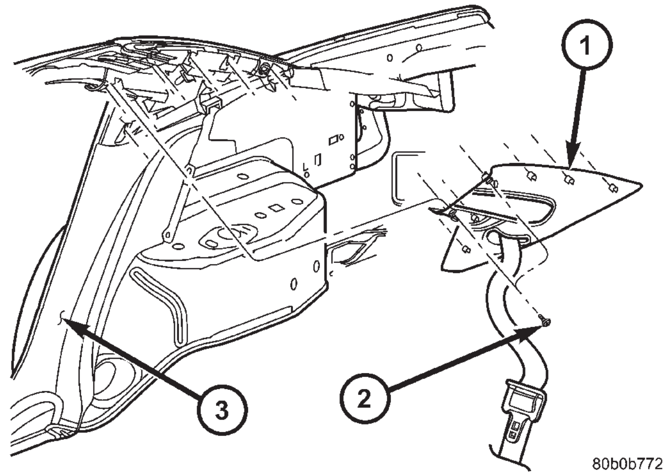

Fig. 23 UPPER QUARTER TRIM W/CURTAIN AIR BAG

1 - UPPER QUARTER TRIM PANEL
2 - SCREWS
3 - C-PILLAR LOWER

UPPER DECK MOLDING

REMOVAL

(1) Lower convertible top to midway position.

(2) Remove screws attaching upper deck molding to rear deck panel above convertible top rear attachment.

(3) Open decklid.

(4) Remove screws attaching upper deck molding to rear deck panel inside decklid water trough.

(5) Disconnect wire connector for CHMSL.

(6) Remove upper deck molding from vehicle.

INSTALLATION

(1) Position upper deck molding on vehicle.

(2) Connect wire connector for CHMSL.

(3) Install screws attaching upper deck molding to rear deck panel inside decklid water trough.

(4) Install screws attaching upper deck molding to rear deck panel above convertible top rear attachment.

(5) Raise and secure convertible top.

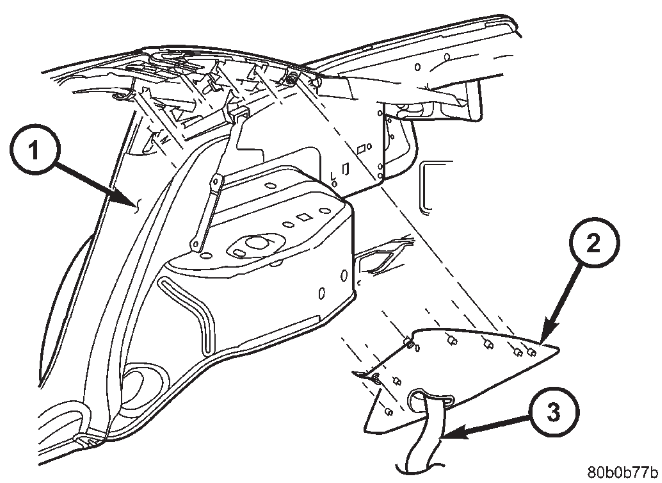

Fig. 24 UPPER QUARTER TRIM W/O CURTAIN AIR BAG

1 - C-PILLAR LOWER
2 - UPPER QUARTER TRIM PANEL
3 - SHOLDER BELT

UPPER QUARTER TRIM

REMOVAL

(1) Remove the door opening weatherstrips as necessary. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/DOOR OPENING WEATHERSTRIP - REMOVAL)

(2) Remove rear seat cushion. (Refer to 23 - BODY/SEATS/REAR SEAT CUSHION - REMOVAL)

(3) Remove bolt attaching rear seat belt anchor to floor. (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT - REMOVAL)

(4) On vehicles equipped with a side curtain air bag, open the screw cap covers and remove the screws (Fig. 23).

(5) Fold the seat back down.

(6) Disengage clips attaching upper quarter trim to inner quarter panel (Fig. 23) and (Fig. 24).

(7) Route seat belt webbing through access hole in upper quarter trim.

(8) Remove upper quarter trim panel from vehicle.

INSTALLATION

(1) Place upper quarter trim panel into position.

(2) Route seat belt webbing through access hole in upper quarter trim.

(3) Engage clips attaching upper quarter trim to inner quarter panel.

(4) On vehicles equipped with side curtain air bag, install the screws and close the screw cap covers.

(5) Install bolt attaching rear seat belt anchor to floor. (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT - INSTALLATION)

(6) Install rear seat cushion. (Refer to 23 - BODY/SEATS/REAR SEAT CUSHION - INSTALLATION)

UPPER QUARTER TRIM (Continued)

(7) Install the door opening weatherstrips as necessary. (Refer to 23 - BODY/WEATHERSTRIP/SEALS/DOOR OPENING WEATHERSTRIP - INSTALLATION)

WINDSHIELD HEADER DAMPER

REMOVAL

(1) Remove center header trim panel (Refer to 23 - BODY/INTERIOR/INTERIOR TRIM PANELS - REMOVAL).

(2) Remove nuts attaching damper (Fig. 25).

(3) Remove damper from vehicle.

INSTALLATION

(1) Place windshield header damper in position.

(2) Install nuts attaching damper.

(3) Install center header trim panel into position (Refer to 23 - BODY/INTERIOR/INTERIOR TRIM PANELS - INSTALLATION).

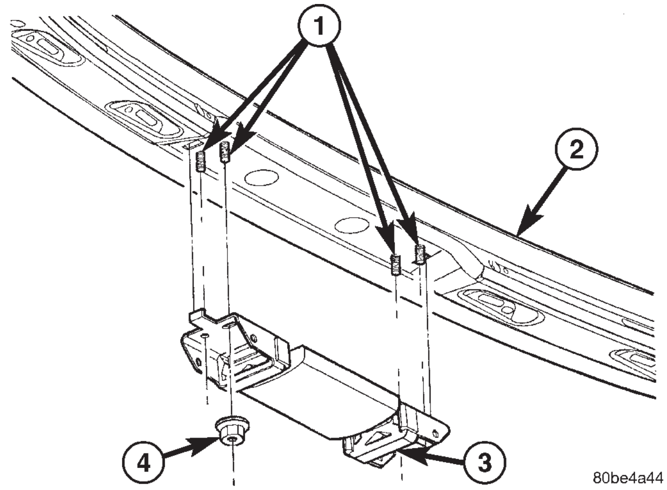

Fig. 25 Windshield Header Damper

1 - STUDS
2 - HEADER PANEL
3 - WINDSHIELD HEADER DAMPER
4 - NUT(S)

PAINT

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PAINT

SPECIFICATIONS - COLOR CODE CHARTS

EXTERIOR COLORS

EXTERIOR COLOR	DAIMLERCHRYSLER CODE	EXTERIOR COLOR	DAIMLERCHRYSLER CODE
BLACK CLEARCOAT	DX8	LIGHT ALMOND PEARL METALLIC CLEARCOAT	ZKJ
BRIGHT SILVER METALLIC CLEARCOAT	WS2	STEEL BLUE PEARLCOAT	XBQ
DARK GARNET RED PEARLCOAT	XRV	STERLING BLUE SATIN GLOW	YB2
DEEP SAPPHIRE BLUE CLEARCOAT	YBW	STONE WHITE CLEARCOAT	SW1
INFERNO RED TINTED PEARLCOAT	WEL	ONYX GREEN PEARLCOAT	YJR

INTERIOR COLORS

INTERIOR COLOR	DAIMLERCHRYSLER CODE	INTERIOR COLOR	DAIMLERCHRYSLER CODE
DARK GREY SLATE	DV	SANDSTONE	T5
DEEP ROYAL BLUE COAT	BP	TAUPE	L5
DEEP ROYAL BLUE/CREAM COAT	BT		

BASECOAT/CLEARCOAT FINISH

DESCRIPTION

On most vehicles a two-part paint application (base coat/clear coat) is used. Color paint that is applied to primer is called base coat. The clear coat protects the base coat from ultraviolet light and provides a durable high-gloss finish.

CAUTION: Do not use abrasive chemicals or compounds on painted surfaces. Damage to finish can result.
Do not use harsh alkaline based cleaning solvents on painted surfaces. Damage to finish or color can result.

PAINT CODE

DESCRIPTION

Exterior vehicle body colors are identified on the Body Code plate.(Refer to VEHICLE DATA/VEHICLE INFORMATION/BODY CODE PLATE - DESCRIPTION AND OPERATION). The paint code is also identified on the Vehicle Safety Certification Label which is located on the drivers door shut face. The first digit of the paint code listed on the vehicle indicates the sequence of application, i.e.: P = primary coat, Q = secondary coat. The codes listed in the Color Code Chart are used for manufacturing purposes.

PAINTED SURFACE TOUCH-UP

DESCRIPTION

When a painted metal surface has been scratched or chipped, it should be touched-up as soon as possible to avoid corrosion. For best results, use Mopar® Scratch Filler/Primer, Touch-Up Paints and Clear Top Coat. (Refer to VEHICLE DATA/VEHICLE INFORMATION/BODY CODE PLATE - DESCRIPTION AND OPERATION).

WARNING: USE A OSHA APPROVED BREATHING MASK WHEN SPRAYING PAINT OR SOLVENTS IN A CONFINED AREA. PERSONAL INJURY CAN RESULT.

TOUCH-UP PROCEDURE

(1) Scrape loose paint and corrosion from inside scratch or chip.
(2) Clean affected area with Mopar® Tar/Road Oil Remover, and allow to dry.
(3) Fill the inside of the scratch or chip with a coat of filler/primer. Do not overlap primer onto good surface finish. The applicator brush should be wet enough to puddle-fill the defect without running. Do not stroke brush applicator on body surface. Allow the filler/primer to dry hard.
(4) Cover the filler/primer with color touch-up paint. Do not overlap touch-up color onto the original color coat around the scratch or chip. Butt the new color to the original color, if possible. Do not stroke applicator brush on body surface. Allow touch-up paint to dry hard.
(5) On vehicles without clear coat, the touch-up color can be lightly finesse sanded (1500 grit) and polished with rubbing compound.
(6) On vehicles with clear coat, apply clear top coat to touch-up paint with the same technique as described in Step 4. Allow clear top coat to dry hard. If desired, Step 5 can be performed on clear top coat.

WARNING: AVOID PROLONGED SKIN CONTACT WITH PETROLEUM OR ALCOHOL – BASED CLEANING SOLVENTS. PERSONAL INJURY CAN RESULT.

FINESSE SANDING/BUFFING AND POLISHING

DESCRIPTION

Minor acid etching, orange peel, or smudging in clear coat or single-stage finishes can be reduced with light finesse sanding, hand buffing, and polishing. **If the finish has been finesse sanded in the past, it cannot be repeated. Finesse sanding operation should be performed by a trained automotive paint technician.**

CAUTION: Do not remove clear coat finish, if equipped. Base coat paint must retain clear coat for durability.

ADJUSTABLE QUARTER GLASS JR-27

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ADJUSTABLE QUARTER GLASS JR-27

REMOVAL

(1) Raise quarter glass to full up position, if possible, to aid in removal.
(2) Remove quarter trim panel.
(3) Partially lower convertible top.
(4) Disconnect wire connector to power window motor.
(5) Remove fasteners holding quarter window module to inner quarter panel (Fig. 1).
(6) Lift quarter window module upward and out opening at top of quarter panel.
(7) Separate quarter glass from quarter window module (Fig. 2).

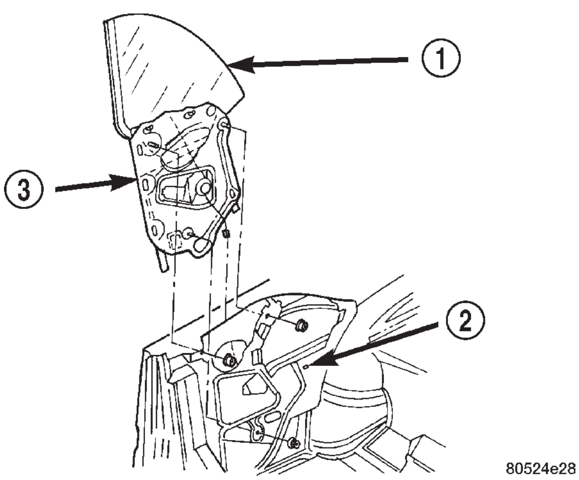


Fig. 1 Quarter Window Module

1 - QUARTER GLASS
2 - INNER QUARTER PANEL
3 - QUARTER WINDOW MODULE

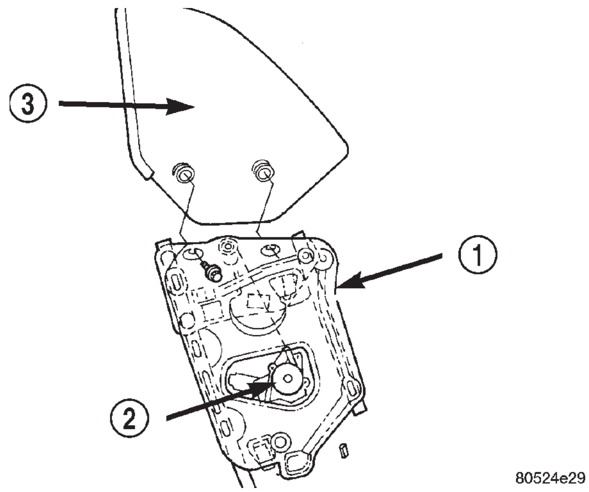


Fig. 2 Quarter Glass

1 - QUARTER WINDOW MODULE
2 - POWER QUARTER WINDOW MOTOR
3 - QUARTER GLASS

INSTALLATION

(1) Lower quarter window module into position through opening in top of quarter panel.
(2) Install fasteners holding quarter window module to inner quarter panel.
(3) Connect wire connector to power window motor.
(4) Raise glass lift channel to full up position.
(5) Position quarter glass on quarter window module.
(6) Loosely install fasteners holding quarter glass to quarter window module.
(7) Lower and secure convertible top.
(8) Adjust quarter glass as necessary (Refer to 23 - BODY/ADJUSTABLE QUARTER GLASS - ADJUSTMENTS).
(9) Install quarter trim panel.

ADJUSTABLE QUARTER GLASS JR-27 (Continued)

ADJUSTMENTS

QUARTER GLASS ADJUSTMENT

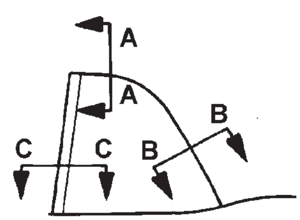
NOTE: The door glass must be properly adjusted prior to performing any quarter glass adjustments.

UP-STOP ADJUSTMENTS

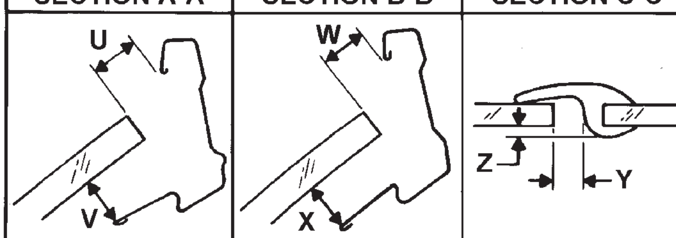
(1) Remove quarter trim panel.
(2) Remove center and rear side rail weatherstrips from side rail weatherstrip retainer channels.
(3) Loosen up-stop nuts.
(4) Raise quarter glass.
(5) Slide up-stop to achieve proper glass to weatherstrip retainer gap. Refer to the Quarter Glass Adjustment Specifications Table.
(6) Tighten all fasteners.
(7) Install center and rear side rail weatherstrips to side rail weatherstrip retainer channels.
(8) Cycle quarter glass between full up and full down positions. Verify operation and adjust as necessary.
(9) Verify that the top edge of the door glass is beneath the lip of the weatherstrip.
(10) Install quarter trim panel.

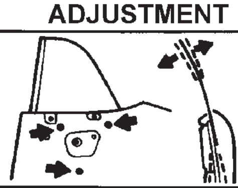
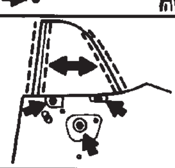
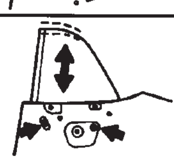
TOP OF GLASS – INBOARD/OUTBOARD ADJUSTMENTS

(1) Remove quarter trim panel.
(2) Remove center and rear side rail weatherstrips from side rail weatherstrip retainer channels.
(3) Using a suitable wrench, loosen the lower jack screw jam nuts.
(4) Raise quarter glass.
(5) Using a suitable allen wrench, rotate jackscrews to achieve the proper gap between the door glass weatherstrip retainer channel. Refer to the Quarter Glass Adjustment Specifications Table.
(6) Verify that the quarter glass maintains even contact with the outer belt weatherstrip.
(7) Install center and rear side rail weatherstrips to side rail weatherstrip retainer channels.
(8) Cycle quarter glass between full up and full down positions. Verify operation and adjust as necessary.
(9) Tighten all fasteners.
(10) Verify that the top edge of the door glass is beneath the lip of the weatherstrip with glass in the full up position.
(11) Install quarter trim panel.



MEASUREMENT LOCATIONS AND THEIR VALUES



SEQUENCE		ADJUSTMENT	U	V	W	X	Y	Z
1	IN/OUT			20.0mm ±2mm		20.0mm ±2mm		2.0mm ±1mm
2	FORWARD/ REARWARD		10.0mm ±2mm		10.0mm ±3mm		6.0mm ±1mm	
	UP/DOWN		10.0mm ±2mm		10.0mm ±3mm			

NOTE: Forward / Rearward and Up/Down adjustment are to be made at the same time.

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QUARTER GLASS ADJUSTMENT SPECIFICATIONS

ADJUSTABLE QUARTER GLASS JR-27 (Continued)

GLASS – FRONT/REAR ADJUSTMENT

(1) Remove quarter trim panel.

(2) Remove center and rear side rail weatherstrips from side rail weatherstrip retainer channels.

(3) Loosen glass attachment bolts.

(4) Raise quarter glass and position correctly. Refer to the Quarter Glass Adjustment Specifications Table.

(5) Tighten all fasteners.

(6) Install center and rear side rail weatherstrips to side rail weatherstrip retainer channels.

(7) Cycle quarter glass between full up and full down positions. Verify operation and adjust as necessary.

(8) Install quarter trim panel.

QUARTER GLASS ALIGNMENT VERIFICATION

(1) Raise door glass to full up position.

(2) Cycle quarter glass between full up and full down positions.

(3) Verify that quarter glass operates smoothly and maintains correct alignment to convertible top and door glass.

(4) Verify that quarter glass weatherstrip fully contacts door glass.

(5) Verify that no scissoring of the door glass and weatherstrip occurs.

(6) If any of the above conditions are found,

(a) Adjust quarter glass.

(b) Adjust the door glass as necessary to cure the condition.

SEATS

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HEADREST

REMOVAL

(1) Raise head restraint slightly.

(2) Insert a stiff wire into the hole on the right hand side head restraint sleeve/guide and push to release latch (Fig. 1).

(3) At the same time, press the button on the head restraint sleeve/guide left hand side and pull upward to release the head restraint.

(4) Remove head restraint from seat back.

INSTALLATION

(1) Place head restraint in position.

(2) Push head restraint down into the lock position.

(3) Raise head restraint to ensure it locks at the last stop.

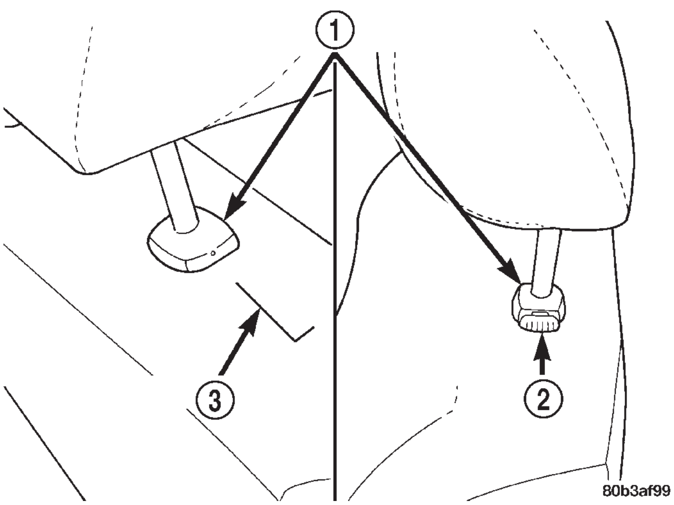

Fig. 1 Head Restraint Removal

1 - SLEEVE GUIDE
2 - BUTTON
3 - STIFF WIRE

FRONT SEAT

DESCRIPTION - JR-27 ONLY

Refer to (Fig. 2) for more information while servicing the front seat.

FRONT SEAT (Continued)

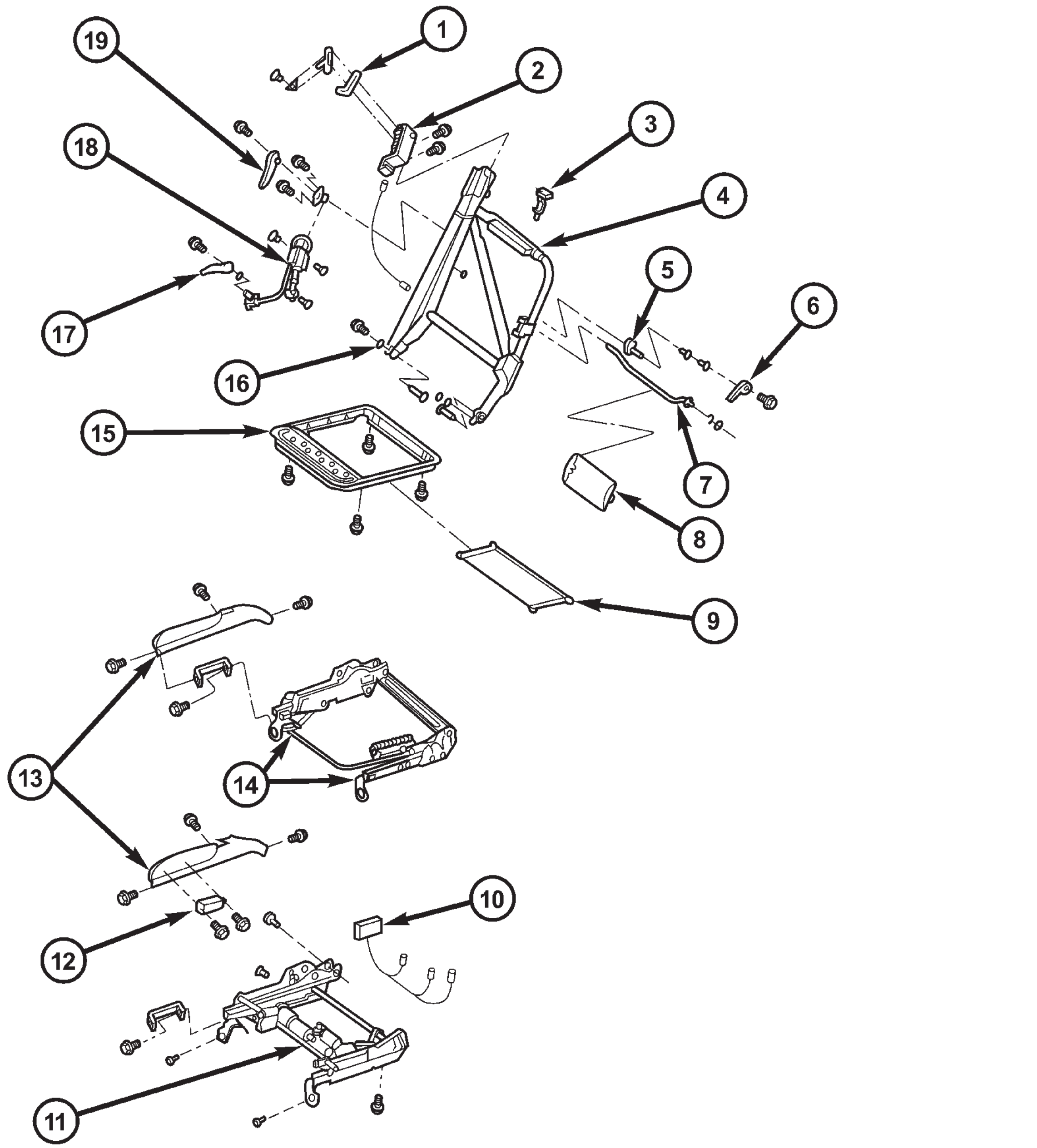

Fig. 2 Front Seat Exploded View

1 - SEAT BELT TRIM BEZEL
2 - SEAT BELT RETRACTOR
3 - HEADREST SLEEVE
4 - SEAT BACK FRAME ASSEMBLY
5 - LUMBAR CAM ASSEMBLY
6 - LUMBAR HANDLE
7 - LUMBAR ROD ASSEMBLY
8 - LUMBAR BACKREST
9 - SEAT SUSPENSION
10 - POWER SEAT WIRING HARNESS
11 - POWER SEAT ADJUSTER ASSEMBLY
12 - POWER SEAT SWITCH
13 - SEAT SIDE SHIELD
14 - MANUAL SEAT ADJUSTER ASSEMBLY
15 - CUSHION FRAME ASSEMBLY
16 - MEMORY DUMP CAM
17 - LOWER RECLINER HANDLE
18 - RECLINER ASSEMBLY
19 - UPPER RECLINER HANDLE

FRONT SEAT (Continued)

REMOVAL

REMOVAL

(1) Position seat far enough forward to gain access to rear mount bolts on floor.

(2) Remove bolts holding rear of seat track to floor (Fig. 3).

(3) Slide seat rearward.

(4) Remove bolts attaching front of the seat track to floor kick up.

(5) Disconnect negative battery cable, if electrical seat.

(6) Disconnect front seat wire harness connector from body harness connector.

CAUTION: Caution should be taken not to handle seat by adjuster release bar when removing spring loaded seat from vehicle.

(7) Remove front seat from vehicle.

REMOVAL - MANUAL - JR-27 ONLY

(1) Move seat to full forward position.

(2) Remove rear inboard bolt attaching seat to floor pan.

(3) Remove rear outboard bolts attaching seat to side sill pylon.

(4) Position seat in full rearward position.

(5) Remove front inboard and outboard bolts holding seat to floor pan crossmember (Fig. 4).

(6) Tilt seat rearward and disconnect seat belt pretensioner wire connector.

(7) Remove seat from vehicle.

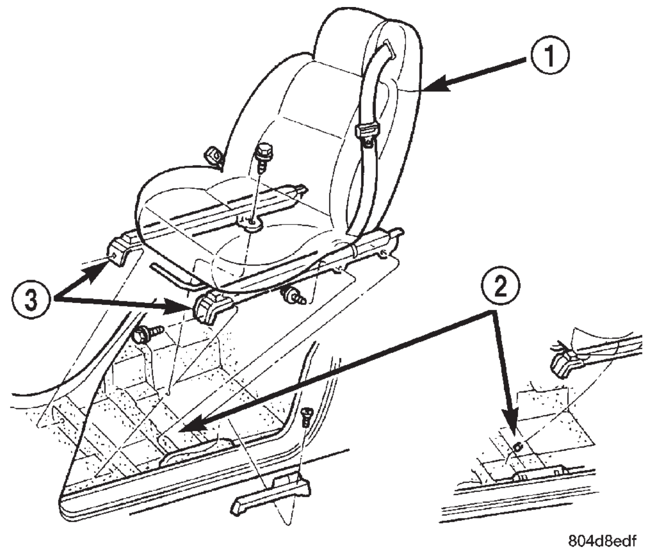

Fig. 4 Front Seat

1 - FRONT SEAT
2 - FLOOR PAN CROSSMEMBER
3 - FRONT SEAT TRACK

REMOVAL - POWER - JR-27

(1) Move seat to full forward position.

(2) Remove rear inboard bolt attaching seat to floor pan.

(3) Remove rear outboard bolts attaching seat to side sill pylon.

(4) Position seat in full rearward position.

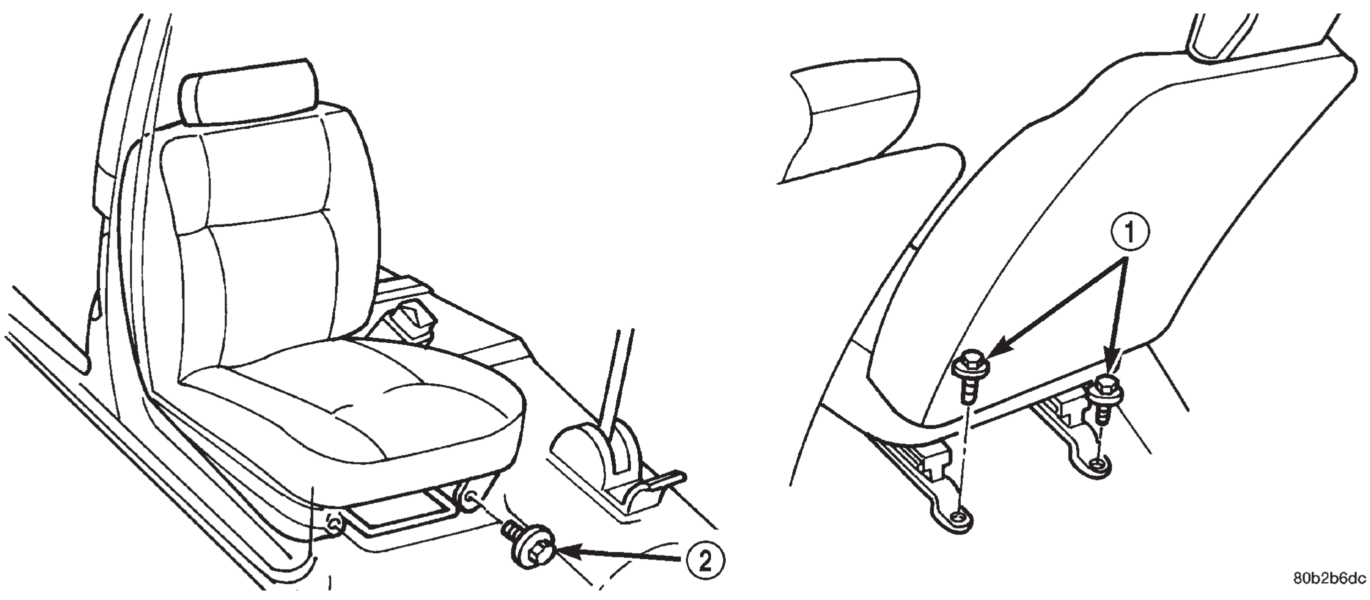

Fig. 3 Front Seat Removal

1 - REAR BOLTS
2 - FRONT BOLTS

FRONT SEAT (Continued)

(5) Remove front inboard and outboard bolts attaching seat to floor pan crossmember (Fig. 4).

(6) Tilt seat rearward and disconnect wire connector to seat belt pretensioner and power seat mechanism.

(7) Remove seat from vehicle.

INSTALLATION

INSTALLATION

CAUTION: Do not handle by seat adjuster release bar.

NOTE: Ensure that the seat tracks are rearward. Ensure the seat tracks on the right and left are in equal latch positions.

(1) Place front seat in position in vehicle.

(2) Connect front seat wire harness connector to body harness connector.

(3) Install bolts to attach front of seat track to the floor kick up. Tighten bolts to 61 N·m (45 ft. lbs.) torque.

(4) Slide seat forward and install bolts attaching rear of seat track to the floor. Tighten bolts to 61 N·m (45 ft. lbs.) torque.

(5) Verify front seat operation.

INSTALLATION - MANUAL - JR-27

CAUTION: It is important that the following steps be done correctly to insure that the seat tracks are properly timed prior to securing the seats to the vehicle.

(1) Adjust seat back to vertical position using either recliner handle.

WARNING: DO NOT GRAB EITHER RECLINER HANDLE OR TOWEL BAR WHEN HANDLING SEAT. THE SEAT TRACKS ARE SPRING LOADED AND WILL RELEASE.

(2) Turn seat upside down so that the seat tracks can be seen.

(3) Securely grasp the spring loaded outboard track rail and while lifting the towel bar, position the lower rail so that it is locked in the forth hole from the end (Fig. 5).

(4) Position the inboard seat track rail so that it is identical to the outboard track lower rail.

(5) Return seat to upright position.

(6) Position seat in vehicle.

(7) Tilt seat rearward and connect wire connector to seat belt pretensioner.

(8) Push downward on seat cushion to ensure that the front mounting brackets are fully seated to floor pan crossmember.

(9) Install and tighten rear outboard bolt seat to side sill pylon.

(10) Install and tighten forward outboard bolt attaching seat to crossmember.

(11) Install and tighten forward inboard bolt attaching seat to crossmember.

(12) Move seat to full forward position. Push rearward slightly on seat to ensure that the adjuster latches are engaged on both seat tracks.

(13) Install and tighten rear inboard bolt attaching seat to floor pan.

(14) Install and tighten middle outboard bolt attaching seat to side sill pylon.

(15) Move seat forward and rearward and check the efforts to move seat. If effort is to high loosen seat track bolts and retighten to the proper torque.

NOTE: Tighten all seat track retaining bolts to 61 N·m (45 ft. lbs.) torque.

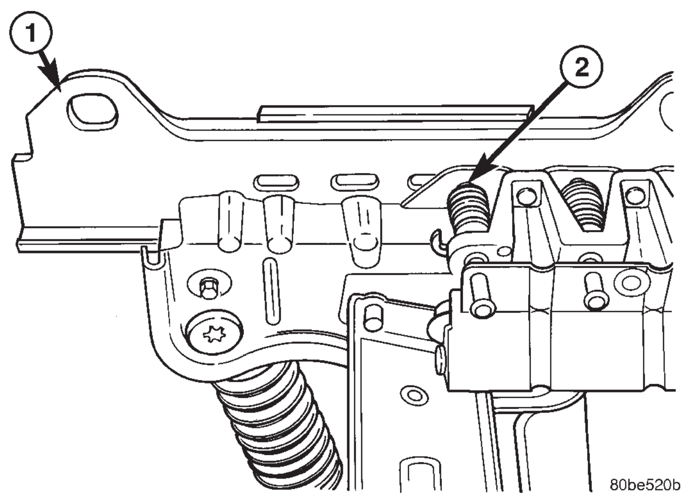

Fig. 5 Seat Track Position

1 - REAR OF SEAT TRACK
2 - FORTH HOLE POSITION

INSTALLATION - POWER - JR-27 ONLY

(1) Adjust seat back to vertical position using either recliner handle.

(2) Position seat in vehicle.

(3) Tilt seat rearward and connect wire connector to seat belt pretensioner and power seat mechanism.

(4) Push downward on seat cushion to ensure that the front mounting brackets are fully seated to floor pan crossmember.

(5) Use power seat switch to move seat to full rearward position.

(6) Install and tighten rear outboard bolt attaching seat to side sill pylon.

FRONT SEAT (Continued)

(7) Install and tighten forward outboard bolt attaching seat to crossmember.

(8) Install and tighten forward inboard bolt attaching seat to crossmember.

(9) Use power seat switch to move seat to full forward position.

(10) Install and tighten rear inboard bolt attaching seat to floor pan.

(11) Install and tighten middle outboard bolt attaching seat to side sill pylon.

NOTE: Tighten all seat track retaining bolts to 61 N·m (45 ft. lbs.) torque.

FRONT SEAT BACK

REMOVAL

REMOVAL

(1) Remove seat from vehicle.

(2) Remove seat cushion side shields.

NOTE: Do not reuse the recliner assembly attaching bolts.

(3) Remove bolts attaching recliner to seat back cushion frame (Fig. 6).

(4) Remove pivot bolts (Fig. 7).

(5) Disconnect any electrical connectors to the seat back, if equipped.

(6) Remove seat back from seat cushion.

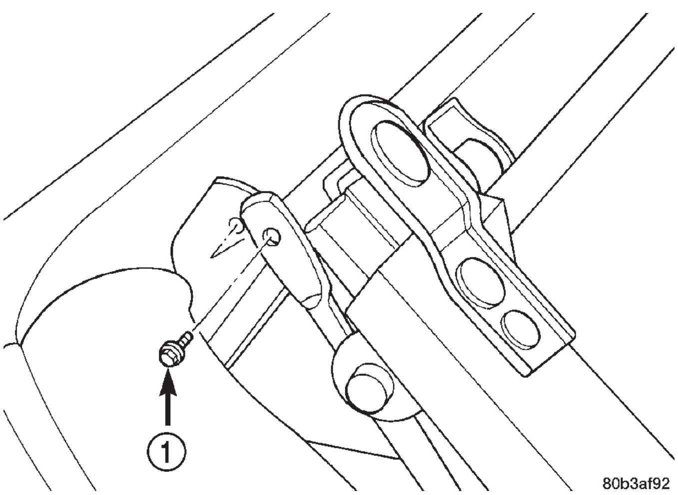

Fig. 6 Recliner Attaching Bolt

1 - RECLINER BOLT

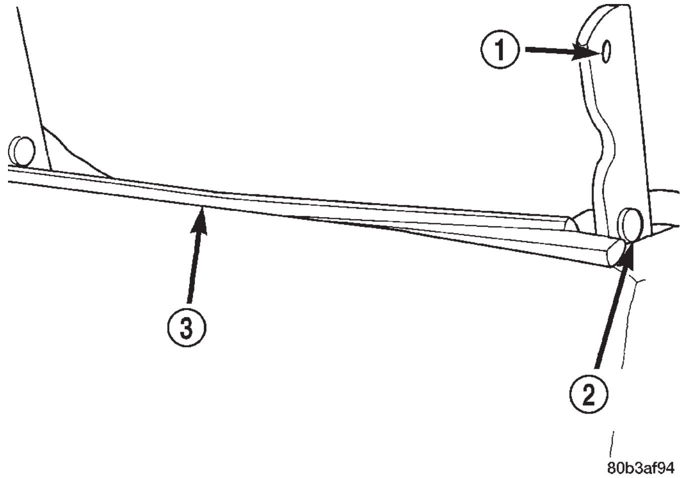

Fig. 7 Remove Seat Back

1 - RECLINER BOLT HOLE
2 - SEAT BACK BOLT HOLE
3 - J-STRAP RETAINER

REMOVAL - JR-27 ONLY

(1) Remove seat from vehicle(Refer to 23 - BODY/SEATS/SEAT - REMOVAL).

(2) Remove recliner handle.

(3) Remove seat side shield(Refer to 23 - BODY/SEATS/SEAT CUSHION SIDE SHIELDS - REMOVAL).

(4) Remove recliner cable eyelet clip (Fig. 8).

(5) Remove recliner cable from arm on seat adjuster and feed cable back through hole in seat adjuster.

NOTE: The torque prevailing nuts used to secure the lower seat belt anchor and seat belt buckle are not reusable. Verify availability prior to proceeding.

(6) Remove seat cushion(Refer to 23 - BODY/SEATS/SEAT CUSHION - REMOVAL).

(7) Remove nut attaching lower seat belt anchor to seat frame (Fig. 8).

(8) Back off nut attaching seat belt buckle to seat frame.

(9) Remove seat belt buckle pretensioner from seat frame.

(10) Remove E-clip and washer from easy entry rod at inboard side of seat, manual seat only.

(11) Remove rod from seat back, manual seat only.

(12) Remove pivot bolts attaching seat back to seat frame.

WARNING: DO NOT PULL ON UPPER RECLINER HANDLE OR RECLINER CABLE END AT ANY POINT UNTIL THE LEAD SCREW IS REMOVED IT IS UNDER A HIGH PRESSURE LOAD.

(13) Remove bolt attaching recliner lead screw to seat frame.

(14) Remove seat back from seat frame(Refer to 23 - BODY/SEATS/SEAT BACK - REMOVAL).

FRONT SEAT BACK (Continued)

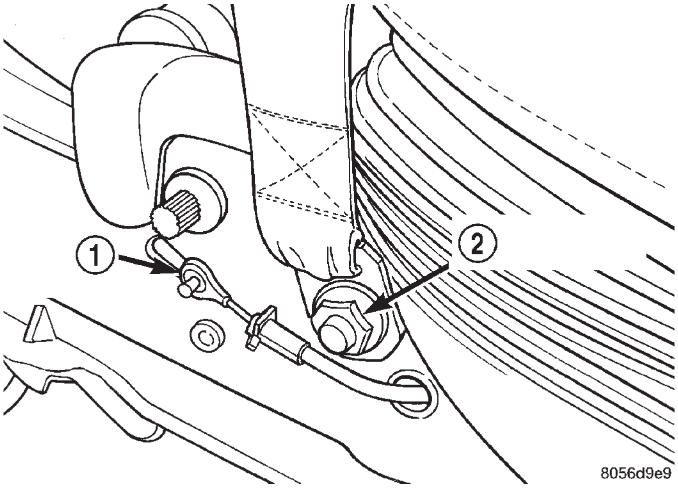

Fig. 8 Lower Seat Belt Anchor And Recliner Cable

1 - RECLINER CABLE
2 - LOWER SEAT BELT ANCHOR

(15) Unscrew lead screw from recliner mechanism (Fig. 9).

(16) Remove lead screw, spring and spring plate (Fig. 10).

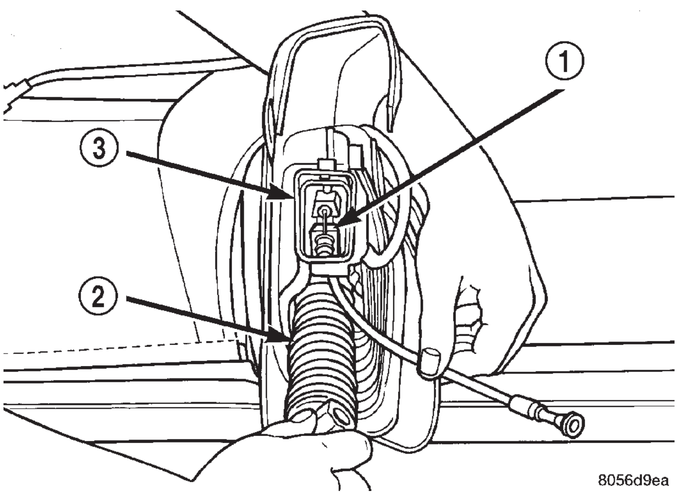

Fig. 9 Recliner Lead Screw

1 - RECLINER MECHANISM
2 - LEAD SCREW
3 - SEAT FRAME

INSTALLATION

INSTALLATION

(1) Position seat back on cushion.

(2) Install both pivot bolts and tighten 40 N·m (30 ft. lbs.).

NOTE: Do not reuse the recliner assembly attaching bolts.

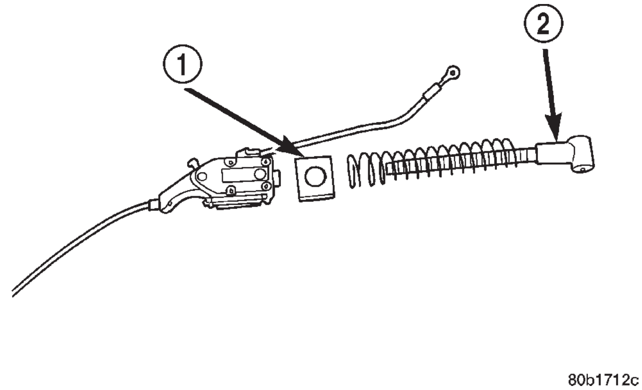

Fig. 10 Recliner Lead Screw

1 - LEAD SCREW SPRING PLATE
2 - LEAD SCREW

(3) Install bolts attaching recliner to seat back frame and tighten to 12 N·m (9 ft. lbs.).

(4) Install seat cushion side shields.

(5) Install seat in vehicle.

INSTALLATION - JR-27 ONLY

(1) Screw recliner lead screw into recliner mechanism. (Fig. 9).

WARNING: DO NOT PULL ON UPPER RECLINER HANDLE OR RECLINER CABLE END AT ANY POINT UNTIL THE LEAD SCREW IS REMOVED.

(2) Route recliner cable in front of metal strap at bottom of the seat back frame (Fig. 11).

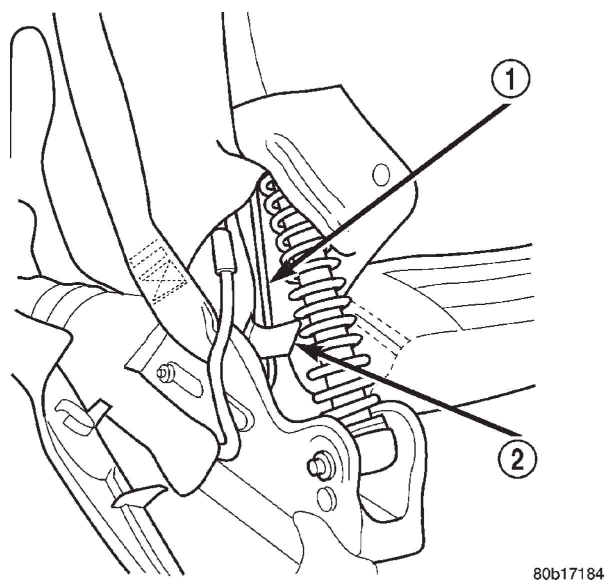

Fig. 11 Route Recliner Cable

1 - NEW CABLE ROUTING (DRIVER SEAT)
2 - BACK FRAME STRAP

FRONT SEAT BACK (Continued)

(3) Position seat back to seat frame(Refer to 23 - BODY/SEATS/SEAT BACK - INSTALLATION).

(4) Install bolt attaching recliner lead screw to seat frame. Tighten bolt to 45.3 N·m (33.3 ft. lbs.) torque.

(5) Install pivot bolts attaching seat back to seat frame. Tighten bolts to 51.0 N·m (33.3 ft. lbs.) torque.

(6) Attach easy entry rod to seat back, passenger side only.

(7) Install easy entry washer and E-clip, passenger side only.

(8) Install seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION - INSTALLATION).

(9) Feed recliner cable through hole in seat adjuster and engage cable eyelet to arm on seat adjuster.

(10) Install new recliner cable eyelet clip to arm on seat frame (Fig. 8).

(11) Position seat belt buckle pretensioner to bolt on side of seat adjuster and install nut.

NOTE: Apply thread adhesive to threads before installing nut.

(12) Position lower seat belt anchor to bolt on seat adjuster.

(13) Verify that seat belt is routed such that it will not be twisted when engaged to the seat belt buckle.

(14) Install new nut attaching lower seat belt anchor to seat frame (Fig. 8).

NOTE: The tighten the lower seat belt anchor and seat belt buckle nuts to 45.3 N·m (33.3 ft. lbs.) torque.

NOTE: Verify that a minimum of three threads extend beyond the lower seat belt anchor nut and that the lower seat belt anchor swivels freely. If both conditions are not found, remove nut, torque bolt, and while preventing bolt from turning, torque nut.

(15) Install seat side shield(Refer to 23 - BODY/SEATS/SEAT CUSHION SIDE SHIELDS - INSTALLATION). Verify that side and rear screws go through the rubber bellows.

(16) Install seat to vehicle (Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).

FRONT SEAT BACK COVER

REMOVAL

REMOVAL

(1) Remove seat from vehicle.

(2) Remove head restraint.

(3) Remove front seat back.

(4) Remove lumbar support handle, if equipped.

(5) Disengage the J-strap retainer (Fig. 7).

(6) Remove hog rings attaching foam pad to back frame (Fig. 12).

(7) Roll seat back cover up to the next hog rings and remove hog rings.

(8) For bonded seat back cover separate frame from bonded cover and pad.

(9) Roll cover to top of cushion and remove head restraint sleeve guides. Do not reuse head restraint sleeve guides.

(10) Remove cover from seat back.

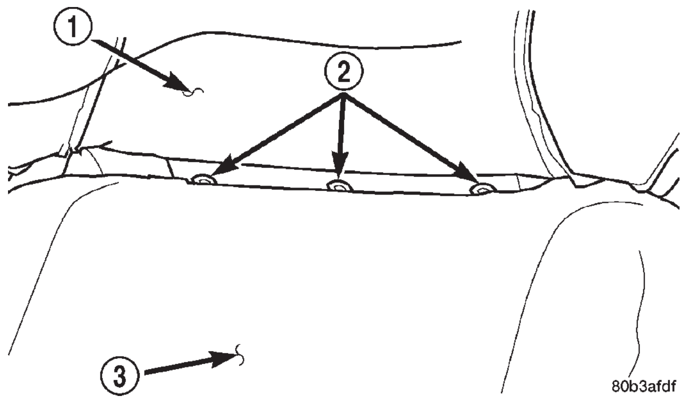

Fig. 12 Front Seat Back Hog Rings

1 - SEAT COVER
2 - HOG RINGS
3 - CUSHION

REMOVAL - JR-27 ONLY

(1) Remove seat from vehicle(Refer to 23 - BODY/SEATS/SEAT - REMOVAL).

(2) Remove head restraint (Fig. 13) by depressing headrest button and using a pick tool in access hole simultaneously.

(3) Remove seat back(Refer to 23 - BODY/SEATS/SEAT BACK - REMOVAL).

(4) Remove upper recliner handle and lumber adjustment handle, if so equipped.

(5) Remove seat side shield(Refer to 23 - BODY/SEATS/SEAT CUSHION SIDE SHIELDS - REMOVAL).

(6) Remove nut attaching lower seat belt anchor to seat frame (Fig. 8)(Refer to 23 - BODY/SEATS/SEAT BACK - REMOVAL).

(7) Remove seat belt bezel.

NOTE: The torque prevailing nut used to secure the lower seat belt anchor is not reusable. Verify availability prior to proceeding.

(8) Disengage plastic J-strip retainer at bottom of seat back (Fig. 14).

FRONT SEAT BACK COVER (Continued)

(9) Remove hog rings holding seat cover seam cords to wires in seat back foam (Fig. 15) and (Fig. 16).

(10) Feed seat belt bezel and seat belt through seat cover while pulling cover from seat back foam.

(11) Remove hog rings attaching the seat cover seam cords and wires to seat back foam.

(12) Poll seat cover upward to mid point position.

(13) Remove head restraint guides (Fig. 17).

(14) Remove seat back cover from seat back foam and frame.

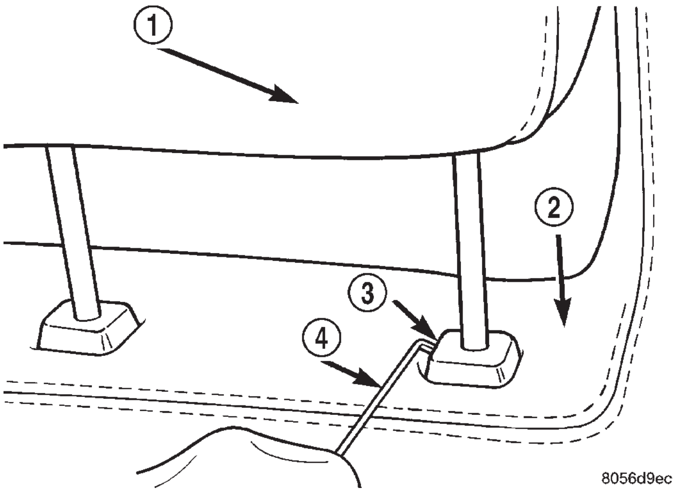

Fig. 13 Head Restraint Removal

1 - HEADREST
2 - SEAT
3 - ACCESS HOLE
4 - PICK TOOL

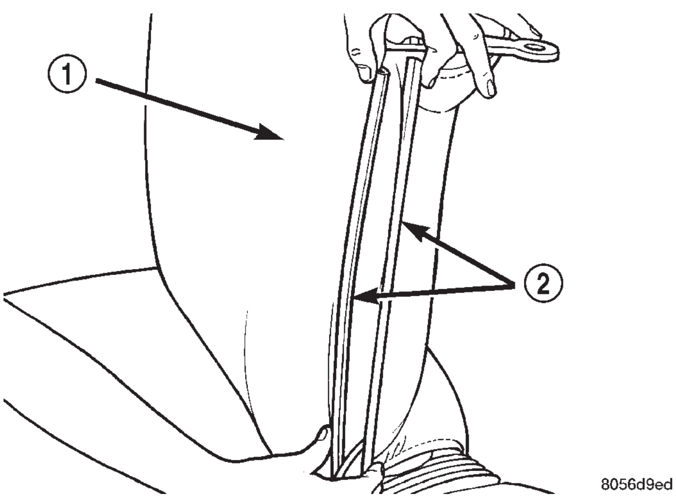

Fig. 14 Seat Cover Retainer Strip

1 - SEAT BACK
2 - PLASTIC RETAINER STRIP

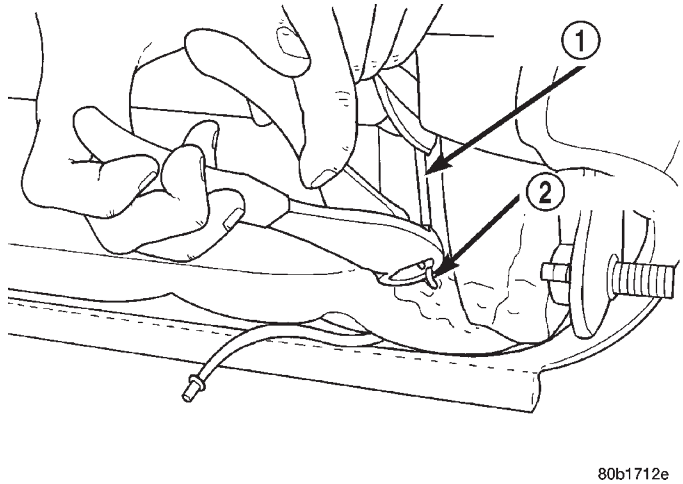

Fig. 15 Hog Rings

1 - SEAT COVER SEAM STRAP
2 - HOG RING

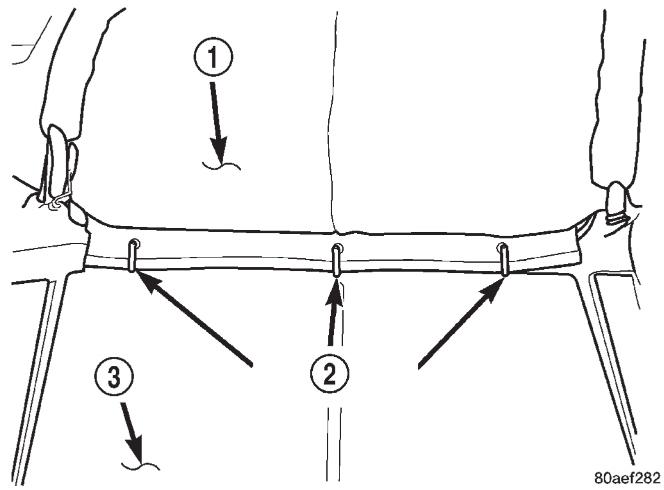

Fig. 16 Mid Seat Back Hog Rings

1 - CUSHION COVER
2 - HOG RINGS
3 - CUSHION

INSTALLATION

INSTALLATION

NOTE: Do not reuse the recliner assembly attaching bolts.

(1) Position cover on the top of seat back.

(2) Install new head restraint sleeve guides.

(3) Carefully roll cover down to the area that hog rings are to be installed.

(4) Install hog rings.

(5) Install hog rings attaching back frame to foam pad.

(6) Roll cover downward.

FRONT SEAT BACK COVER (Continued)

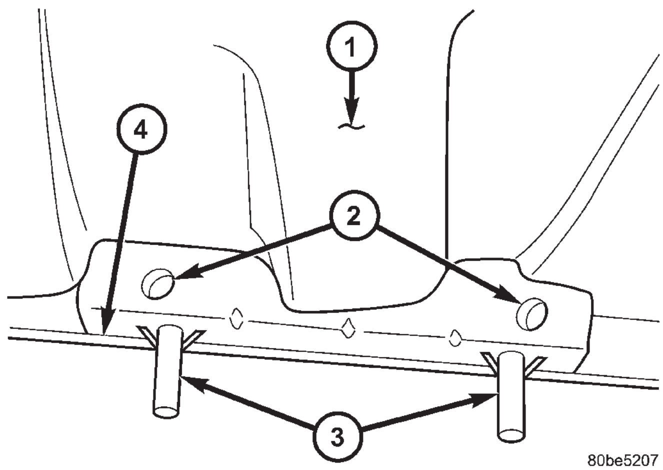

Fig. 17 2 Head Restraint Guides

1 - SEAT CUSHION
2 - HOG RINGS
3 - HEADREST GUIDES
4 - BOTTOM OF TOP SEAT FRAME RAIL

(7) Engage the J-strap retainer
(8) Install lumbar support handle, if equipped.
(9) Install new head restraint sleeve guides.
(10) Install seat back to seat cushion. Tighten recliner bolts to 40 N·m (30 ft. lbs.) torque. Tighten pivot bolts to 12 N·m (9 ft. lbs.) torque.
(11) Install seat in vehicle.
(12) Install head restraint.
(13) Check seat back and headrest operation.

INSTALLATION - JR-27 ONLY

(1) Position seat back cover on to seat back foam and frame.
(2) Install hog rings attaching seat back foam to seat back frame.
(3) Feed seat belt bezel and seat belt through hole in seat cover.
(4) Route recliner cable in front of metal strap at bottom of the seat back frame (Fig. 11).
(5) Pull seat cover downward to first horizontal trench in seat back foam.
(6) Align seat cover upper horizontal seam center notch to center hog ring location.
(7) Install hog rings, center first, to attach upper insert cover seam wire to wire in seat back foam.
(8) Install hog rings to attach seat cover seam cords to wires in seat back foam.
(9) Pull seat cover down fully over seat back foam.
(10) Connect seat cover J-strips at bottom of seat back.
(11) Install head restraint guides
(12) Slide long snaps on outboard portion of seat belt bezel inside seat back cover and seat belt retractor cover.
(13) Install upper recliner handle and lumbar adjustment handle, if so equipped.
(14) Attach lower seat belt anchor to bolt on seat adjuster.
(15) Verify that seat belt is routed such that it will not be twisted when engaged to the seat belt buckle.
(16) Install new nut attaching lower seat belt anchor to seat frame (Fig. 8).

NOTE: The tighten the lower seat belt anchor nut to 45 N·m (33 ft. lbs.) torque.

(17) Verify that a minimum of three threads extend beyond the lower seat belt anchor nut and that the lower seat belt anchor swivels freely. If both conditions are not found, check that the bolt is fully engaged to the seat adjuster.
(18) Install seat to vehicle(Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).
(19) Check seat belt operation.

FRONT SEAT CUSHION SIDE SHIELDS

REMOVAL

REMOVAL

(1) Remove seat from vehicle.
(2) Remove screws attaching seat cushion side shield to the bottom and side of seat cushion (Fig. 18) and (Fig. 19).
(3) Remove shield from seat
(4) Disconnect switch wire connectors, if equipped.
(5) Remove seat switches, if equipped.

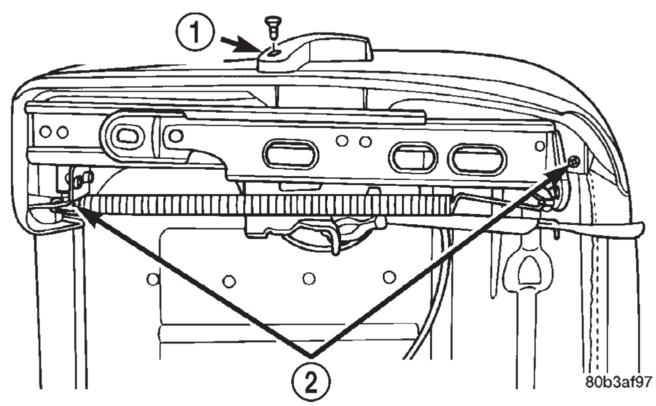

Fig. 18 Bottom View of Side Shield

1 - RECLINER HANDLE AND FASTENER
2 - SIDE SHIELD FASTENERS

FRONT SEAT CUSHION SIDE SHIELDS (Continued)

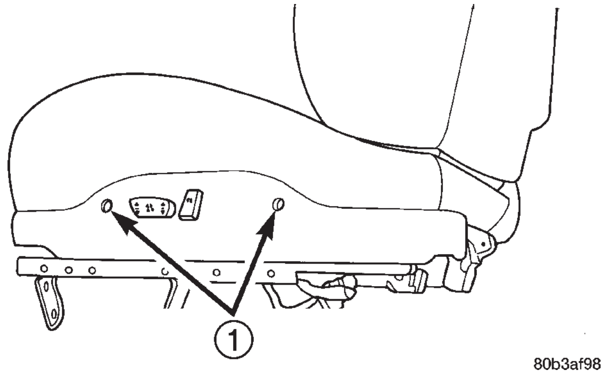

Fig. 19 Side View of Side Shield

1 - SIDESHIELD FASTENERS

REMOVAL - JR-27 ONLY

(1) Remove lower recliner handle.

(2) Remove screws attaching seat side shield to seat frame.

(3) Remove screws attaching power seat switch to side shield, if so equipped.

(4) Remove side shield from vehicle (Fig. 20).

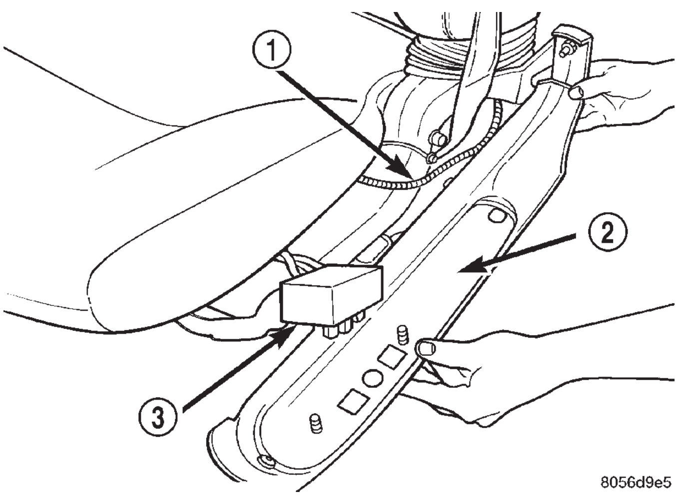

Fig. 20 Front Seat Side Shield

1 - SEAT FRAME
2 - SEAT SIDE SHIELD
3 - POWER SEAT SWITCH

INSTALLATION

INSTALLATION

(1) Transfer seat switches, if equipped.

(2) Connect switch wire connectors to cushion side shield, if equipped.

(3) Place shield in position on seat cushion.

(4) Install screws attaching seat cushion side shield.

(5) Install seat. Tighten front screws to 61 N·m (45 ft. lbs.) and the rear screws to 61 N·m (45 ft. lbs.).

INSTALLATION - JR-27 ONLY

(1) Position side shield near seat.

(2) Install screws attaching power seat switch to side shield, if so equipped.

(3) Install screws attaching side shield to seat frame.

(4) Install lower recliner handle.

FRONT SEAT CUSHION

REMOVAL - FRONT

(1) Remove seat from vehicle.

(2) Remove front seat cushion side shields and disconnect wire connectors, if equipped.

(3) Remove seat back.

(4) Remove seat cushion bolts.

(5) Disconnect wire harness fasteners from cushion frame (Fig. 21).

(6) Remove seat cushion (Fig. 22).

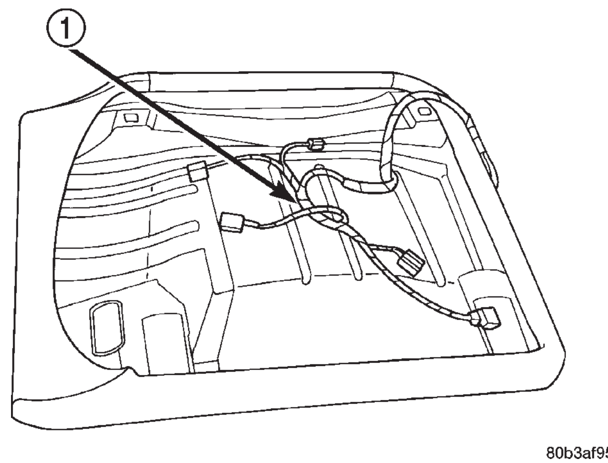

Fig. 21 Front Seat Cushion Wire Harness

1 - WIRE HARNESS

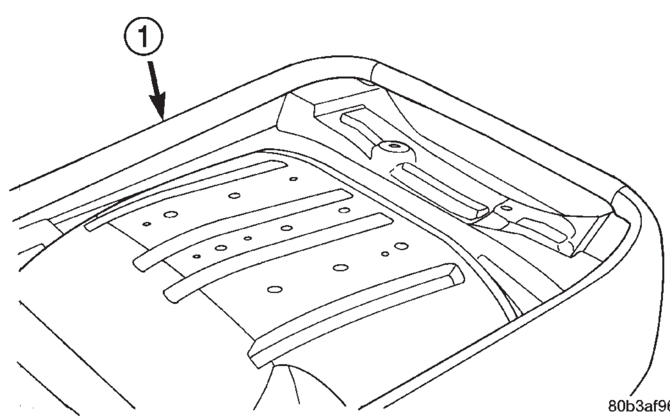

Fig. 22 Front Seat Cushion

1 - FRONT SEAT CUSHION

FRONT SEAT CUSHION (Continued)

INSTALLATION - FRONT

(1) Install wire harness fasteners to cushion frame.
(2) Install seat cushion bolts.
(3) Install seat back. Tighten recliner bolts to 12 N·m (9 ft. lbs.) torque. Tighten pivot bolts to 40 N·m (30 ft. lbs.) torque.
(4) Connect switch wire connectors to the cushion side shield, if equipped.
(5) Install cushion side shields.
(6) Install seat in vehicle.

FRONT SEAT CUSHION COVER

REMOVAL - FRONT SEAT CUSHION COVER

NOTE: Fabric covered cushions are serviced as an assembly.

(1) Remove seat from vehicle.
(2) Remove front seat cushion side shields and disconnect wire connectors, if equipped.
(3) Remove seat back.
(4) Remove seat cushion bolts.
(5) Disconnect wire harness fasteners from cushion pan. (Fig. 21).
(6) Disengage J-strap attaching seat cover from the seat cushion frame (Fig. 23).
(7) Pull cover off to the hog rings (Fig. 24).
(8) Cut hog rings attaching seat cover seat cushion.
(9) Remove seat cushion cover from seat cushion.

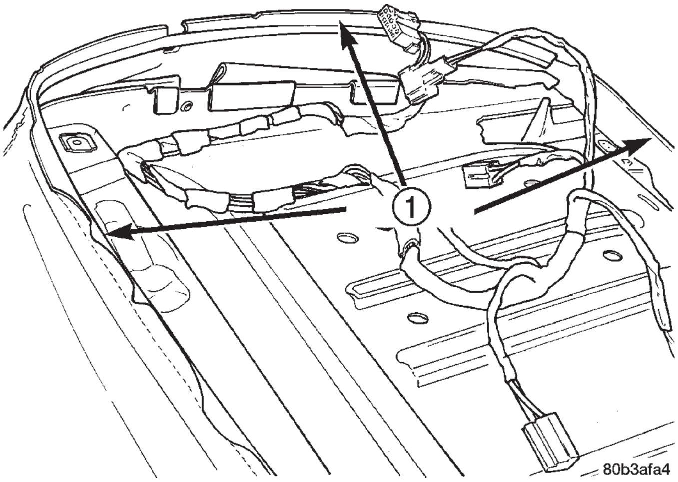

Fig. 23 Front Seat Cushion J-Strap

1 - J-STRAP

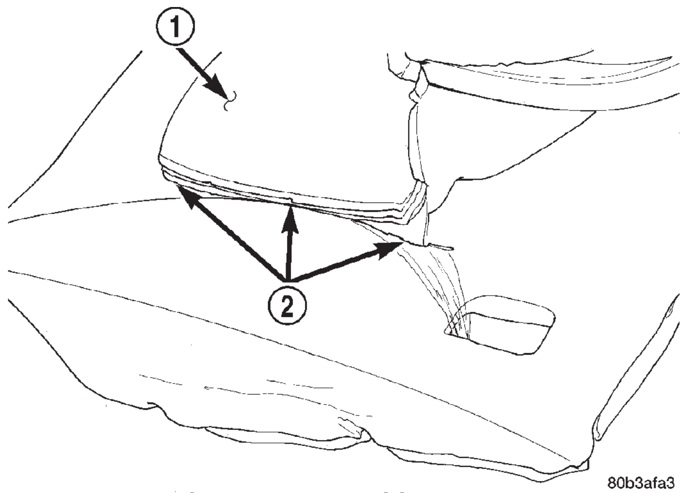

Fig. 24 Seat Cushion Cover

1 - SEAT COVER
2 - HOG RINGS

INSTALLATION - FRONT SEAT CUSHION COVER

NOTE: Fabric covered cushions are serviced as an assembly.

(1) Position seat cover on cushion.
(2) Align seat cover with cushion alignment indentations (Fig. 25).
(3) Install hog rings.
(4) Engage J-strap attaching seat cover to front of seat cushion frame.
(5) Install wire harness fasteners to cushion pan.
(6) Install seat cushion bolts.
(7) Install seat back. Tighten recliner bolts to 12 N·m (9 ft. lbs.) torque. Tighten pivot bolts to 40 N·m (30 ft. lbs.) torque.
(8) Connect switch wire connectors to the cushion side shield, if equipped.
(9) Install cushion side shields.
(10) Install seat in vehicle.

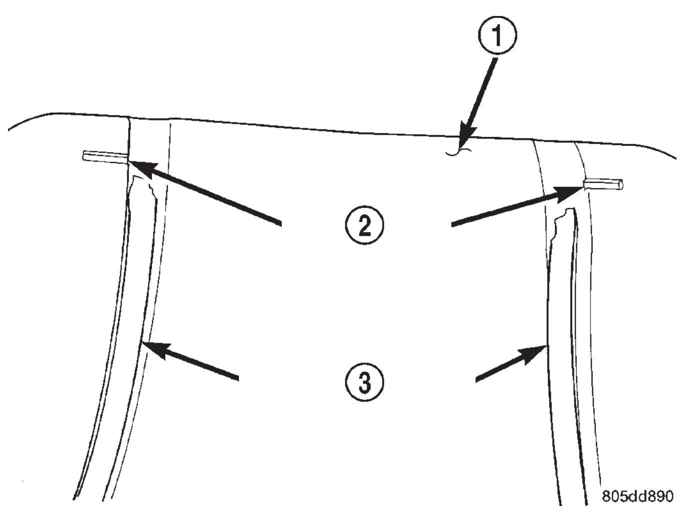

Fig. 25 Seat Cushion

1 - SEAT CUSHION
2 - ALIGNMENT INDENTATIONS
3 - HOOK AND LOOP FASTENER

REAR SEAT

DESCRIPTION

Refer to (Fig. 26) for more information while servicing the rear seat.

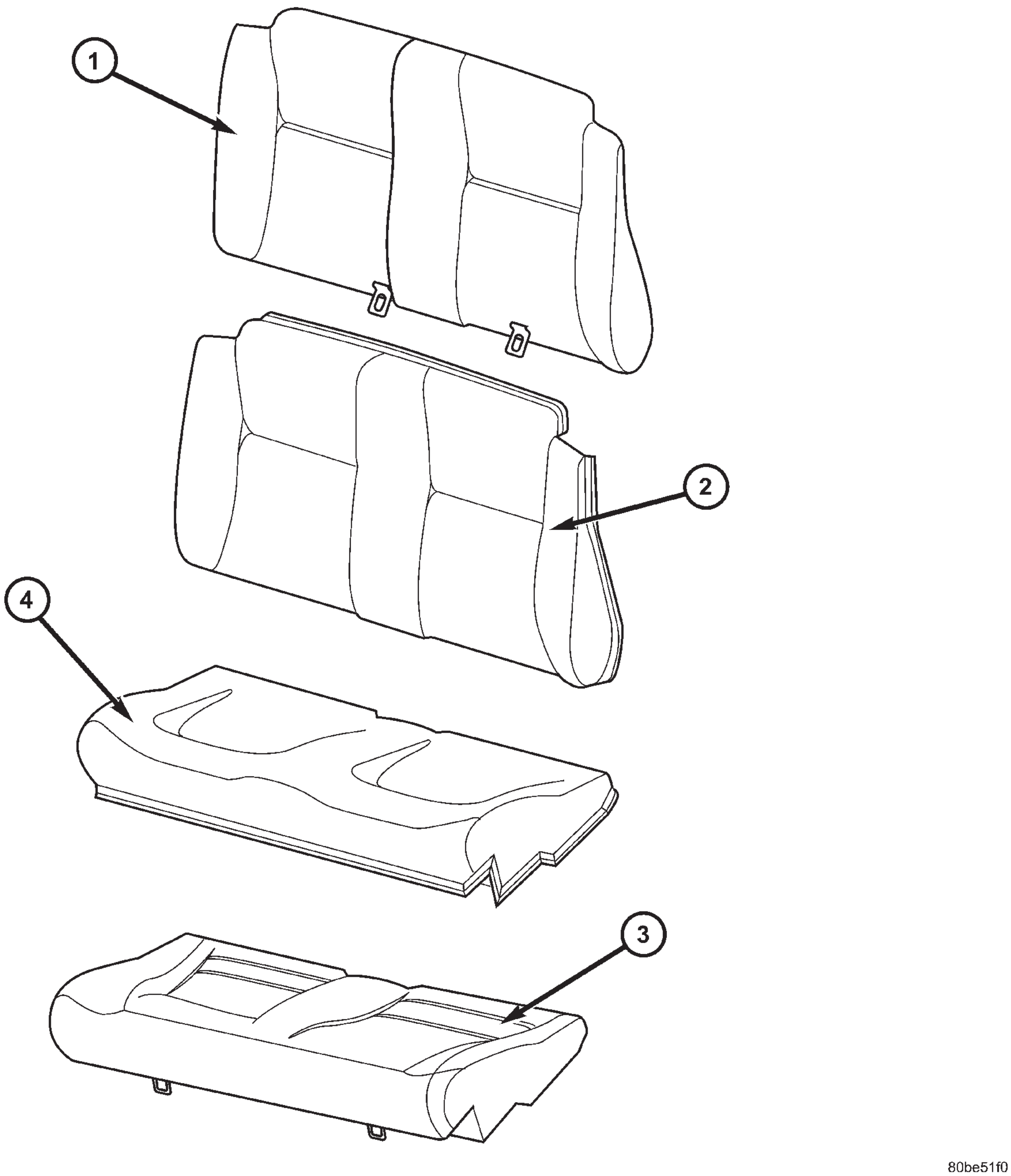

Fig. 26 Rear Seat Exploded View

1 - SEAT BACK FOAM AND FRAME
2 - SEAT BACK COVER
3 - SEAT CUSHION COVER
4 - SEAT CUSHION FOAM AND FRAME

REAR SEAT CUSHION

REMOVAL

REMOVAL - REAR

NOTE: Fabric covered cushions are serviced as an assembly.

(1) Pull upward at forward edge of cushion each retainer loop of the rear seat cushion to disengage retainer loops from cups in floor (Fig. 27).
(2) Guild seat belts through loops.
(3) Remove rear seat cushion from vehicle.

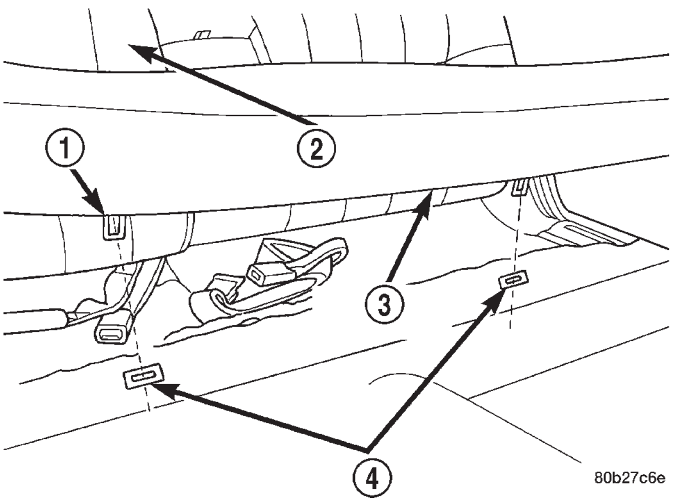

Fig. 27 Rear Seat Cushion

1 - RETAINER LOOP
2 - REAR SEAT BACK
3 - REAR SEAT CUSHION
4 - CUPS

REMOVAL - JR-27 ONLY

NOTE: Special care should be taken when removing rear seat cushion to prevent damage to the cushion frame. Remove cushion at attachment areas, not at wing area.

(1) Push firmly rearward and upward at one attachment point and disengage wire loops from retainers in floor pan (Fig. 28).
(2) Repeat for other attachment point.
(3) Separate rear seat cushion from vehicle.

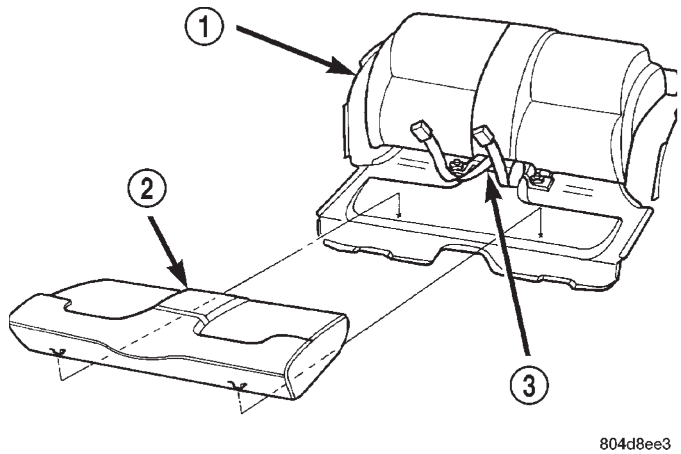

Fig. 28 Rear Seat Cushion

1 - REAR SEAT BACK
2 - REAR SEAT CUSHION
3 - INNER SEAT BELTS

INSTALLATION

INSTALLATION - REAR

NOTE: Fabric covered cushions are serviced as an assembly.

NOTE: Verify visibility of “Latch” bars in the seat bite area.

(1) Place rear seat cushion in position.
(2) Guild seat belts through loops.
(3) Engage retainer loops into cup on floor kick-up.
(4) Push downward at forward edge at each retainer loop of the rear seat cushion to engage retainers.

INSTALLATION - JR-27 ONLY

NOTE: Special care should be taken when removing rear seat cushion to prevent damage to the cushion frame. Remove cushion at attachment areas, not at wing area.

(1) Position rear seat cushion in vehicle.
(2) Place inner seat belts on top of seat cushion.
(3) Push rear seat cushion rearward and align wire loops to retainers in floor pan.
(4) Push rear seat cushion firmly downward and engage wire loops to retainers in floor pan.

REAR SEAT CUSHION COVER

REMOVAL

REMOVAL - REAR SEAT CUSHION COVER

(1) Remove rear seat cushion.
(2) Disengage the J-strap retainers (Fig. 29).
(3) Cut hog rings to free cover (Fig. 30).
(4) Remove seat cushion cover from seat cushion.

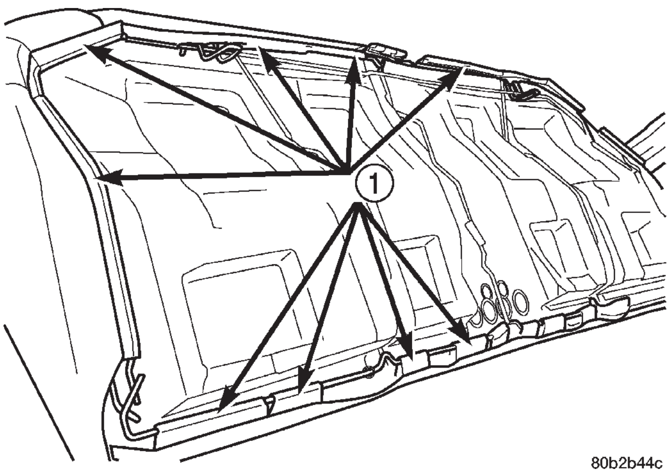

Fig. 29 Rear Seat Cushion Cover J-Straps

1 - J-STRAPS

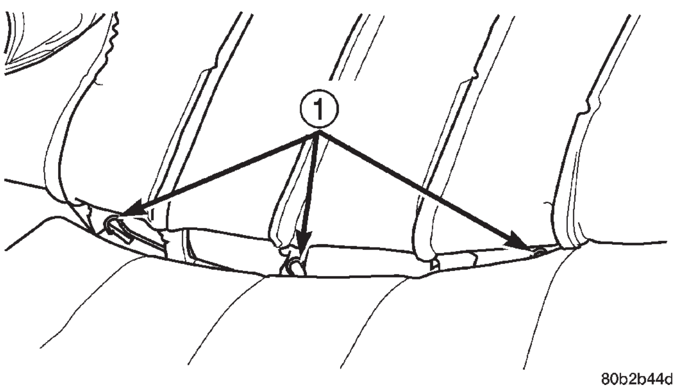

Fig. 30 Rear Seat Cushion Cover Hog Rings

1 - HOG RINGS

REMOVAL - JR-27 ONLY

(1) Remove rear seat cushion from vehicle (Refer to 23 - BODY/SEATS/SEAT CUSHION - REMOVAL).
(2) Place seat cushion on a suitable work surface in inverted position.
(3) Remove hog rings around perimeter of seat cushion attaching seat cushion cover to seat cushion frame.
(4) Pull seat cover from seat cushion frame and seat cushion foam.
(5) Remove hog rings attaching seat cover seam wires to seat foam wires.
(6) Remove seat cover from seat frame and seat cushion foam.

INSTALLATION

INSTALLATION - REAR SEAT CUSHION COVER

(1) Position seat cushion cover on cushion.
(2) Install hog rings to seat cover.
(3) Engage the J-strap retainers.
(4) Steam wrinkles from seat cushion, if necessary.
(5) Install seat cushion.

INSTALLATION - JR-27 ONLY

(1) Position seat cushion cover to seat cushion frame and seat cushion foam.
(2) Install a hog ring at each hog ring location to attach seat cushion cover seam wires to wires in seat cushion foam. Begin at center location and work outward.
(3) Repeat above steps for opposite inboard vertical seam, both outboard vertical seams, and for the horizontal seams.
(4) Pull seat cover over seat cushion frame and seat cushion foam.
(5) Install hog rings at hog ring locators around perimeter of seat cushion foam attaching seat cushion cover to seat cushion frame.
(6) Install rear seat cushion to vehicle (Refer to 23 - BODY/SEATS/SEAT CUSHION - INSTALLATION).

REAR SEAT BACK

REMOVAL

REMOVAL - FOLDING BACK

NOTE: Fabric covered cushions are serviced as an assembly.

(1) Remove rear seat cushion. (Refer to 23 - BODY/SEATS/SEAT CUSHION - REMOVAL)
(2) Remove the rear seat buckles and belt anchors. (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT - REAR INBOARD - REMOVAL)
(3) Remove the outer seat back bracket nuts (Fig. 31).
(4) Release folding rear seat back latches.
(5) Remove seat back from vehicle.

REMOVAL - JR-27 ONLY

(1) Remove rear seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION - REMOVAL).

REAR SEAT BACK (Continued)

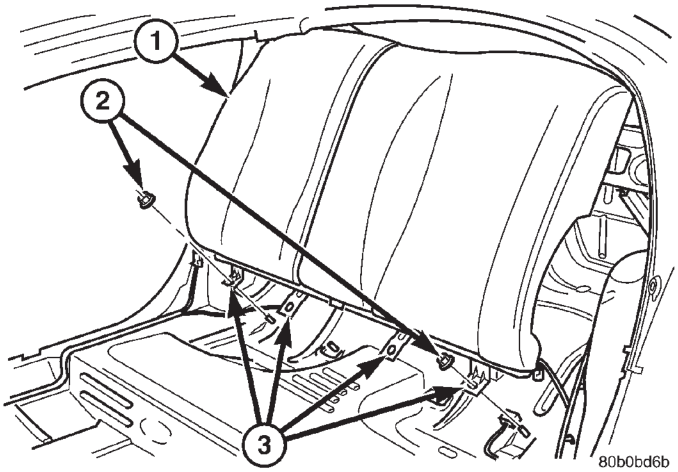

Fig. 31 REAR SEAT BACK

1 - SEAT BACK
2 - NUTS
3 - BRACKETS

(2) Remove rear inner seat belt assembly (Fig. 32).

(3) Pull bottom of rear seat back forward until seat back brackets clear studs on floor pan (Fig. 33).

(4) Push upward on rear seat back and disengage hooks attaching seat back to rear seat back support.

(5) Remove rear seat back from vehicle.

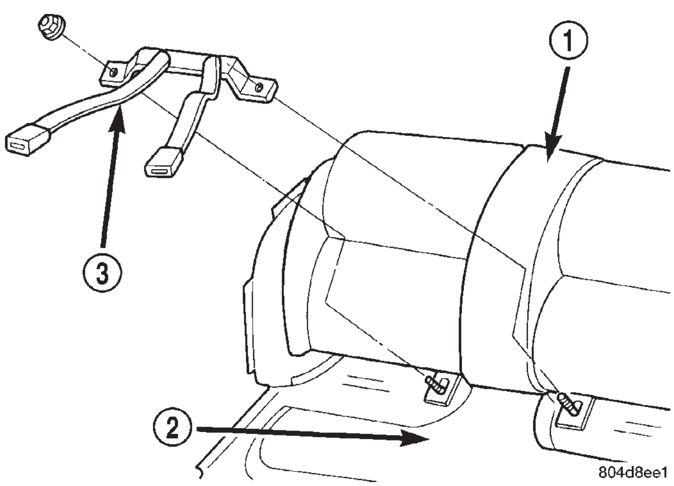

Fig. 32 Rear Inner Seat Belt Assembly

1 - REAR SEAT BACK
2 - FLOOR PAN
3 - INNER SEAT BELT ASSEMBLY

INSTALLATION

INSTALLATION - FOLDING BACK

NOTE: Fabric covered cushions are serviced as an assembly.

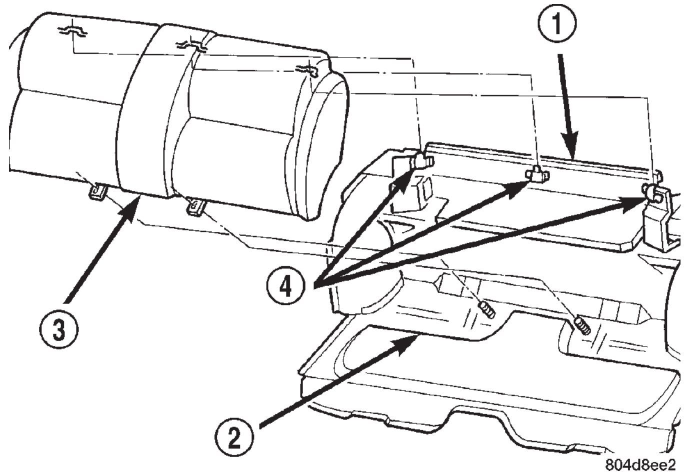

Fig. 33 Rear Seat Back

1 - REAR SEAT BACK SUPPORT
2 - FLOOR PAN
3 - REAR SEAT BACK
4 - RETAINING BRACKET

(1) Place the four seat back brackets over the body mounted weld studs and position seat back in vehicle.

(2) Engage folding rear seat back latch.

(3) Install the outer seat back bracket nuts and tighten to 61 Nm (45 ft. lbs.).

(4) Install the rear seat buckles and belt anchors. (Refer to 8 - ELECTRICAL/RESTRAINTS/SEAT BELT - REAR INBOARD - INSTALLATION)

(5) Install rear seat cushion. (Refer to 23 - BODY/SEATS/SEAT CUSHION - INSTALLATION)

INSTALLATION - JR-27 ONLY

(1) Position rear seat back in vehicle.

(2) Tilt rear seat back rearward and raise seat back above retaining brackets on rear seat back support.

(3) Lower rear seat back until center loop begins to engage.

(4) Lower rear seat back and push rearward on outboard corners of seat back to engage outboard hooks to brackets on rear seat back support.

(5) Push downward on rear seat back until all hooks are fully engaged into retaining brackets.

(6) Install rear inner seat belt assembly.

(7) Install rear seat cushion.

NOTE: Tighten the rear inner seat belt assembly to 40 N·m (30 ft. lbs.) torque.

REAR SEAT BACK COVER

REMOVAL - JR-27 ONLY

(1) Remove rear seat back from vehicle (Refer to 23 - BODY/SEATS/REAR SEAT BACK - REMOVAL).
(2) Place seat back on a suitable work surface in inverted position.
(3) Remove hog rings around perimeter of seat back holding seat back cover to seat back frame.
(4) Pull seat cover from seat back frame and seat back foam.
(5) Remove any hog rings holding seat cover seam wires to seat foam wires.
(6) Remove seat cover from seat frame and seat back foam.

INSTALLATION - JR-27 ONLY

(1) Position seat cover to seat back frame and seat back foam.
(2) Align notch in center of seat back cover vertical seam to center hog ring locator.
(3) Install a hog ring at each hog ring location, center first, attaching seat back cover seam to wires in seat back foam.
(4) Repeat the above steps for the opposite inboard vertical seam, both outboard vertical seams, and the lower horizontal seam.
(5) Install hog rings at each hog ring locator, center first, to attach ends of vertical portions of U-shaped wires to vertical foam wires.
(6) Align notch in center of upper horizontal seat cover seam to center hog ring location.
(7) Install a hog ring at each hog ring locator to hold upper horizontal seam wire to wire in seat back foam.
(8) Install hog rings attaching seat cover seam wires to seat frame.
(9) Pull seat cover over seat back frame and seat back foam.
(10) Install hog rings at hog ring locators around perimeter of seat back cushion attaching seat cover to seat back frame.
(11) Install rear seat back to vehicle (Refer to 23 - BODY/SEATS/REAR SEAT BACK - INSTALLATION).

SEAT ADJUSTERS

REMOVAL

REMOVAL - FRONT SEAT ADJUSTER – POWER

(1) Remove front seat from vehicle.
(2) Remove seat cushion side shield and disconnect switch connector.
(3) Remove seat back.
(4) Remove bolts attaching seat adjuster to cushion pan (Fig. 34).
(5) Disconnect wire harness fasteners from cushion pan.
(6) Remove seat adjuster from seat cushion.

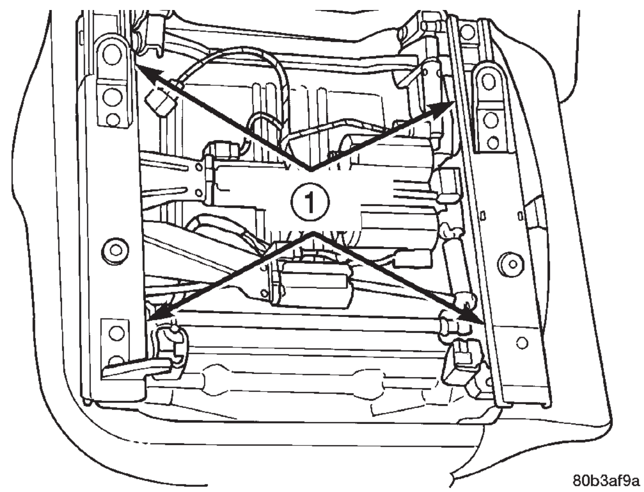

Fig. 34 Front Seat Track

1 - ATTACHING BOLTS

REMOVAL - MANUAL ADJUSTER

(1) Remove front seat from vehicle (Refer to 23 - BODY/SEATS/SEAT - REMOVAL).
(2) Remove recliner handle.
(3) Remove seat cushion side shield (Refer to 23 - BODY/SEATS/SEAT CUSHION SIDE SHIELDS - REMOVAL).
(4) Remove seat back (Refer to 23 - BODY/SEATS/SEAT BACK - REMOVAL).
(5) Remove recliner.
(6) Remove towel bar spring.
(7) Remove push nuts attaching towel bar to seat adjuster.
(8) Remove towel bar from seat adjuster.
(9) Remove seat adjuster.

SEAT ADJUSTERS (Continued)

INSTALLATION

INSTALLATION - FRONT SEAT ADJUSTER – POWER

(1) Place seat adjuster in position on seat cushion pan.

(2) Connect wire harness fasteners to the cushion pan.

(3) Install bolts attaching seat adjuster to cushion pad.

(4) Install seat back.

(5) Install bolt to attach seat back recliner to seat back on each side of seat. Tighten bolt to 12 N·m (9 ft. lbs.) torque.

(6) Connect wire connectors and install the cushion side shields.

(7) Install front seat in vehicle.

INSTALLATION - MANUAL ADJUSTER

(1) Place seat adjuster in position.

(2) Install seat adjuster.

(3) Install towel bar to seat adjuster.

(4) Install new push nuts to attach towel bar to seat adjuster.

(5) Install towel bar spring.

(6) Install recliner.

(7) Install seat back(Refer to 23 - BODY/SEATS/SEAT BACK - INSTALLATION) .

(8) Install bolt to attach seat back recliner to seat back on each side of seat. Tighten recliner bolt to 12 N·m (9 ft. lbs.) torque. Tighten pivot bolts to 40 N·m (30 ft. lbs.) torque.

(9) Install recliner handle.

(10) Install front seat in vehicle(Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).

SEAT BACK LATCH STRIKER

REMOVAL

(1) Release seat back latch and fold down.

(2) Remove the bolts and remove the latch striker (Fig. 35).

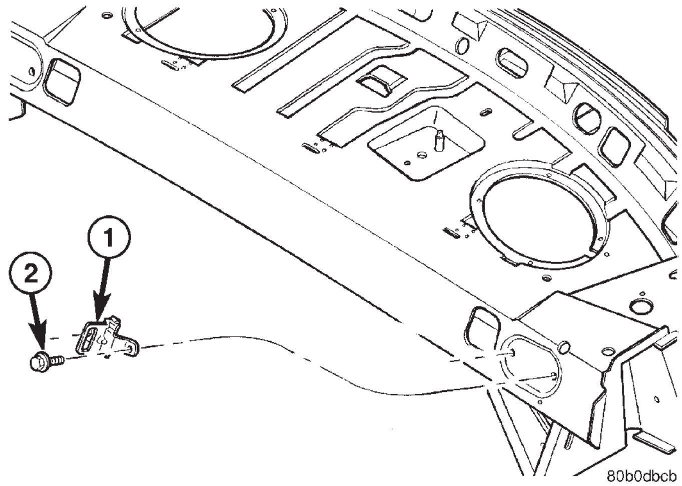

Fig. 35 SEAT BACK STRIKER

1 - STRIKER
2 - BOLTS

INSTALLATION

NOTE: Striker is not symmetrical and should be installed with the white date code towards the outside of the vehicle.

(1) Install the seat back striker and install the bolts.

(2) Tighten the bolts to 12 N·m (9 ft. lbs.).

(3) Lock seat back in the up position and check for operation.

SEAT BACK RECLINER

REMOVAL

REMOVAL

(1) Remove front seat from vehicle.
(2) Remove recliner handle
(3) Remove seat cushion side shield.
(4) Remove seat back.
(5) Remove manual recliner right and left bolts.
(6) Remove manual recliner assembly.

REMOVAL - JR-27 ONLY

(1) Remove seat from vehicle(Refer to 23 - BODY/SEATS/SEAT - REMOVAL).
(2) Remove seat back from lower seat frame(Refer to 23 - BODY/SEATS/SEAT BACK - REMOVAL).
(3) Remove upper recliner handle.
(4) Remove seat back cover until the screws attaching the upper recliner mechanism to the seat back frame can be accessed.
(5) Remove rubber bellows covering lower part of seat back frame.
(6) Remove screws attaching upper recliner mechanism to seat frame.
(7) Remove bolts attaching recliner housing to seat frame.
(8) Push upper recliner mechanism into seat frame with handle shaft facing the front of the seat frame.

NOTE: Do not reuse bolts holding recliner housing to seat frame. Verify availability prior to proceeding.

(9) Pull recliner housing and upper recliner handle mechanism downward and out through bottom of seat frame (Fig. 36).

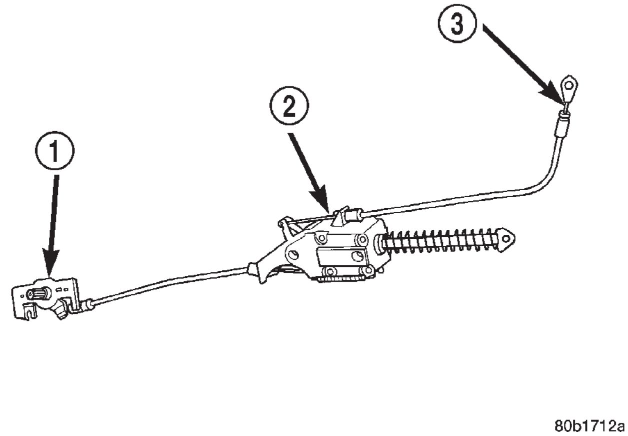

Fig. 36 Recliner Housing

1 - UPPER RECLINER MECHANISM
2 - RECLINER HOUSING
3 - RECLINER CABLE

INSTALLATION

INSTALLATION

(1) Place seat recliner in position.
(2) Install manual recliner right and left bolts.
(3) Install seat back.
(4) Install recliner.
(5) Install bolt to attach seat back recliner to seat back on each side of seat. Tighten recliner bolt to 12 N·m (9 ft. lbs.) torque. Tighten pivot bolts to 40 N·m (30 ft. lbs.) torque.
(6) Remove seat cushion side shield.
(7) Install recliner handle.
(8) Install front seat in vehicle.

INSTALLATION - JR-27 ONLY

(1) Feed upper recliner mechanism and then recliner housing into the seat back frame with handle shaft facing the front of the seat frame.
(2) Install new bolts to attach seat recliner housing to seat frame. Tighten to 34 N·m (300 in. lbs.) torque.
(3) Pull upper recliner mechanism through hole in seat frame.
(4) Install screws attaching upper recliner mechanism to seat frame.
(5) Install rubber bellows covering lower part of seat back frame.
(6) Install seat back cover.
(7) Install recliner spring bracket, spring, and lead screw.
(8) Install seat back to lower seat frame(Refer to 23 - BODY/SEATS/SEAT BACK - INSTALLATION).
(9) Install recliner handle.
(10) Install seat into vehicle(Refer to 23 - BODY/SEATS/SEAT - INSTALLATION).

STATIONARY GLASS

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WINDSHIELD

DESCRIPTION

The windshield is attached to the window frame with urethane adhesive. The urethane adhesive is applied cold and seals the surface area between the window opening and the glass. The primer adheres the urethane adhesive to the windshield.

It is difficult to salvage a windshield during the removal operation. The windshield is part of the structural support for the roof. The urethane bonding used to secure the windshield to the fence is difficult to cut or clean from any surface. If the moldings are set in urethane, it would also be unlikely they could be salvaged. Before removing the windshield, check the availability of the windshield and moldings from the parts supplier.

WARNING

WINDSHIELD SAFETY PRECAUTIONS

WARNING: DO NOT OPERATE THE VEHICLE WITHIN 24 HOURS OF WINDSHIELD INSTALLATION. IT TAKES AT LEAST 24 HOURS FOR URETHANE ADHESIVE TO CURE. IF IT IS NOT CURED, THE WINDSHIELD MAY NOT PERFORM PROPERLY IN AN ACCIDENT.

URETHANE ADHESIVES ARE APPLIED AS A SYSTEM. USE GLASS CLEANER, GLASS PREP SOLVENT, GLASS PRIMER, PVC (VINYL) PRIMER AND PINCH WELD (FENCE) PRIMER PROVIDED BY THE ADHESIVE MANUFACTURER. IF NOT, STRUCTURAL INTEGRITY COULD BE COMPROMISED.

DAIMLERCHRYSLER DOES NOT RECOMMEND GLASS ADHESIVE BY BRAND. TECHNICIANS SHOULD REVIEW PRODUCT LABELS AND TECHNICAL DATA SHEETS, AND USE ONLY ADHESIVES THAT THEIR MANUFACTURES WARRANT WILL RESTORE A VEHICLE TO THE REQUIREMENTS OF FMVSS 212. TECHNICIANS SHOULD ALSO INSURE THAT PRIMERS AND CLEANERS ARE COMPATIBLE WITH THE PARTICULAR ADHESIVE USED.

BE SURE TO REFER TO THE URETHANE MANUFACTURER'S DIRECTIONS FOR CURING TIME SPECIFICATIONS, AND DO NOT USE ADHESIVE AFTER ITS EXPIRATION DATE.

VAPORS THAT ARE EMITTED FROM THE URETHANE ADHESIVE OR PRIMER COULD CAUSE PERSONAL INJURY. USE THEM IN A WELL-VENTILATED AREA.

SKIN CONTACT WITH URETHANE ADHESIVE SHOULD BE AVOIDED. PERSONAL INJURY MAY RESULT.

ALWAYS WEAR EYE AND HAND PROTECTION WHEN WORKING WITH GLASS.

CAUTION: Protect all painted and trimmed surfaces from coming in contact with urethane or primers.

Be careful not to damage painted surfaces when removing moldings or cutting urethane around windshield.

REMOVAL

REMOVAL - JR-27 ONLY

EXTERIOR METHOD

(1) Open convertible top.

(2) Remove header/A-pilllar weatherstrip from weatherstrip retainers.

(3) Remove A-pillar weatherstrip retainer and molding.

(4) Remove header weatherstrip/molding.

(5) Mark top edge of the windshield glass at three locations on the header.

(6) Remove windshield wiper arms.

(7) Remove cowl cover.

WINDSHIELD (Continued)

(8) Place protective covers over instrument panel and hood.

(9) Using a sharp cold knife, cut urethane adhesive holding the windshield to the A-pillars, header and cowl pinch weld fences (Fig. 1). A power cutting device can be used if available.

(10) Remove windshield from vehicle.

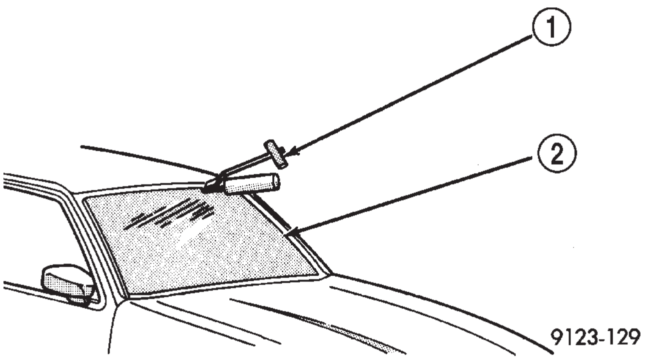

Fig. 1 Cut Urethane Around Windshield

1 - COLD KNIFE
2 - WINDSHIELD

INTERIOR METHOD

(1) Remove cowl cover.

(2) Open convertible top.

(3) Remove header/A-pillar weatherstrip from weatherstrip retainers.

(4) Remove A-pillar weatherstrip retainer and molding.

(5) Remove header weatherstrip/molding.

(6) Mark top edge of the windshield glass at three locations on the header.

(7) Remove header panel trim cover.

(8) Remove header panel weatherstrip from channel.

(9) Remove instrument panel top cover (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - REMOVAL).

(10) Remove A-pillar trim covers.

(11) Place protective covers over instrument panel and hood.

(12) Using a reciprocating or oscillating power knife, cut urethane adhesive holding the windshield to the A-pillars, roof header and cowl pinch weld fences. Refer to instructions provided with the equipment being used.

(13) Remove windshield from vehicle.

REMOVAL

The urethane adhesive holding the windshield to the opening pinch weld (fence) can be cut using a sharp cold knife from the exterior of the vehicle. Using the cold knife method is effective if the windshield is already broken. If the glass must be salvaged, cutting the urethane adhesive from the interior of the vehicle using a reciprocating or oscillating power knife is recommended.

(1) Remove inside rear view mirror.

(2) Remove cowl cover. (Refer to 23 - BODY/INTERIOR/COWL TRIM COVER - REMOVAL).

(3) Remove drip rail weatherstrips as necessary to gain access to screws holding windshield side moldings to A-pillars.

(4) Remove screws holding windshield side moldings to A-pillars

(5) Remove windshield moldings. (Fig. 2)Pull outward on molding at the bottom of A-pillars using pliers.

(6) Cut urethane bonding from around windshield using a suitable sharp cold knife. A pneumatic cutting device can be used if available. (Fig. 3)

(7) Separate windshield from vehicle.

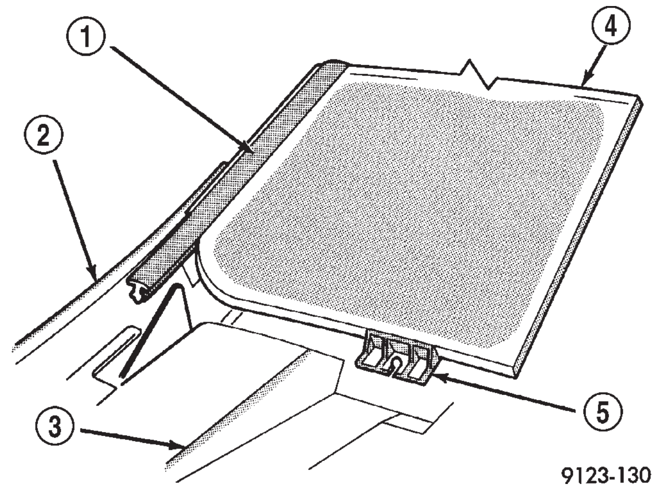

Fig. 2 Windshield Moldings

1 - MOLDING
2 - FENDER
3 - COWL
4 - WINDSHIELD
5 - SUPPORT SPACER

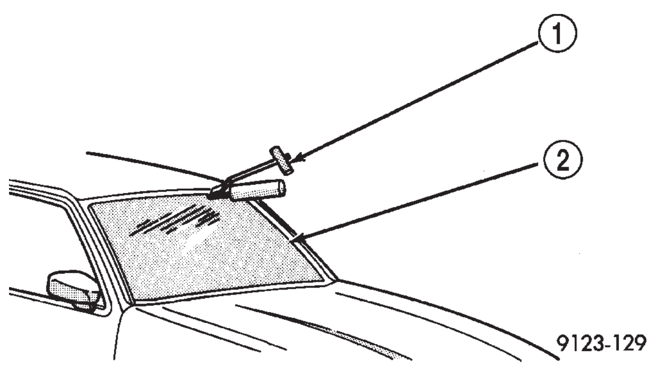

Fig. 3 Cut Urethane Around Windshield

1 - COLD KNIFE
2 - WINDSHIELD

WINDSHIELD (Continued)

INSTALLATION

INSTALLATION - JR-27

CAUTION: Open the left front door glass before installing windshield to avoid pressurizing the passenger compartment. If a door is slammed before urethane bonding is cured, water leaks can result. Allow the urethane at least 24 hours to cure before returning the vehicle to use.
To avoid stressing the replacement windshield, the urethane bonding material on the windshield fence should be smooth and consistent to the shape of the replacement windshield. The support spacers should be cleaned and properly installed on weld studs or repair screws at bottom of windshield opening.

NOTE: The JR 27 uses adjustable support spacers along the bottom. Once the support spacers are set, use care not to move them.

(1) Place replacement windshield into windshield opening and position glass in the center of the opening against the support spacers.
(2) Verify the glass lays evenly against the pinch weld fence at the sides, top and bottom of the replacement windshield. If not, the pinch weld fence must be formed to the shape of the new glass.
(3) Move the support spacers as necessary so that the top of the windshield aligns with the marks on the header, from the original windshield.
(4) Place a piece of tape over the ratcheting portion of the bottom support spacer to prevent them from moving.
(5) Repeat Step 3 and Step 4for the opposite side of the windshield.
(6) Mark the glass at the support spacers with a grease pencil or pieces of masking tape and ink pen to use as a reference for installation (Fig. 4).
(7) Remove replacement windshield from windshield opening.
(8) Position the windshield inside up on a suitable work surface with two padded, wood 10 cm by 10 cm by 50 cm (4 in. by 4 in. by 20 in.) blocks, placed parallel 75 cm (2.5 ft.) apart (Fig. 5).

WARNING: DO NOT USE SOLVENT BASED GLASS CLEANER TO CLEAN WINDSHIELD BEFORE APPLYING GLASS PREP AND PRIMER. POOR ADHESION CAN RESULT.

(9) Clean inside of windshield with ammonia based glass cleaner and lint-free cloth.
(10) Apply Glass Prep adhesion promoter 25 mm (1 in.) wide around perimeter of windshield and wipe with clean/dry lint-free cloth until no streaks are visible.
(11) Apply Glass Primer 25 mm (1 in.) wide around perimeter of windshield. Allow at least three minutes drying time.
(12) Using a razor knife, remove as much original urethane as possible. Do not damage paint on windshield fence.

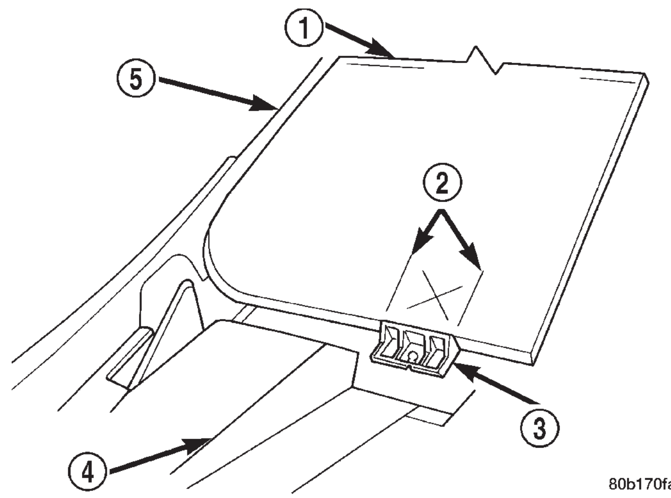

Fig. 4 Center Windshield and Mark at Support Spacers

1 - WINDSHIELD
2 - MARKS
3 - ADJUSTABLE SUPPORT SPACER
4 - COWL
5 - A-PILLAR

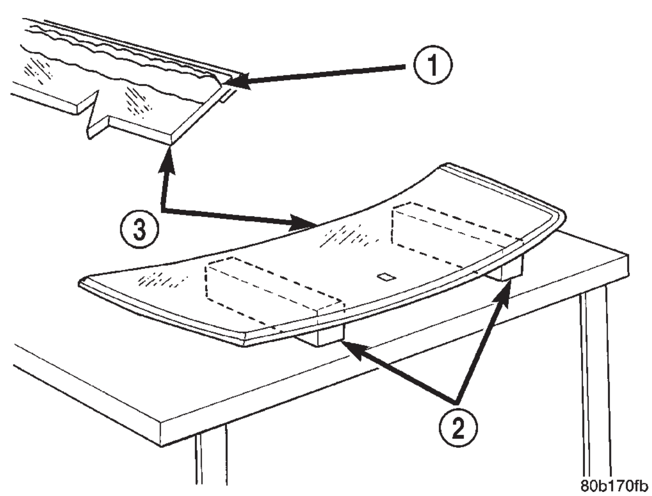

Fig. 5 Work Surface Set Up

1 - URETHANE BEAD AROUND GLASS 7mm (.3 in.) FROM EDGE
2 - BLOCKS
3 - WINDSHIELD

WINDSHIELD (Continued)

(13) Apply pinch weld primer 15 mm (.75 in.) wide around the windshield fence. Allow at least three minutes drying time.

(14) If a low viscosity urethane adhesive is used, install compression spacers on the fence around the windshield opening at original locations (Fig. 6).

(15) Apply a 10 mm (0.4 in.) bead of urethane on center line of windshield fence.

(16) With the aid of a helper, position the windshield over the windshield opening. Align the reference marks at the bottom of the windshield to the support spacers.

(17) Slowly lower windshield glass to windshield opening fence. Push windshield inward until glass is flush to A-pillars (Fig. 7).

(18) Clean access urethane from exterior with Mopar® Super Kleen or equivalent.

(19) Apply 150 mm (6 in.) lengths of 50 mm (2 in.) masking tape spaced 250 mm (10 in.) apart to hold molding in place until urethane cures.

(20) Install cowl cover and wipers.

(21) Install inside rear view mirror to header.

(22) After urethane has cured, remove tape strips and water test windshield to verify repair.

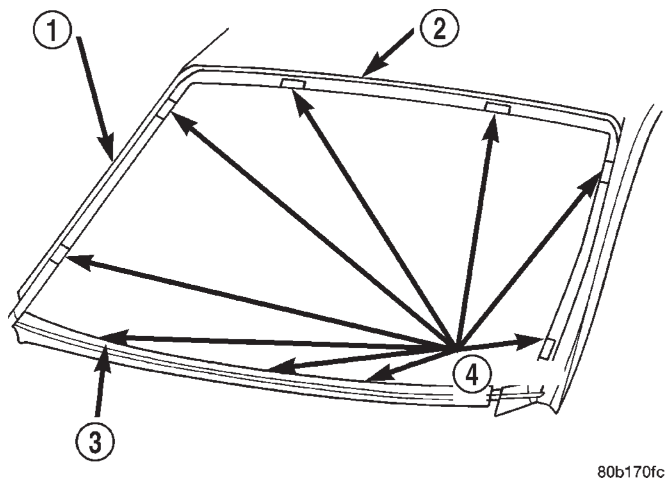

Fig. 6 Position Urethane Compression Spacers – Typical

1 - A-PILLAR
2 - ROOF PANEL
3 - WINDSHIELD OPENING
4 - SPACERS

INSTALLATION

CAUTION: Open the left front door glass before installing windshield to avoid pressurizing the passenger compartment. If a door is slammed before urethane bonding is cured, water leaks can result. Allow the urethane at least 24 hours to cure before returning the vehicle to use.

To avoid stressing the replacement windshield, the urethane bonding material on the windshield fence should be smooth and consistent to the shape of the replacement windshield. The support spacers should be cleaned and properly installed on weld studs or repair screws at bottom of windshield opening.

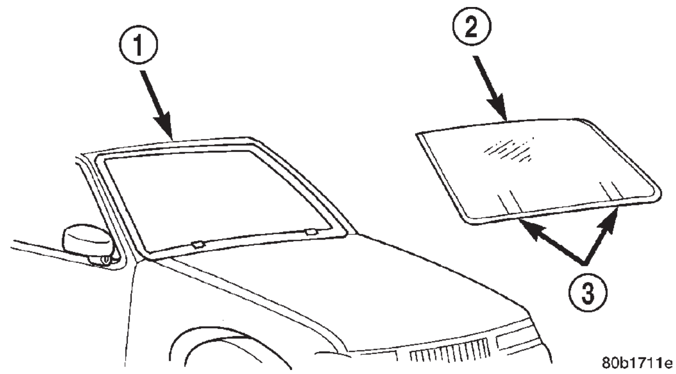

Fig. 7 Lower Windshield Into Position

1 - FENCE
2 - WINDSHIELD WITH URETHANE APPLIED
3 - REFERENCE MARKS

(1) Place replacement windshield into position and center in the opening against the support spacers.

(2) Verify the glass lays evenly against the pinch weld fence at the sides, top and bottom of the replacement windshield. If not, the pinch weld fence must be formed to the shape of the new glass.

(3) Mark the glass at the support spacers with a grease pencil or pieces of masking tape and ink pen to use as a reference for installation (Fig. 8).

(4) Remove replacement windshield from windshield opening.

(5) Position the windshield inside up on a suitable work surface with two padded, wood 10 cm by 10 cm by 50 cm (4 in. by 4 in. by 20 in.) blocks, placed parallel 75 cm (2.5 ft.) apart (Fig. 9).

WARNING: DO NOT USE SOLVENT BASED GLASS CLEANER TO CLEAN WINDSHIELD BEFORE APPLYING GLASS PREP AND PRIMER. POOR ADHESION CAN RESULT.

(6) Clean inside of windshield with ammonia based glass cleaner and lint free cloth.

(7) Apply molding to perimeter of windshield.

(8) Apply Glass Prep adhesion promoter 25 mm (1 in.) wide around perimeter of windshield and wipe with clean/dry lint free cloth until no streaks are visible.

(9) Apply Glass Primer 25 mm (1 in.) wide around perimeter of windshield. Allow at least three minutes drying time.

WINDSHIELD (Continued)

(10) Using a razor knife, remove as much original urethane as possible. Do not damage paint on windshield fence.

(11) Apply pinch weld primer 15 mm (.75 in.) wide around the windshield fence. Allow at least three minutes drying time.

(12) If a low viscosity urethane adhesive is used, install compression spacers on the fence around the windshield opening (Fig. 10).

(13) Apply a 10 mm (0.4 in.) bead of urethane on center line of windshield fence.

(14) With the aid of a helper, position the windshield over the windshield opening. Align the reference marks at the bottom of the windshield to the support spacers.

(15) Slowly lower windshield glass to windshield opening fence. Guide the molding into proper position as necessary. Push windshield inward molding is flush to roof line and A-pillars.

(16) Clean access urethane from exterior with Mopar® Super Kleen or equivalent.

(17) Apply 150 mm (6 in.) lengths of 50 mm (2 in.) masking tape spaced 250 mm (10 in.) apart to hold molding in place until urethane cures.

(18) Install windshield side moldings and drip rail weatherstrips.

(19) Install cowl cover and wipers.

(20) Install inside rear view mirror.

(21) After urethane has cured, remove tape strips and water test windshield to verify repair.

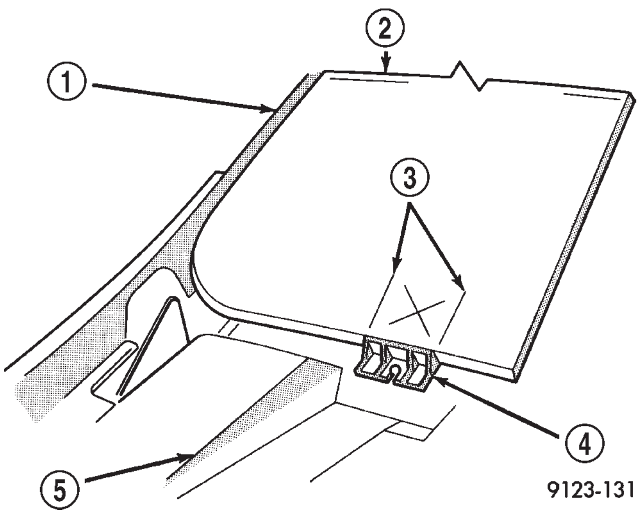

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Fig. 8 Center Windshield and Mark at Support Spacers

1 - A-PILLAR
2 - WINDSHIELD
3 - MARKS
4 - SUPPORT SPACER
5 - COWL

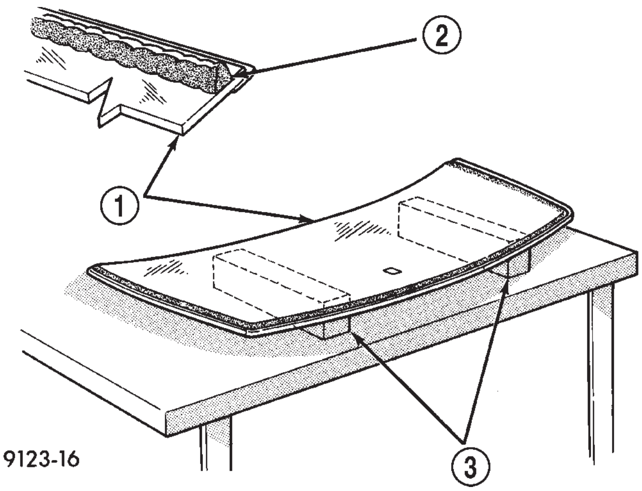

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Fig. 9 Work Surface Set up and Molding Installation

1 - WINDSHIELD AND MOULDINGS
2 - URETHANE BEAD AROUND GLASS 7mm (.3 in.) FROM EDGE
3 - BLOCKS

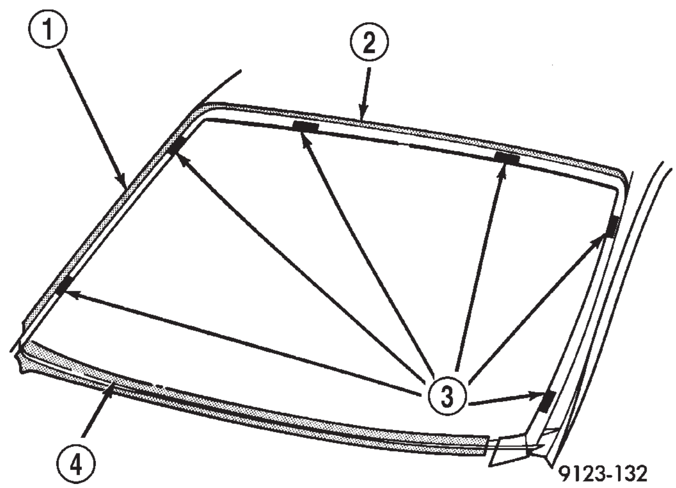

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Fig. 10 Position Urethane Compression Spacers

1 - A-PILLAR
2 - ROOF PANEL
3 - SPACERS
4 - WINDSHIELD OPENING

BACKLITE

REMOVAL

For a description of tools and adhesive systems that are recommended for use in this procedure (Refer to 23 - BODY/STATIONARY GLASS/WINDSHIELD - REMOVAL).

WARNING: DO NOT OPERATE THE VEHICLE WITHIN 24 HOURS OF WINDSHIELD INSTALLATION. IT TAKES AT LEAST 24 HOURS FOR URETHANE ADHESIVE TO CURE. IF IT IS NOT CURED, THE WINDSHIELD MAY NOT PERFORM PROPERLY IN AN ACCIDENT. BE SURE TO REFER TO THE URETHANE MANUFACTURER'S DIRECTIONS FOR CURING TIME SPECIFICATIONS, AND DO NOT USE ADHESIVE AFTER ITS EXPIRATION DATE.

CAUTION: Open the left front door glass before installing the rear window to avoid pressurizing the passenger compartment if a door is slammed before the urethane bonding is fully cured. Water leaks can result

(1) Remove rear window moldings.
(2) Remove upper quarter trim panel.
(3) Disengage wire connectors from rear window defogger, and rear window mounted radio antenna, if so equipped.
(4) Remove C-pillar applique, if so equipped.

WARNING: WEAR EYE AND HAND PROTECTION WHEN HANDLING SAFETY GLASS. PERSONAL INJURY CAN RESULT.

CAUTION: Do not damage body or trim finish when cutting out glass or applying fence primer.

(5) Cut the urethane around the perimeter of the rear window glass. (Refer to 23 - BODY/STATIONARY GLASS/WINDSHIELD - REMOVAL).
(6) Remove the rear window from the vehicle.

INSTALLATION

For a description of tools and adhesive systems that are recommended for use in this procedure (Refer to 23 - BODY/STATIONARY GLASS/WINDSHIELD - INSTALLATION).

WARNING: DO NOT OPERATE THE VEHICLE WITHIN 24 HOURS OF WINDSHIELD INSTALLATION. IT TAKES AT LEAST 24 HOURS FOR URETHANE ADHESIVE TO CURE. IF IT IS NOT CURED, THE WINDSHIELD MAY NOT PERFORM PROPERLY IN AN ACCIDENT. BE SURE TO REFER TO THE URETHANE MANUFACTURER'S DIRECTIONS FOR CURING TIME SPECIFICATIONS, AND DO NOT USE ADHESIVE AFTER ITS EXPIRATION DATE.

CAUTION: Open the left front door glass before installing the rear window to avoid pressurizing the passenger compartment if a door is slammed before the urethane bonding is fully cured. Water leaks can result

(1) Prepare the work area, window fence, and glass the same way as described in the Windshield section of this group (Refer to 23 - BODY/STATIONARY GLASS/WINDSHIELD - INSTALLATION).
(2) Place fence spacers at the locations shown (Fig. 11).
(3) Install the rear window molding on glass.
(4) Apply a 10 mm (0.4 in.) bead of urethane along center line of window fence.
(5) Install the glass in the same manner described in the Windshield section of this group (Refer to 23 - BODY/STATIONARY GLASS/WINDSHIELD - INSTALLATION) (Fig. 11).
(6) Connect rear window defogger wiring, and rear window mounted radio antenna, if so equipped.
(7) Install C-pillar applique, and interior trim.
(8) After urethane has cured, water test rear window to verify repair. Verify rear window defogger operation.

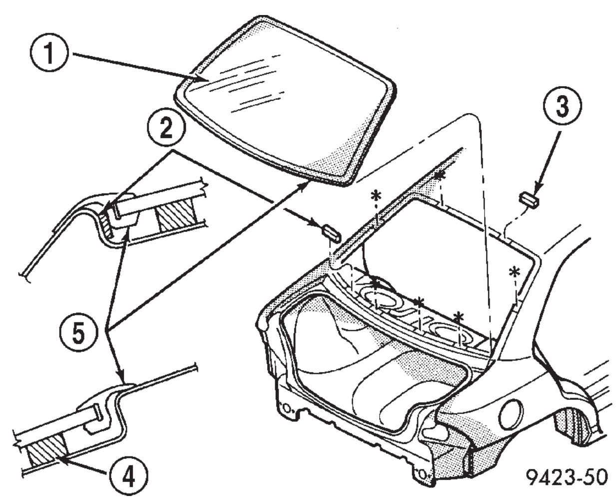

Fig. 11 Rear Window Glass – Typical

1 - REAR WINDOW GLASS
2 - SHIM
3 - SPACERS
4 - URETHANE
5 - MOLDING

SUNROOF

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SUNROOF

DESCRIPTION

WARNING: Keep fingers and other body parts out of sunroof opening at all times.

The sunroof features a power sliding glass panel and a sunshade which can be manually positioned anywhere along its travel, rearward of glass panel front edge.

The sunroof is electrically operated from a three switches located on the windshield header, rearward of the map lamp. To operate the sunroof the ignition switch must be in either the Accessory or On/Run position. One switch (vent) is a push button type and opens the sunroof to the vent position only. The other switch (open/close) is a rocker type for opening and closing the sunroof. Pressing and releasing the open button once the sunroof will express open and the wind deflector will raise. If the button is pressed a second time the sunroof will stop in that position. Pressing and holding the close button will close the sunroof. If the close button is released the sunroof will stop in that position.

DIAGNOSIS AND TESTING - SUNROOF

Before beginning sunroof diagnostics verify that all other power accessories are in proper operating condition. Refer to Sunroof Diagnostic Chart for possible causes. If not, a common electrical problem may exist. (Refer to 8 - ELECTRICAL/WIRING DIAGRAM INFORMATION - DESCRIPTION) for circuit, splice and component descriptions. Check the condition of the circuit protection (20 amp circuit breaker in cavity 19 of the Junction Block). Inspect all wiring connector pins for proper engagement and continuity. Check for battery voltage at the power sunroof controller, (Refer to 8W - WIRING DIAGRAMS), for circuit information. If battery voltage of more than 10 volts is detected at the controller, proceed with the following tests (the controller will not operate at less than 10 volts).

Before beginning diagnosis for wind noise or water leaks, verify that the problem was not caused by releasing the control switch before the sunroof was fully closed. The sunroof module has a water management system. If however, the sunroof glass is in a partial closed position, high pressure water may be forced beyond the water management system boundaries and onto the headlining.

SUNROOF (Continued)

SUNROOF DIAGNOSIS CHART

SYMPTOM	POSSIBLE CAUSE
Sunroof motor inoperative.	Faulty control switch. Faulty circuit ground between sunroof electronics module, control switch, and body harness. Faulty power circuit between sunroof electronics module, control switch, and body harness. Faulty sunroof drive motor. Faulty sunroof electronics module. Faulty sunroof drive motor or electronics module.
Audible whine when switch is depressed, sunroof does not operate.	Faulty sunroof drive motor. Binding cable.
Audible clicking or ratcheting when switch is pressed, sunroof does not operate.	Broken or worn drive cable. Worn drive motor gear. Mechanisms not synchronized.
Sunroof vents and opens, but does not close.	Binding cable. Faulty circuit. Faulty control switch. Faulty sunroof electronic module. Faulty drive motor.
Sunroof vents, but does not open.	Binding cable or mechanism. Faulty circuit. Faulty switch. Faulty sunroof electronic module.
Sunroof does not vent	Binding cable or mechanism. Faulty circuit. Faulty control switch. Faulty sunroof electronic module.
Sunroof water leak.	Drain tubes clogged or kinked or disconnected from the sunroof. Glass panel improperly adjusted. Faulty glass panel seal.
Gurgling sound from sunroof	Low spot in drain hose routing, allowing water to stand.
Wind noise from sunroof.	Front of glass panel too high or rear too low. Wind deflector not deploying. Glass not centered in opening. Faulty glass panel seal.
Rattles from open sunroof while driving	Loose or broken attaching hardware. Worn or broken mechanism.

SUNROOF (Continued)

WATER DRAINAGE AND WIND NOISE DIAGNOSIS

The sliding glass panel is designed to minimize seal water entry with a snug fit between the roof and the seal. The fit can be checked by inserting a piece of paper between the roof and the seal. The piece of paper should have some resistance when pulled out when the glass panel is in the closed position. The sunroof housing will drain off a minimum amount of water. Excessive wind noise could result if the gap clearances are exceeded. The sunroof glass panel may need to be adjusted. (Refer to 23 - BODY/SUNROOF/ GLASS PANEL - DESCRIPTION).

Adequate drainage is provided by a drain trough in the sunroof housing which encircles the sliding glass panel and leads to drain hoses. If a wet headliner or other water leak complaints are encountered, before performing any adjustments, first ensure that the drainage system is not plugged or disconnected. Use a pint container to pour water into the sunroof housing drain trough. If water flow is restricted, use compressed air to blow out any material plugging the drain system. Retest system again.

To further check for a disconnected drain hose:

(1) Remove A-pillar trim, sun visors, and map lamps/mini console.

(2) Remove sunroof opening trim lace. (Refer to 23 - BODY/SUNROOF/OPENING TRIM LACE - REMOVAL).

(3) Lower headliner as necessary to gain access to sunroof housing drain tubes. (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).

(4) Repair as necessary.

SUNROOF CONTROL SWITCH

REMOVAL

(1) Using a flat blade tool, release switch from the headliner (Fig. 1).

(2) Disconnect the wire connector from the switch.

INSTALLATION

(1) Connect the wire connector to the control switch.

(2) Install control switch into headliner.

(3) Test sunroof operation.

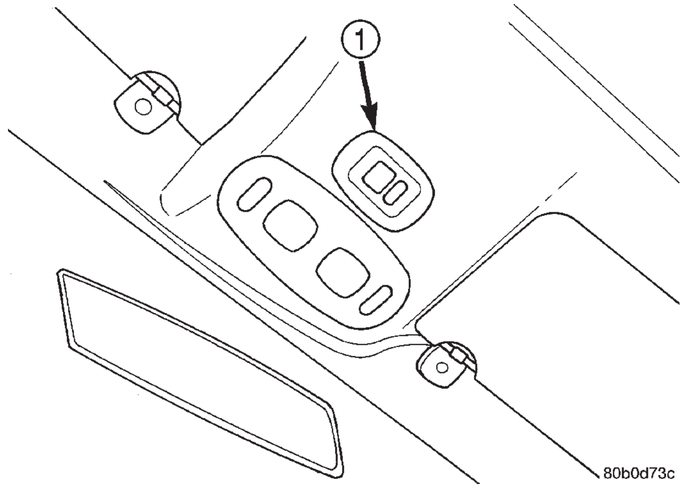

Fig. 1 Sunroof Control Switch

1 - SUN ROOF CONTROL SWITCH

SUNROOF DRIVE MOTOR

REMOVAL

NOTE: The sunroof system is timed from the factory so that the motor shuts off automatically when the sunroof window reaches a certain position. Extreme care must be taken when removing the motor from the sunroof module assembly or this timing may be thrown off causing damage to the sunroof system. Anytime the motor needs to be removed from the module assembly the sunroof window must be in the FULLY CLOSED POSITION if possible.
If glass panel is not in the fully closed position and the motor is removed or inoperative, (Refer to 23 - BODY/SUNROOF/DRIVE MOTOR - ADJUSTMENTS)

(1) Remove A-pillar trim (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - REMOVAL)

(2) Remove sun visors (Refer to 23 - BODY/INTERIOR/SUN VISOR - REMOVAL)

(3) Remove map lamps/mini console

(4) Disconnect the control switch wire connector.

(5) Remove sunroof opening trim lace. (Refer to 23 - BODY/SUNROOF/OPENING TRIM LACE - REMOVAL).

(6) Remove headliner as necessary to gain access to sunroof drive motor. (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).

(7) Disconnect the drive motor wire harness connectors.

(8) Remove drive motor attaching screws.

(9) Remove motor from the sunroof housing

SUNROOF DRIVE MOTOR (Continued)

INSTALLATION

NOTE: Before installing a new motor or the original motor ensure that the sunroof glass panel is in the FULLY CLOSED POSITION. If sunroof glass panel is not in the FULLY CLOSED POSITION (Refer to 23 - BODY/SUNROOF/DRIVE MOTOR - ADJUSTMENTS). If the original drive motor or new drive motor is not in the CLOSED POSITION (Refer to 23 - BODY/SUNROOF/DRIVE MOTOR - ADJUSTMENTS). A new drive motor comes in the PARK POSITION, but if the drive motor not in the fully closed position (Refer to 23 - BODY/SUNROOF/DRIVE MOTOR - ADJUSTMENTS).

(1) Ensure that sunroof module is in the FULLY closed position before mounting the motor. If not in the fully closed position (Refer to 23 - BODY/SUNROOF/DRIVE MOTOR - ADJUSTMENTS).

(2) To time the drive motor (Refer to 23 - BODY/SUNROOF/DRIVE MOTOR - ADJUSTMENTS).

(3) Place drive motor into position on the sunroof housing and install attaching screws.

(4) Connect drive motor, and control switch wire connectors.

(5) Test sunroof drive motor operation, adjust as necessary (Refer to 23 - BODY/SUNROOF/DRIVE MOTOR - ADJUSTMENTS).

(6) Install sunroof glass panel (Refer to 23 - BODY/SUNROOF/GLASS PANEL - INSTALLATION).

(7) Verify sunroof operation and alignment, and adjust as necessary. (Refer to 23 - BODY/SUNROOF/GLASS PANEL - ADJUSTMENTS).

(8) Installing the headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).

(9) Install sunroof opening trim lace. (Refer to 23 - BODY/SUNROOF/OPENING TRIM LACE - INSTALLATION).

ADJUSTMENTS

ADJUSTMENT

DRIVE MOTOR

NOTE: The timing of both the drive motor and the sunroof module play a critical roles in the proper function of the sunroof. The sunroof assembly come in the proper position. As long as the motor is not has not been removed. If the drive motor is removed and cycled the motor will have to be Timed. If the sunroof glass panel has been moved from the park position with the drive motor removed (Refer to 23 - BODY/SUNROOF/GLASS PANEL - ADJUSTMENTS).

(1) With drive motor removed from the sunroof assembly check the time of the drive motor.

(2) Plug the wire connectors to the drive motor. Do not attach motor to sunroof assembly.

(3) Turn ignition switch to the accessory position, tap the drive motor open position switch until the motor timing mark align up straight across (Fig. 2) .

(4) Install drive motor. (Refer to 23 - BODY/SUNROOF/DRIVE MOTOR - INSTALLATION).

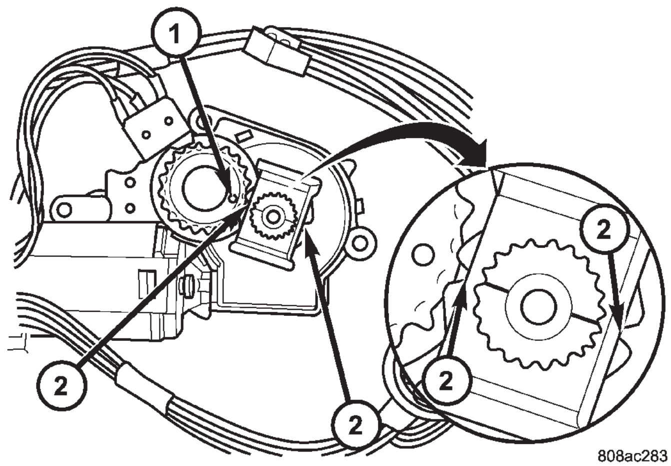

Fig. 2 Sunroof Drive Motor Timing

1 - HOLE
2 - TIMING MARKS

SUNROOF MODULE

NOTE: If the drive motor is removed and the sunroof glass or cables are moved the sunroof module will have to be timed.

(1) With the drive motor removed.

(2) Remove sunroof glass panel (Refer to 23 - BODY/SUNROOF/GLASS PANEL - REMOVAL).

(3) Now place both right and left arms in the closed position. Using a screwdriver, push the plastic cable all the way forward in the track until the glass mounting arm drops into the closed position.

(4) Repeat this on the other side.

(5) To verify correct timing, there is an 1/8 inch hole in the cable ramp that must be aligned with the front glass mounting screw hole.

(6) Using an awl, verify alignment of both right and left timing holes. The tracks will now be timed to the fully closed position.

(7) With the drive motor in the fully closed position. Install drive motor (Refer to 23 - BODY/SUNROOF/DRIVE MOTOR - INSTALLATION).

SUNROOF GLASS PANEL

REMOVAL

(1) Slide sunshade rearward to the open position.
(2) Move the glass panel to the vent position.
(3) Remove the glass panel screws on each side (Fig. 3).
(4) Lift off glass panel and remove from vehicle.

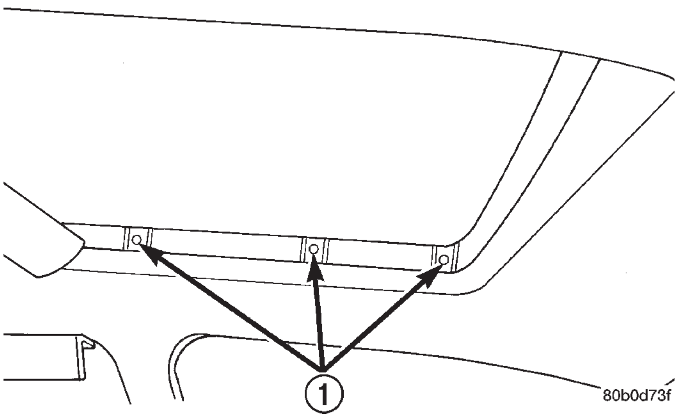

Fig. 3 Sunroof Glass Panel Screws
1 - ATTACHING SCREWS

INSTALLATION

(1) Position glass panel on to mechanism.
(2) Start the six attaching screws.
(3) Close glass.
(4) Center glass in opening by running a business card around the glass.
(5) Adjust front height of glass, just below roof panel.
(6) Tighten front two screws.
(7) Adjust rear height of glass, just above roof panel.
(8) Tighten remaining screws.
(9) Verify sunroof operation and alignment. Check fit and adjust as necessary, (Refer to 23 - BODY/SUNROOF/GLASS PANEL - DESCRIPTION).

ADJUSTMENTS

ADJUSTMENT

(1) Move the sunshade rearward to the open position.
(2) Move the sunroof glass panel to the fully closed position.
(3) Loosen the forward and center screws on each side enough to make the front adjustment.
(4) Adjust the front of the sunroof glass panel 1 mm (1/32 inch) below the top surface of the roof panel.
(5) Tighten the front two screws.
(6) Loosen the rear screws on each side enough to make the rear adjustment.
(7) Adjust the rear of the sunroof glass panel 1 mm (1/32 inch) above the top surface of the roof panel.
(8) Tighten the rear two screws.
(9) Check for proper fit. If not OK, repeat glass panel adjustment. If OK, tighten the center two screws.

SUNROOF GLASS PANEL SEAL

REMOVAL

(1) Remove sunroof glass panel. (Refer to 23 - BODY/SUNROOF/GLASS PANEL - REMOVAL).
(2) Grasp the seal and pull seal away from the glass panel. The seal is a one piece seal.

INSTALLATION

NOTE: Always position seal seam on center of the passenger side of glass panel.

(1) Install seal on glass. Using care working the seal around the glass, being careful not to over stretch the seal while installing.
(2) Install sunroof glass panel.
(3) Test sunroof operation, adjust as necessary.

SUNROOFF HOUSING DRAIN HOSE

REMOVAL

FRONT HOSES

(1) Move glass panel to the fully closed position.
(2) Remove sunroof opening trim lace. (Refer to 23 - BODY/SUNROOF/OPENING TRIM LACE - REMOVAL).
(3) Disconnect the control switch and wire connector.
(4) Remove headliner. (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
(5) Disconnect the drain hose from the sunroof housing (Fig. 4).
(6) Drain any liquid from hose connection, if necessary.
(7) Attach new drain hose to old hose with tape that is to be replaced.

SUNROOFF HOUSING DRAIN HOSE (Continued)

(8) Work the old hose back and forth to loosen the sealer.

(9) Pull the old hose out through the bottom and the new hose through.

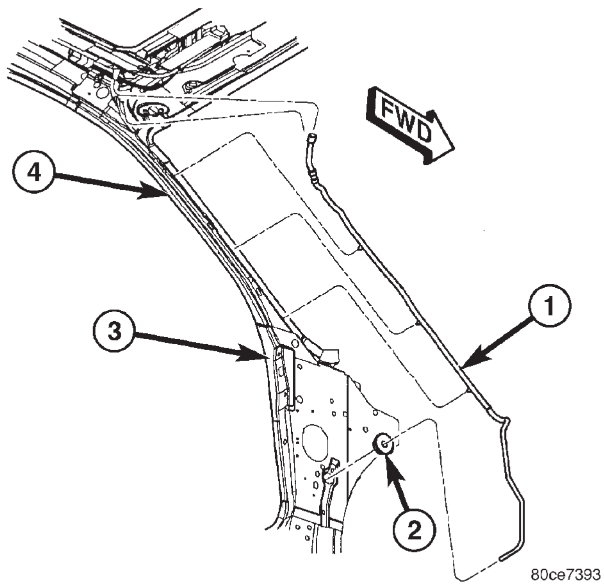

Fig. 4 FRONT DRAIN HOSE

1 - FRONT DRAIN TUBE
2 - DRAIN TUBE GRUMMET
3 - COWL SIDE PANEL
4 - WINDSHIELD OPENING SIDE OUTER FRAME

REAR HOUSING HOSE

(1) Move glass panel to the fully closed position.

(2) Remove sunroof opening trim lace. (Refer to 23 - BODY/SUNROOF/OPENING TRIM LACE - REMOVAL).

(3) Disconnect the control switch and wire connector.

(4) Remove headliner. (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).

(5) Disconnect the drain hose from the sunroof housing (Fig. 5).

(6) Drain any liquid from hose connection, if necessary.

(7) Attach new drain hose to old hose with tape that is to be replaced.

(8) Work the old hose back and forth to loosen the sealer.

(9) Pull the old hose out through the bottom and the new hose through.

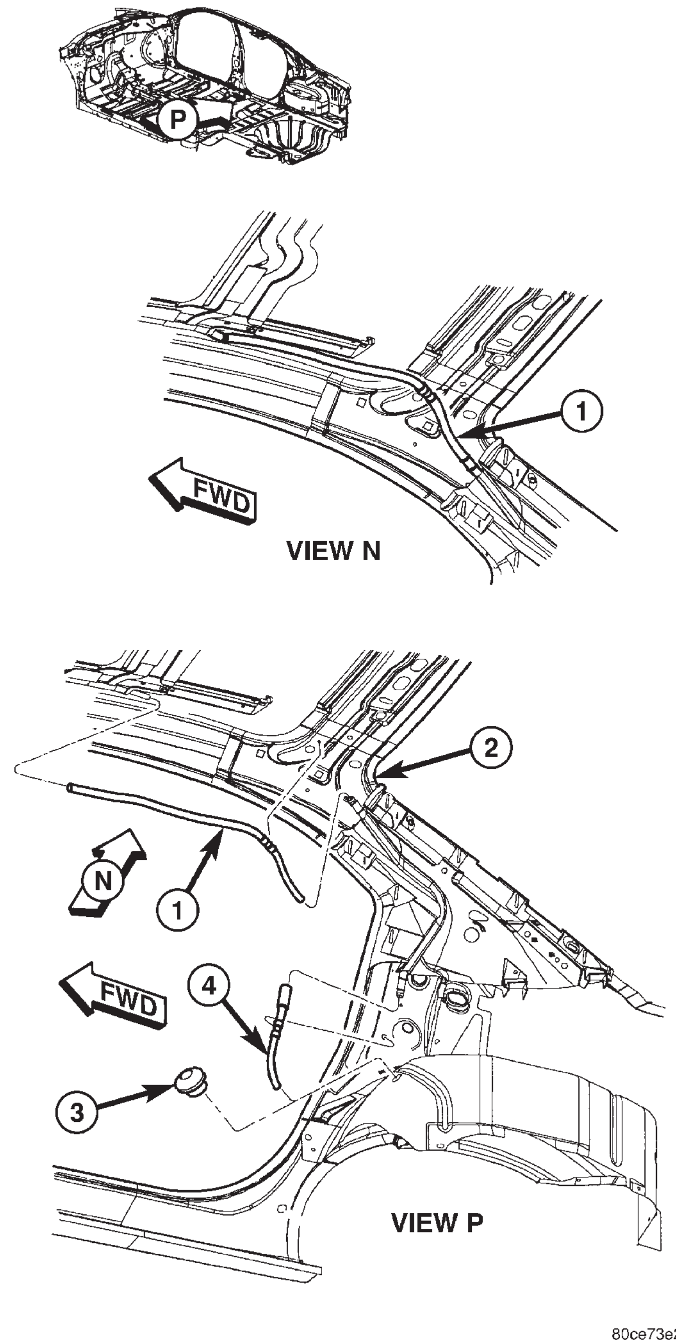

Fig. 5 REAR DRAIN TUBE

1 - REAR DRAIN TUBE
2 - QUARTER INNER UPPER PANEL
3 - DRAIN TUBE GROMMET
4 - REAR DRAIN LOWER TUBE

INSTALLATION

FRONT HOSES

(1) Connect the drain hose to the sunroof housing and test drainage (Fig. 4).

(2) Set headliner into position.

(3) Connect express module, drive motor, and control switch wire connectors.

(4) Test sunroof operation, adjust as necessary.

(5) Finish installing headliner. (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).

SUNROOFF HOUSING DRAIN HOSE (Continued)

(6) Install sunroof opening trim lace. (Refer to 23 - BODY/SUNROOF/OPENING TRIM LACE - INSTALLATION).

(7) Connect the control switch wire connector. Install control switch.

REAR HOUSING HOSE

(1) Connect the drain hose to the sunroof housing and test drainage (Fig. 5).

(2) Set headliner into position.

(3) Connect express module, drive motor, and control switch wire connectors.

(4) Test sunroof operation, adjust as necessary.

(5) Finish installing headliner. (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).

(6) Install sunroof opening trim lace. (Refer to 23 - BODY/SUNROOF/OPENING TRIM LACE - INSTALLATION).

(7) Connect the control switch wire connector. Install control switch.

SUNROOF MODULE ASSEMBLY

REMOVAL

(1) Move glass panel to the fully closed position.

(2) Disconnect battery negative cable.

(3) Recline both front seats.

(4) Remove sunroof opening trim lace. (Refer to 23 - BODY/SUNROOF/OPENING TRIM LACE - REMOVAL).

(5) Remove control switch. (Refer to 23 - BODY/SUNROOF/CONTROL SWITCH).

(6) Disconnect wire harness.

(7) Remove headliner

(8) Disconnect the drain tubes from sunroof housing.

(9) Loosen fasteners attaching sunroof module assembly (Fig. 6).

(10) With the aid of a helper, remove fasteners attaching sunroof module assembly to roof panel.

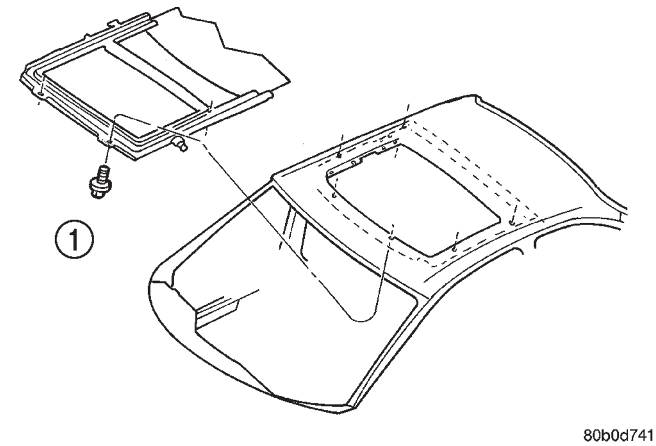

Fig. 6 Sunroof Module Assembly

1 - (6) SCREWS

INSTALLATION

NOTE: There are locating pins on the roof panel near the front corners of the sunroof opening that will help position the sunroof module correctly.

(1) With the Glass panel in the fully closed position.

(2) Raise rear end of sunroof module assembly and guide into position and start fasteners.

(3) Tighten the fasteners holding the sunroof module to roof panel. Tighten the fasteners to 11 N·m (97 in. lbs.) torque.

(4) Connect the drain tubes to the sunroof housing.

(5) Connect wire harness.

(6) Set headliner into position.

(7) Connect battery negative cable.

(8) Connect express module, drive motor, and control switch wire connectors.

(9) Test sunroof operation, adjust as necessary.

(10) Finish installing the headliner.

(11) Install sunroof opening trim lace. (Refer to 23 - BODY/SUNROOF/OPENING TRIM LACE - INSTALLATION).

OPENING TRIM LACE

REMOVAL

Remove lace by starting at the joint and pull one end of the lace away from the headliner until the entire lace is removed (Fig. 7).

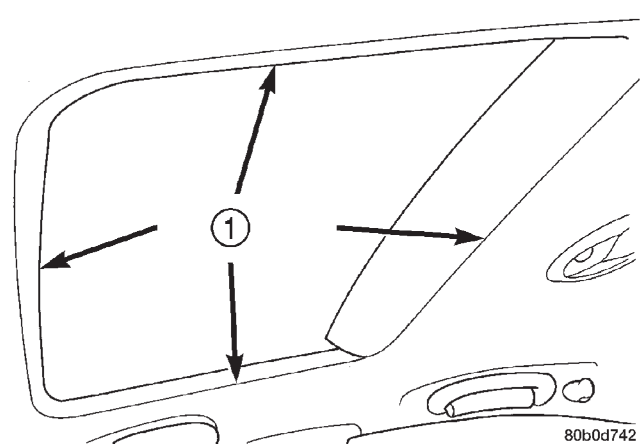

Fig. 7 Sunroof Opening Trim Lace

1 - OPENING TRIM LACE

OPENING TRIM LACE (Continued)

INSTALLATION

Install lace by starting at the spot of the previous joint, fully seat the lace in place around the sunroof opening. Cut to fit if necessary.

SUNSHADE

REMOVAL

(1) Place the sunroof glass panel in the vent position.

(2) Move the sunshade to the closed position

(3) From the outside of the vehicle, using a flat blade tool, disengage the rear sunshade guides. Pushing the guide toward the center of the vehicle (Fig. 8). Raise up on sunshade and slide it rearward out through the opening (Fig. 9). Release the front two guides and remove sunshade from the vehicle (Fig. 10).

CAUTION: Use care not to crease the sunshade when removing or installing.

(4) Remove the sunshade handle from sunshade by compressing the back side of the handle together and pull the handle out.

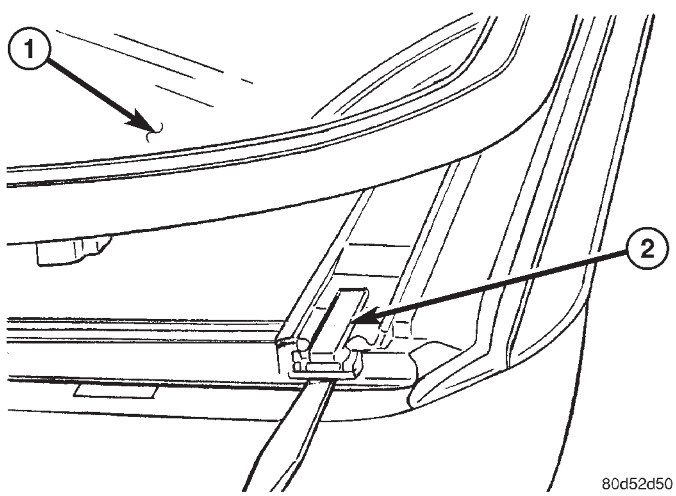

Fig. 8 SUNSHADE REAR GUIDE

1 - GLASS PANEL
2 - SUNSHADE REAR GUIDE

INSTALLATION

(1) Install sunshade handle into the sunshade, by pressing the handle into place until the tabs lock behind the sunshade.

(2) Install the sunshade into the vehicle between the roof and the glass panel in the vent position (Fig. 9).

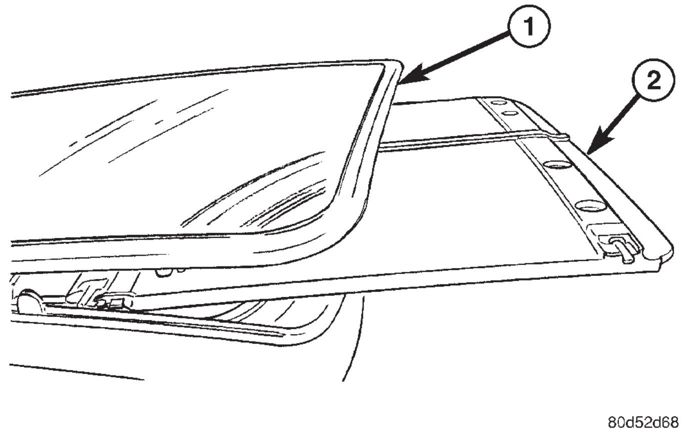

Fig. 9 SUNSHADE REMOVAL

1 - GLASS PANEL
2 - SUNSHADE REMOVAL

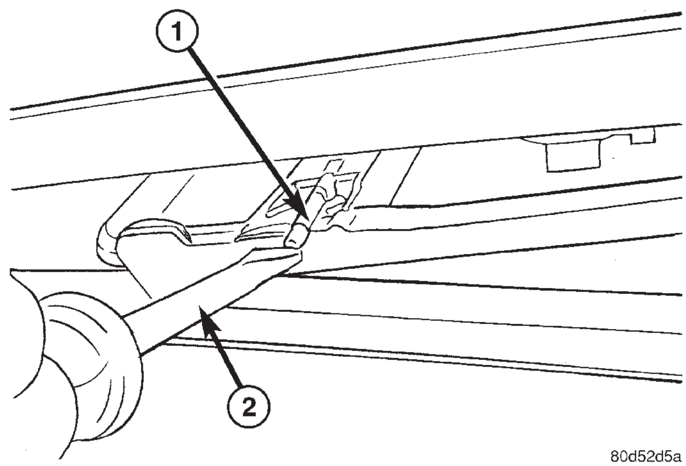

Fig. 10 SUNSHADE FRONT GUIDE

1 - SUNSHADE FRONT GUIDE
2 - SCREWDRIVER DEPRESSING FRONT GUIDE

(3) Move the sunshade to the closed position. Through the opening using a flat tool, engage the rear guides into the guide rails (Fig. 8).

(4) Slide sunshade rearward to access the front two guides. Engage the front guides into the guide rails (Fig. 10).

(5) Ensure the sunshade operation and operate the sunroof.

WIND DEFLECTOR

REMOVAL

(1) Open sunroof glass panel.

(2) Remove hinge pins by pushing them outboard to release the wind deflector from sunroof housing (Fig. 11).

(3) Remove wind deflector (Fig. 12).

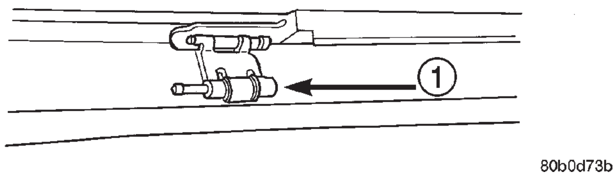

Fig. 11 Wind Deflector Hinge Pin

1 - PUSH

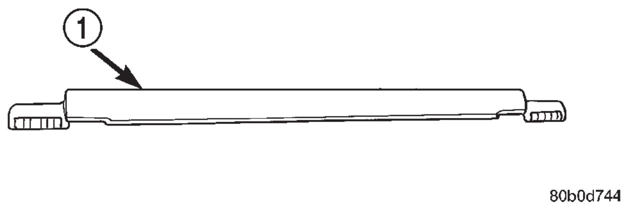

Fig. 12 Wind Deflector

1 - WIND DEFLECTOR

INSTALLATION

(1) Place wind deflector on wind deflector brackets.

(2) Install wind deflector hinge pins.

(3) Test sunroof operation.

SUNROOF EXPRESS MODULE

REMOVAL

(1) Remove A-pillar trim, sun visors, and map lamps/mini console.

(2) Remove sunroof opening trim lace. (Refer to 23 - BODY/SUNROOF/OPENING TRIM LACE - REMOVAL).

(3) Pull headliner down as necessary to gain access to sunroof express module.

(4) Disconnect the express module wire harness connectors (Fig. 13).

(5) Remove express module from the keyway by sliding module towards the center of the vehicle.

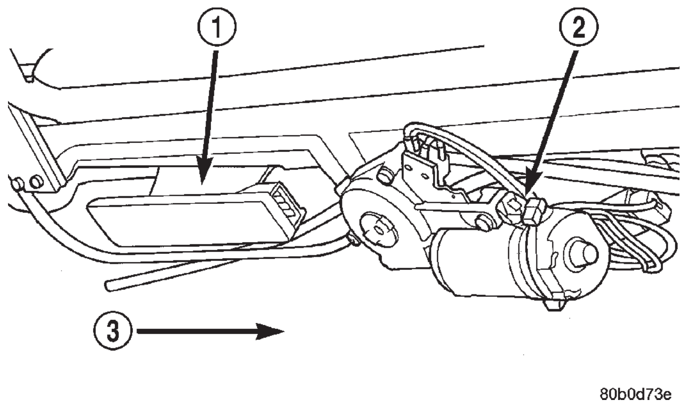

Fig. 13 Sunroof Express Module & Drive Motor

1 - SUN ROOF EXPRESS MODULE
2 - DRIVE MOTOR
3 - TO REMOVE SLIDE

INSTALLATION

(1) Place express module in the keyway located in sunroof module and slide module outward to lock it into position.

(2) Set headliner into position.

(3) Connect drive motor, express module, and control switch wire connectors.

(4) Test sunroof operation, adjust as necessary.

(5) Finish installing headliner.

(6) Install sunroof opening trim lace. (Refer to 23 - BODY/SUNROOF/OPENING TRIM LACE - INSTALLATION).

(7) Install A-pillar trim, sun visors, and map lamps/mini console.

WEATHERSTRIP/SEALS

TABLE OF CONTENTS

A-PILLAR SEAL

REMOVAL

(1) Open front door.
(2) Using a fork-type tool (C-4829), disengage push-in fasteners attaching A-pillar seal to A-pillar.
(3) Remove A-pillar seal from vehicle.

INSTALLATION

(1) Place A-pillar seal into position.
(2) Install push-in fasteners attaching A-pillar seal to A-pillar.
(3) Close front door.

A-PILLAR WEATHERSTRIP RETAINER AND MOLDING

REMOVAL

(1) Partially raise convertible top.

(2) Remove header and A-pillar weatherstrip as necessary to gain access.

(3) Remove screws holding A-pillar weatherstrip retainer to A-pillar (Fig. 1).

(4) Remove retainer from vehicle.

(5) Remove screws attaching A-pillar molding to A-pillar.

(6) Remove A-pillar molding from vehicle.

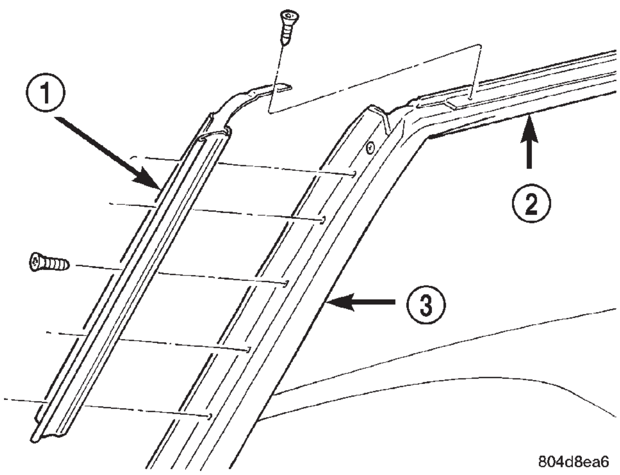

Fig. 1 A-Pillar Weatherstrip Retainer

1 - A-PILLAR WEATHERSTRIP RETAINER
2 - HEADER
3 - A-PILLAR

INSTALLATION

(1) Clean A-pillar of any seal material residue.

(2) Position A-pillar molding to vehicle.

(3) Install screws attaching A-pillar molding to A-pillar.

(4) Position A-pillar weatherstrip retainer on A-pillar.

(5) Install screws attaching retainer to A-pillar. Install middle screw first and then work outward.

(6) Install header and A-pillar weatherstrip.

(7) Lower and secure convertible top.

DECKLID OPENING WEATHERSTRIP

REMOVAL

(1) Release decklid latch and open decklid.

(2) Pull decklid opening weatherstrip from decklid opening flange (Fig. 2).

(3) Remove decklid opening weatherstrip from vehicle.

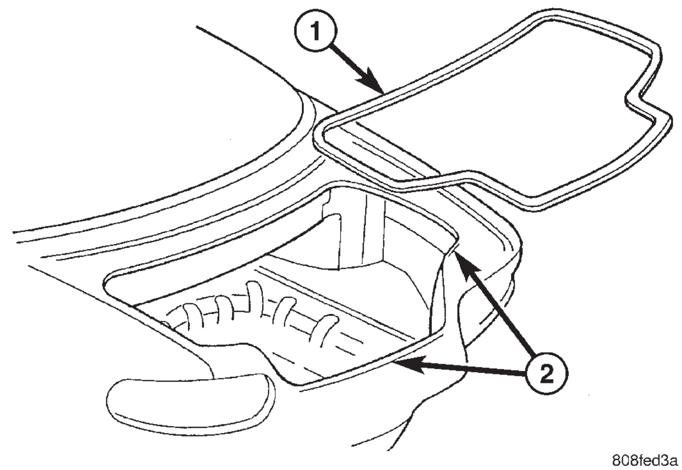

Fig. 2 DECKLID OPENING WEATHERSTRIP

1 - TRUNK OPENING WEATHERSTRIP
2 - TRUNK OPENING FLANGE

INSTALLATION

(1) Position decklid opening weatherstrip on vehicle (Fig. 2).

(2) Starting at center weatherstrip over decklid latch striker and press weatherstrip firmly onto decklid opening flang. Ensure that the weatherstrip seats properly along the entire length..

(3) Verify decklid operation and sealing.

DOOR INNER BELT WEATHERSTRIP

REMOVAL

(1) Remove door trim panel.

(2) Pull upward on rear edge of inner belt weatherstrip (Fig. 3).

(3) Remove weatherstrip from vehicle.

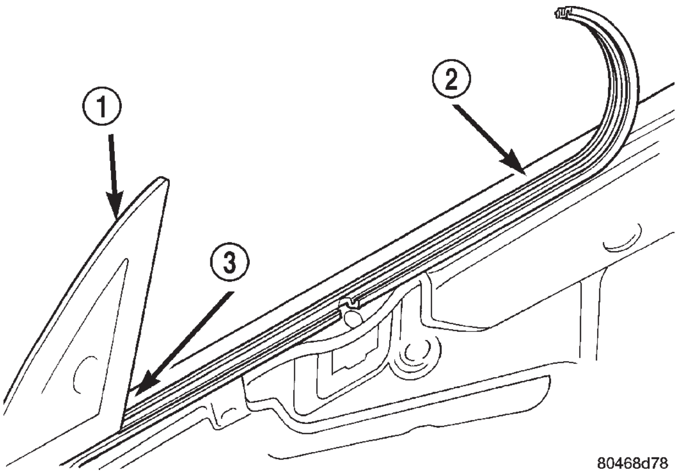

Fig. 3 Door Inner Belt Weatherstrip

1 - MIRROR FLAG/GLASS CHANNEL
2 - INNER BELT WEATHERSTRIP
3 - START THIS END FIRST

INSTALLATION

(1) Start leading edge of weatherstrip on vehicle.

(2) Press the leading edge of the weatherstrip forward until edge is tight to the mirror flag.

(3) Press weatherstrip into position on door panel.

(4) Install door trim panel.

DOOR OPENING TRIM WELT

REMOVAL

(1) Using trim stick, special tool C-4755, remove one end of door opening trim welt from door opening flange.

(2) Remove welt from vehicle (Fig. 4).

INSTALLATION

(1) Position door opening trim welt on vehicle.

(2) Butt end of welt to edge of header/A–pillar weatherstrip.

(3) Push door opening welt onto door opening flange.

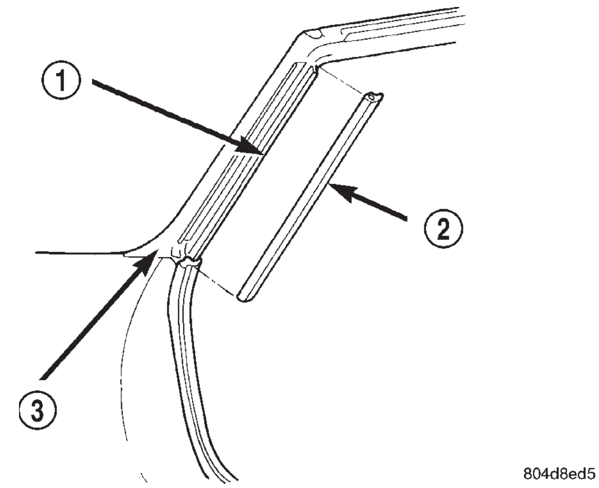

Fig. 4 Door Opening Trim Welt

1 - DOOR OPENING FLANGE
2 - DOOR OPENING TRIM WELT
3 - HEADER A-PILLAR WEATHERSTRIP

DRIP RAIL WEATHERSTRIP

REMOVAL

(1) Open front and rear doors.

(2) Remove two screws (Fig. 5).

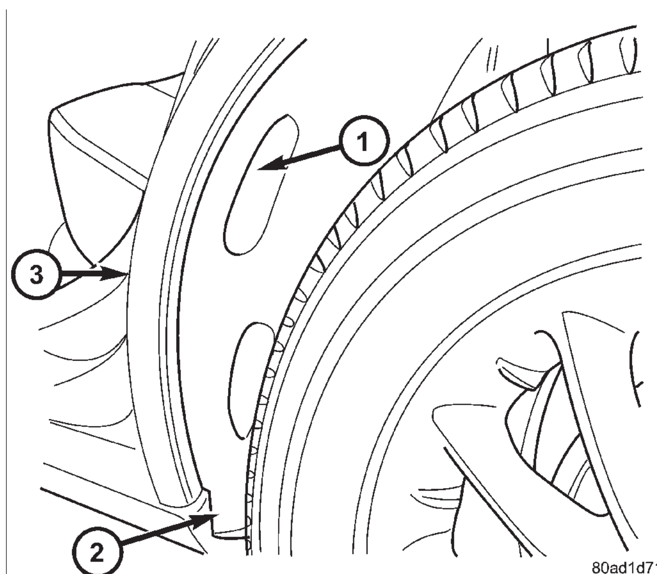

Fig. 5 Splash Shield

1 - FASTENERS
2 - SPALSH SHIELD
3 - DRIP RAIL WEATHERSTRIP

(3) Position splash shield out of way.

(4) Starting at the bottom of the A-pillar, pull the drip rail weatherstrip from the windshield side molding.

(5) Pull the drip rail weatherstrip from the roof rail pinch flange above door openings.

DRIP RAIL WEATHERSTRIP (Continued)

(6) Remove drip rail weatherstrip from vehicle (Fig. 6).

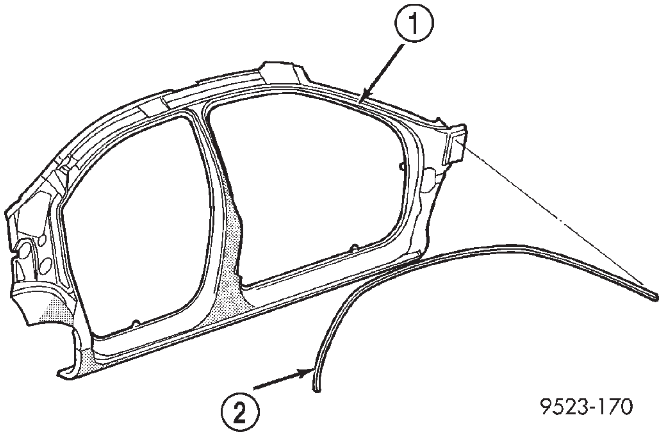

Fig. 6 Drip Rail Weatherstrip

1 - DRIP RAIL
2 - DRIP RAIL WEATHERSTRIP

INSTALLATION

(1) Place drip rail weatherstrip into position.
(2) Push drip rail weatherstrip on to the roof rail pinch flange above door openings.
(3) Starting at the bottom of the A-pillar, push the drip rail weatherstrip on to the windshield side molding.
(4) Position splash shield.
(5) Install two screws.
(6) Close front and rear doors.

FRONT & REAR DOOR OPENING WEATHERSTRIP

REMOVAL

(1) Open door.
(2) Remove door sill plate.
(3) Pull weatherstrip from pinch flange around door opening (Fig. 7).

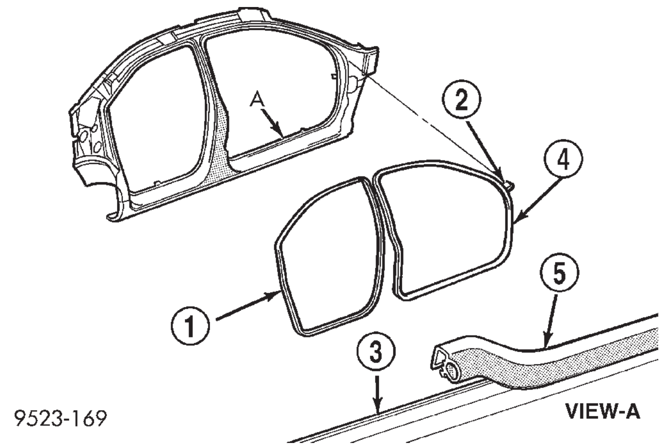

Fig. 7 Door Opening Weatherstrips

1 - REAR DOOR WEATHERSTRIP
2 - A-PILLAR SEAL
3 - PINCH FLANGE
4 - FRONT DOOR WEATHERSTRIP
5 - WEATHERSTRIP

INSTALLATION

Position the splice in the door opening weatherstrip in the center of the bottom of the opening and reverse the preceding operation.
(1) Push weatherstrip on to pinch flange around door opening.
(2) Install door sill plate.
(3) Close door.

FRONT DOOR GLASS RUN WEATHERSTRIP

REMOVAL

(1) Remove door glass. (Refer to 23 - BODY/DOOR - FRONT/DOOR GLASS - REMOVAL)
(2) Remove bolt attaching bottom of front lower run channel to inner door panel.
(3) Pull glass run weatherstrip from door glass opening frame.
(4) Remove lower run channel through opening at top of door (Fig. 8).

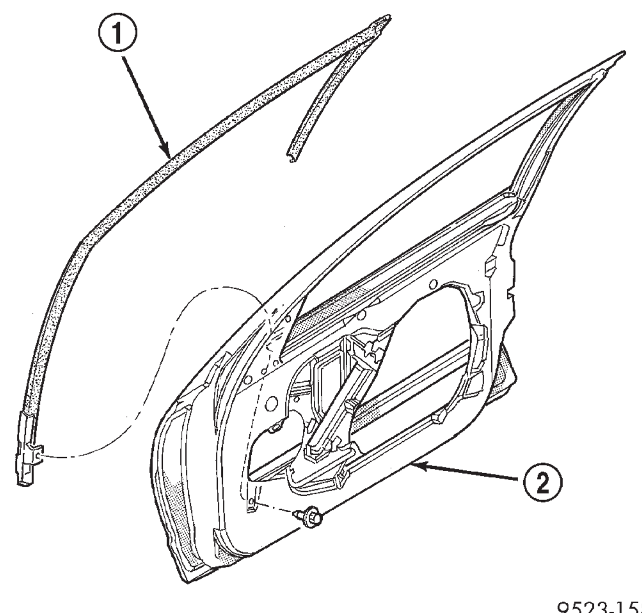

Fig. 8 Door Glass Run Weatherstrip

1 - GLASS RUN WEATHERSTRIP
2 - FRONT DOOR

INSTALLATION

(1) Install lower run channel through opening at top of door.

FRONT DOOR GLASS RUN WEATHERSTRIP (Continued)

(2) Push glass run weatherstrip to door glass opening frame.

(3) Install bolt attaching bottom of front lower run channel to inner door panel.

(4) Install door glass. (Refer to 23 - BODY/DOOR - FRONT/DOOR GLASS - INSTALLATION)

FRONT DOOR INNER BELT WEATHERSTRIP

REMOVAL

(1) Remove front door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL)

(2) Pull upward at rear end of inner belt weatherstrip.

(3) Remove inner belt weatherstrip from vehicle (Fig. 9).

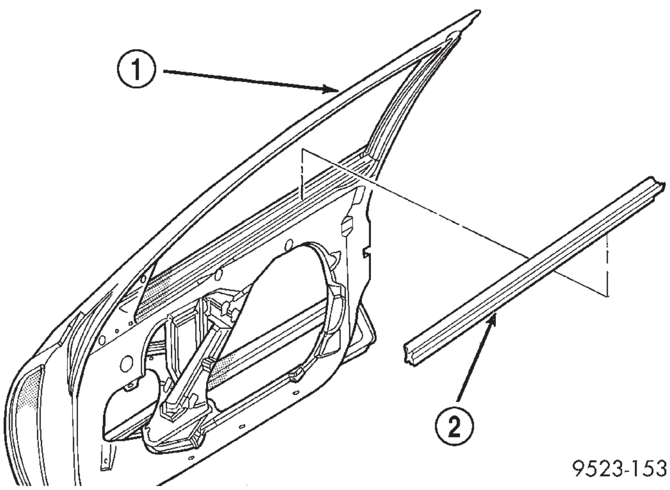

Fig. 9 Front Door Inner Belt Weatherstrip

1 - FRONT DOOR
2 - INNER BELT WEATHERSTRIP

INSTALLATION

(1) Place inner belt weatherstrip into position.

(2) Push downward on the inner belt weatherstrip starting at the front edge.

(3) Install front door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION)

FRONT DOOR OUTER BELT MOLDING

REMOVAL

(1) Remove screw attaching rearward end of molding to front door (Fig. 10).

(2) Using a rubber mallet and block of wood, tap upward at each clip attaching belt molding to door (Fig. 11).

(3) Lift up on the rear of the belt molding and pull rearward to remove.

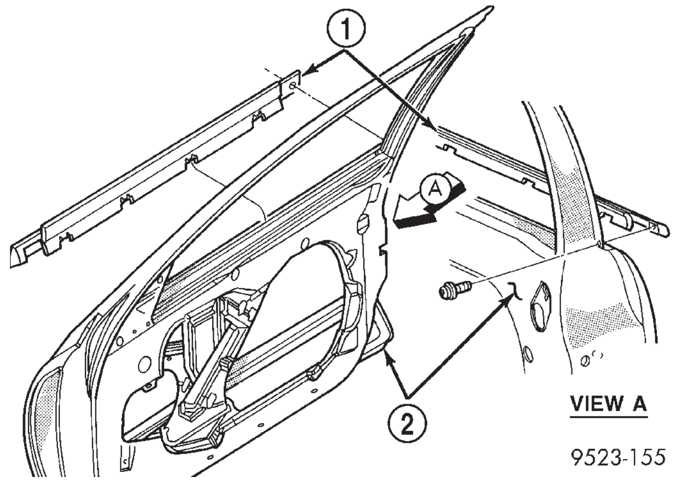

Fig. 10 Front Door Outer Belt Molding

1 - OUTSIDE BELT MOLDING
2 - FRONT DOOR

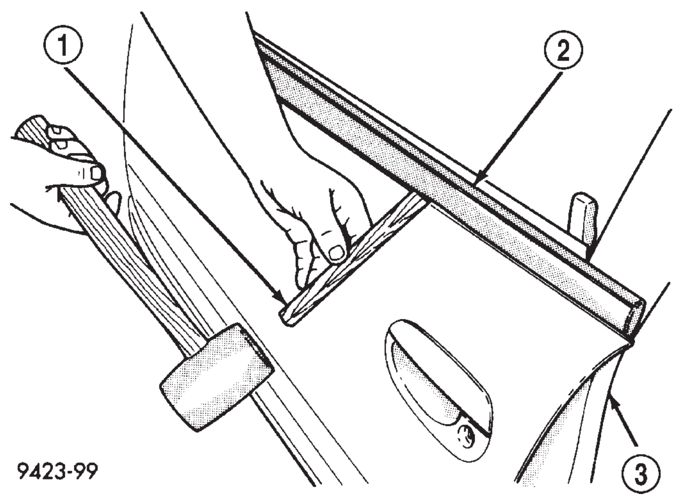

Fig. 11 Front Door Outer Belt Molding Removal

1 - WOOD BLOCK
2 - BELT MOLDING
3 - DOOR

INSTALLATION

(1) Place belt molding in position.

(2) Using your hand press downward at each clip attaching belt molding to door till in position.

(3) Install screw attaching rearward end of molding to front door.

HEADER / A-PILLAR WEATHERSTRIP

REMOVAL

(1) Partially raise convertible top.
(2) Remove inside rear view mirror.
(3) Remove sun visors.
(4) Remove header trim panel.
(5) Remove both door sill trim panels.
(6) Remove nuts holding header and A-pillar weatherstrip at upper corners of windshield (Fig. 12).
(7) Remove push in fasteners at lower corners of windshield holding weatherstrip to A-pillar.
(8) Remove header and A-pillar weatherstrip from vehicle.
(9) Clean any residual seal material from header panel.

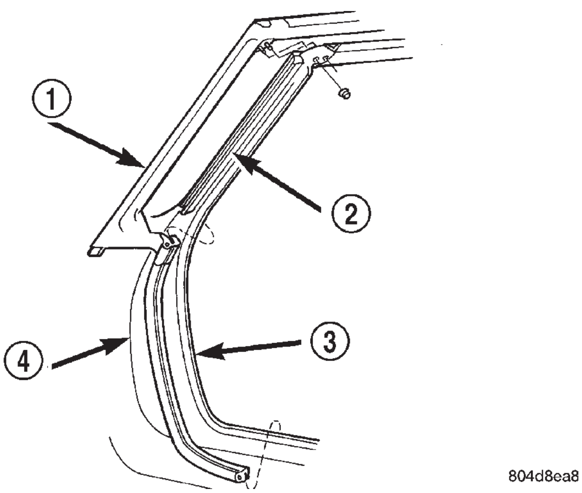

Fig. 12 Header/A-Pillar Weatherstrip

1 - HEADER/A-PILLAR WEATHERSTRIP
2 - A-PILLAR WEATHERSTRIP RETAINER
3 - DOOR OPENING FLANGE
4 - FENDER

INSTALLATION

CAUTION: Ensure that the butyl patch and butyl rope at each corner of the windshield is present and in good condition (Fig. 13). The butyl is critical for the water management system. Replace as necessary.

(1) Install new L foam starting at upper screw on A-pillar retainer.
(2) Install new L foam starting at upper screw on A-pillar retainer (Fig. 14).
(3) Position header and A-pillar weatherstrip on vehicle.
(4) Secure weatherstrip into retainers at header and A-pillar.
(5) Install nuts at upper corners of windshield.
(6) Install push in fasteners at lower corners of windshield.
(7) Install door sill trim panels.
(8) Install header trim panel.
(9) Install sun visors.
(10) Install inside rear view mirror.
(11) Lower and secure convertible top.

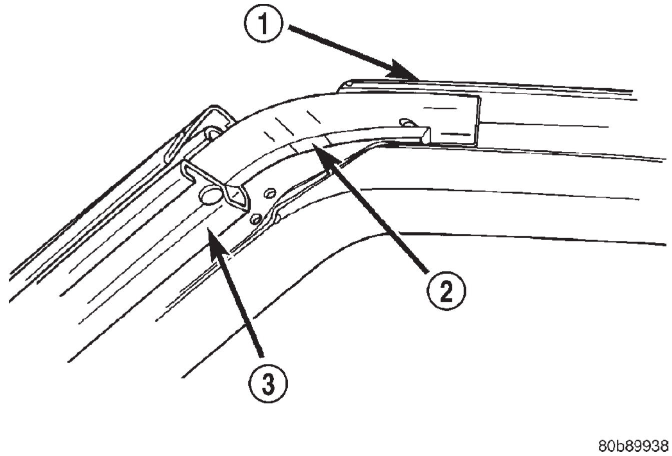

Fig. 13 Butyl Patch and L – FOAM

1 - HEADER WEATHERSTRIP RETAINER
2 - L-SHAPE FOAM ROPE
3 - A-PILLAR WEATHERSTRIP RETAINER

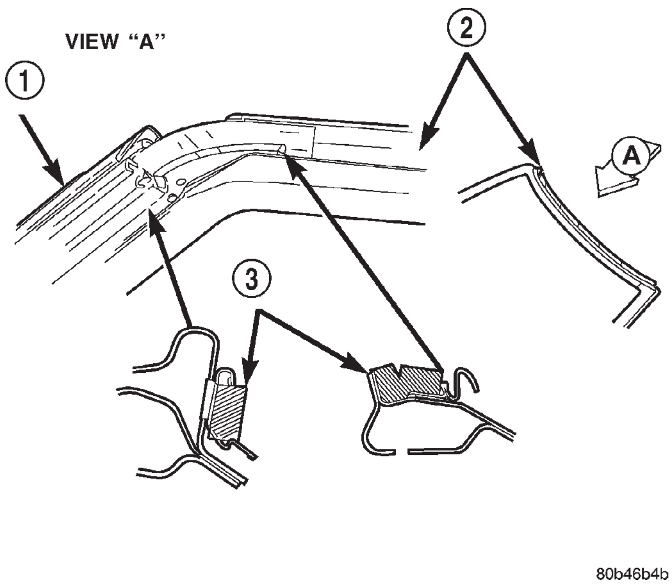

Fig. 14 L Shape Foam Location

1 - A-PILLAR
2 - HEADER
3 - L SHAPE FOAM

HEADER WEATHERSTRIP RETAINER/MOLING

REMOVAL

(1) Partially raise convertible top.

(2) Remove header and A-pillar weatherstrip as necessary to gain access.

(3) Remove screws attaching A-pillar weatherstrip retainer to header weatherstrip retainer.

(4) Remove screws attaching header weatherstrip retainer to header panel (Fig. 15).

(5) Remove retainer from vehicle.

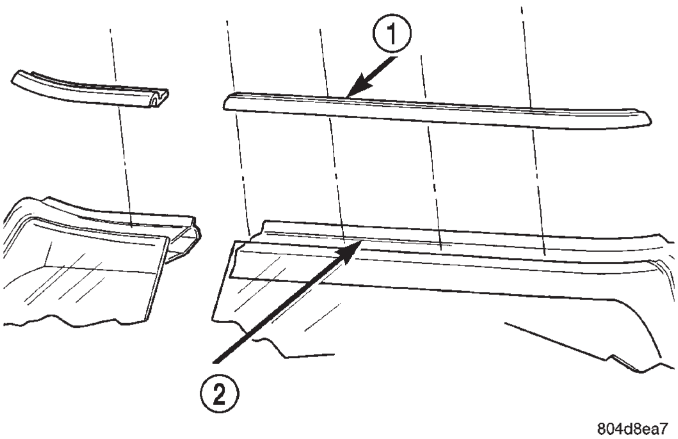

Fig. 15 Header Weatherstrip Retainer

1 - HEADER WEATHERSTRIP RETAINER
2 - HEADER

INSTALLATION

(1) Clean any residual seal material from header panel.

(2) Position header weatherstrip retainer on vehicle.

(3) Install screws attaching retainer to header panel. Install center screw first and then work outward.

(4) Install screws attaching A-pillar weatherstrip retainer to header retainer.

(5) Install L foam in upper corner starting at upper screw on the A-pillar retainer.

(6) Install L foam in upper corner starting at upper screw on A-pillar.

(7) Install header and A-pillar weatherstrip.

(8) Lower and secure convertible top.

OUTER DOOR BELT WEATHERSTRIP

REMOVAL

(1) Remove door glass.

(2) Remove screws attaching outer belt weatherstrip to outer door panel (Fig. 16).

(3) Remove outer belt weatherstrip from the vehicle.

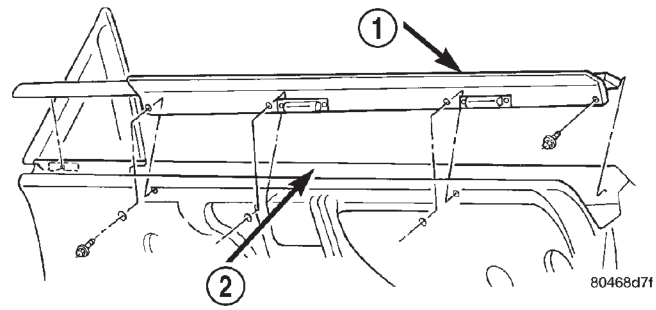

Fig. 16 Door Outer Belt Weatherstrip

1 - DOOR OUTER BELT WEATHERSTRIP
2 - OUTER DOOR PANEL

INSTALLATION

(1) Position outer belt weatherstrip on vehicle.

(2) Install screws to hold outer weatherstrip to outer door panel.

(3) Install door glass.

QUARTER PANEL WEATHERSTRIP

REMOVAL

(1) Remove door sill trim panel.

(2) Remove push in fasteners holding weatherstrip to B-pillar.

(3) Remove weatherstrip from door opening flange.

(4) Remove quarter panel weatherstrip from vehicle (Fig. 17).

INSTALLATION

(1) Position panel weatherstrip onto vehicle.

(2) Install weatherstrip to door opening flange.

(3) Install push in fasteners attaching weatherstrip to B-pillar.

(4) Install door sill trim panel.

QUARTER PANEL OUTER BELT WEATHERSTRIP/MOLDING

REMOVAL

(1) Lower convertible top to midway position.

(2) Lower quarter glass to full down position.

(3) Remove quarter trim panel.

(4) Remove screws attaching quarter panel outer belt weatherstrip/molding to outer quarter panel.

(5) Loosen appropriate side of upper deck molding.

QUARTER PANEL OUTER BELT WEATHERSTRIP/MOLDING (Continued)

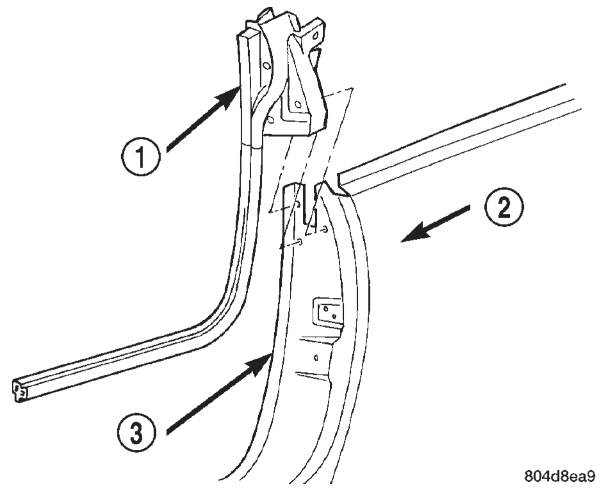

Fig. 17 Quarter Panel Weatherstrip

1 - QUARTER PANEL WEATHERSTRIP
2 - QUARTER PANEL
3 - DOOR OPENING FLANGE

(6) Pull upward at one end of outer belt weatherstrip to separate from vehicle.
(7) Remove outer belt weatherstrip from vehicle.

INSTALLATION

(1) Position quarter panel outer belt weatherstrip/molding on vehicle.
(2) Push outer belt weatherstrip/molding downward until weatherstrip/molding is fully seated.
(3) Install screws attaching outer belt weatherstrip to outer quarter panel.
(4) Tighten fasteners for upper belt molding.
(5) Install quarter trim panel.
(6) Raise and secure convertible top.

REAR DOOR B-PILLAR DOOR SEAL

REMOVAL

(1) Using a suitable heat gun, warm seal to approximately 100° F to ease adhesive separation.
(2) Peel B-pillar seal from upper door frame, top to bottom (Fig. 18).
(3) Clean adhesive residue from door frame.

INSTALLATION

(1) If original seal is reused, clean adhesive residue from back of seal.
(2) Apply body side molding tape to back of seal.
(3) Peel protective paper from back of tape.
(4) Place cutout in seal around screw head at bottom of seal location.
(5) Align seal to edge of door frame.
(6) Press adhesive onto door frame.

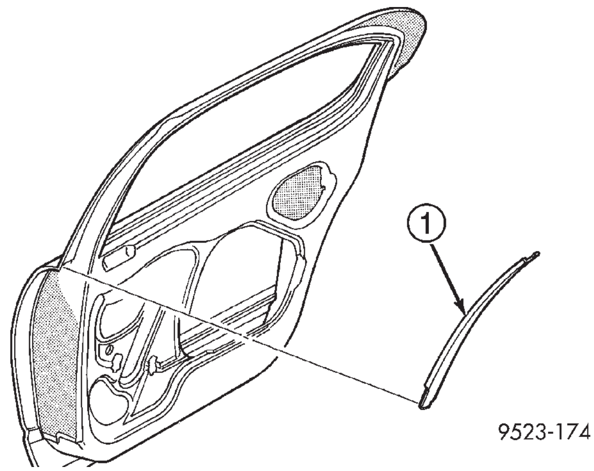

Fig. 18 Rear Door B-Pillar Seal

1 - B-PILLAR SEAL

REAR DOOR GLASS RUN WEATHERSTRIP

REMOVAL

(1) Remove door glass. (Refer to 23 - BODY/DOORS - REAR/DOOR GLASS - REMOVAL)
(2) Pull glass run weatherstrip from door glass opening frame (Fig. 19).

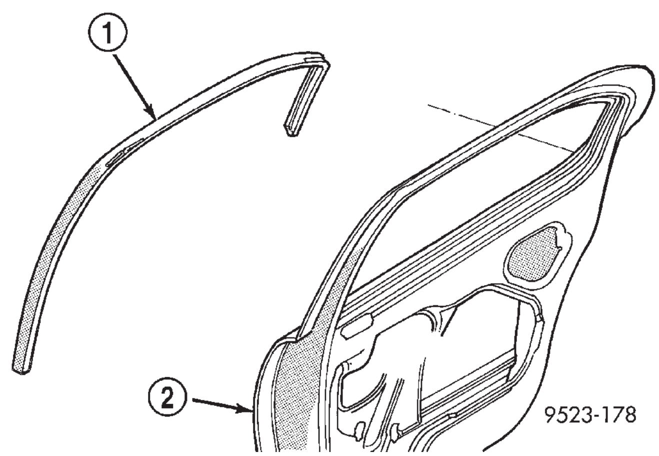

Fig. 19 Door Glass Run Weatherstrip

1 - GLASS RUN WEATHERSTRIP
2 - REAR DOOR

INSTALLATION

(1) Install glass run weatherstrip to door glass opening frame.
(2) Install door glass. (Refer to 23 - BODY/DOORS - REAR/DOOR GLASS - INSTALLATION)

REAR DOOR INNER BELT WEATHERSTRIP

REMOVAL

(1) Remove rear door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL)

(2) Pull upward at front end of inner belt weatherstrip.

(3) Remove inner belt weatherstrip from vehicle (Fig. 20).

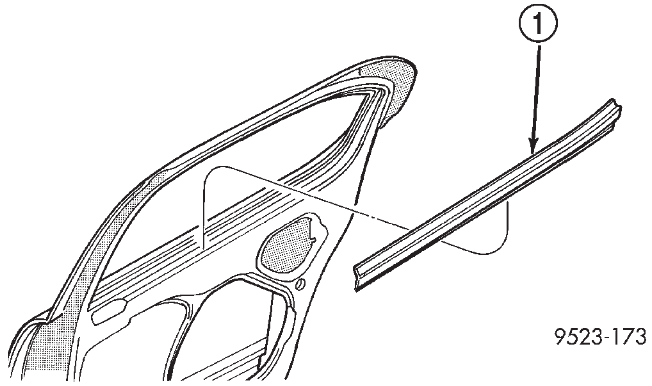

Fig. 20 Rear Door Inner Belt Weatherstrip

1 - INNER BELT WEATHERSTRIP

INSTALLATION

(1) Place inner belt weatherstrip into position.

(2) Push downward on the inner belt weatherstrip.

(3) Install rear door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION)

REAR DOOR OUTER BELT MOLDING

REMOVAL

(1) Remove screw attaching forward end of molding to rear door (Fig. 21).

(2) Disengage clips attaching rearward end of belt molding to rear door.

(3) Using a rubber mallet and block of wood, tap upward at each clip attaching belt molding to door (Fig. 22).

(4) Remove belt molding from door.

INSTALLATION

(1) Place belt molding into position.

(2) Push or tap downward at each clip attaching belt molding to door.

(3) Engage clips attaching rearward end of belt molding to rear door.

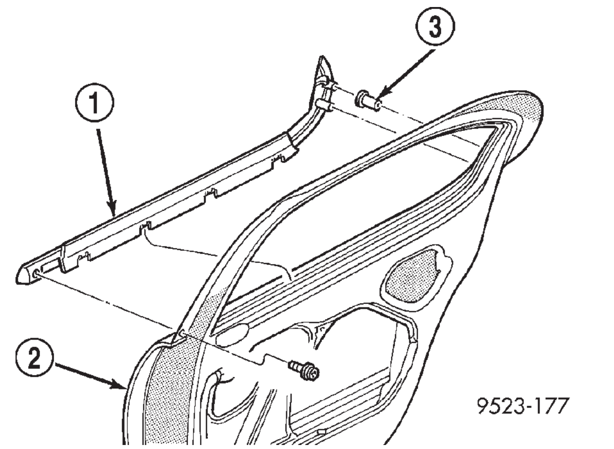

Fig. 21 Rear Door Outer Belt Molding

1 - OUTSIDE BELT MOLDING
2 - REAR DOOR
3 - BARREL CLIP

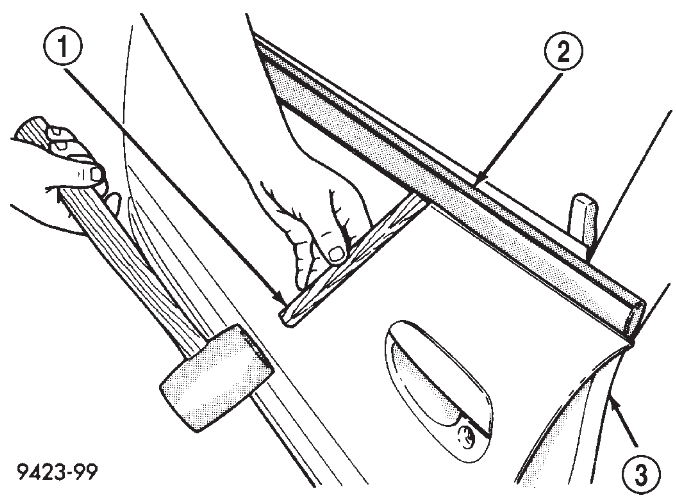

Fig. 22 Outer Belt Molding Removal

1 - WOOD BLOCK
2 - BELT MOLDING
3 - DOOR

(4) Install screw attaching forward end of molding to rear door.

SECONDARY SILL WEATHERSTRIP

REMOVAL

(1) Open door.

(2) Using fork tool C-4829, disengage push in fasteners attaching secondary sill weatherstrip to bottom of door.

(3) Remove secondary sill weatherstrip from vehicle (Fig. 23).

SECONDARY SILL WEATHERSTRIP (Continued)

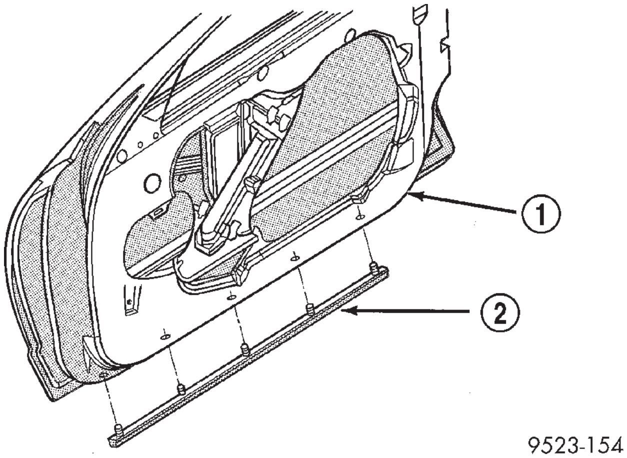

Fig. 23 Secondary Sill Weatherstrip – Typical

1 - DOOR
2 - SECONDARY SILL WEATHERSTRIP

INSTALLATION

(1) Place secondary sill weatherstrip into position.
(2) Install push in fasteners attaching secondary sill weatherstrip to bottom of door.
(3) Close door.

SIDE RAIL WEATHERSTRIP

REMOVAL

FRONT

(1) Partially raise convertible top.
(2) Remove push in fasteners attaching weatherstrip to retainer.
(3) Remove weatherstrip from vehicle (Fig. 24).

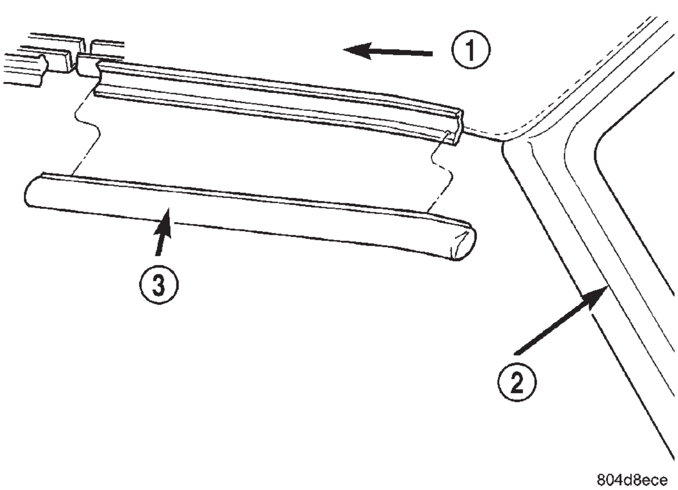

Fig. 24 Front Side Rail Weatherstrip

1 - CONVERTIBLE TOP
2 - A-PILLAR
3 - FRONT SIDE RAIL WEATHERSTRIP

CENTER

(1) Partially raise convertible top.
(2) Remove push in fasteners attaching weatherstrip to retainer.
(3) Remove weatherstrip from vehicle (Fig. 25).

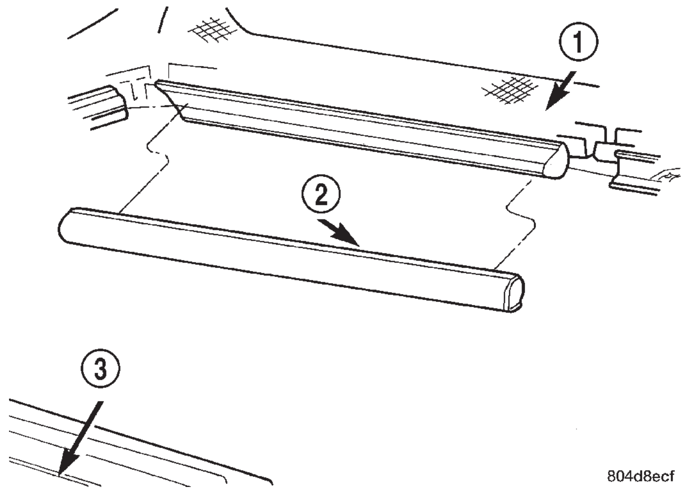

Fig. 25 Center Side Rail Weatherstrip

1 - CONVERTIBLE TOP
2 - CENTER SIDE RAIL WEATHERSTRIP
3 - QUARTER PANEL

REAR

(1) Partially raise convertible top.
(2) Remove push in fasteners attaching weatherstrip to retainer.
(3) Separate weatherstrip from vehicle (Fig. 26).

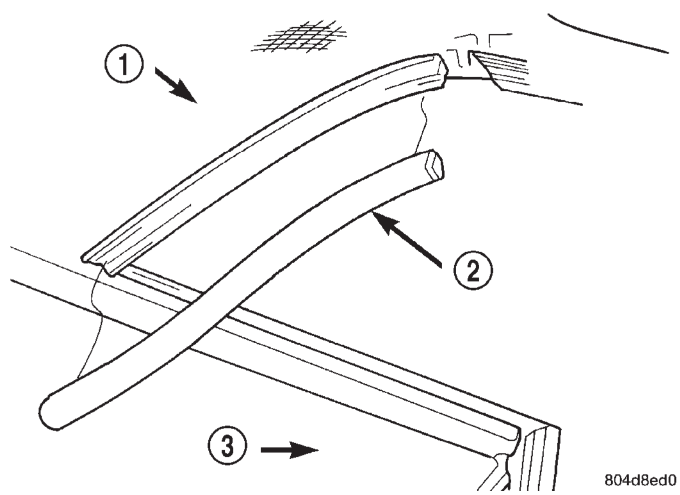

Fig. 26 Rear Side Rail

1 - CONVERTIBLE TOP
2 - REAR SIDE RAIL WEATHERSTRIP
3 - QUARTER PANEL

SIDE RAIL WEATHERSTRIP (Continued)

INSTALLATION

FRONT

(1) Position weatherstrip on vehicle.

(2) Install push in fasteners into retainer channel, aligning embossment on back side of weatherstrip to corner of retainer.

(3) Lower convertible top.

(4) Secure convertible top.

CENTER

(1) Position weatherstrip on vehicle.

(2) Install push in fasteners into retainer channel, aligning embossment on back side of weatherstrip to corner of retainer.

(3) Lower convertible top.

(4) Secure convertible top.

REAR

(1) Position weatherstrip on vehicle.

(2) Install push in fasteners into retainer channel, aligning embossment on back side of weatherstrip to corner of retainer.

(3) Push weatherstrip into retainer channel, aligning embossment on backside of weatherstrip to corner of retainer.

(4) Lower convertible top.

(5) Secure convertible top.

BODY STRUCTURE

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GAP AND FLUSH

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GAP AND FLUSH (Continued)

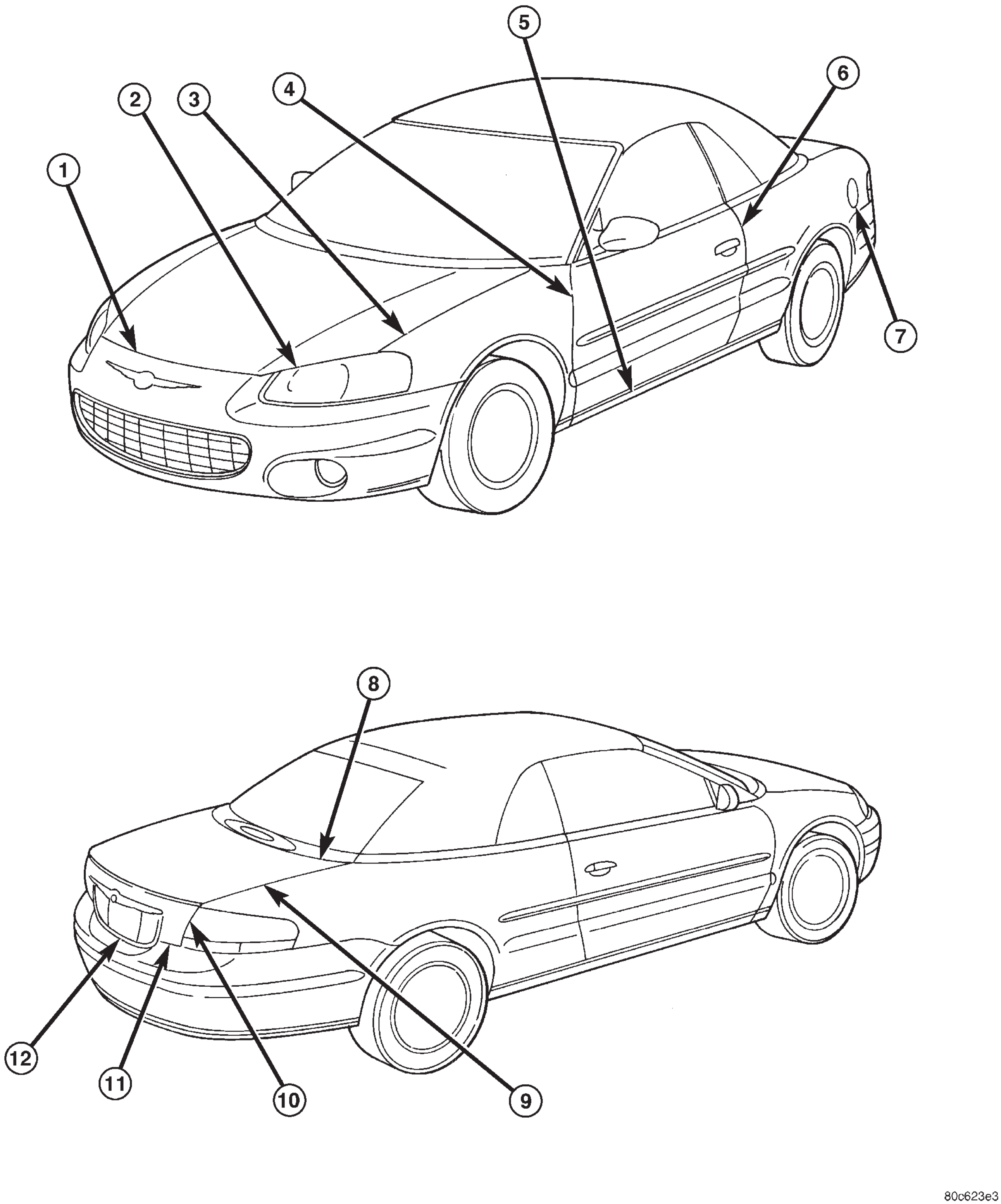

Fig. 1 BODY GAP AND FLUSH

GAP AND FLUSH (Continued)

	LOCATION	GAP	FLUSH
1	Fascia to Hood	6.0 Blending to 8.0 ± 2.5 Parallel within 2.5	1.6 Under Flush ± 2.5 Consistent within 2.5
2	Headlamp to Hood	8.0 ± 2.5 Parallel within 2.0	
3	Hood to Fender	4.0 ± 1.0 Parallel within 1.5	Flush ± 1.5 Consistent within 2.0
4	Fender to Door	5.0 ± 1.0 Parallel within 2.5	0.8 Over Flush ± 1.5 Consistent within 2.0
5	Doors to Body Side Sill	6.0 ± 1.5 Parallel within 2.0	6.0 Under Flush ± 1.5 Consistent within 2.5
6	Door to Quarter Panel	4.0 ± 1.0 Parallel within 1.5	Flush ± 1.5 Consistent within 2.0
7	Fuel Filter Door to Quarter Panel	3.0 ± 0.75 Uniform within 1.0	Flush ± 1.0
8	Deck Lid Molding to Deck Lid	4.5 ± 2.0 Parallel within 2.5	
9	Deck Lid to Quarter Panel	4.0 ± 1.0 Parallel within 1.0	Flush ± 1.5 Consistent within 1.5
10	Tail Lamp to Deck Lid	5.0 Blending to 5.5 ± 1.5 LH & RH to be within 2.0	
11	Fascia to Deck Lid	7.0 ± 2.0 Parallel Within 1.5	
12	Deck Lid Applique to Fascia	9.0 ± 2.0 Parallel within 2.0	
NOTE: ALL MEASUREMENTS ARE IN mm			

OPENING DIMENSIONS

SPECIFICATIONS

BODY OPENING DIMENSION - JR-27

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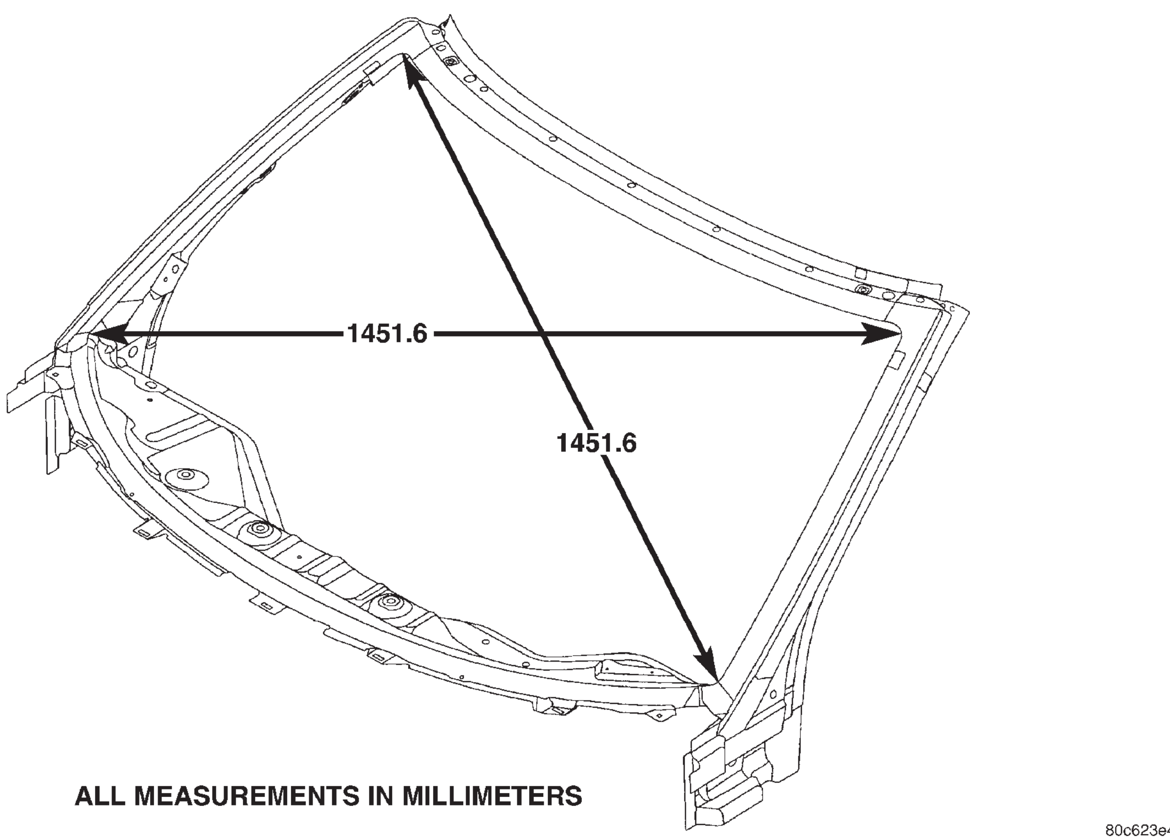

Fig. 2 WINDSHIELD OPENING

OPENING DIMENSIONS (Continued)

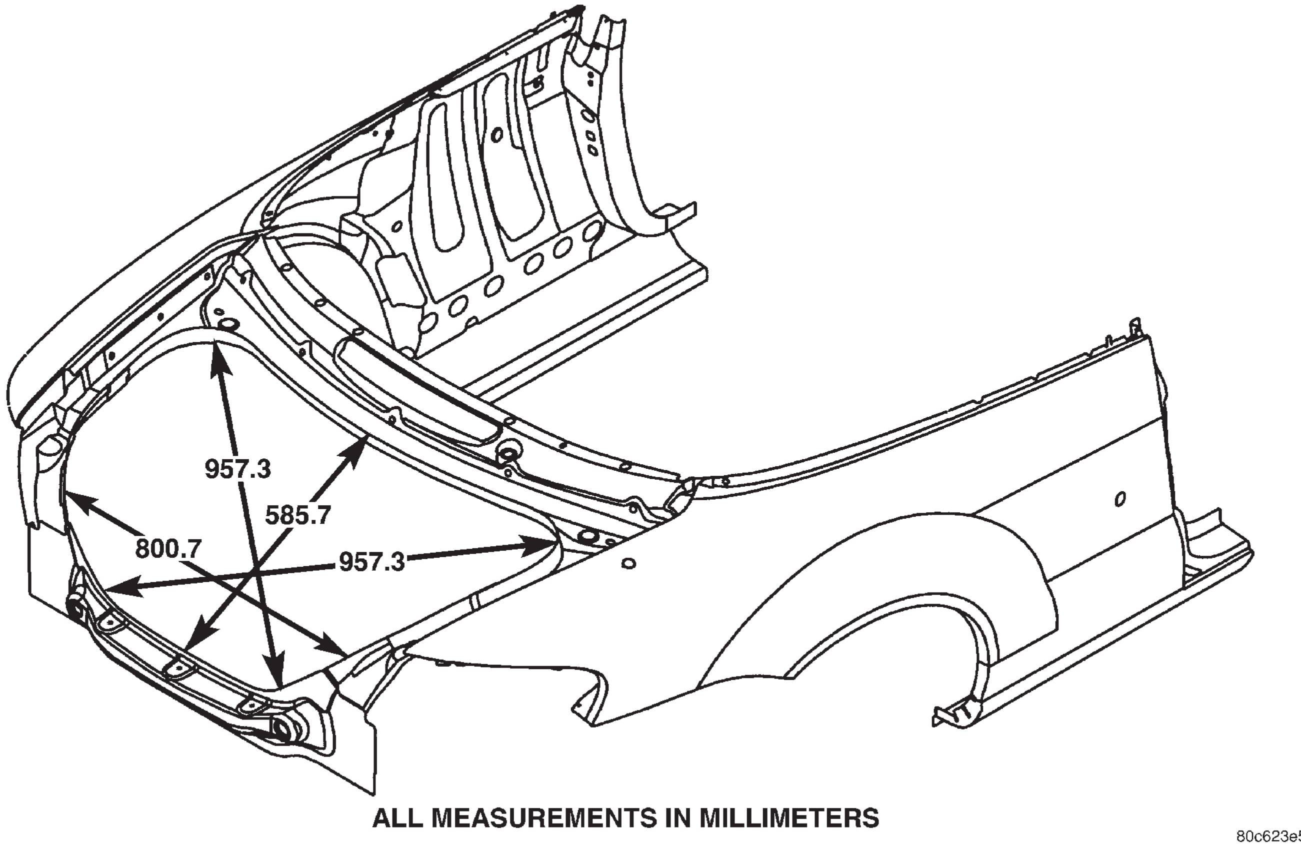

Fig. 3 TRUNK OPENING

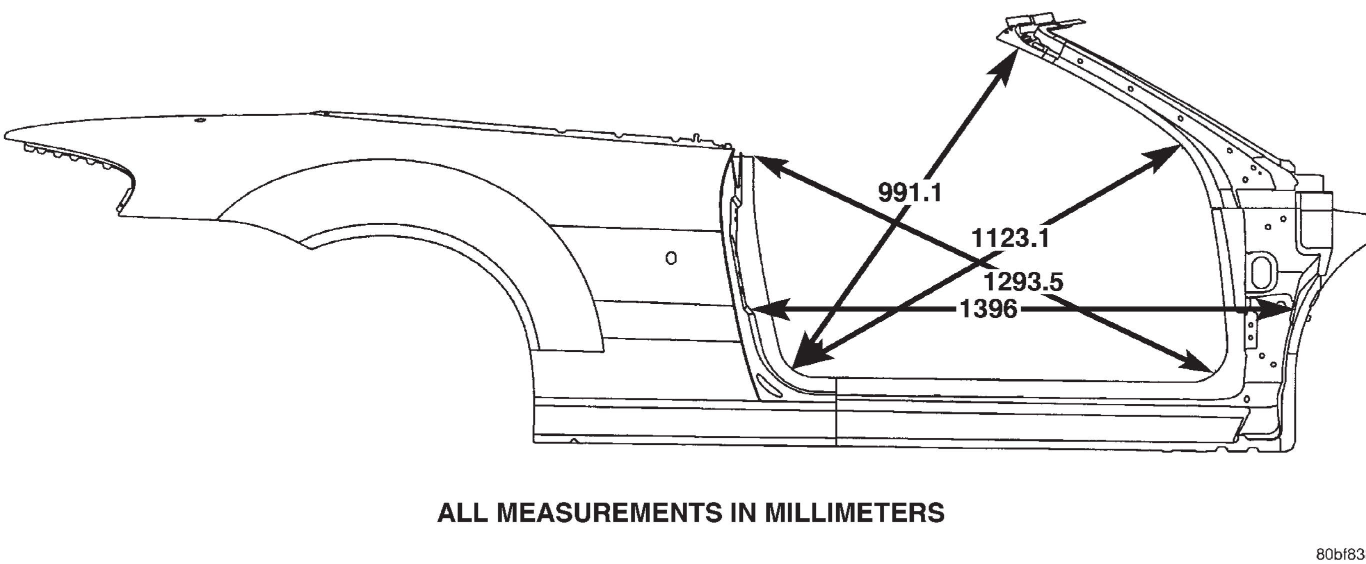

Fig. 4 DOOR OPENING

OPENING DIMENSIONS (Continued)

BODY OPENING DIMENSIONS - JR-41

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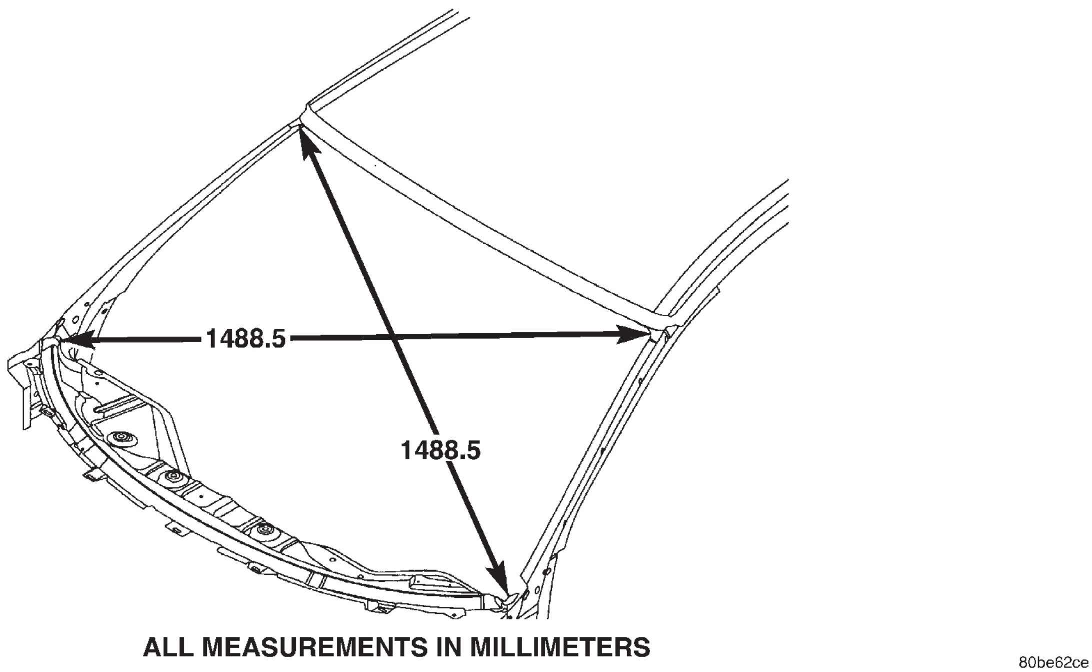


Fig. 5 WINDSHIELD OPENING

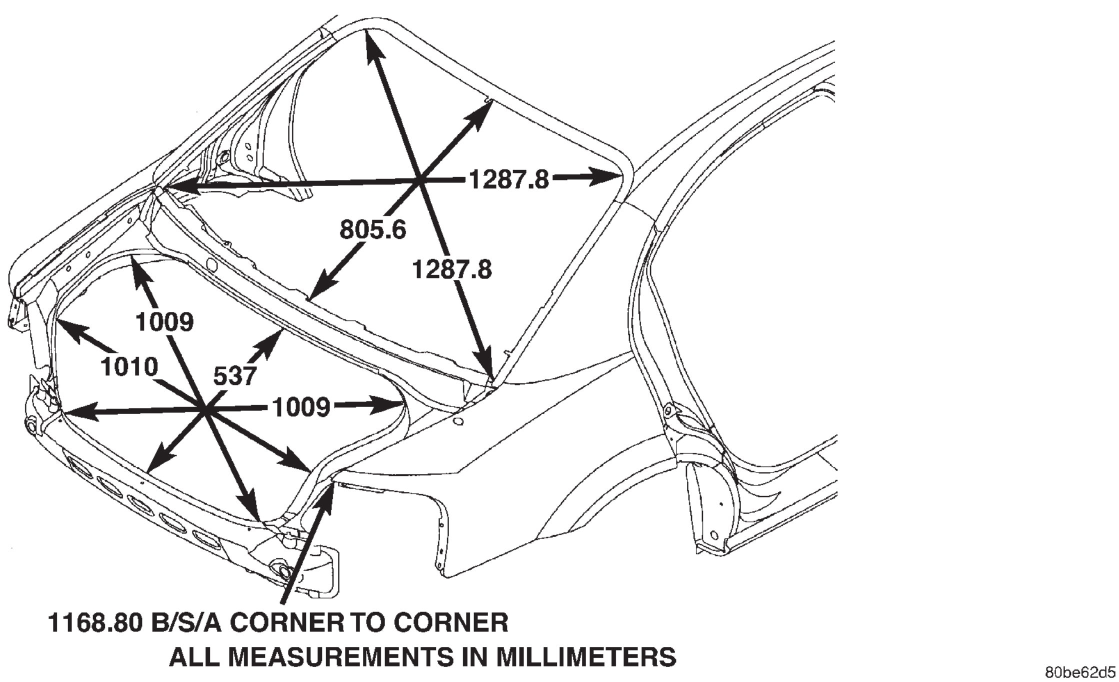
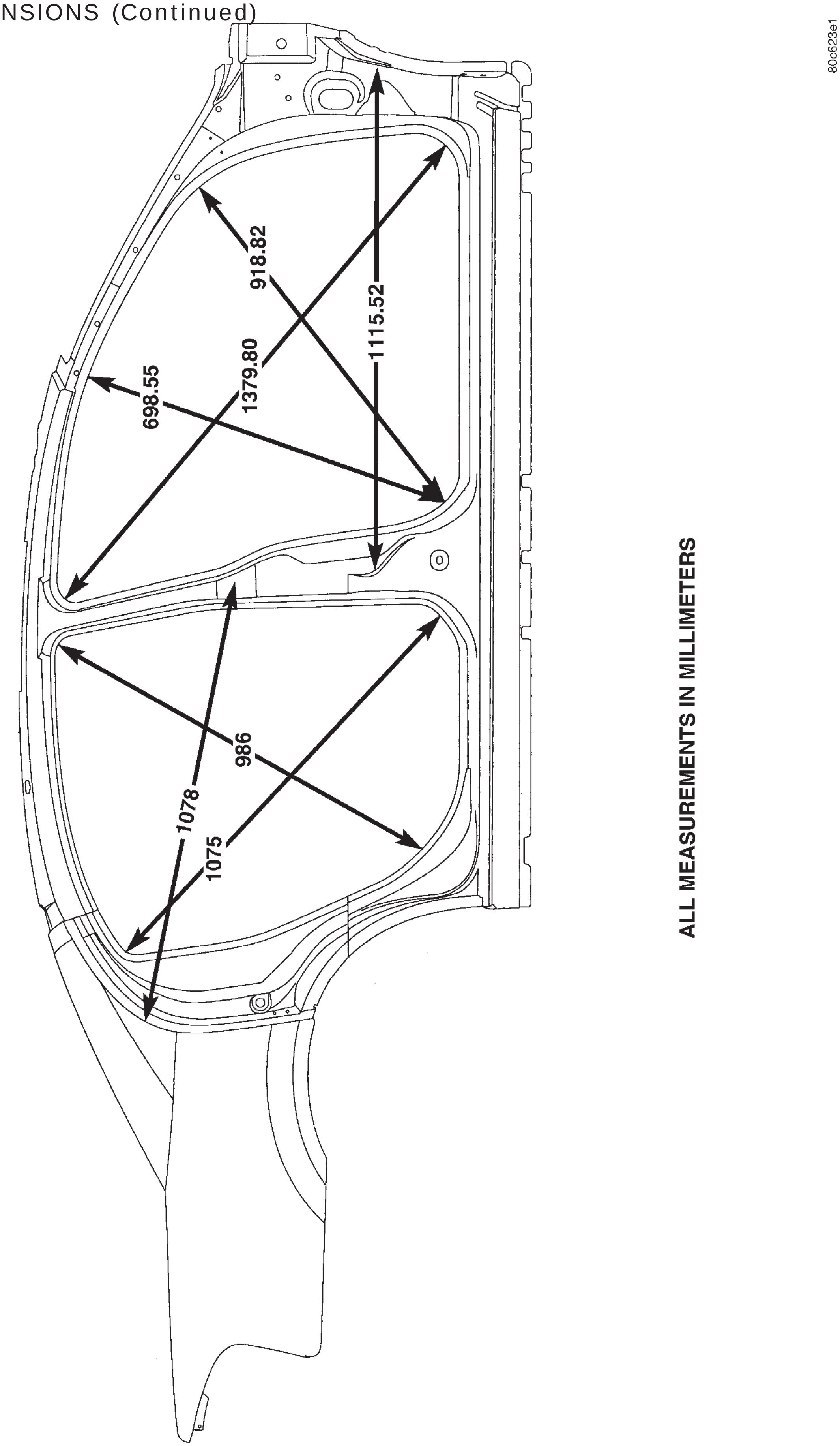


Fig. 6 REAR WINDOW AND TRUNK OPENING

OPENING DIMENSIONS (Continued)



ALL MEASUREMENTS IN MILLIMETERS

Fig. 7 DOOR OPENINGS

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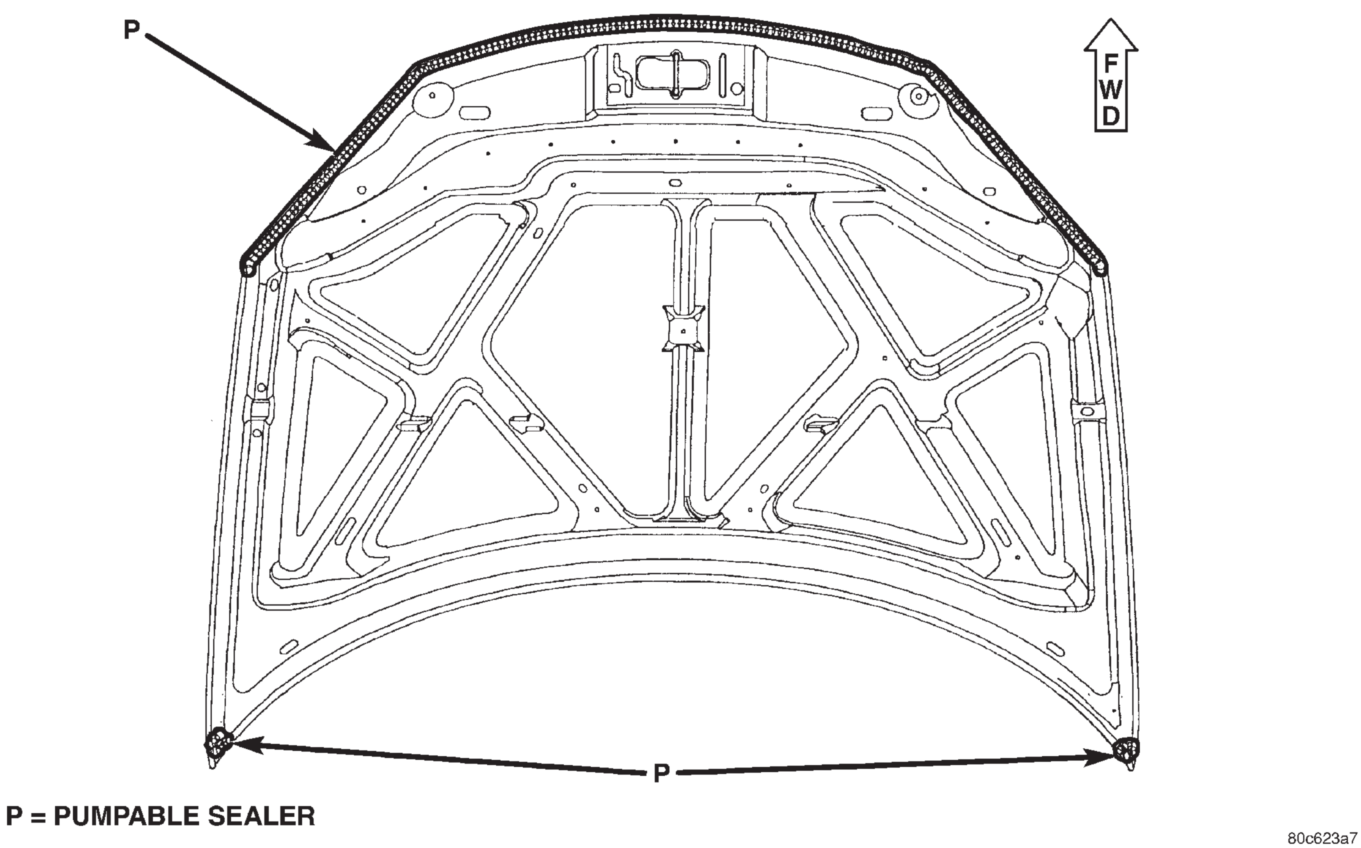

Fig. 8 HOOD HEM FLANGE

SEALER LOCATIONS (Continued)

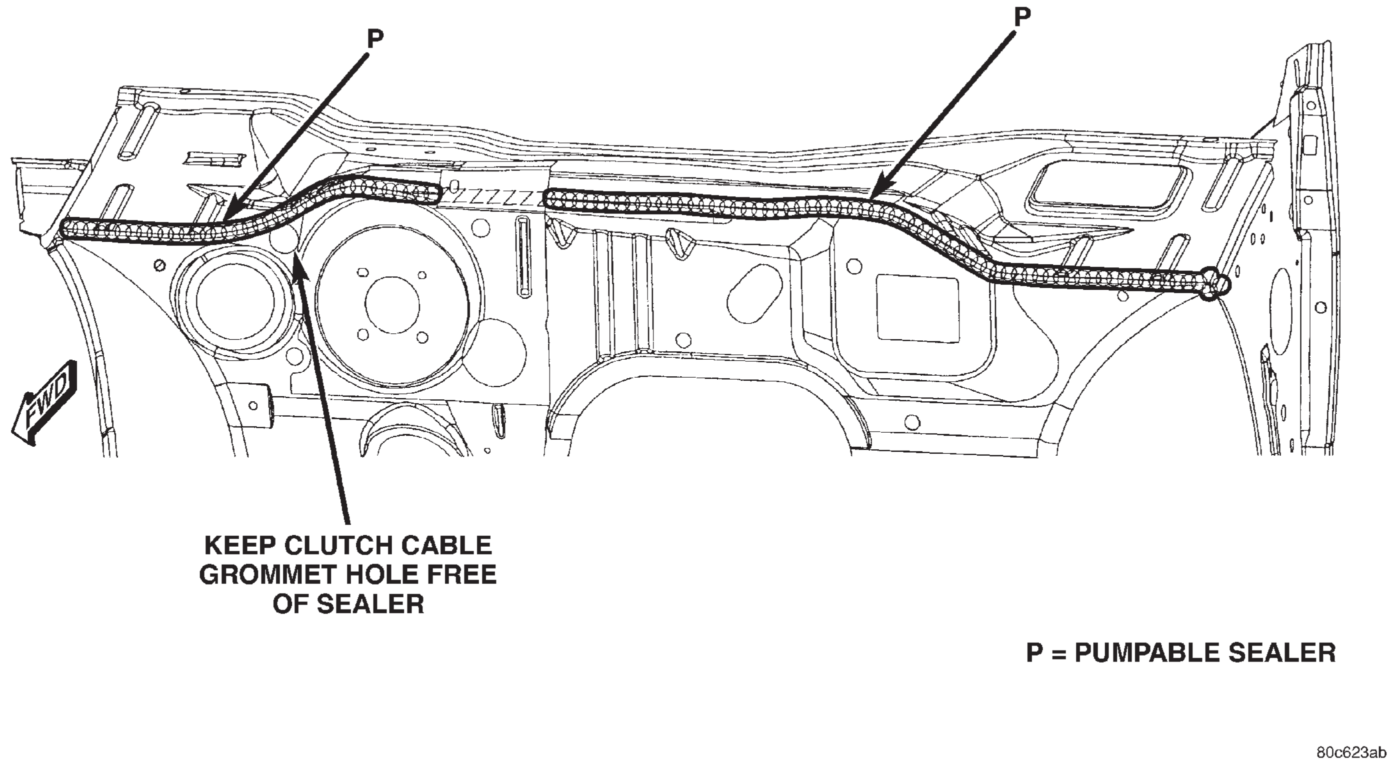

Fig. 9 DASH PANEL TO LOWER COWL PLENUM PANEL

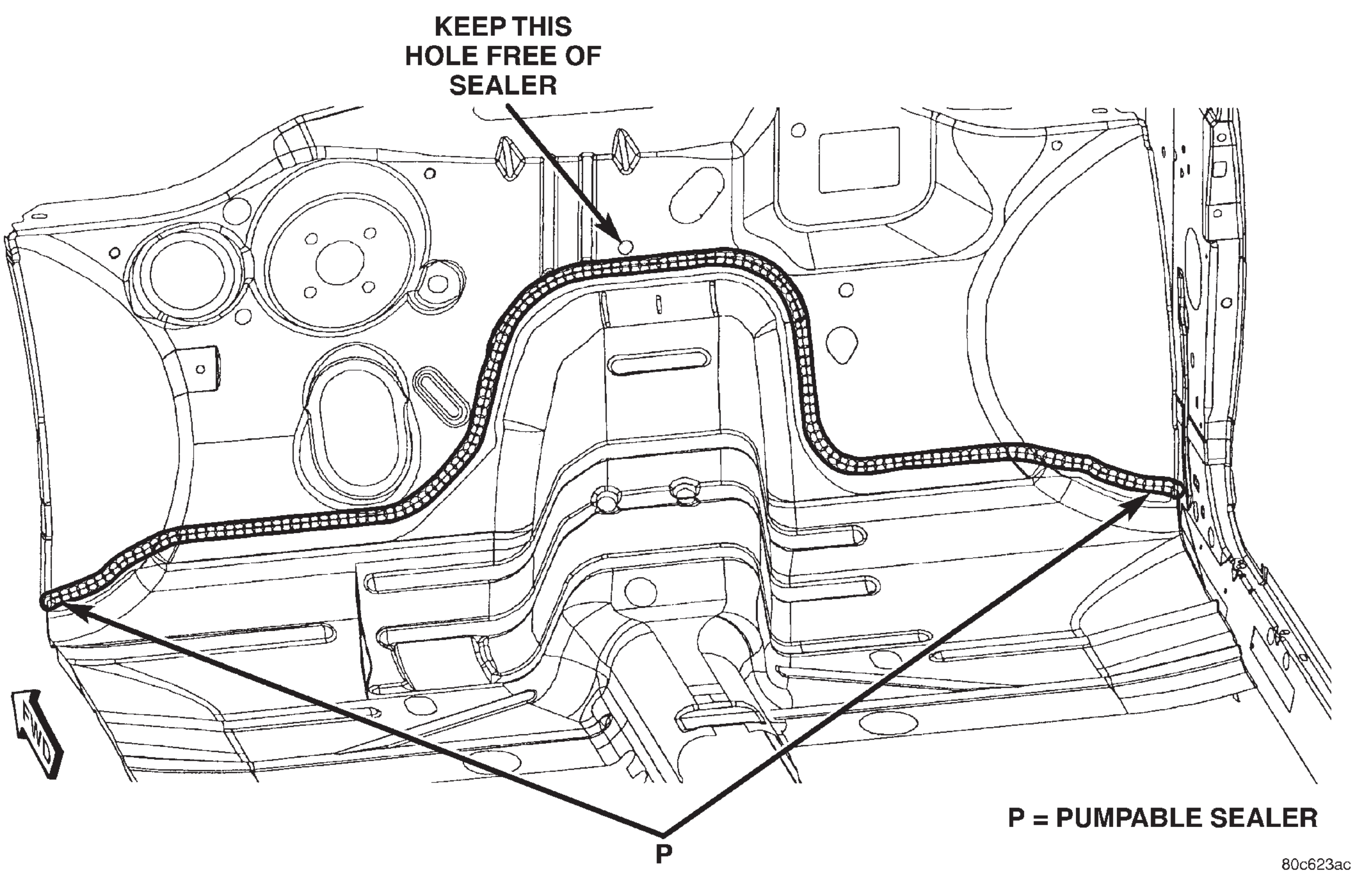

Fig. 10 DASH PANEL TO FRONT FLOOR PAN

SEALER LOCATIONS (Continued)

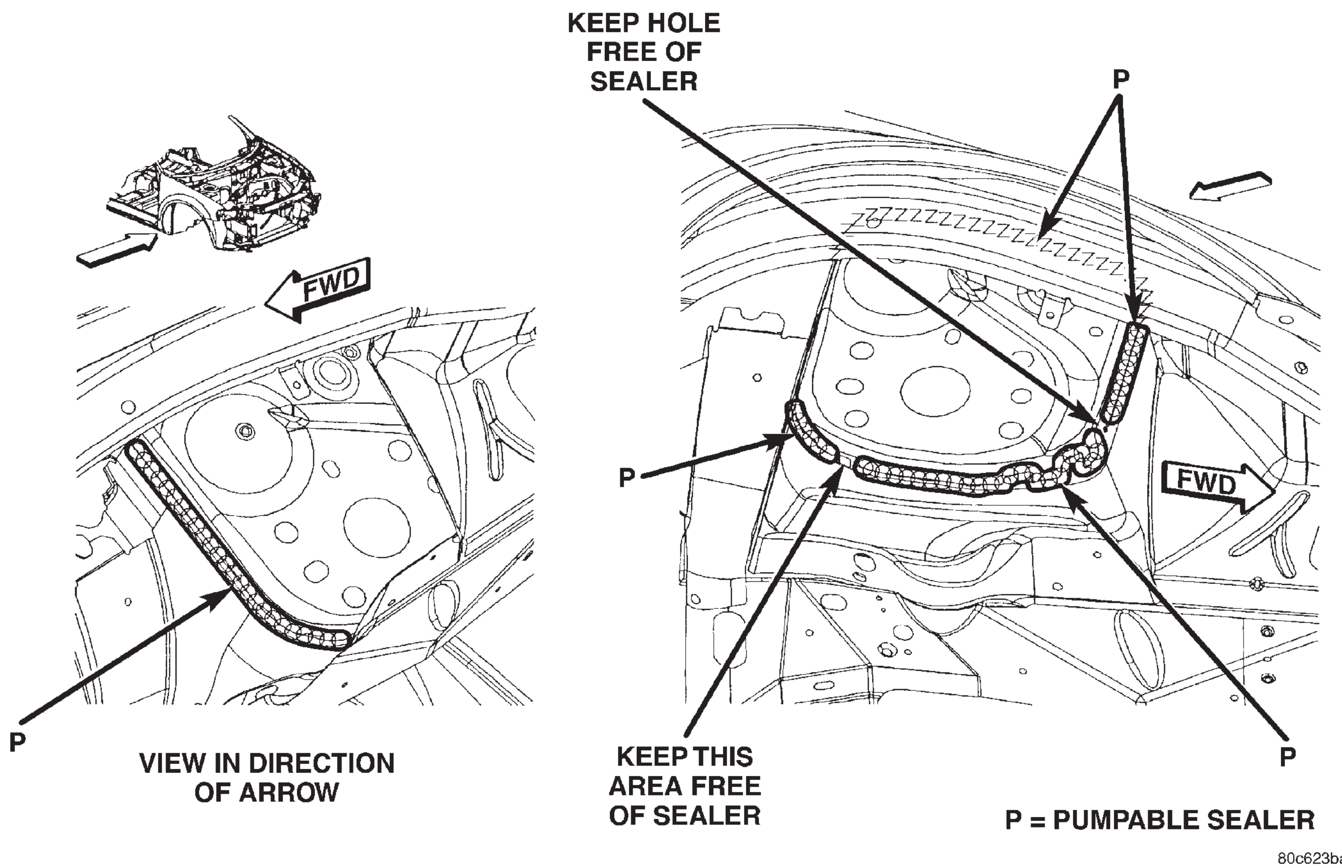

Fig. 11 FRONT SUSPENSION UPPER MOUNTING

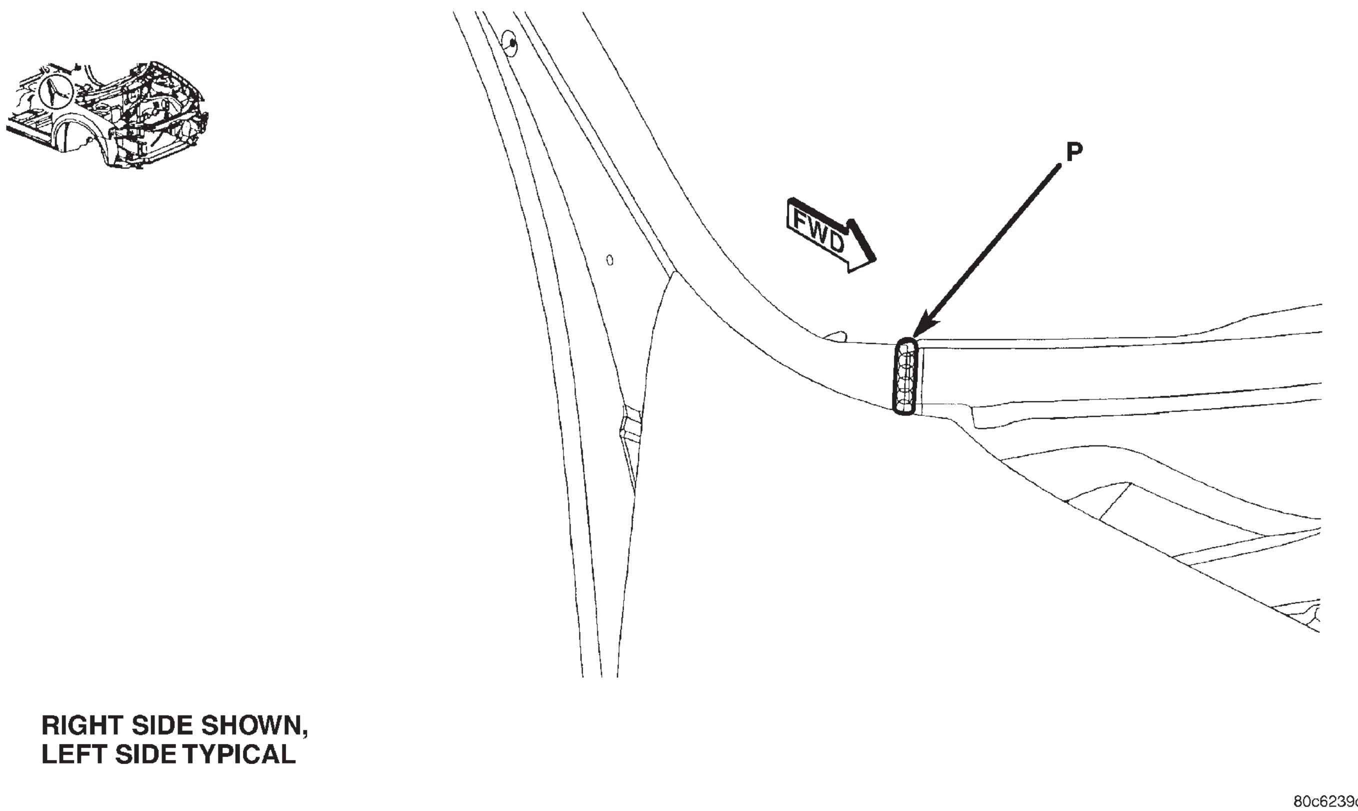

Fig. 12 "A" PILLAR TO UPPER COWL

SEALER LOCATIONS (Continued)

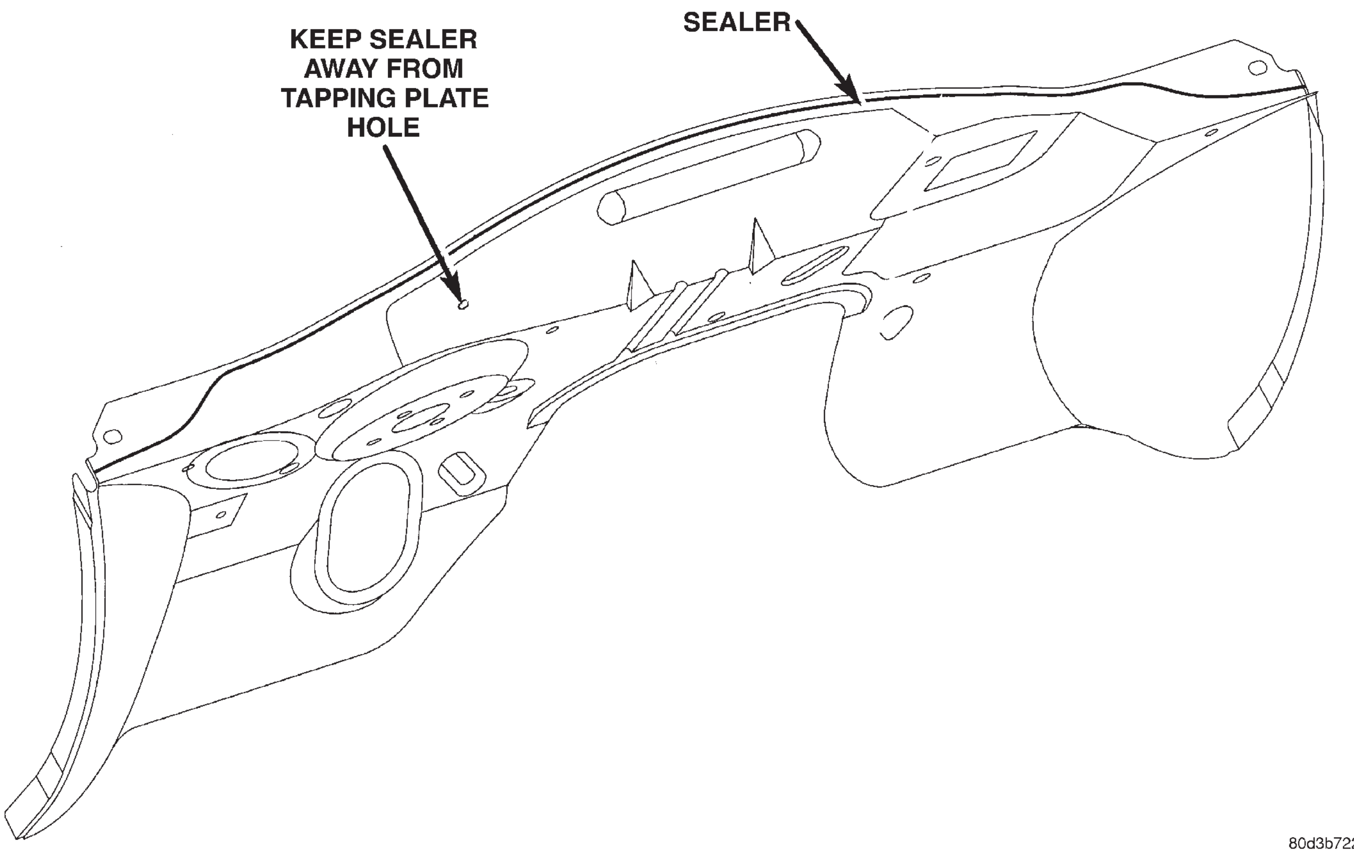

Fig. 13 DASH PANEL & LOWER COWL PLENUM

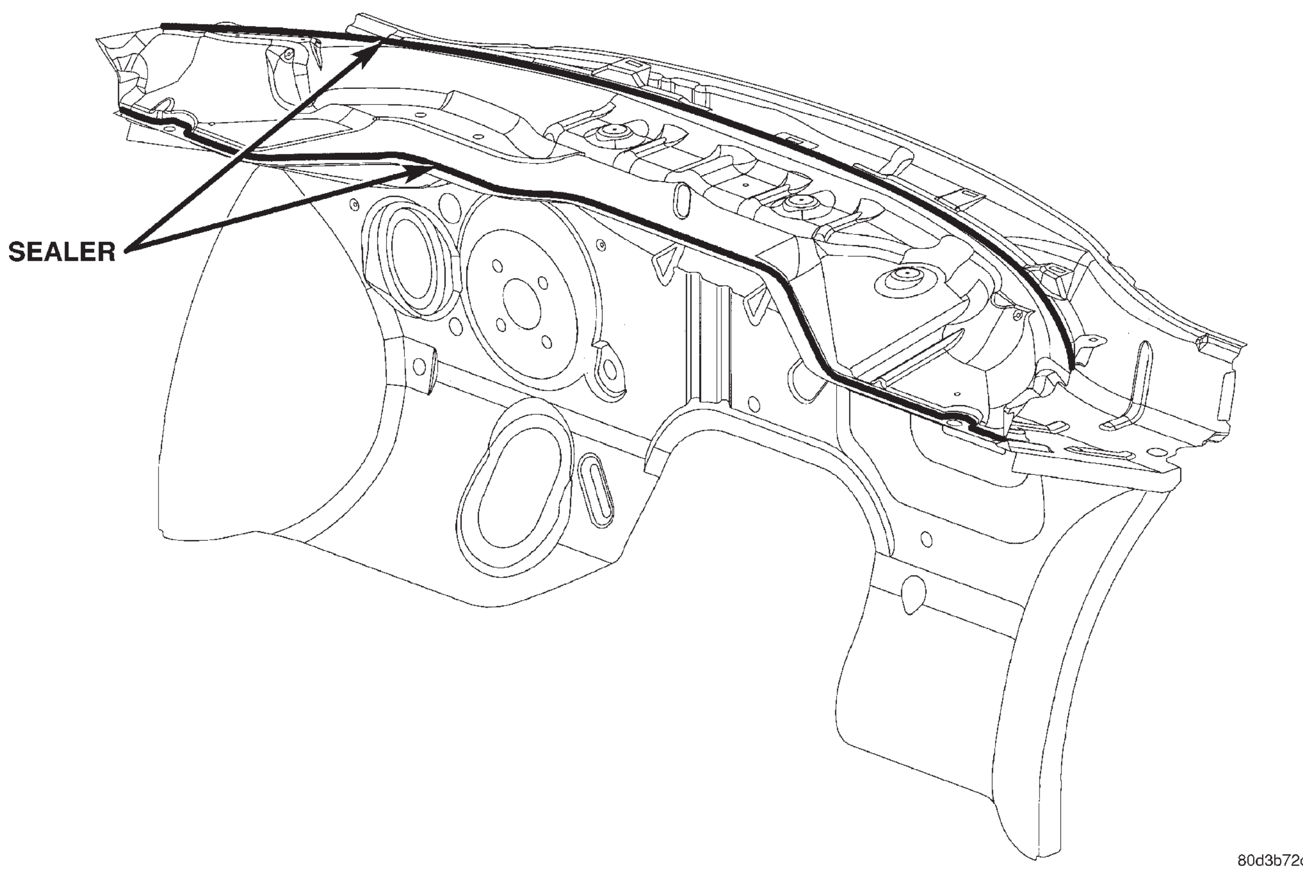

Fig. 14 COWL PLENUM CLOSURE, LOWER COWL PLENUM & UPPER COWL PLENUM

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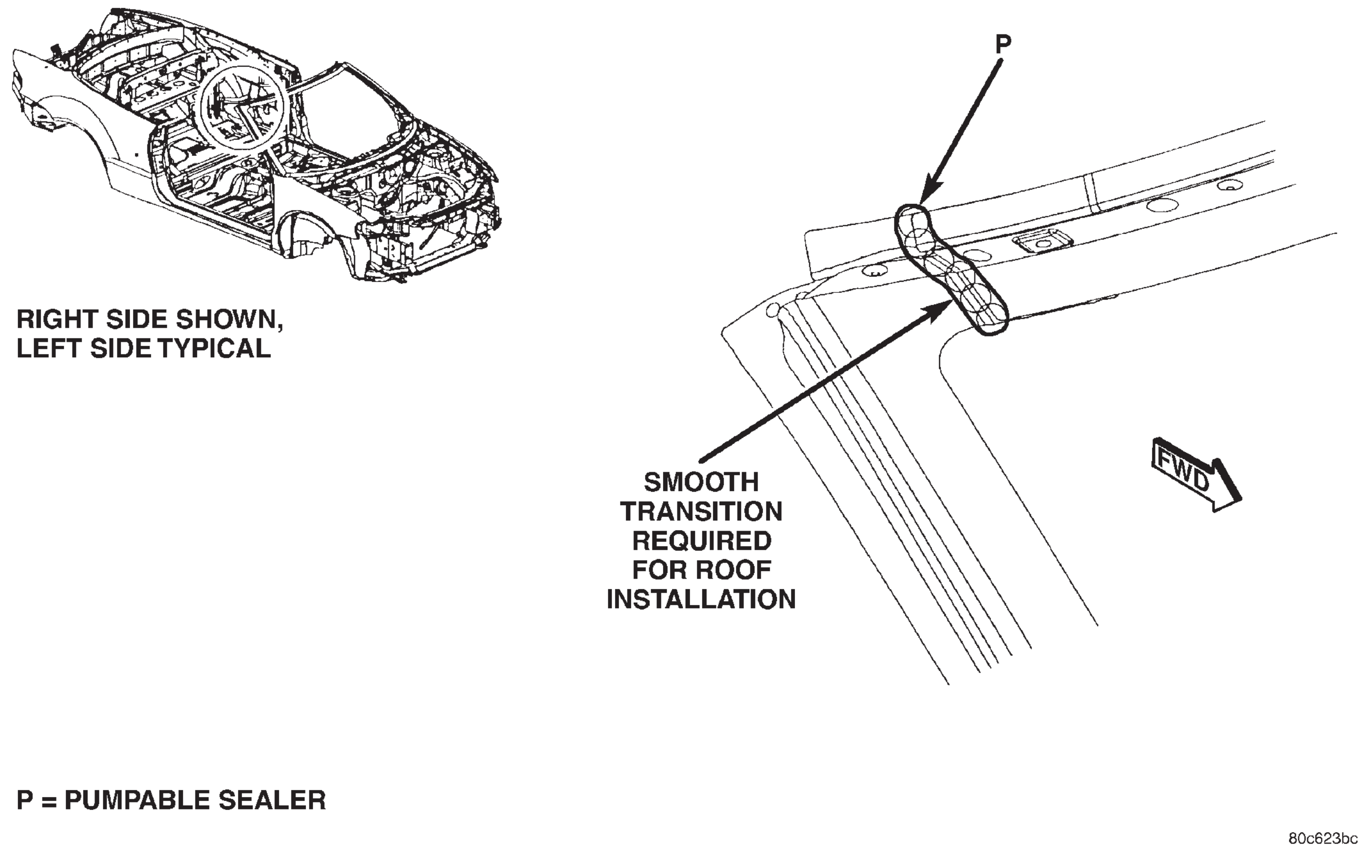


Fig. 15 WINDSHIELD HEADER FRAME TO A-PILLAR

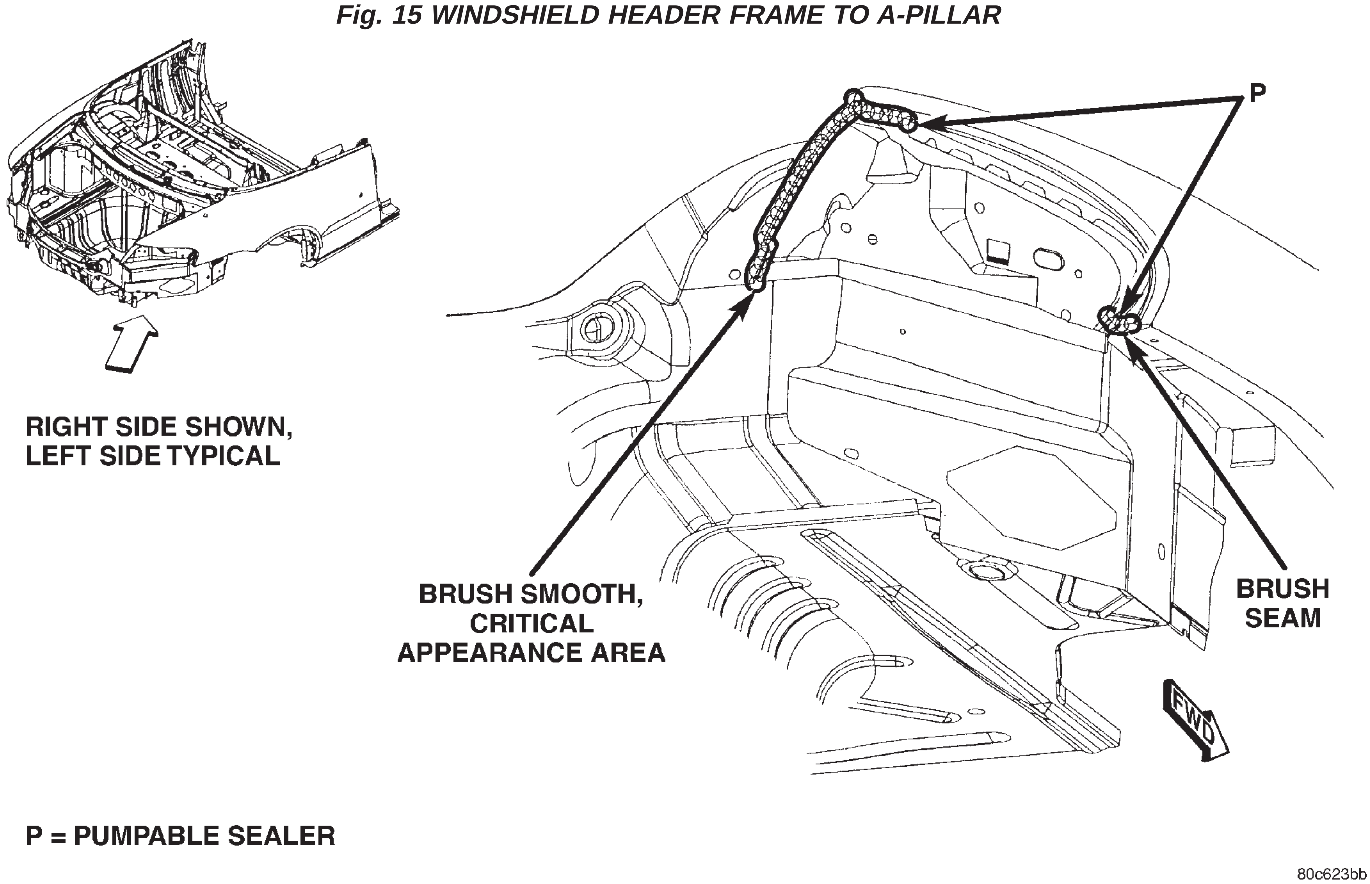


Fig. 16 TAIL LAMP EXTENSION TO QUARTER PANEL AND DRAIN TROUGH

SEALER LOCATIONS (Continued)

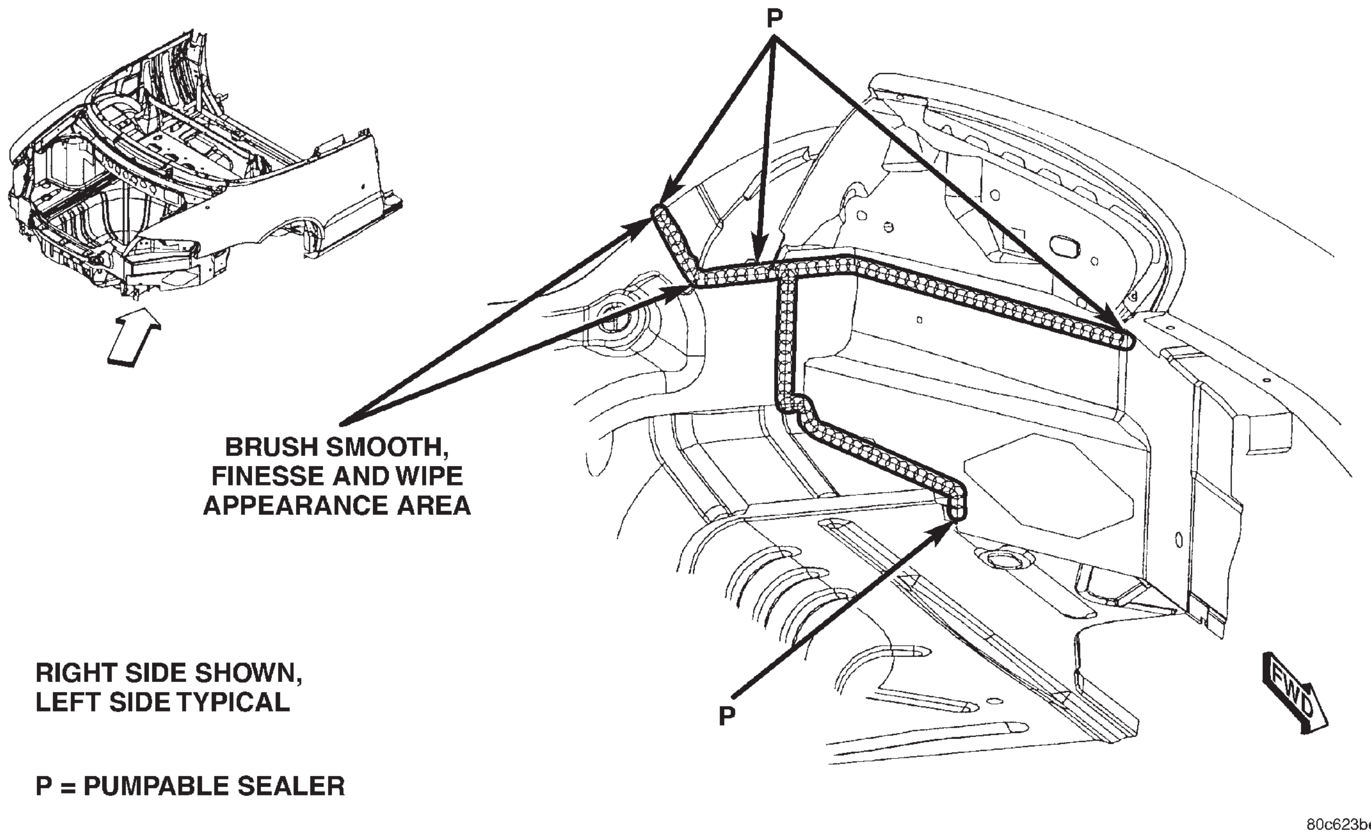


Fig. 17 TAIL LAMP EXTENSION TO LOWER DECKLID PANEL

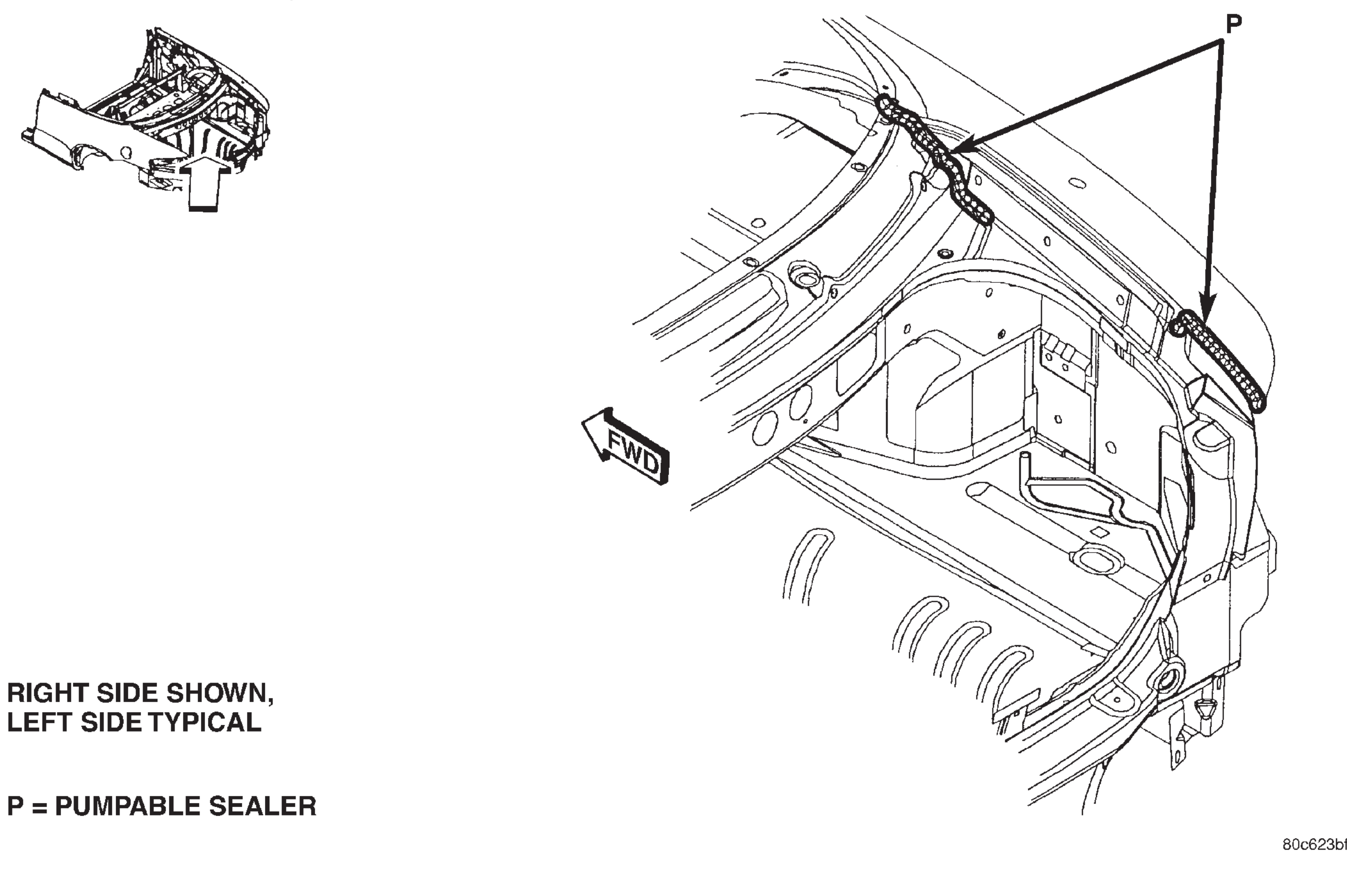


Fig. 18 QUARTER PANEL TO DRAIN TROUGH

SEALER LOCATIONS (Continued)

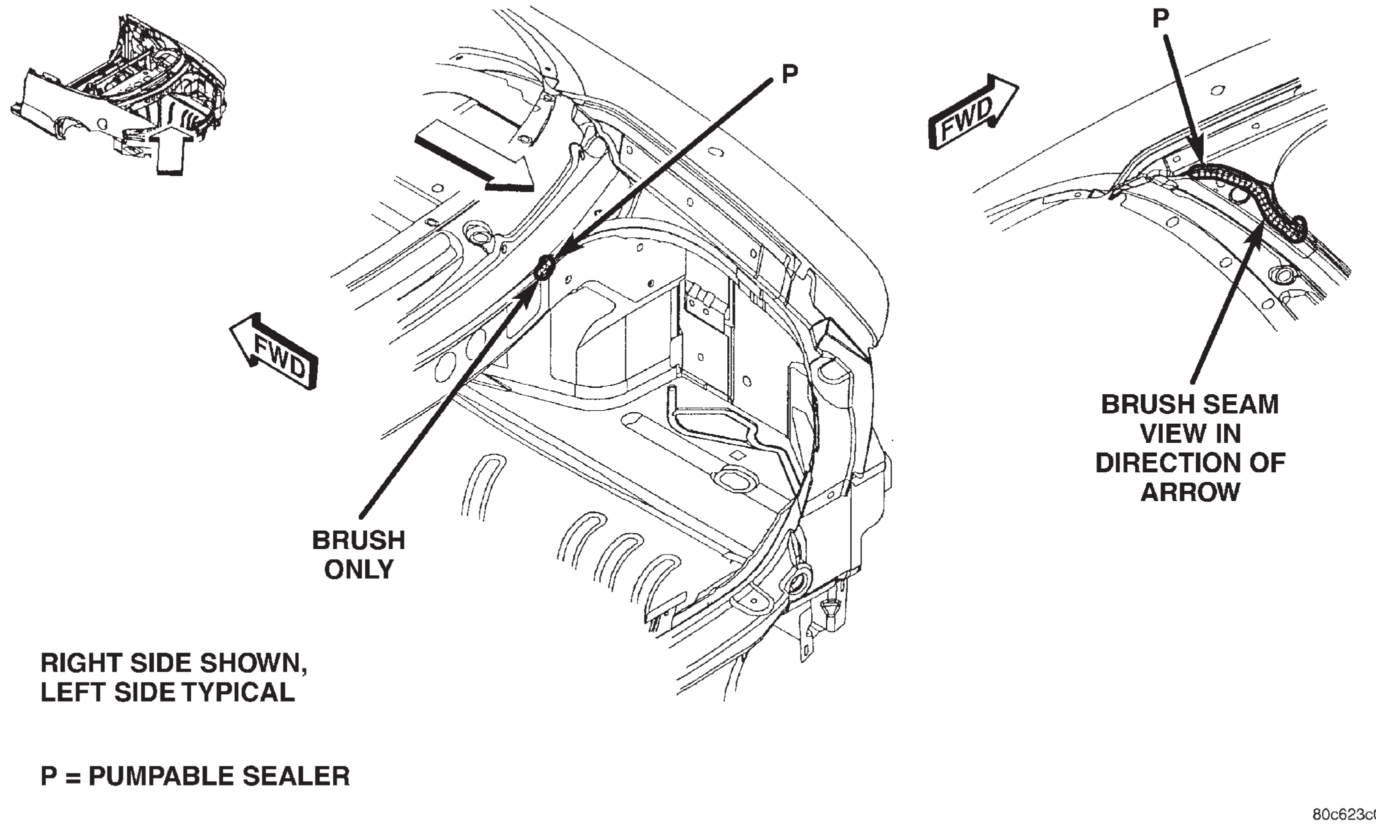


Fig. 19 REAR SHELF PANEL REINFORCEMENT TO DRAIN TROUGH

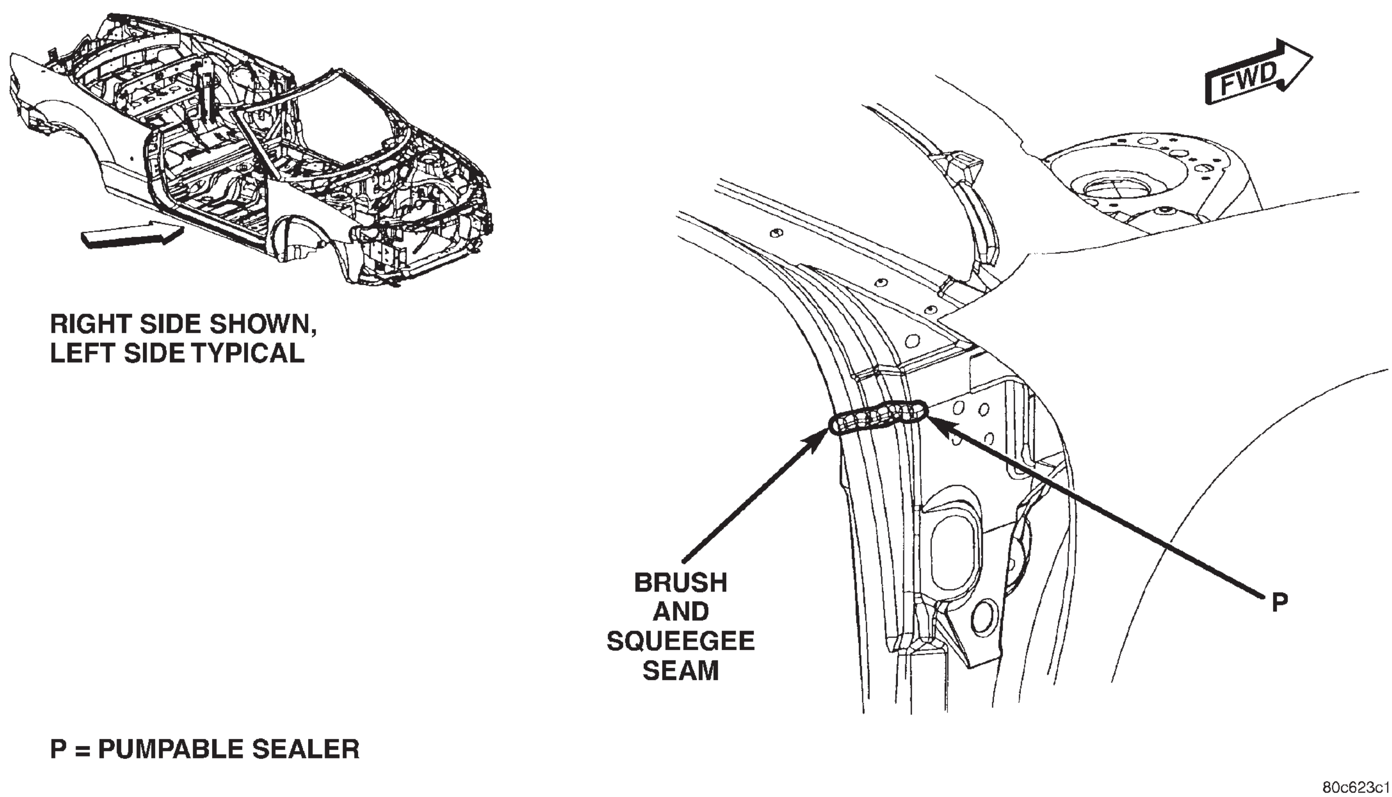


Fig. 20 A-PILLAR TO BODY SIDE OUTER PANEL

SEALER LOCATIONS (Continued)

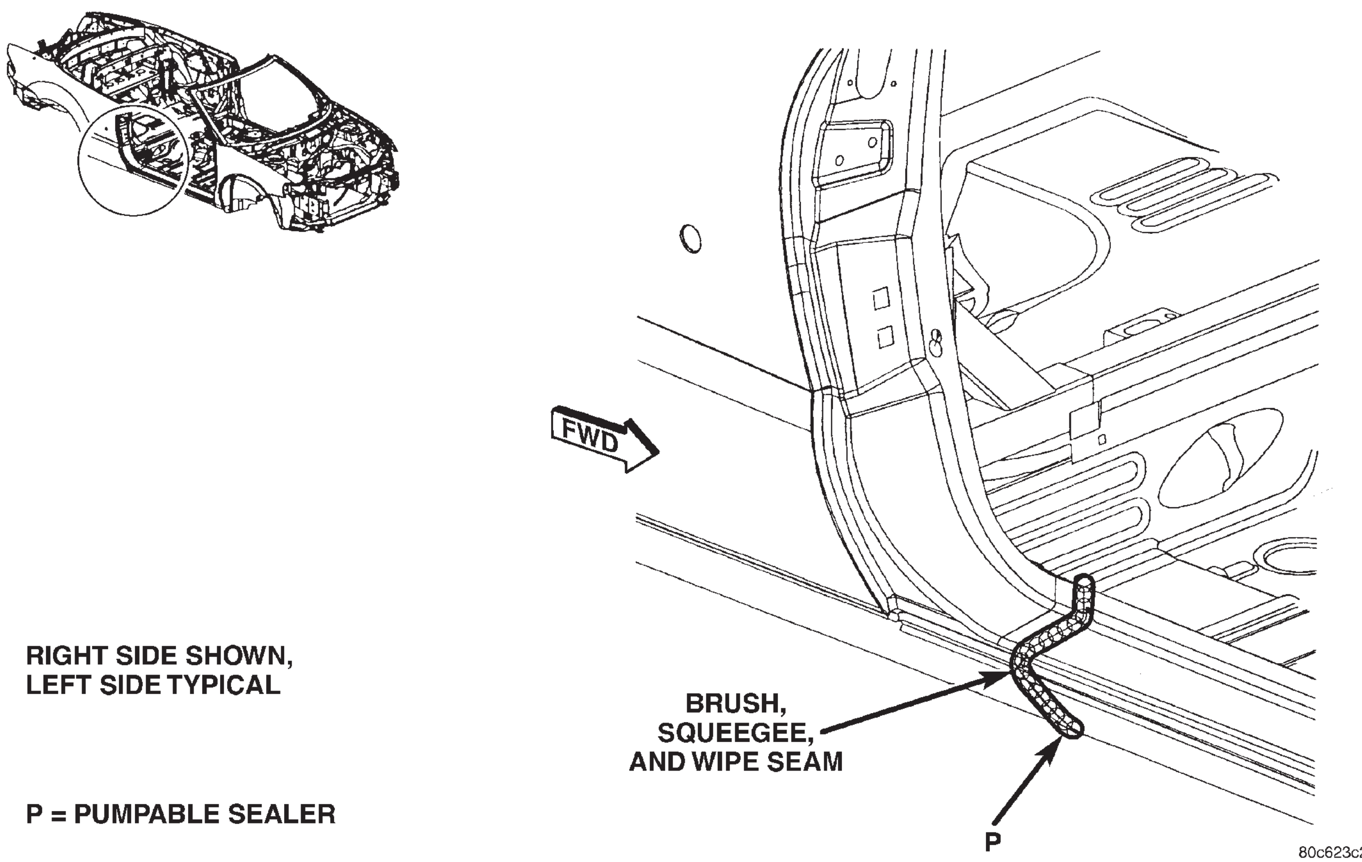


Fig. 21 OUTER QUARTER TO BODY SIDE OUTER DOG LEG

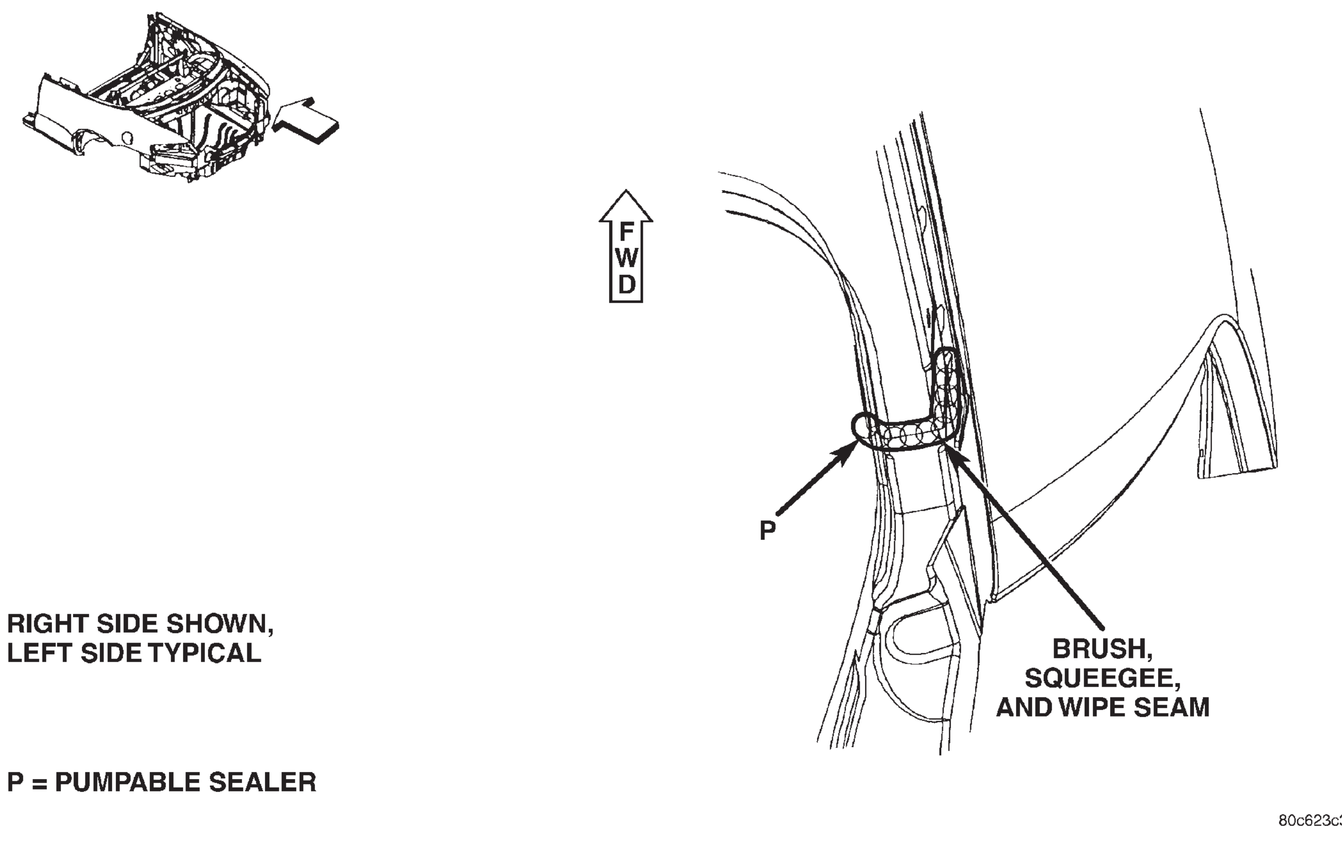


Fig. 22 LOWER DECK TO DRAIN TROUGH EXTENSION

SEALER LOCATIONS (Continued)

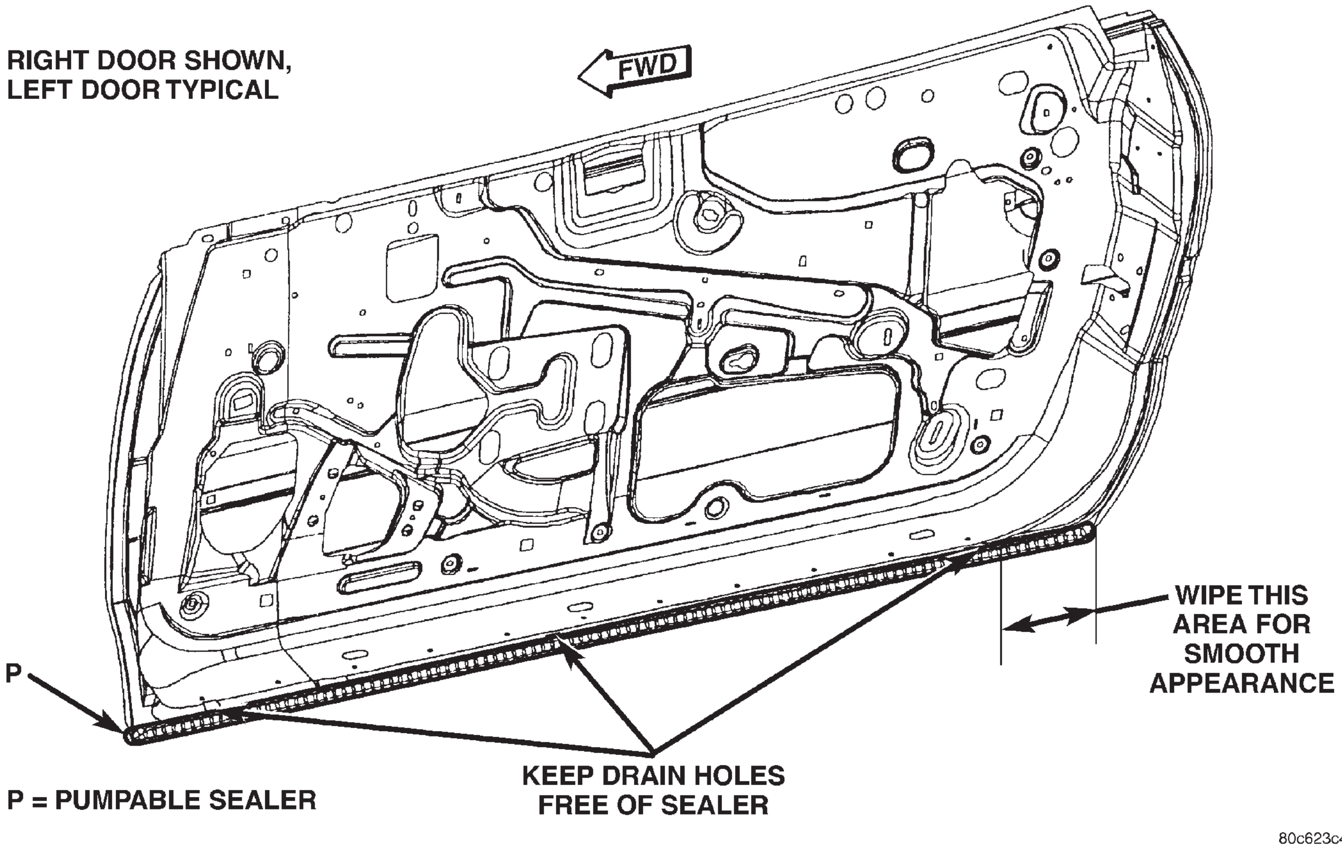


Fig. 23 FRONT DOOR LOWER HEM FLANGE

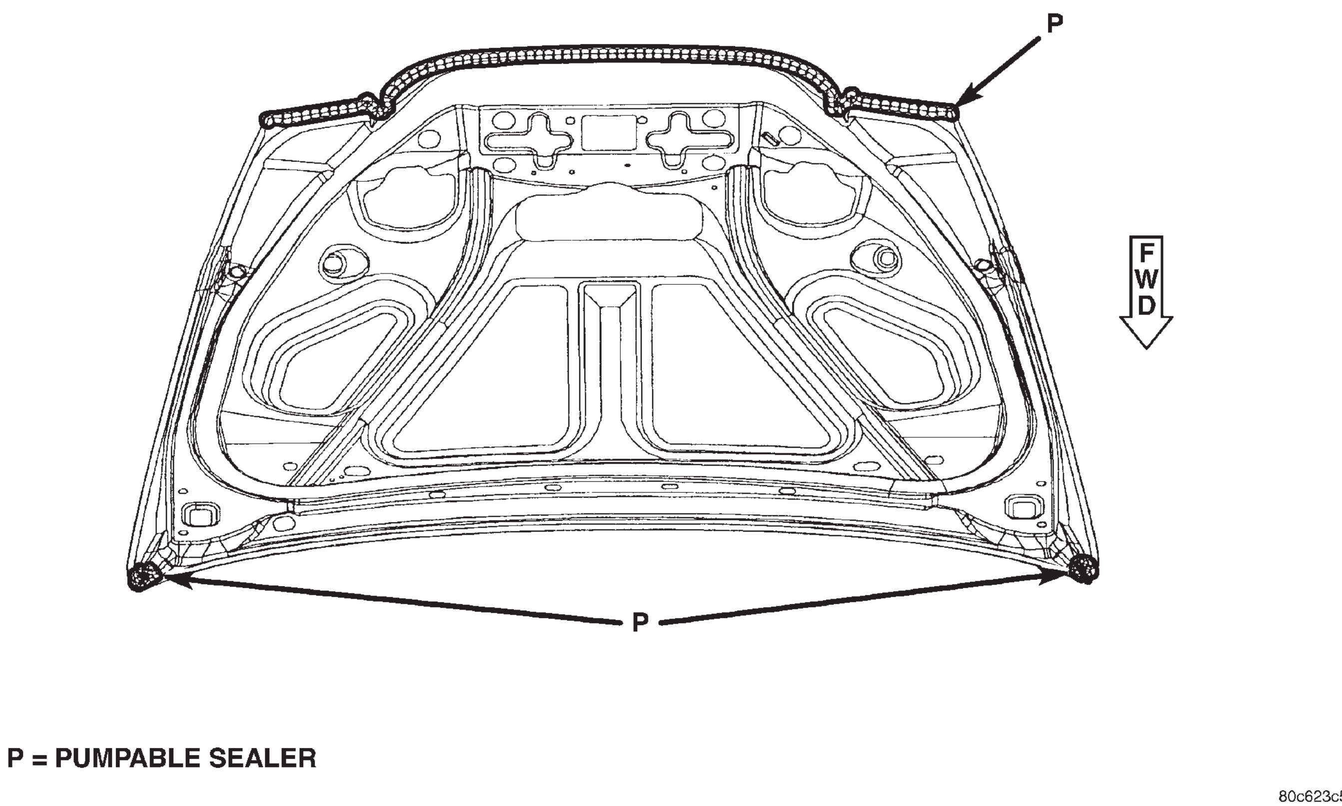
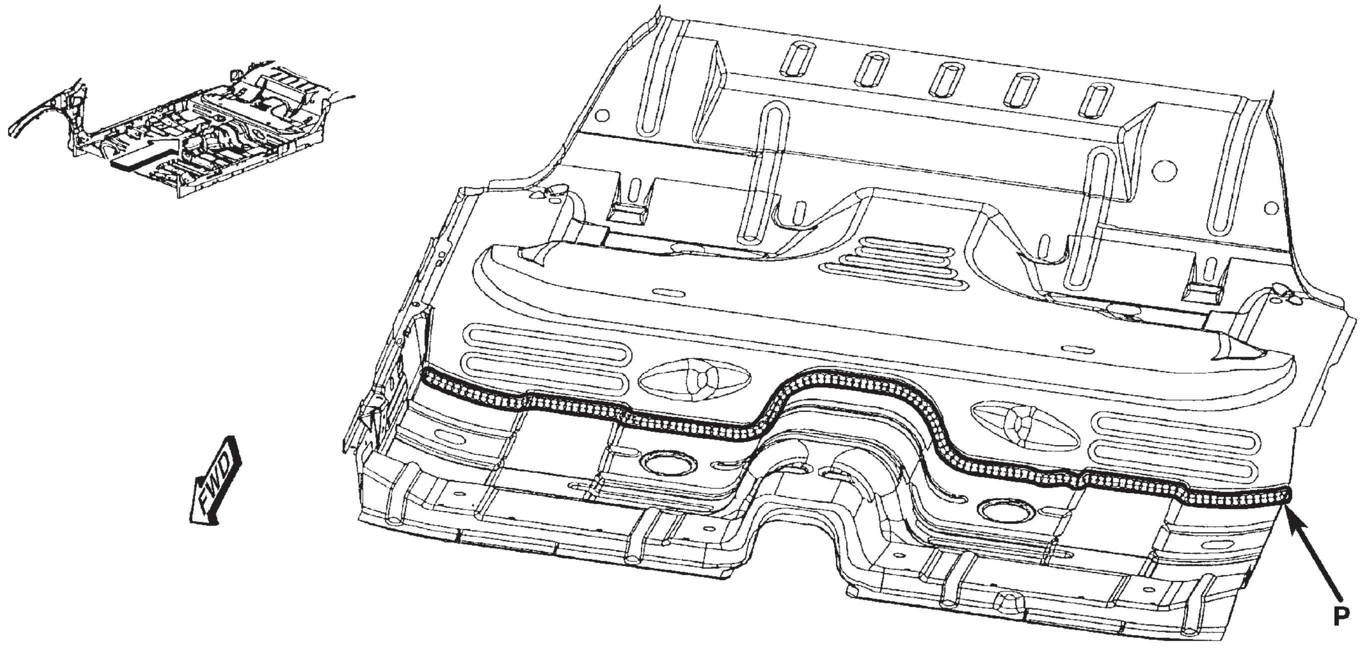


Fig. 24 DECKLID HEM FLANGE

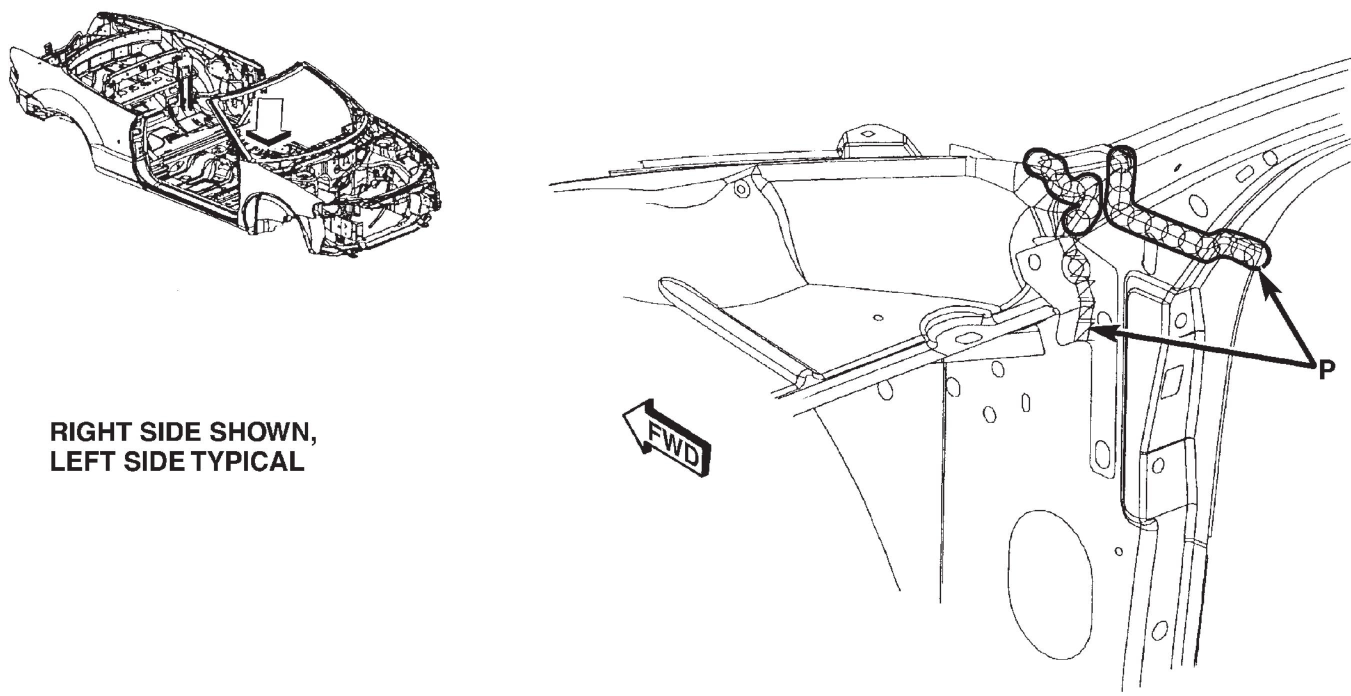
SEALER LOCATIONS (Continued)



P = PUMPABLE SEALER

80c623c6

Fig. 25 FRONT FLOOR PAN TO REAR FLOOR PAN



P = PUMPABLE SEALER

80c623c7

Fig. 26 A-PILLAR TO COWL PLENUM PANEL

SEALER LOCATIONS (Continued)

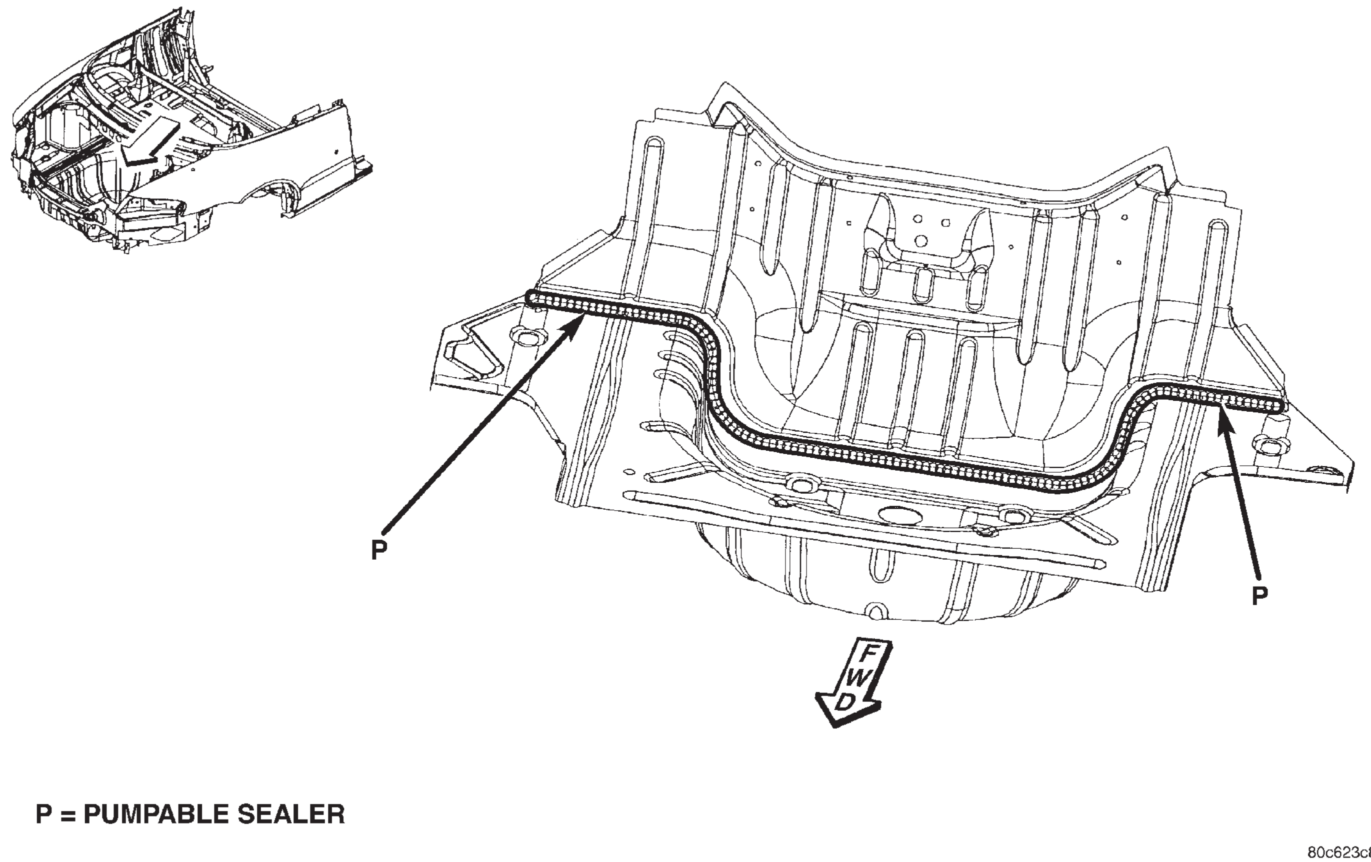


Fig. 27 LOWER DECK OPENING TO REAR FLOOR PAN

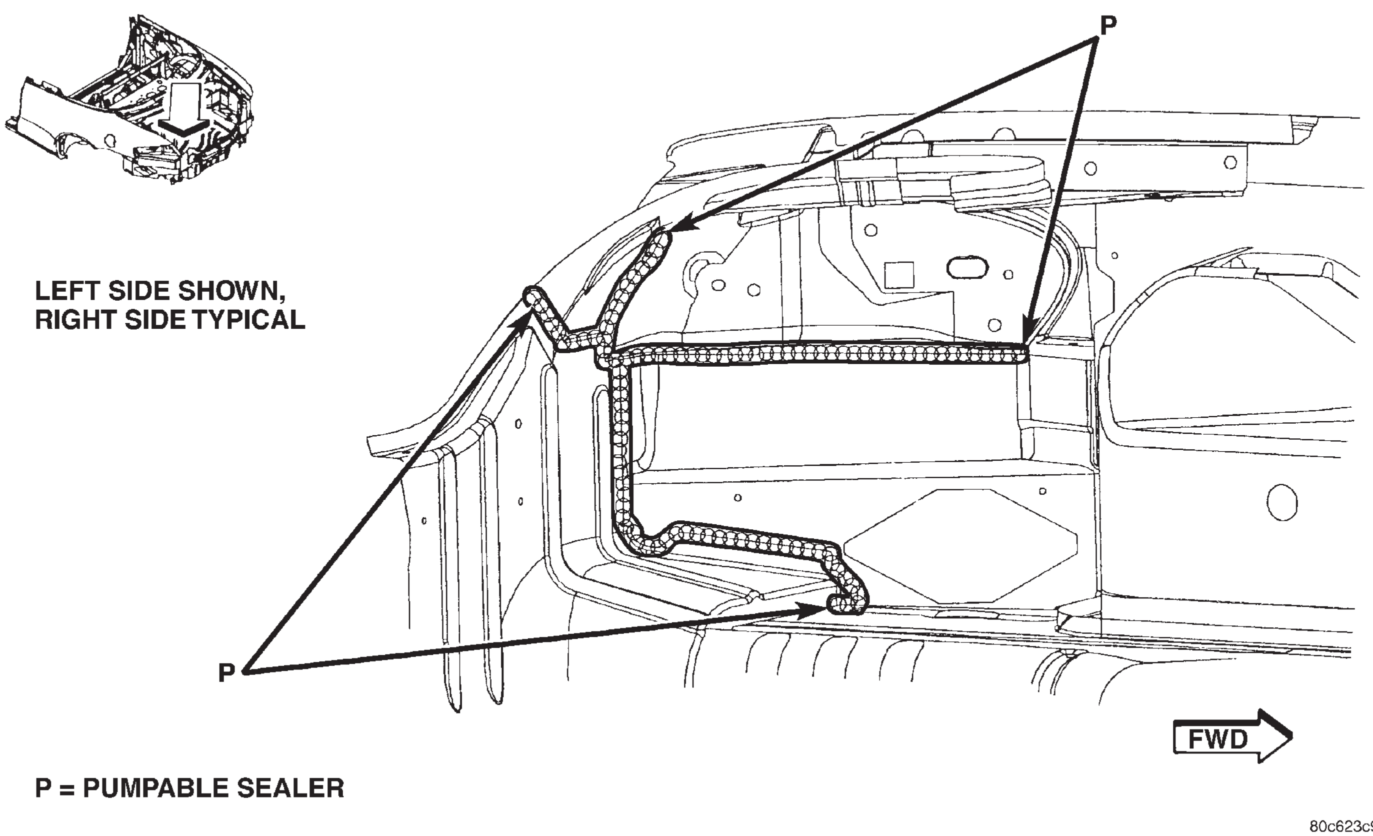


Fig. 28 LOWER INNER DECK OPENING TO TAIL LAMP EXTENSION

SEALER LOCATIONS (Continued)

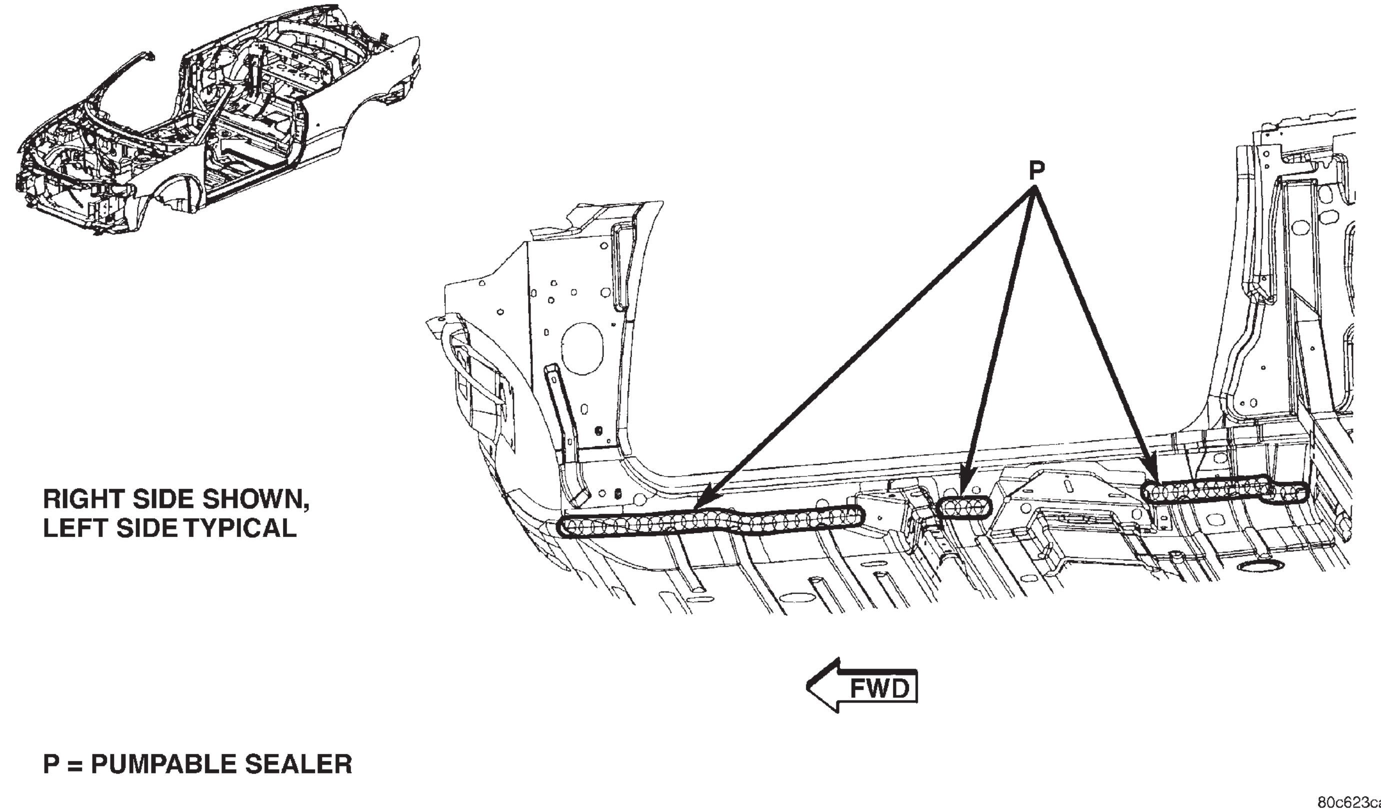


Fig. 29 INNER BODY SILL TO FRONT FLOOR PAN

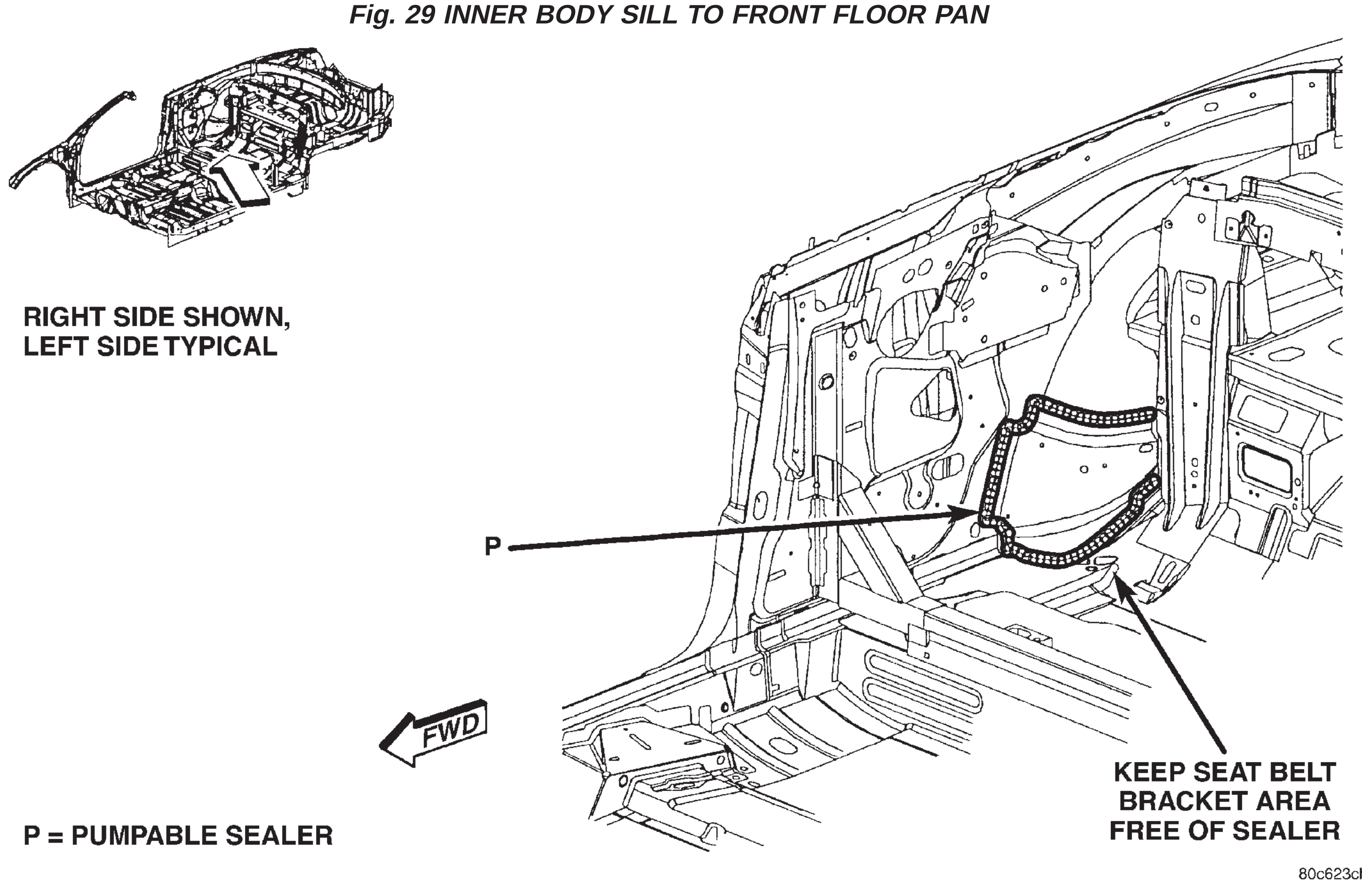


Fig. 30 INNER SILL EXTENSION TO SHOULDER BELT SUPPORT REINFORCEMENT

SEALER LOCATIONS (Continued)

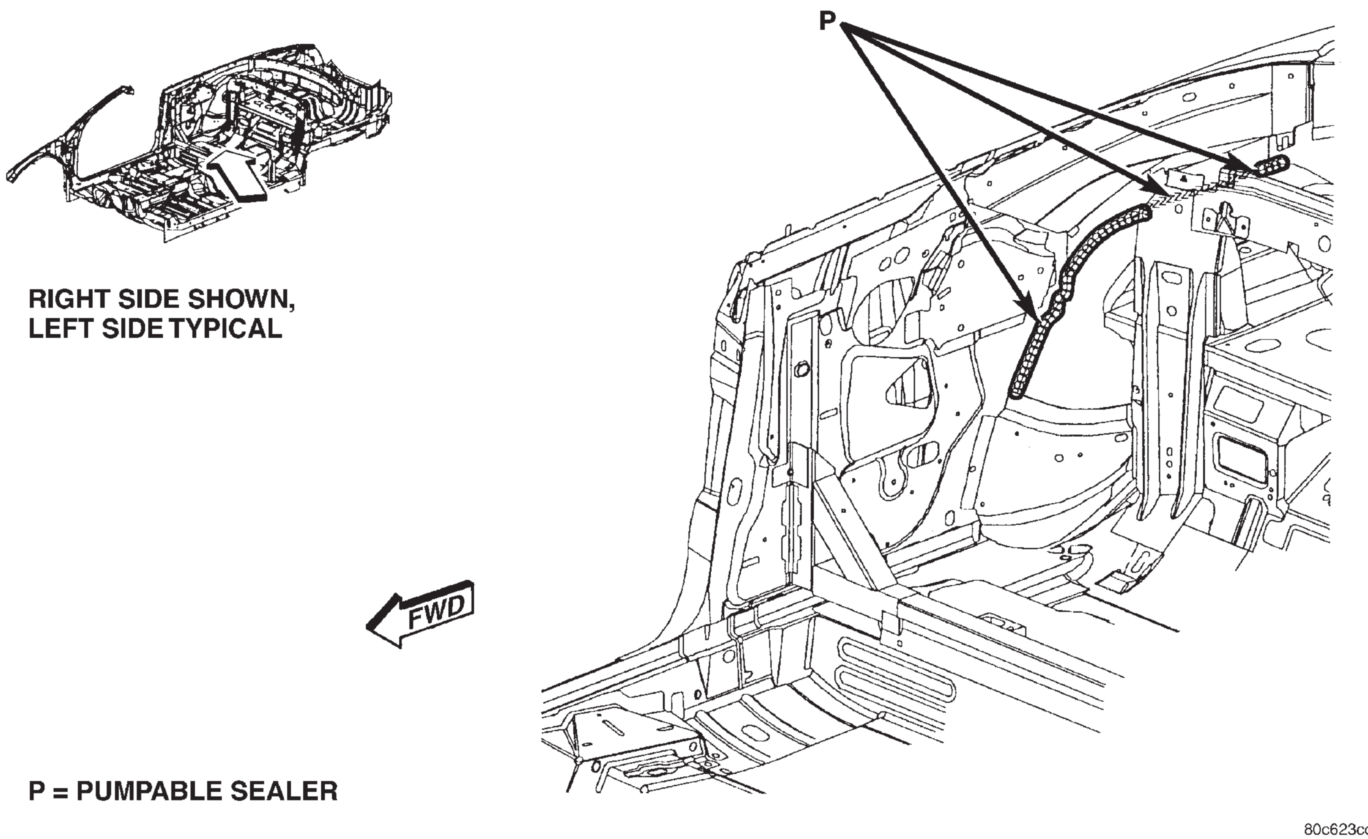


Fig. 31 INNER REAR WHEELHOUSING TO EXTENSION

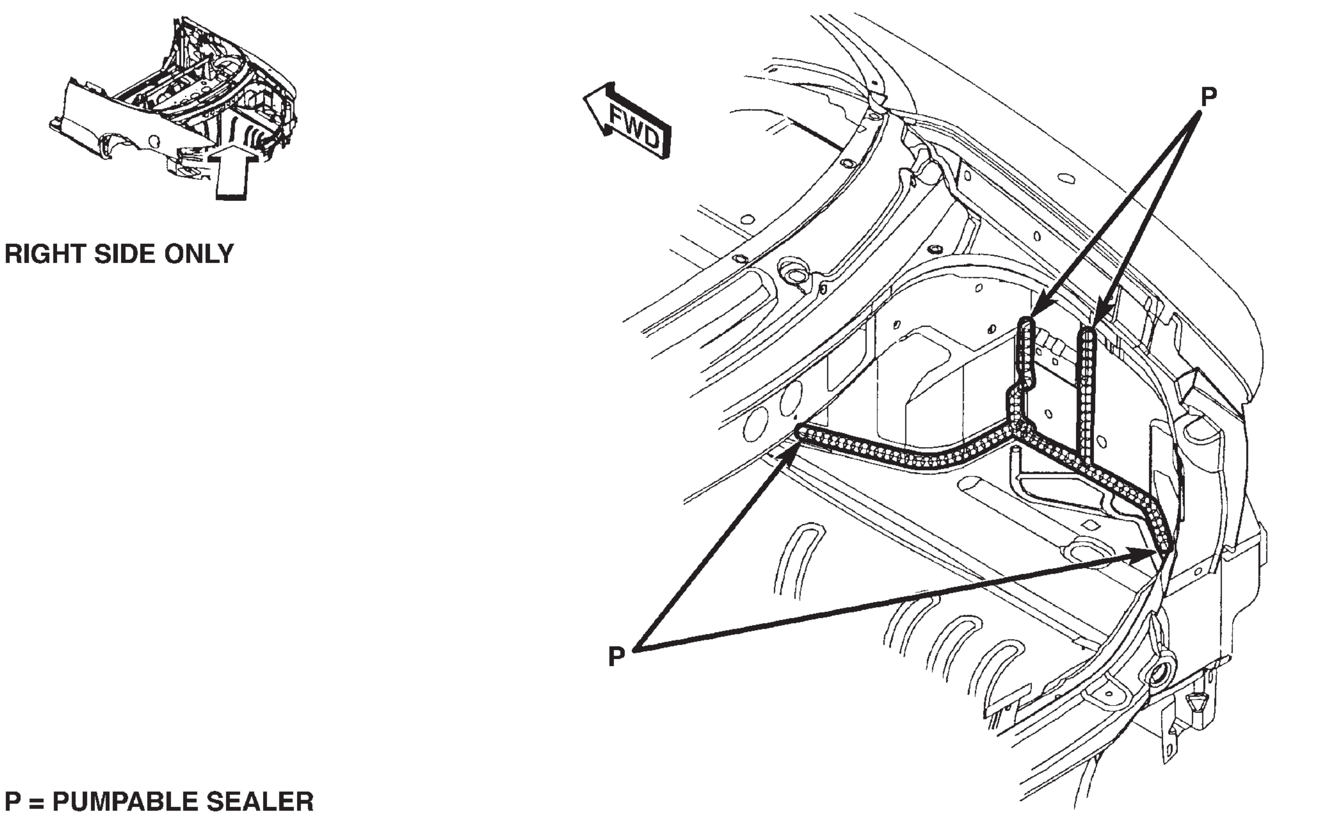


Fig. 32 REAR FLOOR PAN DECKLID INNER AREA - RIGHT SIDE

SEALER LOCATIONS (Continued)

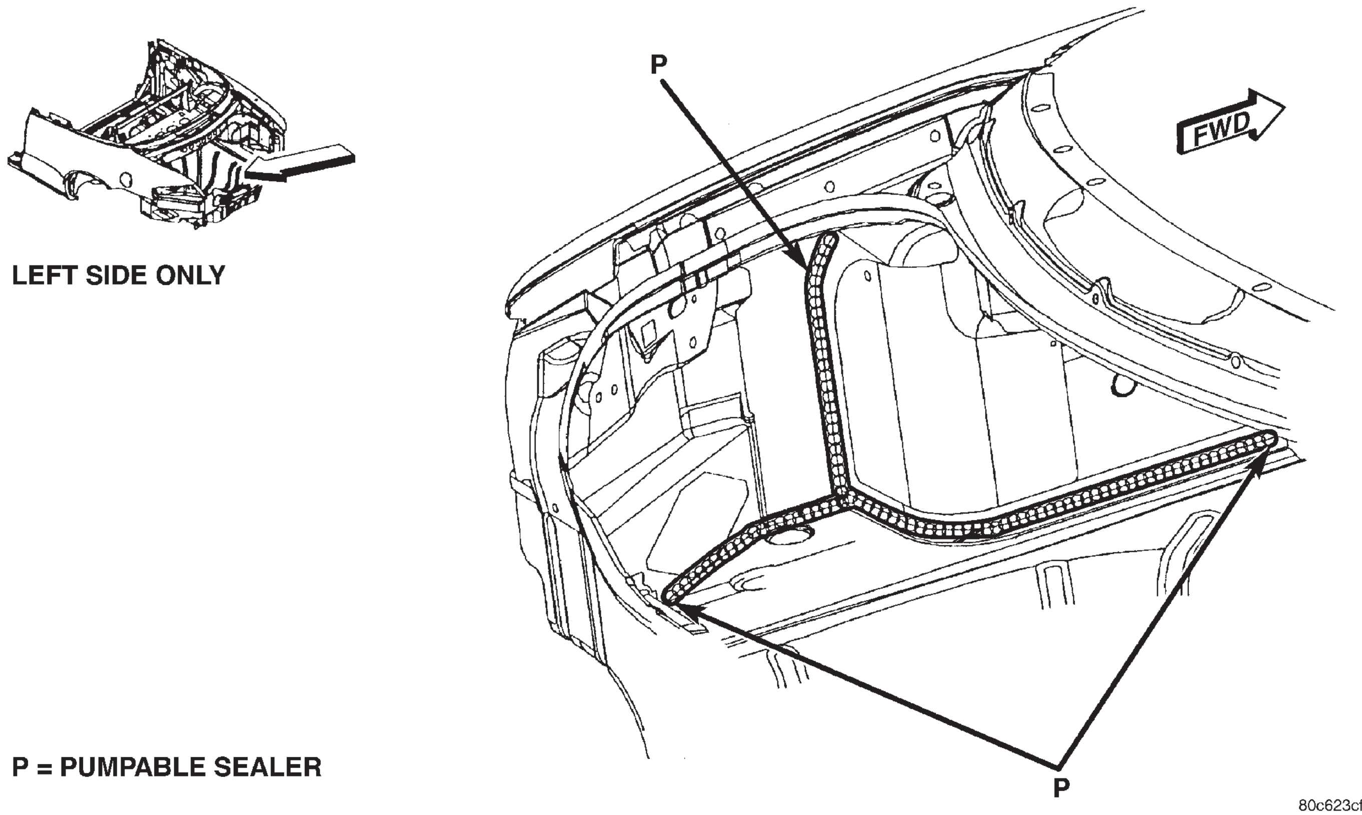


Fig. 33 REAR FLOOR PAN DECKLID INNER AREA - LEFT SIDE

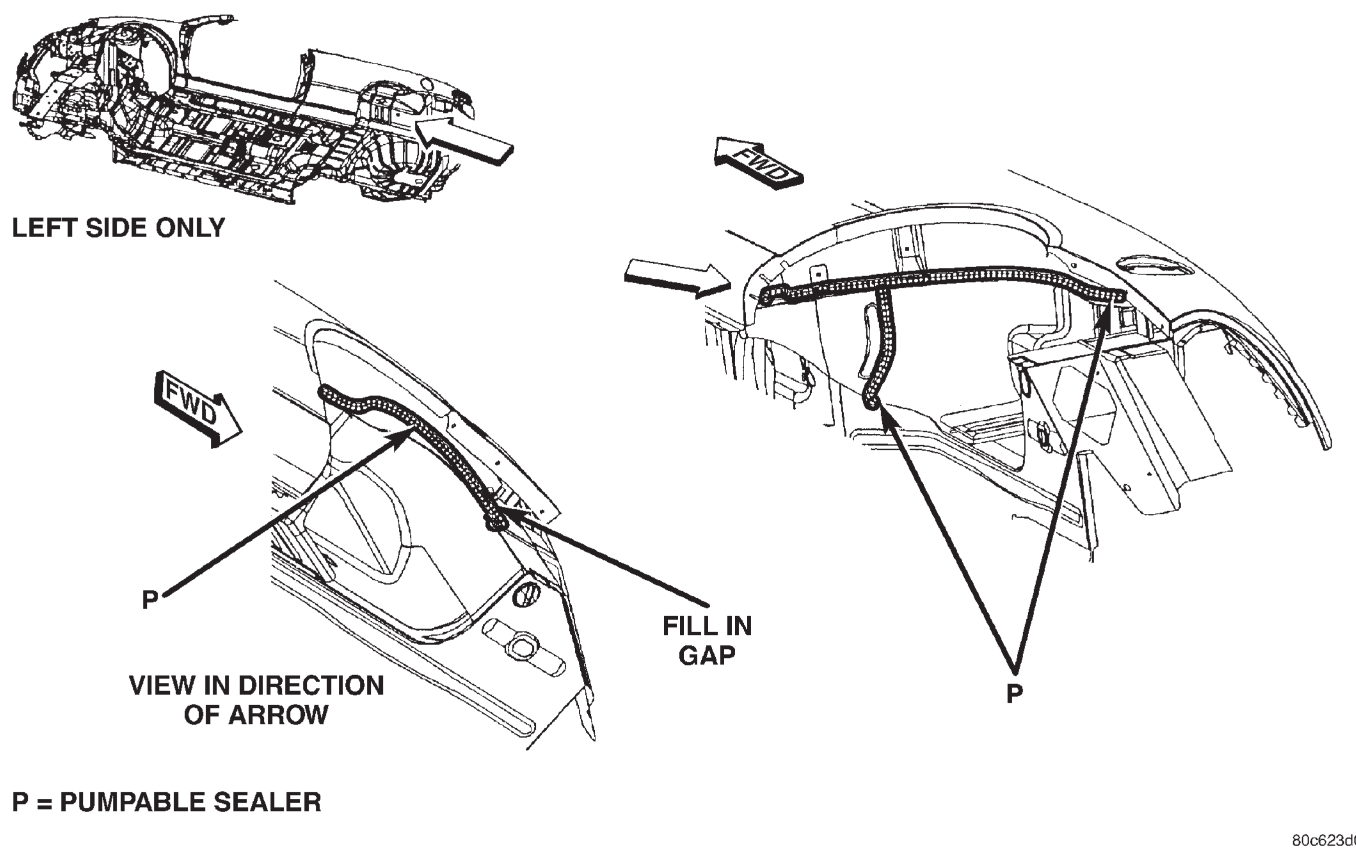


Fig. 34 REAR WHEEL HOUSE - LEFT SIDE

SEALER LOCATIONS (Continued)

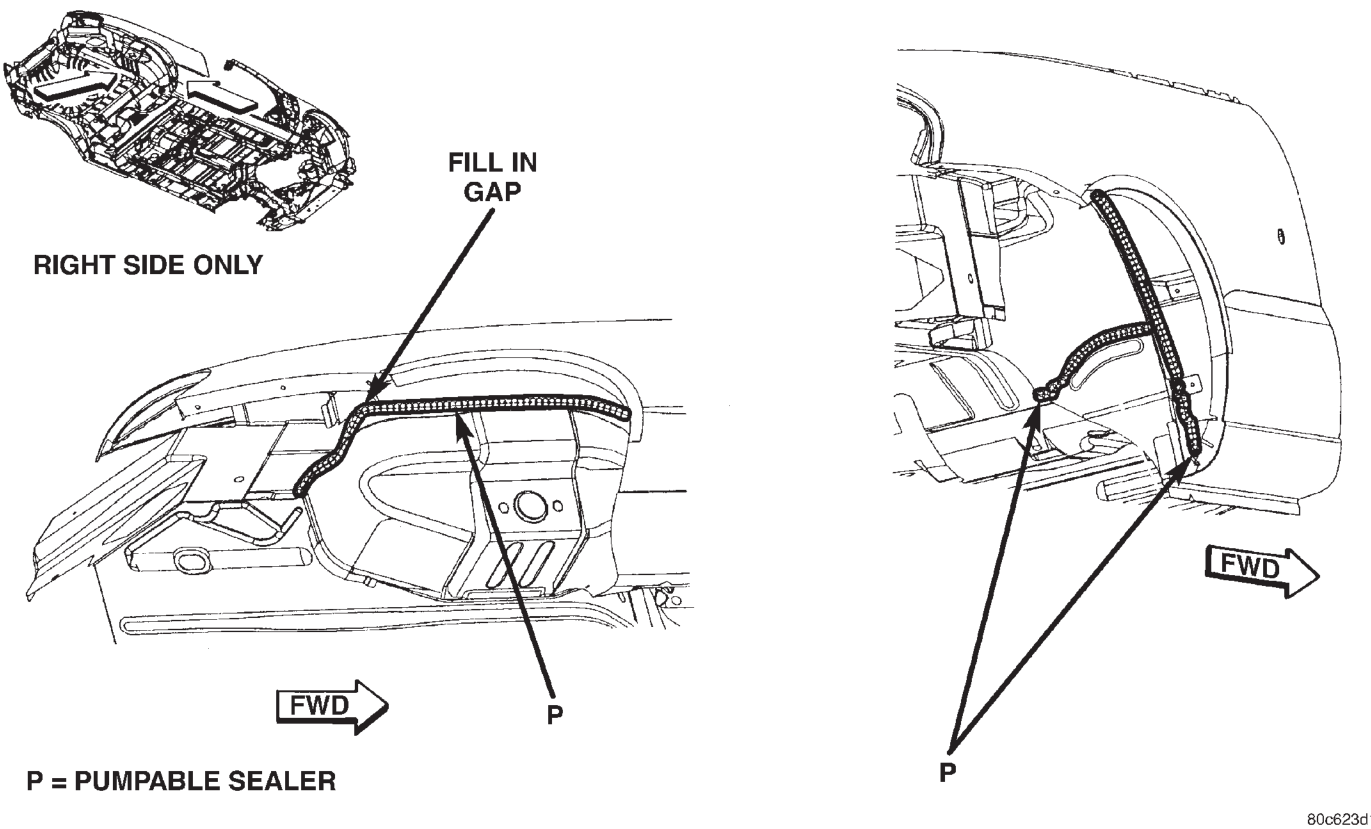


Fig. 35 REAR WHEEL HOUSE - RIGHT SIDE

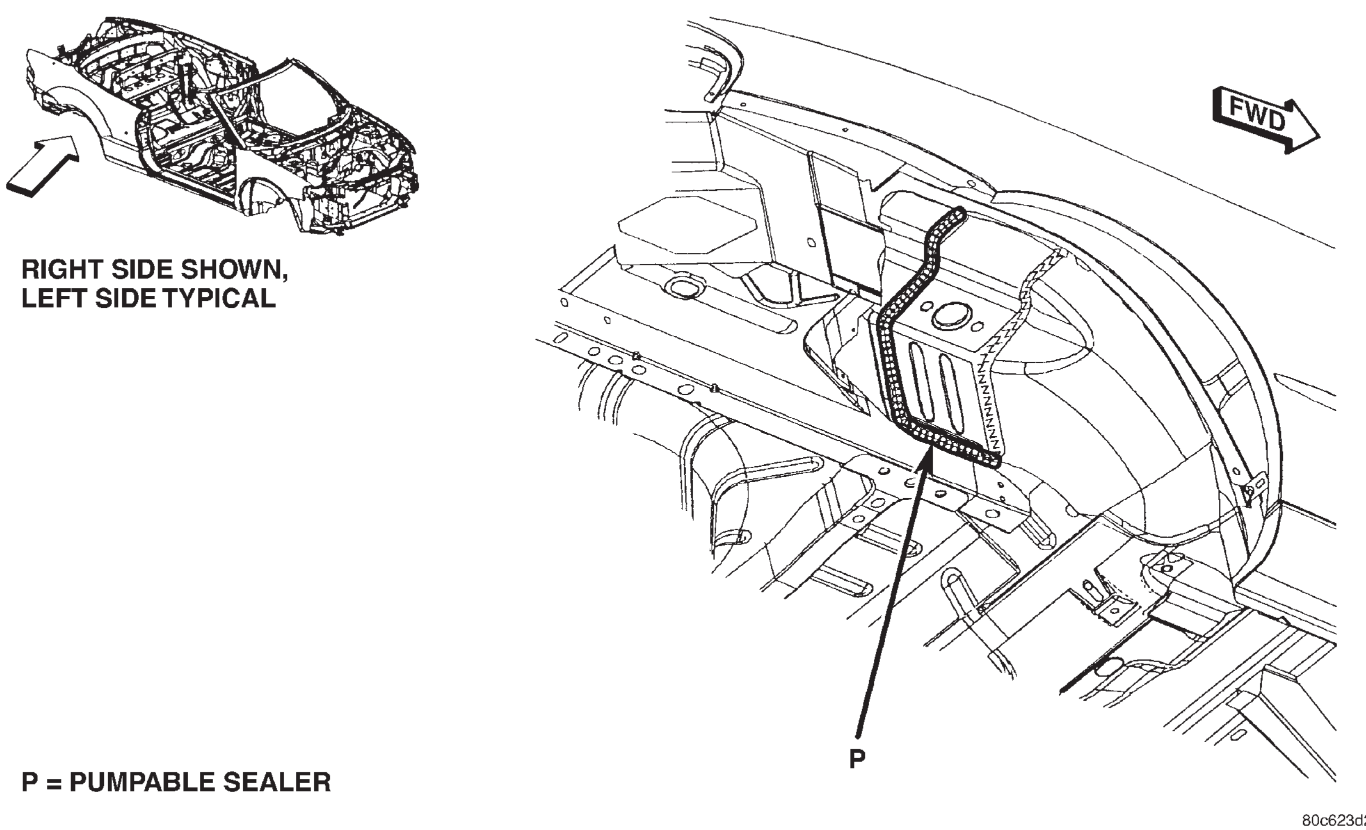


Fig. 36 REAR SHOCK TOWER BRACKET

SEALER LOCATIONS (Continued)

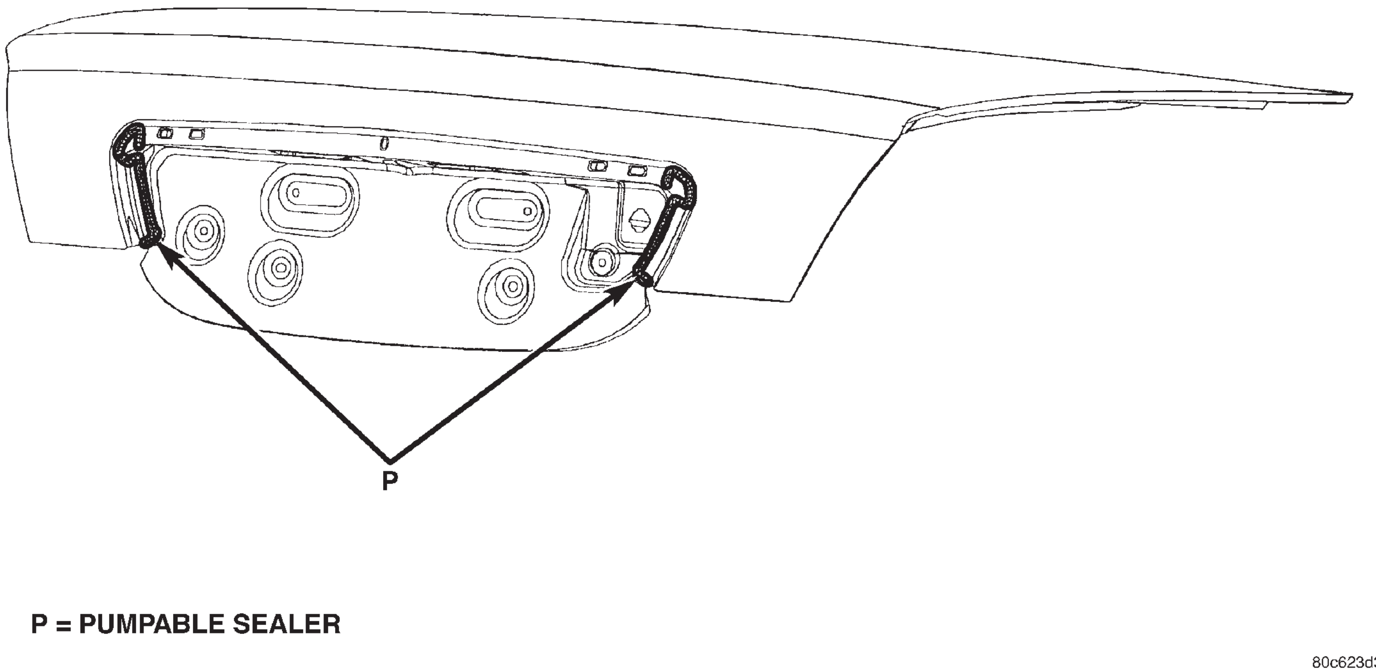


Fig. 37 OUTER DECKLID TO OUTER DECKLID EXTENSION

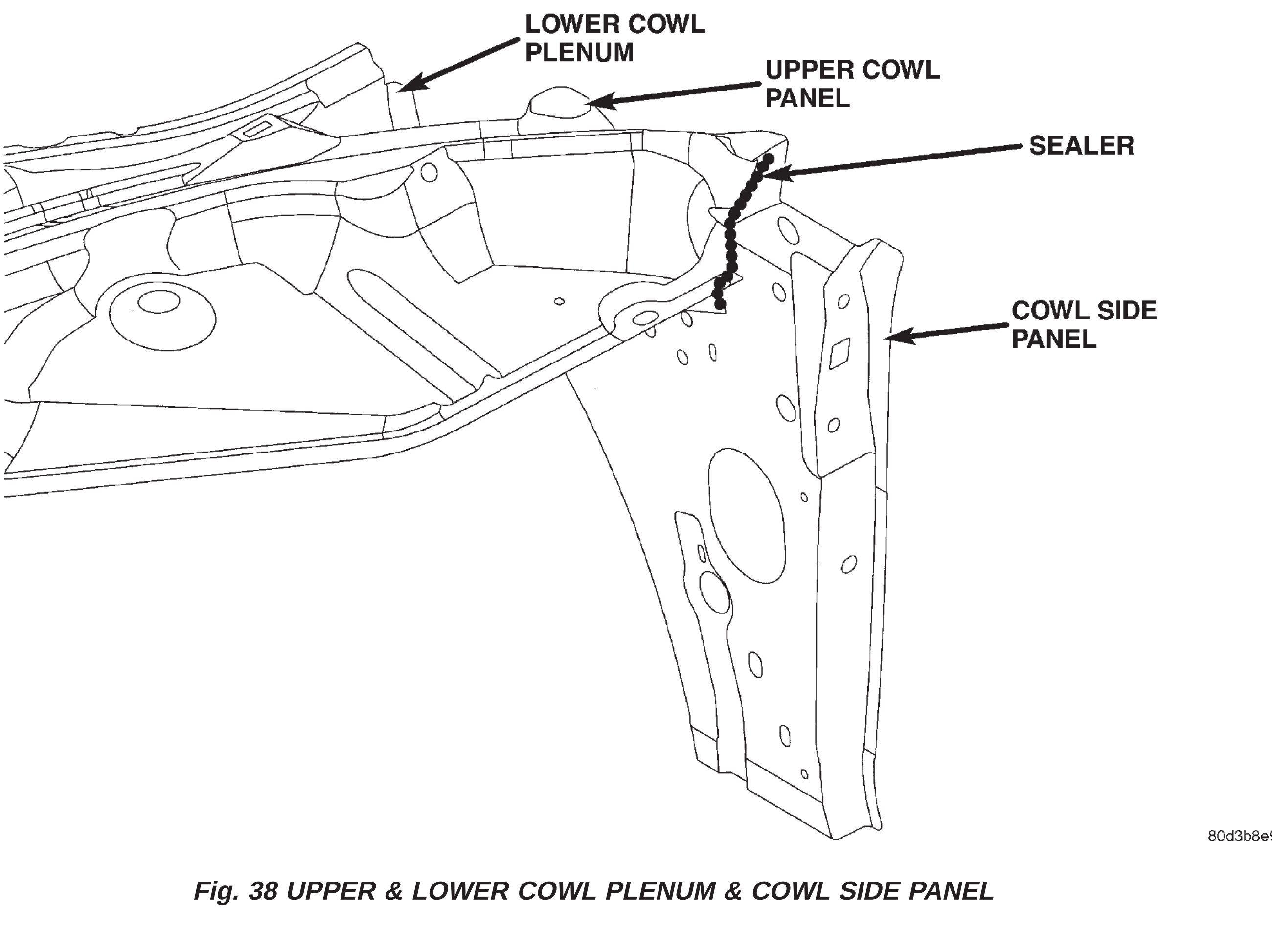


Fig. 38 UPPER & LOWER COWL PLENUM & COWL SIDE PANEL

SEALER LOCATIONS (Continued)

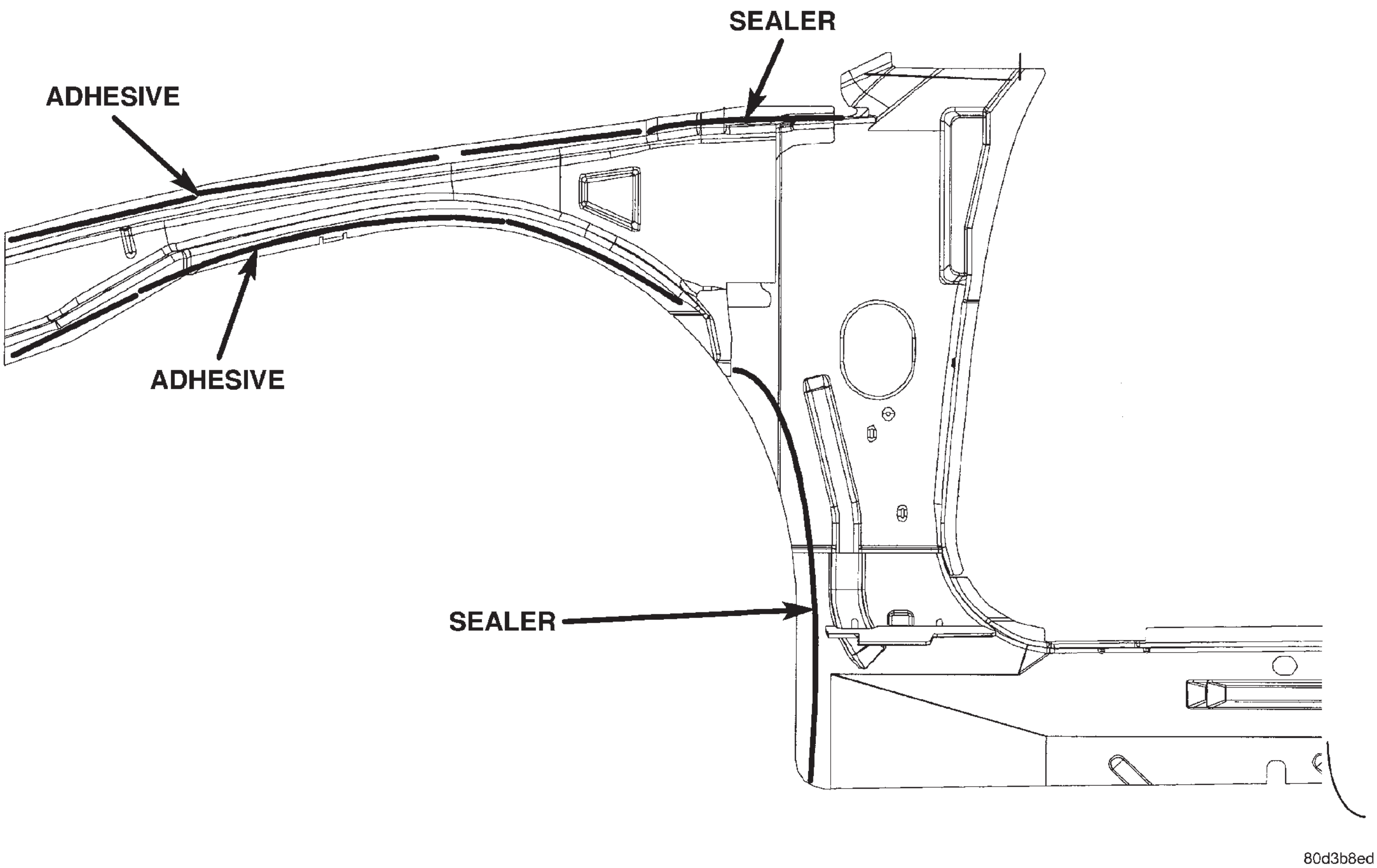


Fig. 39 INNER & OUTER UPPER LOAD PATH BEAM, COWL SIDE PANEL

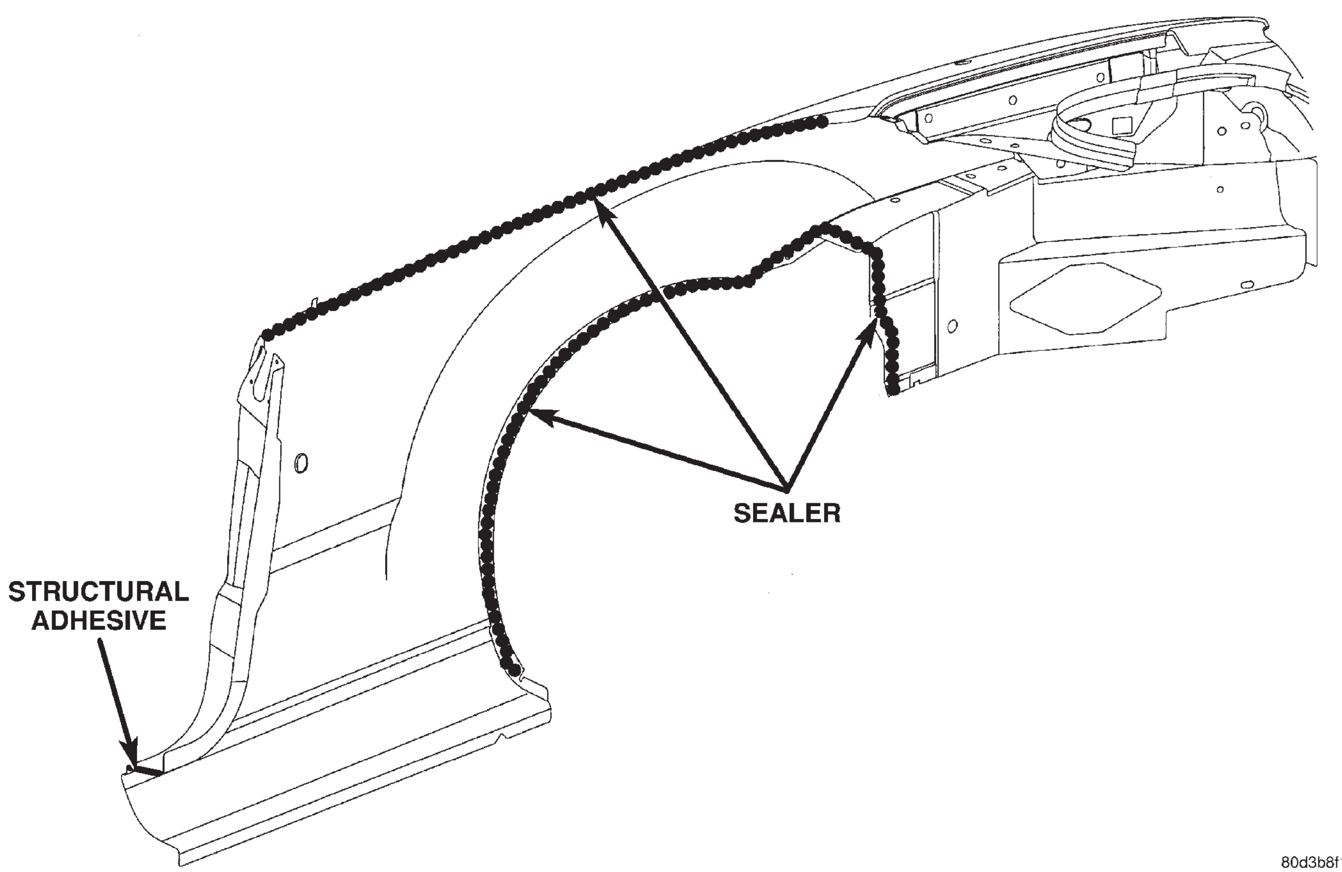


Fig. 40 OUTER QUARTER PANEL

SEALER LOCATIONS (Continued)

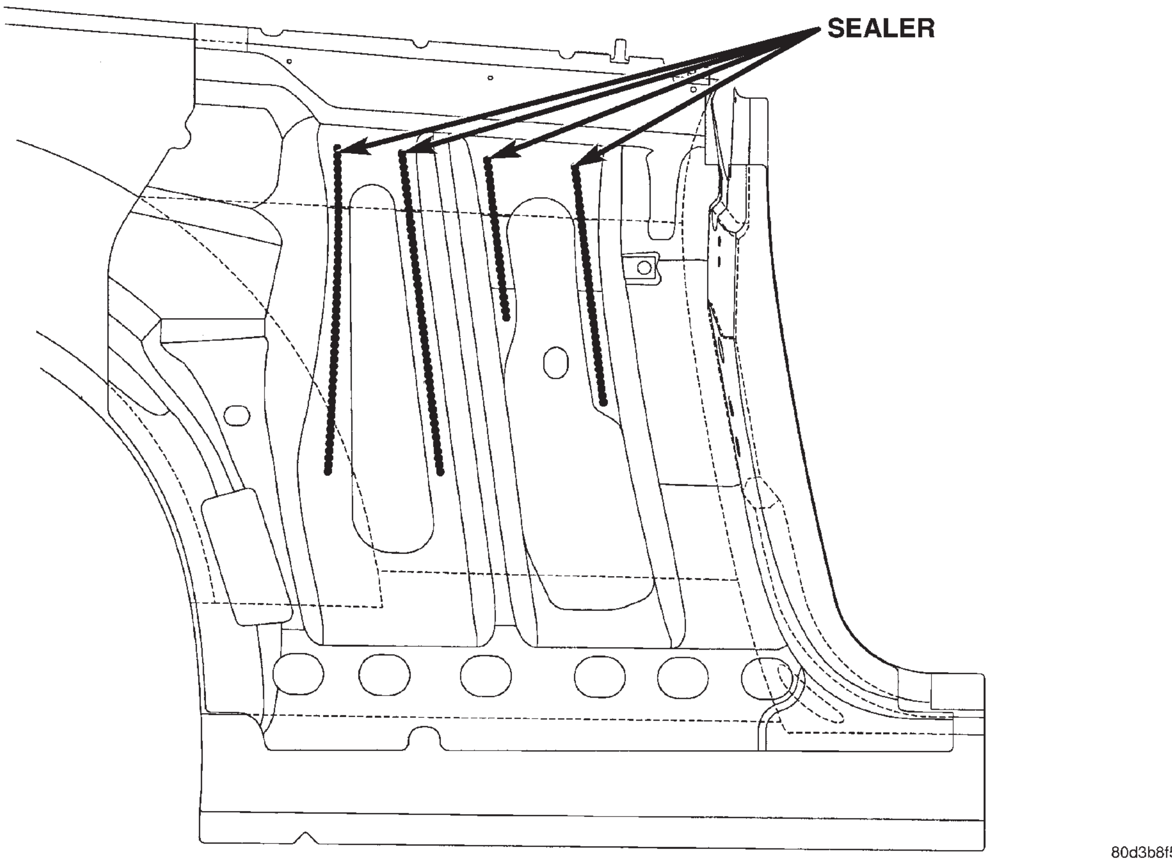


Fig. 41 OUTER QUARTER PANEL & SHELF ASSEMBLY

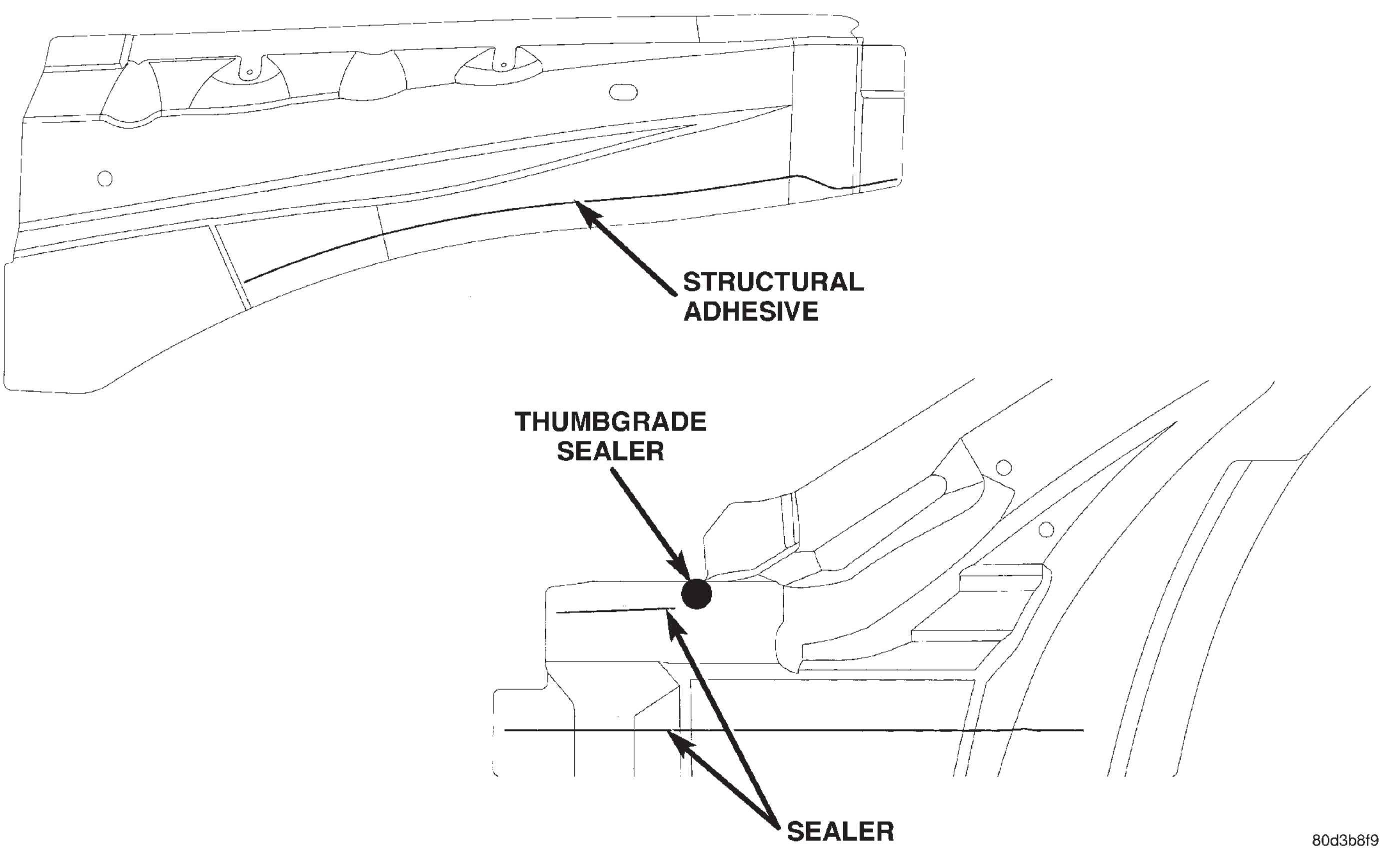


Fig. 42 BODY SIDE APERTURE - INNER

SEALER LOCATIONS (Continued)

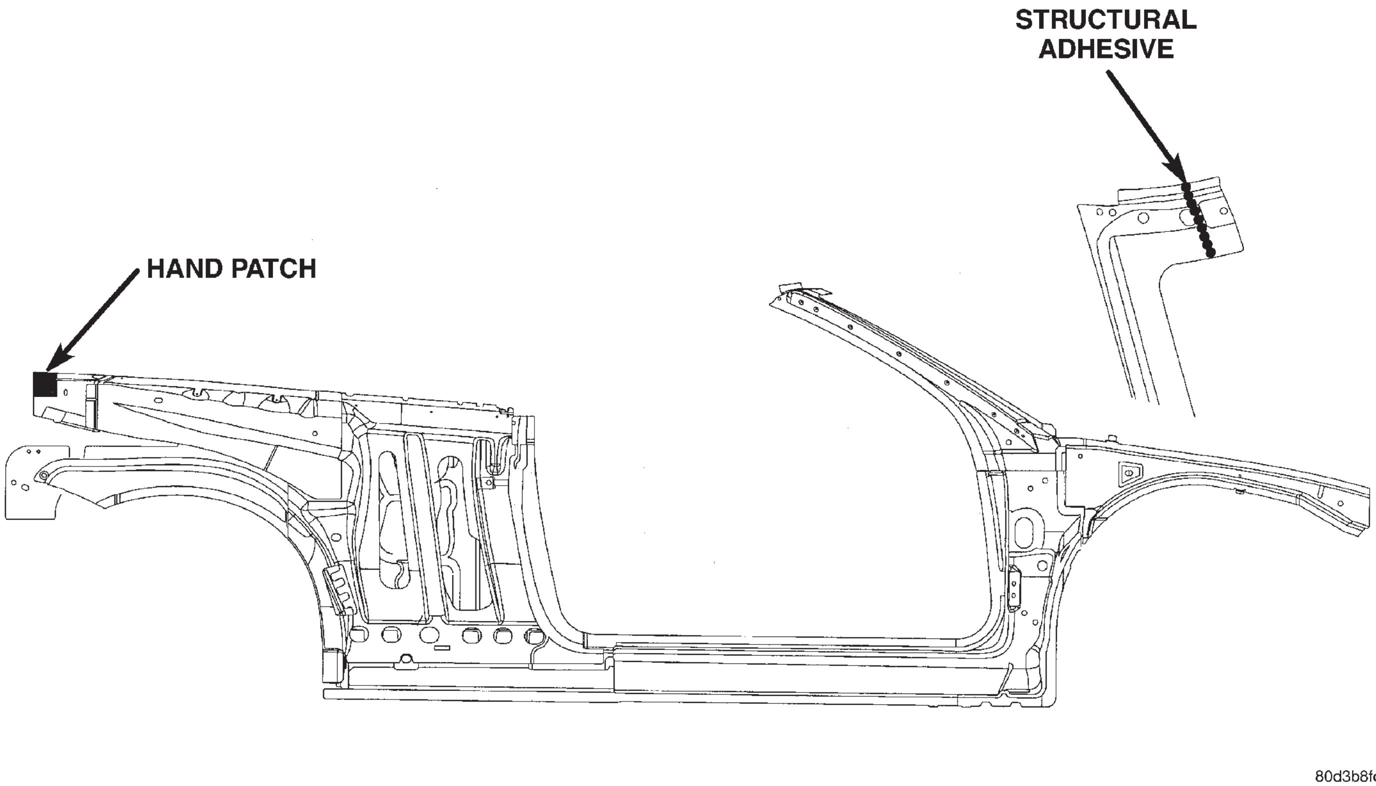


Fig. 43 INNER BODY SIDE APERTURE

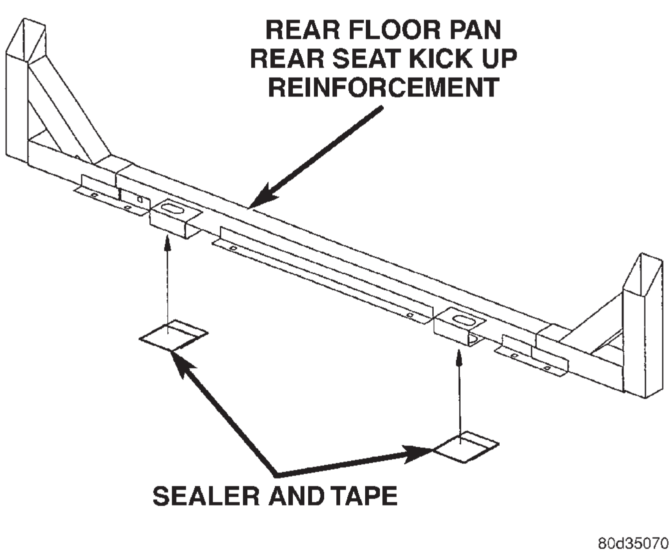


Fig. 44 BAFFLES SEAL & TAPE

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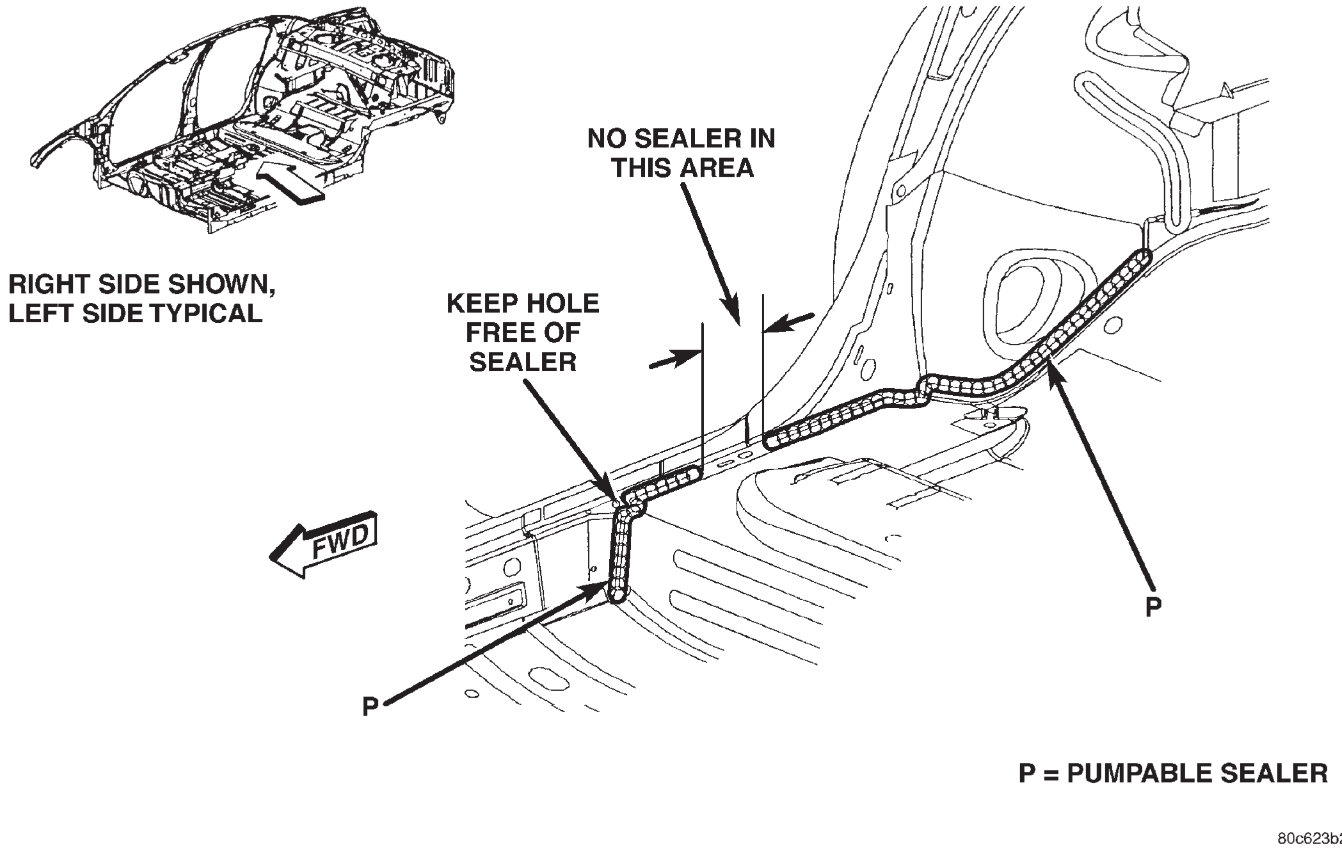


Fig. 45 SILL INNER EXTENSION TO REAR FLOOR PAN

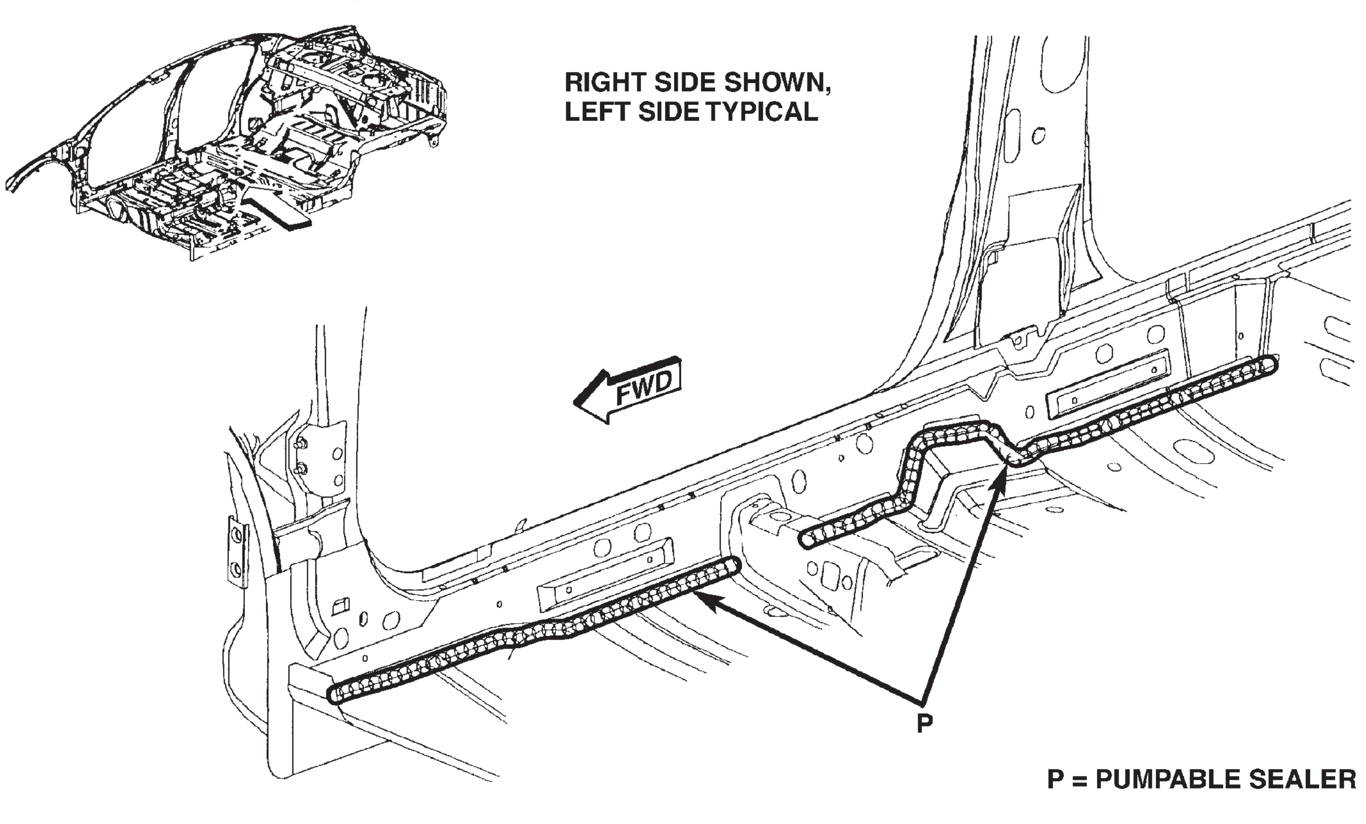
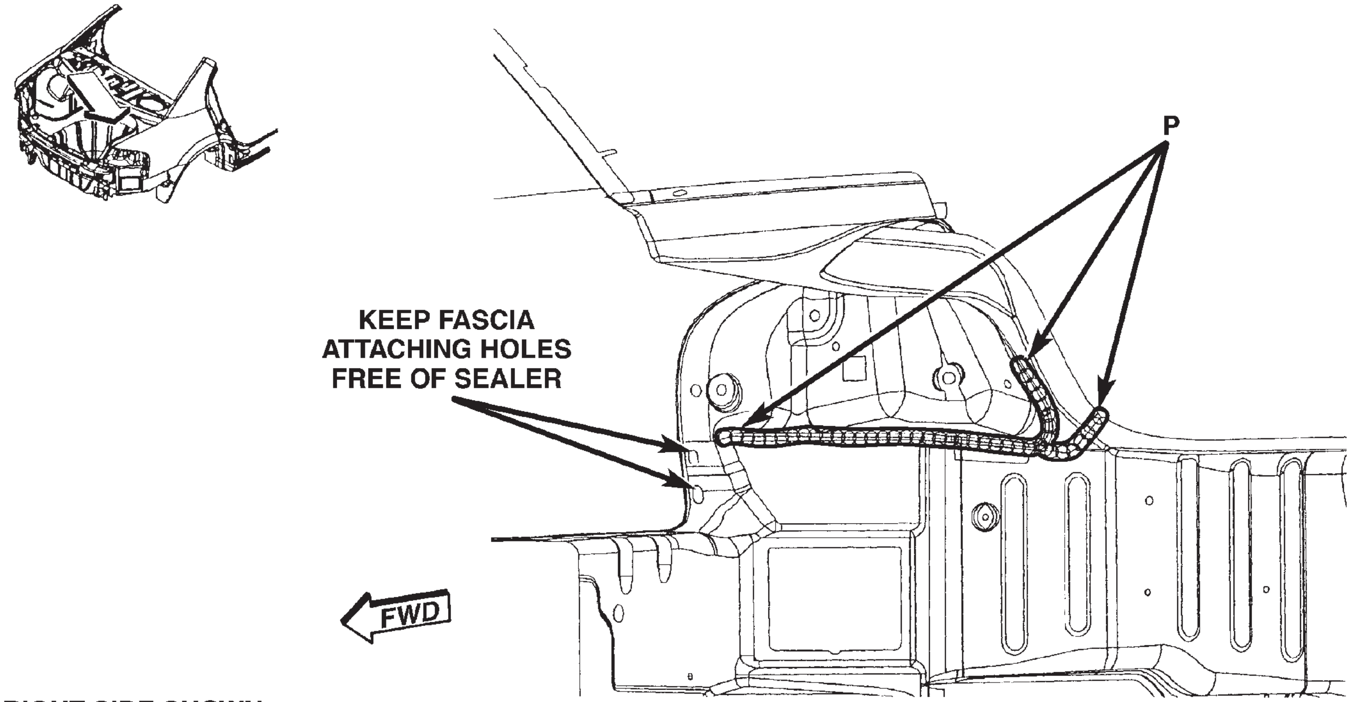


Fig. 46 INNER BODY SILL TO FRONT FLOOR PAN

SEALER LOCATIONS (Continued)

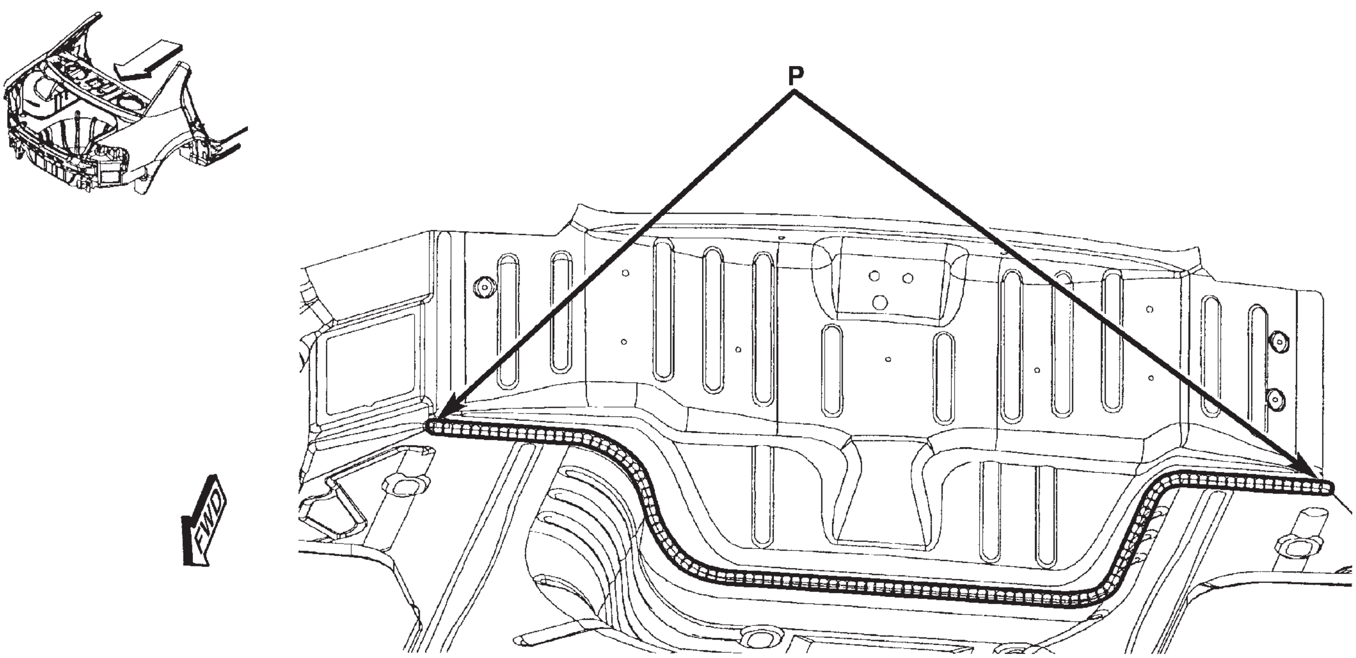


RIGHT SIDE SHOWN,
LEFT SIDE TYPICAL

P = PUMPABLE SEALER

80c623b0

Fig. 47 INNER LOWER DECK OPENING TO TAIL LAMP EXTENSION



P = PUMPABLE SEALER

80c623af

Fig. 48 LOWER DECK OPENING TO REAR FLOOR PAN

SEALER LOCATIONS (Continued)

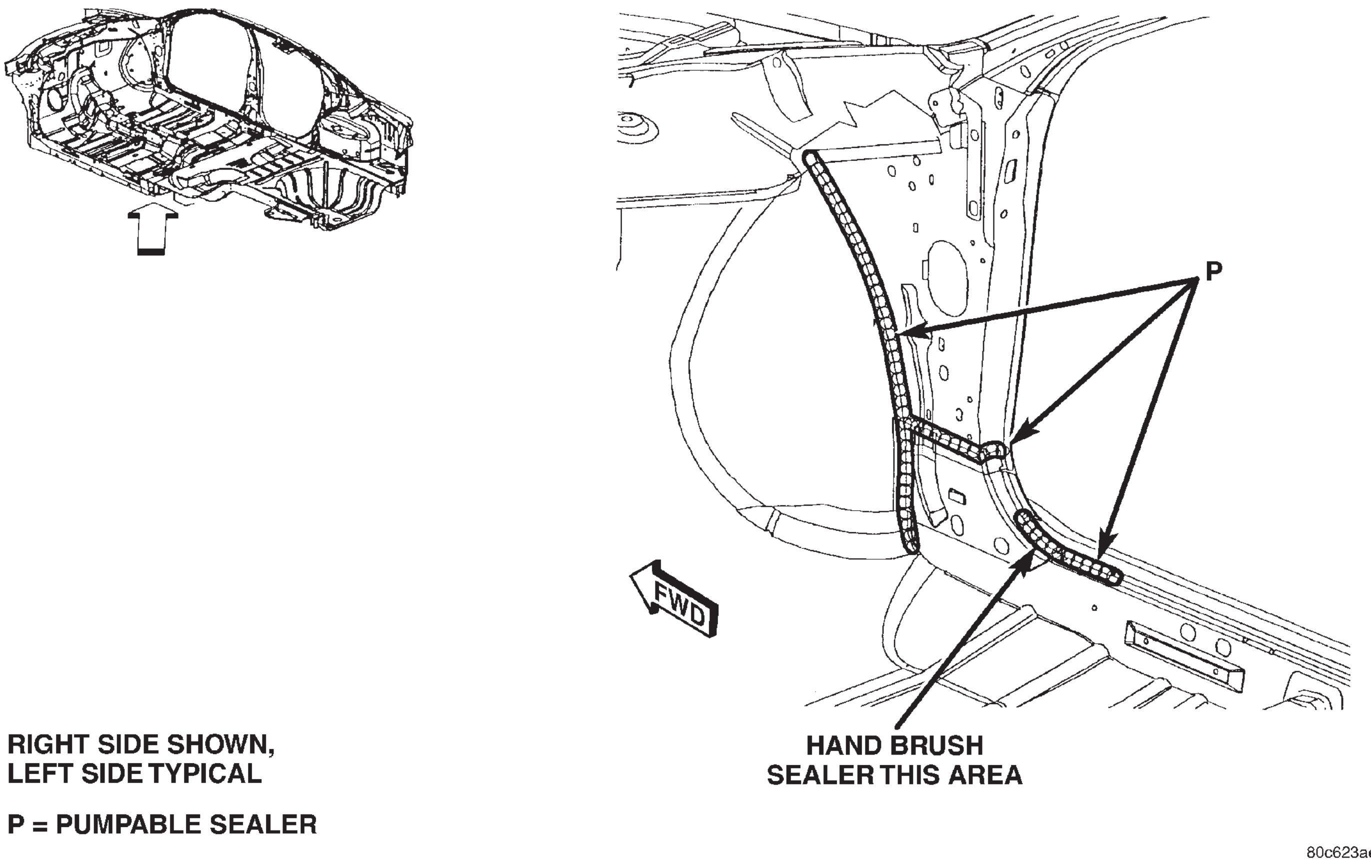


Fig. 49 DASH PANEL TO COWL INNER PANEL

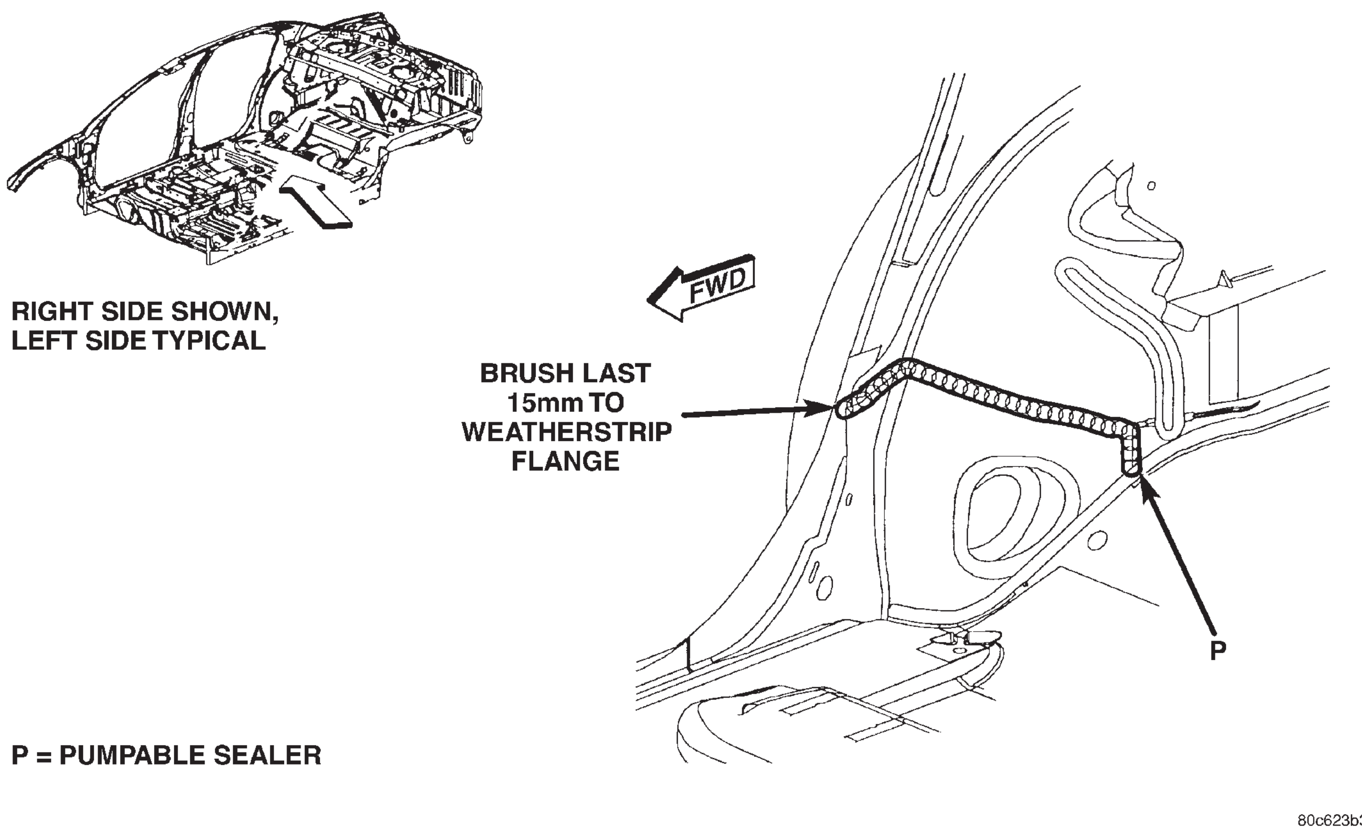


Fig. 50 SILL INNER EXTENSION TO INNER REAR WHEELHOUSE

SEALER LOCATIONS (Continued)

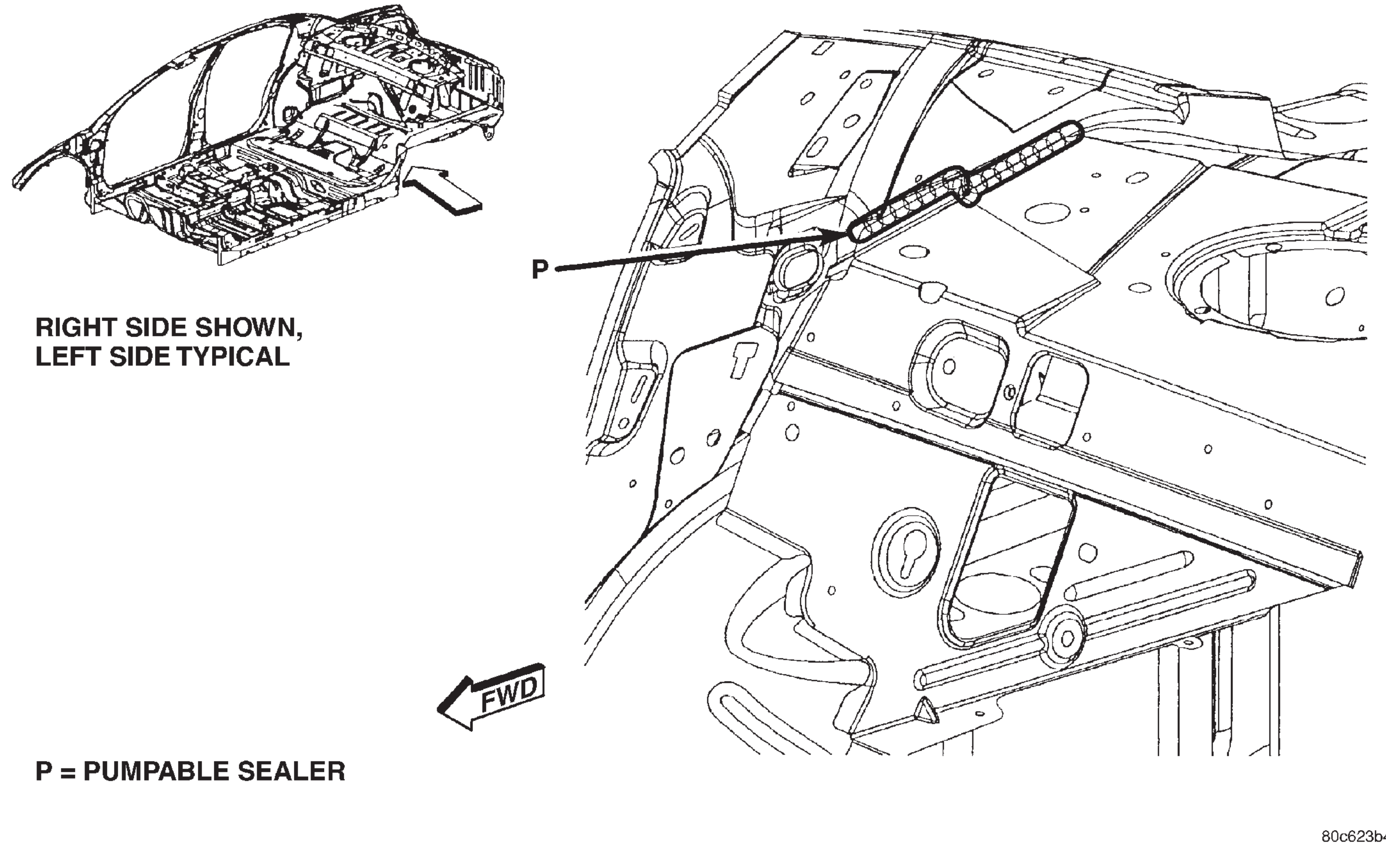


Fig. 51 SHELF PANEL TO INNER BODY SIDE APERTURE

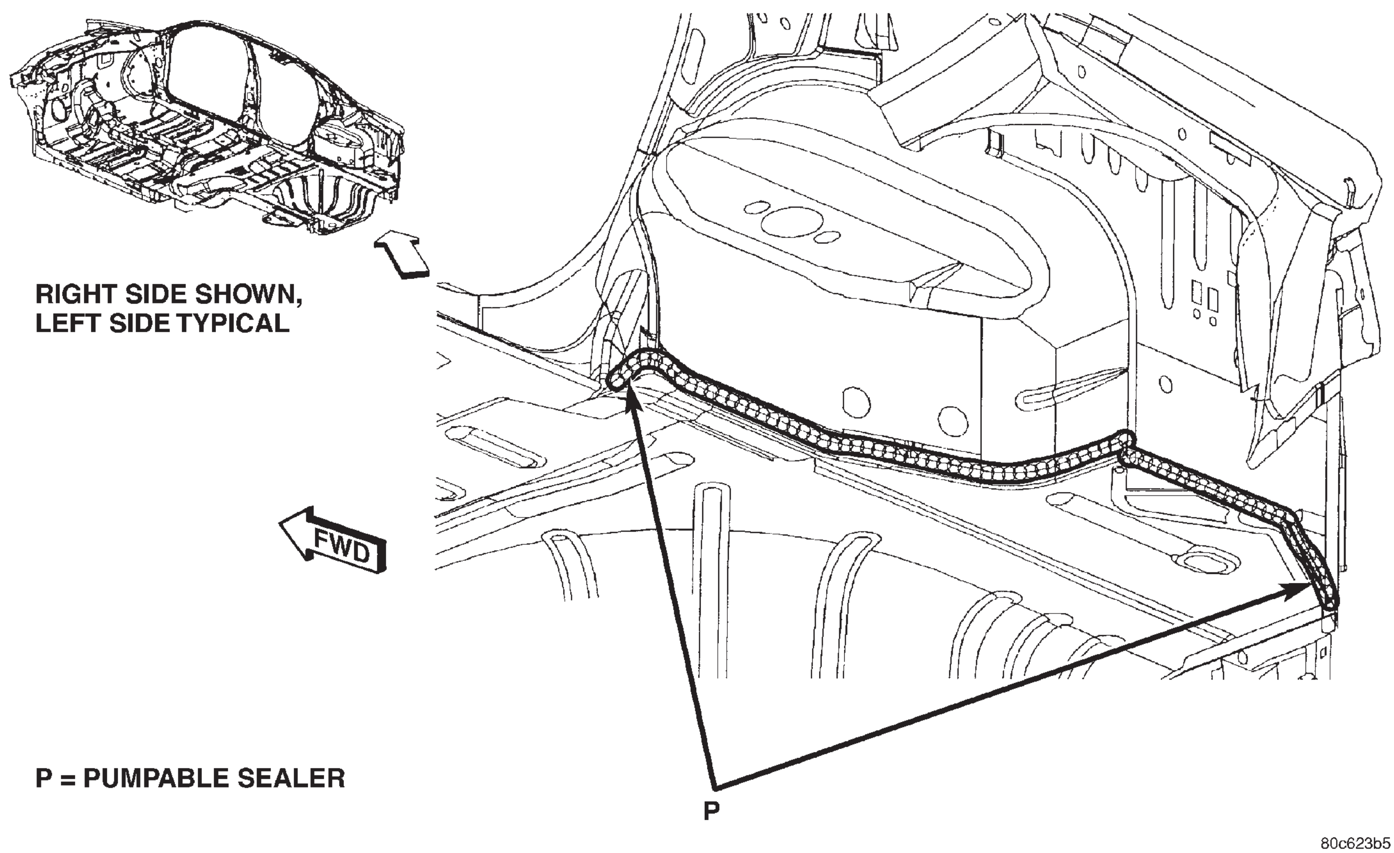


Fig. 52 INNER REAR WHEELHOUSE TO REAR FLOOR PAN

SEALER LOCATIONS (Continued)

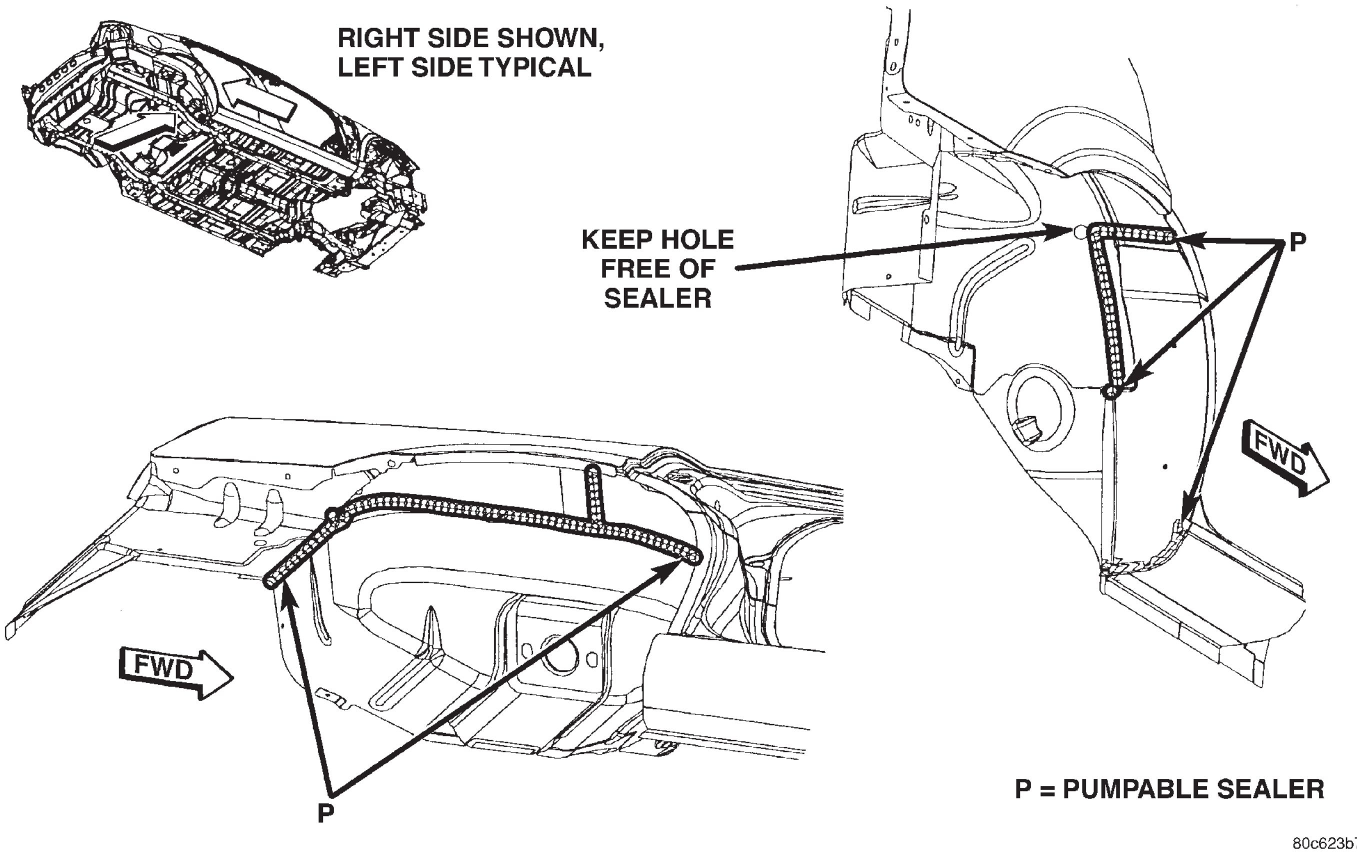


Fig. 53 REAR WHEELHOUSE

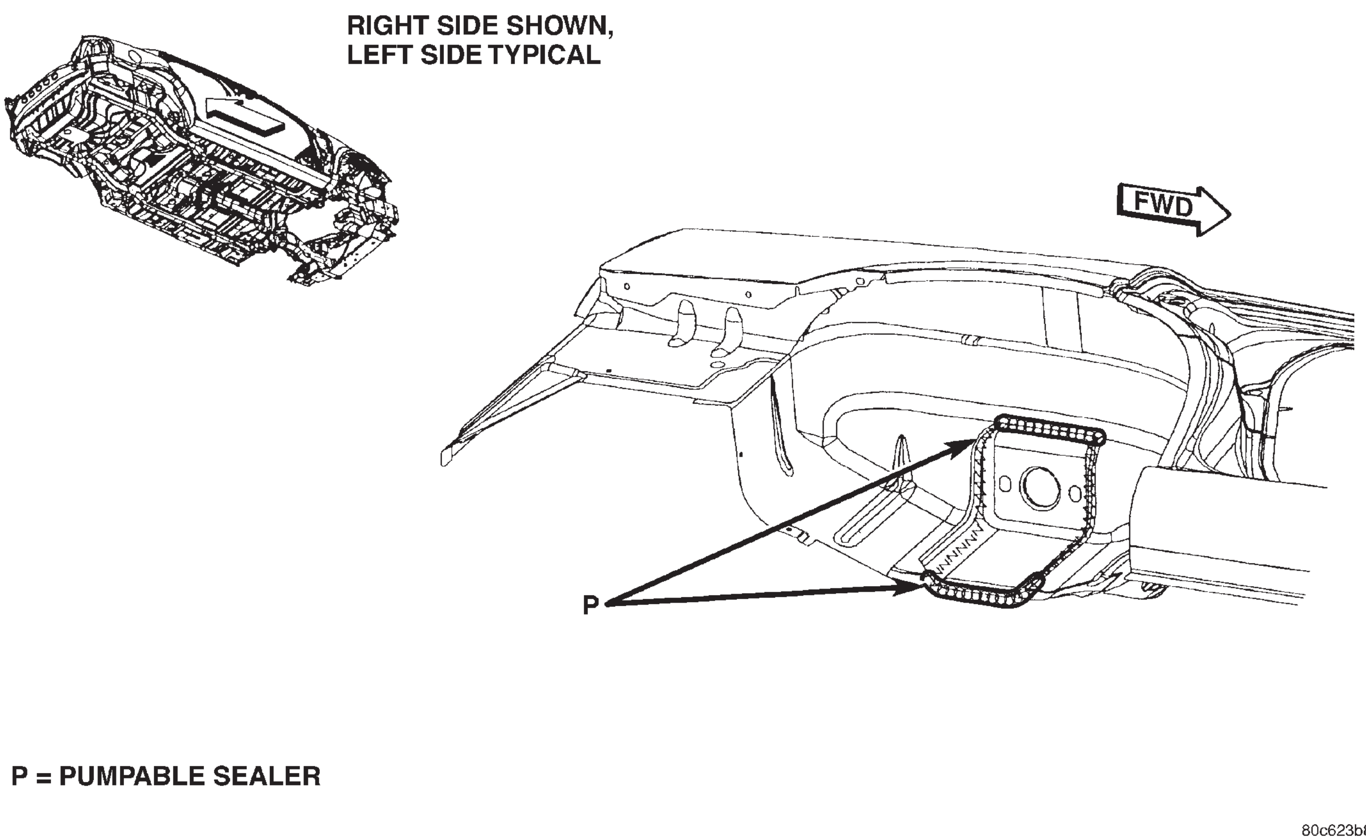


Fig. 54 REAR SHOCK TOWER BRACKET

SEALER LOCATIONS (Continued)

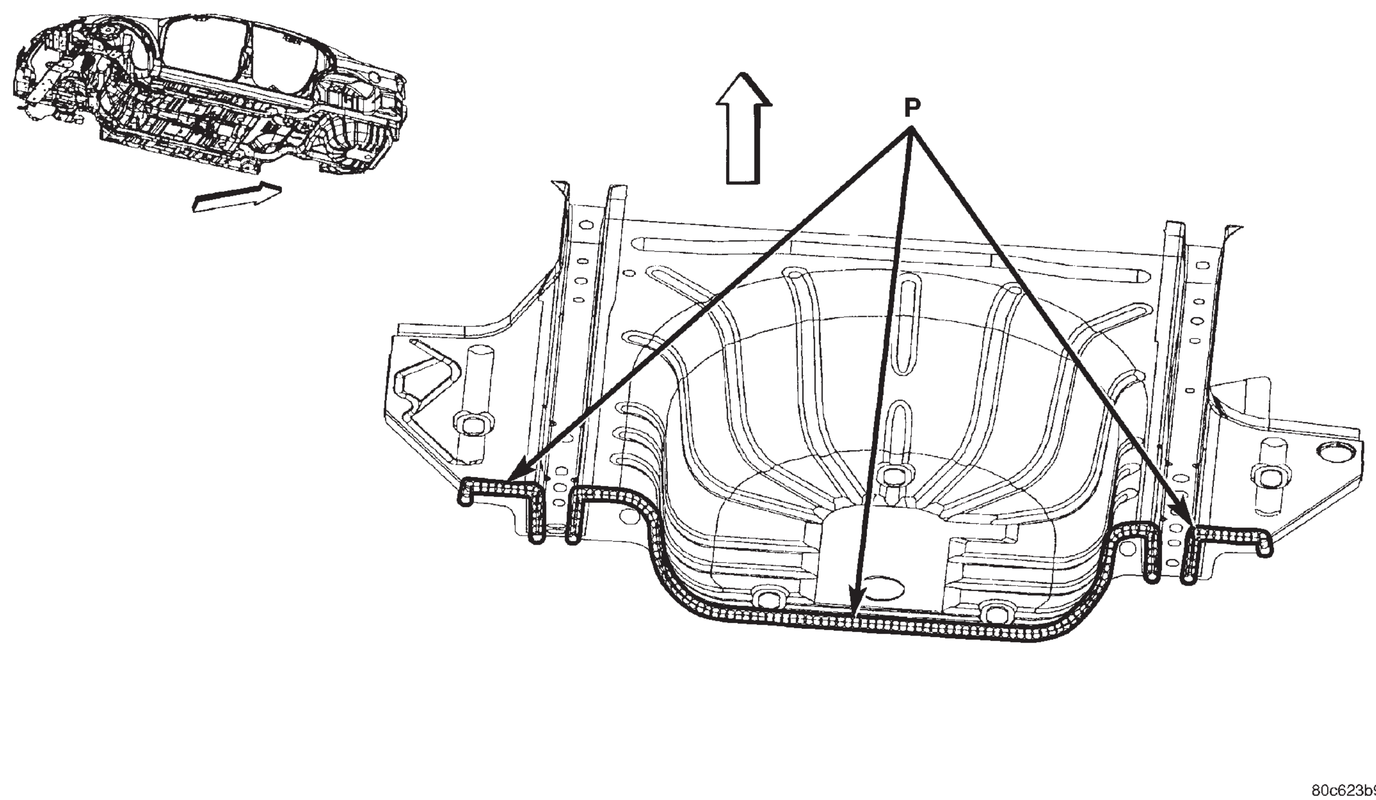


Fig. 55 LOWER REAR FLOOR PAN TO LOWER DECK OPENING

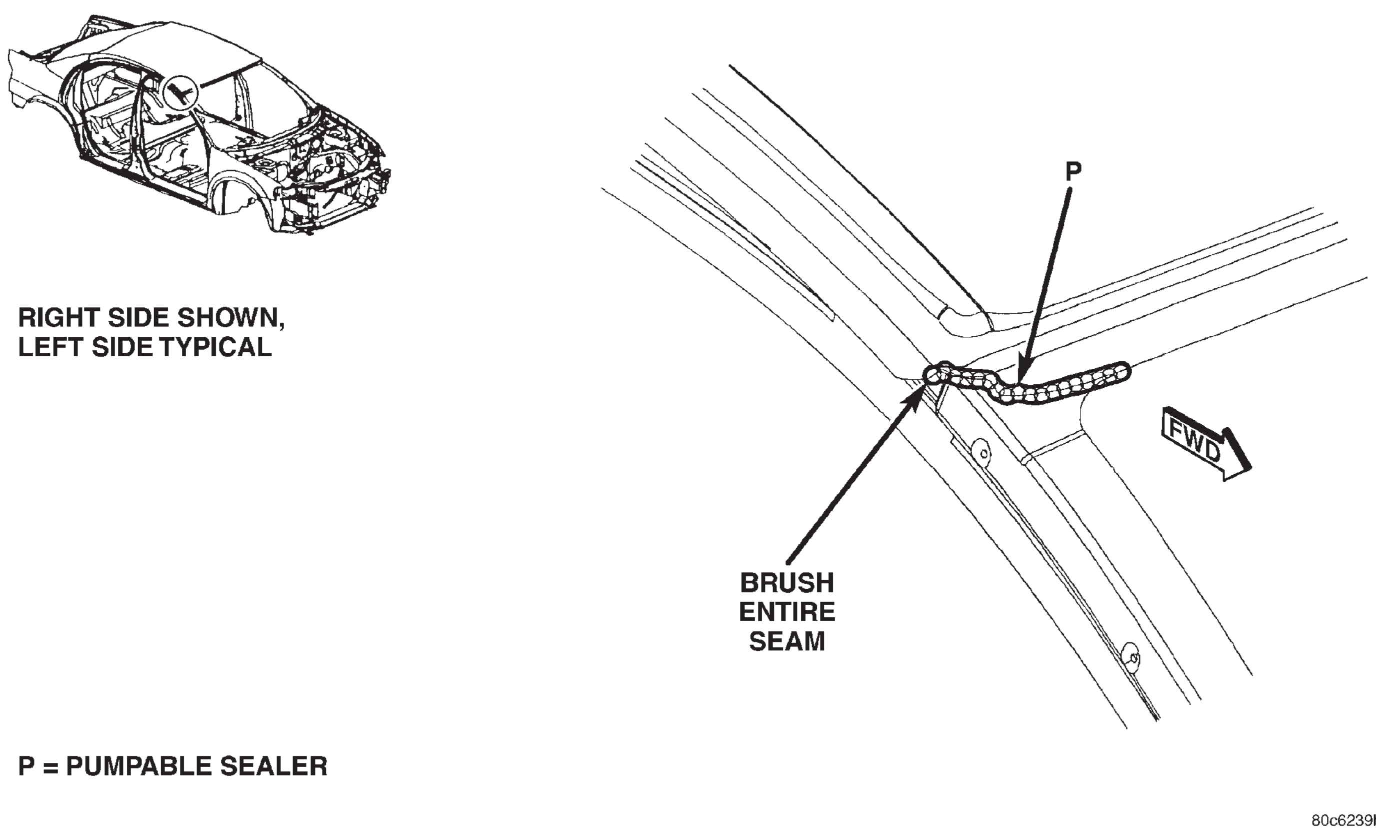


Fig. 56 ROOF TO "A" PILLAR

SEALER LOCATIONS (Continued)

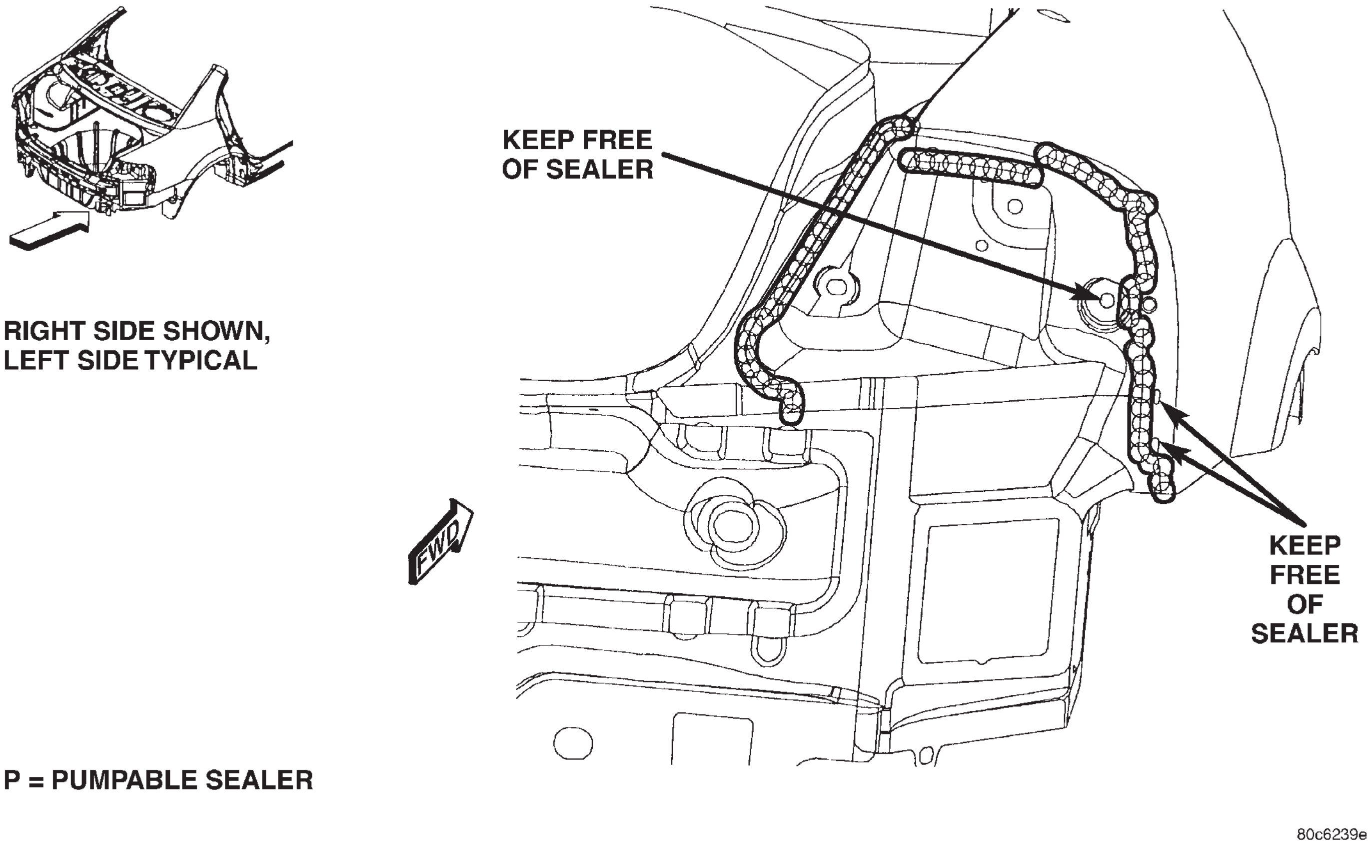


Fig. 57 TAIL LAMP EXTENSION TO QUARTER PANEL & DRAIN THROUGH

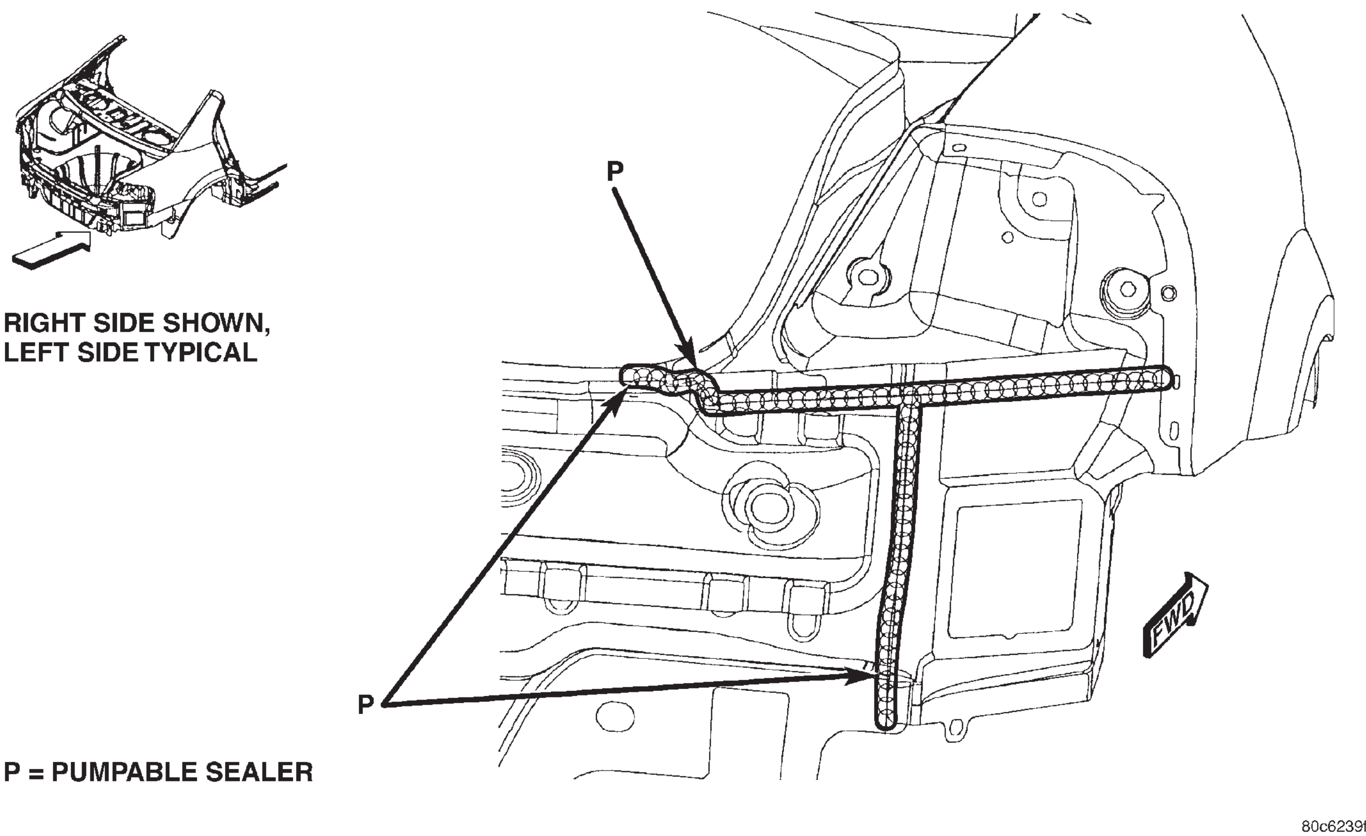


Fig. 58 TAIL LAMP EXTENSION TO LOWER DECKLID PANEL

SEALER LOCATIONS (Continued)

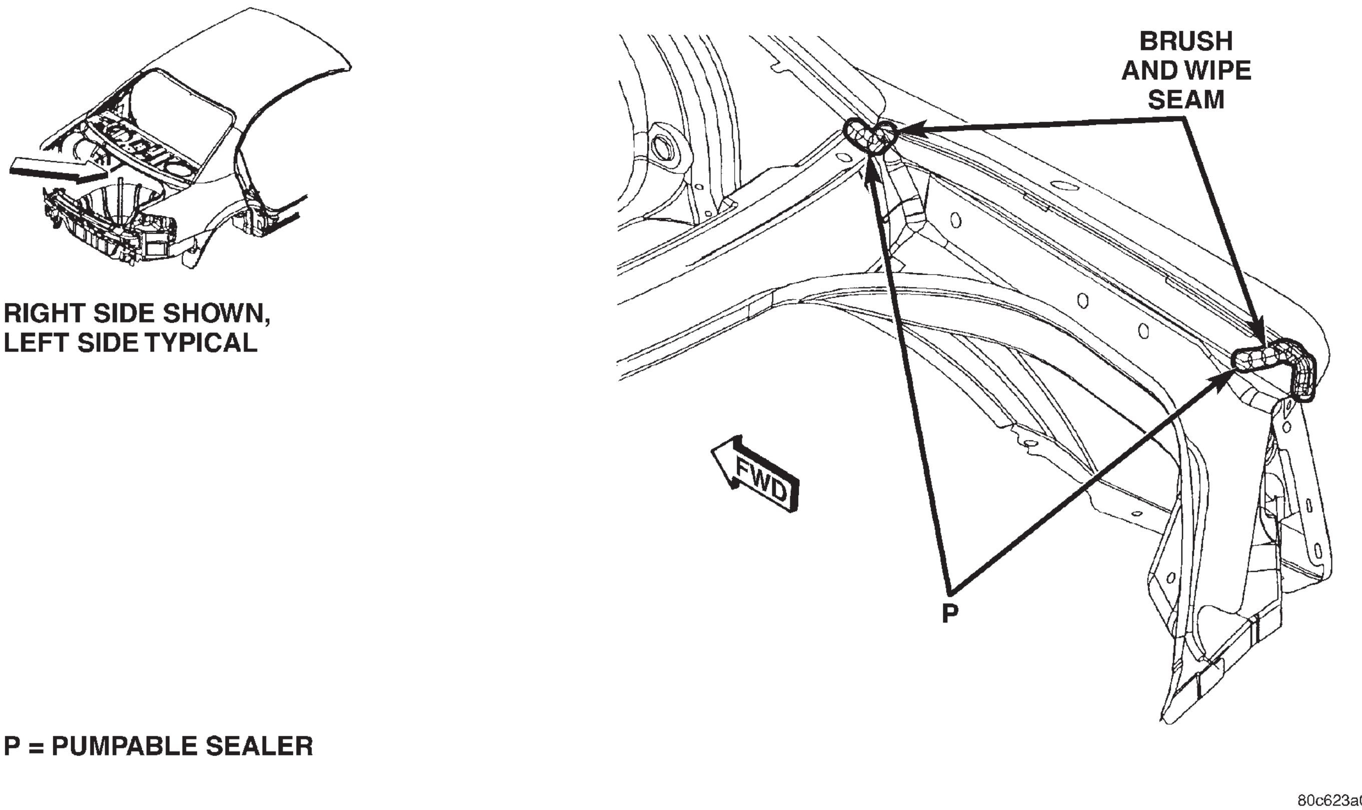


Fig. 59 QUARTER PANEL TO DRAIN TROUGH

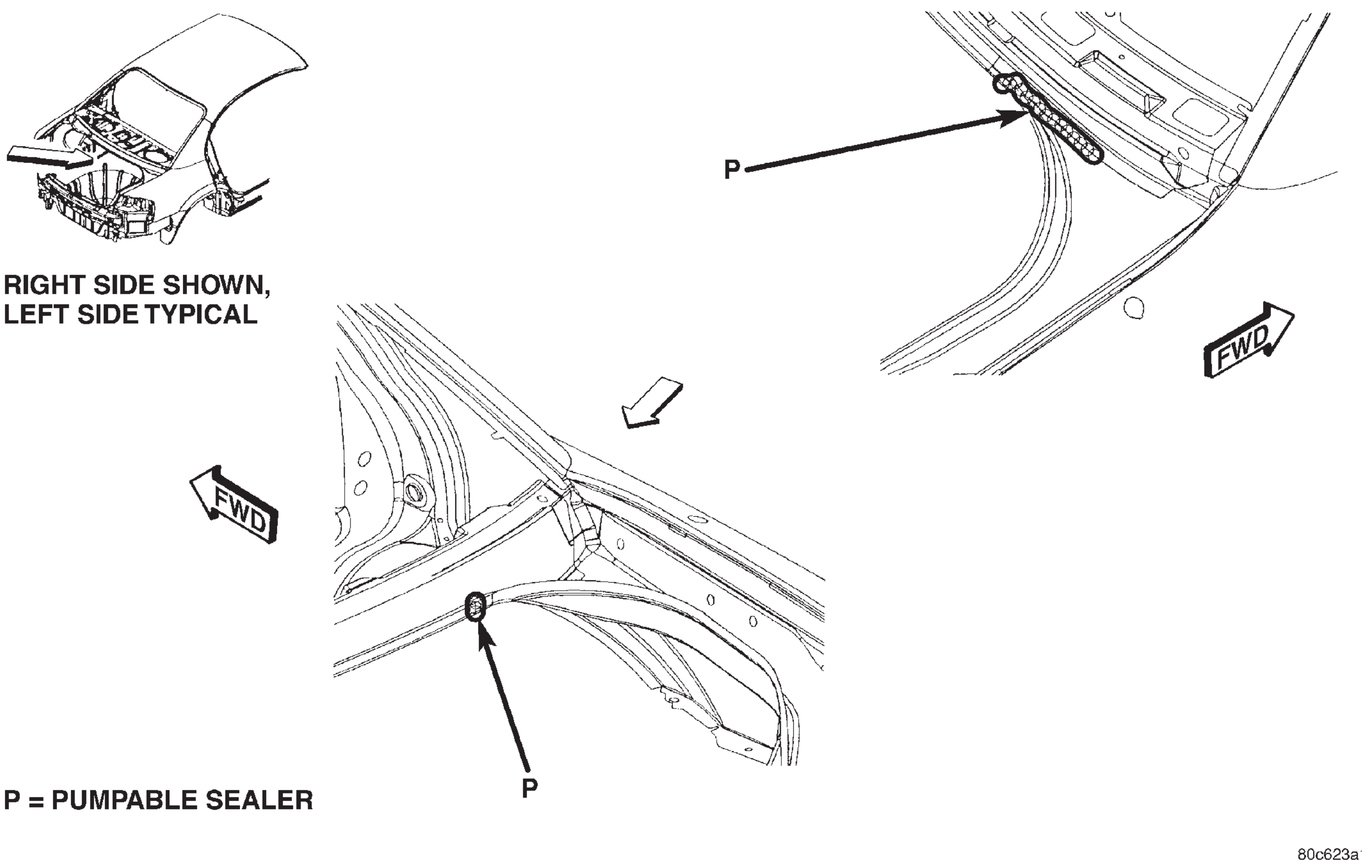


Fig. 60 REAR SHELF PANEL REINFORCEMENT TO DRAIN TROUGH

SEALER LOCATIONS (Continued)

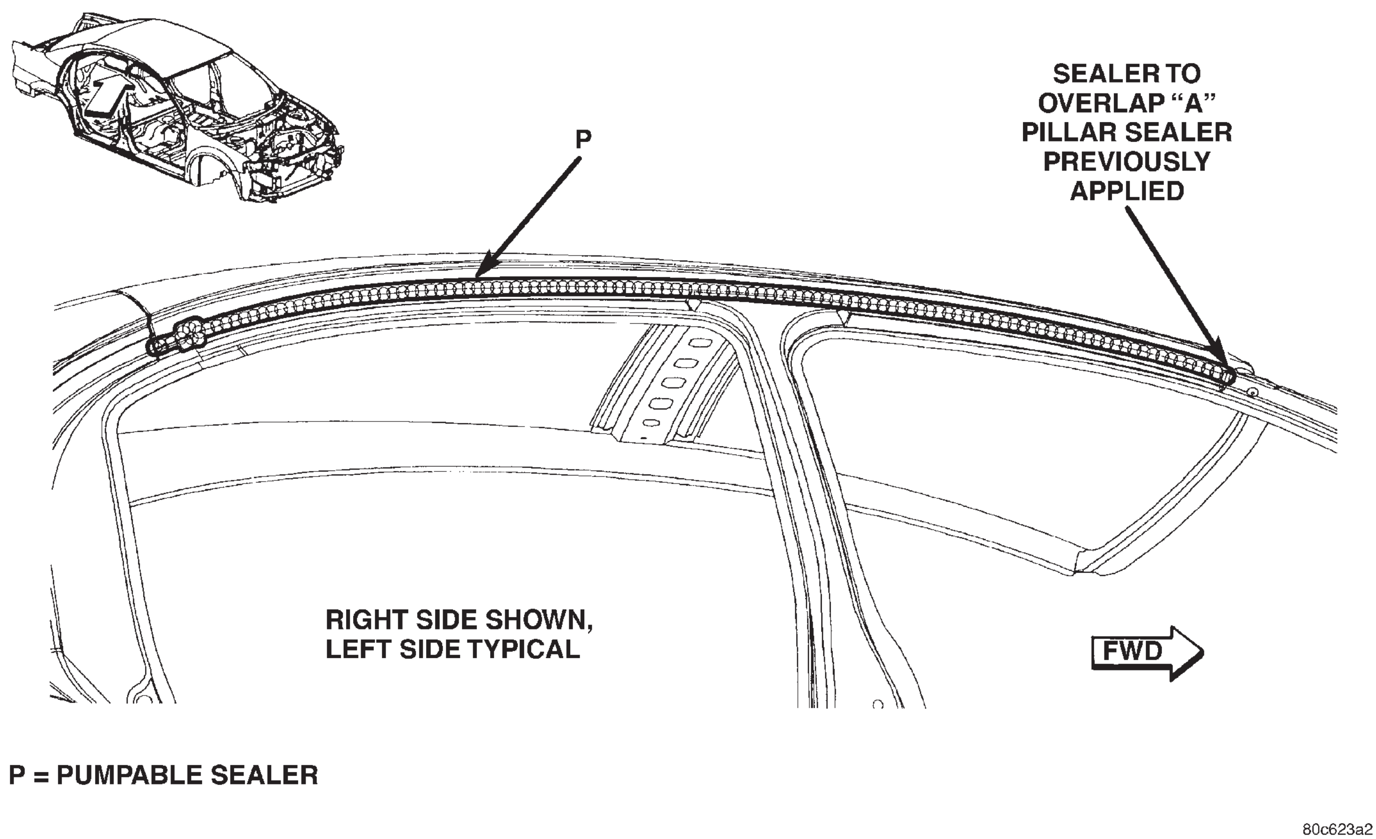


Fig. 61 ROOF DRIP RAIL SEAL SUPPORT

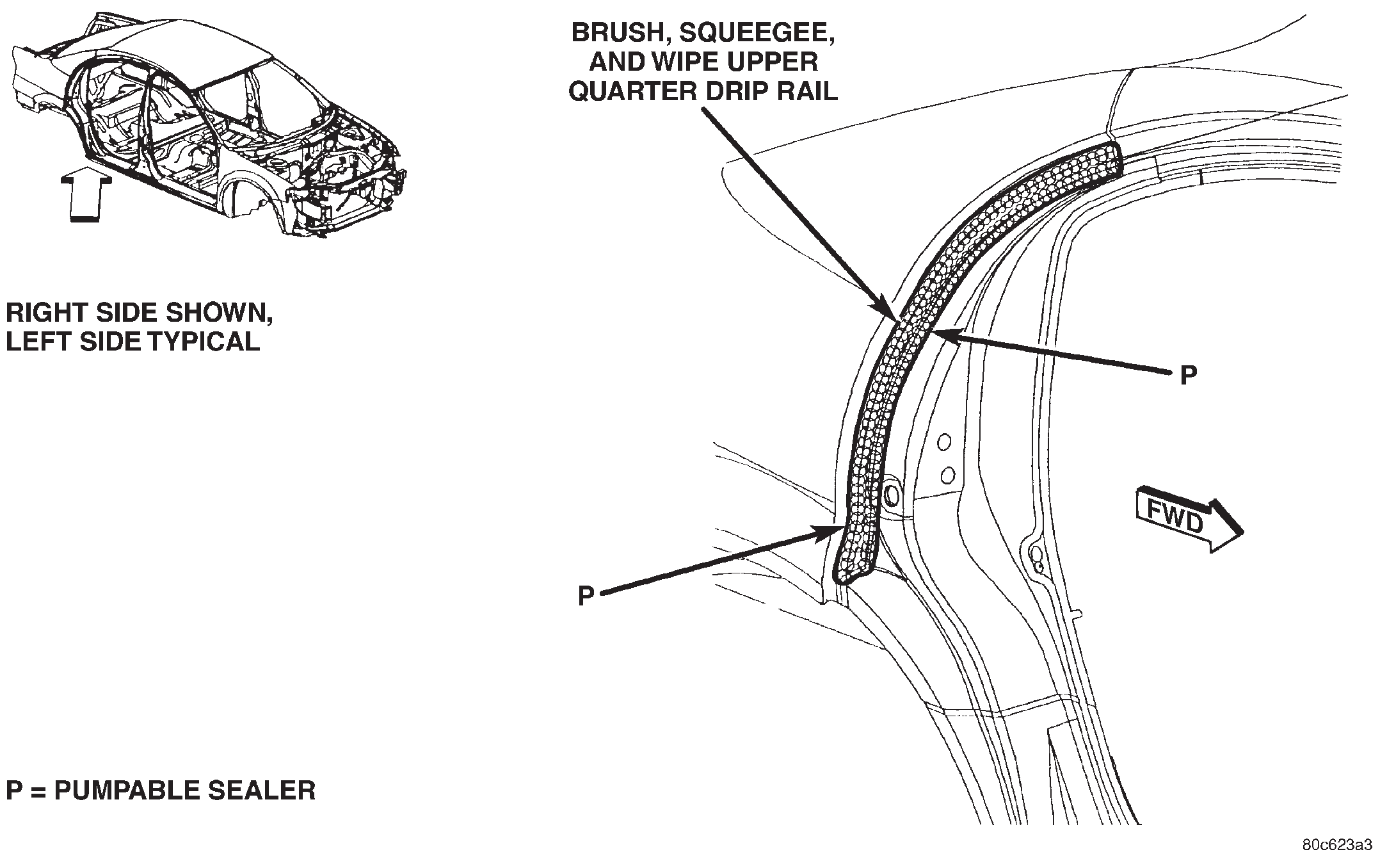


Fig. 62 QUARTER DRIP RAIL SEAL SUPPORT

SEALER LOCATIONS (Continued)

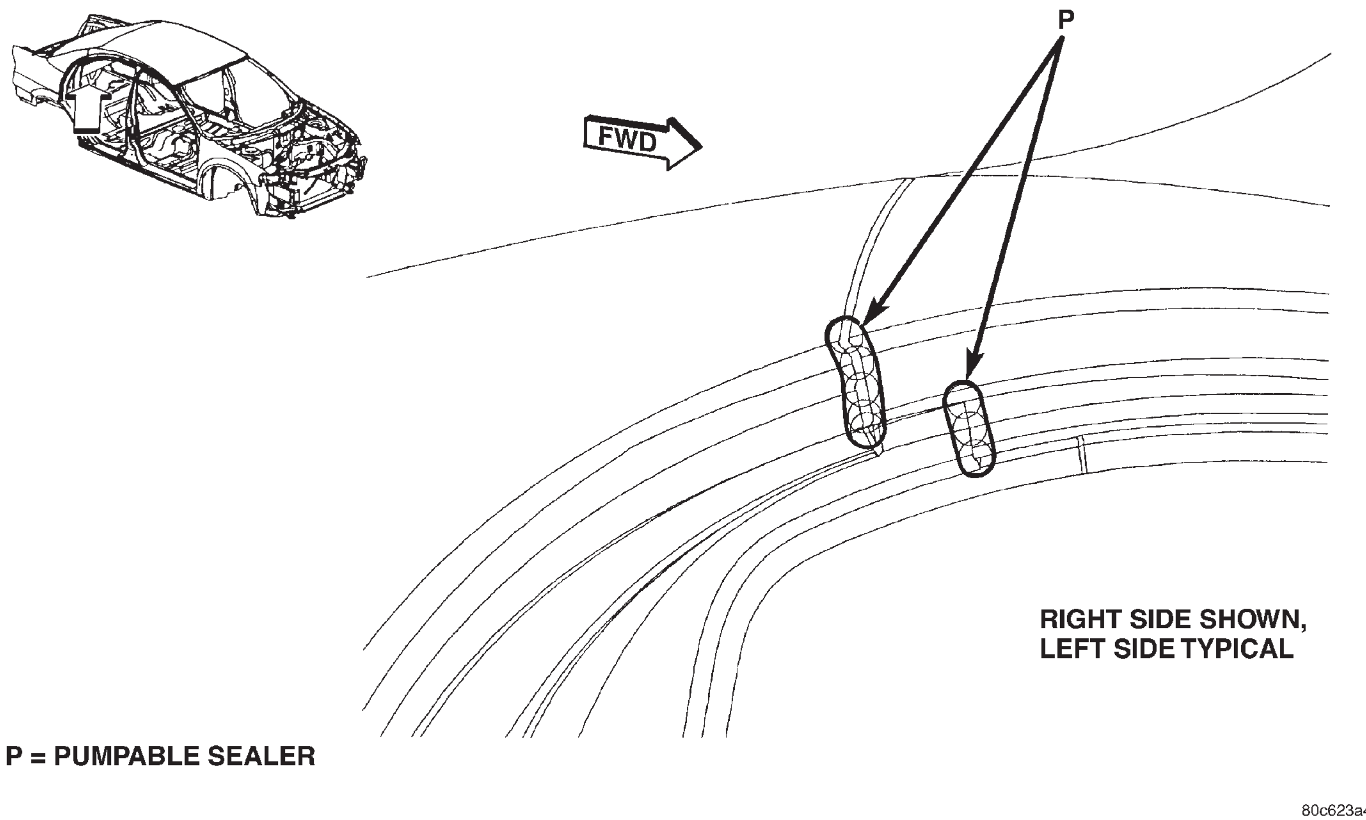


Fig. 63 QUARTER PANEL TO BODY SIDE APERTURE DOOR FRAME JOINT

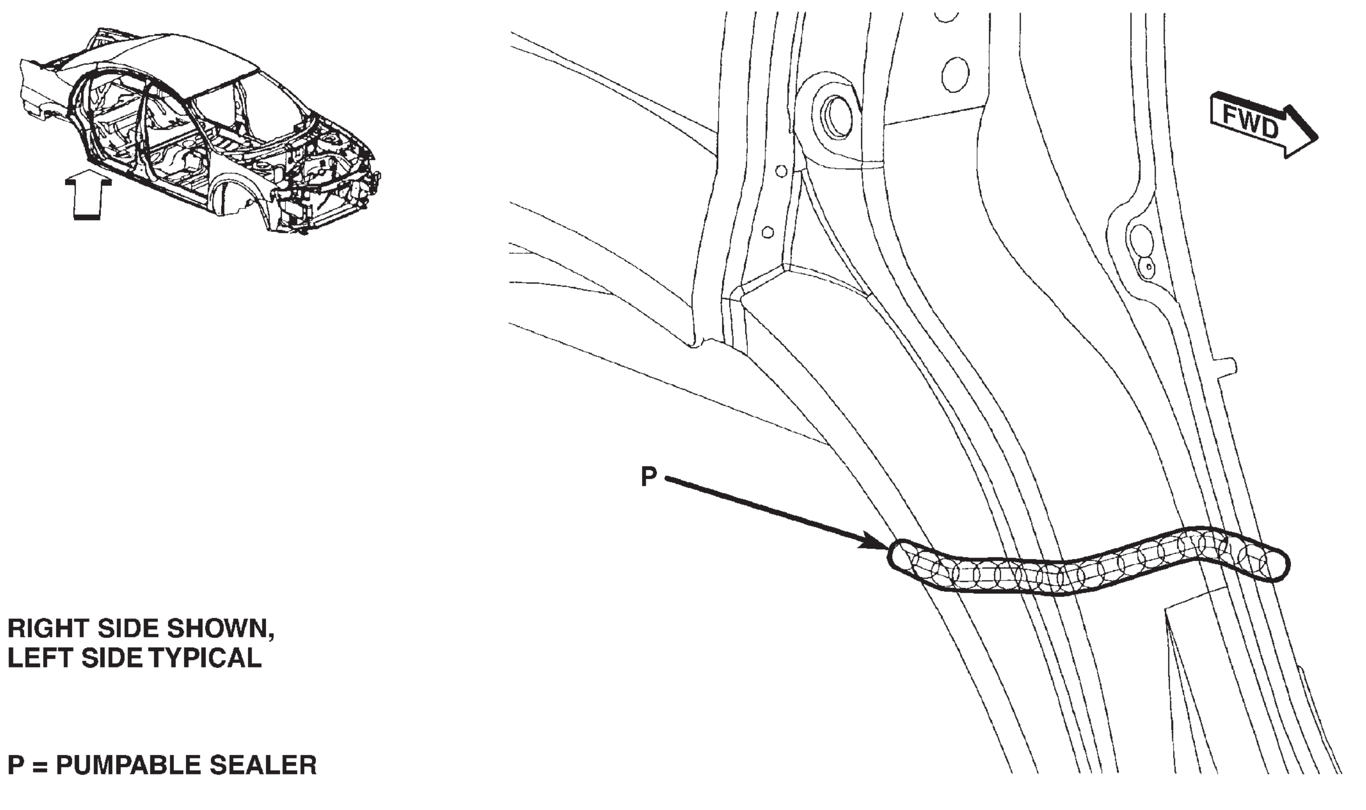


Fig. 64 QUARTER PANEL TO BODY SIDE APERTURE DOG LEG

SEALER LOCATIONS (Continued)

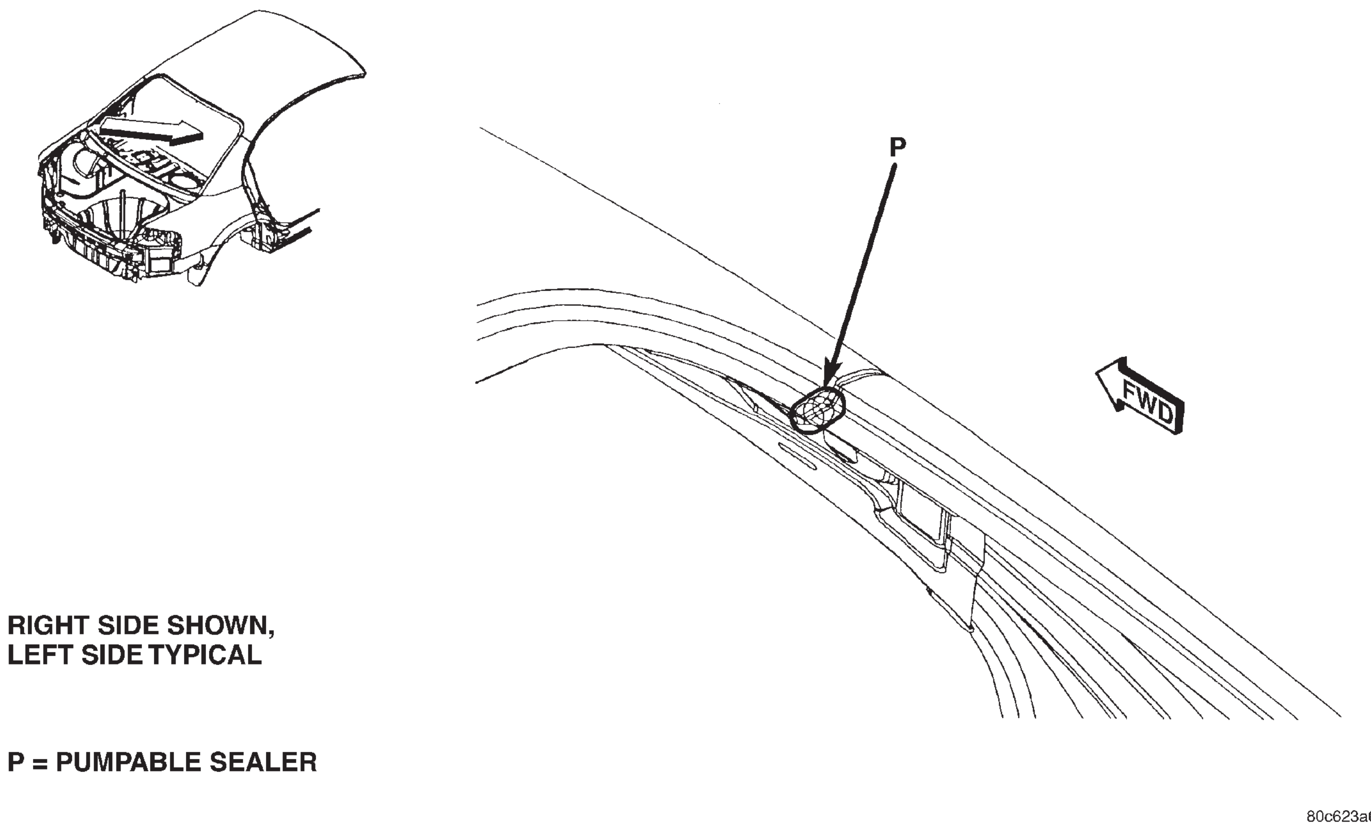


Fig. 65 ROOF FLANGE TO QUARTER PANEL FLANGE

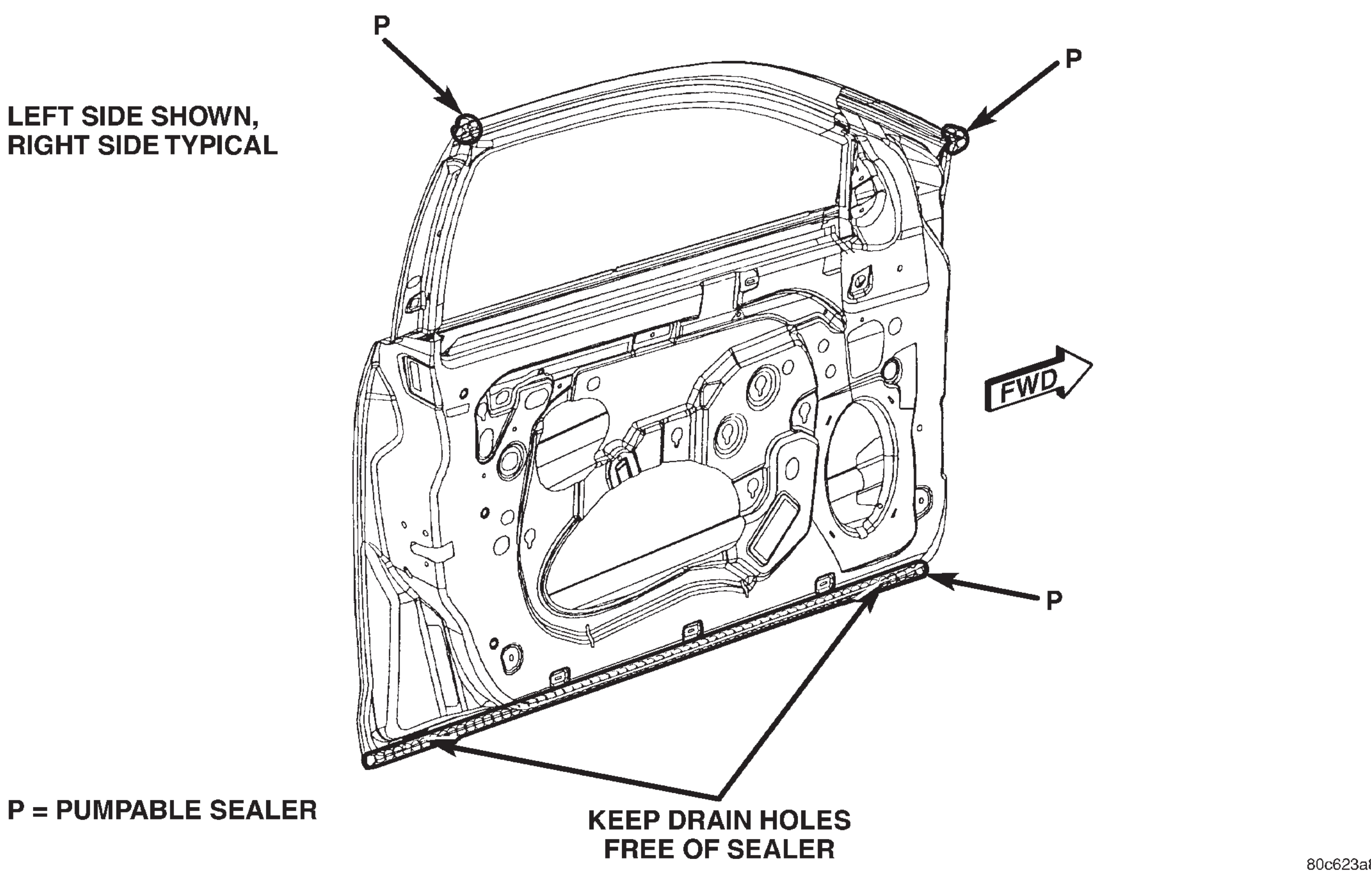


Fig. 66 FRONT DOOR LOWER HEM FLANGE

SEALER LOCATIONS (Continued)

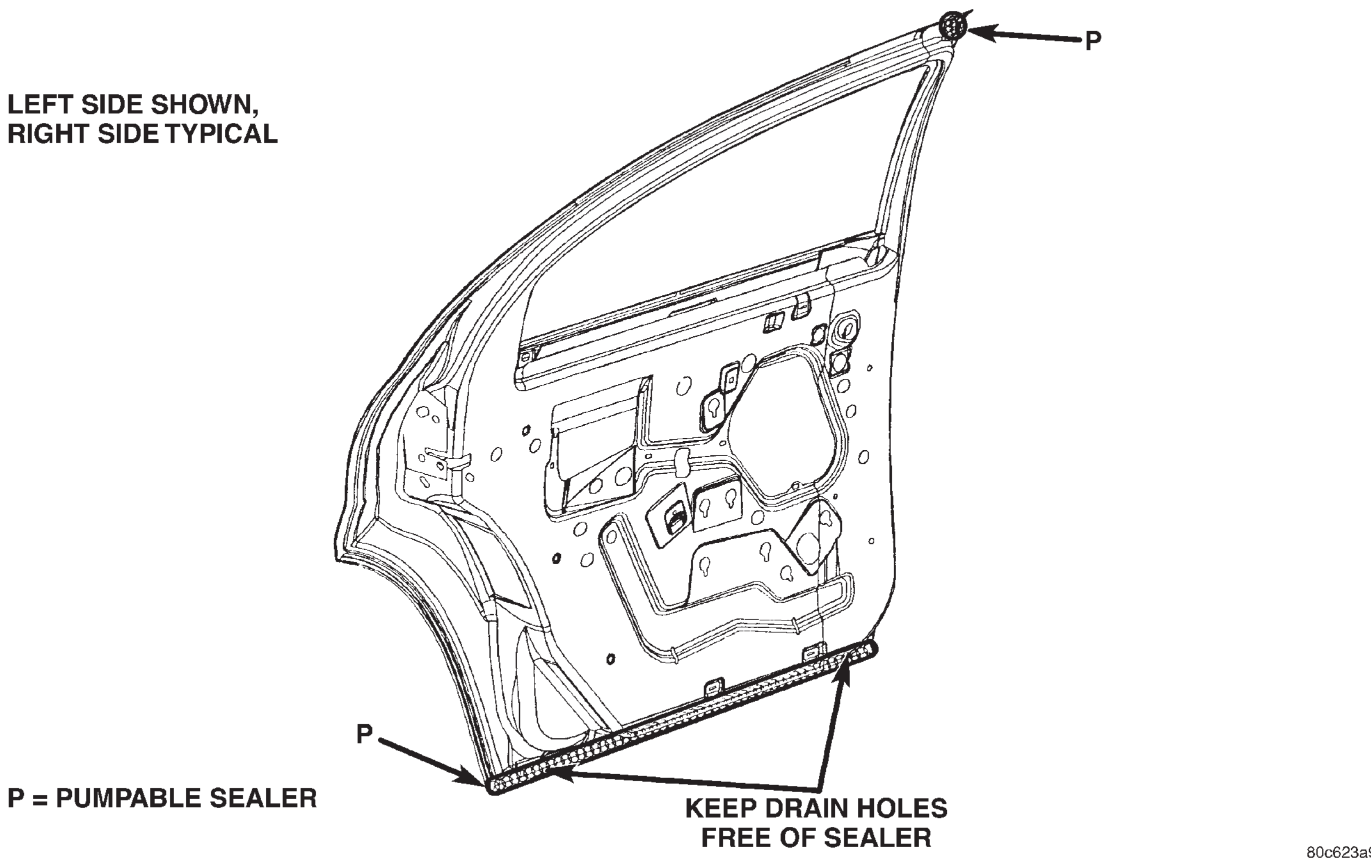


Fig. 67 REAR DOOR LOWER HEM FLANGE

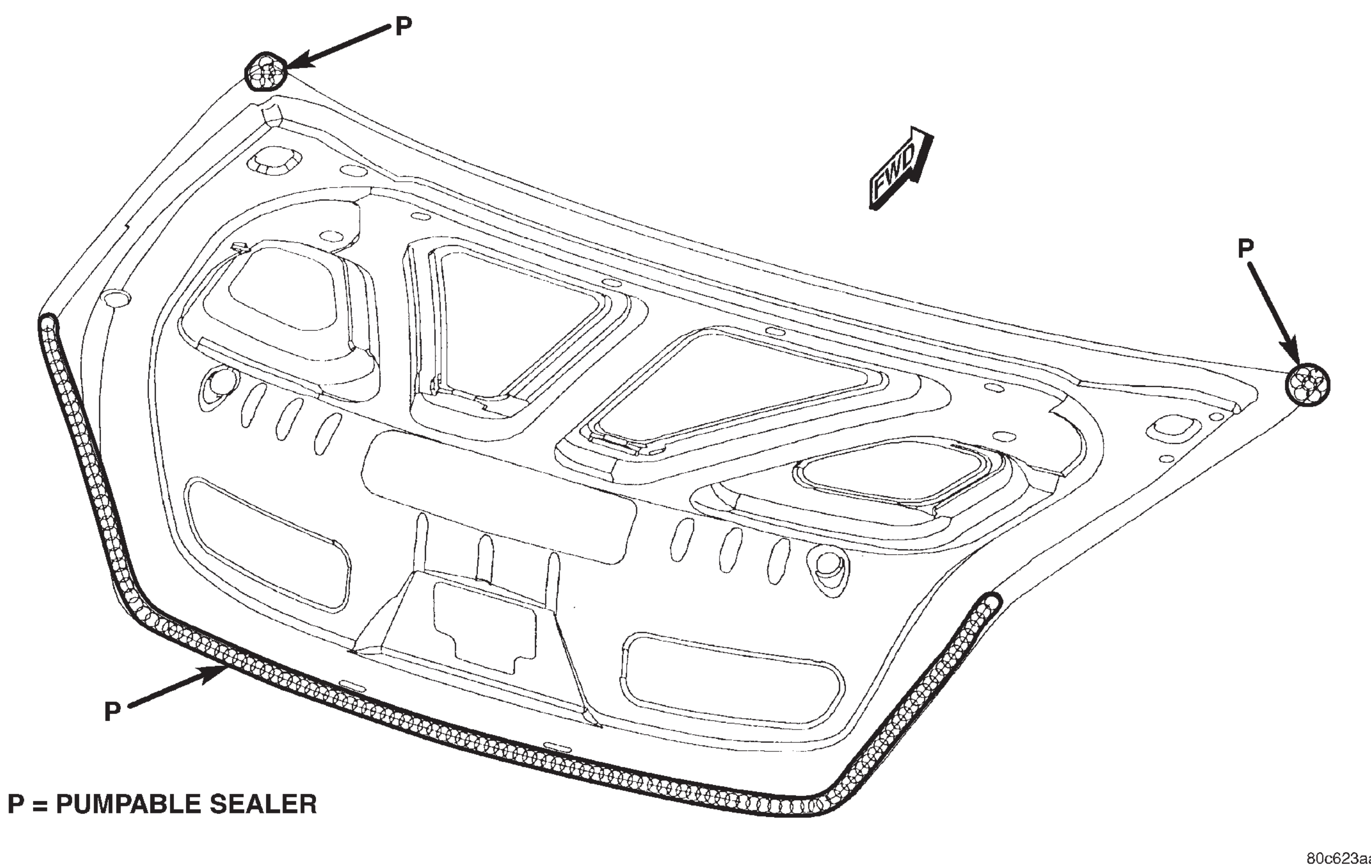


Fig. 68 DECKLID HEM FLANGE

SEALER LOCATIONS (Continued)

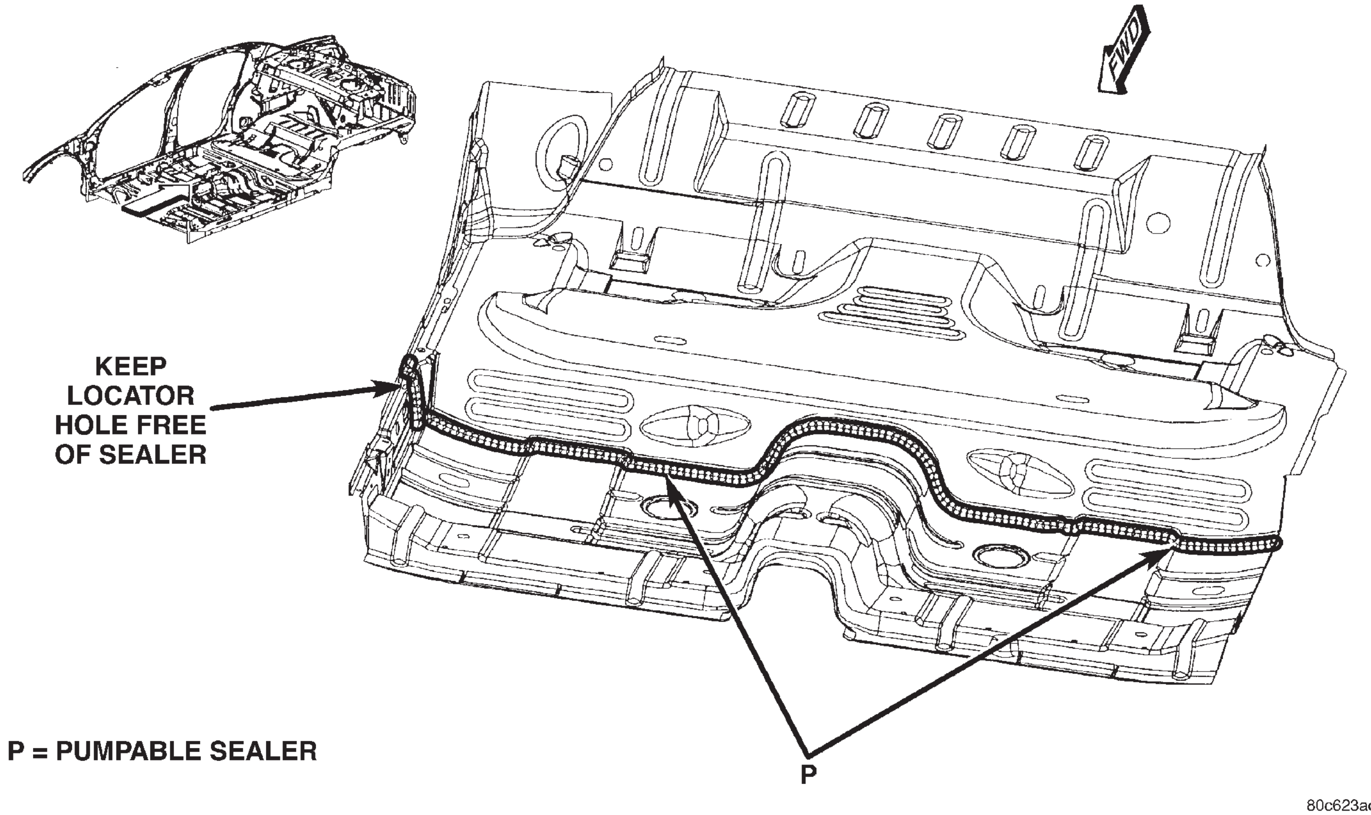


Fig. 69 FRONT FLOOR PAN TO REAR FLOOR PAN

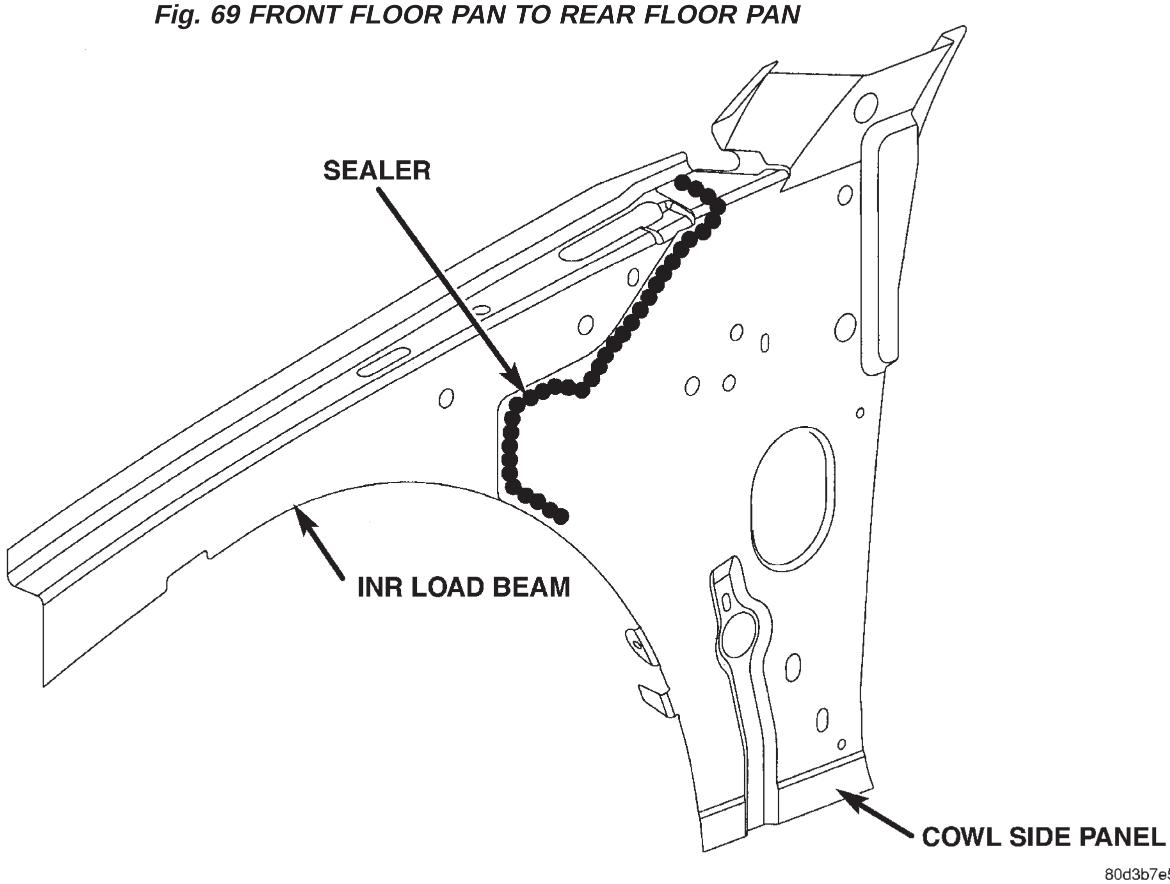


Fig. 70 INNER UPPER LOAD BEAM & COWL SIDE PANEL

SEALER LOCATIONS (Continued)

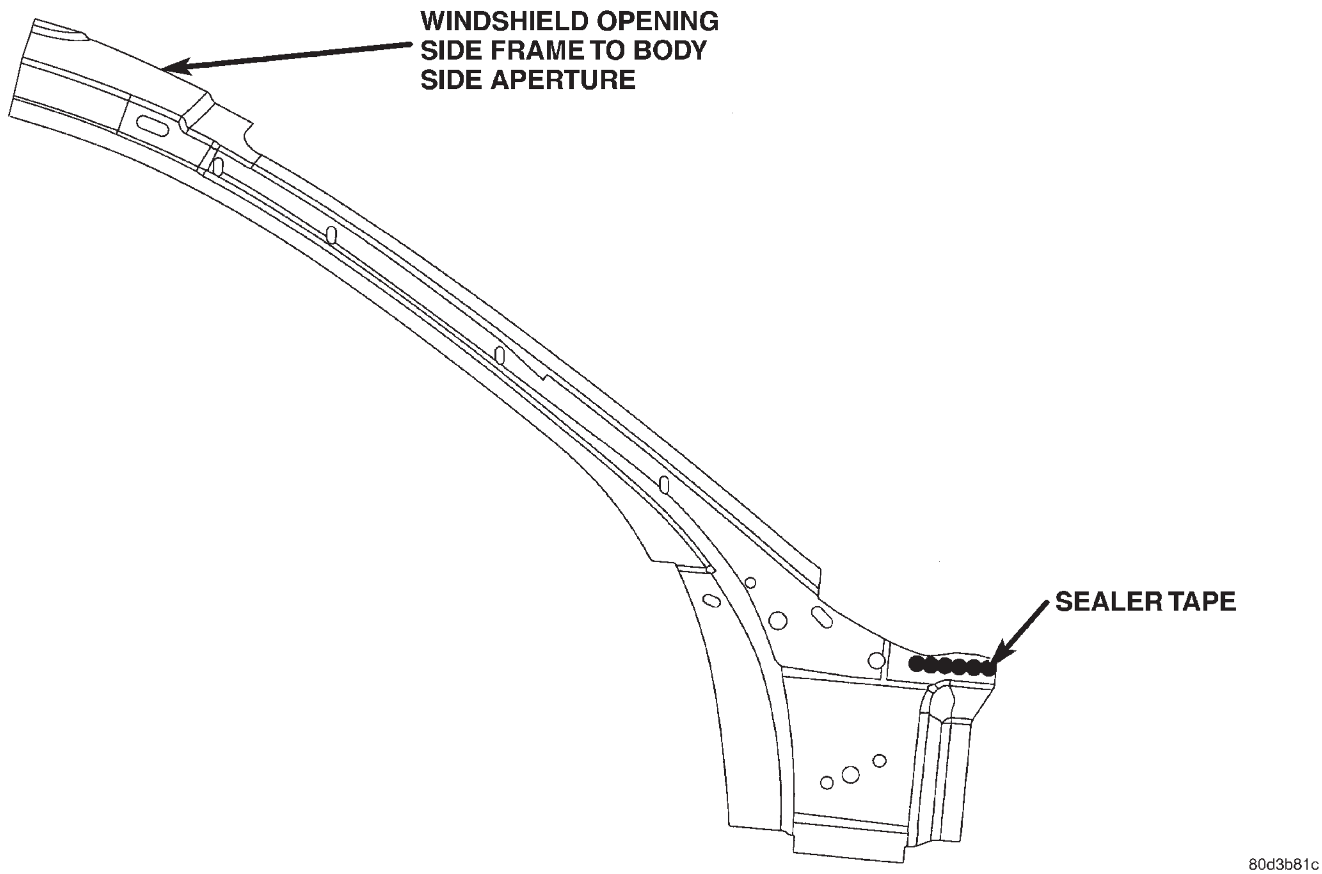


Fig. 71 WINDSHIELD OPENING SIDE FRAME & BODY SIDE APERTURE

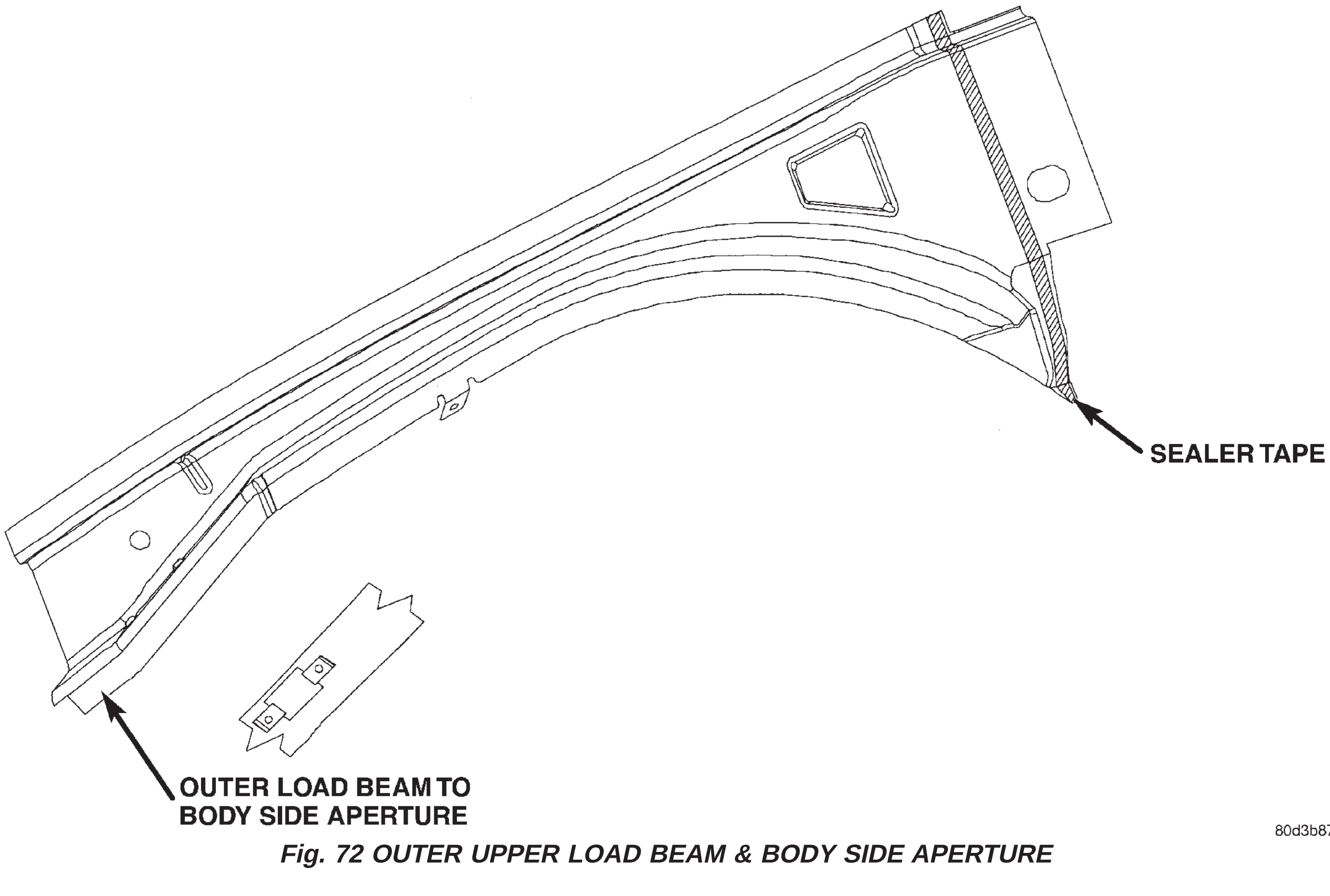


Fig. 72 OUTER UPPER LOAD BEAM & BODY SIDE APERTURE

SEALER LOCATIONS (Continued)

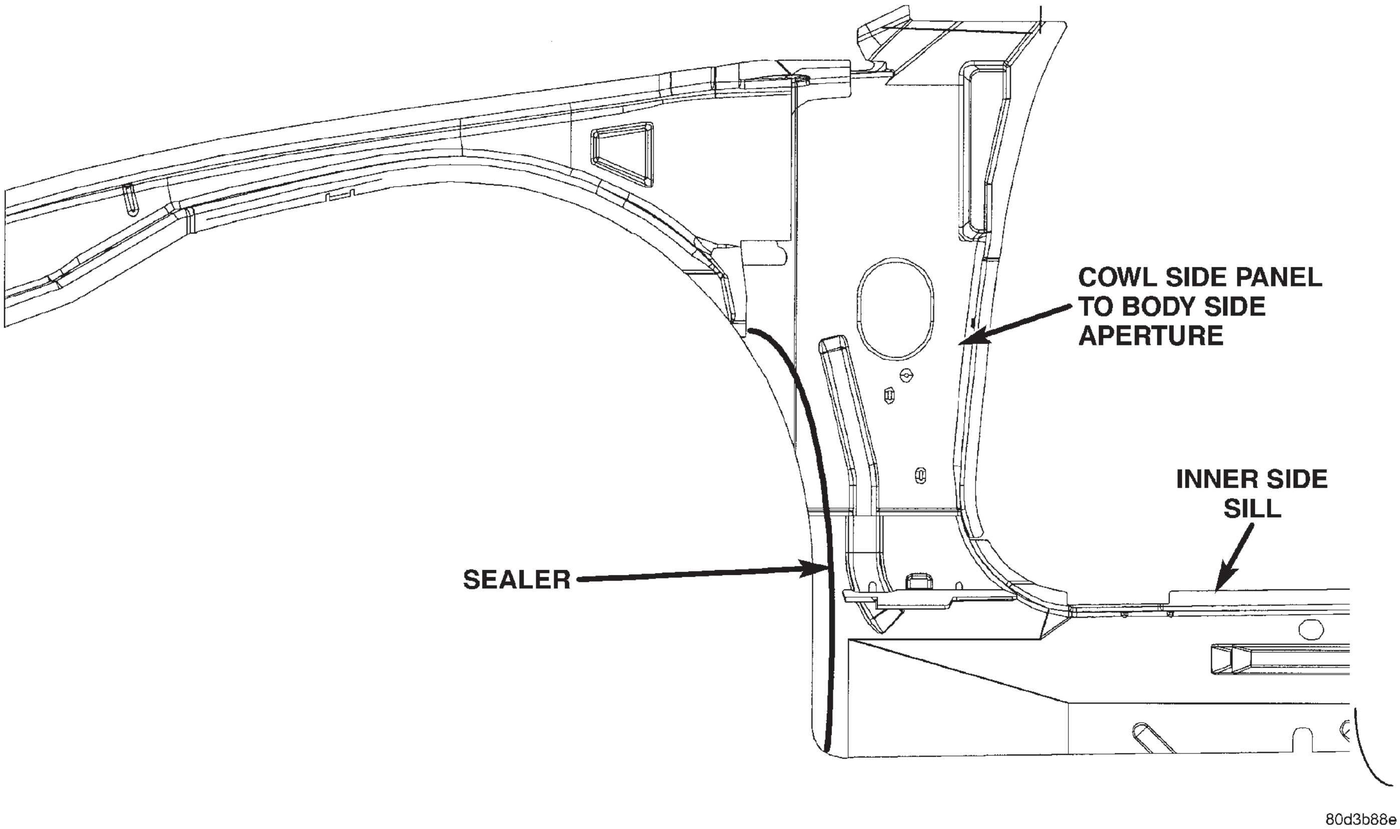


Fig. 73 COWL SIDE PANEL, BODY SIDE APERTURE & INNER SIDE SILL

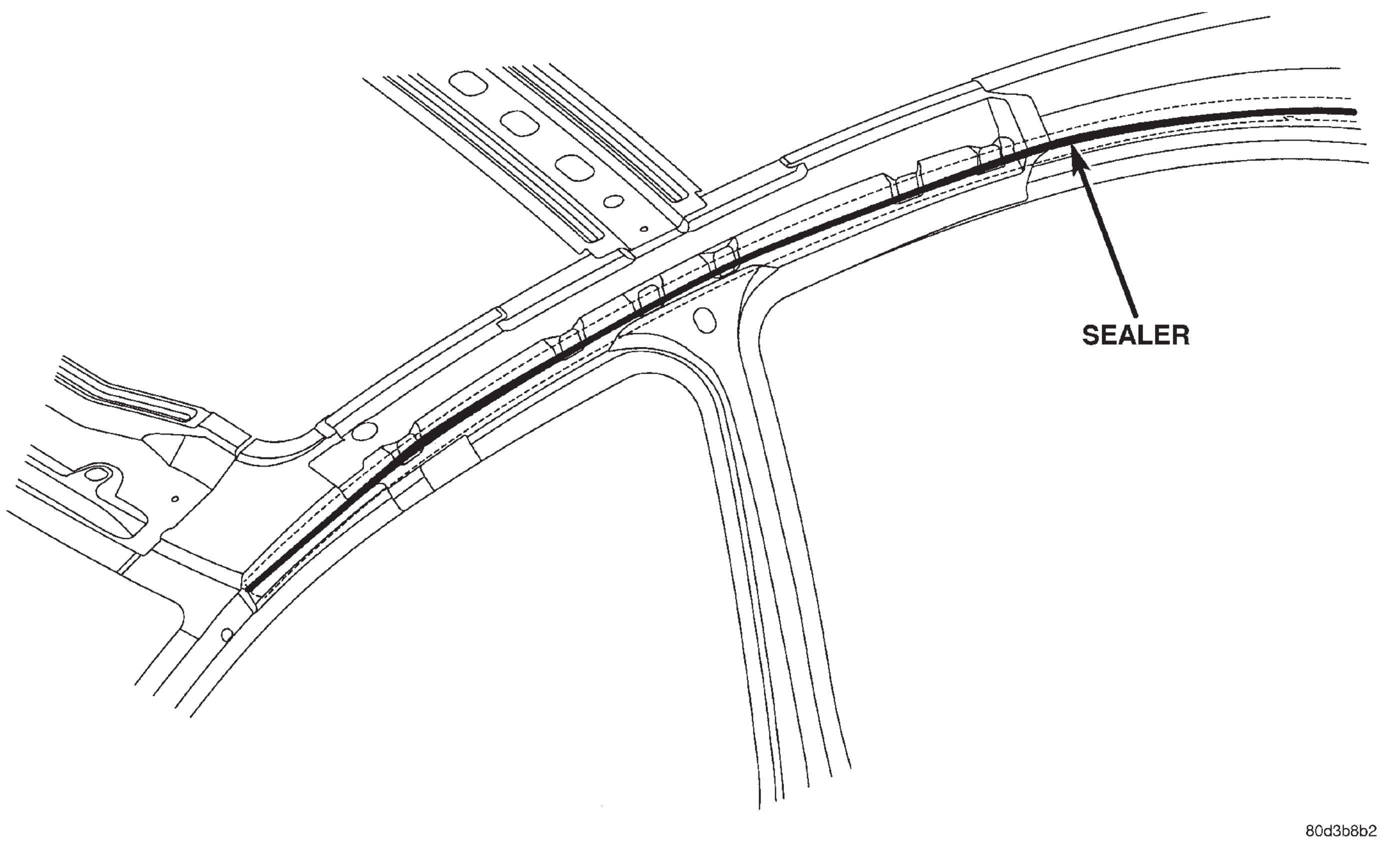


Fig. 74 ROOF SUPPORT, DRIP RAIL & ROOF PANEL

STRUCTURAL ADHESIVE LOCATIONS

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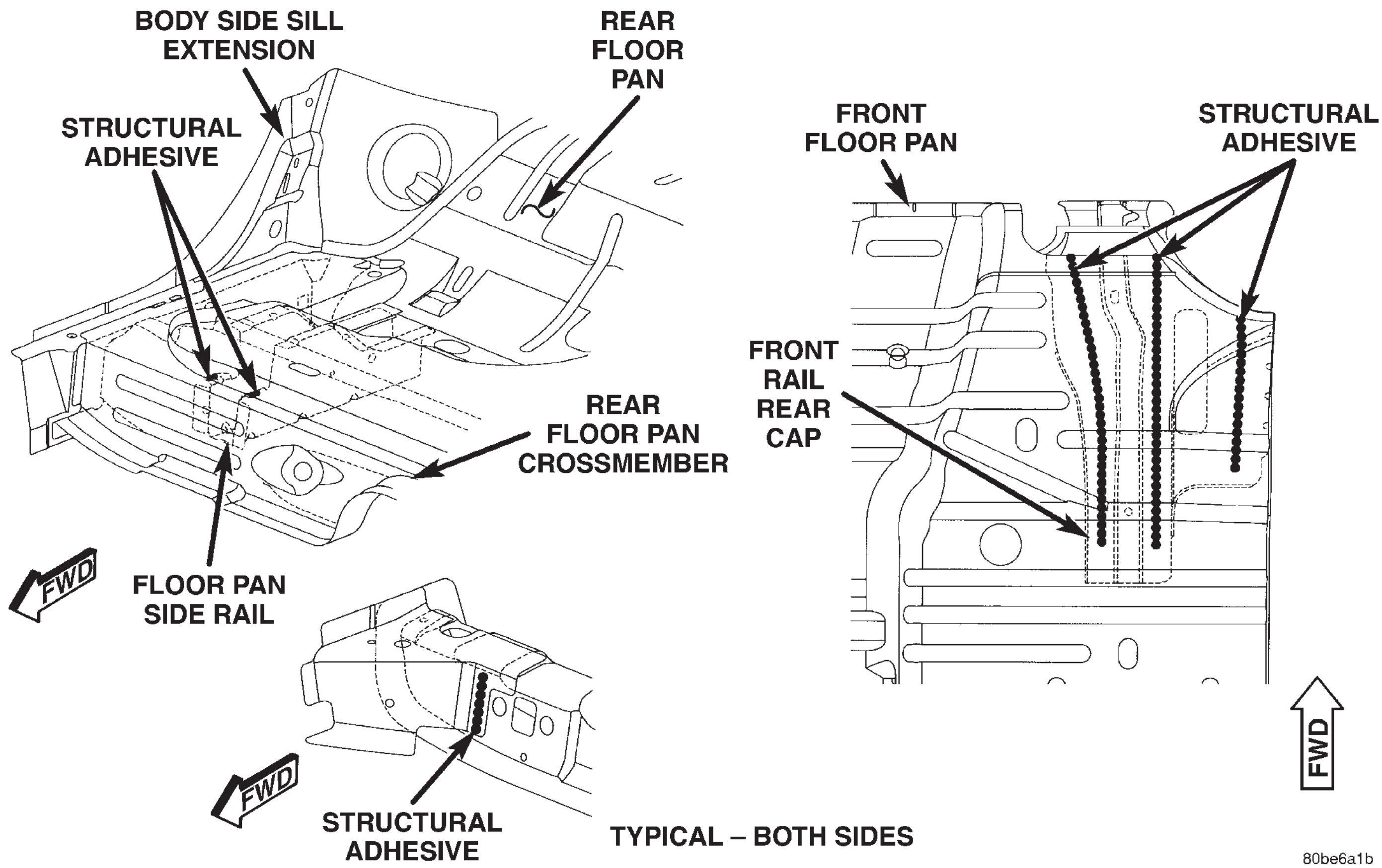

Fig. 75 FRONT AND REAR FLOOR PANS

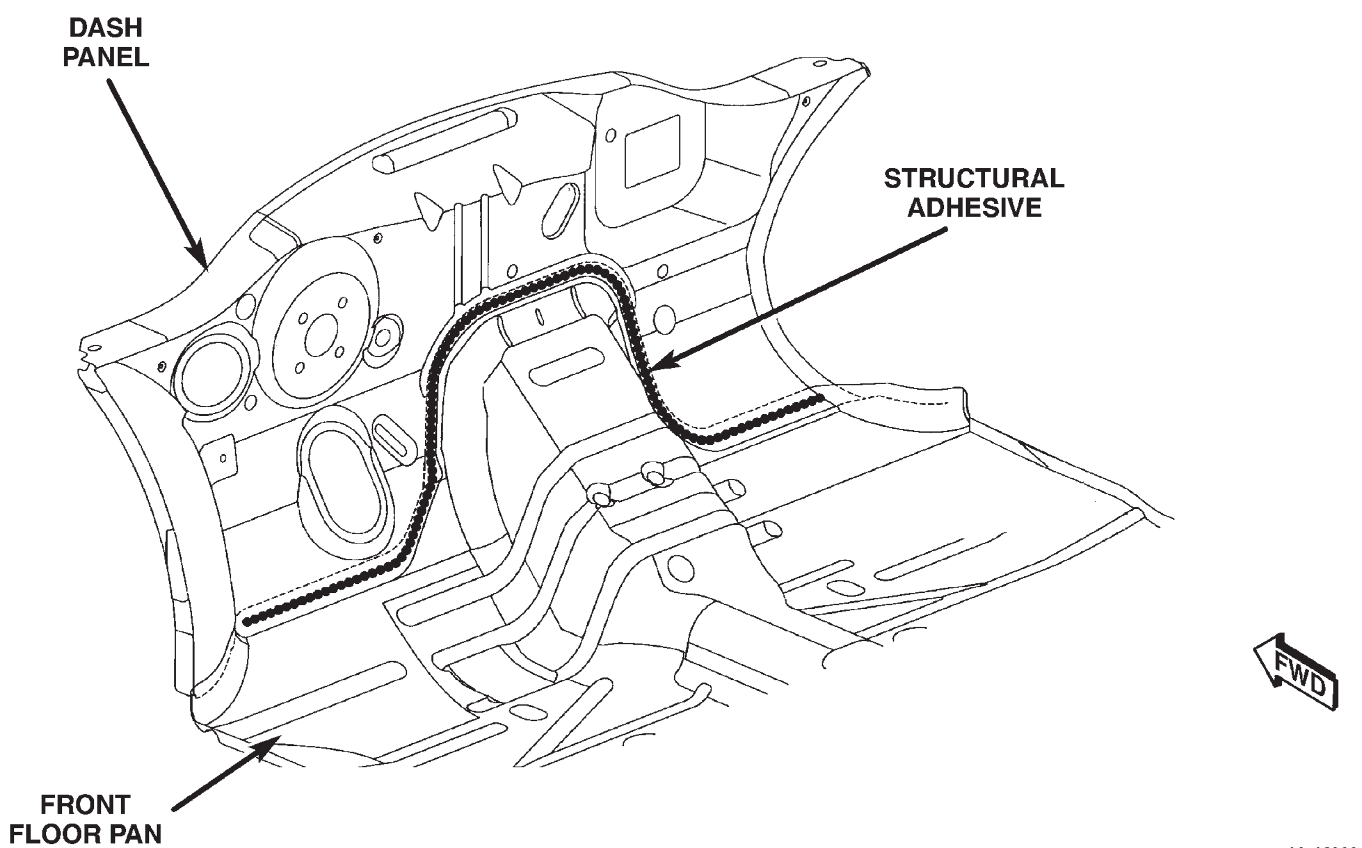

Fig. 76 FRONT FLOOR PAN AND DASH PANEL

STRUCTURAL ADHESIVE LOCATIONS (Continued)

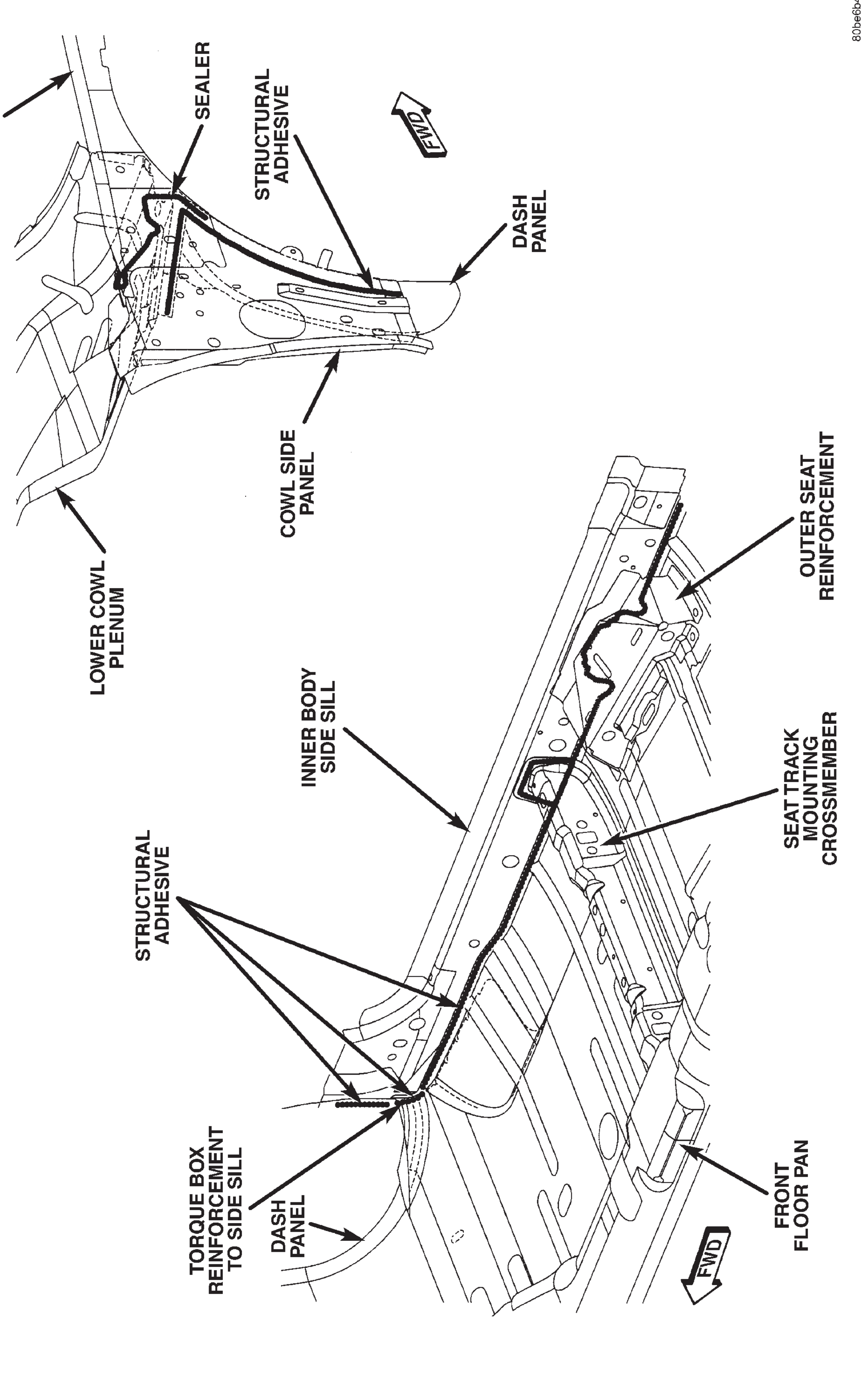

Fig. 77 FRONT FLOOR PAN, COWL SIDE PANEL AND INNER BODY SIDE SILL

STRUCTURAL ADHESIVE LOCATIONS (Continued)

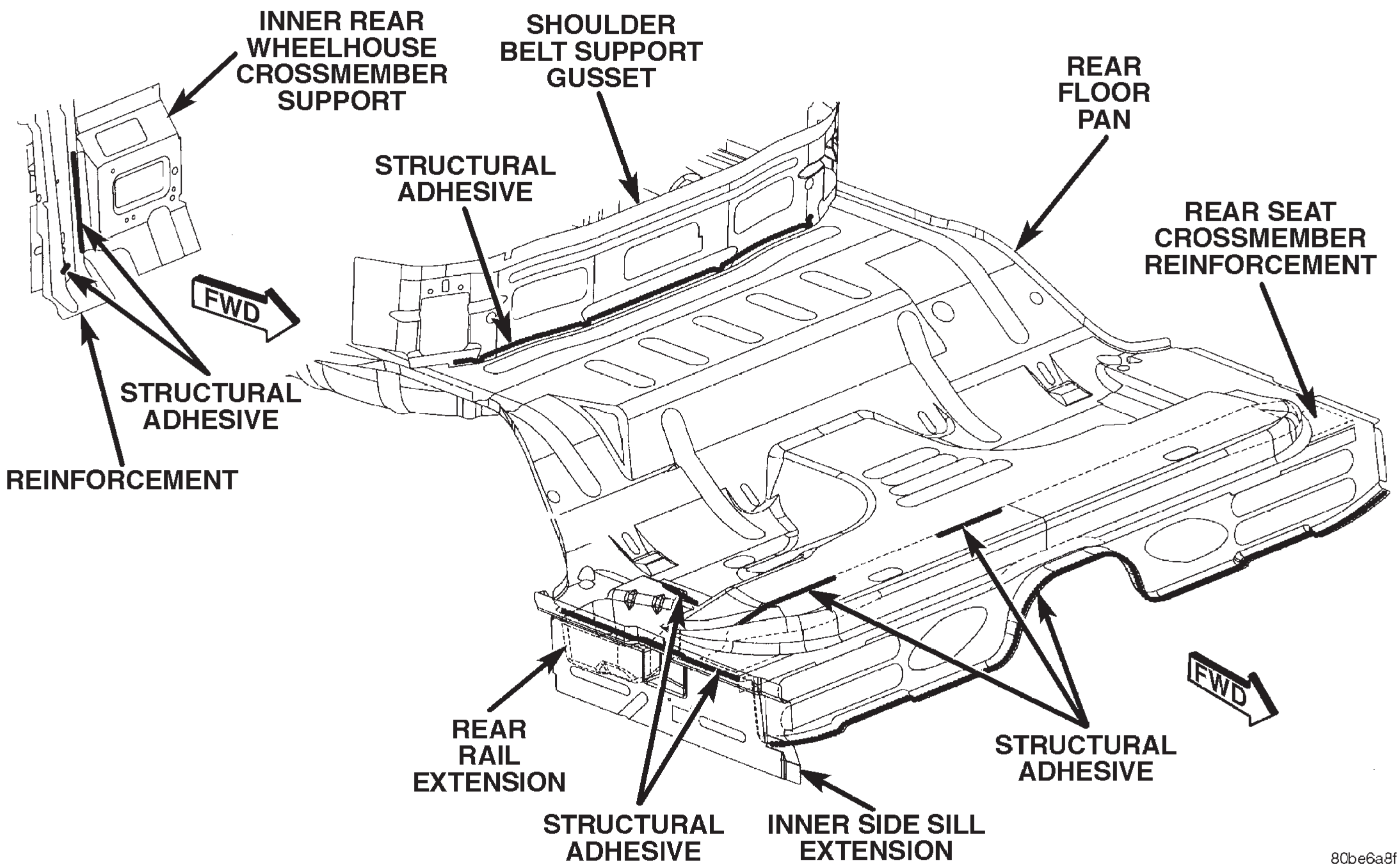

Fig. 78 REAR FLOOR PAN

STRUCTURAL ADHESIVE LOCATIONS (Continued)

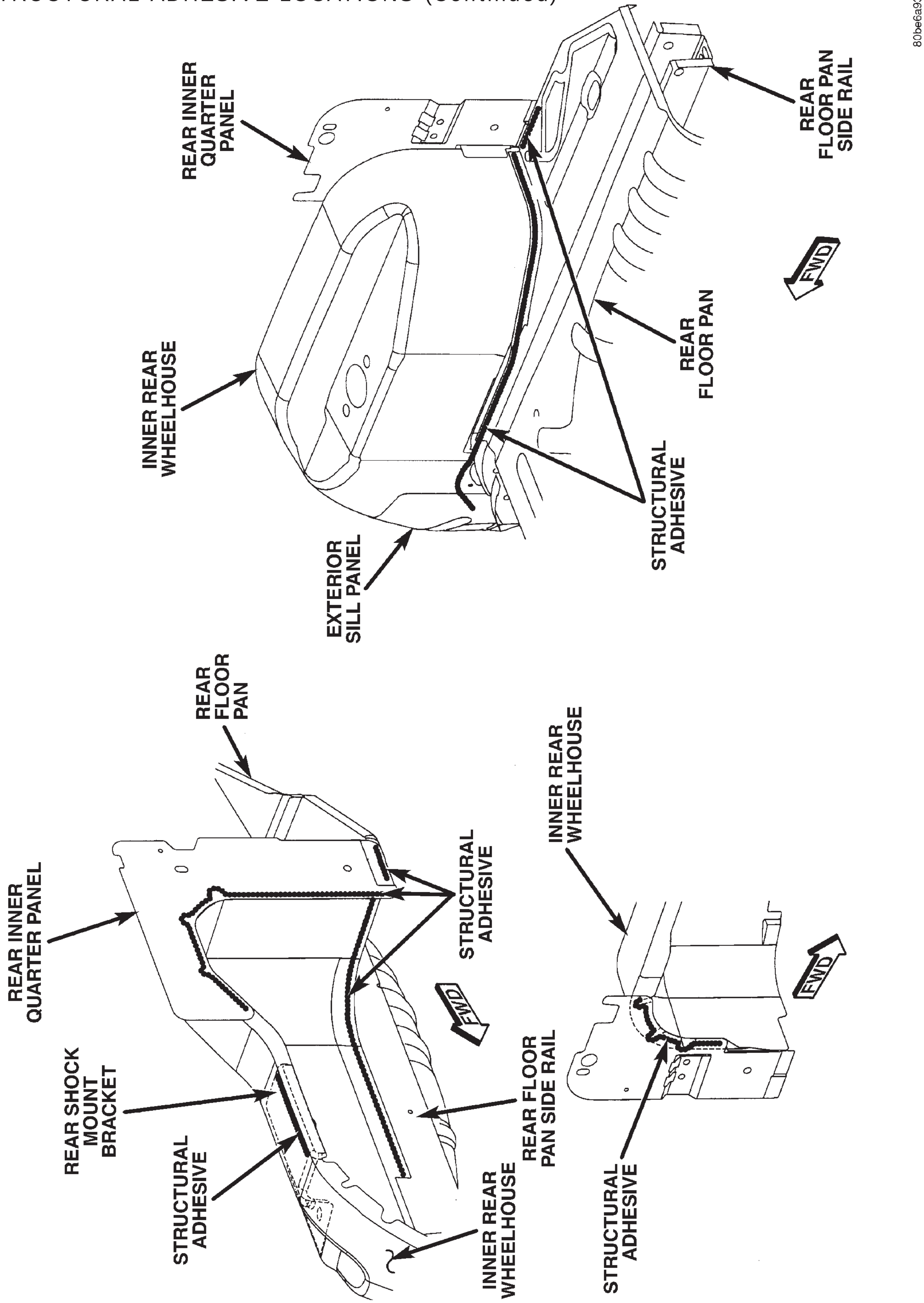

Fig. 79 INNER QUARTER PANEL AND INNER REAR WHEELHOUSE

STRUCTURAL ADHESIVE LOCATIONS (Continued)

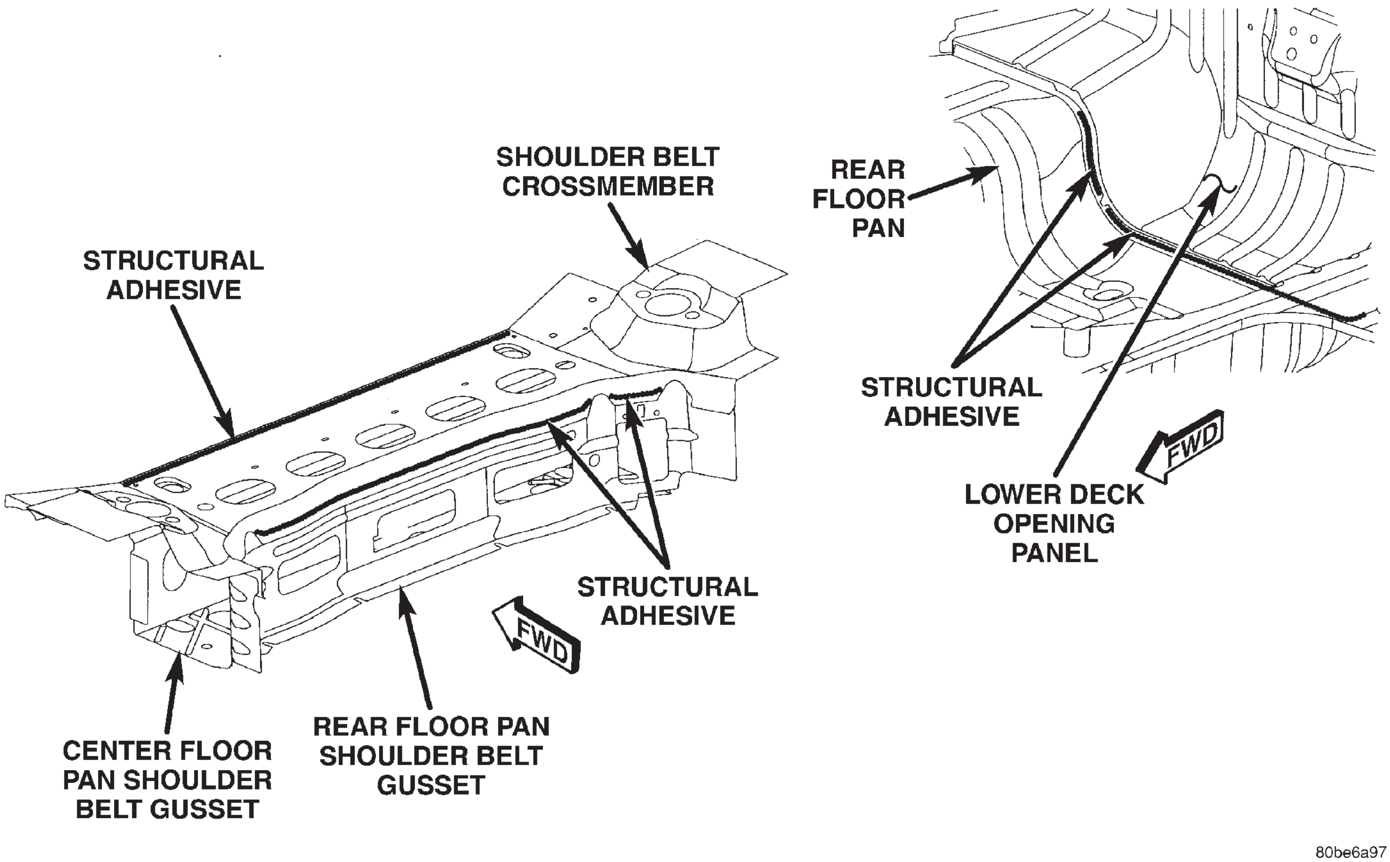

Fig. 80 LOWER DECK PANEL, REAR FLOOR PAN AND REAR SHOULDER BELT CROSSMEMBER

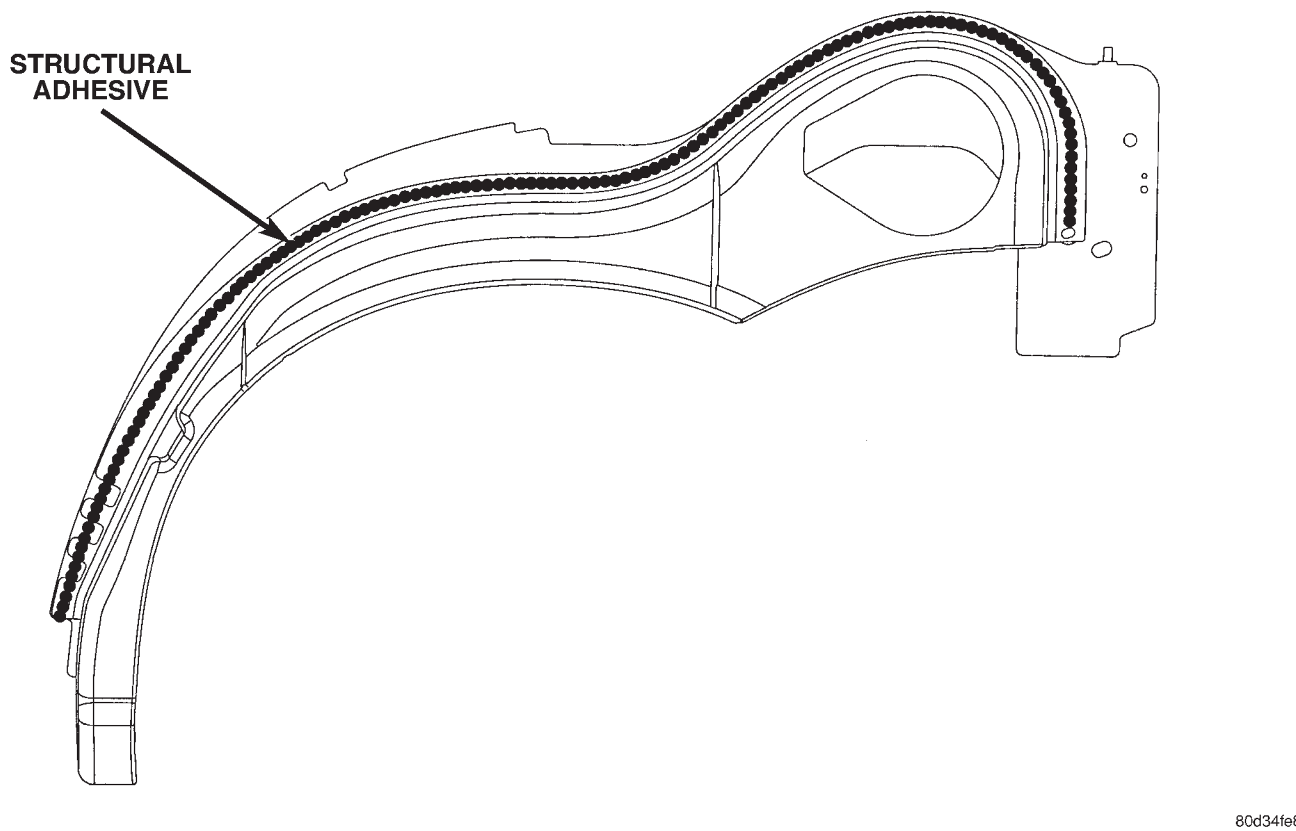

Fig. 81 WHEELHOUSE LEFT OUTER PANEL

STRUCTURAL ADHESIVE LOCATIONS (Continued)

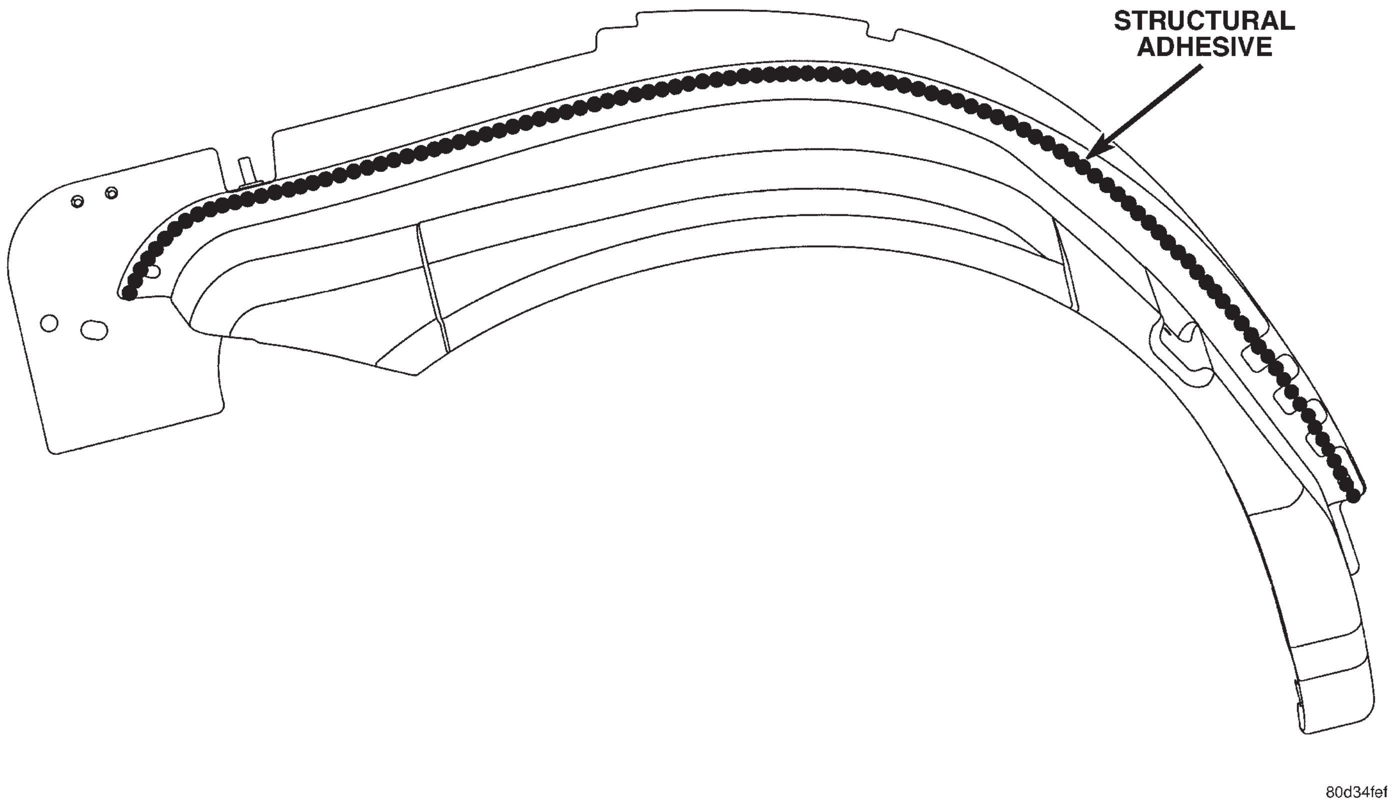

Fig. 82 WHEELHOUSE RIGHT OUTER PANEL

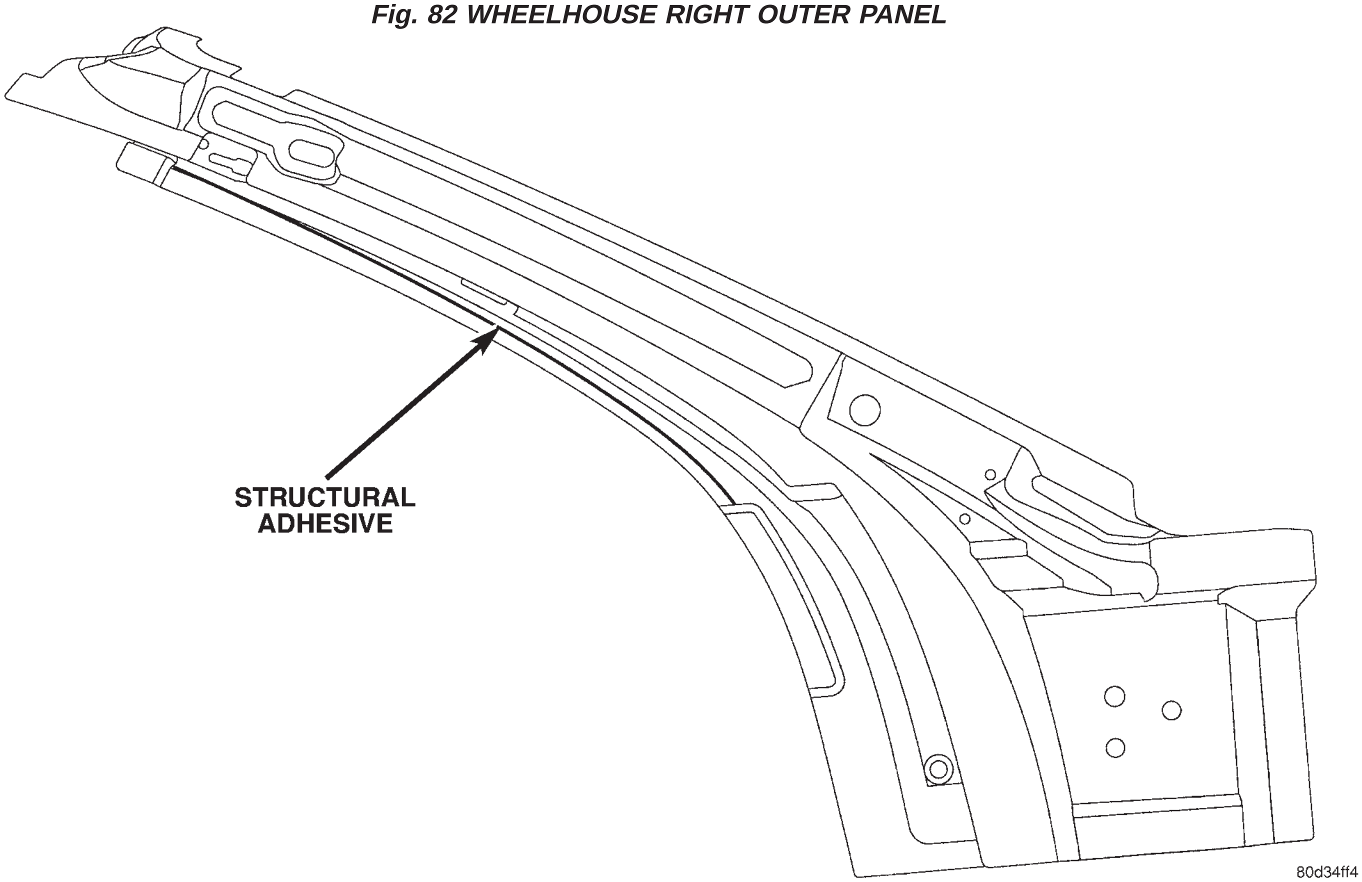

Fig. 83 OPENING INNER FRAME RIGHT/LEFT

STRUCTURAL ADHESIVE LOCATIONS (Continued)

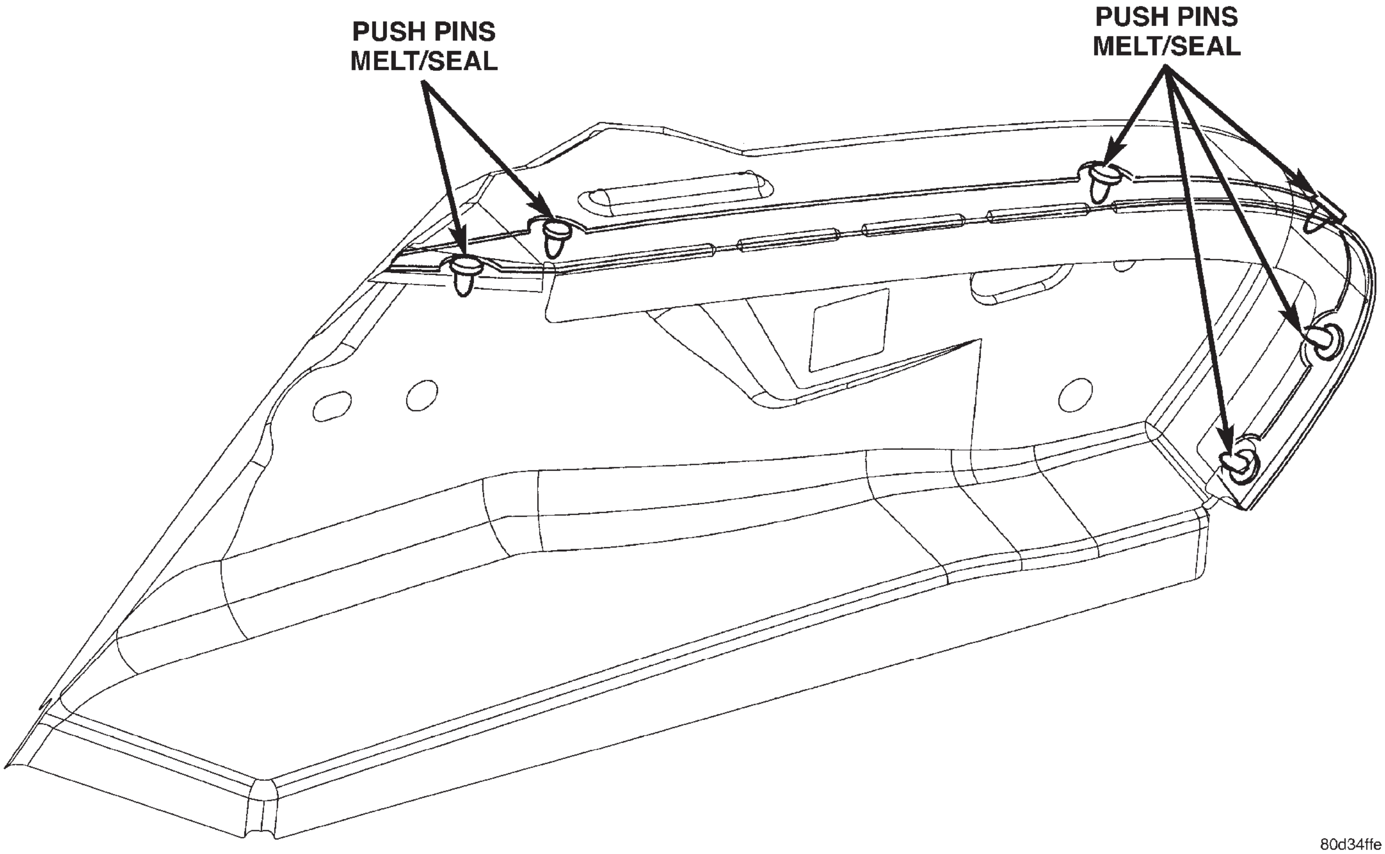

Fig. 84 PUSH PINS MELT SEAL

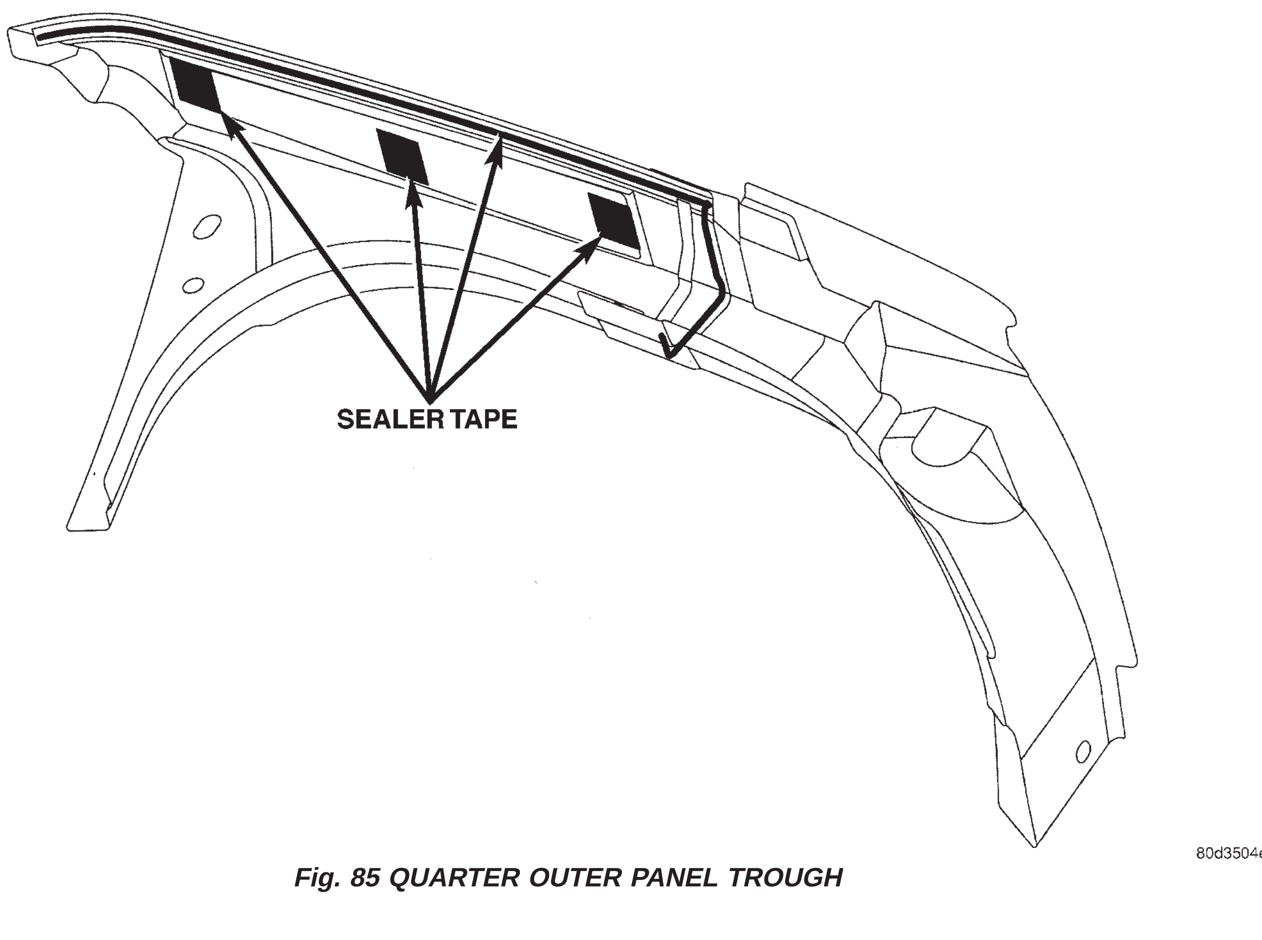

Fig. 85 QUARTER OUTER PANEL TROUGH

STRUCTURAL ADHESIVE LOCATIONS (Continued)

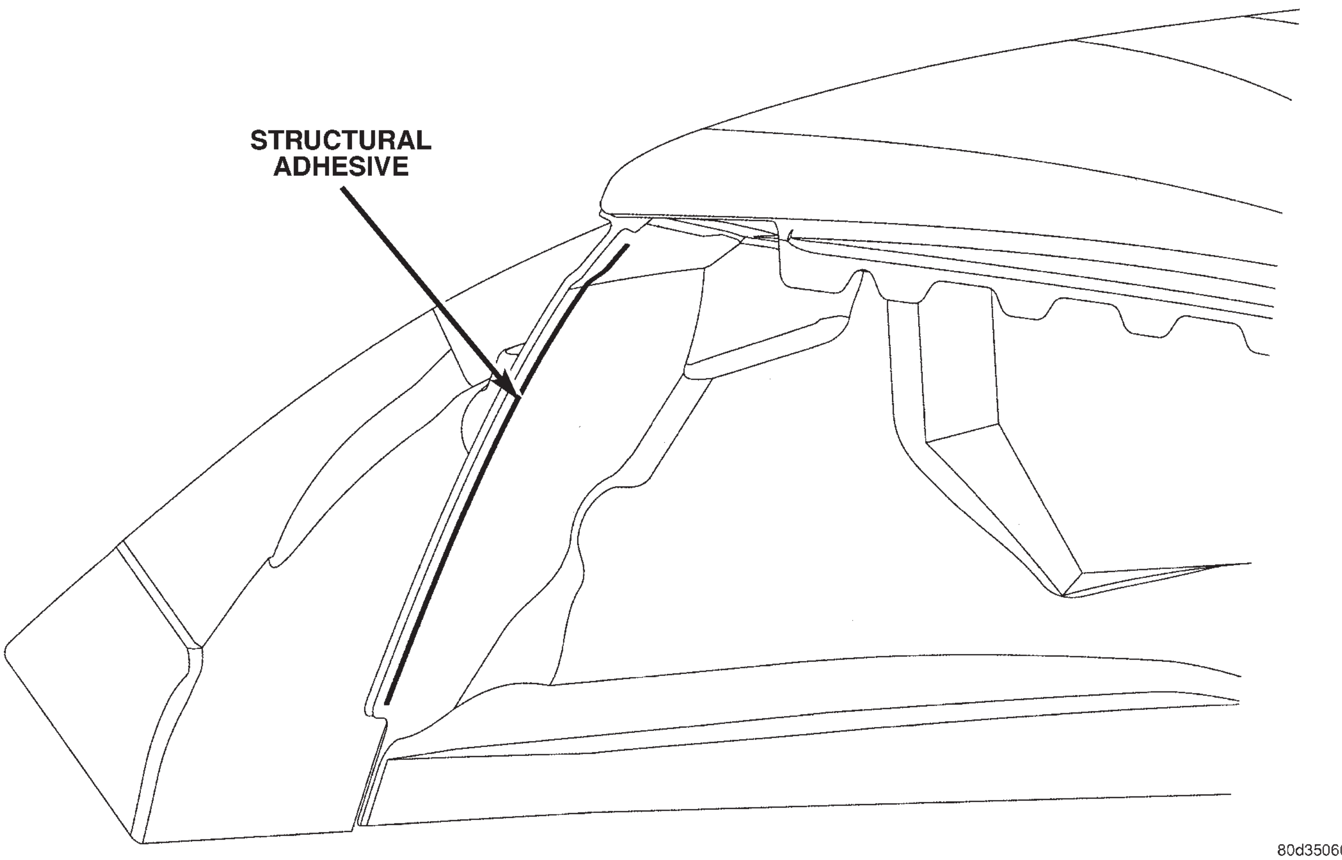

Fig. 86 QUARTER OUTER PANEL SUB

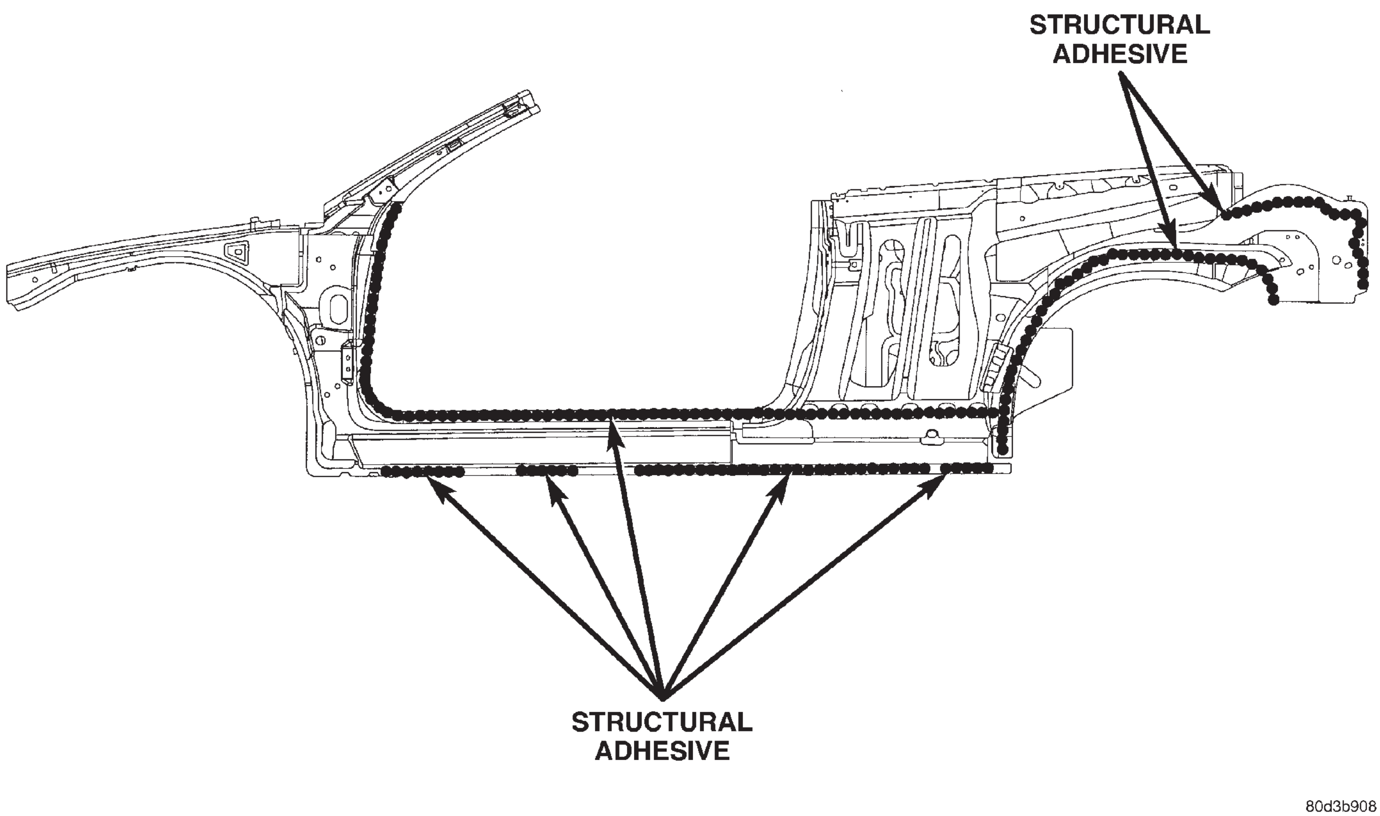

Fig. 87 INNER BODY SIDE APERTURE

STRUCTURAL ADHESIVE LOCATIONS (Continued)

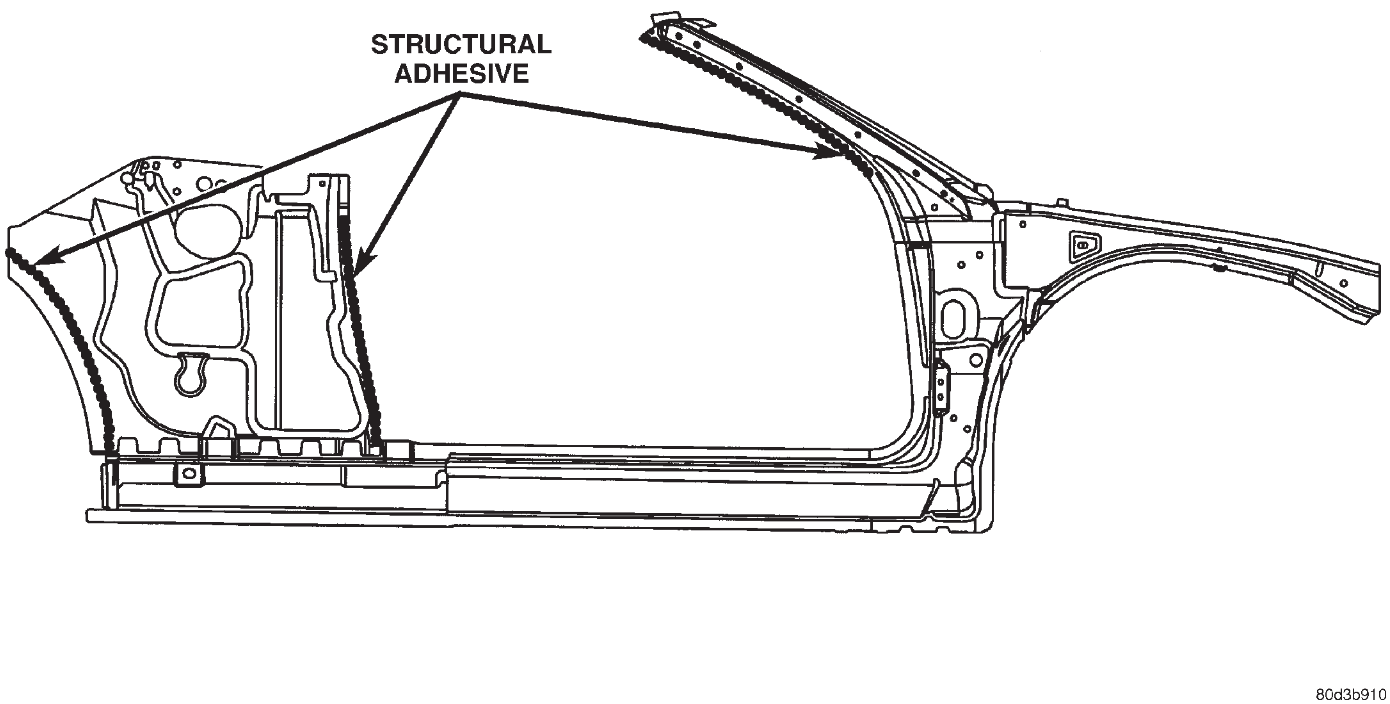

Fig. 88 BODY SIDE APERTURE, INNER QUARTER PANEL & WINDSHIELD FRAME

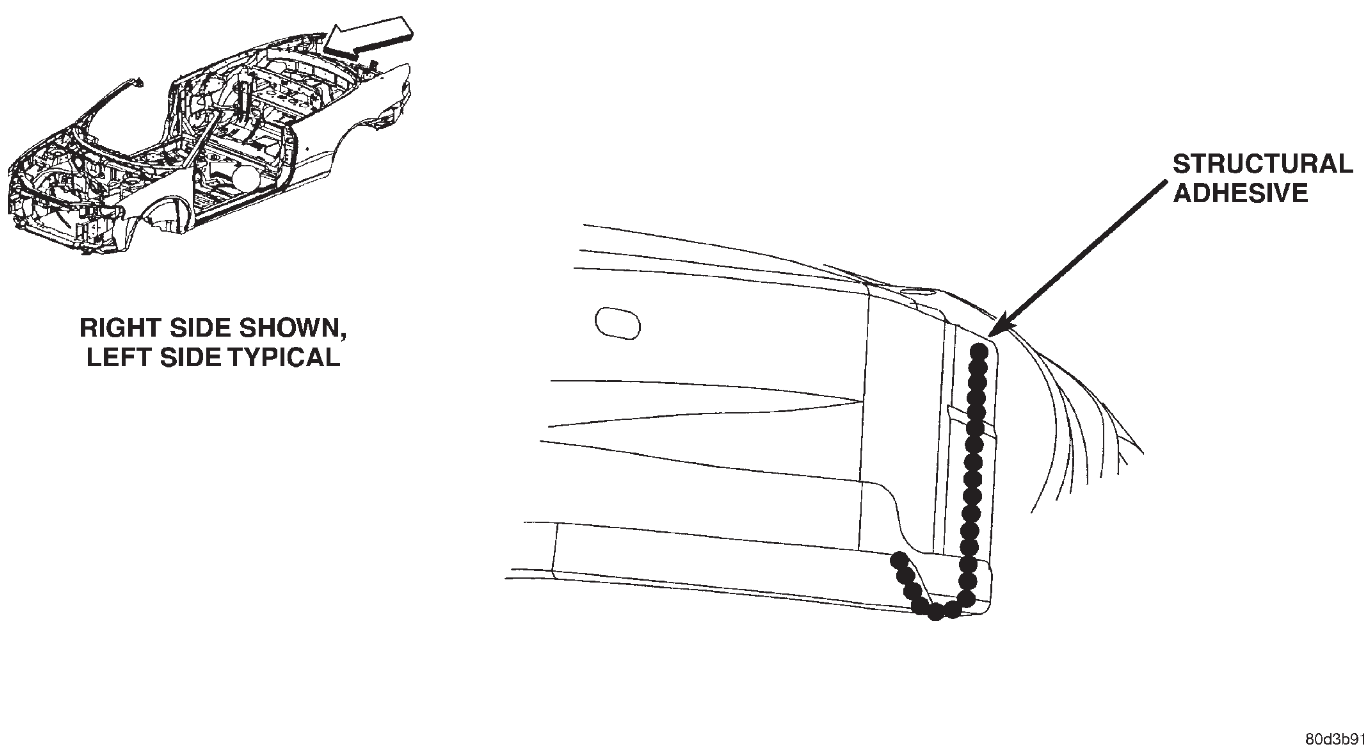

Fig. 89 REAR HEADER

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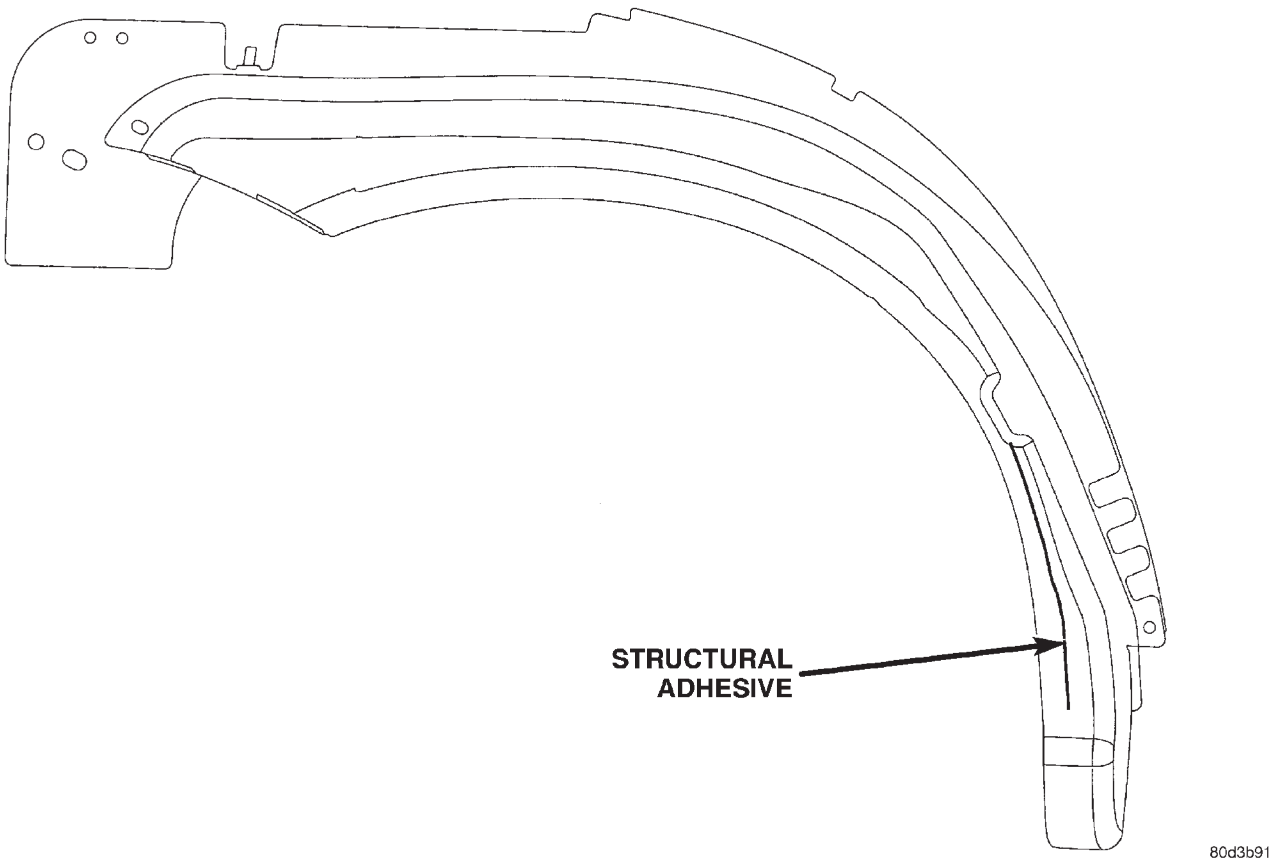

Fig. 90 OUTER WHEELHOUSE

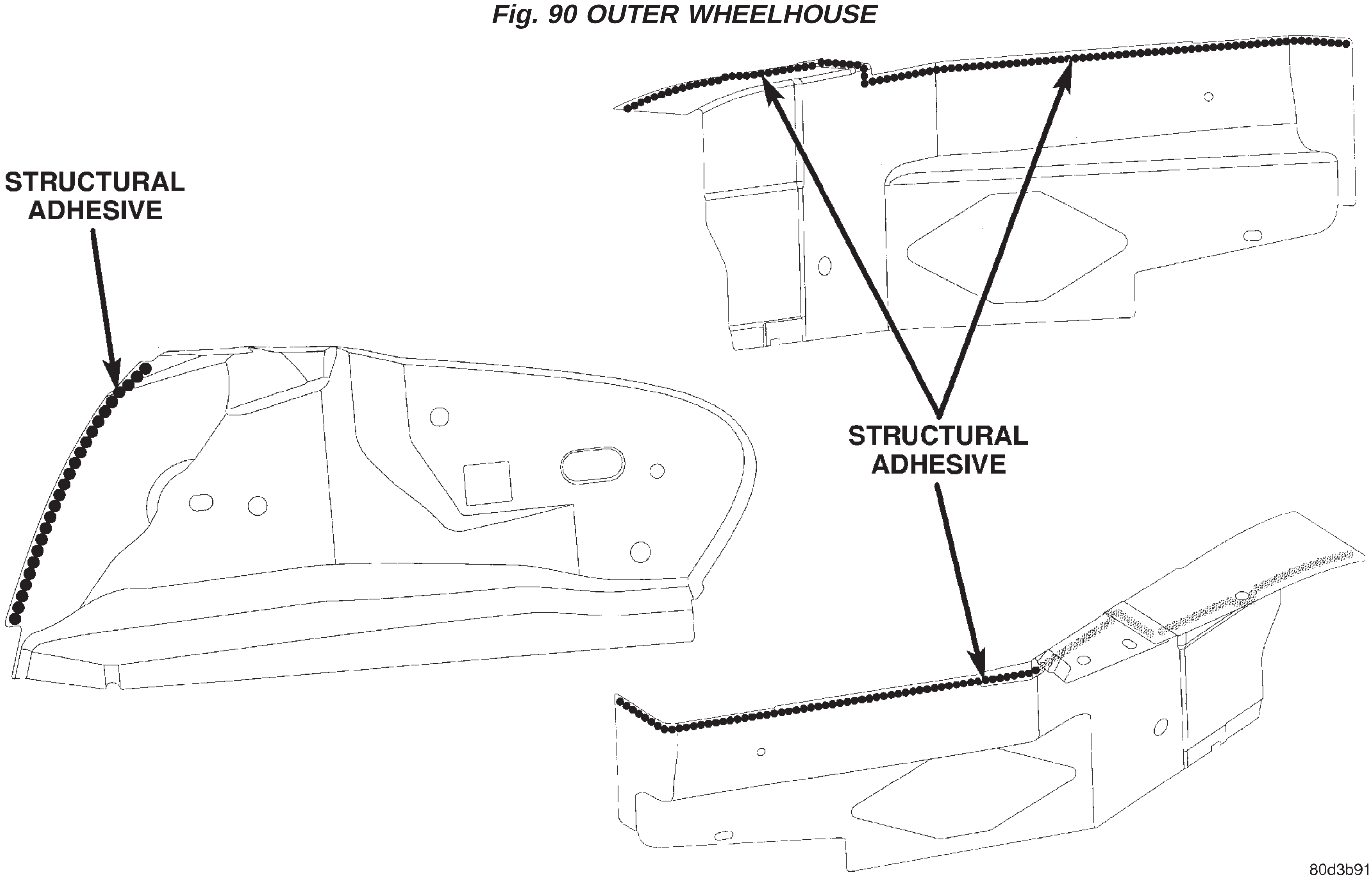

Fig. 91 LOWER QUARTER EXTENSION, TAIL LAMP CAN & OUTER QUARTER FILLER

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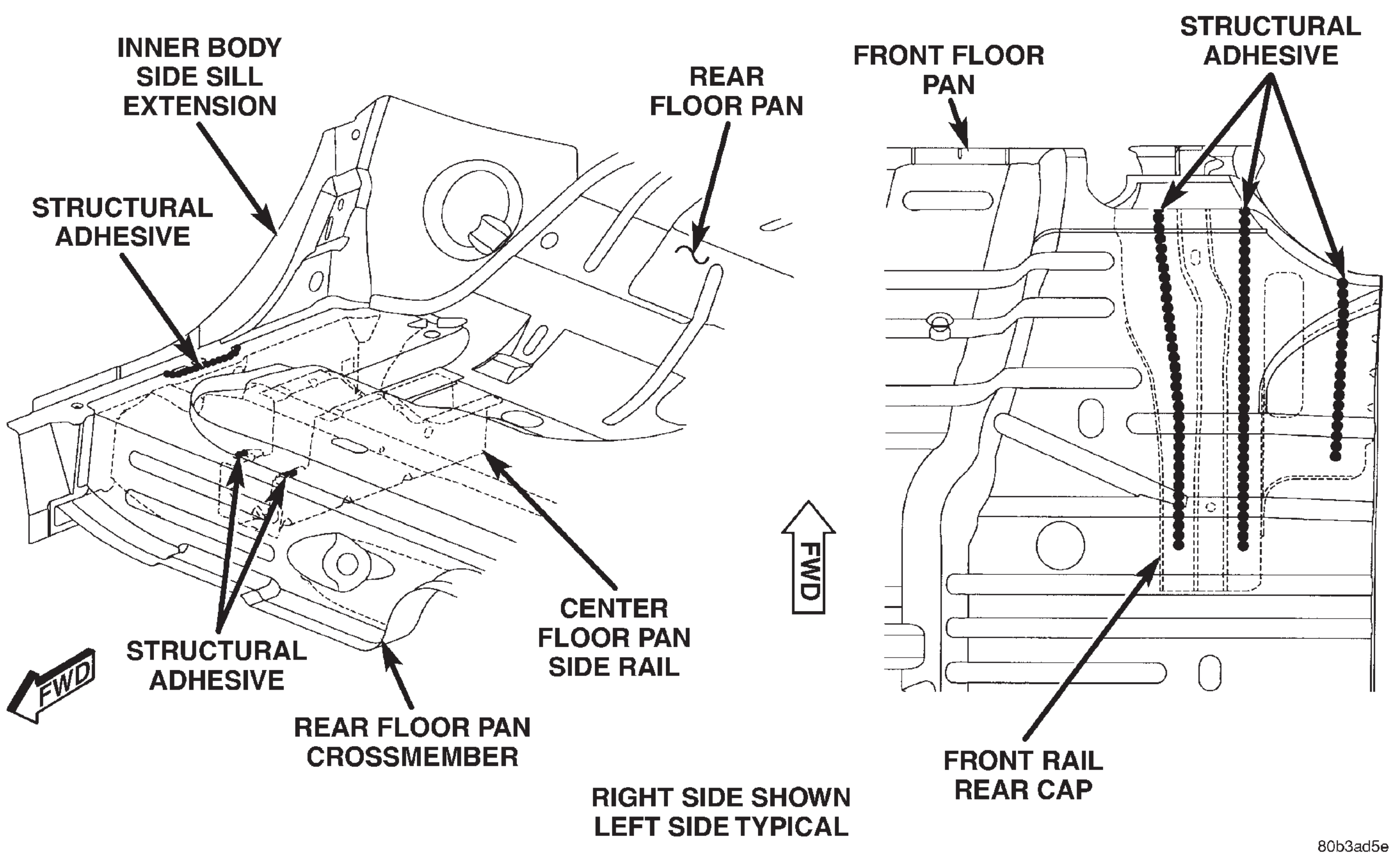

Fig. 92 FRONT AND REAR FLOOR PANS

STRUCTURAL ADHESIVE LOCATIONS (Continued)

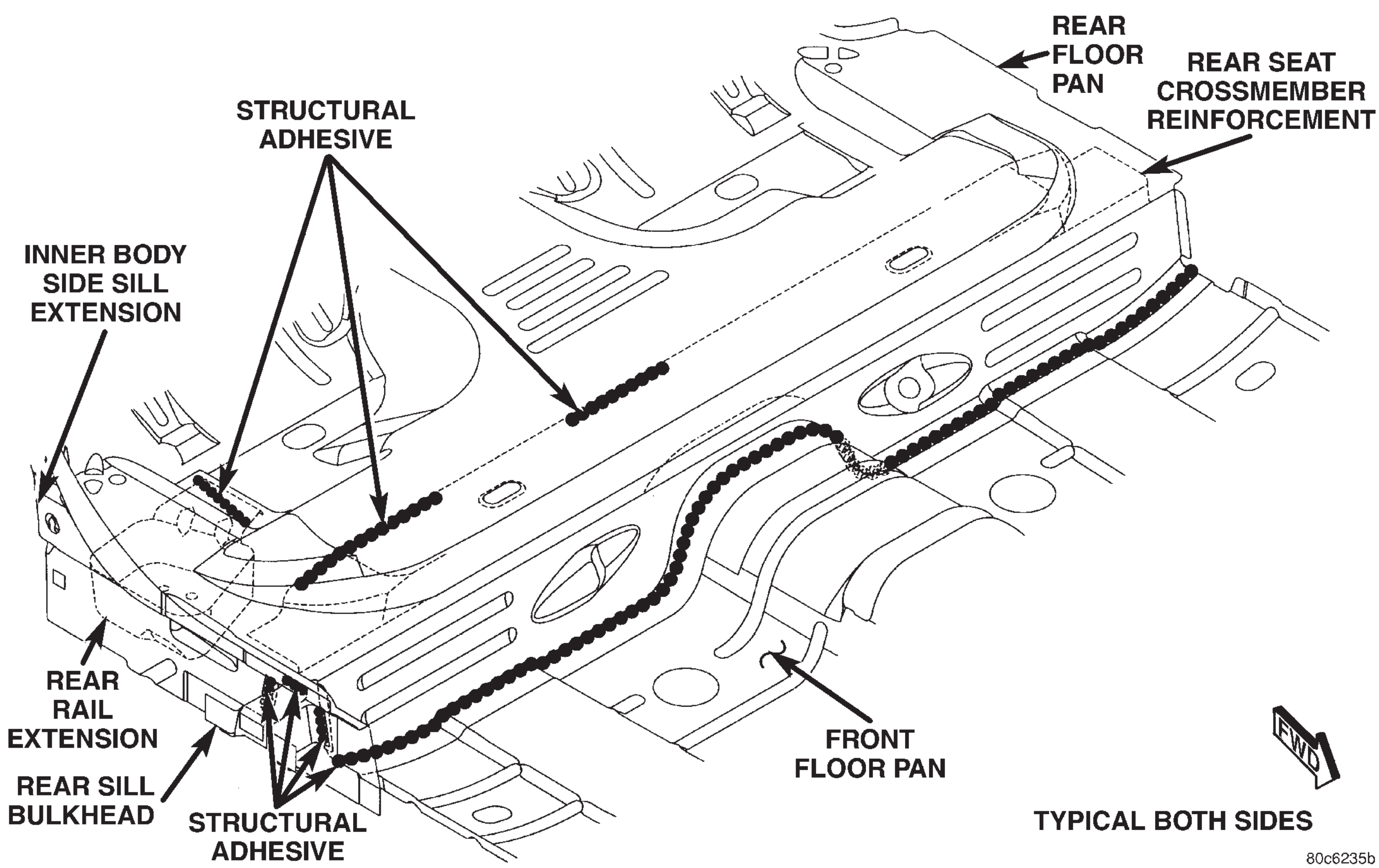

Fig. 93 FRONT/REAR FLOOR PAN CROSSMEMBER REINFORCEMENT

STRUCTURAL ADHESIVE LOCATIONS (Continued)

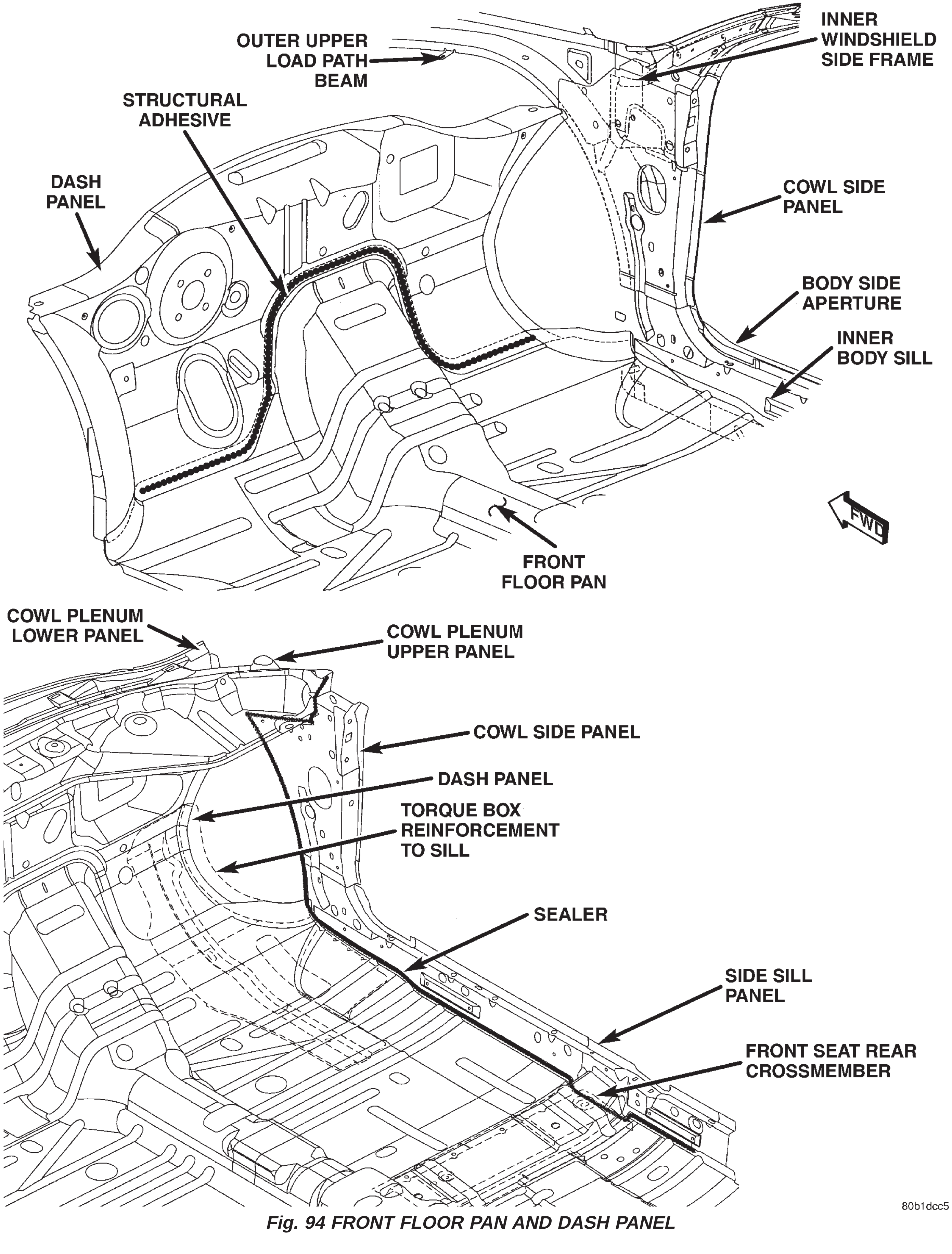

Fig. 94 FRONT FLOOR PAN AND DASH PANEL

STRUCTURAL ADHESIVE LOCATIONS (Continued)

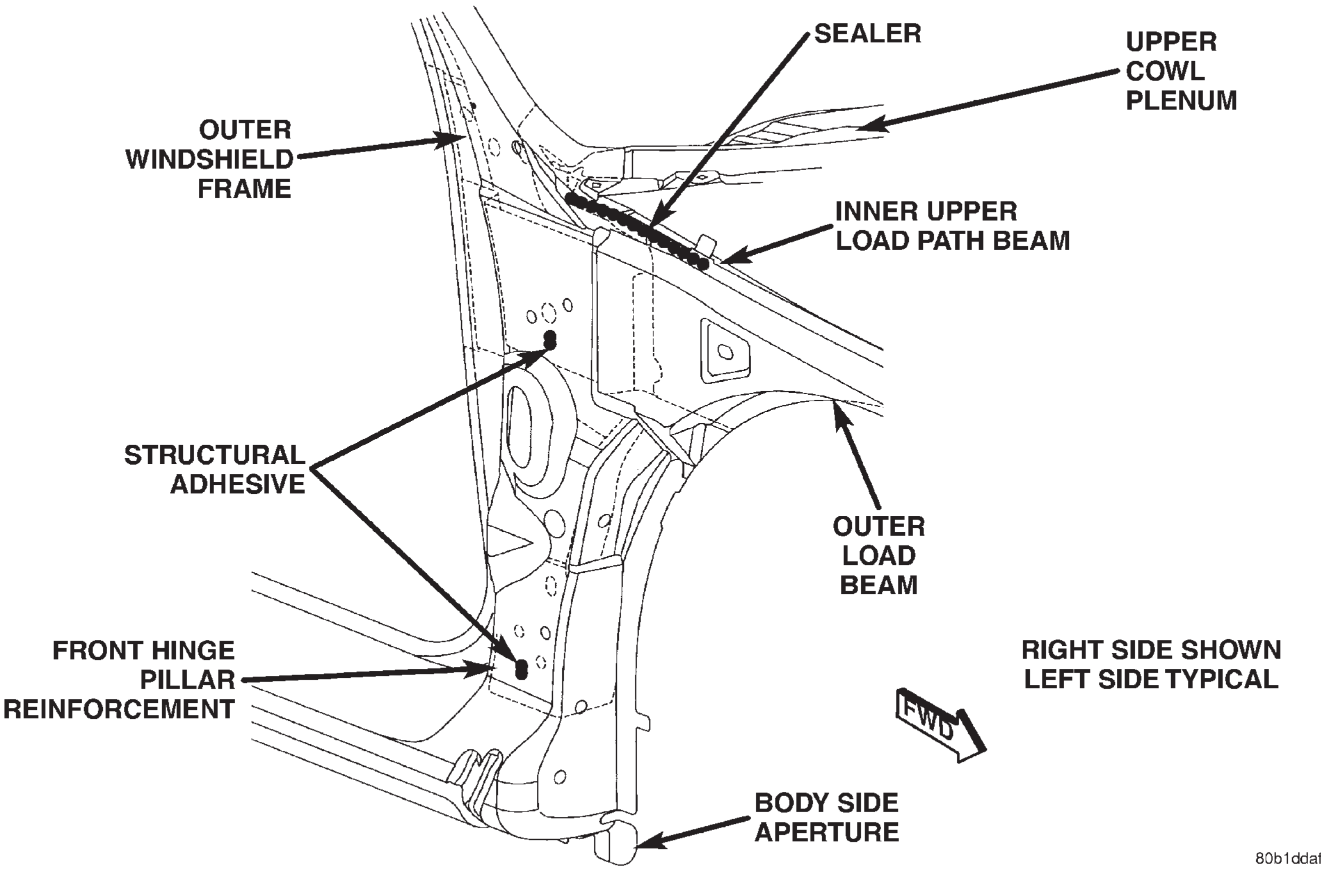

Fig. 95 INNER & OUTER UPPER LOAD PATH BEAMS, HINGE PILLAR REINFORCEMENT

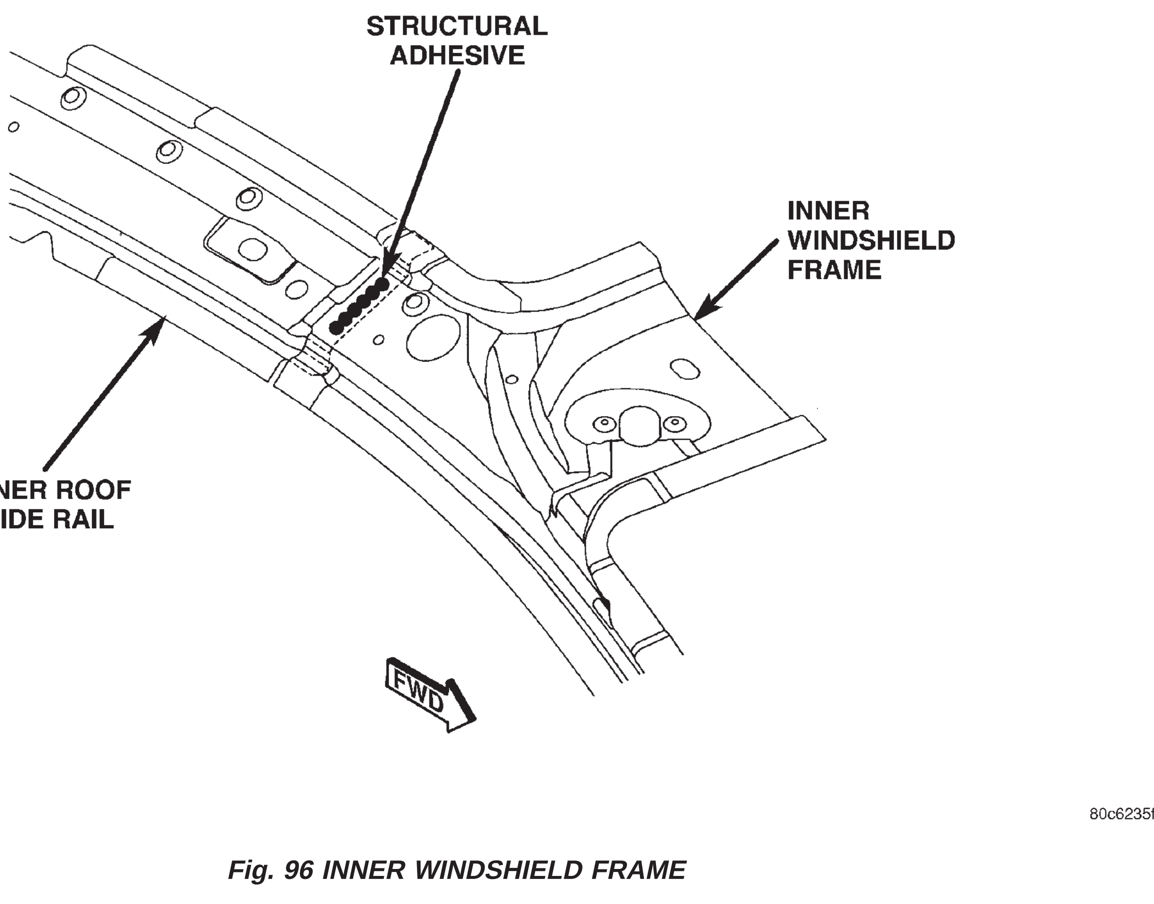

Fig. 96 INNER WINDSHIELD FRAME

STRUCTURAL ADHESIVE LOCATIONS (Continued)

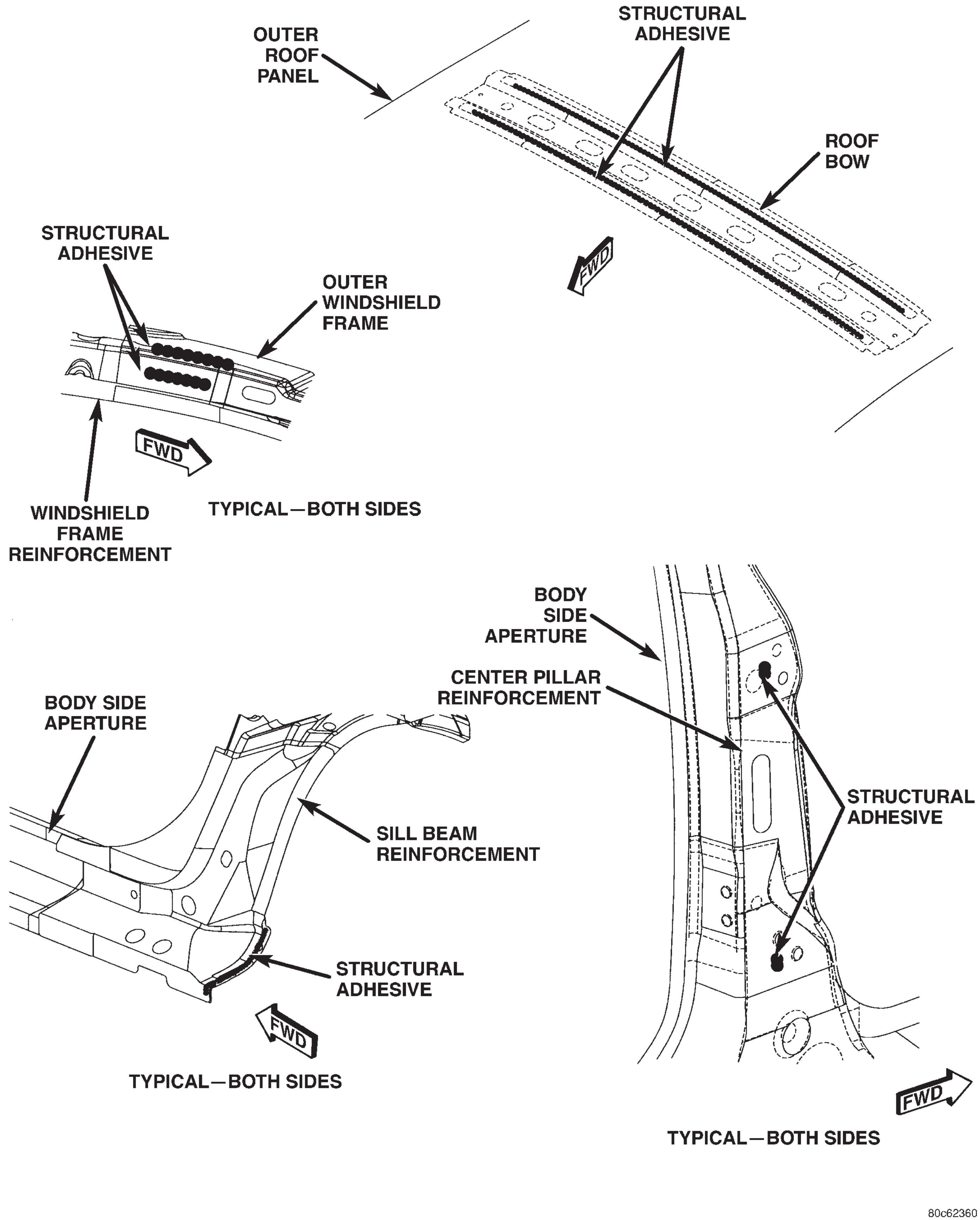

Fig. 97 ROOF BOW/CENTER PILLAR

STRUCTURAL ADHESIVE LOCATIONS (Continued)

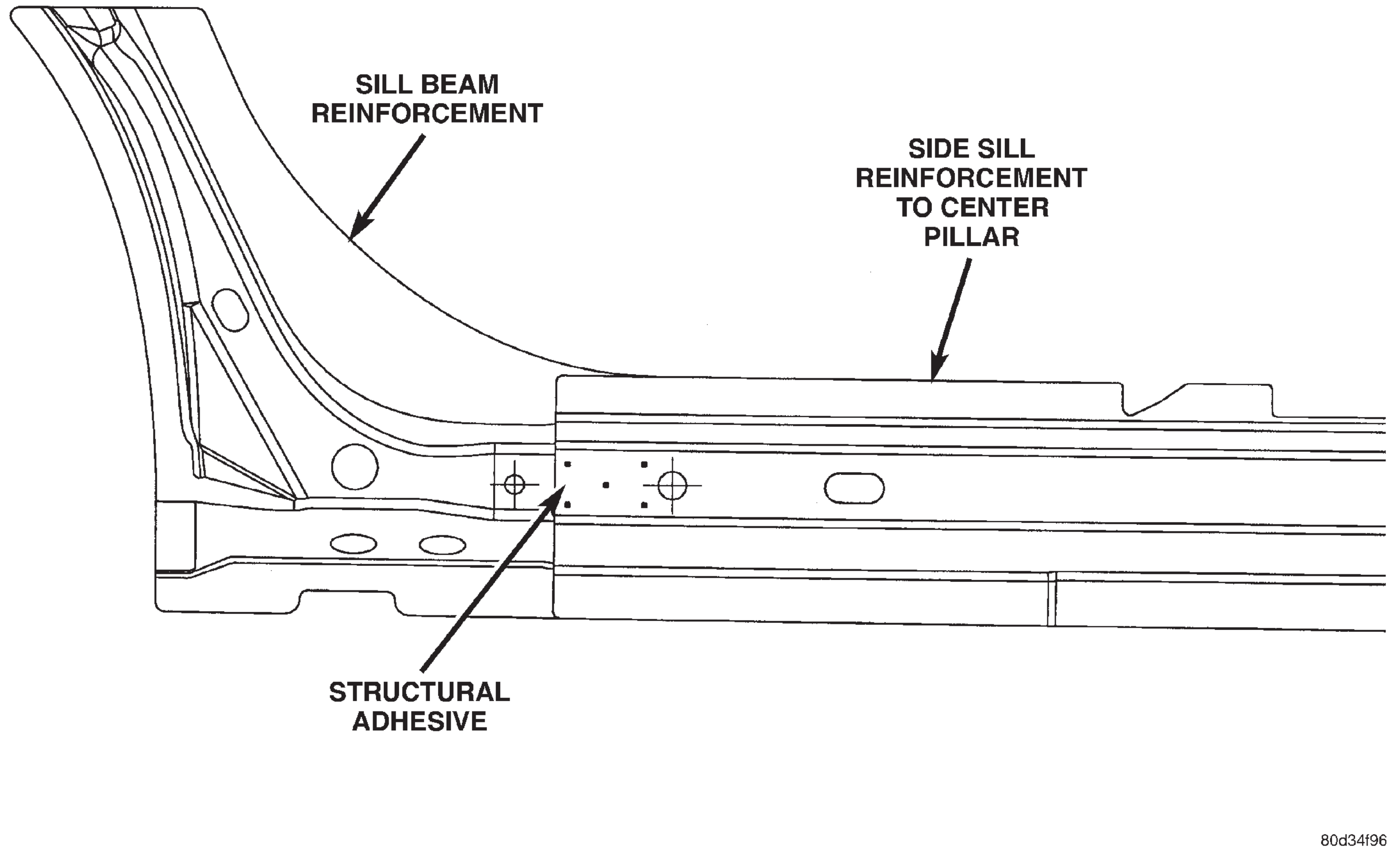

Fig. 98 SIDE SILL REINFORCEMENT TO CENTER PILLAR

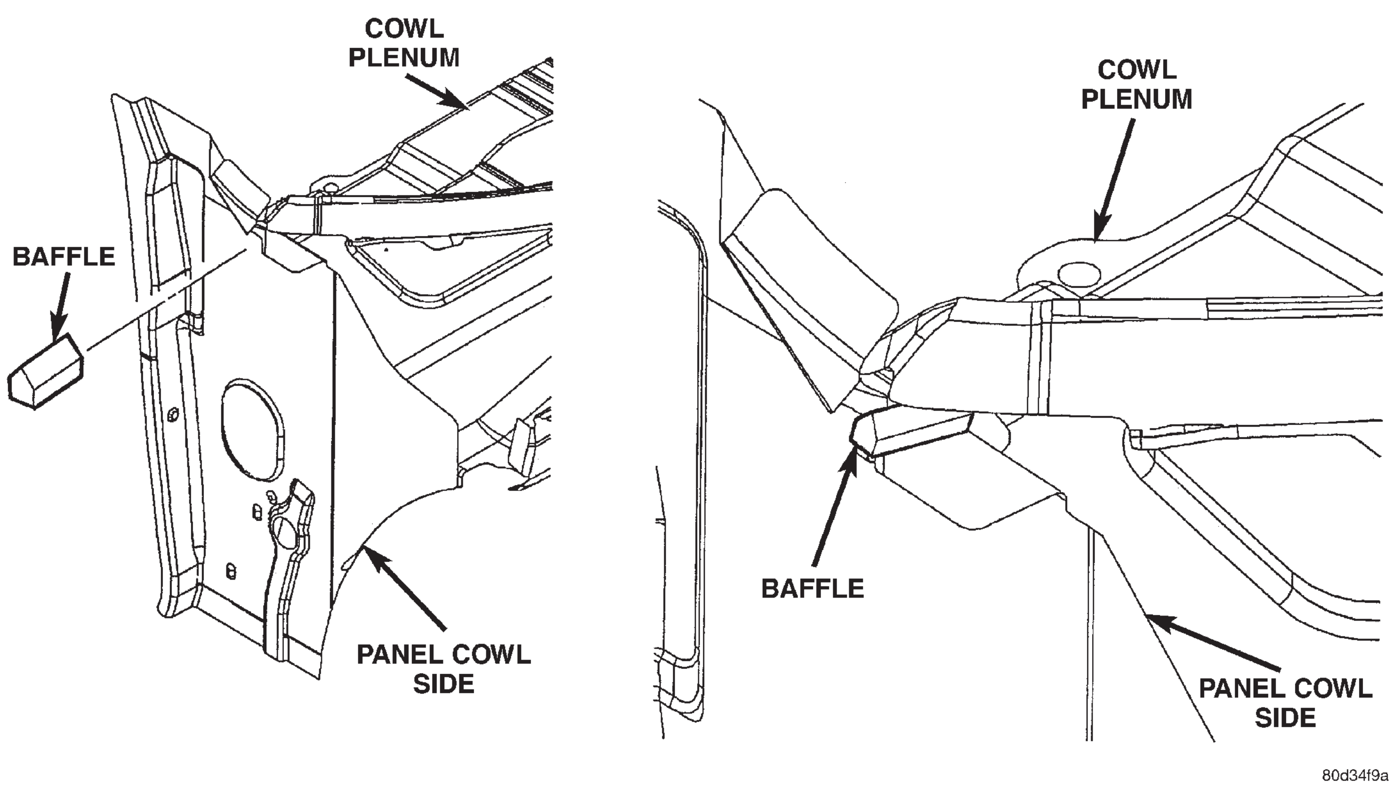

Fig. 99 BAFFLE PLUG COWL PLENUM

STRUCTURAL ADHESIVE LOCATIONS (Continued)

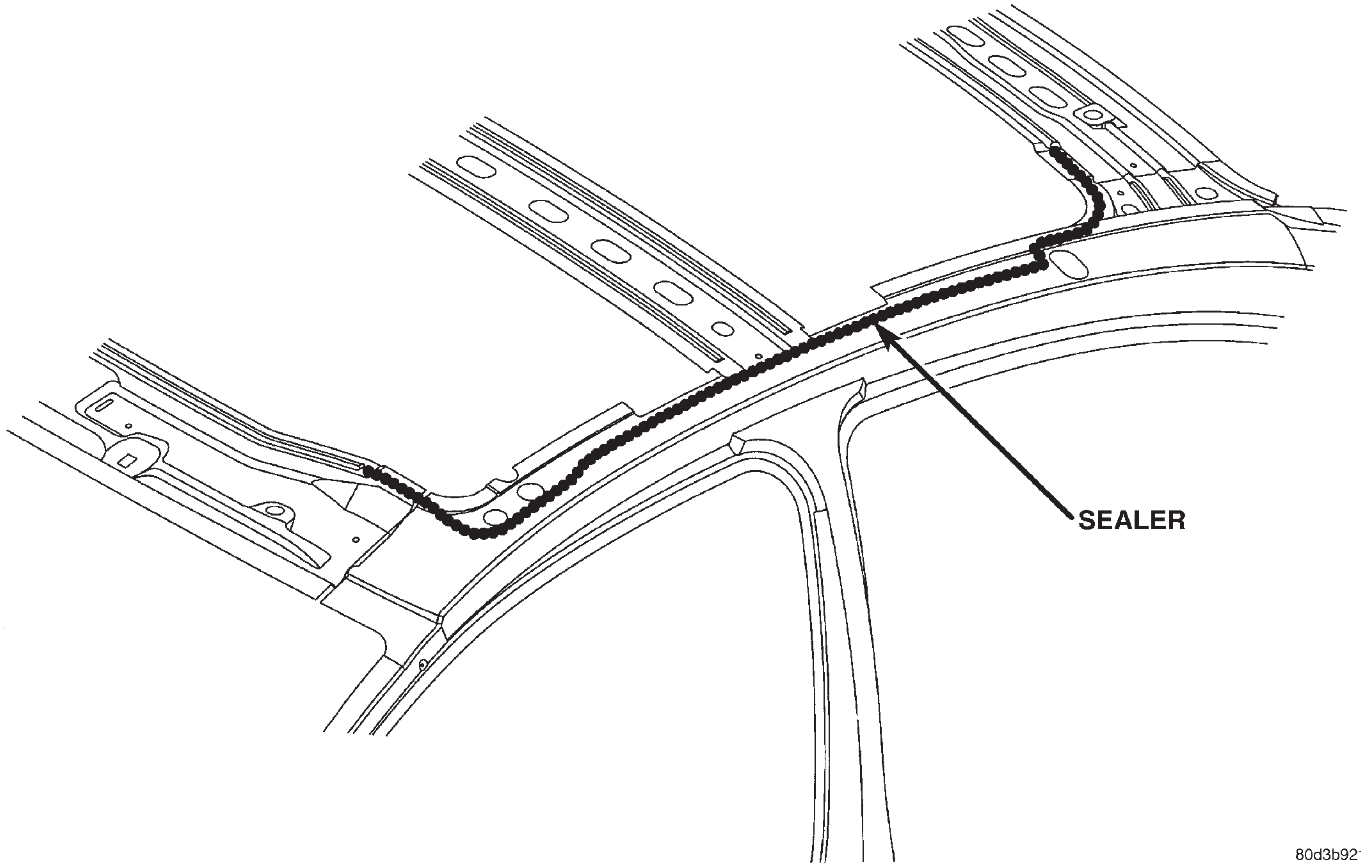

Fig. 100 ROOF PANEL, INNER QUARTER UPPER BODY SIDE APERTURE, UPPER WINDSHIELD FRAME & BACKLITE FRAME REINFORCEMENT

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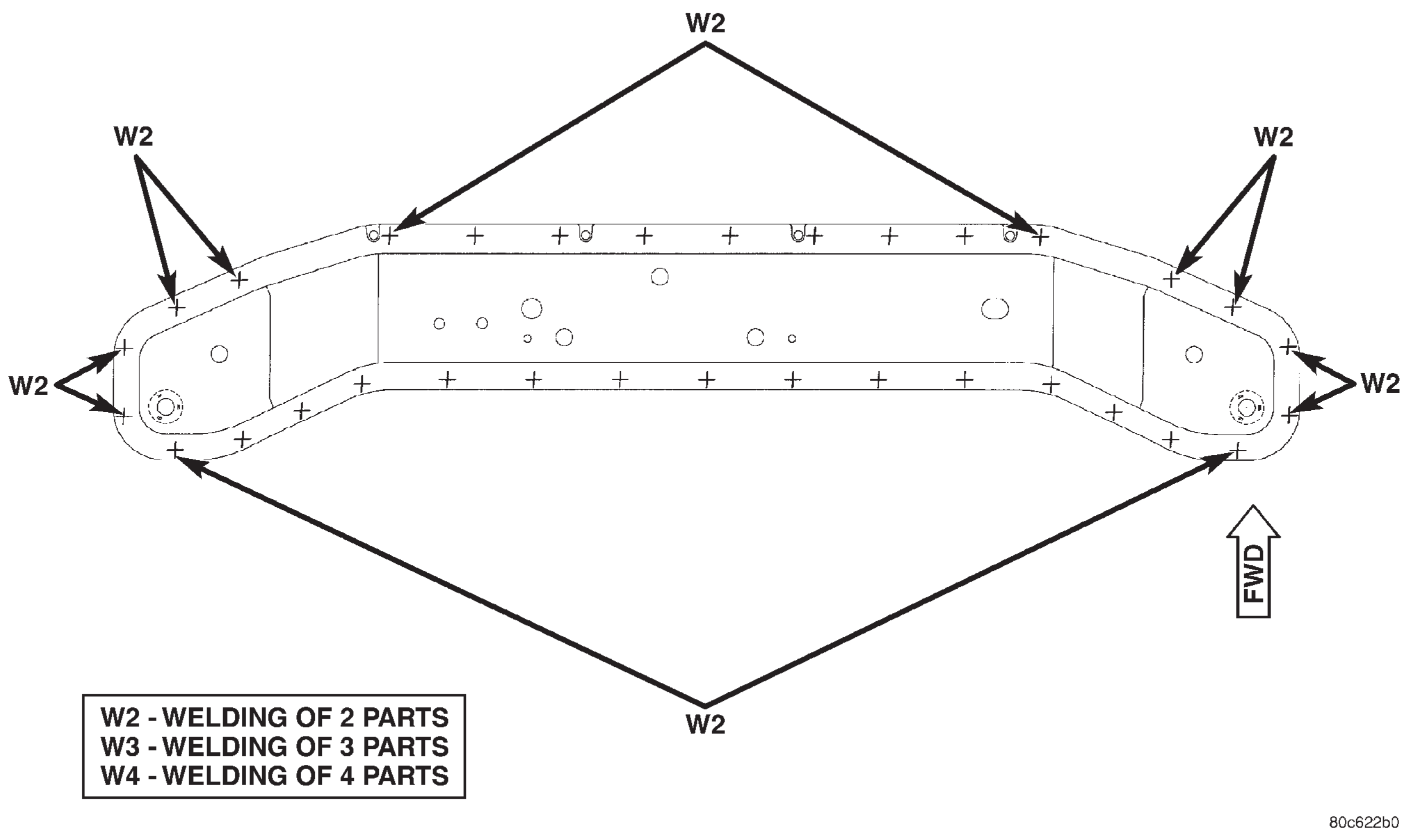

Fig. 101 LOWER RADIATOR CROSSMEMBER, UPPER SUPPORT TO LOWER RADIATOR CROSSMEMBER LOWER SUPPORT

WELD LOCATIONS (Continued)

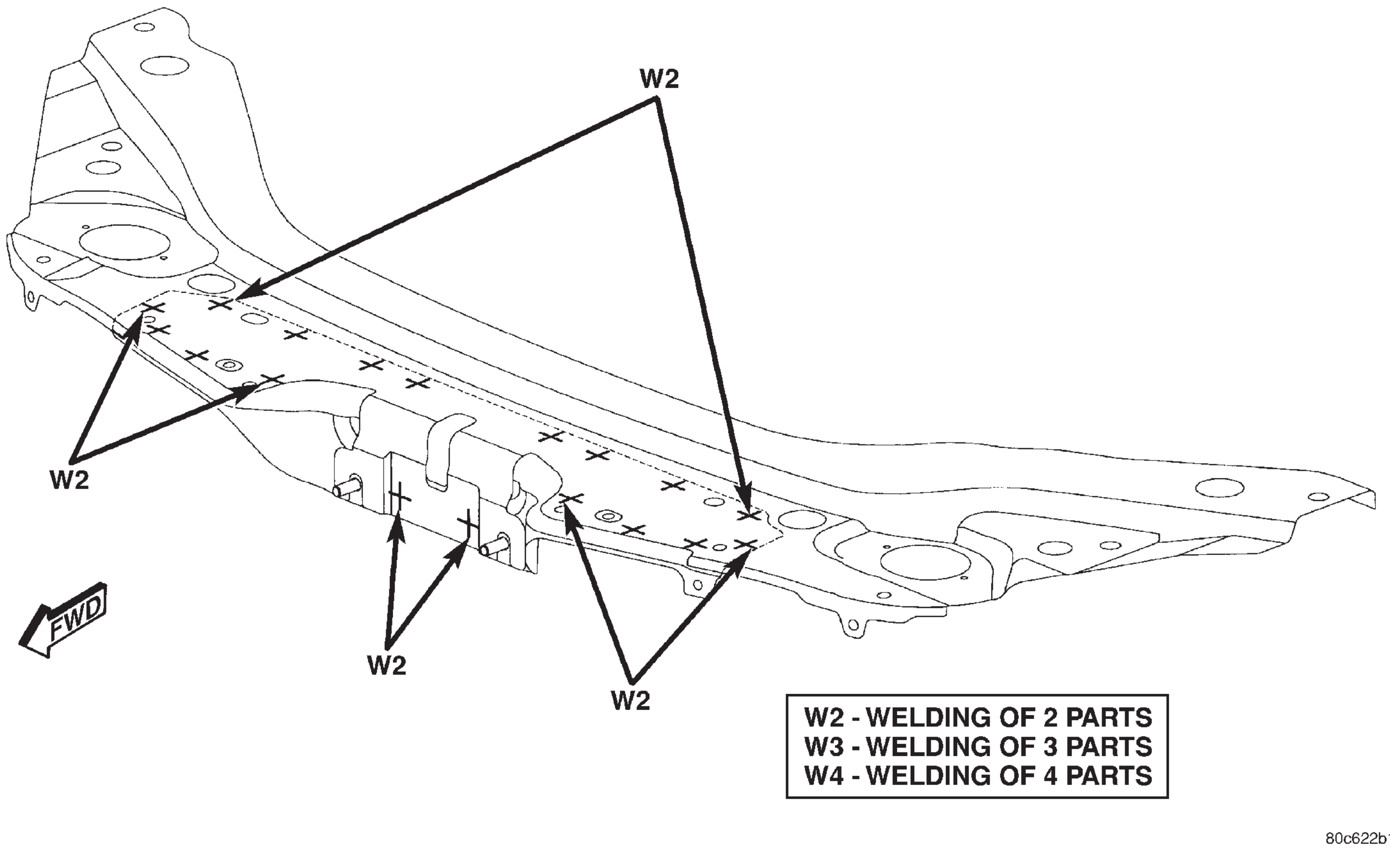

Fig. 102 UPPER RADIATOR MOUNTING CROSSMEMBER TO HOOD LATCH REINFORCEMENT

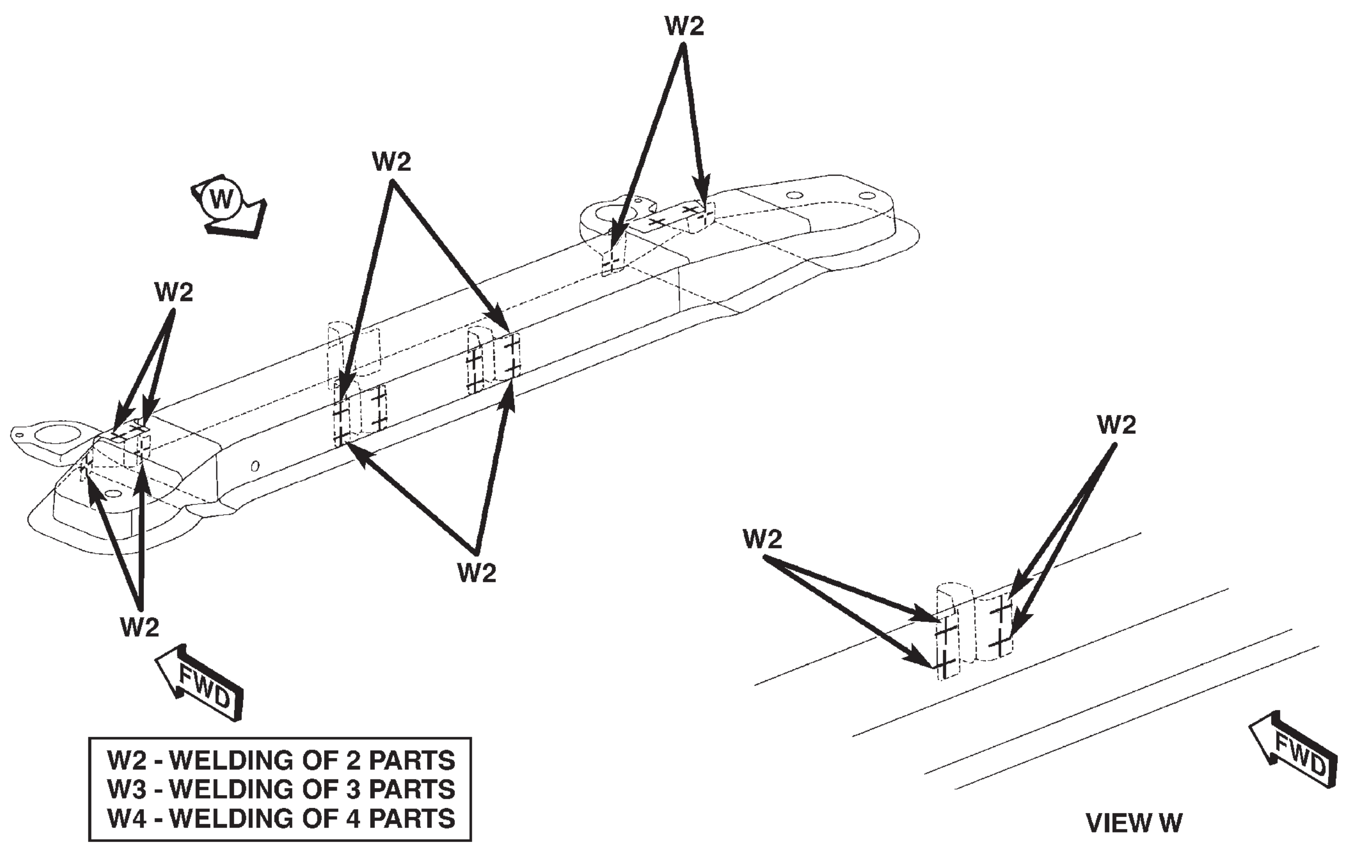

Fig. 103 FRONT ENGINE MOUNT SUPPORTS & RADIATOR BRACKET SUPPORT TO LOWER RADIATOR CROSSMEMBER

WELD LOCATIONS (Continued)

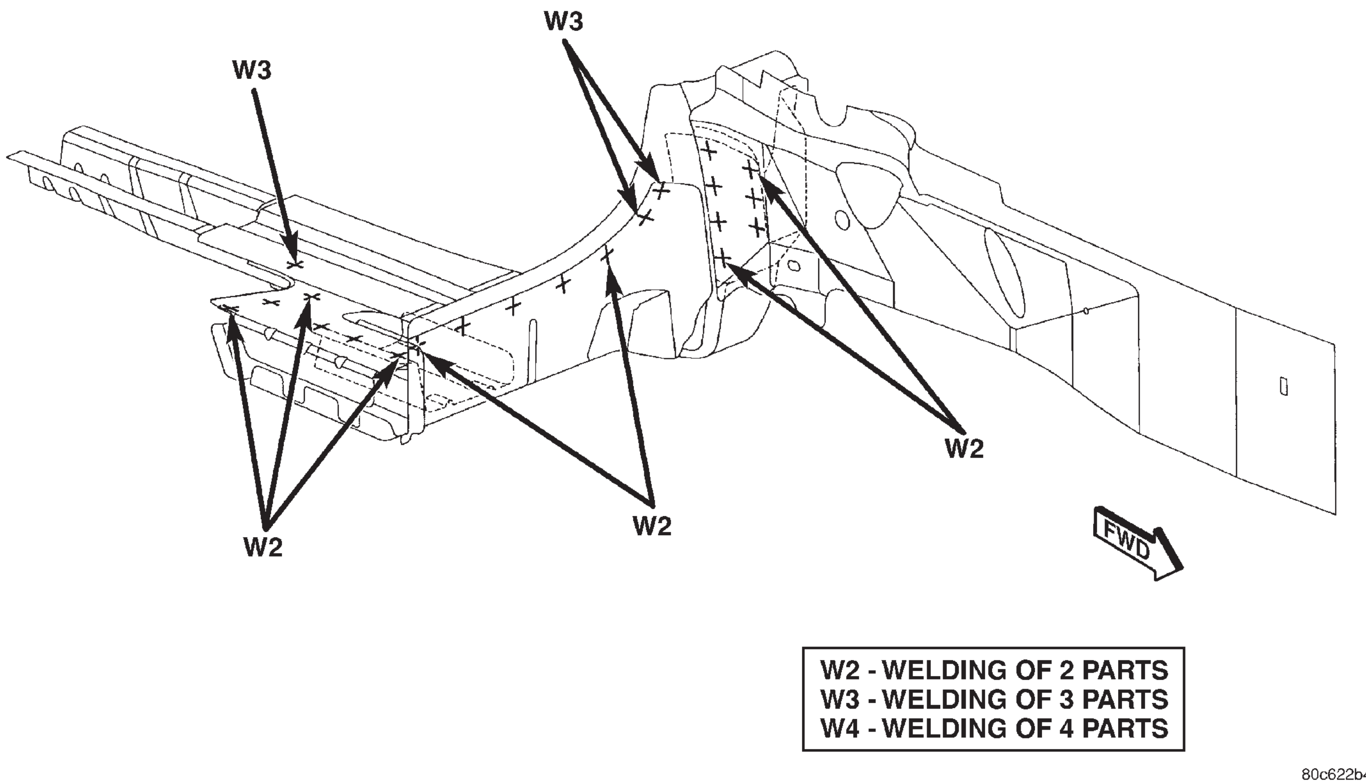

Fig. 104 REAR FRONT SIDE RAIL TO REAR FRONT RAIL CAP TO SILL REINFORCEMENT

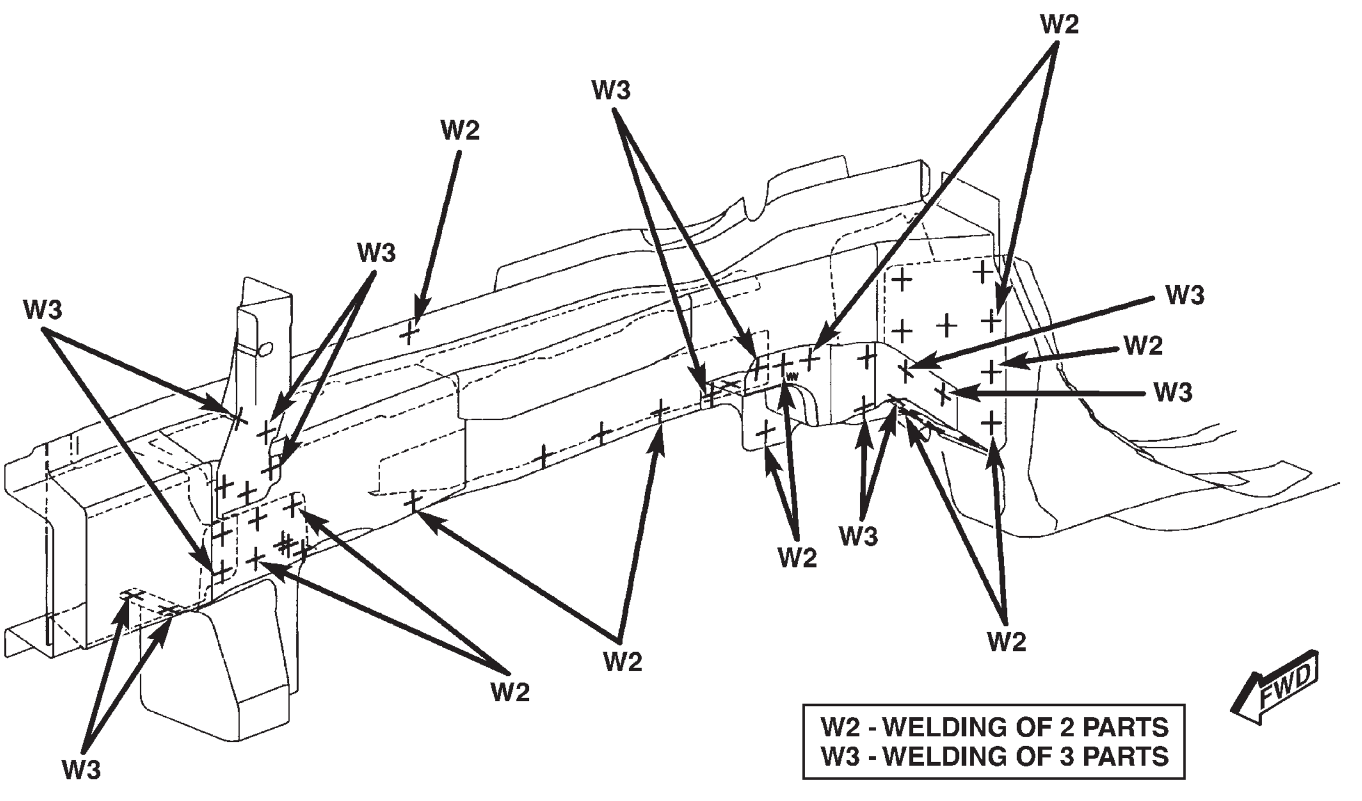

Fig. 105 BUMPER EXTENSION, HEADLAMP SUPPORT RAIL, TO REAR FRONT SIDE RAIL

WELD LOCATIONS (Continued)

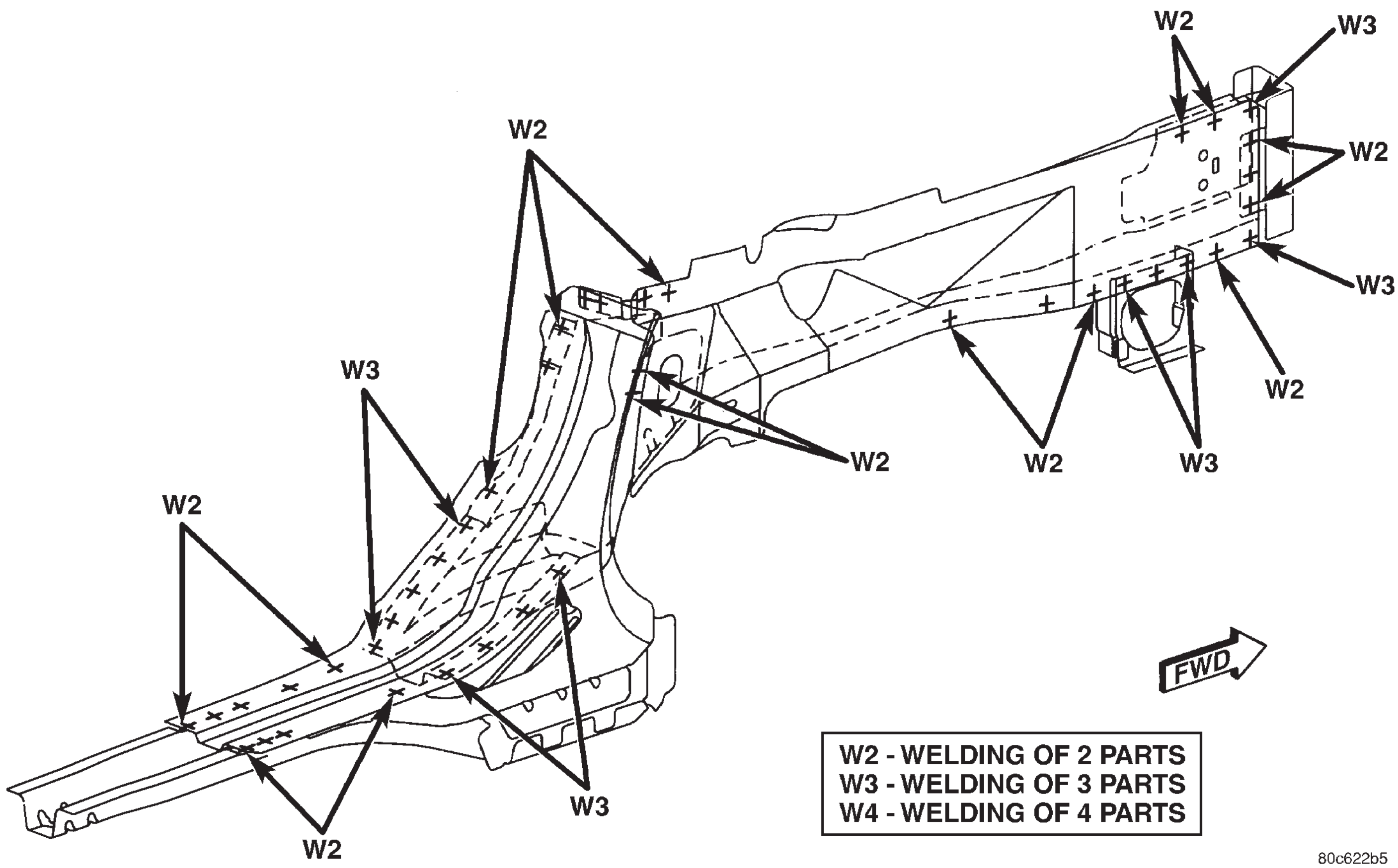

Fig. 106 REAR FRONT SIDE RAIL TO REAR FRONT RAIL CAP TO REAR FRONT SIDE RAIL PLATE

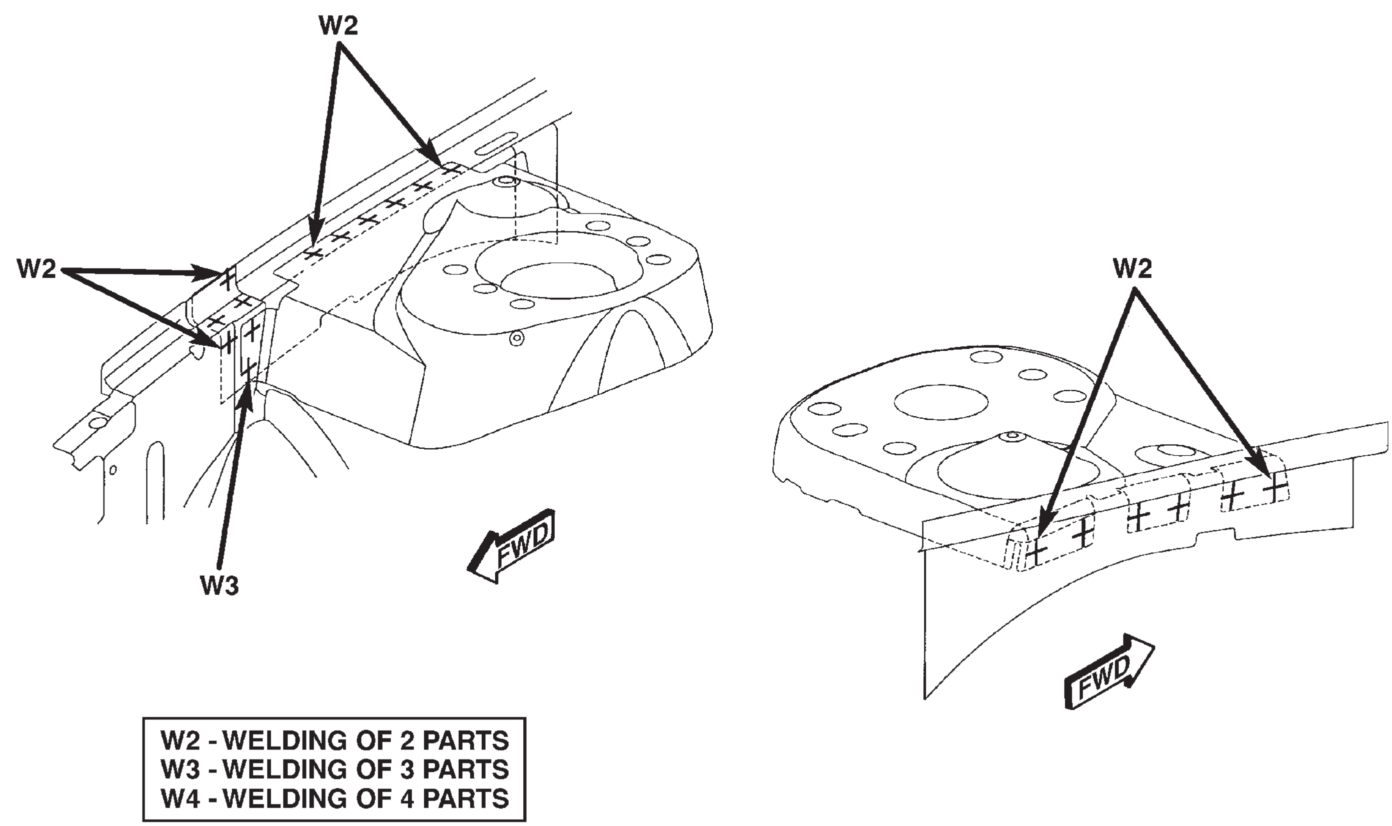

Fig. 107 UPPER FRONT SUSPENSION MOUNTING CAP & REINFORCEMENT TO UPPER LOAD BEAM

WELD LOCATIONS (Continued)

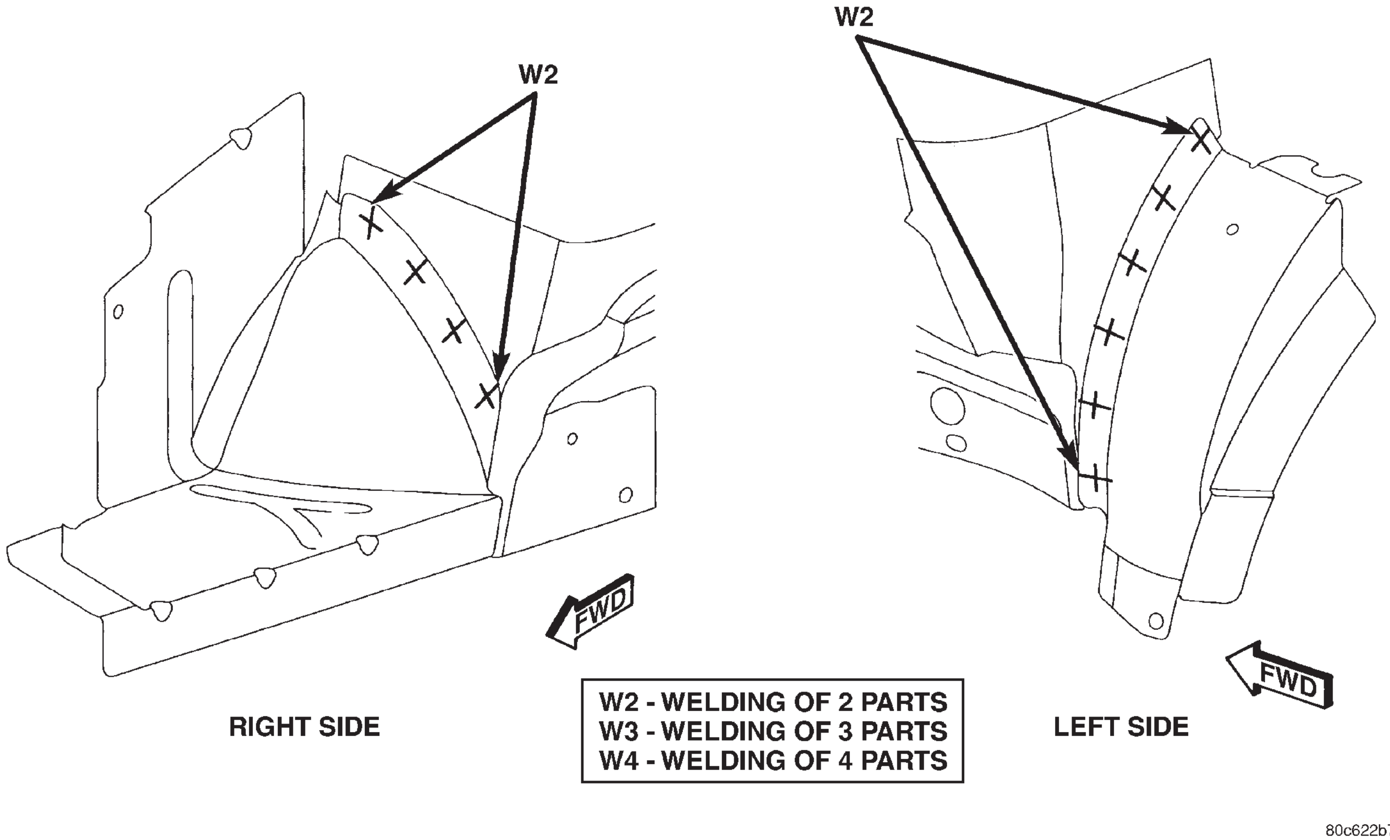

Fig. 108 FRONT SUSPENSION UPPER MOUNTING PANEL TO FRONT FENDER SHIELD

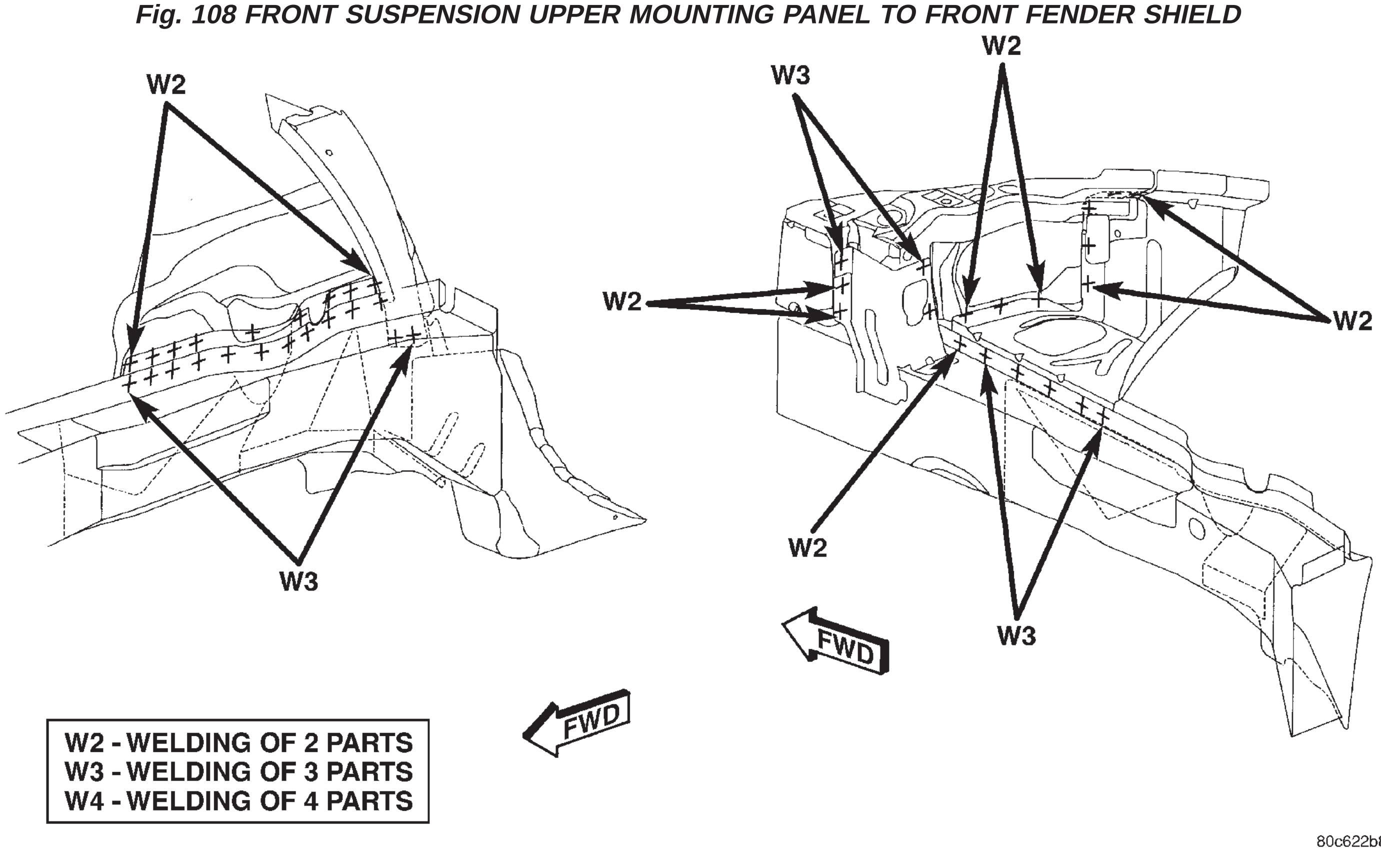

Fig. 109 FRONT WHEELHOUSE TO FRONT SIDE RAIL AND HEADLAMP

WELD LOCATIONS (Continued)

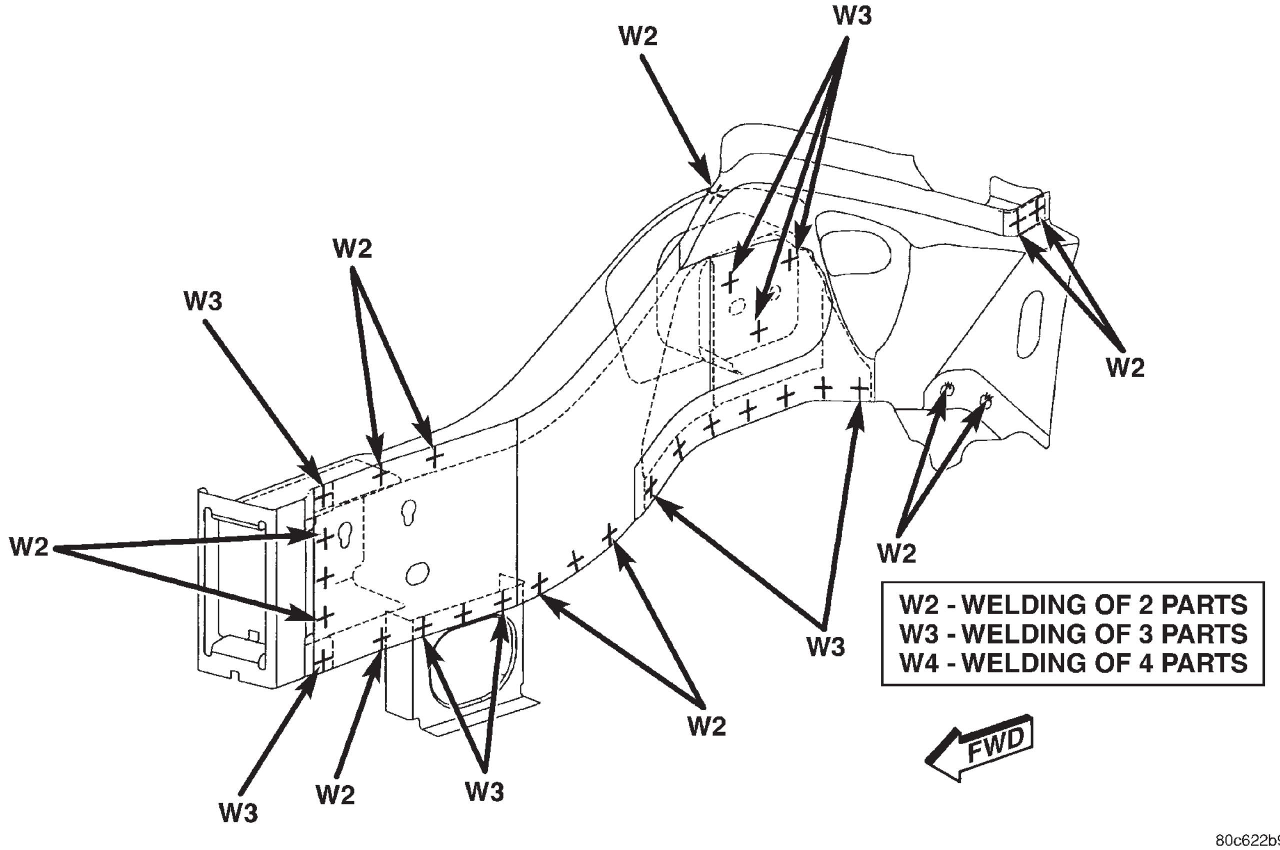

Fig. 110 FRONT SIDE RAIL REINFORCEMENT TO FRONT SIDE RAIL

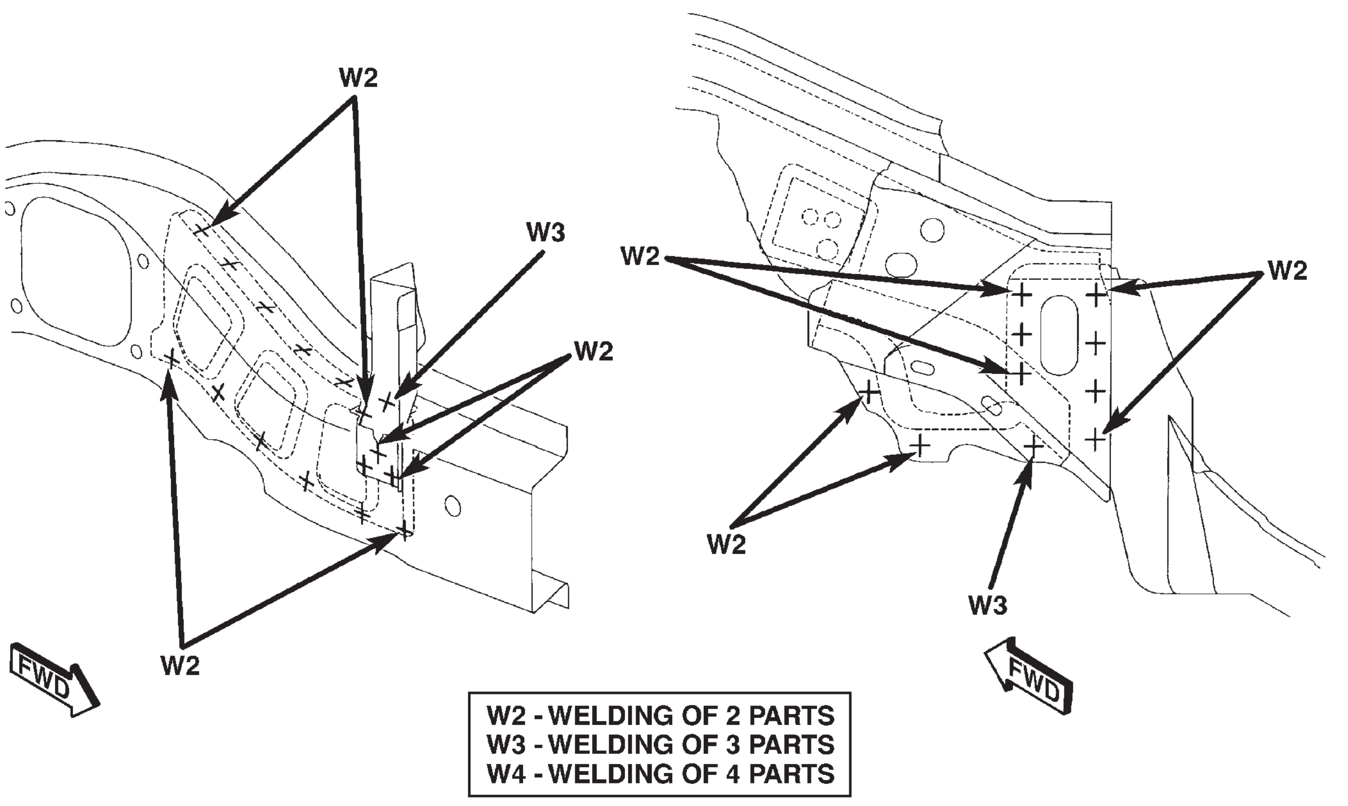

Fig. 111 FRONT SUSPENSION CROSSMEMBER BRACKET TO FRONT SIDE RAIL REINFORCEMENT TO FRONT SIDE RAIL

WELD LOCATIONS (Continued)

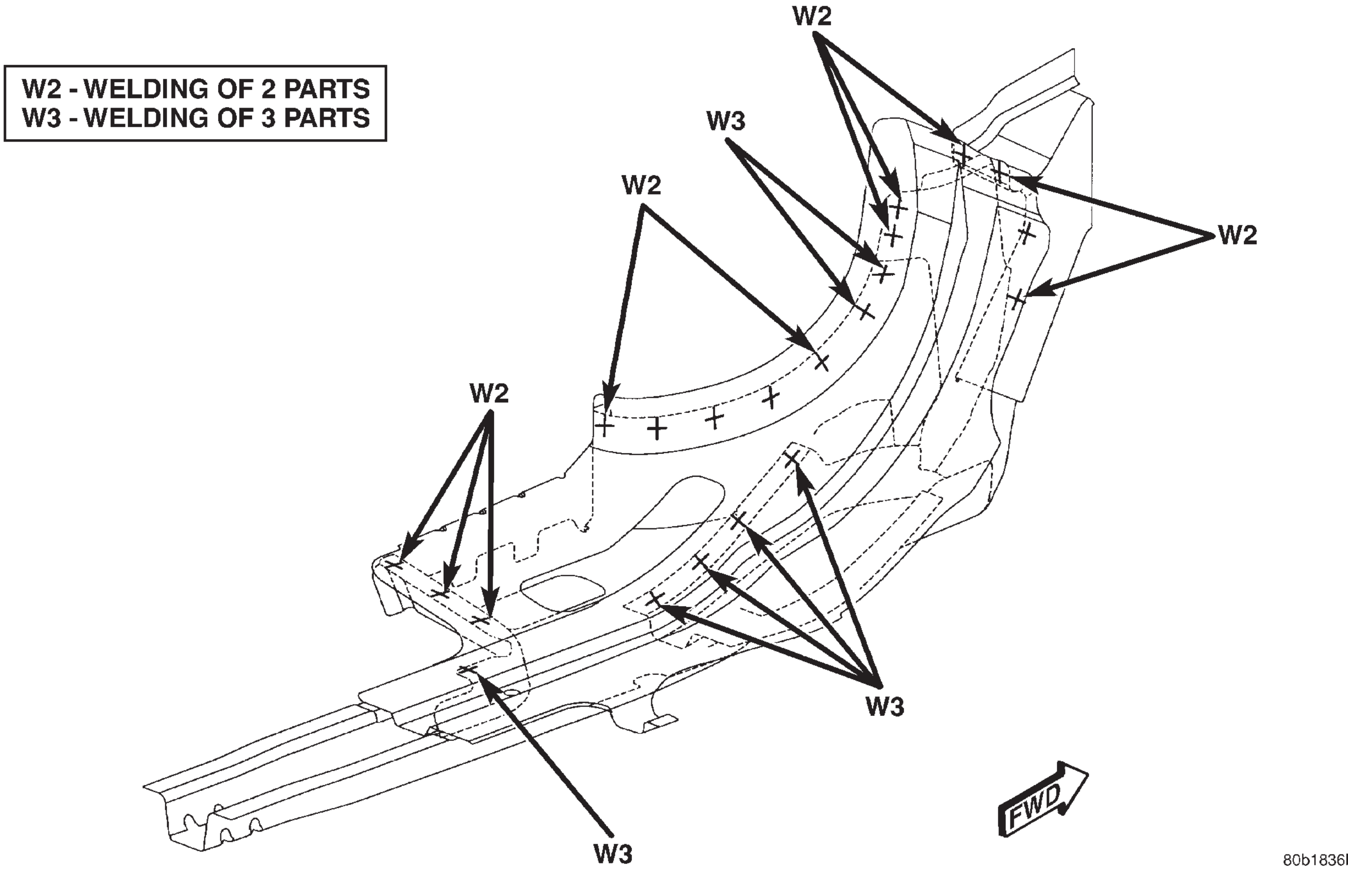

Fig. 112 REAR FRONT SIDE RAIL TO REAR FRONT RAIL CAP

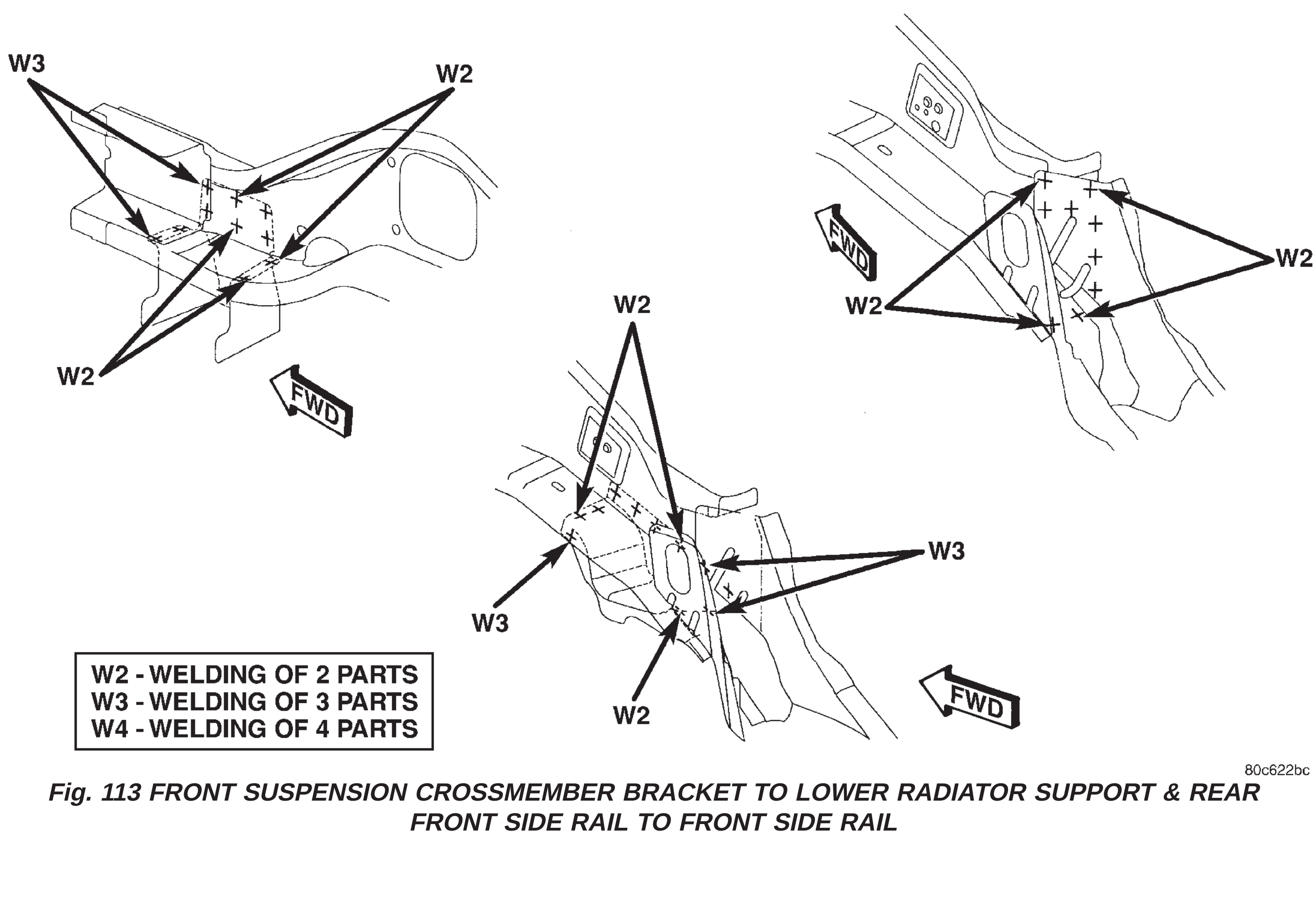

Fig. 113 FRONT SUSPENSION CROSSMEMBER BRACKET TO LOWER RADIATOR SUPPORT & REAR FRONT SIDE RAIL TO FRONT SIDE RAIL

WELD LOCATIONS (Continued)

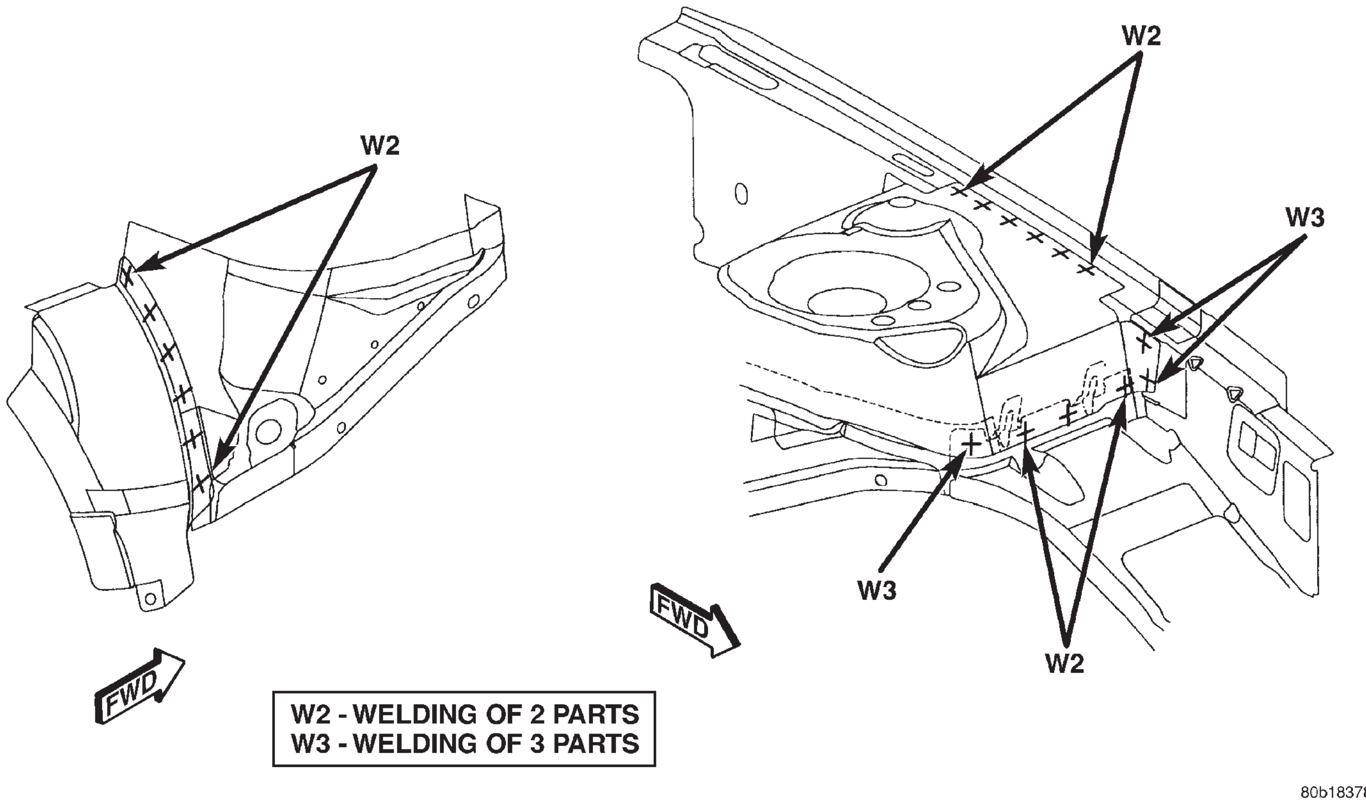

Fig. 114 FRONT SUSPENSION UPPER MOUNTING CAP TO MOUNTING PANEL TO UPPER LOAD BEAM

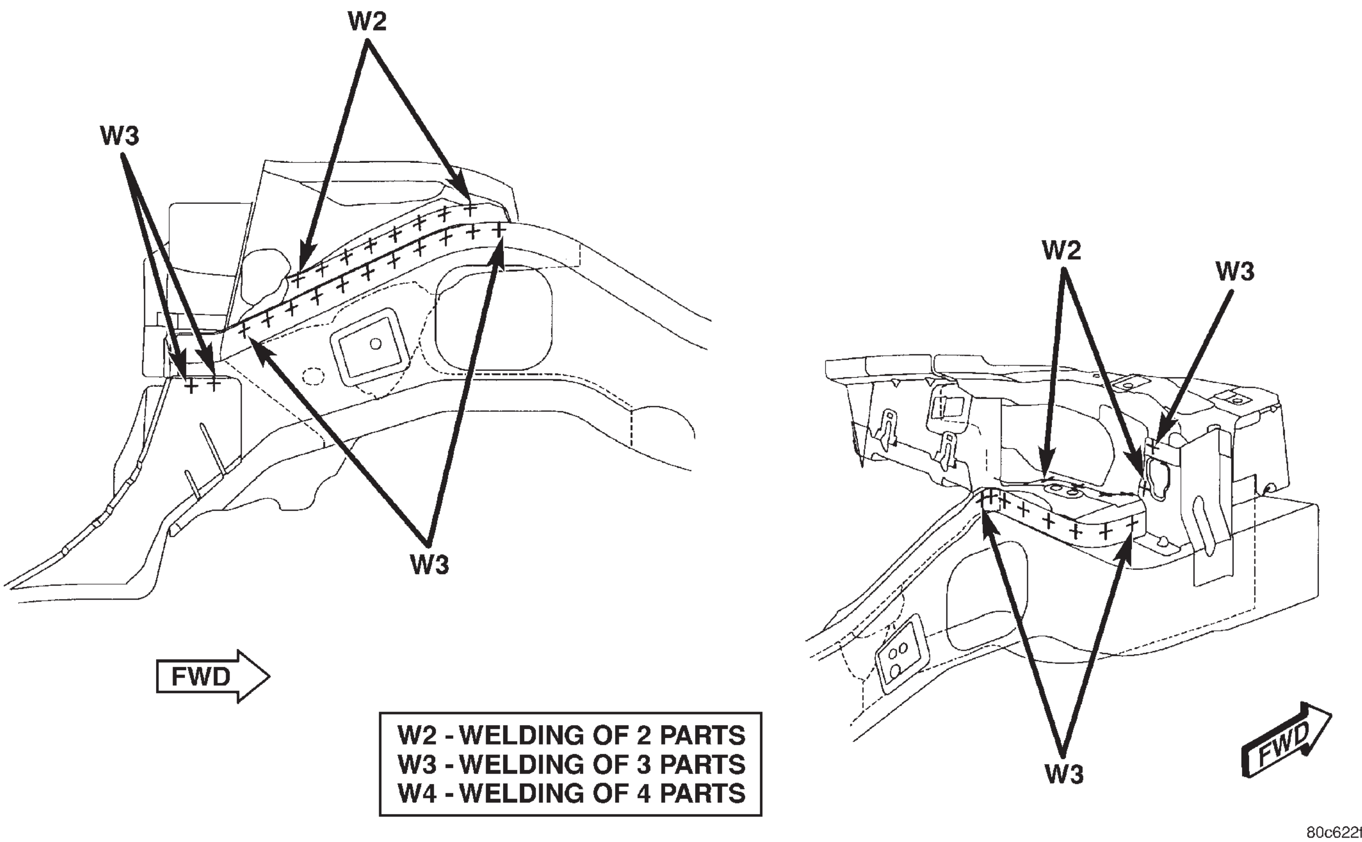

Fig. 115 FRONT WHEELHOUSE TO FRONT SIDE RAIL AND HEADLAMP

WELD LOCATIONS (Continued)

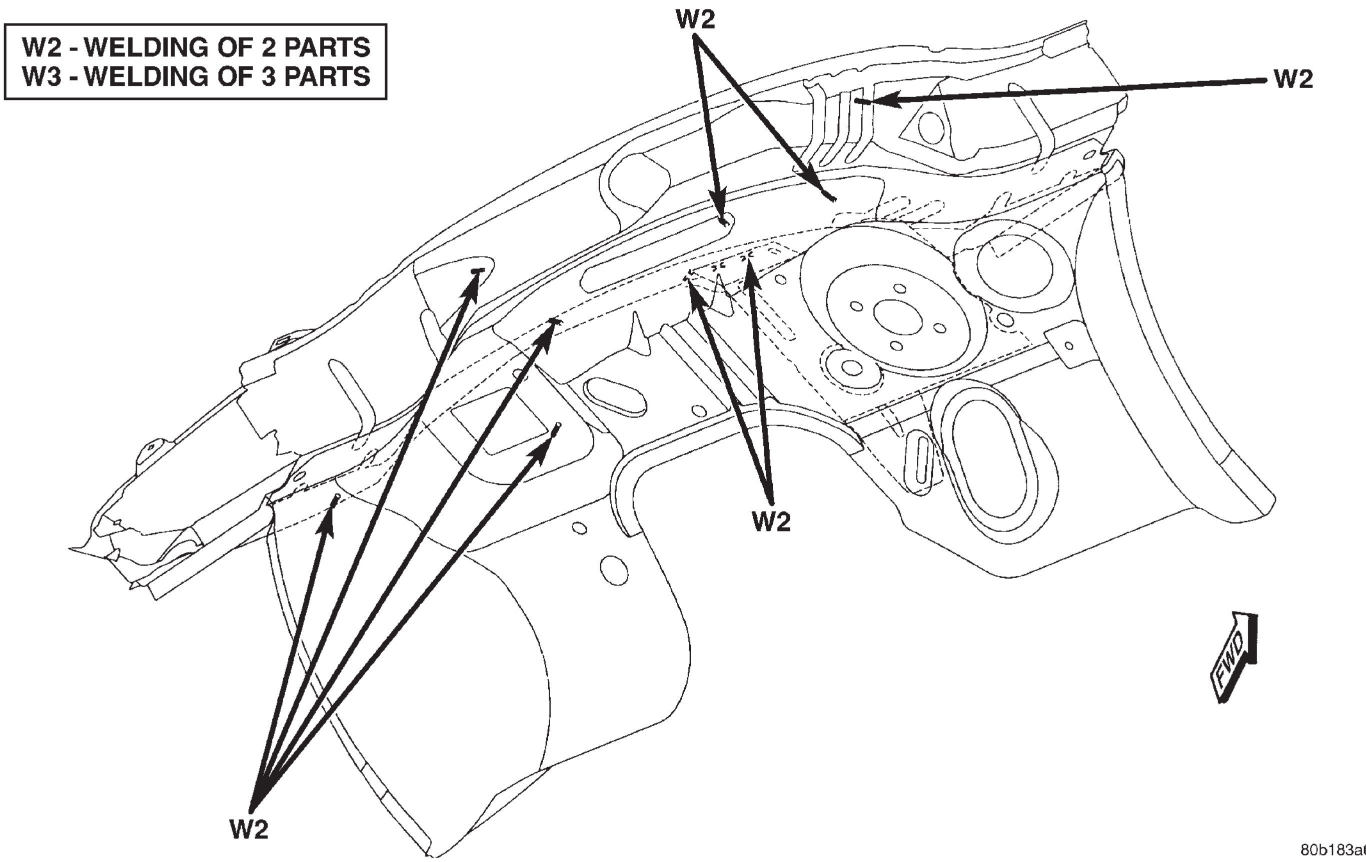

Fig. 116 BRAKE BOOSTER REINFORCEMENT TO DASH PANEL & LOWER CONTROL PLENUM

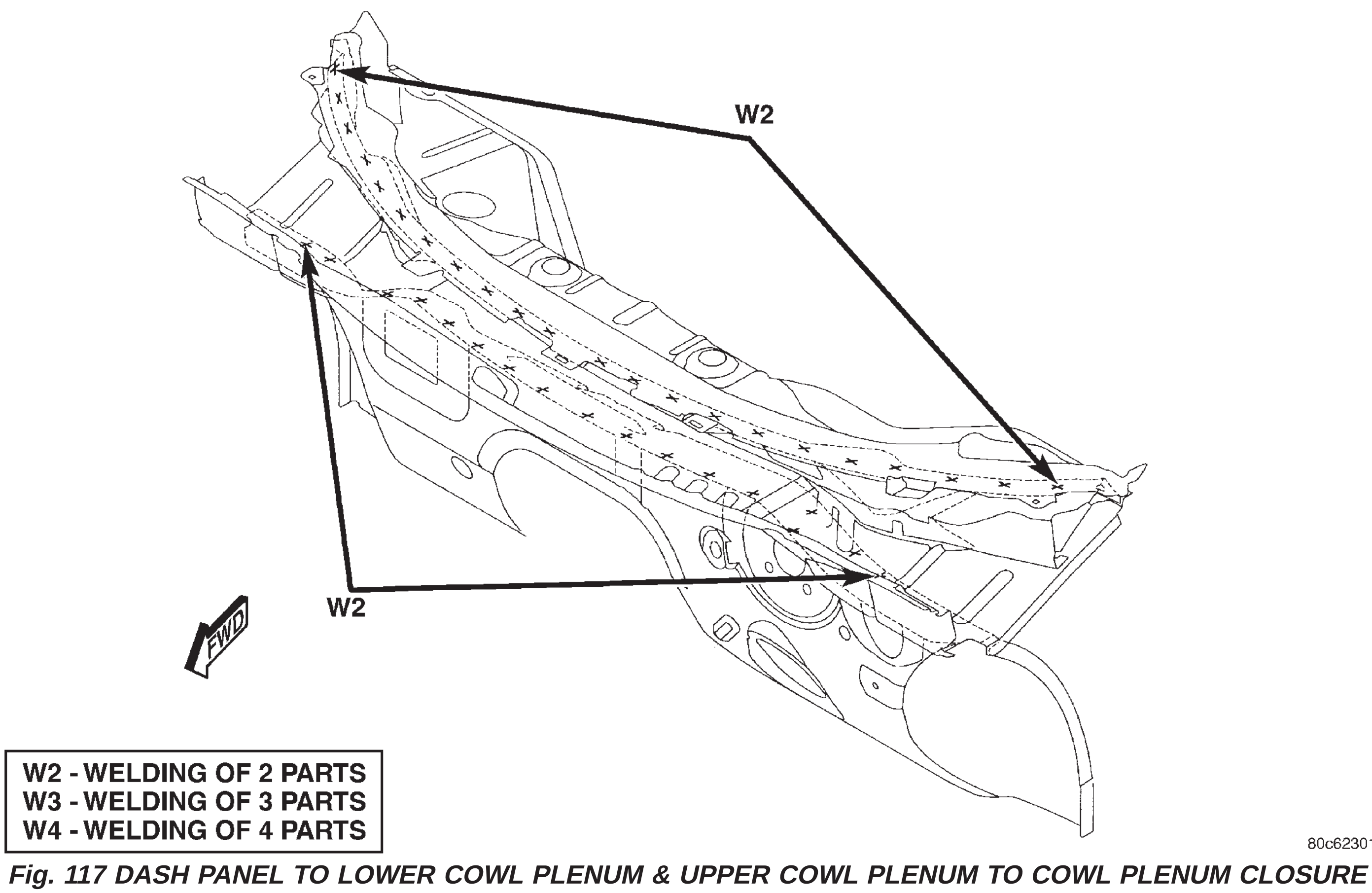

Fig. 117 DASH PANEL TO LOWER COWL PLENUM & UPPER COWL PLENUM TO COWL PLENUM CLOSURE

WELD LOCATIONS (Continued)

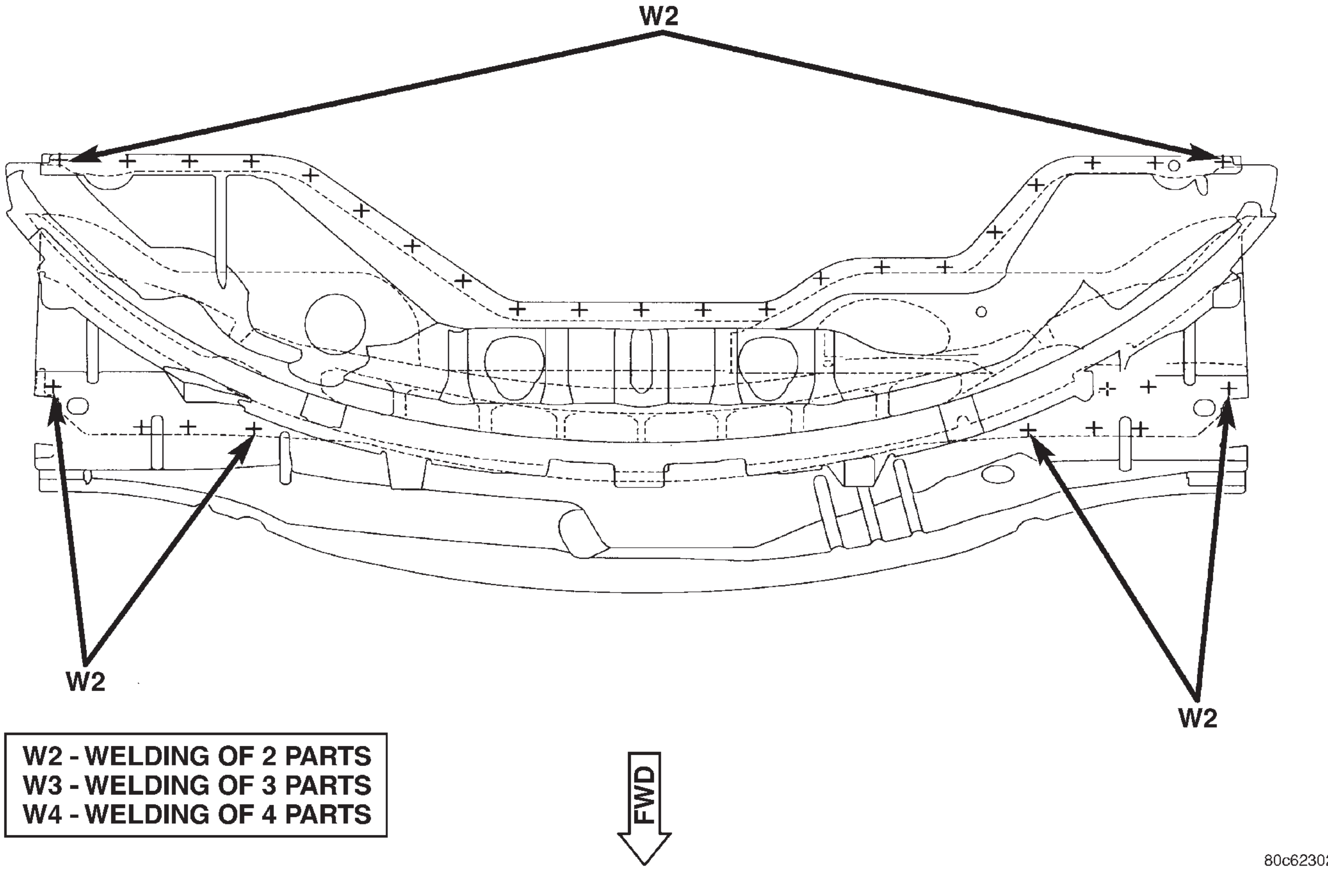

Fig. 118 UPPER COWL PLENUM AND DASH PANEL TO LOWER COWL PLENUM

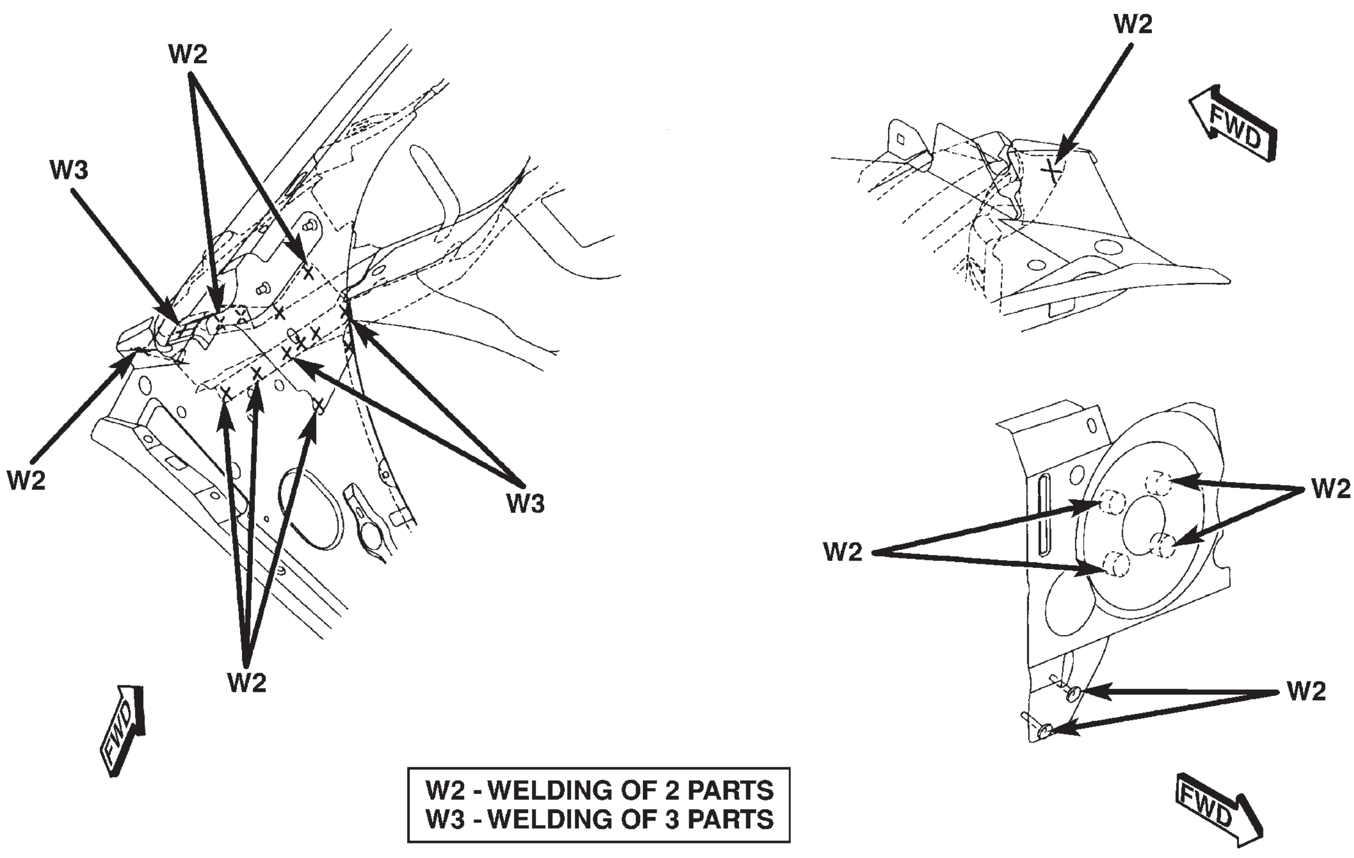

Fig. 119 COWL SIDE PANEL TO DASH PANEL TO LOWER COWL PLENUM

WELD LOCATIONS (Continued)

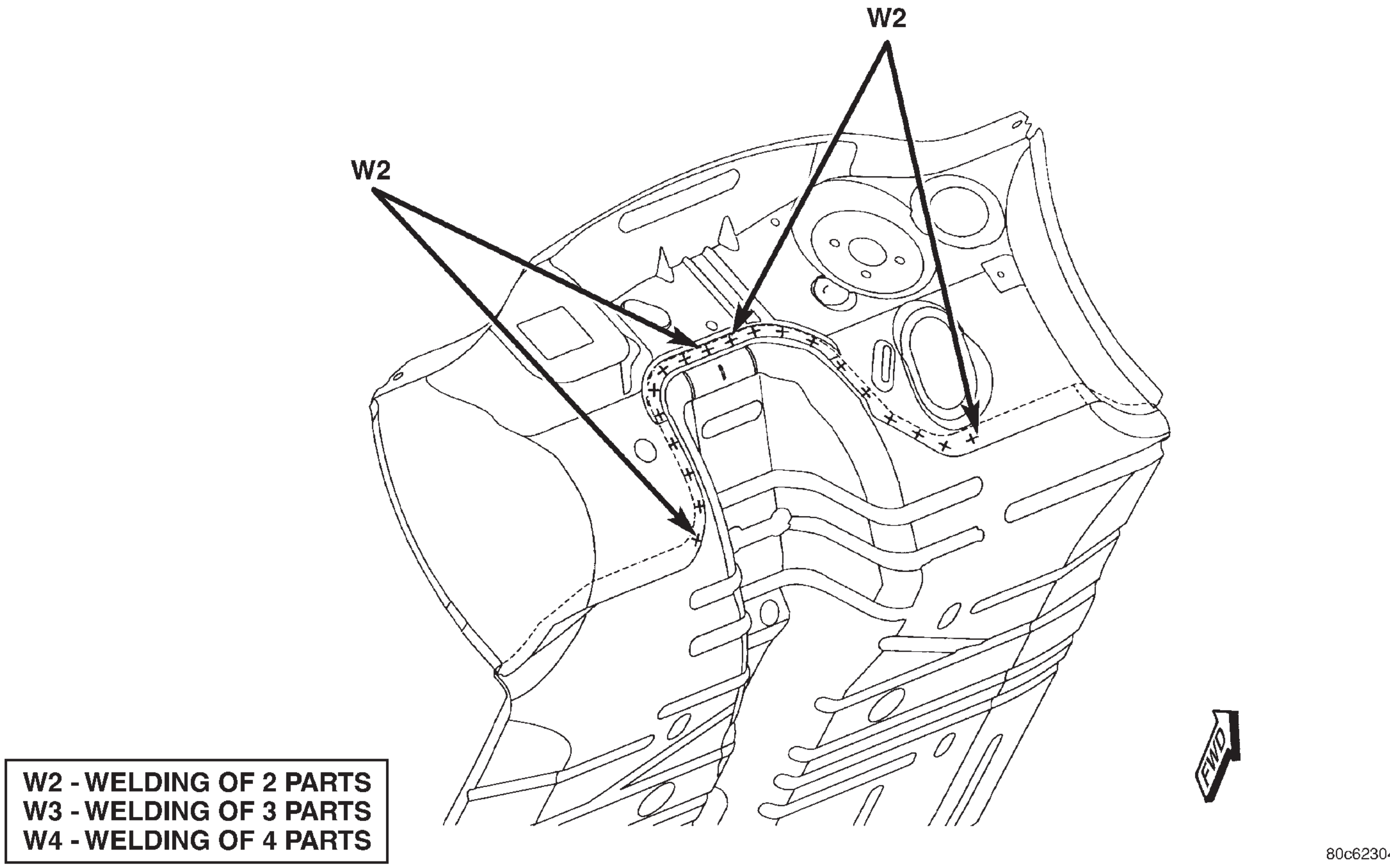

Fig. 120 FRONT FLOOR PAN TO DASH PANEL

WELD LOCATIONS (Continued)

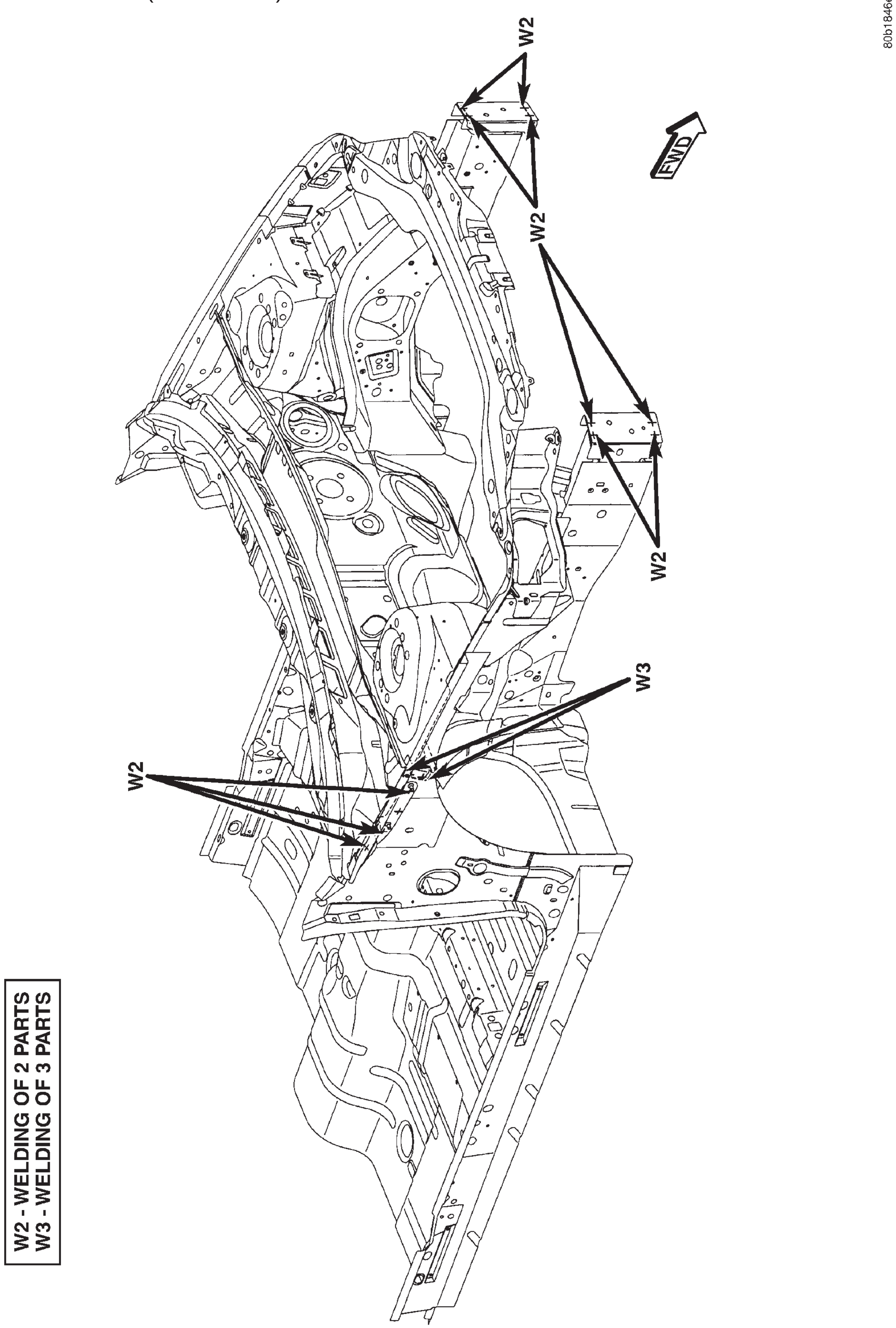

Fig. 121 LOWER COWL PLENUM TO INNER LOAD BEAM BUMPER ATTACHING REINFORCEMENT

WELD LOCATIONS (Continued)

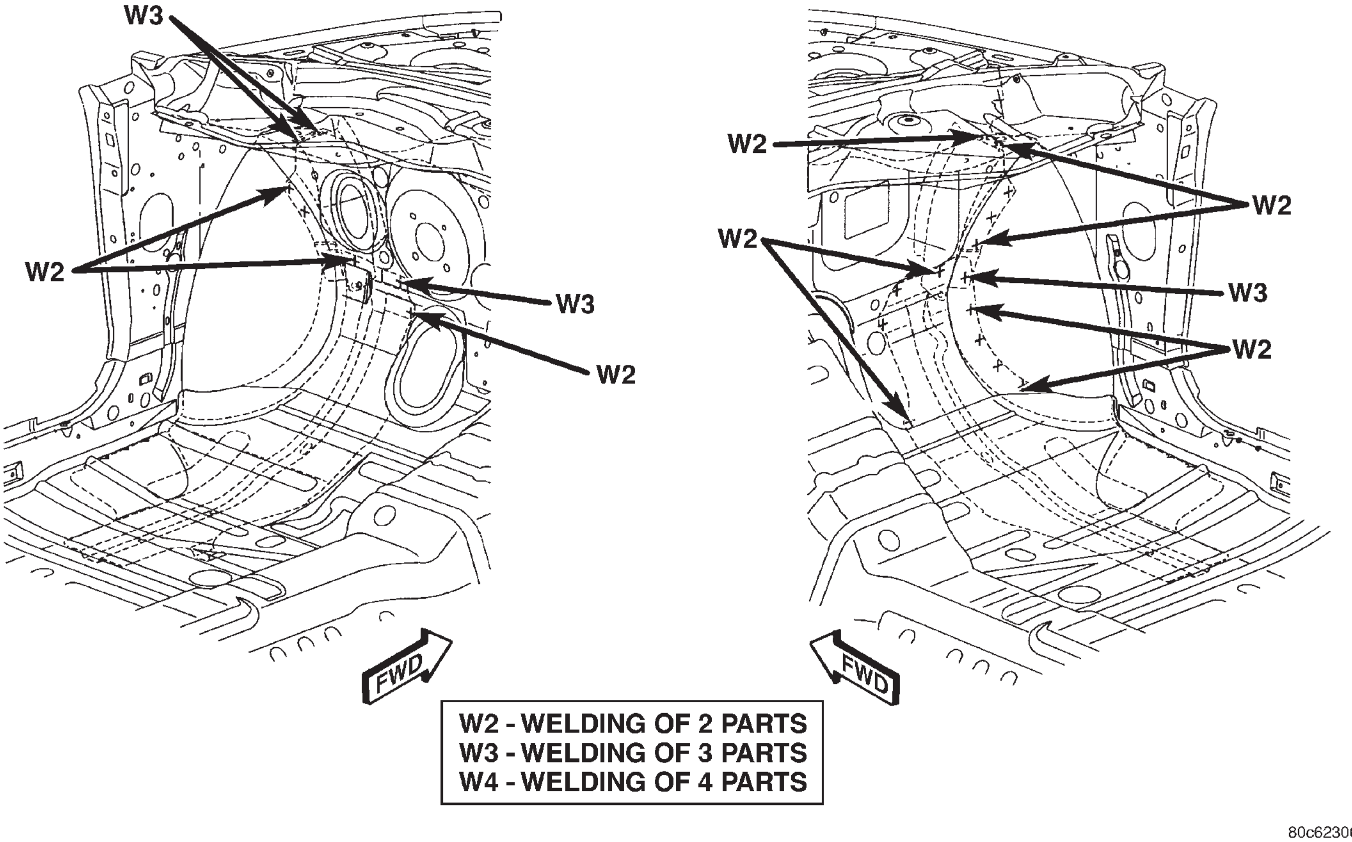

Fig. 122 SHOCK TOWER EXTENSION TO DASH PANEL

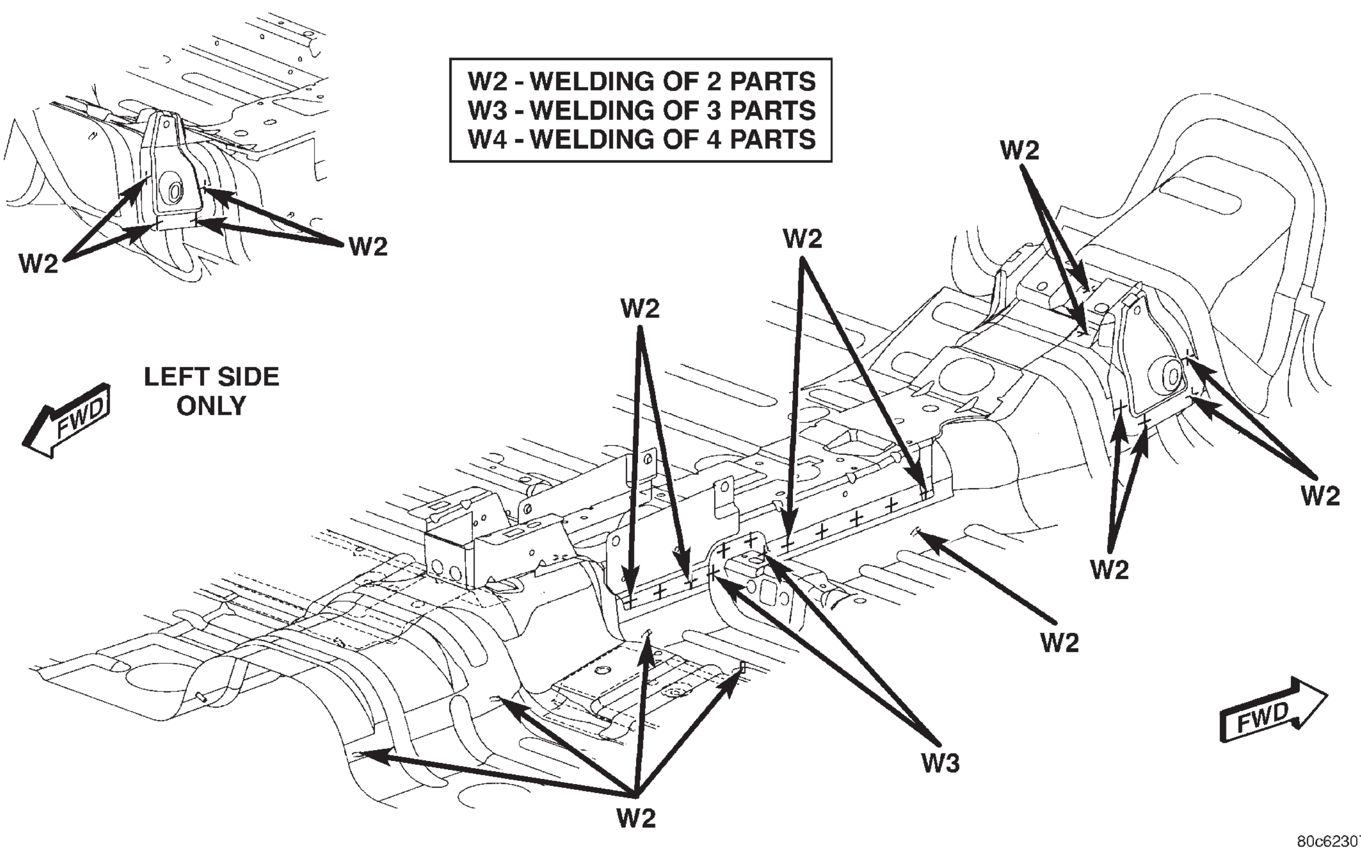

Fig. 123 FRONT CONSOLE MOUNTING BRACKET TO FRONT FLOOR PAN

WELD LOCATIONS (Continued)

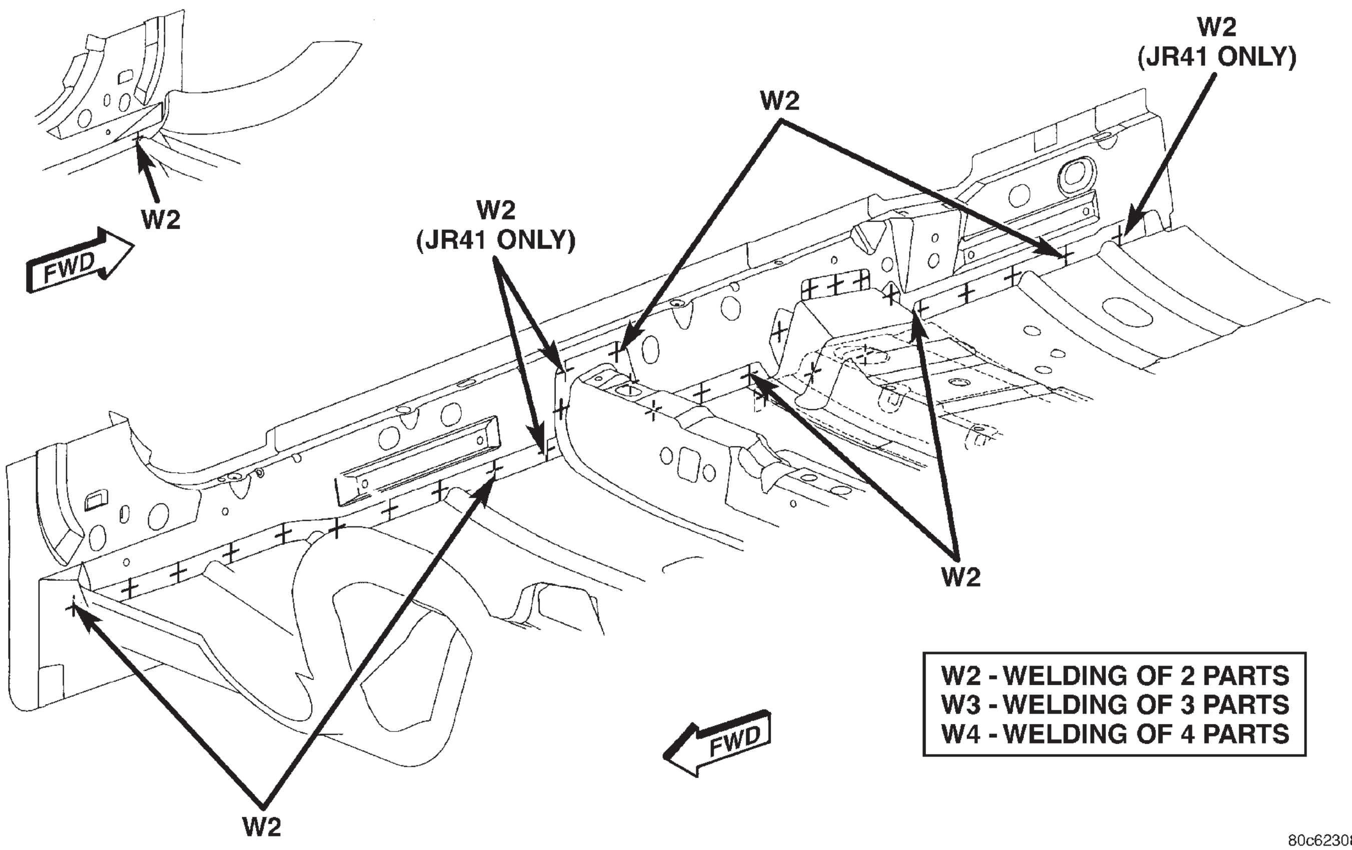

Fig. 124 SEAT TRACK CROSSMEMBER & FRONT FLOOR PAN TO INNER BODY SIDE SILL

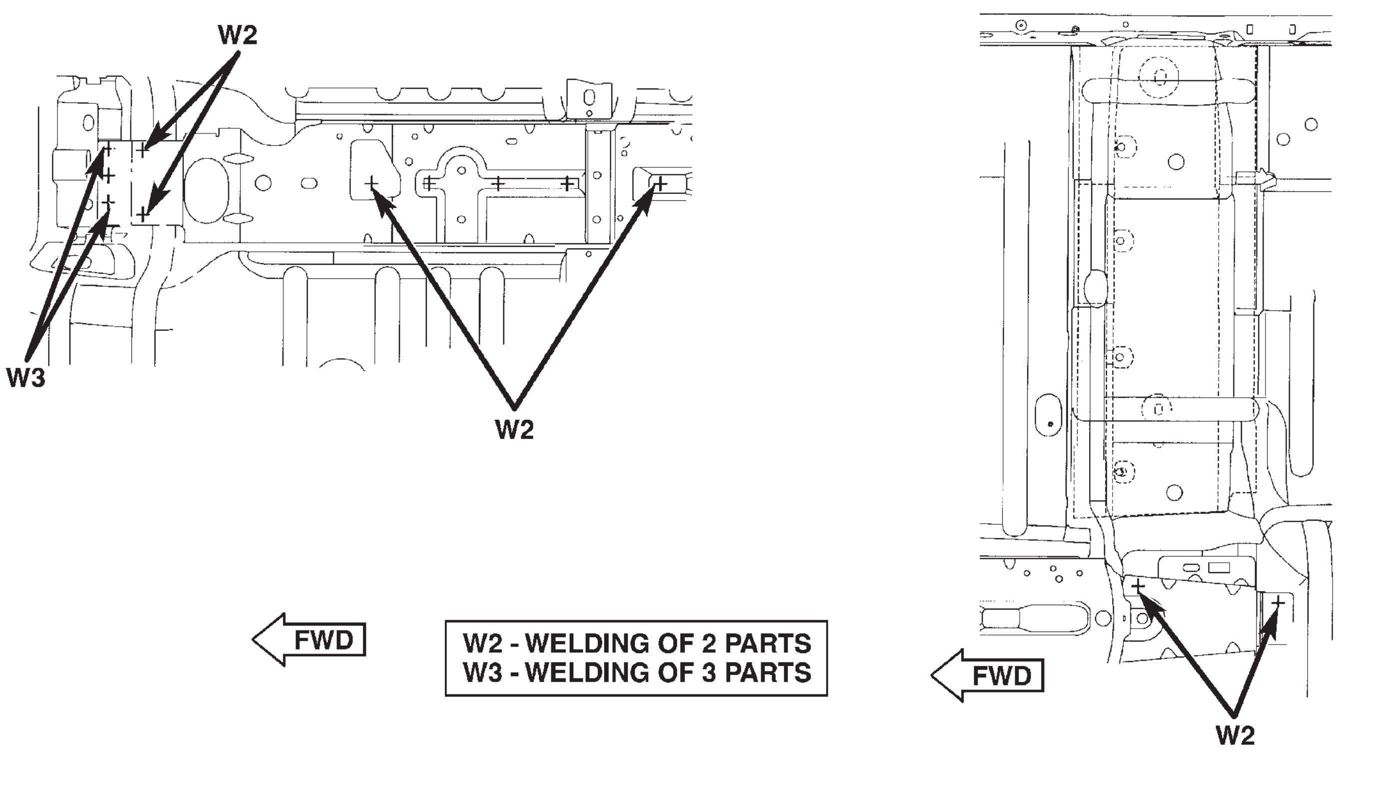

Fig. 125 FRONT SEAT TRACK CROSSMEMBER TO FRONT FLOOR PAN

WELD LOCATIONS (Continued)

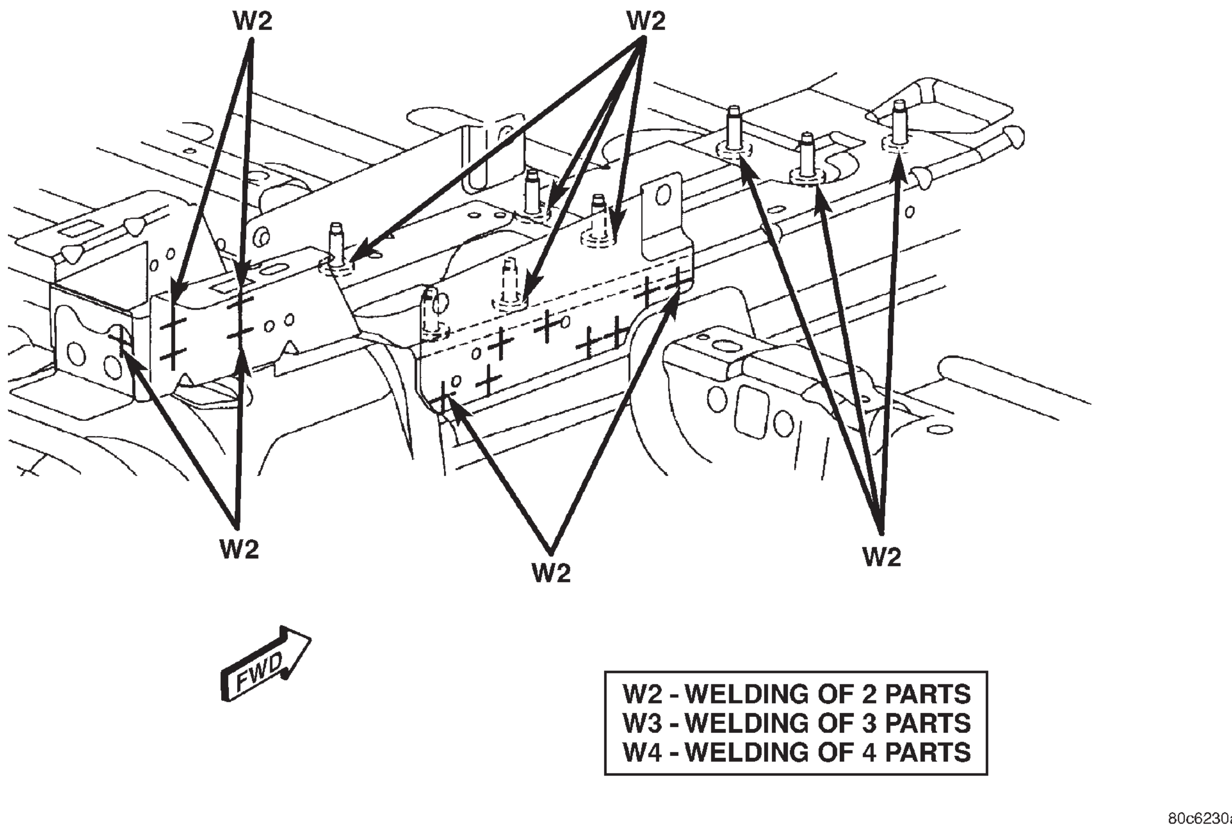

Fig. 126 PARK BRAKE BRACKET & SHIFTER MOUNTING STUDS TO FRONT CONSOLE MOUNTING BRACKET

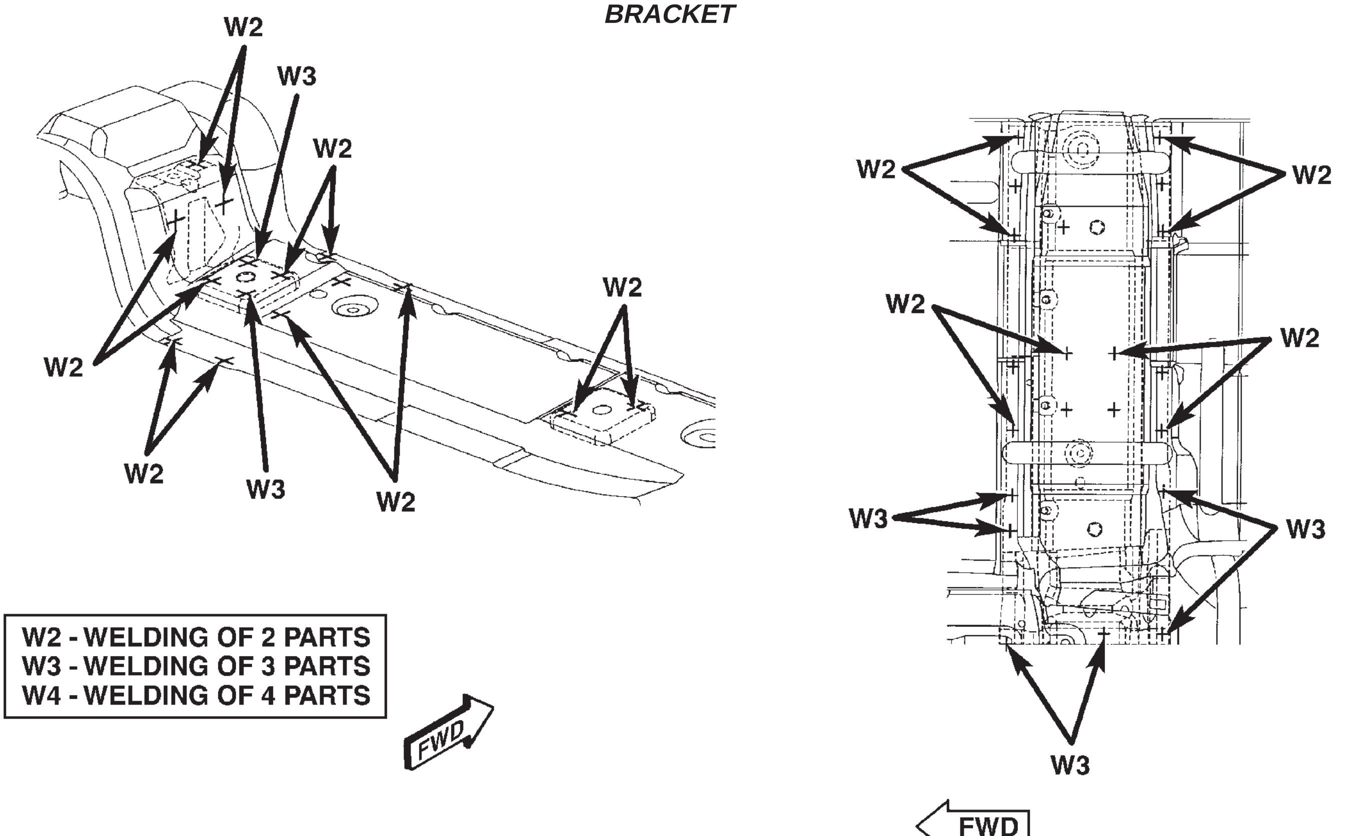

Fig. 127 SEAT MOUNTING CROSSMEMBER TO TUNNEL REINFORCEMENT TO FRONT CONSOLE MOUNTING BRACKET

WELD LOCATIONS (Continued)

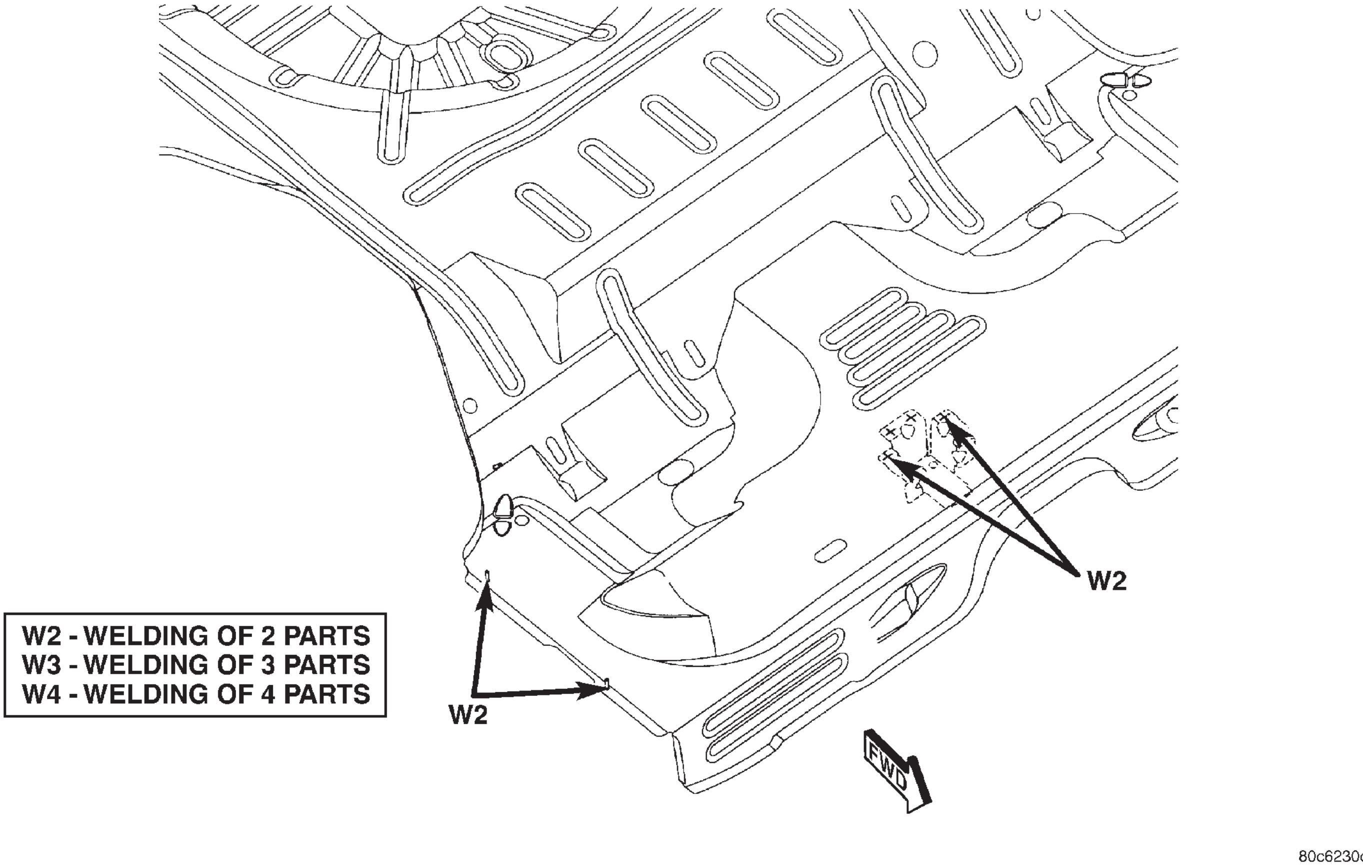

Fig. 128 WIRING HARNESS WELD STUDS & FUEL TANK STRAP BRACKET TO REAR FLOOR PAN

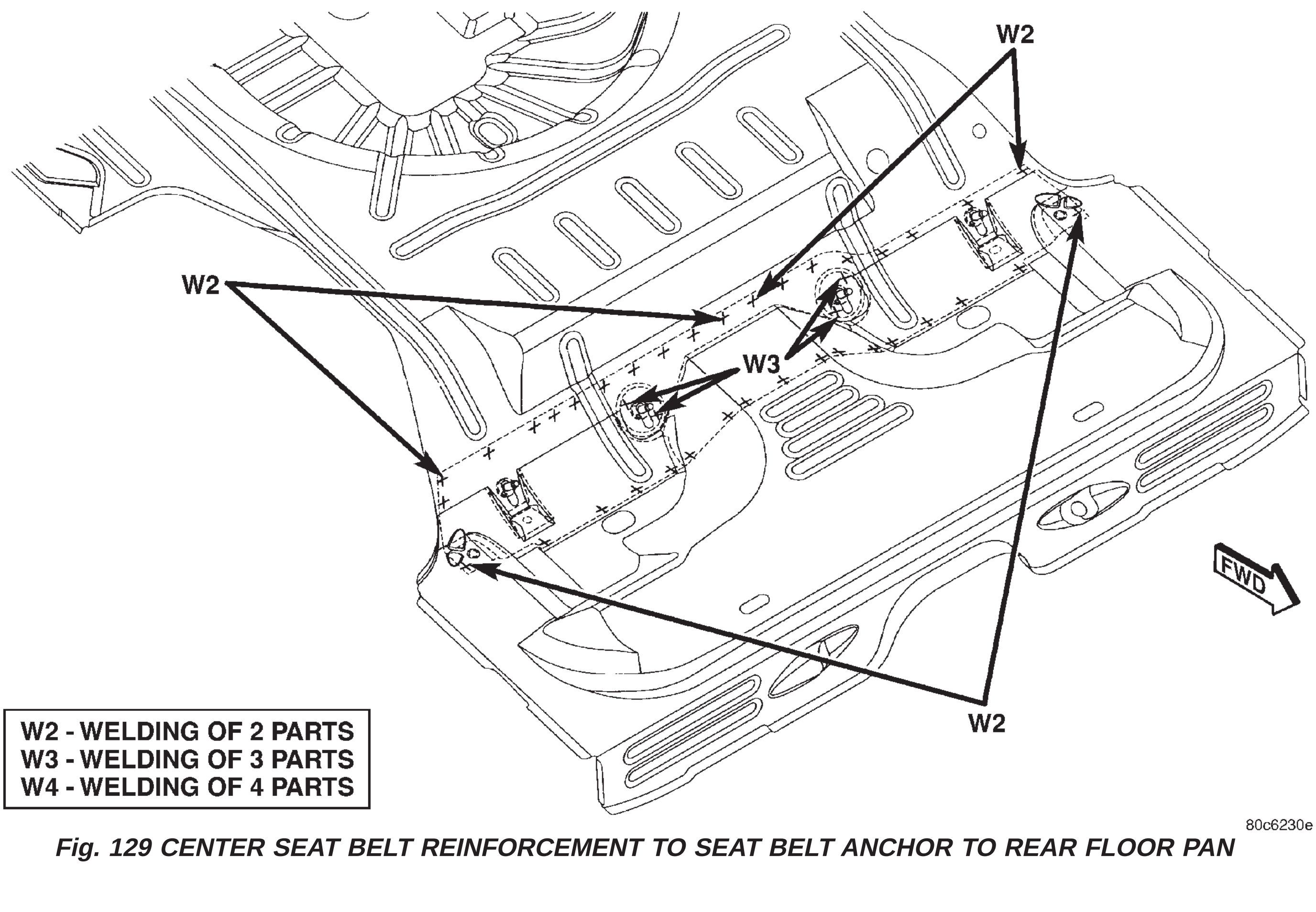

Fig. 129 CENTER SEAT BELT REINFORCEMENT TO SEAT BELT ANCHOR TO REAR FLOOR PAN

WELD LOCATIONS (Continued)

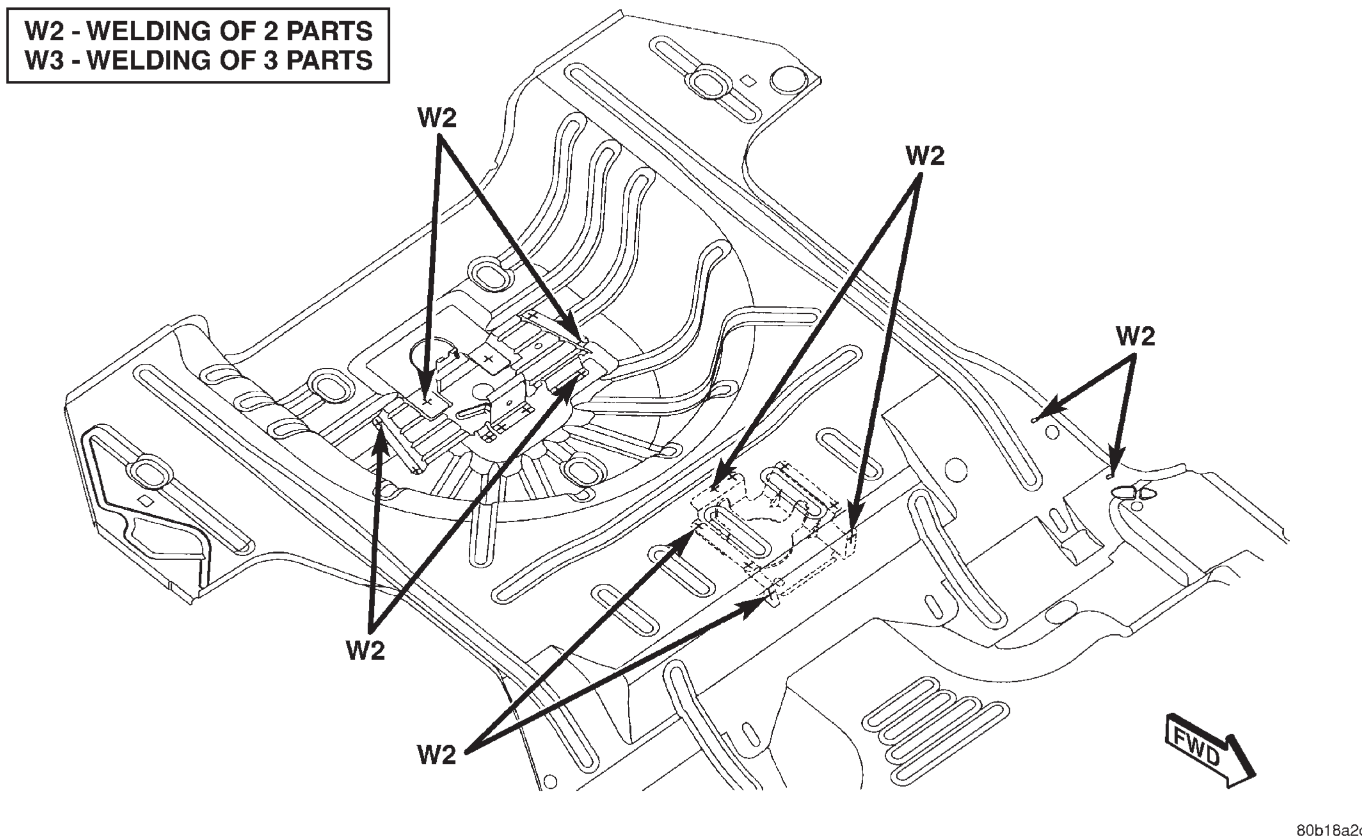

Fig. 130 SPARE WHEEL ANCHOR REINFORCEMENT FUEL TANK SUPPORT BRACKET TO REAR FLOOR PAN

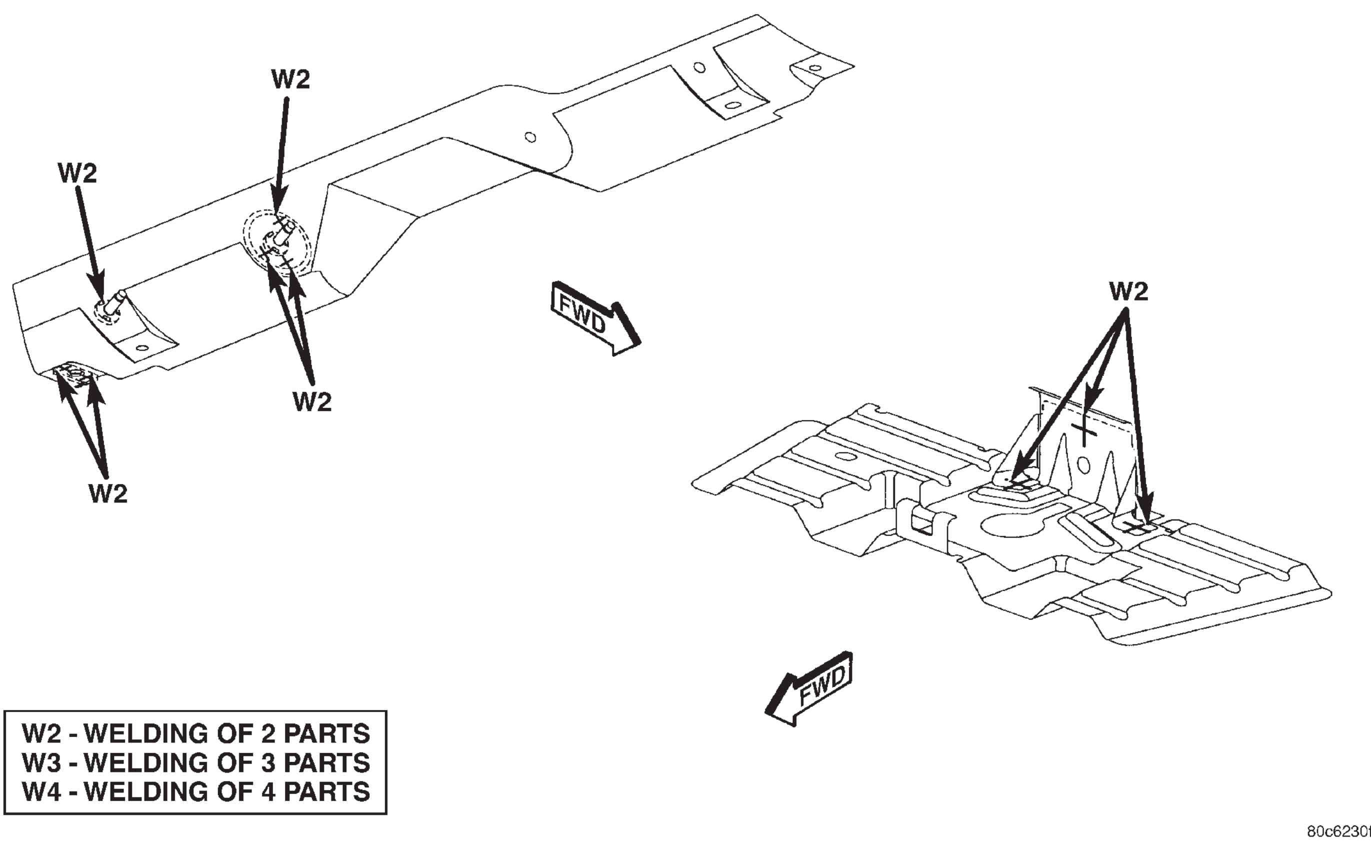

Fig. 131 WELD STUD TO SEAT BELT ANCHOR REINFORCEMENT & SPARE WHEEL BRACKET

WELD LOCATIONS (Continued)

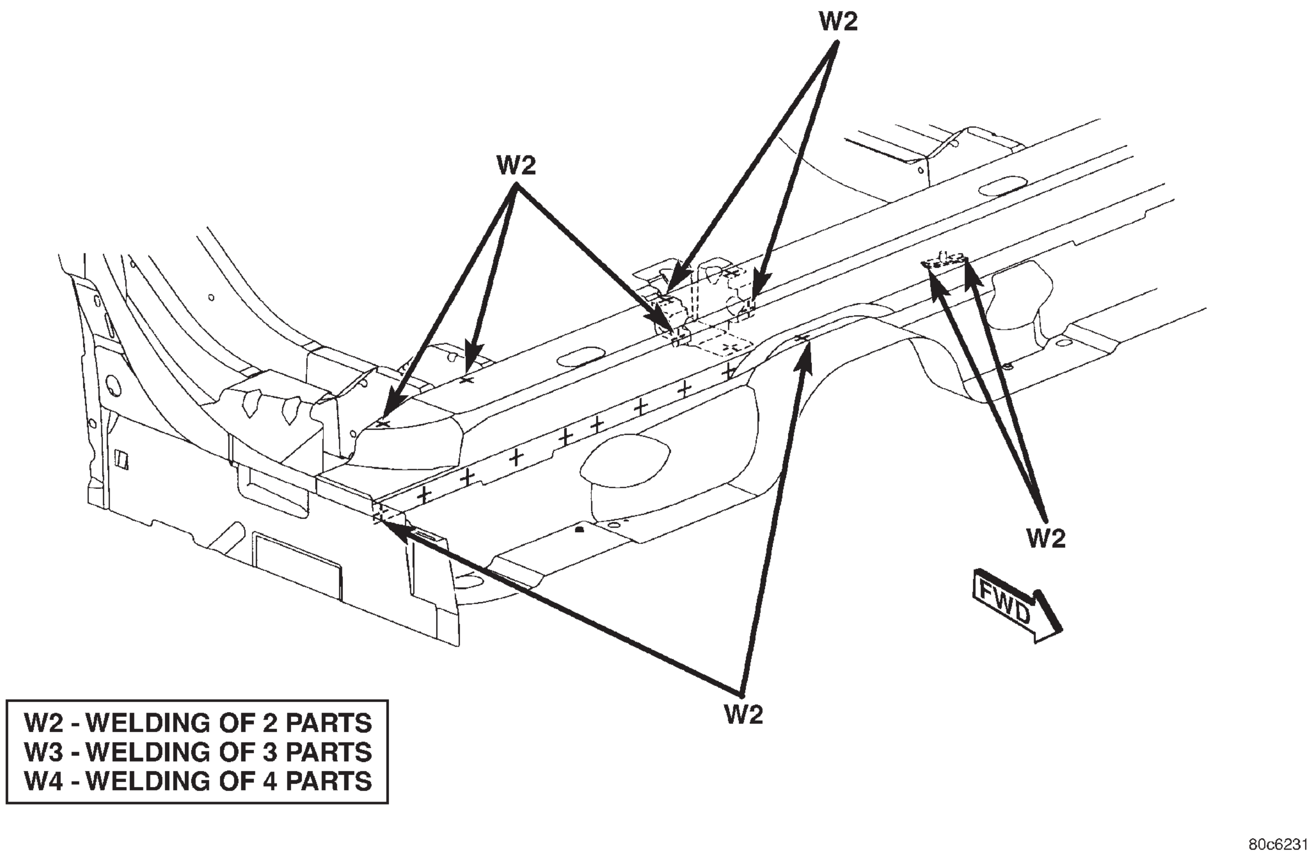

Fig. 132 REAR SEAT CROSSMEMBER REINFORCEMENT TO REAR FLOOR PAN FRONT CROSSMEMBER

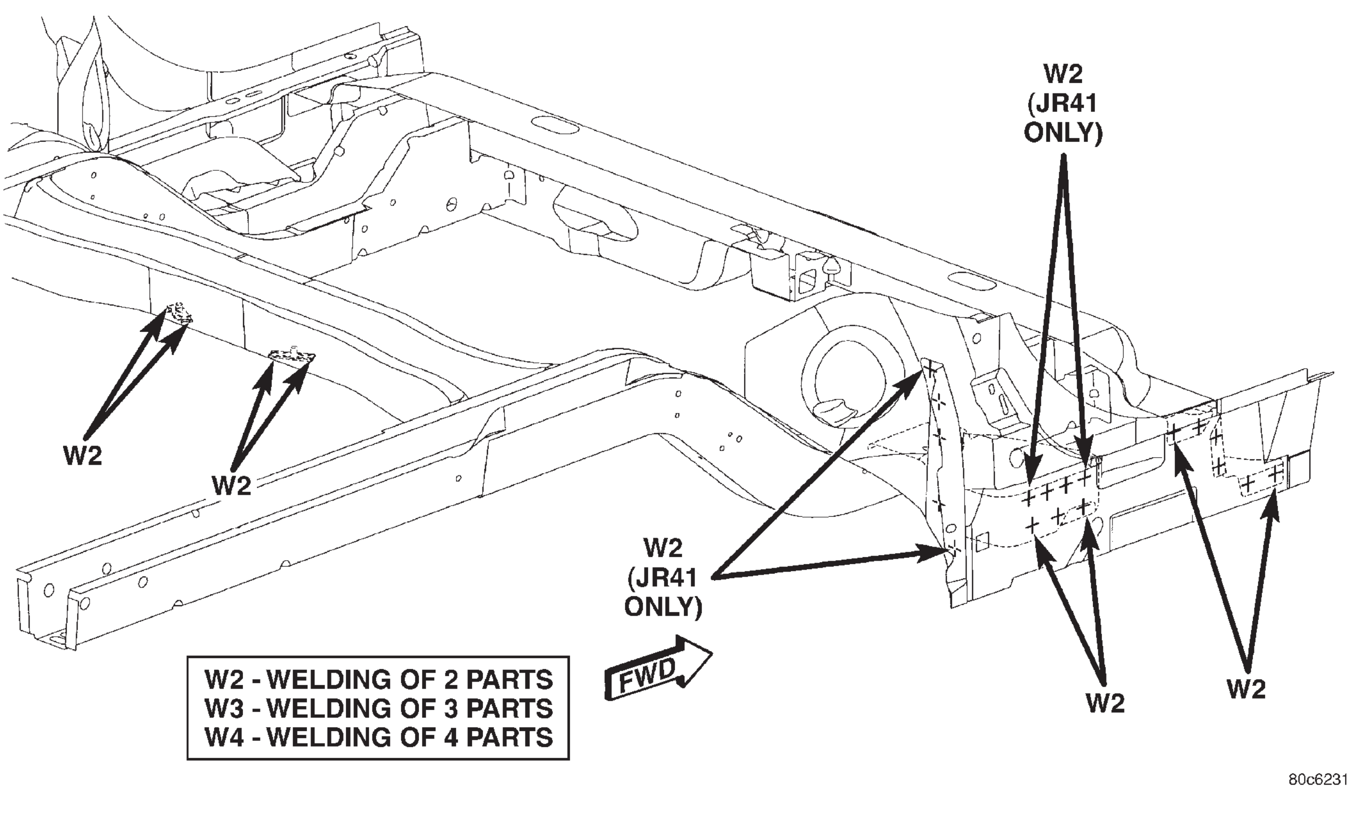

Fig. 133 REAR RAIL EXTENSION BODY SIDE APERTURE BRACKET, REAR FLOOR PAN CROSSMEMBER TO INNER BODY SIDE SILL EXTENSION

WELD LOCATIONS (Continued)

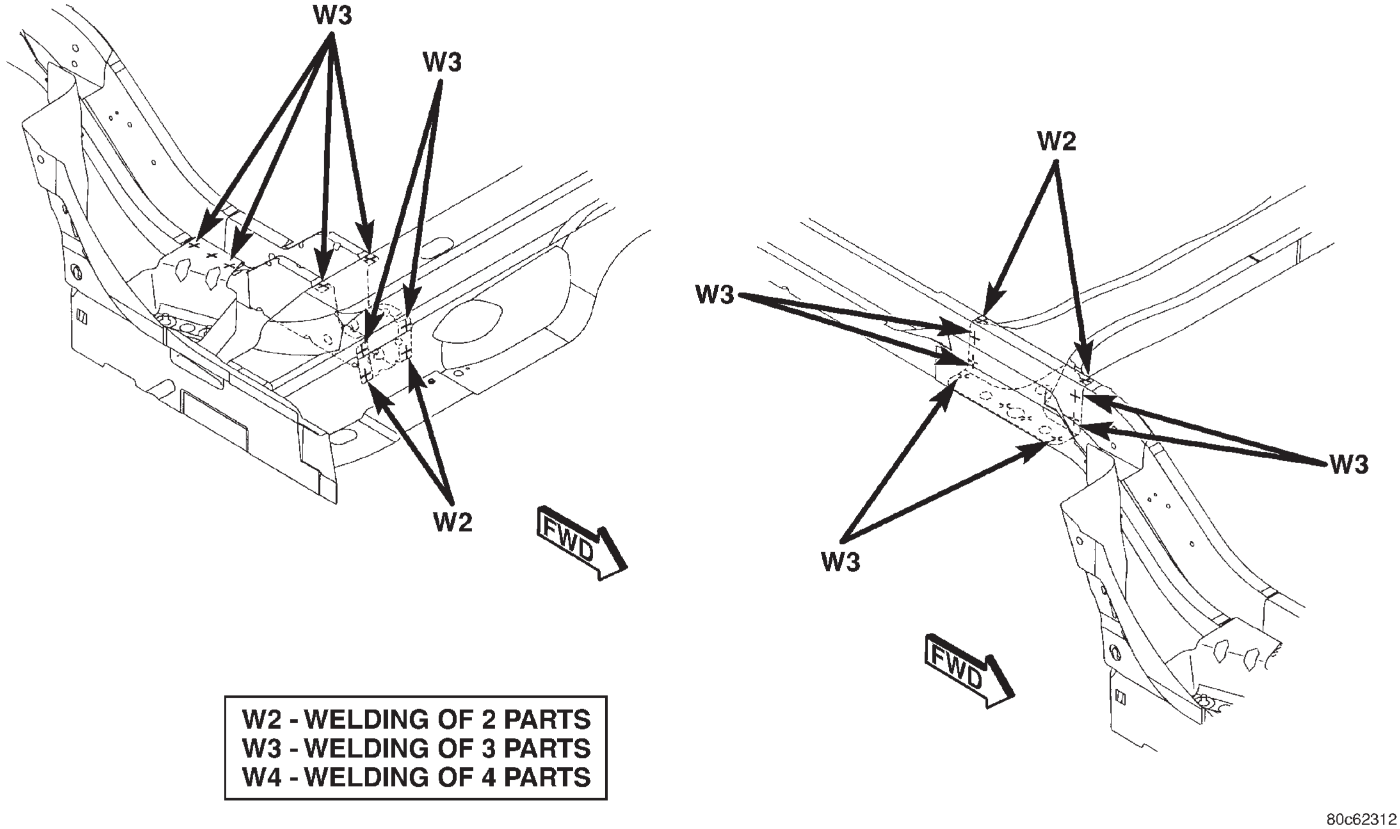

Fig. 134 CENTER FLOOR PAN CROSSMEMBER TO REAR FLOOR PAN SIDE RAIL REAR EXTENSION TO CENTER FLOOR SIDE RAIL

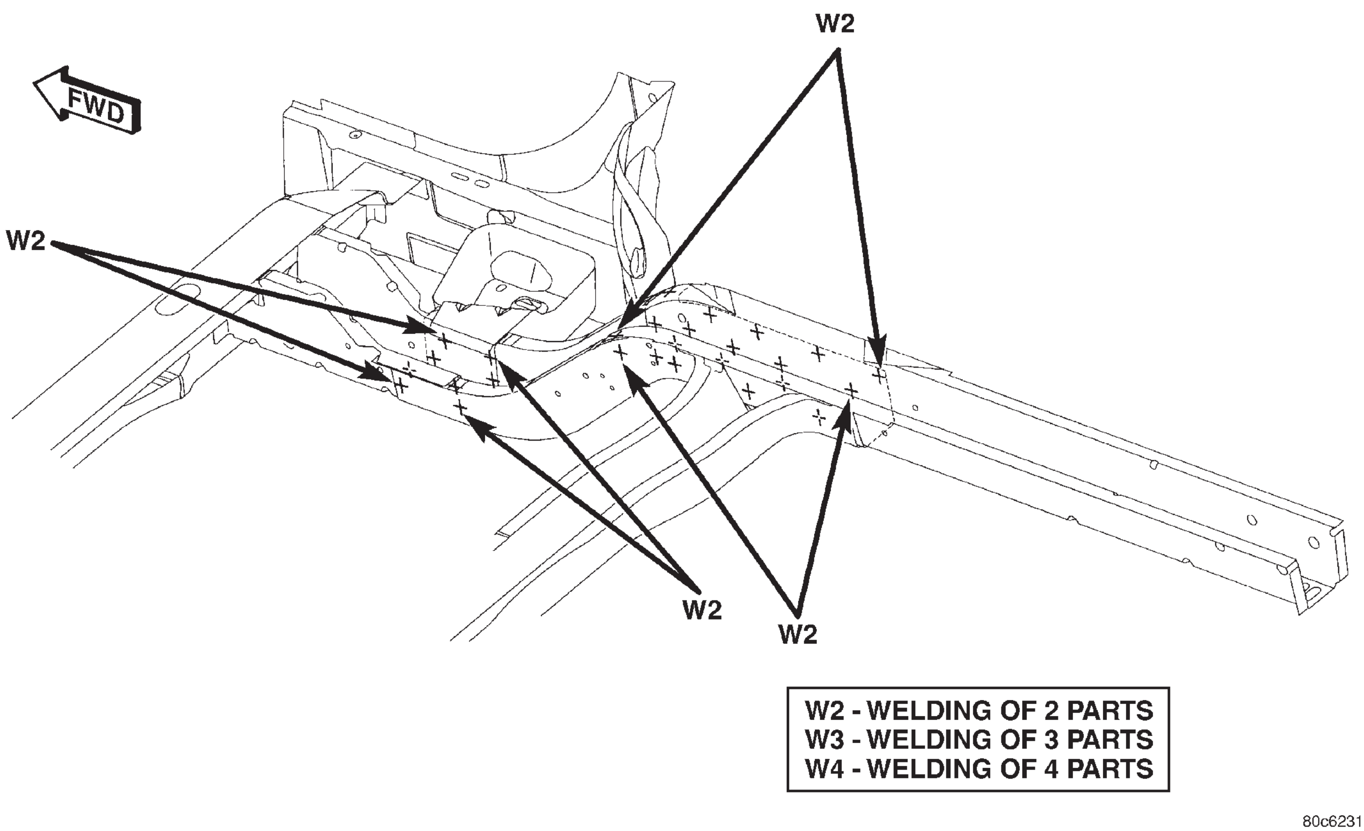

Fig. 135 CENTER FLOOR PAN SIDE RAIL TO CENTER SIDE RAIL EXTENSION TO REAR FLOOR PAN SIDE RAIL

WELD LOCATIONS (Continued)

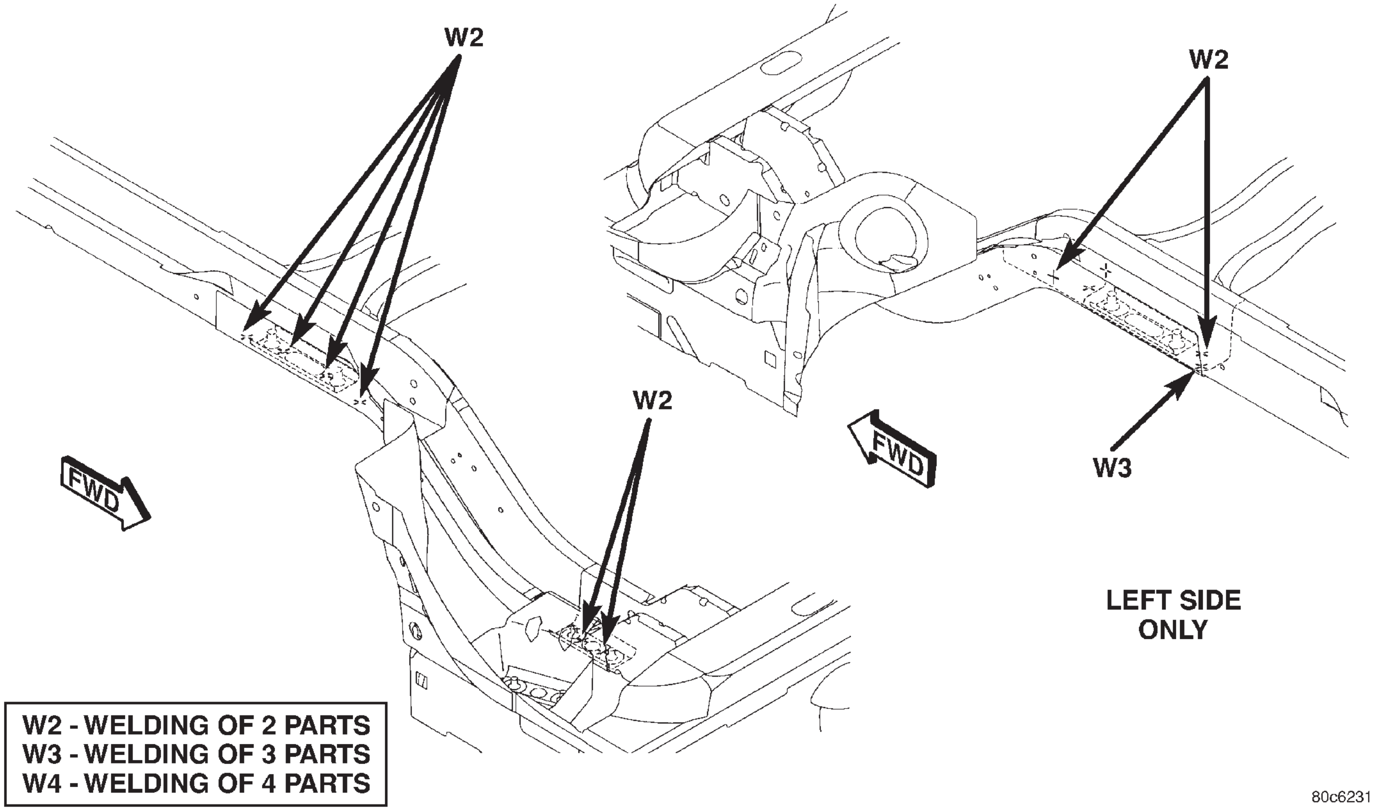

Fig. 136 CENTER FLOOR REAR SUSPENSION CROSSMEMBER TO CENTER SIDE RAIL EXTENSION TO REAR SIDE RAIL

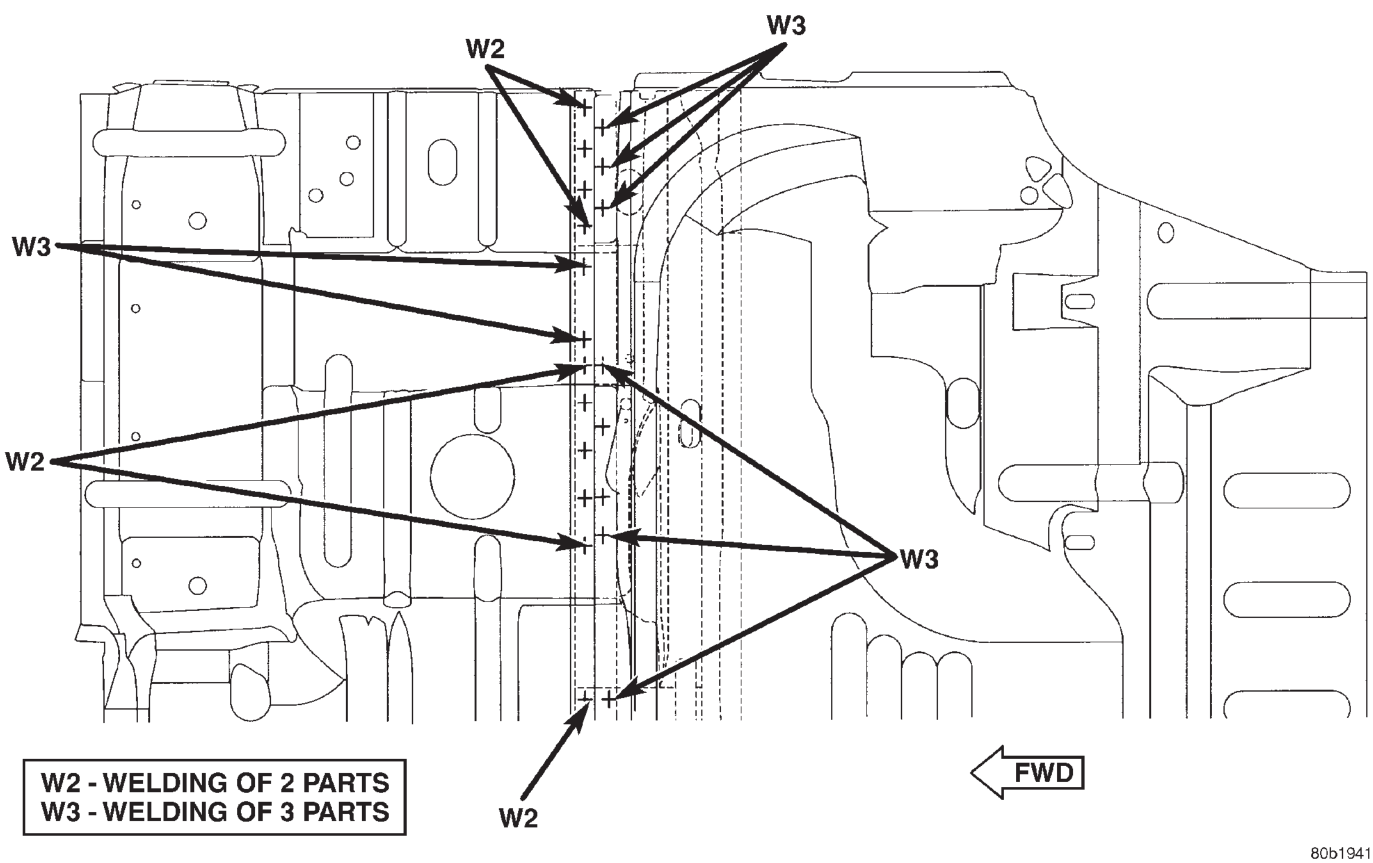

Fig. 137 REAR FLOOR PAN FRONT CROSSMEMBER TO REAR FLOOR PAN TO FRONT FLOOR PAN

WELD LOCATIONS (Continued)

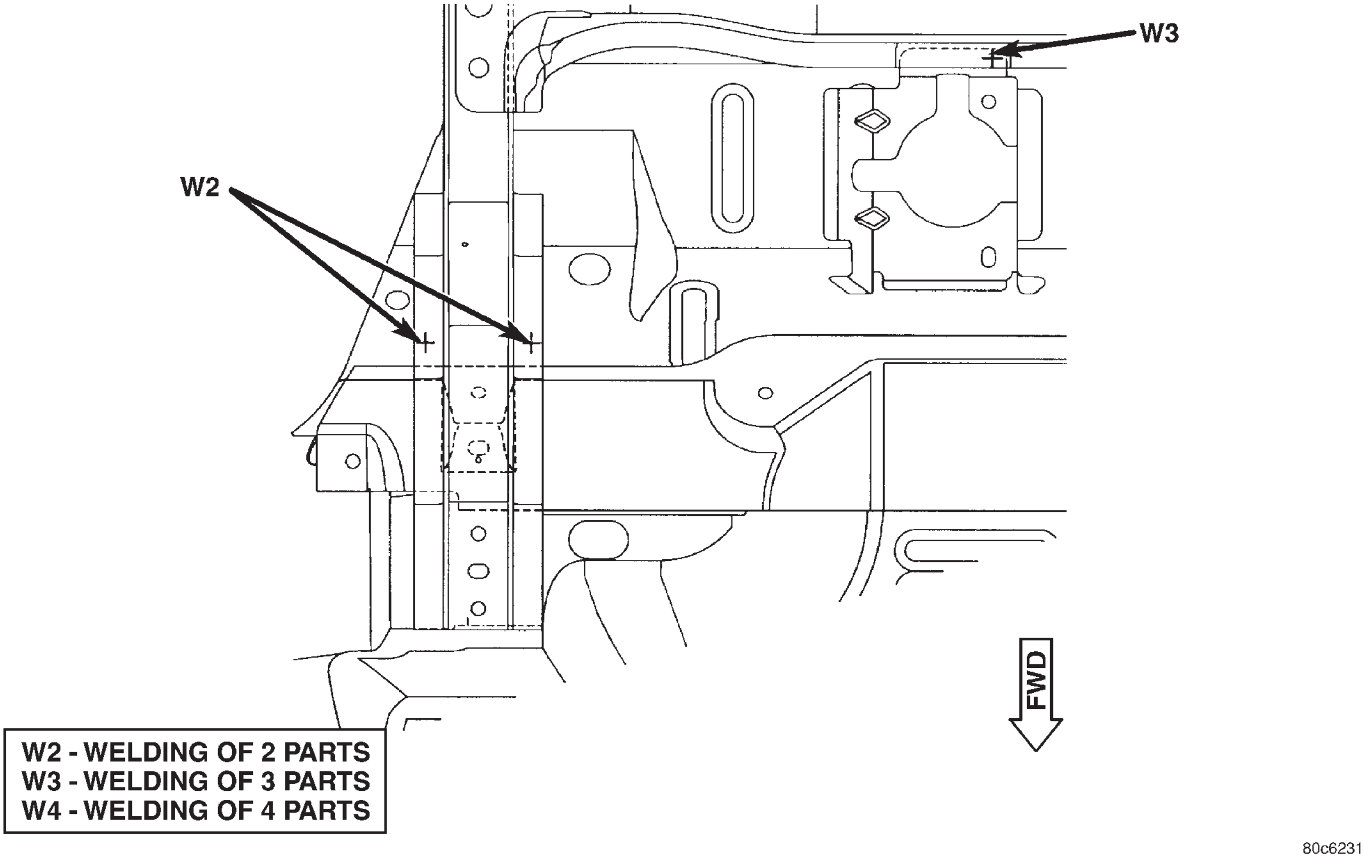

Fig. 138 FUEL TANK SUPPORT TO REAR SUSPENSION CROSSMEMBER & SIDE RAIL EXTENSION TO REAR FLOOR PAN

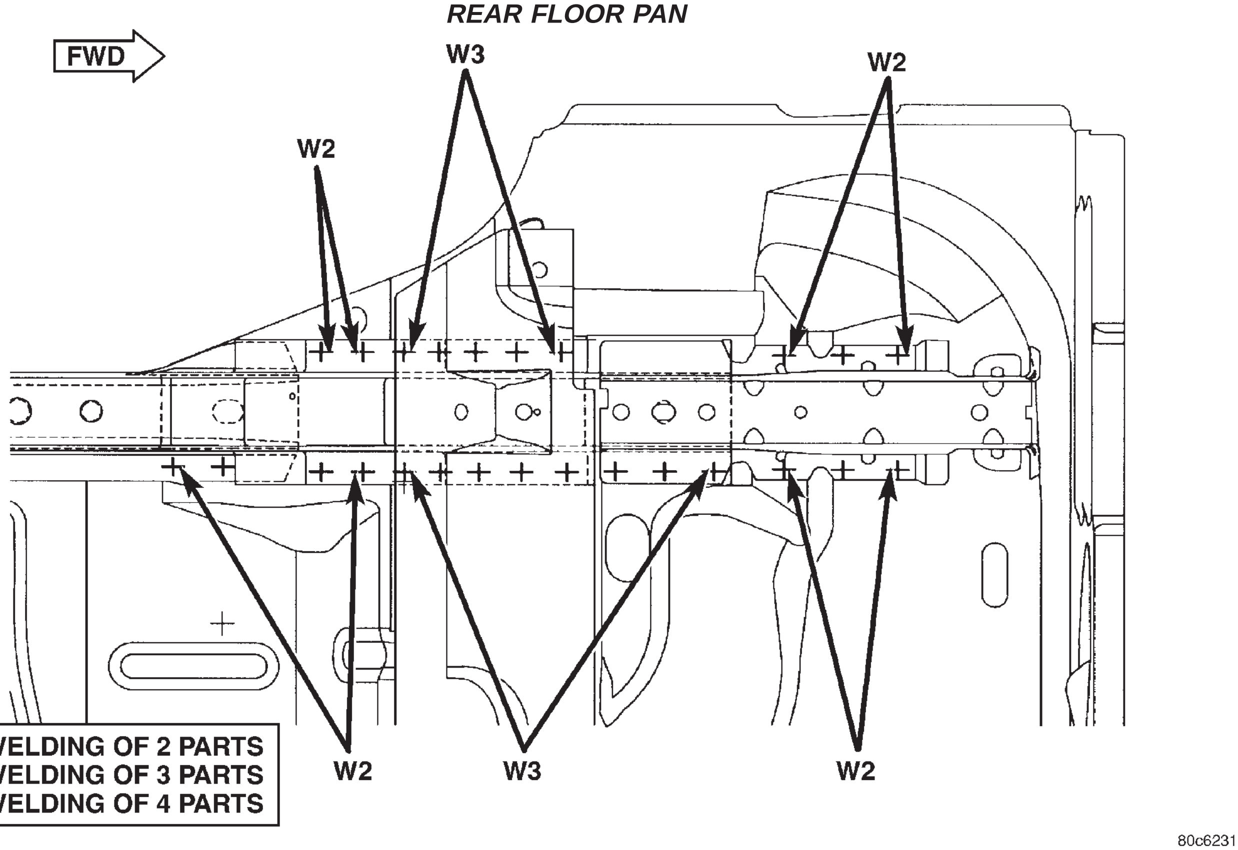

Fig. 139 REAR SIDE RAIL EXTENSION TO CENTER FLOOR PAN SIDE RAIL & REAR SUSPENSION CROSSMEMBER TO REAR FLOOR PAN

WELD LOCATIONS (Continued)

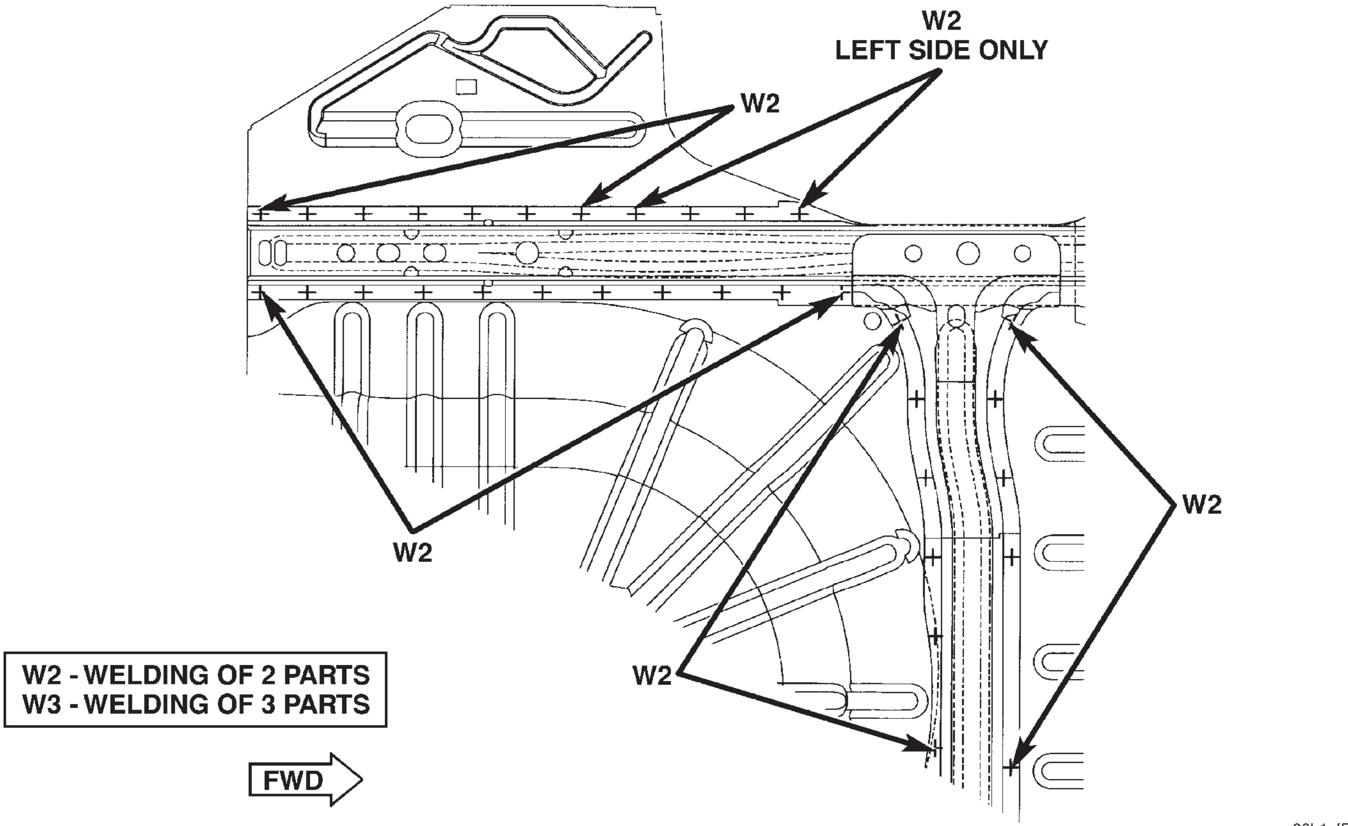

Fig. 140 REAR SIDE RAIL & REAR SUSPENSION CROSSMEMBER TO REAR FLOOR PAN

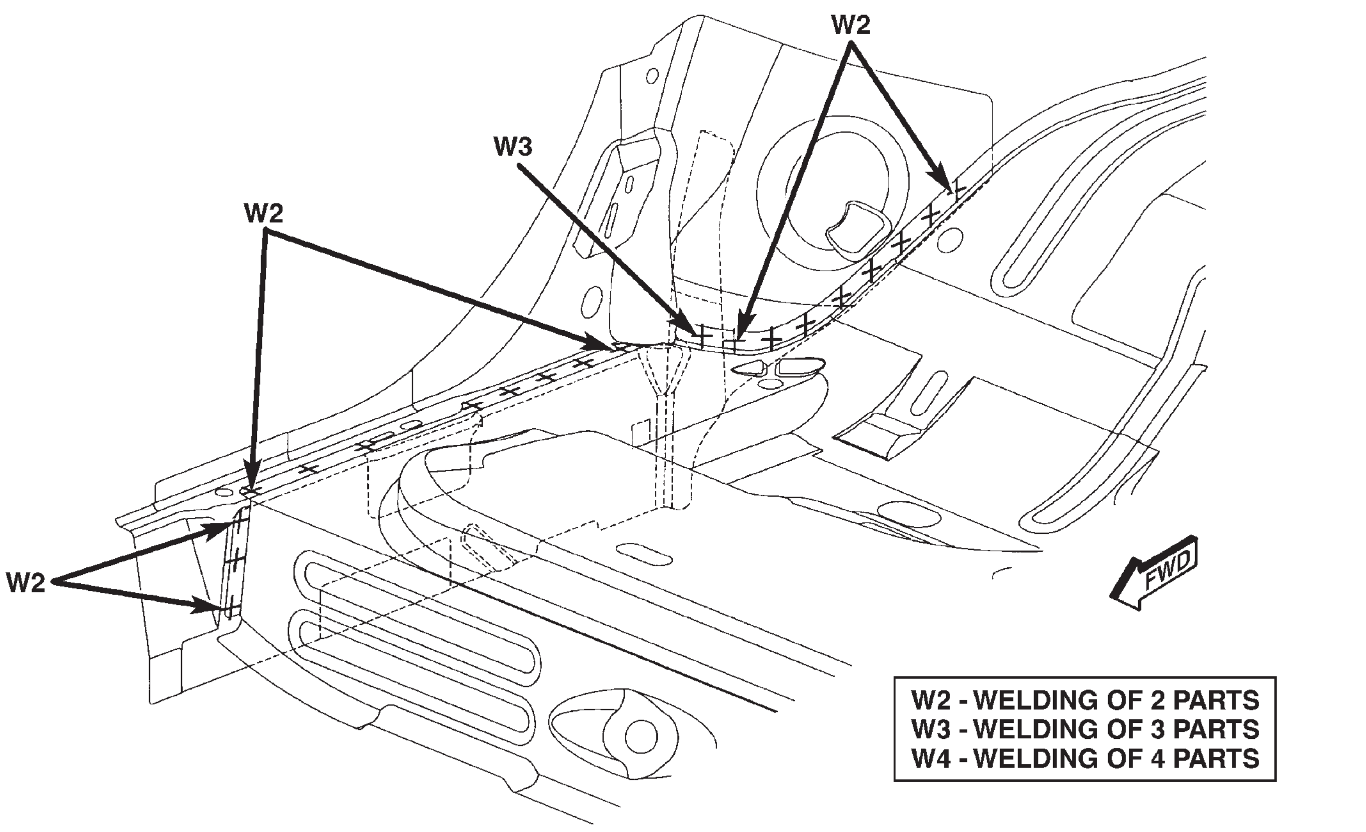

Fig. 141 INNER SILL EXTENSION TO BODY SIDE APERTURE BRACKET TO REAR FLOOR PAN

WELD LOCATIONS (Continued)

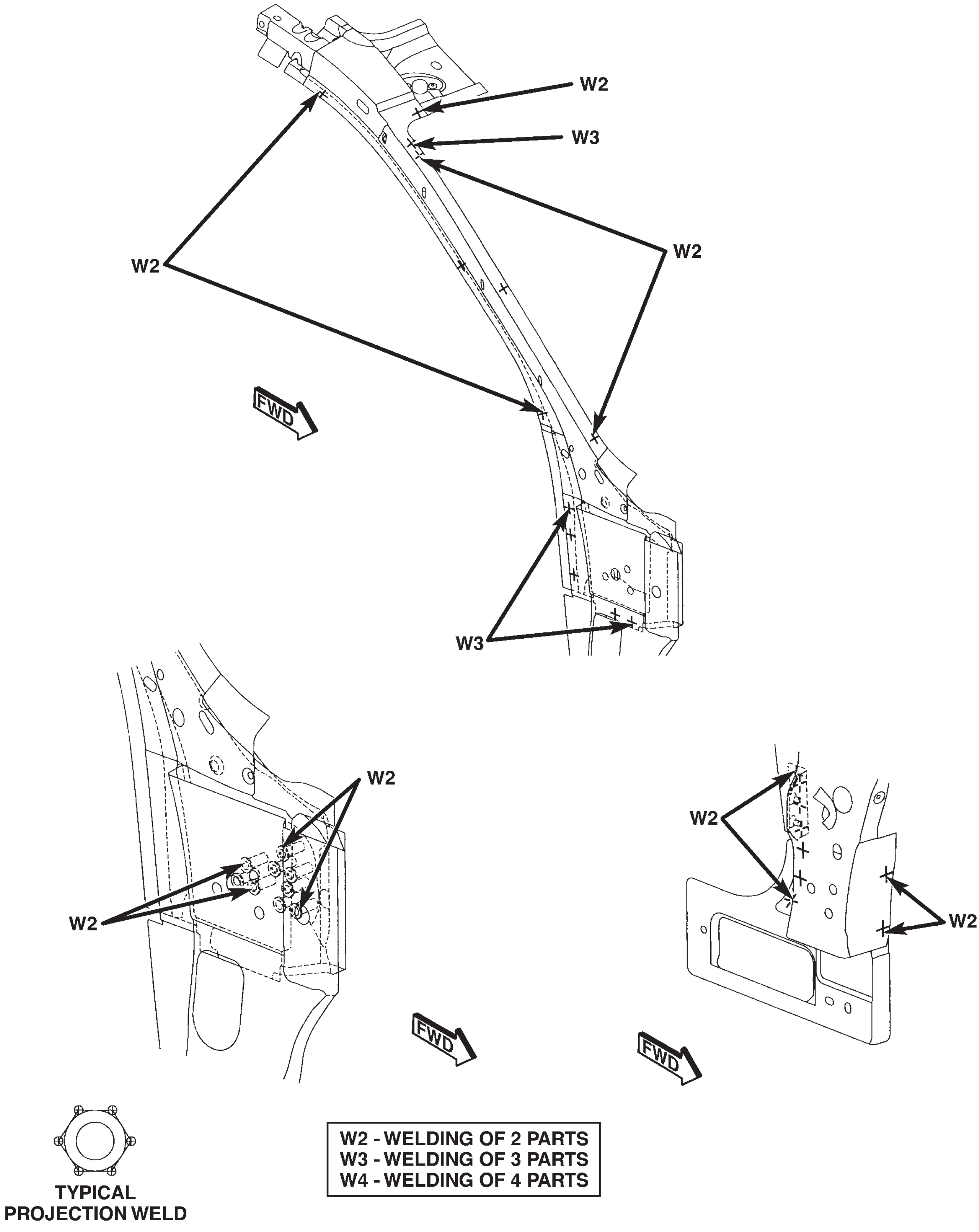

Fig. 142 INNER WINDSHIELD FRAME TO OUTER WINDSHIELD FRAME/HINGE PILLAR REINFORCEMENT TO SILL BEAM

WELD LOCATIONS (Continued)

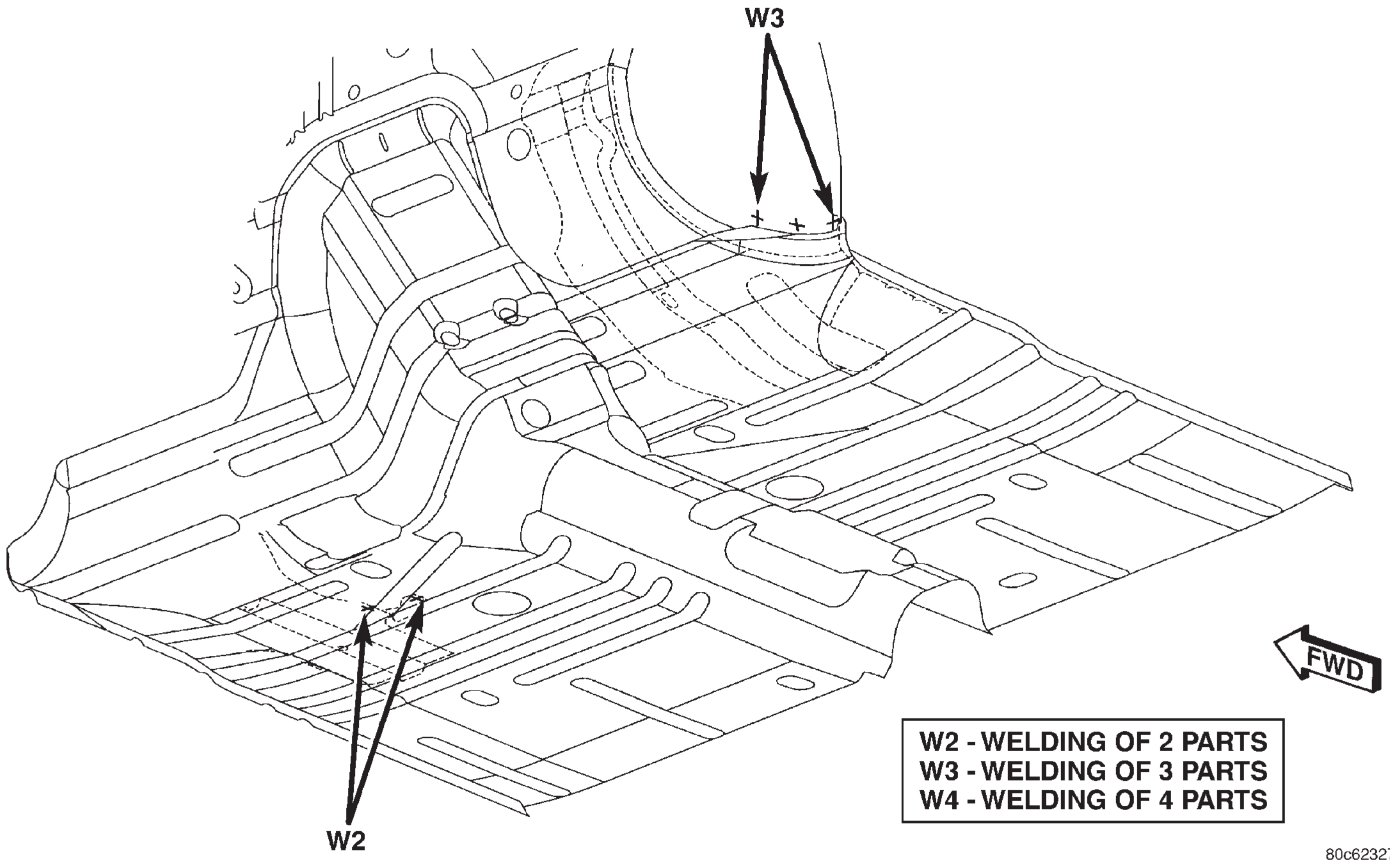

Fig. 143 FRONT RAIL REAR CAP TO DASH PANEL TO FLOOR PAN

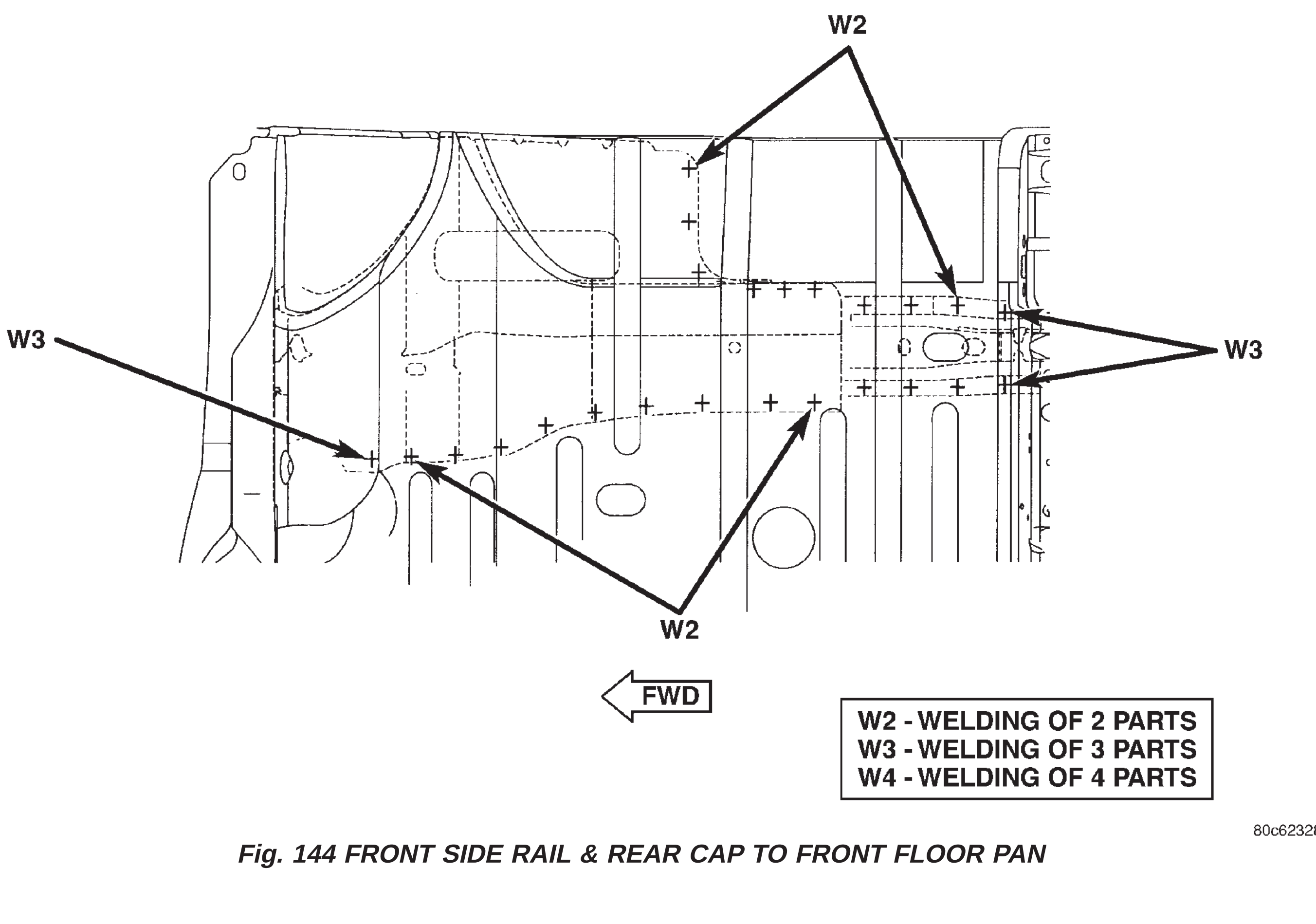

Fig. 144 FRONT SIDE RAIL & REAR CAP TO FRONT FLOOR PAN

WELD LOCATIONS (Continued)

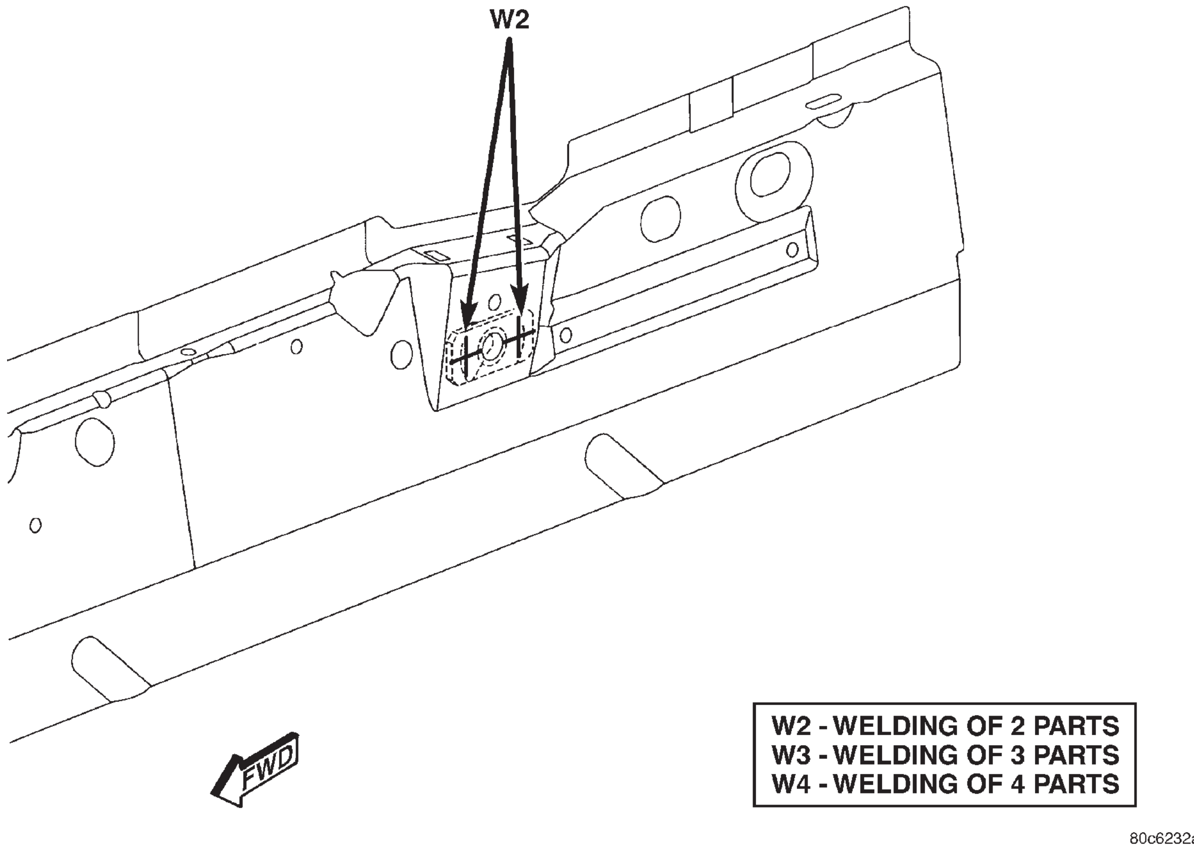

Fig. 145 FRONT SEAT BELT ANCHORAGE TO INNER BODY SILL

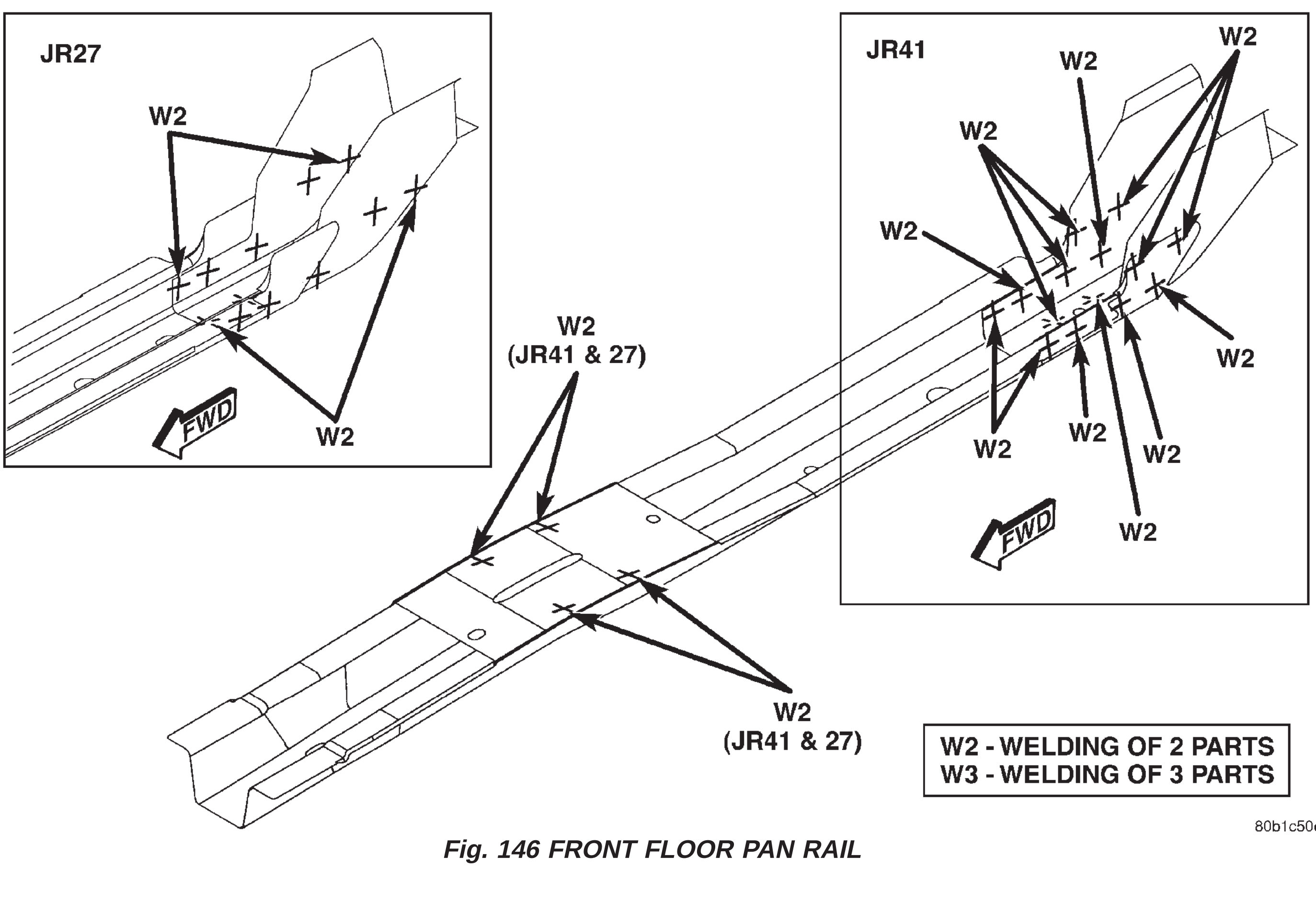

Fig. 146 FRONT FLOOR PAN RAIL

WELD LOCATIONS (Continued)

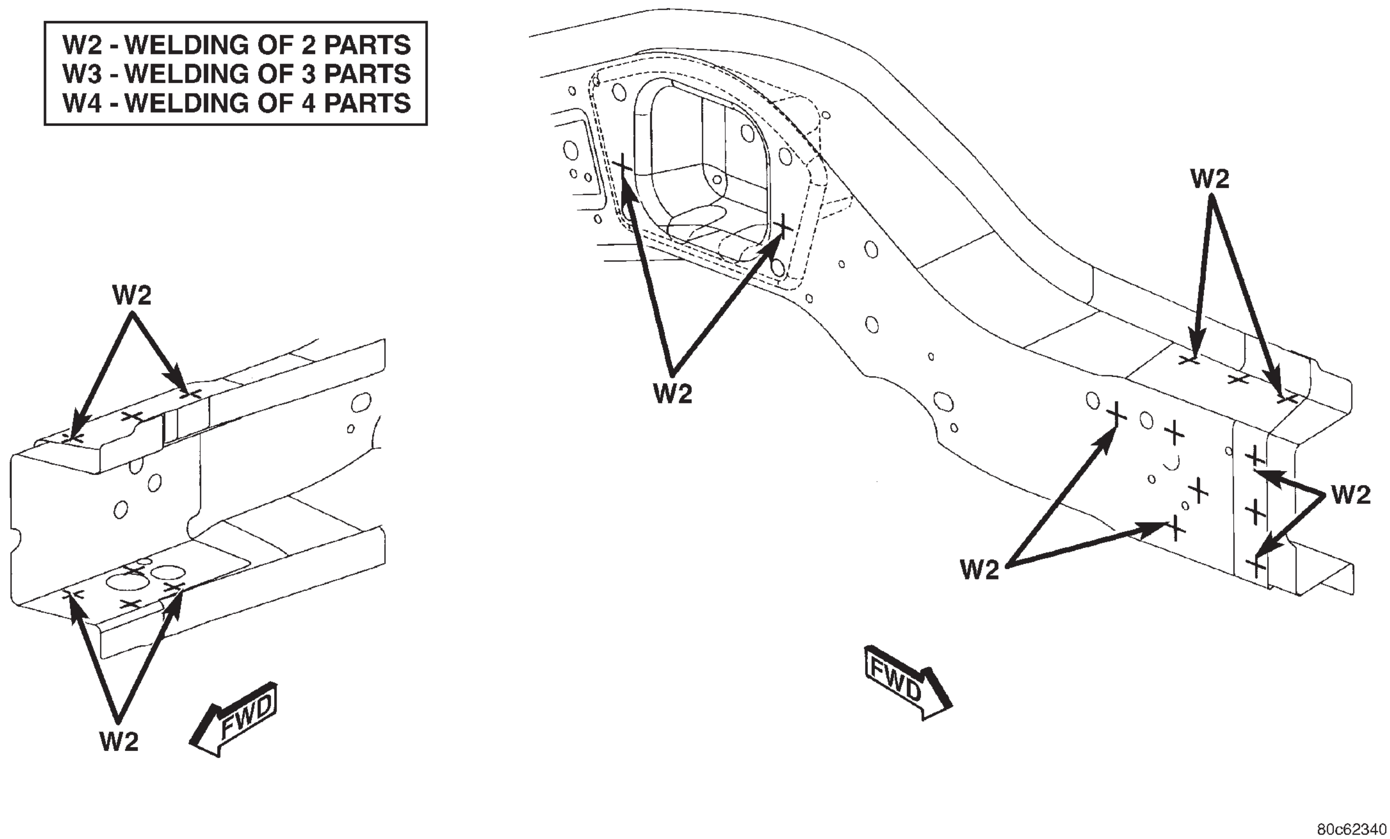

Fig. 147 ENGINE MOUNT TAPPING PLATE & BUMPER EXTENSION TO FRONT SIDE RAIL

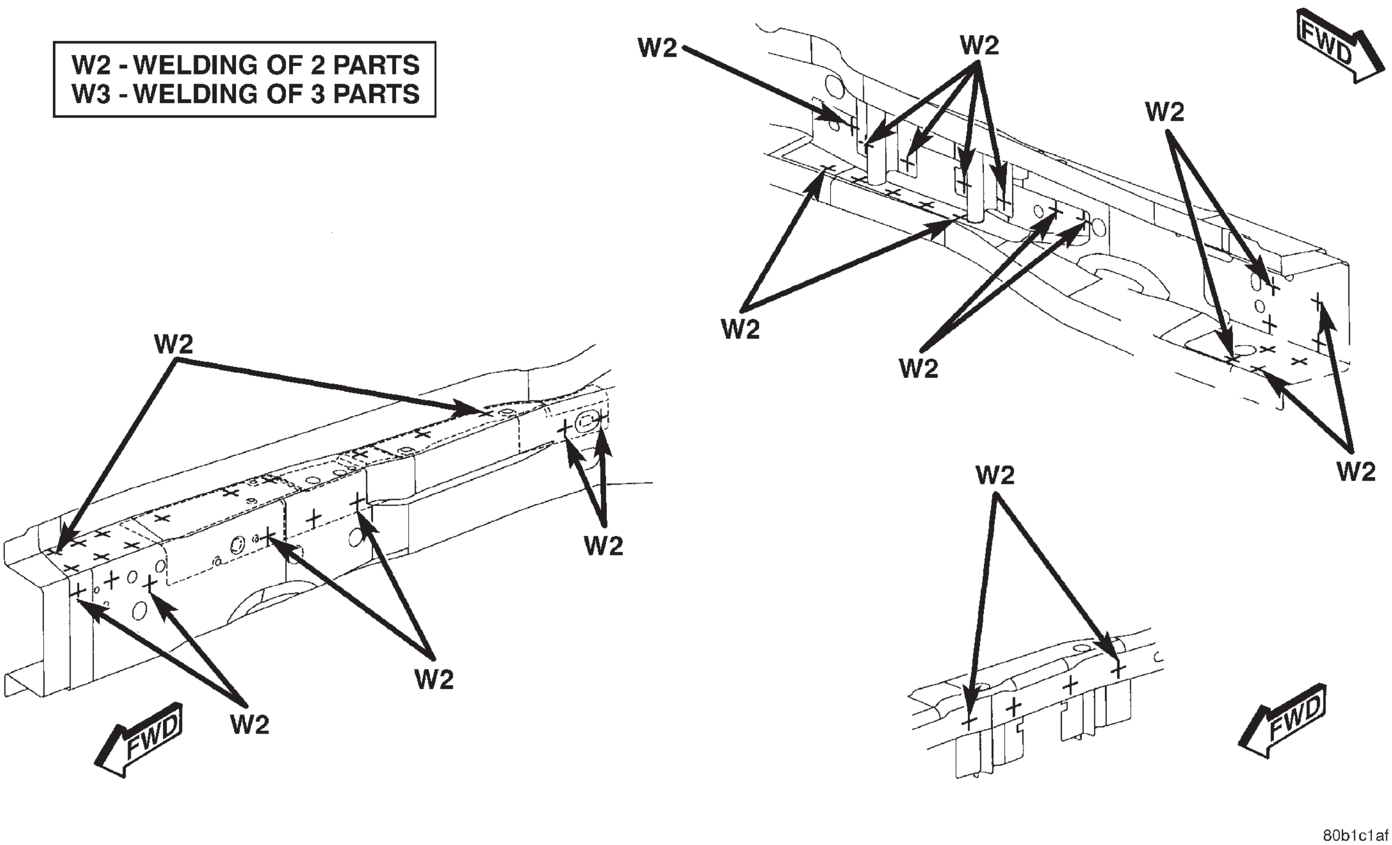

Fig. 148 BUMPER EXTENSION, FRONT RAIL REINFORCEMENT & SPACERS TO FRONT SIDE RAIL

WELD LOCATIONS (Continued)

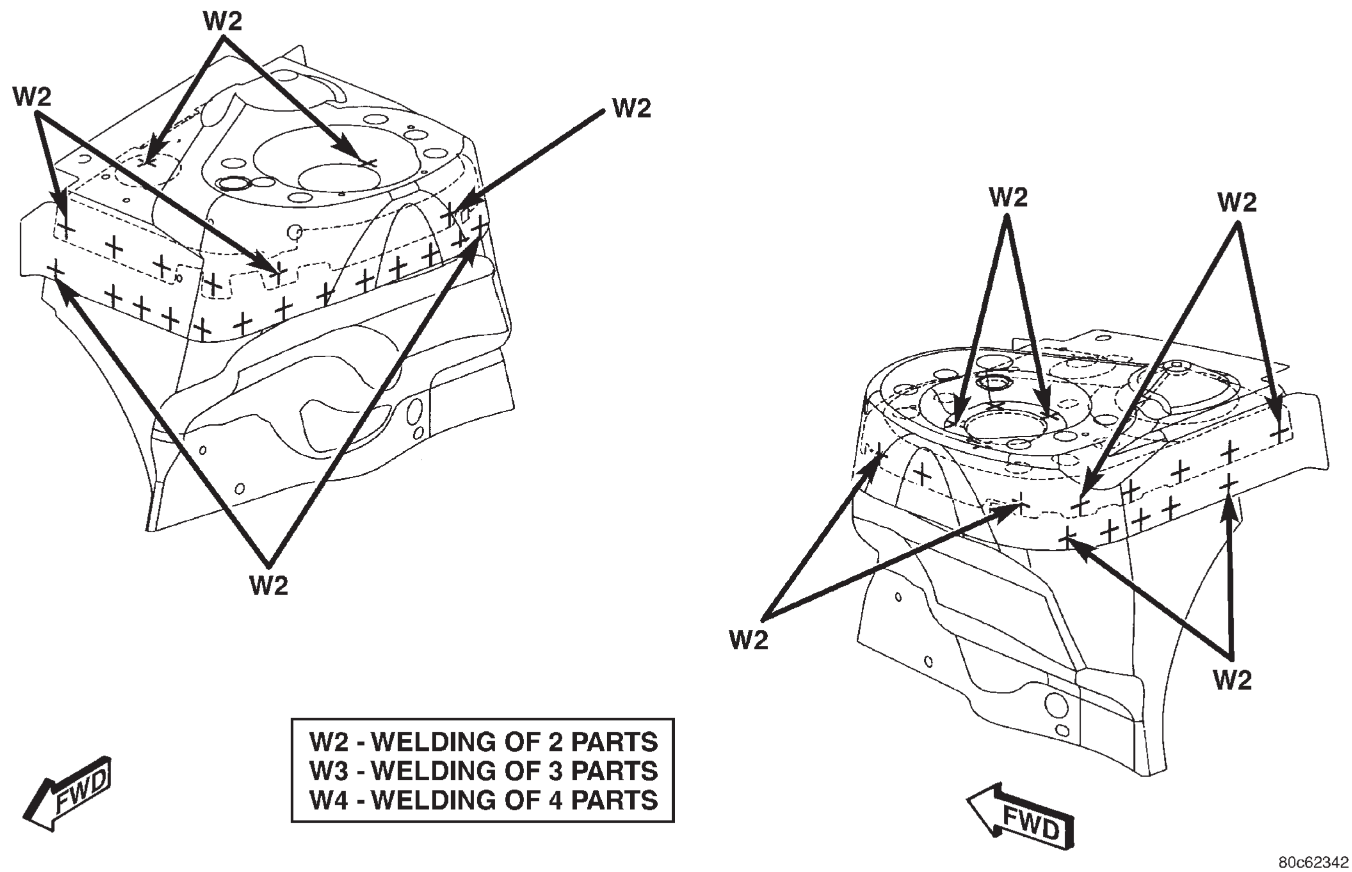

Fig. 149 RIGHT UPPER FRONT SUSPENSION MOUNT, UPPER FRONT SUSPENSION MOUNT

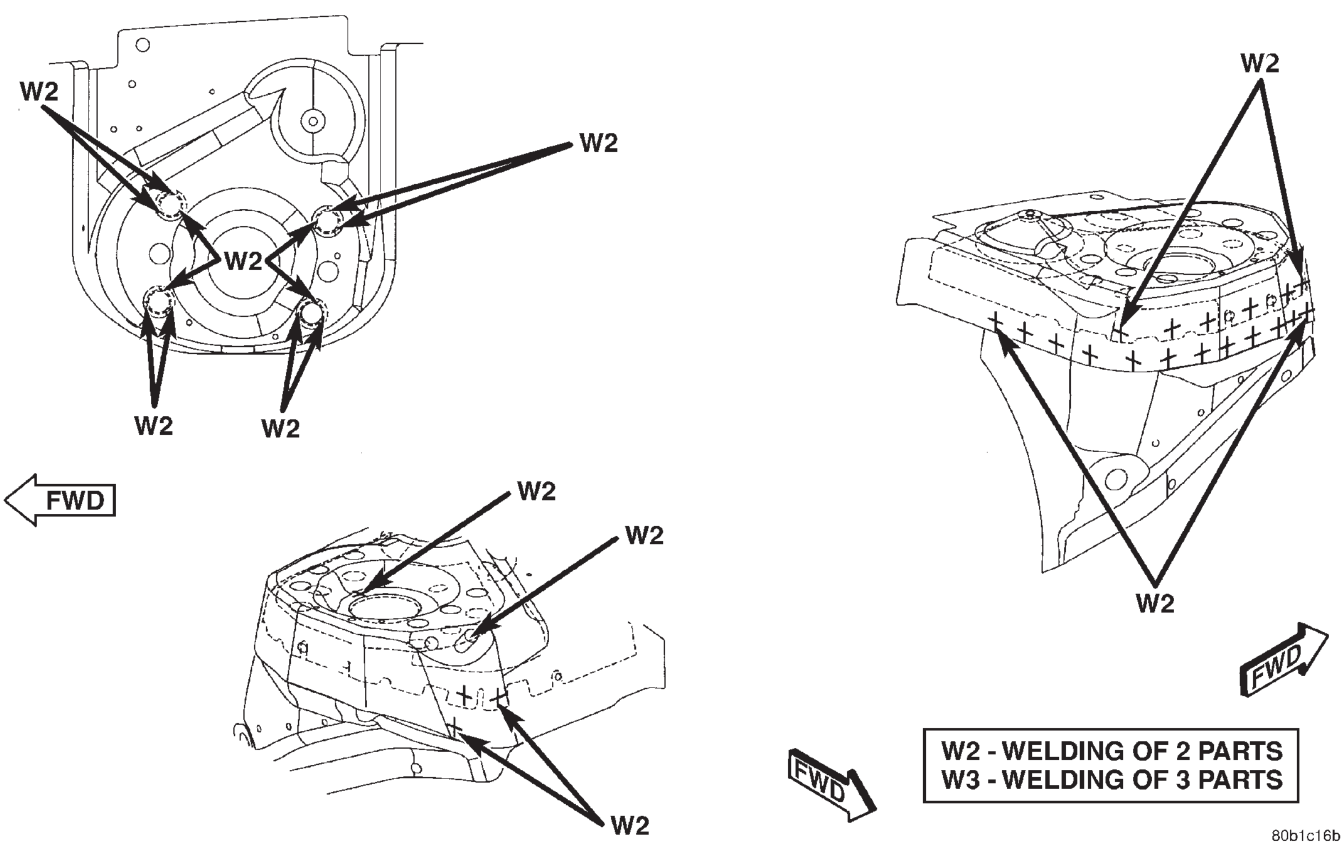

Fig. 150 UPPER FRONT SUSPENSION REINFORCEMENT & UPPER FRONT SUSPENSION MOUNT TO UPPER FRONT SUSPENSION MOUNT CAP

WELD LOCATIONS (Continued)

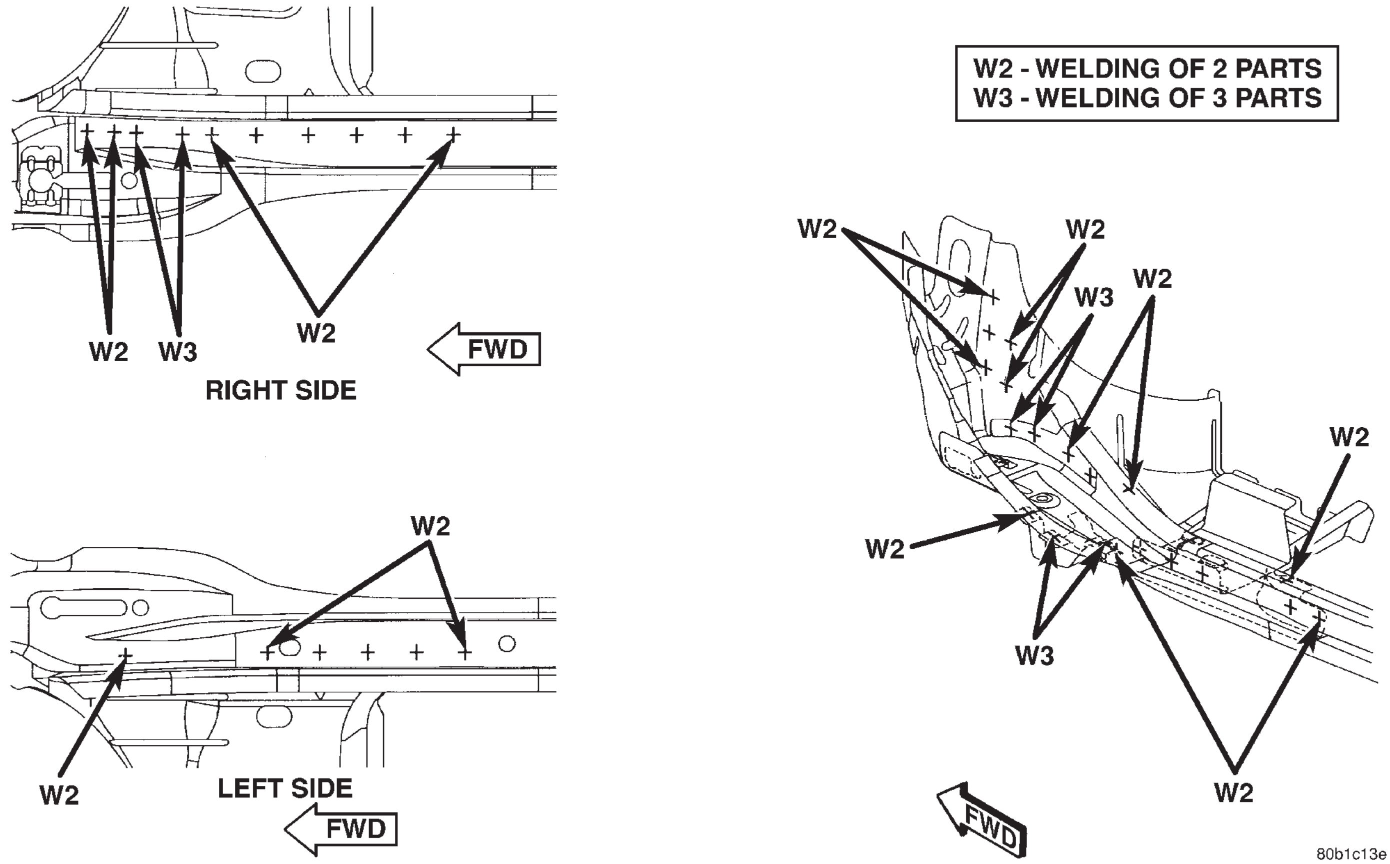

Fig. 151 SWAY BAR BRACKET TO SIDE RAIL PLATE & FRONT SIDE RAIL REINFORCEMENT TO FRONT SIDE RAIL REAR

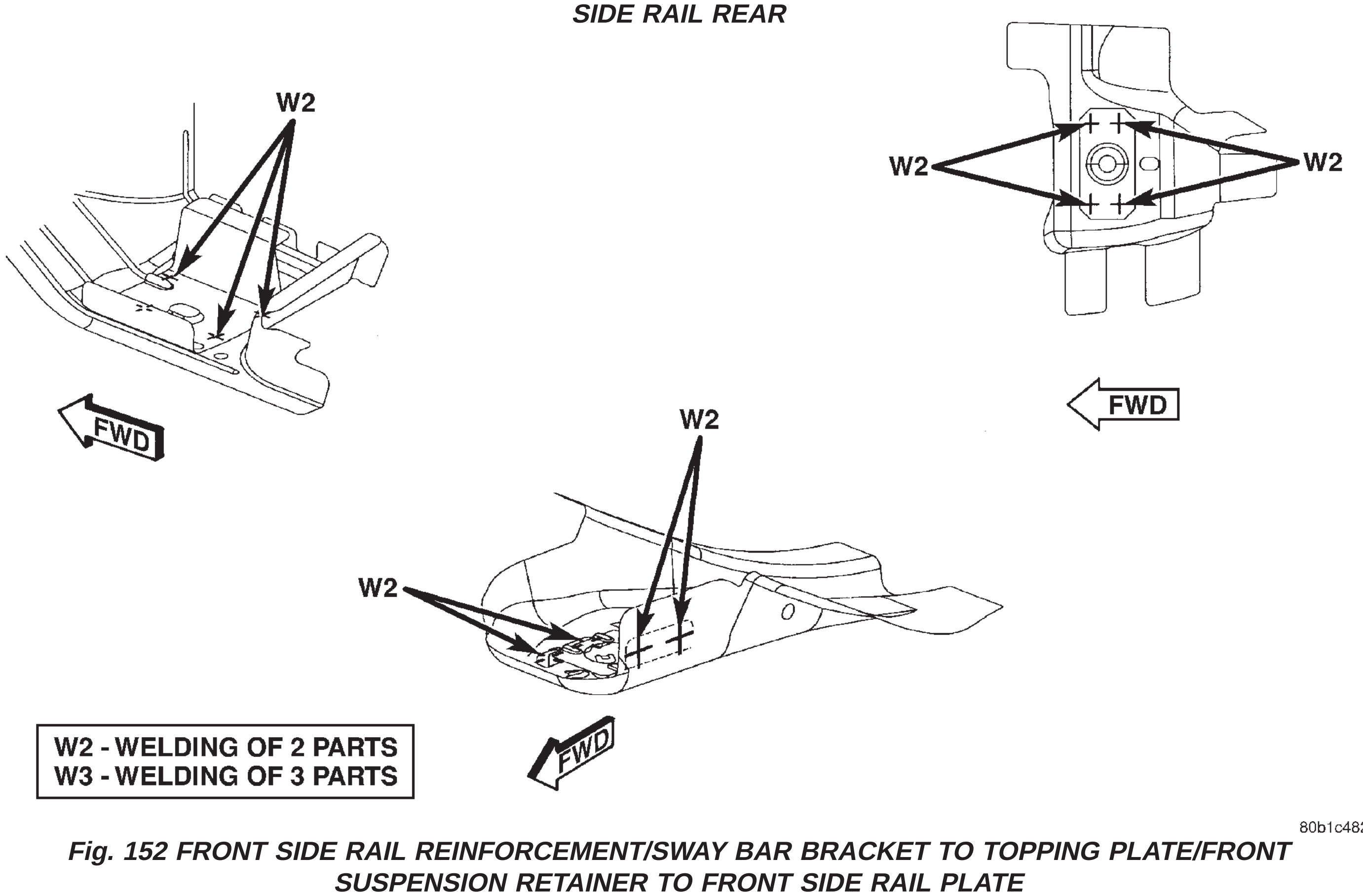

Fig. 152 FRONT SIDE RAIL REINFORCEMENT/SWAY BAR BRACKET TO TOPPING PLATE/FRONT SUSPENSION RETAINER TO FRONT SIDE RAIL PLATE

WELD LOCATIONS (Continued)

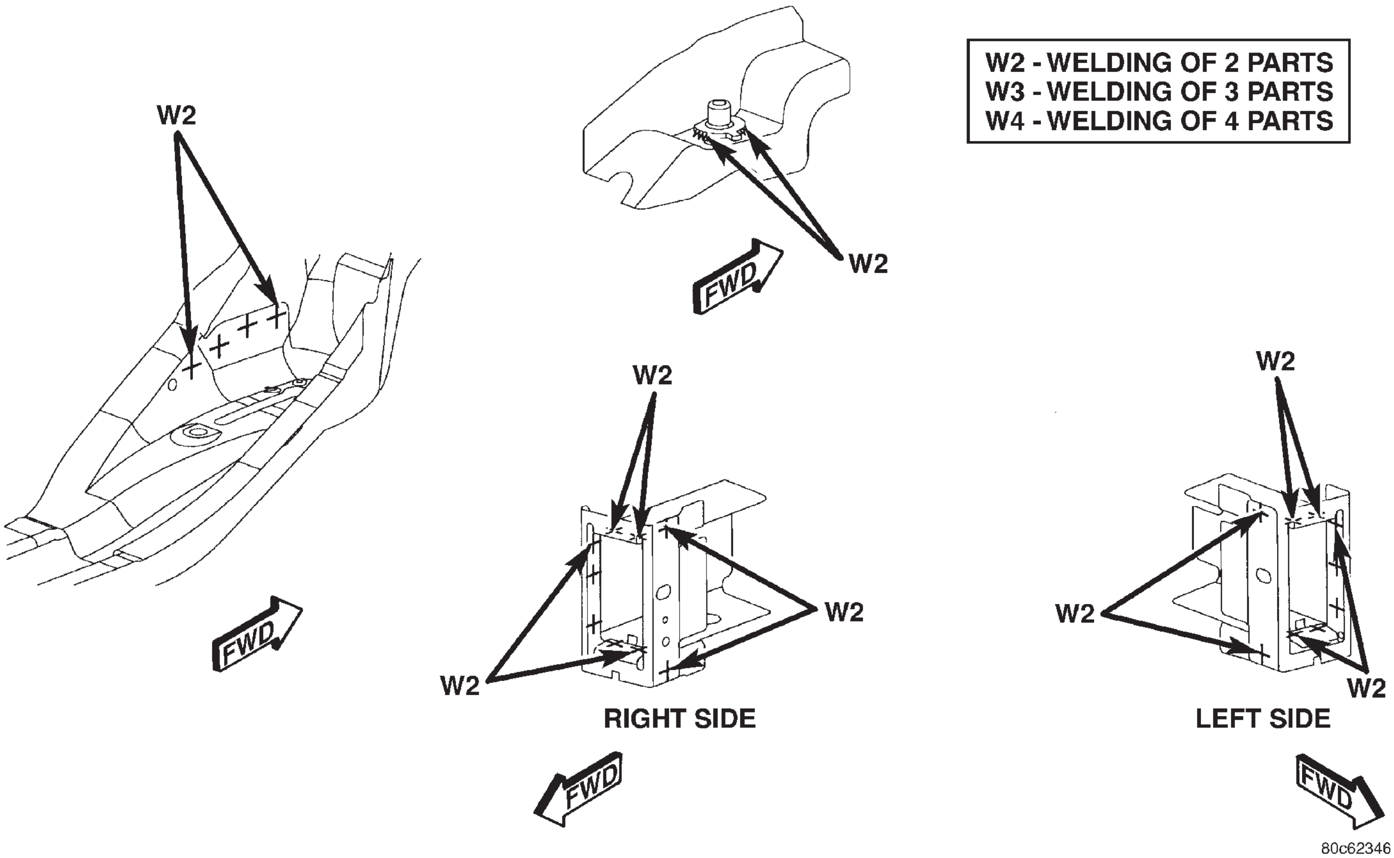

Fig. 153 BUMPER EXTENSION TO FRONT BUMPER MOUNTING BRACKET FRONT SIDE RAIL PLATE TO FRONT SIDE RAIL

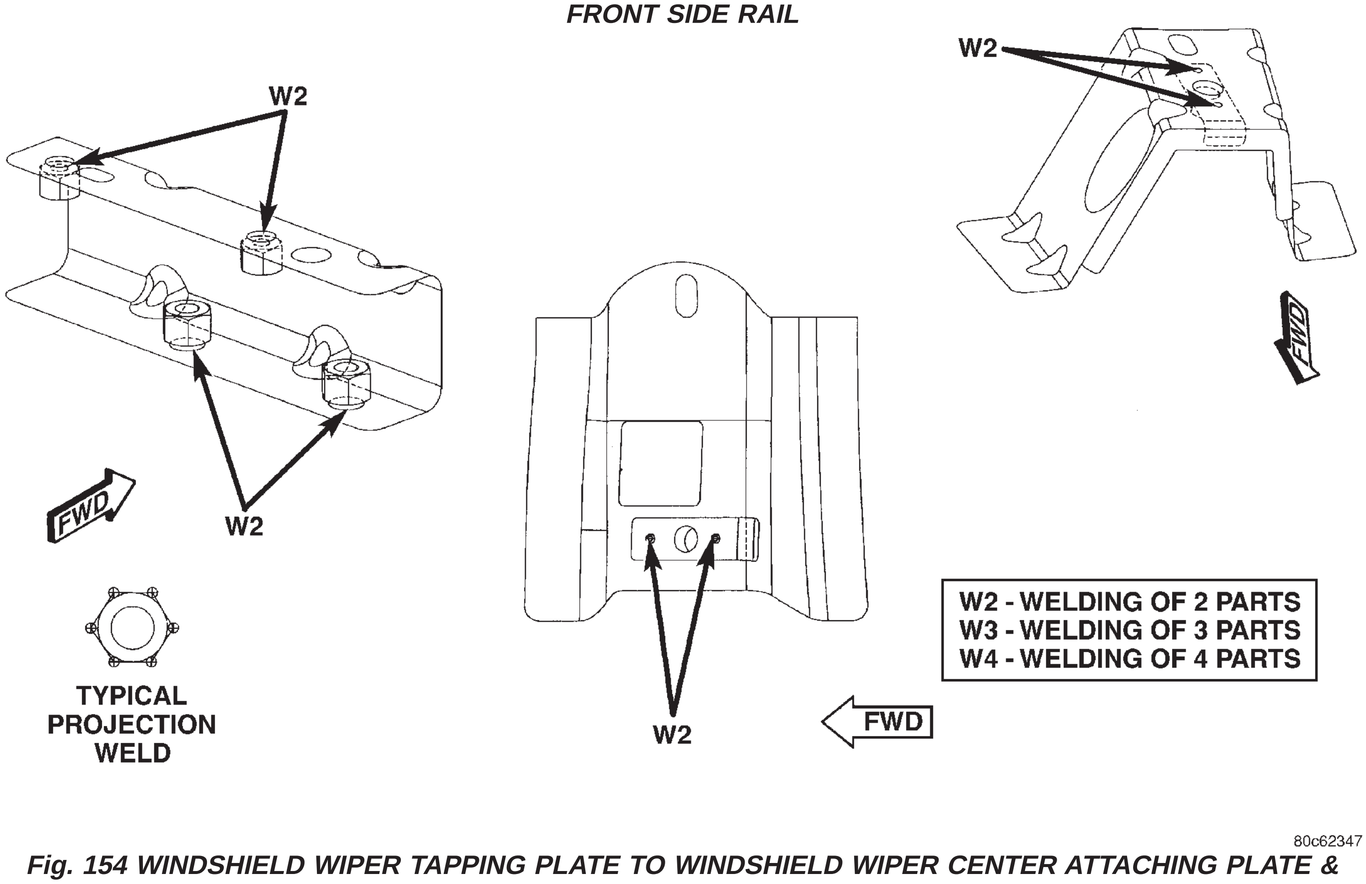

Fig. 154 WINDSHIELD WIPER TAPPING PLATE TO WINDSHIELD WIPER CENTER ATTACHING PLATE & LOWER WIPER MODULE PLENUM BRACKET

WELD LOCATIONS (Continued)

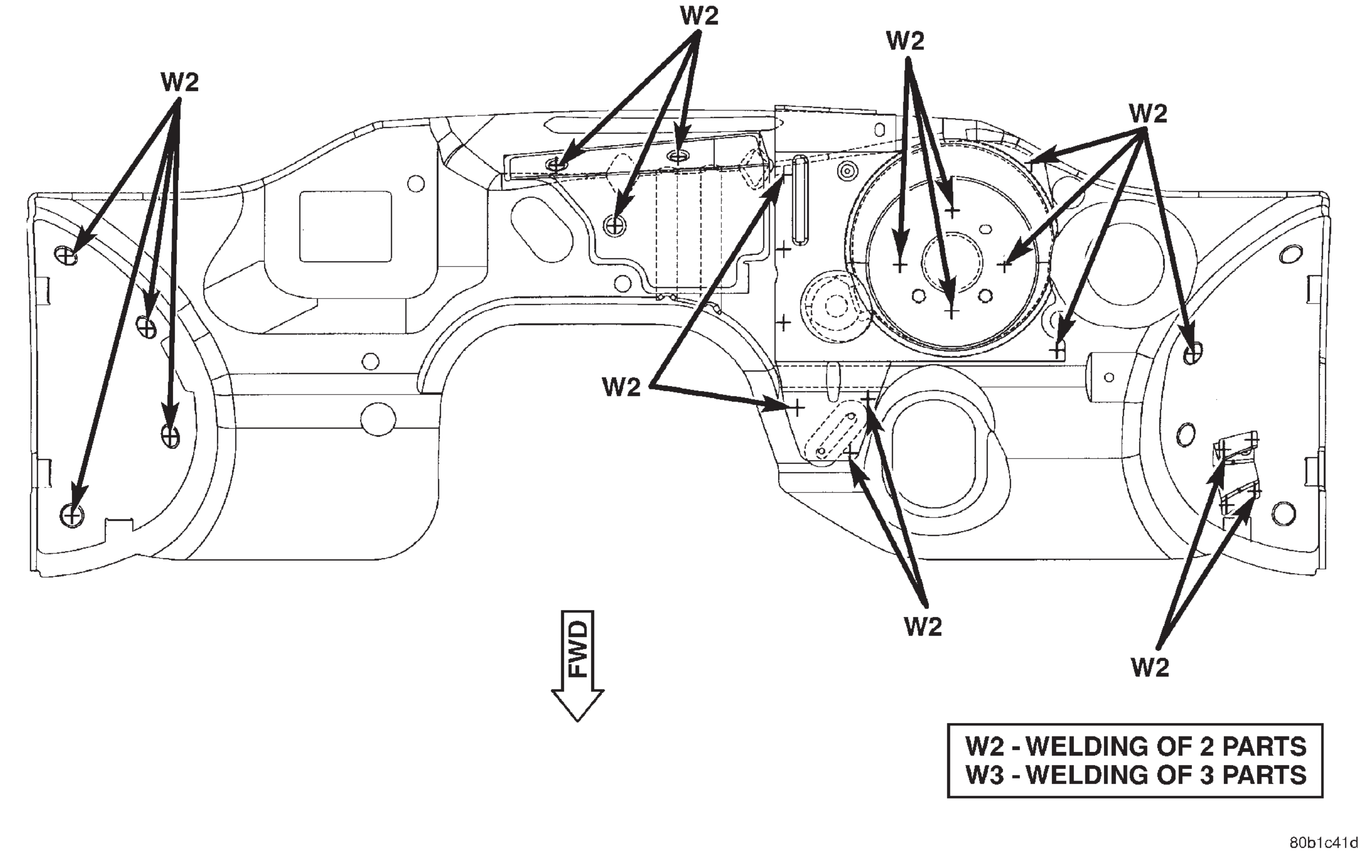

Fig. 155 WHEELHOUSE DEADENER PANEL & DASH PANEL DEADENER PANEL TO DASH PANEL

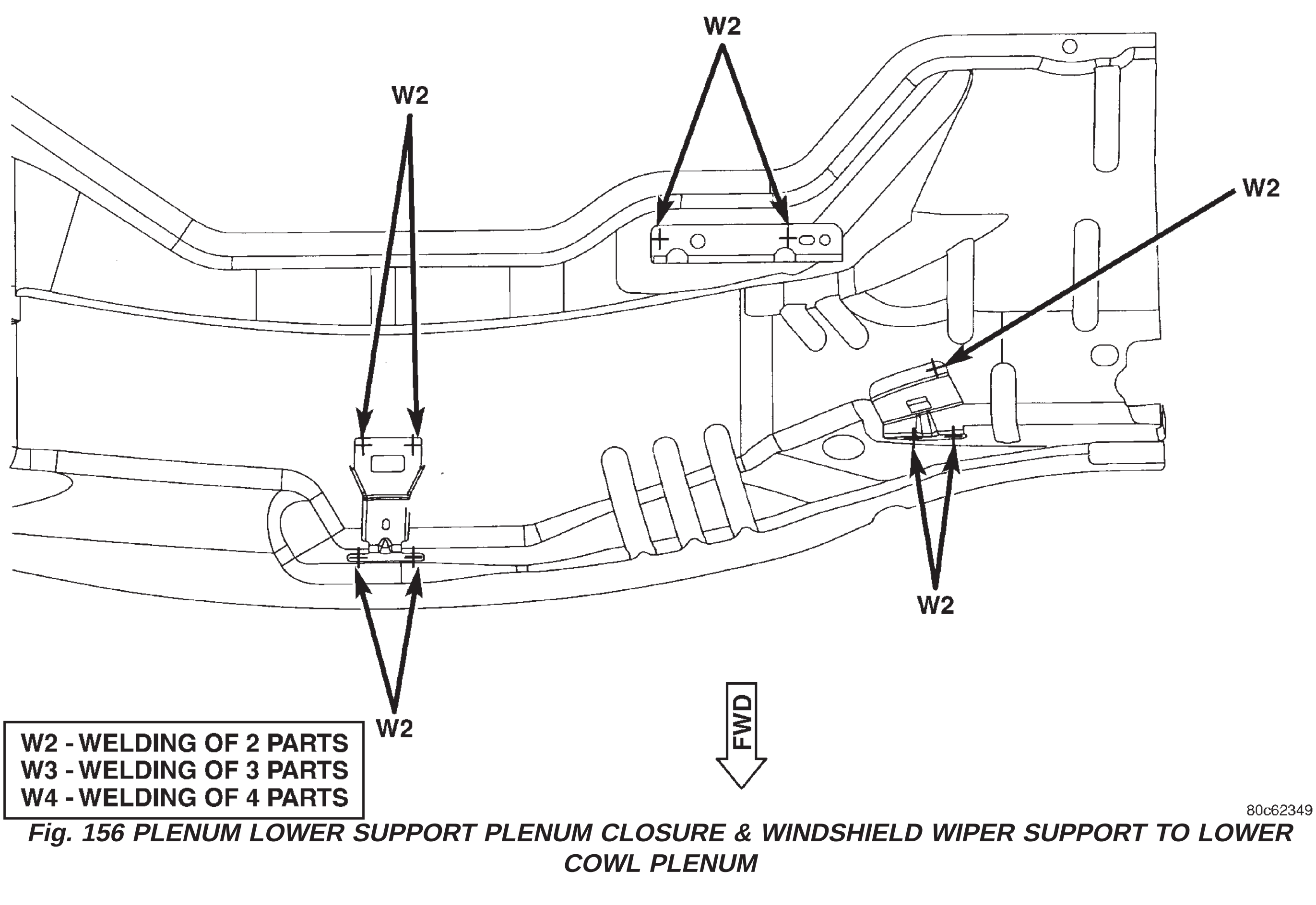

Fig. 156 PLENUM LOWER SUPPORT PLENUM CLOSURE & WINDSHIELD WIPER SUPPORT TO LOWER COWL PLENUM

WELD LOCATIONS (Continued)

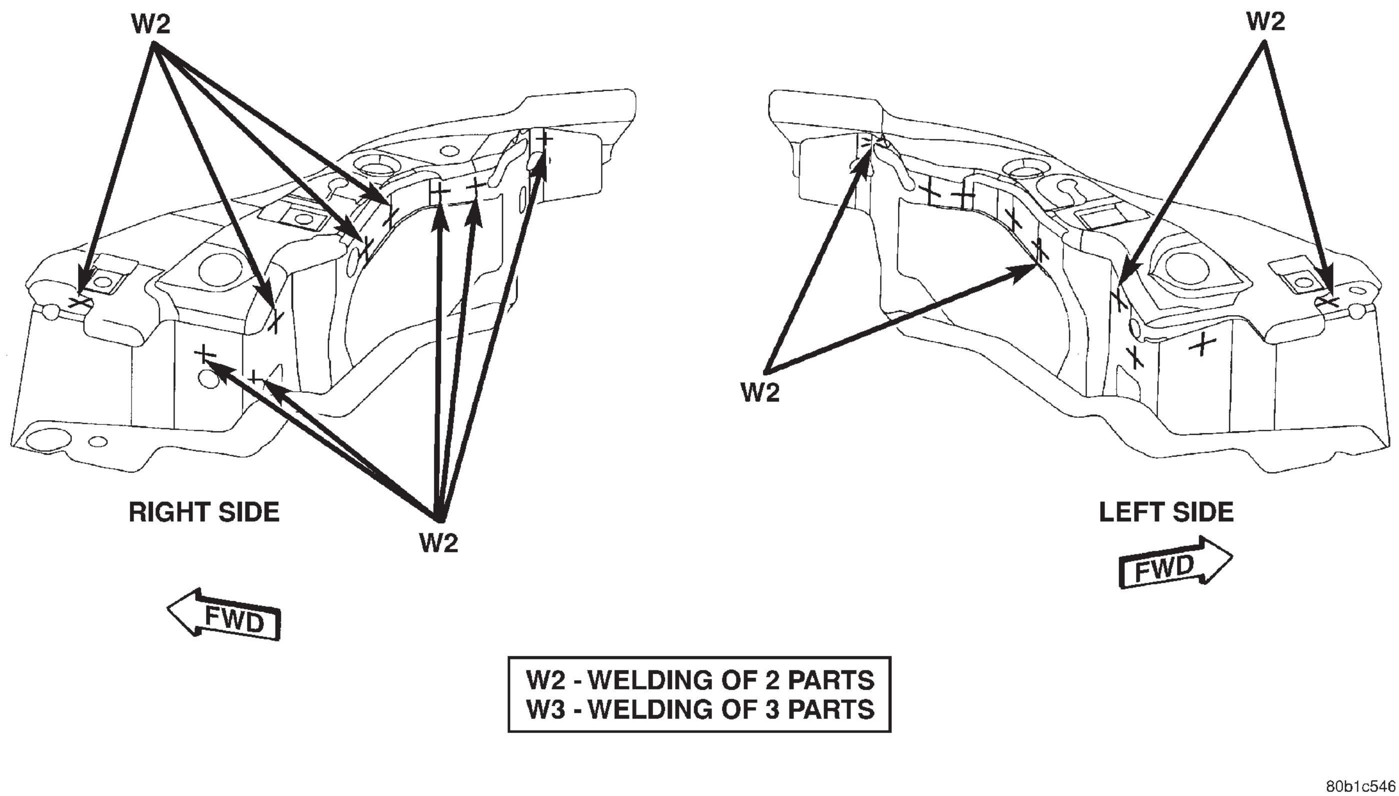

Fig. 157 HEADLAMP MOUNTING REINFORCEMENT TO HEADLAMP MOUNTING PANEL

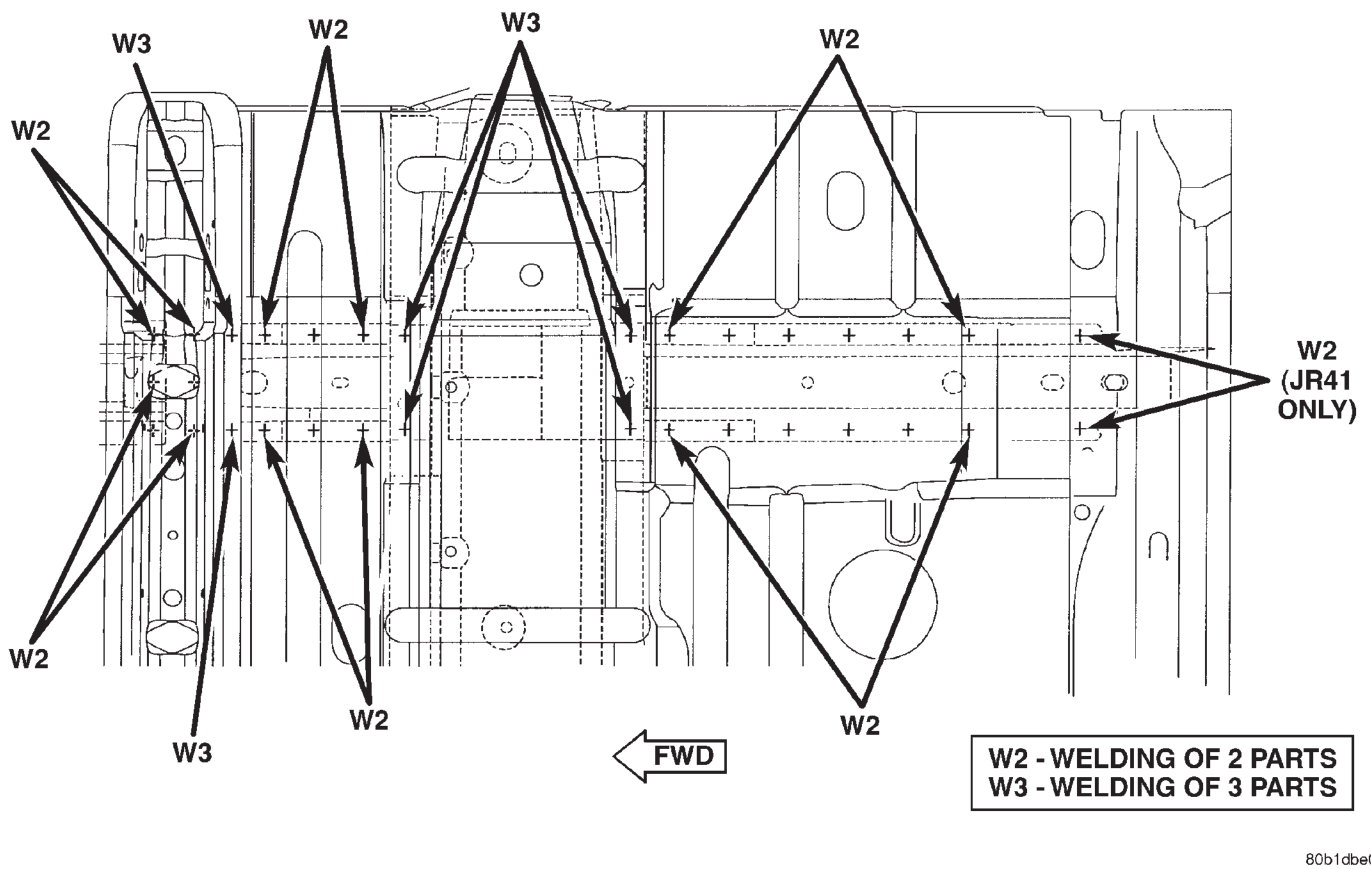

Fig. 158 FRONT FLOOR PAN RAIL EXTENSION & REINFORCEMENT TO FRONT FLOOR PAN RAIL

WELD LOCATIONS (Continued)

WELD LOCATIONS - JR-27 ONLY

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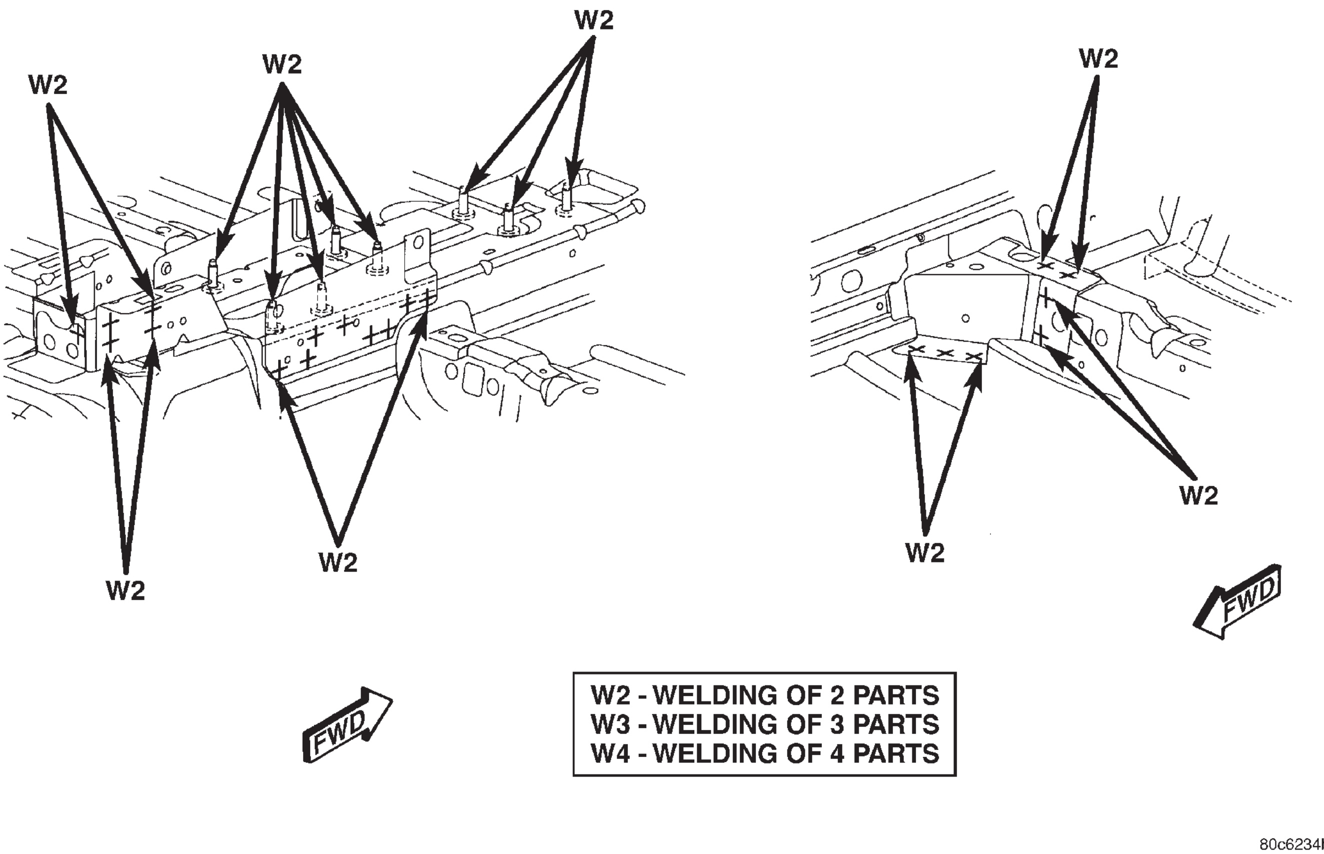

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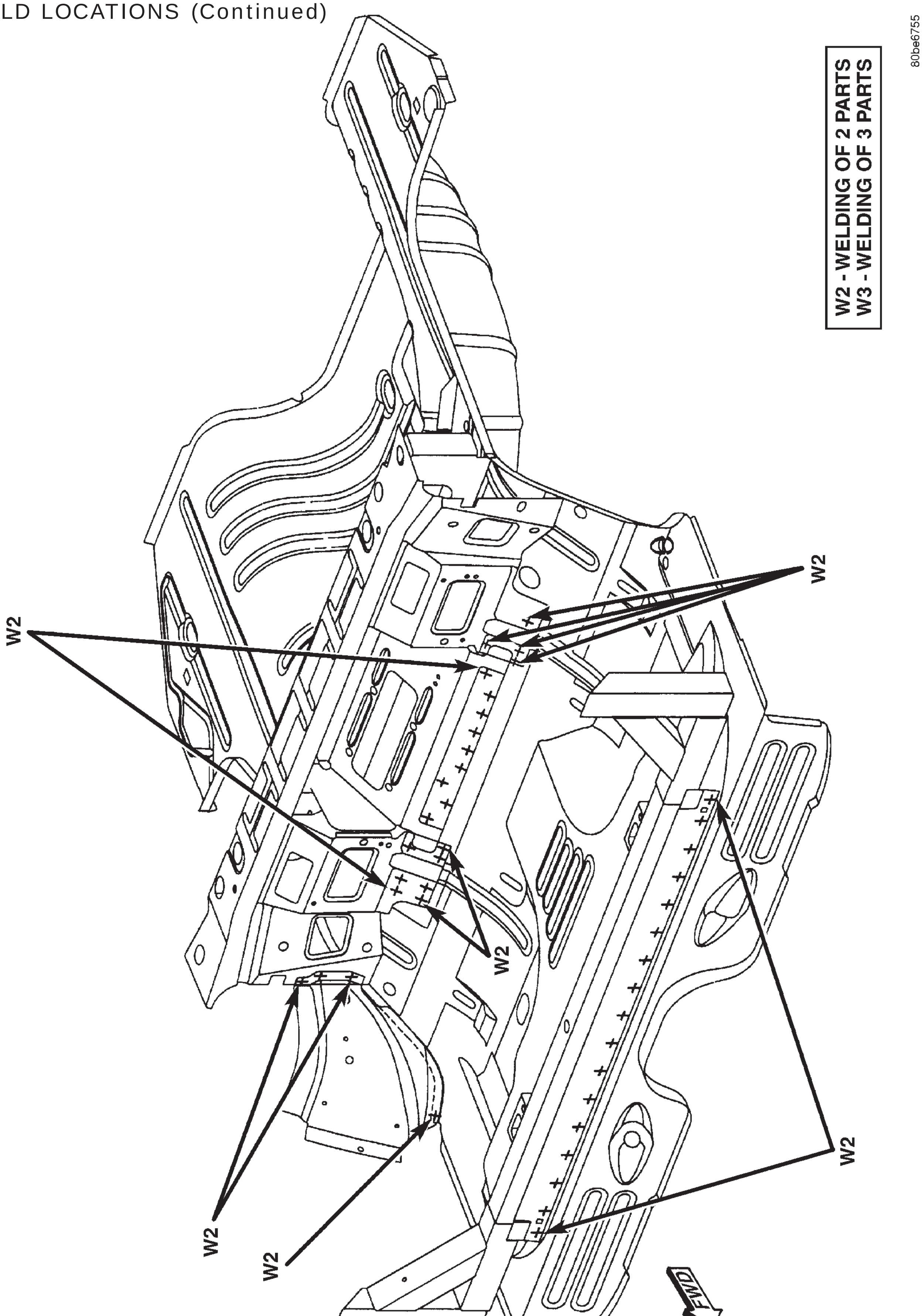

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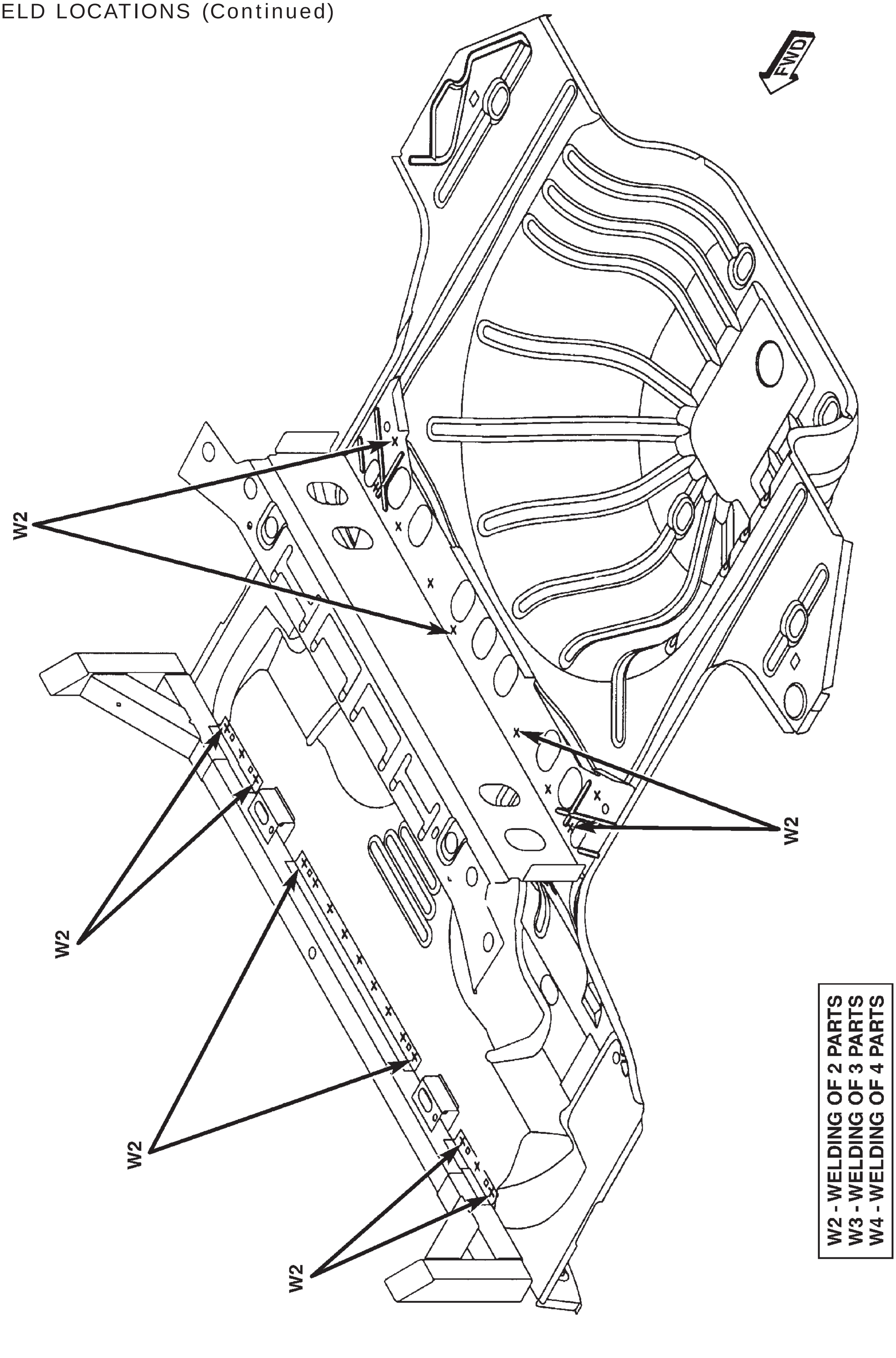

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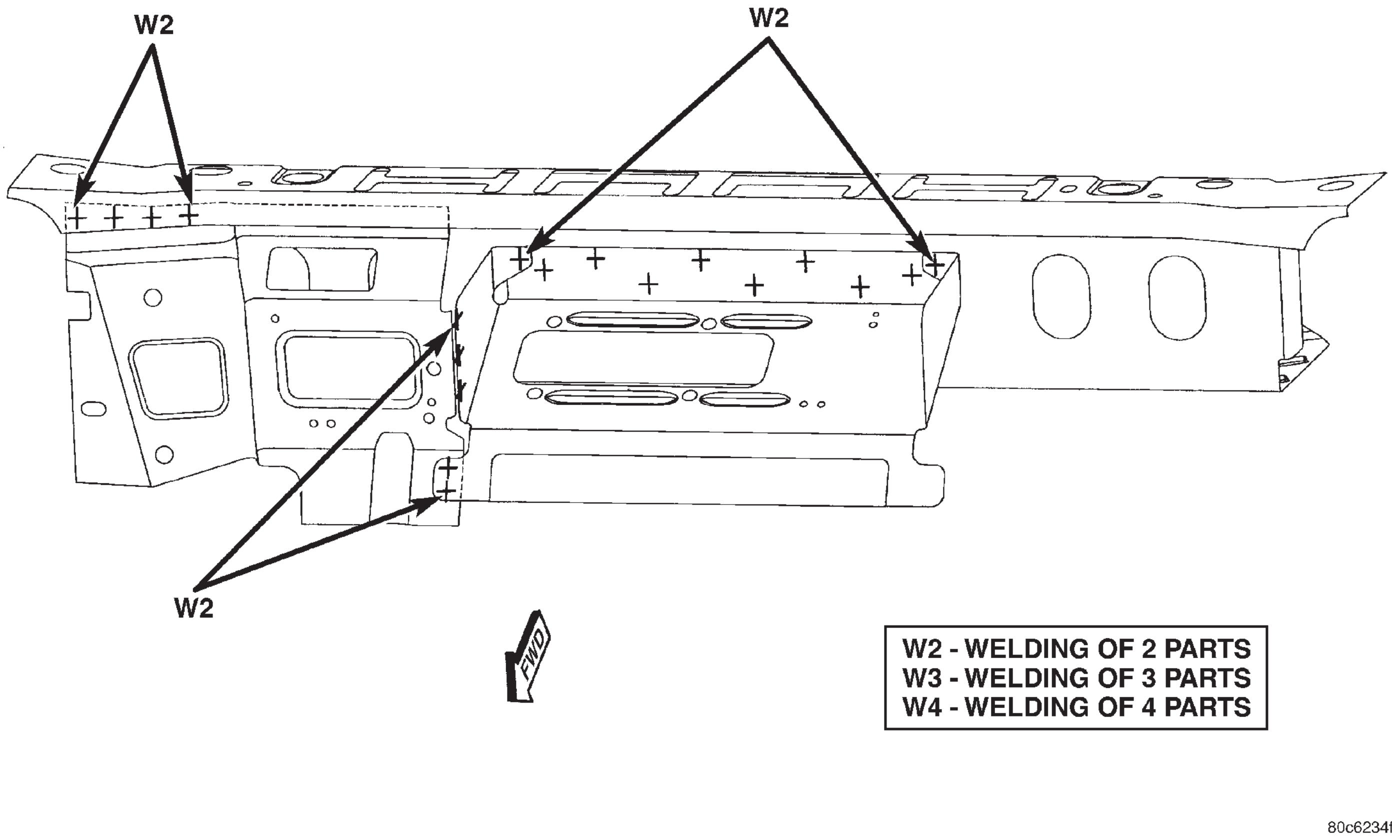

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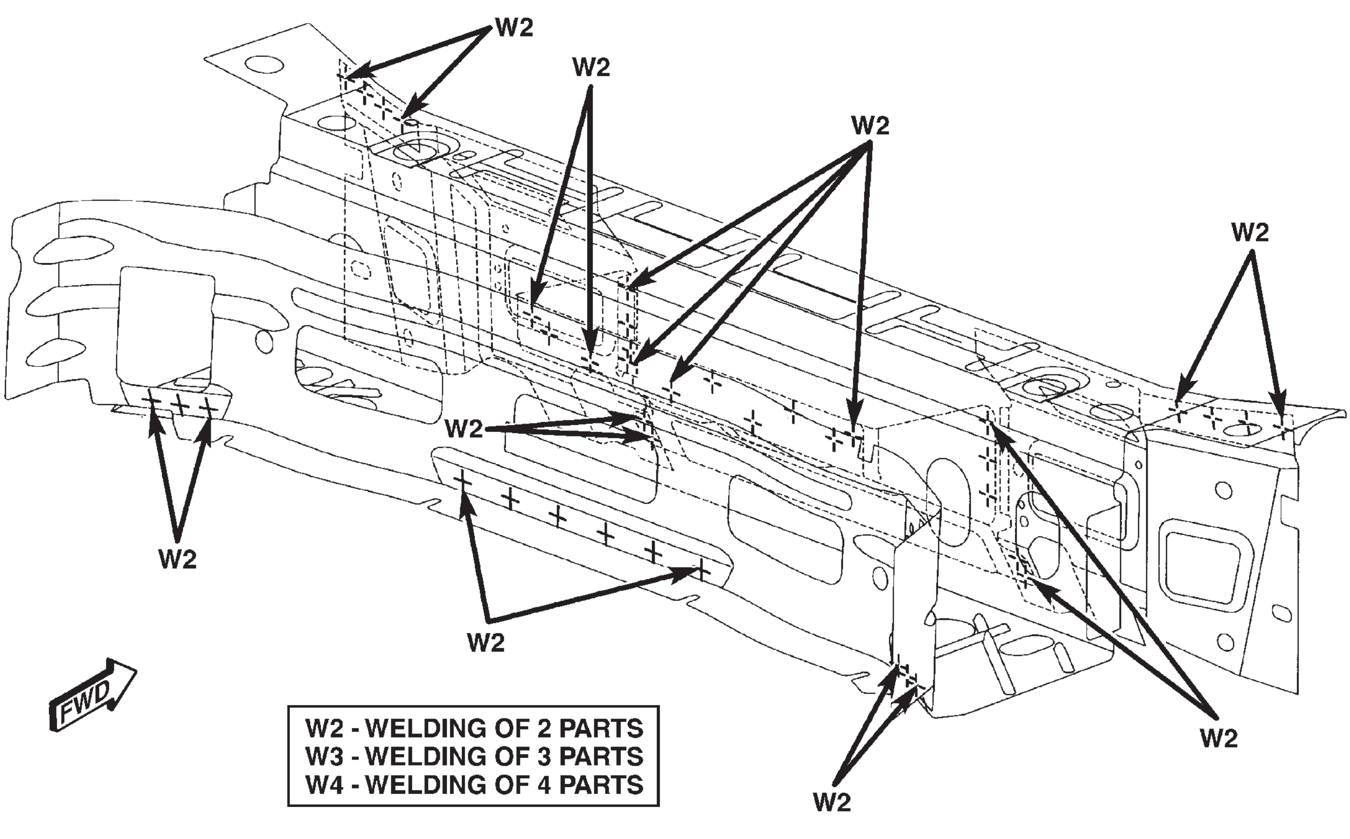

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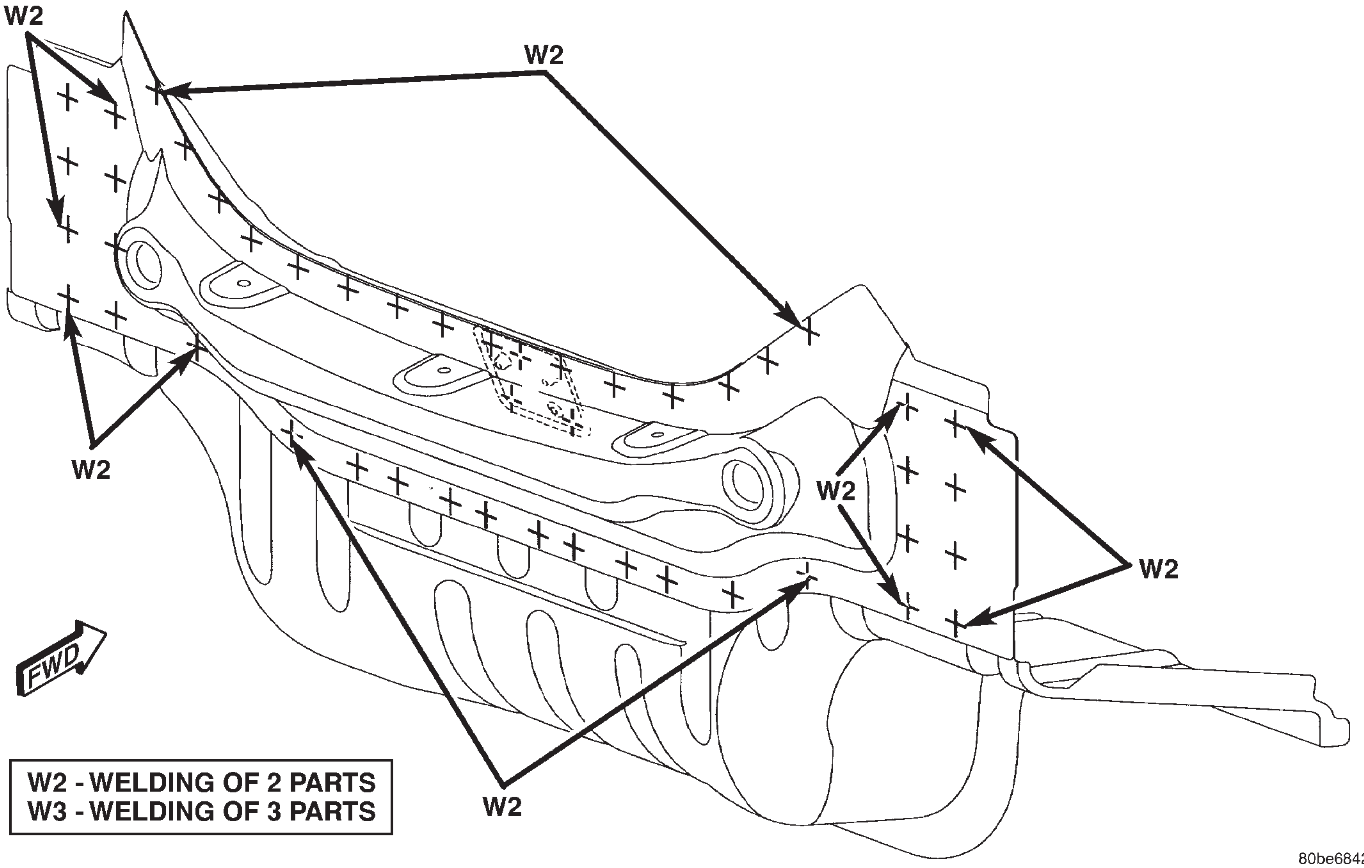

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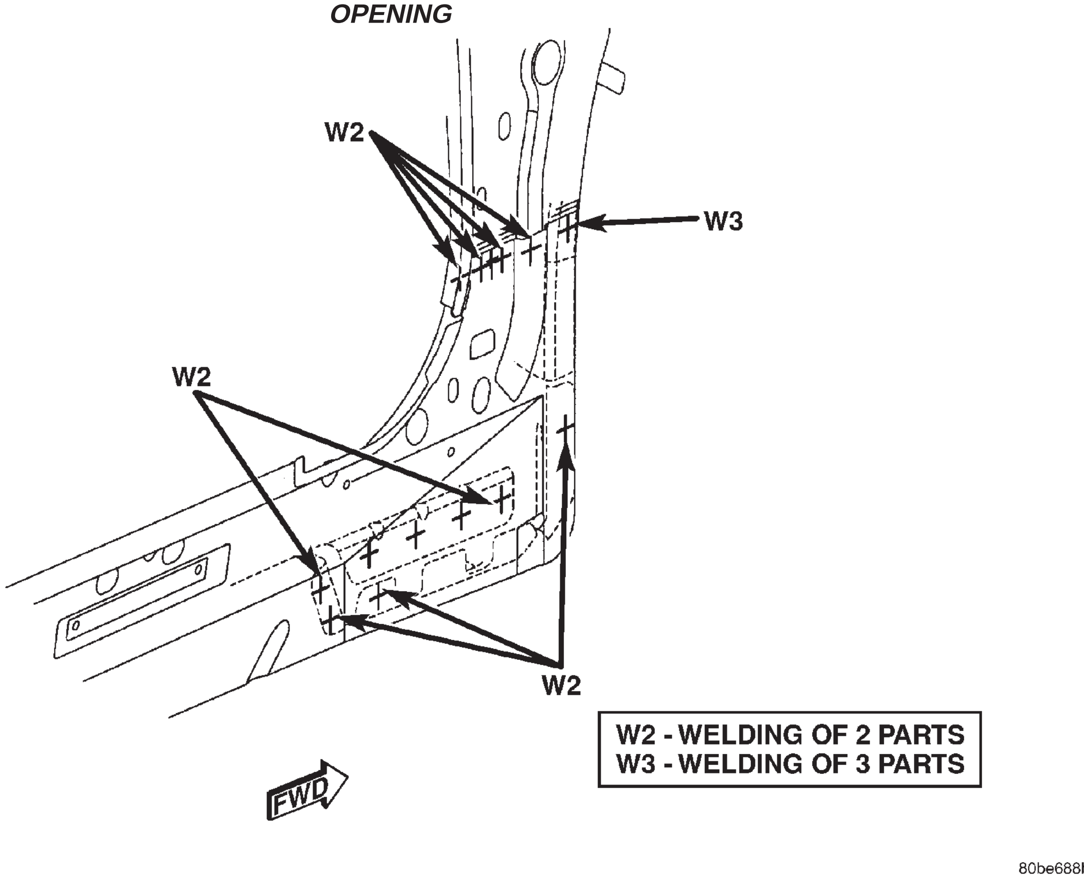

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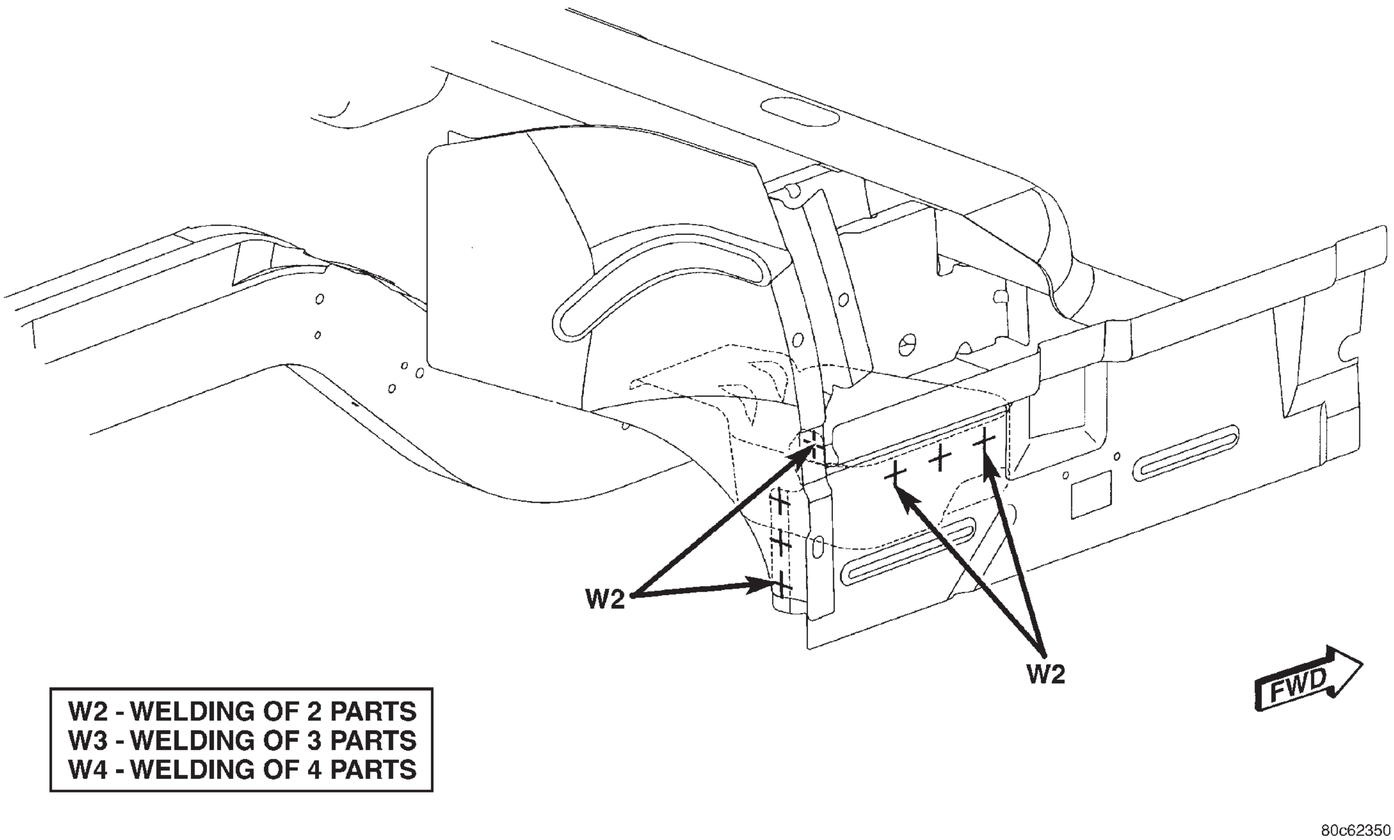

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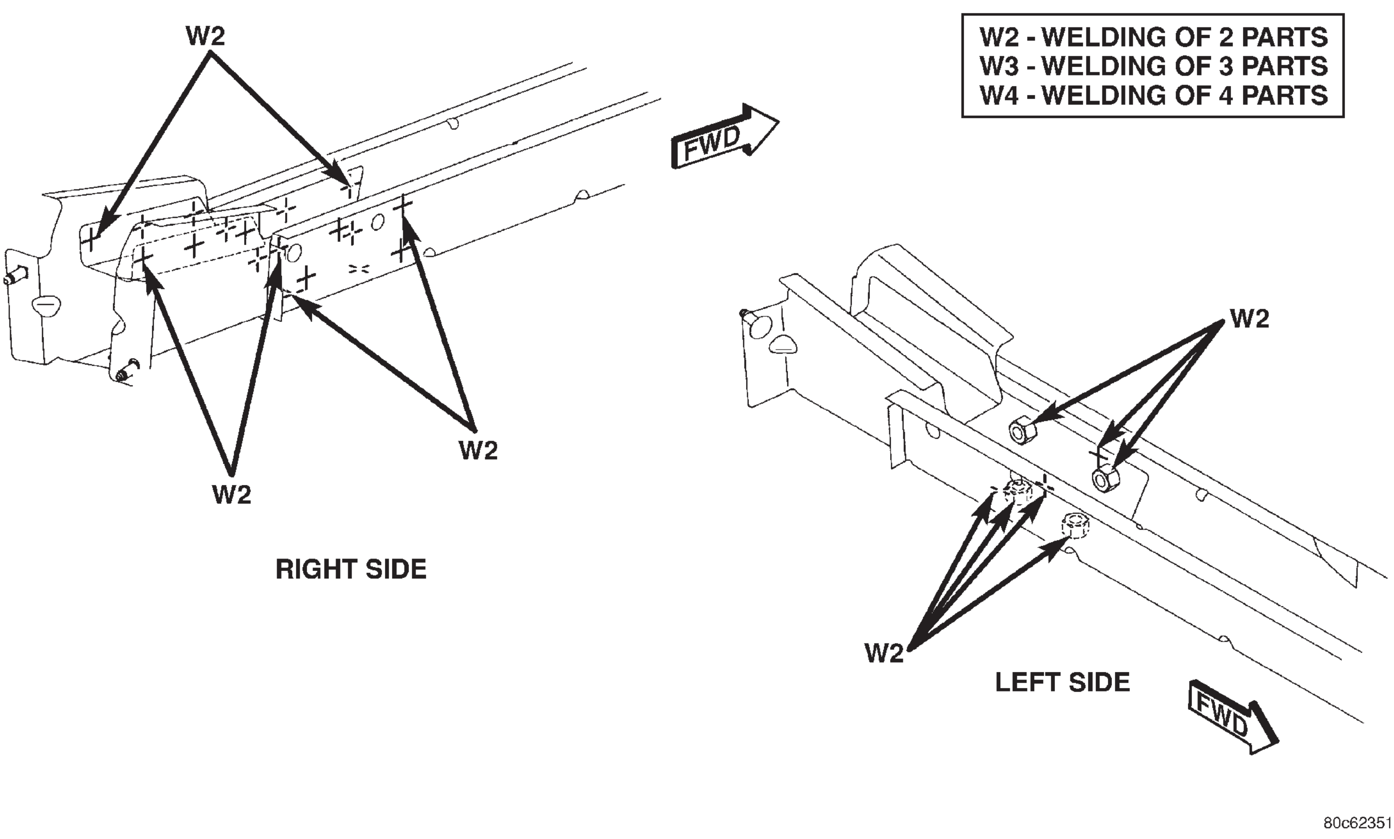

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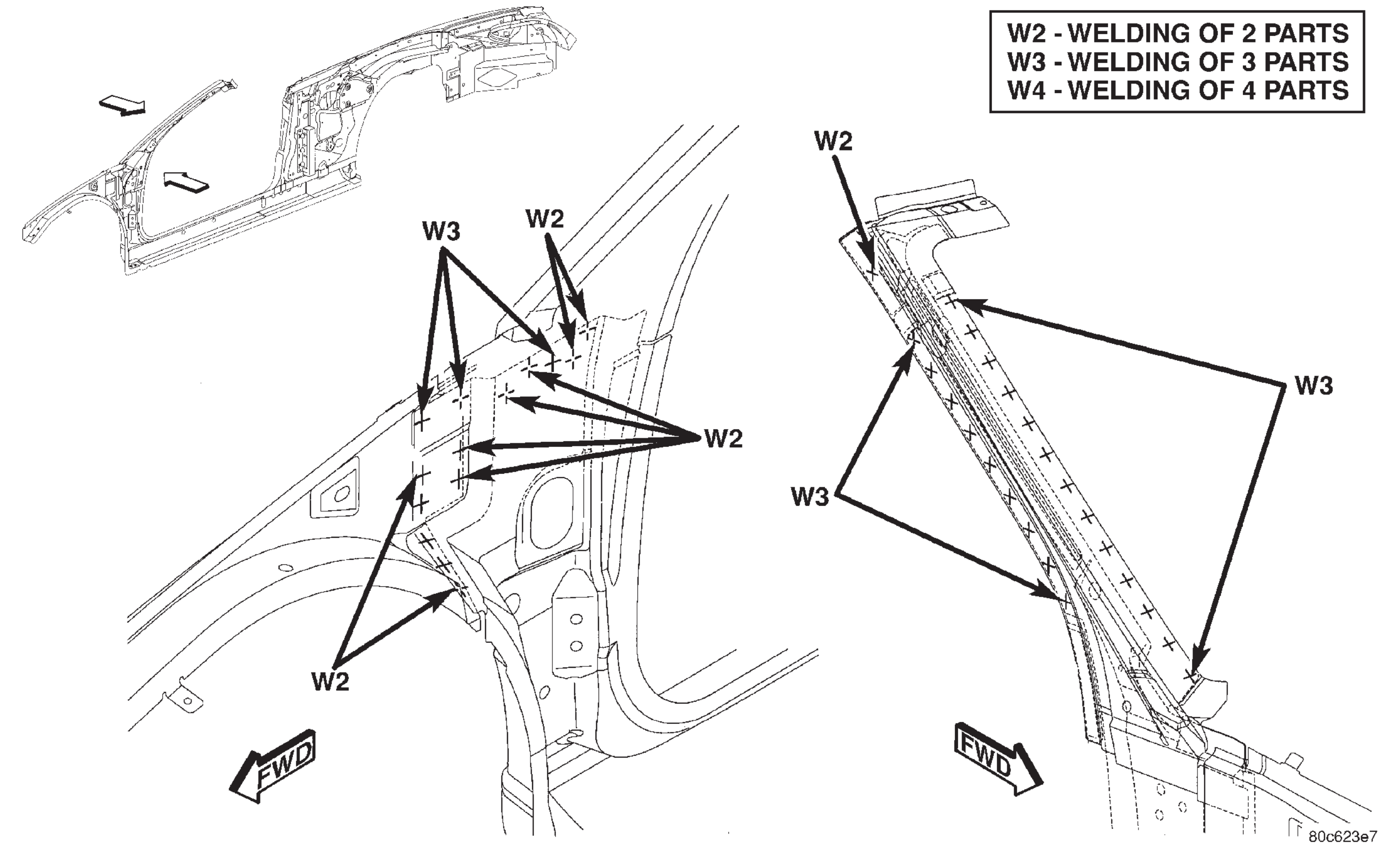

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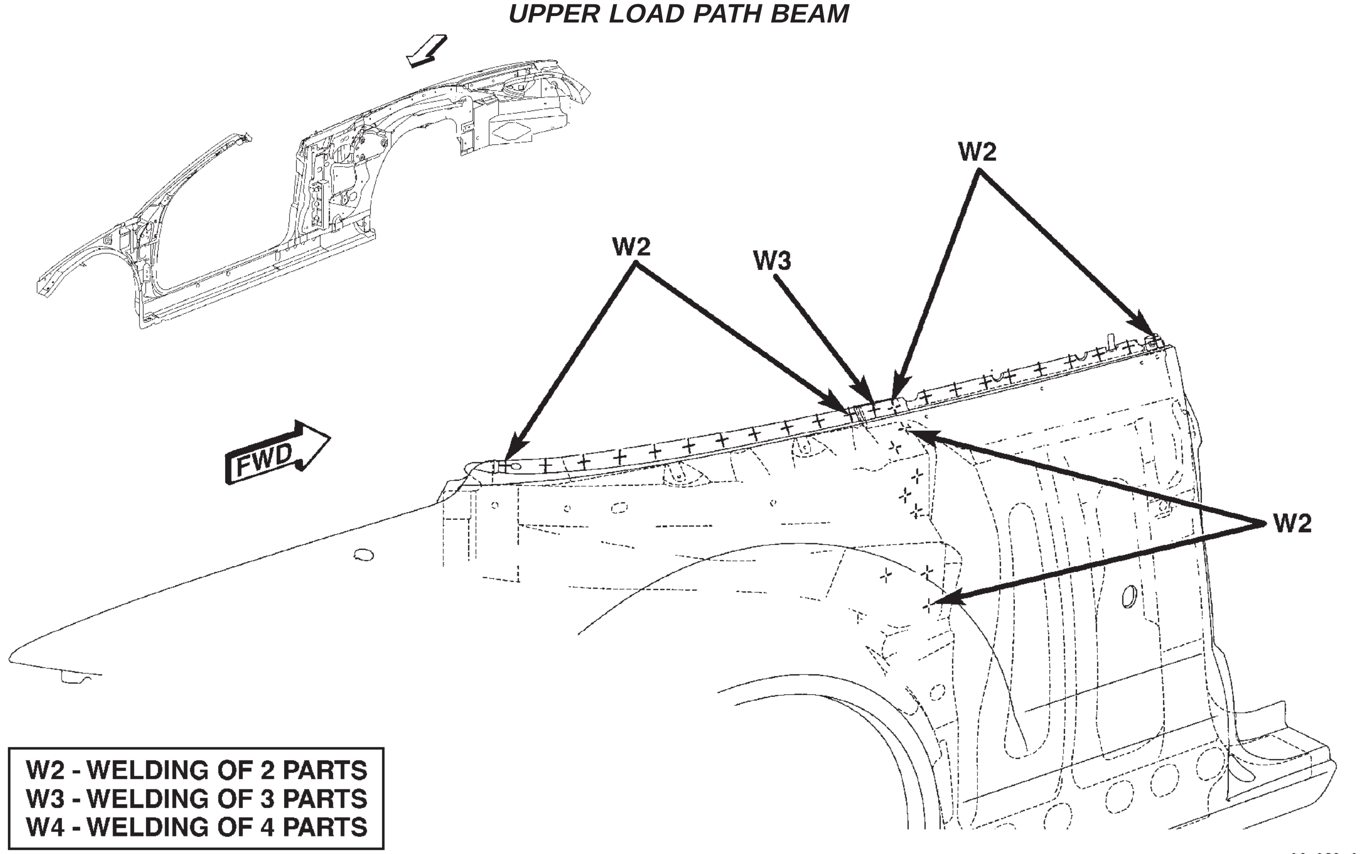

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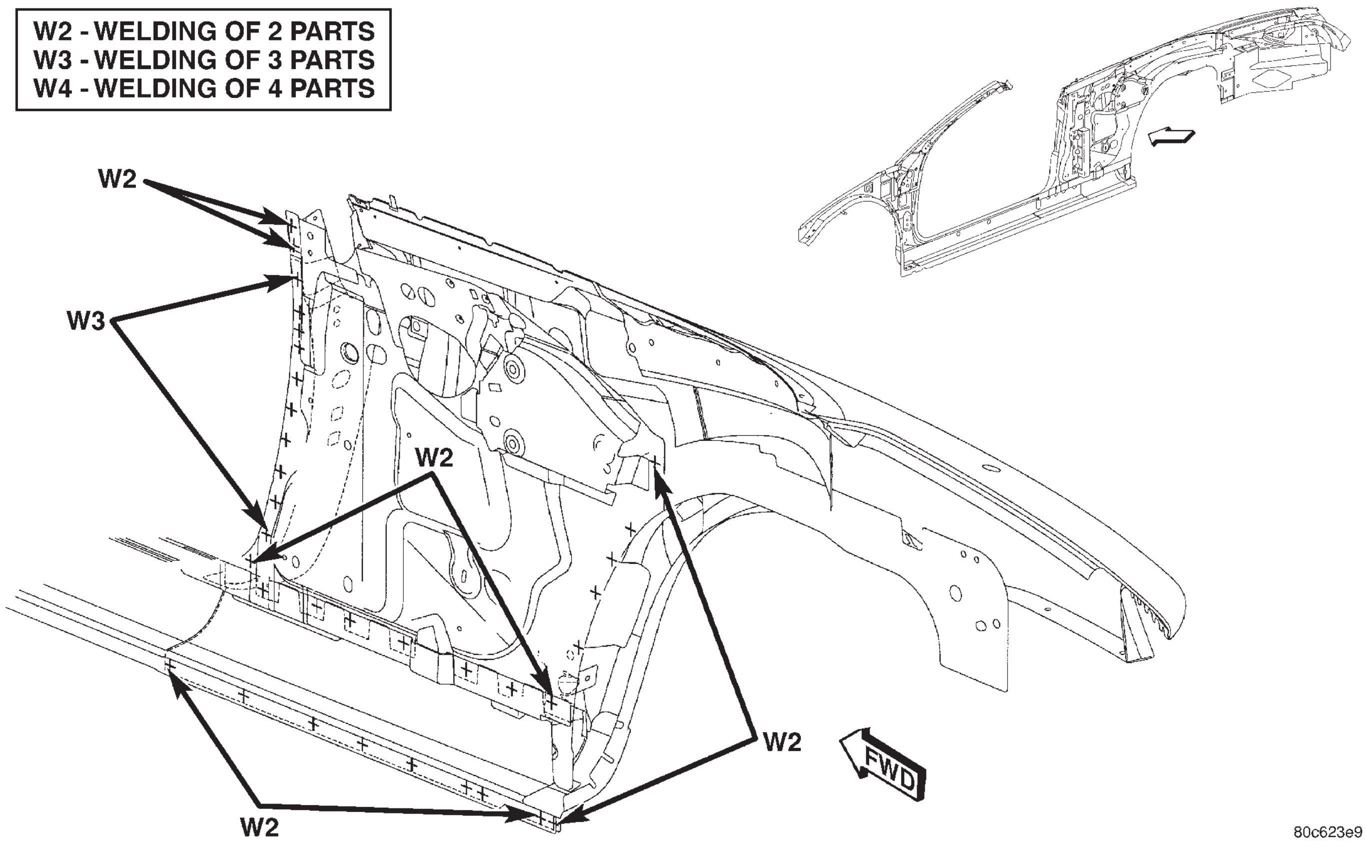

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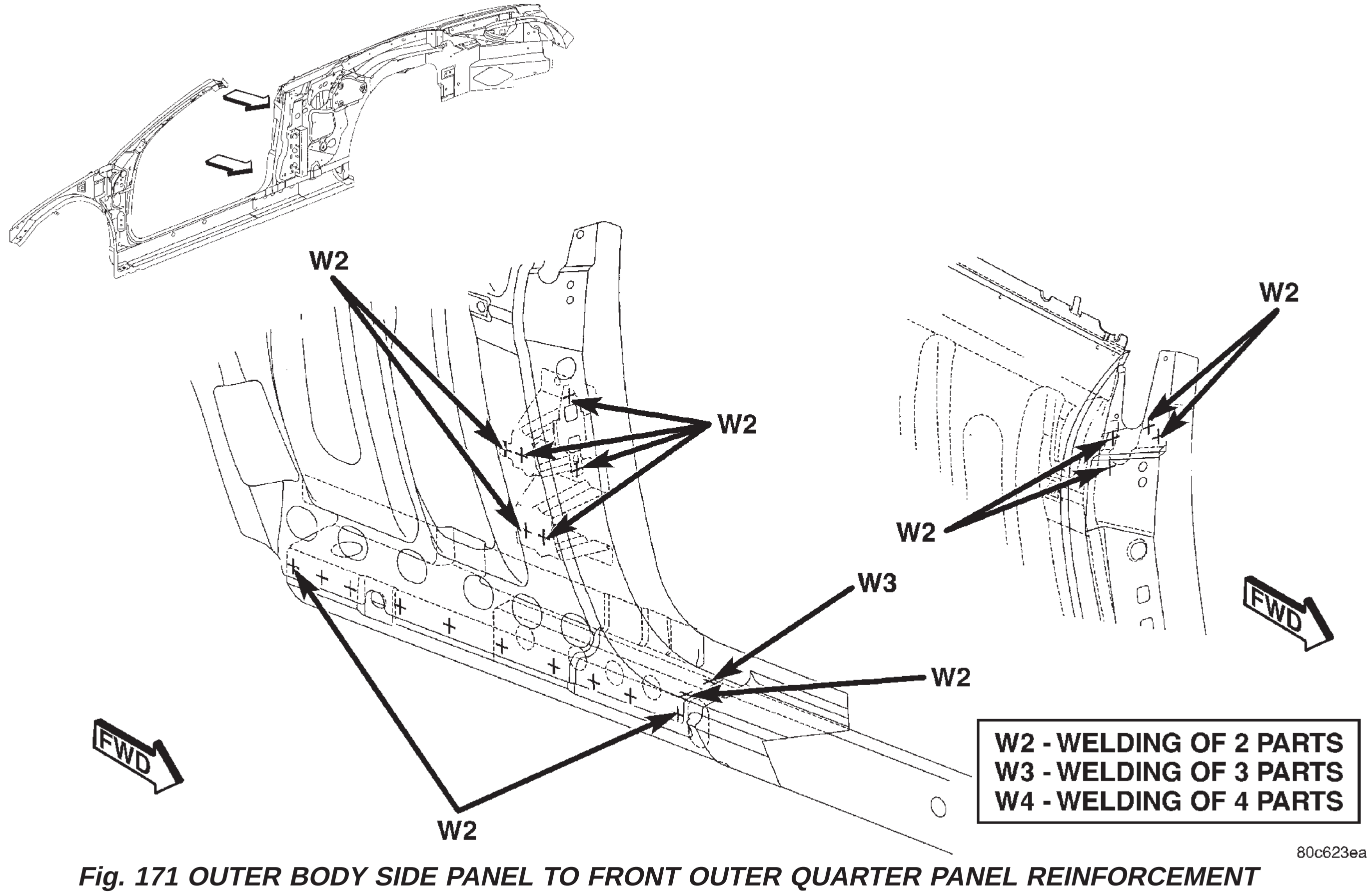

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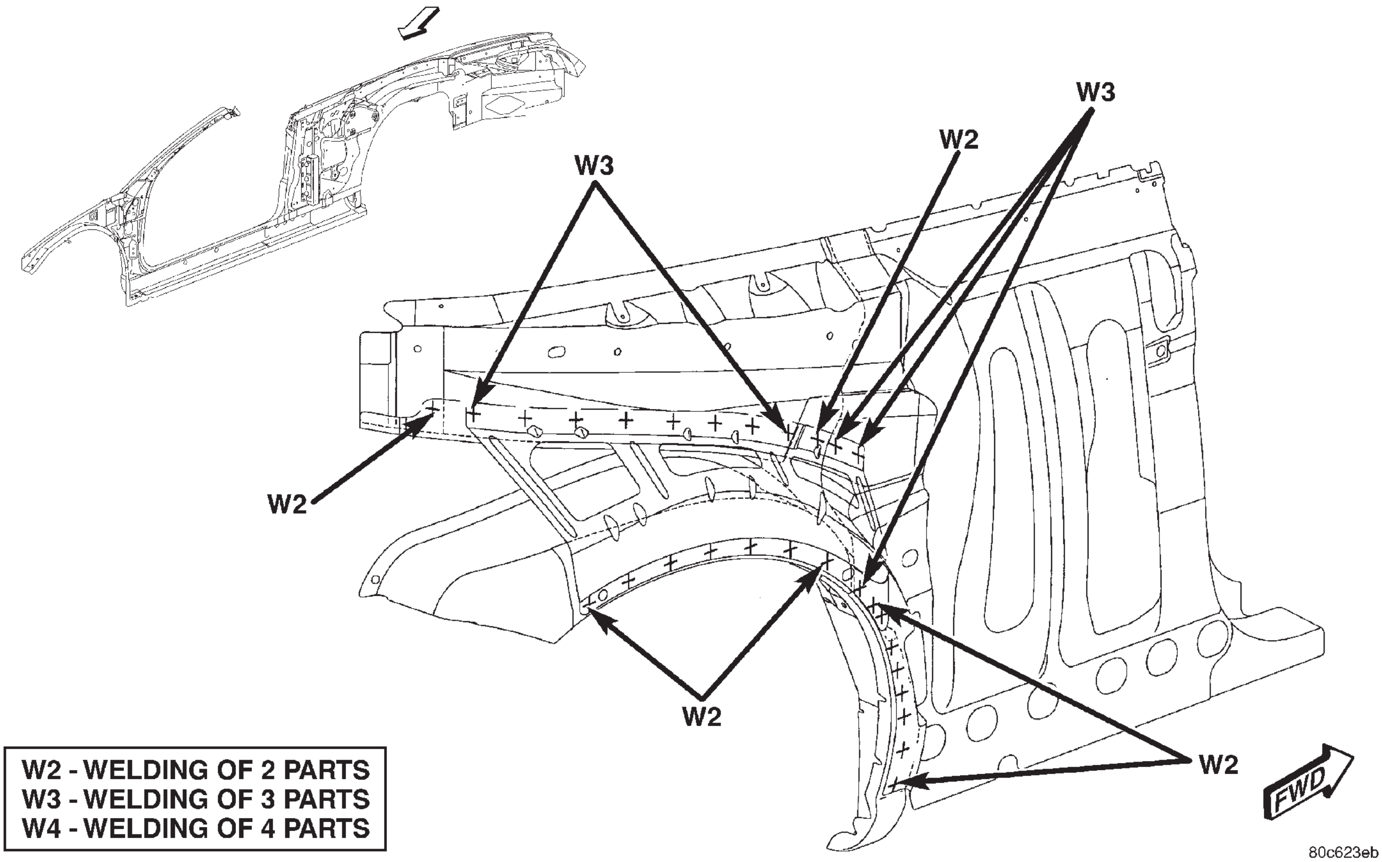

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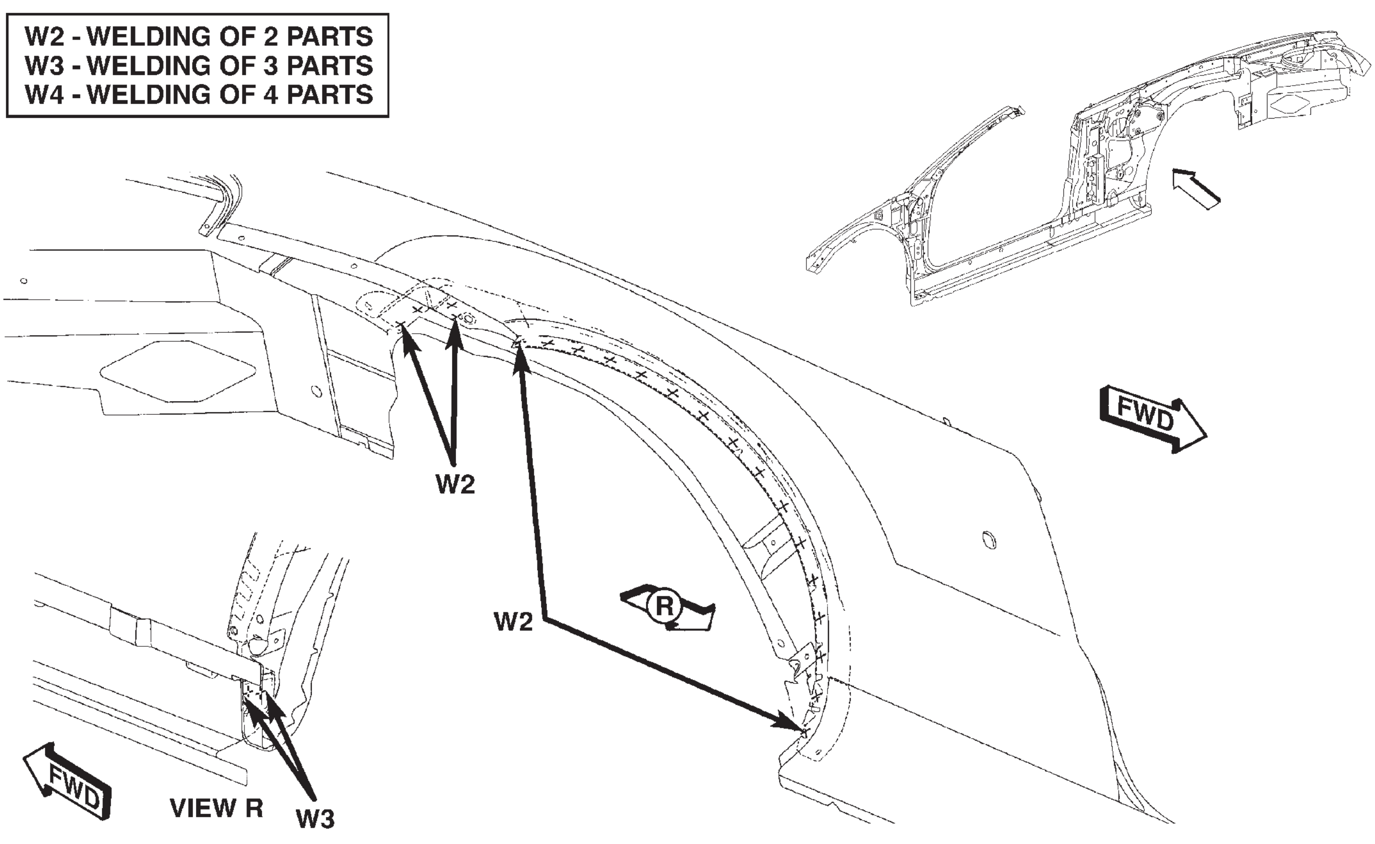

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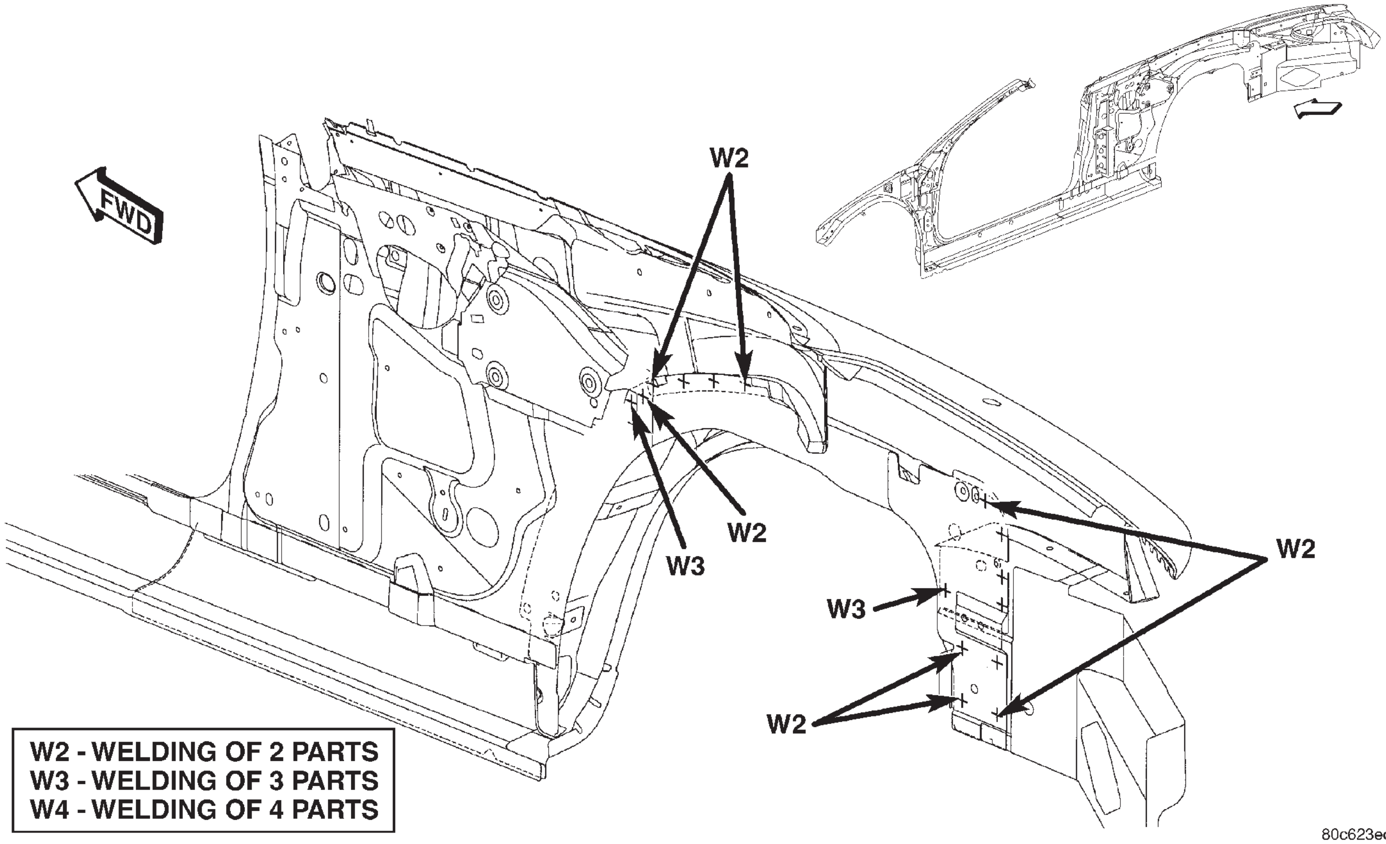

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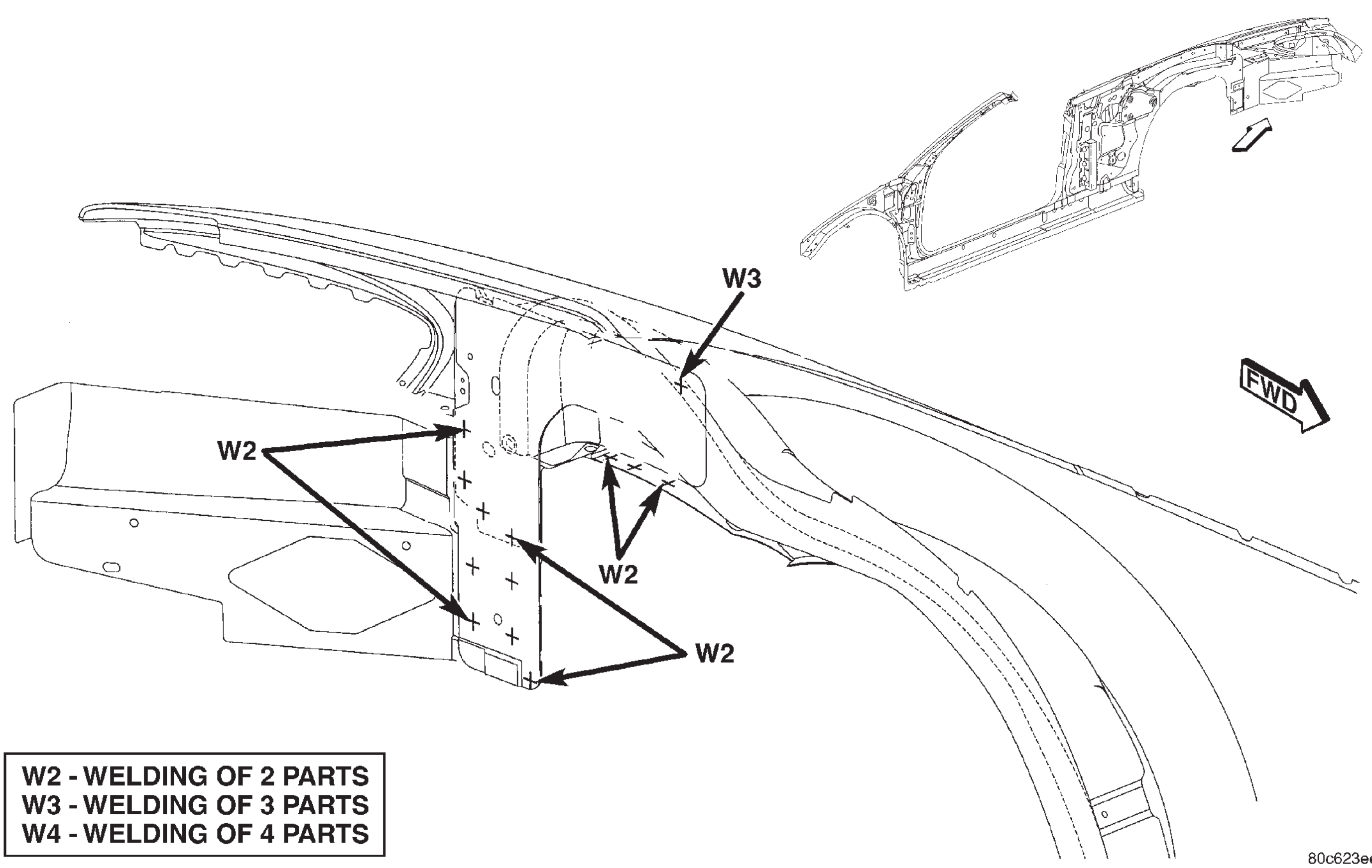

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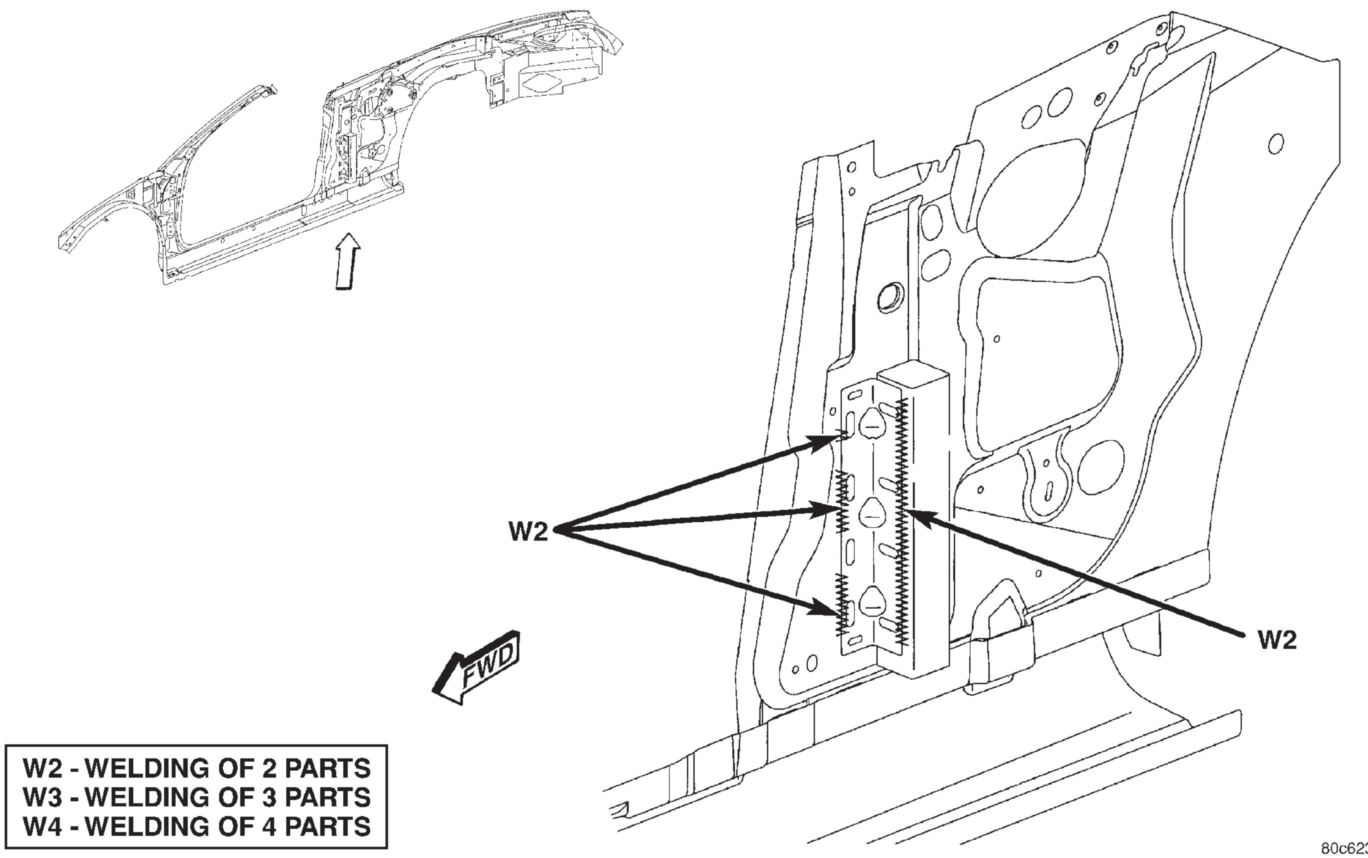

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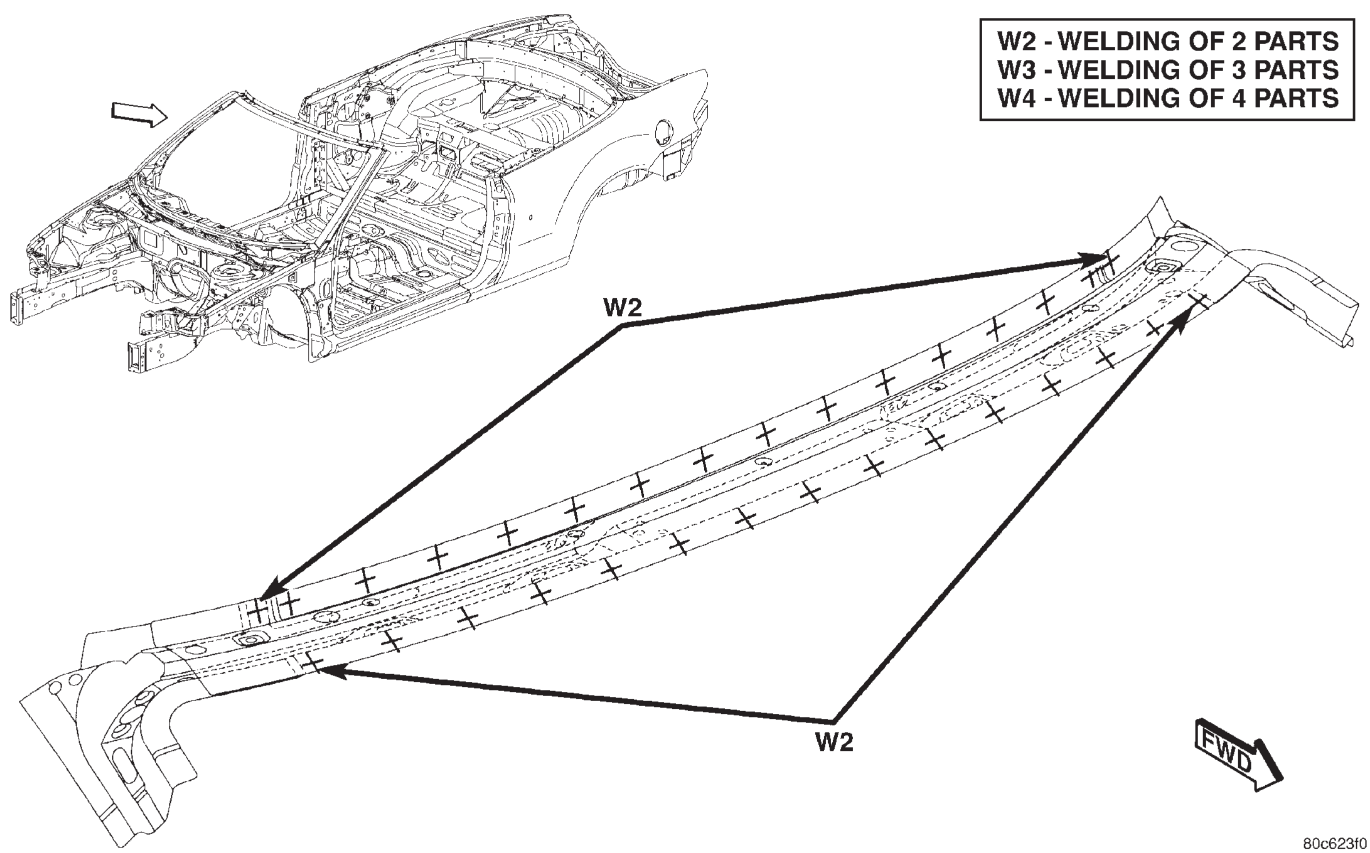

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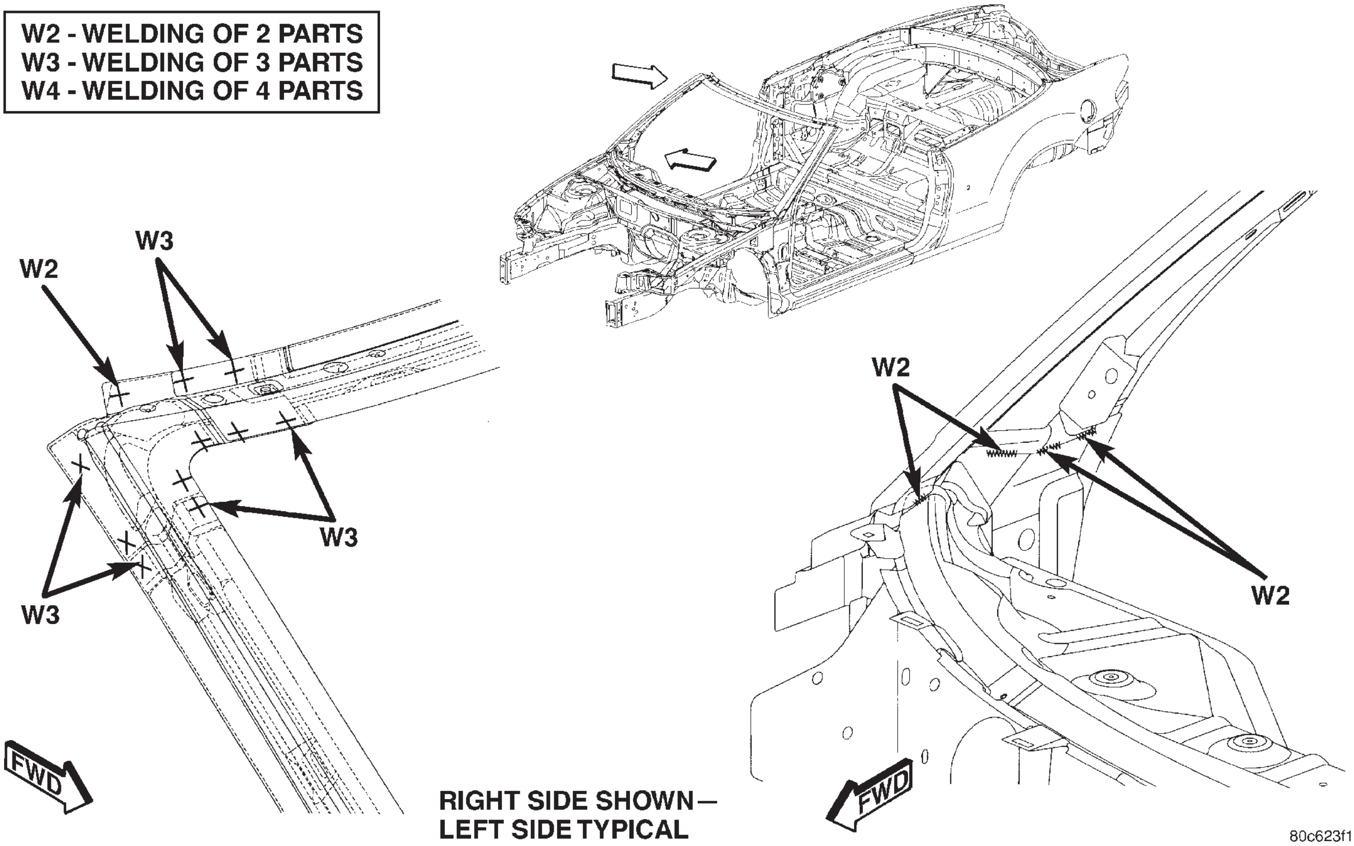

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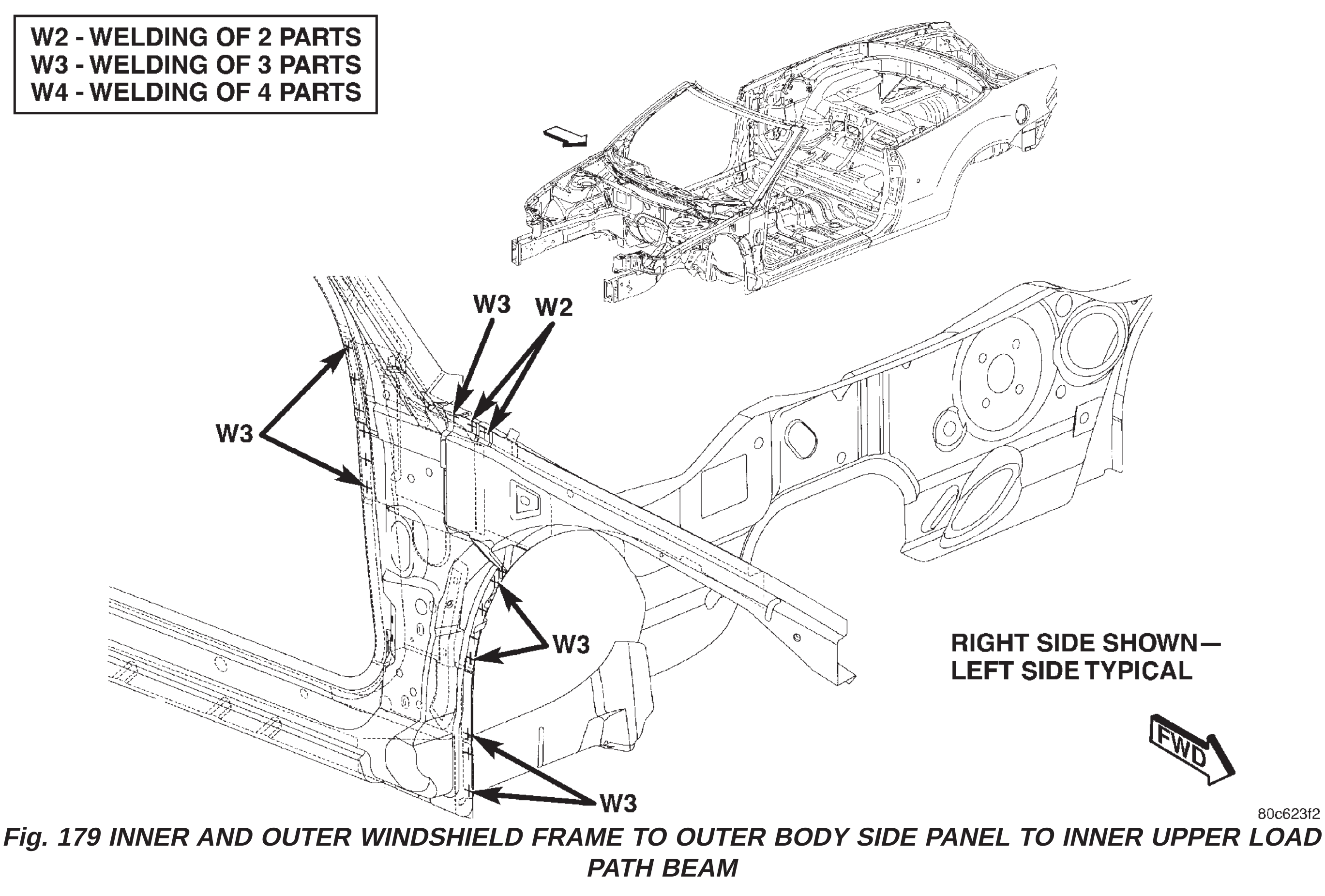

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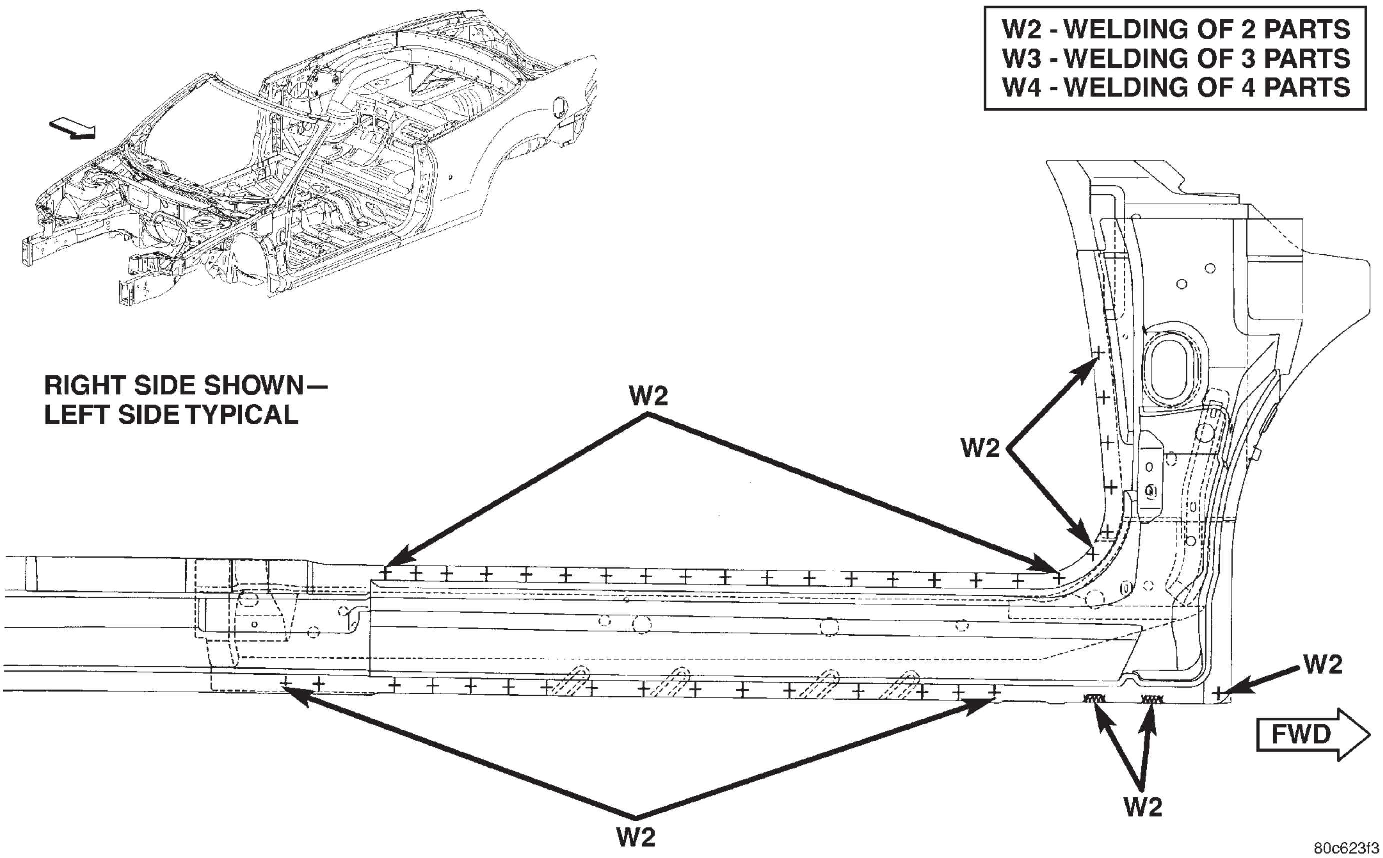

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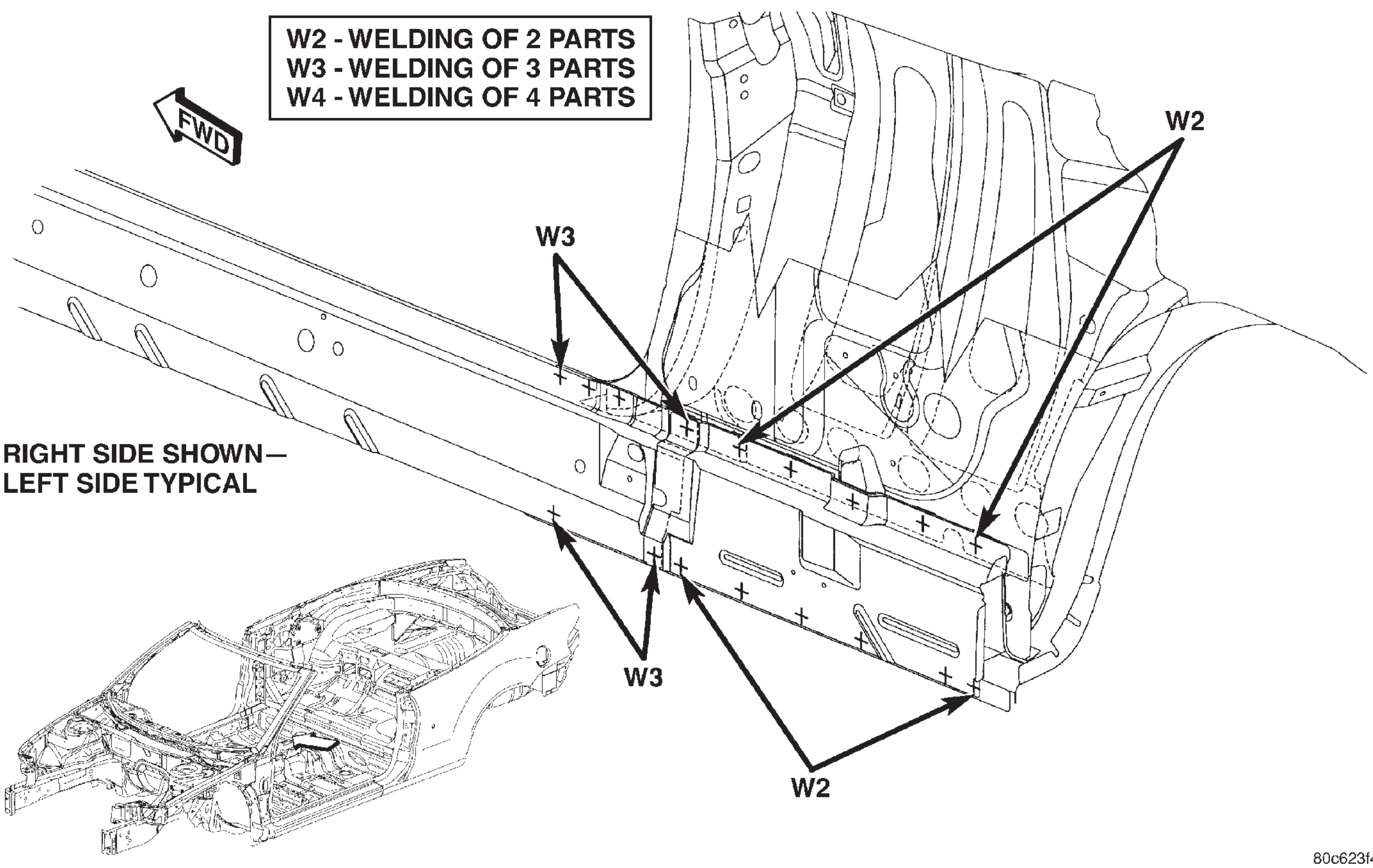

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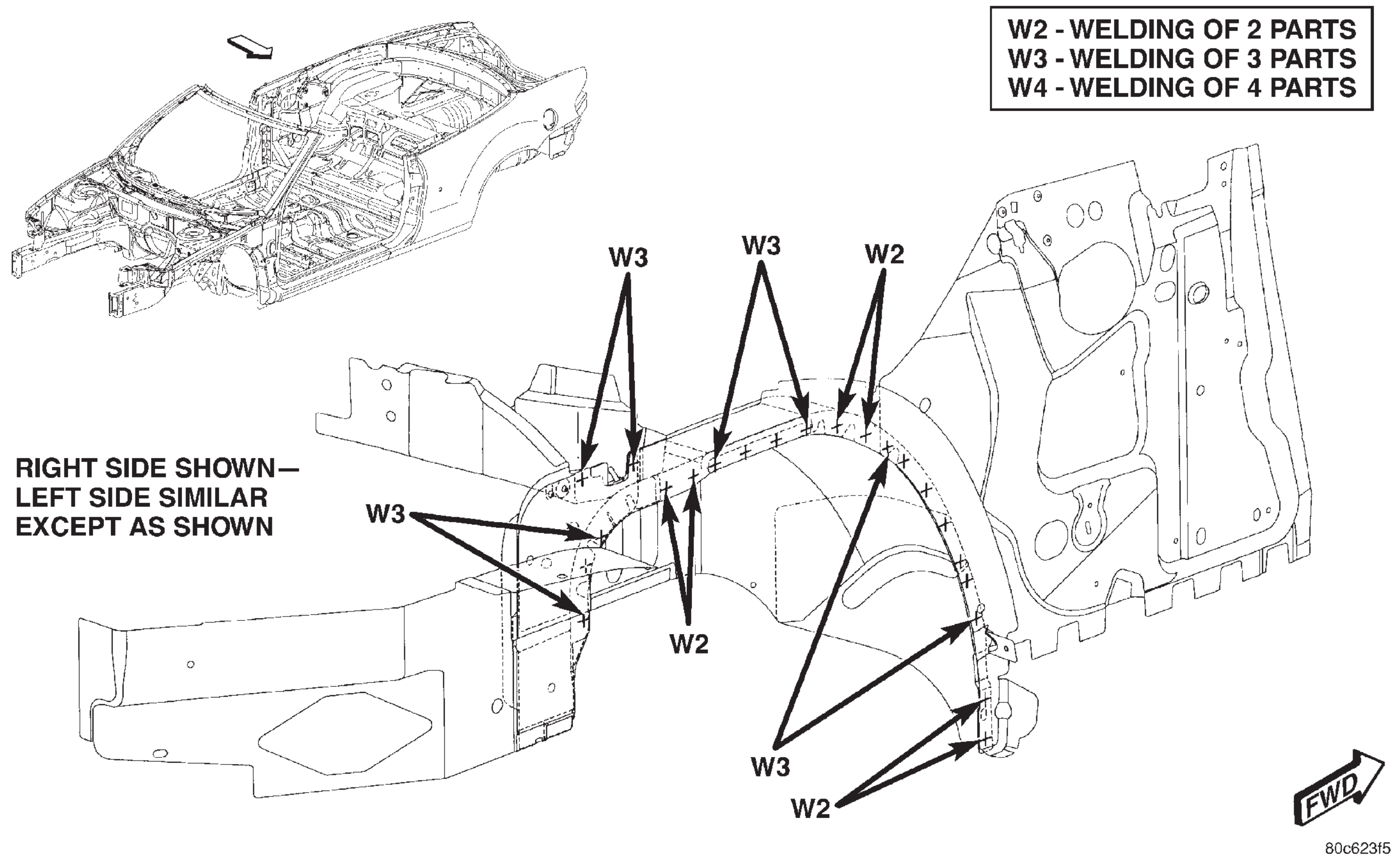

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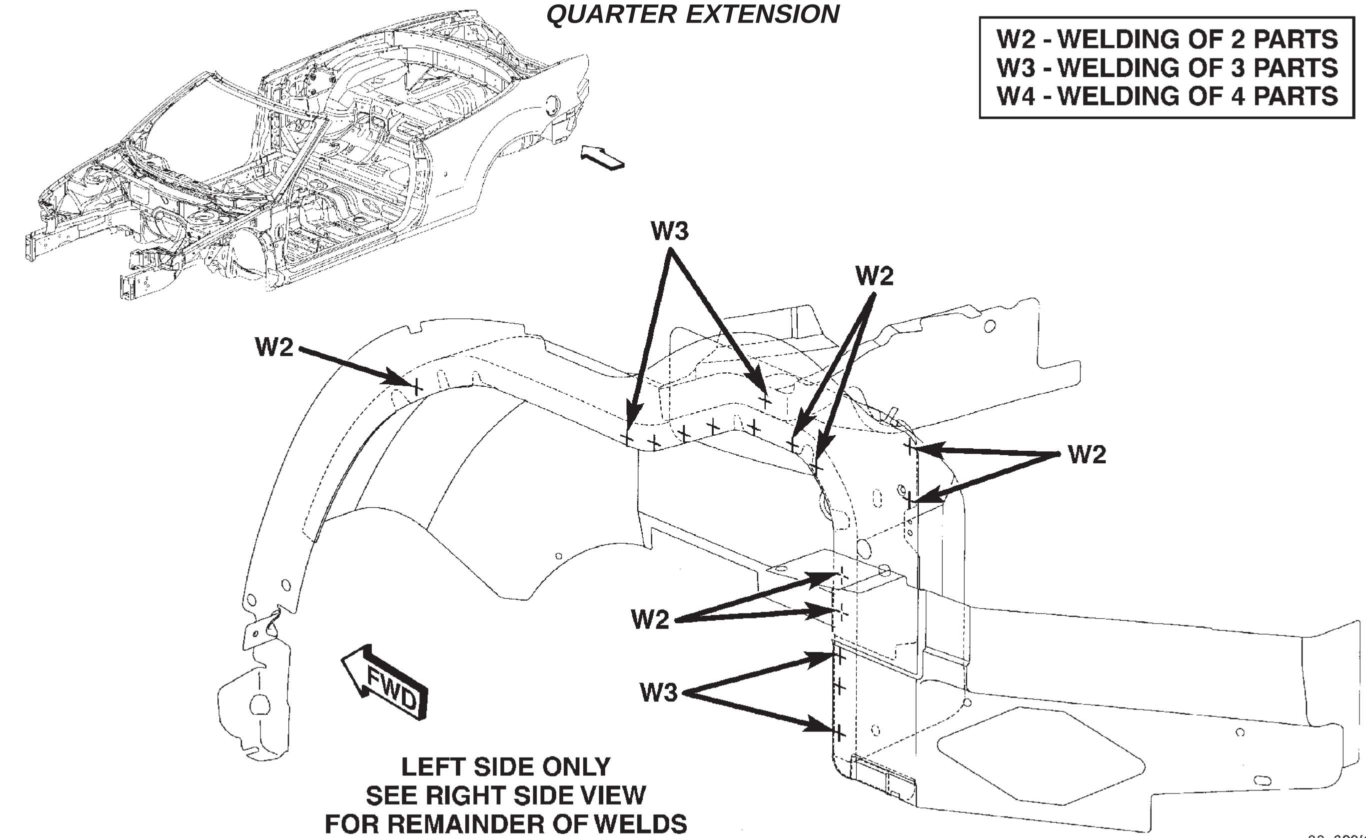

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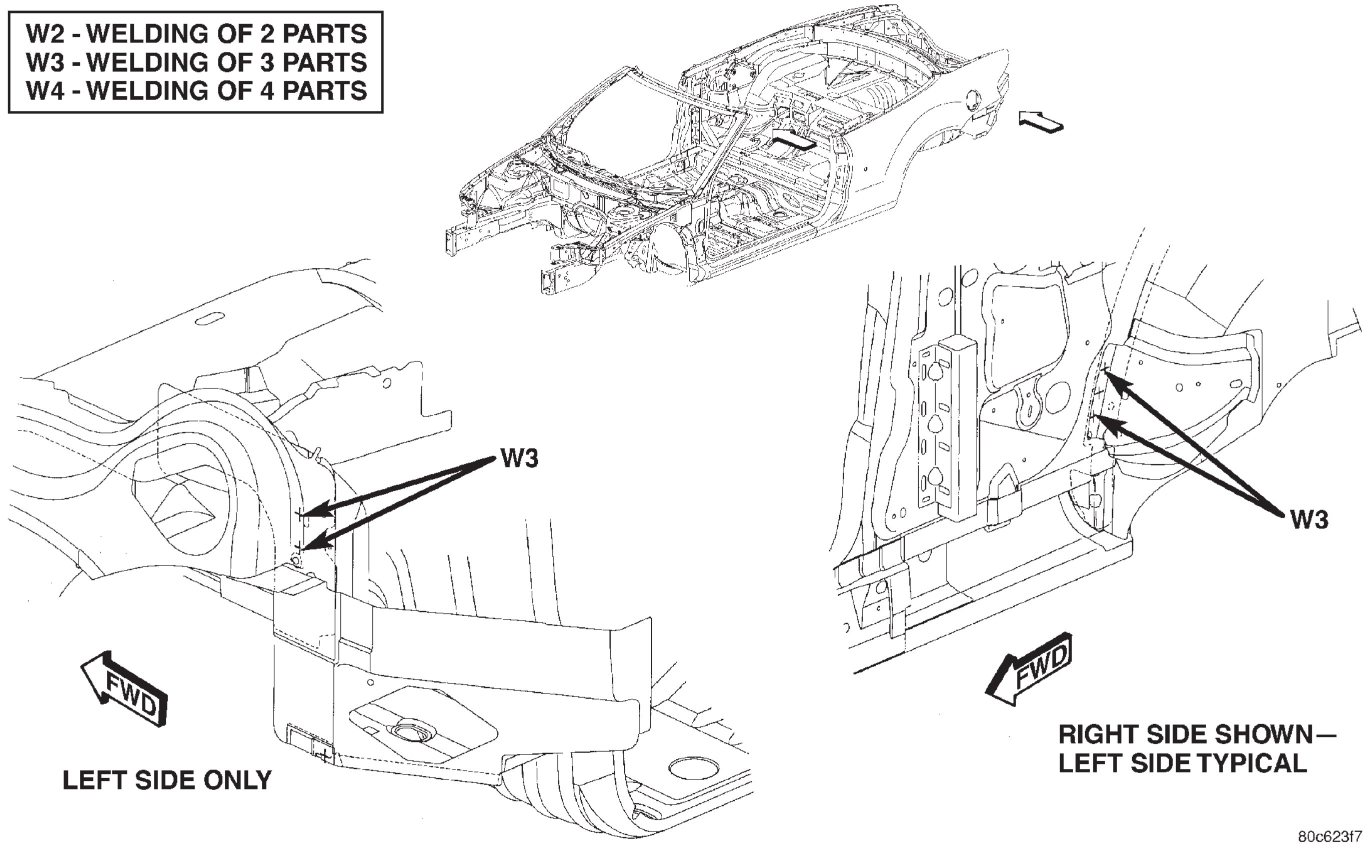

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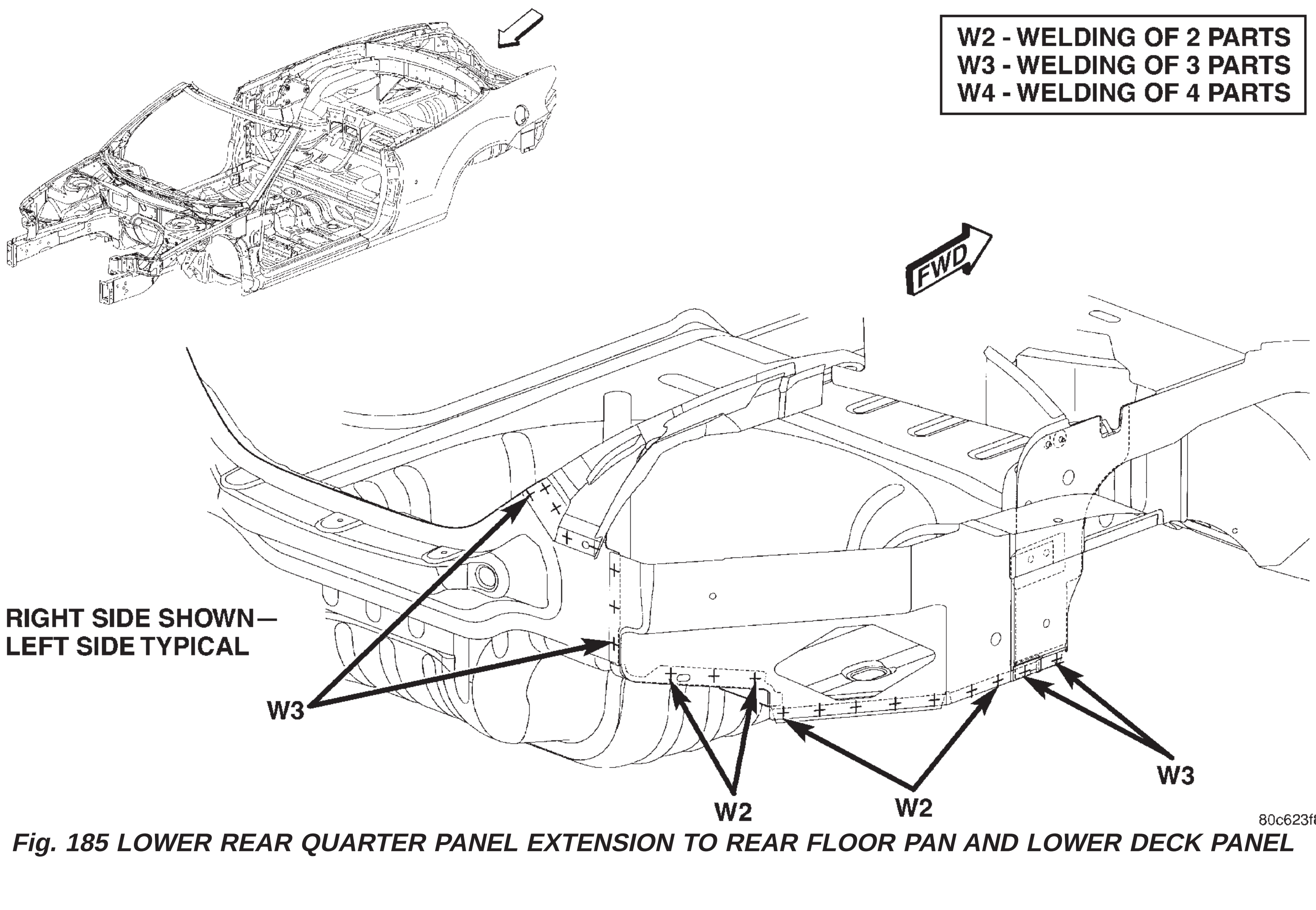

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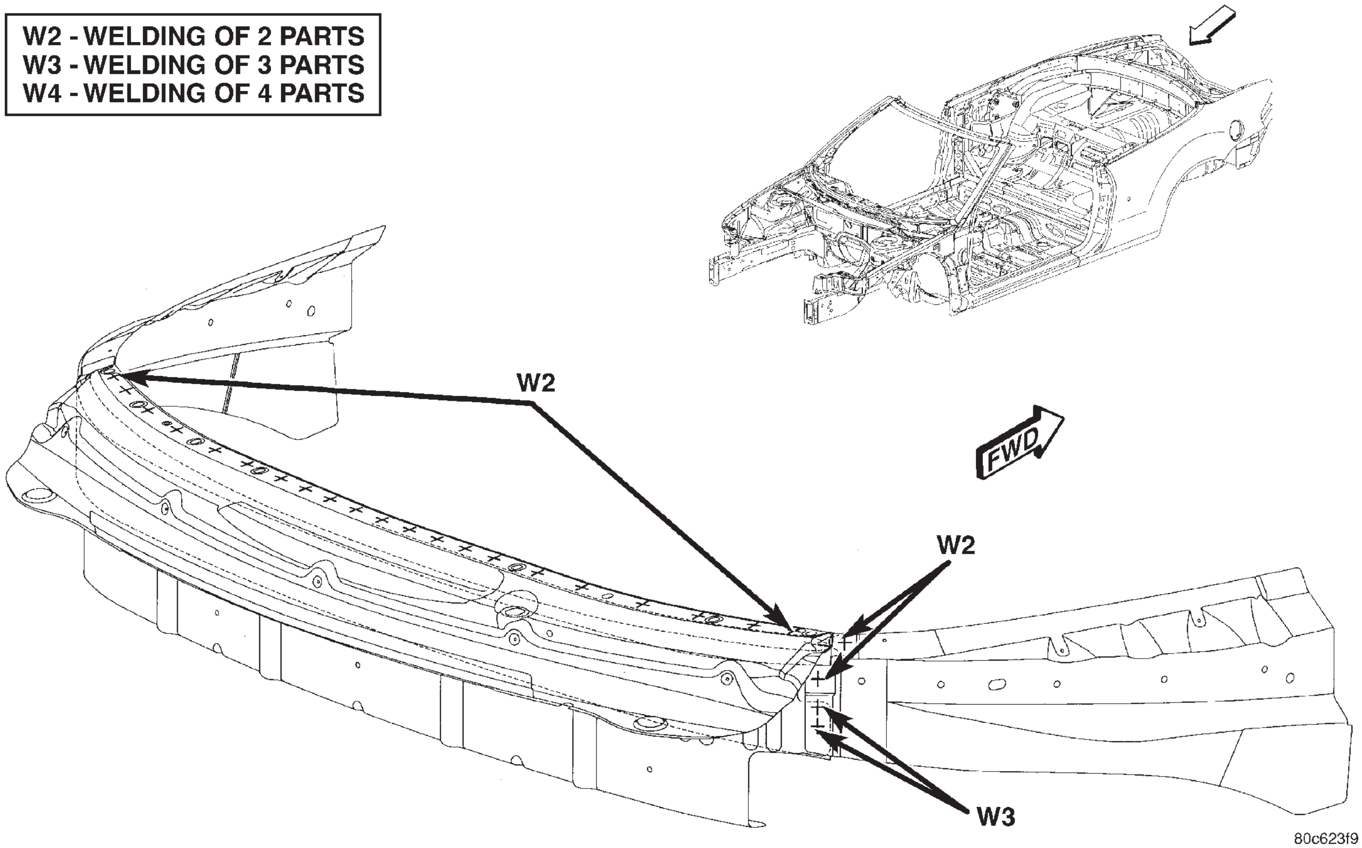

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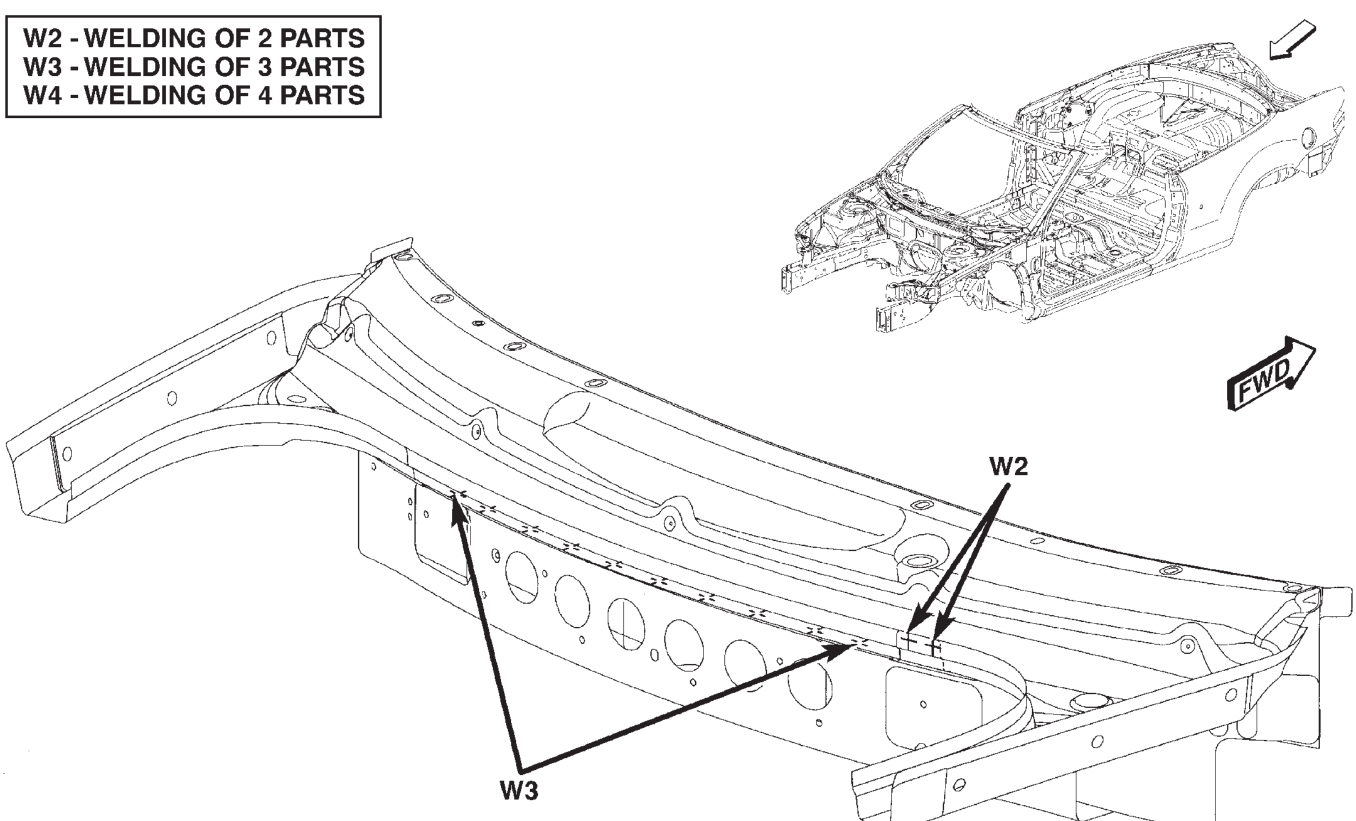

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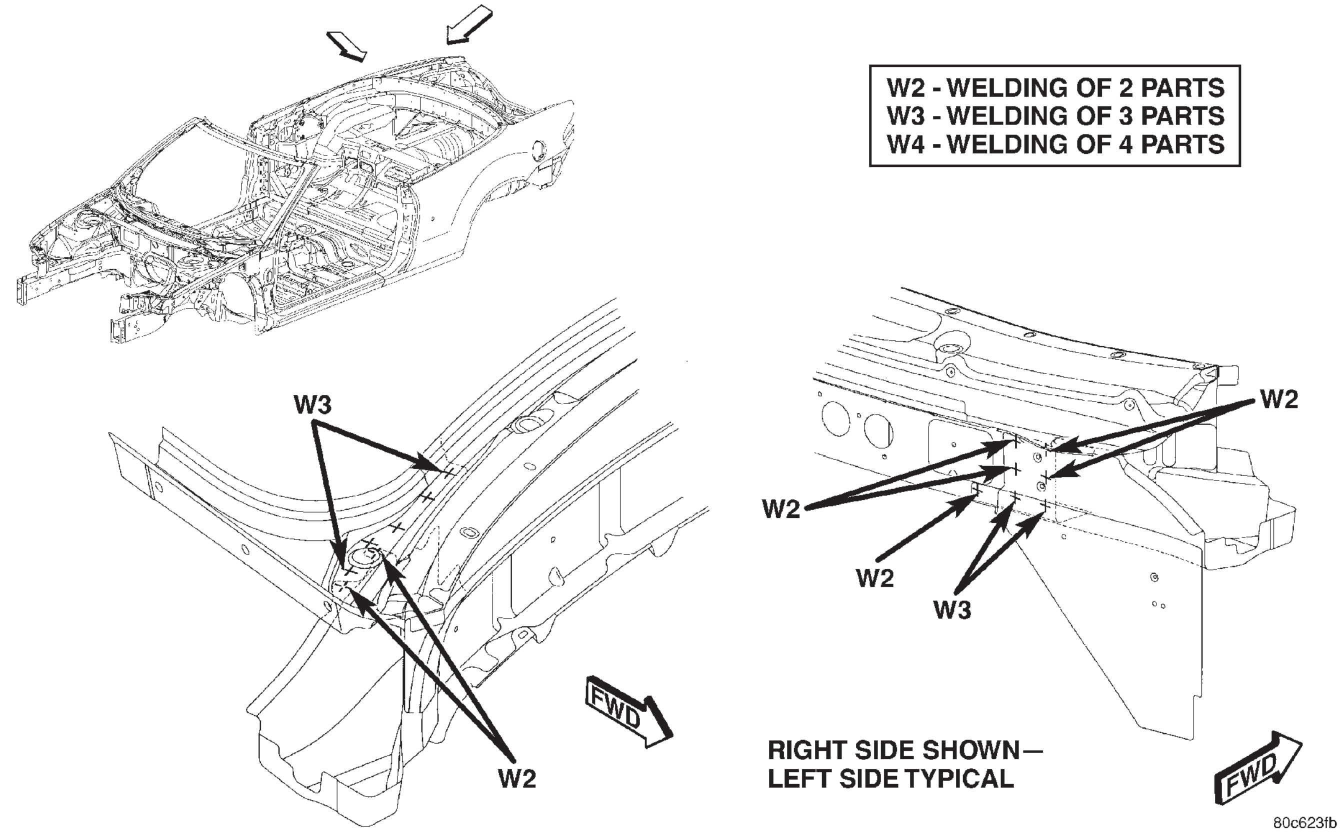

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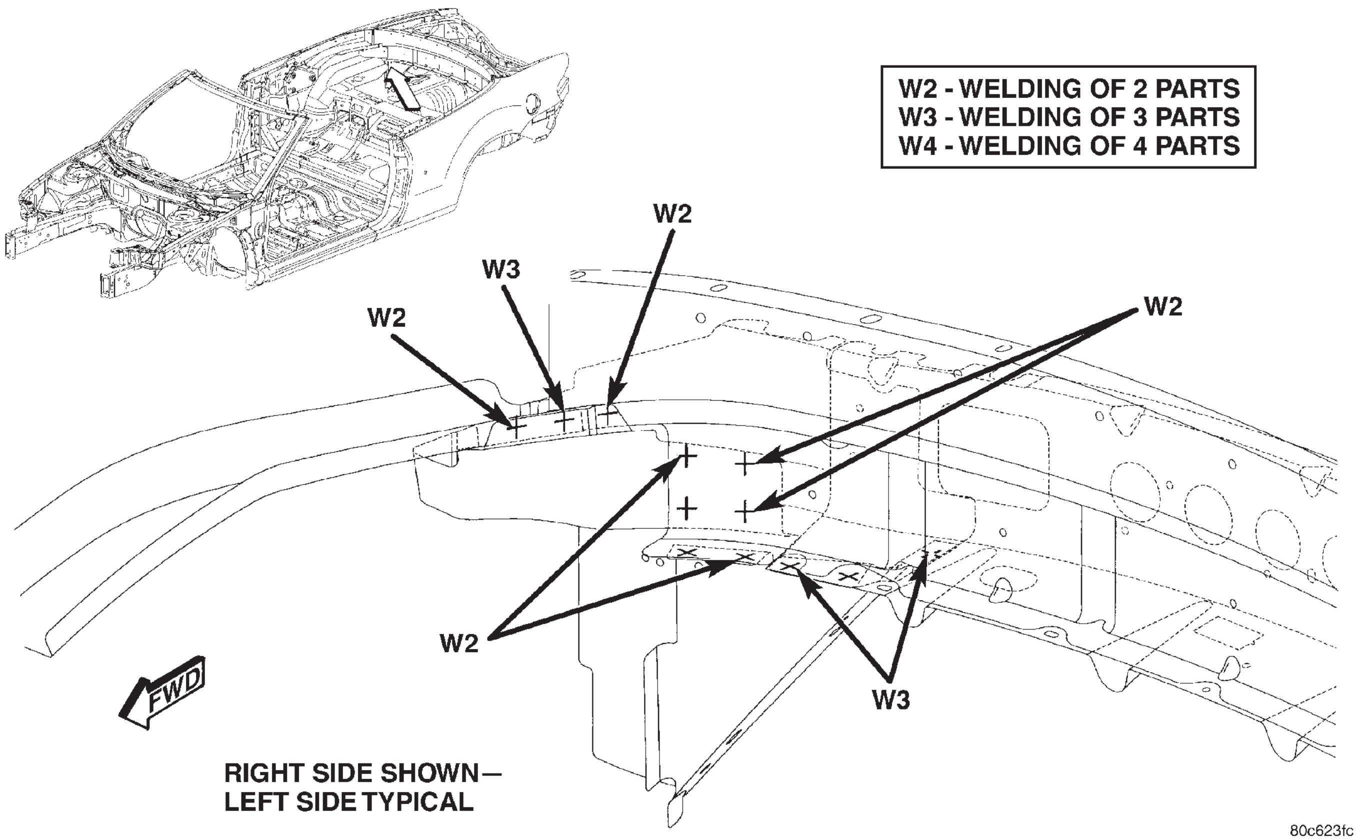

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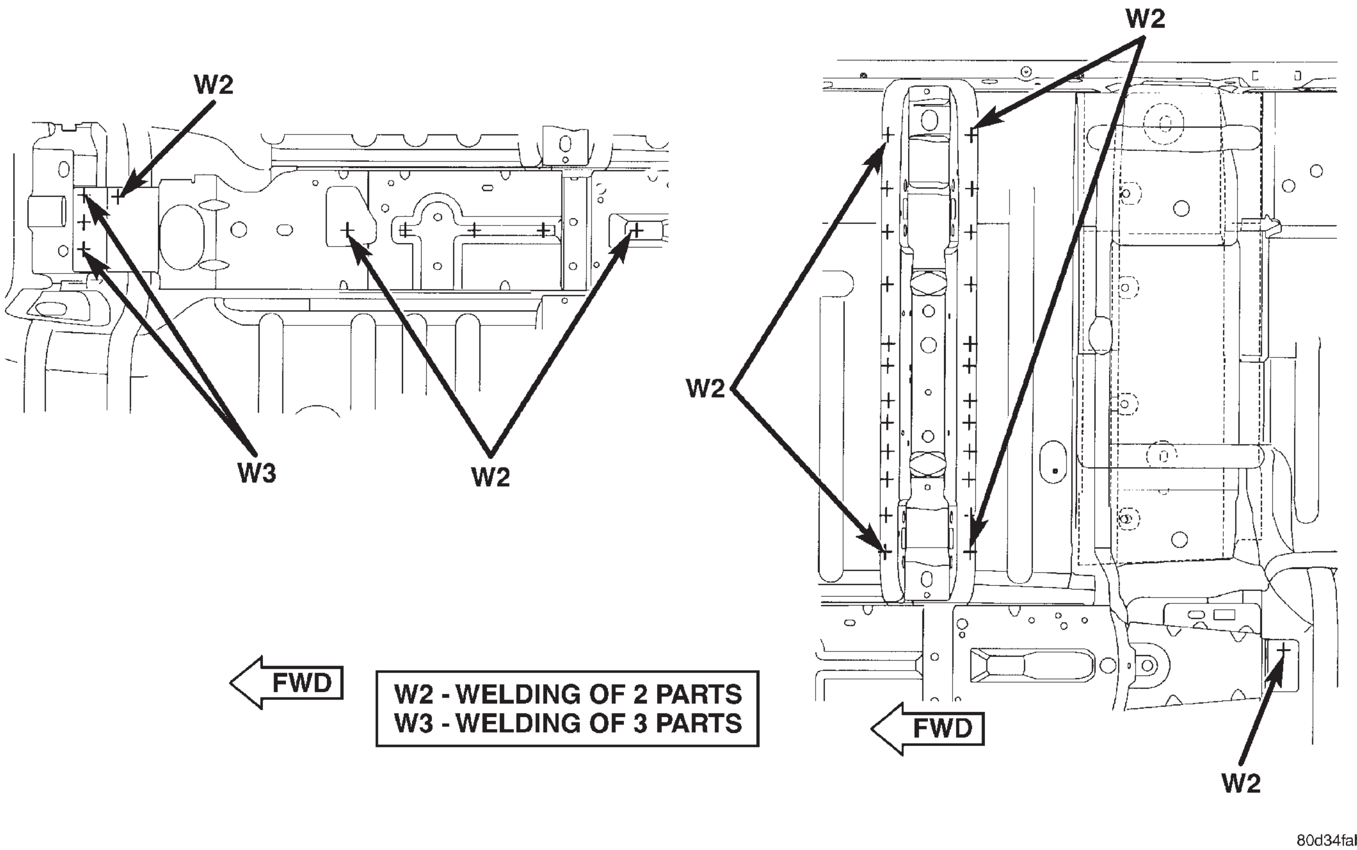

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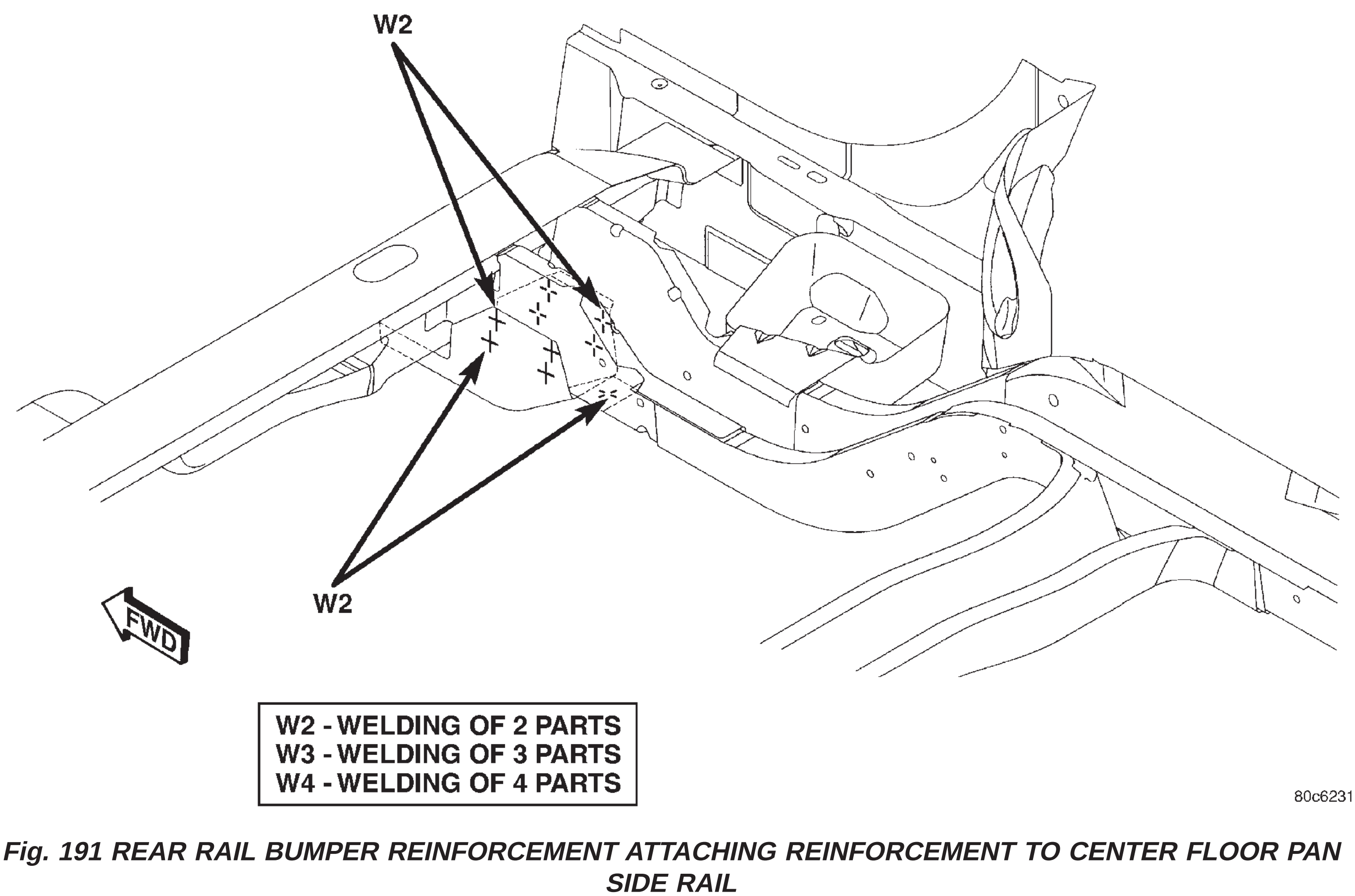

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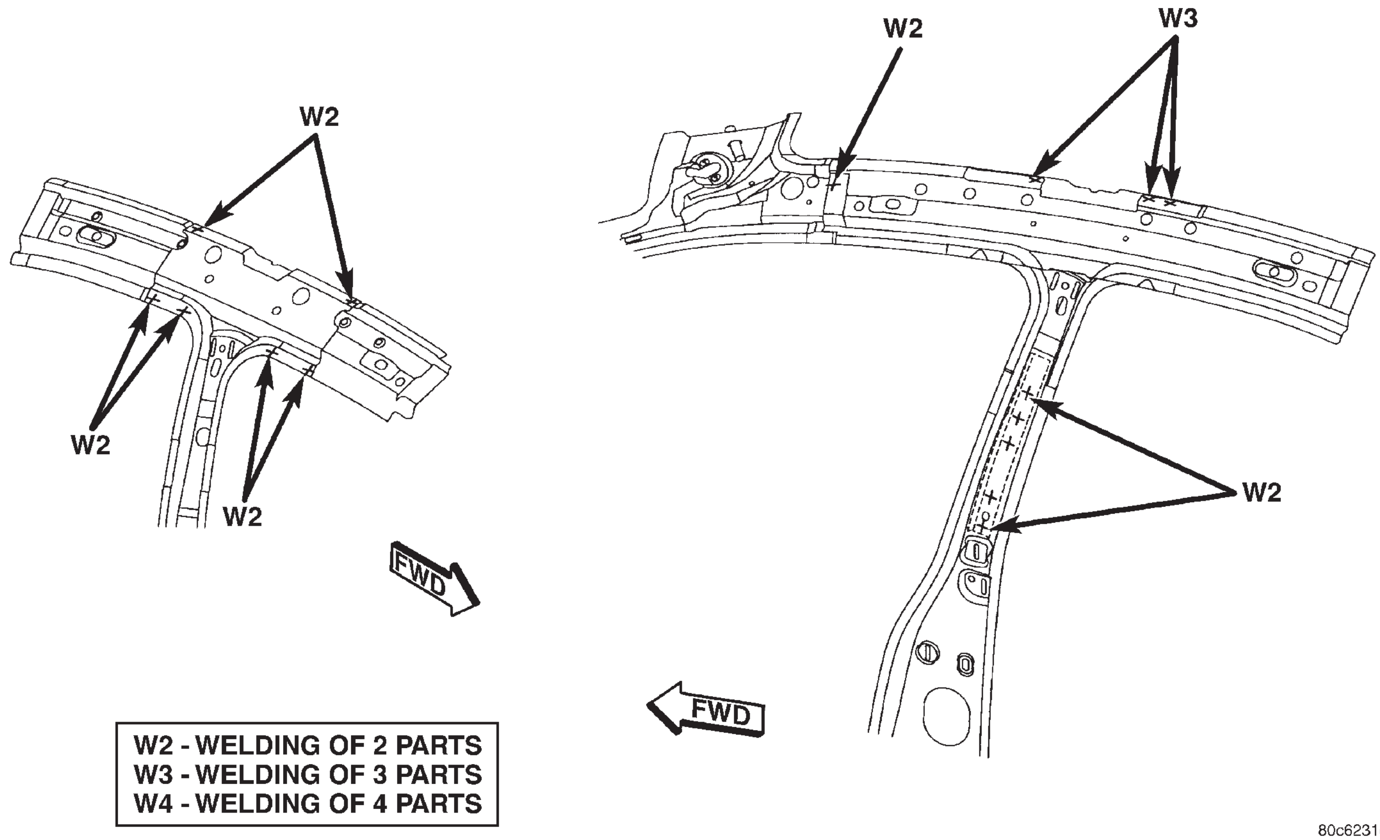

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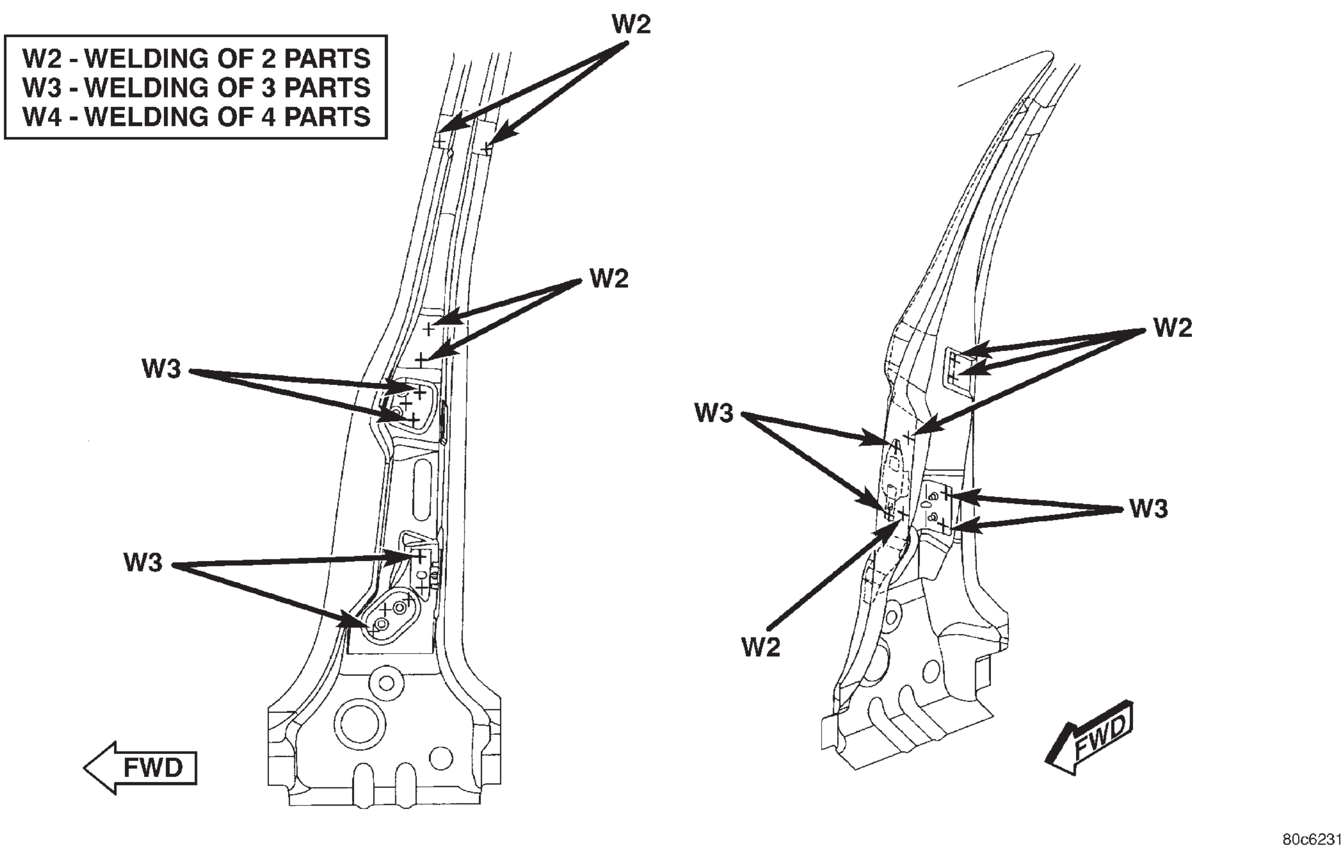

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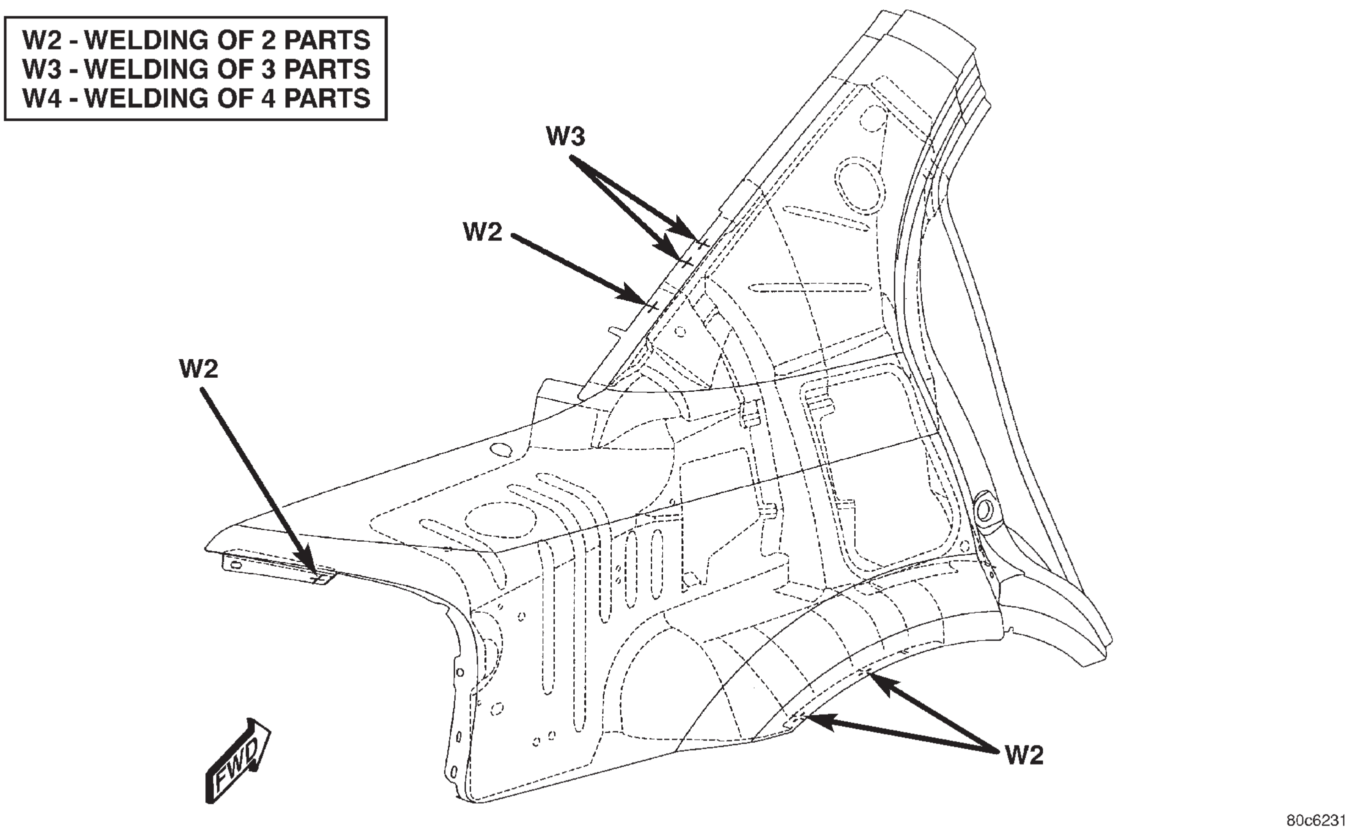

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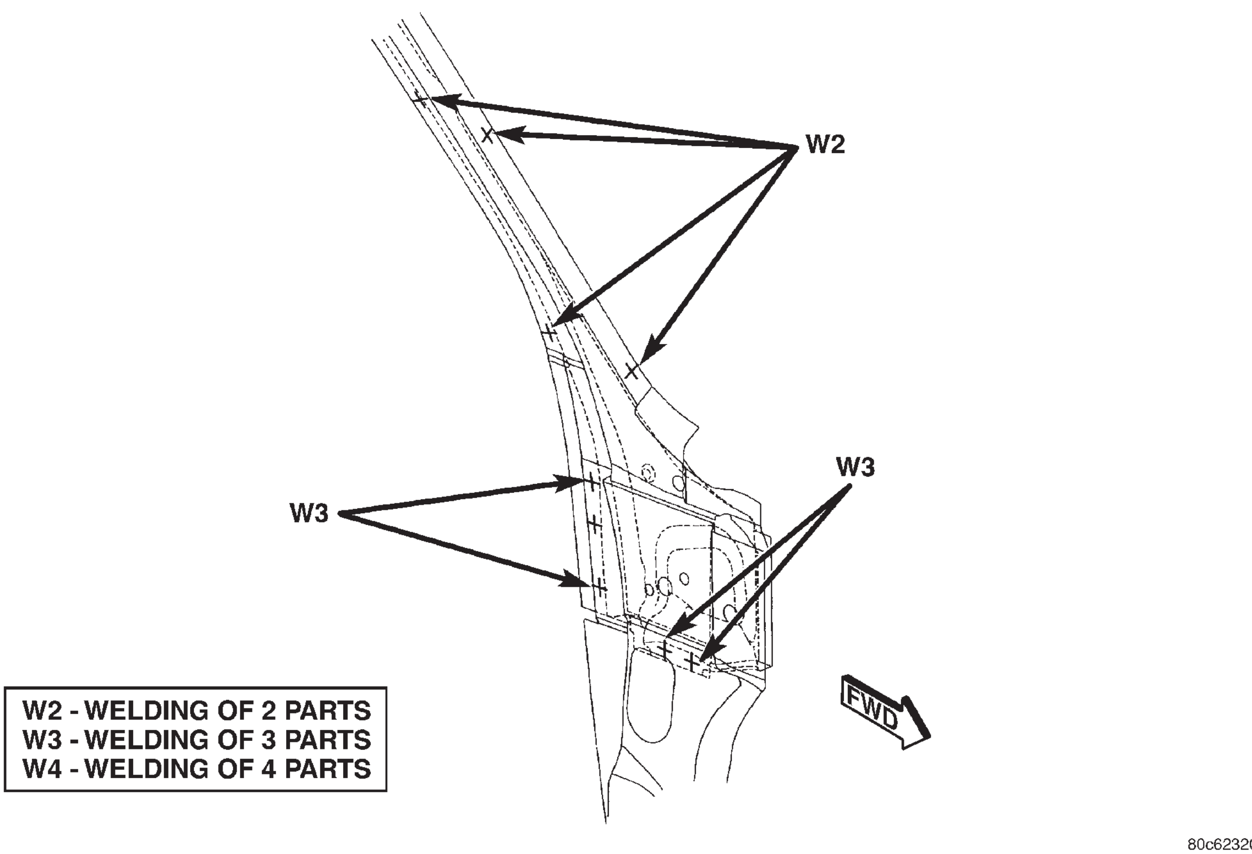

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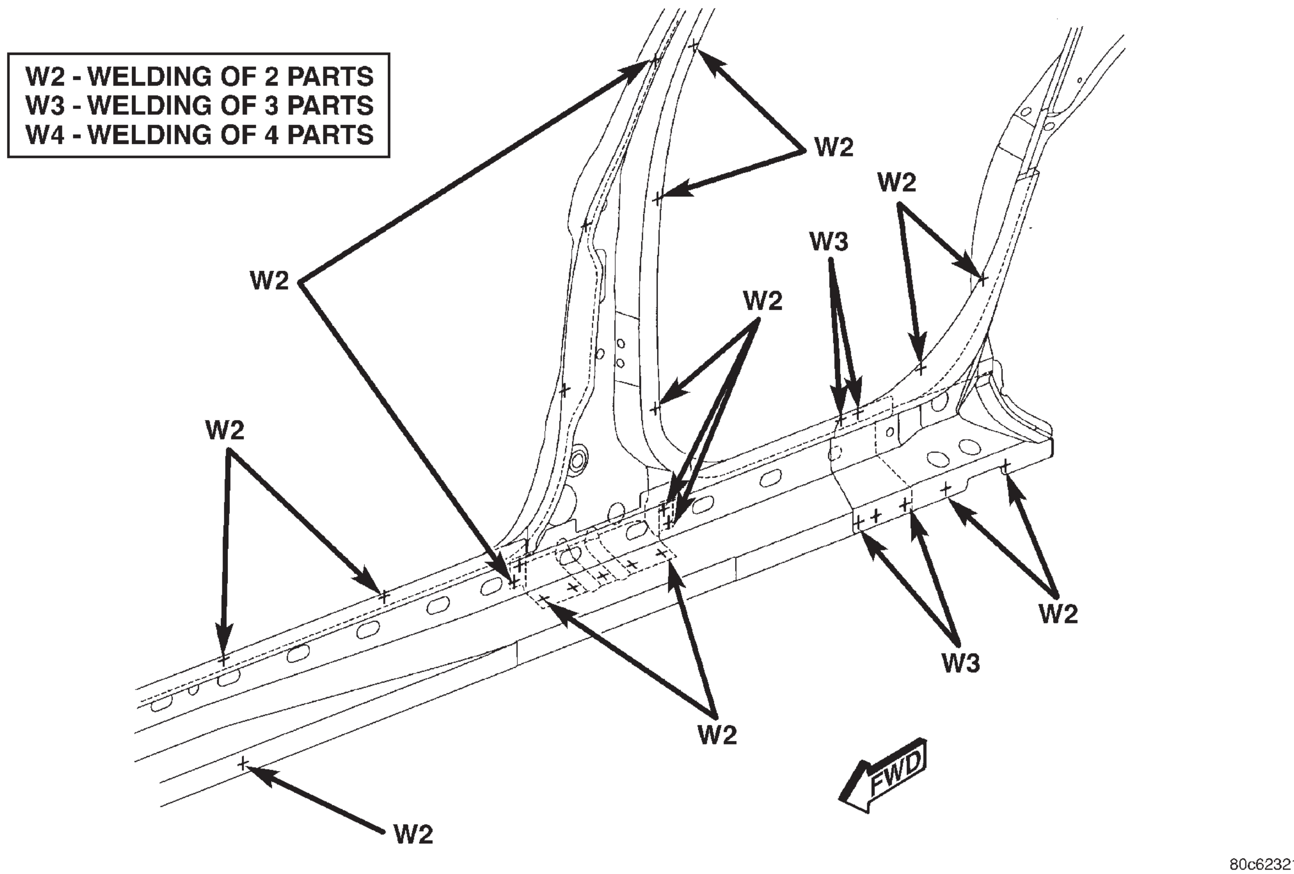

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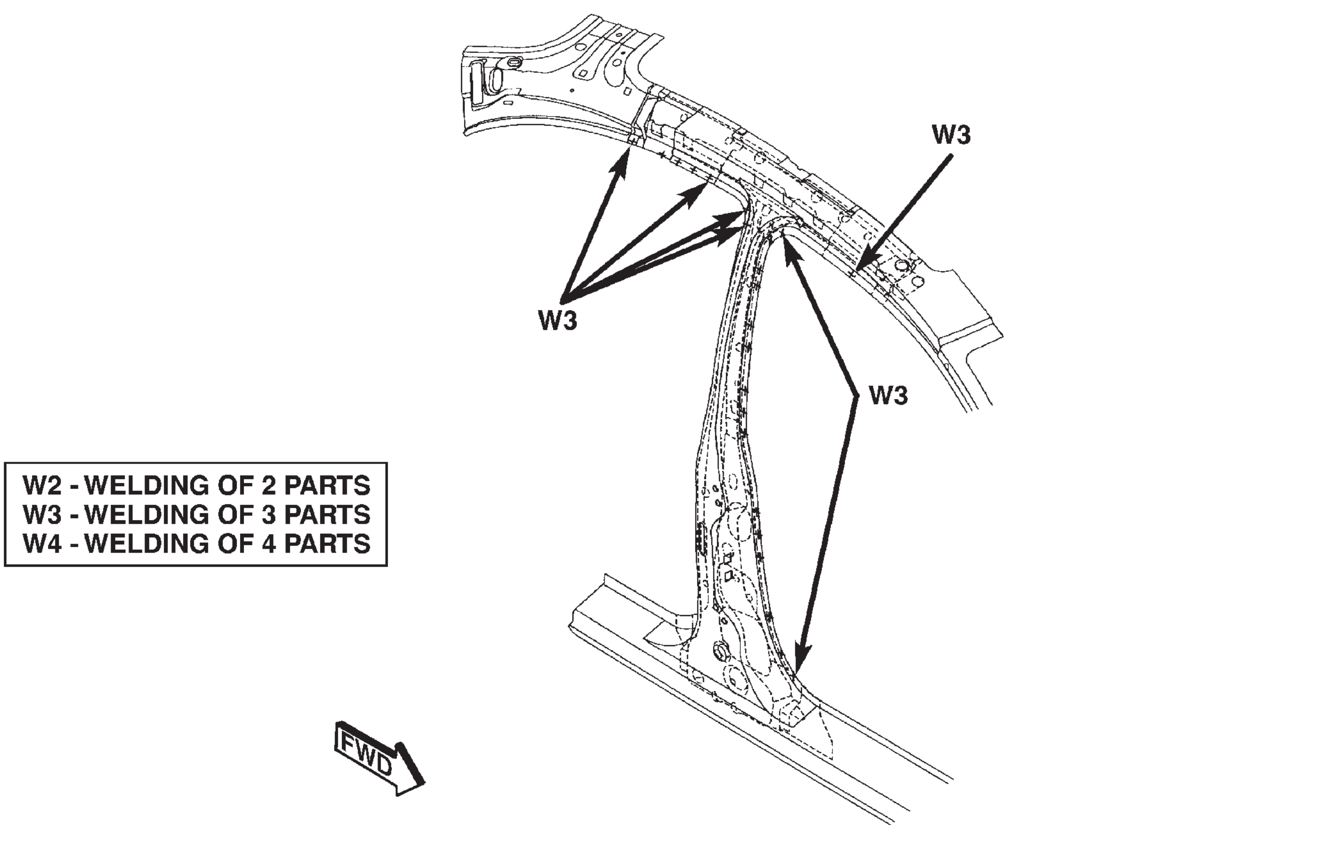

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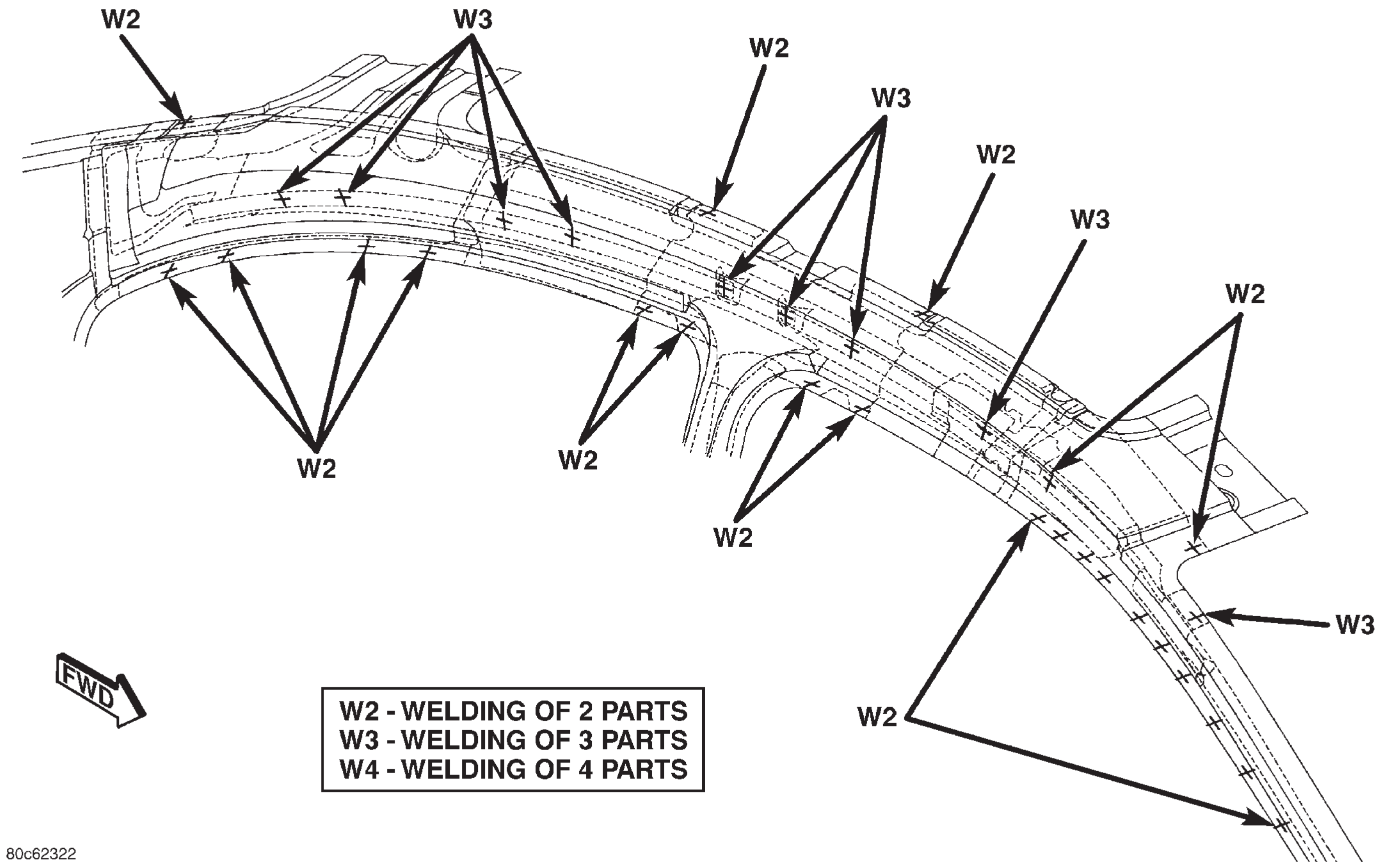

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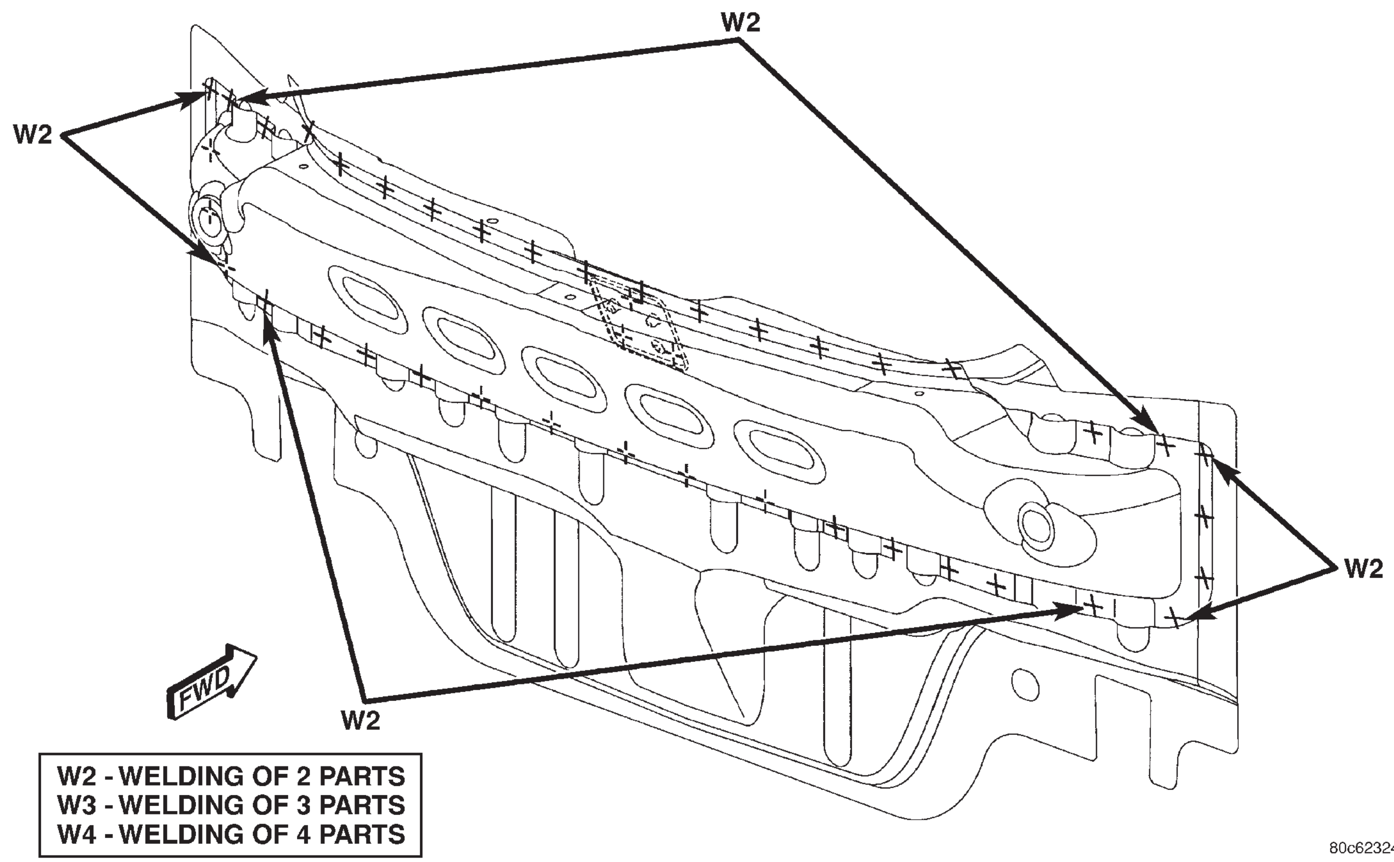

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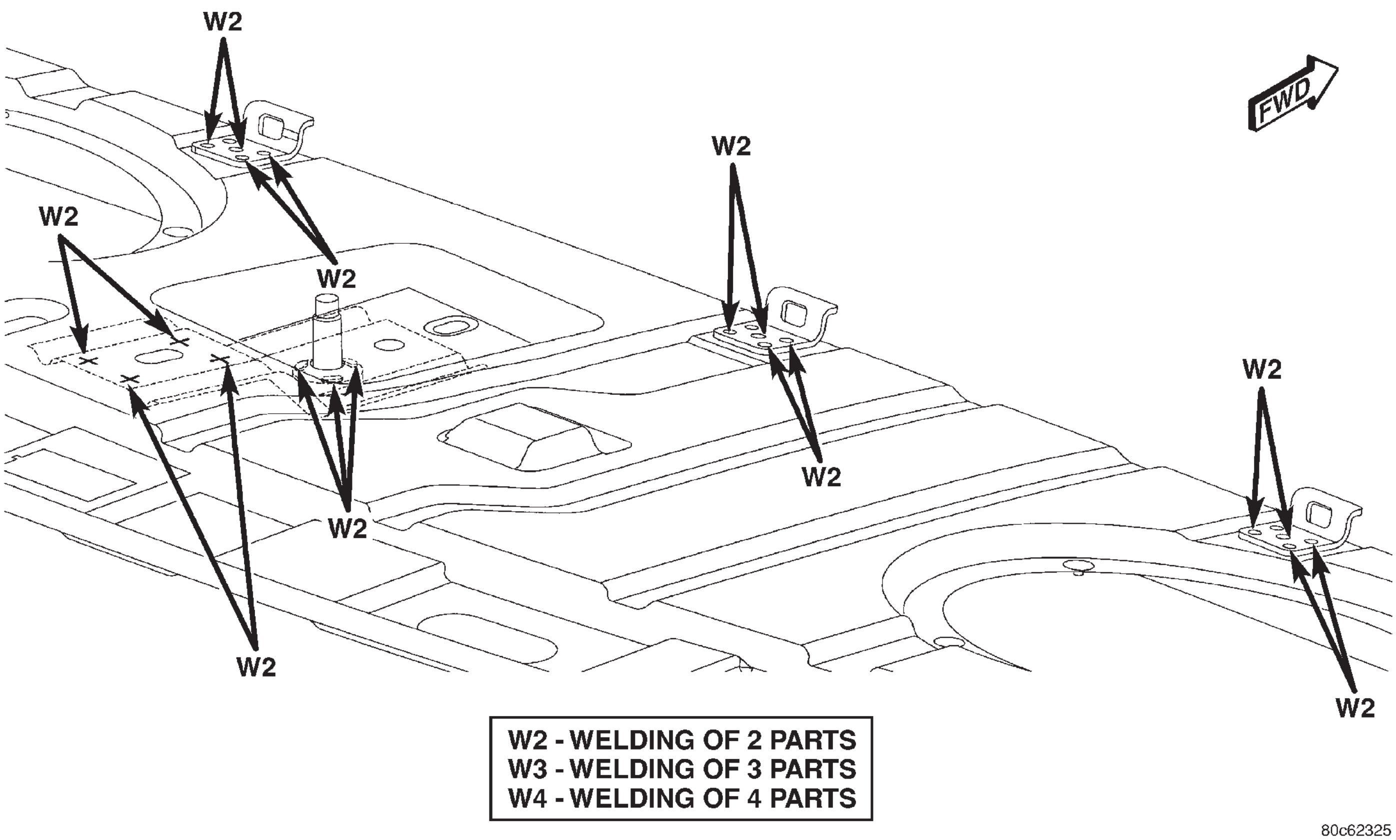

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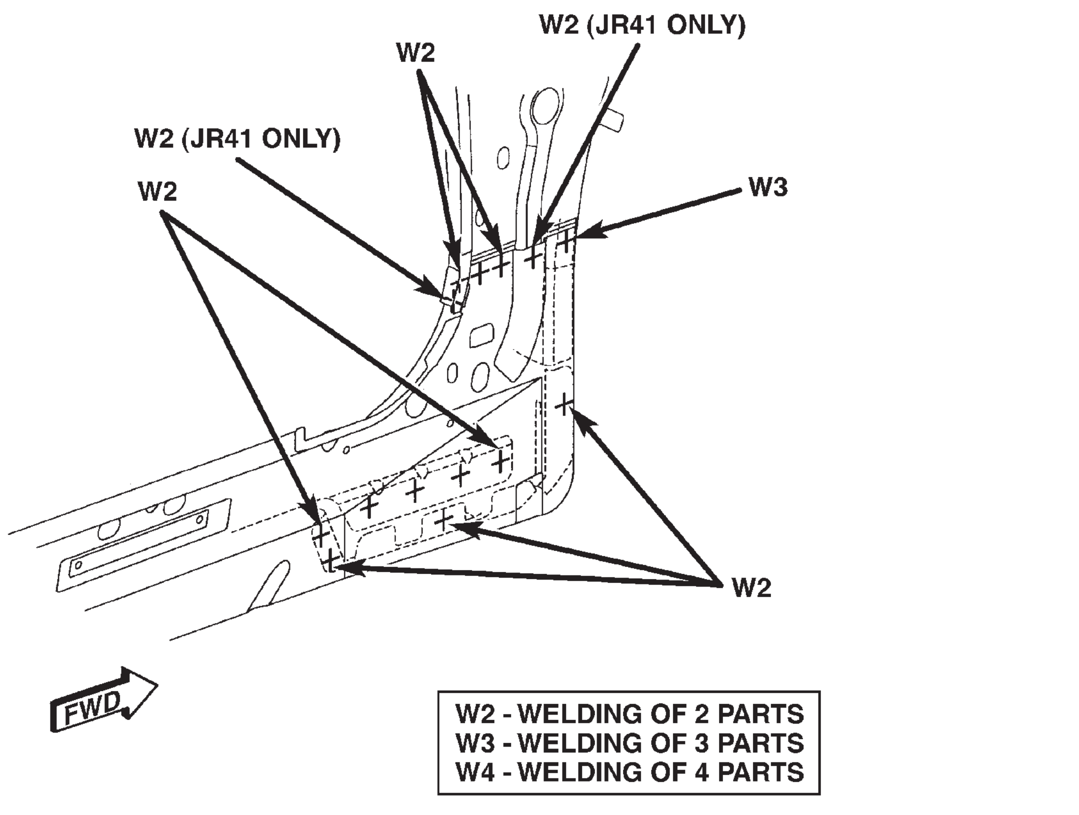

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WELD LOCATIONS (Continued)

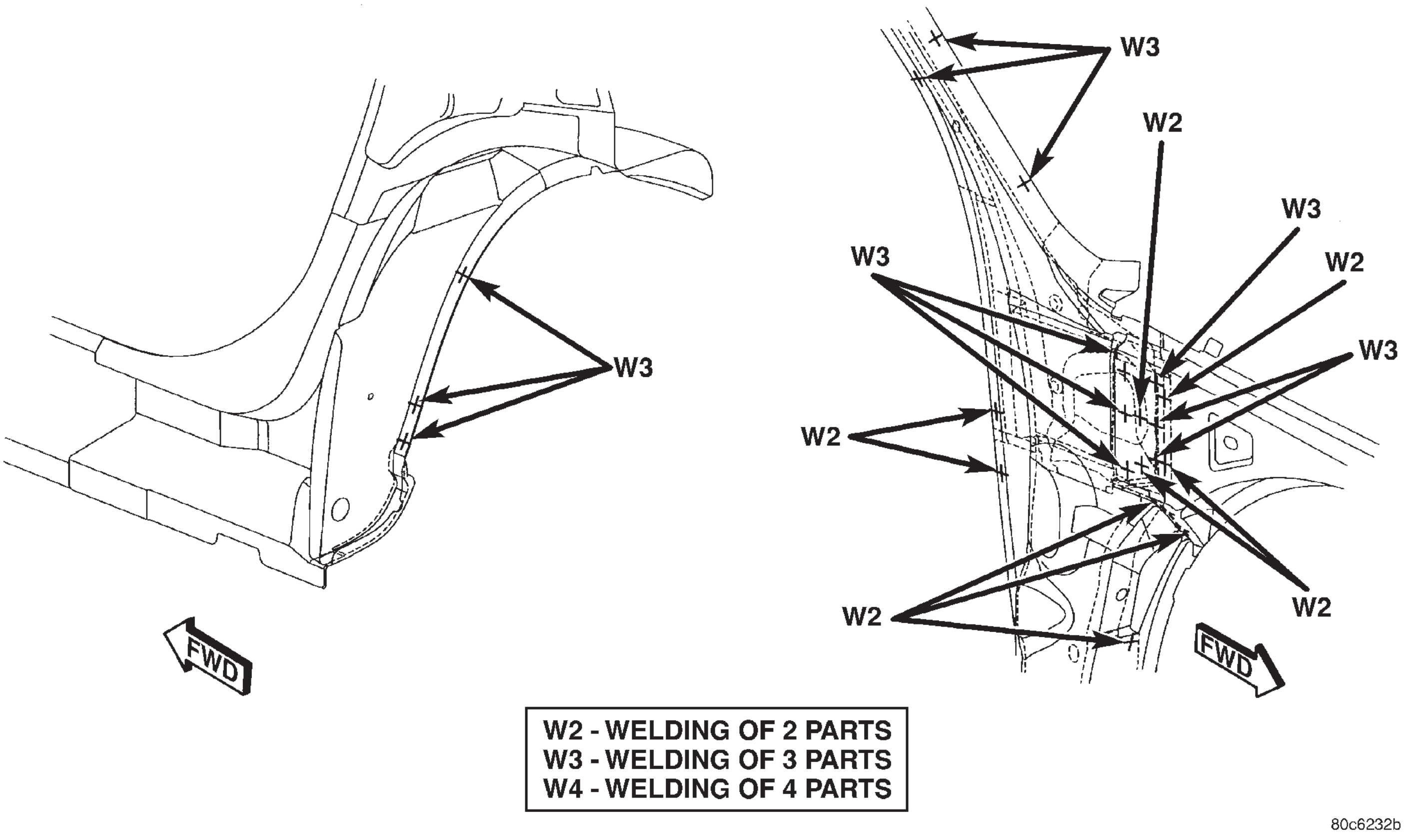

Fig. 202 INNER TO OUTER WINDSHIELD FRAME, OUTER LOAD BEAM & HINGE PILLAR REINFORCEMENT TO BODY SIDE APERTURE

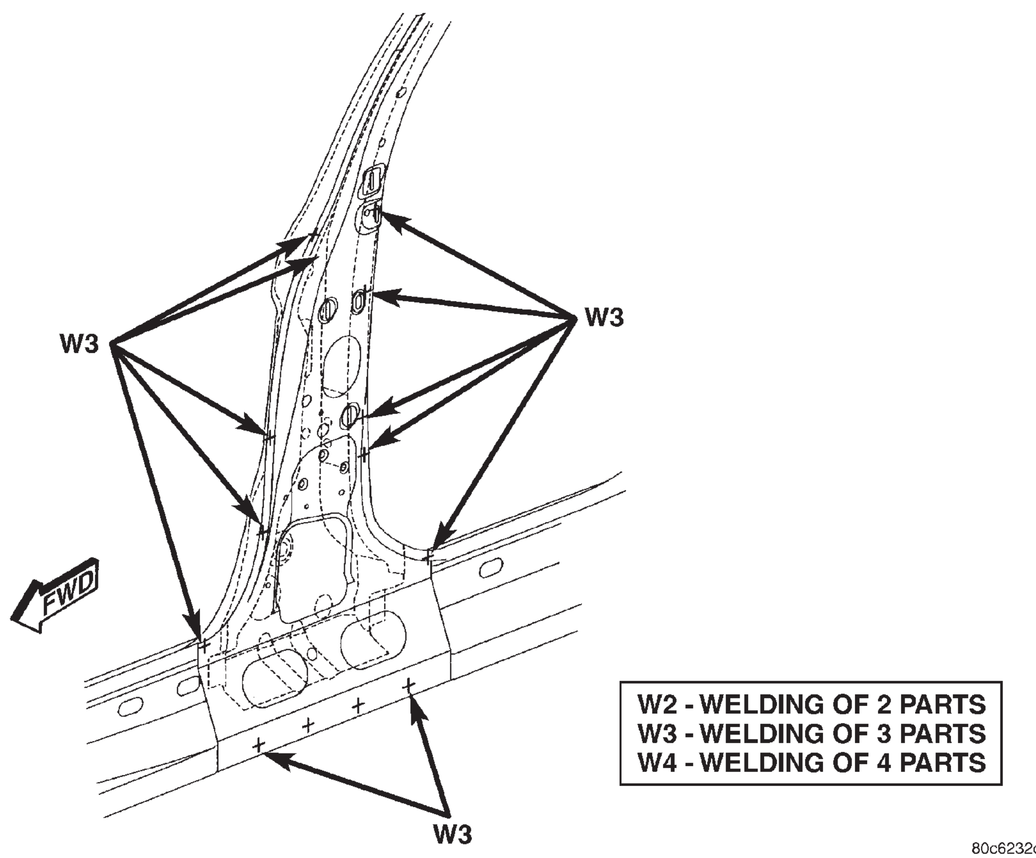

Fig. 203 CENTER PILLAR REINFORCEMENT TO INNER CENTER PILLAR TO BODY SIDE APERTURE

WELD LOCATIONS (Continued)

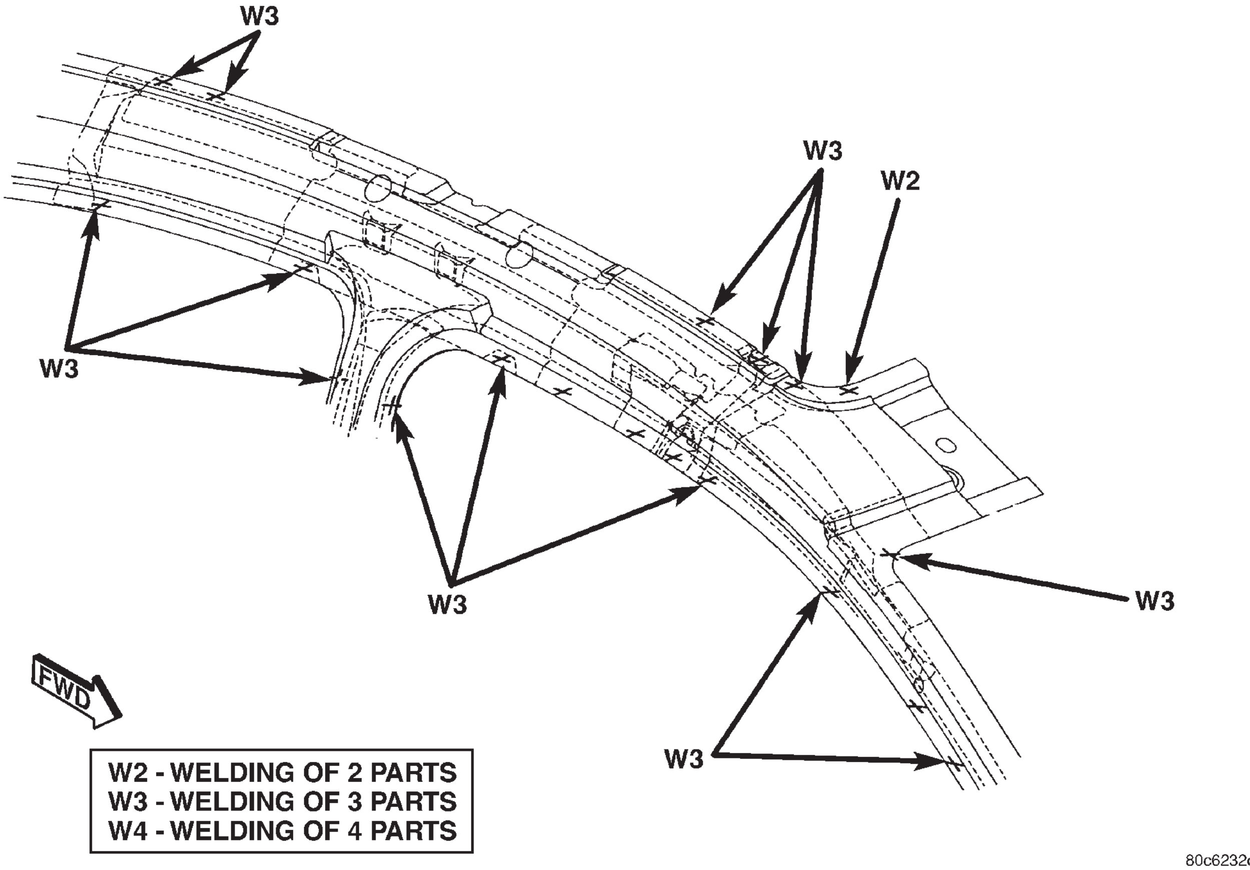

Fig. 204 INNER CENTER PILLAR, WINDSHIELD FRAME & INNER ROOF RAIL TO BODY SIDE APERTURE

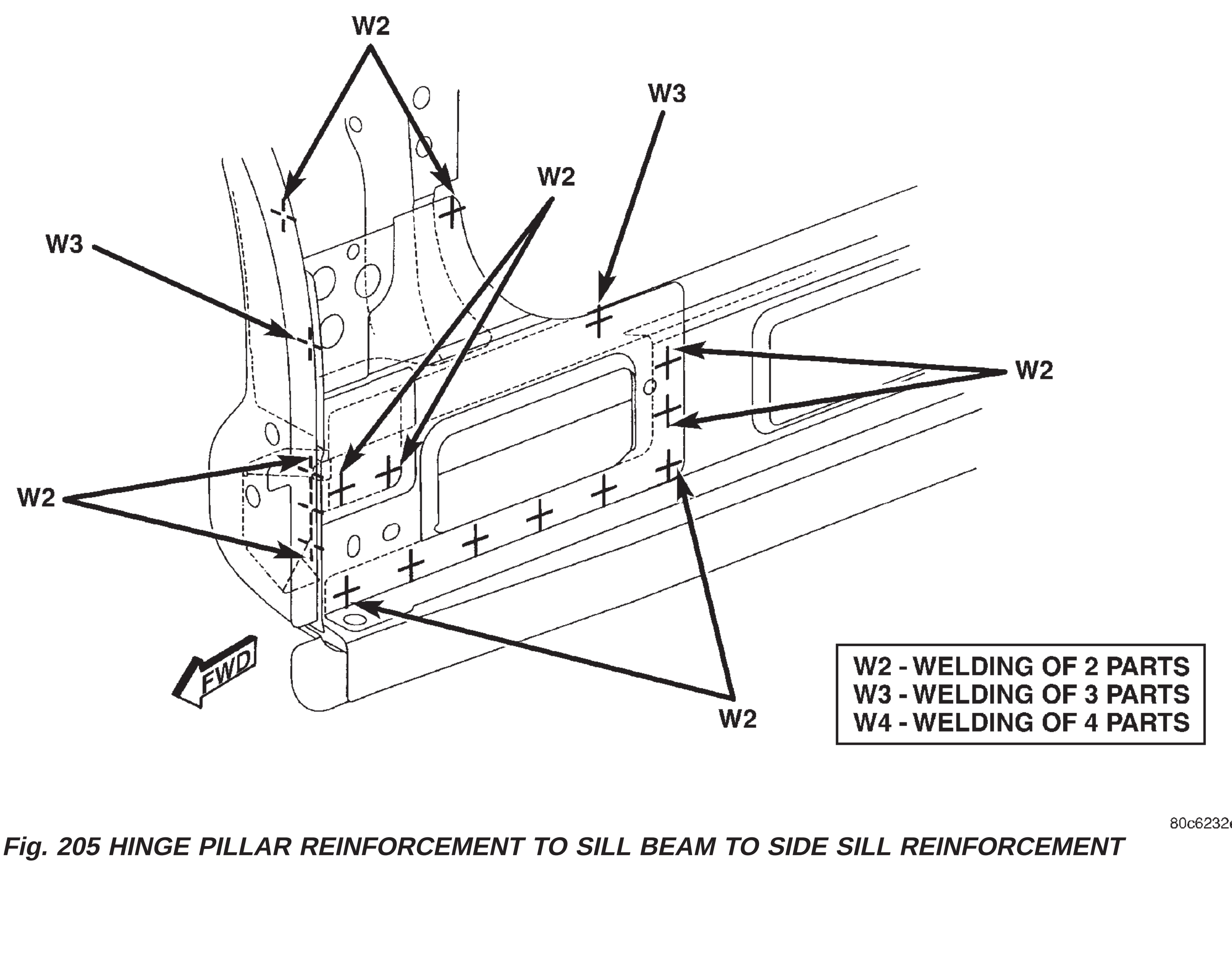

Fig. 205 HINGE PILLAR REINFORCEMENT TO SILL BEAM TO SIDE SILL REINFORCEMENT

WELD LOCATIONS (Continued)

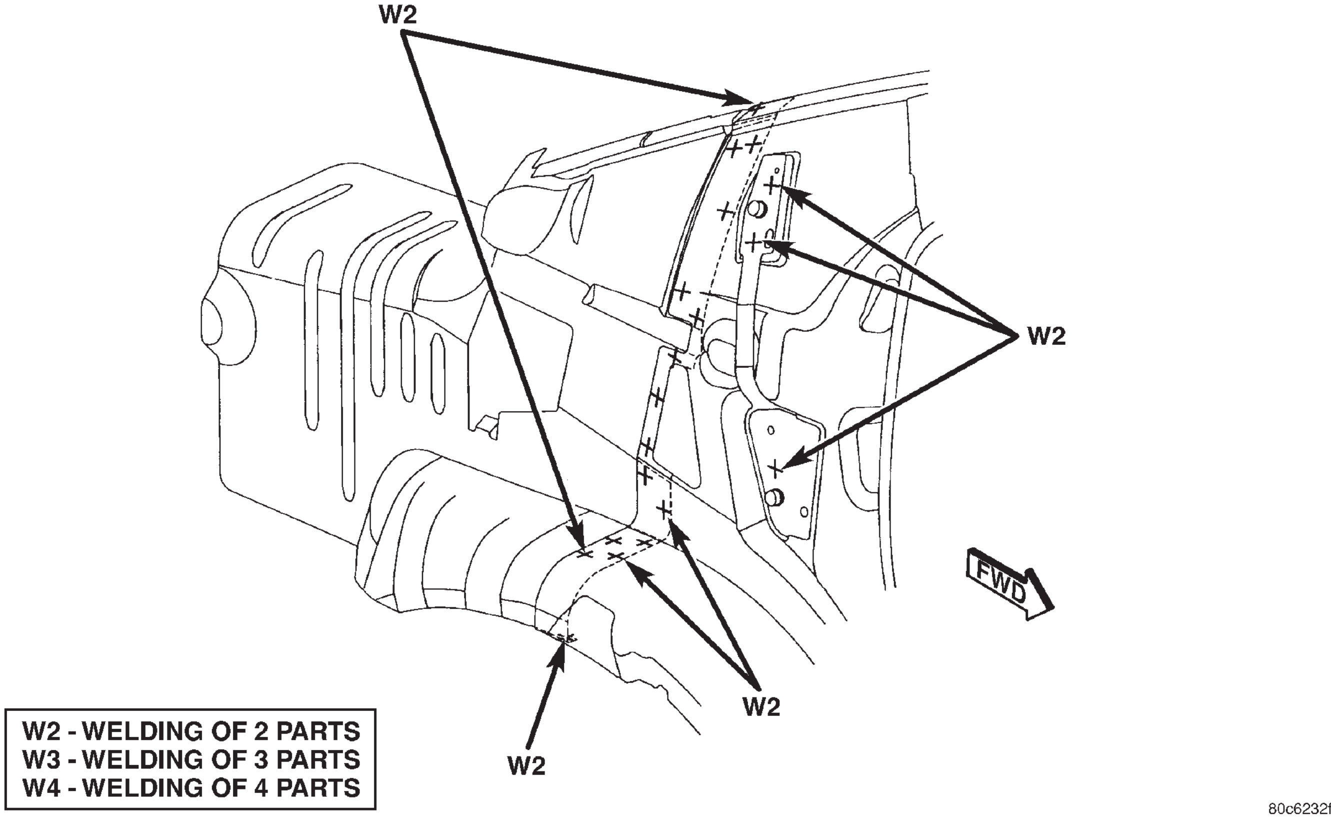

Fig. 206 OUTER REAR WHEELHOUSE & SEAT BELT ANCHOR REINFORCEMENT TO BODY SIDE APERTURE

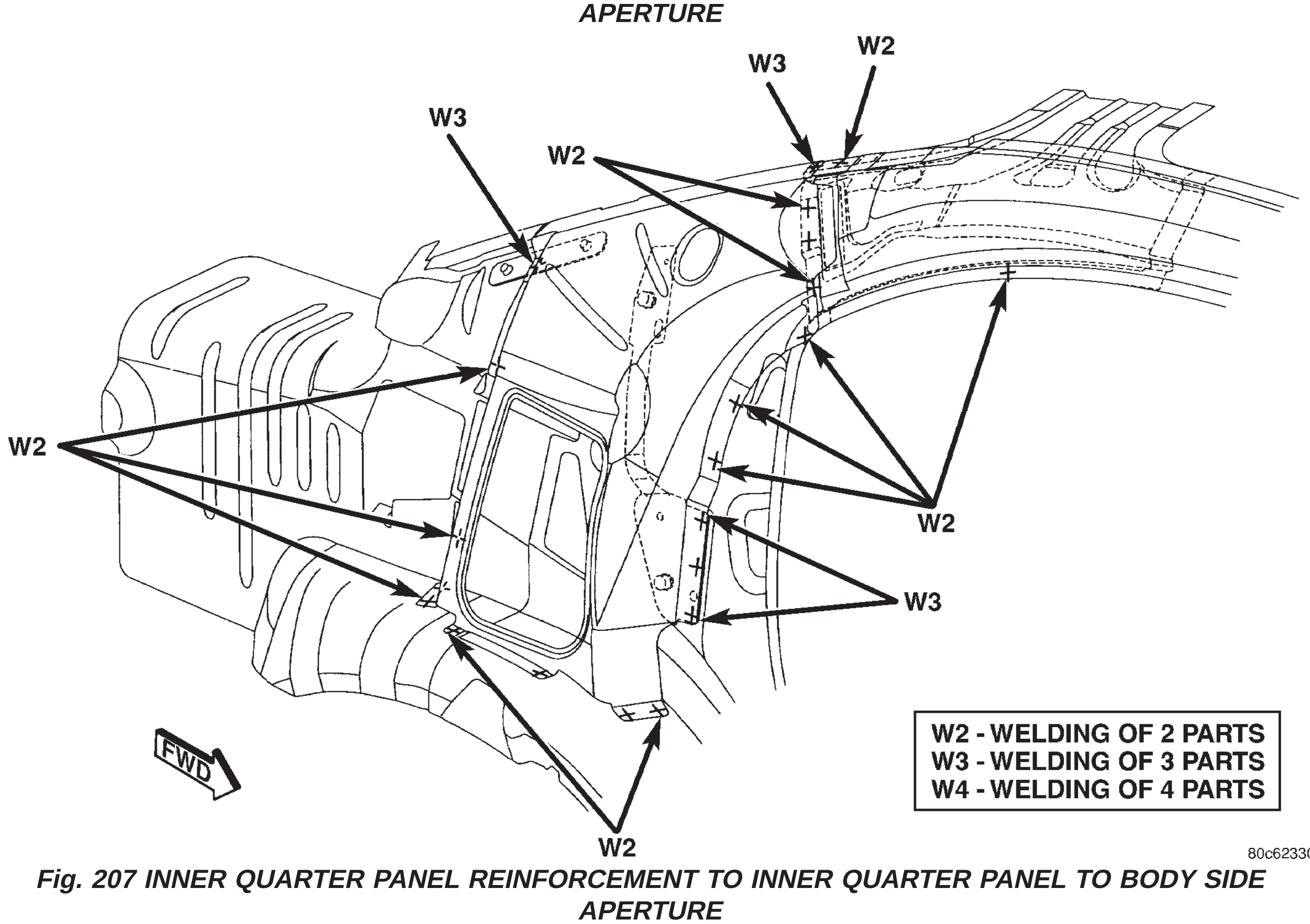

Fig. 207 INNER QUARTER PANEL REINFORCEMENT TO INNER QUARTER PANEL TO BODY SIDE APERTURE

WELD LOCATIONS (Continued)

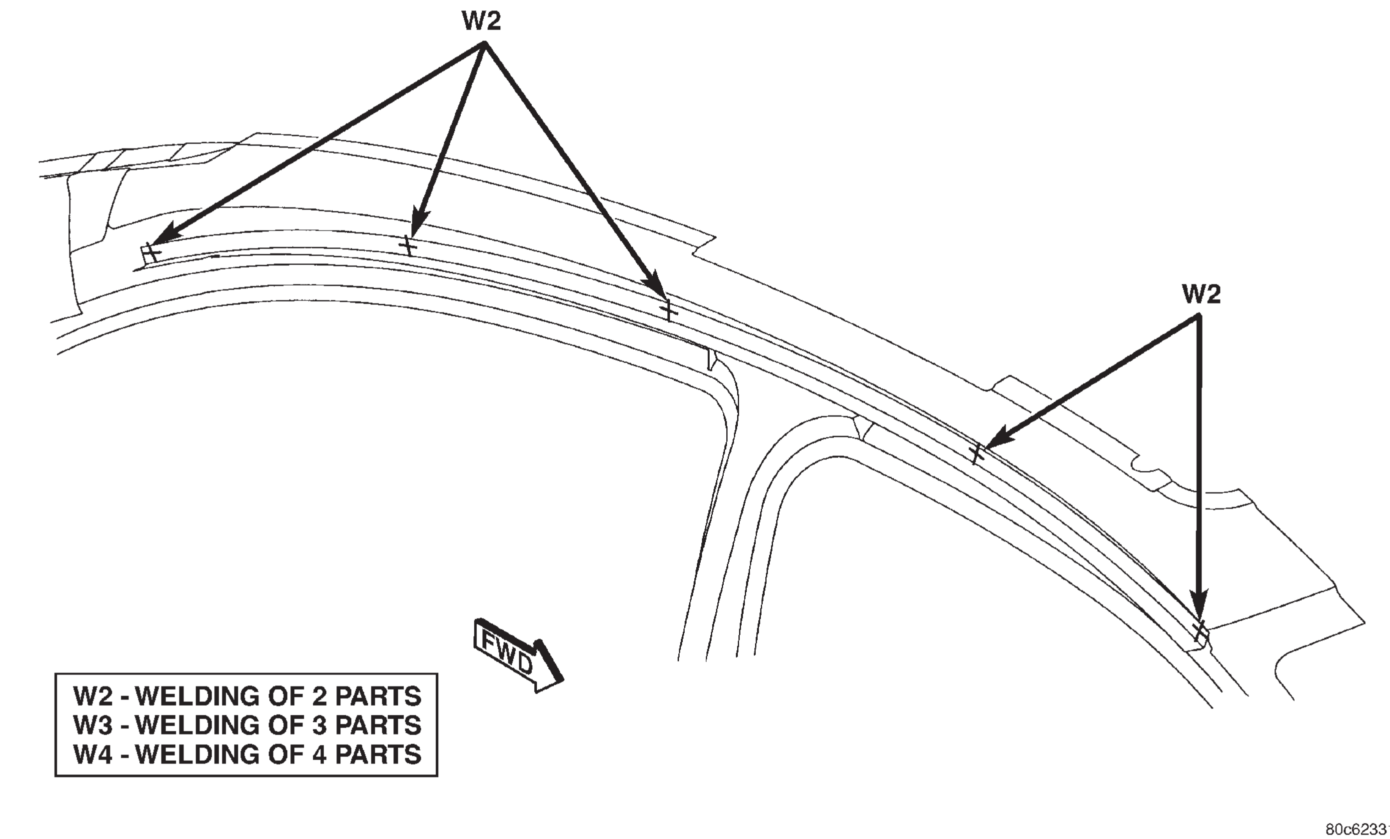

Fig. 208 DRIP RAIL/ROOF SUPPORT TO BODY SIDE APERTURE

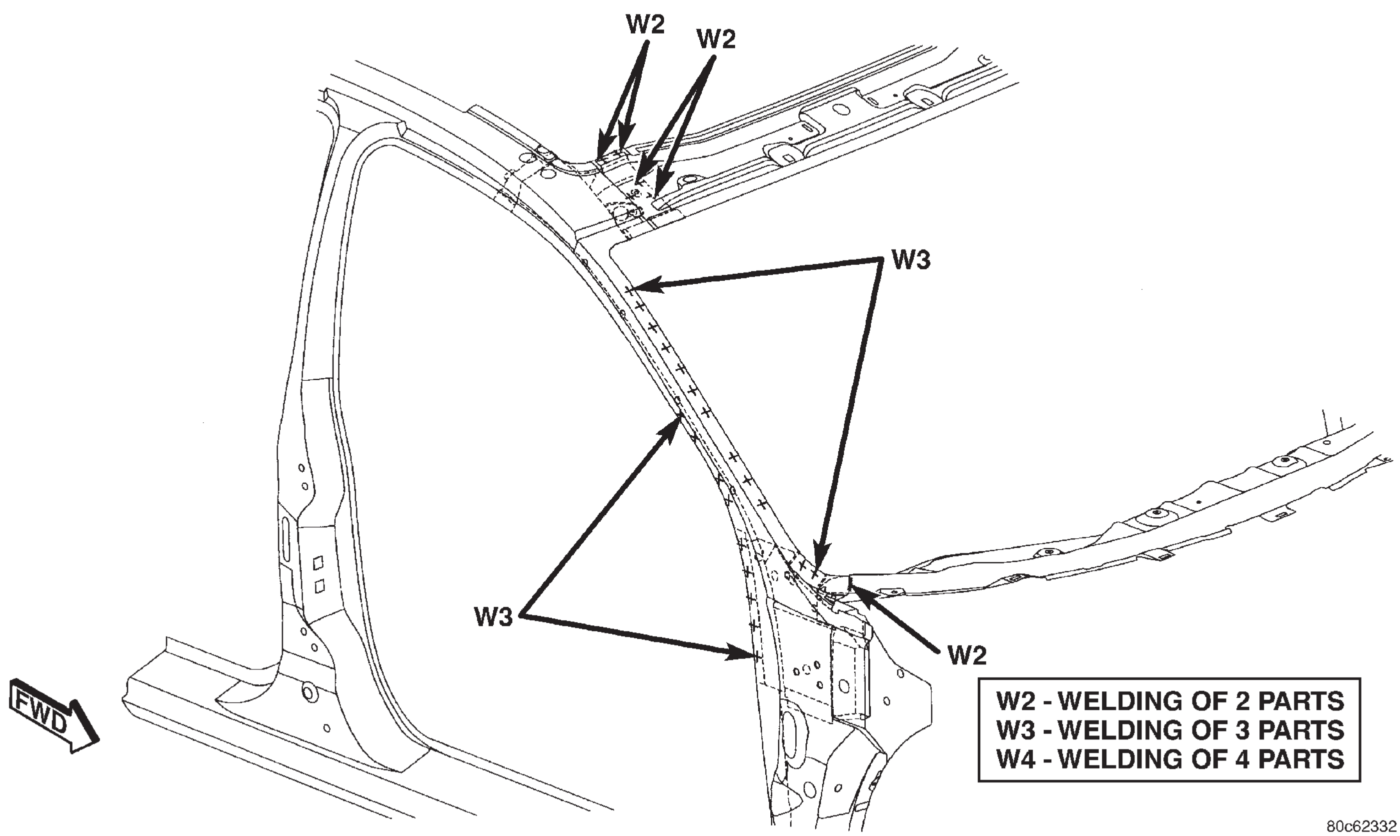

Fig. 209 OUTER WINDSHIELD FRAME TO INNER WINDSHIELD FRAME TO COWL SIDE PANEL

WELD LOCATIONS (Continued)

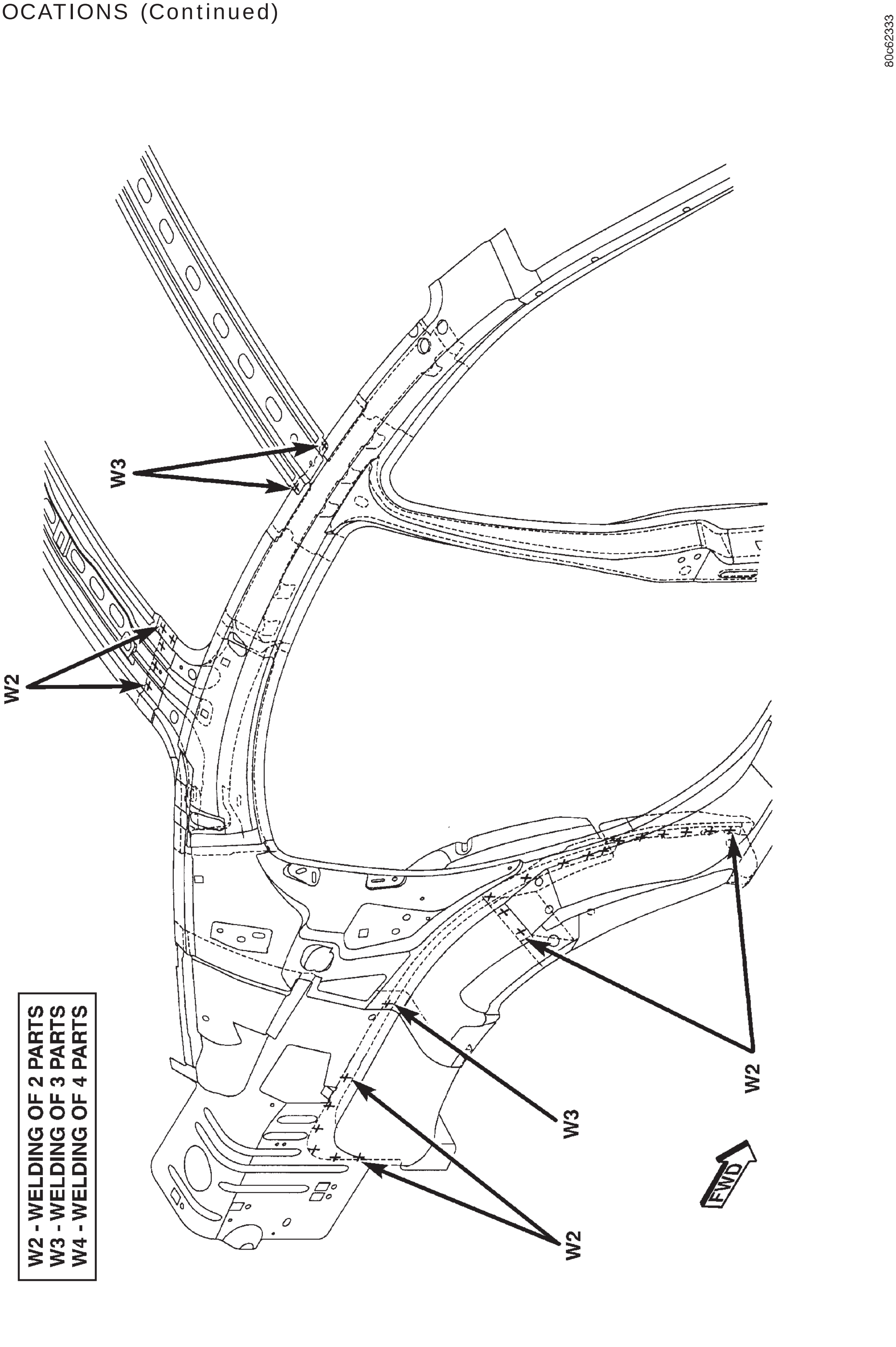

Fig. 210 OUTER REAR WHEELHOUSE & REAR SILL TO BODY SIDE APERTURE ROOF BOWS TO CENTER PILLAR REINFORCEMENT

WELD LOCATIONS (Continued)

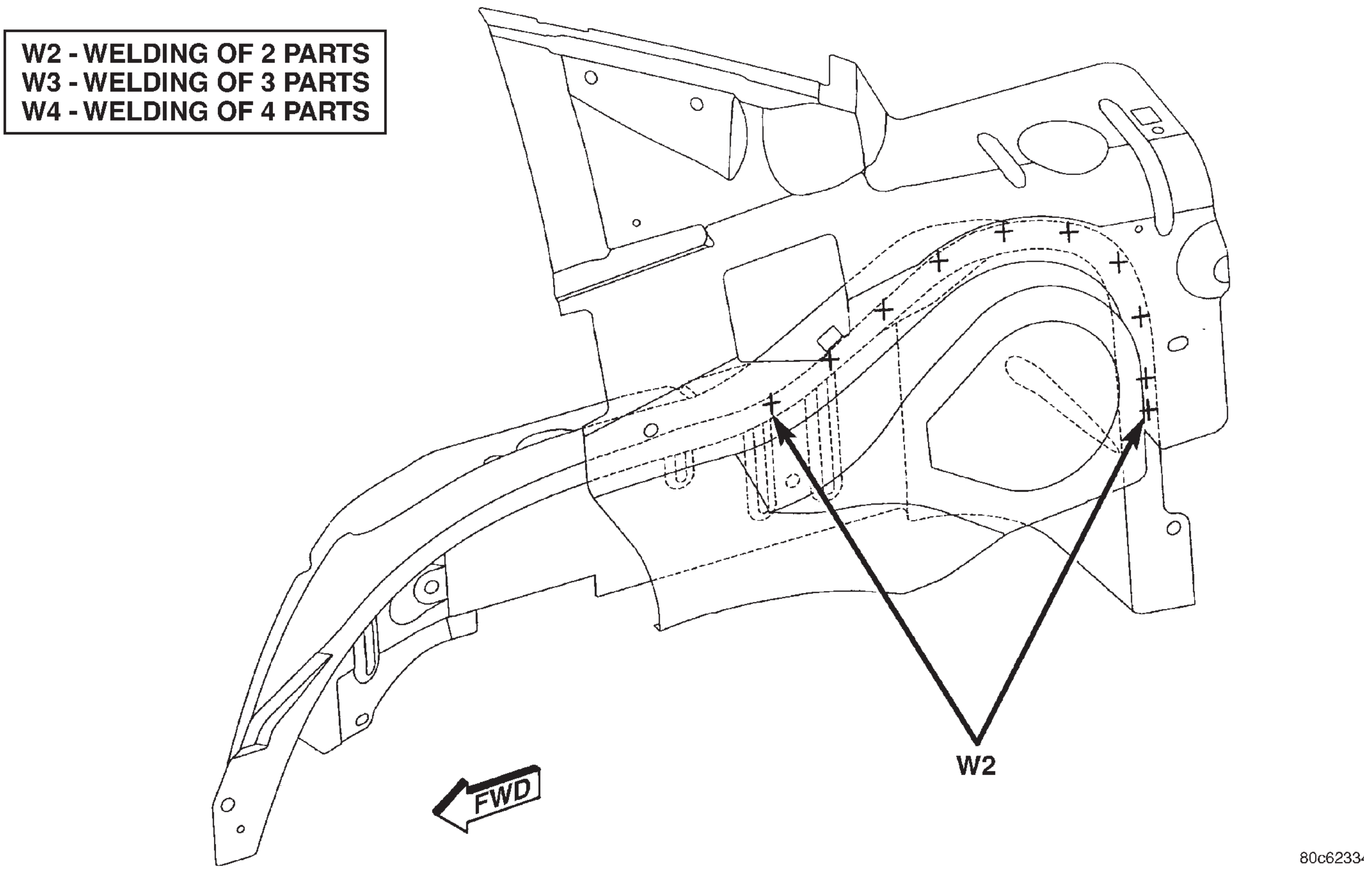

Fig. 211 REAR INNER WHEELHOUSE TO REAR OUTER WHEELHOUSE

WELD LOCATIONS (Continued)

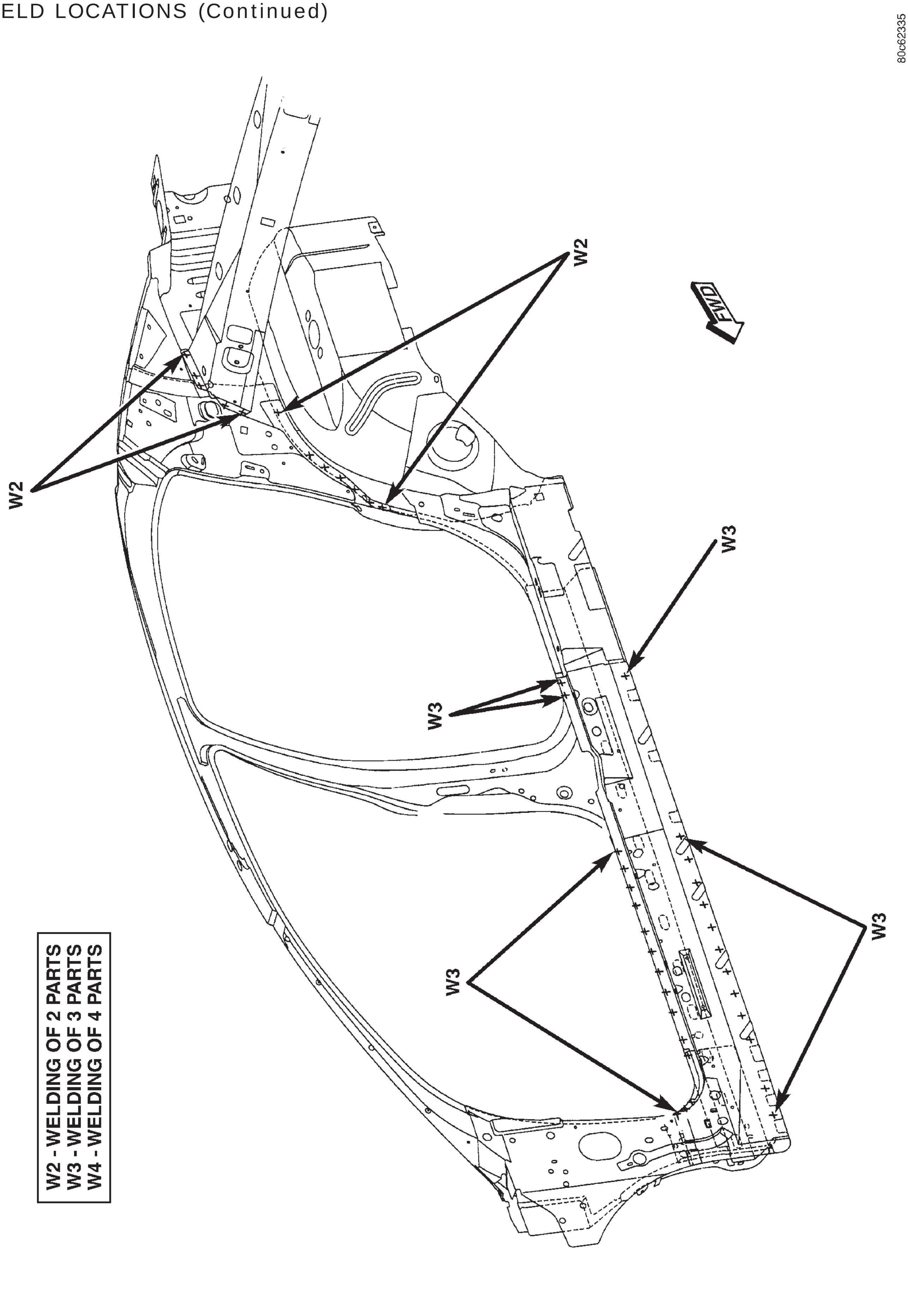

Fig. 212 INNER BODY SILL TO HINGE PILLAR REINFORCEMENT TO SILL BEAM TO BODY SIDE APERTURE

WELD LOCATIONS (Continued)

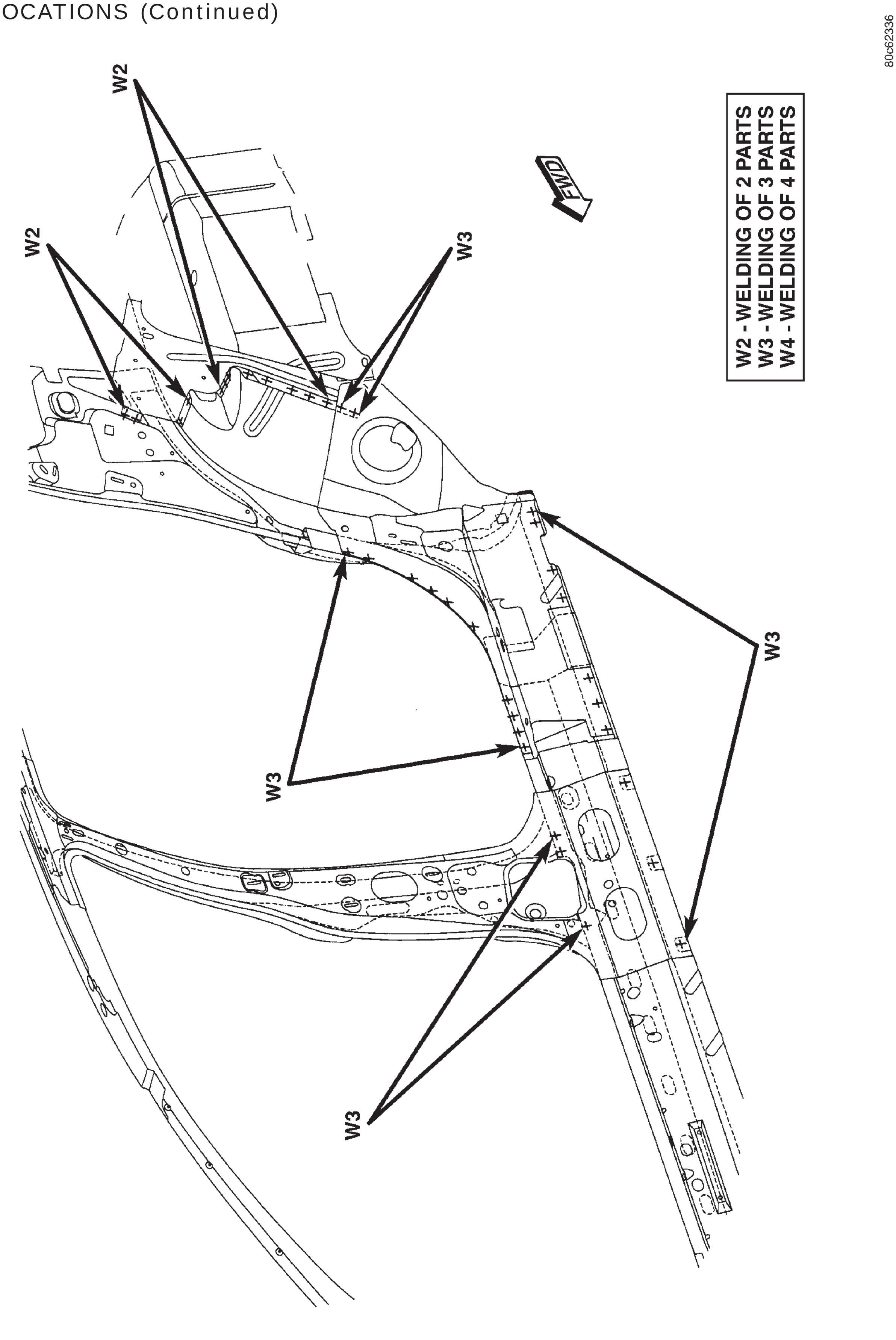

Fig. 213 INNER SILL EXTENSION TO SIDE SILL REINFORCEMENT TO BODY SIDE APERTURE & INNER REAR WHEELHOUSE

WELD LOCATIONS (Continued)

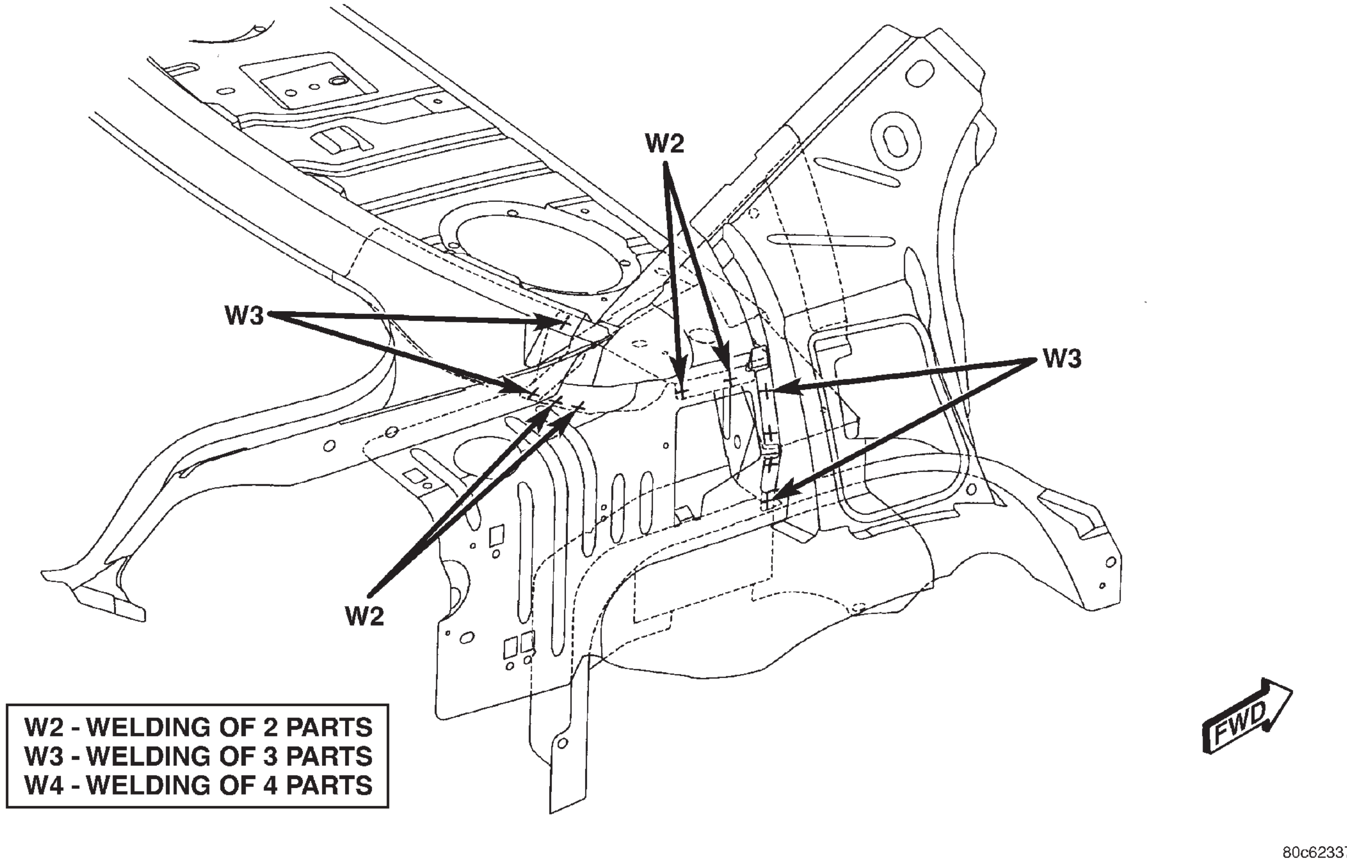

Fig. 214 REAR SHELF SUPPORT TO WHEELHOUSE TO REAR OUTER WHEELHOUSE

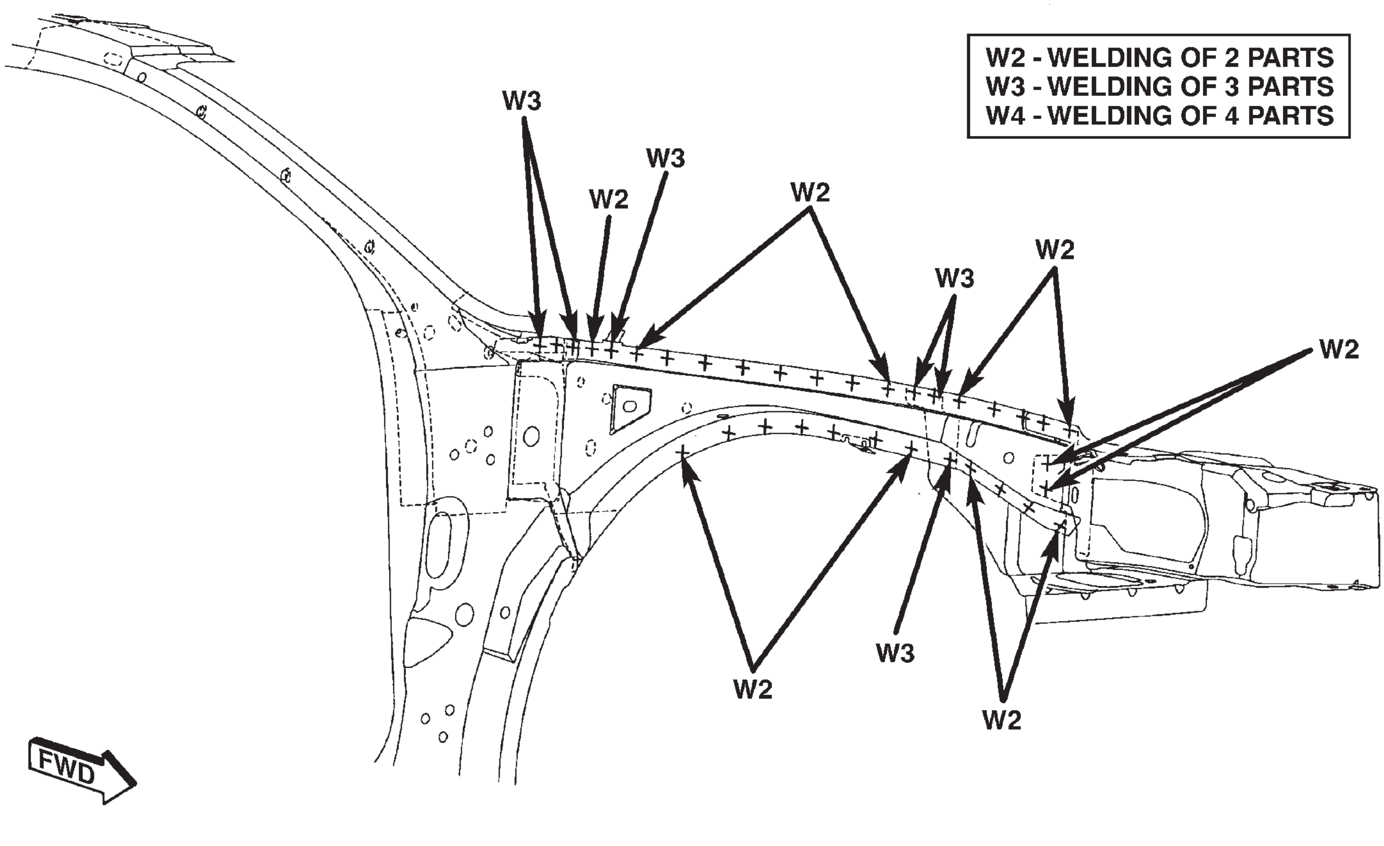

Fig. 215 UPPER OUTER LOAD BEAM TO UPPER INNER LOAD BEAM TO BODY SIDE APERTURE

WELD LOCATIONS (Continued)

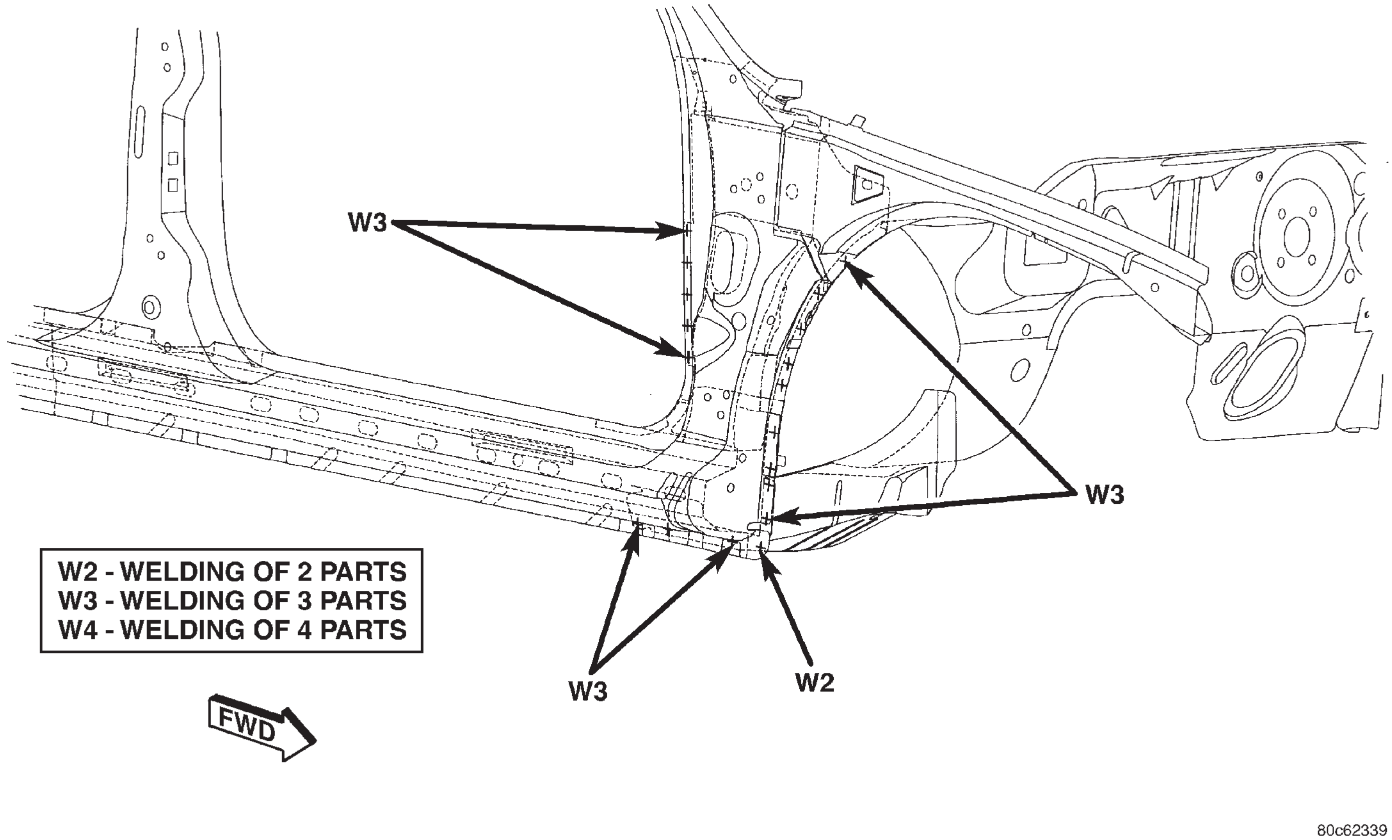

Fig. 216 INNER BODY SIDE SILL TO COWL SIDE PANEL TO BODY SIDE APERTURE TO DASH PANEL

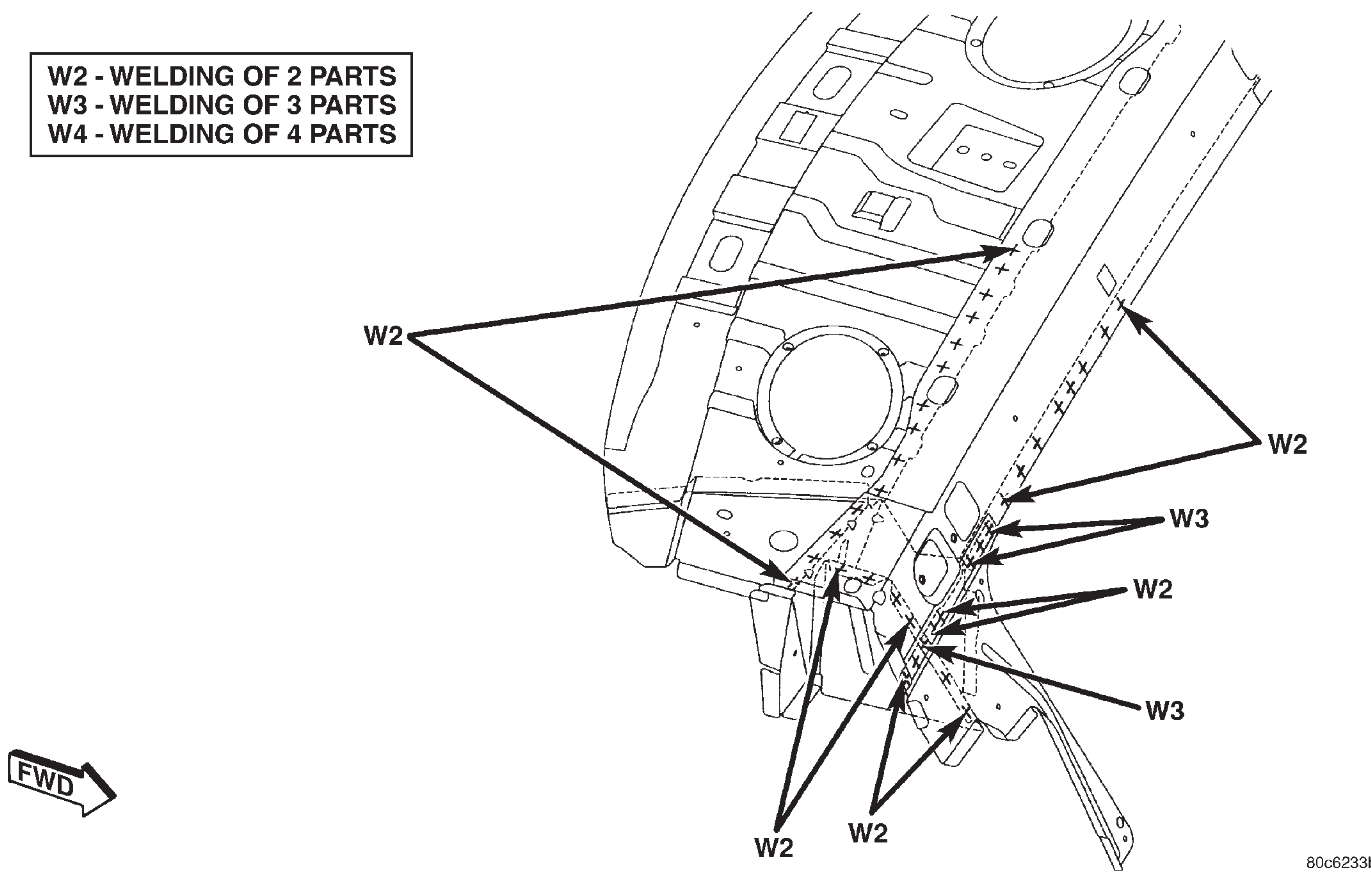

Fig. 217 REAR SHELF PANEL SUPPORTS TO WHEELHOUSE TO SHELF PANEL REINFORCEMENT

WELD LOCATIONS (Continued)

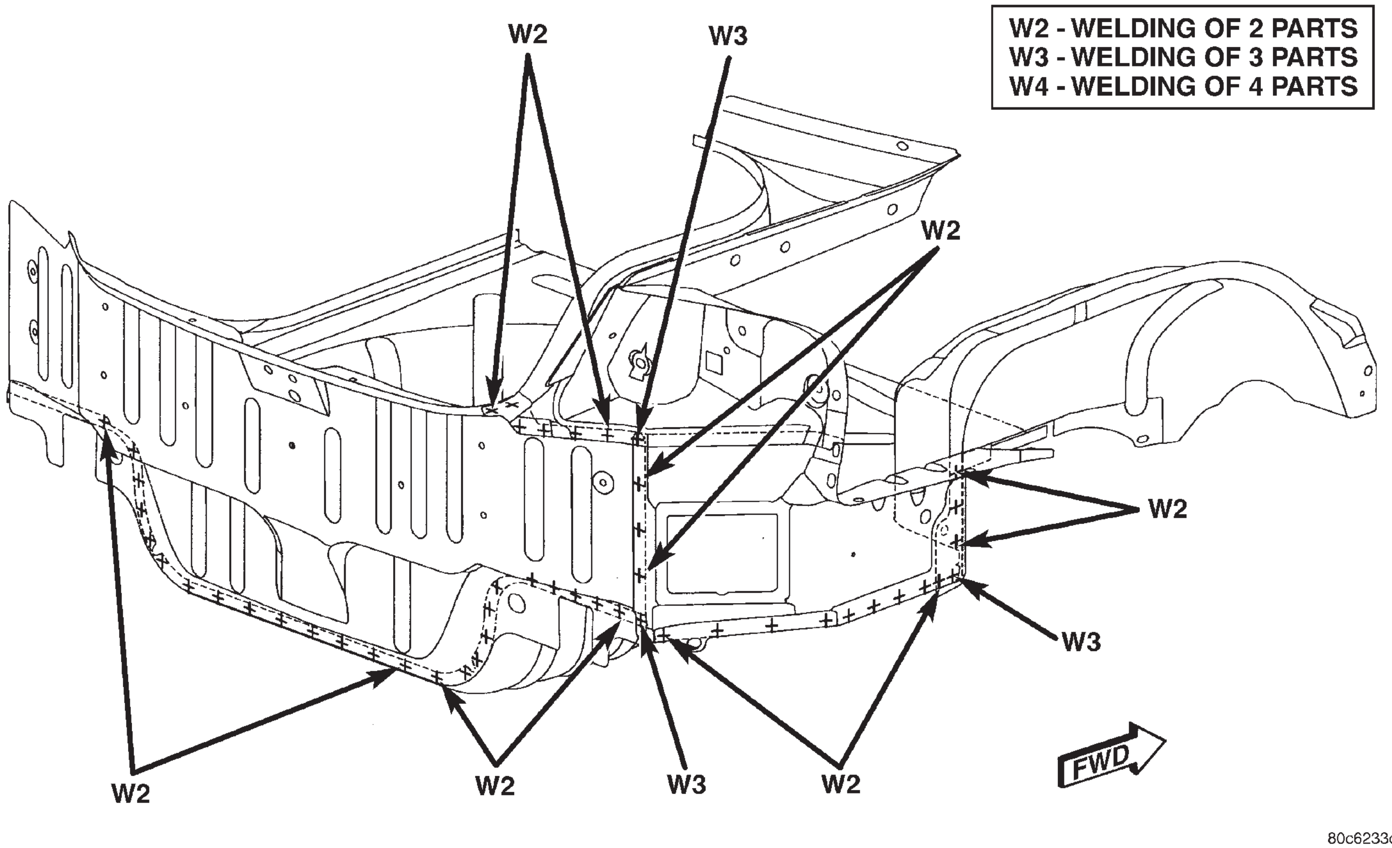

Fig. 218 LOWER DECK OPENING PANEL TO QUARTER EXTENSION TO REAR FLOOR PAN

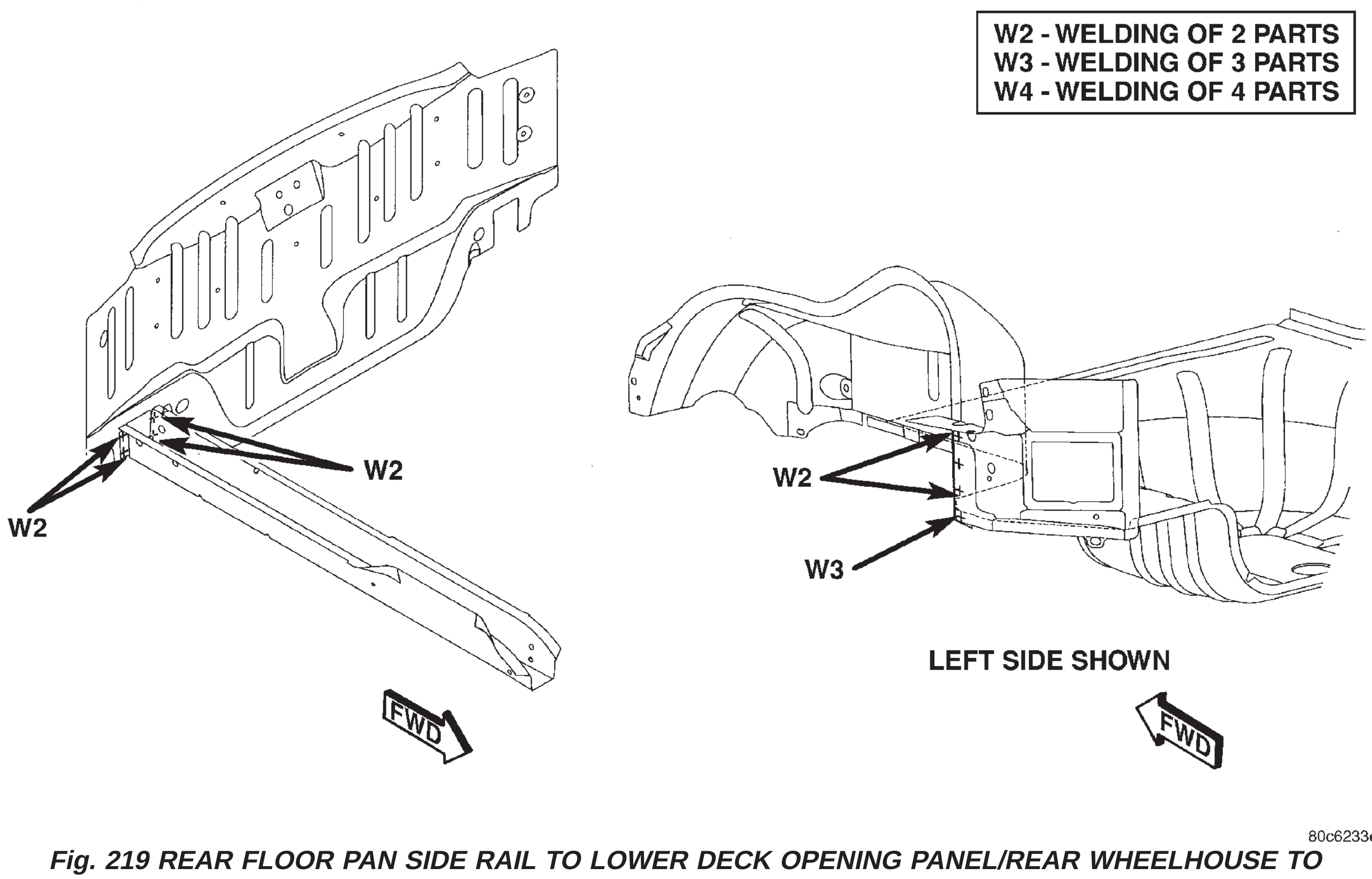

Fig. 219 REAR FLOOR PAN SIDE RAIL TO LOWER DECK OPENING PANEL/REAR WHEELHOUSE TO QUARTER EXTENSION TO REAR FLOOR PAN

WELD LOCATIONS (Continued)

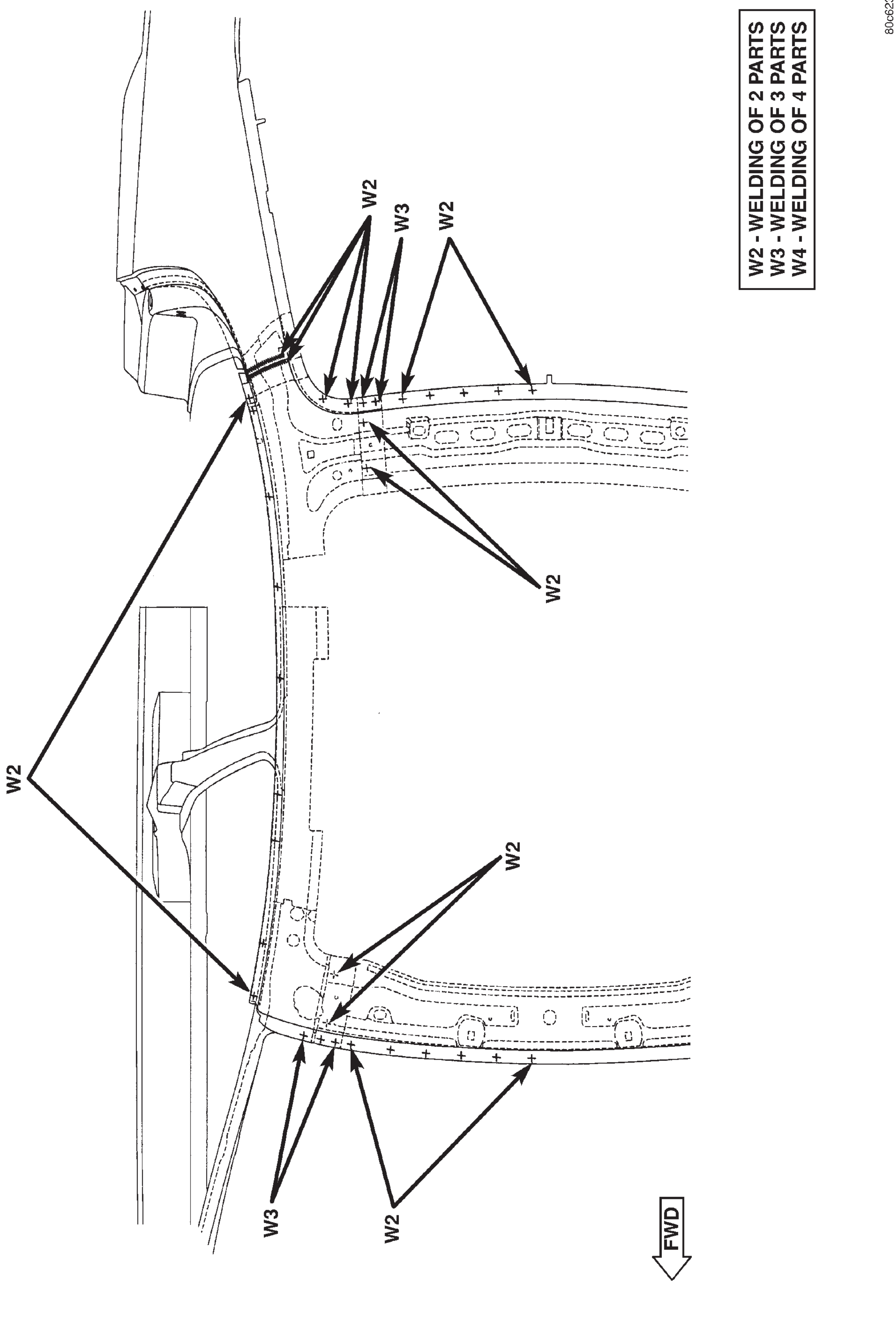

Fig. 220 INNER WINDSHIELD FRAME TO WINDSHIELD FRAME & REAR WINDOW FRAME TO UPPER INNER QUARTER PANEL TO OUTER ROOF PANEL

WELD LOCATIONS (Continued)

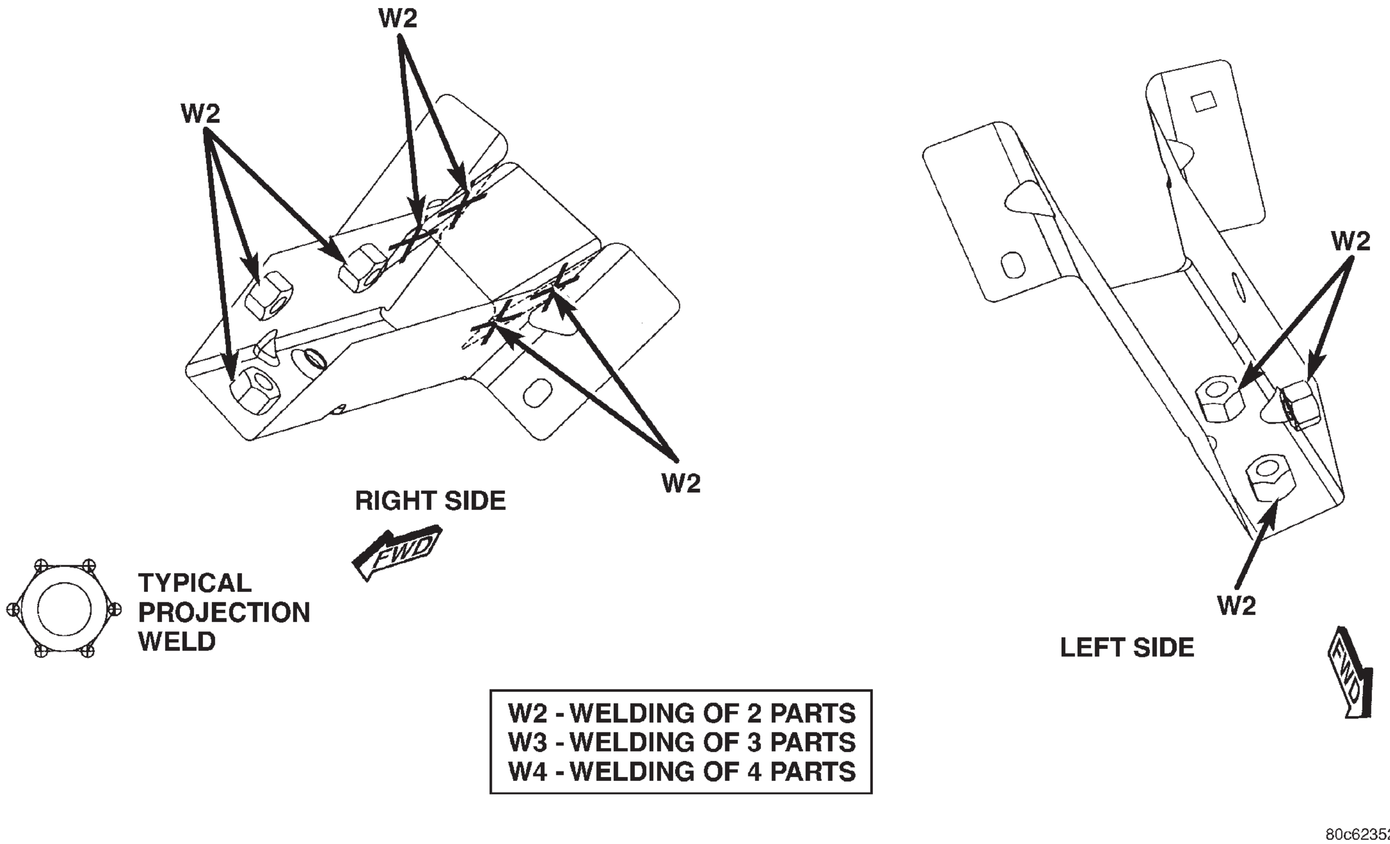

Fig. 221 REAR BUMPER ATTACHING REINFORCEMENT TO REAR RAIL BUMPER ATTACHING BRACKET

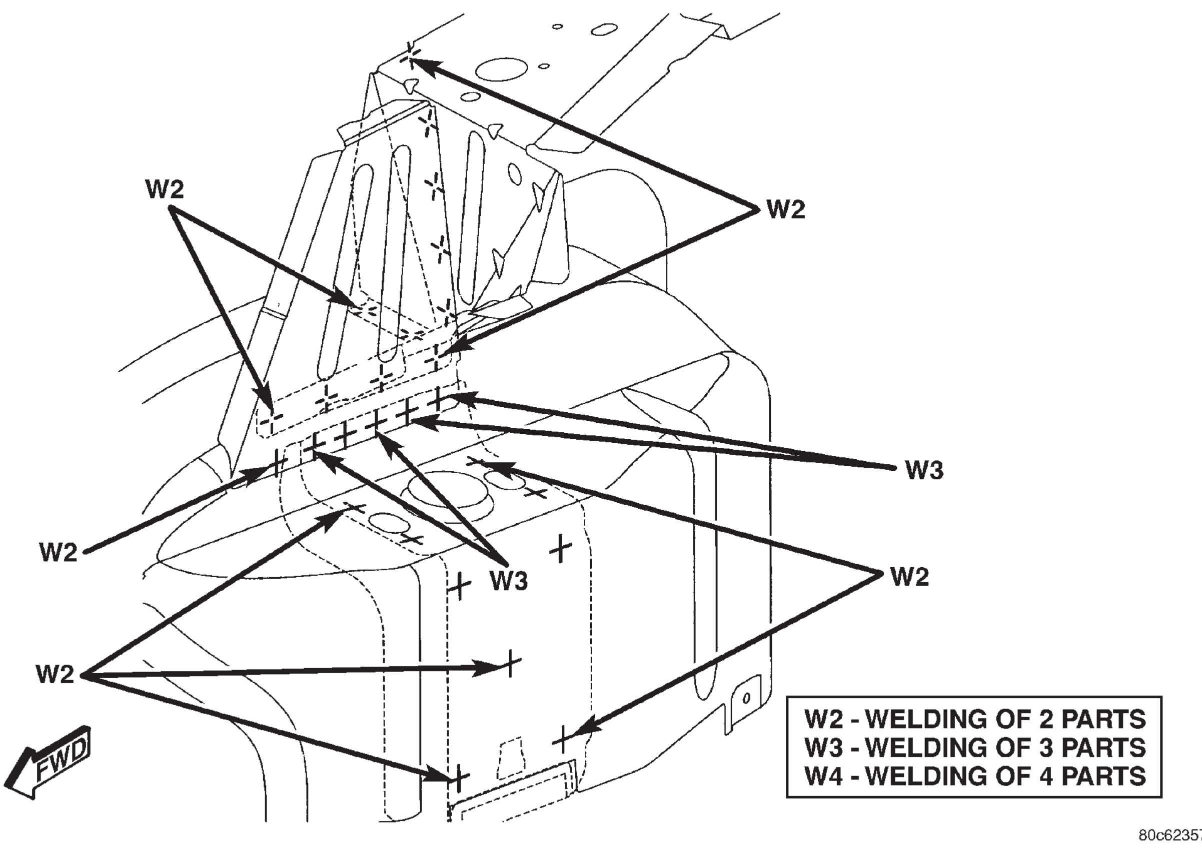

Fig. 222 REAR SHELF PANEL SUPPORT TO REINFORCEMENT TO INNER REAR WHEELHOUSE TO REAR SHOCK MOUNTING BRACKET

WELD LOCATIONS (Continued)

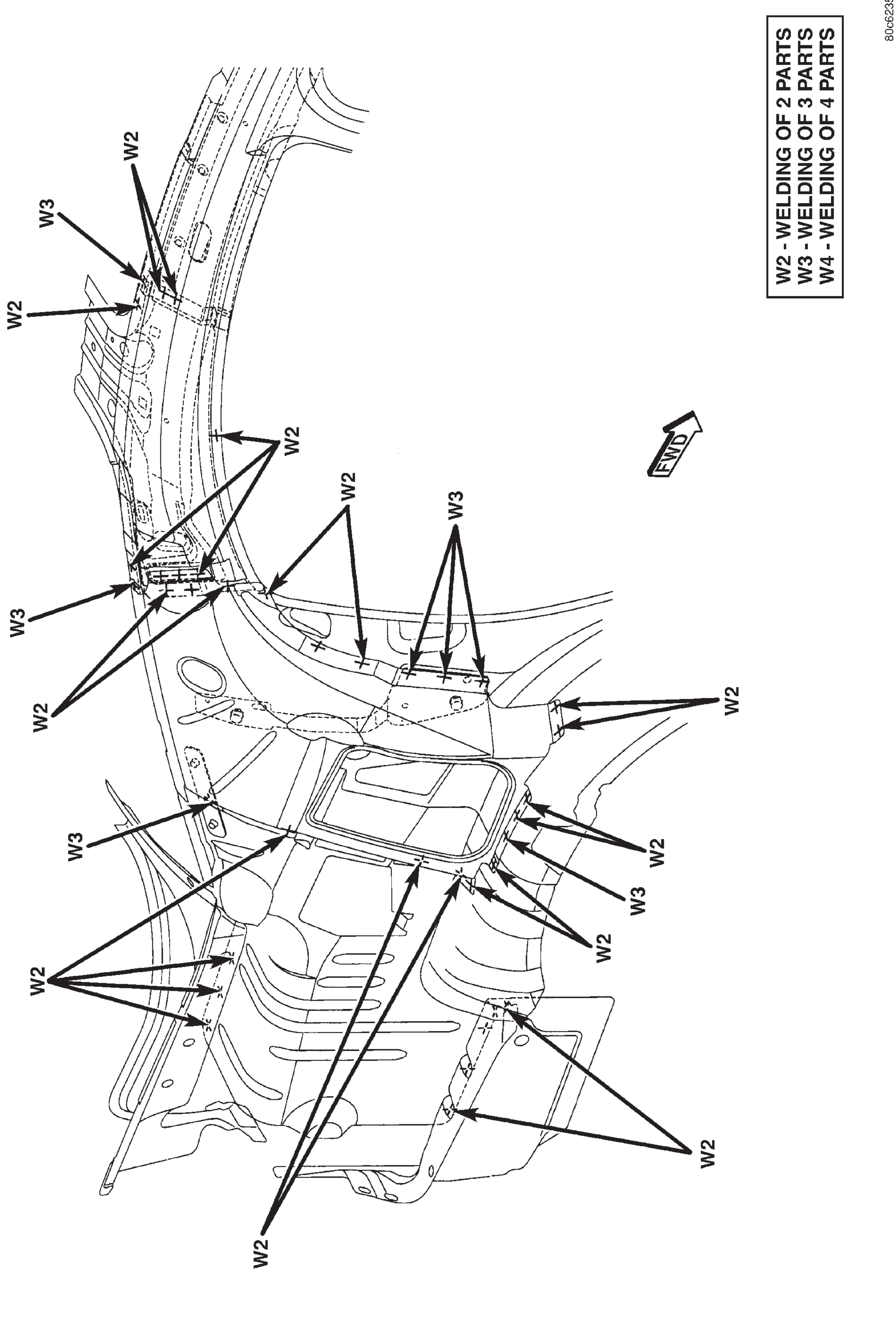

Fig. 223 INNER UPPER QUARTER PANEL TO REINFORCEMENT TO OUTER REAR WHEELHOUSE TO BODY SIDE APERTURE

WELD LOCATIONS (Continued)

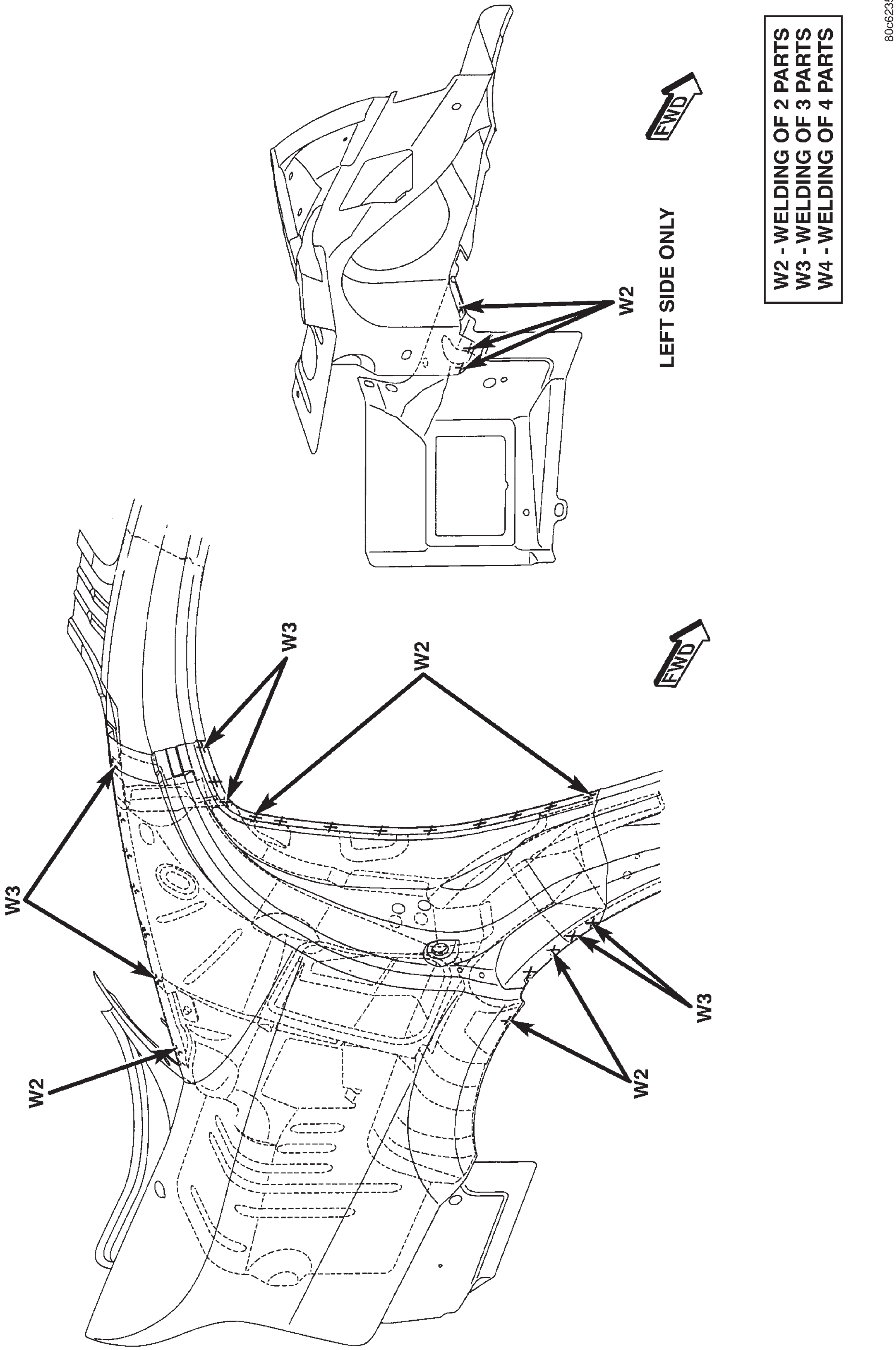

Fig. 224 INNER UPPER QUARTER PANEL REINFORCEMENT TO BODY SIDE APERTURE TO OUTER QUARTER PANEL

WELD LOCATIONS (Continued)

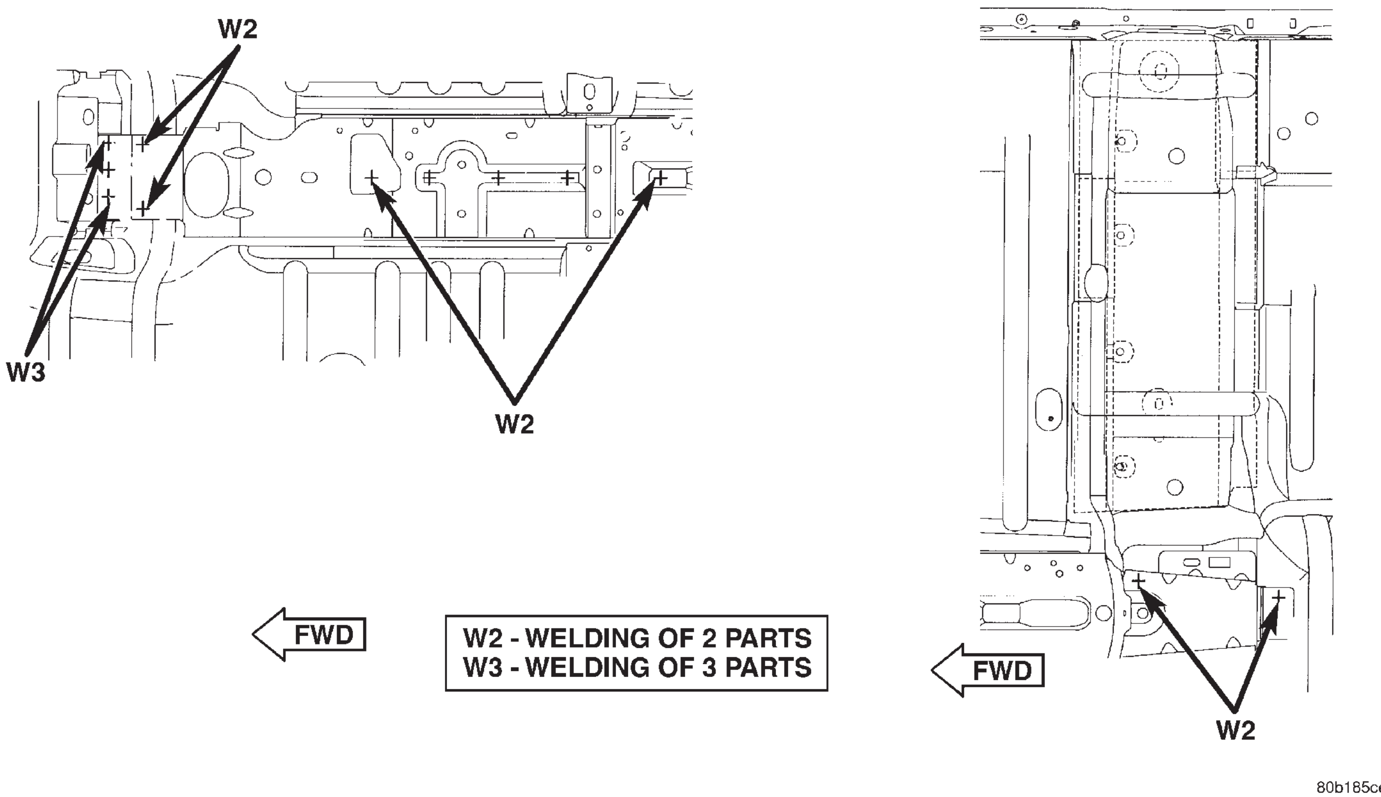

Fig. 225 FRONT CONSOLE BRACKET TO FRONT FLOOR PAN

HEATING & AIR CONDITIONING

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HEATING & AIR CONDITIONING

WARNINGS

WARNING: WEAR EYE PROTECTION WHEN SERVICING THE AIR CONDITIONING REFRIGERANT SYSTEM. SERIOUS EYE INJURY CAN RESULT FROM EYE CONTACT WITH REFRIGERANT. IF EYE CONTACT IS MADE, SEEK MEDICAL ATTENTION IMMEDIATELY.
DO NOT EXPOSE REFRIGERANT TO OPEN FLAME. POISONOUS GAS IS CREATED WHEN REFRIGERANT IS BURNED. AN ELECTRONIC TYPE LEAK DETECTOR IS RECOMMENDED.
LARGE AMOUNTS OF REFRIGERANT RELEASED IN A CLOSED WORK AREA WILL DISPLACE THE OXYGEN AND CAUSE SUFFOCATION.
THE EVAPORATION RATE OF REFRIGERANT AT AVERAGE TEMPERATURE AND ALTITUDE IS EXTREMELY HIGH. AS A RESULT, ANYTHING THAT COMES IN CONTACT WITH THE REFRIGERANT WILL FREEZE. ALWAYS PROTECT SKIN OR DELICATE OBJECTS FROM DIRECT CONTACT WITH REFRIGERANT. R-134a SERVICE EQUIPMENT OR VEHICLE A/C SYSTEM SHOULD NOT BE PRESSURE TESTED OR LEAK TESTED WITH COMPRESSED AIR. SOME MIXTURES OF AIR and R-134a HAVE BEEN SHOWN TO BE COMBUSTIBLE AT ELEVATED PRESSURES. THESE MIXTURES ARE POTENTIALLY DANGEROUS AND MAY RESULT IN FIRE OR EXPLOSION CAUSING INJURY OR PROPERTY DAMAGE.

WARNING: AVOID BREATHING A/C REFRIGERANT AND LUBRICANT VAPOR OR MIST. EXPOSURE MAY IRRITATE EYES, NOSE AND THROAT. USE ONLY APPROVED SERVICE EQUIPMENT MEETING SAE REQUIREMENTS TO DISCHARGE R-134a SYSTEM. IF ACCIDENTAL SYSTEM DISCHARGE OCCURS, VENTILATE WORK AREA BEFORE RESUMING SERVICE.
R-134a SERVICE EQUIPMENT OR VEHICLE A/C SYSTEM SHOULD NOT BE PRESSURE TESTED OR LEAK TESTED WITH COMPRESSED AIR. SOME MIXTURES OF AIR/R-134a HAVE BEEN SHOWN TO BE COMBUSTIBLE AT ELEVATED PRESSURES. THESE MIXTURES ARE POTENTIALLY DANGEROUS AND MAY RESULT IN FIRE OR EXPLOSION CAUSING INJURY OR PROPERTY DAMAGE.

WARNING: NEVER REMOVE REFRIGERANT LINE CLIP OR DISCONNECT BEFORE RECLAIMING ALL THE REFRIGERANT FROM THE SYSTEM. PERSONAL INJURY CAN RESULT.

HEATING & AIR CONDITIONING (Continued)

WARNING: ANTIFREEZE IS AN ETHYLENE GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. SEEK MEDICAL ATTENTION IMMEDIATELY IF SWALLOWED OR INHALED. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL. KEEP OUT OF REACH OF CHILDREN AND PETS.

DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT RUNNING TEMPERATURE. PERSONAL INJURY CAN RESULT.

CAUTIONS

SERVICE CAUTIONS

CAUTION: Liquid refrigerant is corrosive to metal surfaces. Follow the operating instructions supplied with the service equipment being used.

Never add R-12 to a refrigerant system designed to use R-134a. Damage to the system will result.

R-12 refrigerant oil must not be mixed with R-134a refrigerant oil. They are not compatible.

Do not use R-12 equipment or parts on the R-134a system. Damage to the system will result.

Do not overcharge the refrigerant system. This will cause excessive compressor head pressure and can cause noise and system failure.

Recover the refrigerant before opening any fitting or connection. Open the fittings with caution, even after the system has been discharged. Never open or loosen a connection before recovering the refrigerant.

Do not remove the secondary retention clip from any spring-lock coupler connection while the refrigerant system is under pressure. Recover the refrigerant before removing the secondary retention clip. Open the fittings with caution, even after the system has been discharged. Never open or loosen a connection before recovering the refrigerant.

The refrigerant system must always be evacuated before charging.

Do not open the refrigerant system or uncap a replacement component until you are ready to service the system. This will prevent contamination in the system.

Before disconnecting a component, clean the outside of the fittings thoroughly to prevent contamination from entering the refrigerant system.

Immediately after disconnecting a component from the refrigerant system, seal the open fittings with a cap or plug.

Before connecting an open refrigerant fitting, always install a new seal or gasket. Coat the fitting and seal with clean refrigerant oil before connecting.

Do not remove the sealing caps from a replacement component until it is to be installed.

When installing a refrigerant line, avoid sharp bends that may restrict refrigerant flow. Position the refrigerant lines away from exhaust system components or any sharp edges, which may damage the line.

Tighten refrigerant fittings only to the specified torque. The aluminum fittings used in the refrigerant system will not tolerate overtightening.

When disconnecting a refrigerant fitting, use a wrench on both halves of the fitting. This will prevent twisting of the refrigerant lines or tubes.

Refrigerant oil will absorb moisture from the atmosphere if left uncapped. Do not open a container of refrigerant oil until you are ready to use it. Replace the cap on the oil container immediately after using. Store refrigerant oil only in a clean, airtight, and moisture-free container.

Keep service tools and the work area clean. Contamination of the refrigerant system through careless work habits must be avoided.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - HEATER PERFORMANCE

PRE-DIAGNOSTIC PREPARATIONS

Review Safety Precautions and Warnings in this group before performing the following procedures.

Check the coolant level, drive belt tension, vacuum line connections, radiator air flow and fan operation. Start engine and allow to warm up to normal temperature.

WARNING: DO NOT REMOVE RADIATOR CAP WHEN ENGINE IS HOT, PERSONAL INJURY CAN RESULT.

If vehicle has been run recently wait 15 minutes before removing cap. Place a rag over the cap and turn it to the first safety stop. Allow pressure to escape through the overflow tube. When the system stabilizes, remove the cap completely.

MAXIMUM HEATER OUTPUT

Engine coolant is provided to the heater system by two 16 mm (5/8 inch inside diameter) heater hoses. With engine idling at normal running temperature, set the control to maximum heat, floor, and high blower setting. Using a test thermometer, check the air temperature coming from the floor outlets, refer to Temperature Reference chart.

HEATING & AIR CONDITIONING (Continued)

TEMPERATURE REFERENCE CHART

Ambient Temp.		Minimum Floor Outlet Temp.	
Celsius	Fahrenheit	Celsius	Fahrenheit
15.5°	60°	62.2°	144°
21.1°	70°	63.8°	147°
26.6°	80°	65.5°	150°
32.2°	90°	67.2°	153°

If the floor outlet air temperature is insufficient, refer to 7 Cooling Systems for specifications. Both heater hoses should be HOT to the touch (coolant return hose should be slightly cooler than the supply hose). If coolant return hose is much cooler than the supply hose, locate and repair engine coolant flow obstruction in heater system.

POSSIBLE CAUSE OF LOW OR OBSTRUCTED COOLANT FLOW

(1) Pinched or kinked heater hoses.
(2) Improper heater hose routing.
(3) Plugged heater hoses or supply and return ports at cooling system connections.
(4) Plugged heater core.
(5) Air locked heater core or air in cooling system.
(6) If coolant flow is verified and outlet temperature is insufficient, a mechanical problem may exist.
(7) Low coolant level.
(8) Low water pump flow.

POSSIBLE CAUSE OF INSUFFICIENT HEAT

(1) Obstructed cowl air intake.
(2) Obstructed heater system outlets.
(3) Blend-air door not functioning properly.
(4) Evaporator freeze up.

TEMPERATURE CONTROL

If temperature cannot be adjusted with the TEMP knob on the control panel, the following could require service:
(1) Blend-air door binding.
(2) Improper engine coolant temperature.
(3) Faulty Instrument Panel Control.
(4) Wiring or a fuse problem.

DIAGNOSIS AND TESTING - AIR CONDITIONING SYSTEM

The air conditioning system is designed to remove heat and humidity from the air entering the passenger compartment. The evaporator, located in the heater A/C unit, is cooled to temperatures near the freezing point. As warm damp air passes over the fins in the evaporator, moisture in the air condenses to water, dehumidifying the air. Condensation on the evaporator fins reduces the evaporators ability to absorb heat. During periods of high heat and humidity, an air conditioning system will be less effective. With the control module set to RECIRC, only air from the passenger compartment passes through the evaporator. As the passenger compartment air dehumidifies, A/C performance levels rise.

PERFORMANCE

Review all Warnings before proceeding with this procedure. Air temperature in test room and on vehicle must be 21° C (70°F) minimum for this test.

NOTE: When connecting the service equipment coupling to the line fitting, verify that the valve of the coupling is fully closed. This will reduce the amount of effort required to make the connection.

(1) Connect a tachometer and manifold gauge set. Attach a thermocouple to the evaporator inlet line.
(2) Set control to A/C, RECIRC, and PANEL, temperature lever on full cool and blower on high.
(3) Start engine and hold at 1000 rpm with A/C clutch engaged.
(4) Engine should be warmed up with doors and windows closed.
(5) Insert a thermometer or place a thermocouple in the left center A/C outlet and operate the engine for five minutes. The A/C clutch may cycle depending on ambient conditions.
(6) With the A/C clutch engaged, compare the discharge air temperature to the evaporator inlet line temperature. The evaporator inlet line temperature should be no more than 5.5°C (10°F) cooler than the discharge air temperature.
(7) If the discharge air temperature fails to meet the specifications, refer to the System Charge Level.

REFRIGERANT SYSTEM LEAK

If A/C system is not cooling properly, determine if refrigerant system is fully charged with R-134a. This is accomplished by performing a system Charge Level-Check or Fill. If while performing this test A/C liquid line pressure is less than 345 kPa (50 psi) proceed to Refrigerant System Empty. If liquid line pressure is greater than 345 kPa (50 psi) proceed to Refrigerant System Low. If refrigerant system is empty or low a leak at a line fitting or component seal is likely. Check the fittings, lines and components for oily residue, this is an indication of a leak.

REFRIGERANT SYSTEM EMPTY

(1) Evacuate the refrigerant system to the lowest degree of vacuum possible (approx. 28 in Hg.). Determine if the system holds a vacuum for 15 minutes. If vacuum is held, a leak is probably not present. If sys-

HEATING & AIR CONDITIONING (Continued)

tem will not maintain vacuum level, proceed with this procedure.

(2) Prepare a .284 Kg. (10 oz.) refrigerant charge to be injected into the system.

(3) Connect and dispense .284 Kg. (10 oz.) of refrigerant into the evacuated refrigerant system.

(4) Proceed to of Low Refrigerant Level Leak Test.

REFRIGERANT SYSTEM LOW

(1) Determine if there is any R-134a refrigerant in the system.

(2) Position the vehicle in a wind free work area. This will aid in detecting small leaks.

(3) Bring the refrigerant system up to operating temperature and pressure. This is done by allowing the engine to run for five minutes with the system set to the following:

- Transaxle in Park
- Engine Idling at 700 rpm
- A/C Controls Set in 100 percent outside air
- Blower switch in the high A/C position
- A/C in the ON position
- Open all windows

CAUTION: Leak detectors designed for R-12 refrigerant (only) will not detect leaks in a R-134a refrigerant system.

(4) Shut off the vehicle and wait 2 to 7 minutes. Then use an Electronic Leak Detector that is designed to detect R-134a type refrigerant and search for leaks. Fittings, lines, or components that appear to be oily usually indicates a refrigerant leak. To inspect the evaporator core for leaks, insert the leak detector probe into the drain tube opening or a heat duct.

NOTE: A R-134a dye is available to aid in leak detection. Use only Chrysler approved refrigerant dye.If a thorough leak check has been completed without indication of a leak, proceed to System Charge Level.

DIAGNOSIS AND TESTING - REFRIGERANT OIL

It is important to have the correct amount of lubricant in the A/C system to ensure proper lubrication of the compressor. Too little lubricant will result in damage to the compressor. Too much lubricant will reduce the cooling capacity of the system and consequently result in higher discharge air temperatures.

The lubricant used in the compressor is polyalkylene glycol PAG lubricant (SP-15). Only PAG refrigerant lubricant approved for use with R-134a should be used to service the system. Do not use any other lubricant. The lubricant container should be kept tightly capped until it is ready for use. Refrigerant lubricant will quickly absorb any moisture it comes in contact with.

It is not necessary to check or add lubricant unless it has been lost. Lubricant loss at the leak point will be evident by the presence of a wet, shiny surface around the leak.

REFRIGERANT OIL LEVEL

When an air conditioning system is first assembled, all components (except the compressor) are refrigerant oil free. After the system has been charged with (R-134a) refrigerant and operated, the oil in the compressor is dispersed through the lines and components. The evaporator, condenser and receiver/drier will retain a significant amount of oil. Refer to the A/C Component Refrigerant Oil Capacities table. When a component is replaced, the specified amount of refrigerant oil must be added. When the compressor is replaced, the amount of oil that is retained in the rest of the system must be drained from the replacement compressor. When a line or component has ruptured and oil has escaped, the compressor should be removed and drained. The receiver/drier must be replaced along with the ruptured part. The oil capacity of the system, minus the amount of oil still in the remaining components, can be measured and poured into the suction port of the compressor.

Example: On an A/C system the evaporator retains 60 ml. (2 oz.). The condenser retains 30 ml. (1 oz.) of oil, and system capacity may be 150 ml. (5.00 oz.) of oil.

150 ml. minus 90 ml. equals 60 ml. (2.00 oz.).

A/C COMPONENT REFRIGERANT OIL CAPACITIES

COMPONENT NAME	ml.	oz.
Total Air Conditioning System	150 ml.	5.00 oz.
Condenser	30 ml.	1.00 oz.
Evaporator	59 ml.	2.00 oz.
Filter/Drier	30 ml.	1.00 oz.
Line Blown	44 ml.	1.50 oz.

CAUTION: The refrigerant oil used in a R-134a A/C system is unique. Use only oils which were designed to work with R-134a refrigerant. The oil designated for this vehicle is SP-15 PAG (polyalkylene glycol).

VERIFY REFRIGERANT LUBRICANT LEVEL

(1) Discharge refrigerant system using a recycling/ reclaiming equipment if a charge is present.

HEATING & AIR CONDITIONING (Continued)

(2) Disconnect refrigerant lines from A/C compressor. Cap the open lines to prevent moisture from entering system.

(3) Remove compressor from vehicle.

(4) From suction and discharge ports on top of compressor, drain lubricant from compressor.

(5) Add system capacity minus the capacity of components that have not been replaced. Refer to the A/C Component Refrigerant Oil Capacities chart above. Add lubricant through the suction and discharge ports on compressor. This is not to exceed 150 ml. (5.00 oz.) in total.

(6) Install compressor and connect refrigerant lines. Then evacuate and charge refrigerant system.

(7) Most reclaim/recycling equipment will measure the lubricant being removed. This is the amount of lubricant to be added back to the system. If a new compressor is being installed, drain lubricant from old compressor, measure the amount drained and discard old lubricant. Drain the lubricant from the new compressor into a clean container. Return the amount of lubricant measured from the old compressor, plus the amount reclaimed from the system back into the new compressor.

STANDARD PROCEDURE

STANDARD PROCEDURE - TUBING AND FITTINGS

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The refrigerant oil will absorb moisture readily out of the air. This moisture will convert into acids within a closed system.

CAUTION: The system must be completely empty before opening any fitting or connection in the refrigeration system. Open fittings with caution even after the system has been emptied. If any pressure is noticed as a fitting is loosened, retighten fitting and evacuate the system again.

A good rule for the flexible hose lines is to keep the radius of all bends at least 10 times the diameter of the hose. Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so they are at least 3 inches (80 mm) from the exhaust manifold. Inspect all flexible hose lines to make sure they are in good condition and properly routed.

The use of correct wrenches when making connections is very important. Improper wrenches or improper use of wrenches can damage the fittings.

The internal parts of the A/C system will remain stable as long as moisture-free refrigerant and refrigerant oil is used. Abnormal amounts of dirt, moisture or air can upset the chemical stability. This may cause operational troubles or even serious damage if present in more than very small quantities.

When opening a refrigeration system, have everything you will need to repair the system ready. This will minimize the amount of time the system must be opened. Cap or plug all lines and fittings as soon as they are opened. This will help prevent the entrance of dirt and moisture. All new lines and components should be capped or sealed until they are ready to be used.

All tools, including the refrigerant dispensing manifold, the manifold gauge set, and test hoses should be kept clean and dry.

STANDARD PROCEDURE - REFRIGERANT EQUIPMENT

This vehicle uses R-134a refrigerant. It is a non-toxic, non-flammable, clear colorless liquefied gas. R-134a refrigerant is not compatible with R-12 refrigerant. Even a small amount of R-12 in a R-134a system could cause refrigerant oil sludging and poor performance.

Service ports for the air conditioning system are located on the hoses. Service ports have been designed to ensure that the system is not accidentally filled with the wrong refrigerant (R-12).

CAUTION: Never add R-12 to a system designed to use R-134a. System failure will occur. Only use gauges that have not been used for R-12.

When servicing a system, the air conditioning charging/recovery/recycling machine must be used (Fig. 1). Contact an automotive service equipment supplier for proper equipment. Refer to the operating instructions provided with the equipment for proper operation.

A R-134a gauge set (Fig. 2) must be used in conjunction with the charging/recovery/recycling device. The service hoses on the gauge set should have automatic back flow valves at the service port connector ends. This will prevent refrigerant R-134a from being released into the atmosphere.

HEATING & AIR CONDITIONING (Continued)

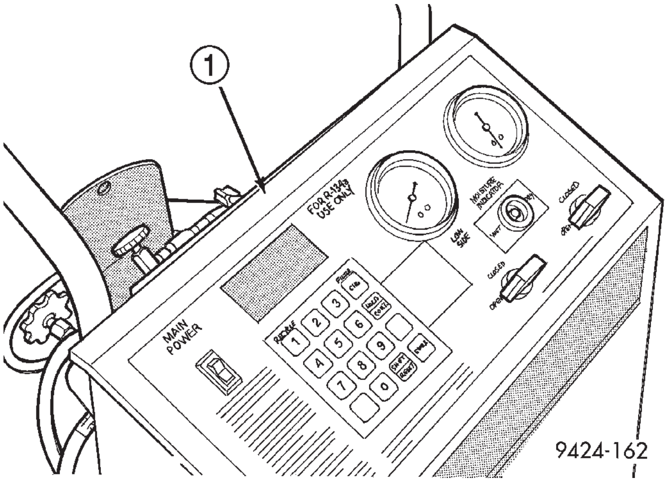

Fig. 1 Refrigerant Recovery/Recycling Station - Typical

1 - R-134 REFRIGERANT RECOVERY MACHINE

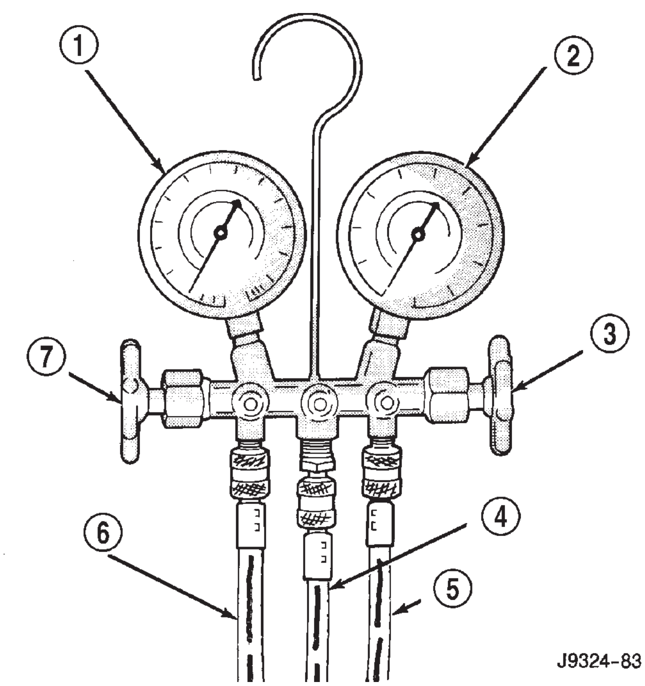

Fig. 2 Manifold Gauge Set - Typical

1 - LOW PRESSURE GAUGE
2 - HIGH PRESSURE GAUGE
3 - VALVE
4 - VACUUM/REFRIGERANT HOSE (YELLOW W/BLACK STRIP)
5 - HIGH PRESSURE HOSE (RED W/BLACK STRIP)
6 - LOW PRESSURE HOSE (BLUE W/BLACK STRIP)
7 - VALVE

R-134a refrigerant requires a special type of compressor oil. When adding oil, make sure that it is designed to be used in a R-134a system. Refer to the label under the hood for proper oil and refrigerant charge levels (Fig. 3).

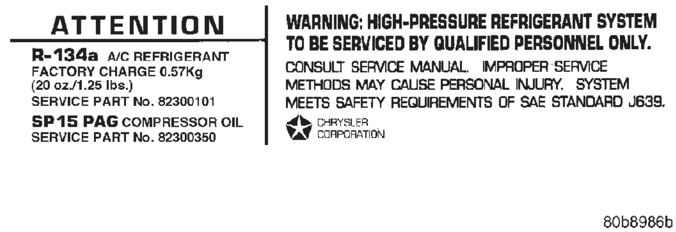

Fig. 3 Underhood Label

The use of R-134a will have a positive environmental impact due to it's zero ozone depletion and low global warming impact.

STANDARD PROCEDURE - SYSTEM CHARGE LEVEL

The procedure below should be used to check and/or fill the refrigerant charge in the air conditioning system.

NOTE: The maximum amount of R-134a refrigerant that the air conditioning system holds is listed on the underhood label.

To verify proper charge level, evacuate (reclaim) and recharge system to the proper refrigerant level.

STANDARD PROCEDURE - CHARGING A/C SYSTEM

PARTIAL CHARGE

This vehicle does not have a sight glass. It is not possible to determine the amount of R-134a charge in the system. Therefore it is necessary to completely evacuate and recover the system, and then recharge the system fully.

EVACUATION

Before adding refrigerant, all air must be evacuated from the system.

- Connect a manifold gauge set to the A/C service ports.
- Use a vacuum pump or charging station and evacuate system to 95 kPa (28 inches Hg) for 30 minutes.
- Go to Charging A/C System below.

HEATING & AIR CONDITIONING (Continued)

CHARGING A/C SYSTEM

The procedure below should be used to fill the refrigerant charge in the air conditioning system. This A/C system does not have or use a sight glass to check or charge the system.

WARNING: AVOID BREATHING A/C REFRIGERANT AND LUBRICANT VAPOR OR MIST. EXPOSURE MAY IRRITATE EYES, NOSE AND THROAT. USE ONLY APPROVED SERVICE EQUIPMENT MEETING SAE REQUIREMENTS TO DISCHARGE R-134a SYSTEM. IF ACCIDENTAL SYSTEM DISCHARGE OCCURS, VENTILATE WORK AREA BEFORE RESUMING SERVICE.R-134a SERVICE EQUIPMENT OR VEHICLE A/C SYSTEM SHOULD NOT BE PRESSURE TESTED OR LEAK TESTED WITH COMPRESSED AIR. MIXTURE OF AIR and R-134a CAN BE COMBUSTIBLE AT ELEVATED PRESSURES. THESE MIXTURES ARE POTENTIALLY DANGEROUS AND MAY RESULT IN FIRE OR EXPLOSION CAUSING INJURY OR PROPERTY DAMAGE.

CAUTION: Do not overcharge refrigerant system, as excessive compressor head pressure can cause noise and system failure.

After system has been tested for leaks and evacuated, a refrigerant (R-134a) charge can be injected into the system.

NOTE: When connecting service equipment coupling to the line fitting, verify that the valve of the coupling is fully closed. This will reduce the amount of effort required to make the connection.

(1) If using a separate vacuum pump close all valves before disconnecting pump. Connect manifold gauge set to the A/C service ports.

(2) Measure refrigerant (refer to capacities). Refer to the instructions provided with the equipment being used.

(3) Verify engine is shut off. Open suction and discharge valves. Open the charge valve to allow the refrigerant to flow into the system. When transfer of refrigerant has stopped, close the suction and discharge valve.

(4) If all of the charge did not transfer from the dispensing device, put vehicle controls into the following mode:

- Automatic transaxle in park or manual transaxle in neutral
- Engine idling at 700 rpm
- A/C control set in 100 percent outside air
- Panel mode
- Blower motor ON high speed
- Vehicle windows closed

If A/C compressor does not engage, test compressor clutch control circuit and correct any failure. Refer to Electrical Wiring Diagrams.

(5) Open the suction valve to allow the remaining refrigerant to transfer to the system.

WARNING: DO NOT OPEN THE DISCHARGE (HIGH-PRESSURE) VALVE AT THIS TIME.

(6) Close all valves and test the A/C system performance.

(7) Disconnect the charging station or manifold gauge set. Install the service port caps.

STANDARD PROCEDURE - EVACUATING A/C SYSTEM

NOTE: Moisture must be prevented from entering the A/C oil. Moisture in the oil is very difficult to remove and will cause a reliability problem with the compressor.

If a compressor is left open to the atmosphere for an extended period of time, the refrigerant oil should be drained and replaced. This will eliminate the possibility of contaminating the refrigerant system.

If refrigerant system has been open to the atmosphere, it must be evacuated before the system can be charged. Moisture and air mixed with the refrigerant will raise the compressor head pressure above acceptable operating levels. This will reduce the performance of the system and damage the compressor.

EVACUATE A/C SYSTEM

NOTE: When connecting the service equipment coupling to the line fitting, verify the valve of the coupling is fully closed. This will reduce the amount of effort required to make the connection.

(1) Connect a suitable charging station, refrigerant recovery machine and a manifold gauge set with vacuum pump.

(2) Open suction and discharge valves and start vacuum pump. The vacuum pump should run a minimum of 45 minutes to eliminate all moisture in system. When suction gauge reads -88 kPa (- 26 in. Hg) vacuum or greater for 45 minutes, close all valves and turn off vacuum pump. If the system fails to reach specified vacuum, the system likely has a leak that must be corrected. If the refrigerant system maintains specified vacuum for at least 30 minutes, start the vacuum pump, open the suction and discharge valves. Then evacuate the system an additional 10 minutes.

(3) Close all valves, turn off and disconnect the vacuum pump.

HEATING & AIR CONDITIONING (Continued)

(4) The refrigerant system is now ready to be charged with refrigerant.

STANDARD PROCEDURE- REFRIGERANT RECOVERY

WARNING: (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) AND (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION) BEFORE PERFORMING THE FOLLOWING OPERATION.

A R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 must be used to recover the refrigerant from an R-134a refrigerant system. Refer to the operating instructions supplied by the equipment manufacturer for the proper care and use of this equipment.

SPECIFICATIONS

AIR CONDITIONING

ITEM	DESCRIPTION	NOTES
SYSTEM	R134a w/expansion valve	
COMPRESSOR	Sanden TRS-090 (Scroll)	SP-15 PAG Oil
Freeze–up Control	evaporator temp probe (2-wire)	BCM input, signals OFF < 33.7° F, ON > 35.7° F (Note: will vary depending on the ambient temperature.)
Low psi Control	pressure transducer to PCM	opens < 29.4 psi
High psi Control		opens > 431 psi
Thermal Limiter Switch	cut Out > 252-262° F, cut In < 225-235° F	scroll compressors only serviced with clutch
Forced Recirc Mode	Sustem forced into Recirc at high pressures	BCB steps HVAC into recirc at 375 psi, steps out at 325 psi
CONTROL HEAD	manual type	resistive multiplex signal for A/C request to BCM
Mode Door	electric actuator w/feedback	BCM controlled
Blend Air Door	electric actuator w/feedback	BCM controlled
Fresh/Recirc door	electric actuator w/feedback	BCM controlled
Blower Motor	hardwired to control head	resistor card
COOLING FANS	PCM controlled module, two fan motors - low/high	low & high relays
CLUTCH		
Control	relay	PCM
Draw	2-4.15 amps @ 12V	± 0.5V
Gap	0.013″-0.025″	

CONTROLS

TABLE OF CONTENTS

A/C COMPRESSOR CLUTCH

DESCRIPTION

The compressor clutch components provide a way to drive the compressor. The compressor clutch assembly consists of a stationary electromagnetic coil, hub bearing and pulley assembly and a clutch plate. The compressor clutch and coil assembly are the only serviced parts on the compressor.

OPERATION

When clutch engages the compressor is then driven by the engine serpentine drive belt. The clutch engagement is controlled the heater-A/C mode control switch, a/c pressure transducer, evaporator probe, thermal limiter switch, compressor clutch relay and Powertrain Control Module (PCM).

A/C COMPRESSOR CLUTCH (Continued)

REMOVAL

NOTE: Refrigerant does not have to be reclaimed for compressor clutch, pulley or coil replacement. The compressor clutch can be serviced in the vehicle.

(1) Disconnect and isolate negative battery cable.

(2) Remove serpentine drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(3) Unplug the compressor clutch coil wire harness connector.

(4) Remove three compressor mounting bolts.

(5) Remove compressor from mounting bracket and support compressor while servicing the clutch.

(6) Insert two pins of the Spanner Wrench C-4489 into the holes of the clutch plate. Hold the clutch plate stationary and remove nut (Fig. 1).

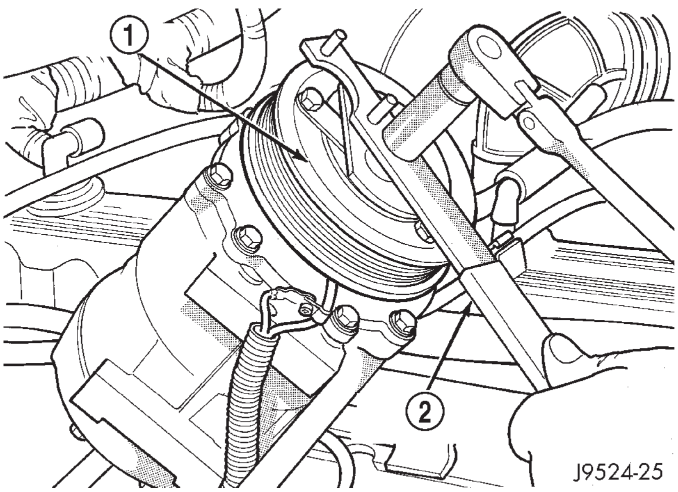

Fig. 1 Clutch Nut

1 - CLUTCH PLATE
2 - SPANNER

(7) Remove clutch plate with a Puller C-6461 (Fig. 2).

(8) Remove compressor clutch shims.

(9) Remove external front housing snap ring with snap ring pliers (Fig. 3).

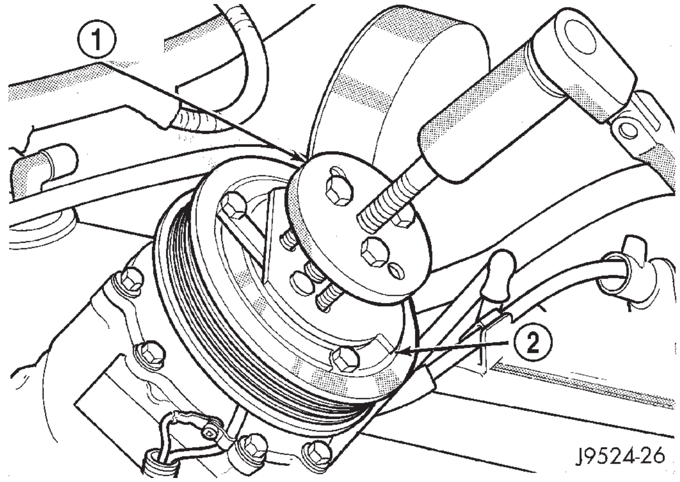

Fig. 2 Clutch Plate

1 - CLUTCH PLATE PULLER
2 - CLUTCH PLATE

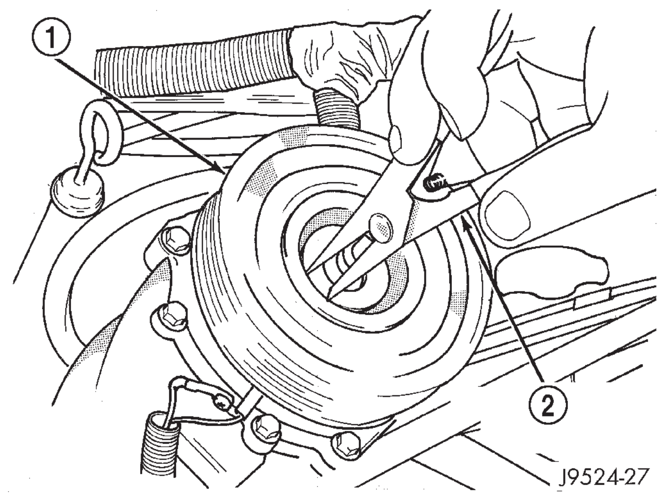

Fig. 3 External Snap Ring

1 - PULLEY
2 - SNAP RING PLIERS

(10) Install lip of the Rotor Puller C-6141-1 into the external snap ring groove and install Shaft Protector C-6141-2 (Fig. 4).

A/C COMPRESSOR CLUTCH (Continued)

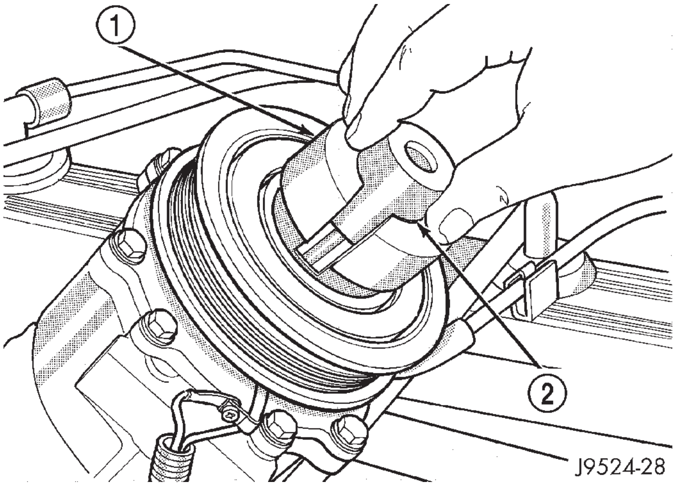

Fig. 4 Shaft Protector and Puller

1 - PULLER JAW
2 - SHAFT PROTECTOR

(11) Install Puller Bolts C-6461 through the puller flange and into the jaws of the rotor puller and tighten (Fig. 5). Turn the puller center bolt clockwise until the rotor pulley is free.

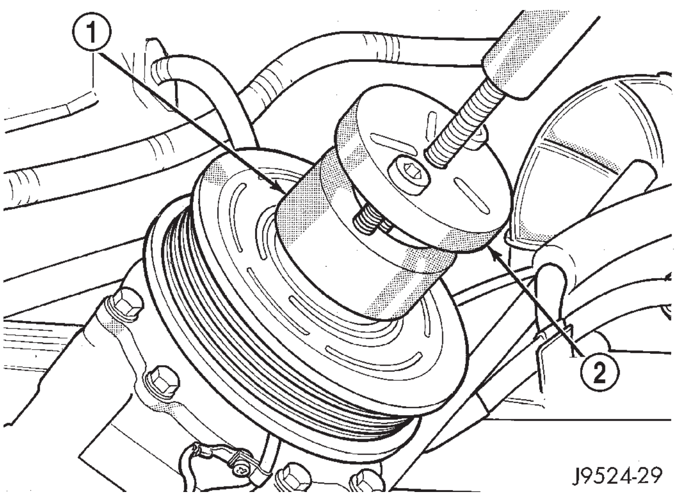

Fig. 5 Puller Plate

1 - PULLER JAW
2 - PULLER

(12) Remove screw and retainer from clutch coil wire harness on the front of the compressor (Fig. 6).

(13) Remove snap ring from compressor hub and remove clutch field coil (Fig. 7). Slide clutch field coil off of the compressor hub.

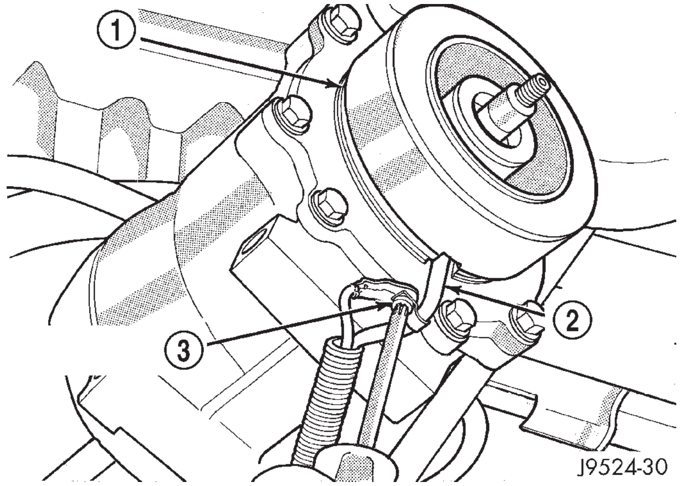

Fig. 6 Clutch Coil Lead Wire Harness

1 - COIL
2 - COIL WIRE
3 - RETAINER SCREW

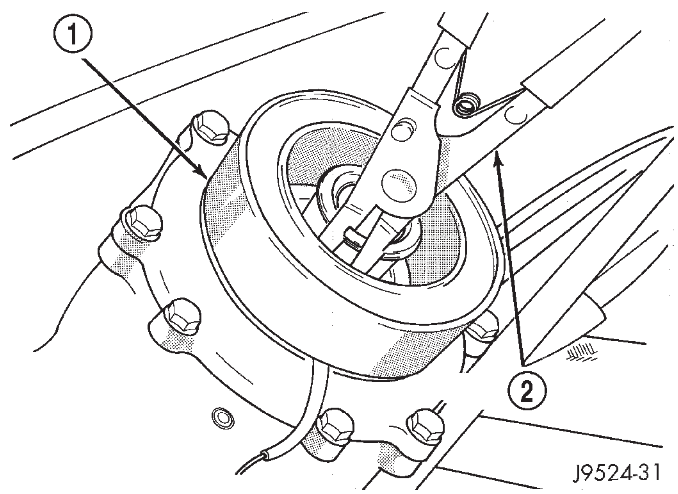

Fig. 7 Clutch Field Coil Snap Ring

1 - COIL
2 - SNAP RING PLIERS

INSTALLATION

(1) Install clutch field coil and snap ring.

(2) Install clutch coil wire harness retaining clip on the front of the compressor and tighten the screw.

(3) Align rotor assembly squarely on the front compressor housing hub.

(4) Install pulley bearing assembly with Installer C-6871 (Fig. 8). Thread installer on the shaft, then turn the nut until the pulley assembly is seated.

(5) Install external snap ring with the bevel side of the snap ring facing outward. Verify snap ring is seated.

A/C COMPRESSOR CLUTCH (Continued)

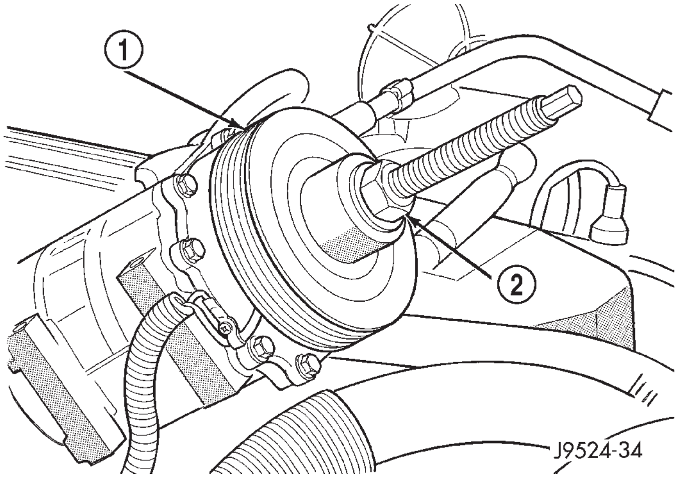

Fig. 8 Clutch Pulley Install

1 - PULLEY BEARING ASSEMBLY
2 - INSTALLER

CAUTION: If snap ring is not seated in the groove it will vibrate out and cause clutch failure and severe compressor damage will occur.

(6) Install compressor with the **original** clutch shims on the compressor shaft.

(7) Install clutch plate with Driver C-6463 (Fig. 9). Install the shaft nut and tighten to 14.4 N·m (10.5 ft. lbs.).

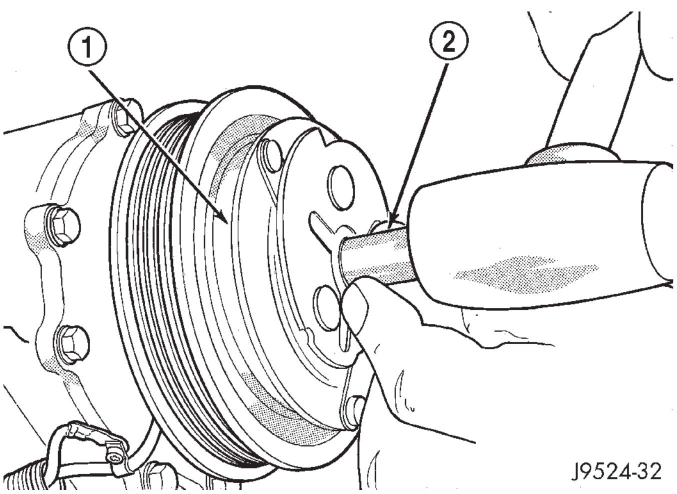

Fig. 9 Clutch Plate Driver

1 - CLUTCH PLATE
2 - DRIVER

(8) Check clutch air gap with a feeler gauge (Fig. 10). If air gap does not meet specification 0.41 - 0.79 mm (0.016 - 0.031 in.) add or subtract shims as required.

NOTE: If air gap is not consistent around the clutch, lightly pry up at the minimum variations and lightly tap down at the maximum variation point.

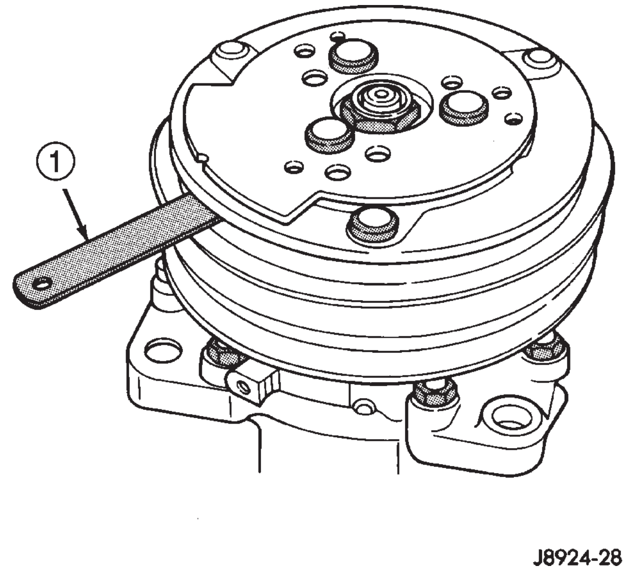

Fig. 10 Check Clutch Air Gap

1 - FEELER GAUGE

NOTE: When installing a new clutch onto a compressor that previously did not have a clutch, use the shims 1.0, 0.50, and 0.13 mm (0.040, 0.020, and 0.005 in.) provided with the new clutch.

(9) Position compressor on the mounting bracket and install bolts. Tighten bolts to 41 N·m (30 ft. lbs.).

(10) Plug in compressor clutch harness.

(11) Install serpentine drive belt. Refer to 7 Cooling System for procedure.

(12) Install Negative battery cable.

(13) Start engine, set system to A/C mode, run engine at 1500-2000 rpm, and blower speed on high. Cycle the **new** A/C clutch 20 times (5 seconds ON and 5 seconds OFF).

NOTE: This procedure will seat (burnishing) friction surfaces and provide a higher clutch torque capability. This is only necessary on a NEW clutch.

A/C COMPRESSOR CLUTCH COIL

DESCRIPTION

The compressor clutch coil is electromagnetic and provides a way to engage the compressor clutch plate. The electromagnetic coil unit, hub bearing and pulley assembly are retained on the compressor front housing with snap rings. The compressor clutch and coil assembly are the only serviced parts on the compressor.

OPERATION

The coil is controlled by the heater-A/C mode control switch, a/c pressure transducer, evaporator probe, thermal limiter switch, compressor clutch relay and Powertrain Control Module (PCM). When the clutch coil is energized, it magnetically draws the clutch plate into contact with the pulley. When the coil is not energized the pulley freewheels on the clutch hub bearing, which is part of the pulley.

DIAGNOSIS AND TESTING - COMPRESSOR CLUTCH COIL

(1) Verify battery state of charge.

(2) Connect an ammeter (0-10 ampere scale) in series with the clutch coil terminal. Use a volt meter (0-20 volt scale) with clip leads measuring voltage across the battery and A/C clutch.

(3) With A/C control in A/C mode and blower at low speed, start the engine and run at normal idle.

(4) The A/C clutch should engage immediately and the clutch voltage should be within 2 volts of the battery voltage. If the A/C clutch does not engage, test the fusible link.

(5) The A/C clutch coil is acceptable if the current draw is 2.0 to 4.15 amperes at 11.5 to 12.5 volts at clutch coil. This is with the work area temperature at 21°C (70°F). If voltage is more than 12.5 volts, add electrical loads by turning on electrical accessories until voltage reads below 12.5 volts.

(6) If coil current reads zero, the coil is open and should be replaced. If the ammeter reading is 5 amperes or more, the coil is shorted and should be replaced. If the coil voltage is not within two volts of the battery voltage, test clutch coil feed circuit for excessive voltage drop.

A/C COMPRESSOR CLUTCH RELAY

DESCRIPTION

The compressor clutch relay is a International Standards Organization (ISO) micro-relay. The terminal designations and functions are the same as a conventional ISO relay. However, the micro-relay terminal orientation (footprint) is different, the current capacity is lower, and the relay case dimensions are smaller than those of the conventional ISO relay.

The compressor clutch relay is located in the Power Distribution Center (PDC) in the engine compartment. Refer to the PDC label for relay identification and location.

OPERATION

The a/c compressor clutch relay is a electromechanical device that switches battery current to the a/c compressor clutch coil when the Powertrain Control Module (PCM) grounds the coil side of the relay. The PCM responds to inputs from the Body Control Module (BCM) and the a/c pressure transducer.

The compressor clutch relay cannot be repaired and, if faulty or damaged, it must be replaced.

DIAGNOSIS AND TESTING - A/C COMPRESSOR CLUTCH RELAY

RELAY TEST

The compressor clutch relay (Fig. 11) is located in the Power Distribution Center (PDC). Refer to the PDC label for relay identification and location. Remove the relay from the PDC to perform the following tests:

(1) A relay in the de-energized position should have continuity between terminals 87A and 30, and no continuity between terminals 87 and 30. If OK, go to Step 2. If not OK, replace the faulty relay.

(2) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 5 ohms. If OK, go to Step 3. If not OK, replace the faulty relay.

(3) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, see Relay Circuit Test in the Diagnosis and Testing section of this group. If not OK, replace the faulty relay.

A/C COMPRESSOR CLUTCH RELAY (Continued)

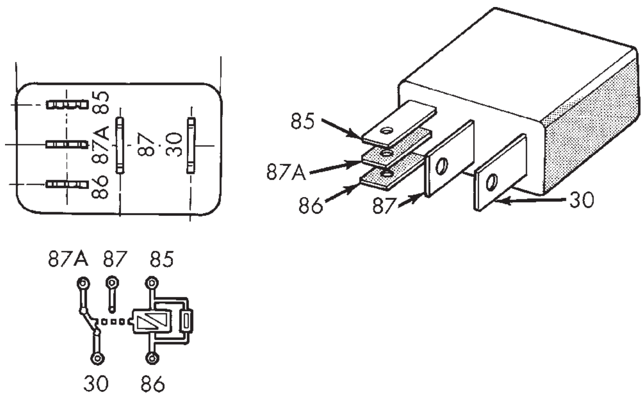

Fig. 11 A/C COMPRESSOR CLUTCH RELAY

30 - COMMON FEED
85 - COIL GROUND
86 - COIL BATTERY
87 - NORMALLY OPEN
87A - NORMALLY CLOSED

RELAY CIRCUIT TEST

For circuit descriptions and diagrams, (Refer to Appropriate Wiring Information).

(1) The relay common feed terminal cavity (30) is connected to fused battery feed. There should be battery voltage at the cavity for relay terminal 30 at all times. If OK, go to Step 2. If not OK, repair the open circuit to the fuse in the PDC as required.

(2) The relay normally closed terminal (87A) is not used in this application. Go to Step 3.

(3) The relay normally open terminal cavity (87) is connected to the compressor clutch coil. There should be continuity between this cavity and the A/C compressor clutch relay output circuit cavity of the compressor clutch coil wire harness connector. If OK, go to Step 4. If not OK, repair the open circuit as required.

(4) The relay coil battery terminal (86) is connected to the fused ignition switch output (run/start) circuit. There should be battery voltage at the cavity for relay terminal 86 with the ignition switch in the On position. If OK, go to Step 5. If not OK, repair the open circuit to the fuse in the junction block as required.

(5) The coil ground terminal cavity (85) is switched to ground through the Powertrain Control Module (PCM). There should be continuity between this cavity and the A/C compressor clutch relay control circuit cavity of the PCM (pin 64). If not OK, repair the open circuit as required.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the cover from the Power Distribution Center (PDC).

(3) Refer to the label on the PDC for compressor clutch relay identification and location.

(4) Unplug compressor clutch relay from the PDC.

INSTALLATION

(1) Install the compressor clutch relay by aligning the relay terminals with the cavities in the PDC and pushing the relay firmly into place.

(2) Install the PDC cover.

(3) Connect the battery negative cable.

(4) Test the relay operation.

A/C HEATER CONTROL

DIAGNOSIS AND TESTING - CONTROL MODULE

The control switch and timer circuit are tested in the vehicle with DRB scan tool. Refer to the Body Diagnostic Procedures Manual.

REMOVAL

(1) Disconnect negative battery cable.

(2) Carfully pull out the control bezel and contol from the intrument panel.

(3) Disconnect the control wiring harness (Fig. 12).

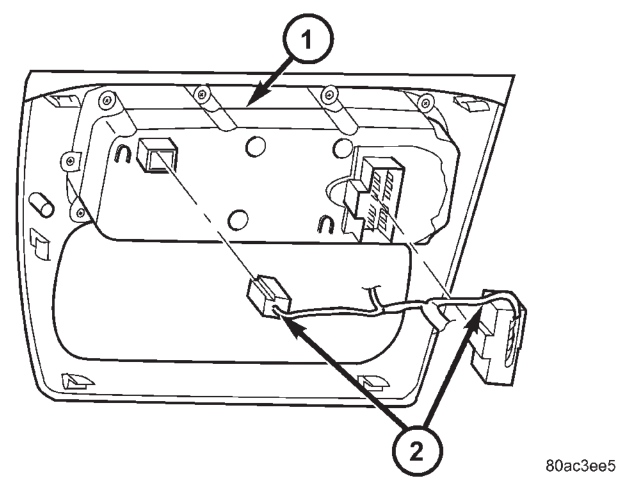

Fig. 12 CONTROL HARNESS

1 - CONTROL
2 - CONTROL CONNECTORS

(4) Remove control mounting screws (Fig. 13).

INSTALLATION

(1) Install control on bezel and install mounting screws.

(2) Connect control harness to control.

(3) Align bezel with instrument panel (Fig. 14) and push bezel and control into place.

A/C HEATER CONTROL (Continued)

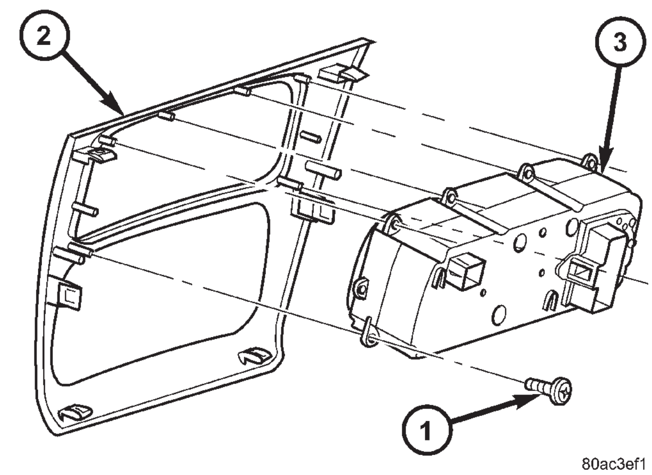

Fig. 13 CONTROL MOUNTING SCREWS

1 - SCREW
2 - BEZEL
3 - CONTROL

CAUTION: Do not push on control knobs, control could be damage.

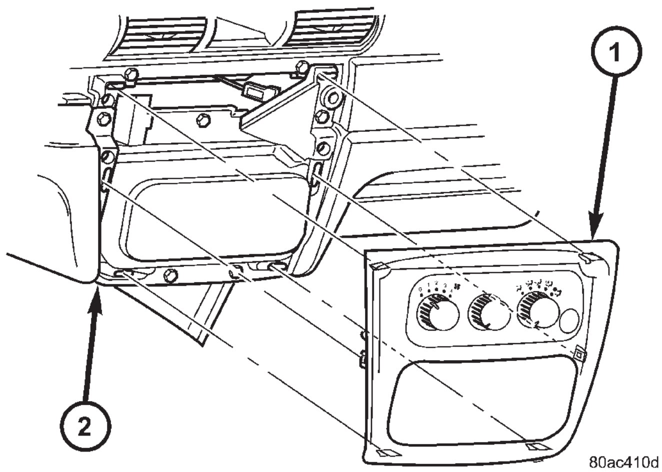

Fig. 14 CONTROL BEZEL

1 - BEZEL
2 - INSTRUMENT PANEL

(4) Connect negative battery cable.

A/C PRESSURE TRANSDUCER

DESCRIPTION

The A/C pressure transducer is located on the discharge line near the condenser and functions as a refrigerant system pressure sensor. This switch prevents compressor operation when the discharge line pressure approaches extreme levels. The transducer is a factory-calibrated unit and cannot be adjusted or repaired. If faulty or damaged, it must be replaced.

OPERATION

When discharge line pressure rises above 2971 kPa (431 psi) the PCM turns off the a/c clutch. When pressure drops below 206 kPa (30 psi), the PCM turns off the a/c clutch.

REMOVAL

CAUTION: A/C pressure transducer switch connector terminal contacts can be damaged by probing tools during system diagnosis and repair. Failure to use their respective mating terminals or pin gauge to check for tightness will cause contact beam spreads. This will result in loss of continuity.

(1) Disconnect the wire harness connector from the A/C pressure transducer.
(2) Remove transducer with a 14 mm open-end wrench.

NOTE: A slight release of pressure trapped in the fitting may be experienced. It is not necessary to discharge the refrigerant system.

INSTALLATION

NOTE: O-ring replacement is required whenever the pressure transducer is serviced. Be sure to use the O-ring specified for this vehicle.

(1) Thread pressure transducer on to discharge line.
(2) Tighten pressure transducer to 6 N·m (50 in. lbs.).
(3) Connected wire connector to transducer.

EVAPORATOR TEMPERATURE SENSOR

DESCRIPTION

The evaporator temperature sensor (Fig. 15) is located at the coldest point on the face of the evaporator. The switch is attached to the evaporator coil with the sensing probe inserted into the coil fins. The evaporator temperature sensor prevents condensate water on the evaporator coil from freezing and obstructing A/C system air flow.

EVAPORATOR TEMPERATURE SENSOR (Continued)

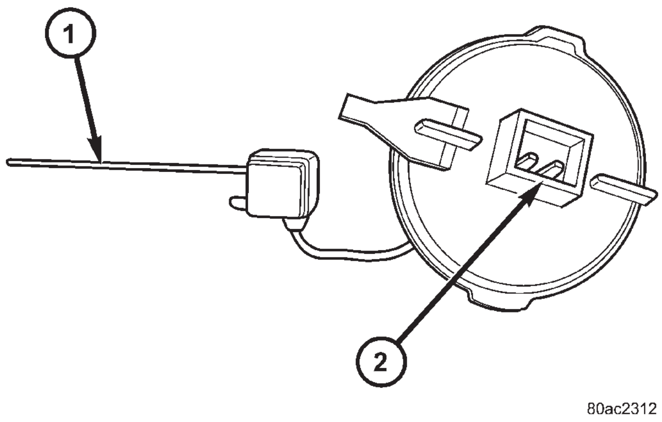

Fig. 15 EVAPORATOR TEMPERATURE SENSOR

1 - PROBE
2 - CONNECTOR

OPERATION

The Body Control Module (BCM) will send a Programmable Communications Interface (PCI) bus message to the Powertrain Control Module (PCM), which will check engine, coolant temperature, and refrigerant pressure temperature before turning ON the A/C Compressor Clutch. Turning ON the A/C Compressor Clutch will allow the system to cool the evaporator. The BCM will send a message to the PCM when the evaporator temperature becomes too cold. The PCM will then turn OFF the A/C Compressor Clutch, before evaporator freeze up occurs. The DRBIII® scan tool can be used to monitor this operation. The temperature setpoint at which the clutch is turned OFF varies with the outside ambient temperature. The temperature at which the clutch is turned ON is preset to 2º F above the OFF setpoint mentioned above. Refer to Evaporator Temperature Sensor Setpoint table and (Fig. 16) for the correct setpoint.

REMOVAL

(1) Disconnect negative battery cable.

(2) Remove the blower motor(Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/BLOWER MOTOR - REMOVAL).

(3) Remove resistor card from underside of HVAC(Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/BLOWER MOTOR RESISTOR BLOCK - REMOVAL).

(4) Lower the glove box door.

(5) Reach through the glove compartment door opening and disconnect the evaporator temperature sensor wiring connector.

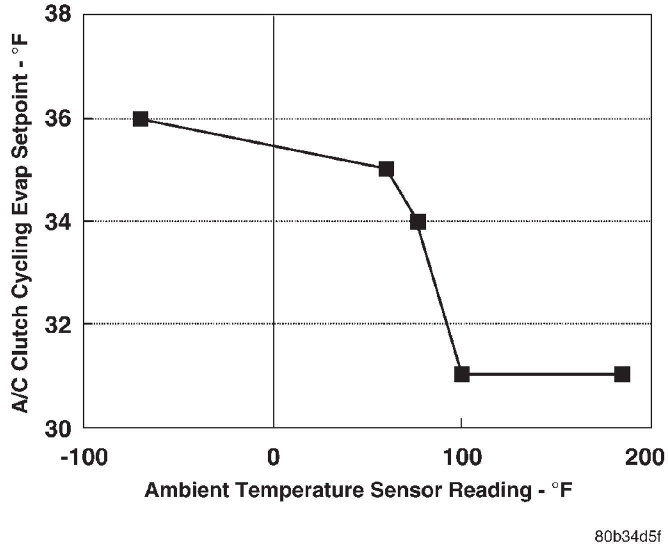

Fig. 16 EVAPORATOR TEMPERATURE SENSOR SETPOINT

EVAPORATOR TEMPERATURE SENSOR SETPOINT

AMBIENT TEMPERATURE SENSOR READING °F (° C)	A/C CLUTCH OFF EVAPORATOR TEMPERATURE SETPOINT ° F (° C)
185 (85)	31 (-0.5)
100 (37.7)	31 (-0.5)
77 (25)	34 (1.1)
60 (15.5)	35 (1.6)
-70 (-56.6)	36 (2.2)

(6) Using a flat blade pry tool, pull back on the locking tab. Twist access plate clockwise one-quarter turn and pushed inside the A/C housing (Fig. 17). Then orientated the plate in such a way that it can be removed from the housing.

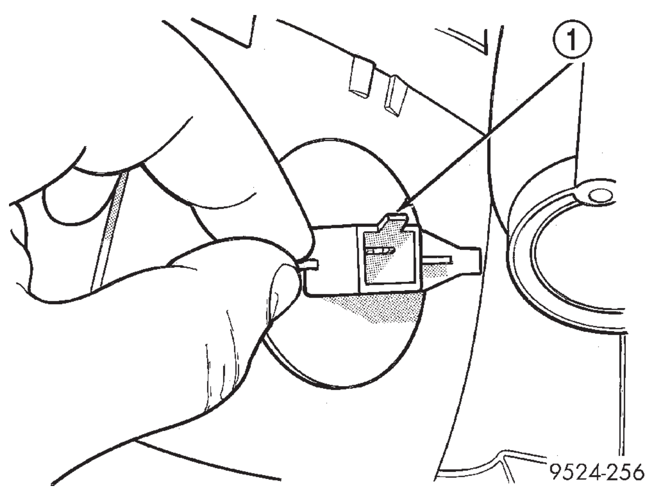

Fig. 17 Evaporator Probe

1 - EVAPORATOR PROBE

EVAPORATOR TEMPERATURE SENSOR (Continued)

(7) Using the access plate hole in the housing as a view hole, reach hand up through blower opening to pull the evaporator probe from the evaporator coil.

INSTALLATION

(1) Install new sensor into the evaporator.

NOTE: The evaporator is manufactured with three holes for probe insertion. Insert the probe in the uppermost hole.

(2) Using the access plate hole in the housing as a view hole, reach up through blower opening to install the evaporator probe to the evaporator coil.

(3) Replace access plate to HVAC housing.

(4) Reach through the glove compartment door opening and connect the evaporator temperature sensor wiring connector.

(5) Install glove compartment door.

(6) Install the resistor card to the underside of the HVAC(Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/BLOWER MOTOR RESISTOR BLOCK - INSTALLATION).

(7) Install the blower motor(Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/BLOWER MOTOR - INSTALLATION).

(8) Connect negative battery cable.

AMBIENT TEMP SENSOR

DESCRIPTION

The ambient air temperature sensor (Fig. 18) is located on the inside of front bumper beam.

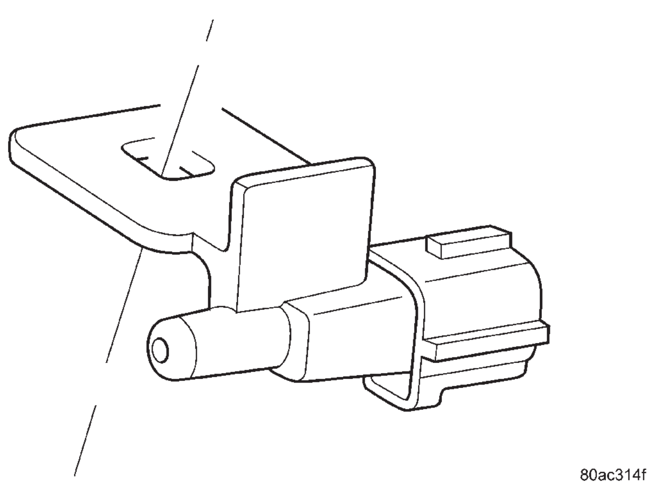

Fig. 18 AMBIENT TEMP SENSOR

OPERATION

The ambient temperature sensor is used by the A/C system to adjust evaporator temperatures on vehicles equipped with the ATC system.

REMOVAL

(1) Remove sensor mounting push pin (Fig. 19).

(2) Disconnect sensor wiring connector.

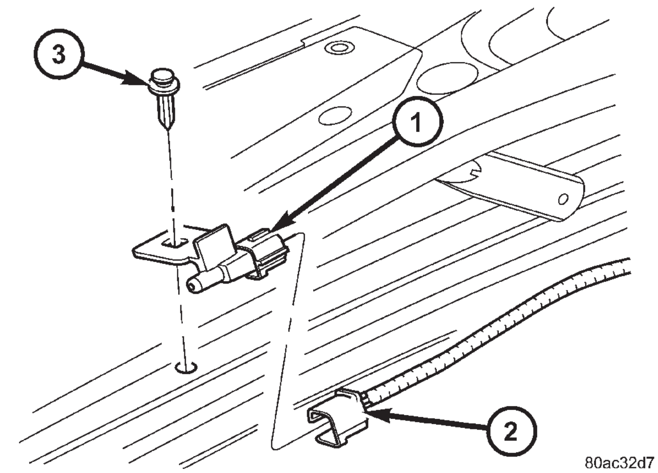

Fig. 19 AMBIENT TEMP SENSOR

1 - SENSOR
2 - WIRING CONNECTOR
3 - PUSH PIN

INSTALLATION

(1) Connect the sensor wiring harness connector.

(2) Install the sensor fastener push pin.

BLEND DOOR ACTUATOR

DESCRIPTION

The blend door actuator is a motor/geartrain assembly which mechanically positions the blend door. The actuator is mounted to the bottom of the HVAC housing in the center.

OPERATION

A potentiometer in the actuator allows the BCM to know the exact position of the blend door at all times. The blend door actuator is not serviceable and must be replaced if found to be defective.

REMOVAL

(1) Disconnect negative battery cable.

(2) Remove the passengerside hush panel.

(3) Disconnect the electrical connection.

(4) Remove actuator retaining screws and pull actuator straight down (Fig. 20). Note actuator shaft position for installation reference.

INSTALLATION

(1) Install blend door actuator on the housing, making sure the shaft spline is positioned properly with the cam (Fig. 21).

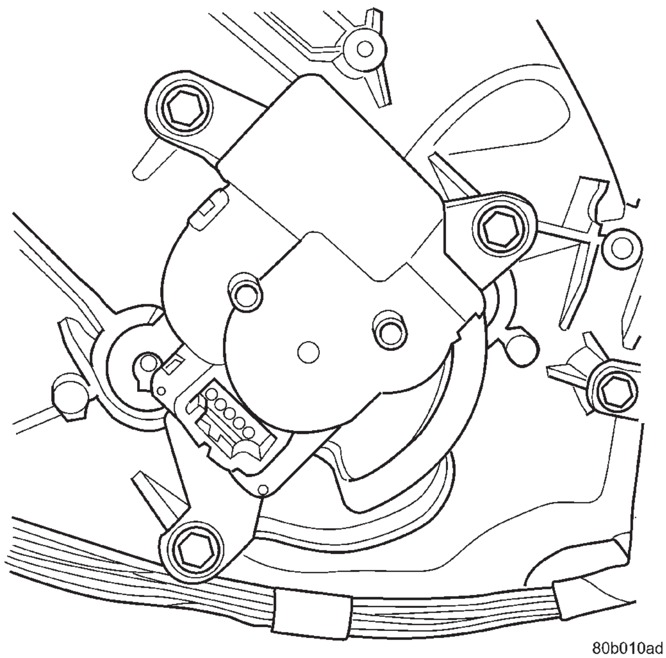

Fig. 20 BLEND DOOR ACTUATOR

(2) Install tighten the actuator mounting.

(3) Connect wire harness connector to the actuator.

(4) Install the passengerside hush panel.

(5) Connect the negative battery cable.

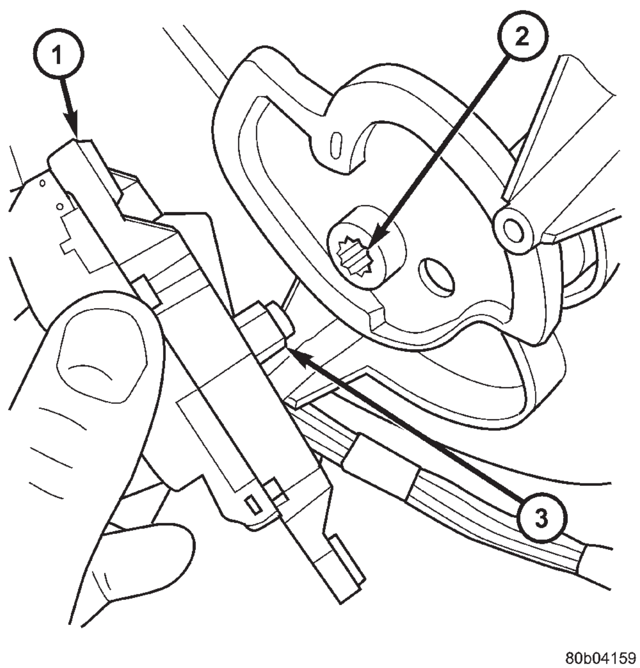

Fig. 21 BLEND ACTUATOR SPLINE

1 - ACTUATOR
2 - CAM SPLINE
3 - ACTUATOR SPLINE

MODE DOOR ACTUATOR

DESCRIPTION

The mode door actuator is a motor/geartrain assembly. It mechanically positions the panel/bi-level door and the heat/defrost door. The actuator is mounted to the bottom of the HVAC housing on the left side.

OPERATION

A potentiometer in the actuator allows the BCM (for both manual and ATC systems) to know the exact position of the doors at all times. The actuator is not serviceable and must be replaced if found to be defective.

REMOVAL

(1) Disconnect battery negative cable.

(2) Remove left silencer panel.

(3) Remove wiring connection from actuator.

(4) Remove mode actuator (Fig. 22) mounting screws and pull actuator straight down. Note actuator shaft position for installation reference.

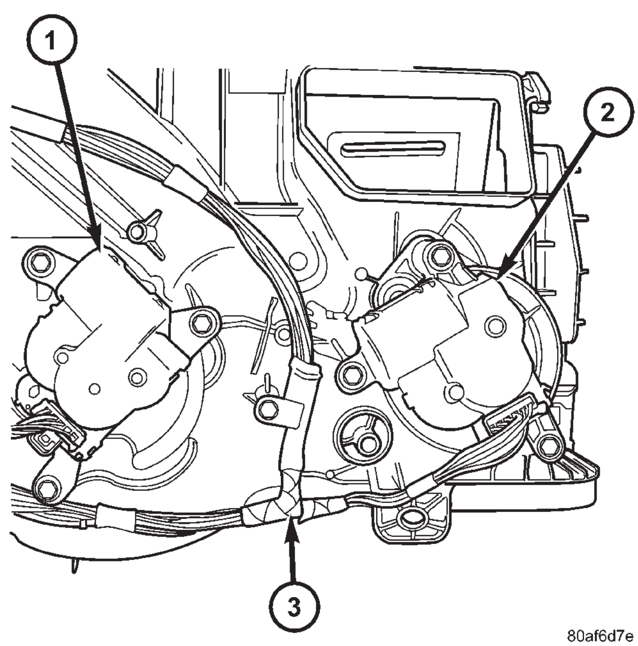

Fig. 22 ACTUATORS

1 - BLEND ACTUATOR
2 - MODE ACTUATOR
3 - HARNESS

MODE DOOR ACTUATOR (Continued)

INSTALLATION

(1) Install mode door actuator on the housing, make sure spline shaft is positioned properly with the cam (Fig. 23).

(2) Install and tighten the mounting screws.

(3) Connect actuator wiring harness to the actuator.

(4) Install console left side panel.

(5) Install left silencer panel.

(6) Connect the negative battery cable.

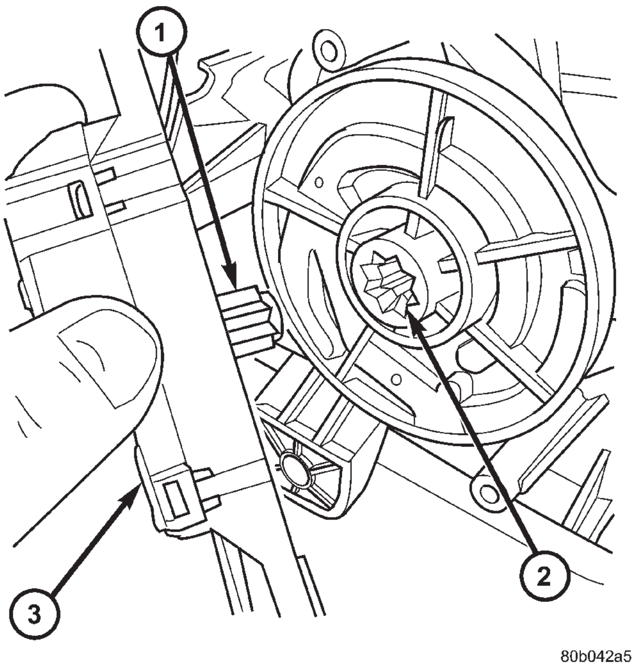

Fig. 23 MODE ACTUATOR SPLINE

1 - ACTUATOR SPLINE
2 - CAM SPLINE
3 - BLEND ACTUATOR

RECIRCULATION DOOR ACTUATOR

DESCRIPTION

The recirculation door actuator is a motor/geartrain assembly. It mechanically positions the recirculation door. The actuator is mounted to the right side of the HVAC housing.

OPERATION

A potentiometer in the actuator allows the BCM (for both manual and ATC systems) to know the exact position of the door at all times. The actuator is not serviceable and must be replaced if found to be defective.

REMOVAL

(1) Disconnect negative battery cable.

(2) Remove the instrument panel. Refer to 23 Body for the procedures.

(3) Remove actuator retaining screws (Fig. 24) and pull actuator straight off. Note actuator shaft position for installation reference.

(4) Disconnect the electrical connection.

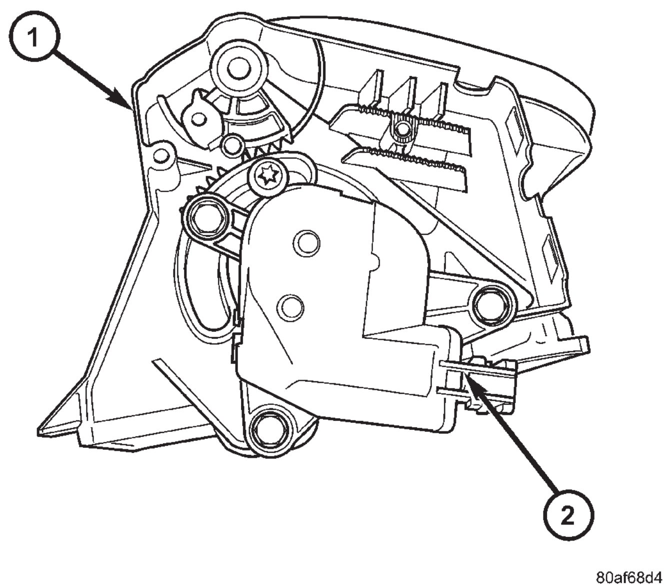

Fig. 24 RECIRCULATION ACTUATOR

1 - RECIRCULATION HOUSING
2 - ACTUATOR

RECIRCULATION DOOR ACTUATOR (Continued)

INSTALLATION

(1) Connect wire harness connector to the recirculation door actuator.

(2) Install recirculation door actuator on the housing, making sure shaft spline is positioned properly with the gear (Fig. 25).

(3) Install and tighten actuator mounting screws.

(4) Install the instrument panel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION)

(5) Connect the negative battery cable.

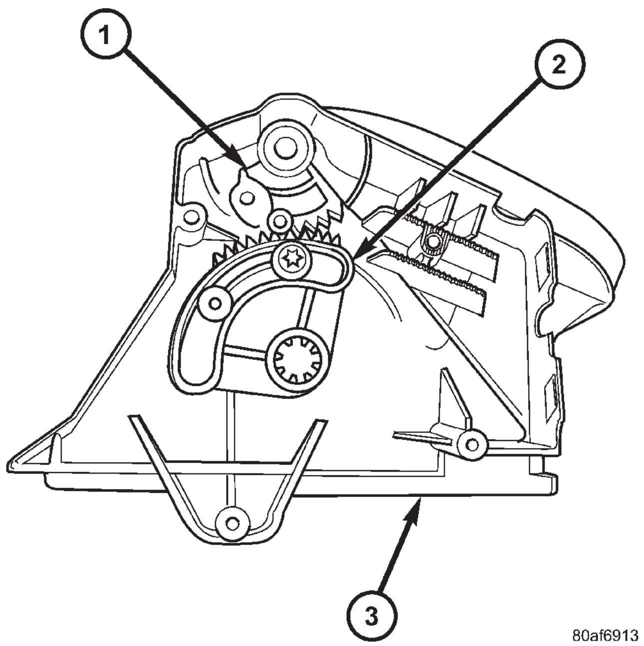

Fig. 25 RECIRCULATION DOOR GEAR

1 - DOOR GEAR
2 - ACTUATOR GEAR
3 - RECIRCULATION HOUSING

BLOWER MOTOR RESISTOR

DESCRIPTION

The blower motor resistor is mounted to the lower right side of the heater-A/C housing in the passenger compartment, where it can be accessed for service.

The blower motor resistor has multiple resistor wires, each of which will change the resistance in the blower motor ground path to change the blower motor speed. The blower motor switch directs the ground path through the correct resistor wire to obtain the selected blower motor speed. The blower motor resistor cannot be repaired and, if faulty or damaged, it must be replaced.

OPERATION

With the blower motor switch in the lowest speed position the ground path for the motor is applied through all of the resistor wires. Each higher speed selected with the blower motor switch applies the blower motor ground path through fewer of the resistor wires, increasing the blower motor speed. When the switch is in the highest speed position, blower motor resistor is bypassed and the blower motor receives a direct path to ground.

DIAGNOSIS AND TESTING-BLOWER MOTOR RESISTOR

The blower motor resistor is located in the passenger compartment on the lower side of the heater-A/C housing.

The blower motor resistor can be tested without removing it from its mounting position. For circuit descriptions and diagrams, (Refer to 8 - ELECTRICAL/WIRING DIAGRAM INFORMATION - DESCRIPTION).

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Unplug the wire harness connector from the blower motor resistor.

(3) Check for continuity between each of the blower motor switch input terminals of the resistor and the resistor output terminal. In each case there should be continuity. If OK, repair the wire harness circuits between the blower motor switch and the blower motor resistor or blower motor as required. If not OK, replace the faulty blower motor resistor.

REMOVAL

(1) Remove lower right silencer panel.

(2) Disconnect wiring connectors (Fig. 26) from resistor.

(3) Remove blower resistor mounting screws.

(4) Pull blower motor resistor out of HVAC housing.

BLOWER MOTOR RESISTOR (Continued)

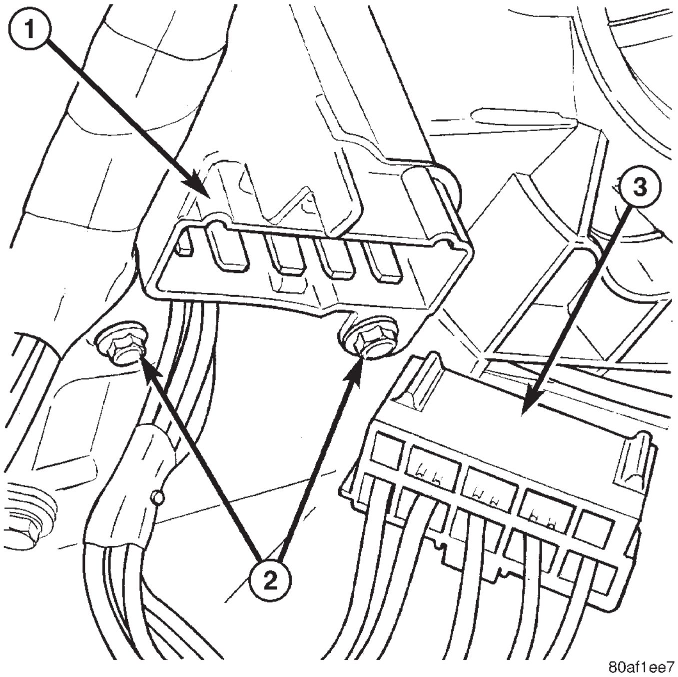

Fig. 26 RESISTOR BLOCK

1 - RESISTOR
2 - MOUNTING SCREWS
3 - CONNECTOR

INSTALLATION

(1) Install blower resistor into HVAC housing.

(2) Install and tighten the two resistor mounting screws.

(3) Connect resistor wiring harness.

(4) Install right silencer panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).

THERMAL LIMITER SWITCH

DESCRIPTION

The thermal limiter switch measures compressor surface temperature. If compressor surface temperature is excessive, the switch cuts battery feed to the compressor clutch coil. The switch will reset itself, once compressor surface temperature returns to normal. The switch is not adjustable or serviceable, if faulty the compressor must be replaced.

OPERATION

The thermal limiter switch interrupts battery feed to the compressor clutch coil when temperature reaches 122 - 128° C (250 - 260° F). The switch restores clutch coil battery feed when the temperature drops to 104 - 116° C (220 - 240° F).

DIAGNOSIS AND TESTING - THERMAL LIMITER SWITCH

(1) Unplug Thermal Limiter connector.

(2) With an ohmmeter, check for continuity between the two terminals. If no continuity is present replace compressor.

(3) The Thermal Limiter is calibrated to open and close at:

- Open circuit (no continuity) Temperature: 122 - 128°C (252 - 262°F)
- Close circuit (continuity) Temperature: 106 - 116°C (225 - 235°F)

NOTE: The thermal limiter switch is not serviceable. If the switch fails, the compressor must be replaced.

DISTRIBUTION

TABLE OF CONTENTS

BLOWER MOTOR

REMOVAL

(1) Disconnect negative battery cable.
(2) Remove lower right silencer panel.
(3) Remove blower motor connector.
(4) Remove the three blower motor mounting screws.
(5) Remover blower motor (Fig. 1) from housing.

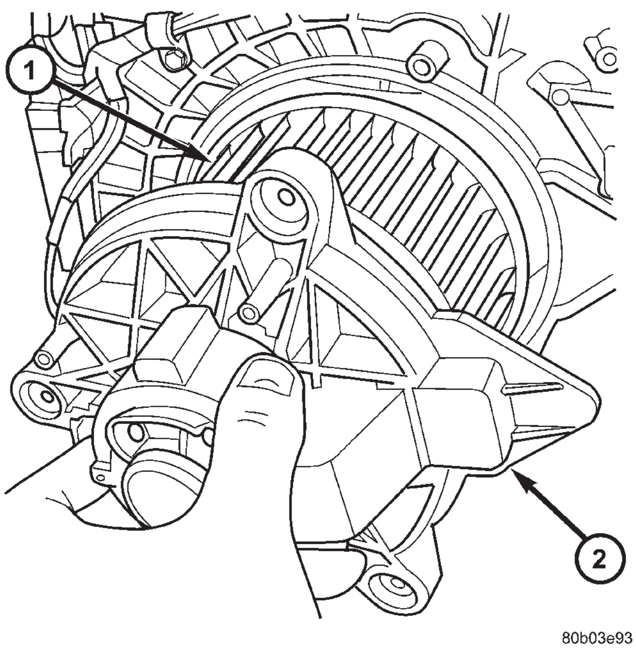

Fig. 1 BLOWER MOTOR

1 - BLOWER WHEEL
2 - BLOWER MOTOR

INSTALLATION

(1) Install blower motor into the housing.
(2) Install the three blower motor mounting screws.
(3) Connect blower motor wiring harness.
(4) Install silencer panel.

HVAC HOUSING

DESCRIPTION

The HVAC housing is mounted under the instrument panel to the dash panel. It houses the heater core, evaporator coil, blower motor and a series of doors. The doors are used to direct air from the blower motor to verious duct and through the heater core/evaporator coil.

OPERATION

The system draws outside air through the cowl opening at the base of the windshield. It then flows into the plenum chamber above the Heater A/C unit housing and passes through the evaporator. At this point airflow can be directed either through or around the heater core. This is done by adjusting the blend-air door with the TEMP control on the control head. After the air passes the blend air door, the air flow is then directed from the PANEL, BI-LEVEL (panel and floor), and FLOOR-DEFROST outlets. Air flow velocity can be adjusted with the blower speed selector switch on the control head.

Ambient air intake can be shut off by closing the recirculating air door. This will recirculate the air that is already inside the vehicle. Rotating the MODE control knob to the Defrost/Floor or Defrost setting on the control head will engage the compressor. This will send refrigerant through the evaporator, and remove heat and humidity from the air before it goes through the heater core.

HVAC HOUSING (Continued)

REMOVAL

(1) Remove negative battery cable.

(2) Recover refrigerant from A/C system with R134a refrigerant recovery machine.

(3) Drain the engine cooling system.(Refer to 7 - COOLING/ENGINE - SERVICE PROCEDURE).

(4) Remove heater hoses from heater core.

NOTE: Plug core tubes to prevent antifreeze from spilling on vehicle interior during removal.

(5) Remove quick connect clips from A/C lines at the expansion valve.

(6) Remove A/C lines from expansion valve with Quick Connectors Tool Kit 7193.

(7) Remove expansion valve mounting bolts and remove valve.

NOTE: Cap the A/C lines and evaporator to prevent moisture from entering the refrigerant system.

(8) Remove floor console (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL).

(9) Remove rear heat ducts.

(10) Remove nuts securing HVAC housing to dash panel under the hood.

(11) Remove the instrument panel and HVAC housing as an assembly(Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).

(12) Disconnect HVAC wiring connect from left side of the housing.

(13) Remove nuts mounting HVAC housing to dash panel.

DISASSEMBLY

(1) Disconnect recirculation actuator wiring connector.

(2) Remove recirculation housing mounting screws from the HVAC housing.

(3) Remove recirculation housing from HVAC housing.

(4) Remove recirculation actuator (Fig. 2) mounting screws and remove actuator.

(5) Remove recirculation actuator gear (Fig. 3) mounting screw and remove gear.

(6) With a small screw driver, depress recirculation door gear release (Fig. 4) and remove gear.

(7) Tilt the gear end of the recirculation door up and pull the door out of the housing.

(8) Remove blower motor wiring connector.

(9) Remove blower motor mounting screws and remove motor.

(10) Remove HVAC harness connector (Fig. 5) from the top of the housing.

(11) Remove seal (Fig. 6) from evaporator coil inlet/outlet.

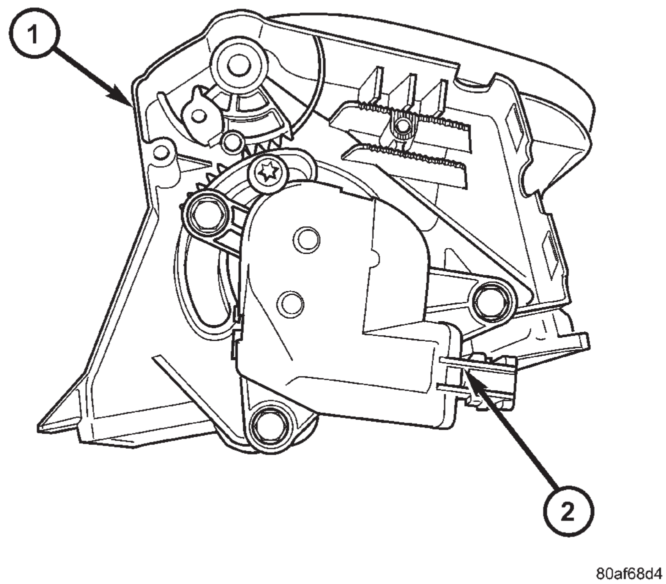

Fig. 2 RECIRCULATION ACTUATOR

1 - RECIRCULATION HOUSING
2 - ACTUATOR

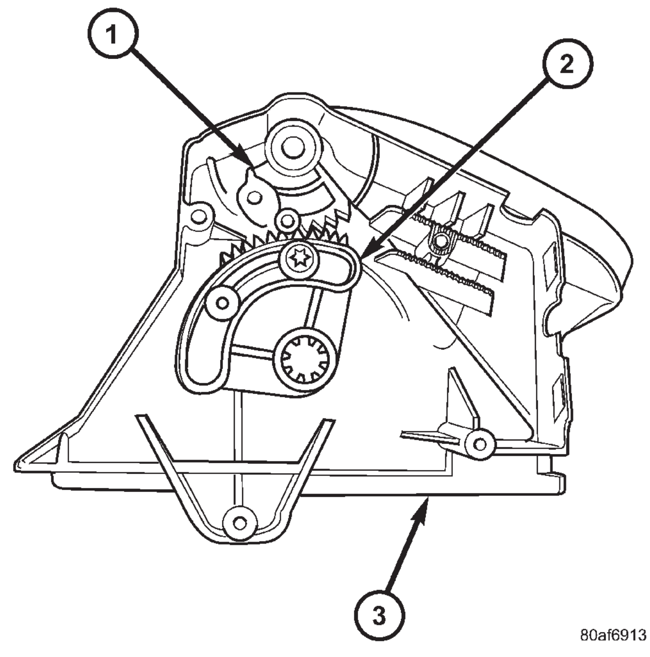

Fig. 3 RECIRCULATION DOOR GEAR

1 - DOOR GEAR
2 - ACTUATOR GEAR
3 - RECIRCULATION HOUSING

(12) Remove retaining screws from the top of the housing.

HVAC HOUSING (Continued)

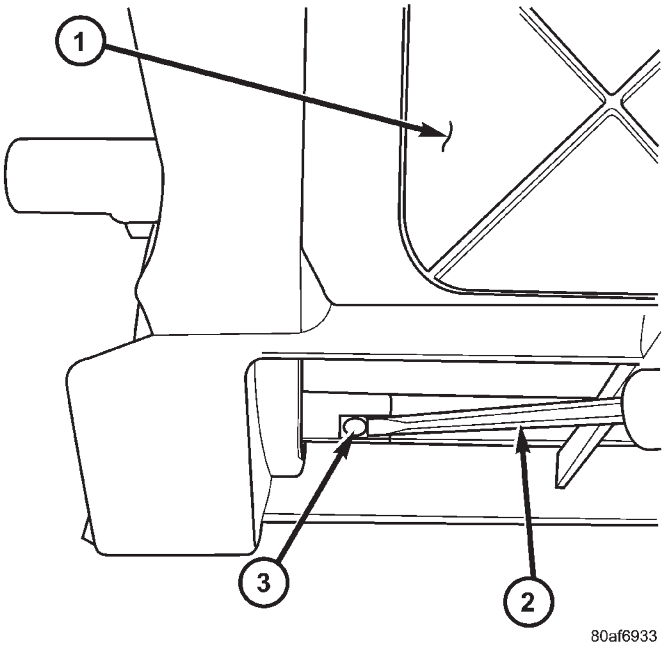

Fig. 4 RECIRCULATION DOOR

1 - DOOR
2 - SCREW DRIVER
3 - DOOR RELEASE

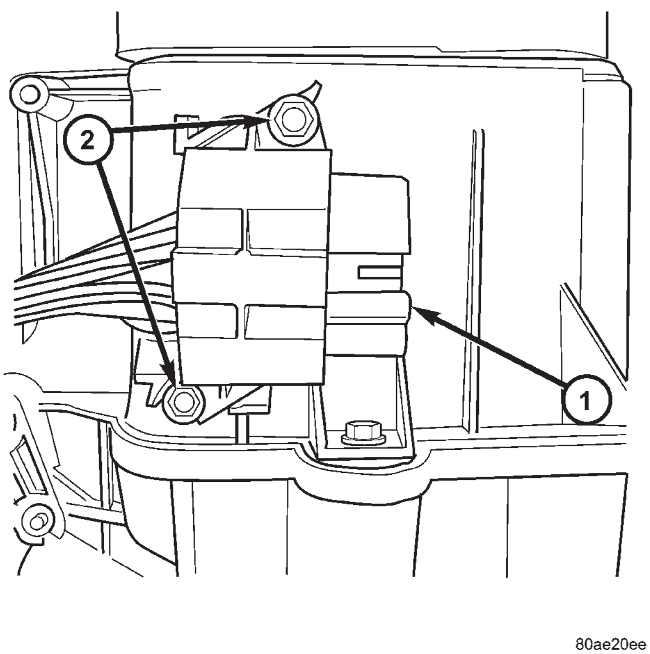

Fig. 5 HVAC HARNESS

1 - CONNECTOR
2 - MOUNTING SCREWS

(13) Separate the top housing from the bottom housing (Fig. 7).

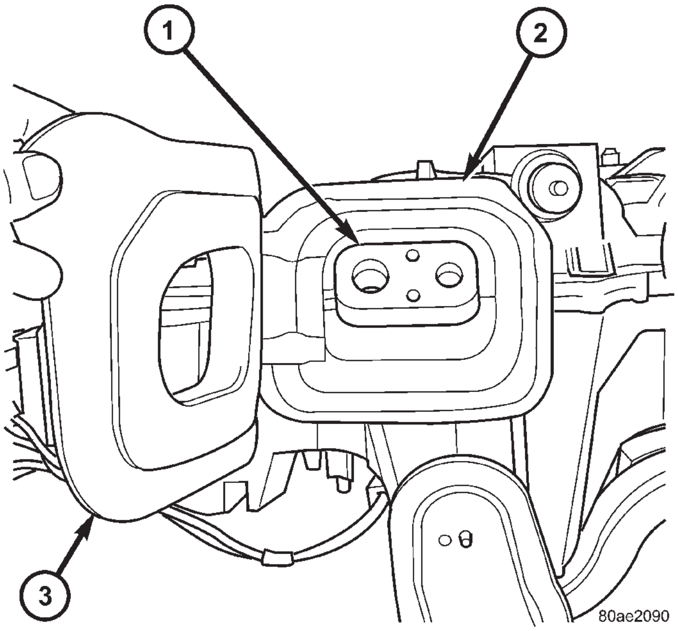

Fig. 6 EVAPORATOR SEAL

1 - EVAPORATOR
2 - HOUSING
3 - EVAPORATOR SEAL

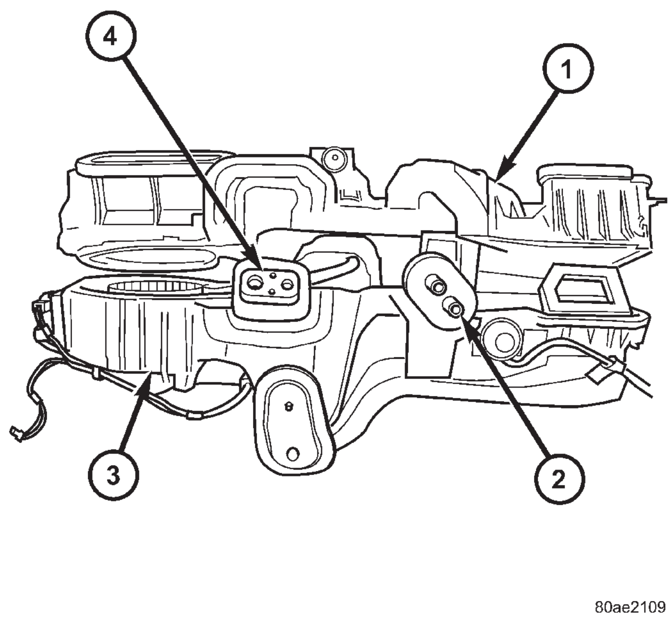

Fig. 7 HVAC HOUSING

1 - TOP HOUSING
2 - HEATER CORE
3 - BOTTOM HOUSING
4 - EVAPORATOR COIL

HVAC HOUSING (Continued)

(14) Remove evaporator temperature sensor (Fig. 8).

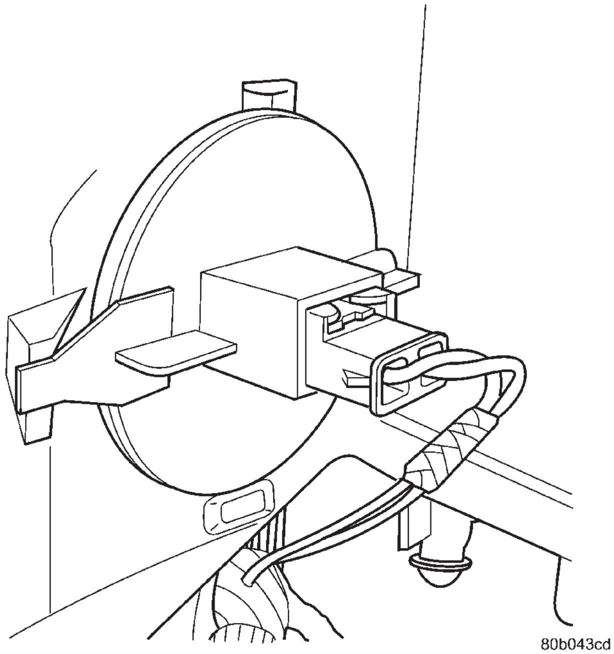

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Fig. 8 EVAPORATOR TEMPERATURE SENSOR

(15) Lift evaporator (Fig. 9) out of the bottom housing.

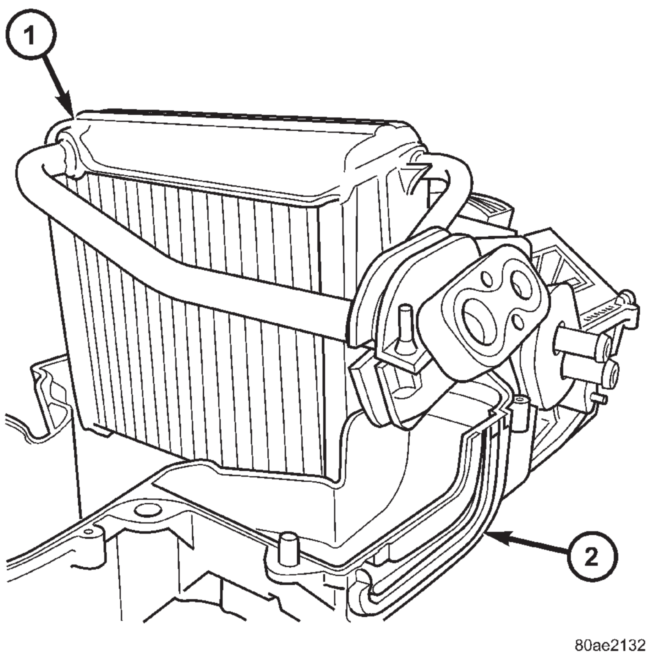


Fig. 9 EVAPORATOR COIL

1 - EVAPORATOR
2 - BOTTOM HOUSING

(16) Lift heater core (Fig. 10) out of the bottom housing.

(17) Disconnect blower resistor wiring connector/ ATC blower motor power module wiring connectors.

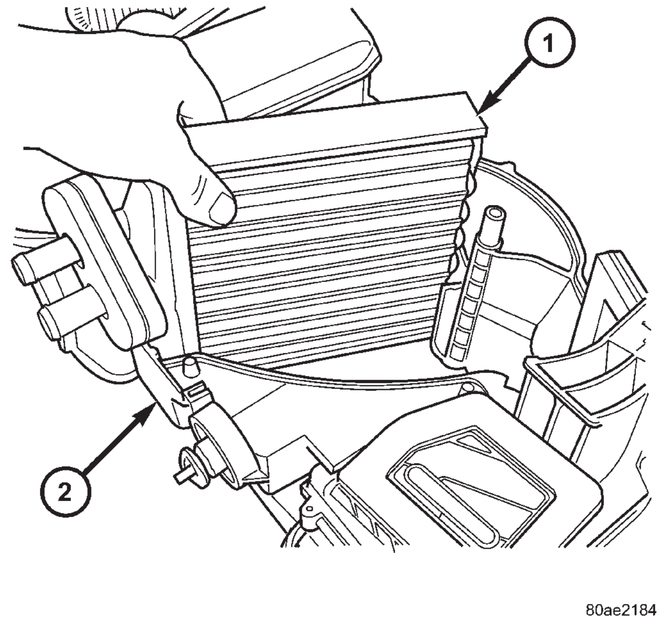


Fig. 10 HEATER CORE

1 - HEATER CORE
2 - BOTTOM HOUSING

(18) Remove blower resistor (Fig. 11) mounting screws /ATC blower motor power module (Fig. 12) mounting screws.

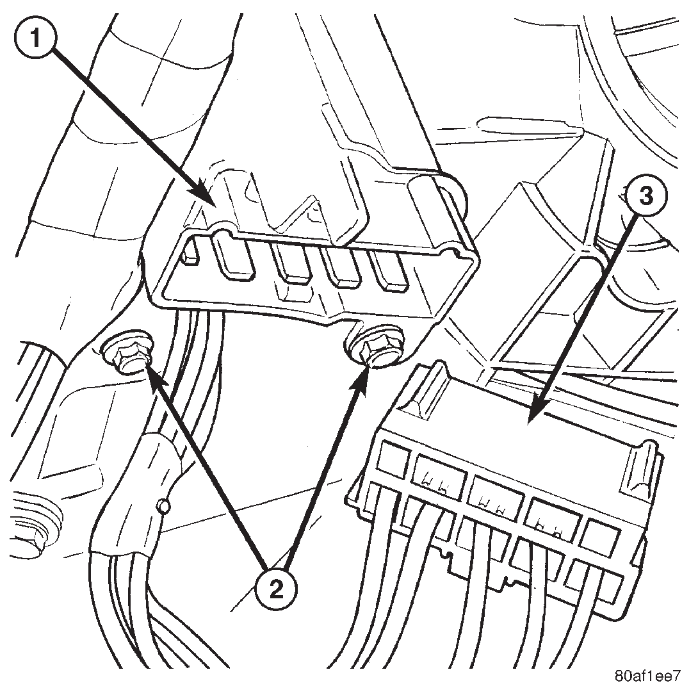


Fig. 11 RESISTOR BLOCK

1 - RESISTOR
2 - MOUNTING SCREWS
3 - CONNECTOR

HVAC HOUSING (Continued)

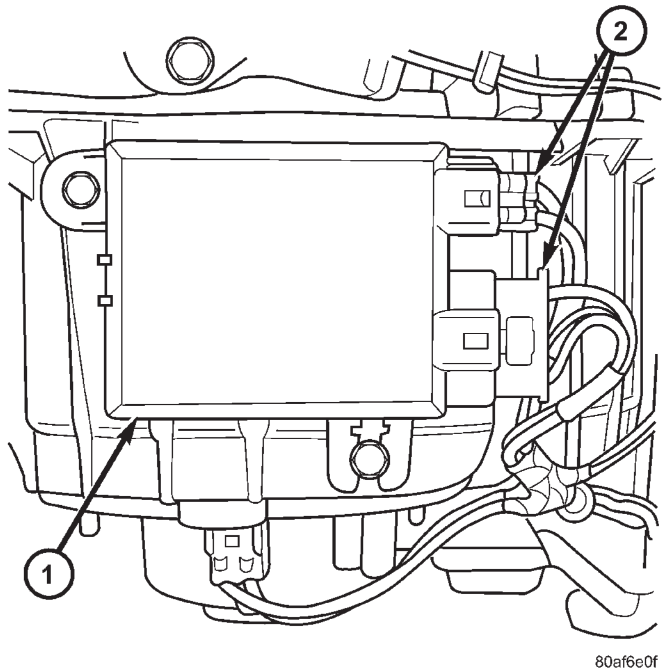


Fig. 12 BLOWER POWER MODULE

1 - MODULE
2 - CONNECTORS

(19) Remove resistor from the bottom of the housing or ATC module from the side of the housing if equipped.

(20) Remove lower heater duct (Fig. 13) screws and remove duct from the bottom housing.

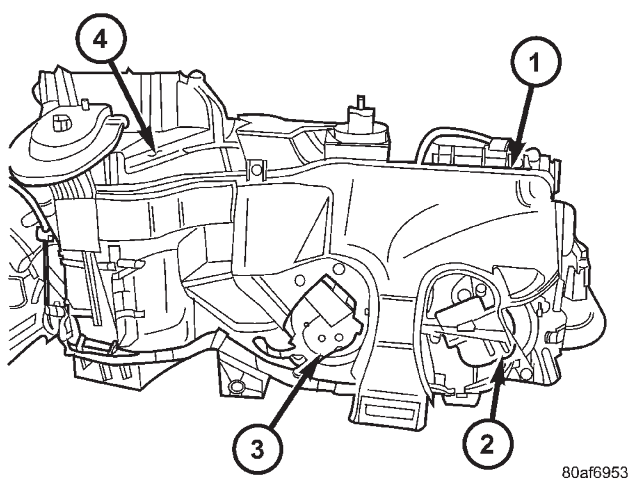


Fig. 13 LOWER HEATER DUCT

1 - HEATER DUCT
2 - MODE ACTUATOR
3 - BLEND ACTUATOR
4 - BOTTOM HOUSING

(21) Disconnect mode door actuator and blend door actuator wiring connectors (Fig. 14).

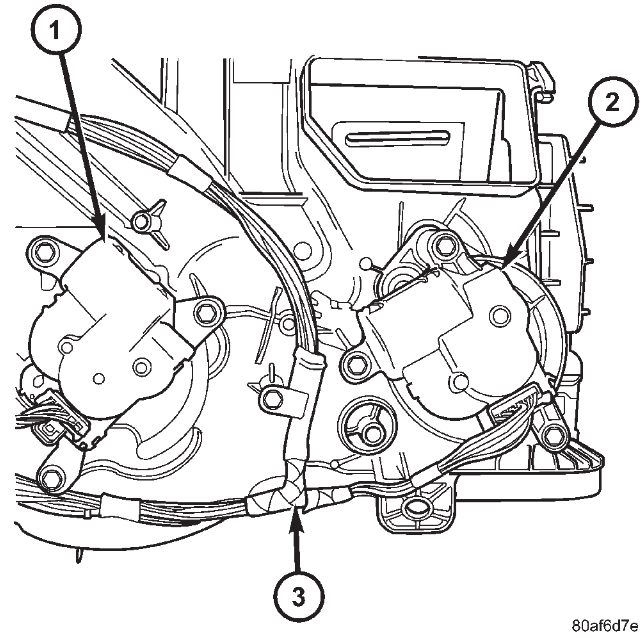


Fig. 14 ACTUATORS

1 - BLEND ACTUATOR
2 - MODE ACTUATOR
3 - HARNESS

(22) Remove mode door actuator mounting screws and remove actuator.

(23) Remove mode door actuator cam (Fig. 15).

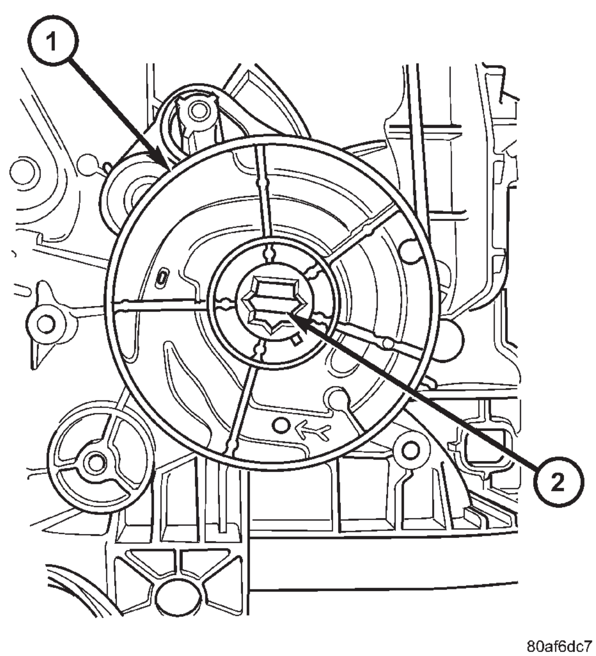


Fig. 15 MODE ACTUATOR CAM

1 - CAM
2 - CAM SPLINE

(24) Remove heat/defrost door lever mounting screw (Fig. 16).

HVAC HOUSING (Continued)

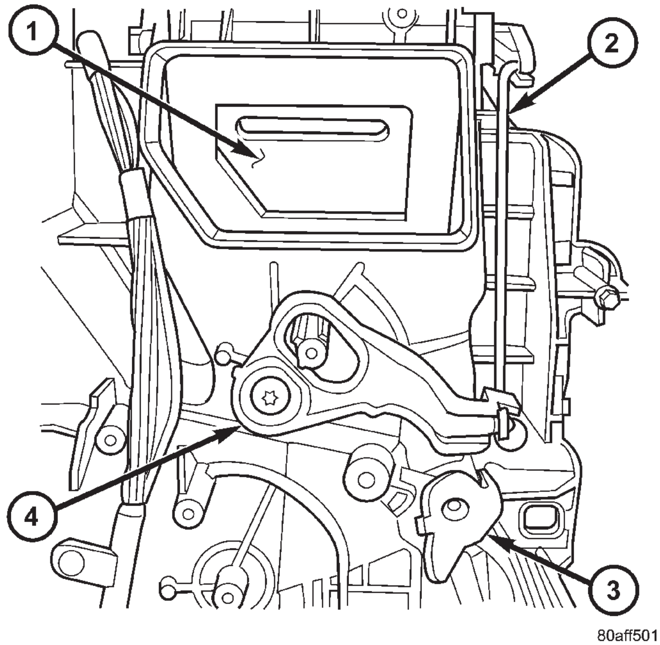


Fig. 16 DEFROSTER DOOR LEVER

1 - HEAT/DEFROST DOOR
2 - LINK
3 - PANEL/BI-LEVEL DOOR LEVER
4 - HEAT/DEFROST DOOR LEVER

(25) Remove heat/defrost door lever, link and door assembly (Fig. 17).

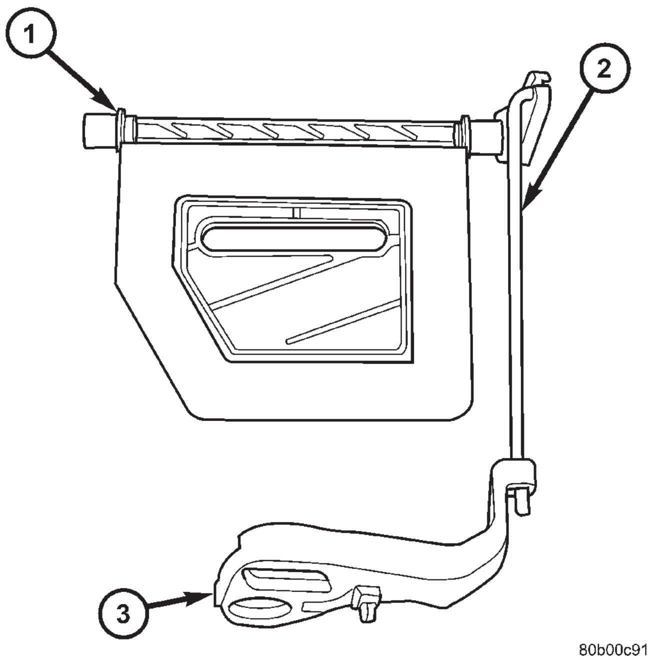


Fig. 17 HEAT/DEFROST DOOR ASSEMBLY

1 - HEAT/DEFROST DOOR
2 - LINK
3 - LEVER

(26) Pull panel/bi-level door lever off door (Fig. 18).

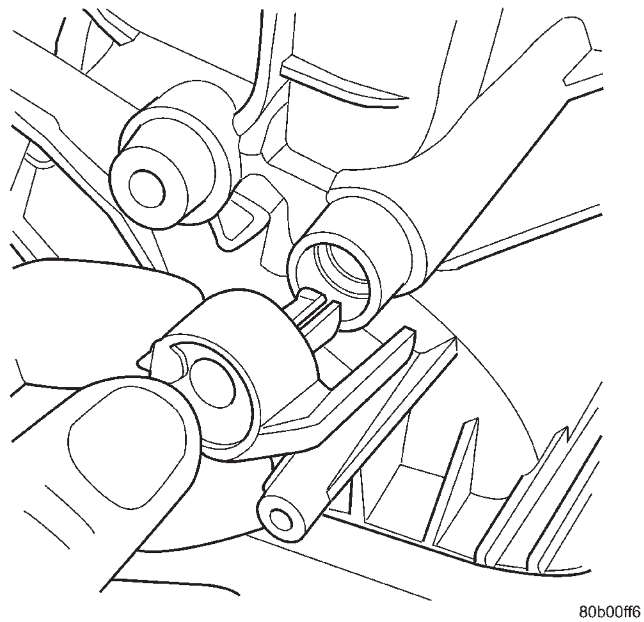


Fig. 18 PANEL/BI-LEVEL DOOR LEVER

(27) Remove panel/bi-levl door and air deflector from the bottom housing (Fig. 19).

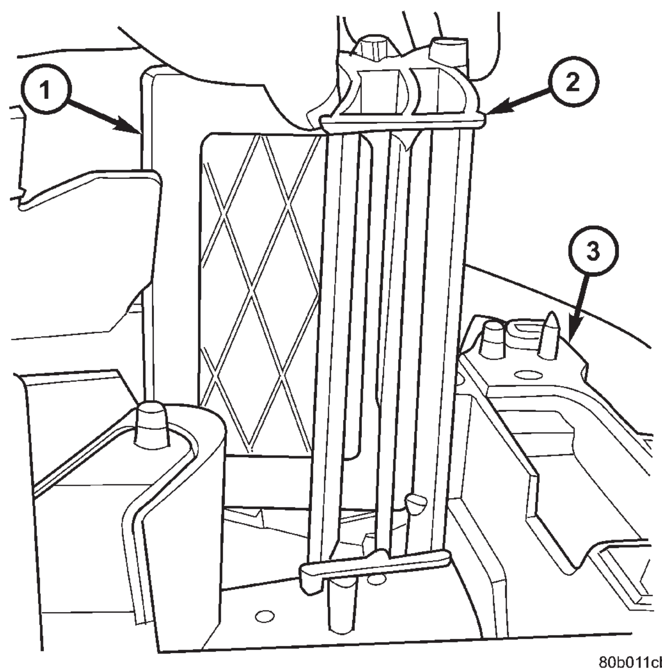


Fig. 19 PANEL/BI-LEVEL DOOR ASSEMBLY

1 - PANEL/BI-LEVEL DOOR
2 - TURNING VANES
3 - BOTTOM HOUSING

HVAC HOUSING (Continued)

(28) Remove blend door actuator mounting screws (Fig. 20) and remove actuator.

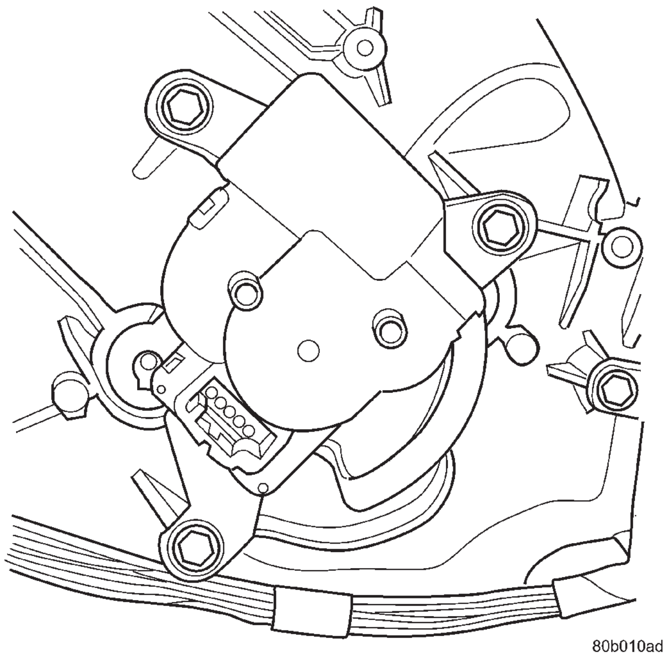


Fig. 20 BLEND DOOR ACTUATOR

(29) Remove blend door actuator cam.

NOTE: The cam (Fig. 21) must be in the correct position for removal.

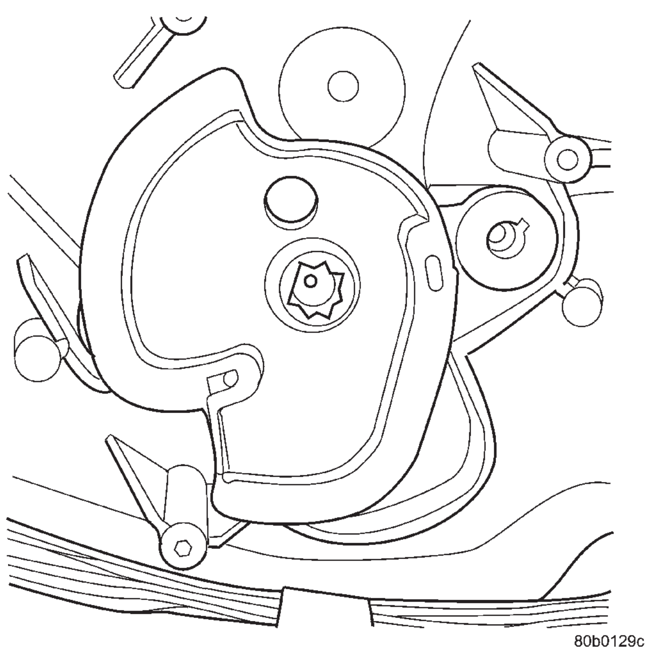


Fig. 21 BLEND DOOR ACTUATOR CAM

(30) With a small screw driver, depress blend door release (Fig. 22) and remove lever and door.

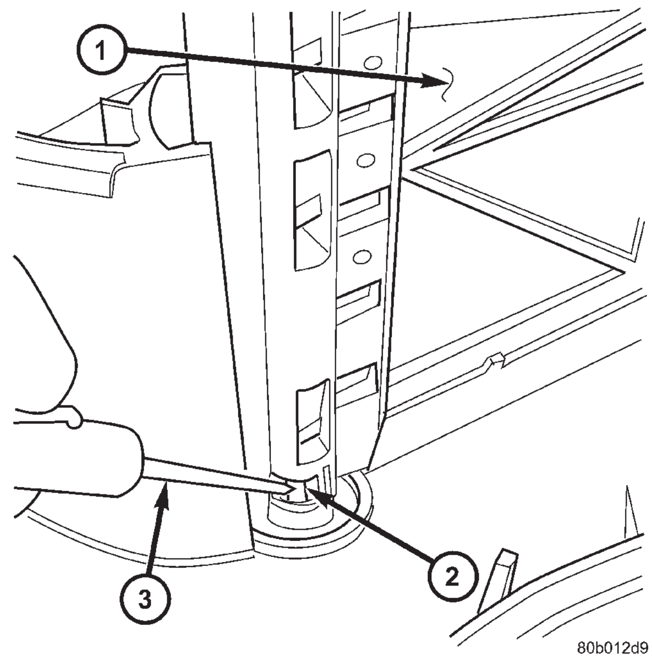


Fig. 22 BLEND DOOR RELEASE

1 - BLEND DOOR
2 - LEVER RELEASE
3 - SCREW DRIVER

(31) Pull other blend door lever off and remove lever and door.

ASSEMBLY

(1) Install blend doors and levers into the bottom housing.

(2) Align blend actuator cam and lever followers (Fig. 23) and install cam.

NOTE: Rotate cam until it drops into the housing. The cam must be in the correct position to install.

(3) Align blend actuator spline with cam spline (Fig. 24) and install actuator.

(4) Install blend actuator mounting screws and plug in wiring connector.

(5) Install panel/bi-level door and air deflector (Fig. 25) into the housing.

NOTE: Center vain of the air deflector must seat in the bottom housing locating tabs.

(6) Install panel/bi-level door lever into bottom of the door shaft.

HVAC HOUSING (Continued)

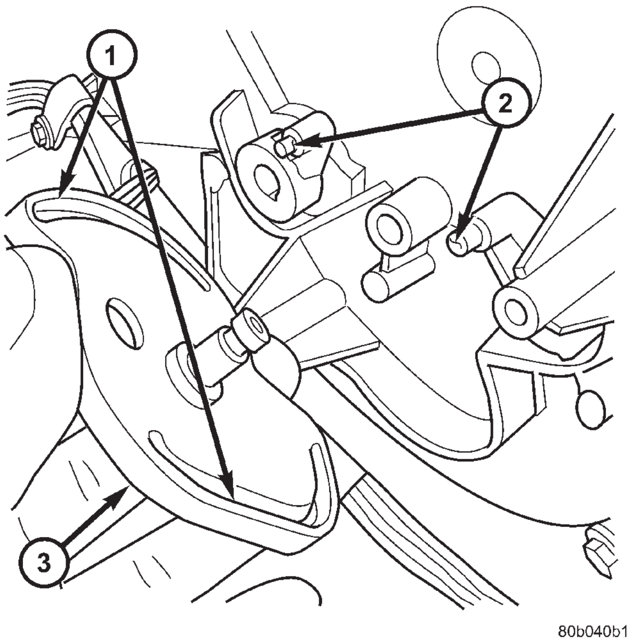


Fig. 23 BLEND CAM FOLLOWERS

1 - CAM GUIDES
2 - FOLLOWERS
3 - ACTUATOR

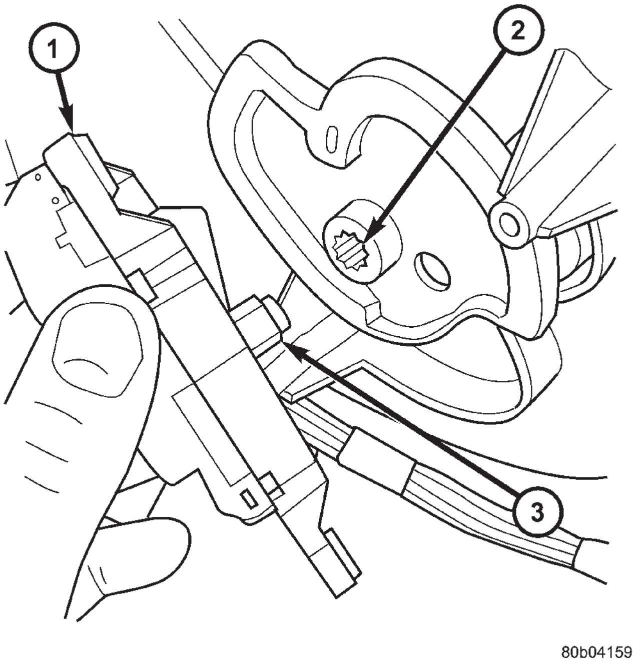


Fig. 24 BLEND ACTUATOR SPLINE

1 - ACTUATOR
2 - CAM SPLINE
3 - ACTUATOR SPLINE

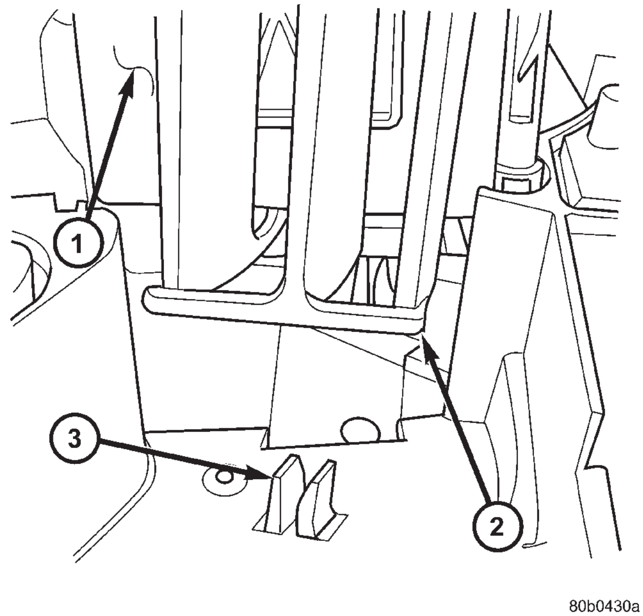


Fig. 25 PANEL/BI-LEVEL DOOR AND AIR DEFLECTOR

1 - PANEL/BI-LEVEL DOOR
2 - TURNING VANES
3 - LOCATING TABS

(7) Install heat/defrost door, link and lever (Fig. 26).

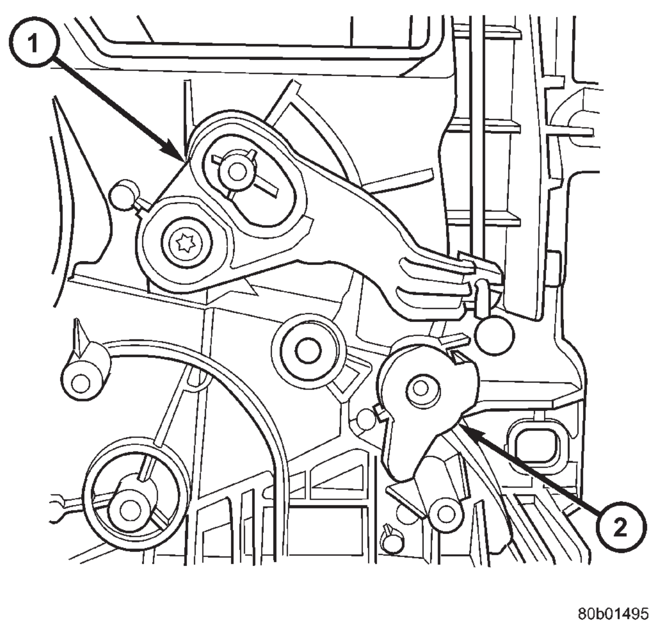


Fig. 26 MODE DOOR LEVERS

1 - HEAT/DEFROST LEVER
2 - PANEL/BI-LEVEL LEVER

HVAC HOUSING (Continued)

(8) Align mode door cam with lever followers (Fig. 27) and install cam.

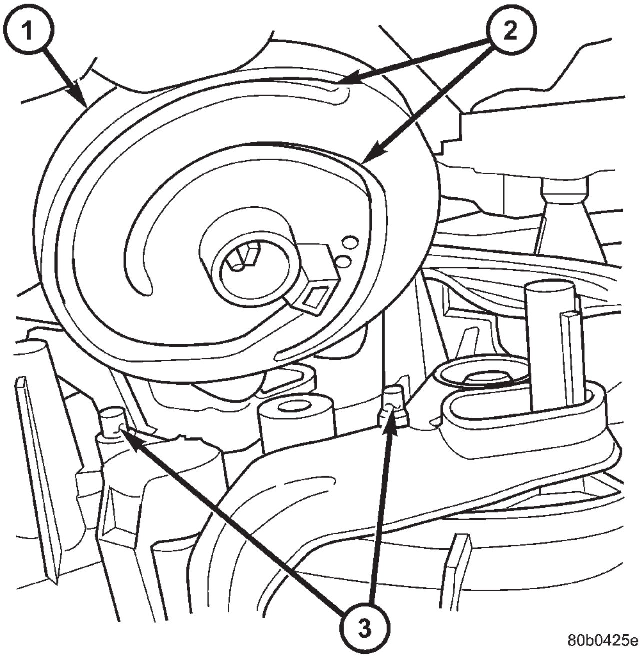


Fig. 27 MODE CAM FOLLOWERS

1 - CAM
2 - GUIDES
3 - FOLLOWERS

(9) Align mode actuator spline with cam spline (Fig. 28) and install actuator.

(10) Install mode actuator mounting screws and plug in wiring connector.

(11) Install blower motor (Fig. 29) into the bottom housing.

(12) Install blower mounting screws and plug in wiring connector.

(13) Install blower resistor into the bottom of the housing (Fig. 30) or ATC blower motor power onto the side of the housing.

(14) Install blower resistor/blower motor power module mounting screws and plug in wiring connector/connectors.

(15) Install lower heat duct (Fig. 31) and mounting screws.

(16) Install evaporator coil (Fig. 32) into the bottom housing.

(17) Install evaporator temperature sensor.

(18) Install heater core (Fig. 33) into the bottom housing.

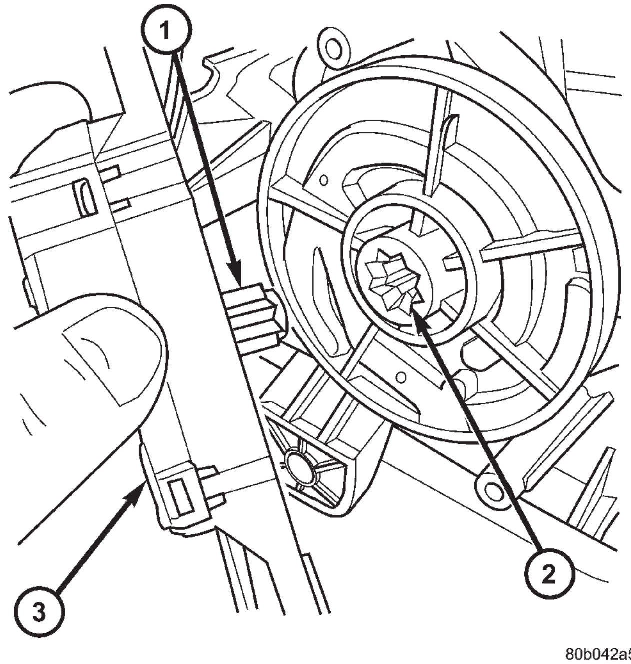


Fig. 28 MODE ACTUATOR SPLINE

1 - ACTUATOR SPLINE
2 - CAM SPLINE
3 - BLEND ACTUATOR

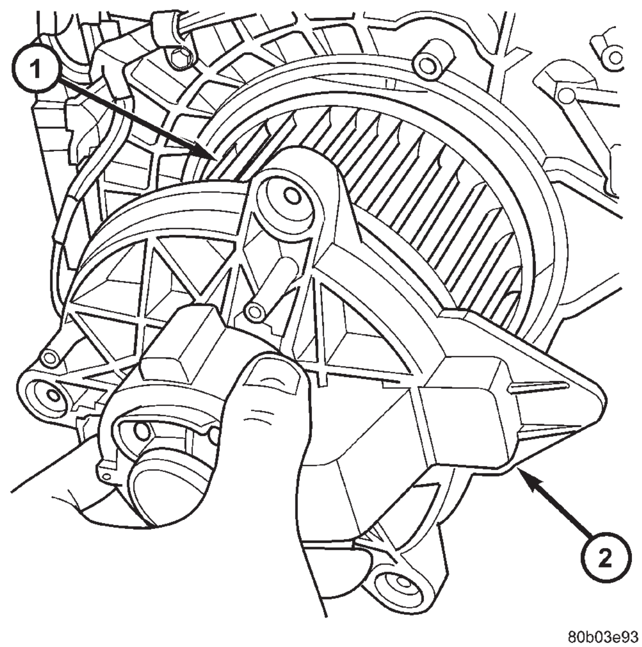


Fig. 29 BLOWER MOTOR

1 - BLOWER WHEEL
2 - BLOWER MOTOR

HVAC HOUSING (Continued)

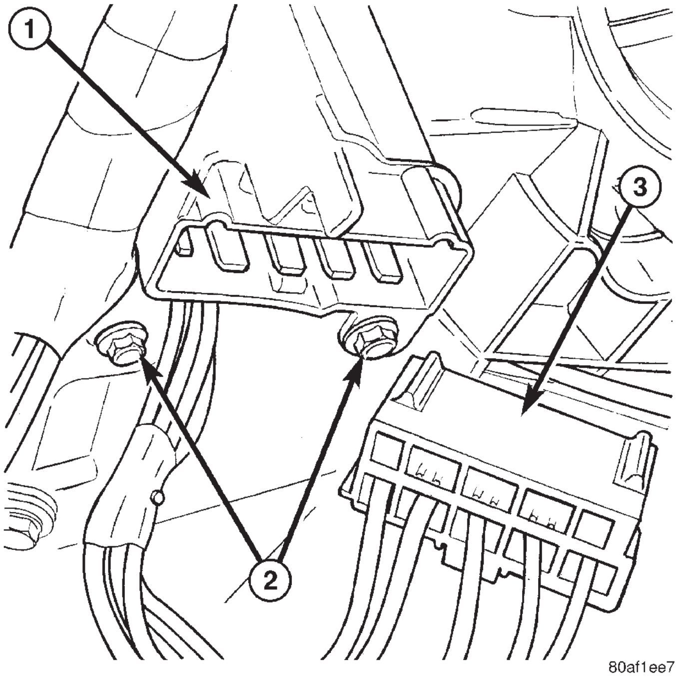


Fig. 30 RESISTOR BLOCK

1 - RESISTOR
2 - MOUNTING SCREWS
3 - CONNECTOR

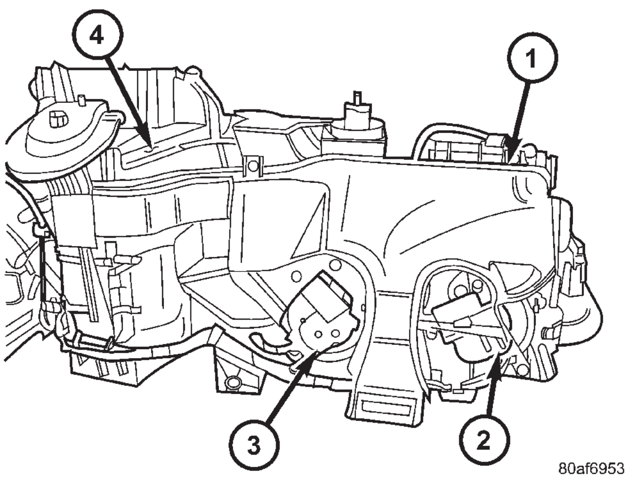


Fig. 31 LOWER HEATER DUCT

1 - HEATER DUCT
2 - MODE ACTUATOR
3 - BLEND ACTUATOR
4 - BOTTOM HOUSING

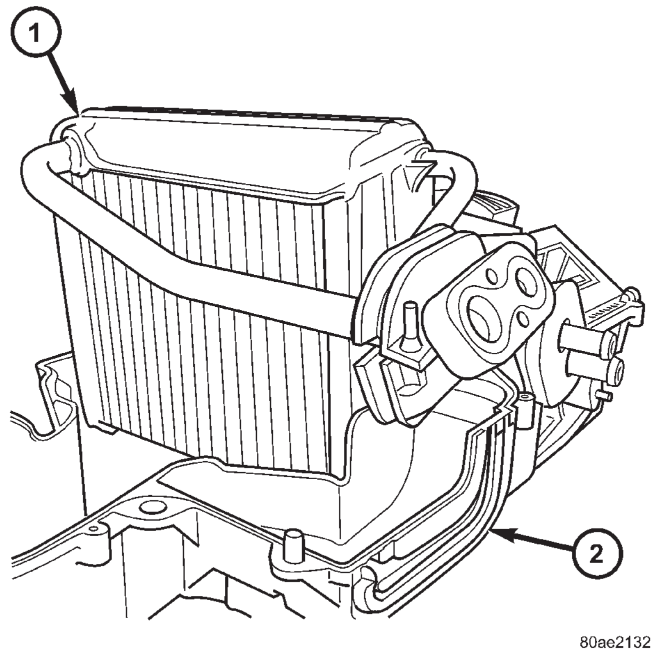


Fig. 32 EVAPORATOR COIL

1 - EVAPORATOR
2 - BOTTOM HOUSING

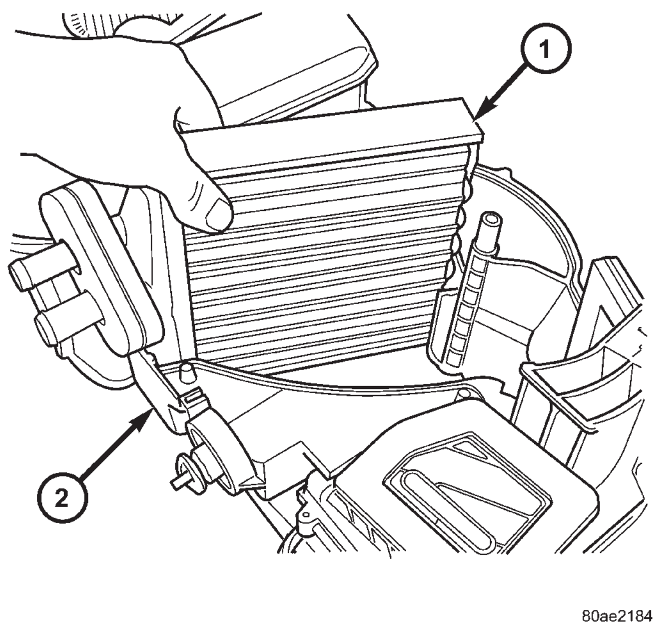


Fig. 33 HEATER CORE

1 - HEATER CORE
2 - BOTTOM HOUSING

HVAC HOUSING (Continued)

(19) Install and align the top of the housing with the door shafts (Fig. 34).

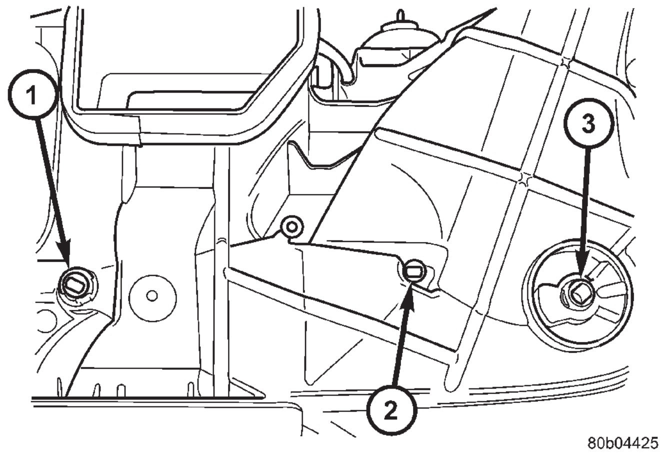


Fig. 34 DOOR SHAFTS

1 - PANEL/BI-LEVEL DOOR SHAFT
2 - BLEND DOOR SHAFT
3 - BLEND DOOR SHAFT

(20) Install top housing mounting screws.
(21) Install evaporator inlet/outlet seal (Fig. 35).

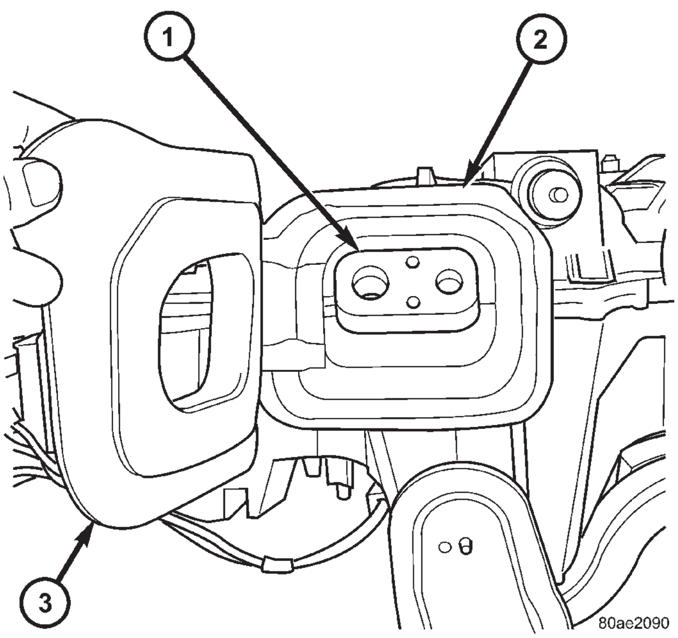


Fig. 35 EVAPORATOR SEAL

1 - EVAPORATOR
2 - HOUSING
3 - EVAPORATOR SEAL

(22) Install recirculation door into the recriculation housing.
(23) Install recirculation door gear onto the door shaft.
(24) Align and install recirculation actuator gear (Fig. 36) with the door gear and install retaining screw.

NOTE: Gears must be align properly to operate.

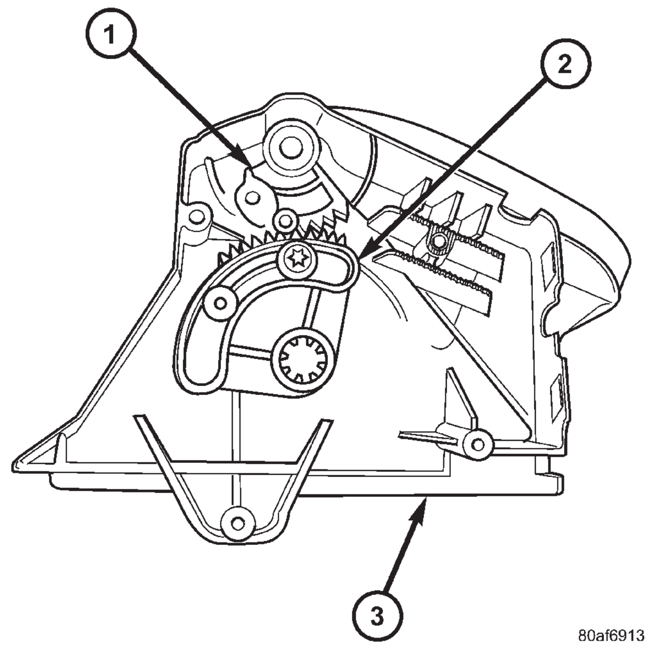


Fig. 36 RECIRCULATION DOOR GEAR

1 - DOOR GEAR
2 - ACTUATOR GEAR
3 - RECIRCULATION HOUSING

(25) Align recirculation actuator spline with the actuator gear spline and install actuator (Fig. 37).
(26) Install recirculation actuator mounting screws.
(27) Install recirculation housing onto the top housing and install mounting screws.
(28) Plug in recirculation actuator wiring connector.

INSTALLATION

(1) Align HVAC housing with instrument panel and install mounting nuts.
(2) Make sure the defrost, demist and lower center panel ducts are lined up and or properly connected with the HVAC outlets.

HVAC HOUSING (Continued)

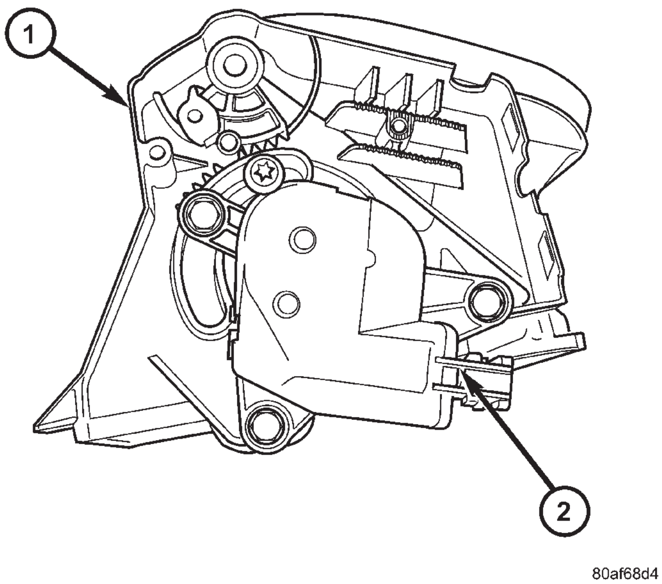


Fig. 37 RECIRCULATION ACTUATOR

1 - RECIRCULATION HOUSING
2 - ACTUATOR

(3) Connect HVAC wiring harness

(4) Make sure the drain tube and evaporator seals are properly seated to the HVAC housing before installing the Instrument Panel and HVAC assembly into the vehicle.

(5) Install instrument panel and HVAC housing assembly(Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).

(6) Install nuts securing HVAC housing to dash panel under the hood.

(7) Install rear heat ducts.

(8) Install console. (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION).

(9) Install expansion valve and tighten mounting bolts.

(10) Install A/C lines to expansion valve with **new** O-rings.

(11) Install quick connect clips to A/C lines.

(12) Install heater hoses to heater core.

(13) Install negative battery cable.

(14) Fill engine cooling system (Refer to 7 - COOLING/ENGINE - SERVICE PROCEDURE).

(15) Evacuate and charge A/C system with R134a refrigerant recovery machine.

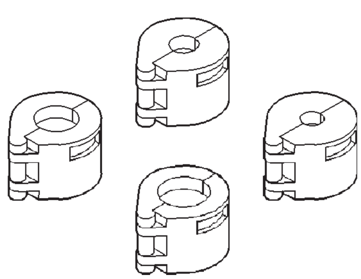
PLUMBING

TABLE OF CONTENTS

PLUMBING

SPECIAL TOOLS

AIR CONDITIONING



A/C Line Disconnect Tool 7193

A/C COMPRESSOR

DESCRIPTION

The TRS90 is a fixed displacement type compressor. The compressor uses an integral thermal limiter switch to protect it from overheating. A high pressure relief valve located on the rear of the compressor housing is designed to protect the system from excessive pressure. The system uses polyalkylene glycol synthetic wax-free refrigerant oil SP-15 PAG.

OPERATION

The compressor is driven by the engine through an electric clutch, drive pulley and belt. The compressor is lubricated by refrigerant oil that is circulated throughout the system with the refrigerant. The compressor draws in low-pressure refrigerant vapor from the evaporator through its suction port. It then com-

A/C COMPRESSOR (Continued)

presses the refrigerant into a high-pressure, high-temperature refrigerant vapor, which is then pumped to the condenser through the compressor discharge port.

A high pressure relief valve is located on the rear surface of the compressor housing. The high pressure relief valve vents the system when a discharge pressure of 3445 - 4135 kPa (500 - 600 psi) or above is reached. The valve closes with a minimum discharge pressure of 2756 kPa (400 psi) is reached. This prevents damage to the compressor and other system components. The compressor and relief valve cannot be repaired and must be replaced if damaged.

DIAGNOSIS AND TESTING - A/C COMPRESSOR

When investigating an air conditioning related noise, you must first know the conditions when the noise occurs. Some possible conditions are weather, vehicle speed, in or out of gear and engine temperature.

Noises that develop during air conditioning operation can often be misleading. For example, what sounds like a failed front engine bearing or connecting rod may be caused by loose bolts, mounting brackets or loose clutch assembly. Improper drive belt tension can cause a misleading noise when compressor is engaged. The noise may not occur when compressor is disengaged.

Drive belt(s) are speed sensitive. At different engine speeds and depending upon belt tension, belt(s) can develop noises that are mistaken for a compressor noise.

(1) Select a quiet area for testing. Duplicate conditions as much as possible. Switch compressor on and off several times to clearly identify compressor noise. Listen to compressor clutch while engaged and disengaged.

(2) To duplicate high-ambient condition (high-head pressure), restrict air flow through condenser. Install manifold gauge set to make sure discharge pressure doesn't exceed 2070 kPa (300 psi).

(3) Tighten ALL compressor mounting bolts, clutch mounting bolt and clutch coil mounting screws

(4) Check refrigerant hoses for rubbing or interference with other components.

(5) Check refrigerant charge.

(6) Check compressor noise as in Step 1.

(7) If noise still exists, loosen compressor mounting bolts and torque. Repeat Step 1.

(8) If noise continues, replace compressor and repeat Step 1.

REMOVAL

(1) Recover refrigerant from A/C system with R134a refrigerant recovery machine(Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

(2) Disconnect negative battery cable.

(3) Remove refrigerant lines from compressor. (Fig. 1)

NOTE: Cap lines while system is open to prevent moisture from entering system.

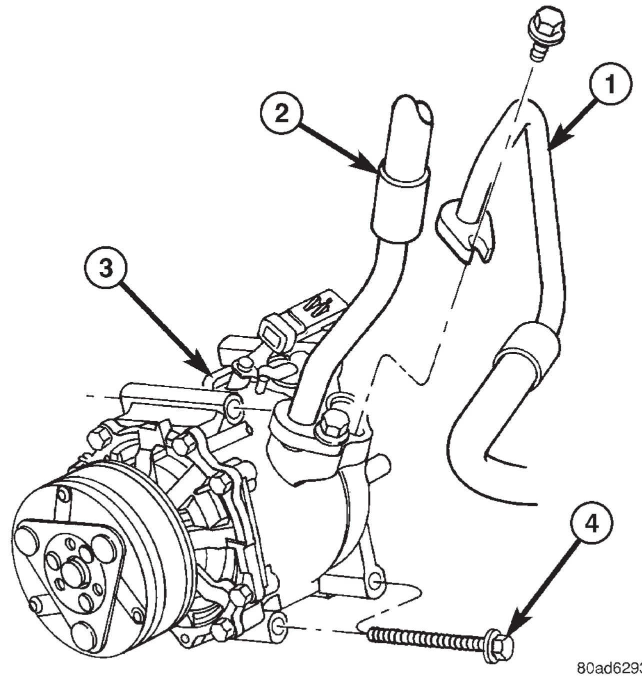


Fig. 1 A/C COMPRESSOR

1 - DISCHARGE LINE
2 - SUCTION LINE
3 - COMPRESSOR
4 - MOUNTING BOLT

(4) Raise and support vehicle.

(5) Remove drive belt(Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL) or (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(6) Disconnect compressor clutch wire lead.

(7) Remove three compressor mounting bolts and lower compressor from vehicle.

INSTALLATION

(1) Lift compressor up on mounting bracket.

(2) Install compressor mounting bolts and tighten to 28.2 N·m (20.8 ft. lbs.).

(3) Connect clutch wiring harness.

(4) Install drive belt(Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION) or (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(5) Remove support and lower vehicle.

(6) Install **new** O-rings and install A/C lines.

A/C COMPRESSOR (Continued)

(7) Connect negative battery cable.

(8) Evacuate the refrigerant system(Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

(9) Recharge the refrigerant system(Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

A/C CONDENSER

DESCRIPTION

The condenser is a heat exchanger that allows the high-pressure refrigerant gas being discharged by the compressor to give up its heat to the air passing over the condenser fins. The condenser is located in front of the vehicles radiator.

OPERATION

When air passes through the condenser fins the refrigerant gives up its heat. The refrigerant then condenses as it leaves the condenser and becomes a high-pressure liquid. The volume of air flowing over the condenser fins is critical for proper air conditioning performance. It is important that there are no objects placed in front of the radiator grille openings or foreign material on the condenser fins that might obstruct proper air flow. The condenser cannot be repaired and if faulty or damaged must be replaced. All factory-installed air seals or shrouds must be installed following service to maintain proper air flow.

REMOVAL

(1) Recover refrigerant from A/C system with an R134a refrigerant recovery machine.

(2) Remove front fascia (Refer to 23 - BODY/EXTERIOR/GRILLE - REMOVAL).

(3) Remove upper radiator support cross-member.

(4) Remove transmission cooler lines.

(5) Remove A/C lines (Fig. 2).

NOTE: Cap lines while system is open to prevent moisture from entering system.

(6) Remove two condenser mounting bolts.

(7) Lift condenser up out of the vehicle.

INSTALLATION

(1) Lower condenser into vehicle.

(2) Install condenser mounting bolts.

(3) Install **new** O-rings and install A/C lines.

(4) Install transmission cooler lines.

(5) Install upper radiator support.

(6) Install front fascia (Refer to 23 - BODY/EXTERIOR/GRILLE - INSTALLATION).

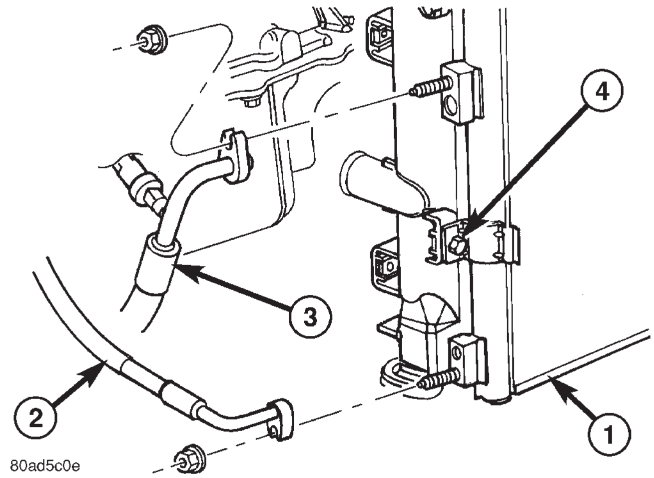


Fig. 2 AIR CONDITIONING LINES

1 - CONDENSER
2 - LIQUID LINE
3 - DISCHARGE LINE
4 - MOUNTING BOLT

(7) Evacuate and charge A/C system.

A/C EXPANSION VALVE

DESCRIPTION

The “H” valve-type thermal expansion valve (TXV) (Fig. 3) is located in front of the heater-A/C housing between the liquid and suction lines and the evaporator coil.

The expansion valve is a calibrated unit and cannot be adjusted or repaired. If faulty or damaged, the expansion valve must be replaced.

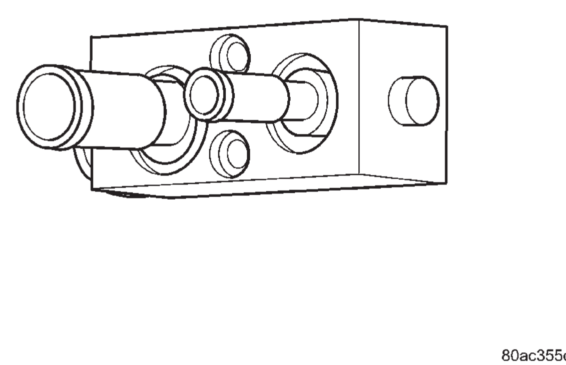


Fig. 3 EXPANSION VALVE

A/C EXPANSION VALVE (Continued)

OPERATION

High pressure high temperature liquid refrigerant from the liquid line passes through the expansion valve orifice. The refrigerant is converted into a low-pressure, low-temperature mixture of liquid and gas before it enters the evaporator coil. A temperature sensor in the expansion valve control head monitors refrigerant temperature leaving the evaporator coil through the suction line. The valve adjusts the orifice size at the liquid line to let the proper amount of refrigerant into the evaporator coil. Controlling refrigerant flow through the evaporator ensures that none of the refrigerant leaving the evaporator is in a liquid state, which could damage the compressor.

DIAGNOSIS AND TESTING - A/C EXPANSION VALVE

The expansion valve is located on the engine side of the dash panel, near the right shock tower.

The expansion valve can fail in three different positions (open, closed or restricted).

In an Open Position: this will result in a noisy compressor or no cooling. The cause can be a broken spring, broken ball or excessive moisture in the A/C system. If the spring or ball are found to be defective, replace the expansion valve. If excessive moisture is found in the A/C system, recycle the refrigerant.

In a Closed Position: There will be low suction pressure and no cooling. This may be caused by a failed power dome or excessive moisture in the A/C system. If the power dome on the expansion valve is found to be defective replace the expansion valve. If excessive moisture is found recycle the refrigerant.

A Restricted Orifice: There will be low suction pressure and no cooling. This may be caused by debris in the refrigerant system. If debris is believed to be the cause, recycle the refrigerant and replace the expansion valve and receiver/drier.

REMOVAL

(1) Recover refrigerant from the A/C system with a refrigerant recovery machine.

(2) Disconnect clips from expansion valve lines.

(3) Disconnect quick connectors on expansion valve with Quick Connector Kit 7193.

(4) Remove lines at expansion valve.

NOTE: Cap lines while system is open to prevent moisture from entering system.

(5) Remove two retaining bolts from expansion valve and remove valve (Fig. 4).

(6) Remove expansion valve.

(7) Remove expansion valve gasket.

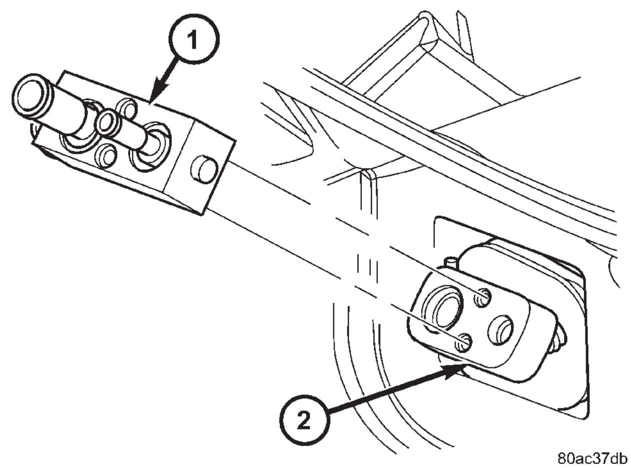


Fig. 4 EXPANSION VALVE

1 - VALVE
2 - EVAPORATOR

INSTALLATION

(1) Install a **new** gasket and install valve on evaporator.

(2) Install expansion valve bolts and tighten to 11 N·m (100 in. lbs.).

(3) Install **new** O-rings and install A/C lines on expansion valve.

(4) Install quick connector clips.

(5) Evacuate and charge system.

A/C EVAPORATOR

DESCRIPTION

The evaporator coil (Fig. 5) is located in the heater-A/C housing on the passenger side of the vehicle. The evaporator coil is positioned in the housing so all the air entering the housing passes over the evaporator fins then through the system ducts and outlets. Air passing over the evaporator fins will only be conditioned when the A/C system is on. The evaporator coil cannot be repaired and must be replaced if faulty or damaged.

OPERATION

Refrigerant enters the evaporator from the expansion valve as a low-temperature low-pressure mixture of liquid and gas. As air flows over the evaporator fins, humidity in the air condenses on the fins and heat from the air is absorbed by the refrigerant. Heat absorption causes the refrigerant to boil and vaporize. The refrigerant becomes a low-pressure gas before it leaves the evaporator.

A/C EVAPORATOR (Continued)

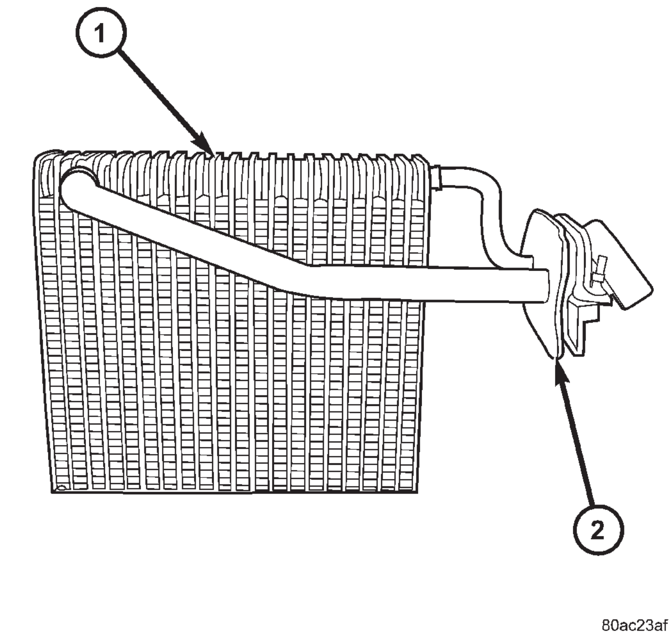


Fig. 5 EVAPORATOR COIL

1 - COIL
2 - HVAC SEAL

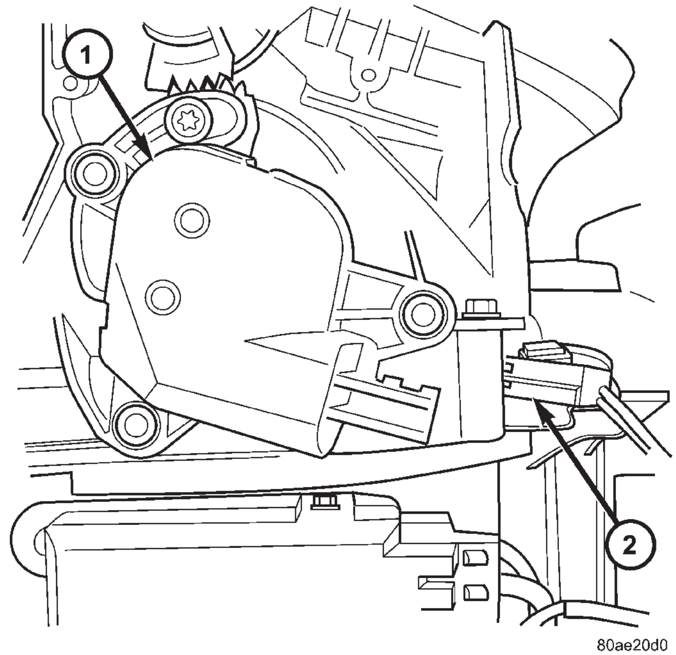


Fig. 6 RECIRCULATION MOTOR

1 - MOTOR
2 - CONNECTOR

REMOVAL

(1) Disconnect negative battery cable.

(2) Remove HVAC housing from the vehicle(Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL).

(3) Disconnect connector from recirculation motor (Fig. 6).

(4) Remove wiring harness connector (Fig. 7) from the top of the housing.

(5) Remove seal (Fig. 8) around evaporator coil inlet/outlet.

(6) Remove retaining screw from the top of the housing.

(7) Separate the upper from the housing from the lower (Fig. 9).

(8) Remove evaporator temperature sensor.

(9) Lift evaporator (Fig. 10) out of bottom housing.

(10) Remove styrofoam seal around evaporator.

INSTALLATION

(1) Install evaporator coil into lower housing.

(2) Install evaporator temperature sensor(Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/EVAPORATOR TEMPERATURE SENSOR - INSTALLATION).

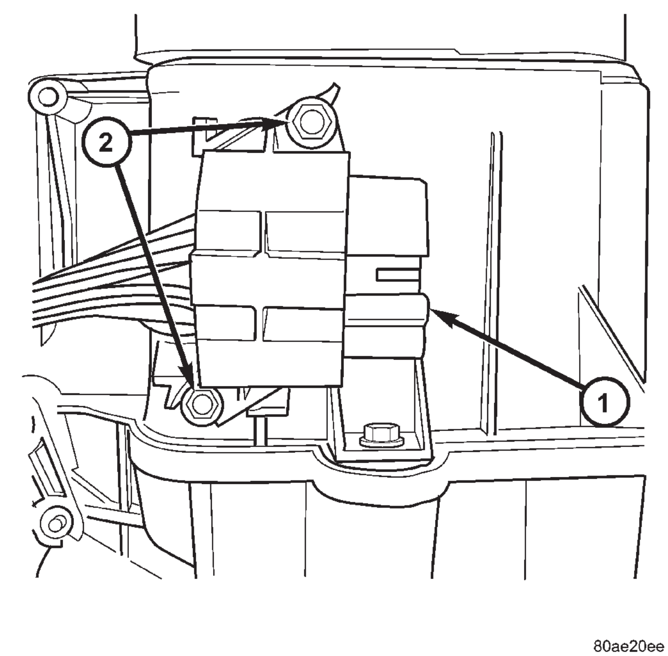


Fig. 7 HVAC HARNESS

1 - CONNECTOR
2 - MOUNTING SCREWS

A/C EVAPORATOR (Continued)

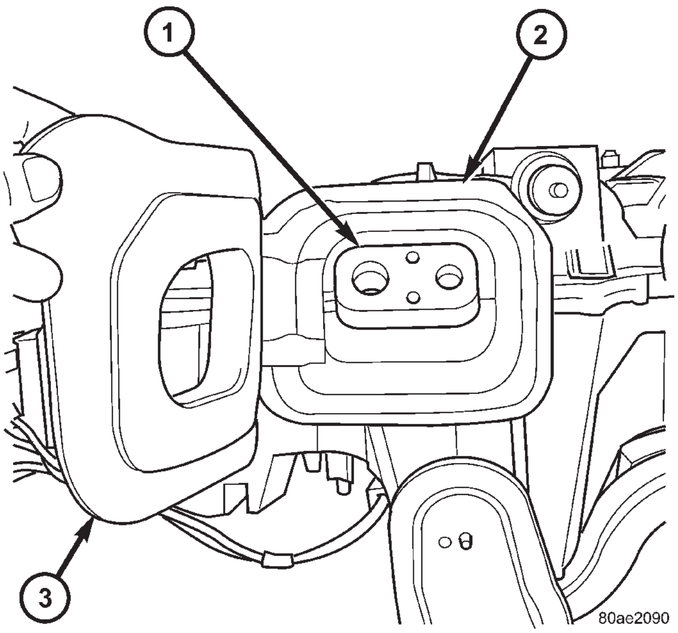


Fig. 8 EVAPORATOR SEAL

1 - EVAPORATOR
2 - HOUSING
3 - EVAPORATOR SEAL

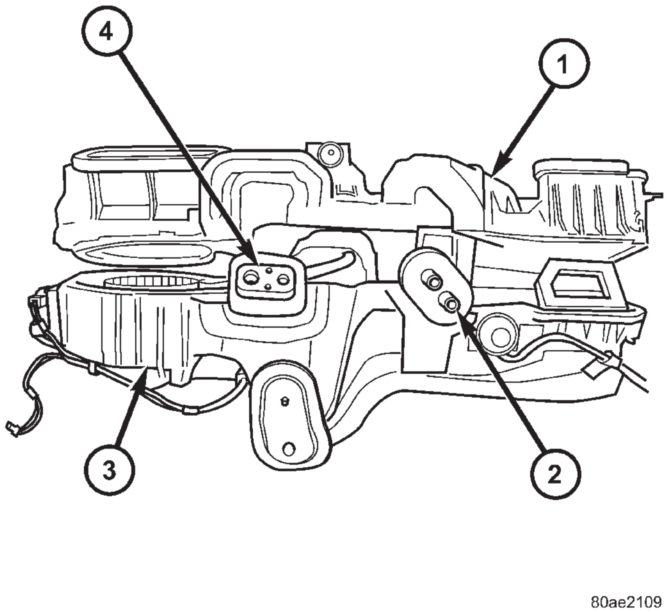


Fig. 9 HVAC HOUSING

1 - UPPER HOUSING
2 - HEATER CORE
3 - LOWER HOUSING
4 - EVAPORETOR COIL

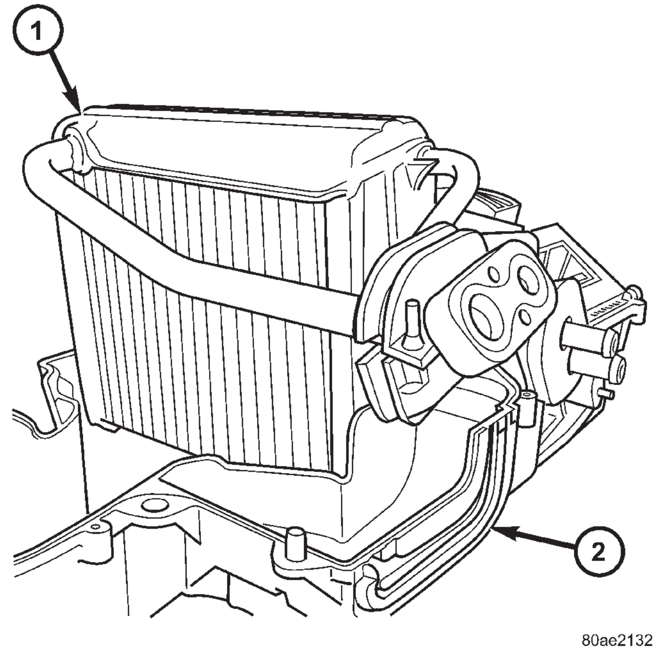


Fig. 10 EVAPORATOR COIL

1 - EVAPORATOR
2 - LOWER HOUSING

(3) Install upper housing onto lower housing and install screws(Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - ASSEMBLY).

(4) Connect recriculation motor connector.

(5) Install evaporator seal.

(6) Install HVAC harness on upper housing.

(7) Install HVAC housing in vehicle(Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - INSTALLATION).

DISCHARGE LINE

DESCRIPTION

The discharge line is made from reinforced rubber with a nylon liner on the inner walls. The line has a light weight aluminum fittings at the compressor and condenser end. The O-rings used to seal the connections are made from a special type of rubber not affected by R-134a refrigerant. O-rings must replaced whenever the line is removed and installed.

CAUTION: Use only O-rings specified for the vehicle. Failure to use correct O-ring will cause the connection to leak.

DISCHARGE LINE (Continued)

REMOVAL

(1) Recover refrigerant from A/C system with R134a refrigerant recovery machine(Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

(2) Disconnect A/C pressure transducer wire harness.

(3) Remove discharge line (Fig. 11) from A/C condenser.

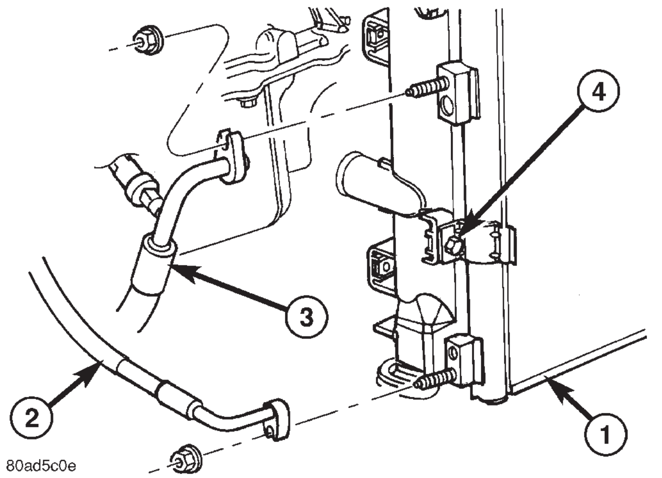


Fig. 11 AIR CONDITIONING LINES

1 - CONDENSER
2 - LIQUID LINE
3 - DISCHARGE LINE
4 - MOUNTING BOLT

(4) Remove the discharge line from A/C compressor (Fig. 12).

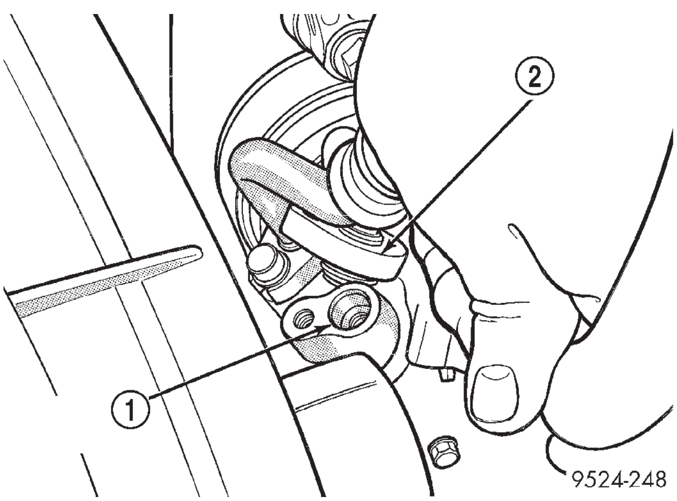


Fig. 12 DISCHARGE LINE

1 - DISCHARGE PORT
2 - DISCHARGE LINE

NOTE: Cap compressor and condenser while system is open to prevent moisture from entering system.

INSTALLATION

NOTE: Always lubricate the NEW O-rings with refrigerant oil as specified for this vehicle.

(1) Install discharge line on the compressor with **new** O-ring and tighten bolt to 22.5 N·m (199 in. lbs.).

(2) Install discharge line on the condenser with **new** O-ring and tighten nut to 22.5 N·m (199 in. lbs.).

(3) Connect pressure transducer wiring harness.

(4) Evacuate the A/C system(Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

(5) Recharge the refrigerant system(Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

SUCTION LINE

DESCRIPTION

The suction line is made from reinforced rubber. The line has a light weight aluminum fitting at the compressor end and a quick connect fitting at the expansion valve end. The quick connect has two O-rings to seal the connection made from a special type of rubber not affected by R-134a refrigerant. The O-rings must be replaced whenever the line is removed and installed.

CAUTION: Use only O-rings specified for the vehicle. Failure to use correct O-ring will cause the connection to leak.

REMOVAL

(1) Recover refrigerant from A/C system with R134a refrigerant recovery machine(Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

(2) Remove suction line from the compressor.

(3) Remove clip from the line at the expansion valve.

(4) Disconnect quick connector on expansion valve with Quick Connector Kit 7193.

(5) Remove the shock tower to suction line bracket bolt.

(6) Remove suction line (Fig. 13) from expansion valve.

SUCTION LINE (Continued)

NOTE: Cap compressor and expansion valve while system is open to prevent moisture from entering system.

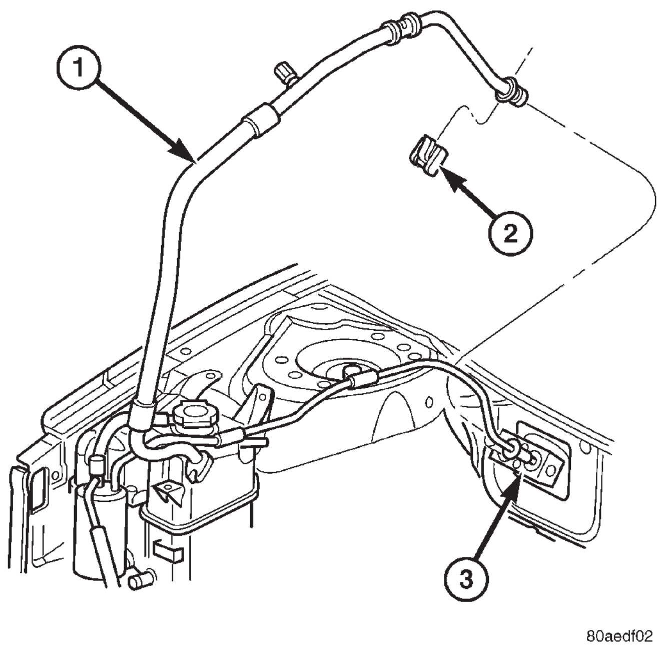


Fig. 13 SUCTION LINE

1 - SUCTION LINE
2 - QUICK CONNECT CLIP
3 - EXPANSION VALVE

INSTALLATION

(1) Install suction line to expansion valve with **new** O-rings.

(2) Install clip on the line quick connect at the expansion valve.

(3) Install suction line to compressor with **new** O-ring and tighten bolt to 22.5 N·m (199 in. lbs.).

(4) Install the shock tower to suction line bracket bolt and tighten to 6.8 N·m (60.1 In. Lbs.)

(5) Evacuate the refrigerant system(Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

(6) Recharge the refrigerant system(Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

RECEIVER / DRIER

DESCRIPTION

The receiver/drier is mounted on the right side of the engine compartment. It is part of the liquid line, between the condenser outlet and evaporator inlet.

OPERATION

High-pressure liquid refrigerant from the condenser flows into the receiver/drier. The receiver/drier filters the refrigerant to prevent foreign material from contaminating the expansion valve. A desiccant bag inside absorbs any moisture which may have become trapped in refrigerant system. In periods of high demand air conditioner operation, it acts as a reservoir to store surplus refrigerant. If the receiver/drier is faulty, damaged, contaminated or the system has been left open to the atmosphere for an undetermined period, it must be replaced.

REMOVAL

(1) Recover the refrigerant from A/C system with a refrigerant recovery machine(Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

(2) Remove liquid line from condenser(Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C DISCHARGE LINE - REMOVAL).

(3) Remove clip from the line at the expansion valve.

(4) Disconnect quick connector on expansion valve with Quick Connector Kit 7193.

(5) Remove liquid line from expansion valve.

(6) Remove receiver/drier bracket bolt (Fig. 14) at base of receiver/drier and remove the receiver/drier and line.

NOTE: Cap condenser and evaporator while system is open to prevent moisture from entering system.

INSTALLATION

(1) Install receiver/drier in bracket and tighten mounting bolt.

(2) Install liquid line to expansion valve with **new** O-rings.

(3) Install clip on the line quick connect at the expansion valve.

(4) Install liquid line to condenser with **new** O-rings and tighten nut to 19.2 N·m (170 in. lbs.).

(5) Evacuate the refrigerant system(Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

(6) Recharge the refrigerant system(Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE).

RECEIVER / DRIER (Continued)

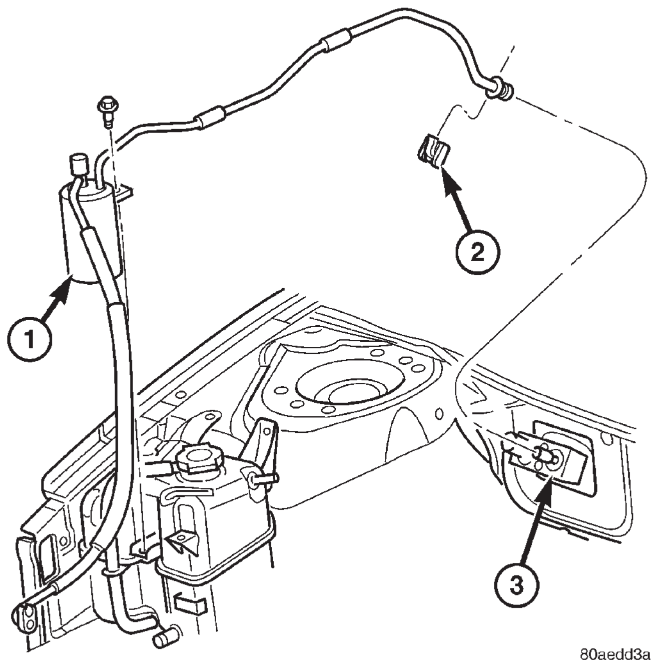


Fig. 14 RECEIVER/DRIER

1 - RECEIVER/DRIER
2 - QUICK CONNECT CLIP
3 - EXPANSION VALVE

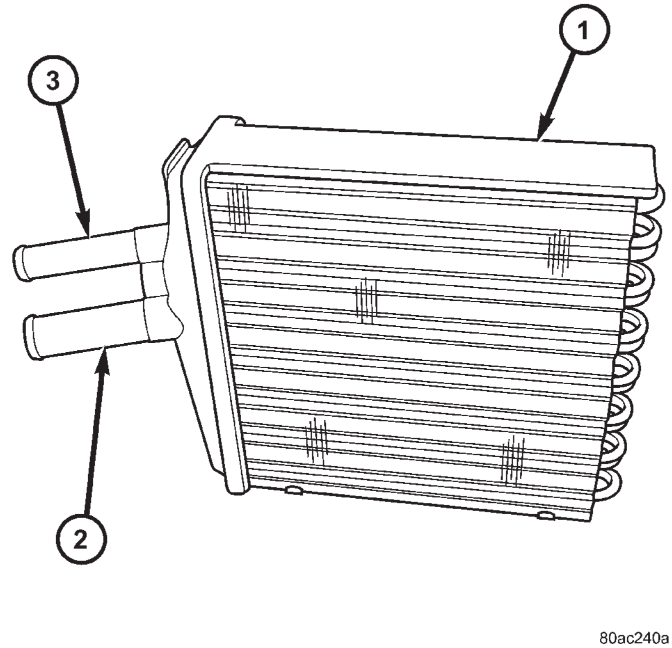


Fig. 15 HEATER CORE

1 - CORE
2 - INLET TUBE
3 - OUTLET TUBE

SERVICE PORT VALVE CORE

DESCRIPTION

The high pressure service port is located on the receiver drier. The low pressure service port is located on the suction line, near the right strut tower.

Each of the service ports has a threaded plastic protective cap installed over it from the factory. After servicing the refrigerant system, always reinstall both of the service port caps.

OPERATION

The two refrigerant system service ports are used to charge/recover/recycle/evacuate and test the air conditioning refrigerant system. Unique service port coupler sizes are used on the R-134a system to ensure the refrigerant system is not accidentally contaminated with R-12 refrigerant or refrigerant system service equipment.

HEATER CORE

DESCRIPTION

The heater core (Fig. 15) is located in the HVAC housing. The core is a heat exchanger made of rows of tubes and fins.

OPERATION

Engine coolant is circulated through heater hoses to the heater core. As coolant flows through the heater core, heat is transferred to the heater core fins and tubes. Air directed through the heater core fins, picks up the heat. The temperature control door controls heater output air temperature by controlling the air flowing through the HVAC housing. The heater core cannot be repaired and must be replaced if damaged.

REMOVAL

(1) Disconnect negative battery cable.

(2) Remove HVAC housing from the vehicle(Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL).

(3) Disconnect connector from recirculation motor (Fig. 16).

(4) Remove wiring harness connector (Fig. 17) from the top of the housing.

(5) Remove seal (Fig. 18) around evaporator coil inlet/outlet.

(6) Remove retaining screw from the top of the housing.

(7) Separate the upper from the housing from the lower (Fig. 19).

HEATER CORE (Continued)

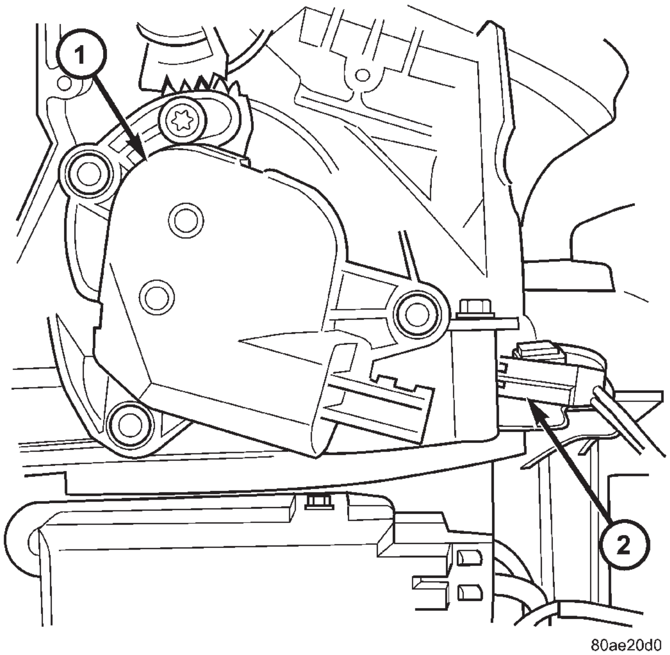


Fig. 16 RECIRCULATION MOTOR

1 - MOTOR
2 - CONNECTOR

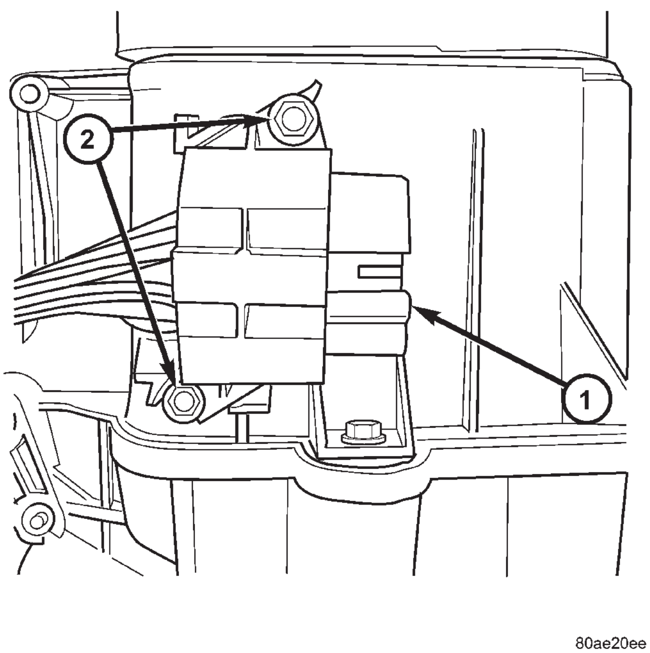


Fig. 17 HVAC HARNESS

1 - CONNECTOR
2 - MOUNTING SCREWS

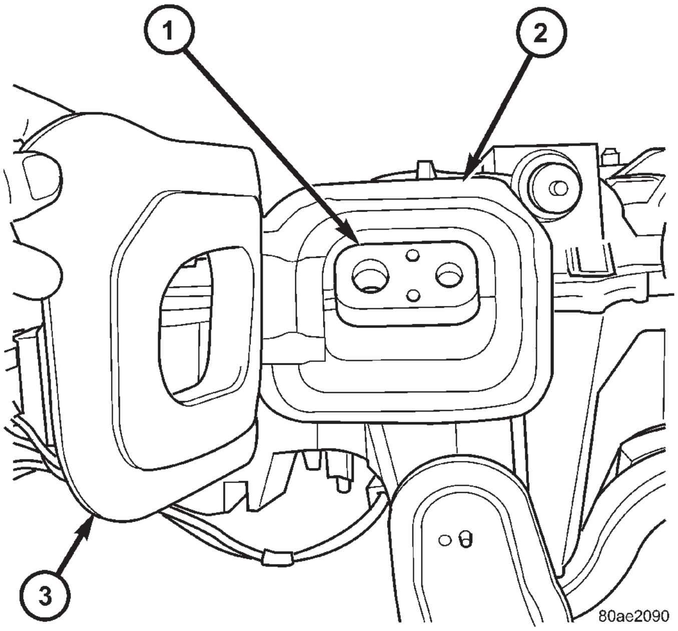


Fig. 18 EVAPORATOR SEAL

1 - EVAPORATOR
2 - HOUSING
3 - EVAPORATOR SEAL

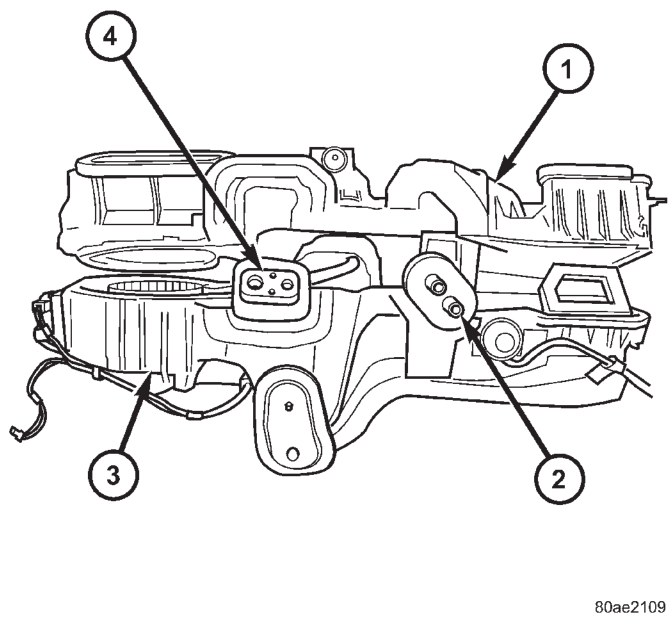


Fig. 19 HVAC HOUSING

1 - UPPER HOUSING
2 - HEATER CORE
3 - LOWER HOUSING
4 - EVAPORETOR COIL

HEATER CORE (Continued)

(8) Lift heater core (Fig. 20) out of lower housing.

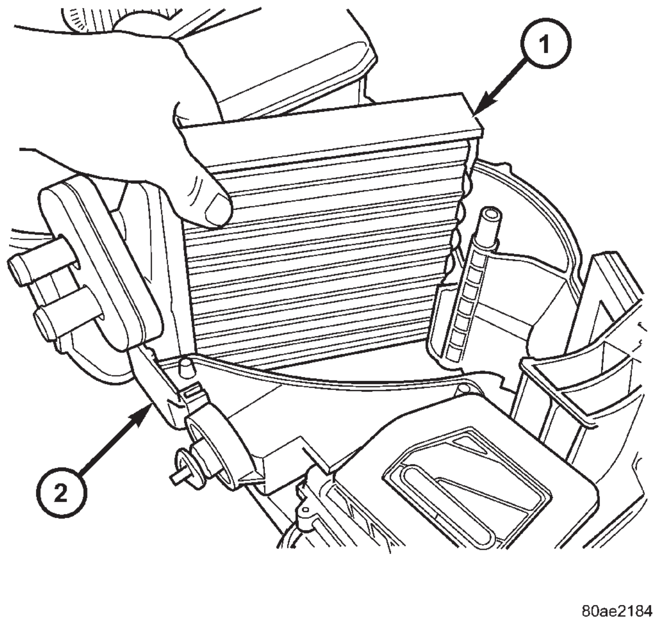


Fig. 20 HEATER CORE

1 - HEATER CORE
2 - LOWER HOUSING

INSTALLATION

(1) Install new heater core into lower housing.
(2) Install upper housing onto lower housing and install screws.
(3) Install evaporator seal
(4) Install HVAC harness on upper housing
(5) Connect recirculation motor connector.
(6) Install HVAC housing(Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - INSTALLATION).

REFRIGERANT OIL

DESCRIPTION

The refrigerant oil used in R-134a refrigerant systems is a synthetic-based, PolyAlkylene Glycol (PAG), wax-free lubricant. Mineral-based R-12 refrigerant oils are not compatible with PAG oils, and should never be introduced to an R-134a refrigerant system.

There are different PAG oils available, and each contains a different additive package. The TRS90 compressor used in this vehicle is designed to use an SP-15 PAG refrigerant oil. Use only refrigerant oil of this same type to service the refrigerant system.

OPERATION

After performing any refrigerant recovery or recycling operation, always replenish the refrigerant system with the same amount of the recommended refrigerant oil as was removed. Too little refrigerant oil can cause compressor damage and too much can reduce air conditioning system performance.

PAG refrigerant oil is much more hygroscopic than mineral oil, and will absorb any moisture it comes into contact with even moisture in the air. The PAG oil container should always be kept tightly capped until it is ready to be used. Recap the oil container immediately after use to prevent moisture contamination.

STANDARD PROCEDURE - REFRIGERANT OIL LEVEL

It is important to have the correct amount of lubricant in the a/c system to ensure proper lubrication of the compressor. Too little lubricant will result in damage to the compressor. Too much lubricant will reduce the cooling capacity of the system and consequently result in higher discharge air temperatures.

The lubricant used in the compressor is polyalkalene glycol PAG lubricant. Only the refrigerant lubricant approved for use with this vehicle (SP-15 PAG oil) should be used to service the system. Do not use any other lubricant. The lubricant container should be kept tightly capped until it is ready for use. Refrigerant lubricant will quickly absorb any moisture it comes in contact with.

It is not necessary to check or add lubricant unless it has been lost. Lubricant loss at the leak point will be evident by the presence of a wet, shiny surface around the leak.

REFRIGERANT OIL LEVEL CHECK

When an air conditioning system is first assembled, all components (except the compressor) are refrigerant oil free. After the system has been charged with (R-134a) refrigerant and operated, the oil in the compressor is dispersed through the lines and components. The evaporator, condenser, and receiver/drier will retain a significant amount of oil. Refer to the A/C Component Refrigerant Oil Capacities table. When a component is replaced, the specified amount of refrigerant oil must be added. When the compressor is replaced, the amount of oil that is retained in the rest of the system must be drained from the replacement compressor. The oil capacity of the system, minus the amount of oil still in the remaining components (refer to the oil capacity chart below) can be measured and poured into the suction port of the compressor. When a line or component has ruptured and oil has escaped, the receiver/drier must be replaced along with the ruptured part.

REFRIGERANT OIL (Continued)

Example: On an A/C system the evaporator retains 60 ml. (2 oz.). The condenser retains 30 ml. (1 oz.) of oil, and system capacity may be 150 ml. (5.00 oz.) of oil.

150 ml. minus 90 ml. equals 60 ml. (2.00 oz.).

A/C COMPONENT REFRIGERANT OIL CAPACITIES

COMPONENT NAME	ml.	oz.
Total Air Conditioning System	150 ml.	5.00 oz.
Condenser	30 ml.	1.00 oz.
Evaporator	59 ml.	2.00 oz.
Receiver/Drier	30 ml.	1.00 oz.
Line Blown	44 ml.	1.50 oz.
Compressor	Drain and measure the oil from the old compressor. See text.	

CAUTION: The refrigerant oil used in a R-134a A/C system is unique. Use only oils which were designed to work with R-134a refrigerant. The oil designated for this vehicle is ND 8 PAG (polyalkalene glycol).

VERIFY REFRIGERANT LUBRICANT LEVEL

(1) Recover refrigerant from the system.

(2) Disconnect refrigerant lines from the a/c compressor. Cap open lines to prevent moisture from entering the system.

(3) Remove compressor from the vehicle.

(4) From the suction and discharge ports on the compressor, drain the lubricant from the compressor.

(5) Add the system capacity minus the capacity of the components that have not been replaced. Refer to the A/C Component Refrigerant Oil Capacities chart above. Add lubricant through the suction and discharge ports on compressor. This is not to exceed 150 ml. (5.00 oz.) in total.

(6) Install the compressor and connect the refrigerant lines. Then evacuate and charge refrigerant system.

(7) Most reclaim/recycling equipment will measure the lubricant being removed. This amount of lubricant should be added back to the system. If a new compressor is being installed, drain lubricant from old compressor, measure the amount drained and discard old lubricant. Drain the lubricant from the new compressor into a clean container. Return the amount of lubricant measured from the old compressor, plus the amount reclaimed from the system back into the new compressor.

REFRIGERANT

DESCRIPTION

The refrigerant used in this air conditioning system is a HydroFluoroCarbon (HFC), type R-134a. Unlike R-12, which is a ChloroFluoroCarbon (CFC), R-134a refrigerant does not contain ozone-depleting chlorine. R-134a refrigerant is a non-toxic, non-flammable, clear, and colorless liquefied gas.

Even though R-134a does not contain chlorine, it must be reclaimed and recycled just like CFC-type refrigerants. This is because R-134a is a greenhouse gas and can contribute to global warming.

OPERATION

R-134a refrigerant is not compatible with R-12 refrigerant in an air conditioning system. Even a small amount of R-12 added to an R-134a refrigerant system will cause compressor failure, refrigerant oil sludge or poor air conditioning system performance. In addition, the PolyAlkylene Glycol (PAG) synthetic refrigerant oils used in an R-134a refrigerant system are not compatible with the mineral-based refrigerant oils used in an R-12 refrigerant system.

R-134a refrigerant system service ports, service tool couplers and refrigerant dispensing bottles have all been designed with unique fittings to ensure that an R-134a system is not accidentally contaminated with the wrong refrigerant (R-12). There are also labels posted in the engine compartment of the vehicle and on the compressor identifying to service technicians that the air conditioning system is equipped with R-134a.

EMISSIONS CONTROL

TABLE OF CONTENTS

EMISSIONS CONTROL

DESCRIPTION

DESCRIPTION - VEHICLE EMISSION CONTROL INFORMATION LABEL

All models have a Vehicle Emission Control Information (VECI) Label. Chrysler permanently attaches the label in the engine compartment. It cannot be removed without defacing information and destroying the label.

The label contains the vehicle's emission specifications and vacuum hose routings. All hoses must be connected and routed according to the label.

DESCRIPTION - TRIP DEFINITION

A "Trip" means vehicle operation (following an engine-off period) of duration and driving mode such that all components and systems are monitored at least once by the diagnostic system. The monitors must successfully pass before the PCM can verify that a previously malfunctioning component is meeting the normal operating conditions of that component. For misfire or fuel system malfunction, the MIL may be extinguished if the fault does not recur when monitored during three subsequent sequential driving cycles in which conditions are similar to those under which the malfunction was first determined.

Anytime the MIL is illuminated, a DTC is stored. The DTC can self erase only after the MIL has been extinguished. Once the MIL is extinguished, the PCM must pass the diagnostic test for the most recent DTC for 40 warm-up cycles (80 warm-up cycles for the Fuel System Monitor and the Misfire Monitor). A warm-up cycle can best be described by the following:

- The engine must be running
- A rise of 40°F in engine temperature must occur from the time when the engine was started
- Engine coolant temperature must crossover 160°F
- A "driving cycle" that consists of engine start up and engine shut off.

Once the above conditions occur, the PCM is considered to have passed a warm-up cycle. Due to the conditions required to extinguish the MIL and erase the DTC, it is most important that after a repair has been made, all DTC's be erased and the repair verified by running 1–good trip.

DESCRIPTION - MONITORED COMPONENT

There are several components that will affect vehicle emissions if they malfunction. If one of these components malfunctions the Malfunction Indicator Lamp (Check Engine) will illuminate.

Some of the component monitors are checking for proper operation of the part. Electrically operated components now have input (rationality) and output (functionality) checks. Previously, a component like the Throttle Position sensor (TPS) was checked by the PCM for an open or shorted circuit. If one of these conditions occurred, a DTC was set. Now there is a check to ensure that the component is working. This is done by watching for a TPS indication of a greater or lesser throttle opening than MAP and engine rpm indicate. In the case of the TPS, if engine vacuum is low and engine rpm is 1600 or greater and the TPS indicates a small throttle opening, a DTC will be set. The same applies to low vacuum and 1600 rpm.

Any component that has an associated limp in will set a fault after 1 trip with the malfunction present.

Refer to the Diagnostic Trouble Codes Description Charts (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - DESCRIPTION) and the appropriate

EMISSIONS CONTROL (Continued)

Powertrain Diagnostic Procedure Manual for diagnostic procedures.

The following is a list of the monitored components:
- Comprehensive Components
- Oxygen Sensor Monitor
- Oxygen Sensor Heater Monitor
- Catalyst Monitor

COMPREHENSIVE COMPONENTS

Along with the major monitors, OBD II requires that the diagnostic system monitor any component that could affect emissions levels. In many cases, these components were being tested under OBD I. The OBD I requirements focused mainly on testing emissions-related components for electrical opens and shorts.

However, OBD II also requires that inputs from powertrain components to the PCM be tested for **rationality**, and that outputs to powertrain components from the PCM be tested for **functionality**. Methods for monitoring the various Comprehensive Component monitoring include:

(1) Circuit Continuity
- Open
- Shorted high
- Shorted to ground

(2) Rationality or Proper Functioning
- Inputs tested for rationality
- Outputs tested for functionality

NOTE: Comprehensive component monitors are continuous. Therefore, enabling conditions do not apply.

Input Rationality—While input signals to the PCM are constantly being monitored for electrical opens and shorts, they are also tested for rationality. This means that the input signal is compared against other inputs and information to see if it makes sense under the current conditions.

PCM sensor inputs that are checked for rationality include:
- Manifold Absolute Pressure (MAP) Sensor
- Oxygen Sensor (O2S)
- Engine Coolant Temperature (ECT) Sensor
- Camshaft Position (CMP) Sensor
- Vehicle Speed Sensor
- Crankshaft Position (CKP) Sensor
- Intake/inlet Air Temperature (IAT) Sensor
- Throttle Position (TPS) Sensor
- Ambient/Battery Temperature Sensors
- Power Steering Switch
- Oxygen Sensor Heater
- Engine Controller
- Brake Switch
- Leak Detection Pump Switch (if equipped)
- P/N Switch
- Trans Controls

Output Functionality—PCM outputs are tested for functionality in addition to testing for opens and shorts. When the PCM provides a voltage to an output component, it can verify that the command was carried out by monitoring specific input signals for expected changes. For example, when the PCM commands the Idle Air Control (IAC) Motor to a specific position under certain operating conditions, it expects to see a specific (target) idle speed (RPM). If it does not, it stores a DTC.

PCM outputs monitored for functionality include:
- Fuel Injectors
- Ignition Coils
- Torque Converter Clutch Solenoid
- Idle Air Control
- Purge Solenoid
- EGR Solenoid (if equipped)
- LDP Solenoid (if equipped)
- Radiator Fan Control
- Trans Controls

OXYGEN SENSOR (O2S) MONITOR

DESCRIPTION—Effective control of exhaust emissions is achieved by an oxygen feedback system. The most important element of the feedback system is the O2S. The O2S is located in the exhaust path. Once it reaches operating temperature 300° to 350°C (572° to 662°F), the sensor generates a voltage that is inversely proportional to the amount of oxygen in the exhaust. When there is a large amount of oxygen in the exhaust caused by a lean condition, the sensor produces a low voltage, below 450 mV. When the oxygen content is lower, caused by a rich condition, the sensor produces a higher voltage, above 450mV.

The information obtained by the sensor is used to calculate the fuel injector pulse width. The PCM is programmed to maintain the optimum air/fuel ratio. At this mixture ratio, the catalyst works best to remove hydrocarbons (HC), carbon monoxide (CO) and nitrous oxide (NOx) from the exhaust.

The O2S is also the main sensing element for the EGR (if equipped), Catalyst and Fuel Monitors.

The O2S may fail in any or all of the following manners:
- Slow response rate (Big Slope)
- Reduced output voltage (Half Cycle)
- Heater Performance

Slow Response Rate (Big Slope)—Response rate is the time required for the sensor to switch from lean to rich signal output once it is exposed to a richer than optimum A/F mixture or vice versa. As the PCM adjusts the air/fuel ratio, the sensor must be able to rapidly detect the change. As the sensor ages, it could take longer to detect the changes in the

EMISSIONS CONTROL (Continued)

oxygen content of the exhaust gas. The rate of change that an oxygen sensor experiences is called 'Big Slope'. The PCM checks the oxygen sensor voltage in increments of a few milliseconds.

Reduced Output Voltage (Half Cycle)—The output voltage of the O2S ranges from 0 to 1 volt. A good sensor can easily generate any output voltage in this range as it is exposed to different concentrations of oxygen. To detect a shift in the A/F mixture (lean or rich), the output voltage has to change beyond a threshold value. A malfunctioning sensor could have difficulty changing beyond the threshold value. Each time the voltage signal surpasses the threshold, a counter is incremented by one. This is called the Half Cycle Counter.

Heater Performance—The heater is tested by a separate monitor. Refer to the Oxygen Sensor Heater Monitor.

OPERATION—As the Oxygen Sensor signal switches, the PCM monitors the half cycle and big slope signals from the oxygen sensor. If during the test neither counter reaches a predetermined value, a malfunction is entered and Freeze Frame data is stored. Only one counter reaching its predetermined value is needed for the monitor to pass.

The Oxygen Sensor Monitor is a two trip monitor that is tested only once per trip. When the Oxygen Sensor fails the test in two consecutive trips, the MIL is illuminated and a DTC is set. The MIL is extinguished when the Oxygen Sensor monitor passes in three consecutive trips. The DTC is erased from memory after 40 consecutive warm-up cycles without test failure.

Enabling Conditions—The following conditions must typically be met for the PCM to run the oxygen sensor monitor:

- Battery voltage
- Engine temperature
- Engine run time
- Engine run time at a predetermined speed
- Engine run time at a predetermined speed and throttle opening
- Transmission in gear and brake depressed (automatic only)
- Fuel system in Closed Loop
- Long Term Adaptive (within parameters)
- Power Steering Switch in low PSI (no load)
- Engine at idle
- Fuel level above 15%
- Ambient air temperature
- Barometric pressure
- Engine RPM within acceptable range of desired idle

Pending Conditions—The Task Manager typically does not run the Oxygen Sensor Monitor if overlapping monitors are running or the MIL is illuminated for any of the following:

- Misfire Monitor
- Front Oxygen Sensor and Heater Monitor
- MAP Sensor
- Vehicle Speed Sensor
- Engine Coolant Temperature Sensor
- Throttle Position Sensor
- Engine Controller Self Test Faults
- Cam or Crank Sensor
- Injector and Coil
- Idle Air Control Motor
- EVAP Electrical
- EGR Solenoid Electrical (if equipped)
- Intake/inlet Air Temperature
- 5 Volt Feed

Conflict—The Task Manager does not run the Oxygen Sensor Monitor if any of the following conditions are present:

- A/C ON (A/C clutch cycling temporarily suspends monitor)
- Purge flow in progress
- Ethanel content learn is takeng place and the ethenal used once flag is set (if equipped)

Suspend—The Task Manager suspends maturing a fault for the Oxygen Sensor Monitor if any of the following are present:

- Oxygen Sensor Heater Monitor, Priority 1
- Misfire Monitor, Priority 2

OXYGEN SENSOR HEATER MONITOR

DESCRIPTION—If there is an oxygen sensor (O2S) DTC as well as a O2S heater DTC, the O2S fault MUST be repaired first. After the O2S fault is repaired, verify that the heater circuit is operating correctly.

The voltage readings taken from the O2S are very temperature sensitive. The readings are not accurate below 300°C. Heating of the O2S is done to allow the engine controller to shift to closed loop control as soon as possible. The heating element used to heat the O2S must be tested to ensure that it is heating the sensor properly.

The heater element itself is not tested. The sensor output is used to test the heater by isolating the effect of the heater element on the O2S output voltage from the other effects. The resistance is normally between 100 ohms and 4.5 megaohms. When oxygen sensor temperature increases, the resistance in the internal circuit decreases. The PCM sends a 5 volts biased signal through the oxygen sensors to ground this monitoring circuit. As the temperature increases, resistance decreases and the PCM detects a lower voltage at the reference signal. Inversely, as the temperature decreases, the resistance increases and the

EMISSIONS CONTROL (Continued)

PCM detects a higher voltage at the reference signal. The O2S circuit is monitored for a drop in voltage.

OPERATION—The Oxygen Sensor Heater Monitor begins after the ignition has been turned OFF. The PCM sends a 5 volt bias to the oxygen sensor every 1.6 seconds. The PCM keeps it biased for 35 ms each time. As the sensor cools down, the resistance increases and the PCM reads the increase in voltage. Once voltage has increased to a predetermined amount, higher than when the test started, the oxygen sensor is cool enough to test heater operation.

When the oxygen sensor is cool enough, the PCM energizes the ASD relay. Voltage to the O2 sensor begins to increase the temperature. As the sensor temperature increases, the internal resistance decreases. The PCM continues biasing the 5 volt signal to the sensor. Each time the signal is biased, the PCM reads a voltage decrease. When the PCM detects a voltage decrease of a predetermined value for several biased pulses, the test passes.

The heater elements are tested each time the engine is turned OFF if all the enabling conditions are met. If the monitor fails, the PCM stores a maturing fault and a Freeze Frame is entered. If two consecutive tests fail, a DTC is stored. Because the ignition is OFF, the MIL is illuminated at the beginning of the next key cycle.

Enabling Conditions—The following conditions must be met for the PCM to run the oxygen sensor heater test:

- Engine run time of at least 3 minutes
- Engine run time at a predetermind speed and throttle opening.
- Key OFF power down
- Battery voltage of at least 10 volts
- Sufficient Oxygen Sensor cool down

Pending Conditions—There are not conditions or situations that prompt conflict or suspension of testing. The oxygen sensor heater test is not run pending resolution of MIL illumination due to oxygen sensor failure.

Suspend—There are no conditions which exist for suspending the Heater Monitor.

CATALYST MONITOR

To comply with clean air regulations, vehicles are equipped with catalytic converters. These converters reduce the emission of hydrocarbons, oxides of nitrogen and carbon monoxide.

Normal vehicle miles or engine misfire can cause a catalyst to decay. A meltdown of the ceramic core can cause a reduction of the exhaust passage. This can increase vehicle emissions and deteriorate engine performance, driveability and fuel economy.

The catalyst monitor uses dual oxygen sensors (O2S's) to monitor the efficiency of the converter. The dual O2S strategy is based on the fact that as a catalyst deteriorates, its oxygen storage capacity and its efficiency are both reduced. By monitoring the oxygen storage capacity of a catalyst, its efficiency can be indirectly calculated. The upstream O2S is used to detect the amount of oxygen in the exhaust gas before the gas enters the catalytic converter. The PCM calculates the A/F mixture from the output of the O2S. A low voltage indicates high oxygen content (lean mixture). A high voltage indicates a low content of oxygen (rich mixture).

When the upstream O2S detects a lean condition, there is an abundance of oxygen in the exhaust gas. A functioning converter would store this oxygen so it can use it for the oxidation of HC and CO. As the converter absorbs the oxygen, there will be a lack of oxygen downstream of the converter. The output of the downstream O2S will indicate limited activity in this condition.

As the converter loses the ability to store oxygen, the condition can be detected from the behavior of the downstream O2S. When the efficiency drops, no chemical reaction takes place. This means the concentration of oxygen will be the same downstream as upstream. The output voltage of the downstream O2S copies the voltage of the upstream sensor. The only difference is a time lag (seen by the PCM) between the switching of the O2S's.

To monitor the system, the number of lean-to-rich switches of upstream and downstream O2S's is counted. The ratio of downstream switches to upstream switches is used to determine whether the catalyst is operating properly. An effective catalyst will have fewer downstream switches than it has upstream switches i.e., a ratio closer to zero. For a totally ineffective catalyst, this ratio will be one-to-one, indicating that no oxidation occurs in the device.

The system must be monitored so that when catalyst efficiency deteriorates and exhaust emissions increase to over the legal limit, the MIL (check engine lamp) will be illuminated.

Monitor Operation—To monitor catalyst efficiency, the PCM expands the rich and lean switch points of the heated oxygen sensor. With extended switch points, the air/fuel mixture runs richer and leaner to overburden the catalytic converter. Once the test is started, the air/fuel mixture runs rich and lean and the O2 switches are counted. A switch is counted when an oxygen sensor signal goes from below the lean threshold to above the rich threshold. The number of Rear O2 sensor switches is divided by the number of Front O2 sensor switches to determine the switching ratio.

EMISSIONS CONTROL (Continued)

The test runs for 20 seconds. As catalyst efficiency deteriorated over the life of the vehicle, the switch rate at the downstream sensor approaches that of the upstream sensor. If at any point during the test period the switch ratio reaches a predetermined value, a counter is incremented by one. The monitor is enabled to run another test during that trip. When the test fails 6 times, the counter increments to 3, a malfunction is entered, and a Freeze Frame is stored, the code is matured and the MIL is illuminated. If the first test passes, no further testing is conducted during that trip.

The MIL is extinguished after three consecutive good trips. The good trip criteria for the catalyst monitor is more stringent than the failure criteria. In order to pass the test and increment one good trip, the downstream sensor switch rate must be less than 45% of the upstream rate. The failure percentages are 59% respectively.

Enabling Conditions—The following conditions must typically be met before the PCM runs the catalyst monitor. Specific times for each parameter may be different from engine to engine.

- Accumulated drive time
- Enable time
- Ambient air temperature
- Barometric pressure
- Catalyst warm-up counter
- Engine coolant temperature
- Vehicle speed
- MAP
- RPM
- Engine in closed loop
- Fuel level

Pending Conditions—

- Misfire DTC
- Front Oxygen Sensor Response
- Front Oxygen Sensor Heater Monitor
- Front Oxygen Sensor Electrical
- Rear Oxygen Sensor Rationality (middle check)
- Rear Oxygen Sensor Heater Monitor
- Rear Oxygen Sensor Electrical
- Fuel System Monitor
- All TPS faults
- All MAP faults
- All ECT sensor faults
- Purge flow solenoid functionality
- Purge flow solenoid electrical
- All PCM self test faults
- All CMP and CKP sensor faults
- All injector and ignition electrical faults
- Idle Air Control (IAC) motor functionality
- Vehicle Speed Sensor
- Brake switch (auto trans only)
- Intake air temperature

Conflict—The catalyst monitor does not run if any of the following are conditions are present:

- EGR Monitor in progress (if equipped)
- Fuel system rich intrusive test in progress
- EVAP Monitor in progress
- Time since start is less than 60 seconds
- Low fuel level-less than 15 %
- Low ambient air temperature
- Ethanel content learn is takeng place and the ethenal used once flag is set

Suspend—The Task Manager does not mature a catalyst fault if any of the following are present:

- Oxygen Sensor Monitor, Priority 1
- Oxygen Sensor Heater, Priority 1
- EGR Monitor, Priority 1 (if equipped)
- EVAP Monitor, Priority 1
- Fuel System Monitor, Priority 2
- Misfire Monitor, Priority 2

OPERATION - NON-MONITORED CIRCUITS

The PCM does not monitor all circuits, systems and conditions that could have malfunctions causing driveability problems. However, problems with these systems may cause the PCM to store diagnostic trouble codes for other systems or components. For example, a fuel pressure problem will not register a fault directly, but could cause a rich/lean condition or misfire. This could cause the PCM to store an oxygen sensor or misfire diagnostic trouble code.

The major non-monitored circuits are listed below along with examples of failures modes that do not directly cause the PCM to set a DTC, but for a system that is monitored.

FUEL PRESSURE

The fuel pressure regulator controls fuel system pressure. The PCM cannot detect a clogged fuel pump inlet filter, clogged in-line fuel filter, or a pinched fuel supply or return line. However, these could result in a rich or lean condition causing the PCM to store an oxygen sensor, fuel system, or misfire diagnostic trouble code.

SECONDARY IGNITION CIRCUIT

The PCM cannot detect an inoperative ignition coil, fouled or worn spark plugs, ignition cross firing, or open spark plug cables. The misfire will however, increase the oxygen content in the exhaust, deceiving the PCM in to thinking the fuel system is too lean. Also misfire detection.

CYLINDER COMPRESSION

The PCM cannot detect uneven, low, or high engine cylinder compression. Low compression lowers O2 content in the exhaust. Leading to fuel system, oxygen sensor, or misfire detection fault.

EMISSIONS CONTROL (Continued)

EXHAUST SYSTEM

The PCM cannot detect a plugged, restricted or leaking exhaust system. It may set a EGR (if equipped) or Fuel system or O2S fault.

FUEL INJECTOR MECHANICAL MALFUNCTIONS

The PCM cannot determine if a fuel injector is clogged, the needle is sticking or if the wrong injector is installed. However, these could result in a rich or lean condition causing the PCM to store a diagnostic trouble code for either misfire, an oxygen sensor, or the fuel system.

EXCESSIVE OIL CONSUMPTION

Although the PCM monitors engine exhaust oxygen content when the system is in closed loop, it cannot determine excessive oil consumption.

THROTTLE BODY AIR FLOW

The PCM cannot detect a clogged or restricted air cleaner inlet or filter element.

VACUUM ASSIST

The PCM cannot detect leaks or restrictions in the vacuum circuits of vacuum assisted engine control system devices. However, these could cause the PCM to store a MAP sensor diagnostic trouble code and cause a high idle condition.

PCM SYSTEM GROUND

The PCM cannot determine a poor system ground. However, one or more diagnostic trouble codes may be generated as a result of this condition. The module should be mounted to the body at all times, also during diagnostic.

PCM CONNECTOR ENGAGEMENT

The PCM may not be able to determine spread or damaged connector pins. However, it might store diagnostic trouble codes as a result of spread connector pins.

DESCRIPTION - MONITORED SYSTEMS

There are new electronic circuit monitors that check fuel, emission, engine and ignition performance. These monitors use information from various sensor circuits to indicate the overall operation of the fuel, engine, ignition and emission systems and thus the emissions performance of the vehicle.

The fuel, engine, ignition and emission systems monitors do not indicate a specific component problem. They do indicate that there is an implied problem within one of the systems and that a specific problem must be diagnosed.

If any of these monitors detect a problem affecting vehicle emissions, the Malfunction Indicator (Check Engine) Lamp will be illuminated. These monitors generate Diagnostic Trouble Codes that can be displayed with the a DRBIII® scan tool.

The following is a list of the system monitors:

- EGR Monitor (if equipped)
- Misfire Monitor
- Fuel System Monitor
- Oxygen Sensor Monitor
- Oxygen Sensor Heater Monitor
- Catalyst Monitor
- Evaporative System Leak Detection Monitor (if equipped)

Following is a description of each system monitor, and its DTC.

Refer to the appropriate Powertrain Diagnostics Procedures manual for diagnostic procedures.

OXYGEN SENSOR (O2S) MONITOR

Effective control of exhaust emissions is achieved by an oxygen feedback system. The most important element of the feedback system is the O2S. The O2S is located in the exhaust path. Once it reaches operating temperatures of 300° to 350°C (572° to 662°F), the sensor generates a voltage that is inversely proportional to the amount of oxygen in the exhaust. The information obtained by the sensor is used to calculate the fuel injector pulse width. The PCM is programmed to maintain the optimum air/fuel ratio. At this mixture ratio, the catalyst works best to remove hydrocarbons (HC), carbon monoxide (CO) and nitrous oxide (NOx) from the exhaust.

The O2S is also the main sensing element for the EGR (if equipped), Catalyst and Fuel Monitors.

The O2S may fail in any or all of the following manners:

- Slow response rate
- Reduced output voltage
- Dynamic shift
- Shorted or open circuits

Response rate is the time required for the sensor to switch from lean to rich once it is exposed to a richer than optimum A/F mixture or vice versa. As the sensor starts malfunctioning, it could take longer to detect the changes in the oxygen content of the exhaust gas.

The output voltage of the O2S ranges from 0 to 1 volt. A good sensor can easily generate any output voltage in this range as it is exposed to different concentrations of oxygen. To detect a shift in the A/F mixture (lean or rich), the output voltage has to change beyond a threshold value. A malfunctioning sensor could have difficulty changing beyond the threshold value.

EMISSIONS CONTROL (Continued)

OXYGEN SENSOR HEATER MONITOR

If there is an oxygen sensor (O2S) DTC as well as a O2S heater DTC, the O2S fault MUST be repaired first. After the O2S fault is repaired, verify that the heater circuit is operating correctly.

Effective control of exhaust emissions is achieved by an oxygen feedback system. The most important element of the feedback system is the O2S. The O2S is located in the exhaust path. Once it reaches operating temperatures of 300° to 350°C (572 ° to 662°F), the sensor generates a voltage that is inversely proportional to the amount of oxygen in the exhaust. The information obtained by the sensor is used to calculate the fuel injector pulse width. This maintains a 14.7 to 1 Air Fuel (A/F) ratio. At this mixture ratio, the catalyst works best to remove hydrocarbons (HC), carbon monoxide (CO) and nitrogen oxide (NOx) from the exhaust.

The voltage readings taken from the O2S are very temperature sensitive. The readings are not accurate below 300°C. Heating of the O2S is done to allow the engine controller to shift to closed loop control as soon as possible. The heating element used to heat the O2S must be tested to ensure that it is heating the sensor properly.

The O2S circuit is monitored for a drop in voltage. The sensor output is used to test the heater by isolating the effect of the heater element on the O2S output voltage from the other effects.

EGR MONITOR (if equipped)

The Powertrain Control Module (PCM) performs an on-board diagnostic check of the EGR system.

The EGR monitor is used to test whether the EGR system is operating within specifications. The diagnostic check activates only during selected engine/driving conditions. When the conditions are met, the EGR is turned off (solenoid energized) and the O2S compensation control is monitored. Turning off the EGR shifts the air fuel (A/F) ratio in the lean direction. The O2S data should indicate an increase in the O2 concentration in the combustion chamber when the exhaust gases are no longer recirculated. While this test does not directly measure the operation of the EGR system, it can be inferred from the shift in the O2S data whether the EGR system is operating correctly. Because the O2S is being used, the O2S test must pass its test before the EGR test. Also looks at EGR linear potentiometer for feedback.

MISFIRE MONITOR

Excessive engine misfire results in increased catalyst temperature and causes an increase in HC emissions. Severe misfires could cause catalyst damage. To prevent catalytic convertor damage, the PCM monitors engine misfire.

The Powertrain Control Module (PCM) monitors for misfire during most engine operating conditions (positive torque) by looking at changes in the crankshaft speed. If a misfire occurs the speed of the crankshaft will vary more than normal.

FUEL SYSTEM MONITOR

To comply with clean air regulations, vehicles are equipped with catalytic converters. These converters reduce the emission of hydrocarbons, oxides of nitrogen and carbon monoxide. The catalyst works best when the air fuel (A/F) ratio is at or near the optimum of 14.7 to 1.

The PCM is programmed to maintain the optimum air/fuel ratio. This is done by making short term corrections in the fuel injector pulse width based on the O2S output. The programmed memory acts as a self calibration tool that the engine controller uses to compensate for variations in engine specifications, sensor tolerances and engine fatigue over the life span of the engine. By monitoring the actual air-fuel ratio with the O2S (short term) and multiplying that with the program long-term (adaptive) memory and comparing that to the limit, it can be determined whether it will pass an emissions test. If a malfunction occurs such that the PCM cannot maintain the optimum A/F ratio, then the MIL will be illuminated.

CATALYST MONITOR

To comply with clean air regulations, vehicles are equipped with catalytic converters. These converters reduce the emission of hydrocarbons, oxides of nitrogen and carbon monoxide.

Normal vehicle miles or engine misfire can cause a catalyst to decay. A meltdown of the ceramic core can cause a reduction of the exhaust passage. This can increase vehicle emissions and deteriorate engine performance, driveability and fuel economy.

The catalyst monitor uses dual oxygen sensors (O2S's) to monitor the efficiency of the converter. The dual O2S's strategy is based on the fact that as a catalyst deteriorates, its oxygen storage capacity and its efficiency are both reduced. By monitoring the oxygen storage capacity of a catalyst, its efficiency can be indirectly calculated. The upstream O2S is used to detect the amount of oxygen in the exhaust gas before the gas enters the catalytic converter. The PCM calculates the A/F mixture from the output of the O2S. A low voltage indicates high oxygen content (lean mixture). A high voltage indicates a low content of oxygen (rich mixture).

When the upstream O2S detects a lean condition, there is an abundance of oxygen in the exhaust gas. A functioning converter would store this oxygen so it can use it for the oxidation of HC and CO. As the converter absorbs the oxygen, there will be a lack of oxygen downstream of the converter. The output of the downstream O2S will indicate limited activity in this condition.

As the converter loses the ability to store oxygen, the condition can be detected from the behavior of the downstream O2S. When the efficiency drops, no chemical reaction takes place. This means the concentration of oxygen will be the same downstream as upstream. The output voltage of the downstream O2S copies the voltage of the upstream sensor. The only difference is a time lag (seen by the PCM) between the switching of the O2S's.

To monitor the system, the number of lean-to-rich switches of upstream and downstream O2S's is counted. The ratio of downstream switches to upstream switches is used to determine whether the catalyst is operating properly. An effective catalyst will have fewer downstream switches than it has upstream switches i.e., a ratio closer to zero. For a totally ineffective catalyst, this ratio will be one-to-one, indicating that no oxidation occurs in the device.

The system must be monitored so that when catalyst efficiency deteriorates and exhaust emissions increase to over the legal limit, the MIL (Check Engine lamp) will be illuminated.

LEAK DETECTION PUMP MONITOR

The leak detection assembly incorporates two primary functions: it must detect a leak in the evaporative system and seal the evaporative system so the leak detection test can be run.

The primary components within the assembly are: A three port solenoid that activates both of the functions listed above; a pump which contains a switch, two check valves, a spring/diaphragm, and a canister vent valve (CVV) seal which contains a spring loaded vent seal valve.

Immediately after a cold start, between predetermined temperature thresholds limits, the three port solenoid is briefly energized. This initializes the pump by drawing air into the pump cavity and also closes the vent seal. During non test conditions the vent seal is held open by the pump diaphragm assembly which pushes it open at the full travel position. The vent seal will remain closed while the pump is cycling due to the reed switch triggering of the three port solenoid that prevents the diaphragm assembly from reaching full travel. After the brief initialization period, the solenoid is de-energized allowing atmospheric pressure to enter the pump cavity, thus permitting the spring to drive the diaphragm which forces air out of the pump cavity and into the vent system. When the solenoid is energized and de energized, the cycle is repeated creating flow in typical diaphragm pump fashion. The pump is controlled in 2 modes:

Pump Mode: The pump is cycled at a fixed rate to achieve a rapid pressure build in order to shorten the overall test length.

Test Mode: The solenoid is energized with a fixed duration pulse. Subsequent fixed pulses occur when the diaphragm reaches the Switch closure point.

The spring in the pump is set so that the system will achieve an equalized pressure of about 7.5" water. The cycle rate of pump strokes is quite rapid as the system begins to pump up to this pressure. As the pressure increases, the cycle rate starts to drop off. If there is no leak in the system, the pump would eventually stop pumping at the equalized pressure. If there is a leak, it will continue to pump at a rate representative of the flow characteristic of the size of the leak. From this information we can determine if the leak is larger than the required detection limit (currently set at .020" orifice by CARB). If a leak is revealed during the leak test portion of the test, the test is terminated at the end of the test mode and no further system checks will be performed.

The canister vent valve will unseal the system after completion of the test sequence as the pump diaphragm assembly moves to the full travel position.

Evaporative system functionality will be verified by using the stricter evap purge flow monitor. At an appropriate warm idle the LDP will be energized to seal the canister vent. The purge flow will be clocked up from some small value in an attempt to see a shift in the 02 control system. If fuel vapor, indicated by a shift in the 02 control, is present the test is passed. If not, it is assumed that the purge system is not functioning in some respect. The LDP is again turned off and the test is ended.

DESCRIPTION - HIGH AND LOW LIMITS

The PCM compares input signal voltages from each input device with established high and low limits for the device. If the input voltage is not within limits and other criteria are met, the PCM stores a diagnostic trouble code in memory. Other diagnostic trouble code criteria might include engine RPM limits or input voltages from other sensors or switches that must be present before verifying a diagnostic trouble code condition.

OPERATION

OPERATION - SYSTEM

The Powertrain Control Module (PCM) monitors many different circuits in the fuel injection, ignition, emission and engine systems. If the PCM senses a problem with a monitored circuit often enough to indicate an actual problem, it stores a Diagnostic Trouble Code (DTC) in the PCM's memory. If the code applies to a non-emissions related component or system, and the problem is repaired or ceases to exist, the PCM cancels the code after 40 warmup cycles. Diagnostic trouble codes that affect vehicle emissions illuminate the Malfunction Indicator Lamp (MIL). Refer to Malfunction Indicator Lamp in this section.

Certain criteria must be met before the PCM stores a DTC in memory. The criteria may be a specific range of engine RPM, engine temperature, and/or input voltage to the PCM.

The PCM might not store a DTC for a monitored circuit even though a malfunction has occurred. This may happen because one of the DTC criteria for the circuit has not been met. **For example** , assume the diagnostic trouble code criteria requires the PCM to monitor the circuit only when the engine operates between 750 and 2000 RPM. Suppose the sensor's output circuit shorts to ground when engine operates above 2400 RPM (resulting in 0 volt input to the PCM). Because the condition happens at an engine speed above the maximum threshold (2000 rpm), the PCM will not store a DTC.

There are several operating conditions for which the PCM monitors and sets DTC's. Refer to Monitored Systems, Components, and Non-Monitored Circuits in this section.

NOTE: Various diagnostic procedures may actually cause a diagnostic monitor to set a DTC. For instance, pulling a spark plug wire to perform a spark test may set the misfire code. When a repair is completed and verified, use the DRBIII® scan tool to erase all DTC's and extinguish the MIL.

Technicians can display stored DTC's. Refer to Diagnostic Trouble Codes (Refer to 8 - ELECTRICAL/ ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - DESCRIPTION). For obtaining the DTC information, use the Data Link Connector with the DRBIII® scan tool (Fig. 1).

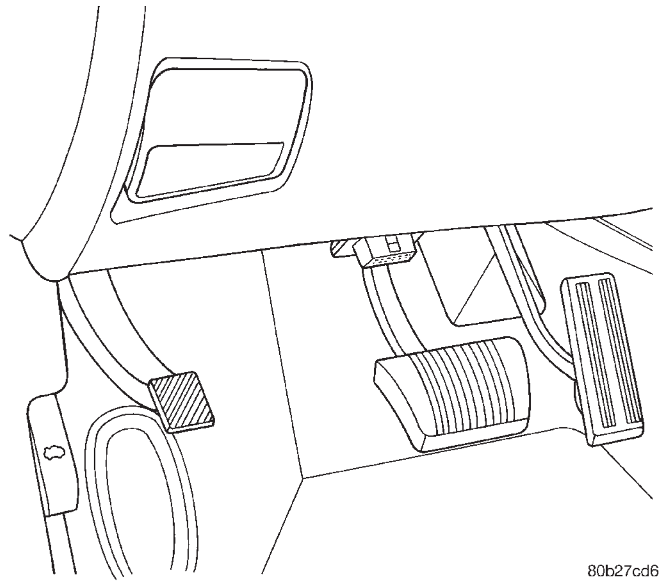


Fig. 1 Data Link Connector

DRB III® STATE DISPLAY TEST MODE

OPERATION

The switch inputs to the Powertrain Control Module (PCM) have two recognized states; HIGH and LOW. For this reason, the PCM cannot recognize the difference between a selected switch position versus an open circuit, a short circuit, or a defective switch. If the State Display screen shows the change from HIGH to LOW or LOW to HIGH, assume the entire switch circuit to the PCM functions properly. From the state display screen, access either State Display Inputs and Outputs or State Display Sensors.

EVAPORATIVE EMISSIONS

TABLE OF CONTENTS

EVAPORATIVE EMISSIONS

OPERATION - EVAPORATION CONTROL SYSTEM

The evaporation control system prevents the emission of fuel tank vapors into the atmosphere. When fuel evaporates in the fuel tank, the vapors pass through vent hoses or tubes to an activated carbon filled evaporative canister. The canister temporarily holds the vapors. The Powertrain Control Module (PCM) allows intake manifold vacuum to draw vapors into the combustion chambers during certain operating conditions (Fig. 1).

All engines use a proportional purge solenoid system. The PCM controls vapor flow by operating the purge solenoid. Refer to Proportional Purge Solenoid in this section.

NOTE: The evaporative system uses specially manufactured hoses. If they need replacement, only use fuel resistant hose. Also the hoses must be able to pass an Ozone compliance test.

NOTE: For more information on Onboard Refueling Vapor Recovery (ORVR), refer to the Fuel Delivery section.

EVAPORATIVE EMISSIONS (Continued)

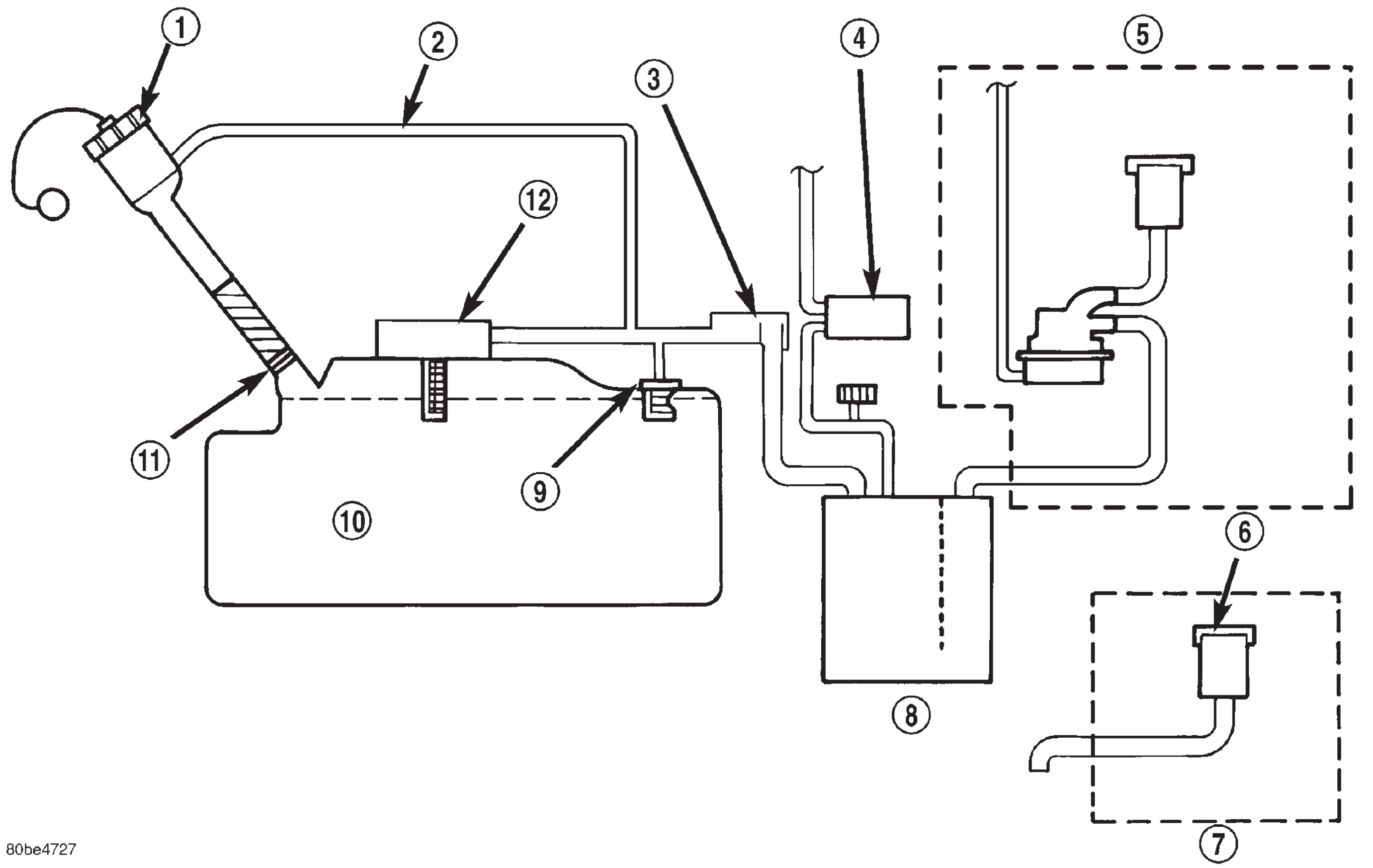


Fig. 1 ORVR System Schematic

1 - FUEL CAP
2 - RECIRCULATION TUBE
3 - LIQUID SEPARATOR
4 - PURGE SOLENOID
5 - W/LDP
6 - BREATHER ELEMENT
7 - W/O LDP
8 - CANISTER
9 - ROLLOVER VALVE
10 - FUEL TANK
11 - CHECK VALVE
12 - CONTROL VALVE

EVAP/PURGE SOLENOID

OPERATION

During the cold start warm-up period and the hot start time delay, the PCM does not energize the solenoid. When de-energized, no vapors are purged.

The proportional purge solenoid operates at a frequency of 200 hz and is controlled by an engine controller circuit that senses the current being applied to the proportional purge solenoid and then adjusts that current to achieve the desired purge flow. The proportional purge solenoid controls the purge rate of fuel vapors from the vapor canister and fuel tank to the engine intake manifold.

REMOVAL

(1) Disconnect the negative battery cable.
(2) Remove the air cleaner box.
(3) Disconnect the electrical connector.
(4) Disconnect the vacuum hoses.
(5) Remove purge solenoid from the bracket (Fig. 2).

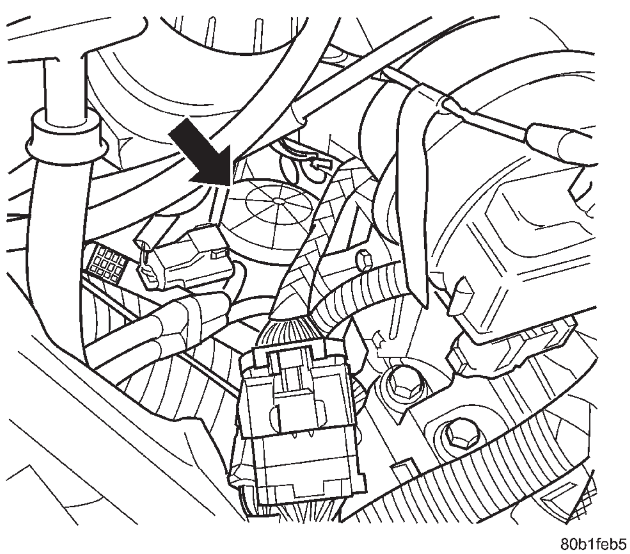


Fig. 2 PURGE SOLENOID

INSTALLATION

(1) Install purge solenoid onto bracket (Fig. 2).
(2) Connect the vacuum hoses.
(3) Connect the electrical connector.
(4) Install the air cleaner box.
(5) Connect the negative battery cable.

FUEL FILLER CAP

DESCRIPTION

The plastic fuel fill cap is threaded/quarter turn onto the end of the fuel filler tube. It's purpose is to retain vapors and fuel in the fuel tank.

OPERATION

The fuel filler cap incorporates a two-way relief valve that is closed to atmosphere during normal operating conditions. The relief valve is calibrated to open when a pressure of 17 kPa (2.5 psi) or vacuum of 2 kPa (0.6 in. Hg) occurs in the fuel tank. When the pressure or vacuum is relieved, the valve returns to the normally closed position.

CAUTION: Remove the fuel filler cap to release fuel tank pressure before disconnecting any fuel system component.

LEAK DETECTION PUMP

REMOVAL

(1) Disconnect the negative battery cable.
(2) Remove fuel tank, refer to the Fuel Delivery section (Fig. 3) and (Fig. 4).

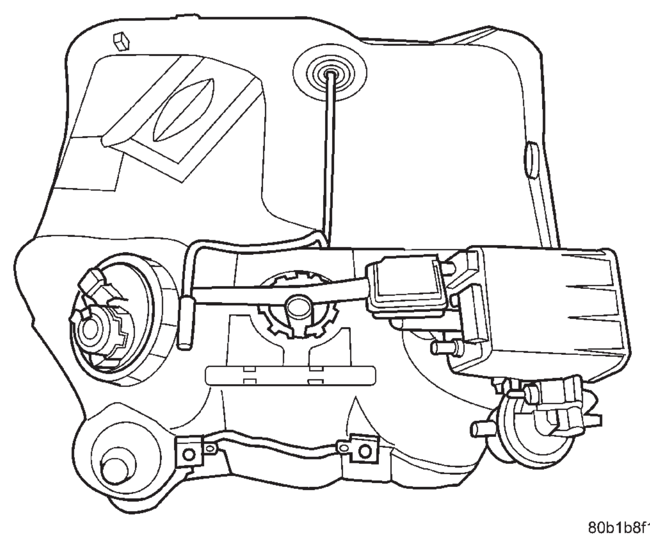


Fig. 3 FUEL TANK AND EVAP SYSTEM

LEAK DETECTION PUMP (Continued)

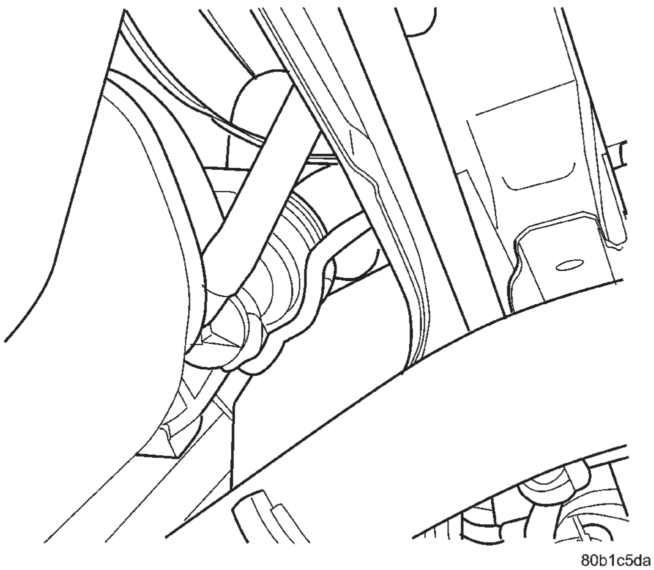


Fig. 4 LDP LOCATION

(3) Disconnect the hoses from the EVAP canister.
(4) Remove LDP from EVAP canister.

INSTALLATION

(1) Install LDP to EVAP Canister.
(2) Connect hoses.
(3) Install fuel tank refer to the Fuel Delivery section (Fig. 3).
(4) Connect negative battery cable.

ORVR

OPERATION

The emission control principle used in the ORVR system is that the fuel flowing into the filler tube (appx. 1” I.D.) creates an aspiration effect which draws air into the fill tube (Fig. 5). During refueling, the fuel tank is vented to the vapor canister to capture escaping vapors. With air flowing into the filler tube, there are no fuel vapors escaping to the atmosphere. Once the refueling vapors are captured by the canister, the vehicle's computer controlled purge system draws vapor out of the canister for the engine to burn. The vapors flow is metered by the purge solenoid so that there is no or minimal impact on driveability or tailpipe emissions.

As fuel starts to flow through the fill tube, it opens the normally closed check valve and enters the fuel tank. Vapor or air is expelled from the tank through the control valve to the vapor canister. Vapor is absorbed in the canister until vapor flow in the lines stops, either following shut-off or by having the fuel level in the tank rise high enough to close the control valve. The control valve(Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL TANK - OPERATION) contains a float that rises to seal the large diameter vent path to the canister. At this point in the fueling of the vehicle, the tank pressure increases, the check valve closes (preventing tank fuel from spitting back at the operator), and fuel then rises up the filler tube to shut-off the dispensing nozzle.

If the engine is shut-off while the On-Board diagnostics test is running, low level tank pressure can be trapped in the fuel tank and fuel can not be added to the tank until the pressure is relieved. This is due to the leak detection pump closing the vapor outlet from the top of the tank and the one-way check valve not allowing the tank to vent through the fill tube to atmosphere. Therefore, when fuel is added, it will back-up in the fill tube and shut off the dispensing nozzle. The pressure can be eliminated in two ways: 1. Vehicle purge must be activated and for a long enough period to eliminate the pressure. 2. Removing the fuel cap and allowing enough time for the system to vent thru the recirulation tube.

ORVR (Continued)

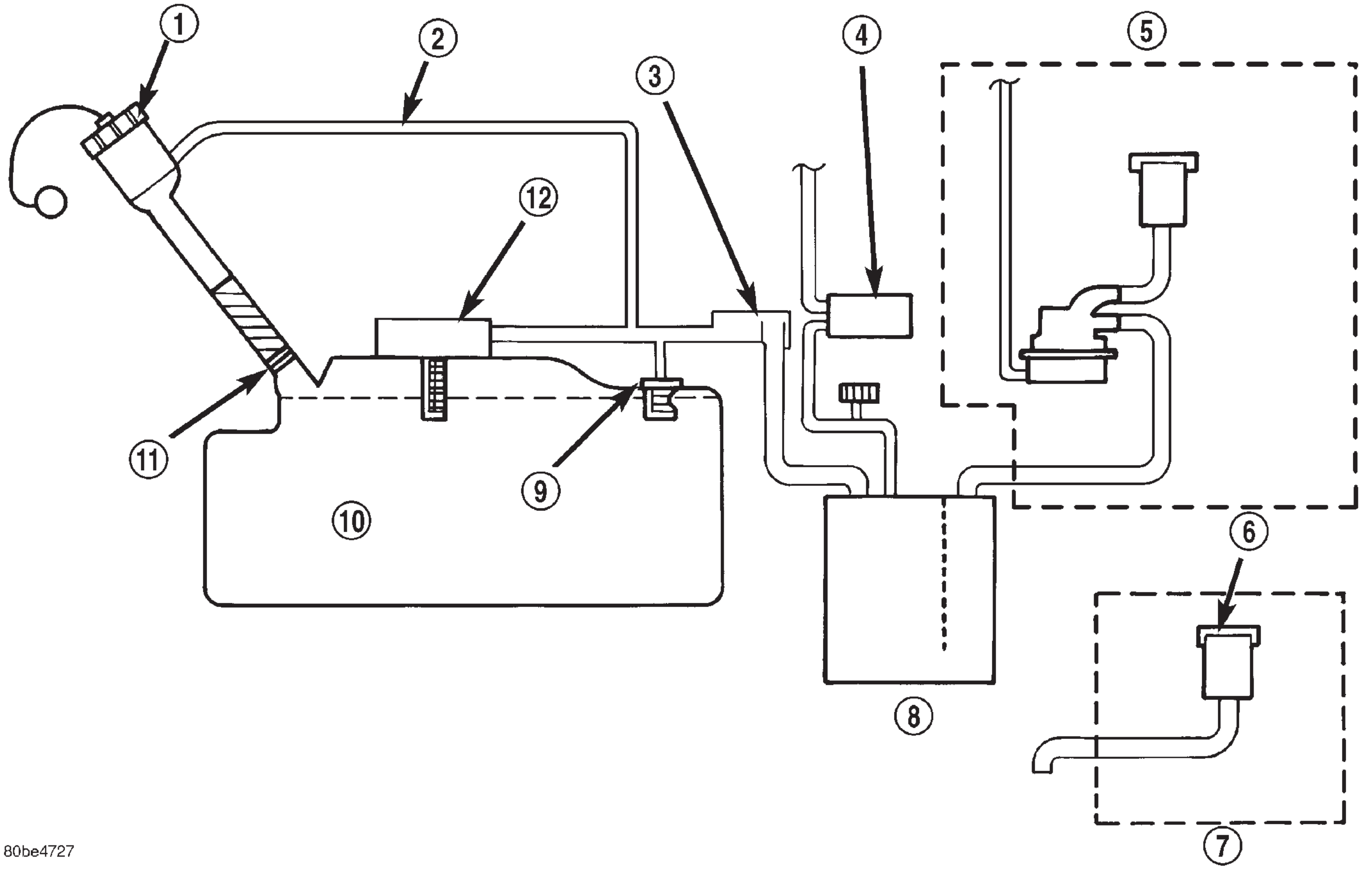


Fig. 5 ORVR System Schematic

1 - FUEL CAP
2 - RECIRCULATION TUBE
3 - LIQUID SEPARATOR
4 - PURGE SOLENOID
5 - W/LDP
6 - BREATHER ELEMENT
7 - W/O LDP
8 - CANISTER
9 - ROLLOVER VALVE
10 - FUEL TANK
11 - CHECK VALVE
12 - CONTROL VALVE

ORVR (Continued)

DIAGNOSIS AND TESTING - VEHICLE DOES NOT FILL

CONDITION	POSSIBLE CAUSES	CORRECTION
Pre-Mature Nozzle Shut-Off	Defective fuel tank assembly components.	Fill tube improperly installed (sump) Fill tube hose pinched. Check valve stuck shut. Control valve stuck shut.
	Defective vapor/vent components.	Vent line from control valve to canister pinched. Vent line from canister to vent filter pinched. Canister vent valve failure (requires double failure, plugged to LDP and atmosphere). Leak detection pump failed closed. Leak detection pump filter plugged.
	On-Board diagnostics evaporative system leak test just conducted.	Canister vent valve vent plugged to atmosphere. engine still running when attempting to fill (System designed not to fill).
	Defective fill nozzle.	Try another nozzle.
Fuel Spits Out Of Filler Tube.	During fill.	See Pre-Mature Shut-Off.
	At conclusion of fill.	Defective fuel handling component. (Check valve stuck open).
		Defective vapor/vent handling component.
		Defective fill nozzle.

PCV VALVE

DESCRIPTION

The PCV valve contains a spring loaded plunger. The plunger meters the amount of crankcase vapors routed into the combustion chamber based on intake manifold vacuum (Fig. 6).

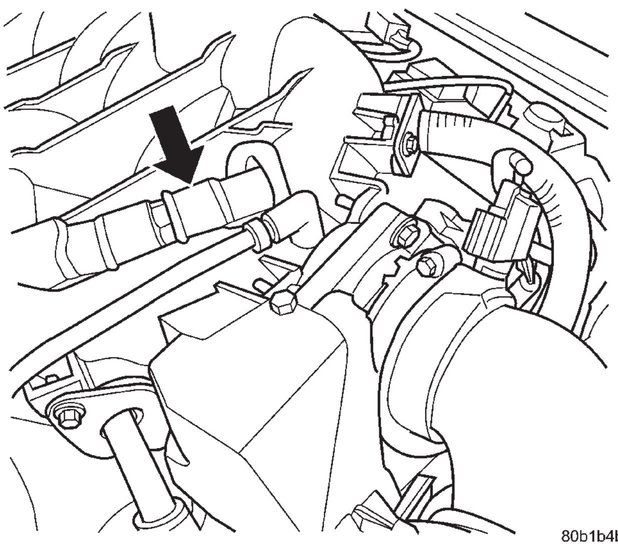


Fig. 6 POSITIVE CRANKCASE VALVE

OPERATION

When the engine is not operating or during an engine backfire, the spring forces the plunger back against the seat. This prevents vapors from flowing through the valve (Fig. 7).

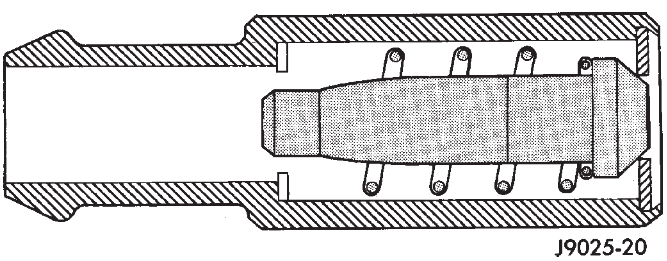


Fig. 7 Engine Off or Engine Backfire No Vapor Flow

When the engine is at idle or cruising, high manifold vacuum is present. At these times manifold vacuum is able to completely compress the spring and pull the plunger to the top of the valve (Fig. 8). In this position there is minimal vapor flow through the valve.

During periods of moderate intake manifold vacuum the plunger is only pulled part way back from the inlet. This results in maximum vapor flow through the valve (Fig. 9).

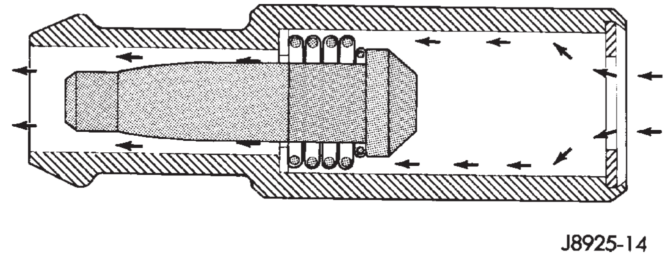


Fig. 8 High Intake Manifold Vacuum Minimal Vapor Flow

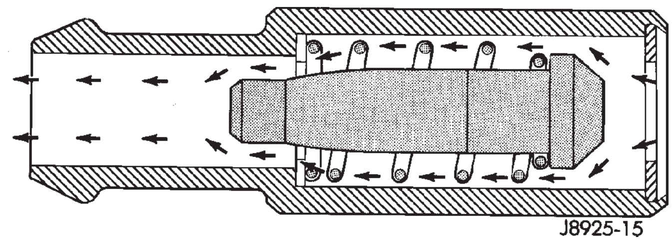


Fig. 9 Moderate Intake Manifold Vacuum Maximum Vapor Flow

DIAGNOSIS AND TESTING - PCV SYSTEM

WARNING: APPLY PARKING BRAKE AND/OR BLOCK WHEELS BEFORE PERFORMING ANY TEST OR ADJUSTMENT WITH THE ENGINE OPERATING.

(1) With engine idling, remove the hose from the PCV valve. If the valve is not plugged, a hissing noise will be heard as air passes through the valve. A strong vacuum should also be felt when a finger is placed over the valve inlet.

(2) Install hose on PCV valve. Remove the make-up air hose from the air plenum at the rear of the engine. Hold a piece of stiff paper (parts tag) loosely over the end of the make-up air hose.

(3) After allowing approximately one minute for crankcase pressure to reduce, the paper should draw up against the hose with noticeable force. If the engine does not draw the paper against the grommet after installing a new valve, replace the PCV valve hose.

(4) Turn the engine off. Remove the PCV valve from intake manifold. The valve should rattle when shaken.

(5) Replace the PCV valve and retest the system if it does not operate as described in the preceding tests. **Do not attempt to clean the old PCV valve.** If the valve rattles, apply a light coating of Loctite® Pipe Sealant With Teflon to the threads. Thread the PCV valve into the manifold plenum and tighten to 7 N·m (60 in. lbs.) torque.

VAPOR CANISTER

DESCRIPTION

The canister attaches to the bracket. The vacuum and vapor tubes connect to the top of the canister (Fig. 10). It is a charcoal canister.

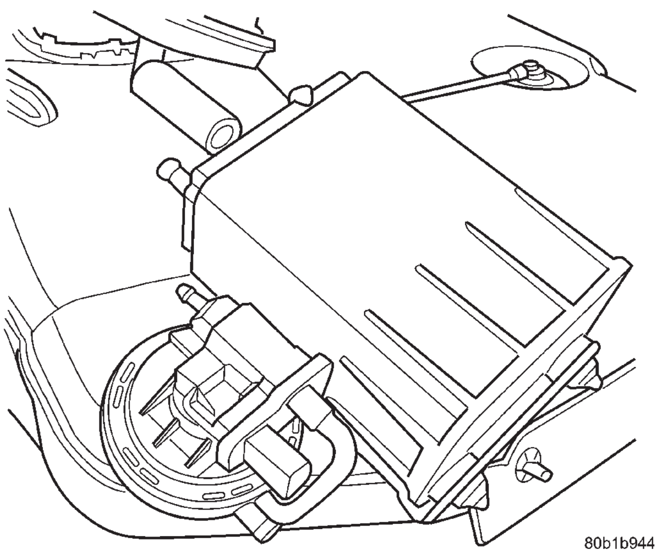

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Fig. 10 EVAP Canister

OPERATION

All vehicles use a maintenance free, evaporative (EVAP) canister. Fuel tank vapors vent into the canister. The canister temporarily holds the fuel vapors until intake manifold vacuum draws them into the combustion chamber. The Powertrain Control Module (PCM) purges the canister through the proportional purge solenoid. The PCM purges the canister at predetermined intervals and engine conditions.

Purge Free Cells

Purge-free memory cells are used to identify the fuel vapor content of the evaporative canister. Since the evaporative canister is not purged 100% of the time, the PCM stores information about the evaporative canister's vapor content in a memory cell.

The purge-free cells are constructed similar to certain purge-normal cells. The purge-free cells can be monitored by the DRB III® Scan Tool. The only difference between the purge-free cells and normal adaptive cells is that in purge-free, the purge is completely turned off. This gives the PCM the ability to compare purge and purge-free operation.

REMOVAL

(1) Disconnect the negative battery cable.

(2) Remove fuel tank, refer to the Fuel Delivery section (Fig. 11).

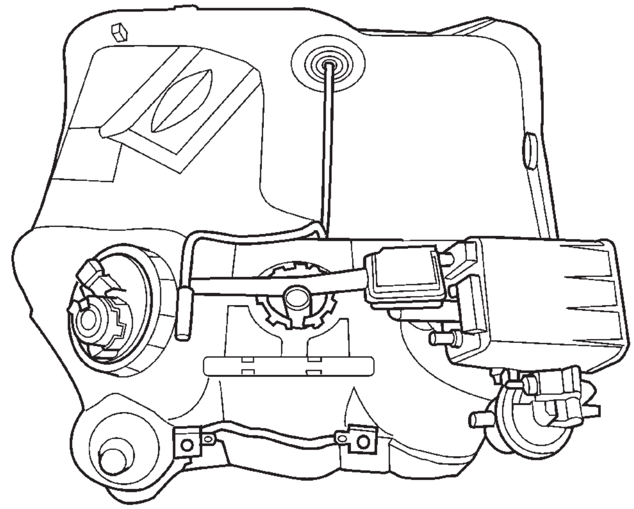
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Fig. 11 FUEL TANK AND EVAP SYSTEM

(3) Remove the LDP Pump from the EVAP canister.

(4) Disconnect the hoses from the EVAP canister.

(5) Remove plastic fastener from the bracket of the EVAP canister (Fig. 13) and (Fig. 12)

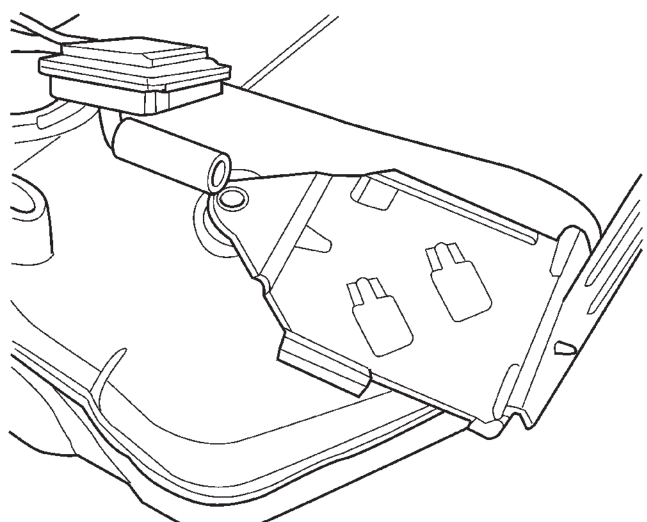
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Fig. 12 EVAP CANISTER BRACKET

(6) Remove EVAP canister from bracket.

VAPOR CANISTER (Continued)

INSTALLATION

(1) Install LDP to EVAP Canister.

(2) Install EVAP canister to Bracket (Fig. 13).

(3) Install the plastic fastener to EVAP canister bracket (Fig. 12).

(4) Connect hoses.

(5) Install fuel tank refer to the Fuel Delivery section.

(6) Connect negative battery cable.

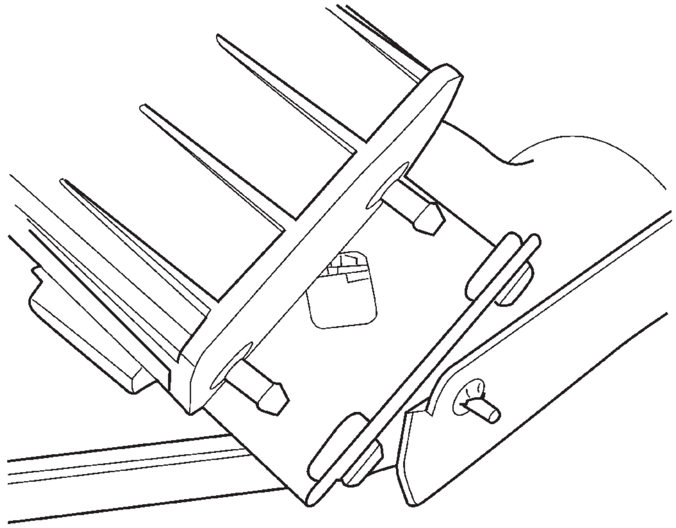

Fig. 13 EVAP CANISTER PINS

EXHAUST GAS RECIRCULATION

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EXHAUST GAS RECIRCULATION

SPECIFICATIONS

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
EGR valve to cyl. head 2.4L	30	22.1	265
EGR tube to EGR valve 2.4L	11.3	8.5	99.9
EGR tube to intake manifold 2.4L	11.3	8.5	99.9

TUBE

REMOVAL - 4 CYLINDER

(1) Disconnect the negative battery cable.
(2) Remove the air cleaner box.
(3) Remove the EGR tube clamp bolt at intake manifold.
(4) Slide clamp out of the intake manifold slot (Fig. 1).
(5) Remove the 2 bolts from EGR valve (Fig. 2).

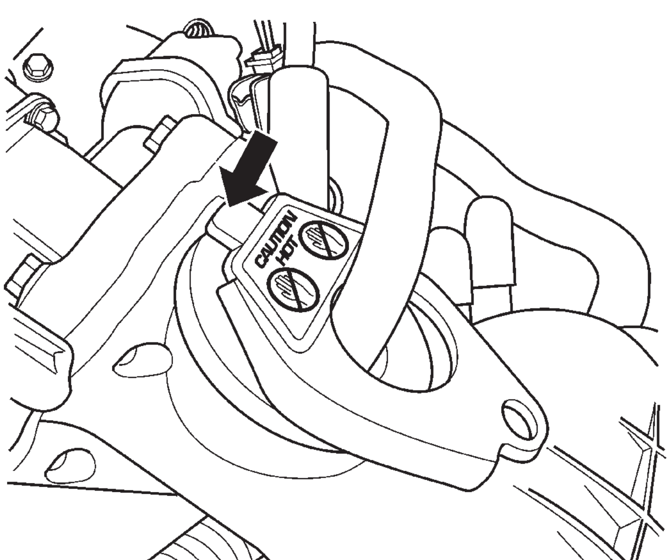

Fig. 1 EGR TUBE CLAMP

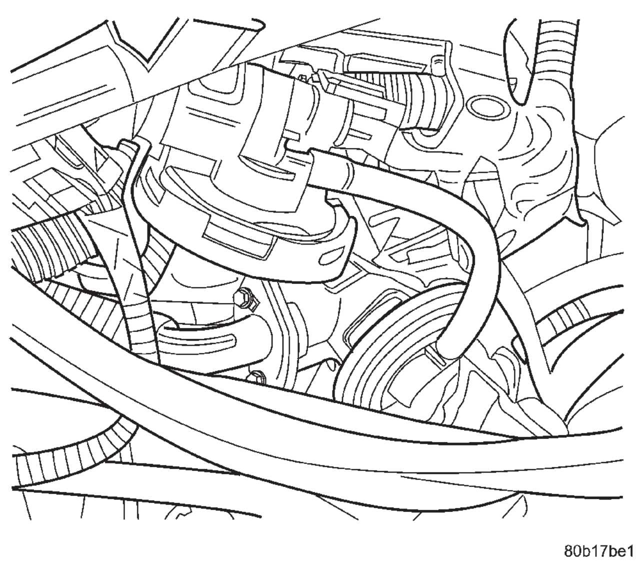

Fig. 2 EGR VALVE

TUBE (Continued)

(6) Remove the tube and gasket (Fig. 3).

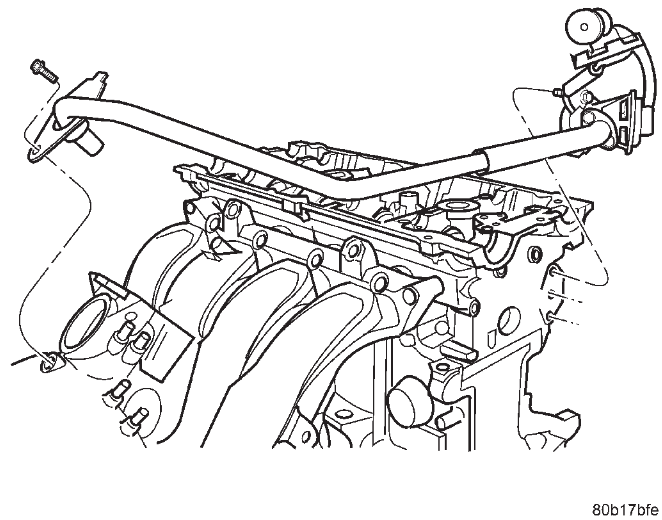

Fig. 3 EGR ASSEMBLY

(7) Remove the rubber silicone seal from the intake manifold and inspect (Fig. 4). Replace seal if damaged.

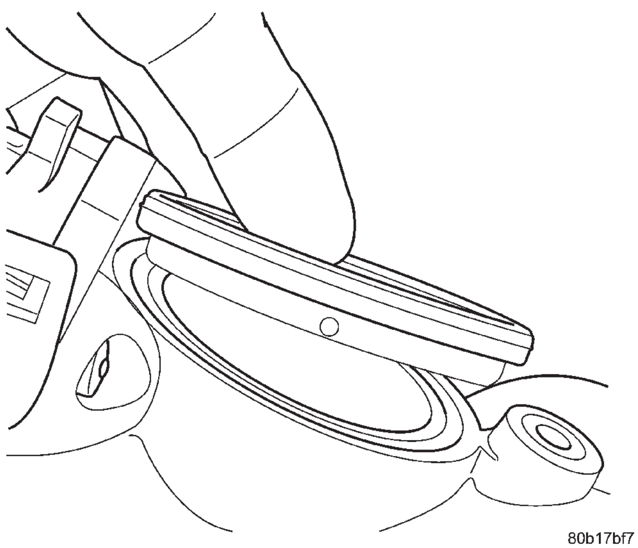

Fig. 4 EGR TUBE GASKET

INSTALLATION - 4 CYLINDER

(1) Clean all mating surfaces.

(2) Inspect rubber silicone seal on intake manifold. Replace seal if damaged.

(3) Install new gasket between the EGR tube and EGR valve and loose install bolts to EGR valve (Fig. 3).

(4) Slide clamp into the intake manifold slot (Fig. 1). Tighten the bolt to 11.3 N·m (100 in. lbs.).

(5) Tighten bolts to EGR valve to 11.3 N·m (100 in. lbs.) torque.

(6) Install the air cleaner box.

(7) Connect the negative battery cable.

VALVE

DESCRIPTION

The EGR valve consists of three major components. First there is the pintle, valve seat, and housing which contains and regulates the gas flow. Second there is the armature, return spring, and solenoid coil to provide the operating force to regulate the flow by changing the pintle position. The solenoid coil assembly is in parallel with a diode and connects to the two connectors in the connector assembly. The third major component which senses pintle position and is connected to the three connectors in the electrical connector.

OPERATION

Refer to Monitored Systems - EGR Monitor in this group for more information.

The engines use Exhaust Gas Recirculation (EGR) systems. The EGR system reduces oxides of nitrogen (NOx) in engine exhaust and helps prevent detonation (engine knock). Under normal operating conditions, engine cylinder temperature can reach more than 3000°F. Formation of NOx increases proportionally with combustion temperature. To reduce the emission of these oxides, the cylinder temperature must be lowered. The system allows a predetermined amount of hot exhaust gas to recirculate and dilute the incoming air/fuel mixture. The diluted air/fuel mixture reduces peak flame temperature during combustion.

This system does not allow EGR at idle.

A failed or malfunctioning EGR system can cause engine spark knock, sags or hesitation, rough idle, engine stalling and increased emissions.

4 - CYLINDER The electric EGR transducer contains an electrically operated solenoid and a back-pressure transducer (Fig. 5). The Powertrain Control Module (PCM) operates the solenoid. The PCM determines when to energize the solenoid. Exhaust system back-pressure controls the transducer.

When the PCM energizes the solenoid, vacuum does not reach the transducer. Vacuum flows to the transducer when the PCM de-energizes the solenoid.

When exhaust system back-pressure becomes high enough, it fully closes a bleed valve in the transducer. When the PCM de-energizes the solenoid and back-pressure closes the transducer bleed valve, vacuum flows through the transducer to operate the EGR valve.

VALVE (Continued)

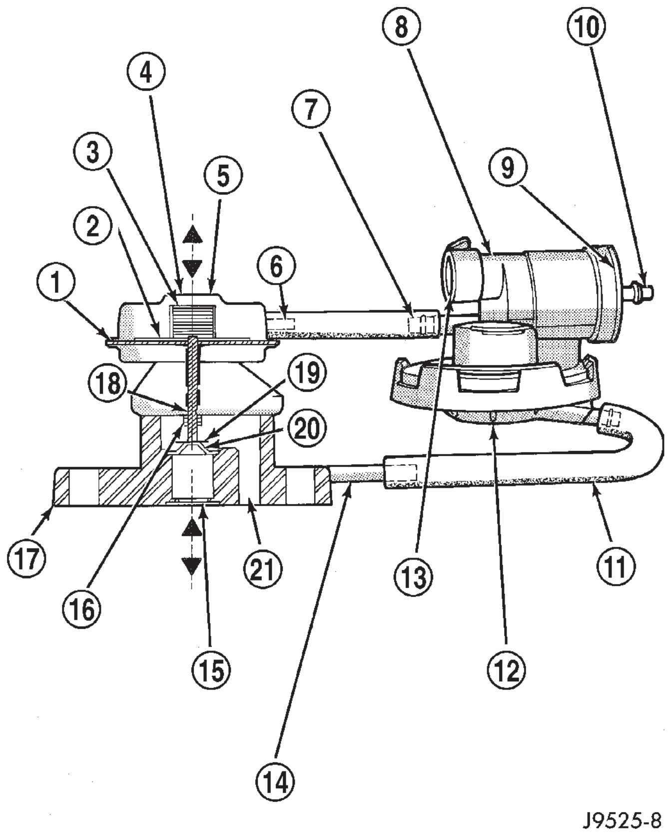

Fig. 5 EGR Valve and Transducer - Typical

1 - DIAPHRAGM
2 - PISTON
3 - SPRING
4 - EGR VALVE ASSEMBLY
5 - VACUUM MOTOR
6 - VACUUM MOTOR FITTING
7 - VACUUM OUTLET FITTING TO EGR VALVE
8 - EGR VALVE CONTROL ASSEMBLY
9 - ELECTRIC SOLENOID PORTION OF VALVE CONTROL
10 - VACUUM INLET FITTING FROM ENGINE
11 - BACK-PRESSURE HOSE
12 - TRANSDUCER PORTION OF VALVE CONTROL
13 - ELECTRICAL CONNECTION POINT
14 - EGR VALVE BACK-PRESSURE FITTING
15 - EXHAUST GAS INLET
16 - STEM PROTECTOR AND BUSHING
17 - BASE
18 - MOVEMENT INDICATOR
19 - POPPET VALVE
20 - SEAT
21 - EXHAUST GAS OUTLET

De-energizing the solenoid, but not fully closing the transducer bleed hole (because of low back-pressure), varies the strength of vacuum applied to the EGR valve. Varying the strength of the vacuum changes the amount of EGR supplied to the engine. This provides the correct amount of exhaust gas recirculation for different operating conditions.

2.7L The exhaust gas recirculation flow is determined by the engine controller. For a given set of conditions, the engine controller knows the ideal exhaust gas recirculation flow to optimize NOx and fuel economy as a function of the pintle position. Pintle position is obtained from the position sensor.

The engine controller adjust the duty cycle of the 128hz power supplied to the solenoid coil to obtain the correct pintle position.

REMOVAL - 4 CYLINDER

The EGR valve and Transducer are to be replaced as an assembly.

(1) Disconnect the negative battery cable.
(2) Remove the air cleaner box.
(3) remove the 2 bolts EGR tube to EGR valve (Fig. 2).
(4) Remove the 2 bolts for EGR valve to cylinder head.
(5) Disconnect the electrical connector from transducer.
(6) Remove the vacuum hose from the EGR transducer.
(7) Remove the EGR valve and transducer as an assembly

INSTALLATION - 4 CYLINDER

(1) Clean surfaces of cylinder head and EGR tube where EGR valve interfaces.
(2) Install new gasket between the EGR valve and the transducer to cylinder head and loose install bolts.
(3) Install the 2 bolts from EGR tube to EGR valve.
(4) Tighten the EGR valve to cylinder head bolts to 22.9 N·m (202 in. lbs.).
(5) Tighten the EGR tube to EGR valve bolts to 11.3 N·m (100 in. lbs.).
(6) Connect the electrical connector to EGR transducer.
(7) Connect the vacuum hose to EGR transducer.
(8) Install the air cleaner box.
(9) Connect the negative battery cable.

ON-BOARD DIAGNOSTICS

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TASK MANAGER

DESCRIPTION

The PCM is responsible for efficiently coordinating the operation of all the emissions-related components. The PCM is also responsible for determining if the diagnostic systems are operating properly. The software designed to carry out these responsibilities is call the 'Task Manager'.

OPERATION

The Task Manager determines when tests happen and when functions occur. Many of the diagnostic steps required by OBD II must be performed under specific operating conditions. The Task Manager software organizes and prioritizes the diagnostic procedures. The job of the Task Manager is to determine if conditions are appropriate for tests to be run, monitor the parameters for a trip for each test, and record the results of the test. Following are the responsibilities of the Task Manager software:

- Test Sequence
- MIL Illumination
- Diagnostic Trouble Codes (DTCs)
- Trip Indicator
- Freeze Frame Data Storage
- Similar Conditions Window

Test Sequence

In many instances, emissions systems must fail diagnostic tests more than once before the PCM illuminates the MIL. These tests are know as 'two trip monitors.' Other tests that turn the MIL lamp on after a single failure are known as 'one trip monitors.' A trip is defined as 'start the vehicle and operate it to meet the criteria necessary to run the given monitor.'

Many of the diagnostic tests must be performed under certain operating conditions. However, there are times when tests cannot be run because another test is in progress (conflict), another test has failed (pending) or the Task Manager has set a fault that may cause a failure of the test (suspend).

- Pending

Under some situations the Task Manager will not run a monitor if the MIL is illuminated and a fault is stored from another monitor. In these situations, the Task Manager postpones monitors **pending** resolution of the original fault. The Task Manager does not run the test until the problem is remedied.

For example, when the MIL is illuminated for an Oxygen Sensor fault, the Task Manager does not run the Catalyst Monitor until the Oxygen Sensor fault is remedied. Since the Catalyst Monitor is based on signals from the Oxygen Sensor, running the test would produce inaccurate results.

- Conflict

There are situations when the Task Manager does not run a test if another monitor is in progress. In these situations, the effects of another monitor running could result in an erroneous failure. If this **conflict** is present, the monitor is not run until the conflicting condition passes. Most likely the monitor will run later after the conflicting monitor has passed.

For example, if the Fuel System Monitor is in progress, the Task Manager does not run the catalyst Monitor. Since both tests monitor changes in air/fuel ratio and adaptive fuel compensation, the monitors will conflict with each other.

- Suspend

Occasionally the Task Manager may not allow a two trip fault to mature. The Task Manager will **suspend** the maturing of a fault if a condition exists that may induce an erroneous failure. This prevents illuminating the MIL for the wrong fault and allows more precise diagnosis.

For example, if the PCM is storing a one trip fault for the Oxygen Sensor and the catalyst monitor, the Task Manager may still run the catalyst Monitor but will suspend the results until the Oxygen Sensor Monitor either passes or fails. At that point the Task Manager can determine if the catalyst system is actually failing or if an Oxygen Sensor is failing.

MIL Illumination

The PCM Task Manager carries out the illumination of the MIL. The Task Manager triggers MIL illumination upon test failure, depending on monitor failure criteria.

TASK MANAGER (Continued)

The Task Manager Screen shows both a Requested MIL state and an Actual MIL state. When the MIL is illuminated upon completion of a test for a good trip, the Requested MIL state changes to OFF. However, the MIL remains illuminated until the next key cycle. (On some vehicles, the MIL will actually turn OFF during the third key cycle) During the key cycle for the third good trip, the Requested MIL state is OFF, while the Actual MIL state is ON. After the next key cycle, the MIL is not illuminated and both MIL states read OFF.

Diagnostic Trouble Codes (DTCs)

With OBD II, different DTC faults have different priorities according to regulations. As a result, the priorities determine MIL illumination and DTC erasure. DTCs are entered according to individual priority. DTCs with a higher priority overwrite lower priority DTCs.

Priorities

- Priority 0 —Non-emissions related trouble codes.
- Priority 1 — One trip failure of a two trip fault for non-fuel system and non-misfire. (MIL Off)
- Priority 2 — One trip failure of a two trip fault for fuel system (rich/lean) or misfire. (MIL Off)
- Priority 3 — Two trip failure for a non-fuel system and non-misfire or matured one trip comprehensive component fault. (MIL On)
- Priority 4 — Two trip failure or matured fault for fuel system (rich/lean) and misfire or one trip catalyst damaging misfire. Catalyst damage misfire is a 2 trip MIL. The MIL flashes on the first trip when catalyst damage misfire levels are present. (MIL On)

Non-emissions related failures have no priority. One trip failures of two trip faults have low priority. Two trip failures or matured faults have higher priority. One and two trip failures of fuel system and misfire monitor take precedence over non-fuel system and non-misfire failures.

DTC Self Erasure

With one trip components or systems, the MIL is illuminated upon test failure and DTCs are stored.

Two trip monitors are components requiring failure in two consecutive trips for MIL illumination. Upon failure of the first test, the Task Manager enters a maturing code. If the component fails the test for a second time the code matures and a DTC is set.

After three good trips the MIL is extinguished and the Task Manager automatically switches the trip counter to a warm-up cycle counter. DTCs are automatically erased following 40 warm-up cycles if the component does not fail again.

For misfire and fuel system monitors, the component must pass the test under a Similar Conditions Window in order to record a good trip. A Similar Conditions Window is when engine RPM is within ±375 RPM and load is within ±20% of when the fault occurred.

NOTE: It is important to understand that a component does not have to fail under a similar window of operation to mature. It must pass the test under a Similar Conditions Window when it failed to record a Good Trip for DTC erasure for misfire and fuel system monitors.

DTCs can be erased anytime with a DRBIII®. Erasing the DTC with the DRBIII® erases all OBD II information. The DRBIII® automatically displays a warning that erasing the DTC will also erase all OBD II monitor data. This includes all counter information for warm-up cycles, trips and Freeze Frame.

Trip Indicator

The **Trip** is essential for running monitors and extinguishing the MIL. In OBD II terms, a trip is a set of vehicle operating conditions that must be met for a specific monitor to run. All trips begin with a key cycle.

Good Trip

The Good Trip counters are as follows:

- Global Good Trip
- Fuel System Good Trip
- Misfire Good Trip
- Alternate Good Trip (appears as a Global Good Trip on DRBIII®)
- Comprehensive Components
- Major Monitor
- Warm-Up Cycles

Global Good Trip

To increment a Global Good Trip, the Oxygen sensor and Catalyst efficiency monitors must have run and passed, and 2 minutes of engine run time.

Fuel System Good Trip

To count a good trip (three required) and turn off the MIL, the following conditions must occur:

- Engine in closed loop
- Operating in Similar Conditions Window
- Short Term multiplied by Long Term less than threshold
- Less than threshold for a predetermined time

If all of the previous criteria are met, the PCM will count a good trip (three required) and turn off the MIL.

Misfire Good Trip

If the following conditions are met the PCM will count one good trip (three required) in order to turn off the MIL:

- Operating in Similar Condition Window
- 1000 engine revolutions with no misfire

Alternate Good Trip

TASK MANAGER (Continued)

Alternate Good Trips are used in place of Global Good Trips for Comprehensive Components and Major Monitors. If the Task Manager cannot run a Global Good Trip because a component fault is stopping the monitor from running, it will attempt to count an Alternate Good Trip.

The Task Manager counts an Alternate Good Trip for Comprehensive components when the following conditions are met:

- Two minutes of engine run time, idle or driving
- No other faults occur

The Task Manager counts an Alternate Good Trip for a Major Monitor when the monitor runs and passes. Only the Major Monitor that failed needs to pass to count an Alternate Good Trip.

Warm-Up Cycles

Once the MIL has been extinguished by the Good Trip Counter, the PCM automatically switches to a Warm-Up Cycle Counter that can be viewed on the DRBIII®. Warm-Up Cycles are used to erase DTCs and Freeze Frames. Forty Warm-Up cycles must occur in order for the PCM to self-erase a DTC and Freeze Frame. A Warm-Up Cycle is defined as follows:

- Engine coolant temperature must start below and rise above 160° F
- Engine coolant temperature must rise by 40° F
- No further faults occur

Freeze Frame Data Storage

Once a failure occurs, the Task Manager records several engine operating conditions and stores it in a Freeze Frame. The Freeze Frame is considered one frame of information taken by an on-board data recorder. When a fault occurs, the PCM stores the input data from various sensors so that technicians can determine under what vehicle operating conditions the failure occurred.

The data stored in Freeze Frame is usually recorded when a system fails the first time for two trip faults. Freeze Frame data will only be overwritten by a different fault with a higher priority.

CAUTION: Erasing DTCs, either with the DRBIII®; or by disconnecting the battery, also clears all Freeze Frame data.

Similar Conditions Window

The Similar Conditions Window displays information about engine operation during a monitor. Absolute MAP (engine load) and Engine RPM are stored in this window when a failure occurs. There are two different Similar conditions Windows: Fuel System and Misfire.

FUEL SYSTEM

- **Fuel System Similar Conditions Window** — An indicator that 'Absolute MAP When Fuel Sys Fail' and 'RPM When Fuel Sys Failed' are all in the same range when the failure occurred. Indicated by switching from 'NO' to 'YES'.
- **Absolute MAP When Fuel Sys Fail** — The stored MAP reading at the time of failure. Informs the user at what engine load the failure occurred.
- **Absolute MAP** — A live reading of engine load to aid the user in accessing the Similar Conditions Window.
- **RPM When Fuel Sys Fail** — The stored RPM reading at the time of failure. Informs the user at what engine RPM the failure occurred.
- **Engine RPM** — A live reading of engine RPM to aid the user in accessing the Similar Conditions Window.
- **Adaptive Memory Factor** — The PCM utilizes both Short Term Compensation and Long Term Adaptive to calculate the Adaptive Memory Factor for total fuel correction.
- **Upstream O2S Volts** — A live reading of the Oxygen Sensor to indicate its performance. For example, stuck lean, stuck rich, etc.
- **SCW Time in Window (Similar Conditions Window Time in Window)** — A timer used by the PCM that indicates that, after all Similar Conditions have been met, if there has been enough good engine running time in the SCW without failure detected. This timer is used to increment a Good Trip.
- **Fuel System Good Trip Counter** — A Trip Counter used to turn OFF the MIL for Fuel System DTCs. To increment a Fuel System Good Trip, the engine must be in the Similar Conditions Window, Adaptive Memory Factor must be less than calibrated threshold and the Adaptive Memory Factor must stay below that threshold for a calibrated amount of time.
- **Test Done This Trip** — Indicates that the monitor has already been run and completed during the current trip.

MISFIRE

- **Same Misfire Warm-Up State** — Indicates if the misfire occurred when the engine was warmed up (above 160° F).
- **In Similar Misfire Window** — An indicator that 'Absolute MAP When Misfire Occurred' and 'RPM When Misfire Occurred' are all in the same range when the failure occurred. Indicated by switching from 'NO' to 'YES'.
- **Absolute MAP When Misfire Occurred** — The stored MAP reading at the time of failure. Informs the user at what engine load the failure occurred.

TASK MANAGER (Continued)

- **Absolute MAP** — A live reading of engine load to aid the user in accessing the Similar Conditions Window.
- **RPM When Misfire Occurred** — The stored RPM reading at the time of failure. Informs the user at what engine RPM the failure occurred.
- **Engine RPM** — A live reading of engine RPM to aid the user in accessing the Similar Conditions Window.
- **Adaptive Memory Factor** — The PCM utilizes both Short Term Compensation and Long Term Adaptive to calculate the Adaptive Memory Factor for total fuel correction.
- **200 Rev Counter** — Counts 0–100 720 degree cycles.
- **SCW Cat 200 Rev Counter** — Counts when in similar conditions.
- **SCW FTP 1000 Rev Counter** — Counts 0–4 when in similar conditions.
- **Misfire Good Trip Counter** — Counts up to three to turn OFF the MIL.

SERVICE MANUAL COMMENTS

What errors(s) have you found?

____

____

____

____

In order for us to assist you, please include as much details as possible when reporting an error

Comments / Suggestions

____

____

____

____

☐ **Dealership Technician**
Dealer Code: ____________

Retail Customer ☐

Manual Title, Year, Number and Page: ______________________________

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Your Name: ____

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1.0 INTRODUCTION

The procedures contained in this manual include specifications, instructions, and graphics needed to diagnose the PCM Powertrain System. The diagnostics in this manual are based on the failure condition or symptom being present at time of diagnosis.

Please follow the recommendations below when choosing your diagnostic path.

1. First make sure the DRBIII® is communicating with the appropriate modules; ie., if the DRBIII® displays a No Response condition, you must diagnose this first before proceeding.
2. Read DTC's (diagnostic trouble codes) with the DRBIII®.
3. If no DTC's are present, identify the customer complaint.
4. Once the DTC or customer complaint is identified, locate the matching test in the Table of Contents and begin to diagnose the symptom.

All component location views are in Section 8.0. All connector pinouts are in Section 9.0. All system schematics are in Section 10.0.

An * placed before the symptom description indicates a customer complaint.

When repairs are required, refer to the appropriate service information for the proper removal and repair procedure.

Diagnostic procedures change every year. New diagnostic systems may be added; carryover systems may be enhanced. READ THIS DIAGNOSTIC INFORMATION BEFORE TRYING TO DIAGNOSE A VEHICLE CODE. It is recommended that you review the entire diagnostic information to become familiar with all new and changed diagnostic procedures.

If you have any comments or recommendations after reviewing the diagnostic information, please fill out the form at the back of the book and mail it back to us.

1.1 SYSTEM COVERAGE

This diagnostic procedures manual covers the 2002 JR vehicle equipped with the 2.0L/2.4L and 2.7L engines.

1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the powertrain control module (PCM) is done in six basic steps:

- verification of complaint
- verification of any related symptoms
- symptom analysis
- problem isolation
- repair of isolated problem
- verification of proper operation

2.0 IDENTIFICATION OF SYSTEM

The Powertrain Control Module (PCM) monitors and controls:

- Fuel System
- Idle Air Control System
- Ignition System
- Charging System
- Speed Control System
- Cooling system

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 GENERAL DESCRIPTION

These Sequential Fuel Injection (SFI) engine systems have the latest in technical advances. The OBDII/Euro Stage III OBD diagnostics incorporated with the Powertrain Control Module (PCM) are intended to assist the field technician in repairing vehicle problems by the quickest means.

3.2 FUNCTIONAL OPERATION

3.2.1 FUEL CONTROL

The PCM controls the air/fuel ratio of the engine by varying fuel injector on time. Mass air flow is calculated using the speed density method using enigne speed, manifold absolute pressure, and air temperature change.

Different fuel calculation strategies are used depending on the operational state of the engine. During crank mode, a longer pulse width fuel pulse is delivered followed by fuel pulses determined by a crank time strategy. Cold engine operation is determined via an open loop strategy until the O2 sensors have reached operating temperature. At this point, the strategy enters a closed loop mode where fuel requirements are based upon the state of the O2 sensors, engine speed, MAP, throttle position, air temperature, battery voltage, and coolant temperature.

3.2.2 ON-BOARD DIAGNOSTICS

The PCM has been programmed to monitor many different circuits of the fuel injection system. This monitoring is called on-board diagnosis.

Certain criteria, or arming conditions, must be met for a trouble code to be entered into the PCM memory. The criteria may be a range of: engine rpm, engine temperature, and/or input voltage to the PCM. If a problem is sensed with a monitored circuit, and all of the criteria or arming conditions are met, then a trouble code will be stored in the PCM.

It is possible that a trouble code for a monitored circuit may not be entered into the PCM memory even though a malfunction has occurred. This may happen because one of the trouble code criteria have not been met.

The PCM compares input signal voltages from each input device with specifications (the established high and low limits of the range) that are programmed into it for that device. If the input voltage is not within specifications and other trouble code criteria are met, a trouble code will be stored in the PCM memory.

The On Board Diagnostics have evolved to the second Generation of Diagnostics referred to as OBDII/Euro Stage III OBD. These OBDII/Euro Stage III OBD Diagnostics control the functions necessary to meet the requirements of California OBDII, Federal OBD regulation and European regulation. These requirements specify the inclusion of a Malfunction Indicator Light (MIL) located on the instrument panel. The purpose of the MIL is to inform the vehicle operator in the event of a malfunction of any emission system or component.

The following table summarizes the various OBDII/Euro Stage III OBD monitors operation.

OBD II/EURO STAGE III OBD MONITOR INFORMATION

Comprehensive Components Monitor	Major Monitors Non Fuel Control & Non Misfire	Major Monitors Fuel Control & Misfire
Run constantly	Run Once Per Trip	Run Constantly
Includes All Engine Hardware - Sensors, Switches, Solenoids, etc.	Monitors Entire Emission System	Monitors Entire System
One Trip Faults - Turns On The MIL and Sets DTC After One Failure	Two Trip Faults - Turns On The MIL and Sets DTC After Two Consecutive Failures	Two Trip Faults - Turns On The MIL and Sets DTC After Two Consecutive Failures
Priority 3	**Priority 1 or 3**	**Priority 2 or 4**
All Checked For Continuity Open Short To Ground Short To Voltage	Done Stop Testing = Yes Oxygen Sensor Heater Oxygen Sensor Response	**Fuel Control Monitor** Monitors Fuel Control System For: Fuel System Lean Fuel System Rich Requires 3 Consecutive *Fuel System Good Trips* To Extinguish The MIL
Inputs Checked For Rationality Outputs Checked For Functionality	Catalytic Converter Efficiency Except EWMA - up to 6 tests per trip and a one trip fault EGR System Evaporative Emission System (Purge and Leak) Non-LDP or LDP	**Misfire Monitor** Monitors For Engine Misfire at: 1000 RPM Counter (Type B) **200 RPM Counter (Type A)
Requires 3 Consecutive *Global/Alternate Good Trips* to Extinguish the MIL*	Requires 3 Consecutive *Global Good Trips* to Extinguish the MIL*	Requires 3 Consecutive *Misfire Good Trips* To Extinguish the MIL **Type A misfire is a two trip failure. The MIL will illuminate and blink at the first failure.

***40 Warm Up Cycles** are required to erase DTC's *after* the MIL has been extinguished.

3.2.3 OTHER CONTROLS

CHARGING SYSTEM

The charging system is turned on when the engine is started and ASD relay energized. When the ASD relay is on, ASD output voltage is supplied to the ASD sense circuit at the PCM. This voltage is connected in some cases, through the PCM and supplied to one of the generator field terminals (Gen Source +). All others, the Gen field is connected directly to the ASD output voltage. The amount of current produced by the generator is controlled by the Electronic Voltage Regulator (EVR) circuitry, in the PCM. Battery temperature is determined from IAT. This temperature along with sensed line voltage, is used by the PCM to vary the battery charging rate. This is done by cycling the ground path to the other generator field terminal (Gen field driver).

SPEED CONTROL SYSTEM

The PCM controls vehicle speed by operation of the speed control servo vacuum and vent solenoids. Energizing the vacuum solenoid applies vacuum to the servo to increase throttle position. Operation of the vent solenoid slowly releases the vacuum allowing throttle position to decrease. A special vacuum dump solenoid allows immediate release of the throttle during speed control operation.

Speed control may be cancelled by braking, driver input using the speed control switches, shifting into neutral, excessive engine speed (wheels spinning), or turning the ignition off.

LEAK DETECTION PUMP SYSTEM

The evaporative emission system is designed to prevent the escape of fuel vapors from the fuel system. Leaks in the system, even small ones, can allow fuel vapors to escape into the atmosphere. Government regulations require onboard testing to make sure that the evaporative (EVAP) system is functioning properly. The leak detection system tests for EVAP system leaks and blockage. It also performs self-diagnostics. During self-diagnostics, the Powertrain Control Module (PCM) first checks the Leak Detection Pump (LDP) for electrical and mechanical faults. If the first checks pass, the PCM then uses the LDP to seal the vent valve and pump air into the system to pressurize it. If a leak is present, the PCM will continue pumping the LDP to replace the air that leaks out. The PCM determines the size of the leak based on how fast/long it must pump the LDP as it tries to maintain pressure in the system.

EVAP LEAK DETECTION SYSTEM COMPONENTS (FIGURE 1)

Service Port: Used with special tools like the Miller Evaporative Emissions Leak Detector (EELD) to test for leaks in the system.

EVAP Purge Solenoid: The PCM uses the EVAP purge solenoid to control purging of excess fuel vapors stored in the EVAP canister. It remains closed during leak testing to prevent loss of pressure.

EVAP Canister: The EVAP canister stores fuel vapors from the fuel tank for purging.

EVAP Purge Orifice: Limits purge volume.

EVAP System Air Filter: Provides air to the LDP for pressurizing the system. It filters out dirt while allowing a vent to atmosphere for the EVAP system.

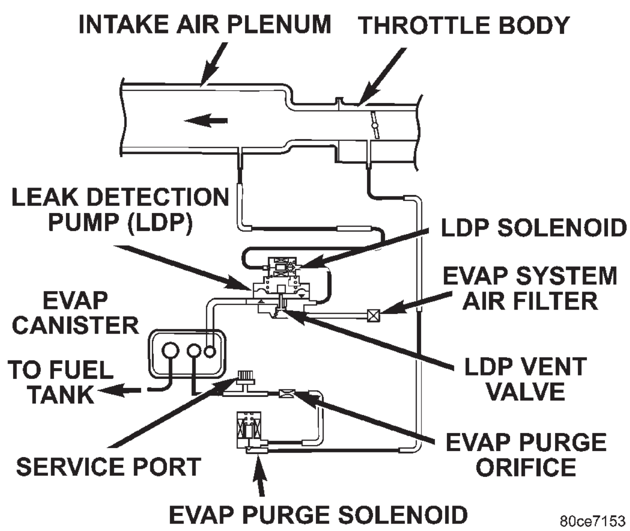


FIGURE 1

Leak Detection Pump (LDP) Components:

The main purpose of the LDP is to pressurize the fuel system for leak checking. It closes the EVAP system vent to atmospheric pressure so the system can be pressurized for leak testing. The diaphragm is powered by engine vacuum. It pumps air into the EVAP system to develop a pressure of about 7.5″ H_2O (¼) psi. A reed switch in the LDP allows the PCM to monitor the position of the LDP diaphragm. The PCM uses the reed switch input to monitor how fast the LDP is pumping air into the EVAP system. This allows detection of leaks and blockage.

The LDP assembly consists of several parts (Figure 2). The solenoid is controlled by the PCM, and it connects the upper pump cavity to either engine vacuum or atmospheric pressure. A vent valve closes the EVAP system to atmosphere, sealing the system during leak testing. The pump section of the LDP consists of a diaphragm that moves up and down to bring air in through the air filter and inlet check valve, and pump it out through an outlet check valve into the EVAP system.

The diaphragm is pulled up by engine vacuum, and pushed down by spring pressure, as the LDP solenoid turns on and off. The LDP also has a magnetic reed switch to signal diaphragm position to the PCM. When the diaphragm is down, the switch is closed, which sends a 12 V (system voltage) signal to the PCM. When the diaphragm is up, the switch is open, and there is no voltage sent to the PCM. This allows the PCM to monitor LDP pumping action as it turns the LDP solenoid on and off.

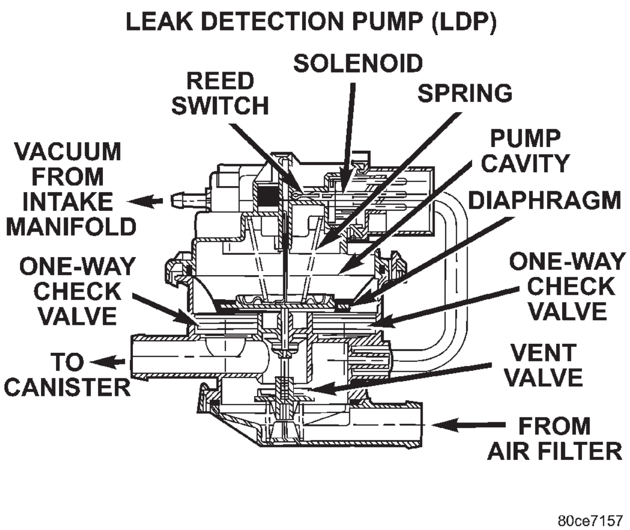


FIGURE 2

LDP AT REST (NOT POWERED)

When the LDP is at rest (no electrical/vacuum) the diaphragm is allowed to drop down if the internal (EVAP system) pressure is not greater than the return spring. The LDP solenoid blocks the engine vacuum port and opens the atmospheric pressure port connected through the EVAP system air filter. The vent valve is held open by the diaphragm. This allows the canister to see atmospheric pressure (Figure 3).

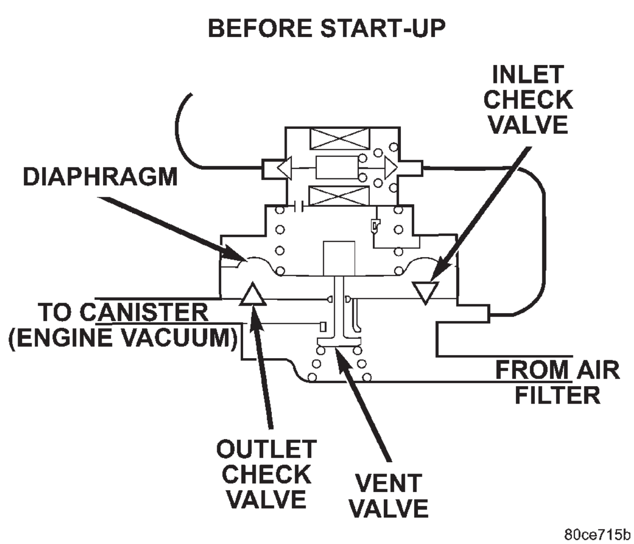


FIGURE 3

DIAPHRAGM UPWARD MOVEMENT

When the PCM energizes the LDP solenoid, the solenoid blocks the atmospheric port leading through the EVAP air filter and at the same time opens the engine vacuum port to the pump cavity above the diaphragm. The diaphragm moves upward when the vacuum above the diaphragm exceeds spring force. This upward movement closes the vent valve. It also causes low pressure below the diaphragm, unseating the inlet check valve and allowing air in from the EVAP air filter. When the diaphragm completes its upward movement, the LDP reed switch turns from closed to open (Figure 4).

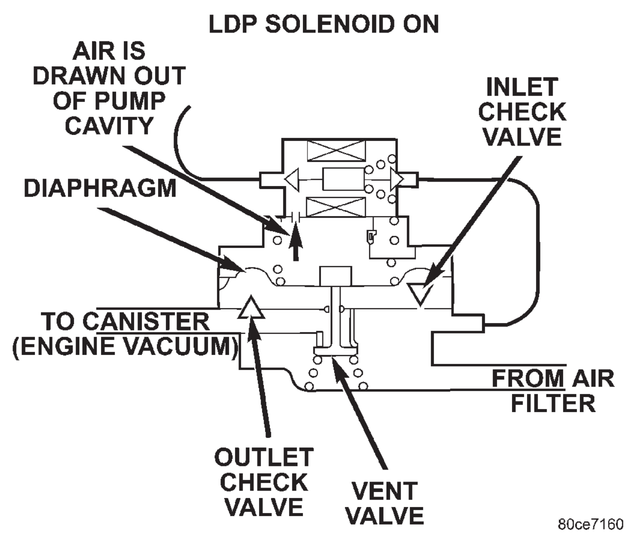


FIGURE 4

DIAPHRAGM DOWNWARD MOVEMENT

Based on reed switch input, the PCM de-energizes the LDP solenoid, causing it to block the vacuum port, and open the atmospheric port. This connects the upper pump cavity to atmosphere through the EVAP air filter. The spring is now able to push the diaphragm down. The downward movement of the diaphragm closes the inlet check valve and opens the outlet check valve pumping air into the evaporative system. The LDP reed switch turns from open to closed, allowing the PCM to monitor LDP pumping (diaphragm up/down) activity (Figure 5). During the pumping mode, the diaphragm will not move down far enough to open the vent valve.

The pumping cycle is repeated as the solenoid is turned on and off. When the evaporative system begins to pressurize, the pressure on the bottom of the diaphragm will begin to oppose the spring pressure, slowing the pumping action. The PCM watches the time from when the solenoid is de-energized, until the diaphragm drops down far enough for the reed switch to change from open to closed. If the reed switch changes too quickly, a leak may be indicated. The longer it takes the reed switch to change state, the tighter the evaporative system is sealed. If the system pressurizes too quickly, a restriction somewhere in the EVAP system may be indicated.

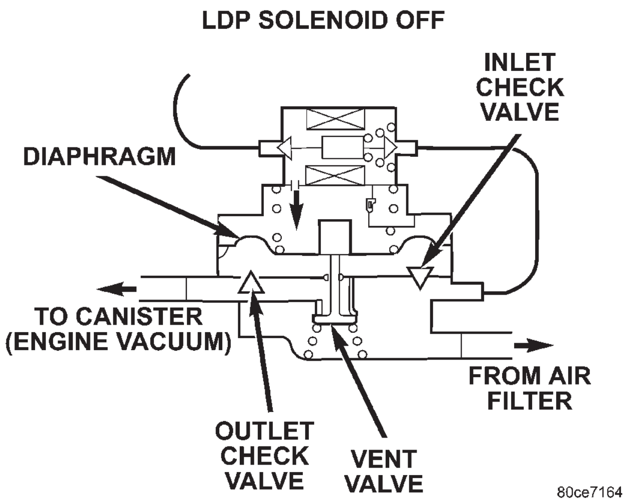


FIGURE 5

PUMPING ACTION

During portions of this test, the PCM uses the reed switch to monitor diaphragm movement. The solenoid is only turned on by the PCM after the reed switch changes from open to closed, indicating that the diaphragm has moved down. At other times during the test, the PCM will rapidly cycle the LDP solenoid on and off to quickly pressurize the system. During rapid cycling, the diaphragm will not move enough to change the reed switch state. In the state of rapid cycling, the PCM will use a fixed time interval to cycle the solenoid.

If the system does not pass the EVAP Leak Detection Test, the following DTCs may be set:

- P0442 - EVAP LEAK MONITOR 0.040″ LEAK DETECTED
- P0455 - EVAP LEAK MONITOR LARGE LEAK DETECTED
- P0456 - EVAP LEAK MONITOR 0.020″ LEAK DETECTED
- P1486 - EVAP LEAK MON PINCHED HOSE FOUND
- P1494 - LEAK DETECTION PUMP SW OR MECH FAULT
- P1495 - LEAK DETECTION PUMP SOLENOID CIRCUIT

ENABLING CONDITIONS TO RUN EVAP LEAK DETECTION TEST

1. Cold start: with ambient temperature (obtained from modeling the inlet air temperature sensor on passenger vehicles and the battery temperature sensor on Jeep & truck vehicles) between 4°C (40°F) and 32°C (90°F) for 0.040 leak. Between 4°C (40°F) and 29°C (85°F) for 0.020 leak.
2. Engine coolant temperature within: -12° to -8°C (10° to 18°F) of battery/ambient.
3. Battery voltage between 10 and 15 volts.

NOTE: If battery voltage drops below 10 volts for more than 5 seconds during engine cranking, the EVAP Leak Detection Test will not run.

4. Low fuel warning light off (fuel level must be between 15% and 85%).
5. MAP sensor reading 22 in Hg or above (This is the manifold absolute pressure, not vacuum).
6. No engine stall during test.

NOTE: The following values are approximate and vehicle specific. Use the values seen in pre test/monitor test screen on the DRBIII®. See TSB 25-02-98 for more detail.

A DTC will not set if a one-trip fault is set or if the MIL is illuminated for any of the following:

- Purge Solenoid
- All engine Controller Self Test Faults
- All Cam and/or Crank Sensor Faults
- MAP Sensor Faults
- Ambient/Battery Temperature Sensor Electrical Faults
- All Coolant Sensor Faults
- All TPS Faults
- LDP Pressure Switch Faults
- EGR Solenoid Electrical Faults
- All Injector Faults
- Baro Out Of Range
- Vehicle Speed Faults
- LDP Solenoid Circuit

FIGURE 6 SECTION 1

When the ignition key is turned to “ON”, the LDP diaphragm should be in the down position and the LDP reed switch should be closed. If the EVAP system has residual pressure, the LDP diaphragm may be up. This could result in the LDP reed switch being open when the key is turned to “ON” and a P1494 fault could be set because the PCM is expecting the reed switch to be closed.

After the key is turned “ON”, the PCM immediately tests the LDP solenoid circuit for electrical faults. If a fault is detected, DTC P1495 will set, the MIL will illuminate, and the remaining EVAP Leak Detection Test is canceled.

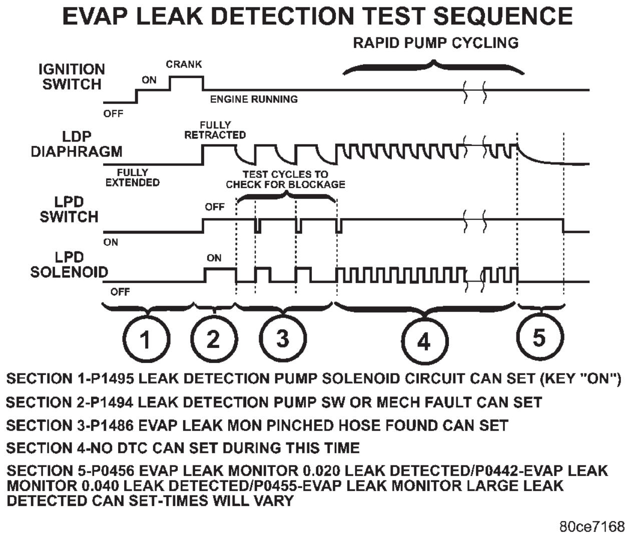


FIGURE 6

NOTE: If battery temperature is not within range, or if the engine coolant temperature is not within a specified range of the battery temperature, the PCM will not run tests for DTC P1494, P1486, P0442, P0455 and P0441. These temperature calibrations may be different between models.

FIGURE 6 SECTION 2

If DTC P1495 is not set, the PCM will check for DTC P1494. If the LDP reed switch was closed when the key was turned to “ON”, the PCM energizes the LDP solenoid for up to 8 seconds and monitors the LDP switch. As the LDP diaphragm is pulled up by engine vacuum, the LDP reed switch should change from closed to open. If it does not, the PCM sets a temporary fault (P1494) in memory, and waits until the next time the Enabling Conditions are met to run the test again. If this is again detected, P1494 is stored and the MIL is illuminated. If the problem is not detected during the next enabling cycle, the temporary fault will be cleared.

However, if the PCM detects the reed switch open when the key is turned to “ON”, the PCM must determine if this condition is due to residual pressure in the EVAP system, or an actual fault. The PCM stores information in memory on EVAP system purging from previous engine run or drive cycles.

If little or no purging took place, residual pressure could be holding the LDP diaphragm up, causing the LDP switch to be open. Since this is not a malfunction, the PCM cancels the EVAP Leak Detection Test without setting the temporary fault.

If there was sufficient purging during the previous cycle to eliminate EVAP system pressure, the PCM judges that this is a malfunction and sets a temporary fault in memory. The next time that the Enabling Conditions are met, the test will run again. If the fault is again detected, the MIL will illuminate and DTC 1494 will be stored. If the fault is not detected, the temporary fault will be cleared.

FIGURE 6 SECTION 3

If no fault has been detected so far, the PCM begins testing for possible blockage in the EVAP system between the LDP and the fuel tank. This is done by monitoring the time required for the LDP to pump air into the EVAP system during two to three pump cycles. If no blockage is present, the LDP diaphragm is able to quickly pump air out of the LDP each time the PCM turns off the LDP solenoid. If a blockage is present, the PCM detects that the LDP takes longer to complete each pump cycle. If the pump cycles take longer than expected (approximately 6 to 10 seconds) the PCM will suspect a blockage. On the next drive when Enabling Conditions are met, the test will run again. If blockage is again detected, P1486 is stored, and the MIL is illuminated.

FIGURE 6 SECTION 4

After the LDP blockage tests are completed, the PCM then tests for EVAP system leakage. First, the PCM commands the LDP to rapidly pump for 20 to 50 seconds (depending on fuel level) to build pressure in the EVAP system. This evaluates the system to see if it can be sufficiently pressurized. This evaluation (rapid pump cycling) may occur several times prior to leak checking. The LDP reed switch does not close and open during rapid pumping because the diaphragm does not travel through its full range during this part of the test.

FIGURE 6 SECTION 5

Next, the PCM performs one or more test cycles by monitoring the time required for the LDP reed switch to close (diaphragm to drop) after the LDP solenoid is turned off.

If the switch does not close, or closes after a long delay, it means that the system does not have any significant leakage and the EVAP Leak Detection Test is complete.

However, if the LDP reed switch closes quickly, there may be a leak or the fuel level may be low enough that the LDP must pump more to finish pressurizing the EVAP system. In this case, the PCM will rapidly pump the LDP again to build pressure in the EVAP system, and follow that by monitoring the time needed for several LDP test cycles. This process of rapid pumping followed by several LDP test cycles may repeat several times before the PCM judges that a leak is present.

When leaks are present, the LDP test cycle time will be inversely proportional to the size of the leak. The larger the leak, the shorter the test cycle time. The smaller the leak, the longer the test cycle time. DTC's may be set when a leak as small as 0.5 mm (0.020″) diameter is present.

If the system detects a leak, a temporary fault will be stored in PCM memory. The time it takes to detect a .020, .040, or Large leak is based on calibrations that vary from model to model. The important point to remember is if a leak is again detected on the next EVAP Leak Detection Test, the MIL will illuminate and a DTC will be stored based on the size of leak detected. If no leak is detected during the next test, the temporary fault will be cleared.

DIAGNOSTIC TIPS

During diagnosis, you can compare the LDP solenoid activity with the monitor sequence in Figure 6. If the PCM detects a problem that could set a DTC, the testing is halted and LDP solenoid activity will stop. As each section of the test begins, it indicates that the previous section passed successfully. By watching to see which tests complete, you can see if any conditions are present that the PCM considers abnormal.

For example, if the LDP solenoid is energized for the test cycles to test for blockage (P1486), it means that the LDP has already passed its test for P1494. Then, if the PCM detects a possible blockage, it will set a temporary fault without turning on the MIL and continue the leak portion of the test. However, the PCM will assume that the system is already pressurized and skip the rapid pump cycles.

Always diagnose leaks, if possible, before disconnecting connections. Disconnecting connections may mask a leak condition.

Keep in mind that if the purge solenoid seat is leaking, it could go undetected since the leak would end up in the intake manifold. Disconnect the purge solenoid at the manifold when leak checking. In addition, a pinched hose fault (P1486) could set if the purge solenoid does not purge the fuel system properly (blocked seat). The purge solenoid must vent the fuel system prior to the LDP system test. If the purge solenoid cannot properly vent the system the LDP cannot properly complete the test for P1486 and this fault can set due to pressure being in the EVAP system during the test sequence.

Multiple actuation's of the DRBIII® Leak Detection Pump (LDP) Monitor Test can hide a 0.020 leak because of excess vapor generation. Additionally, any source for additional vapor generation can hide a small leak in the EVAP system. Excess vapor generation can delay the fall of the LDP diaphragm thus hiding the small leak. An example of this condition could be bringing a cold vehicle into a warm shop for testing or high ambient temperatures.

Fully plugged and partially plugged underhood vacuum lines have been known to set MIL conditions. P1494 and P0456 can be set for this reason. Always, thoroughly, check plumbing for pinches or blockage before condemning components.

TEST EQUIPMENT

The Evaporative Emission Leak Detector (EELD) Miller Special Tool 8404 is capable of visually detecting leaks in the evaporative system and will take the place of the ultrasonic leak detector 6917A. The EELD utilizes shop air and a smoke generator to visually detect leaks down to 0.020 or smaller. The food grade oil used to make the smoke includes an UV trace dye that will leave telltale signs of the leak under a black light. This is helpful when components have to be removed to determine the exact leak location. For detailed test instructions, follow the operators manual packaged with the EELD.

IMPORTANT

Be sure that the PCM has the latest software update. Reprogram as indicated by any applicable Technical Service Bulletin. After LDP repairs are completed, verify the repair by running the DRBIII® Leak Detection Pump (LDP) Monitor Test as described in Technical Service Bulletin 18-12-99.

3.2.4 PCM OPERATING MODES

As input signals to the PCM change, the PCM adjusts its response to output devices. For example, the PCM must calculate a different injector pulse width and ignition timing for idle than it does for wide open throttle. There are several different modes of operation that determine how the PCM responds to the various input signals.

There are two types of engine control operation: **open loop** and **closed loop.**

In **open loop** operation, the PCM receives input signals and responds according to preset programming. Inputs from the heated oxygen sensors are not monitored.

In **closed loop** operation, the PCM monitors the inputs from the heated oxygen sensors. This input indicates to the PCM whether or not the calculated injector pulse width results in the ideal air-fuel ratio of 14.7 parts air to 1 part fuel. By monitoring the exhaust oxygen content through the oxygen sensor, the PCM can fine tune injector pulse width. Fine tuning injector pulse width allows the PCM to achieve the lowest emission levels while maintaining optimum fuel economy.

The engine start-up (crank), engine warm-up, and wide open throttle modes are open loop modes. Under most operating conditions, closed loop modes occur with the engine at operating temperature.

IGNITION SWITCH ON (ENGINE OFF) MODE

When the ignition switch activates the fuel injection system, the following actions occur:

1. The PCM determines atmospheric air pressure from the MAP sensor input to determine basic fuel strategy.
2. The PCM monitors the engine coolant temperature sensor and throttle position sensor input. The PCM modifies fuel strategy based on this input.

When the key is in the on position and the engine is not running (zero rpm), the auto shutdown relay and fuel pump relay are not energized. Therefore, voltage is not supplied to the fuel pump, ignition coil, and fuel injectors.

Engine Start-up Mode — This is an open loop mode. The following actions occur when the starter motor is engaged:

1. The auto shutdown and fuel pump relays are energized. If the PCM does not receive the camshaft and crankshaft signal within approximately one second, these relays are de-energized.
2. The PCM energizes all fuel injectors until it determines crankshaft position from the camshaft and crankshaft signals. The PCM determines crankshaft position within one engine revolution. After the camshaft position has been determined, the PCM energizes the fuel injectors in sequence. The PCM adjusts the injector pulse width and synchronizes the fuel injectors by controlling the fuel injectors' ground paths.
3. Once the engine idles within 64 rpm of its target engine speed, the PCM compares the current MAP sensor value with the value received during the ignition switch on (zero rpm) mode. A diagnostic trouble code is written to PCM memory if a minimum difference between the two values is not found.

Once the auto shutdown and fuel pump relays have been energized, the PCM determines the fuel injector pulse width based on the following:

– engine coolant temperature
– manifold absolute pressure
– intake/inlet air temperature
– engine revolutions
– throttle position

The PCM determines the spark advance based on the following:

– engine coolant temperature
– crankshaft position
– intake/inlet air temperature
– manifold absolute pressure
– throttle position

Engine Warm-Up Mode − This is an open loop mode. The PCM adjusts injector pulse width and controls injector synchronization by controlling the fuel injectors' ground paths. The PCM adjusts ignition timing and engine idle speed. The PCM adjusts the idle speed by controlling the idle air control motor.

Cruise or Idle Mode − When the engine is at normal operating temperature, this is a closed loop mode.

Acceleration Mode − This is a closed loop mode. The PCM recognizes an increase in throttle position and a decrease in Manifold Vacuum as engine load increases. In response, the PCM increases the injector pulse width to meet the increased load. The A/C compressor may be de-energized for a short period of time.

Deceleration − This is a closed loop mode. The PCM recognizes a decrease in throttle position and an increase in Manifold Vacuum as engine load decreases. In response, the PCM decreases the injector pulse width to meet the decreased load. Full injector shut off may be obtained during high speed deceleration.

Wide Open Throttle Mode − This is an open loop mode. The throttle position sensor notifies the PCM of a wide open throttle condition. Once a wide open throttle is sensed, the PCM de-energizes the A/C compressor clutch relay for 20 seconds.

3.2.5 NON-MONITORED CIRCUITS

The PCM does not monitor the following circuits, systems, and conditions even though they could have malfunctions that result in driveability problems. A diagnostic code may not be displayed for the following conditions. However, problems with these systems may cause a diagnostic code to be displayed for other systems. For example, a fuel pressure problem will not register a diagnostic code directly, but could cause a rich or lean condition. This could cause an oxygen sensor, fuel system, or misfire monitor trouble code to be stored in the PCM.

Engine Timing − The PCM cannot detect an incorrectly indexed timing chain, camshaft sprocket, or crankshaft sprocket. The PCM also cannot detect an incorrectly indexed distributor.(*)

Fuel Pressure − Fuel pressure is controlled by the fuel pressure regulator. The PCM cannot detect a clogged fuel pump inlet filter, clogged in-line filter, or a pinched fuel supply.(*)

Fuel Injectors − The PCM cannot detect if a fuel injector is clogged, the pintle is sticking, or the wrong injectors are installed.(*)

Fuel Requirements − Poor quality gasoline can cause problems such as hard starting, stalling, and stumble. Use of methanol-gasoline blends may result in starting and driveability problems. See individual symptoms and their definitions in Section 6.0 (Glossary of Terms).

PCM Grounds − The PCM cannot detect a poor system ground. However, a diagnostic trouble code may be stored in the PCM as a result of this condition.

Throttle Body Air Flow − The PCM cannot detect a clogged or restricted air cleaner inlet or filter element.(*)

Exhaust System − The PCM cannot detect a plugged, restricted, or leaking exhaust system.(*)

Cylinder Compression − The PCM cannot detect uneven, low, or high engine cylinder compression.(*)

Excessive Oil Consumption − Although the PCM monitors the exhaust stream oxygen content through the oxygen sensor when the system is in a closed loop, it cannot determine excessive oil consumption.

NOTE: Any of these conditions could result in a rich or lean condition causing an oxygen sensor TROUBLE CODE to be stored in the PCM, or the vehicle may exhibit one or more of the driveability symptoms listed in the Table of Contents.

3.2.6 SKIS OVERVIEW

The Sentry Key Immobilizer System (SKIS) is designed to prevent unauthorized vehicle operation. The system consists of a Sentry Key Immobilizer Module (SKIM), ignition key(s) equipped with a transponder chip and PCM. When the ignition switch is turned on, the SKIM interrogates the ignition key. If the ignition key is Valid or Invalid, the SKIM sends a PCI Bus message to the PCM indicating ignition key status. Upon receiving this message the PCM will terminate engine operation, or allow the engine to continue to operate.

3.2.7 SKIM ON-BOARD DIAGNOSTICS

The SKIM has been programmed to transmit and monitor many different coded messages as well as PCI Bus messages. This monitoring is called On Board Diagnosis.

Certain criteria must be met for a diagnostic trouble code to be entered into the SKIM memory. The criteria may be a range of; Input voltage, PCI Bus message, or coded messages to the SKIM. If all of the criteria for monitoring a circuit or function are met and a fault is sensed, a diagnostic trouble code will be stored in the SKIM memory.

3.2.8 SKIS OPERATION

When ignition power is supplied to the SKIM, the SKIM performs an internal self-test. After the self-test is completed, the SKIM energizes the antenna (this activates the transponder chip) and sends a challenge to the transponder chip. The transponder chip responds to the challenge by generating an encrypted response message using the following:

Secret Key - This is an electronically stored value (identification number) that is unique to each SKIS. The secret key is stored in the SKIM, PCM and all ignition key transponders.

Challenge - This is a random number that is generated by the SKIM at each ignition key cycle.

The secret key and challenge are the two variables used in the algorithm that produces the encrypted response message. The transponder uses the crypto algorithm to receive, decode and respond to the message sent by the SKIM. After responding to the coded message, the transponder sends a transponder I.D. message to the SKIM. The SKIM compares the transponder I.D. to the available valid key codes in the SKIM memory (8 key maximum at any one time). After validating the key ignition the SKIM sends a PCI Bus message called a Seed Request to the engine controller then waits for a PCM response. If the PCM does not respond, the SKIM will send the seed request again. After three failed attempts the SKIM will stop sending the seed request and store a trouble code. If the PCM sends a seed response, the SKIM sends a valid/invalid key message to the PCM. This is an encrypted message that is generated using the following:

VIN - Vehicle Identification Number

Seed - This is a random number that is generated by the PCM at each ignition key cycle.

The VIN and seed are the two variables used in the rolling code algorithm that encrypts the valid/invalid key message. The PCM uses the rolling code algorithm to receive, decode and respond to the valid/invalid key message sent by the SKIM. After sending the valid/invalid key message the SKIM waits 3.5 seconds for a PCM status message from the PCM. If the PCM does not respond with a valid key message to the SKIM, a fault is detected and a trouble code is stored.

The SKIS incorporates a VTSS LED located on the instrument panel upper cover. The LED receives switched ignition voltage and is hardwired to the body control module. The LED is actuated when the SKIM sends a PCI Bus message to the body controller requesting the LED on. The body controller then provides the ground for the LED. The SKIM will request VTSS LED operation for the following:

– bulb checks at ignition on

– to alert the vehicle operator to a SKIS malfunction
– customer key programming mode

For all faults except transponder faults and VTSS LED remains on steady. In the event of a transponder fault the LED flashes at a rate of 1 Hz (once per second). If a fault is present the LED will remain on or flashing for the complete ignition cycle. If a fault is stored in SKIM memory which prevents the system from operating properly, the PCM will allow the engine to start and run (for 2 seconds) up to six times. After the sixth attempt, the PCM disables the starter relay until the fault is corrected.

3.2.9 PROGRAMMING THE POWERTRAIN CONTROL MODULE

Important Note: Before replacing the PCM for a failed driver, control circuit or ground circuit, be sure to check the related component/circuit integrity for failures not detected due to a double fault in the circuit. Most PCM driver/control circuit failures are caused by internal failure to components (i.e. 12-volt pull-ups, drivers and ground sensors). These failures are difficult to detect when a double fault has occurred and only one DTC has set.

NOTE: If the PCM and the SKIM are replaced at the same time, program the VIN into the PCM first. All vehicle keys will then need to be replaced and programmed to the new SKIM.

The SKIS Secret Key is an I.D. code that is unique to each SKIS. This code is programmed and stored in the SKIM, engine controller and transponder chip (ignition key). When replacing the PCM it is necessary to program the secret key into the PCM.

1. Turn the ignition on (transmission in park/neutral).
2. Use the DRBIII® and select THEFT ALARM, SKIM then MISCELLANEOUS.
3. Select PCM REPLACED.
4. Enter secured access mode by entering the vehicle four-digit PIN.

NOTE: If three attempts are made to enter the secure access mode using an incorrect PIN, secured access mode will be locked out for one hour. To exit this lockout mode, turn the ignition to the run position for one hour then enter the correct PIN. (Ensure all accessories are turned off. Also monitor the battery state and connect a battery charger if necessary).

5. Press ENTER to transfer the secret key (the SKIM will send the secret key to the PCM).

3.2.10 PROGRAMMING THE SENTRY KEY IMMOBILIZER MODULE

NOTE: If the PCM and the SKIM are replaced at the same time, program the VIN into the PCM first. All vehicle keys will then need to be replaced and programmed to the new SKIM.

1. Turn the ignition on (transmission in park/neutral).
2. Use the DRBIII® and select THEFT ALARM, SKIM then MISCELLANEOUS.
3. Select SKIM MODULE REPLACEMENT (GASOLINE).
4. Program the vehicle four-digit PIN into the SKIM.
5. Select COUNTRY CODE and enter the correct country.

NOTE: Be sure to enter the correct country code. If the incorrect country code is programmed into SKIM, the SKIM must be replaced.

6. Select UPDATE VIN (the SKIM will learn the VIN from the PCM).
7. Press ENTER to transfer the VIN (the PCM will send the VIN to the SKIM).
8. The DRBIII® will ask if you want to transfer the secret key. Select ENTER to transfer secret key from the PCM. This will ensure the current vehicle ignition keys will still operate the SKIS system.

3.2.11 PROGRAMMING THE IGNITION KEYS TO THE SENTRY KEY IMMOBILIZER MODULE

1. Turn the ignition on (transmission in park/neutral).
2. Use the DRBIII® and select THEFT ALARM, SKIM, then MISCELLANEOUS.

3. Select PROGRAM IGNITION KEYS.
4. Enter secured access mode by entering the vehicle four-digit PIN.

NOTE: A maximum of eight keys can be learned to each SKIM AT ONE TIME. Once a key is learned to a SKIM it (the key) cannot be transferred to another vehicle.

If ignition key programming is unsuccessful, the DRBIII® will display one of the following messages:

Programming Not Attempted - The DRBIII® attempts to read the programmed key status and there are no keys programmed in the SKIM memory.

Programming Key Failed - (Possible Used Key From Wrong Vehicle) - SKIM is unable to program key due to one of the following:

– faulty ignition key transponder

– ignition key is programmed to another vehicle.

8 Keys Already Learned, Programming Not Done - SKIM transponder ID memory is full.

1. Obtain ignition keys to be programmed from customer (8 keys maximum)
2. Using the DRBIII®, erase all ignition keys by selecting MISCELLANEOUS and ERASE ALL CURRENT IGN. KEYS
3. Program all ignition keys.

Learned Key In Ignition - Ignition key transponder ID is currently programmed in SKIM memory.

3.3 DIAGNOSTIC TROUBLE CODES

Each diagnostic trouble code is diagnosed by following a specific testing procedure. The diagnostic test procedures contain step-by-step instructions for determining the cause of trouble codes as well as no trouble code problems. It is not necessary to perform all of the tests in this book to diagnose an individual code.

Always begin by reading the diagnostic trouble codes using the DRBIII®.

3.3.1 HARD CODE

A diagnostic trouble code that comes back within one cycle of the ignition key is a hard code. This means that the defect is there every time the powertrain control module checks that circuit or function. Procedures in this manual verify if the DTC is a hard code at the beginning of each test. When it is not a hard code, an intermittent test must be performed.

DTC's that are for OBDII/Euro Stage III OBD monitors will not set with just the ignition key on. Comparing these to non-emission DTC's, they will seem like an intermittent. These DTC's require a set of parameters to be performed (The DRBIII® pre-test screens will help with this for MONITOR DTC's), this is called a TRIP. All OBDII/Euro Stage III OBD DTCs will be set after one or in some cases two trip failures, and the MIL will be turned on. These DTC's require three successful, no failures, TRIPS to extinguish the MIL, followed by 40 warm-up cycles to erase the DTC. For further explanation of TRIPS, Pre-test screens, Warm-up cycles, and the use of the DRBIII®, refer to the On Board Diagnostic training booklet #81-699-97094.

3.3.2 INTERMITTENT CODE

A diagnostic trouble code that is not there every time the PCM checks the circuit is an intermittent DTC. Most intermittent DTC's are caused by wiring or connector problems. Defects that come and go like this are the most difficult to diagnose; they must be looked for under specific conditions that cause them. The following checks may assist you in identifying a possible intermittent problem:

- Visually inspect related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.
- Visually inspect the related harnesses. Look for chafed, pierced, or partially broken wire.
- Refer to any technical service bulletins that may apply.
- Use the DRBIII® data recorder or co-pilot.

3.3.3 STARTS SINCE SET COUNTER

The start since set counter counts the number of times the vehicle has been started since codes were last set, erased, or the battery was disconnected. The reset counter will count up to 255 start counts.

The number of starts helps determine when the trouble code actually happened. This is recorded by the PCM and can be viewed on the DRBIII® as STARTS since set.

When there are no trouble codes stored in memory, the DRBIII® will display NO DTC's Detected and the reset counter will show STARTS since clear = XXX.

3.3.4 HANDLING NO DTC PROBLEMS

Symptom checks cannot be used properly unless the driveability problem characteristic actually happens while the vehicle is being tested.

Select the symptom that most accurately describes the vehicle's driveability problem and then perform the test routine that pertains to this symptom. Perform each routine test in sequence until the problem is found. For definitions, see Section 6.0 Glossary Of Terms.

3.3.5 DISTANCE SINCE MI SET

The Euro Stage III OBD directive requires that the distance traveled by the vehicle while the MI is activated must be available at any instant through the serial port on the standard data link connector. This feature works as follows:

1. If the MI is illuminated due to a fault, the distance count is updated (i.e. it is counting).
2. If there is a stale MI fault (i.e. the fault is still frozen in memory but the MI has been extinguished due to 3 good trips), the distance count is held (i.e. frozen).
3. If the distance count is being held due to (Item 2.) and the fault is cleared, the distance is cleared (set to zero).
4. If the distance count is being held due to (Item 2.) and another MI occurs, the distance count is reset (to) and begins updating anew.
5. If a fault occurs while the MI is already illuminated due to a previous fault (the distance count is updating), then the distance count continues to update w/out interruption.
6. If the MI is flashing due to active misfire and there is an active fault (i.e. matured fault for which 3 good trips have not occurred), the distance count behaves as the MI in ON.
7. If the MI is flashing due to active misfire and there is no active fault (i.e. the MI is flashing for a 1 malf.), the distance count behaves as if the MI is off (because it is not yet a matured fault).
8. The distance count is cleared whenever the fault is cleared. (Via 40 warm up cycles, or via scan tool).

SYMPTOM	DIAGNOSTIC TEST
HARD START	CHECKING THE FUEL PRESSURE CHECKING THE ECT SENSOR CHECKING THROTTLE POSITION SENSOR CHECKING MAP SENSOR CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING EGR SYSTEM CHECKING IAT SENSOR
START AND STALL	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING ECT SENSOR CHECKING THROTTLE POSITION SENSOR CHECKING MAP SENSOR CHECKING IDLE AIR CONTROL MOTOR OPERATION
HESITATION/SAG/STUMBLE	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING ECT SENSOR CHECKING THROTTLE POSITION SENSOR CHECKING MAP SENSOR
SURGE	CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING IAT SENSOR CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING ECT SENSOR CHECKING THROTTLE POSITION SENSOR CHECKING MAP SENSOR CHECKING IDLE AIR CONTROL MOTOR OPERATION

SYMPTOM	DIAGNOSTIC TEST
LACK OF POWER/SLUGGISH	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING ECT SENSOR CHECKING THROTTLE POSTION SENSOR CHECKING MAP SENSOR CHECKING IDLE AIR CONTROL MOTOR OPERATION
SPARK KNOCK DETONATION	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING ECT SENSOR CHECKING THROTTLE POSITION SENSOR CHECKING MAP SENSOR CHECKING IDLE AIR CONTROL MOTOR OPERATION
CUTS OUT/MISSES	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING IDLE AIR CONTROL MOTOR OPERATION
BACKFIRE/POPBACK	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING MAP SENSOR
RUNS ROUGH/UNSTABLE/ ERRATIC IDLE	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING ECT SENSOR CHECKING THROTTLE POSITION SENSOR CHECKING MAP SENSOR CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING IAT SENSOR
POOR FUEL ECONOMY	CHECKING PCM POWER AND GND CKT CHECKING THE FUEL PRESSURE CHECKING ECT SENSOR CHECKING THROTTLE POSITION SENSOR CHECKING MAP SENSOR CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING IAT SENSOR

3.4 USING THE DRBIII®

Refer to the DRBIII® user's guide for instructions and assistance with reading DTC's, erasing DTC's, and other DRBIII® functions.

3.5 DRBIII® ERROR MESSAGES AND BLANK SCREEN

Under normal operation, the DRBIII® will display one of only two error messages:

– User-Requested WARM Boot or User-Requested COLD Boot

If the DRBIII® should display any other error message, record the entire display and call the Star Center for information and assistance. This is a sample of such an error message display:

```
ver: 2.14
date: 26 Jul93
file: key_itf.cc
date: Jul 26 1993
line: 548
err: 0x1
User-Requested COLD Boot

Press MORE to switch between this display
   and the application screen.
Press F4 when done noting information.
```

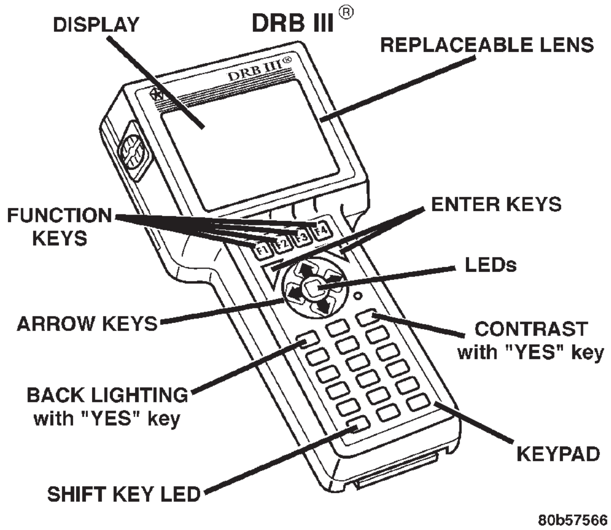
3.5.1 DRBIII® DOES NOT POWER UP

If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link connector cavity 16). A minimum of 11 volts is required to adequately power the DRBIII®.

If all connections are proper between the DRBIII® and the vehicle or other devices, and the vehicle battery is fully charged, and inoperative DRBIII® may be the result of faulty cable or vehicle wiring.

3.5.2 DISPLAY IS NOT VISIBLE

Low temperatures will affect the visibility of the display. Adjust the contrast to compensate for this condition



4.0 DISCLAIMERS, SAFETY, WARNINGS

4.1 DISCLAIMERS

All information, illustrations, and specifications contained in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

4.2 SAFETY

4.2.1 TECHNICIAN SAFETY INFORMATION

WARNING: ENGINES PRODUCE CARBON MONOXIDE THAT IS ODORLESS, CAUSES SLOWER REACTION TIME, AND CAN LEAD TO SERIOUS INJURY. WHEN THE ENGINE IS OPERATING, KEEP SERVICE AREAS WELL VENTILATED OR ATTACH THE VEHICLE EXHAUST SYSTEM TO THE SHOP EXHAUST REMOVAL SYSTEM.

Set the parking brake and block the wheels before testing or repairing the vehicle. It is especially important to block the wheels on front-wheel drive vehicles; the parking brake does not hold the drive wheels.

When servicing a vehicle, always wear eye protection, and remove any metal jewelry such as watchbands or bracelets that might make an inadvertent electrical contact.

When diagnosing a powertrain system problem, it is important to follow approved procedures where applicable. These procedures can be found in service manual procedures. Following these procedures is very important to the safety of individuals performing diagnostic tests.

4.2.2 VEHICLE PREPARATION FOR TESTING

Make sure the vehicle being tested has a fully charged battery. If it does not, false diagnostic codes or error messages may occur.

4.2.3 SERVICING SUB ASSEMBLIES

Some components of the powertrain system are intended to be serviced in assembly only. Attempting to remove or repair certain system subcomponents may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

4.2.4 DRBIII® SAFETY INFORMATION

WARNING: EXCEEDING THE LIMITS OF THE DRBIII® MULTIMETER IS DANGEROUS. IT CAN EXPOSE YOU TO SERIOUS INJURY. CAREFULLY READ AND UNDERSTAND THE CAUTIONS AND THE SPECIFICATION LIMITS.

Follow the vehicle manufacturer's service specifications at all times.

- Do not use the DRBIII® if it has been damaged.
- Do not use the test leads if the insulation is damaged or if metal is exposed.
- To avoid electrical shock, do not touch the test leads, tips, or the circuit being tested.
- Choose the proper range and function for the measurement. Do not try voltage or current measurements that may exceed the rated capacity.
- Do not exceed the limits shown in the table below:

FUNCTION	INPUT LIMIT
Volts	0 - 500 peak volts AC 0 - 500 volts DC
Ohms (resistance)*	0 - 1.12 megohms

FUNCTION	INPUT LIMIT
Frequency Measured Frequency Generated	0 - 10 kHz
Temperature	-58 - 1100°F -50 - 600°C

* Ohms cannot be measured if voltage is present. Ohms can be measured only in a non-powered circuit.

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- The circuit being tested must be protected by a 10A fuse or circuit breaker.
- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeding 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- When measuring current, connect the meter in series with the load.
- Disconnect the live test lead before disconnecting the common test lead.
- When using the meter function, keep the DRBIII® away from spark plug or coil wires to avoid measuring error from outside interference.

4.3 WARNINGS AND CAUTIONS

4.3.1 ROAD TEST WARNINGS

Some complaints will require a test drive as part of the repair verification procedure. The purpose of the test drive is to try to duplicate the diagnostic code or symptom condition.

CAUTION: Before road testing a vehicle, be sure that all components are reassembled. During the test drive, do not try to read the DRBIII® screen while in motion. Do not hang the DRBIII® from the rear view mirror or operate it yourself. Have an assistant available to operate the DRBIII®.

4.3.2 VEHICLE DAMAGE CAUTIONS

Before disconnecting any control module, make sure the ignition is off. Failure to do so could damage the module.

When testing voltage or continuity at any control module, use the terminal side (not the wire end) of the connector. Do not probe a wire through the insulation; this will damage it and eventually cause it to fail because of corrosion.

Be careful when performing electrical tests so as to prevent accidental shorting of terminals. Such mistakes can damage fuses or components. Also, a second DTC could be set, making diagnosis of the original problem more difficult.

5.0 REQUIRED TOOLS AND EQUIPMENT

DRBIII® (diagnostic read-out box) scan tool
Evaporative System Diagnostic Kit #6917
fuel filler adapter #8382
fuel pressure adapter (C-6631) or #6539
fuel pressure kit (C-4799-B) or #5069
fuel release hose (C-4799-1)
Min Air flow fitting #6714
jumper wires
ohmmeter
oscilloscope
vacuum gauge
voltmeter
12 volt test light minimum 25 ohms resistance with probe #6801

CAUTION: A 12 volt test light should not be used for the following circuits, damage to the powertrain controller will occur.

- 5 Volt Supply
- 8 Volt Supply
- J1850 PCI Bus
- CCD Bus
- CKP Sensor Signal
- CMP Sensor Signal
- Vehicle Speed Sensor Signal
- O2 Sensor Signal

6.0 GLOSSARY OF TERMS

ABS	anti-lock brake system
backfire, popback	fuel ignites in either the intake or the exhaust system
CKP	crank position sensor
CMP	camshaft position sensor
cuts out, misses	a steady pulsation or the inability of the engine to maintain a consistent rpm
DLC	data link connector (previously called engine diagnostic connector)
detonation, spark knock	a mild to severe ping, especially under loaded engine conditions
ECT	engine coolant temperature sensor
EGR	exhaust gas recirculation valve and system
generator	previously called alternator
hard start	The engine takes longer than usual to start, even though it is able to crank normally.
hesitation, sag, stumble	There is a momentary lack of response when the throttle is opened. This can occur at all vehicle speeds. If it is severe enough, the engine may stall.
IAT	intake/inlet air temperature sensor
IAC	idle air control motor
JTEC	Combined engine and transmission control module
lack of power, sluggish	The engine has less than expected power, with little or no increase in vehicle speed when the throttle is opened.
LDP	leak detection pump
MAP	manifold absolute pressure sensor
MIL	malfunction indicator lamp
MTV	manifold tuning valve
O2S	oxygen sensor
PCI	programmable communication interface
PCM	powertrain control module
PCV	positive crankcase ventilation
PEP	peripheral expansion port
poor fuel economy	There is significantly less fuel mileage than other vehicles of the same design ad configuration
rough, unstable, or erratic idle stalling	The engine runs unevenly at idle and causes the engine to shake if it is severe enough. The engine idle rpm may vary (called hunting). This condition may cause stalling if it is severe enough.
SBEC	single board engine controller
SKIM	sentry key immobilizer module
SKIS	sentry key immobilizer system
start & stall	The engine starts but immediately dies.
surge	engine rpm fluctuation without corresponding change in throttle position sensor
TPS	throttle position sensor
TRS	transmission range sensor
VSS	vehicle speed sensor/signal

NOTES

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

Symptom:
P0622-GENERATOR FIELD NOT SWITCHING PROPERLY

When Monitored and Set Condition:

P0622-GENERATOR FIELD NOT SWITCHING PROPERLY

When Monitored: With the ignition on. Engine running.

Set Condition: When the PCM tries to regulate the generator field with no result during monitoring.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
INSPECT WIRING HARNESS
ASD RELAY OUTPUT CIRCUIT OPEN
GENERATOR FIELD DRIVER CIRCUIT SHORT TO GROUND
GENERATOR FIELD DRIVER CIRCUIT OPEN
GENERATOR FIELD COIL OPEN
GENERATOR FIELD COIL SHORTED
PCM TERMINAL CONDITION
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the Generator Field Driver circuit. Using a 12-volt test light connected to ground, backprobe the Generator Field Driver circuit in the back of the Generator. Does the test light illuminate brightly and flash? Yes → Go To 2 No → Go To 4	All
2	With the DRBIII®, erase DTCs. Start the engine and allow it to idle. Wiggle the wiring harness from the Generator to PCM. With the DRBIII®, read DTC's. Did the DTC reset? Yes → Repair as necessary . Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3	All

P0622-GENERATOR FIELD NOT SWITCHING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All
4	**NOTE: Carefully inspect all Connectors for corrosion or spread Terminals before continuing.** Disconnect the Generator Field harness connector. Turn the ignition on. With the DRBIII® actuate the Generator Field Driver circuit. Using a 12-volt test light connected to ground, probe the ASD Relay Output circuit. Does the test light illuminate brightly? Yes → Go To 5 No → Repair the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Generator Field harness connector. Measure the resistance of the Generator Field Driver circuit from PCM harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the Generator Field Driver circuit for a shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 6	All
6	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Generator Field harness connector. Measure the resistance of the Generator Field Driver circuit from the PCM harness connector to the Generator Field harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Generator Field Driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
7	Turn the ignition off. Disconnect the Generator Field harness connector. Measure the resistance across the Generator Field Terminals at the Generator. Is the resistance above 15.0 ohms? Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 8	All

P0622-GENERATOR FIELD NOT SWITCHING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the Generator Field harness connector. Measure the resistance across the Generator Field Terminals at the Generator. Is the resistance below 0.5 ohms? Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 9	All
9	Turn the ignition off. Disconnect the PCM harness connector. Inspect the Generator Field Driver terminal on both sides of the PCM connectors. Check for corrosion, damage or terminal push out. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:
P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH

When Monitored and Set Condition:

P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH

When Monitored: The ignition key on.

Set Condition: The Ambient Temperature Sensor voltage is greater than 4.9 volts at the PCM for 5 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
AMBIENT TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
AMBIENT TEMPERATURE SENSOR INTERNAL FAILURE
AMBIENT TEMPERATURE SENSOR SIGNAL CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
PCM TERMINAL CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the Ambient Temperature Sensor voltage. Is the voltage above 4.8 volts? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Turn the ignition on. Measure the voltage of the Ambient Temperature Sensor Signal circuit in the Ambient Temperature Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the Ambient Temperature Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Connect a jumper wire between the Ambient Temperature Sensor Signal circuit and the Sensor ground circuit in the Ambient Temperature Sensor harness connector. Turn the ignition on. With the DRBIII®, read Ambient Temperature Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the Ambient Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Ambient Temperature Sensor Signal circuit between the Ambient Temperature Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Ambient Temperature Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor ground circuit between the Ambient Temperature Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the PCM harness connector. Inspect the Ambient Air Temperature Sensor Signal terminal on both sides of the PCM connector. Check for corrosion, damage or terminal push out. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1493-AMBIENT/BATT TEMP SEN VOLTS TOO LOW

When Monitored and Set Condition:

P1493-AMBIENT/BATT TEMP SEN VOLTS TOO LOW

When Monitored: The ignition key on.

Set Condition: Ambient Temperture Sensor is less than .098 volt at the PCM for 5 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
AMBIENT TEMPERATURE SENSOR INTERNAL FAILURE
AMBIENT TEMPERATURE SENSOR SIGNAL SHORTED TO GROUND
AMBIENT TEMPERATURE SENSOR SIGNAL SHORTED TO SENSOR GROUND CIRCUIT
PCM TERMINAL CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the Ambient Temperature Sensor voltage. Is the voltage below 0.3 volt? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Turn the ignition on. With the DRBIII®, read Ambient Temperature Sensor voltage. Is the voltage above 1.0 volt? Yes → Replace the Ambient Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Ambient Temperature Sensor Signal circuit in the Ambient Temperature Sensor harness connector to chassis ground. Is the resistance below 100 ohms? Yes → Repair the Ambient Temperature Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P1493-AMBIENT/BATT TEMP SEN VOLTS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the Ambient Temperature Sensor Signal circuit and the Sensor ground circuit in the Ambient Temperature Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the Ambient Temperature Sensor Signal circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Inspect the Ambient Air Temperature Sensor Signal terminal on both sides of the PCM connector. Check for corrosion, damage or terminal push out. Were any of the above condition present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1594-CHARGING SYSTEM VOLTAGE TOO HIGH

When Monitored and Set Condition:

P1594-CHARGING SYSTEM VOLTAGE TOO HIGH

When Monitored: The engine running. The engine speed greater than 380 RPM.

Set Condition: Battery voltage is 1 volt greater than desired system voltage.

POSSIBLE CAUSES
TARGET VOLTAGE DIFFERS FROM BATTERY VOLTAGE
INTERMITTENT CONDITION
GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
GENERATOR FIELD
POWERTRAIN CONTROL MODULE
PCM TERMINAL CONDITION

TEST	ACTION	APPLICABILITY
1	**Note: Battery must be fully charged.** **Note: Generator Belt tension and condition must be checked before continuing.** Turn the ignition on. With DRBIII®, actuate the Generator Field Driver. With a 12-volt test light connected to ground, backprobe the Generator Field Driver circuit in the back of Generator Field harness connector. Does the test light illuminate brightly and flash? Yes → Go To 2 No → Go To 5	All
2	With DRBIII®, stop all actuation. Turn the ignition on. With DRBIII®, read the Target Charging voltage. Is the Target Charging voltage above 13 volts? Yes → Go To 3 No → Go To 4	All
3	Start the engine. With the DRBIII®, manually set the engine speed to 1600 RPM. With DRBIII®, read both the Battery voltage and the Target Charging voltage. Compare the Target Charging Voltage to the Battery Voltage reading. Monitor voltage for 5 minutes, if necessary. Look for a 1.0 volt difference or more. Was there more than a 1.0 volt difference? Yes → Replace the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All

P1594-CHARGING SYSTEM VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Generator Field harness connector. Measure the resistance of the Generator Field Driver circuit from the PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 6	All
6	Turn the ignition off. Disconnect the Generator Field harness connector. Measure resistance of the Generator Field Driver terminal pin of the Generator to ground. Is the resistance below 5.0 ohms? Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector. Inspect the Generator Field Driver terminal on both the PCM connector. Check for corrosion, damage or terminal push out. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:
P1682-CHARGING SYSTEM VOLTAGE TOO LOW

When Monitored and Set Condition:

P1682-CHARGING SYSTEM VOLTAGE TOO LOW

When Monitored: With the ignition on. Engine RPM greater than 1152 RPM. With no other charging system codes set.

Set Condition: The battery sensed voltage is 1 volt below the charging goal for 13.47 seconds. The PCM senses the battery voltage turns off the field driver and senses the battery voltage again. If the voltages are the same, the code is set.

POSSIBLE CAUSES
B+ CIRCUIT HIGH RESISTANCE
GENERATOR GROUND HIGH RESISTANCE
INTERMITTENT CONDITION
GENERATOR FIELD DRIVER CIRCUIT OPEN
ASD RELAY OUTPUT CIRCUIT OPEN
GENERATOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Inspect the vehicle for aftermarket accessories that may exceed the Generator System output.** Turn the ignition off. **NOTE: The battery must be fully charged.** **NOTE: The Generator belt tension and condition must be checked before continuing.** Start the engine. Allow the idle to stabilize. With the DRBIII®, read the Target Charging Voltage. Is the Target Charging Voltage above 15.1 volts? Yes → Go To 8 No → Go To 2	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Turn the ignition on. **NOTE: Ensure all wires are clear of the engine's moving parts.** Measure the voltage between the Generator B+ Terminal and the Battery+ Post. Start the engine. Is the voltage above 0.4 volt with the engine running? Yes → Repair the B+ circuit for high resistance between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3	All

P1682-CHARGING SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Warm the engine to operating temperature. **NOTE: Ensure all wires are clear of the engine's moving parts.** Measure the voltage between the Generator case and Battery ground post. Is the voltage above 0.1 volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery ground side. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All
4	Start the engine. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Turn on all accessories, manually set engine speed to 1600 RPM. With DRBIII®, read Target Charging and Charging voltage. Compare the two readings. Is there more than a 1.0 volt difference? Yes → Go To 5 No → Go To 8	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Generator Field harness connector. Measure the resistance of the Generator Field Driver circuit from the PCM harness connector to Generator harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Generator Field Driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
6	Disconnect the Generator Field harness connector. Turn the ignition on. With the DRBIII® actuate the Generator Field Driver. Using a 12-volt test light connected to ground, probe the ASD Relay Output circuit in the Generator harness connector. Does the test light illuminate brightly? Yes → Go To 7 No → Repair the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
7	If there is no possible causes remaining, view repair. Yes → Replace the Generator. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

P1682-CHARGING SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All

Symptom List:
P0600-PCM FAILURE SPI COMMUNICATIONS
P0601-PCM INTERNAL CONTROLLER FAILURE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0600-PCM FAILURE SPI COMMUNICATIONS.

When Monitored and Set Condition:

P0600-PCM FAILURE SPI COMMUNICATIONS

When Monitored: Ignition key on.

Set Condition: Internal Bus communication failure between processors.

P0601-PCM INTERNAL CONTROLLER FAILURE

When Monitored: Ignition key on.

Set Condition: Internal checksum for software failed, does not match calculated value.

POSSIBLE CAUSES
PCM INTERNAL OR SPI

TEST	ACTION	APPLICABILITY
1	The Powertrain Control Module is reporting internal errors, view repair to continue. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
P1685 WRONG OR INVALID KEY MSG RECEIVED FROM SKIM

POSSIBLE CAUSES
INCORRECT VIN IN PCM
INVALID SKIM KEY PRESENT
NO COMMUNICATION WITH SKIM
NO VIN PROGRAMMED IN THE PCM
PCM
SKIM TROUBLE CODES SET

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the PCM DTCs. Look for P1685. Is the Starts Since Set counter for DTC P1685 displayed and equal to 0? Yes → Go To 2 No → Go To 7	All
2	With the DRBIII®, attempt to communicate with the SKIM. Turn the ignition on. Can the DRB III communicate with the SKIM? Yes → Go To 3 No → Refer to symptom BUS +/- SIGNAL OPEN FROM SKIM in the COMMUNICATION category. Perform SKIS VERIFICATION.	All
3	Turn the ignition on. With the DRB III, check for SKIM DTCs. Are any DTCs present in the SKIM? Yes → Repair all SKIM DTCs. Perform SKIS VERIFICATION. No → Go To 4	All
4	Turn the ignition on. With the DRB III, display the VIN that is programmed in the PCM. Has a VIN been programmed into the PCM? Yes → Go To 5 No → Program the correct VIN into the PCM and retest. Perform SKIS VERIFICATION.	All
5	Turn the ignition on. With the DRB III, display the VIN that is programmed in the PCM. Was the correct VIN programmed into the PCM? Yes → Go To 6 No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All

P1685 WRONG OR INVALID KEY MSG RECEIVED FROM SKIM — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Turn the ignition on. With the DRB III, erase all SKIM and PCM DTCs. Attempt to start and idle the engine. With the DRB III, read the PCM DTCs. Does the DRB III display this code? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All
7	**NOTE: This DTC could have been set if the SKIM harness connector was disconnected, or if the SKIM was replaced recently.** **NOTE: All keys that the customer uses for this vehicle must be tested to verify they are operating properly.** **NOTE: Ensure the customer is not attempting to use a non-SKIM duplicate key.** Turn the ignition on. Verify the correct VIN is programmed into the PCM and SKIM. Turn the ignition off. With the next customer key turn the ignition key on and crank the engine to start. With the DRB III, read the PCM DTCs. Look for P1685 Is the Starts Since Set counter for DTC P1685 displayed and equal to 0? Yes → Replace the Ignition Key. Perform SKIS VERIFICATION. No → Test Complete. **NOTE: If this DTC cannot be reset, it could have been an actual theft attempt.**	All

Symptom:
P1686 NO SKIM BUS MESSAGE RECEIVED

POSSIBLE CAUSES
SKIM/PCM
INTERMITTENT CONDITION
LOSS OF SKIM COMMUNICATION
PCI BUS CIRCUIT OPEN FROM PCM TO SKIM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB III, read the PCM DTCs. Look for P1686. Is the Starts Since Set counter on the DTC screen for P1686 equal to Zero? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition on. With the DRB III, attempt to communicate with the SKIM. **NOTE: This test will indicate if the Bus is operational from the DLC to the SKIM.** Was the DRB III able to communicate with the SKIM? Yes → Go To 3 No → Refer to symptom BUS +/- SIGNAL OPEN FROM SKIM in the COMMUNICATION category. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the SKIM harness connector. Measure the resistance of the PCI Bus circuit between the PCM harness connector and the SKIM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the PCI Bus circuit between the PCM and the SKIM for an open. Perform SKIS VERIFICATION.	All
4	Turn the ignition off. Replace the Sentry Key Immobilizer Module in accordance with the Service Information. Turn the ignition on. Display and erase all PCM and SKIM DTCs. Perform 5 ignition key cycles leaving the ignition key on for 90 seconds per cycle. With the DRB, display PCM DTCs. Does the DRB display the same DTC? Yes → Replace and program the PCM in accordance with the Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All

P1686 NO SKIM BUS MESSAGE RECEIVED — Continued

TEST	ACTION	APPLICABILITY
5	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running and at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DTC When Monitored and Set Conditions. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:
P1687-NO CLUSTER BUS MESSAGE

When Monitored and Set Condition:

P1687-NO CLUSTER BUS MESSAGE

When Monitored: Ignition key on.

Set Condition: No messages received from the MIC (Instrument Cluster) for 20 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
COMMUNICATE WITH CLUSTER
INSTRUMENT CLUSTER OPERATION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTCs. Cycle the ignition key on and off several times. Leaving the ignition in the ON position for a minimum of 20 seconds each time. With the DRBIII®, read DTC's. Does the DTC reset? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, attempt to communicate with the Instrument cluster. Can communication be established with the Instrument Cluster? Yes → Go To 3 No → Refer to the Communication Category and perform the appropriate symptom related to no communication with cluster. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Start the engine Allow the engine to idle. Is the correct engine speed display in the instrument cluster (Tach)? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Refer to the Instrument Category and perform the appropriate symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

P1687-NO CLUSTER BUS MESSAGE — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P1695-NO CCD/J1850 MESSAGE FROM BODY CONTROL MODULE

When Monitored and Set Condition:

P1695-NO CCD/J1850 MESSAGE FROM BODY CONTROL MODULE

When Monitored: With the ignition on. Battery voltage greater than 10.0 volts.

Set Condition: No BUS messages recieved from the BCM for 20 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
COMMUNICATE WITH BCM
PCI BUS CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTCs. Cycle the ignition key on and off several times. Leaving the ignition on for at least 20 seconds. With the DRBIII®, read DTC's. Does the DTC reset? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, attempt to communicate with the BCM. Can communication be established with the BCM? Yes → Go To 3 No → Refer to the Communication Category and perform the appropriate symptom related to no communication with BCM. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. Disconnect the PCM harness connector Disconnect the BCM harness connector. **NOTE: Inspect the PCI Bus terminal at both the PCM connectors and the BCM connectors. Check for corrosion, damage or terminal push out.** Measure the resistance of the PCI BUS circuit between the PCM harness connector and the BCM harness connector. Is the resistance below 5.0 ohms? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the PCI BUS circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

P1695-NO CCD/J1850 MESSAGE FROM BODY CONTROL MODULE — Continued

TEST	ACTION	APPLICABILITY
4	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom List:

P1696-PCM FAILURE EEPROM WRITE DENIED
P1697-PCM FAILURE SRI MILE NOT STORED

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1696-PCM FAILURE EEPROM WRITE DENIED.

When Monitored and Set Condition:

P1696-PCM FAILURE EEPROM WRITE DENIED

When Monitored: Ignition key on, Continuous.

Set Condition: An attempt to program/write to the internal EEPROM failed, Also checks at powerdown.

P1697-PCM FAILURE SRI MILE NOT STORED

When Monitored: Ignition key on, Continuous.

Set Condition: An attempt to program/write to the internal EEPROM failed, Also checks at powerdown.

POSSIBLE CAUSES
DRB DISPLAYS WRITE FAILURE
DRB DISPLAYS WRITE REFUSED 3RD TIME
DRB DISPLAYS SRI MILEAGE INVALID
COMPARE SRI MILEAGE WITH ODOMETER

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, perform the SRI Memory Test. Does the DRBIII® display Write Failure? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 2	All
2	With the DRBIII®, perform the SRI Memory Test a second time. Does the DRBIII® display Write Refused? Yes → Go To 3 No → Go To 4	All

P1696-PCM FAILURE EEPROM WRITE DENIED — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, perform the SRI Memory Test a third time. **NOTE: Retest the SRI Memory two more times.** Does the DRBIII® display Write Refused again? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All
4	With the DRBIII®, perform the SRI Memory Test. Does the DRBIII® display SRI Mileage Invalid? Yes → Update the mileage and retest the SRI Memory. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 5	All
5	Compare the SRI Mileage stored with the Instrument Panel Odometer. Is the mileage within the specified range displayed on the DRBIII®? Yes → Test Complete. No → Update the mileage and retest the SRI Memory. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
P1698-NO BUS MESSAGE FROM TRANS CONTROL MODULE

When Monitored and Set Condition:

P1698-NO BUS MESSAGE FROM TRANS CONTROL MODULE

When Monitored: Equipped with automatic transmission. The ignition on. Battery voltage greater than 10 volts.

Set Condition: No bus messages from the TCM for 20 seconds, two trips required.

POSSIBLE CAUSES
INTERMITTENT CONDITION
COMMUNICATE WITH TCM
PCI BUS CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTCs. Cycle the ignition key on and off several times. Leaving the ignition on for at least 20 seconds. With the DRBIII®, read DTC's. Does the DTC reset? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, attempt to communicate with the TCM. Can communication be established with the TCM? Yes → Go To 3 No → Refer to the Communication Category and perform the appropriate symptom related to no communication with TCM. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. Disconnect the PCM harness connector Disconnect the TCM harness connector. **NOTE: Inspect the PCI Bus terminal at both the PCM connectors and the TCM connectors. Check for corrosion, damage or terminal push out.** Measure the resistance of the PCI BUS circuit between the PCM harness connector and the TCM harness connector. Is the resistance below 5.0 ohms? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the PCI BUS circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

P1698-NO BUS MESSAGE FROM TRANS CONTROL MODULE — Continued

TEST	ACTION	APPLICABILITY
4	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
*BUS +/- SIGNALS OPEN OR NO RESPONSE FROM SENTRY KEY IMMOBILIZER MODULE

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE BCM
GROUND CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
FUSED B(+) CIRCUIT OPEN
SENTRY KEY IMMOBILIZER MODULE (SKIM)
PCI BUS CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, enter Body then Body Computer. Was the DRB able to I/D or communicate with the BCM? Yes → Go To 2 No → Refer to the symptom list for problems related to no communication with the BCM. Perform SKIS VERIFICATION.	All
2	Turn the ignition off. Disconnect the SKIM harness connector. Using a 12-volt test light connected to 12-volts, probe the ground circuit. Is the test light illuminated? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Disconnect the SKIM harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output circuit. Is the test light illuminated? Yes → Go To 4 No → Repair the Fused Ignition Switch Output circuit for an open. Refer to the wiring diagrams in the service information. Perform SKIS VERIFICATION.	All

*BUS +/- SIGNALS OPEN OR NO RESPONSE FROM SENTRY KEY IMMOBILIZER MODULE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the SKIM harness connector. Using a 12-volt test light connected to ground, probe the Fused B(+) circuit. Is the test light illuminated? Yes → Go To 5 No → Repair the Fused B+ circuit for an open. Refer to the wiring diagrams in the service information. Perform SKIS VERIFICATION.	All
5	**Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.** Disconnect the SKIM harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the SKIM connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace the Sentry Key Immobilizer Module (SKIM) in accordance with the service information. Perform SKIS VERIFICATION. No → Go To 6	All
6	Turn the ignition off. Disconnect the SKIM harness connector. Disconnect the BCM C2 harness connector. Measure the resistance of the PCI bus circuit between the SKIM connector and the BCM C2 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module in accordance with the service information. Perform SKIS VERIFICATION. No → Repair the PCI Bus circuit for an open. Perform SKIS VERIFICATION.	All

Symptom:
*NO RESPONSE FROM PCM (PCI BUS)

POSSIBLE CAUSES
PCM PCI NO RESPONSE
POWERTRAIN CONTROL MODULE
PCI BUS CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: As soon as one or more module communicates with the DRB, answer the question.** With the DRB, enter Body then Body Computer. With the DRB, enter Body then Electro/Mechanical Cluster (MIC). Were you able to establish communications with any of the modules? Yes → Go To 2 No → Refer to symptom PCI Bus Communication Failure in the Communications category. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	With the DRB read PCM Diagnostic Trouble Codes. This is to ensure power and grounds to the PCM are operational. **NOTE: If the DRB will not read PCM DTC's, follow the NO RESPONSE TO PCM (SCI only) symptom path.** Turn the ignition off. Disconnect the PCM C2 harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the PCM C2 connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 3	All

*NO RESPONSE FROM PCM (PCI BUS) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM C2 harness connector. Disconnect the BCM C3 harness connector. Measure the resistance of the PCI bus circuit between the PCM C2 connector and the BCM C3 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module in accordance with the service information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the PCI Bus circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*NO RESPONSE FROM PCM (SCI ONLY)

POSSIBLE CAUSES
CHECK PCM POWERS AND GROUNDS
SCI TRANSMIT CIRCUIT SHORTED TO VOLTAGE
TRANSMISSION CONTROL MODULE
SCI RECEIVE CIRCUIT SHORTED TO VOLTAGE
SCI CIRCUITS SHORTED TOGETHER
SCI TRANSMIT CIRCUIT SHORTED TO GROUND
SCI RECEIVE CIRCUIT SHORTED TO GROUND
SCI RECEIVE CIRCUIT OPEN
SCI TRANSMIT CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Perform the symptom Checking PCM Power and Ground Circuits in the Driveability category. **NOTE: With the DRBIII® in the generic scan tool mode, attempt to communicate with the PCM.** **NOTE: If the DRBIII® can communicate with the PCM in the generic scan tool mode, it may not be necessary to perform this step.** Did the vehicle pass this test? Yes → Go To 2 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRB from the DLC. Measure the resistance between ground and the SCI Transmit circuit. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Go To 4	All
3	Turn the ignition off. Disconnect the TCM harness connector (if equipped). **NOTE: If vehicle is not equipped with a TCM, answer yes to the question.** Measure the resistance between ground and the SCI Transmit circuit. Is the resistance below 5.0 ohms? Yes → Repair the SCI Transmit circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace the Transmission Control Module in accordance with the service information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO RESPONSE FROM PCM (SCI ONLY) — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the DRB from the DLC. Disconnect the PCM harness connector. Disconnect the TCM harness connector (if equipped). Turn the ignition on. Measure the voltage of the SCI Transmit circuit at the DLC connector (cav 7). Is the voltage above 1.0 volt? Yes → Repair the SCI Transmit circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the DRB from the DLC. Disconnect the PCM harness connector. Turn the ignition on. Measure the voltage of the SCI Receive circuit at the DLC connector (cav 6). Is the voltage above 1.0 volt? Yes → Repair the SCI Receive circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the DRB from the DLC. Disconnect the PCM harness connector. Measure the resistance between the SCI Transmit circuit and the SCI Receive circuit at the PCM connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the SCI Transmit and the SCI Receive circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRB from the DLC. Measure the resistance between ground and the SCI Receive circuit. Is the resistance below 5.0 ohms? Yes → Repair the SCI Receive circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 8	All
8	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRB from the DLC. Measure the resistance of the SCI Receive circuit between the PCM connector and the DLC. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the SCI Receive circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO RESPONSE FROM PCM (SCI ONLY) — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRB from the DLC. Measure the resistance of the SCI Transmit circuit between the PCM connector and the DLC. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the SCI Transmit circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
10	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*PCI BUS COMMUNICATION FAILURE

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
OPEN PCI BUS CIRCUIT AT THE DATA LINK CONNECTOR (DLC)
HIGH VOLTAGE ON THE PCI BUS CIRCUITS AT THE BCM CONNECTORS
MODULE (PCI BUS SHORT TO VOLTAGE)
PCI BUS CIRCUIT SHORTED TO VOLTAGE
LOW RESISTANCE TO GROUND ON THE PCI BUS CIRCUITS AT THE BCM CONNECTORS
MODULE (PCI BUS SHORT TO GROUND)
PCI BUS CIRCUIT SHORTED TO GROUND

TEST	ACTION	APPLICABILITY
1	**Note: Determine which modules this vehicle is equipped with before beginning.** **Note: When attempting to communicate with any of the modules on this vehicle, the DRB will display 1 of 2 different communication errors: a NO RESPONSE message or a BUS +/- SIGNALS OPEN message.** Turn the ignition on. Using the DRB, attempt to communicate with the following control modules: Body Control Module (BCM) Instrument Cluster (MIC) Occupant Restraint Controller (ORC) Controller Antilock Brake (CAB) Was the DRB able to communicate with one or more Module(s)? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: If the DRB can not communicate with a single module, refer to the category list for the related symptom.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

*PCI BUS COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the DRB from the Data Link Connector (DLC). Measure the resistance of the PCI Bus circuit between the Data Link Connector (DLC) and the BCM C2 connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the PCI Bus circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
4	**NOTE: Reconnect the BCM C2 harness connector.** Turn the ignition on. Measure the voltage of the PCI Bus circuit at the Data Link Connector (DLC). Is the voltage above 4.0 volts? Yes → Go To 5 No → Go To 7	All
5	**Note: Determine which modules this vehicle is equipped with before beginning.** Turn the ignition off. Disconnect the BCM C2 and C3 harness connectors. Turn the ignition on. Measure the voltage of each PCI Bus circuit at the BCM C2 and C3 connectors. Is the voltage steadily above 4.0 volts for any measurement? Yes → Go To 6 No → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Disconnect the module that corresponds to the PCI Bus circuit that measured steadily above 4.0 volts. Turn the ignition on. **NOTE: If the PCI Bus circuit for the Radio was above 4.0 volts and is equipped with a CD Changer, disconnect the CD Changer before the Radio.** **NOTE: If the PCI Bus circuit for the Instrument Cluster (MIC) was above 4.0 volts and is equipped with a Compass/Mini Trip Computer (CMTC), disconnect the CMTC before the MIC.** **NOTE: If the PCI Bus circuit for the side airbags (if equipped) was above 4.0 volts, disconnect each module one at a time.** Measure the voltage of the PCI Bus circuit that previously measured above 4.0 volts. Is the voltage steadily above 4.0 volts with the module disconnected? Yes → Repair the PCI Bus circuit that measured over 4.0 volts for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Replace the module that caused the short to voltage on the PCI Bus circuit. Perform BODY VERIFICATION TEST - VER 1.	All

*PCI BUS COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	**Note: Determine which modules this vehicle is equipped with before beginning.** Turn the ignition off. Disconnect the negative battery cable. Disconnect the BCM C2 and C3 harness connectors. Measure the resistance between ground and each of the PCI Bus circuits at the BCM C2 and C3 connectors. Is the resistance below 1000.0 ohms for any of the measurements? Yes → Go To 8 No → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1.	All
8	Turn the ignition off. Disconnect the negative battery cable. Disconnect the module that corresponds to the PCI Bus circuit that resistance measured below 1000.0 ohms. **NOTE: If the PCI Bus circuit for the Radio was below 1000.0 ohms and is equipped with a CD Changer, disconnect the CD Changer before the Radio.** **NOTE: If the PCI Bus circuit for the Instrument Cluster (MIC) was below 1000.0 ohms and is equipped with a Compass/Mini Trip Computer (CMTC), disconnect the CMTC before the MIC.** **NOTE: If the PCI Bus circuit for the side airbags (if equipped) was below 1000.0 ohms, disconnect each module one at a time.** Measure the resistance between ground and the PCI Bus circuit that previously measured below 1000.0 ohms. Is the resistance below 1000.0 ohms with the module disconnected? Yes → Repair the PCI Bus circuit that resistance measured below 1000.0 ohms for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the module that caused the short to ground on the PCI Bus circuit. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
P0071 - AMBIENT TEMP SENSOR PERFORMANCE

When Monitored and Set Condition:

P0071 - AMBIENT TEMP SENSOR PERFORMANCE

When Monitored: With the ignition on. Coolant Temperature greater than 71°C (160°F) No Ambient Air Temperature Sensor Faults present

Set Condition: After 5 warm cycles have occurred (coolant increases from greater than 4.4°C (40°F) to a minimum of 71°C (160°F) and the odometer mileage has increased 196.6 miles and the Ambient Air Temperature has increased less than 3°C (5.4°F). Two trip fault.

POSSIBLE CAUSES
INTERMITTENT CONDITION
AMBIENT AIR TEMP SENSOR VOLTAGE BELOW 1.0 VOLTS
SENSOR GROUND CIRCUIT VOLTAGE DROP
AMBIENT AIR TEMP SENSOR SIGNAL CIRCUIT VOLTAGE DROP
PCM TERMINAL CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P1492 or P1493 have set along with P0071, diagnose P1492 or P1493 first before continuing.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Ambient Air Temperature Sensor harness connector. Turn the ignition on. With the DRBIII®, read the Ambient Air Temp voltage. Is the voltage above 4.6 volts? Yes → Go To 3 No → Go To 4	All

P0071 - AMBIENT TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Ambient Air Temperature Sensor harness connector. Using a jumper wire, jumper across the Ambient Air Temp Sensor harness connector. Turn the ignition on. With the DRBIII®, read the Ambient Air Temp voltage. Is the voltage below 1.0 volt? Yes → Replace the Ambient Air Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Perform a voltage drop test by backprobing between the Sensor ground circuit at the Ambient Air Temp Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 5 No → Repair the high resistance in the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Perform a voltage drop test by backprobing the Ambient Air Temp Sensor Signal circuit at the Ambient Temperature Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 6 No → Repair the high resistance in the Ambient Air Temp Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the PCM harness connector. Inspect the IAT Signal and the Sensor ground terminals on both sides of the PCM connectors. Check for corrosion, damage or terminal push out. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0071 - AMBIENT TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information to identify under what conditions the DTC set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0106-BAROMETRIC PRESSURE OUT OF RANGE

When Monitored and Set Condition:

P0106-BAROMETRIC PRESSURE OUT OF RANGE

When Monitored: With the ignition key on. No Cam or Crank signal within 75 ms. Engine speed at less than 250 RPM.

Set Condition: The PCM senses the voltage from the MAP sensor to be less than 2.196 volts but above 0.0392 volts for 300 milliseconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5 VOLT SUPPLY CIRCUIT OPEN
MAP SENSOR INTERNAL FAILURE
MAP SENSOR SIGNAL CIRCUIT OPEN
MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
PCM 5 VOLT SUPPLY CIRCUIT
PCM MAP SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. (Do not start engine) With the DRBIII®, read the MAP Sensor voltage. Is the voltage below 2.2 volts. Yes → Go To 2 No → Go To 11	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the MAP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 7	All

P0106-BAROMETRIC PRESSURE OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. With the DRBIII®, monitor the MAP Sensor voltage. Is the voltage above 2.2 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the MAP Sensor Signal circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the MAP Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the MAP Sensor Signal circuit in the MAP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the MAP Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the MAP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the 5 Volt Supply circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0106-BAROMETRIC PRESSURE OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit in the MAP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the 5 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0107-MAP SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P0107-MAP SENSOR VOLTAGE TOO LOW

When Monitored: Engine speed between 600 to 3500 RPM. TPS voltage less than 1.2 volts. Battery voltage greater than 10 volts.

Set Condition: The MAP sensor signal voltage is below 0.0392 volt for 1.7 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5 VOLT SUPPLY CIRCUIT OPEN
MAP SENSOR INTERNAL FAILURE
MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
MAP SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
PCM 5 VOLT SUPPLY CIRCUIT
PCM MAP SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. (Do not start engine.) With the DRBIII®, read the MAP Sensor voltage. Is the voltage below 1.2 volts. Yes → Go To 3 No → Go To 2	All
2	Start the engine. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below .04 volts. Yes → Go To 3 No → Go To 11	All
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the MAP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 4 No → Go To 8	All

P0107-MAP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. With the DRBIII®, monitor the MAP Sensor voltage. Is the voltage above 1.2 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the MAP Sensor Signal circuit between the MAP Sensor harness connector and ground. Is the resistance below 100 ohms? Yes → Repair the MAP Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the MAP Sensor Signal circuit and the Sensor ground circuit in the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the MAP Sensor Signal circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit in the MAP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All

P0107-MAP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the 5 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0108-MAP SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0108-MAP SENSOR VOLTAGE TOO HIGH

When Monitored: Engine speed between 600 to 3500 RPM. TP sensor voltage less than 1.2 volts. Battery voltage greater than 10 volts

Set Condition: The MAP sensor signal voltage is greater than 4.96 voltsfor 1.7 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
MAP SENSOR SIGNAL CIRCUIT SHORTED TO 5 VOLT SUPPLY CIRCUIT
MAP SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
MAP SENSOR INTERNAL FAILURE
MAP SENSOR SIGNAL CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, read the MAP Sensor voltage. Is the voltage above 4.6 volts. Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the MAP Sensor Signal circuit and the 5 Volt Supply circuit in the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the MAP Sensor Signal circuit for a short to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0108-MAP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the voltage of the MAP Sensor Signal circuit in the MAP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the MAP Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. Connect a jumper wire between the MAP Sensor Signal circuit and the Sensor ground circuit. With the DRBIII®, monitor the MAP Sensor voltage. Turn the ignition on. Is the voltage below 1.0 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the MAP Sensor Signal circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the MAP Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor ground circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0108-MAP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0111-INTAKE AIR TEMP SENSOR PERFORMANCE

When Monitored and Set Condition:

P0111-INTAKE AIR TEMP SENSOR PERFORMANCE

When Monitored: With the ignition on. Coolant Temperature greater than 71°C (160°F) No Inlet Air Temperature Sensor Faults present (P1192 and P1193)

Set Condition: After 5 warm cycles have occurred (coolant increases from greater than 4.4°C (40°F) to a minimum of 71°C (160°F) and the odometer mileage has increased 196.6 miles and the Inlet Air Temperature has increased less than 3°C (5.4°F). Two trip fault.

POSSIBLE CAUSES
INTERMITTENT CONDITION
IAT SENSOR VOLTAGE BELOW 1.0 VOLTS
SENSOR GROUND CIRCUIT VOLTAGE DROP
IAT SENSOR SIGNAL CIRCUIT VOLTAGE DROP
PCM TERMINAL CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: If DTC P1192 or P1193 have set along with P0111, diagnose P1192 or P1193 first before continuing.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Inlet Air Temperature Sensor harness connector. Turn the ignition on. With the DRBIII®, read the IAT voltage. Is the voltage above 4.6 volts? Yes → Go To 3 No → Go To 4	All

P0111-INTAKE AIR TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Inlet Air Temperature Sensor harness connector. Using a jumper wire, jumper across the IAT Sensor harness connector. Turn the ignition on. With the DRBIII®, read the IAT voltage. Is the voltage below 1.0 volt? Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Back probe between the Sensor ground circuit at the IAT Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 5 No → Repair the high resistance in the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Back probe between the IAT Sensor Signal circuit at the IAT Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 6 No → Repair the high resistance in the IAT Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the PCM harness connector. Inspect the IAT Sensor Signal and Sensor Ground terminals. Check for corrosion, damage or terminal push out. Were any of the above conditions present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0111-INTAKE AIR TEMP SENSOR PERFORMANCE — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0117-ECT SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P0117-ECT SENSOR VOLTAGE TOO LOW

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: The Engine Coolant Temperature (ECT) sensor circuit voltage at the PCM is less than 0.5 volt for more than 2.6 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ECT SENSOR INTERNAL FAILURE
ECT SENSOR SIGNAL SHORTED TO GROUND
ECT SENSOR SIGNAL SHORTED TO SENSOR GROUND CIRCUIT
PCM TERMINAL CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the ECT voltage. Is the voltage below 1.0 volt? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the ECT harness connector. Turn the ignition on. With the DRBIII®, read ECT voltage. Is the voltage above 1.0 volt? Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the ECT Sensor Signal circuit in the ECT Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the ECT Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0117-ECT SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the ECT Sensor Signal circuit and the Sensor ground circuit in the ECT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the ECT Sensor Signal circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Inspect the ECT Signal and Sensor Ground terminals. Check for corrosion, damage or terminal push out. If there are no possible causes remaining, view repair. Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0118-ECT SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0118-ECT SENSOR VOLTAGE TOO HIGH

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: The Engine Coolant Temperature (ECT) sensor circuit voltage at the PCM is greater than 4.96 volts for more than 2.6 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ECT SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
ECT SENSOR INTERNAL FAILURE
ECT SENSOR SIGNAL CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
PCM TERMINAL CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the ECT voltage. Is the voltage above 4.6 volts? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the ECT Sensor harness connector. Turn the ignition on. Measure the voltage of the ECT Sensor Signal circuit in the ECT Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the ECT Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0118-ECT SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the ECT harness connector. Connect a jumper wire between the ECT Sensor Signal circuit and the Sensor ground circuit in the ECT harness connector. Turn the ignition on. With the DRBIII®, read ECT voltage. Is the voltage below 1.0 volt? Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the ECT Sensor Signal circuit between the ECT Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the ECT Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor ground circuit between the ECT Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the PCM harness connector. Inspect the ECT Signal and Sensor Ground terminals. Check for corrosion, damage or terminal push out. Were any of the above condition present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0118-ECT SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP

When Monitored and Set Condition:

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP

When Monitored: With the engine running and no MAP Sensor or TP Sensor DTC's set.

Set Condition: When the manifold vacuum is low, the TP sensor signal should be high. Conversely, when manifold vacuum is high, the TP sensor signal should be low. If the MAP Sensor and TP Sensor do not respond within 4 seconds as stated above, a DTC will be set.

POSSIBLE CAUSES
INTERMITTENT CONDITION
HIGH RESISTANCE IN 5 VOLT SUPPLY CIRCUIT
RESISTANCE TO GROUND IN 5 VOLT SUPPLY CIRCUIT
MAP SENSOR
HIGH RESISTANCE IN MAP SENSOR SIGNAL CIRCUIT
RESISTANCE TO GROUND IN MAP SENSOR SIGNAL CIRCUIT
HIGH RESISTANCE IN SENSOR GROUND CIRCUIT
PCM
HIGH RESISTANCE IN 5 VOLT SUPPLY CIRCUIT
RESISTANCE TO GROUND IN 5 VOLT SUPPLY CIRCUIT
TP SENSOR
HIGH RESISTANCE IN TP SENSOR SIGNAL CIRCUIT
RESISTANCE TO GROUND IN THROTTLE POSITION SENSOR SIGNAL CIRCUIT
HIGH RESISTANCE IN SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose any TP Sensor or MAP Sensor component DTC first before continuing.** **NOTE: If the P0500 - No Vehicle Speed Signal is set long with this DTC, refer to the P0500 diagnostics before continuing.** **NOTE: The throttle plate and linkage should be free from binding and carbon build up.** **NOTE: Ensure the throttle plate is at the idle position.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 18	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
2	Start the engine. With the DRBIII®, monitor the MAP Sensor voltage. Snap the throttle. Does the MAP Sensor voltage vary from below 2.0 volts at idle to above 3.5 volts wide open throttle? Yes → Go To 3 No → Go To 11	All
3	Turn the ignition on. With the DRBIII®, monitor the TP Sensor voltage while slowly depressing the throttle pedal from the idle position to the wide open throttle position. Does voltage start approximately at 0.8 volts and go above 3.5 volts with a smooth voltage change? Yes → Go To 18 No → Go To 4	All
4	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit from the TP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the 5 Volt Supply circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit from the TP Sensor harness connector to ground. Is the resistance above 100k ohms? Yes → Go To 6 No → Repair the 5 Volt Supply circuit for low resistance to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the TP Sensor harness connector. With the DRBIII®, monitor the TP Sensor voltage. Turn the ignition on. Connect a jumper wire between the TP Sensor Signal circuit and the Sensor ground circuit . Does the DRBIII® display TP voltage from approximately 4.9 volts to below 0.5 volt? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the TP Sensor Signal circuit from the TP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the Throttle Position Sensor Signal circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the TP Sensor Signal circuit from the TP Sensor harness connector to ground. Is the resistance above 100k ohms? Yes → Go To 9 No → Repair the TP Sensor Signal circuit for low resistance to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor ground circuit from the TP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the Sensor Ground circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit from the MAP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the 5 Volt Supply circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit from the MAP Sensor harness connector to ground. Is the resistance above 100k ohms? Yes → Go To 13 No → Repair the 5 Volt Supply circuit for low resistance to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
13	Turn the ignition off. Disconnect the MAP Sensor harness connector. With the DRBIII®, monitor the MAP Sensor voltage. Turn the ignition on. Connect a jumper wire between the MAP Sensor Signal circuit and the Sensor ground circuit . Cycle the ignition switch off and then on again. With the DRBIII®, monitor the MAP Sensor voltage. Does the DRBIII® display MAP voltage from approximately 4.9 volts to below 0.5 volt? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the MAP Sensor Signal circuit from the MAP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 15 No → Repair the MAP Sensor Signal circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
15	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the MAP Sensor Signal circuit from the MAP Sensor harness connector to ground. Is the resistance above 100k ohms? Yes → Go To 16 No → Repair the MAP Sensor Signal circuit for low resistance to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
16	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor ground circuit from the MAP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 17 No → Repair the Sensor Ground circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
17	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
18	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0122-THROTTLE POSITION SENSOR VOLTAGE LOW

When Monitored and Set Condition:

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: Throttle Position Sensor voltage at the PCM is less than 0.16volt for 0.7 seconds.

POSSIBLE CAUSES
THROTTLE POSITION SENSOR SWEEP
INTERMITTENT CONDITION
5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5 VOLT SUPPLY CIRCUIT OPEN
TP SENSOR INTERNAL FAILURE
THROTTLE POSITION SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
THROTTLE POSITION SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
TCM INTERNALLY SHORTED TP SIGNAL CIRCUIT
PCM 5 VOLT SUPPLY CIRCUIT
PCM TP SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the Throttle Position Sensor voltage. Is the voltage below 0.16 volts? Yes → Go To 2 No → Go To 11	All
2	Turn the ignition off. Disconnect the TP Sensor harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the TP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 8	All

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the TP Sensor harness connector. With the DRBIII®, monitor the TP Sensor voltage. Turn the ignition on. Is the voltage above 4.5 volts? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the TP Sensor Signal circuit in the TP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the Throttle Position Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the TP Sensor Signal circuit and the Sensor ground circuit in the TP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the Throttle Position Sensor Signal circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the TCM harness connector. With the DRBIII®, monitor the TP Sensor voltage. Turn the ignition on. Is the voltage above 4.5 volts? Yes → Replace the Transmission Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit in the TP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit between the TP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the 5 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition on. With the DRBIII®, monitor the Throttle Position Sensor voltage. Slowly open the throttle from the idle position to the wide open throttle position. Does voltage start at approximately 0.8 volts and go above 3.5 volts with a smooth voltage change? Yes → Go To 12 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
12	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH

When Monitored and Set Condition:

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: Throttle Position Sensor voltage at the PCM is greater than 4.5 volts for 0.7 seconds.

POSSIBLE CAUSES
THROTTLE POSITION SENSOR SWEEP
INTERMITTENT CONDITION
TP SENSOR SIGNAL CIRCUIT SHORTED TO 5 VOLT SUPPLY CIRCUIT
TP SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
TP SENSOR INTERNAL FAILURE
SENSOR GROUND CIRCUIT OPEN
TP SENSOR SIGNAL CIRCUIT OPEN
PCM TERMINAL CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the throttle is fully closed and free from binding or carbon build up.** Start the engine. With the DRBIII®, read the TP Sensor voltage. Is the voltage above 4.5 volts. Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the TP Sensor Signal circuit and the 5 Volt Supply circuit in the TP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the Throttle Position Sensor Signal circuit for a short to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the TP Sensor harness connector. Turn the ignition on. Measure the voltage of the TP Sensor Signal circuit in the TP Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the Throttle Position Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the TP Sensor harness connector. Connect a jumper wire between the TP Sensor Signal circuit and the Sensor ground circuit. With the DRBIII®, monitor the TP Sensor voltage. Turn the ignition on. Is the voltage below 0.5 volts? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor ground circuit between the TP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the TP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the TP Sensor Signal circuit between the TP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Throttle Position Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the PCM harness connector. Inspect the TP sensor Signal and the Sensor Ground terminal on both the PCM connectors. Check for corrosion, damage or terminal push out. Were any of the above condition present? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition on. With the DRBIII®, monitor the Throttle Position Sensor voltage. Slowly open the throttle from the idle position to the wide open throttle position. Does voltage start at approximately 0.8 volts and go above 3.5 volts with a smooth voltage change? Yes → Go To 9 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0125-CLOSED LOOP TEMP NOT REACHED

When Monitored and Set Condition:

P0125-CLOSED LOOP TEMP NOT REACHED

When Monitored: With battery voltage greater than 10.4 volts, after engine is started. No ECT Sensor Fault present.

Set Condition: The engine temperature does not go above 45°F (7°C). F Time dependants on start-up coolant temperature and ambient temperature. (i.e. 2 minutes for a start temp of 10°C (50°F) or up to 10 mintues for a vehicle with a start-up temp of -28°C (20°F). Two trips are required to set this DTC.

POSSIBLE CAUSES
LOW COOLANT LEVEL
THERMOSTAT OPERATION
ENGINE COOLANT TEMPERATURE SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: If a Engine Coolant Temperature (ECT) DTC is set along with this code, diagnose the ECT DTC first.** **NOTE: Inspect the ECT terminals and related PCM terminals. Ensure the terminals are free from corrosion and damage.** **NOTE: The best way to diagnose this DTC is to allow the vehicle to sit overnight outside in order to have a totally cold soaked engine.** **Note: Extremely cold outside ambient temperatures may have caused this DTC to set.** **WARNING: Never open the cooling system when the engine is hot. The system is under pressure. Extreme burns or scalding may result. Allow the engine to cool before opening the cooling system.** Check the coolant system to make sure that the coolant is in good condition and at the proper level. Is the coolant level and condition OK? Yes → Go To 2 No → Inspect the vehicle for a coolant leak and add the necessary amount of coolant. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0125-CLOSED LOOP TEMP NOT REACHED — Continued

TEST	ACTION	APPLICABILITY
2	**Note: This test works best if performed on a cold engine (cold soak)** Turn the ignition on. With the DRBIII®, read the Eng Coolant Tmp Deg value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up monitor the Eng Coolant Tmp Deg value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F) . Also monitor the actual coolant temperature with a thermometer. **NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the Eng Coolant Tmp Deg in the DRB values should stay relatively close to each other.** Using the appropriate service information, determine the proper opening temperature of the thermostat. Did the thermostat open at the proper temperature? Yes → Go To 3 No → Replace the thermostat. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition on. With the DRBIII®, read the Eng Coolant Tmp Deg value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up monitor the Eng Coolant Tmp Deg value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F) . Also monitor the actual coolant temperature with a thermometer. **NOTE: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the Eng Coolant Tmp Deg in the DRB values should stay relatively close to each other.** Does the actual coolant temperature and the reading on the DRBIII® remain relatively the same with a Yes → Test Complete. No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:

P0131-1/1 O2 SENSOR SHORTED TO GROUND
P0137-1/2 O2 SENSOR SHORTED TO GROUND
P0151-2/1 O2 SENSOR SHORTED TO GROUND
P0157-2/2 O2 SENSOR SHORTED TO GROUND

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0131-1/1 O2 SENSOR SHORTED TO GROUND.

When Monitored and Set Condition:

P0131-1/1 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 36°C (98°F), ambient/battery sensor reading within 6.6°C (20°F), and engine coolant temperature above 71°C (160°F) on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.059 volts for 3 seconds after starting engine.

P0137-1/2 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 36°C (98°F), ambient/battery sensor reading within 6.6°C (20°F), and engine coolant temperature above 71°C (160°F) on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.059 volts for 3 seconds after starting engine.

P0151-2/1 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 36°C (98°F), ambient/battery sensor reading within 6.6°C (20°F), and engine coolant temperature above 71°C (160°F) on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.059 volts for 3 seconds after starting engine.

P0157-2/2 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 36°C (98°F), ambient/battery sensor reading within 6.6°C (20°F), and engine coolant temperature above 71°C (160°F) on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.059 volts for 3 seconds after starting engine.

P0131-1/1 O2 SENSOR SHORTED TO GROUND — Continued

POSSIBLE CAUSES
INTERMITTENT CONDITION
O2 SENSOR OPERATION
O2 SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
O2 SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
O2 SENSOR SIGNAL SHORTED TO HEATER GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. Allow the engine to idle. With the DRBIII®, read the O2 Sensor voltage. Is the voltage below 0.06? Yes → Go To 2 No → Go To 7	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage above 0.06? Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Signal circuit in the O2 Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the O2 Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the O2 Sensor Signal circuit and the Sensor ground circuit in the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the O2 Sensor Signal circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

P0131-1/1 O2 SENSOR SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the O2 Sensor Signal circuit and the Heater ground circuit in the O2 Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the O2 Sensor Signal circuit for a short to the Heater ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE
P0138-1/2 O2 SENSOR SHORTED TO VOLTAGE
P0152-2/1 O2 SENSOR SHORTED TO VOLTAGE
P0158-2/2 O2 SENSOR SHORTED TO VOLTAGE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE.

When Monitored and Set Condition:

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: Engine running for 119 seconds. Battery voltage greater than 10 volts. Coolant temperature above 80°C (176°F).

Set Condition: The Oxygen Sensor voltage is above 1.29 volts for 30 seconds. One trip fault.

P0138-1/2 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: The engine running for 119 seconds. Battery voltage greater than 10 volts. Coolant temperature above 80°C (176°F).

Set Condition: The Oxygen Sensor voltage is above 1.29 volts for 30 seconds. Two trip fault.

P0152-2/1 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: Battery voltage greater than 10 volts. Engine running for greater than 121 seconds. Coolant temperature above 80°C (176°F).

Set Condition: The Oxygen Sensor voltage is above 1.21 volts.

P0158-2/2 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: With battery voltage greater than 10 volts. Engine running for more than 2 minutes. Coolant temperature above 80°C (176°F).

Set Condition: The Oxygen Sensor voltage is above 1.21 volts.

POSSIBLE CAUSES
INTERMITTENT CONDITION
O2 SENSOR OPERATION
O2 SENSOR SIGNAL SHORTED TO VOLTAGE
O2 SENSOR SIGNAL OPEN
O2 SENSOR GROUND CIRCUIT OPEN
PCM

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
1	Start the engine. Allow the engine to idle. With the DRBIII®, read the O2 Sensor voltage. Is the voltage above 1.2 volts? Yes → Go To 2 No → Go To 7	All
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage below 1.2 volts? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the O2 Sensor harness connector **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine and allow the engine to idle. Measure the voltage of the O2 Sensor Signal circuit in the O2 Sensor harness connector. Is the voltage above 1.2 volts? Yes → Repair the O2 Sensor Signal circuit for a shorted to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Signal circuit from the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the O2 Sensor Signal for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the O2 Sensor harness connector Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor ground circuit from the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the O2 Sensor ground cirucit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0133-1/1 O2 SENSOR SLOW RESPONSE
P0139-1/2 O2 SENSOR SLOW RESPONSE
P0153-2/1 O2 SENSOR SLOW RESPONSE
P0159-2/2 O2 SENSOR SLOW RESPONSE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0133-1/1 O2 SENSOR SLOW RESPONSE.

When Monitored and Set Condition:

P0133-1/1 O2 SENSOR SLOW RESPONSE

When Monitored: Start engine. Allow engine to idle. For 1st part of test, if limits are exceeded, test passes. If not 2nd part of test runs. Ambient Temp great than 6.6°C (44°F), Baro greater than 22.13 Hg, Battery voltage 10.5 volts, MAP greater than 11.9 and less than 18.15″ Hg, RPM greater than 1216 and less than 1984 and VSS greater 19 and less than 46 MPH.

Set Condition: The oxygen sensor signal voltage is switching from below 0.33 volts to above 0.61 volts and back fewer times than required in 60 seconds. Two trip fault.

P0139-1/2 O2 SENSOR SLOW RESPONSE

When Monitored: Start engine. Allow engine to idle. For 1st part of test, if limits are exceeded, test passes. If not 2nd part of test runs. Ambient Temp great than 6.6°C (44°F), Baro greater than 22.13 Hg, Battery voltage 10.5 volts, MAP greater than 11.9 and less than 18.15″ Hg, RPM greater than 1216 and less than 1984 and VSS greater 19 and less than 46 MPH.

Set Condition: The oxygen sensor signal voltage is has not switched below 0.33 volts to above 0.61 volts in 411 seconds of engine run. Two trip fault.

P0153-2/1 O2 SENSOR SLOW RESPONSE

When Monitored: Start engine. Allow engine to idle. For 1st part of test, if limits are exceeded, test passes. If not 2nd part of test runs. Ambient Temp great than 6.6°C (44°F), Baro greater than 22.13 Hg, Battery voltage 10.5 volts, MAP greater than 11.9 and less than 18.15″ Hg, RPM greater than 1216 and less than 1984 and VSS greater 19 and less than 46 MPH.

Set Condition: The oxygen sensor signal voltage is switching from below 0.33 volts to above 0.61 volts and back fewer times than required.

P0133-1/1 O2 SENSOR SLOW RESPONSE — Continued

P0159-2/2 O2 SENSOR SLOW RESPONSE

When Monitored: Start engine. Allow engine to idle. For 1st part of test, if limits are exceeded, test passes. If not 2nd part of test runs. Ambient Temp great than 6.6°C (44°F), Baro greater than 22.13 Hg, Battery voltage 10.5 volts, MAP greater than 11.9 and less than 18.15″ Hg, RPM greater than 1216 and less than 1984 and VSS greater 19 and less than 46 MPH.

Set Condition: The oxygen sensor signal voltage is switching from below 0.33 volts to above 0.61 volts and back fewer times than required.

POSSIBLE CAUSES
INTERMITTENT CONDITION
EXHAUST LEAK
O2 SENSOR SIGNAL CIRCUIT VOLTAGE DROP
O2 SENSOR GROUND CIRCUIT VOLTAGE DROP
O2 SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 6	All
2	Start the engine. Inspect the exhaust system for leak between the engine and the O2 sensors. Are there any exhaust leaks? Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Perform a voltage drop test by backprobing the O2 Sensor Signal circuit at the O2 Sensor harness connector and at the PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 4 No → Repair the high resistance on the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0133-1/1 O2 SENSOR SLOW RESPONSE — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Backprobe between the O2 Sensor ground circuit at the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 5 No → Repair the high resistance on the O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	If there are no possible causes remaining, view repair. Repair Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0134-1/1 O2 SENSOR STAYS AT CENTER
P0140-1/2 O2 SENSOR STAYS AT CENTER
P0154-2/1 02 SENSOR STAYS AT CENTER
P0160-2/2 O2 SENSOR STAYS AT CENTER

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0134-1/1 O2 SENSOR STAYS AT CENTER.

When Monitored and Set Condition:

P0134-1/1 O2 SENSOR STAYS AT CENTER

When Monitored: Engine running for greater than 121 second. Coolant Temperature greater than 66°C (150.8°F). Engine in closed loop fuel control mode.

Set Condition: O2 signal voltage is between .35 volt and .58 volt for a total of 30 seconds and then O2 signal volt is 1.5 volts for 60 seconds. One trip fault.

P0140-1/2 O2 SENSOR STAYS AT CENTER

When Monitored: Engine running for greater than 121 second. Coolant Temperature greater than 66°C (150.8°F). Engine in closed loop fuel control mode. Vehicle Speed greater than 40 MPH.

Set Condition: O2 signal voltage is between .35 volt and .58 volt for a total of 30 seconds and then O2 signal volt is 1.5 volts for 60 seconds. Two trip fault.

P0154-2/1 02 SENSOR STAYS AT CENTER

When Monitored: Engine running for greater than 121 second. Coolant Temperature greater than 66°C (150.8°F). Engine in closed loop fuel control mode.

Set Condition: O2 signal voltage is between .35 volt and .58 volt for a total of 30 seconds and then O2 signal volt is 1.5 volts for 60 seconds. One trip fault.

P0160-2/2 O2 SENSOR STAYS AT CENTER

When Monitored: Engine running for greater than 121 second. Coolant Temperature greater than 66°C (150.8°F). Engine in closed loop fuel control mode.

Set Condition: O2 signal voltage is between .35 volt and .58 volt for a total of 30 seconds and then O2 signal volt is 1.5 volts for 60 seconds. Two trip fault.

POSSIBLE CAUSES
INTERMITTENT CONDITION
O2 SENSOR OPERATION
O2 SENSOR GROUND CIRCUIT OPEN
O2 SENSOR SIGNAL OPEN

P0134-1/1 O2 SENSOR STAYS AT CENTER — Continued

POSSIBLE CAUSES
O2 SENSOR GROUND CIRCUIT VOLTAGE DROP
O2 SENSOR SIGNAL CIRCUIT VOLTAGE DROP
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the O2 Sensor harness connector. Turn the ignition on. Connect a test light to battery voltage, probe the O2 Sensor Signal circuit in the O2 Sensor harness connector. With the DRBIII®, read the O2 Sensor voltage. Is the voltage above 1.0 volts? Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the O2 Sensor harness connector Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor ground circuit between the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the O2 Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Signal circuit between the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the O2 Sensor Signal for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0134-1/1 O2 SENSOR STAYS AT CENTER — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Perform a voltage drop test by back probing between the O2 Sensor ground circuit at the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 6 No → Repair the high resistance on the O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Perform a voltage drop test by back probing between the O2 Sensor Signal circuit at the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 7 No → Repair the high resistance on the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0135-1/1 O2 SENSOR HEATER FAILURE (4 CYLINDER)

When Monitored and Set Condition:

P0135-1/1 O2 SENSOR HEATER FAILURE (4 CYLINDER)

When Monitored: During vehicle shutdown after vehicle had been driven greater than 10 miles with throttle open for a minimum of 3 minutes. Battery voltage greater than 11.0 volts.

Set Condition: O2 sensor voltage continues to rise (instead of fall) after the diagnostics has turned the ASD relay back on. Two trip fault.

POSSIBLE CAUSES
O2 HEATER ELEMENT
O2 SENSOR HEATER CONTROL CIRCUIT OPEN
O2 SENSOR HEATER CONTROL CIRCUIT SHORTED TO GROUND
ASD RELAY OUTPUT CIRCUIT OPEN
INTERMITTENT CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip display and equal to zero? Yes → Go To 3 No → Go To 2	All
2	Turn the ignition off. **NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize between 0.4 to 0.6 volts.** Turn the ignition on. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay between 0.4 and 0.6 Yes → Go To 3 No → Go To 8	All

P0135-1/1 O2 SENSOR HEATER FAILURE (4 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: Allow the O2 sensor to cool down to room temperature.** Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element component side. Is the resistance between 2.0 and 7.0 ohms? Yes → Go To 4 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Heater Control circuit between the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the O2 Sensor Heater Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Heater Control circuit in the O2 Sensor harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the O2 Sensor Heater Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the O2 Sensor harness connector. With the DRBIII®, actuate the O2 Heater Test. Measure the voltage of the ASD Relay Output circuit in the O2 Sensor harness connector. Is the voltage above 11.0 volts? Yes → Go To 7 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0135-1/1 O2 SENSOR HEATER FAILURE (4 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0135-1/1 O2 SENSOR HEATER FAILURE (6 CYLINDER)
P0141-1/2 O2 SENSOR HEATER FAILURE
P0155-2/1 O2 SENSOR HEATER FAILURE
P0161-2/2 O2 SENSOR HEATER FAILURE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0135-1/1 O2 SENSOR HEATER FAILURE (6 CYLINDER).

When Monitored and Set Condition:

P0135-1/1 O2 SENSOR HEATER FAILURE (6 CYLINDER)

When Monitored: During vehicle shutdown after vehicle had been driven greater than 10 miles with throttle open for a minimum of 3 minutes. Battery voltage greater than 11.0 volts.

Set Condition: No sensor output is received when the ASD powers up the sensor heater. Two trip fault.

P0141-1/2 O2 SENSOR HEATER FAILURE

When Monitored: During vehicle shutdown after vehicle had been driven greater than 10 miles with throttle open for a minimum of 3 minutes. Battery voltage greater than 11.0 volts.

Set Condition: No sensor output is received when the ASD powers up the sensorheater. Two trip fault.

P0155-2/1 O2 SENSOR HEATER FAILURE

When Monitored: During vehicle shutdown after vehicle had been driven greater than 10 miles with throttle open for a minimum of 3 minutes. Battery voltage greater than 11.0 volts.

Set Condition: No sensor output is received when the ASD powers up the sensorheater. Two trip fault.

P0161-2/2 O2 SENSOR HEATER FAILURE

When Monitored: During vehicle shutdown after vehicle had been driven greater than 10 miles with throttle open for a minimum of 3 minutes. Battery voltage greater than 11.0 volts.

Set Condition: No sensor output is received when the ASD powers up the sensorheater. Two trip fault.

P0135-1/1 O2 SENSOR HEATER FAILURE (6 CYLINDER) — Continued

POSSIBLE CAUSES
O2 HEATER ELEMENT
O2 SENSOR HEATER GROUND CIRCUIT OPEN
ASD RELAY OUTPUT CIRCUIT OPEN
INTERMITTENT CONDITION
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip display and equal to zero? Yes → Go To 3 No → Go To 2	All
2	Turn the ignition off. **NOTE: Wait a minimum of 8 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize between 0.4 to 0.6 volts.** Turn the ignition on. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay between 0.4 and 0.6 volts? Yes → Go To 3 No → Go To 7	All
3	**NOTE: Allow the O2 sensor to cool down to room temperature.** Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element component side. Is the resistance between 4.0 and 7.0 ohms? Yes → Go To 4 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance of the O2 Sensor Heater ground circuit in the O2 Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the O2 Sensor Heater ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0135-1/1 O2 SENSOR HEATER FAILURE (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. With the DRBIII®, actuate the O2 Heater Test. Measure the voltage of the ASD Relay Output circuit in the O2 Sensor harness connector. Is the voltage above 11.0 volts? Yes → Go To 6 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:
P0171-1/1 FUEL SYSTEM LEAN
P0174-2/1 FUEL SYSTEM LEAN

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0171-1/1 FUEL SYSTEM LEAN.

When Monitored and Set Condition:

P0171-1/1 FUEL SYSTEM LEAN

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8000 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

P0174-2/1 FUEL SYSTEM LEAN

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8000 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

POSSIBLE CAUSES
INTERMITTENT CONDITION
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
O2 SENSOR
O2 SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
O2 SENSOR HEATER OPERATION
THROTTLE POSITION SENSOR VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
THROTTLE POSITION SENSOR SWEEP
MAP SENSOR OPERATION
ECT SENSOR OPERATION
ENGINE MECHANICAL PROBLEM
FUEL FILTER/PRESSURE REGULATOR (HIGH)
PCM

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 16	All
2	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge to the fuel rail. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Turn the ignition off. Choose a conclusion that best matches your fuel pressure reading. Within Specification Go To 3 Above Specification Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5. Below Specification Go To 13 **Caution: Stop All Actuations.**	All
3	Turn the ignition on With the DRBIII®, read the O2 Sensor voltage. Is the voltage between 0.4 to 0.6 volts? Yes → Go To 4 No → Go To 10	All
4	Turn the ignition off. **NOTE: Wait a minimum of 10 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize between 0.4 to 0.6 volts.** Turn the ignition on. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay between 0.4 and 0.6 volts. Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition on. With the DRBIII®, read TP Sensor voltage. **NOTE: The throttle must be against the stop.** Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 6 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition on. With the DRBIII®, read the TP Sensor voltage. While monitoring the DRBIII®, slowly open and close the throttle. Does the voltage increase and decease smoothly? Yes → Go To 7 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** With the DRBIII® in Sensors, read the MAP Sensor vacuum value. Is the DRBIII® reading within 1″ of the Vacuum Gauge reading? Yes → Go To 8 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** Turn the ignition on. With the DRBIII®, read the Engine Coolant Temperature (ECT) Sensor value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the ECT Sensor value. The temperature value change should be a smooth transition from start up to normal operating temperature 82°C (180°F). The value should reach at least 82°C (180°F). Did the Engine Coolant Temperature value increase a smooth transition and did it reach at least 82°C Yes → Go To 9 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
9	Check for any of the following conditions/mechanical problems. AIR INDUCTION SYSTEM - must be free from leaks. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
10	Turn the ignition on. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage between 0.40 to 0.60 volts? Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Signal circuit in the PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the O2 Sensor Signal for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16 fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the T fitting on tool #6539. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification? Yes → Repair or replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14 **Caution: Stop All Actuations.**	All
14	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
16	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:
P0172-1/1 FUEL SYSTEM RICH
P0175-2/1 FUEL SYSTEM RICH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0172-1/1 FUEL SYSTEM RICH.

When Monitored and Set Condition:

P0172-1/1 FUEL SYSTEM RICH

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8000 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and the result is below a certain value for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

P0175-2/1 FUEL SYSTEM RICH

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8000 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and the result is below a certain value for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

POSSIBLE CAUSES
INTERMITTENT CONDITION
O2 SENSOR HEATER OPERATION
O2 SENSOR
EVAP PURGE SOLENOID OPERATION
O2 SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
O2 SENSOR SIGNAL CIRCUIT OPEN
THROTTLE POSITION SENSOR VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
TP SENSOR SWEEP
MAP SENSOR OPERATION
ECT SENSOR OPERATION
ENGINE MECHANICAL PROBLEM
FUEL FILTER/PRESSURE REGULATOR (HIGH)
PCM

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 15	All
2	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge to the fuel rail. (2.7L use the fuel adapter #6539 Miller Tool) Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Turn the ignition off. Choose a conclusion that best matches your fuel pressure reading. Within Specification Go To 3 Above Specification Replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Caution: Stop All Actuations.**	All
3	Turn the ignition on With the DRBIII®, read the O2 Sensor voltage. Is the voltage between 0.4 to 0.6 volts? Yes → Go To 4 No → Go To 11	All
4	Turn the ignition off. **NOTE: Wait a minimum of 10 minutes to allow the O2 Sensor to cool down before continuing the test. Allow the O2 Sensor voltage to stabilize between 0.4 to 0.6 volts.** Turn the ignition on. With the DRBIII®, actuate the O2 Heater Test. With the DRBIII®, monitor O2 Sensor voltage for at least 2 minutes. Does the voltage stay between 0.4 and 0.6 Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the hoses at the Evap Purge Solenoid. Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port on the component side. Did the Evap Purge Solenoid hold vacuum? Yes → Go To 6 No → Replace the EVAP Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition on. With the DRBIII®, read TPS voltage. **NOTE: The throttle must be against the stop.** Is the TPS voltage 0.92V or less with the Throttle closed? Yes → Go To 7 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition on. With the DRBIII®, read the TP Sensor voltage. While monitoring the DRBIII®, slowly open and close the throttle. Does the voltage increase and decease smoothly? Yes → Go To 8 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** With the DRBIII® in Sensors, read the MAP Sensor vacuum value. Is the DRB reading within 1″ of the Vacuum Gauge reading? Yes → Go To 9 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
9	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** Turn the ignition on. With the DRBIII®, read the Engine Coolant Temperature Sensor value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the ambient temperature. **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the Engine Coolant Temperature value. The temp value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F). Did the Engine Coolant Temperature value increase a smooth transition and did it reach at least 82°C Yes → Go To 10 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Check for any of the following conditions/mechanical problems. AIR INDUCTION SYSTEM - must be free from restrictions. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
11	Turn the ignition on. Disconnect the O2 Sensor harness connector. With the DRBIII®, monitor the O2 Sensor voltage. Is the O2 Sensor voltage between 0.4 to 0.6 volts? Yes → Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the O2 Sensor harness connector. Measure the resistance of the O2 Sensor Signal circuit between the PCM harness connector and the O2 Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 13 No → Check for O2 Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
13	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Turn the ignition off. Disconnect the O2 Sensor harness connector. Start the engine. Measure the voltage of the O2 Sensor Signal circuit in the O2 Sensor harness connector. Is the voltage above 0.60 volt? Yes → Repair the O2 Sensor Signal for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
15	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0201-INJECTOR #1 CONTROL CIRCUIT (4 CYLINDER)
P0202-INJECTOR #2 CONTROL CIRCUIT (4 CYLINDER)
P0203-INJECTOR #3 CONTROL CIRCUIT (4 CYLINDER)
P0204-INJECTOR #4 CONTROL CIRCUIT (4 CYLINDER)

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0201-INJECTOR #1 CONTROL CIRCUIT (4 CYLINDER).

When Monitored and Set Condition:

P0201-INJECTOR #1 CONTROL CIRCUIT (4 CYLINDER)

When Monitored: With battery voltage greater than 12 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive spike is detected after injector turn off.

P0202-INJECTOR #2 CONTROL CIRCUIT (4 CYLINDER)

When Monitored: With battery voltage greater than 12 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive spike is detected after injector turn off.

P0203-INJECTOR #3 CONTROL CIRCUIT (4 CYLINDER)

When Monitored: With battery voltage greater than 12 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive is detected after injector turn off.

P0204-INJECTOR #4 CONTROL CIRCUIT (4 CYLINDER)

When Monitored: With battery voltage greater than 12 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive spike is detected after injector turn off, and with no other injectors on.

POSSIBLE CAUSES
ASD RELAY OUTPUT CIRCUIT OPEN
INTERMITTENT CONDITION
FUEL INJECTOR
FUEL INJECTOR DRIVER CIRCUIT OPEN
FUEL INJECTOR DRIVER CIRCUIT SHORTED TO GROUND
PCM

P0201-INJECTOR #1 CONTROL CIRCUIT (4 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Record the Freeze Frame Information that set along with the DTC.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Fuel Injector harness connector. Measure the resistance of the Fuel Injector (component side). Is the resistance between 10 and 16 ohms? Yes → Go To 3 No → Replace the Fuel Injector. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the Fuel Injector harness connector. Remove the ASD Relay from the PDC. Using a 12-volt test light connected to ground, probe the ASD Relay Output circuit. Does the test light flash brightly? Yes → Go To 4 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connector. Measure the resistance of the Fuel Injector driver circuit between the Fuel Injector harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Fuel Injector driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Fuel Injector driver circuit in the Fuel Injector harness connector. Is the resistance below 100k ohms? Yes → Repair the Fuel Injector driver circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0201-INJECTOR #1 CONTROL CIRCUIT (4 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0201-INJECTOR #1 CONTROL CIRCUIT 2.7L
P0202-INJECTOR #2 CONTROL CIRCUIT 2.7L
P0203-INJECTOR #3 CONTROL CIRCUIT 2.7L
P0204-INJECTOR #4 CONTROL CIRCUIT 2.7L
P0205-INJECTOR #5 CONTROL CIRCUIT 2.7L
P0206-INJECTOR #6 CONTROL CIRCUIT 2.7L

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0201-INJECTOR #1 CONTROL CIRCUIT 2.7L.

When Monitored and Set Condition:

P0201-INJECTOR #1 CONTROL CIRCUIT 2.7L

When Monitored: With battery voltage greater than 12 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive spike is detected after injector turn off.

P0202-INJECTOR #2 CONTROL CIRCUIT 2.7L

When Monitored: With battery voltage greater than 12 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive spike is detected after injector turn off.

P0203-INJECTOR #3 CONTROL CIRCUIT 2.7L

When Monitored: With battery voltage greater than 12 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive is detected after injector turn off.

P0204-INJECTOR #4 CONTROL CIRCUIT 2.7L

When Monitored: With battery voltage greater than 12 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive spike is detected after injector turn off, and with no other injectors on.

P0205-INJECTOR #5 CONTROL CIRCUIT 2.7L

When Monitored: With battery voltage greater than 12 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive spike is detected after injector turn off.

P0201-INJECTOR #1 CONTROL CIRCUIT 2.7L — Continued

P0206-INJECTOR #6 CONTROL CIRCUIT 2.7L

When Monitored: With battery voltage greater than 12 volts. Auto Shutdown Relay energized. Engine speed less than 3000 rpm.

Set Condition: No inductive spike is detected after injector turn off.

POSSIBLE CAUSES
ASD RELAY OUTPUT CIRCUIT OPEN
INTERMITTENT CONDITION
FUEL INJECTOR DRIVER CIRCUIT OPEN
FUEL INJECTOR DRIVER CIRCUIT SHORTED TO GROUND
FUEL INJECTOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Record the Freeze Frame Information that set along with the DTC.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Fuel Injector harness connector. Turn the ignition on. With the DRB, actuate the ASD Relay. Using a 12 volt test light connected to ground, probe the ASD Relay Output circuit in the Fuel Injector harness connector. Does the test light flash brightly? Yes → Go To 4 No → Go To 3	All
3	Turn the ignition off. Disconnect the Fuel Injector harness connector. Remove the ASD Relay from the PDC. Using a 12-volt test light connected to 12-volts, probe the ASD Relay Output circuit. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0201-INJECTOR #1 CONTROL CIRCUIT 2.7L — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connector. Measure the resistance of the Fuel Injector driver circuit between the Fuel Injector harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Fuel Injector driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Fuel Injector driver circuit in the Fuel Injector harness connector. Is the resistance below 100k ohms? Yes → Repair the Fuel Injector driver circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	With the DRBIII®, erase DTC's. Turn the ignition off. Replace the Fuel Injector in accordance with the Service Information. Attempt to operate the vehicle using the information noted in the Freeze Frame. With the DRBIII®, read DTC's. Does the DRB display the DTC that was previously erased? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0300-MULTIPLE CYLINDER MIS-FIRE
P0301-CYLINDER #1 MISFIRE
P0302-CYLINDER #2 MISFIRE
P0303-CYLINDER #3 MISFIRE
P0304-CYLINDER #4 MISFIRE
P0305-CYLINDER #5 MISFIRE
P0306-CYLINDER #6 MISFIRE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0300-MULTIPLE CYLINDER MIS-FIRE.

When Monitored and Set Condition:

P0300-MULTIPLE CYLINDER MIS-FIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5% LEV) misfire rate is measured during two trips. Above 3000 RPM 1 trip less than 3000 RPM 2 trip.

P0301-CYLINDER #1 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5% LEV) misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0302-CYLINDER #2 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5% LEV) misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0303-CYLINDER #3 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5% LEV) misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0304-CYLINDER #4 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5% LEV) misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

P0305-CYLINDER #5 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5% LEV) misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0306-CYLINDER #6 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% (2.5 LEV) misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

POSSIBLE CAUSES
MIS-FIRE CONDITIONS NO LONGER EXIST
FUEL SYSTEM PROBLEM
SECONDARY IGNITION OR MECHANICAL PROBLEM
ERRATIC CAM/CRANK SENSOR SIGNALS
ENGINE MECHANICAL PROBLEM
OTHER POSSIBLE CAUSES FOR MIS-FIRE

TEST	ACTION	APPLICABILITY
1	**Note: Repair all other PCM DTC's before continuing with this test.** With the DRBIII®, read DTC's. Is the MIS-FIRE GOOD TRIP counter displayed and equal to zero? Yes → Go To 2 No → Go To 8	All
2	At this time the conditions that set the Misfire DTC are present. With the DRBIII®, select DTC's and RELATED FUNCTIONS. Read and record the FREEZE FRAME DATA. Select OBD II MONITORS. Read and record the MIS-FIRE SIMILAR CONDITIONS WINDOW DATA. With these screens, attempt to duplicate the condition(s) that has set this DTC. When the vehicle is operating in the SIMILAR CONDITIONS WINDOW, refer to the WHICH CYLINDER IS MISFIRING screen. Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute. Is the DRBIII® counting mis-fires at this time? Yes → Go To 3 No → Go To 8	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
3	Start the engine and allow the engine to idle. With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME, are the adaptive fuel percentages greater than +/- 15%? Yes → Refer to the Driveablitiy Category and perform the Checking Fuel Delivery symptom. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME DATA, is the LOAD VALUE over 50% and the operating temp normal? Yes → Check secondary ignition, compression, and cylinder leakage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME DATA, is the engine RPM over 3000 and the operating temp normal? Yes → Test CMP and CKP signals with Lab Scope, check valve timing, and perform running vacuum test. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
7	**Note: Anything that affects the speed of the crankshaft can cause a misfire DTC.** The following are other possible causes for mis-fire: Injector harness connectors, secondary ignition problem, mechanical engine problem, PCM power grounds, irregular cam and crank signal, plugged injectors, restricted exhaust, intake restriction, damaged trigger wheel, contaminated fuel, or vacuum leak. Weak valve springs, carbon deposits on valves, or accessory drive belt (serpentine belt). Check for any TSB's that may relate to a Misfire DTC. Do any of the above causes exist? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
8	At this time the mis-fire does not exist or is an intermittent problem. **Note: An intermittent problem may have been caused by moisture in the secondary ignition.** With the DRBIII®, select DTC's AND RELATED FUNCTIONS. Read and record the FREEZE FRAME DATA. Select OBD II MONITORS. Read and record MIS-FIRE SIMILAR CONDITIONS WINDOW DATA. With these screens, attempt to duplicate the condition that has set the Misfire DTC. While using FREEZE FRAME DATA, pay particular attention to the DTC setting conditions, such as speed, temp, load, and map vacuum. Does the mis-fire reoccur? Yes → Go To 9 No → Mis-fire DTC conditions no longer exist. Refer to any TSB's that may relate to the symptom. Operate the vehicle for 2 misfire good trip and erase DTC's. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Start the engine and allow the engine to idle. With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME, are the adaptive fuel percentages greater than +/- 15%? Yes → Refer to the Driveablitiy Category and perform the Checking Fuel Delivery symptom. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All
10	With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME DATA, is the LOAD VALUE over 50% and the operating temp normal? Yes → Check secondary ignition, compression, and cylinder leakage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
11	With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME DATA, is the engine RPM over 3000 and the operating temp normal? Yes → Test CMP and CKP signals with Lab Scope, check valve timing, and perform running vacuum test. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0320-NO CRANK REFERENCE SIGNAL AT PCM

When Monitored and Set Condition:

P0320-NO CRANK REFERENCE SIGNAL AT PCM

When Monitored: Engine cranking.

Set Condition: No CKP signal is present during engine cranking, and at least 8 camshaft position sensor signals have occurred.

POSSIBLE CAUSES
INTERMITTENT CKP SIGNAL
INTERMITTENT CMP SIGNAL
INTERMITTENT WIRING
INTERMITTENT CONDITION
8 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
8 VOLT SUPPLY CIRCUIT OPEN
8 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
CRANKSHAFT POSITION SENSOR SIGNAL CIRCUIT SHORTED GROUND
CRANKSHAFT POSITION SENSOR SIGNAL CIRCUIT OPEN
CRANKSHAFT POSITION SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
CRANKSHAFT POSITION SENSOR SIGNAL SHORTED TO 8 VOLT SUPPLY CIRCUIT
SENSOR GROUND CIRCUIT OPEN
PCM - 8 VOLT SUPPLY
PCM - CRANKSHAFT POSITION SENSOR SIGNAL
CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read the Current Crankshaft Position (CKP) Sensor State while cranking the engine. Does the DRBIII® display Current CKP State Present while cranking the engine? Yes → Go To 2 No → Go To 6	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CKP Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Turn the ignition on. (do not start or crank the engine) Observe the lab scope screen. Look for any pulses generated by the CKP Sensor. Did the CKP Sensor generate any pulses? Yes → Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, back probe the Camshaft Position (CMP) Sensor Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Turn the ignition on. (do not start or crank the engine) Observe the lab scope screen. Look for any pulses generated by the CMP Sensor. Did the CMP Sensor generate any pulses? Yes → Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CKP Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check the harness connectors carefully. If OK, replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
6	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. Measure the voltage of the 8 Volt Supply circuit in the CKP Sensor harness connector. Is the voltage between 7.5 and 8.5 volts? Yes → Go To 7 No → Go To 15	All
7	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. Measure the voltage of the CKP Sensor Signal circuit in the CKP Sensor harness connector. Is the voltage between 4.5 and 5.0 volts? Yes → Go To 8 No → Go To 10	All
8	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor Ground circuit between the CKP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the Sensor Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	**NOTE: Inspect the slots on the flywheel for damage. If a problem is found repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the CKP Sensor Signal circuit in the CKP Sensor harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the CKP Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the CKP Sensor Signal circuit between the CKP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the CKP Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. Measure the voltage of the CKP Sensor Signal circuit in the CKP Sensor harness connector. Is the voltage above 5.0 volts? Yes → Repair the CKP Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
13	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the CKP Sensor Signal circuit and the 8 Volt Supply circuit in the CKP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the CKP Sensor Signal circuit shorted to the 8 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
15	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 8 Volt Supply circuit in the CKP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the 8 Volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All
16	Turn the ignition off. Disconnect the CKP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 8 Volt Supply circuit between the CKP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 17 No → Repair the 8 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
17	Turn the ignition off. Disconnect the CKP Sensor harness connector. Turn the ignition on. Measure the voltage of the 8 Volt Supply circuit in the CKP Sensor harness connector. Is the voltage above 8.5 volts? Yes → Repair the 8 Volt Supply circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 18	All
18	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0325-KNOCK SENSOR #1 CIRCUIT

When Monitored and Set Condition:

P0325-KNOCK SENSOR #1 CIRCUIT

When Monitored: With the ignition on and the engine running.

Set Condition: The Knock Sensor circuit voltage falls below a minimum value at idle or deceleration. The minimum value is from a look-up table internal to the PCM and is based on engine rpm. DTC also sets if sensor output goes above 5.0 volts.

POSSIBLE CAUSES
INTERMITTENT CONDITION
KNOCK SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
KNOCK SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
KNOCK SENSOR SIGNAL CIRCUIT OPEN
KNOCK SENSOR SIGNAL CIRCUIT SHORTED TO KNOCK SENSOR RETURN CIRCUIT
KNOCK SENSOR RETURN CIRCUIT OPEN
KNOCK SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Record the Freeze Frame Information that set along with the DTC.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the Knock Sensor harness connector. Measure the voltage of the Knock Sensor Signal circuit in the Knock Sensor harness connector. Is the voltage above 2.0 volts? Yes → Repair the Knock Sensor Signal circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0325-KNOCK SENSOR #1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. Measure the Knock Sensor Signal circuit in the Knock Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the Knock Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Knock Sensor Signal circuit between the Knock Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Knock Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Knock Sensor harness connector. Measure the resistance between the Knock Sensor Signal circuit and the Knock Sensor Return circuit in the Knock Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the Knock Sensor Signal circuit for a short to Knock Sensor Return circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Knock Sensor Return circuit between the Knock Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Knock Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Replace the Knock Sensor. Turn the ignition on. With the DRBIII®, erase DTC. Attempt to operate the vehicle using the information noted in the Freeze Frame. With the DRBIII®, read DTC's. Does the DRBIII® display the DTC that was previously erased? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

P0325-KNOCK SENSOR #1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0340-NO CAM SIGNAL AT PCM

When Monitored and Set Condition:

P0340-NO CAM SIGNAL AT PCM

When Monitored: Engine cranking/running. Battery voltage greater than 10 volts.

Set Condition: At least 5 seconds or 2.5 engine revolutions have elapsed with crankshaft position sensor signals present but no camshaft position sensor signal.

POSSIBLE CAUSES
INTERMITTENT CRANKSHAFT POSITION SENSOR SIGNAL
INTERMITTENT CAMSHAFT POSITION SENSOR SIGNAL
INTERMITTENT WIRING
INTERMITTENT CONDITION
8 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
8 VOLT SUPPLY CIRCUIT OPEN
8 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
CAMSHAFT POSITION SENSOR SIGNAL CIRCUIT SHORTED GROUND
CAMSHAFT POSITION SENSOR SIGNAL CIRCUIT OPEN
CAMSHAFT POSITION SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
CAMSHAFT POSITION SENSOR SIGNAL SHORTED TO 8 VOLT SUPPLY CIRCUIT
SENSOR GROUND CIRCUIT OPEN
PCM - 8 VOLT SUPPLY
PCM - CAMSHAFT POSITION SENSOR SIGNAL
CAMSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read the Current Camshaft Position (CMP) Sensor State while cranking the engine. Does the DRBIII® display Current CMP State Present while cranking the engine. Yes → Go To 2 No → Go To 6	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, back probe the Crankshaft Position (CKP) Sensor signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Turn the ignition on. (do not start or crank the engine) Observe the lab scope screen. Look for any pulses generated by the Crankshaft Position (CKP) Sensor. Did the CKP Sensor generate any pulses? Yes → Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CMP Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Turn the ignition on. (do not start or crank the engine) Observe the lab scope screen. Look for any pulses generated by the CMP Sensor. Did the CMP Sensor generate any pulses? Yes → Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CMP Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check the harness connectors carefully. If OK, replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
6	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. Measure the voltage of the 8 Volt Supply circuit in the CMP Sensor harness connector. Is the voltage between 7.5 and 8.5 volts? Yes → Go To 7 No → Go To 15	All
7	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. Measure the voltage of the CMP Sensor Signal circuit in the CMP Sensor harness connector. Is the voltage between 4.5 and 5.0 volts? Yes → Go To 8 No → Go To 10	All
8	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor Ground circuit between the CMP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the Sensor Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
9	**NOTE: Inspect the Camshaft sprocket for damage per the Service Information. If a problem is found repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the CMP Sensor Signal circuit in the CMP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the CMP Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the CMP Sensor Signal circuit between the CMP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the CMP Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. Measure the voltage of the CMP Sensor Signal circuit in the CMP Sensor harness connector. Is the voltage above 5.0 volts? Yes → Repair the CMP Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
13	Turn the ignition off. Disconnect the CMP Sensor harness connector. Measure the resistance between the CMP Sensor Signal circuit and the 8 Volt Supply circuit in the CMP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the CMP Sensor Signal circuit shorted to the 8 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
14	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
15	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 8 Volt Supply circuit in the CMP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the 8 Volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 16	All
16	Turn the ignition off. Disconnect the CMP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 8 Volt Supply circuit between the CMP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 17 No → Repair the 8 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
17	Turn the ignition off. Disconnect the CMP Sensor harness connector. Turn the ignition on. Measure the voltage of the 8 Volt Supply circuit in the CMP Sensor harness connector. Is the voltage above 8.5 volts? Yes → Repair the 8 Volt Supply circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 18	All
18	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom List:
P0351-IGNITION COIL #1 PRIMARY CIRCUIT (4 CYLINDER)
P0352-IGNITION COIL #2 PRIMARY CIRCUIT (4 CYLINDER)

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0351-IGNITION COIL #1 PRIMARY CIRCUIT (4 CYLINDER).

When Monitored and Set Condition:

P0351-IGNITION COIL #1 PRIMARY CIRCUIT (4 CYLINDER)

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 13 volts with engine running. Engine RPM less than 3000. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

P0352-IGNITION COIL #2 PRIMARY CIRCUIT (4 CYLINDER)

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 13 volts with engine running. Engine RPM less than 3000. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

POSSIBLE CAUSES
IGNITION COIL
INTERMITTENT CONDITION
ASD RELAY OUTPUT CIRCUIT
IGNITION COIL DRIVER CIRCUIT OPEN
IGNITION COIL DRIVER CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Record the Freeze Frame Information that set along with the DTC.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 7	All

P0351-IGNITION COIL #1 PRIMARY CIRCUIT (4 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the Ignition Coil harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Using a 12 volt test light connected to ground, probe the ASD Relay Output circuit in the Ignition Coil harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the Ignition Coil harness connector. Using a 12-volt test light connected to 12-volts, probe the Ignition Coil Driver circuit. Crank the engine for 5 second while observing the test light. Does the test light blink/flicker? Yes → Replace the Ignition Coil. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Ignition Coil harness connector. Disconnect the PCM harness connector. Measure the resistance of the Ignition Coil driver circuit between the Ignition Coil harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Ignition Coil driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Ignition Coil harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Ignition Coil driver circuit in the Ignition Coil harness connector. Is the resistance below 100k ohms? Yes → Repair the Ignition Coil driver circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0351-IGNITION COIL #1 PRIMARY CIRCUIT (4 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0351-IGNITION COIL #1 PRIMARY CIRCUIT 2.7L
P0352-IGNITION COIL #2 PRIMARY CIRCUIT 2.7L
P0353-IGNITION COIL #3 PRIMARY CIRCUIT 2.7L
P0354-IGNITION COIL #4 PRIMARY CIRCUIT 2.7L
P0355-IGNITION COIL #5 PRIMARY CIRCUIT 2.7L
P0356-IGNITION COIL #6 PRIMARY CIRCUIT 2.7L

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0351-IGNITION COIL #1 PRIMARY CIRCUIT 2.7L.

When Monitored and Set Condition:

P0351-IGNITION COIL #1 PRIMARY CIRCUIT 2.7L

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 13 volts with engine running. Engine RPM less than 3000. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

P0352-IGNITION COIL #2 PRIMARY CIRCUIT 2.7L

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 13 volts with engine running. Engine RPM less than 3000. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

P0353-IGNITION COIL #3 PRIMARY CIRCUIT 2.7L

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 13 volts with engine running. Engine RPM less than 3000. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

P0354-IGNITION COIL #4 PRIMARY CIRCUIT 2.7L

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 13 volts with engine running. Engine RPM less than 3000. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

P0351-IGNITION COIL #1 PRIMARY CIRCUIT 2.7L — Continued

P0355-IGNITION COIL #5 PRIMARY CIRCUIT 2.7L

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 13 volts with engine running. Engine RPM less than 3000. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

P0356-IGNITION COIL #6 PRIMARY CIRCUIT 2.7L

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 13 volts with engine running. Engine RPM less than 3000. No coil in dwell during test.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ASD RELAY OUTPUT CIRCUIT OPEN
CAPACITOR(S) SHORTED TO GROUND
ASD OUTPUT CIRCUIT SHORTED TO GROUND
IGNITION COIL DRIVER CIRCUIT OPEN
IGNITION COIL DRIVER CIRCUIT SHORTED TO GROUND
IGNITION COIL

TEST	ACTION	APPLICABILITY
1	**NOTE: Record the Freeze Frame Information that set along with the DTC.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the Ignition Coil harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Using a 12 volt test light connected to ground, probe the ASD Relay Output circuit in the Ignition Coil harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Go To 6	All

P0351-IGNITION COIL #1 PRIMARY CIRCUIT 2.7L — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Ignition Coil harness connector. Disconnect the PCM harness connector. Measure the resistance of the Ignition Coil driver circuit between the Ignition Coil harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the Ignition Coil driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the Ignition Coil harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Ignition Coil driver circuit in the Ignition Coil harness connector. Is the resistance below 100k ohms? Yes → Repair the Ignition Coil driver circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	With the DRBIII®, erase DTC's. Turn the ignition off. Install a substitute Ignition Coil in place of the Ignition Coil in question. Attempt to operate the vehicle using the information noted in the Freeze Frame. With the DRBIII®, read DTC's. Does the DRB display the DTC that was previously erased? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
6	Turn the ignition off. Disconnect the Ignition Coil harness connector. Remove the ASD Relay from the PDC. Measure the resistance of the ASD Relay Output circuit between the ASD Relay connector and the Ignition Coil harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0351-IGNITION COIL #1 PRIMARY CIRCUIT 2.7L — Continued

TEST	ACTION	APPLICABILITY
7	**NOTE: Repeat the following test for both capacitors** **NOTE: The Capacitors are attached to the side of each valve cover.** Turn the ignition off. Disconnect the Capacitor harness connector. Install a good INJ/COIL fuse. With the DRBIII®, actuate the ASD Relay. **NOTE: If the above test result is an open fuse for both capacitor tests, the problem is a short to ground in the ASD Relay Out circuit. Repair the short to ground in the ASD Relay Output circuit and refer to VER-5** Is the INJ/COIL fuse OK for both capacitor tests? Yes → Replace the Capacitor(s) Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Repair the ASD Output circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0401 - EGR SYSTEM FAILURE (4 CYLINDER)

When Monitored and Set Condition:

P0401 - EGR SYSTEM FAILURE (4 CYLINDER)

When Monitored: With the ignition on and the battery voltage greater than 10.4 volts.

Set Condition: Conditions are met, the EGR is turned off and on momentarily. The oxygen sensor signal is monitor for changes in its output signal during this test. If no significant change or too much change is seen, a flag is set.

POSSIBLE CAUSES
INTERMITTENT CONDITION
EGR SOLENOID VACUUM SUPPLY
EGR VALVE OPERATION (CLOSED)
ASD OUTPUT CIRCUIT OPEN
EGR VALVE OPERATION (OPEN)
EGR SOLENOID CONTROL CIRCUIT SHORTED TO VOLTAGE
EGR SOLENOID CONTROL CIRCUIT OPEN
EGR SOLENOID (CLOSED)
EGR SOLENOID CONTROL CIRCUIT SHORT TO GND
EGR SOLENOID (OPEN)
PCM
PCM (CLOSED)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 12	All
2	Start the engine. Allow the engine to reach operating temperature. Does the engine run rough or stall at idle? Yes → Go To 3 No → Go To 6	All

P0401 - EGR SYSTEM FAILURE (4 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
3	Disconnect the vacuum hose from the EGR Valve. Start the engine and allow it to idle. Does the engine run rough or stall at idle? Yes → Remove the EGR Valve and inspect the valve for an obstruction that would keep the valve open. If OK, replace the EGR Valve. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid harness connector. Measure the resistance of the EGR Solenoid Control circuit in the EGR Solenoid harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the EGR Solenoid Control circuirt for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Using a 12-volt test light connected to 12-volts, probe the EGR Solenoid Control circuit. Turn the ignition on. With the DRBIII®, actuate the EGR Solenoid. Observe the test light. Does the test light flash on and off? Yes → Replace the EGR Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the EGR Solenoid vacuum supply at the EGR Solenoid. Connect a vacuum gauge to the EGR Solenoid vacuum supply. Start the engine. Observe the vacuum gauge. Does the vacuum gauge read above 10″? Yes → Go To 7 No → Repair the EGR Solenoid vacuum supply. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Disconnect the vacuum hose from the EGR Valve. Inspect the vacuum hose for any obstructions. Connect a Vacuum Pump to the EGR Valve. Using the Vacuum Pump, apply vacuum to the EGR Valve. Does the engine run rough or stall at idle? Yes → Go To 8 No → Remove the EGR Valve and inspect the valve for an obstruction that would keep the valve form opening. If OK, replace the EGR Valve. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0401 - EGR SYSTEM FAILURE (4 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
8	Turn the igntion off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Using a 12 volt Test Light connected to ground, probe the ASD Output circuit in the EGR Solenoid harness connector. Does the 12 volt test light illuminate? Yes → Go To 9 No → Repair the ASD Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Measure the voltage of the EGR Solenoid Control circuit in the EGR Solenoid connector. Is the voltage above 1.0 volts? Yes → Repair the EGR Solenoid Control circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All
10	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid harness connector. Measure the resistance of the EGR Solenoid Control circuit between the PCM harness connector and the EGR Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Go To 11 No → Repair the EGR solenoid control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Using a 12-volt test light connected to 12-volts, probe the EGR Solenoid Control circuit in the EGR Solenoid harness connector. Turn the ignition on. With the DRBIII®, actuate the EGR Solenoid. Observe the test light. Does the test light flash on and off. Yes → Inspect the EGR Solenoid Back Pressure hose and tube for obstructions or damage. If OK, replace the EGR Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0401 - EGR SYSTEM FAILURE (4 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
12	**NOTE: Inspect the exhaust system for leaks.** **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0401 - EGR SYSTEM FAILURE (6 CYLINDER)

When Monitored and Set Condition:

P0401 - EGR SYSTEM FAILURE (6 CYLINDER)

When Monitored: With the ignition on and the battery voltage greater than 10.4 volts.

Set Condition: Conditions are met, the EGR is turned off and on momentarily. The oxygen sensor signal is monitor for changes in its output signal during this test. If no significant change or too much change is seen, a flag is set.

POSSIBLE CAUSES
INTERMITTENT CONDITION
EGR VALVE OPEN AT IDLE
EGR SOLENOID CONTROL CKT SHORT TO GND
EGR SOLENOID CONTROL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
EGR VALVE ASSEMBLY INSPECTION
EGR SOLENOID ASSEMBLY
ASD RELAY OUTPUT CIRCUIT OPEN
EGR SOLENOID CONTROL CKT SHORTED TO VOLTAGE
EGR SOLENOID CONTROL CKT OPEN
PCM - EGR OPEN
PCM - EGR CLOSED

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 13	All
2	**Note: If the vehicle is running rough at idle (DRB not actuated) follow the yes path to continue.** Turn the ignition on. Turn all accessories off. Start the engine. Allow the engine to reach normal operating temperature. With the DRB, enter Engine System Test, then EGR System Test. Actuate the FLOW function in the EGR System Test. Did the engine run rough or stall? Yes → Go To 3 No → Go To 8	All

P0401 - EGR SYSTEM FAILURE (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the EGR Solenoid Assembly harness connector. Start engine. Attempt to allow the engine to idle. Does the engine run rough or stall? Yes → Inspect the EGR tube assembly. If OK, replace the EGR valve. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid harness connector. Measure the resistance of the EGR Solenoid Control circuit in the EGR Solenoid harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the EGR Solenoid Control circuirt for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid harness connector. Measure the resistance of the EGR Solenoid Control circuit to Sensor ground circuit at the EGR Solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the EGR Solenoid Control circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Inspect the EGR Assembly for the following. Gasket(s) for leaking Damage and/or holes in the EGR tube(s) Carbon build up on or near the EGR pintle and passage ways. Obstruction in the EGR tubes Were any problem found? Yes → Repair or replace the EGR Assembly as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0401 - EGR SYSTEM FAILURE (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition on. Turn all accessories off. Disconnect the EGR Solenoid harness connector. Using a 12 volt Test Light connected to the ASD Relay Output circuit, probe the EGR Solenoid Control circuit. With the DRB, actuate the EGR solenoid. Does the 12 volt test light flash on and off? Yes → Inspect the tube(s) for obstructions and damage, repair as necessary. If OK, replace the EGR Solenoid Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the igntion off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. With the DRB, actuate the ASD Relay. Using a 12 volt Test Light connected to ground, probe the ASD Relay Output circuit in the EGR Solenoid harness connector. Does the 12 volt test light illuminate? Yes → Go To 10 No → Repair the ASD Realy Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Measure the voltage on the EGR Solenoid Control circuit in the EGR Solenoid connector. Is the voltage above 1.0 volt? Yes → Repair the EGR solenoid control circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid harness connector. Measure the resistance of the EGR Solenoid Control circuit between the PCM harness connector and the EGR Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the EGR solenoid control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0401 - EGR SYSTEM FAILURE (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
13	**NOTE: Closely inspect the EGR tube(s) for obstructions, damage and holes. Also, inspect the gasket(s) for leaks.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0403 - EGR SOLENOID CIRCUIT (4 CYLINDER)

When Monitored and Set Condition:

P0403 - EGR SOLENOID CIRCUIT (4 CYLINDER)

When Monitored: Engine running. Battery voltage greater than 10 volts.

Set Condition: The EGR solenoid control circuit is not in the expected state when requested to operate by the PCM.

POSSIBLE CAUSES
INTERMITTENT CONDITION
EGR SOLENOID
ASD OUTPUT CIRCUIT OPEN
EGR SOLENOID CONTROL CKT SHORTED TO VOLTAGE
EGR SOLENOID CONTROL CKT SHORT TO GND
EGR SOLENOID CONTROL CKT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Turn all accessories off. Using a 12 volt Test Light connected to the Fused Ignition Switch Output circuit, probe the EGR Solenoid Control circuit. With the DRB, actuate the EGR solenoid. Does the 12 volt test light flash on and off? Yes → Inspect the EGR Valve Back Pressure hose and tube for obstructions or damage. If OK, replace the EGR Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0403 - EGR SOLENOID CIRCUIT (4 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the igntion off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Using a 12 volt Test Light connected to ground, probe the ASD Relay Output circuit in the EGR Solenoid harness connector. Does the 12 volt test light illuminate? Yes → Go To 4 No → Repair the Fused Ignition Switch Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Measure the voltage of the EGR Solenoid Control circuit in the EGR Solenoid connector. Is the voltage above 1.0 volt. Yes → Repair the EGR Solenoid Control circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid harness connector. Measure the resistance of the EGR Solenoid Control circuit in the EGR Solenoid harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the EGR Solenoid Control circuirt for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid harness connector. Measure the resistance of the EGR Solenoid Control circuit between the PCM harness connector and the EGR Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the EGR Solenoid Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0403 - EGR SOLENOID CIRCUIT (4 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
8	**NOTE: Inspect the exhaust system for leaks.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0403 - EGR SOLENOID CIRCUIT (6 CYLINDER)

When Monitored and Set Condition:

P0403 - EGR SOLENOID CIRCUIT (6 CYLINDER)

When Monitored: Engine running. Battery voltage greater than 10 volts.

Set Condition: The EGR solenoid control circuit is not in the expected state when requested to operate by the PCM.

POSSIBLE CAUSES
INTERMITTENT CONDITION
EGR SOLENOID ASSEMBLY
ASD RELAY OUTPUT CIRCUIT OPEN
EGR SOLENOID CONTROL CIRCUIT SHORTED TO VOLTAGE
EGR SOLENOID CONTROL CIRCUIT SHORT TO GND
EGR SOLENOID CONTROL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
EGR SOLENOID CONTROL CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Turn all accessories off. Using a 12 volt Test Light connected to the ASD Relay Output circuit, probe the EGR Solenoid Control circuit. With the DRB, actuate the EGR solenoid. Does the 12 volt test light flash on and off? Yes → Replace the EGR Solenoid Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0403 - EGR SOLENOID CIRCUIT (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the igntion off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. With the DRB, actuate the ASD Relay. Using a 12 volt Test Light connected to ground, probe the ASD Relay Output circuit in the EGR Solenoid harness connector. Does the 12 volt test light illuminate? Yes → Go To 4 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Measure the voltage on the EGR Solenoid Control circuit in the EGR Solenoid connector. Is the voltage above 1.0 volt? Yes → Repair the EGR Solenoid Control circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid harness connector. Measure the resistance of the EGR Solenoid Control circuit in the EGR Solenoid harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the EGR Solenoid Control circuirt for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid harness connector. Measure the resistance of the EGR Solenoid Control circuit to Sensor ground circuit at the EGR Solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the EGR Solenoid Control circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR Solenoid harness connector. Measure the resistance of the EGR Solenoid Control circuit between the PCM harness connector and the EGR Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the EGR Solenoid Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0403 - EGR SOLENOID CIRCUIT (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
8	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	**NOTE: Closely inspect the EGR tube(s) for obstructions, damage and holes. Also, inspect the gasket(s) for leaks.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0404 - EGR POSITION SENSOR RATIONALITY (6 CYLINDER)

When Monitored and Set Condition:

P0404 - EGR POSITION SENSOR RATIONALITY (6 CYLINDER)

When Monitored:

Set Condition: The EGR flow or valve movement is not what is expected.

POSSIBLE CAUSES
HIGH RESISTANCE IN 5 VOLT SUPPLY
5 VOLT SUPPLY CIRCUIT OUTPUT
EGR SENSOR SIGNAL CIRCUIT OPEN
EGR ASSEMBLY
EGR SOLENOID CONTROL CKT
INTERMITTENT CONDITION
EGR SENSOR SIGNAL CIRCUIT OPEN
EGR SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
SENSOR GROUND CIRCUIT OPEN
EGR ASSEMBLY (GROUND)
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 12	All
2	**NOTE: Diagnose all other EGR DTC(s) first before continuing.** Start the engine. With the DRBIII®, read the EGR Position Sensor voltage. Choose a conclusion that best matches the EGR voltage reading. Below 3.5 volts Go To 3 Between 3.5 volts to 4.3 volts Go To 6 Above 4.3 volts Go To 7	All

P0404 - EGR POSITION SENSOR RATIONALITY (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition on. Perform a Voltage Drop Test on the 5 Volt Supply circuit between the EGR Solenoid harness connector and the PCM harness connector. Is the voltage drop more than 0.3 volts? Yes → Repair the 5 Volt Supply circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition on. While backprobing the PCM harness connector, measure the voltage of the 5 Volt Supply circuit. Is the voltage above 4.8 volts? Yes → Go To 5 No → Replace the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance of the EGR Sensor Signal circuit between the EGR Solenoid harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Replace the EGR Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Repair the EGR Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition on. With the DRBIII®, actuate the EGR Solenoid. Allow the EGR Solenoid to actuate for least 15 seconds. Feel the EGR solenoid for operation. Stop actuation. Does EGR Solenoid operate during actuation test and than turn off when actuation test was stop? Yes → Go To 12 No → Refer to the Driveability category and perform P0403 - EGR Solenoid Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Measure the voltage of the EGR Sensor Signal circuit at the EGR Solenoid harness connector. Is the voltage above 4.30 volts? Yes → Go To 8 No → Go To 9	All

P0404 - EGR POSITION SENSOR RATIONALITY (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor Ground circuit between the EGR Solenoid harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Replace the EGR Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Repair the Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance of the EGR Sensor Signal circuit between the EGR Solenoid harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the EGR Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance of the EGR Sensor Signal circuit in the EGR Solenoid harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the EGR Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0404 - EGR POSITION SENSOR RATIONALITY (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
12	**NOTE: Closely inspect the EGR tube(s) for obstructions, damage and holes. Also, inspect the gasket(s) for leaks.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0405 - EGR POSITION SENSOR VOLTS TOO LOW (6 CYLINDER)

When Monitored and Set Condition:

P0405 - EGR POSITION SENSOR VOLTS TOO LOW (6 CYLINDER)

When Monitored: With the ignition on. Battery voltage above 10.0 volts.

Set Condition: EGR Position Sensor Signal is less than 0.157 volts.

POSSIBLE CAUSES
EGR POSITION SENSOR SWEEP
INTERMITTENT CONDITION
5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5 VOLT SUPPLY CIRCUIT OPEN
EGR POSITION INTERNAL FAILURE
EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
PCM 5 VOLT SUPPLY CIRCUIT
PCM EGR POSITION SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the EGR Position Sensor voltage. Is the voltage below 0.2 volts? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the EGR Solenoid harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 7	All
3	Turn the ignition off. Disconnect the EGR Solenoid harness connector. With the DRBIII®, monitor the EGR Position Sensor voltage. Turn the ignition on. Is the voltage above 4.5 volts? Yes → Replace the EGR Solenoid Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0405 - EGR POSITION SENSOR VOLTS TOO LOW (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the EGR Position harness connector. Disconnect the PCM harness connector. Measure the resistance of the EGR Position Sensor Signal circuit in the EGR Position harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the EGR Position Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the EGR Position harness connector. Disconnect the PCM harness connector. Measure the resistance between the EGR Position Sensor Signal circuit and the Sensor ground circuit in the EGR Position harness connector. Is the resistance below 100 ohms? Yes → Repair the EGR Position Sensor Signal circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit in the EGR Solenoid harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit between the EGR Solenoid harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the 5 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0405 - EGR POSITION SENSOR VOLTS TOO LOW (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
9	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	**NOTE: The engine will run rough and possibly stall in the following test. Feather the accelerator panel to keep the engine from stalling.** Start the engine. With the DRBIII®, enter Engine System Test and then EGR System Test. Push the 4=VARIABLE function. Monitor the EGR voltage while slowly pushing the up arrow. Is the voltage change smooth? Yes → Go To 11 No → Replace the EGR Solenoid Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0406 - EGR POSITION SENSOR VOLTS TOO HIGH (6 CYLINDER)

When Monitored and Set Condition:

P0406 - EGR POSITION SENSOR VOLTS TOO HIGH (6 CYLINDER)

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: EGR position sensor signal is greater than 4.9 volts 6 seconds.

POSSIBLE CAUSES
EGR POSITION SENSOR SWEEP
INTERMITTENT CONDITION
EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO 5 VOLT SUPPLY CIRCUIT
EGR POSITION SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
EGR SOLENOID ASSEMBLY INTERNAL FAILURE
EGR POSITION SENSOR SIGNAL CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, read the EGR Position Sensor voltage. Is the voltage above 4.5 volts. Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance between the EGR Position Sensor Signal circuit and the 5 Volt Supply circuit in the EGR Solenoid harness connector. Is the resistance below 100 ohms? Yes → Repair the EGR Position Sensor Signal circuit for a short to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0406 - EGR POSITION SENSOR VOLTS TOO HIGH (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Measure the voltage of the EGR Sensor Signal circuit in the EGR Position Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the EGR Position Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Connect a jumper wire between the EGR Position Sensor Signal circuit and the Sensor ground circuit. With the DRBIII®, monitor the EGR Position Sensor voltage. Turn the ignition on. Is the voltage below 0.5 volts? Yes → Replace the EGR Solenoid Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance of the EGR Position Sensor Signal circuit between the EGR Solenoid harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the EGR Position Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor ground circuit between the EGR Solenoid harness connector and the PCM harness connector. Is the resistance below 30 ohms? Yes → Go To 7 No → Repair the Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0406 - EGR POSITION SENSOR VOLTS TOO HIGH (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
8	**NOTE: The engine will run rough and possibly stall in the following test. Feather the accelerator pedal to keep the engine from stalling.** Start the engine. With the DRBIII®, enter Engine System Test and then EGR System Test. Push the 4=VARIABLE function. Monitor the EGR voltage while slowly pushing the up arrow. Is the voltage change smooth? Yes → Go To 9 No → Replace the EGR Solenoid Assembly. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY
P0432-2/1 CATALYTIC CONVERTER EFFICIENCY

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0420-1/1 CATALYTIC CONVERTER EFFICIENCY.

When Monitored and Set Condition:

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY

When Monitored: After engine warm up to 70°C (158°F), 180 seconds of open throttle operation, at a speed greater than 20 mph and less than 55 mph, with the engine at 1400-2000 rpm and MAP between 13.0 and 17.8.0 inches of mercury (Hg).

Set Condition: As catalyst efficiency deteriorates, the switch rate of the downstream O2 sensor approaches that of the upstream O2 sensor. If at any point during the test the switch ratio reaches a predetermined value, the test fails and the code is set.

P0432-2/1 CATALYTIC CONVERTER EFFICIENCY

When Monitored: After engine warm up to 147 deg. F, 180 seconds of open throttle operation, at a speed greater than 35 mph, with the engine at 1400-2000 rpm and MAP between 13.0 and 17.8 inches of mercury (Hg).

Set Condition: As catalyst efficiency deteriorates, the switch rate of the downstream O2 sensor approaches that of the upstream O2 sensor. If at any point during the test the switch ratio reaches a predetermined value, the test fails and the code is set.

POSSIBLE CAUSES
INTERMITTENT CONDITION
VISUALLY INSPECT CATALYTIC CONVERTER
EXHAUST LEAK
ENGINE MECHANICAL CONDITION
AGING O2 SENSOR
CATALYTIC CONVERTER

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: If a O2 Sensor DTC(s) set along with the Catalytic Converter Efficiency DTC diagnose the O2 Sensor DTC(s) before continuing.** **NOTE: Check for contaminates that may have damaged the O2 Sensor and Catalytic Converter: contaminated fuel, unapproved silicone, oil and coolant, repair necessary.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Inspect the Catalytic Converter for the following damage. Damage Catalytic Converter, dent and holes. Severe discoloration caused by overheating the Catalytic Converter. Catalytic Converter broke internally. Leaking Catalytic Converter. Were any problems found? Yes → Replace the Catalytic Converter. Repair the condition that may have caused the failure. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Start the engine. Inspect the exhaust for leak between the engine and the O2 sensor. Inspect the exhaust for leaks between the engine and the appropriate rear O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Check the exhaust for excessive smoke caused by an internal problem in the engine. Is a engine mechanical condition present? Yes → Repair the engine mechanical condition as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	A new rear O2 Sensor along with an aging front O2 Sensor may cause the DTC to set. Review the vehicles repair history. Has the rear O2 Sensor been replace without replacing the front O2 Sensor? Yes → Replace the Front O2 Sensor as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	If there are no possible cause remaining, view repair. Repair Replace the Catalytic Converter. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: Check for contaminates that may have damaged the O2 Sensor and Catalytic Converter: contaminated fuel, unapproved silicone, oil and coolant, repair necessary.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** A new rear O2 Sensor along with a aging front O2 Sensor may cause the DTC to set. Review repair history of the vehicle and repair as necessary. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0441-EVAP PURGE FLOW MONITOR

When Monitored and Set Condition:

P0441-EVAP PURGE FLOW MONITOR

When Monitored: With engine temperature greater than 71°C (160°F), fuel control in closed loop, engine idling for 200 seconds, no low fuel, MAP less than 23.6 inches mercury and barometric altitude less than 8,000 feet.

Set Condition: After having passed the Leak Detection Pump (LDP) test, no air flow through the evaporative system is detected by the evap monitor.

POSSIBLE CAUSES
INTERMITTENT CONDITION
EVAP PURGE SOLENOID LEAKS/STUCK OPEN
EVAP PURGE SOLENOID STUCK CLOSED
EVAP PURGE SOLENOID VACUUM SUPPLY
EVAP PURGE HOSE SOLENOID TO CANISTER
EVAP PURGE HOSE CANISTER TO FUEL TANK
EVAP CANISTER

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 8	All
2	**NOTE: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty rollover valve. Replace/repair as necessary.** Turn the ignition off. Disconnect the vacuum hoses at the Evap Purge Solenoid. Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port on the component side. Does the Evap Purge Solenoid hold vacuum? Yes → Go To 3 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0441-EVAP PURGE FLOW MONITOR — Continued

TEST	ACTION	APPLICABILITY
3	Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port on the component side. Turn the ignition on. Observe the vacuum gauge. With the DRBIII®, actuate the EVAP Purge Solenoid . Does the vacuum drop when the solenoid is actuated? Yes → Go To 4 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Carefully inspect the Evap Purge Solenoid vacuum supply hose for proper routing. Check for a pinched or plugged hose from the throttle body to the Purge Solenoid. Inspect the vacuum port at the throttle body for any damage or plugging. Were any problems found? Yes → Repair the vacuum supply hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Visually inspect the Evap Purge hose from the Evap Purge Solenoid to the Evap Canister. Look for any physical damage such as a pinched, plugged, ripped or dry rotted hose. Were any problems found? Yes → Repair or replace hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Visually inspect the Evap Purge hose from between the Evap Canister and the Fuel Tank. Check for any physical damage such as a pinched, plugged, ripped or dry rotted hose. Were any problems found? Yes → Repair or replace hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Visually inspect the Evap Canister for the following. Check for physical damage or signs of fuel that has entered the canister. Check for signs of fuel, this may indicate a bad rollover valve. Were any problems found? Yes → Repair or Replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

P0441-EVAP PURGE FLOW MONITOR — Continued

TEST	ACTION	APPLICABILITY
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** Perform a wiggle test of the Evap Purge Solenoid wiring while the circuit is actuated with the DRBIII®. Listen for the solenoid to quit actuating. Also watch for the Good Trip Counter to change to 0. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0442-EVAP LEAK MONITOR MEDIUM LEAK DETECTED
P0455-EVAP LEAK MONITOR LARGE LEAK DETECTED
P0456 - EVAP LEAK MONITOR LEAK DETECTED

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0442-EVAP LEAK MONITOR MEDIUM LEAK DETECTED.

When Monitored and Set Condition:

P0442-EVAP LEAK MONITOR MEDIUM LEAK DETECTED

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 32°C (90°F) and coolant temperature within -12°C (20°F) of battery/ambient.

Set Condition: If there is a leak larger than 0.040″ and smaller than 0.080″ in the evaporative system.

P0455-EVAP LEAK MONITOR LARGE LEAK DETECTED

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 32°C (90°F) and coolant temperature within -12°C (10°F) of battery/ambient.

Set Condition: There is a leak larger than 0.080″ in the evaporative system.

P0456 - EVAP LEAK MONITOR LEAK DETECTED

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 30°C (86°F) and coolant temperature within -12°C (10°F) of battery/ambient.

Set Condition: If there is a leak larger than 0.020″ and smaller than 0.040″ in the evaporative system.

POSSIBLE CAUSES
EVAPORATIVE EMISSION LEAK DETECTION
EVAP PURGE SOLENOID LEAKS/STUCK OPEN
INTERMITTENT LDP MONITOR FAILURE

P0442-EVAP LEAK MONITOR MEDIUM LEAK DETECTED — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Since a hot vehicle can conceal a leak, it is best to perform this test at room temperature.** **NOTE: A loose gas cap could have caused this DTC to set. Make sure gas cap is tight and in good condition. Ensure the gas cap meets OEM specifications.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 5	All
2	To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD). **WARNING: Keep lighted cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.** **NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.** Disconnect the vacuum supply hose at the Leak Detection Pump. Connect and apply a continuous vacuum supply (i.e. 20″Hg) to the Leak Detection Pump. A vacuum pump such as an A/C recovery unit works well. Using the DRBIII®, select Engine/System Tests and actuate the Leak Detect Pump Test (Option 3/Hold PSI). **NOTE: The above energizes the LDP solenoid and allows the constant vacuum source to apply vacuum to the LDP pump diaphragm. This lifts the diaphragm up and seals the atmospheric canister vent valve at the bottom of the Leak Detection Pump.** Connect the red power lead of Miller Tool #8404 to the battery positive terminal and the black ground lead to battery negative terminal. **NOTE: See Charts and Graph support material EELD Calibration Setup for an example.** Connect shop air to the #8404 EELD. Set the smoke/air control switch to AIR. Insert the tester's AIR supply tip (clear hose) into the appropriate calibration orifice on the tester's control panel (based on DTC leak size). Press the remote smoke/air start button. Position the red flag on the air flow meter so it is aligned with the indicator ball. When the calibration is complete, release the remote button. The EELD is now calibrated the flow meter in liters per minute to the size leak indicated by the DTC set in the PCM. Install the service port adapter #8404-14 on the vehicle's service port. Connect the Air supply hose from the EELD to the service port. Press the remote button to activate AIR flow. **NOTE: Larger volume fuel tanks, and/or those with less fuel, may require 4 to 5 minutes to fill.** Compare the flow meter indicator ball reading to the red flag. ABOVE the red flag indicates a leak present. BELOW the red flag indicates a sealed system. Is the indicator ball above the red flag? Yes → Go To 3 No → Go To 5	All

P0442-EVAP LEAK MONITOR MEDIUM LEAK DETECTED — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** To continue testing, you will need Miller Tool #8404 Evaporative Emissions Leak Detector (EELD). Remove the Air supply hose from the service port. Connect the SMOKE supply tip (black hose) to the service port. Set the smoke/air control switch to SMOKE. **NOTE: The flow meter indicator ball will not move at this point.** Press the remote smoke/air start button. **NOTE: Ensure that smoke has filled the EVAP system by continuing to press the remote smoke/air start button, remove the vehicle fuel cap, and wait for the smoke to exit. Once smoke is indicated reinstall the fuel cap.** **NOTE: For optimal performance, introduce smoke into the system for an additional 60 seconds; continue introducing smoke at 15 second intervals, as necessary.** While still holding the remote smoke/air start button, use the white light (#8404-CLL) to follow the EVAP system path, and look for the source of the leak indicated by exiting smoke. If a leak is concealed from view (i.e., top of fuel tank), release the remote smoke/air start button, and use the ultraviolet (UV) black light #8404-UVL and the yellow goggles 8404-20 to look for residual traces of dye that is left behind by the smoke. The exiting smoke deposits a residual fluid that is either bright green or bright yellow in color when viewed with a UV light. **NOTE: Hoses** Was a leak found? Yes → Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 4	All
4	**NOTE: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty rollover valve. Replace/repair as necessary.** Turn the ignition off. Disconnect the vacuum hoses at the Evap Purge Solenoid. Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port on the component side. **NOTE: Monitor the vacuum gauge for at least 15 seconds.** Does the Evap Purge Solenoid hold vacuum? Yes → Go To 5 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P0442-EVAP LEAK MONITOR MEDIUM LEAK DETECTED — Continued

TEST	ACTION	APPLICABILITY
5	At this time, the conditions required to set the DTC are not present. **NOTE: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **NOTE: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** **NOTE: Refer to any Technical Service Bulletins (TSB's) that may apply.** With the DRBIII® in System Tests, perform the LDP Monitor Test. This will force the PCM to run the LDP Monitor. If the monitor fails, further diagnosis is required to find faulty component. If the monitor passes, the condition is not present at this time. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	All

Symptom:
P0443-EVAP PURGE SOLENOID CIRCUIT

When Monitored and Set Condition:

P0443-EVAP PURGE SOLENOID CIRCUIT

When Monitored: The ignition on or engine running. Battery voltage greater than 10 volts.

Set Condition: The PCM will set a trouble code if the actual state of the solenoid does not match the intended state.

POSSIBLE CAUSES
INTERMITTENT CONDITION
EVAP PURGE SOLENOID CONTROL CIRCUIT OPEN
EVAP PURGE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
EVAP PURGE SOLENOID SENSE CIRCUIT OPEN
EVAP PURGE SOLENOID SENSE CIRCUIT SHORTED TO GROUND
EVAP PURGE SOLENOID
EVAP PURGE SOLENOID LEAKS/STUCK OPEN
EVAP PURGE SOLENOID STUCK CLOSED
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Disconnect the Powertrain Control Module harness connectors. Measure the resistance of the Evap Purge Solenoid Control circuit from the PCM harness connector to the Evap Purge Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the Evap Purge Solenoid Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0443-EVAP PURGE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Disconnect the Powertrain Control Module harness connectors. Measure the resistance of the Evap Purge Solenoid Control circuit in the Evap Purge Solenoid harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Evap Purge Solenoid Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Disconnect the Powertrain Control Module harness connectors. Measure the resistance of the Evap Purge Solenoid Sense circuit from the PCM harness connector to the Evap Purge Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Evap Purge Solenoid Sense circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Disconnect the Powertrain Control Module harness connectors. Measure the resistance between ground and the Evap Purge Solenoid Sense circuit at the Evap Purge Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Evap Purge Solenoid Sense circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the Evap Purge Solenoid harness connector. Measure the resistance between the terminals of the Evap Purge Solenoid. Is the resistance between 10.0 and 15.0 ohms? No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5. Yes → Go To 7	All
7	Turn the ignition off. Disconnect the vacuum hoses at the Evap Purge Solenoid. Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port on the component side. Does the Evap Purge Solenoid hold vacuum? Yes → Go To 8 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0443-EVAP PURGE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port on the component side. Turn the ignition on. Observe the vacuum gauge. With the DRBIII®, actuate the EVAP Purge Solenoid . Does the vacuum drop when the solenoid is actuated? Yes → Go To 9 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	If there are no possible causes remaining, view repair. Repair Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** Perform a wiggle test of the Evap Purge Solenoid wiring while the circuit is actuated with the DRBIII®. Listen for the solenoid to quit actuating. Also watch for the Good Trip Counter to change to 0. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES

When Monitored and Set Condition:

P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES

When Monitored: TEST #1: With the ignition on, the fuel level is compared to the previous key down after a 20 second delay. TEST #2: The PCM monitor the fuel level at ignition on.

Set Condition: TEST #1: If the PCM does not see a difference in fuel level of greater than 0.1 volt the test will fail. TEST #2: If the PCM does not see a change in the fuel level of .1765 over a set amount of miles the test will fail. See Charts and Graphs (Fuel Level Voltage Change Over Miles Chart) for an example.

POSSIBLE CAUSES
INTERMITTENT CONDITION
VISUALLY INSPECT FUEL TANK
FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
FUEL LEVEL SENSOR SIGNAL CIRCUIT OPEN
GROUND CIRCUIT OPEN
INTERNAL INSPECTION OF THE FUEL TANK
FUEL LEVEL SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose P0462 or P0463 first, if set along with P0460.** **NOTE: Inspect the Fuel Pump Module harness connector for any corrosion or damage.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 8	All
2	Visually inspect the Fuel Tank for damage that may restrict the Fuel Sending Unit float from moving. Is the Fuel Tank OK? Yes → Go To 3 No → Replace the Fuel Tank as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Measure the resistance of the Fuel Level Sensor Signal circuit in the Fuel Pump Module harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the Fuel Level Sensor Signal circuit for a short to ground Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Disconnect the BCM harness connector. Measure the resistance of the Fuel Level Sensor Signal circuit between the Fuel Pump Module harness connector and the BCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Fuel Level Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Measure the resistance of the Ground circuit in the Fuel Pump Module harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**WARNING: The fuel system is under a constant pressure even with the engine off. Before opening the fuel system the fuel pressure must be release. Relieve the fuel pressure in accordance with the service information.** Remove the Fuel Tank in accordance with the Service Information. Remove the Fuel Pump Module. Visually inspect the inside of the Fuel Tank for any obstructions or deformities. Inspect the Fuel Pump Module Float arm for damage. Were any problem found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the Fuel Level Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES — Continued

TEST	ACTION	APPLICABILITY
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **NOTE: Physically and Visually inspect the fuel tank for damage, if a problem is found repair or replace as necessary.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:
P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW
P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW.

When Monitored and Set Condition:

P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW

When Monitored: Ignition on and battery voltage above 10.4 volts.

Set Condition: The fuel level sensor signal voltage goes below 0.098 volts for more than 200 seconds.

P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH

When Monitored: Ignition on and battery voltage above 10.4 volts.

Set Condition: The fuel level sensor signal voltage read by the PCM goes above 4.9 volts for more than 200 seconds.

POSSIBLE CAUSES
GOOD TRIP EQUAL TO ZERO
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Refer to the Instrument Category and perform the appropriate symptoms. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All

P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **NOTE: Physically and Visually inspect the fuel tank for damage. if a problem is found repair or replace as necessary.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0500-NO VEHICLE SPEED SIGNAL (EATX TRANSMISSION)

When Monitored and Set Condition:

P0500-NO VEHICLE SPEED SIGNAL (EATX TRANSMISSION)

When Monitored: With the engine running, transmission not in park or neutral, brakes not applied, and engine rpm greater than 2200.

Set Condition: This code will set if no vehicle speed signal is received from the TCM (transmission control module) for more than 7 seconds for 2 consecutive trips.

POSSIBLE CAUSES
INTERMITTENT CONDITION
VEHICLE SPEED SENSOR SIGNAL SHORTED VOLTAGE
VSS SIGNAL FROM TCM
VEHICLE SPEED SENSOR SIGNAL SHORTED TO GROUND
VEHICLE SPEED SENSOR SIGNAL OPEN
PCM VSS SIGNAL

TEST	ACTION	APPLICABILITY
1	**NOTE: Before continuing this test use the DRB and check Pinion Factor. If not correct, reset and retest vehicle.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the TCM harness connector. Turn the ignition on. Measure the voltage of the VSS Signal circuit in the TCM harness connector. Is the voltage above 6.0 volts? Yes → Repair the Vehicle Speed Sensor Signal circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0500-NO VEHICLE SPEED SIGNAL (EATX TRANSMISSION) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the TCM harness connector. Turn the ignition on. Connect a jumper wire to the VSS Signal circuit in the TCM harness connector. With the DRBIII®, monitor the Vehicle Speed Signal display. Tap the other end of the jumper wire rapidly to ground. Does the Vehicle Speed Signal display the MPH/KMH above 0? Yes → Go To 4 No → Replace the Transmission Comtrol Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the TCM harness connector. Measure the resistance of the Vehicle Speed Sensor Signal circuit in the PCM harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the Vehicle Speed Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the TCM harness connector Measure the resistance of the Vehicle Speed Sensor Signal circuit between the PCM harness connector and the TCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Vehicle Speed Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	If there is no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0500-NO VEHICLE SPEED SIGNAL (EATX TRANSMISSION) — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0505-IDLE AIR CONTROL MOTOR CIRCUITS

When Monitored and Set Condition:

P0505-IDLE AIR CONTROL MOTOR CIRCUITS

When Monitored: Engine running. Battery voltage greater than 10 volts. IAC motor operating.

Set Condition: The PCM senses a short to ground or battery voltage on any of the four Idle Air Control (IAC) driver circuits for 0.050 seconds while the IAC motor is active.

POSSIBLE CAUSES
INTERMITTENT CONDITION
IAC #1 DRIVER CIRCUIT SHORTED TO #2, #3, OR #4
IAC #2 DRIVER CIRCUIT SHORTED TO #3 OR #4
IAC #3 DRIVER CIRCUIT SHORTED TO #4
IAC DRIVER CIRCUIT SHORTED TO VOLTAGE
IAC DRIVER CIRCUIT SHORTED TO GROUND
IAC MOTOR OPERATION
IAC MOTOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: The following steps are checking for a short between the IAC Driver Circuits.** Measure the resistance between the IAC #1 Driver circuit and #2, #3, #4 Driver circuits. Is the resistance below 5.0 ohms between any of the Drivers? Yes → Repair the IAC Driver Circuits shorted together. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: The following steps are checking for a short between the IAC Driver Circuits.** Measure the resistance between the IAC #2 Driver circuit and #3, #4 Driver circuits. Is the resistance below 5.0 ohms between any of the Drivers? Yes → Repair the IAC Driver Circuits shorted together. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: The following steps are checking for a short between the Driver Circuits.** Measure the resistance between the IAC #3 Driver circuit and the #4 Driver circuit. Is the resistance below 5.0 ohms? Yes → Repair the IAC Driver Circuits shorted together. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the Powertrain Control Module harness connector. Remove the ASD Relay. Using a jumper wire, jumper between the Fused B+ circuit and ASD Relay Output circuit in the PDC. Turn the ignition on. Measure the voltage of each of the IAC Driver circuit. Is the voltage above 1.0 volt at any IAC Driver circuit? Yes → Repair the IAC Driver circuit(s) for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect IAC Motor harness connector. Disconnect the PCM harness connector. Repeat each measurement for each IAC Driver circuit. Measure the resistance of each IAC Driver circuit to ground. Is the resistance below 5.0 ohms at any IAC Driver circuit? Yes → Repair the IAC Driver circuit(s) for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the IAC Motor harness connector. Start and idle the engine. Using a test light connected to ground, probe the IAC Driver #1 circuit for 10 seconds. Repeat the above test for the remaining IAC Motor Driver circuits. Does the test light turn on and off while probing each IAC Motor Driver circuit? Yes → Replace the Idle Air Control Motor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0551-POWER STEERING SWITCH FAILURE (4 CYLINDER)

When Monitored and Set Condition:

P0551-POWER STEERING SWITCH FAILURE (4 CYLINDER)

When Monitored: With the ignition key on and engine running.

Set Condition: With the vehicle above 65 KMH (40 MPH) for over 30 seconds, the power steering pressure switch remains open.

POSSIBLE CAUSES
POWER STEERING PRESSURE SWITCH OPERATION
GROUND CIRCUIT
POWER STEERING PRESSURE SWITCH SENSE CIRCUIT SHORTED TO GROUND
POWER STEERING PRESSURE SENSE CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Power Steering Pressure Switch harness connector. Turn the ignition on. With the DRBIII®, monitor the Power Steering Pressure Switch. Using a jumper wire, connect one end to the Power Steering Pressure Switch Sense circuit. With the other end of the jumper tap the ground circuit in the Power Steering Pressure Switch harness connector. Does the Power Steering Pressure Switch display change from HI to LOW? Yes → Replace the Power Steering Pressure Switch Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition off. Disconnect Power Steering Pressure Switch harness connector. Using a 12-volt test light connected to 12-volts, probe the ground circuit in the Power Steering Pressure Switch harness connector. Does the test light illuminate? Yes → Go To 3 No → Repair the ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0551-POWER STEERING SWITCH FAILURE (4 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Power Steering Pressure Switch harness connector. Disconnect the PCM harness connector. Measure the resistance of the Power Steering Pressure Switch Sense circuit in the PSP Switch harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the Power Steering Pressure Sense circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Power Steering Pressure Switch harness connector. Disconnect the PCM harness connector. Measure the resistance of the Power Steering Pressure Switch Sense circuit between the PSP Switch harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Power Steering Pressure Sense circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P0700-EATX CONTROLLER DTC PRESENT

TEST	ACTION	APPLICABILITY
1	This is an informational DTC letting you know that a DTC(s) is stored in the Transmission Control Module. Erase this DTC from the PCM after all Transmission DTC(s) have been repaired. Using the DRBIII®, read the Transmission Controller DTC and refer to the Transmission Category and perform the appropriate symptom. PCM Diagnostic Information complete. Continue Test Complete.	All

Symptom:
P0703-BRAKE SWITCH SENSE CIRCUIT

When Monitored and Set Condition:

P0703-BRAKE SWITCH SENSE CIRCUIT

When Monitored: TEST #1: Vehicle speed greater than 17 MPH to enable. TEST #2: Speed must be 0 and brake switch indicates on.

Set Condition: TEST #1: If vehicle speed goes to 0 MPH without brake input. Condition must be repeated 9 times to set fault. Two trip fault. TEST #2: If vehicle speed go above 17 MHP for more than 6.4 seconds without a change in brake state. Condition must be repeat 9 times to set fault.

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUSED B+ CIRCUIT
BRAKE SWITCH SENSE CIRCUIT SHORTED TO VOLTAGE
BRAKE SWITCH SENSE SHORTED TO GROUND
BRAKE SWITCH SENSE CIRCUIT OPEN
GROUND CIRCUIT OPEN
BRAKE LAMP SWITCH OPERATION
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the Brake Switch is adjusted properly before continuing.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Using a 12-volt test light connected to ground, check the Fused B+ circuit in the Brake Lamp Switch harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the Fuse B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0703-BRAKE SWITCH SENSE CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. Remove the ASD Relay from the PDC. Using a jumper wire, jumper between the Fused B+ circuit and ASD Relay Output circuit in the PDC. Turn the ignition on. Measure the voltage of the Brake Switch Sense circuit in the Brake Lamp Switch harness connector. Is the voltage above 1.0 volts? Yes → Repair the Brake Switch Sense circuit shorted to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All
4	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. Measure the resistance of the Brake Switch Sense circuit in the Brake Lamp Switch harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Brake Switch Sense circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	All
5	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. Measure the resistance of the Brake Switch Sense circuit between the Brake Lamp Switch harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Brake Switch Sense circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
6	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance of the Ground circuit in the Brake Lamp Switch harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
7	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between the Ground circuit terminal and the Brake Switch Sense terminal in the Brake Lamp Switch. Apply and release the brake pedal while monitoring the ohmmeter. Does the resistance change from below 5.0 ohms to open circuit? Yes → Go To 8 No → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P0703-BRAKE SWITCH SENSE CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
9	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All

Symptom:
P1192-INLET AIR TEMP SENSOR VOLTAGE LOW

When Monitored and Set Condition:

P1192-INLET AIR TEMP SENSOR VOLTAGE LOW

When Monitored: With the ignition on and battery voltage greater than 10.4 volts.

Set Condition: The Inlet Air Temperature (IAT) sensor circuit voltage at the PCM goes below 0.8 volt.

POSSIBLE CAUSES
INTERMITTENT CONDITION
IAT SENSOR INTERNAL FAILURE
IAT SENSOR SIGNAL SHORTED TO GROUND
IAT SENSOR SIGNAL SHORTED TO SENSOR GROUND CIRCUIT
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the IAT voltage. Is the voltage below 1.0 volt? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the IAT harness connector. Turn the ignition on. With the DRBIII®, read IAT voltage. Is the voltage above 1.0 volt? Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the IAT Sensor Signal circuit between the IAT Sensor harness connector and ground. Is the resistance below 100 ohms? Yes → Repair the IAT Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P1192-INLET AIR TEMP SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the IAT Sensor Signal circuit and the Sensor ground circuit in the IAT Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the IAT Sensor Signal circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1193-INLET AIR TEMP SENSOR VOLTAGE HIGH

When Monitored and Set Condition:

P1193-INLET AIR TEMP SENSOR VOLTAGE HIGH

When Monitored: With the ignition on and battery voltage greater than 10.4 volts.

Set Condition: The inlet air temperature (IAT) sensor circuit voltage at the PCM goes above 4.9 volts.

POSSIBLE CAUSES
INTERMITTENT CONDITION
IAT SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
IAT SENSOR INTERNAL FAILURE
IAT SENSOR SIGNAL CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the IAT voltage. Is the voltage above 4.6 volts? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the IAT Sensor harness connector. Turn the ignition on. Measure the voltage of the IAT Sensor Signal circuit in the IAT Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the IAT Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the IAT harness connector. Connect a jumper wire between the IAT Sensor Signal circuit and the Sensor ground circuit in the IAT harness connector. Turn the ignition on. With the DRBIII®, read IAT voltage. Is the voltage below 1.0 volt? Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P1193-INLET AIR TEMP SENSOR VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the IAT Sensor Signal circuit between the IAT Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the IAT Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor ground circuit between the IAT Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR

P1196-2/1 O2 SENSOR SLOW DURING CATALYST MONITOR

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR.

When Monitored and Set Condition:

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR

When Monitored: With the engine running, coolant greater than 70°C (158°F), open throttle, steady to slightly increasing vehicle speed greater than 18 mph but less than 55 mph, with a light load on the engine, for a period no less than 5 minutes.

Set Condition: The oxygen sensor signal voltage is switching from below 0.39 volt to above 0.6 volts and back fewer times than required.

P1196-2/1 O2 SENSOR SLOW DURING CATALYST MONITOR

When Monitored: With the engine running, coolant greater than 170°F, open throttle, steady to slightly increasing vehicle speed greater than 18 mph but less than 55 mph, with a light load on the engine, for a period no less than 5 minutes.

Set Condition: The oxygen sensor signal voltage is switching from below 0.39 volt to above 0.6 volts and back fewer times than required.

POSSIBLE CAUSES
INTERMITTENT CONDITION
EXHAUST LEAK
O2 SENSOR SIGNAL CIRCUIT VOLTAGE DROP
O2 SENSOR GROUND CIRCUIT VOLTAGE DROP
O2 SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Check for contaminants that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 6	All

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR — Continued

TEST	ACTION	APPLICABILITY
2	Start the engine. Inspect the exhaust for leak between the engine and the O2 sensor. Inspect the exhaust for leaks between the engine and the appropriate rear O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Back probe the O2 Sensor Signal circuit at the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 4 No → Repair the high resistance on the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Back probe the O2 Sensor ground circuit at the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 5 No → Repair the high resistance on the O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	If there are no possible causes remaining, view repair. Repair Replace the O2 Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR — Continued

TEST	ACTION	APPLICABILITY
6	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1281-ENGINE IS COLD TOO LONG

When Monitored and Set Condition:

P1281-ENGINE IS COLD TOO LONG

When Monitored: The ignition key on, engine running.

Set Condition: The engine does not warm to 71°C (160°F) while driving (throttle off idle) greater than 20 MPH for 27 minutes after start.

POSSIBLE CAUSES
COOLING SYSTEM PROBLEM

TEST	ACTION	APPLICABILITY
1	**NOTE: The best way to diagnose this DTC is to allow the vehicle to remain outside overnight in order to have a completely cold soaked engine.** **NOTE: Extremely cold outside ambient temperatures may cause this DTC to set.** Verify that the coolant level is correct. If not, repair as necessary **NOTE: Ensure the ECT Sensor is operating correctly.** With the DRBIII®, monitor the Engine Coolant Temperature value during the warm up cycle. Make sure the transition of the temperature change is smooth. Did the engine temperature reach a minimum of 71°C (160°F)? Yes → Test Complete. No → Refer to the Service Information for cooling system performance diagnosis. The most probable cause is a Thermostat problem. Also, refer to any related TSBs. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P1282-FUEL PUMP RELAY CONTROL CIRCUIT

When Monitored and Set Condition:

P1282-FUEL PUMP RELAY CONTROL CIRCUIT

When Monitored: With the ignition on. Battery voltage greater than 10.4 volts.

Set Condition: An open or shorted condition is detected in the fuel pump relay control circuit.

POSSIBLE CAUSES
FUEL PUMP RELAY INTERMITTENT OPERATION
INTERMITTENT CONDITION
FUSED IGNITION SWITCH OUTPUT CIRCUIT
FUEL PUMP RELAY RESISTANCE
FUEL PUMP RELAY CONTROL CIRCUIT OPEN
FUEL PUMP RELAY CONTROL CIRCUIT SHORT TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the Fuel Pump Relay. Is the Fuel Pump Relay operating? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, actuate the Fuel Pump Relay. Wiggle the wiring harness from the Fuel Pump Relay to the PCM while the relay is actuating. Did the Fuel Pump Relay stop when wiggling the wiring harness? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P1282-FUEL PUMP RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
4	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Turn the ignition on. Measure the voltage of the Fused Ignition Switch Output circuit in the PDC. Is the voltage above 11.0 volts? Yes → Go To 5 No → Repair the Fused Ignition Switch Output circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Measure the resistance of the Fuel Pump Relay between the Fused Ignition Switch Output terminal and the Fuel Pump Relay Control terminal. Is the resistance between 70 to 90 ohms? Yes → Go To 6 No → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the Fuel Pump Relay Control circuit between the PDC and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Fuel Pump Relay Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1282-FUEL PUMP RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Measure the resistance of the Fuel Pump Relay Control circuit in the PDC to ground. Is the resistance below 5.0 ohms? Yes → Repair the Fuel Pump Relay Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P1289-MANIFOLD TUNE VALVE CONTROL CIRCUIT (6 CYLINDER)

When Monitored and Set Condition:

P1289-MANIFOLD TUNE VALVE CONTROL CIRCUIT (6 CYLINDER)

When Monitored: With the ignition on. ASD Relay energized. Battery voltage greater than 10 volts.

Set Condition: The PCM senses the MTV is not at the desired state.

POSSIBLE CAUSES
INTERMITTENT CONDITION
MANIFOLD TUNE VALVE SOLENOID OPERATION
ASD RELAY OUTPUT CIRCUIT OPEN
CAPACITOR(S) SHORTED TO GROUND
ASD OUTPUT CIRCUIT SHORTED TO GROUND
MTV SOLENOID CONTROL CIRCUIT SHORTED TO ASD RELAY OUTPUT CIRCUIT
MTV SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
MTV SOLENOID CONTROL CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Disconnect the Manifold Tune Valve Solenoid harness connector. Turn the ignition on. Using a 12-volt test light, connect one end to the ASD Relay Output circuit and the other end to the MTV Solenoid Control circuit. With the DRBIII®, actuate the MTV Solenoid. Does the 12-volt test light flash on and off. No → Go To 3 Yes → Replace the Manifold Tune Valve Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1289-MANIFOLD TUNE VALVE CONTROL CIRCUIT (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MTV Solenoid harness connector. Turn the ignition on. With the DRB, actuate the MTV Solenoid. Using a 12-volt test light connected to ground, probe the ASD Relay Output circuit in the MTV Solenoid harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Go To 8	All
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the MTV Solenoid harness connector. Measure the resistance between the MTV Solenoid Control circuit and ASD Relay Output circuit in the MTV Solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the MTV Solenoid Control circuit for a short to the ASD Relay Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the MTV Solenoid harness connector. Measure the resistance of the MTV Solenoid Control circuit in the MTV Solenoid harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the MTV Solenoid Control circuirt for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the MTV Solenoid harness connector. Measure the resistance of the MTV Solenoid Control circuit between the PCM harness connector and the MTV Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the MTV Solenoid Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	IF there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1289-MANIFOLD TUNE VALVE CONTROL CIRCUIT (6 CYLINDER) — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the MTV Solenoid harness connector. Remove the ASD Relay from the PDC. Measure the resistance of the ASD Relay Output circuit between the ASD Relay connector and the MTV Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	**NOTE: Repeat the following test for both capacitors** **NOTE: The Capacitors are attached to the side of each valve cover.** Turn the ignition off. Disconnect the Capacitor harness connector. Install a good INJ/COIL fuse. With the DRBIII®, actuate the ASD Relay. **NOTE: If the above test result is an open fuse for both capacitor tests, the problem is a short to ground in the ASD Relay Output circuit. Repair the short to ground in the ASD Relay Output circuit and refer to VER-5.** Is the INJ/COIL fuse OK for both capacitor tests? Yes → Replace the Capacitor(s) Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Repair the ASD Output circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1294-TARGET IDLE NOT REACHED

When Monitored and Set Condition:

P1294-TARGET IDLE NOT REACHED

When Monitored: With the engine idling and the transmission in drive, if automatic. There must not be a MAP sensor trouble code or a Throttle Position Sensor trouble code.

Set Condition: The engine idle is not within 200 rpm above or 100 rpm below the target idle for 15 seconds. Two trip fault.

POSSIBLE CAUSES
IAC MOTOR OPERATION INTERMITTENT
INTERMITTENT CONDITION
IAC MOTOR OPERATION INTERMITTENT
IAC MOTOR
IAC DRIVER CIRCUIT OPEN
VACUUM LEAKS
AIR INDUCTION SYSTEM
THROTTLE BODY AND THROTTLE LINKAGE
PCM IAC MOTOR
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 10	All
2	Start the engine. Allow the engine idle to stabilize for 60 seconds. Using the DRBIII®, perform the IAC wiggle test. **NOTE: The engine idle should raise and lower with the display.** Does the RPM raise and lower correctly? Yes → Go To 3 No → Go To 6	All

P1294-TARGET IDLE NOT REACHED — Continued

TEST	ACTION	APPLICABILITY
3	Reinstall the IAC Motor. Start the engine. Inspect the vehicle for external vacuum leaks. Inspect the engine for internal leaks. Were any vacuum leaks found? Yes → Repair the vacuum leak as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Inspect the Air Induction System for the following problems. Restrictions: Dirty Air Cleaner, Foreign material trapped in the air intake tube, etc. Leaks: Air Intake tube connection, Air Cleaner housing, etc. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Inspect the throttle body plate carbon build up or other restrictions. Inspect the throttle linkage for binding and smooth operation. Ensure the throttle plate is resting on the stop at idle. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
6	Turn the ignition off. Disconnect the IAC Motor harness connector. Start and idle the engine. Using a test light connected to ground, probe the IAC Driver #1 circuit for 10 seconds. Repeat the above test for the remaining IAC Motor Driver circuits. Does the test light turn on and off while probing each IAC Motor Driver circuit? Yes → Go To 7 No → Go To 8	All
7	Turn the ignition off. Disconnect the IAC Motor harness connector. Start and idle the engine. Using a test light connected to battery positive, probe the IAC Driver #1 circuit for 10 seconds. Repeat the above test for the remaining IAC Motor Driver circuits. Does the test light turn on and off while probing each IAC Motor Driver circuit? Yes → Replace the IAC Motor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1294-TARGET IDLE NOT REACHED — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect IAC Motor harness connector. Disconnect the PCM harness connector. Measure the resistance of the IAC Driver circuit between the IAC Motor harness connector and the PCM harness connector that indicated no test light illumination. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the IAC Driver circuit(s) for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Start the engine. Allow the engine idle to stabilize for 60 seconds. Using the DRBIII®, perform the IAC wiggle test. **NOTE: The engine idle should raise and lower with the display.** Does the RPM raise and lower correctly? Yes → Go To 11 No → Refer to symptom Checking the IAC Motor in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** Inspect the throttle linkage, ensure smooth operation. Ensure the throttle linkage allows the throttle plate to close fully and rests on the stop. With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1297-NO CHANGE IN MAP FROM START TO RUN

When Monitored and Set Condition:

P1297-NO CHANGE IN MAP FROM START TO RUN

When Monitored: With engine RPM +/- 64 of target idle and the throttle blade at closed throttle.

Set Condition: Too small of a difference is seen between barometric pressure with ignition on (engine running) and manifold vacuum for 8.80 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5 VOLT SUPPLY CIRCUIT OPEN
MAP SENSOR INTERNAL FAILURE
MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
MAP SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
MAP 5 VOLT SUPPLY CIRCUIT OPEN
MAP SENSOR VACUUM PORT
MAP SENSOR
PCM 5 VOLT SUPPLY CIRCUIT
PCM MAP SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	**NOTE: If a MAP high or Low DTC set along with P1297, diagnose the High or Low DTC first before continuing.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 14	All
2	Turn the ignition on. With the DRBIII®, read the MAP Sensor voltage. Is the voltage below 3.19 volts. Yes → Go To 3 No → Go To 11	All

P1297-NO CHANGE IN MAP FROM START TO RUN — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the MAP Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 4 No → Go To 8	All
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. With the DRBIII®, monitor the MAP Sensor voltage. Turn the ignition on. Is the voltage above 1.2 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the MAP Sensor Signal circuit in the MAP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the MAP Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the MAP Sensor Signal circuit and the Sensor ground circuit in the MAP Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the MAP Sensor Signal circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1297-NO CHANGE IN MAP FROM START TO RUN — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit in the MAP Sensor harness connector to ground. Is the resistance below 100 ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the 5 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit between the MAP Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the 5 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Turn the ignition off. Remove the MAP Sensor. Inspect the vacuum port, check for restrictions or any foreign materials. Were any restriction found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
13	If there are no possible causes remaining, view repair. Repair Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1297-NO CHANGE IN MAP FROM START TO RUN — Continued

TEST	ACTION	APPLICABILITY
14	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **NOTE: Remove the MAP Sensor and inspect the MAP and vacuum passage for restrictions and foriegn material** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1299-VACUUM LEAK FOUND (IAC FULLY SEATED)

When Monitored and Set Condition:

P1299-VACUUM LEAK FOUND (IAC FULLY SEATED)

When Monitored: With the engine running.

Set Condition: The MAP sensor signal does not correlate to the TPS signal.

POSSIBLE CAUSES
VACUUM LEAK
INTERMITTENT CONDITION
THROTTLE POSITION SENSOR SWEEP
MAP SENSOR OPERATION
TP SENSOR FULLY SEATED

TEST	ACTION	APPLICABILITY
1	**NOTE: A large vacuum leak is mostly the cause of this DTC.** Inspect the Intake manifold for vacuum leaks. Inspect the Power Brake Booster for any vacuum leaks. Inspect the PCV system for proper operation or any vacuum leaks. Were any vacuum leaks found? Yes → Repair vacuum leak as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, monitor the Throttle Position Sensor voltage. Slowly open the throttle from the idle position to the wide open throttle position. Does voltage start at approximately 0.8 volts and go above 3.5 volts with a smooth voltage change? Yes → Go To 3 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	**NOTE: The throttle must be fully seated and rest on the throttle stop.** Turn the ignition on. With the DRBIII®, read the Throttle Position Sensor voltage. Is the voltage below 1.5 volts? Yes → Go To 4 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1299-VACUUM LEAK FOUND (IAC FULLY SEATED) — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Connect a vacuum gauge to manifold vacuum. Start the engine and allow it to reach operating temperature. **NOTE: If the engine will not idle, maintain a constant RPM above idle.** With the DRBIII®, read the MAP Sensor vacuum value. Is the DRB reading within 1″ of the vacuum gauge? Yes → Go To 5 No → Replace the MAP Sensor Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT

When Monitored and Set Condition:

P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT

When Monitored: With ignition on. Battery voltage above 10 volts.

Set Condition: An open or shorted condition is detected in the ASD relay control circuit.

POSSIBLE CAUSES
ASD RELAY INTERMITTENT OPERATION
INTERMITTENT CONDITION
FUSED B+ CIRCUIT
ASD RELAY RESISTANCE
ASD RELAY CONTROL CIRCUIT OPEN
ASD RELAY CONTROL CIRCUIT SHORT TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Is the ASD Relay operating? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, actuate the ASD Relay. Wiggle the wiring harness from the ASD Relay to the PCM while the relay is actuating. Did the ASD Relay stop when wiggling the wiring harness? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII®parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
4	Turn the ignition off. Remove the ASD Relay from the PDC. Turn the ignition on. Measure the voltage of the Fused B+ circuit in the PDC. Is the voltage above 11.0 volts? Yes → Go To 5 No → Repair the Fused B+ circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Remove the ASD Relay from the PDC. Measure the resistance of the ASD Relay between the Fused B+ terminal and the ASD Relay Control terminal. Is the resistance between 60 to 80 ohms? Yes → Go To 6 No → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the ASD Control circuit between the PDC and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the ASD Relay Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Remove the ASD Relay from the PDC. Measure the resistance of the ASD Relay Control circuit in the PDC to ground. Is the resistance below 5.0 ohms? Yes → Repair the ASD Relay Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM

When Monitored and Set Condition:

P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM

When Monitored: With ignition key on. Battery voltage greater than 10 volts.

Set Condition: No voltage sensed at the PCM when the ASD relay is energized.

POSSIBLE CAUSES
INTERMITTENT CONDITION
ASD RELAY
FUSED B+ CIRCUIT
ASD RELAY OUTPUT CIRCUIT OPEN
ASD RELAY OUTPUT CIRCUIT OPEN
PCM NO START
PCM START

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose P1388 - Auto Shutdown Relay Control Circuit first if set along with this DTC.** With the DRBIII®, erase the DTC. Attempt to start the engine. If the engine will not start, crank the engine for at least 15 seconds. It may be necessary to repeat several times. Does the DTC reset. Yes → Go To 2 No → Go To 9	All
2	Attempt to start the engine. Does the engine start. Yes → Go To 3 No → Go To 5	All
3	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the ASD Output circuit between the PDC and the PCM harness connector. Is the resistance below 5.0 ohms. Yes → Go To 4 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM — Continued

TEST	ACTION	APPLICABILITY
4	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Install a substitute relay in place of the ASD Relay. With the DRBIII®, erase DTCs. Attempt to start the engine. With the DRBIII®, read DTCs. Does the DTC reset? Yes → Go To 6 No → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Remove the ASD Relay from the PDC. Measure the voltage of the Fused B+ circuit in the PDC. Is the voltage above 11.0 volts? Yes → Go To 7 No → Repair the Fused B+ circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the ASD Output circuit between the PDC and the PCM harness connector. Is the resistance below 5.0 ohms. Yes → Go To 8 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM — Continued

TEST	ACTION	APPLICABILITY
9	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Check for the engine stumble, stall or quite running. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1390-TIMING BELT SKIPPED 1 TOOTH OR MORE 2.0L

When Monitored and Set Condition:

P1390-TIMING BELT SKIPPED 1 TOOTH OR MORE 2.0L

When Monitored: With the engine running, every 44 ms an inhibit condition is looked for (wide open throttle, large change in rpm, large change in MAP, cold engine, insufficient start to run time, rpm outside of given windows).

Set Condition: If an inhibit condition does not exist, the misalignment between the camshaft and the crankshaft is monitored. When the camshaft position sensor is offset from the crankshaft position sensor one tooth or more.

POSSIBLE CAUSES
VALVE TIMING OUT OF SPECIFICATION
VALVE TIMING NOT OUT OF SPECS

TEST	ACTION	APPLICABILITY
1	**NOTE: The PCM has detected the Cam and Crank are out of sync.** Using the appropriate service information check the valve timing. Is the valve timing within specifications? Yes → Perform the Re-Learn Cam/Crank function using the DRBIII®. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Repair valve timing as necessary. After performing the repair, use the DRBIII® under Engine, Misc. and perform the Re-Learn Cam/Crank function. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P1391-INTERMITTENT LOSS OF CMP OR CKP

When Monitored and Set Condition:

P1391-INTERMITTENT LOSS OF CMP OR CKP

When Monitored: Engine running or cranking.

Set Condition: When the failure counter reaches 20 for 2 consecutive trips.

POSSIBLE CAUSES
WIRING HARNESS INSPECTION
TONE WHEEL/PULSE RING INSPECTION
WIRING HARNESS INSPECTION
TONE WHEEL/PULSE RING INSPECTION
CHECKING INTERMITTENT CRANKSHAFT POSITION SENSOR SIGNAL WITH LAB
CHECKING INTERMITTENT CAMSHAFT POSITION SENSOR SIGNAL WITH LAB
CHECKING INTERMITTENT CKP WIRING WITH LAB SCOPE
CHECKING INTERMITTENT CMP WIRING WITH LAB SCOPE
INTERMITTENT CONDITION
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CMP Signal circuit in the CMP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Go To 3 No → Go To 6	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
3	Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) tight. Refer to any TSB that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Remove the Camshaft Position Sensor. Inspect the Tone Wheel/Pulse Ring for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Pulse Ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CKP Signal circuit in the CKP harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen. Are there any irregular or missing signals? Yes → Go To 7 No → Go To 10	All
7	Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Ensure the Crankshaft Position Sensor and the Camshaft Position Sensor are properly installed and the mounting bolt(s) are tight. Refer to any TSB that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Remove the Crankshaft Position Sensor. Inspect the Tone Wheel/Flex Plate slots for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Flex Plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CKP Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Turn the ignition on. (do not start the engine) Observe the lab scope screen. Look for any pulses generated by the CKP Sensor. Did the CKP Sensor generate any pulses? Yes → Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CMP Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Turn the ignition on. (do not start the engine) Observe the lab scope screen. Look for any pulses generated by the CMP Sensor. Did the CMP Sensor generate any pulses? Yes → Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CKP Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check the harness connectors carefully. If OK, replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 13	All
13	Turn the ignition off. With the DRBIII® lab scope probe and the Miller special tool #6801, backprobe the CMP Signal circuit in the PCM harness connector. **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check the harness connectors carefully. If OK, replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT

When Monitored and Set Condition:

P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT

When Monitored: Under closed throttle decel with A/C off, ECT above 75, and more than 50 seconds after engine start.

Set Condition: One of the CKP sensor target windows has more than 2.86% variance from the reference window.

POSSIBLE CAUSES
INTERMITTENT CONDITION
TONE WHEEL/PULSE RING INSPECTION
WIRING HARNESS INSPECTION
CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	**Note: Check for any TSB's that may apply to this symptom.** Turn the ignition on. With the DRBIII® in the miscellaneous menu, choose Clear PCM battery disconnect to reset the PCM. With the DRBIII®, choose the Misfire Pretest Road test the vehicle and relearn the adaptive numerator. The adaptive numerator is learned when the Adaptive Numerator Done Learning line on the Misfire screen changes to Yes. Did the adaptive numerator relearn? Yes → Go To 2 No → Go To 3	All

P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
3	Visually inspect the CKP wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the CKP wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Ensure the Crankshaft Position Sensor properly installed and the mounting bolt(s) tight. Refer to any TSB that may apply. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Remove the Crankshaft Position Sensor. Inspect the Tone Wheel/Flex Plate slots for damage, foreign material, or excessive movement. Were any problems found? Yes → Repair or replace the Tone Wheel/Flex Plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND

When Monitored and Set Condition:

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 32°C (90°F) and coolant temperature within -12°C (10°F) of battery/ambient.

Set Condition: LDP Switch does not reach at least 3 closures with 10 seconds. LDP must initial in normal conditions to mature failure.

POSSIBLE CAUSES
INTERMITTENT LDP MONITOR FAILURE
EVAP CANISTER OBSTRUCTED
PRESSURIZING EVAP EMISSION SYSTEM
OBSTRUCTION IN HOSE/TUBE BETWEEN EVAP CANISTER AND PURGE SOLENOID
LDP PRESSURE HOSE OBSTRUCTED
LEAK DETECTION PUMP

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 6	All

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND — Continued

TEST	ACTION	APPLICABILITY
2	To continue testing you will need Miller Tool #8404 Evaporative Emission Leak Detector (EELD). **WARNING: Keep lighted cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.** **NOTE: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.** Disconnect the vacuum supply hose at the Leak Detection Pump. Connect and apply a continuous vacuum supply (i.e. 20″Hg) to the Leak Detection Pump. A vacuum pump such as an A/C recovery unit works well. Using the DRBIII®, select Engine/System Tests and actuate the Leak Detect Pump Test (Option 3/Hold PSI). **NOTE: The above energizes the LDP solenoid and allows the constant vacuum source to apply vacuum to the LDP pump diaphragm. This lifts the diaphragm up and seals the atmospheric canister vent valve at the bottom of the Leak Detection Pump.** Connect the red power lead of Miller Tool #8404 to the battery positive terminal and the black ground lead to battery negative terminal. **NOTE: See Charts and Graph support material EELD Calibration Setup for an example.** Connect shop air to the #8404 EELD. Set the smoke/air control switch to AIR. Insert the tester's AIR supply tip (clear hose) into the appropriate calibration orifice on the tester's control panel (based on DTC leak size). Press the remote smoke/air start button. Position the red flag on the flow meter so it is aligned with the indicator ball. When the calibration is complete, release the remote button. The EELD is now calibrated the flow meter in liters per minute to the size leak indicated by the DTC set in the PCM. Install the service port adapter #8404-14 on the vehicle's service port. Connect the Air supply hose from the EELD to the service port. Press the remote button to activate AIR flow. **NOTE: Larger volume fuel tanks, and/or those with less fuel, may require 4 to 5 minutes to fill.** The flow meter gauge on the EELD will read zero LPM when the EVAP system is completely pressurized. Disconnect the hose at the EVAP Canister that goes to the Fuel Tank. Did the pressure drop when the hose was disconnected? Yes → Go To 3 No → Repair the obstruction in the EVAP system between the EVAP Canister and the Fuel Tank. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
3	**Note: All previously disconnected hose(s) reconnected.** Re-pressurize the EVAP System. Using Miller Tool #8404, hold down the Remote Smoke/Air Start Button and monitor the gauge. The flow meter gauge on the EELD reads 0 LPM the EVAP system completely pressurized. Disconnect the LDP Pressure hose at the EVAP Canister. The LDP Pressure hose is the hose that connects the Evap Canister to the Leak Detection Pump. Did the pressure drop when the hose was disconnected? Yes → Go To 4 No → Replace the EVAP Canister. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND — Continued

TEST	ACTION	APPLICABILITY
4	**Note: All previously disconnected hose(s) reconnected.** Re-pressurize the EVAP System. On Miller Tool #8404, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. The flow meter gauge on the EELD reads 0 LPM the EVAP system completely pressurized. Disconnect the EVAP hoses at the Purge Solenoid. Did the pressure drop when the hose was disconnected? Yes → Go To 5 No → Repair or replace hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
5	Disconnect and remove the LDP pressure hose. The LDP pressure hose is the hose that connects the EVAP Canister to the Leak Detection Pump. Inspect the LDP pressure hose for any obstructions or physical damage. Is the LDP pressure hose free from defects? Yes → Replace the Leak Detection Pump. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Repair/replace hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
6	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** With the DRBIII® in System Tests, perform the LDP Monitor Test. This will force the PCM to run the LDP Monitor. If the monitor fails, further diagnosis is required to find faulty component. If the monitor passes, the condition is not present at this time. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	All

Symptom:
P1489-HIGH SPEED FAN CONTROL RELAY CIRCUIT

When Monitored and Set Condition:

P1489-HIGH SPEED FAN CONTROL RELAY CIRCUIT

When Monitored: With the ignition on. Battery voltage greater than 10.0 volts.

Set Condition: An open or shorted circuit is detected in the radiator fan relay control circuit.

POSSIBLE CAUSES
HIGH SPEED RADIATOR FAN RELAY INTERMITTENT OPERATION
INTERMITTENT CONDITION
FUSED IGNITION SWITCH OUTPUT CIRCUIT
HIGH SPEED RADIATOR FAN RELAY RESISTANCE
HIGH SPEED RADIATOR FAN RELAY CONTROL CIRCUIT OPEN
HIGH SPEED RADIATOR FAN RELAY CONTROL CIRCUIT SHORT TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the High Speed Radiator Fan Relay. Is the High Speed Radiator Fan Relay operating? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, actuate the High Speed Radiator Fan Relay. Wiggle the wiring harness from the High Speed Radiator Fan Relay to the PCM while the relay is actuating. Did the High Speed Radiator Fan Relay stop when wiggling the wiring harness? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P1489-HIGH SPEED FAN CONTROL RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
4	Turn the ignition off. Remove the High Speed Radiator Fan Relay from the PDC. Turn the ignition on. Measure the voltage of the Fused Ignition Switch Output circuit in the PDC. Is the voltage above 11.0 volts? Yes → Go To 5 No → Repair the Fused Ignition Switch Output circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Remove the High Speed Radiator Fan Relay from the PDC. Measure the resistance of the High Speed Radiator Fan Relay between the Fused Ignition Switch Output terminal and the High Speed Radiator Fan Relay Control terminal. Is the resistance between 60 to 80 ohms? Yes → Go To 6 No → Replace the High Speed Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Remove the High Speed Radiator Fan Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the High Speed Radiator Fan Relay Control circuit between the PDC and the PCM harness connector. Is the resistance below 5.0 ohms. Yes → Go To 7 No → Repair the High Speed Radiator Fan Relay Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1489-HIGH SPEED FAN CONTROL RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Remove the High Speed Radiator Fan Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the High Speed Radiator Fan Relay Control circuit in the PDC to ground. Is the resistance below 5.0 ohms. Yes → Repair the High Speed Radiator Fan Relay Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P1490-LOW SPEED FAN CONTROL RELAY CIRCUIT

When Monitored and Set Condition:

P1490-LOW SPEED FAN CONTROL RELAY CIRCUIT

When Monitored: With the ignition on. Battery voltage greater than 10 volts.

Set Condition: An open or shorted circuit is detected in the radiator fan relay control circuit.

POSSIBLE CAUSES
LOW SPEED RADIATOR FAN RELAY INTERMITTENT OPERATION
INTERMITTENT CONDITION
FUSED IGNITION SWITCH OUTPUT CIRCUIT
LOW SPEED RADIATOR FAN RELAY RESISTANCE
LOW SPEED RADIATOR FAN RELAY CONTROL CIRCUIT OPEN
LOW SPEED RADIATOR FAN RELAY CONTROL CIRCUIT SHORT TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the Low Speed Radiator Fan Relay. Is the Low Speed Radiator Fan Relay operating? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, actuate the Low Speed Radiator Fan Relay. Wiggle the wiring harness from the Low Speed Radiator Fan Relay to the PCM while the relay is actuating. Did the Low Speed Radiator Fan Relay stop when wiggling the wiring harness? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P1490-LOW SPEED FAN CONTROL RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
4	Turn the ignition off. Remove the Low Speed Radiator Fan Relay from the PDC. Turn the ignition on. Measure the voltage of the Fused Ignition Switch Output circuit in the PDC. Is the voltage above 11.0 volts? Yes → Go To 5 No → Repair the Fused Ignition Switch Output circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Remove the Low Speed Radiator Fan Relay from the PDC. Measure the resistance of the Low Speed Radiator Fan Relay between the Fused Ignition Switch Output terminal and the Low Speed Radiator Fan Relay Control terminal. Is the resistance between 60 to 80 ohms? Yes → Go To 6 No → Replace the Low Speed Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Remove the Low Speed Radiator Fan Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the Low Speed Radiator Fan Relay Control circuit between the PDC and the PCM harness connector. Is the resistance below 5.0 ohms. Yes → Go To 7 No → Repair the Low Speed Radiator Fan Relay Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1490-LOW SPEED FAN CONTROL RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Remove the Low Speed Radiator Fan Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the Low Speed Radiator Fan Relay Control circuit in the PDC to ground. Is the resistance below 100 ohms. Yes → Repair the Low Speed Radiator Fan Relay Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P1494-LEAK DETECT PUMP SW OR MECHANICAL FAULT

When Monitored and Set Condition:

P1494-LEAK DETECT PUMP SW OR MECHANICAL FAULT

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 32°C (90°F) and coolant temperature within -6.6°C (20°F) of battery/ambient.

Set Condition: The state of the switch does not change when the solenoid is energized.

POSSIBLE CAUSES
LDP VACUUM SUPPLY
WIRING HARNESS INTERMITTENT
LEAK DETECTION PUMP
LDP SWITCH SENSE CIRCUIT SHORTED TO GROUND
LDP SWITCH SENSE CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the vacuum supply hose at the Leak Detection Pump. Connect a vacuum gauge to the disconnected vacuum supply hose at the Leak Detection Pump. Start the engine and read the vacuum gauge. Does the vacuum gauge read at least 13 in/Hg? Yes → Go To 3 No → Repair leak or obstruction in vacuum hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P1494-LEAK DETECT PUMP SW OR MECHANICAL FAULT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Leak Detection Pump harness connector. Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the Leak Detect Pump Sw state. While observing the Leak Detect Pump Sw state, connect a jumper wire between a 12 volt source and the LDP Switch Sense circuit. Did the Leak Detect Pump Sw state change when the jumper was connected? Yes → Replace the Leak Detection Pump. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 4	All
4	Turn the ignition off. Disconnect the Leak Detection Pump harness connector. Disconnect the Powertrain Control Module harness connectors. Measure the resistance of the LDP Switch Sense circuit in the LDP harness connector to ground. Is the resistance below 5.0 Ohms? Yes → Repair the LDP Switch Sense Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 5	All
5	Turn the ignition off. Disconnect the Leak Detection Pump harness connector. Disconnect the Powertrain Control Module harness connectors. Measure the resistance of the LDP Switch Sense circuit between the LDP harness connector and the PCM harness connector. Is the resistance below 5.0 Ohms? Yes → Go To 6 No → Repair the LDP Switch Sense Circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
7	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** Perform a wiggle test of the LDP wiring while the circuit is actuated with the DRB. Listen for the LDP to quit actuating. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	All

Symptom:
P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT

When Monitored and Set Condition:

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4.4°C (40°F). F and 32°C (90°F). Coolant temperature within -6.6°C (20°F) of battery/ambient.

Set Condition: The state of the solenoid circuit does not match the PCM's desired state.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
LEAK DETECTION PUMP
FUSED IGNITION SWITCH OUTPUT
LDP SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
LDP SOLENOID CONTROL CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Leak Detection Pump harness connector. Using a 12-volt test light, connect one end to the Fused Ignition Switch Output circuit and the other end to the LDP Solenoid Control circuit. Turn the ignition on. With the DRBIII®, actuate the Leak Detection Pump. Does the test light flash on and off. Yes → Replace the Leak Detection Pump. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 3	All

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Leak Detection Pump harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Ignition Switch Output circuit in the LDP harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the Fused Ignition Switch Output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
4	Turn the ignition off. Disconnect the Leak Detection Pump harness connector. Disconnect the Powertrain Control Module harness connector. Measure the resistance of the LDP Solenoid Control circuit in the LDP harness connector to ground. Is the resistance below 5.0 Ohms? Yes → Repair the LDP Solenoid Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 5	All
5	Turn the ignition off. Disconnect the Leak Detection Pump harness connector. Disconnect the Powertrain Control Module harness connector. Measure the resistance of the LDP Solenoid Control circuit between the LDP Solenoid harness connector and the PCM harness connector. Is the resistance below 5.0 Ohms? Yes → Go To 6 No → Repair the LDP Solenoid Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
7	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** Perform a wiggle test of the LDP wiring while the circuit is actuated with the DRB. Listen for the LDP to quit actuating. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	All

Symptom:
P1496-5 VOLT SUPPLY, OUTPUT TOO LOW

When Monitored and Set Condition:

P1496-5 VOLT SUPPLY, OUTPUT TOO LOW

When Monitored: With the ignition on.

Set Condition: The 5-volt supply to the sensors is below 3.5 volts for 4 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
THROTTLE POSITION SENSOR
MAP SENSOR
A/C PRESSURE SENSOR
EGR SOLENOID
5 VOLT SUPPLY SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the DTC's. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Turn the ignition on. Measure the 5 Volt Supply circuit at the Throttle Position Sensor harness connector. Is the Voltage below 4.5 Volts? Yes → Go To 3 No → Go To 8	All

P1496-5 VOLT SUPPLY, OUTPUT TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Turn the ignition on. Connect a Voltmeter to the 5 Volt Supply circuit at the Throttle Position Sensor harness connector. Monitor the voltage display. Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Did the 5 Volt Supply go from below 4.5 volts to above 4.5 volts when MAP Sensor was disconnected? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Turn the ignition on. Connect a Voltmeter to the 5 Volt Supply circuit at the Throttle Position Sensor harness connector. Monitor the voltage display. Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Turn the ignition on. Did the 5 Volt Supply go from below 4.5 volts to above 4.5 volts when the A/C sensor was disconnecte Yes → Replace the A/C Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Turn the ignition on. Connect a Voltmeter to the 5 Volt Supply circuit at the Throttle Position Sensor harness connector. Monitor the voltage display. Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Did the 5 Volt Supply go from below 4.5 volts to above 4.5 volts when the EGR was disconnected? Yes → Replace the EGR Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All

P1496-5 VOLT SUPPLY, OUTPUT TOO LOW — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the MAP Sensor harness connector. Disconnect the A/C Pressure Sensor harness connector. Disconnect the EGR Solenoid harness connector. Disconnect the PCM harness connectors. Measure the resistance of the 5 Volt Supply circuit in the Throttle Position Sensor harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the 5 Volt Supply Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	**NOTE: The Throttle Position Sensor harness connector must be connected during this test.** Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the 5 Volt Supply circuit in the MAP Sensor harness connector. Is the Voltage below 4.5 Volts? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1602-PCM NOT PROGRAMMED

When Monitored and Set Condition:

P1602-PCM NOT PROGRAMMED

When Monitored: Ignition key on.

Set Condition: PCM has not been programmed.

POSSIBLE CAUSES
PCM PROGRAMMED

TEST	ACTION	APPLICABILITY
1	Attempt to program PCM in accordance with the Service Information. Turn the ignition on. Start the engine. **NOTE: If the engine will not start, crank the engine over for 15 seconds. Crank at least 2 time with the ignition switch returning to the off position each time.** Allow the engine to reach normal operating temperature. With the DRBIII®, read DTCs. Does the DTC reset? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P1899-P/N SWITCH STUCK IN PARK OR IN GEAR

When Monitored and Set Condition:

P1899-P/N SWITCH STUCK IN PARK OR IN GEAR

When Monitored: Continuously with the transmission in Park, Neutral, or Drive and NOT in Limp-in mode.

Set Condition: This code will set if the PCM detects an incorrect Park/Neutral switch state for a given mode of vehicle operation.

POSSIBLE CAUSES
INTERMITTENT PARK/NEUTRAL SWITCH
P/N POSITION SWITCH SENSE CIRCUIT SHORTED TO GROUND
P/N POSITION SWITCH SENSE CIRCUIT OPEN
TRANSMISSION RANGE SENSOR
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read PCM DTCs. Is the Good Trip displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition on. With the DRBIII®, read the Park/Neutral Position Switch input state. While moving the gear selector through all gear positions (Park to 1 and back to Park), monitor the DRB display. Did the DRB display show P/N and D/R in the correct gear positions? Yes → Go To 7 No → Go To 3	All
3	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Transmission Range Sensor harness connector. Measure the resistance between ground and the P/N Position Switch Sense circuit. Is the resistance above 100k ohms? Yes → Go To 4 No → Repair the P/N Position Switch Sense circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P1899-P/N SWITCH STUCK IN PARK OR IN GEAR — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Transmission Range Sensor harness connector. Measure the resistance of the P/N Position Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the P/N Position Switch Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the PCM harness connector. Move the Gear selector through all gear positions, from Park to 1st and back. While moving the gear selector through each gear, measure the resistance between ground and the P/N Position Switch Sense circuit. Did the resistance change from below 10.0 ohms to above 10.0 ohms? Yes → Go To 6 No → Replace the Transmission Range Sensor. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Module in accordance with the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
7	At this time, the conditions required to set the DTC are not present. **NOTE: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **NOTE: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any technical service bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
*CHECKING ECT SENSOR

POSSIBLE CAUSES
ECT SENSOR OPERATION
ECT SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: The engine coolant temperature must be below 62°C (150°F).** Turn the ignition on. With the DRBIII®, monitor the ECT value. Start the engine. Does the ECT reach 82°C (180°F) and was it a smooth transition? Yes → Engine Coolant Temperature sensor is operating normally. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
*CHECKING FUEL DELIVERY

POSSIBLE CAUSES
FUEL PUMP RELAY
FUEL PRESSURE OUT OF SPECS
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
FUEL PUMP RELAY FUSED B+ CIRCUIT
FUEL PUMP RELAY OUTPUT CIRCUIT OPEN
FUEL PUMP GROUND CIRCUIT OPEN/HIGH RESISTANCE
FUEL PUMP MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test. **Note: It may be necessary to use a mechanics stethoscope in the next step.** Listen for fuel pump operation at the fuel tank. Does the Fuel Pump operate? Yes → Go To 2 No → Go To 6 **Caution: Stop All Actuations.**	All
2	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge to the fuel rail test port. (2.7L use the fuel adapter #6539 Miller Tool) Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 3 Within Specification Go To 5 Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1. **Caution: Stop All Actuations.**	All

*CHECKING FUEL DELIVERY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16″ fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the ″T″ fitting on tool #6539. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 4 **Caution: Stop All Actuations.**	All
4	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
5	**Note: The fuel pressure must be within specification before continuing.** Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16″) or #6631(3/8″) to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container. **Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.** **Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.** Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification? Yes → Test Complete. No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. Perform POWERTRAIN VERIFICATION TEST VER - 1. **Caution: Stop All Actuations.**	All

*CHECKING FUEL DELIVERY — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the fuel pump module harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test. Using a 12 volt test light connected to ground, probe the Fuel Pump Relay Output circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 7 No → Go To 9 **Caution: Stop All Actuations.**	All
7	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Using a test light connected to battery voltage, probe the Fuel Pump ground circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 8 No → Repair the open/high resistance in the fuel pump ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
8	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
9	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. With a 12 volt test light connected to ground, probe the Fuel Pump Relay Fused B+ circuit at the PDC. Does the test light illuminate? Yes → Go To 10 No → Repair the Fuel Pump Realy Fused B+ circuit. Check for open fuse in the PDC. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
10	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Disconnect the Fuel Pump Module harness connector. **NOTE: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities** Measure the resistance of the Fuel Pump Relay Output circuit from the relay connector to the fuel pump module connector. Is the resistance below 5.0 ohms? Yes → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the Fuel Pump Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*CHECKING HARD START (FUEL DELIVERY SYSTEM)

POSSIBLE CAUSES
FUEL PRESSURE OUT OF SPECS
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE
FUEL PUMP INLET STRAINER PLUGGED
INTERNAL FUEL SUPPLY LEAK
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
FUEL PUMP MODULE
FUEL CONTAMINATION

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge to the fuel rail test port. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 2 Within Specification Go To 4 **Caution: Stop All Actuations.**	All

*CHECKING HARD START (FUEL DELIVERY SYSTEM) — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16″ fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the ″T″ fitting on tool #6539. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Visually and physically inspect the fuel supply line between the fuel tank and the fuel rail. Repair/replace as necessary. If no problem is found replace the fuel filter. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3 **Caution: Stop All Actuations.**	All
3	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	**NOTE: Before continuing visually and physically inspect the fuel delivery for external leaks or damage. Repair /replace as necessary.** Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line from the fuel rail. Install special 5/16″ fuel line adapter tool #6539 between disconnected fuel supply line and the fuel rail. Attach a fuel pressure test gauge to the ″T″ fitting on tool #6539. Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. **NOTE: Fuel specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Is the fuel pressure within specification? Yes → Go To 5 No → Go To 6 **Caution: Stop All Actuations.**	All

*CHECKING HARD START (FUEL DELIVERY SYSTEM) — Continued

TEST	ACTION	APPLICABILITY
5	**Note: The fuel pressure must be within specification before continuing.** Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16″) to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container. **Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.** **Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.** Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification? Yes → Check the fuel for contaminants. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. Perform POWERTRAIN VERIFICATION TEST VER - 2. **Caution: Stop All Actuations.**	All
6	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line from the fuel rail. Install special 5/16″ fuel line adapter tool #6539 between disconnected fuel supply line and the fuel rail. Attach a fuel pressure test gauge to the ″T″ fitting on tool #6539. Start the engine and allow the fuel system to reach maximum pressure. Turn the ignition off. **NOTE: Be certain that the clamping technique used is adequate to provide a good seal and will not damage the fuel pressure adapter tool hose.** Using the hose clamp pliers special tool #C-4390, slowly clamp off the rubber hose on the Fuel Pressure adapter nearest the fuel rail. Turn the ignition off. Monitor the fuel pressure gauge for a minimum of 5 minutes. **NOTE: The pressure should not fall below 241 KPa (35 psi)** Is the fuel pressure within specification? Yes → Replace the leaking injector(s) Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the fuel pump module. Perform POWERTRAIN VERIFICATION TEST VER - 2. **Caution: Stop All Actuations.**	All

Symptom:
*CHECKING IAC MOTOR

POSSIBLE CAUSES
IAC MOTOR OPERATION
IAC DRIVER CIRCUITS OPEN
IAC MOTOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, monitor engine RPM. With the DRBIII®, set the engine speed to 1400 RPM. Does the engine speed reach 1400 rpm? Yes → The IAC Motor is operation normally Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition off. Disconnect IAC Motor harness connector. Disconnect the PCM harness connector. Repeat each measurement for each IAC Driver circuit. Measure the resistance of each IAC Driver circuit between the IAC Motor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms at all IAC Driver circuits? Yes → Replace the Idle Air Control Motor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Repair the IAC Driver circuit(s) for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
*CHECKING IAT SENSOR

POSSIBLE CAUSES
IAT SENSOR OPERATION
IAT SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Do not allow more than 5 minutes delay during the removal of the IAT sensor and measuring the temperature.** Turn the ignition on. With the DRBIII®, read and record the IAT temperature value. Remove the IAT sensor. Using a temperature probe, measure the temperature inside the opening of the IAT sensor. Compare both temperature readings. Are the temperature readings with 12°C (10°F) of one another? Yes → The IAT sensor is operating normally. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the IAT sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
*CHECKING MAP SENSOR

POSSIBLE CAUSES
MAP SENSOR OPERATION
MAP SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Attach a vacuum gauge to a manifold vacuum source. **NOTE: If the engine will not idle, maintain a constant engine speed above idle.** Allow the engine to idle. With the DRBIII®, monitor the MAP sensor vacuum. Compare the MAP vacuum value on the DRBIII® and the vacuum reading on the vacuum gauge. Are the vacuum readings within 1 inch of vacuum of each other? Yes → The MAP sensor is operating normally. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the MAP sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
*CHECKING PCM POWER AND GROUND CIRCUITS

POSSIBLE CAUSES
PCM FUSED B+ CIRCUIT
PCM FUSED IGNITION SWITCH OUTPUT CIRCUIT
PCM GROUND CIRCUITS

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the PCM harness connector. Using a 12-volt test light connected to ground, probe the PCM Fused B+ circuit in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 2 No → Repair the Fused B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Turn the ignition off. Disconnect the PCM harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the PCM Fused Ignition Switch Output circuit in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the Ignition Switch Output circuit Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. Disconnect the PCM harness connector. Using a 12-volt test light connected to battery voltage, probe the PCM ground circuits in the PCM harness connector. Does the test light illuminate brightly? Yes → Test Complete. No → Repair the PCM ground circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*CHECKING RADIATOR FAN RELAY OUTPUT

POSSIBLE CAUSES
RADIATOR FAN RELAY OPERATION
GROUND CIRCUIT OPEN
RADIATOR FAN MOTOR
FUSED B+ CIRCUIT
RADIATOR FAN RELAY OUTPUT CIRCUIT
RADIATOR FAN RELAY

TEST	ACTION	APPLICABILITY
1	**NOTE: This test can be used for either Low or High Speed Relay Output circuits.** Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Is the Radiator Fan actuating? Yes → The Radiator Fan System operating properly at this time. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition off. Disconnect the Radiator Fan harness connector. Measure the Ground circuit in the Radiator Fan harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Disconnect the Radiator Fan harness connector. Turn the ignition on. With the DRBIII®, actuate the Radiator Fan Relay. Measure the voltage of the Radiator Fan Relay Output circuit in the Radiator Fan harness connector. Is the voltage above 11.0 volts? Yes → Replace the Radiator Fan Motor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Turn the ignition off. Remove the Radiator Fan Relay from the PDC. Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the PDC. Does the test light illuminate brightly? Yes → Go To 5 No → Repair the Fused B+ circuit. Inspect fuses and replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

*CHECKING RADIATOR FAN RELAY OUTPUT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Remove the Radiator Fan Relay from the PDC. Disconnect the Radiator Fan harness connector. Measure the resistance of the Radiator Fan Relay Output circuit between the PDC and the Radiator Fan harness connector. Is the resistance below 5.0 ohms? Yes → Replace the Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Repair the Radiator Fan Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
*CHECKING THE A/C RELAY OUTPUT

POSSIBLE CAUSES
A/C CLUTCH RELAY OPERATION
GROUND CIRCUIT OPEN
A/C CLUTCH
FUSED B+ CIRCUIT
A/C CLUTCH OUTPUT CIRCUIT
A/C CLUTCH RELAY

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the refrigerant system is properly charged. Refer to the appropriate Service Information.** Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch actuating? Yes → The A/C Clutch System operating properly at this time. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition off. Disconnect the A/C Clutch harness connector. Measure the Ground circuit in the A/C Clutch harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Disconnect the A/C Clutch harness connector. Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Measure the voltage of the A/C Clutch Relay Output circuit in the A/C Clutch harness connector. Is the voltage above 11.0 volts? Yes → Replace the A/C Clutch. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the PDC. Does the test light illuminate brightly? Yes → Go To 5 No → Repair the Fused B+ circuit. Inspect fuses and replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

*CHECKING THE A/C RELAY OUTPUT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the A/C Clutch Relay from the PDC. Disconnect the A/C Clutch harness connector. Measure the resistance of the A/C Clutch Relay Output circuit between the PDC and the A/C Clutch harness connector. Is the resistance below 5.0 ohms? Yes → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Repair the A/C Clutch Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
*CHECKING THE EVAP SYSTEM (EXPORT ONLY)

POSSIBLE CAUSES
EVAP PURGE SOLENOID VACUUM HOSE
EVAP PURGE SOLENOID LEAKING
EVAP PURGE SOLENOID RESTICTION
EVAP CANISTER VACUUM FEED HOSE
EVAP CANISTER VENT VALVE HOSE
EVAP CANISTER OUTPUT HOSE BETWEEN THE CANISTER AND THE FUEL TANK

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the EVAP Purge Solenoid hose assembly Connect a vacuum gauge to the vacuum side of the hose assembly. Start the engine and observe the vacuum gauge. Is the vacuum above 13 inches of vacuum? Yes → Go To 2 No → Repair vacuum hose or vacuum source as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	Turn the ignition off. Disconnect the EVAP Purge Solenoid hose assembly. Connect a vacuum pump to the vacuum port side of the EVAP Purge Solenoid component side. Apply 10 inches of vacuum to the EVAP Purge Solenoid. Does the EVAP purge Solenoid hold vacuum? Yes → Go To 3 No → Replace the EVAP Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Turn the ignition off. Disconnect the EVAP Purge Solenoid hose assembly. Connect a vacuum pump to the vacuum port side of the EVAP Purge Solenoid component side. Apply 10 inches of vacuum to the EVAP Purge Solenoid. With the DRBIII®, actuate the EVAP Purge Solenoid. Does vacuum drop to zero when the EVAP Purge Solenoid is actuated? Yes → Go To 4 No → Replace the EVAP Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

*CHECKING THE EVAP SYSTEM (EXPORT ONLY) — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the vacuum hose from the EVAP Canister. Connect a vacuum gauge to the vacuum hose. Disconnect the EVAP Purge Solenoid hose assembly. Using a piece of extra hose, jumper the vacuum port to the EVAP canister vacuum feed port on the hose assembly side. Start the engine and observe the vacuum gauge. Is the vacuum above 13 inches? Yes → Go To 5 No → Repair or replace the vacuum hose between the EVAP Purge Solenoid and EVAP Canister. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Turn the ignition off. Disconnect the EVAP Canister Outlet hose from the EVAP Canister. Connect a vacuum gauge to the EVAP Canister Outlet port on the EVAP canister. Plug the EVAP Canister vent hose. Disconnect the EVAP Solenoid hose assembly. Using a piece of extra hose, jumper the vacuum port to the EVAP canister vacuum feed port on the hose assembly side. Start the engine and observe the vacuum gauge. Is the vacuum above 13 inches? Yes → Go To 6 No → Check for a restricted or damage canister vent hose, repair/ replace as necessary. If ok, replace the EVAP Canister. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Inspect the EVAP Canister Output hose between the Fuel Tank and the EVAP Canister. Check hose for holes or rubbed through areas. **NOTE: If using shop air to check for restriction do not let the air pressure exceed 5.0 psi.** Check hose for restrictions. Were any problems found? Yes → Repair or replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:
*CHECKING TP SENSOR

POSSIBLE CAUSES
THROTTLE POSITION SENSOR VOLTAGE ABOVE 1.5 VOLTS
THROTTLE POSITION SENSOR SWEEP
TP SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the throttle and linkage is not binding and is operating properly.** Turn the ignition on. With the DRBIII®, read the Throttle Position Sensor voltage. Is the voltage above 1.5 volts? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, monitor the Throttle Position Sensor voltage. Slowly open the throttle from the idle position to the wide open throttle position. Does voltage start at approximately 0.8 volts and go above 3.5 volts with a smooth voltage change? Yes → Throttle Position Sensor Operating normally. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P0645-A/C CLUTCH RELAY CKT

When Monitored and Set Condition:

P0645-A/C CLUTCH RELAY CKT

When Monitored: With the ignition on. Battery voltage greater than 10 volts. A/C Switch on.

Set Condition: An open or shorted condition is detected in the A/C clutch relay control circuit.

POSSIBLE CAUSES
A/C CLUTCH RELAY INTERMITTENT OPERATION
INTERMITTENT CONDITION
FUSED IGNITION SWITCH OUTPUT CIRCUIT
A/C CLUTCH RELAY RESISTANCE
A/C CLUTCH RELAY CONTROL CIRCUIT OPEN
A/C CLUTCH RELAY CONTROL CIRCUIT SHORT TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch Relay operating? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRBIII®, actuate the A/C Clutch Relay. Wiggle the wiring harness from the A/C Clutch Relay to the PCM while the relay is actuating. Did the A/C Clutch Relay stop when wiggling the wiring harness? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All

P0645-A/C CLUTCH RELAY CKT — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All
4	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Turn the ignition on. Measure the voltage on the Fused Ignition Switch Output circuit in the PDC. Is the voltage above 11.0 volts? Yes → Go To 5 No → Repair the Fused Ignition Switch Output circuit. Check and replace any open fuses. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Measure the resistance of the A/C Clutch Relay between the Fused Ignition Switch Output terminal and the A/C Clutch Relay Control terminal. Is the resistance between 60 to 80 ohms? Yes → Go To 6 No → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Disconnect the PCM harness connector. Measure the resistance of the A/C Clutch Relay Control circuit between the PDC and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the A/C Clutch Relay Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P0645-A/C CLUTCH RELAY CKT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. Measure the resistance between ground and the A/C Clutch Control circuit in the PDC. Is the resistance below 5.0 ohms? Yes → Repair the A/C Clutch Relay Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P1598-A/C PRESSURE SENSOR VOLTS TOO HIGH

When Monitored and Set Condition:

P1598-A/C PRESSURE SENSOR VOLTS TOO HIGH

When Monitored: Engine running. The A/C relay energized.

Set Condition: The A/C pressure sensor signal at the PCM goes above 4.92 volts.

POSSIBLE CAUSES
INTERMITTENT CONDITION
A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO 5 VOLT SUPPLY CIRCUIT
A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
A/C PRESSURE SENSOR INTERNAL FAILURE
A/C PRESSURE SENSOR SIGNAL CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the A/C refrigerant System is properly charged per the Service Information.** Start the engine. With the DRBIII®, read the A/C Pressure Sensor voltage. Is the voltage above 4.6 volts? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the A/C Pressure Sensor Signal circuit and the 5 Volt Supply circuit in the A/C Pressure Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the A/C Pressure Sensor Signal circuit for a short to the 5 Volt Supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All

P1598-A/C PRESSURE SENSOR VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Turn the ignition on. Measure the voltage on the A/C Pressure Sensor Signal circuit at the A/C Pressure Sensor harness connector. Is the voltage above 5.2 volts? Yes → Repair the A/C Pressure Sensor Signal circuit for a short to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Connect a jumper wire between the A/C Pressure Sensor Signal circuit and the Sensor ground circuit. With the DRBIII®, monitor the A/C Pressure Sensor voltage. Turn the ignition on. Is the voltage below 1.0 volts? Yes → Replace the A/C Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the A/C Pressure Sensor Signal circuit between the PCM harness connector and the A/C Pressure Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the A/C Pressure Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Measure the resistance between ground and the Sensor ground circuit at the A/C Pressure Sensor harness connector. Is the resistance below 30 ohms? Yes → Go To 7 No → Repair the Sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P1598-A/C PRESSURE SENSOR VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
8	**NOTE: Ensure the A/C refrigerant System is properly charged per the Service Information.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:
P1599-A/C PRESSURE SENSOR VOLTS TOO LOW

When Monitored and Set Condition:

P1599-A/C PRESSURE SENSOR VOLTS TOO LOW

When Monitored: Engine running. The A/C relay energized.

Set Condition: The A/C pressure sensor signal voltage at the PCM goes below 0.58 volts for 2.6 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5 VOLT SUPPLY CIRCUIT OPEN
A/C PRESSURE SENSOR INTERNAL FAILURE
A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
PCM 5 VOLT SUPPLY CIRCUIT
PCM A/C PRESSURE SENSOR SIGNAL

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the A/C refrigerant System is properly charged per the Service Information.** Start the engine. With the DRBIII®, read the A/C Pressure Sensor voltage. Is the voltage below 0.6 volts? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the A/C Pressure Sensor harness connector. Is the voltage between 4.5 to 5.2 volts? Yes → Go To 3 No → Go To 7	All

P1599-A/C PRESSURE SENSOR VOLTS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. With the DRBIII®, monitor the A/C Pressure Sensor voltage. Turn the ignition on. Is the voltage above 0.6 volts? Yes → Replace the A/C Pressure Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the A/C Pressure Sensor Signal circuit in the A/C Pressure Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the A/C Pressure Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the A/C Pressure Sensor Signal circuit and the Sensor ground circuit in the A/C Pressure Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the A/C Pressure Sensor Signal circuit for a short to the Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the 5 Volt Supply circuit in the A/C Pressure Sensor harness connector. Is the resistance below 100 ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All

P1599-A/C PRESSURE SENSOR VOLTS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 5 Volt Supply circuit between the A/C Pressure Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the 5 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
9	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
10	**NOTE: Ensure the A/C refrigerant System is properly charges per the Service Information.** **WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom List:

- **ANTENNA FAILURE**
- **COP FAILURE**
- **EEPROM FAILURE**
- **INTERNAL FAULT**
- **RAM FAILURE**
- **SERIAL LINK INTERNAL FAULT**
- **STACK OVERFLOW FAILURE**

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be ANTENNA FAILURE.

When Monitored and Set Condition:

ANTENNA FAILURE

When Monitored: Every 250 milliseconds with the ignition on.

Set Condition: The SKIM's microcontroller determines that an antenna circuit fault has occurred for 2.0 consecutive seconds.

COP FAILURE

When Monitored: With the ignition on.

Set Condition: The COP timer is not reset by the micro controller every 65.5 milliseconds.

EEPROM FAILURE

When Monitored: With the ignition on.

Set Condition: When the value written to EEPROM memory does not equal the value read back after the write operation.

INTERNAL FAULT

When Monitored: With the ignition on.

Set Condition: The SKIM has detected a fault during an internal self test.

RAM FAILURE

When Monitored: With the ignition on.

Set Condition: The RAM fails a test that checks the RAM's ability to retain memory.

SERIAL LINK INTERNAL FAULT

When Monitored: With the ignition on.

Set Condition: The SKIM fails an internal J1850 communication self test.

STACK OVERFLOW FAILURE

When Monitored: With the ignition on.

Set Condition: The micro controller has exceeded its stack space limit.

ANTENNA FAILURE — Continued

POSSIBLE CAUSES
SKIM INTERNAL DTC FAILURE

TEST	ACTION	APPLICABILITY
1	**Note: This trouble code indicates an internal SKIM fault.** With the DRBIII®, read and record the SKIM DTCs and then erase the SKIM DTCs Perform 10 ignition key cycles, leaving the ignition key on for a minimum of 90 seconds per cycle. With the DRBIII® , read the SKIM DTCs. Did the same SKIM DTC return? Yes → Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:
PCM STATUS FAILURE
SERIAL LINK EXTERNAL FAULT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be PCM STATUS FAILURE.

When Monitored and Set Condition:

PCM STATUS FAILURE

When Monitored: With the ignition on.

Set Condition: This DTC exists when a PCM STATUS message was not received from the PCM for at least 20.0 consecutive seconds.

SERIAL LINK EXTERNAL FAULT

When Monitored: At ignition on, after ignition on during any rolling code handshake that occurs with the PCM due to a SKIM reset, or during SECRET KEY transfers to the PCM.

Set Condition: When the SKIM does not receive an expected PCI BUS message transmission acknowledgement from the PCM after 3 transmit attempts.

POSSIBLE CAUSES
INTERMITTENT WIRING HARNESS PROBLEM
WIRING HARNESS INSPECTION
SKIM/PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the PCM has proper power and ground connections before continuing.** With the DRBIII®, read and record the SKIM DTCs then erase the SKIM DTCs. Turn the ignition off. Wait 2 minutes. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DRBIII® display the DTC that was previously erased? Yes → Go To 2 No → Go To 4	All

PCM STATUS FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and CCD/PCI Bus (whichever applicable) circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Perform SKIS VERIFICATION. No → Go To 3	All
3	**NOTE: Before proceeding it will be necessary to obtain the SKIM PIN.** Turn the ignition on. With the DRBIII®, display and erase all PCM and SKIM DTC's. Perform 5 ignition key cycles, leaving the ignition key on for a minimum of 90 seconds per cycle. With the DRBIII®, read the SKIM DTCs. Does the code appear? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All
4	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:

ROLLING CODE FAILURE

VIN MISMATCH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be ROLLING CODE FAILURE.

When Monitored and Set Condition:

ROLLING CODE FAILURE

When Monitored: At ignition on, after ignition on during any rolling code handshake that occurs with the PCM due to a SKIM or PCM reset.

Set Condition: When a PCM STATUS message with a Valid Key status is not received by the SKIM within 3.5 seconds of transmitting the last Valid Key Code message to the PCM.

VIN MISMATCH

When Monitored: With the ignition on.

Set Condition: When the VIN received from the PCM does not match the VIN stored in the SKIM's EEPROM.

POSSIBLE CAUSES
VERIFYING PCM VIN
REPLACE SKIM AND CHECK DTC'S
INTERMITTENT WIRING HARNESS PROBLEM
PCM

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase the SKIM DTCs. Turn the ignition off. Wait 10 seconds. Turn the ignition on and wait 2 minutes. With the DRBIII®, read the SKIM DTCs. Does the DRBIII® display the DTC that was previously erased? Yes → Go To 2 No → Go To 4	All

ROLLING CODE FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRBIII®, select Engine system from the main menu. Display and record the Vehicle Identification Number. **NOTE: Ensure that a VIN has been programmed into the PCM. If a VIN is not displayed, attempt to program the PCM with the correct vehicle VIN before continuing.** Does the VIN recorded from the PCM match the VIN of the vehicle? Yes → Go To 3 No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Turn the ignition on. With the DRBIII®, display and clear all PCM and SKIM DTC's. Perform 5 ignition key cycles leaving the ignition key on for 90 seconds per cycle. With the DRBIII®, check for SKIM DTCs. Does the DRBIII® display the same DTC? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → The repair is complete. Perform SKIS VERIFICATION.	All
4	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:

TRANSPONDER COMMUNICATION FAILURE
TRANSPONDER CYCLIC REDUNDANCY CHECK (CRC) FAILURE
TRANSPONDER ID MISMATCH
TRANSPONDER RESPONSE MISMATCH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be TRANSPONDER COMMUNICATION FAILURE.

When Monitored and Set Condition:

TRANSPONDER COMMUNICATION FAILURE

When Monitored: At ignition on and during Key Programming Mode.

Set Condition: When the SKIM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds.

TRANSPONDER CYCLIC REDUNDANCY CHECK (CRC) FAILURE

When Monitored: At ignition on and during Key Programming Mode.

Set Condition: When 5 consecutive transponder signal transmissions are sent to the SKIM with the correct message format but with invalid data.

TRANSPONDER ID MISMATCH

When Monitored: At ignition on and during Key Programming Mode.

Set Condition: When the transponder ID read by the SKIM does not match any of the transponder ID's stored in the SKIM's memory.

TRANSPONDER RESPONSE MISMATCH

When Monitored: At ignition on and during Key Programming Mode.

Set Condition: When the transponder's crypto algorithm result fails to match the SKIM's result.

POSSIBLE CAUSES
CHECKING MULTIPLE KEY OPERATION
SKIM
INTERMITTENT WIRING HARNESS PROBLEM
REPLACE IGNITION KEY

TRANSPONDER COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read and record the SKIM DTCs. With the DRBIII®, erase the SKIM DTCs. **NOTE: Perform the following test several times to ensure the DTC is current.** Turn the ignition off. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DRBIII® display the DTC that was previously erased? Yes → Go To 2 No → Go To 7	All
2	Are there multiple vehicle ignition keys available? Yes → Go To 3 No → Go To 4	All
3	**NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys one at a time.** With the DRBIII®, erase the SKIM DTCs. Turn the ignition off. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Is the DTC present for all ignition keys? Yes → Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Replace the ignition key(s) that cause the SKIM DTC. Perform SKIS VERIFICATION.	All
4	With the DRBIII®, attempt to reprogram the ignition keys to the SKIM. With the DRBIII®, erase the SKIM DTCs. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DTC reset? Yes → Go To 5 No → Test Complete.	All
5	Replace the ignition key with a new key. With the DRBIII®, program the new ignition key to the SKIM. With the DRBIII®, erase the SKIM DTCs. Turn the ignition off. Wait 10 seconds. Turn the ignition on. With the DRBIII®, read the SKIM DTCs. Does the DTC reset? Yes → Go To 6 No → Test Complete.	All

TRANSPONDER COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	If there are no possible causes remaining, view repair. Repair Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All
7	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:

P1595-SPEED CONTROL SOLENOID CIRCUITS
P1683-SPD CTRL PWR RELAY; OR S/C 12V DRIVER CKT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1595-SPEED CONTROL SOLENOID CIRCUITS.

When Monitored and Set Condition:

P1595-SPEED CONTROL SOLENOID CIRCUITS

When Monitored: With the ignition on. Battery voltage greater than 10 volts. Speed Control Switched on.

Set Condition: The Powertrain Control Module actuates the vacuum and vent solenoids but they do not respond.

P1683-SPD CTRL PWR RELAY; OR S/C 12V DRIVER CKT

When Monitored: With the ignition key on. The speed control switched on.

Set Condition: The speed control power supply circuit is either open or shorted to ground.

POSSIBLE CAUSES
GROUND CIRCUIT OPEN
INTERMITTENT CONDITION
S/C BRAKE SWITCH OUTPUT CIRCUIT
SPEED CONTROL SWITCH OUTPUT OPEN
BRAKE LAMP SWITCH
SPEED CONTROL POWER SUPPLY CIRCUIT
PCM (S/C POWER SUPPLY)
SPEED CONTROL VACUUM SOLENOID
SPEED CONTROL VACUUM SOLENOID CONTROL CIRCUIT OPEN
PCM (VACUUM SOLENOID)
SPEED CONTROL VACUUM SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
SPEED CONTROL VENT SOLENOID
SPEED CONTROL VENT SOLENOID CONTROL CIRCUIT OPEN
SPEED CONTROL VENT SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
PCM (VENT SOLENOID)

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: In the below step you will need to actuate both S/C solenoids separately. Note the operation of the each solenoid when actuated.** With the DRBIII®, actuate the Speed Control Vacuum Solenoid and note operation. With the DRBIII®, actuate the Speed Control Vent Solenoid and note operation. Choose the conclusion that best matches the solenoids operation? Vacuum Solenoid not operating Go To 2 Vent Solenoid not operating Go To 6 Both S/C Solenoids not operating Go To 10 Both S/C Solenoids operating Go To 15	All
2	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Turn the ignition on. With the DRBIII®, actuate the Speed Control Vacuum Solenoid. Using a 12-volt test light connected to 12-volts, probe the Speed Control Vacuum Solenoid Control circuit. Does the test light illuminate brightly and flash? Yes → Replace the Speed Control Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 3	All
3	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the PCM harness connector. Measure the resistance of the Speed Control Vacuum Solenoid Control circuit between the PCM harness connector and Speed Control Servo harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the Speed Control Vacuum Solenoid Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
4	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the PCM harness connector. Measure the resistance of the Speed Control Vacuum Solenoid Control circuit in the PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Speed Control Vacuum Solenoid Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
5	If the there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
6	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Turn the ignition on. With the DRBIII®, actuate the Speed Control Vent Solenoid. Using a 12-volt test light connected to 12-volts, probe the Speed Control Vent Solenoid Control circuit in the Speed Control Servo harness connector. Does the test light illuminate brightly and flash? Yes → Replace the Speed Control Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 7	All
7	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the PCM harness connector. Measure the resistance of the Speed Control Vent Solenoid Control circuit between the PCM harness connector and Speed Control Servo harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the Speed Control Vacuum Solenoid Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
8	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the PCM harness connector. Measure the resistance of the Speed Control Vent Solenoid Control circuit in the PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Speed Control Vacuum Solenoid Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 9	All
9	If the there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the S/C Servo harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the S/C Brake Switch Output circuit in the S/C Servo harness connector. Does the test light illuminate brightly? Yes → Replace the Speed Control Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 11	All
11	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Disconnect the Brake Lamp Switch harness connector. Measure the resistance of the Speed Control Brake Switch Output circuit between the Speed Control Servo harness connector and Brake Lamp Switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the Speed Control Brake Switch Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
12	Disconnect the Brake Lamp Switch harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Speed Control Power Supply circuit in the Brake Lamp Switch harness connector. Does the test light illuminate brightly? Yes → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 13	All
13	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the Brake Lamp Switch harness connector. Measure the resistance of the Speed Control Power Supply circuit between the PCM harness connector and the Brake Lamp Switch harness connector. Is the resistance below 5.0 ohms? Yes → Go To 14 No → Repair the Speed Control Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
14	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
15	Turn the ignition off. Disconnect the S/C Servo harness connector. Using a 12-volt test light connected to 12-volts, probe the ground circuit in the S/C Servo harness connector. Does the test light illuminate brightly? Yes → Go To 16 No → Repair the ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
16	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All

Symptom:
P1597-SPEED CONTROL SWITCH ALWAYS LOW

When Monitored and Set Condition:

P1597-SPEED CONTROL SWITCH ALWAYS LOW

When Monitored: With the ignition key on. Battery voltage above 10 volts.

Set Condition: When switch voltage is less than 0.43 volts for 2 minutes.

POSSIBLE CAUSES
INTERMITTENT CONDITION
SPEED CONTROL ON/OFF SWITCH
SPEED CONTROL RESUME/ACCEL SWITCH
SPEED CONTROL SWITCH SIGNAL CIRCUIT SHORTED TO SENSOR GROUND
SPEED CONTROL SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: Do not press any of the Speed Control Switch buttons.** Turn the ignition on. With the DRBIII®, read the Speed Control voltage. Is the Speed Control voltage below 1.0 volts? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition on. With the DRBIII®, monitor the Speed Control Switch voltage. Disconnect the Speed Control On/Off Switch harness connector. Did the volt change to above 4.7 volts? Yes → Replace the Speed Control On/Off Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 3	All
3	Turn the ignition on. With the DRBIII®, monitor the Speed Control Switch voltage. Disconnect the Speed Control Resume/Accel Switch harness connector. Did the volt change to above 4.7 volts? Yes → Replace the Speed Control Resume/Accel Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 4	All

P1597-SPEED CONTROL SWITCH ALWAYS LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Speed Control On/Off Switch harness connector. Disconnect the Speed Control Resume/Accel Switch harness connector. Disconnect the PCM harness connector. Measure the resistance between the Speed Control Switch Signal circuit and the Sensor ground circuit in the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Speed Control Switch Signal circuit shorted to Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	All
5	Turn the ignition off. Disconnect the Speed Control On/Off Switch harness connector. Disconnect the Speed Control Resume/Accel Switch harness connector. Disconnect the PCM harness connector. Measure the resistance of the Speed Control Switch Signal circuit in PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Speed Control Switch Signal circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 6	All
6	**NOTE: Before Continuing: Disconnect the PCM harness connector and check the related wiring terminals for corrosion, damage or terminal push out. Repair as necessary.** If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 4.	All
7	**WARNING: WHEN THE ENGINE IS OPERATING, DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRBIII® parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRBIII® Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Test Complete.	All

Symptom:
*ENGINE CRANKS DOES NOT START

POSSIBLE CAUSES
FUEL PUMP RELAY
NO START PRE-TEST
OTHER POSSIBLE CAUSES FOR NO START
POWERTRAIN FUSES OPEN
FUEL PRESSURE OUT OF SPECS
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
FUEL PUMP RELAY FUSED B+ CIRCUIT
FUEL PUMP RELAY OUTPUT CIRCUIT OPEN
FUEL PUMP GROUND CIRCUIT OPEN/HIGH RESISTANCE
FUEL PUMP MODULE

TEST	ACTION	APPLICABILITY
1	**Note: The following list of items must be checked before continuing with any no start tests.** The battery must be fully charged and in good condition. A low charged battery may produce invalid test results. If the battery is low, charge the battery and then attempt to start the vehicle by cranking the engine for 15 seconds, 3 consecutive times. This will allow any DTC's to set that may have been erased due to a dead battery. Ensure the Powers and Ground to the PCM are ok. Make sure the PCM communicates with the DRB and that there are no DTC's stored in the PCM memory. If the PCM reports a No Response condition, refer to the Communication category for the proper tests. Read the PCM DTC's with the DRB. If any DTC's are present, they must be repaired before continuing with any other No Start diagnostic tests. Refer to the Symptom list for the related P-code that is reported by the PCM. Ensure that the PCI bus is functional. Attempt to communicate with the Instrument Cluster and SKIM, If you are unable to establish communicate refer to the Communication category for the proper symptoms. The Sentry Key Immobilizer System must be operating properly. Check for proper communication with the DRBIII® and check for DTC's that may be stored in the Sentry Key Immobilizer Module (SKIM). repair the DTC(s) before continuing. If no DTC's are found, using the DRB select Clear PCM (Batt Disconnect). Crank the engine several times. Using the DRB, read DTC's. If a DTC is present perform the DTC diagnostics before continuing. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 2	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
2	Check for any open fuses in the PDC or Fuse Block that may be related to the No Start condition. Are any of the fuses open? Yes → Using the wiring diagram/schematic as a guide, inspect the wiring and connectors, repair as necessary. Replace the Fuse. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 3	All
3	Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test. **Note: It may be necessary to use a mechanics stethoscope in the next step.** Listen for fuel pump operation at the fuel tank. Does the Fuel Pump operate? Yes → Go To 4 No → Go To 9 **Caution: Stop All Actuations.**	All
4	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge to the fuel rail test port. (2.7L use the fuel adapter #6539 Miller Tool) Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 kPa +/- 34 kPa (58 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 5 Within Specification Go To 7 Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1. **Caution: Stop All Actuations.**	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16″ fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the ″T″ fitting on tool #6539. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 6 **Caution: Stop All Actuations.**	All
6	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
7	**Note: The fuel pressure must be within specification before continuing.** Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16″) or #6631(3/8″) to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container. **Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.** **Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.** Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification? Yes → Go To 8 No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. Perform POWERTRAIN VERIFICATION TEST VER - 1. **Caution: Stop All Actuations.**	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
8	The following items need to be checked as a possible cause for a no start condition. Refer to any Technical Service Bulletins that may apply to the symptom. The spark plugs must be free from fuel, oil, coolant and/or any foreign material or deposits. The fuel must be free from contamination. The exhaust may be free from restrictions. The engine compression must be within specifications. The engine valve timing must be within specifications. The engine must be free from vacuum leaks. Were any of the above conditions found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All
9	Turn the ignition off. Disconnect the fuel pump module harness connector. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test. Using a 12 volt test light connected to ground, probe the Fuel Pump Relay Output circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 10 No → Go To 12 **Caution: Stop All Actuations.**	All
10	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Using a test light connected to battery voltage, probe the Fuel Pump ground circuit at the Fuel Pump Module harness connector. Does the test light illuminate brightly? Yes → Go To 11 No → Repair the open/high resistance in the fuel pump ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
11	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
12	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. With a 12 volt test light connected to ground, probe the Fuel Pump Relay Fused B+ circuit at the PDC. Does the test light illuminate? Yes → Go To 13 No → Repair the Fuel Pump Relay Fused B+ circuit. Check for open fuse in the PDC. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. Remove the Fuel Pump Relay from the PDC. Disconnect the Fuel Pump Module harness connector. **NOTE: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities** Measure the resistance of the Fuel Pump Relay Output circuit from the relay connector to the fuel pump module connector. Is the resistance below 5.0 ohms? Yes → Replace the Fuel Pump Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the open fuel pump relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*NO CRANK CONDITION

POSSIBLE CAUSES
REPAIR MECHANICAL CONDITION
TRANSMISSION RANGE SENSOR
BATTERY CIRCUIT RESISTANCE TOO HIGH
IGNITION SWITCH OUTPUT CIRCUIT OPEN
STARTER RELAY CONTROL CIRCUIT OPEN
STARTER RELAY OUTPUT CIRCUIT OPEN
FUSED B(+) CIRCUIT OPEN
STARTER
STARTER MOTOR RELAY
STARTER RELAY

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that SKIS is operating properly. Check the SKIM for DTC. If a SKIM DTC(s) is present diagnose them first before continuing.** **WARNING: MAKE SURE THE BATTERY IS DISCONNECTED, THEN WAIT TWO MINUTES BEFORE PROCEEDING.** Turn the engine over by hand to ensure the engine is not seized. Is the engine able to turn over? Yes → Go To 2 No → Repair the mechanical condition preventing the starter motor from cranking. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Turn the ignition off. Disconnect the PCM harness connectors. Move the Gear selector through all gear positions, from Park to 1st and back. While moving the gear selector through each gear, measure the resistance between ground and the P/N Position Switch Sense circuit. Did the resistance change from above 10.0 ohms to below 10.0 ohms? Yes → Go To 3 No → Replace the Transmission Range Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. Check the Battery Cables for high resistance using the service information procedure. Did either Battery Cable have a voltage drop greater than 0.2 volt? Yes → Repair the Battery circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 4	All

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. Remove the Starter Relay from PDC. **WARNING: The Parking Brake must be on and the Transmission must be in park for a vehicle equipped with an automatic transmission.** **Warning: The engine may be cranked in the next step. Keep away from moving engine parts.** Briefly connect a jumper wire between Starter Relay B+ circuit and the Starter Relay Output Circuits. Did the Starter Motor crank the engine? Yes → Go To 5 No → Go To 8	All
5	Turn the ignition off. Remove the Starter Relay from the PDC. Turn the ignition on. Using a 12-volt test light, probe the Ignition Switch Output circuit in the Starter Relay connector. While observing 12-volt test light, hold ignition key in the start position. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Ignition Switch Output circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
6	Turn the ignition off. Remove the Starter Relay from the PDC. Disconnect the PCM harness connector. Measure the Starter Relay Control circuit between the Relay terminal and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Starter Relay Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
7	Turn the ignition off. Install a substitute a Relay in the of the Starter Motor Relay. Attempt to start the vehicle. Does the engine crank over? Yes → Replace the Starter Motor Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. Remove the Starter Relay from the PDC. Disconnect the Starter Relay Output connector from the Starter Solenoid. Measure the resistance of the Starter Relay Output circuit between the Relay and the Solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair Starter Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
9	Turn the ignition off. Remove the Starter Relay from the PDC. Using a 12-volt test light connected to ground, probe the Fused B+ circuit at the Starter Relay terminal. Does the test light illuminate brightly? Yes → Go To 10 No → Repair the Fused B(+) Circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
10	If there are no other possible causes remaining, review repair. Repair Replace the Starter. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*NO RESPONSE FROM PCM WITH A NO START CONDITION

POSSIBLE CAUSES
PCM FUSED B+ CIRCUIT
PCM FUSED IGNITION SWITCH OUTPUT CIRCUIT
PCM GROUND CIRCUITS
PCM

TEST	ACTION	APPLICABILITY
1	**NOTE: The DRBIII® and cable must be operating properly for the results of this test to be valid.** **NOTE: Ensure the ignition switch was on when trying to communicate with the PCM.** Turn the ignition off. Disconnect the PCM harness connector. Using a 12-volt test light connected to ground, probe the PCM Fused B+ circuit in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 2 No → Repair the Fused B+ circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Turn the ignition off. Disconnect the PCM harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the PCM Fused Ignition Switch Output circuit in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the Ignition Switch Output circuit Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. Disconnect the PCM harness connector. Using a 12-volt test light connected to battery voltage, probe all the PCM ground circuits in the PCM harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the PCM ground circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
4	If there is no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*START AND STALL CONDITION

POSSIBLE CAUSES
CHECKING DTCS
CHECKING SKIM DTCS
FUEL PRESSURE OUT OF SPECS
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
TP SENSOR SWEEP
TP SENSOR VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
ECT SENSOR OPERATION
OTHER POSSIBLE CAUSES FOR START & STALL
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Are any DTCs present? Yes → Refer to the Driveability Category and perform the appropriate symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 2	All
2	Turn the ignition on. **NOTE: If you are unable to communicate with the SKIM, refer to the Communication Category and perform the appropriate symptom.** With the DRBIII®, read the SKIM codes. Are there any SKIM DTCs? Yes → Refer to the Vehicle Theft category and perform the appropriate symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 3	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge to the fuel rail test port. (2.7L use the fuel adapter #6539 Miller Tool) Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 4 Within Specification Go To 6 Above Specification Replace the fuel filter/fuel pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 1. **Caution: Stop All Actuations.**	All
4	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16″ fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the ″T″ fitting on tool #6539. Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 5 **Caution: Stop All Actuations.**	All
5	Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
6	**Note: The fuel pressure must be within specification before continuing.** Turn the ignition off. **WARNING: The fuel system is under a constant pressure even with the engine off. Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16″) or #6631(3/8″) to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container. **Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.** **Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.** Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification? Yes → Go To 7 No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. Perform POWERTRAIN VERIFICATION TEST VER - 1. **Caution: Stop All Actuations.**	All
7	Turn the ignition on. With the DRBIII®, read TPS VOLTS. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 8 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
8	Turn the ignition on. With the DRBIII®, read Throttle Position voltage. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 9 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
9	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soaked).** **NOTE: If the vehicle was allow to sit over night with no engine start, coolant temperature should be near ambient temperatures.** Turn the ignition on. With the DRBIII®, read the Engine Coolant Temperature value. **Note: If engine coolant temperature is above 82° C (180° F), allow the engine to cool until 65° C (150° F) is reached.** Start the engine. During engine warm-up, monitor the Engine Coolant Temperature value. The temperature value change should be a smooth transition from start up to normal operating temp 82° C (180° F). The value should reach at least 82° C (180° F). Did the Engine Temperature value increase smoothly and did it reach at least 82° C (180° F)? Yes → Go To 10 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
10	The following additional items should be checked as a possible cause for a start and stall condition. Refer to any Technical Service Bulletins (TSB's) that may apply to the symptom. Fuel must be free of contamination. The exhaust system must be free of any restrictions. The engine compression must be within specifications. The engine valve timing must be within specifications. The engine must be free from vacuum leaks. The throttle body must be free of carbon buildup and dirt. Do any of the above conditions exist? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All

Verification Tests

41TE TRANSMISSION VERIFICATION TEST - VER 1	APPLICABILITY
1. Connect the DRBIII® to the Data Link Connector (DLC). 2. Reconnect any disconnected components. 3. With the DRBIII®, erase all Transmission DTC's, also erase the PCM DTC's. **4. NOTE: Erase DTC P0700 in the PCM to turn the Malfunction Indicator Lamp (MIL) off after making Transmission repairs.** 5. With the DRBIII®, display Transmission Temperature. Start and run the engine until the Transmission Temperature is HOT - above 43° C or 110° F. 6. Check the Transmission Fluid and adjust if necessary. Refer to the Service information for the Fluid Fill procedure. **7. NOTE: If the Transmission Control Module or the Transmission has been repaired or replaced it is necessary to perform the DRBIII® Quick Learn Procedure and reset the ″Pinion Factor″** 8. Road test the vehicle. With the DRBIII®, monitor the engine RPM. Make 15 to 20 1-2, 2-3, 3-4 upshifts. Perform these shifts from a standing start to 45 MPH with a constant throttle opening of 20 to 25 degrees. 9. Below 25 MPH, make 5 to 8 wide open throttle kickdowns to 1st gear. Allow at least 5 seconds each in 2nd and 3rd gear between each kickdown. 10. For a specific DTC, drive the vehicle to the Symptom's When Monitored/When Set conditions to verify the DTC repair. 11. If equipped with AutoStick®, up-shift and down-shift several times using the AutoStick® feature during the road test. **12. NOTE: Use the EATX OBDII Task Manager to run Good Trip time in each gear, this will confirm the repair and to ensure that the DTC has not re-matured.** 13. Check for Diagnostic Trouble Codes (DTC's) during the road test. If a DTC sets during the road test , return to the Symptom list and perform the appropriate Symptom. Were there any Diagnostic Trouble Codes (DTCs) set during the road test? Yes → Refer to the Symptom List for appropriate Symptom(s). No → Repair is complete.	All

Verification Tests — Continued

BODY VERIFICATION TEST - VER 1	APPLICABILITY
1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors. 2. If the Sentry Key Immobilizer Module (SKIM) or the Powertrain Control Module (PCM) was replaced, proceed to number 6. If the SKIM or PCM was not replaced, continue to the next number. 3. If the Body Control Module was replaced, turn the ignition on for 15 seconds (to allow the new BCM to learn VIN) or engine may not start (if VTSS equipped). If the vehicle is equipped with VTSS, use the DRBIII® and enable VTSS. 4. Program all other options as needed. 5. If any repairs were made to the HVAC System, disconnect the battery or, using the DRBIII®, recalibrate the HVAC doors. Proceed to number 13. 6. Obtain the Vehicle's unique PIN assigned to it's original SKIM from either the vehicle's invoice or from Chrysler's Customer Assistance Center (1-800-992-1997). 7. NOTE: Once Secured Access Mode is active, the SKIM will remain in that mode for 60 seconds. 8. With the DRBIII®, select THEFT ALARM, SKIM, MISCELLANEOUS and select SKIM REPLACED. Enter the 4 digit PIN to put the SKIM in Secured Access Mode. 9. The DRBIII® will prompt for the following steps. (1) Program the country code into the SKIM's memory. (2) Program the vehicle's VIN into the SKIM memory. (3) Transfer the vehicle's Secret Key data from the PCM. 10. Using the DRBIII®, program all customer keys into the SKIM memory. This requires that the SKIM be in Secured Access Mode, using the 4 digit PIN. 11. Note: If the PCM is replaced, the VIN and the unique Secret Key data must be transferred from the SKIM to the PCM. This procedure requires the SKIM to be placed in Secured Access Mode using the 4-digit PIN. 12. Note: After 3 attempts at entering Secured Access Mode with an incorrect PIN, Secured Access Mode will be locked out for 1 hour and the DRBIII® will display ″Bus +\- Signals Open″ or ″No Response″. To exit this mode, turn ignition to Run for 1 hour. 13. Ensure that all accessories are turned off and the battery is fully charged. 14. Ensure that the Ignition is on. 15. With the DRBIII®, record and erase all DTCs from ALL modules. Start and run the engine for 2 minutes. Operate all functions of the system that caused the original concern. 16. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII®, read DTCs from ALL modules. Are any DTC's present or is the original condition still present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 1	APPLICABILITY
1. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM. **2. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.** 3. Inspect the vehicle to ensure that all components related to the repair are connected properly. 4. Inspect the engine oil for fuel contamination. Replace the oil and filter as necessary. 5. Attempt to start the engine. 6. If the No Start condition is still present, refer to the symptom list and perform the diagnostic testing as necessary. refer to and Technical Service Bulletins that may apply. 7. Run the engine for one warm-up cycle to verify operation. 8. With the DRBIII®, confirm that no DTCs or Secondary Indicators are present and that all components are functioning properly. 9. If a DTC is present, refer to the appropriate category and select the corresponding symptom. Are any DTCs present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

POWERTRAIN VERIFICATION TEST VER - 2	APPLICABILITY
1. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM. **2. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.** 3. Inspect the vehicle to ensure that all components related to the repair are connected properly. 4. With the DRBIII®, clear DTCs and Reset Memory all engine values. 5. Run the engine for one warm-up cycle to verify proper operation. 6. Road test the vehicle. Use all accessories that may be related to this repair. 7. With the DRBIII®, confirm that no DTC's or Secondary Indicators are present and that all components are functioning properly. 8. If this test is being performed after a No Trouble Code test, verify the symptom is no longer present. 9. If the symptom is still present, or any other symptom or DTC is present refer to the appropriate category and perform the corresponding symptom. 10. Refer to any Technical Service Bulletins that may apply. 11. If there are no DTCs present and all components are functional properly, the repair is complete. Are any DTCs present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 3	APPLICABILITY
1. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM. **2. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.** 3. Inspect the vehicle to ensure that all components related to the repair are connected properly. 4. With the DRBIII®, clear DTCs. 5. Perform generator output test. Refer to the appropriate service information as necessary. 6. Start the engine and set engine speed to 2000 RPM for at least thirty seconds. 7. Cycle the ignition key off and on. 8. With the DRBIII®, read the DTCs. If the DTC returns, or any other symptom or DTC is present, refer to the appropriate category and perform the corresponding symptom. 9. If there are no DTCs present and all components are functioning properly, the repair is complete. Are any DTCs present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 4	APPLICABILITY
1. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM. **2. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.** 3. Inspect the vehicle to ensure that all engine components are properly installed and connected. 4. Connect the DRBIII® to the data link connector and erase all codes. 5. Turn the speed control ON (if equipped, cruise light will be on). 6. Press and release the SET Switch. If the speed control did not engage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 7. Press and hold the RESUME/ACCEL Switch. If the vehicle speed did not increase by at least 2 mph, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 8. Press and hold the COAST switch. The vehicle speed should decrease. If it did not decrease, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 9. Using caution, press and release the brake pedal. If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 10. Bring the vehicle speed back up to 35 MPH. 11. Press the RESUME/ACCEL switch. If the speed control did not resume the previously set speed, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 12. Hold down the SET switch. If the vehicle did not decelerate, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 13. Ensure vehicle speed is greater than 35 mph and release the SET Switch. If vehicle did not adjust and set a new vehicle speed, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 14. Press and release the CANCEL switch. If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 15. Bring the vehicle speed back up above 35 mph and engage speed control. 16. Turn the Speed Control Off. (Cruise light will be off). If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 17. If the vehicle successfully passed all of the previous tests, the speed control system is now functioning as designed. The repair is now complete. Did the Speed Control pass the above test? Yes → Repair is complete. No → Repair is not complete, refer to appropriate symptom.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 5	APPLICABILITY
1. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM. **2. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.** 3. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 4. Connect the DRBIII® to the data link connector. 5. Ensure the fuel tank has at least a quarter tank of fuel. Turn off all accessories. 6. If a Comprehensive Component DTC was repaired, perform steps 5 - 8. If a Major OBDII Monitor DTC was repaired skip those steps and continue verification. 7. After the ignition has been off for at least 10 seconds, restart the vehicle and run 2 minutes. 8. If the Good Trip counter changed to one or more and there are no new DTC's, the repair was successful and is now complete. Erase DTC's and disconnect the DRBIII®. 9. If the repaired DTC has reset, the repair is not complete. Check for any related TSB's or flash updates and return to the Symptom list. 10. If another DTC has set, return to the Symptom List and follow the path specified for that DTC. 11. With the DRBIII®, monitor the appropriate pre-test enabling conditions until all conditions have been met. Once the conditions have been met, switch screen to the appropriate OBDII monitor, (Audible beeps when the monitor is running). 12. If the monitor ran, and the Good Trip counter changed to one or more, the repair was successful and is now complete. Erase DTC's and disconnect the DRBIII®. 13. If the repaired OBDII trouble code has reset or was seen in the monitor while on the road test, the repair is not complete. Check for any related technical service bulletins or flash updates and return to Symptom List. 14. If another DTC has set, return to the Symptom List and follow the path specified for that DTC. Are any DTCs present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

Verification Tests — Continued

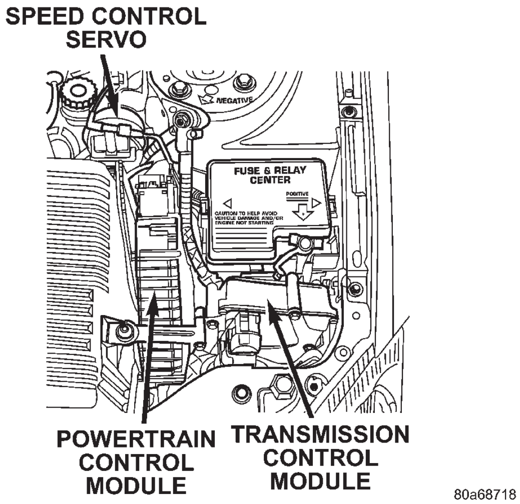
POWERTRAIN VERIFICATION TEST VER - 6	APPLICABILITY
1. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM. **2. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.** 3. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 4. The LDP Monitor Test Mode has been added to the DRBIII® to verify repairs to the LDP System. A DRBIII® software program was written which causes the PCM to run the LDP Monitor as part of this test. Test failures will be indicated through a stored DTC. 5. LDP Monitor Test Mode is a useful way to run a total system performance test. Use this test to verify any type of LDP system repair. 6. Software program makes temporary changes to operating mode of PCM. For this reason, it is critical that test not be interrupted. PCM's left in this mode as result of interrupted test will illuminate the MIL for 8-10 mi of driving with no DTC's stored. 7. Erasing DTC's will not change this condition. 8. If a vehicle is found to be stuck in the mode described above, the LDP Dealer Test should be re-run in its entirety so that the software program in the DRBIII® can restore the PCM operating mode. 9. Note similarity to LDP Monitor screen found under OBDII Monitors. Failure modes are fewer in this System Test than OBDII LDP Monitor. 10. System Test failure may have been, for example, due to a large leak, but the PCM will set the Small Leak DTC to indicate failures that occurred as part of the system test. 11. Connect the DRBIII® to the data link connector. Engine running, turn off all accessories. 12. Note: While test is being performed, PCM must see RPM, minimum MAP, No Vehicle speed and minimum Throttle Position sensor (At idle, in park.) With DRBIII® in System Tests, perform the LDP Monitor Test and follow the instructions on the screen. 13. If the LDP Monitor Test failed and a .020 Leak DTC has set, the repair is not complete. Check for any related Technical Service Bulletins and return to Symptom List. 14. If any other trouble code has set, return to Symptom List and follow the path specified for that trouble code. If the LDP Monitor Test passed, the repair was successful and testing is now complete. Are any DTCs present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

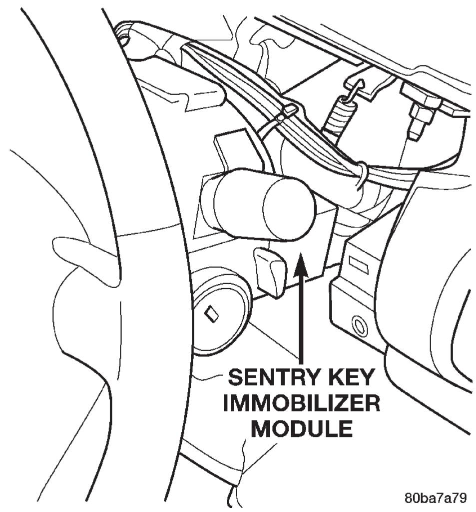
Verification Tests — Continued

SKIS VERIFICATION	APPLICABILITY
1. Reconnect all previously disconnected components and connectors. 2. Obtain the vehicle's unique Personal Identification Number (PIN) assigned to it's original SKIM. This number can be obtained from the vehicle's invoice or Chrysler's Customer Center (1-800-992-1997). **3. NOTE: When entering the PIN, care should be taken because the SKIM will only allow 3 consecutive attempts to enter the correct PIN. If 3 consecutive incorrect PIN's are entered the SKIM will Lock Out the DRB III for 1 hour.** 4. To exit Lock Out mode, the ignition key must remain in the Run position continually for 1 hour. Turn off all accessories and connect a battery charger if necessary. 5. With the DRB III, select Theft Alarm, SKIM and Miscellaneous. Then select desired procedure and follow the steps that will be displayed. 6. If the SKIM has been replaced, ensure all of the vehicle ignition keys are programmed to the new SKIM. **7. NOTE: Prior to returning vehicle to the costumer, perform a module scan to be sure that all DTC's are erased. Erase any DTC's that are found.** 8. With the DRB III erase all DTC's. Perform 5 ignition key cycles leaving the key on for at least 90 seconds per cycle. 9. With the DRB III, read the SKIM DTC's. Are there any SKIM DTC's? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

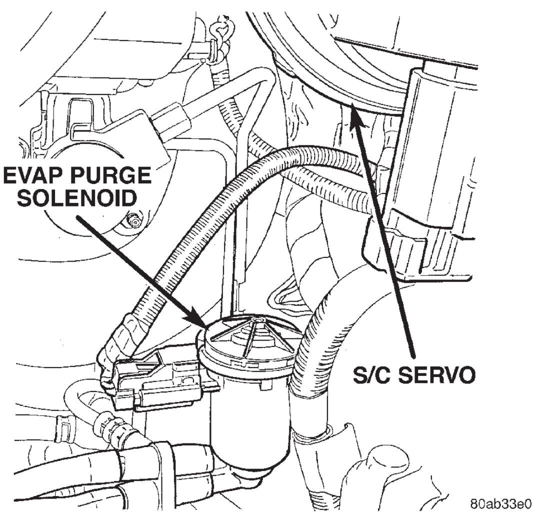
8.0 COMPONENT LOCATIONS

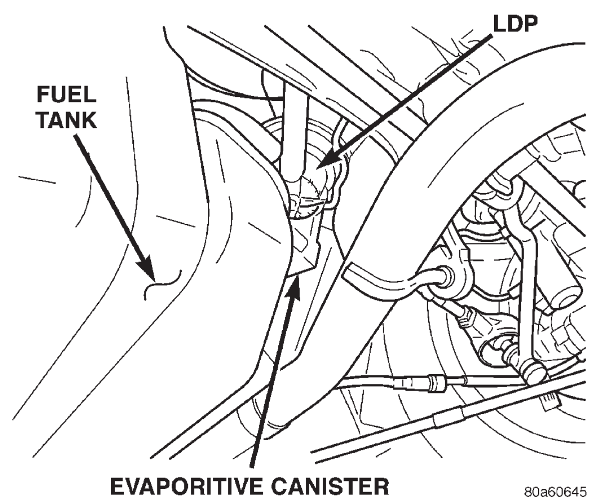
8.1 CONTROL MODULES AND PDC





8.2 CONTROL AND SOLENOIDS





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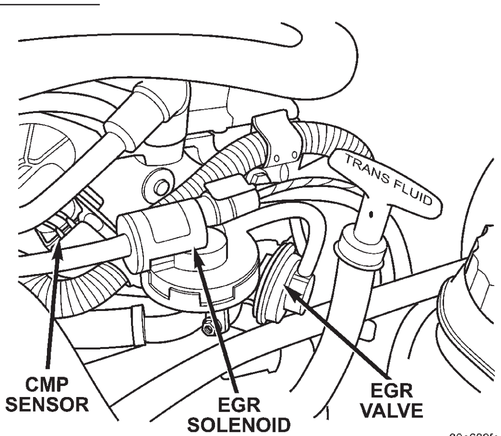

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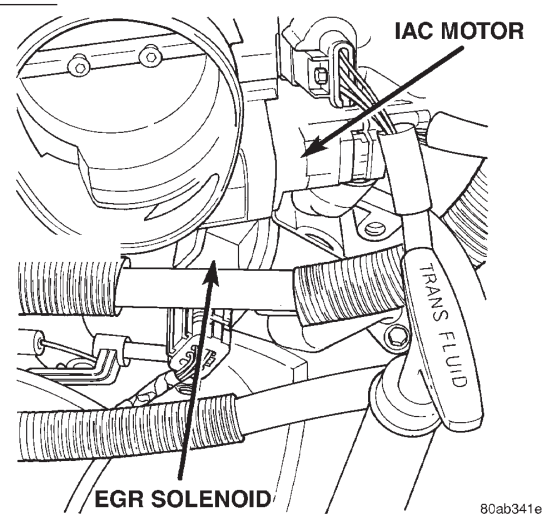

8.2 CONTROL AND SOLENOIDS (Continued)

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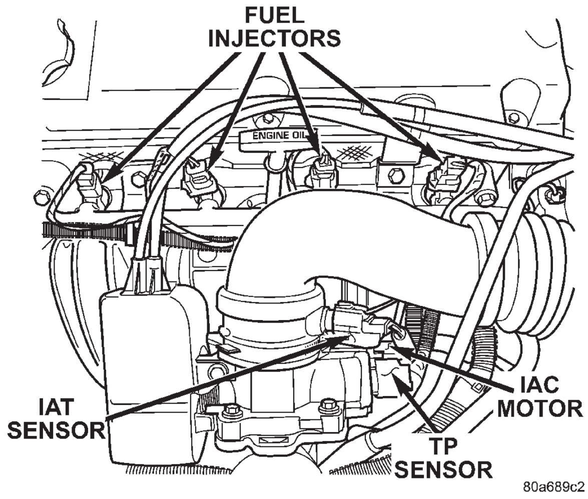

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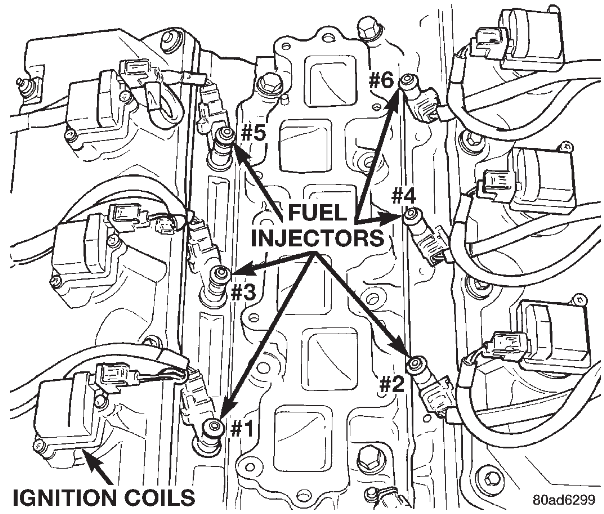

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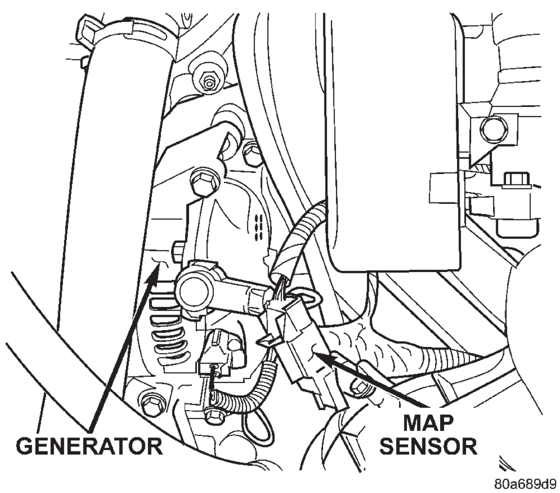

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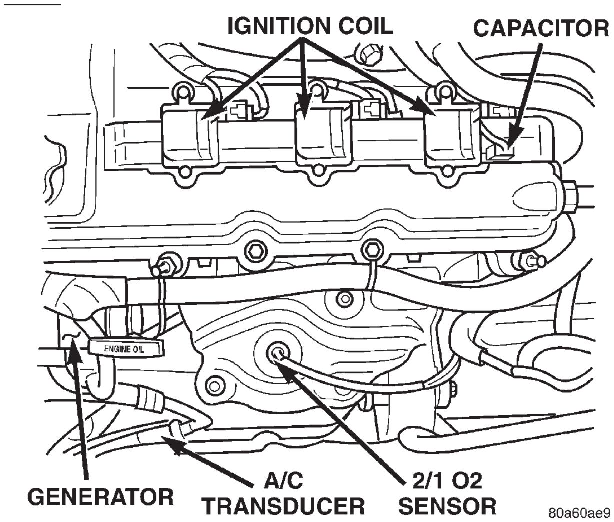

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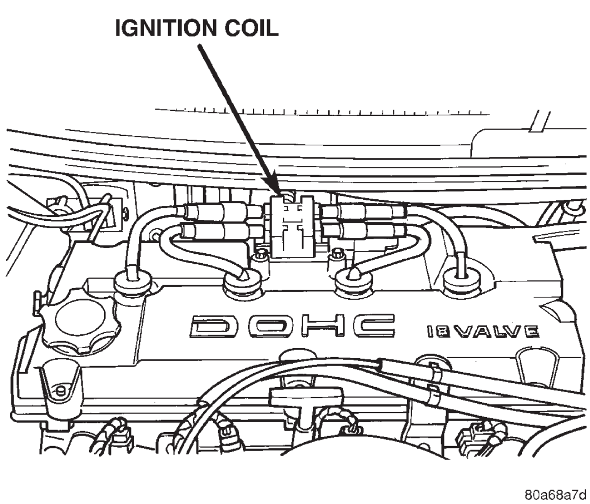

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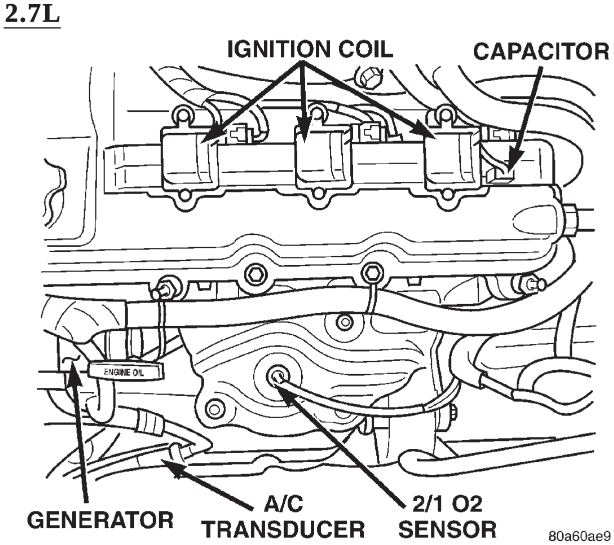

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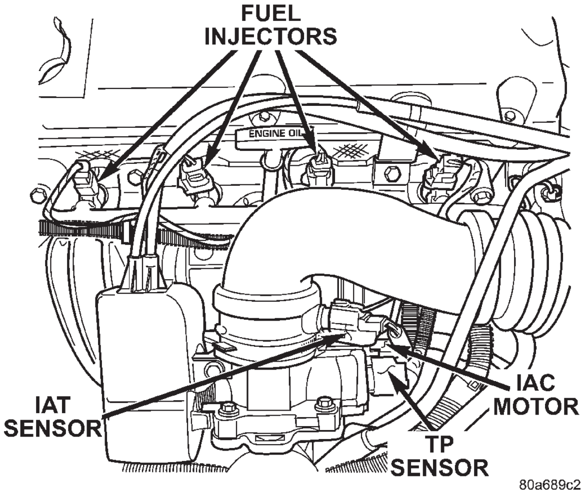

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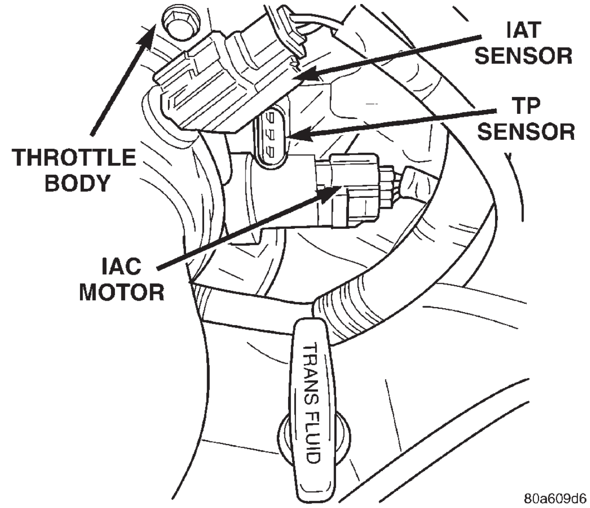
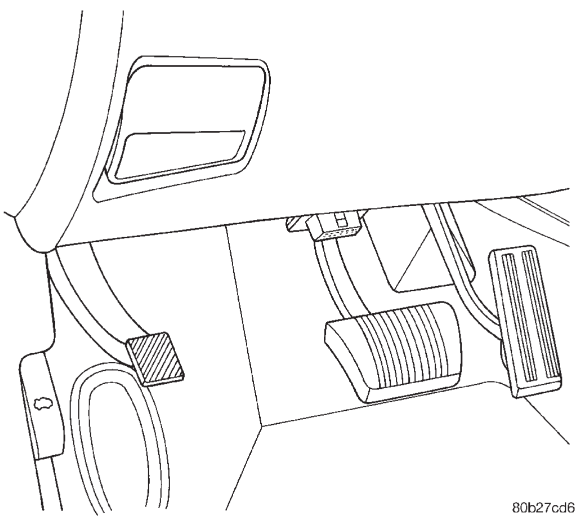
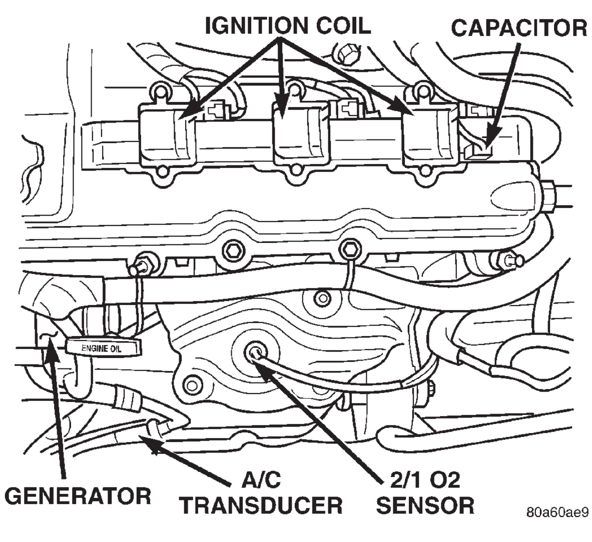


8.3 DATA LINK CONNECTOR



8.4 SENSORS



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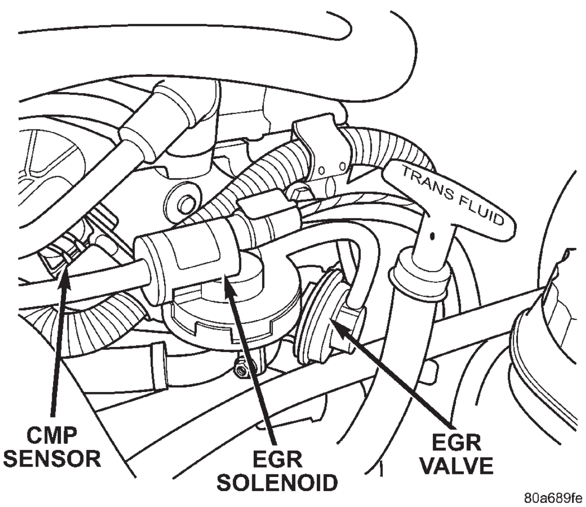

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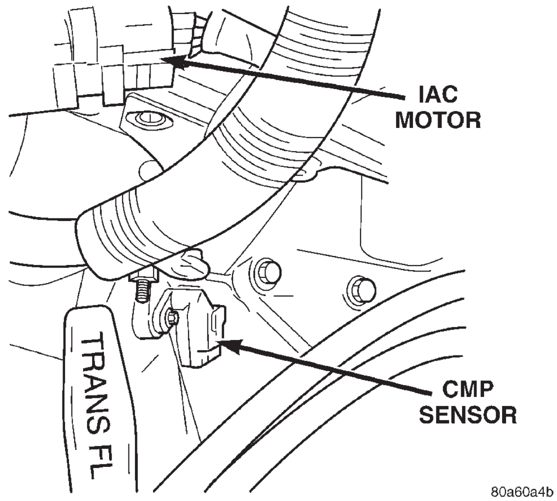

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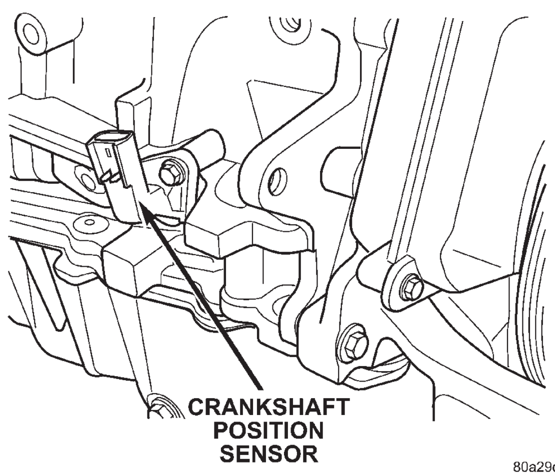

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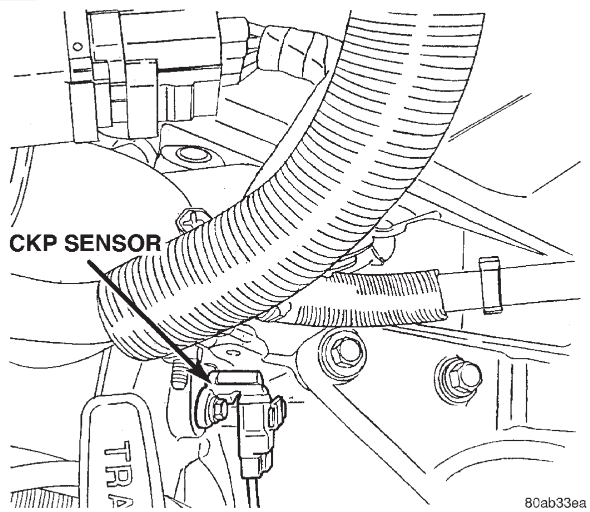

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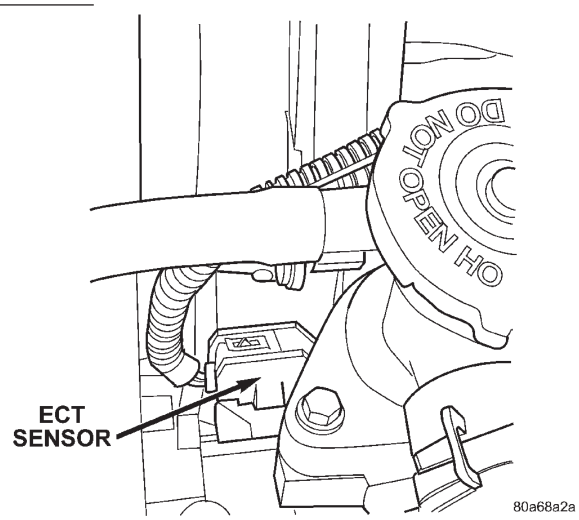

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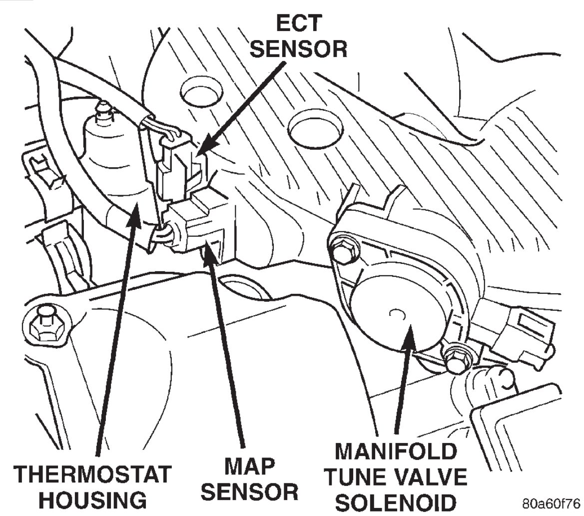

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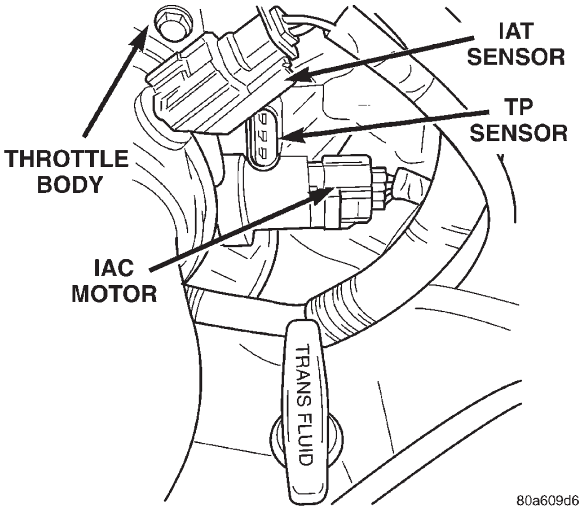

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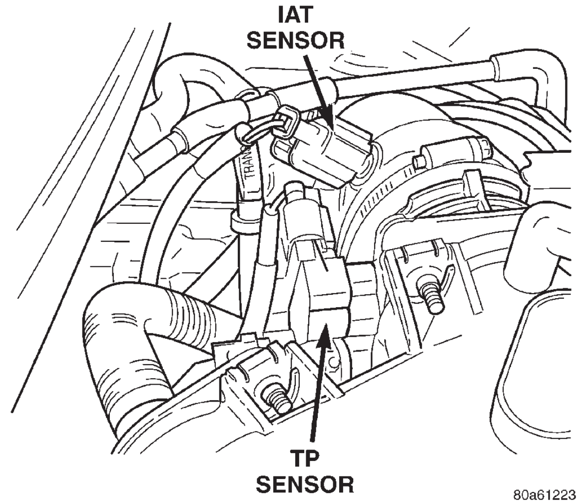

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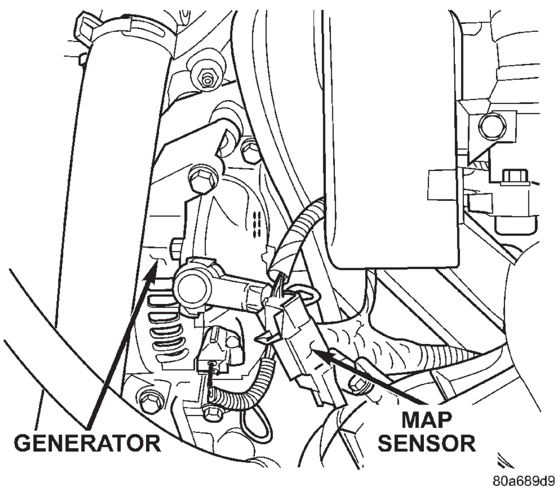

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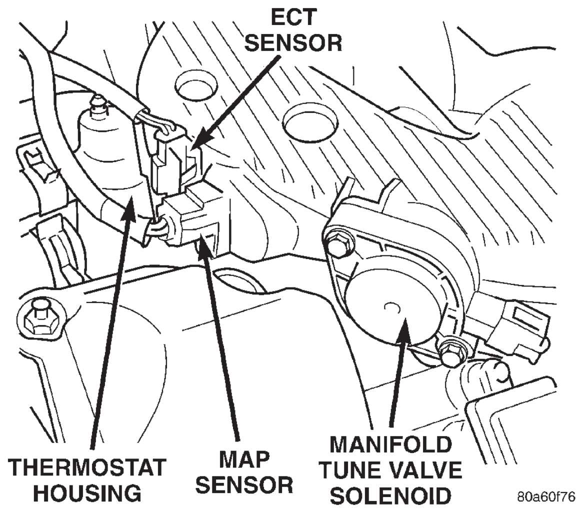

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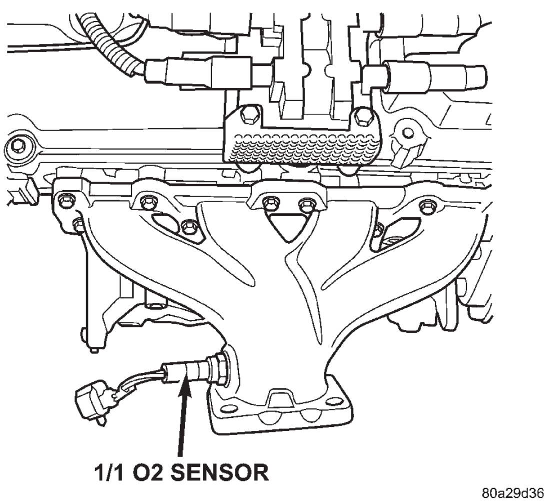

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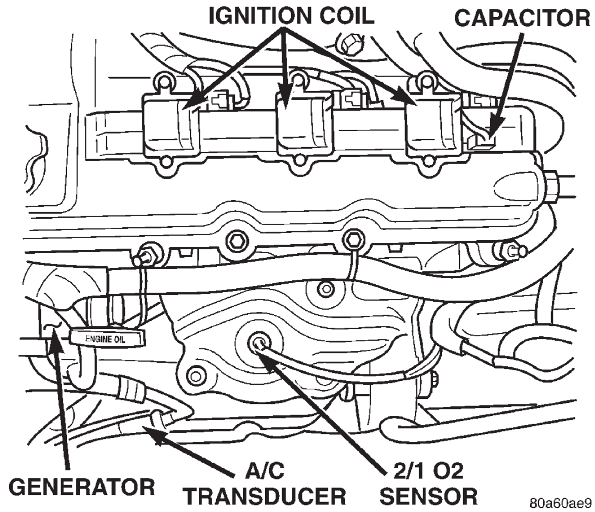

8.4 SENSORS (Continued)

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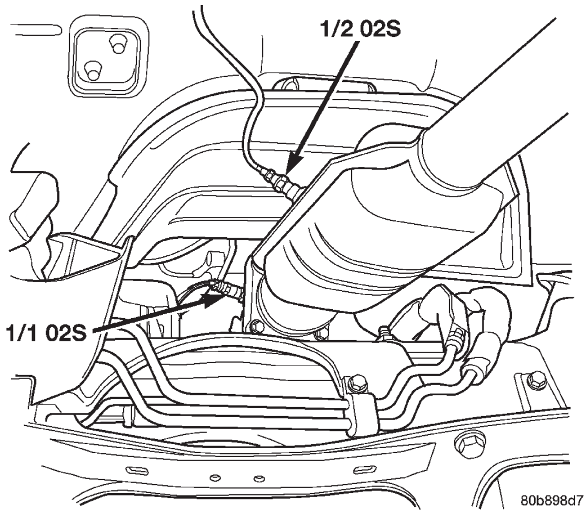

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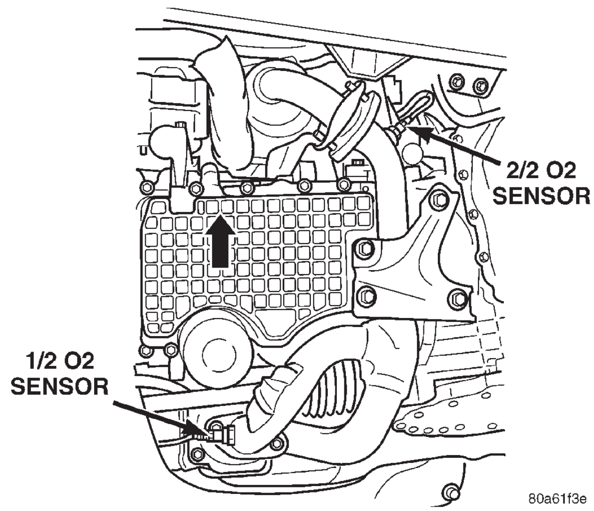

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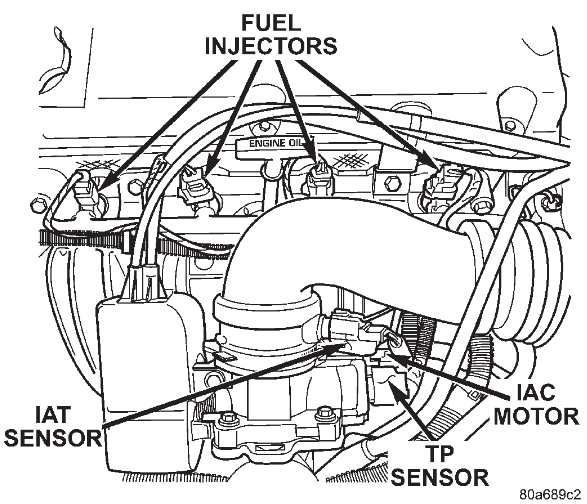

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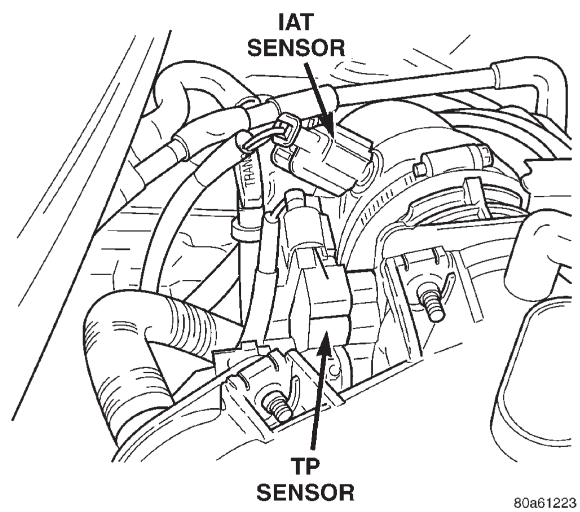
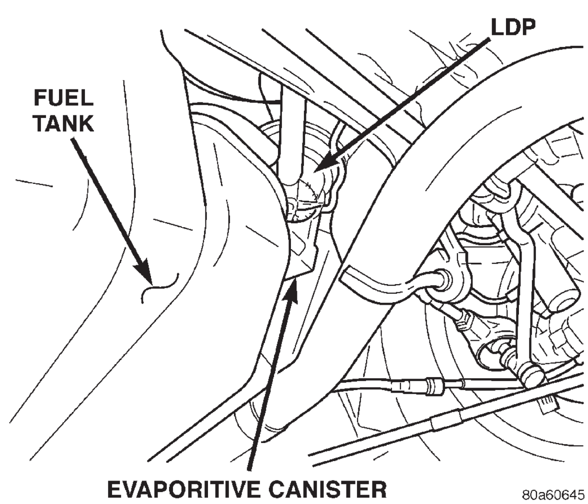
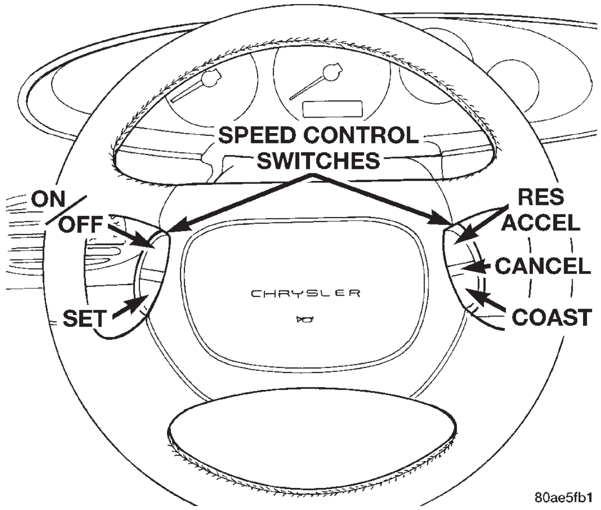


8.5 FUEL SYSTEM



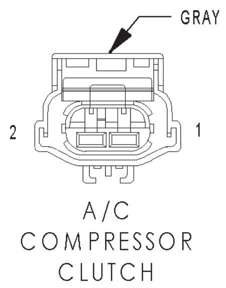
8.6 SWITCHES



SPEED CONTROL SWITCHES
ON/OFF
SET
RES ACCEL
CANCEL
COAST
CHRYSLER
80ae5fb1

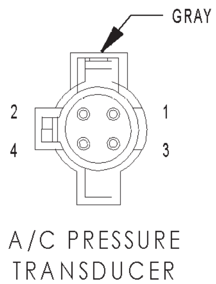
NOTES

9.0 CONNECTOR PINOUTS



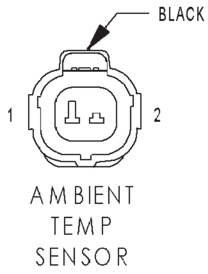
A/C COMPRESSOR CLUTCH - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	C3 14DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
2	-	-



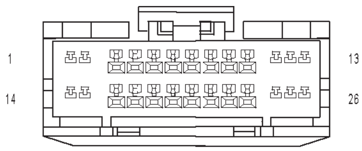
A/C PRESSURE TRANSDUCER - GRAY 4 WAY

CAV	CIRCUIT	FUNCTION
1	K4 20BK/LB	SENSOR GROUND
2	K6 20VT/WT	5V SUPPLY
3	C18 20DB	A/C PRESSURE SIGNAL
4	-	-



AMBIENT TEMP SENSOR - BLACK 2 WAY

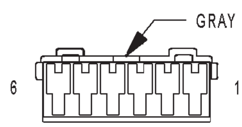
CAV	CIRCUIT	FUNCTION
1	K25 18VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND



BODY CONTROL MODULE C4

BODY CONTROL MODULE C4 - 26 WAY

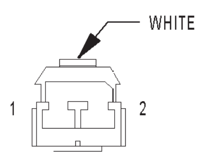
CAV	CIRCUIT	FUNCTION
1	P2 18BK/WT	DECKLID RELEASE SOLENOID DRIVER
2	Q17 20RD/WT (JR27)	WINDOW DROP RELAY CONTROL
3	G72 20DG/OR (VTSS)	PASSENGER CYLINDER LOCK SWITCH MUX
4	G73 20LG/OR (VTSS)	DRIVER CYLINDER LOCK SWITCH MUX
5	G75 20TN	DRIVER DOOR AJAR SWITCH SENSE
6	G74 20TN/RD	PASSENGER DOOR AJAR SWITCH SENSE
7	G77 20TN/OR (JR41)	LEFT REAR DOOR AJAR SWITCH SENSE
8	G76 20TN/YL (JR41)	RIGHT REAR DOOR AJAR SWITCH SENSE
9	P175 18OR/BK	DRIVER LOCK RELAY OUTPUT
10	P179 18OR/BR (JR41)	LEFT REAR LOCK RELAY OUTPUT
11	P180 18OR/TN (JR41)	RIGHT REAR LOCK RELAY OUTPUT
12	P176 18PK/BK	PASSENGER LOCK RELAY OUTPUT
13	P177 18DB/WT	DRIVER UNLOCK RELAY OUTPUT
14	G38 18GY (JR27)	GARAGE DOOR OPENER ENABLE
15	P97 20WT/DG	DRIVER DOOR SWITCH MUX
16	P96 20WT/LG	PASSENGER DOOR SWITCH MUX
17	Q31 20WT/BK (JR27)	CONVERTIBLE TOP SWITCH MUX
18	G78 18TN/BK	DECKLID AJAR SWITCH SENSE
19	E2 20OR	PANEL LAMPS DRIVER
20	P6 20RD/WT (JR27)	TOP UP RELAY CONTROL
21	G71 20VT/YL (VTSS)	DECKLID SECURITY SWITCH SENSE
22	G4 18DB	FUEL LEVEL SENSOR SIGNAL
23	P5 20 YL/BK (JR27)	TOP DOWN RELAY CONTROL
24	P182 18PK/DB (JR41)	RIGHT REAR UNLOCK RELAY OUTPUT
25	P178 18PK/LB	PASSENGER UNLOCK RELAY OUTPUT
26	P181 18PK/BK (JR41)	LEFT REAR UNLOCK RELAY OUTPUT



BRAKE LAMP SWITCH

BRAKE LAMP SWITCH - GRAY 6 WAY

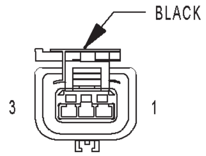
CAV	CIRCUIT	FUNCTION
1	K29 20WT/PK	BRAKE SWITCH SENSE
2	Z241 20BK/LG	GROUND
3	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
4	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
5	L50 16WT/TN	BRAKE LAMP SWITCH OUTPUT
6	A7 16RD/BK	FUSED B(+)



BRAKE TRANSMISSION SHIFT INTERLOCK SOLENOID

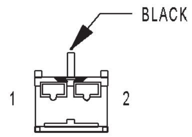
BRAKE TRANSMISSION SHIFT INTERLOCK SOLENOID - WHITE 2 WAY

CAV	CIRCUIT	FUNCTION
1	K29 18 WT/PK (JR27)	BRAKE SWITCH SENSE
1	K29 20WT/PK (JR41)	BRAKE SWITCH SENSE
2	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)



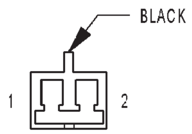
CAMSHAFT POSITION SENSOR - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K7 20OR	8V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL



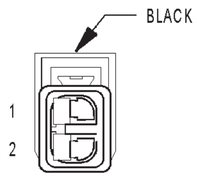
CLUTCH INTERLOCK/UPSTOP SWITCH (JR27 MTX) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	T141 16YL/RD	FUSED IGNITION SWITCH OUTPUT (START)
2	A41 16YL	FUSED IGNITION SWITCH OUTPUT (START)



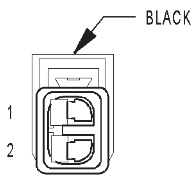
CLUTCH INTERLOCK/ UPSTOP SWITCH (JR41 MTX) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	A41 16YL	FUSED IGNITION SWITCH OUTPUT (START)
2	T141 16YL/RD	FUSED IGNITION SWITCH OUTPUT (START)



COIL ON PLUG NO. 1 (2.7L) - BLACK 2 WAY

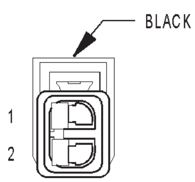
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K91 16TN/RD	COIL ON PLUG DRIVER NO. 1



COIL ON PLUG NO. 2 (2.7L)

COIL ON PLUG NO. 2 (2.7L) - BLACK 2 WAY

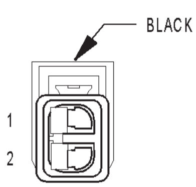
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K92 16TN/PK	COIL ON PLUG DRIVER NO. 2



COIL ON PLUG NO. 3 (2.7L)

COIL ON PLUG NO. 3 (2.7L) - BLACK 2 WAY

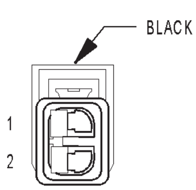
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K93 16TN/OR	COIL ON PLUG DRIVER NO. 3



COIL ON PLUG NO. 4 (2.7L)

COIL ON PLUG NO. 4 (2.7L) - BLACK 2 WAY

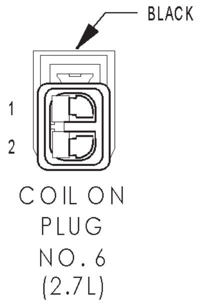
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K94 16TN/LG	COIL ON PLUG DRIVER NO. 4



COIL ON PLUG NO. 5 (2.7L)

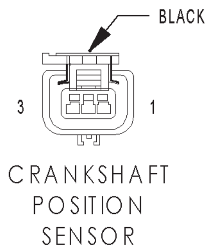
COIL ON PLUG NO. 5 (2.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K95 16TN/DG	COIL ON PLUG DRIVER NO. 5



COIL ON PLUG NO. 6 (2.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K96 16TN/LB	COIL ON PLUG DRIVER NO. 6

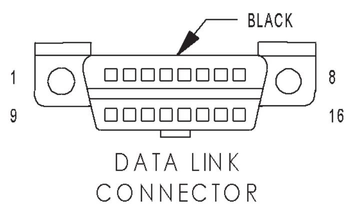


CRANKSHAFT POSITION SENSOR - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K7 20OR	8V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL

DATA LINK CONNECTOR - BLACK 16 WAY

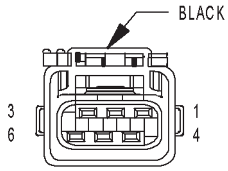
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/GY	PCI BUS
3	-	-
4	Z305 20BK/YL	GROUND
5	Z306 20BK/VT	GROUND
6	D20 20LG	SCI RECEIVE
7	D21 20PK	SCI TRANSMIT
8	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
9	D19 20VT/OR	BODY CONTROL MODULE FLASH ENABLE
10	-	-
11	-	-
12	-	-
13	-	-
14	D6 20PK/LB	SCI RECEIVE
15	-	-
16	M1 20PK	FUSED B(+)



EGR SOLENOID (2.0L/2.4L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F142 16OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K35 20GY/YL	EGR SOLENOID CONTROL

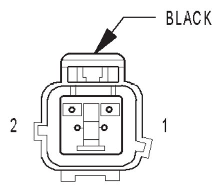
CONNECTOR PINOUTS



EGR SOLENOID (2.7L)

EGR SOLENOID (2.7L) - BLACK 6 WAY

CAV	CIRCUIT	FUNCTION
1	K235 20LG/PK	EGR SENSOR SIGNAL
2	K6 20VT/WT	5V SUPPLY
3	K4 20BK/LB	SENSOR GROUND
4	K35 20GY/YL	EGR SOLENOID CONTROL
5	-	-
6	F142 18OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT



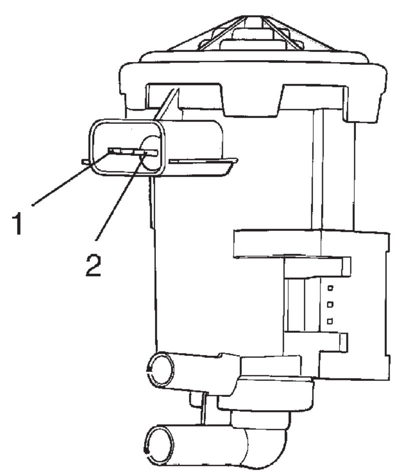
ENGINE COOLANT TEMP SENSOR

ENGINE COOLANT TEMP SENSOR - BLACK 2 WAY

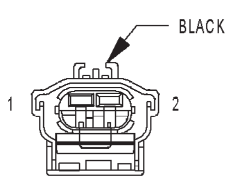
CAV	CIRCUIT	FUNCTION
1	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
2	K4 20BK/LB	SENSOR GROUND

EVAP/PURGE SOLENOID - 2 WAY

CAV	CIRCUIT	FUNCTION
1	K52 18PK/BK	EVAPORATIVE EMISSION SOLENOID CONTROL
2	K108 18WT/TN	EVAPORATIVE SOLENOID SENSE



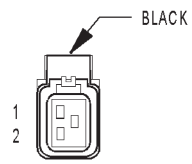
EVAP/PURGE SOLENOID



EVAP/PURGE SOLENOID

EVAP/PURGE SOLENOID - BLACK 2 WAY

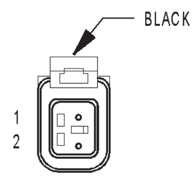
CAV	CIRCUIT	FUNCTION
1	K52 18PK/BK	EVAPORATIVE EMISSION SOLENOID CONTROL
2	K108 18WT/TN	EVAPORATIVE SOLENOID SENSE



FUEL INJECTOR NO. 1 (2.0L/2.4L)

FUEL INJECTOR NO. 1 (2.0L/2.4L) - BLACK 2 WAY

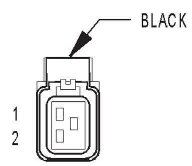
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K11 18WT/DB	INJECTOR NO. 1 DRIVER



FUEL INJECTOR NO. 1 (2.7L)

FUEL INJECTOR NO. 1 (2.7L) - BLACK 2 WAY

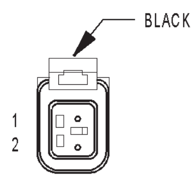
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K11 18WT/DB	INJECTOR NO. 1 DRIVER



FUEL INJECTOR NO. 2 (2.0L/2.4L)

FUEL INJECTOR NO. 2 (2.0L/2.4L) - BLACK 2 WAY

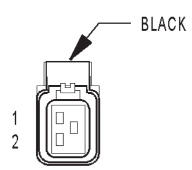
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K12 18TN	INJECTOR NO. 2 DRIVER



FUEL INJECTOR NO. 2 (2.7L)

FUEL INJECTOR NO. 2 (2.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K12 18TN	INJECTOR NO. 2 DRIVER



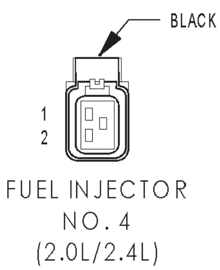
FUEL INJECTOR NO. 3 (2.0L/2.4L)

FUEL INJECTOR NO. 3 (2.0L/2.4L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K13 18YL/WT	INJECTOR NO. 3 DRIVER

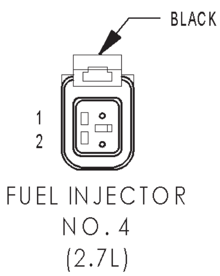
FUEL INJECTOR NO. 3 (2.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K13 18YL/WT	INJECTOR NO. 3 DRIVER



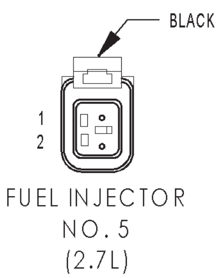
FUEL INJECTOR NO. 4 (2.0L/2.4L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K14 18LB/BR	INJECTOR NO. 4 DRIVER



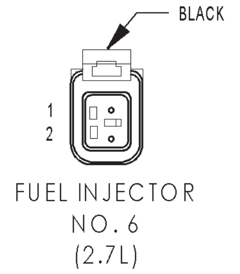
FUEL INJECTOR NO. 4 (2.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K14 18LB/BR	INJECTOR NO. 4 DRIVER



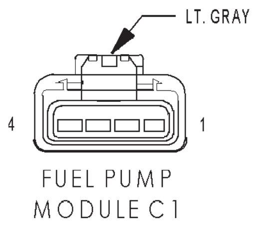
FUEL INJECTOR NO. 5 (2.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K38 18GY	INJECTOR NO. 5 DRIVER



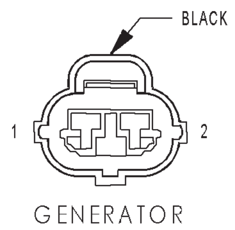
FUEL INJECTOR NO. 6 (2.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K58 18BR/DB	INJECTOR NO. 6 DRIVER



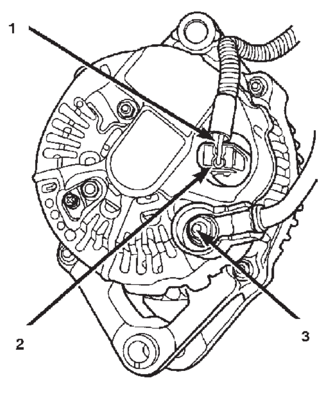
FUEL PUMP MODULE C1 - LT. GRAY 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z211 14BK	GROUND
2	Z211 14BK	GROUND
3	G4 18DB	FUEL LEVEL SENSOR SIGNAL
4	A141 14DG/WT	FUEL PUMP RELAY OUTPUT



GENERATOR - BLACK 2 WAY

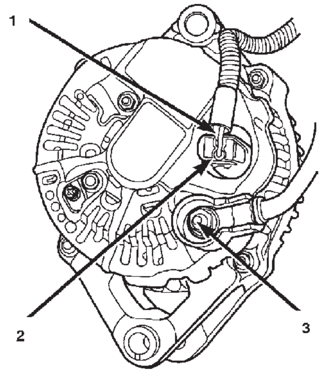
CAV	CIRCUIT	FUNCTION
1	F142 18OR/DG (2.7L)	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
1	F142 16OR/DG (2.0L/2.4L)	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
2	K20 18DG	GENERATOR FIELD DRIVER



GENERATOR (2.0L/2.4L) - 4 WAY

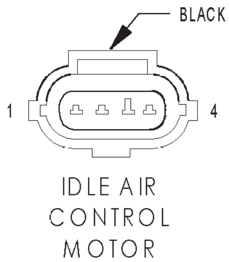
CAV	CIRCUIT	FUNCTION
1	-	AUTOMATIC SHUTDOWN RELAY OUTPUT
2	-	GENERATOR FIELD DRIVER
3	-	B(+) TERMINAL
4	-	CASE GROUND

CONNECTOR PINOUTS



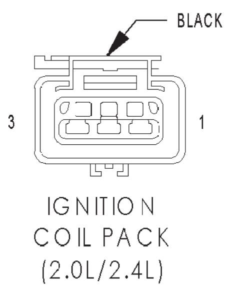
GENERATOR (2.7L) - 4 WAY

CAV	CIRCUIT	FUNCTION
1	-	AUTOMATIC SHUTDOWN RELAY OUTPUT
2	-	GENERATOR FIELD DRIVER
3	-	B(+) TERMINAL
4	-	CASE GROUND



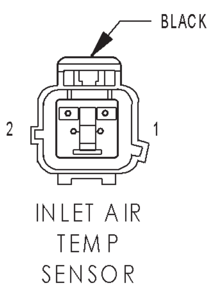
IDLE AIR CONTROL MOTOR - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	K39 20GY/RD	IDLE AIR CONTROL MOTOR NO. 1 DRIVER
2	K60 20YL/BK	IDLE AIR CONTROL MOTOR NO. 2 DRIVER
3	K40 20BR/WT	IDLE AIR CONTROL MOTOR NO. 3 DRIVER
4	K59 20VT/BK	IDLE AIR CONTROL MOTOR NO. 4 DRIVER



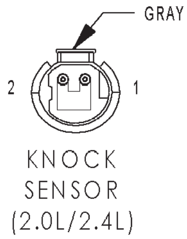
IGNITION COIL PACK (2.0L/2.4L) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K17 16DB/TN	IGNITION COIL NO. 2 DRIVER
2	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K19 16BK/GY	IGNITION COIL NO. 1 DRIVER



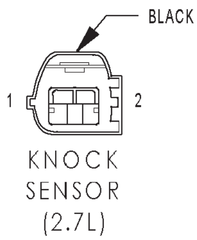
INLET AIR TEMP SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K21 20BK/RD	INLET AIR TEMPERATURE SIGNAL
2	K4 20BK/LB	SENSOR GROUND



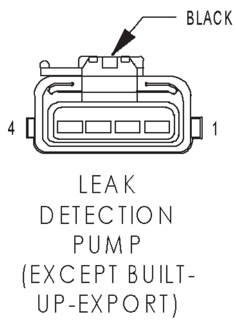
KNOCK SENSOR (2.0L/2.4L) - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	K42 18DB/LG	KNOCK SENSOR SIGNAL
2	K4 20BK/LB	SENSOR GROUND



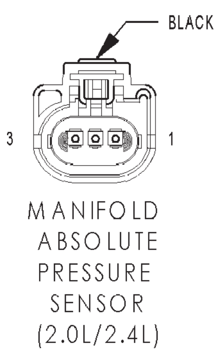
KNOCK SENSOR (2.7L) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K4 20BK/LB	SENSOR GROUND
2	K42 18DB/LG	KNOCK SENSOR SIGNAL



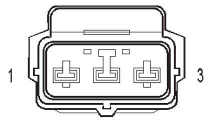
LEAK DETECTION PUMP (EXCEPT BUILT-UP-EXPORT) - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	K106 20WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
4	K107 20OR	LEAK DETECTION PUMP SWITCH SENSE



MANIFOLD ABSOLUTE PRESSURE SENSOR (2.0L/2.4L) - BLACK 3 WAY

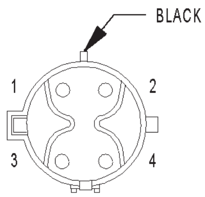
CAV	CIRCUIT	FUNCTION
1	K1 20DG/RD	MAP SENSOR SIGNAL
2	K4 20BK/LB	SENSOR GROUND
3	K6 20VT/WT	5V SUPPLY



MANIFOLD ABSOLUTE PRESSURE SENSOR (2.7L)

MANIFOLD ABSOLUTE PRESSURE SENSOR (2.7L) - 3 WAY

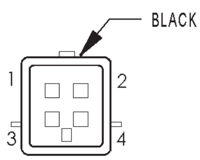
CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K1 20DG/RD	MAP SENSOR SIGNAL



OXYGEN SENSOR 1/1 RIGHT BANK UP (2.7L)

OXYGEN SENSOR 1/1 RIGHT BANK UP (2.7L) - BLACK 4 WAY

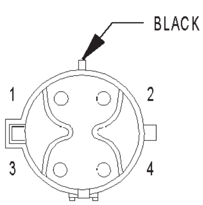
CAV	CIRCUIT	FUNCTION
1	Z192 20BK	GROUND
2	F142 18OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K127 18DB/LG	OXYGEN SENSOR GROUND
4	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL



OXYGEN SENSOR 1/1 UPSTREAM (2.0L/2.4L)

OXYGEN SENSOR 1/1 UPSTREAM (2.0L/2.4L) - BLACK 4 WAY

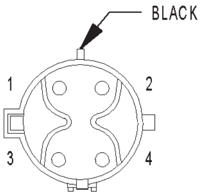
CAV	CIRCUIT	FUNCTION
1	K79 18OR/RD	OXYGEN SENSOR 1/1 HEATER CONTROL
2	F142 16OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K127 18DB/OR	OXYGEN SENSOR GROUND
4	K41 20BK/LG	OXYGEN SENSOR 1/1 SIGNAL



OXYGEN SENSOR 1/2 DOWNSTREAM (2.0L/2.4L)

OXYGEN SENSOR 1/2 DOWNSTREAM (2.0L/2.4L) - BLACK 4 WAY

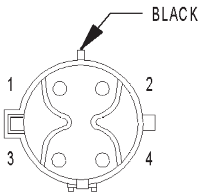
CAV	CIRCUIT	FUNCTION
1	Z186 20BK	GROUND
2	F142 16OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K127 18DB/OR	OXYGEN SENSOR GROUND
4	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL



OXYGEN SENSOR 1/2 RIGHT BANK DOWN (2.7L)

OXYGEN SENSOR 1/2 RIGHT BANK DOWN (2.7L) - BLACK 4 WAY

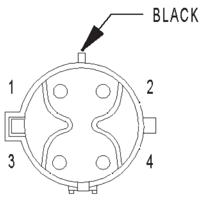
CAV	CIRCUIT	FUNCTION
1	Z188 20BK	GROUND
2	F142 18OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K127 18DB/LG	OXYGEN SENSOR GROUND
4	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL



OXYGEN SENSOR 2/1 LEFT BANK UP (2.7L)

OXYGEN SENSOR 2/1 LEFT BANK UP (2.7L) - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z193 20BK	GROUND
2	F142 18OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K127 18DB/LG	OXYGEN SENSOR GROUND
4	K241 20LG/RD	OXYGEN SENSOR 2/1 SIGNAL

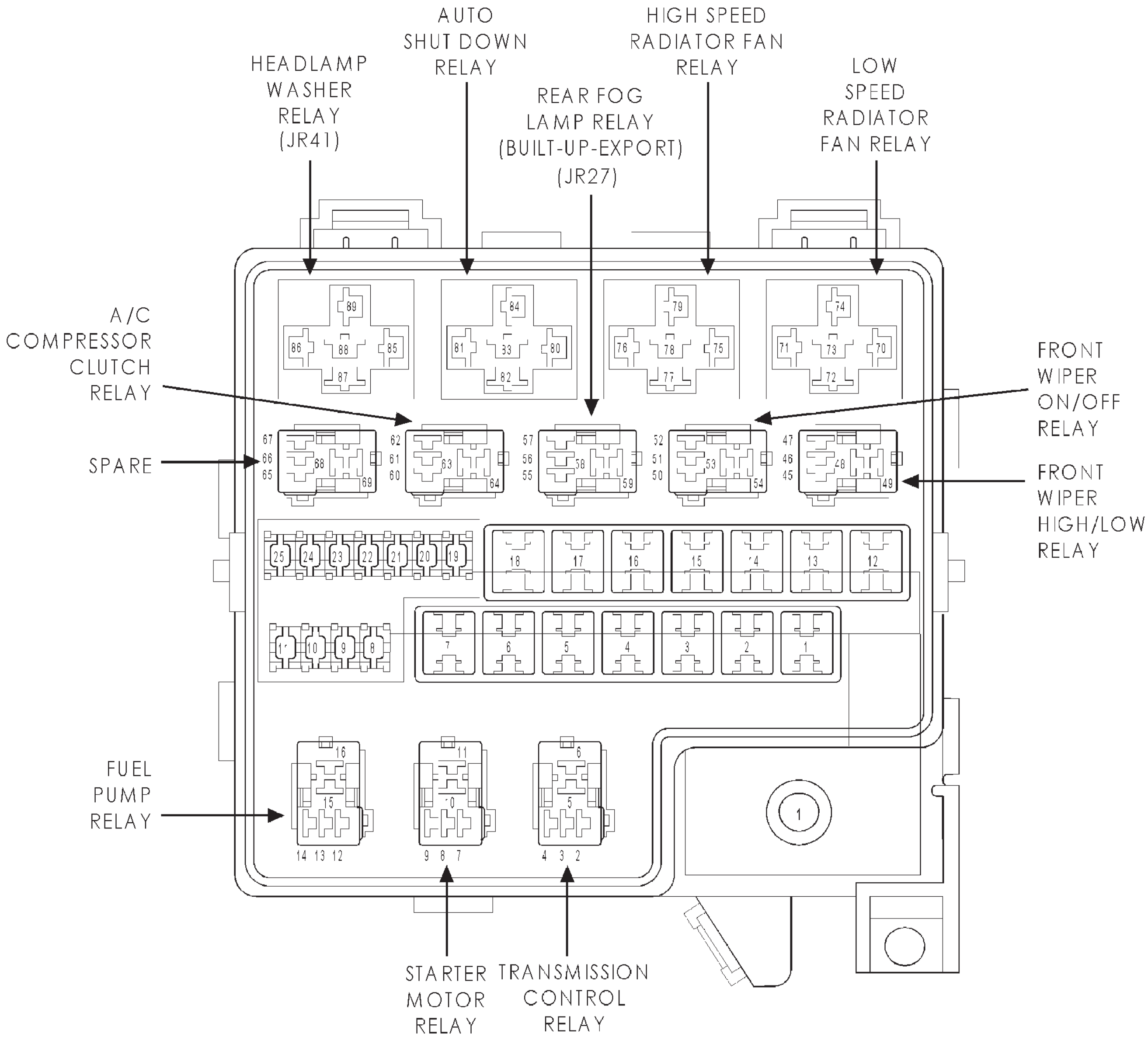


OXYGEN SENSOR 2/2 LEFT BANK DOWN (2.7L)

OXYGEN SENSOR 2/2 LEFT BANK DOWN (2.7L) - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z186 20BK	GROUND
2	F142 18OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
3	K127 18DB/LG	OXYGEN SENSOR GROUND
4	K341 20TN/WT	OXYGEN SENSOR 2/2 SIGNAL

POWER DISTRIBUTION CENTER



FUSES (PDC)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	40A	A2 12PK/BK	FUSED B(+)
2	20A	F30 16RD	FUSED B(+)
3	30A	A53 14RD/YL (JR41 BUILT-UP-EXPORT)	FUSED B(+)
4	40A	A3 12RD/WT	FUSED B(+)
5	-	SPARE	FUSED B(+)
6	40A	A4 12BK/PK	FUSED B(+)
7	-	SPARE	FUSED B(+)
8	20A	A1 16RD	FUSED B(+)
9	20A	A24 16BK (EATX)	FUSED B(+)
10	10A	A51 20RD/WT	FUSED B(+)
11	20A	A7 16RD/BK	FUSED B(+)
12	40A	A16 12RD/LG	FUSED B(+)
13	20A	P86 16PK/BK (JR41 BUILT-UP-EXPORT)	FUSED B(+)
14	30A	A14 14RD/TN	FUSED B(+)
15	40A	A10 12RD/DG	FUSED B(+)
16	40A	A13 12PK/WT	FUSED B(+)
17	40A	A25 12DB (JR27)	FUSED B(+)
18	40A	A5 12RD/GY	FUSED B(+)
19	20A	A45 18BR (JR27)	FUSED B(+)
20	20A	A15 16PK	FUSED B(+)
21	-	SPARE	FUSED B(+)
22	20A	A20 12RD/DB	FUSED B(+)
23	20A	F12 18DB/WT (JR27)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
23	10A	F12 18DB/WT (JR41)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
24	20A	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
25	20A	F142 16OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT

A/C COMPRESSOR CLUTCH RELAY

CAV	CIRCUIT	FUNCTION
60	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
61	-	-
62	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
63	C3 14DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
64	A16 12RD/LG	FUSED B(+)

AUTO SHUT DOWN RELAY

CAV	CIRCUIT	FUNCTION
80	K51 20DB/VT	AUTOMATIC SHUTDOWN RELAY CONTROL
81	A14 14RD/TN	FUSED B(+)
82	A142 14DG/OR	AUTOMATIC SHUTDOWN RELAY OUTPUT
83	-	-
84	A14 14RD/TN	FUSED B(+)

FUEL PUMP RELAY

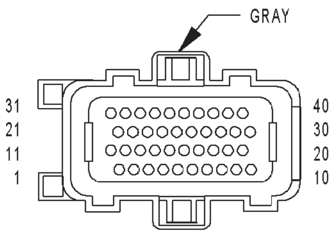
CAV	CIRCUIT	FUNCTION
12	K31 20BR/LG	FUEL PUMP RELAY CONTROL
13	-	-
14	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
15	A141 14DG/WT	FUEL PUMP RELAY OUTPUT
16	A1 16RD	FUSED B(+)

LOW SPEED RADIATOR FAN RELAY

CAV	CIRCUIT	FUNCTION
70	C24 20DB/TN	LOW SPEED RADIATOR FAN RELAY CONTROL
71	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
72	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
73	-	-
74	A16 12RD/LG	FUSED B(+)

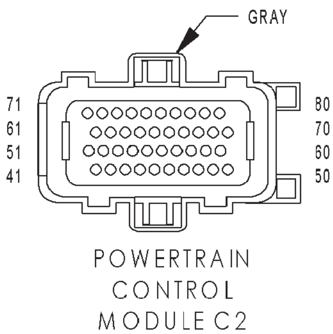
STARTER MOTOR RELAY

CAV	CIRCUIT	FUNCTION
7	K90 20TN	ENGINE STARTER MOTOR RELAY CONTROL
8	-	-
9	T141 16YL/RD (MTX)	FUSED IGNITION SWITCH OUTPUT (START)
9	A41 16YL (EATX)	FUSED IGNITION SWITCH OUTPUT (START)
10	T40 14BR	ENGINE STARTER MOTOR RELAY OUTPUT
11	A1 16RD	FUSED B(+)



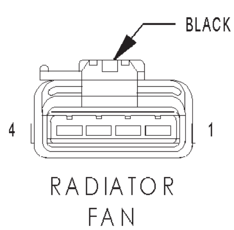
POWERTRAIN CONTROL MODULE C1 - GRAY 40 WAY

CAV	CIRCUIT	FUNCTION
1	K94 16TN/LG (2.7L)	COIL ON PLUG DRIVER NO. 4
2	K93 16TN/OR (2.7L)	COIL ON PLUG DRIVER NO. 3
3	K17 16DB/TN (2.0L/2.4L)	IGNITION COIL NO. 2 DRIVER
3	K92 16TN/PK (2.7L)	COIL ON PLUG DRIVER NO. 2
4	K96 16TN/LB (2.7L)	COIL ON PLUG DRIVER NO. 6
5	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
6	A142 14DG/OR	AUTOMATIC SHUTDOWN RELAY OUTPUT
7	K13 18YL/WT	INJECTOR NO. 3 DRIVER
8	K20 18DG	GENERATOR FIELD DRIVER
9	-	-
10	Z108 14BK/TN	GROUND
11	K91 16TN/RD (2.7L)	COIL ON PLUG DRIVER NO. 1
11	K19 16BK/GY (2.0L/2.4L)	IGNITION COIL NO. 1 DRIVER
12	-	-
13	K11 18WT/DB	INJECTOR NO. 1 DRIVER
14	K58 18BR/DB (2.7L)	INJECTOR NO. 6 DRIVER
15	K38 18GY (2.7L)	INJECTOR NO. 5 DRIVER
16	K14 18LB/BR	INJECTOR NO. 4 DRIVER
17	K12 18TN	INJECTOR NO. 2 DRIVER
18	K79 18OR/RD (2.0L/2.4L)	OXYGEN SENSOR 1/1 HEATER CONTROL
19	-	-
20	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
21	K95 16TN/DG (2.7L)	COIL ON PLUG DRIVER NO. 5
22	-	-
23	-	-
24	-	-
25	K42 18DB/LG	KNOCK SENSOR SIGNAL
26	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
27	K127 18DB/OR (2.0L/2.4L)	OXYGEN SENSOR GROUND
27	K127 18DB/LG (2.7L)	OXYGEN SENSOR GROUND
28	-	-
29	K241 20LG/RD (2.7L)	OXYGEN SENSOR 2/1 SIGNAL
30	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL
31	K90 20TN	ENGINE STARTER MOTOR RELAY CONTROL
32	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
33	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
34	K235 20LG/PK (2.7L)	EGR SENSOR SIGNAL
35	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
36	K1 20DG/RD	MAP SENSOR SIGNAL
37	K21 20BK/RD	INTAKE AIR TEMPERATURE SIGNAL
38	-	-
39	K36 18VT/RD (2.7L)	MANIFOLD SOLENOID CONTROL
40	K35 20GY/YL	EGR SOLENOID CONTROL



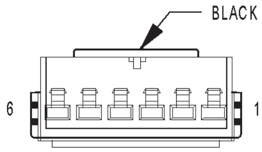
POWERTRAIN CONTROL MODULE C2 - GRAY 40 WAY

CAV	CIRCUIT	FUNCTION
41	V37 20PK/LG	SPEED CONTROL SWITCH SIGNAL
42	C18 20DB	A/C PRESSURE SIGNAL
43	K4 18BK/LB	SENSOR GROUND
44	K7 18OR/WT	8V SUPPLY
45	K10 20DB/OR (2.0L/2.4L)	STEERING PRESSURE SWITCH SENSE
46	A14 14RD/TN	FUSED B(+)
47	Z109 14BK	GROUND
48	K40 20BR/WT	IDLE AIR CONTROL MOTOR NO. 3 DRIVER
49	K60 20YL/BK	IDLE AIR CONTROL MOTOR NO. 2 DRIVER
50	Z107 14BK/TN	GROUND
51	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL
52	K25 18VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
53	K341 20PK/WT (2.7L) (EATX)	OXYGEN SENSOR 2/2 SIGNAL
54	-	-
55	C24 20DB/TN	LOW SPEED RADIATOR FAN RELAY CONTROL
56	V36 20TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
57	K39 20GY/RD	IDLE AIR CONTROL MOTOR NO. 1 DRIVER
58	K59 20VT/BK	IDLE AIR CONTROL MOTOR NO. 4 DRIVER
59	D25 20OR	PCI BUS
60	-	-
61	K6 18VT/WT	5V SUPPLY
62	K29 20WT/PK	BRAKE SWITCH SENSE
63	T10 20YL/DG (EATX)	TORQUE MANAGEMENT REQUEST SENSE
64	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
65	D21 20PK	SCI TRANSMIT
66	G7 18WT/OR	VEHICLE SPEED SENSOR SIGNAL
67	K51 20DB/VT	AUTOMATIC SHUTDOWN RELAY CONTROL
68	K52 18PK/BK	EVAPORATIVE EMISSION SOLENOID CONTROL
69	C27 20DB/PK	HIGH SPEED RADIATOR FAN RELAY CONTROL
70	K108 18WT/TN	EVAPORATIVE SOLENOID SENSE
71	K71 20WT/RD (EATX)	EATX RPM SIGNAL
72	K107 18OR	LEAK DETECTION PUMP SWITCH SENSE
73	-	-
74	K31 20BR/LG	FUEL PUMP RELAY CONTROL
75	D20 20LG	SCI RECEIVE
76	T41 20BK/LB (EATX)	TRS T41 SENSE
77	K106 18WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
78	-	-
79	-	-
80	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL



RADIATOR FAN - BLACK 4 WAY

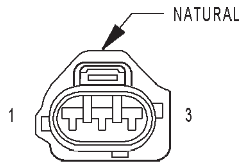
CAV	CIRCUIT	FUNCTION
1	Z212 12BK	GROUND
2	Z213 12BK	GROUND
3	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
4	C25 12YL	HIGH SPEED RADIATOR FAN RELAY OUTPUT



SENTRY KEY IMMOBILIZER MODULE

SENTRY KEY IMMOBILIZER MODULE - BLACK 6 WAY

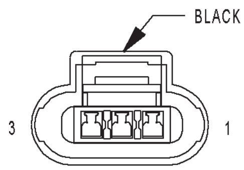
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/PK	PCI BUS
3	-	-
4	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	Z110 20BK	GROUND
6	A51 20RD/WT	FUSED B(+)



THROTTLE POSITION SENSOR (2.0L/2.4L)

THROTTLE POSITION SENSOR (2.0L/2.4L) - NATURAL 3 WAY

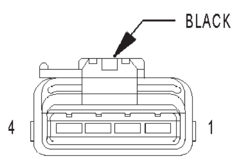
CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5 VOLT SUPPLY
2	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
3	K4 20BK/LB	SENSOR GROUND



THROTTLE POSITION SENSOR (2.7L)

THROTTLE POSITION SENSOR (2.7L) - BLACK 3 WAY

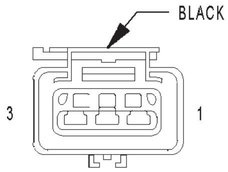
CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
3	K4 20BK/LB	SENSOR GROUND



VEHICLE SPEED CONTROL SERVO

VEHICLE SPEED CONTROL SERVO - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	V36 20TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
2	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL
3	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
4	Z190 20BK	GROUND



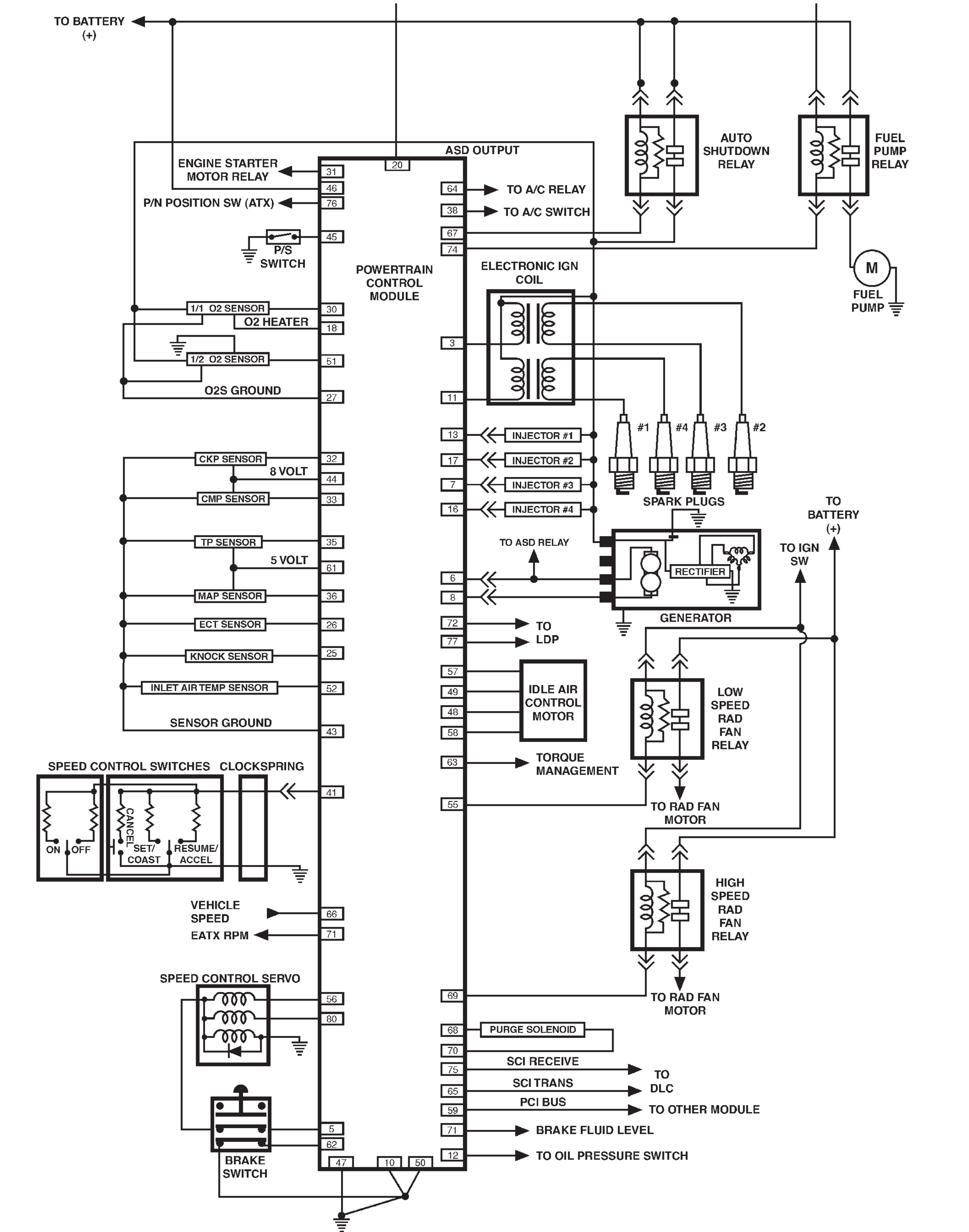
VEHICLE SPEED SENSOR (MTX)

VEHICLE SPEED SENSOR (MTX) - BLACK 3 WAY

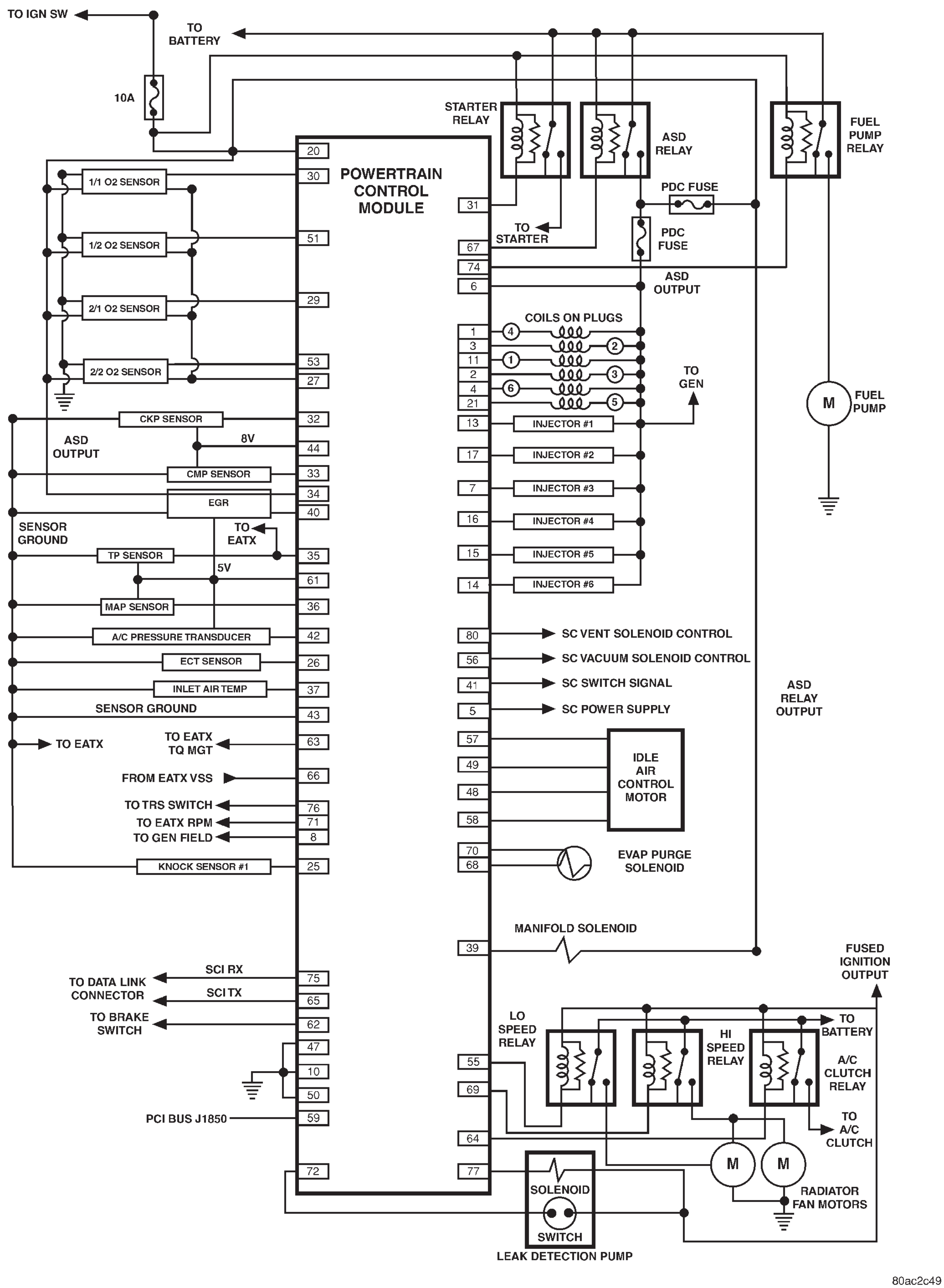
CAV	CIRCUIT	FUNCTION
1	K7 18OR/WT	8V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	G7 18WT/OR	VEHICLE SPEED SENSOR SIGNAL

10.0 SCHEMATIC DIAGRAMS

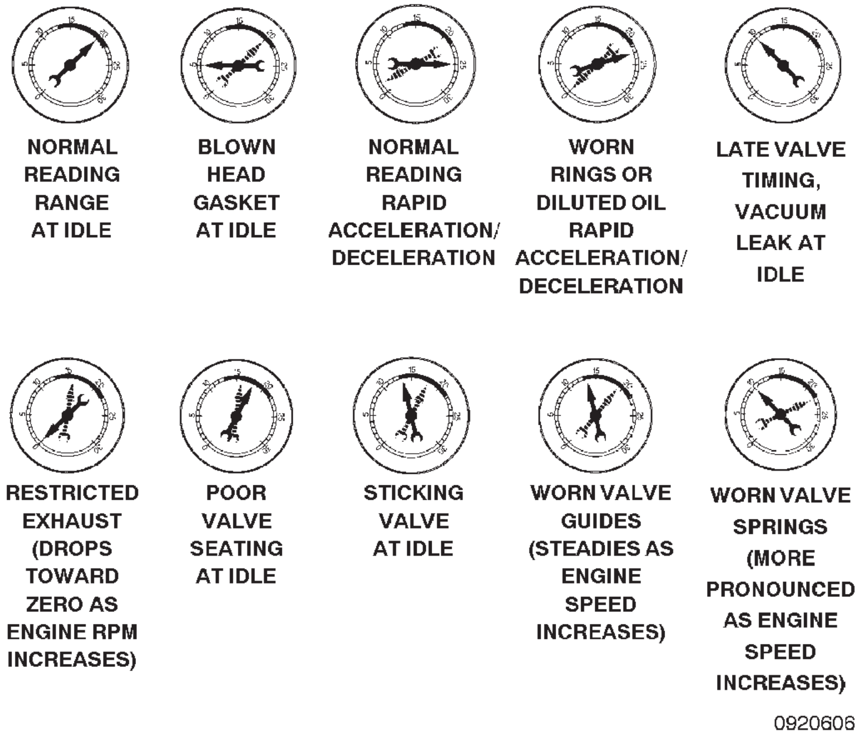
10.1 2002 JR 2.0L/2.4L

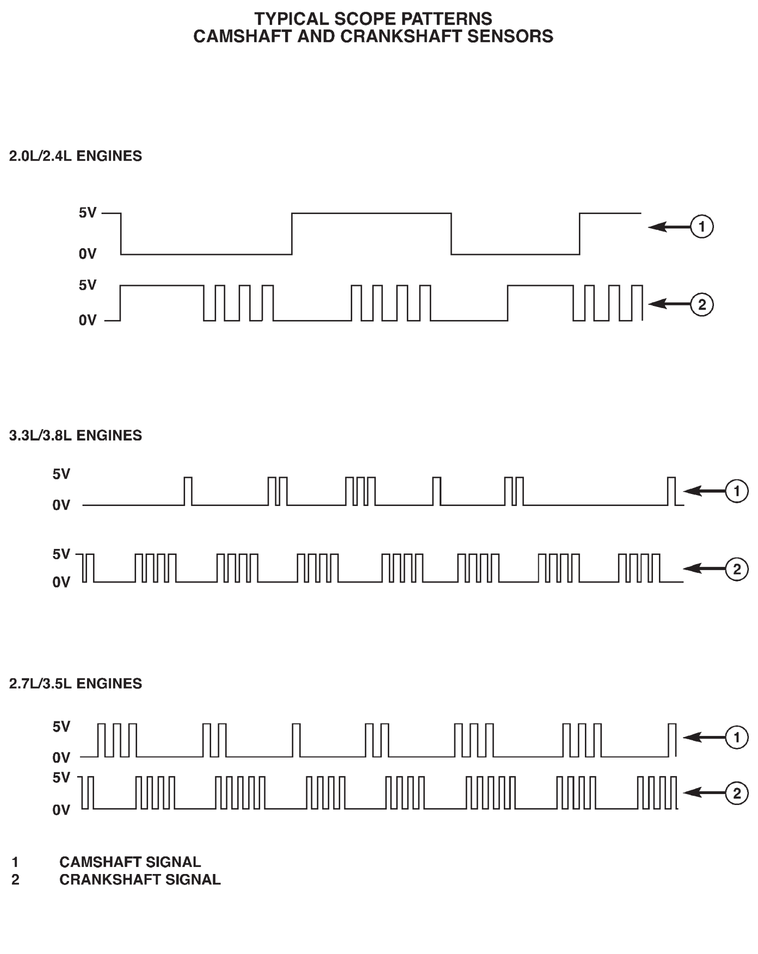


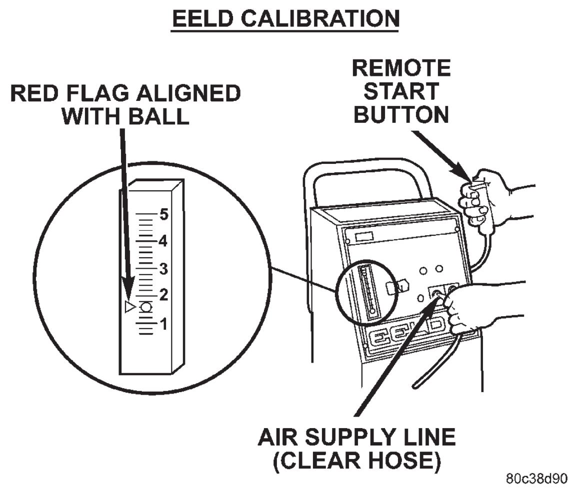
10.2 2002 JR 2.7L

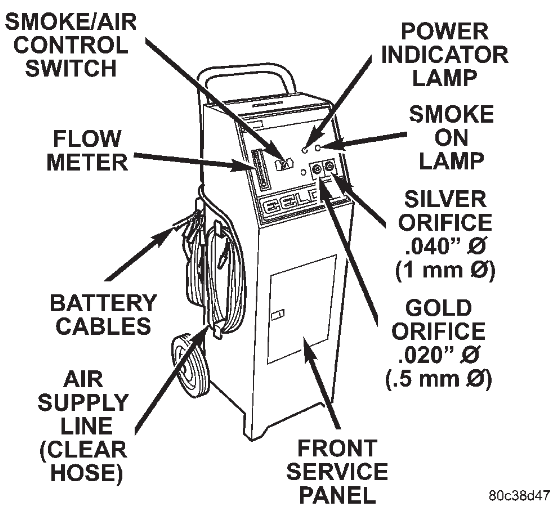


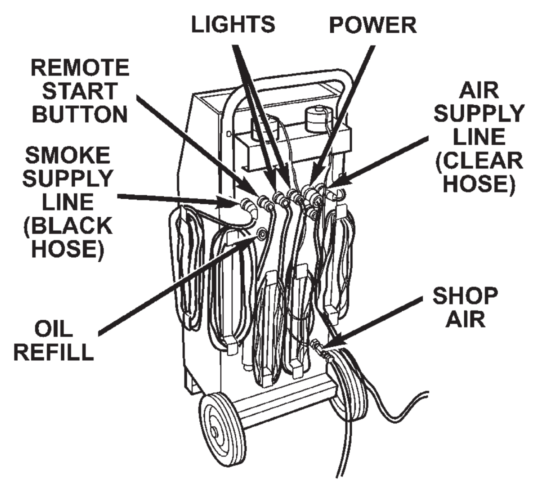
11.0 CHARTS AND GRAPHS






EELD CALIBRATION
RED FLAG ALIGNED WITH BALL
REMOTE START BUTTON
5
4
3
2
1
AIR SUPPLY LINE (CLEAR HOSE)
80c38d90


SMOKE/AIR CONTROL SWITCH
POWER INDICATOR LAMP
SMOKE ON LAMP
FLOW METER
SILVER ORIFICE .040" Ø (1 mm Ø)
BATTERY CABLES
GOLD ORIFICE .020" Ø (.5 mm Ø)
AIR SUPPLY LINE (CLEAR HOSE)
FRONT SERVICE PANEL
80c38d47

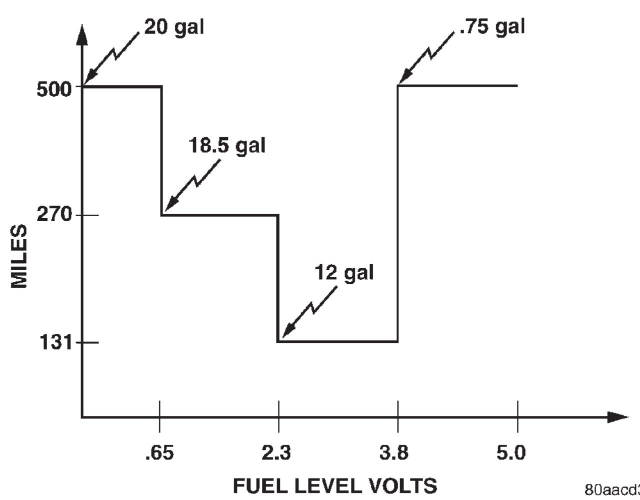

LIGHTS
POWER
REMOTE START BUTTON
AIR SUPPLY LINE (CLEAR HOSE)
SMOKE SUPPLY LINE (BLACK HOSE)
SHOP AIR
OIL REFILL
80c38d69

O2 SENSOR CONFIGURATION

JR	4 CYLINDER	1/1	UPSTREAM
JR	4 CYLINDER	1/2	DOWNSTREAM
JR	2.7L V-6	1/1	REAR BANK UP
JR	2.7L V-6	1/2	REAR BANK DOWN
JR	2.7L V-6	2/1	FRONT BANK UP
JR	2.7L V-6	2/2	FRONT BANK DOWN
LH	V-6 ALL	1/1	RIGHT BANK UP
LH	V-6 ALL	1/2	RIGHT BANK DOWN
LH	V-6 ALL	2/1	LEFT BANK UP
LH	V-6 ALL	2/2	LEFT BANK DOWN
RS/RG	ALL	1/1	UPSTREAM
RS/RG	ALL	1/2	DOWNSTREAM
PL	ALL	1/1	UPSTREAM
PL	ALL	1/2	DOWNSTREAM
PR	3.5L	1/1	RIGHT BANK UP
PR	3.5L	1/2	RIGHT BANK DOWN
PR	3.5L	2/1	LEFT BANK UP
PR	3.5L	2/2	LEFT BANK DOWN
PT	ALL	1/1	UPSTREAM
PT	ALL	1/2	DOWNSTREAM

80aa3148

FUEL LEVEL VOLTAGE CHANGE OVER MILES (EXAMPLE) CHART



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NOTES

1.0 INTRODUCTION

The procedures contained in this manual include all the specifications, instructions and graphics needed to diagnose **2002 JR body system problems.** The diagnostics in this manual are based on the failure, condition or symptom being present at the time of diagnosis.

Please follow the recommendations below when choosing your diagnostic path.

1. First make sure the DRBIII® is communicating with the appropriate module; i.e., if the DRBIII® shows a “no response” condition, you must diagnose that first.
2. Read DTC’s (diagnostic trouble codes) with the DRBIII®.
3. If no DTC’s are present, identify the customer complaint.
4. Once the DTC or customer complaint is identified, locate the matching test in the Table of Contents and begin to diagnose the symptom.

All component location views are in Section 8.0.
All connector pinouts are in Section 9.0.
All schematics are in Section 10.0.
An * placed before the symptom description indicates a customer complaint.

When repairs are required, refer to the appropriate service manual for the proper removal and installation procedure.

Diagnostic procedures change every year. New diagnostic systems may be added: carry over systems may be enhanced. READ THIS MANUAL BEFORE TRYING TO DIAGNOSE A VEHICLE DIAGNOSTIC TROUBLE CODE. It is recommended that you review the entire manual to become familiar with all the new and changed diagnostic procedures.

This book reflects many suggested changes from readers of past issues. After using this book, if you have any comments or suggestions, please fill out the form in the back of this book and mail it back to us.

1.1 SYSTEM COVERAGE

This diagnostic procedures manual covers all 2002 Chrysler Sebring convertible and four door models, and Dodge Stratus four door models.

1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the body control module (BCM) is done in six basic steps:

- verification of complaint
- verification of any related symptoms
- symptom analysis
- problem isolation
- repair of isolated problem
- verification of proper operation

1.3 FUSES AND LIGHT BULBS

When replacing a blown fuse, it is important to use only a fuse having the correct amperage rating. The use of a fuse with a rating other than indicated may result in a dangerous electrical system overload. If a properly rated fuse continues to blow, it indicates a problem in the circuit that must be corrected.

When replacing HALOGEN bulbs, do not touch the new bulb with your fingers. Oil contamination will severely shorten bulb life. If the bulb comes in contact with an oily surface, clean the bulb with rubbing alcohol.

2.0 IDENTIFICATION OF SYSTEM

The vehicle systems that are part of the “body” system are:

- Airbag System
- Audio
- Chimes
- Compass/Mini-Trip
- Door Ajar
- Exterior Lighting
- Heating and A/C
- Interior Lighting
- Mechanical Instrument Cluster
- Power Door Locks/Remote Keyless Entry
- Power Convertible Top
- Vehicle Communications
- Vehicle Theft Security System
- Wiper/Washer

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

The body system on the 2002 JR consists of a combination of modules that communicate over the PCI bus (Programmable Communication Interface multiplex system). Through the PCI bus, information about the operation of vehicle components and circuits is relayed quickly to the appropriate modules. All modules receive all the information transmitted on the bus even though a module may not require all information to perform its function. It will only respond to messages “addressed” to it through a binary coding process. This method of data transmission significantly reduces the complexity of the wiring in the vehicle and the size of wiring harnesses. All of the information about the functioning of all the systems is organized, controlled and communicated by the PCI bus, which is described in the Vehicle Communication section of this General Information.

Always begin by reading the diagnostic trouble codes using the DRBIII®. Next, look for the symptom in the Diagnostic Information and Procedures section of the Table of Contents located in the front of the book. This will direct you to the specific tests that must be performed.

Important Note:

If the Powertrain Control Module has been changed and the correct VIN and mileage have not been programmed, a DTC will be set in the Airbag module. In addition, if the vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable starting. Refer to the 2002 JR Powertrain Diagnostic Manual for more information. Erase codes in all modules.

3.1 AIRBAG SYSTEM/OCCUPANT RESTRAINT CONTROLLER SYSTEM

The 2002 Airbag System contain the following components: Occupant Restraint Controller (ORC), Airbag Warning Indicator, Clockspring, Driver and Passenger Dual Squib Airbags, Seat belt Tensioners, Left and Right Side Impact Airbag Control Module (SIACM), and Curtain (roof mounted) Airbags.

The (ORC) is a new type of Airbag Control Module (ACM) that supports staged airbag deployment. Staged deployment is the ability to trigger airbag system squib inflators all at once or individually as needed to provide the appropriate restraint for the severity of the impact. The ACM has four major functions: PCI Bus communications, onboard diagnostics, impact sensing, and component deployment. The ACM also contains an energy-storage capacitor. This capacitor stores enough electrical energy to deploy the front airbag components for two seconds following a battery disconnect or failure during an impact. The ACM is secured to the floor panel transmission tunnel between the front seats inside the vehicle. The ACM cannot be repaired or adjusted and must be replaced.

The ACM sends and/or receives PCI Bus messages with the Instrument Cluster (MIC), Body Control Module (BCM), Left and Right Side Impact Airbag Control Module (SIACM) and Powertrain Control Module (PCM). Diagnostic trouble codes will be set if the communication with these modules is lost or contains invalid information.

The microprocessor in the ACM monitors the impact sensor signal and the airbag system electrical circuits to determine the system readiness. The ACM also monitors bus messages from both SIACM. If the ACM detects a monitored system fault or SIACM fault, it sends a message to the instrument cluster via PCI bus to turn on the airbag warning indicator. The ACM can set both active and stored diagnostic trouble codes to aid in the diagnosing system problems. See DIAGNOSTIC TROUBLE CODES in this section.

The ACM has an internal accelerometer that senses the rate of vehicle deceleration, which provides verification of the direction and severity of an impact. A pre-programmed decision algorithm in the ACM microprocessor determines when the deceleration rate is severe enough to require airbag system protection. The ACM also uses the crash severity to determine the level of driver and front passenger deployment, low medium or high. When the programmed conditions are met, the ACM sends an electrical signal to deploy the appropriate airbag system components.

THE AIRBAG SYSTEM IS A SENSITIVE, COMPLEX ELECTROMECHANICAL UNIT. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY AIRBAG SYSTEM OR RELATED STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO THIS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY. NEVER STRIKE OR KICK THE AIRBAG CONTROL MODULE, AS IT CAN DAMAGE THE IMPACT SENSOR OR AFFECT ITS CALIBRATION. IF AN AIRBAG CONTROL MODULE IS ACCIDENTALLY DROPPED DURING SERVICE, THE MODULE MUST BE SCRAPPED AND REPLACED WITH A NEW UNIT.

The airbag warning lamp is the only point at which the customer can observe symptoms of a system malfunction. Whenever the ignition key is turned to the run or start position, the MCI performs a lamp check by turning the airbag warning indicator on for 6-8 seconds. After the lamp check, if the indicator turns on, it means that the ACM has checked the system and found it to be free of discernible malfunctions. If the lamp remains on, there could be an active fault in the system or the MIC lamp circuit may be internally shorted to ground. If the lamp comes on and stays on for a period longer than 6-8 seconds, then goes off, there is usually an intermittent problem in the system.

3.1.1 DRIVER AIRBAG

The airbag protective trim cover is the most visible part of the driver side airbag system. The protective trim cover is fitted to the front of the airbag module and forms a decorative cover in the center of the steering wheel. The module is mounted directly to the steering wheel. Located under the trim cover are the horn switch, the airbag cushion, and the airbag cushion supporting components. The airbag module includes a housing to which the cushion and hybrid inflator are attached and sealed. For 2002 driver airbag has dual stage squib inflators that include a small canister of highly compressed argon gas. The ACM uses vehicle crash severity, to determine the level of airbag deployment. When supplied with the proper electrical signal, the hybrid inflator or inflators discharge the compressed gas it contains directly into the cushion. The airbag module cannot be repaired, and must be replaced if deployed or in any way damaged.

WARNING: THE DRIVER AIRBAG MODULE CONTAINS ARGON GAS PRESSURIZED TO OVER 17236.89 Kpa (2500 PSI). DO NOT ATTEMPT TO DISMANTLE AN AIRBAG MODULE OR TAMPER WITH ITS INFLATOR. DO NOT PUNCTURE, INCINERATE, OR BRING INTO CONTACT WITH ELECTRICITY. DO NOT STORE AT TEMPERATURE EXCEEDING 93°C (200°F). REPLACE AIRBAG SYSTEM COMPONENTS ONLY WITH PARTS SPECIFIED IN THE CHRYSLER MOPAR PARTS CATALOG. SUBSTITUTE PARTS MAY APPEAR INTER-CHANGEABLE, BUT INTERNAL DIFFERENCES MAY RESULT IN INFERIOR OCCUPANT PROTECTION. THE FASTENERS, SCREWS, AND BOLTS ORIGINALLY USED FOR THE AIRBAG SYSTEM COMPONENTS HAVE SPECIAL COATINGS AND ARE SPECIFICALLY DESIGNED FOR THE AIRBAG SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. ANY TIME A NEW FASTENER IS NEEDED, REPLACE IT WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR SPECIFIED IN THE MOPAR PARTS CATALOG.

CAUTION: Deployed front airbags may or may not have live pyrotechnic material within the airbag inflator. Do not dispose of 2002 model year driver and passenger airbags unless you are sure of complete deployment. Please refer to the hazardous substance control system for proper disposal. Dispose of deployed airbags in a manner consistent with state, provincial, local, and federal regulations. Use the following table to identify the status of the airbag squib.

AIRBAG SQUIB STATUS

(1) Using a DRBIII® read Airbag DTC's

If the following active codes are present:

ACTIVE DTC	CONDITIONS	SQUIB STATUS
Driver Squib 1 open Driver Squib 2 open	Check the stored codes **AND IF** the stored minutes for both are within 15 minutes of each other.	Both Driver Squib 1 and 2 were used.
Driver Squib 1 open Driver Squib 2 open	Check the stored codes **AND IF** the stored minutes for Driver Squib 2 open is GREATER than the stored minutes for Driver Squib 1 by 15 minutes or more.	Driver Squib 1 was used; Driver Squib 2 is live.
Driver Squib 1 open Driver Squib 2 open	Check the stored codes **AND IF** the stored minutes for Driver Squib 1 open is GREATER than the stored minutes for Driver Squib 2 by 15 minutes or more.	Driver Squib 1 is live; Driver Squib 2 was used.
If Driver Squib 1 open	**AND IF** Driver Squib 2 opens is NOT an active code.	Driver Squib 1 was used; Driver Squib 2 is live.
If Driver Squib 2 open	**AND IF** Driver Squib 1 open is NOT an active code.	Driver Squib 1 is live; Driver Squib 2 was used.

If neither of the following codes is an active code:

ACTIVE DTC	SQUIB STATUS
Driver squib 1 open Driver squib 2 open	Status of Airbag is Unknown.

3.1.2 CLOCKSPRING

The clockspring is mounted on the steering column behind the steering wheel. This assembly consist of a plastic housing which contains a flat, ribbon-like, electrically conductive tape that winds and unwinds with the steering wheel rotation. The clockspring is used to maintain a continuous electrical circuit between the instrument panel wiring the driver airbag, the horn, and the vehicle speed control switches if equipped. The clockspring must be properly centered when it is reinstalled on the steering column following any service procedure, or if could be damaged. The clockspring cannot be repaired and it must be replaced.

3.1.3 PASSENGER AIRBAG

The airbag door in the instrument panel top cover above the glove box is the most visible part of the passenger side airbag system. The airbag door has a living hinge at the top, which is secured to the instrument panel top cover. Located under the airbag door is the airbag cushion and it's supporting components. The airbag module includes a housing to which the cushion and hybrid inflators are attached and sealed. For 2002 the front passenger airbag is equipped with dual stage squib inflators that include a small canister of highly compressed argon gas. The ACM uses vehicle crash severity, to determine the level of airbag deployment. When supplied with the proper electrical signal, the hybrid inflator or inflators discharge the compressed gas if contains directly into the airbag. The airbag module cannot be repaired, and must be replaced if deployed or in any way damaged.

WARNING: THE PASSENGER AIRBAG MODULE CONTAINS ARGON GAS PRESSURIZED TO 17236.89 Kpa (2500 PSI). DO NOT ATTEMPT TO DISMANTLE AN AIRBAG MODULE OR TAMPER WITH ITS INFLATOR. DO NOT PUNCTURE, INCINERATE, OR BRING INTO CONTACT WITH ELECTRICITY. DO NOT STORE AT TEMPERATURE EXCEEDING 93°C (200°F). REPLACE AIRBAG SYSTEM COMPONENTS ONLY WITH PARTS SPECIFIED IN THE MOPAR PARTS CATALOG. SUBSTITUTE PARTS MAY APPEAR INTER-CHANGEABLE, BUT INTERNAL DIFFERENCES MAY RESULT IN INFERIOR OCCUPANT PROTECTION. THE FASTENERS, SCREWS, AND BOLTS ORIGINALLY USED FOR THE AIRBAG SYSTEM COMPONENTS HAVE SPECIAL COATINGS AND ARE SPECIFICALLY DESIGNED FOR THE AIRBAG SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. ANY TIME A NEW FASTENER IS NEEDED, REPLACE IT WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR SPECIFIED IN THE MOPAR PARTS CATALOG.

CAUTION: Deployed front airbags may or may not have live pyrotechnic material within the airbag inflator. Do not dispose of 2002 model year driver and passenger airbags unless you are sure of complete deployment. Please refer to the hazardous substance control system for proper disposal. Dispose of deployed airbags in a manner consistent with state, provincial, local, and federal regulations. Use the following table to identify the status of the airbag squib.

AIRBAG SQUIB STATUS

(1) Using a DRBIII® read Airbag DTC's

If the following active codes are present:

ACTIVE DTC	CONDITIONS	SQUIB STATUS
Passenger Squib 1 open Passenger Squib 2 open	Check the stored DTC's **AND IF** the stored minutes for both are within 15 minutes of each other.	Both Passenger Squib 1 and 2 were used.
Passenger Squib 1 open Passenger Squib 2 open	Check the stored DTC's **AND IF** the stored minutes for Passenger Squib 2 open is GREATER than the stored minutes for Passenger Squib 1 by 15 minutes or more.	Passenger Squib 1 was used; Passenger Squib 2 is live.
Passenger Squib 1 open Passenger Squib 2 open	Check the stored DTC's **AND IF** the stored minutes for Passenger Squib 1 open is GREATER than the stored minutes for Driver Squib 2 by 15 minutes or more.	Passenger Squib 1 is live; Driver Squib 2 was used.
If Passenger Squib 1 open	**AND IF** Passenger Squib 2 open is NOT an active code.	Passenger Squib 1 was used; Passenger Squib 2 is live.
If Passenger Squib 2 open	**AND IF** Passenger Squib 1 open is NOT an active code.	Passenger Squib 1 is live; Passenger Squib 2 was used.

If neither of the following codes is an active code:

ACTIVE DTC	SQUIB STATUS
Passenger squib 1 open Passenger squib 2 open	Status of Airbag is Unknown.

3.1.4 SEAT BELT TENSIONER (SBT)

The JR41 4-door driver and front passenger seat belt (retractor) tensioners are mounted to the inboard side of the "B" pillar at the floor. The tensioner is an integral part of the seat belt retractor. At the onset of an impact event the ACM uses the seat belt tensioner to rapidly retracts the seat belt. With the slack removed, the occupant's forward motion in an impact will be reduced as will the likelihood of contacting interior components. The seat belt tensioner cannot be repaired, if damaged or defective it must be replaced. The ACM continuously monitors the resistance of the seat belt tensioner circuits an open or shorted conditions.

The JR27 convertible driver and front passenger seat belt (buckle) tensioners are mounted to the inboard side of the front seats. The seat belt buckle is connected directly to the seat belt tensioner cable. At the onset of an impact event the ACM uses the seat belt tensioner to rapidly retract the seat belt buckles. With the slack removed, the occupant's forward motion in an impact will be reduced as will the likelihood of contacting interior components. The seat belt tensioner cannot be repaired, if damaged or defective it must be replaced. The ACM continuously monitors the resistance of the seat belt tensioner circuits an open or shorted conditions.

3.1.5 SIDE IMPACT AIRBAG CONTROL MODULE (SIACM)

Supplemental driver and passenger curtain airbags provide side impact protection for the occupants. Each side airbag has it's own side impact airbag control module (SIACM) to provide independent impact sensing and deployment. SIACM are located on the left and right B post just above the seat belt retractor. One, same part number, SIACM is used on both side of the vehicle. However, for proper PCI bus operation each SIACM must have a unique module identification. To provide the unique module identification for both, left and right, the SIACM software looks for a ground on cavity #5 of the SIACM connector. If cavity #5 is grounded the SIACM communicates as a left SIACM otherwise it communicates as a right SIACM. The SIACM performs self diagnostics and circuit tests to determine if the system is functioning properly. If the test finds a problem the SIACM will set both active and stored diagnostic trouble codes. If a DTC is active the SIACM will request that the airbag warning lamp be turned on. The results of the system test are transmitted on the PCI Bus to the ACM once each second or on change in lamp state. If the warning lamp status message from the either SIACM contains a lamp on request, the ACM will set an active DTC. At the same time as the DTC is set, the ACM sends a PCI Bus message to the (MIC) requesting the airbag warning indicator be turned on. Observe all ACM warning and caution statements when servicing or handling the SIACM. SIACM are not repairable and must be replaced if they are dropped.

WARNING: THE AIRBAG SYSTEM IS A SENSITIVE, COMPLEX ELECTRO-MECHANICAL UNIT. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY AIRBAG SYSTEM OR RELATED STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO THIS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY. NEVER STRIKE OR KICK THE AIRBAG CONTROL MODULE, AS IT CAN DAMAGE THE IMPACT SENSOR OR AFFECT ITS CALIBRATION. IF AN AIRBAG CONTROL MODULE IS ACCIDENTALLY DROPPED DURING SERVICE, THE MODULE MUST BE SCRAPPED AND REPLACED WITH A NEW UNIT.

The airbag warning lamp is the only point at which the customer can observe symptoms of a system malfunction. Whenever the ignition key is turned to the run or start position, the MIC performs a lamp check by turning the airbag warning indicator on for 6-8 seconds. After the lamp check, if the indicator turns on, it means that the ACM has checked the system and found it to be free of discernible malfunctions. If the lamp remains on, there could be an active fault in the system or the MIC lamp circuit may be internally shorted to ground. If the lamp comes on and stays on for a period longer than 6-8 seconds then goes off, there is usually an intermittent problem in the system.

3.1.6 CURTAIN AIRBAGS

The Left and Right curtain airbag modules are located in the outboard edge of the roof under the headliner, just above the door opening. The curtain airbag contains a squib and inflator (a small canister of highly compressed argon gas) and a mounting bracket mounted to the C post and tethered to the A post. When supplied with the proper electrical signal the inflator can discharge the compress gas it contains directly into the curtain airbag. Upon deployment, the curtain will tear open the headliner allowing the curtain airbag to fully deploy between the headliner and seat. The curtain airbag module cannot be repaired and must be replaced if deployed or in any way damaged.

WARNING: THE PASSENGER AIRBAG MODULE CONTAINS ARGON GAS PRESSURIZED TO 17236.89 Kpa (2500 PSI). DO NOT ATTEMPT TO DISMANTLE AN AIRBAG MODULE OR TAMPER WITH ITS INFLATOR. DO NOT PUNCTURE, INCINERATE, OR BRING INTO CONTACT WITH ELECTRICITY. DO NOT STORE AT TEMPERATURE EXCEEDING 93°C (200°F). REPLACE AIRBAG SYSTEM COMPONENTS ONLY WITH PARTS SPECIFIED IN THE MOPAR PARTS CATALOG. SUBSTITUTE PARTS MAY APPEAR INTERCHANGEABLE, BUT INTERNAL DIFFERENCES MAY RESULT IN INFERIOR OCCUPANT PROTECTION. THE FASTENERS, SCREWS, AND BOLTS ORIGINALLY USED FOR THE AIRBAG SYSTEM COMPONENTS HAVE SPECIAL COATINGS AND ARE SPECIFICALLY DESIGNED FOR THE AIRBAG SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. ANY TIME A NEW FASTENER IS NEEDED, REPLACE IT WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR SPECIFIED IN THE MOPAR PARTS CATALOG.

3.1.7 SPECIAL TOOLS

Some airbag diagnostic test use special tools, 8310 and 8443 airbag load tool, for testing squib circuits. The load tools contain fixed resistive loads, jumpers and adapters. The fixed loads are connected to cables and mounted in a storage case. The cables can be directly connected to some airbag system connectors. Jumpers are used to convert the load tool cable connectors to the other airbag system connectors. The adapters are connected to the module harness connector to open shorting clips and protect the connector terminal during testing. When using the load tool follow all of the safety procedures in the service information for disconnecting airbag system components. Inspect the wiring, connector and terminals for damage or misalignment. Substitute the airbag load tool in place of a Driver or Passenger Airbag, curtain airbag, clockspring, or seat belt tensioner (use a jumper if needed). Then follow all of the safety procedures in the service information for connecting airbag system components. Read the module active DTC's. If the module reports NO ACTIVE DTC's the defective component has been removed from the system and should be replaced. If the DTC is still active, continue this process until all components in the circuit have been tested. Then disconnect the module connector and connect the matching adapter to the module connector. With all airbags disconnected and the adapter installed the squib wiring can be tested for open and shorted conditions.

3.1.8 DIAGNOSTIC TROUBLE CODES

Airbag diagnostic trouble codes consist of active and stored codes. If more than one code exists, diagnostic priority should be given to the active codes. Each diagnostic trouble code is diagnosed by following a specific testing procedure. The diagnostic test procedures contain step-by-step instructions for determining the cause of the trouble codes. It is not necessary to perform all of the tests in this book to diagnose an individual code.

Always begin by reading the diagnostic trouble codes using the DRBIII®. Then begin diagnostic with the Table of Contents section 7.0. This will direct you to the specific test(s) that must be performed. Active diagnostic trouble codes for the airbag system are not permanent and will change the moment the reason for the code is corrected. In certain test procedures within this manual, diagnostic trouble codes are used as a diagnostic tool.

3.1.9 ACTIVE CODES

The code becomes active as soon as the malfunction is detected or key-in, whichever occurs first. An active trouble code indicates an on-going malfunction. This means that the defect is currently there every time the airbag control module checks that circuit or component. It is impossible to erase an active code. Active codes automatically erase by themselves when the reason for the code has been corrected. With the exception of the warning lamp trouble codes or malfunctions, when a malfunction is detected, the airbag lamp remains lit for a minimum of 12 seconds or as long as the malfunction is present.

3.1.10 STORED CODES

Airbag codes are automatically stored in the ORC's memory as soon as the malfunction is detected. The exception is the Loss of Ignition Run Only code which is an active code only. A stored code indicates there was an active code present at some time. However, the code currently may not be present as an active code, although another code could be active. When a trouble code occurs, the airbag warning indicator illuminates for 12 seconds minimum (even if the problem existed for less than 12 seconds). The code is stored, along with the time in minutes it was active, and the number of times the ignition has been cycled since the problem was last detected. The minimum time shown for any code will be one minute, even if the code was actually present for less than one minute. Thus, the time shown for a code that was present for two minutes 13 seconds, for example, would be three minutes. If a malfunction is detected a diagnostic trouble code is stored and will remain stored. When and if the malfunction ceases to exist, an ignition cycle count will be initiated for that code. If the ignition cycle count reaches 100 without a reoccurrence of the same malfunction, the diagnostic trouble code is erased and that ignition cycle counter is reset to zero. If the malfunction reoccurs before the count reaches 100, then the ignition cycle counter will be reset and the diagnostic trouble code will continue to be a stored code. If a malfunction is not active while performing a diagnostic test procedure, the active code diagnostic test will not locate the source of the problem. In this case, the stored code can indicate an area to inspect. It no obvious problems are found, erase stored codes, and with the ignition on wiggle the wire harness and connectors, rotate the steering wheel from stop to stop. Recheck for codes periodically as you work through the system. This procedure may uncover a malfunction that is difficult to locate.

3.2 AUDIO SYSTEM

Some radio systems available on the 2002 JR communicate on the PCI Bus. They use the bus for three reasons. The first is to communicate trouble codes, second is to receive dimming information, and third is to receive cabin equalization information. The audio system is available in a 4 speaker or 6 speaker base system and a 6 speaker system with an external power amplifier. An in-dash CD Changer is also optional.

When troubleshooting output shorts or “output” error messages, the following applies:

On radios without an external amplifier, the term output refers to the path between the radio and the speaker. This type of circuit can be monitored all the way through the speaker connections by the radio assembly. When the radio displays a shorted output DTC with this type of system, the speaker, radio, or wiring could be at fault.

On radios with an external amplifier, the term “output” refers to the circuit between the radio connector and the amplifier. The radio is capable of monitoring only this portion and can tell nothing about the circuit between the amplifier and the speakers. Consequently, a shorted output DTC on this type of system would only refer to this circuit. A faulty speaker could not cause this DTC.

The new in-dash CD-changer is designed to fit into the existing cubby bin in the center stack. This new cartridge-less CD-changer is controlled by your radio, and allows you to individually load up to four discs at one time. However, due to its compact design, the CD-changer can only carry out one operation at a time. For example you can not load a new disc while playing another at the same time. Each operation happens sequentially.

The radio unit installed with you system provides control over all features of the CD-changer with the exception of the CD load and eject functions, which are controlled by buttons located on the front of the CD-changer. The radio also supplies the power, ground, PCI Bus, left and right speaker output through a single DIN cable. All features you would expect, such as Disc Up/Down, Track Up/Down, Random and Scan are controlled by the radio, which also displays all relevant CD-changer information on the radio display.

The CD-changer contains a Load/Eject button and an indicator light for each of the four disc positions. The individual light indicates whether a CD is currently loaded in that particular chamber of the CD-changer. Pressing the individual Load/Eject button for a particular chamber will eject a disc currently present in that chamber. If the chamber is currently empty, actuating the Load/Eject button will position that chamber to receive and load a new disc in that chamber.

3.3 BODY CONTROL MODULE

The body control module (BCM) supplies vehicle occupants with visual and audible information and controls various vehicle functions. To provide and receive information, the module is interfaced to the vehicle’s serial bus communications network (the Programmable Communication Interface or PCI bus). This network consists of the body control module (BCM), powertrain control module (PCM), sentry key immobilizer module (SKIM), the transmission control module (TCM), the electro/mechanical instrument cluster (MIC), compass/mini-trip computer (CMTC), occupant restraint controller (ORC), optional antilock brakes (ABS), the optional radio and remote CD-player, optional left and right airbag control modules. The (BCM) is operational when battery power is supplied to the module, ignition switch power is needed for ignition switched functions.

The body control module provides the following features:

A/C switch status/evaporator temperature status
BCM diagnostic support
Central lock and unlock (VTSS only)
Climate Control system support
Door ajar switch status
Door Lock Inhibit (key in ignition or headlamps/park lamps on)
Electronic Odometer Support
Headlamp Time Delay
Illuminated Entry with “fade to off”
Interior lighting with battery save feature
Mechanical Instrument Cluster (fuel level, dim

data, odometer & warning chime) support
Travel information system
Power convertible top
Power door lock multiplexing control
Rear Window Defogger Control
Remote Keyless Entry with Panic Mode
Remote power deck lid release
Rolling door lock control (customer programmable)
Sentry key immobilizer support
Vehicle Theft Security System
Wiper Control (speed sensitive with return to park)

The BCM receives information over the PCI Bus from the PCM in order to support certain features.

The required information is as follows:

- Engine RPM
- Engine Temperature
- Injector on Time and Distance Pulses
- Vehicle Speed
- Charging System Failure, Engine Temperature Limp-In, VTSS Arming Status
- Engine Model
- “Check Engine” lamp status

The BCM provides the PCM with information on the A/C switch status and the VTSS status.

The JR has several customer programmable features which can be disabled or enabled by the customer.

FEATURE	DEFAULT	PROGRAMMING METHOD	FEEDBACK
Rolling Automatic Door Locks	Enabled	Close all doors Place vehicle key in the ignition and cycle between off and run four times ending in the off position Customer depresses the driver power door look switch to lock the doors Body Controller will toggle the enable/disable state of rolling locks	BCM provides a single chime to indicate completion of the programming
RKE-Horn Chirp	Enabled	Continually press the lock button for a minimum of 4 seconds to a maximum of 10 seconds Within the 4-10 second range, press the unlock button while continuing to press the lock button Release both buttons Body Controller will toggle on/off state of horn chirp feature	None
RKE-Rear Release Toggle	Press Twice	Continually press the unlock button for a minimum of 4 seconds to a maximum of 10 seconds Within the 4-10 second range, press the rear release button while continuing to press the unlock buttons Release both buttons RKE will toggle state of one press/two press rear release	
RKE Program New FOB (Using an already programmed FOB)	Not Applicable	Turn vehicle ignition switch on. With programmed FOB continually press the unlock button for a minimum of 4 seconds to a maximum of 10 seconds Within the 4-10 second range, press the panic button while continuing to press the unlock button Release both buttons Press lock and unlock together and then press any button of FOB(s) to be Learned. (Note: RKE system erases all FOBs when program mode is entered So any existing FOBs must also be Programmed	BCM will sound a second chime when programming mode is started BCM will sound a second chime after each FOB has been learned, a 32 second time out period has elapsed, or the vehicle ignition has been turned off Turn off ignition or wait for 32 seconds to exit programming mode
Auto Unlock on Exit	Enabled	Close all doors Place vehicle key in the ignition and cycle between off and run four times ending in the off position Customer depresses the driver power door unlock switch to unlock the doors Body Controller will toggle the enable/disable state of auto unlock on Exit	BCM provides a single chime to indicate completion of the programming

FEATURE	DEFAULT	PROGRAMMING METHOD	FEEDBACK
RKE Lamp Flash	Enabled	Continually press the lock button for a minimum of 4 seconds to a maximum of 10 seconds Within the 4-10 second range, press the trunk button while continuing to press the lock button Release both buttons Body Controller will toggle on/off state of lamp flash feature	None

3.4 CHIME SYSTEM

The chime system is comprised of an audible chime located internal to the BCM; and is dependent on various inputs to the BCM to operate. These inputs to the BCM include key-in ignition switch, exterior lamps as well as requests for the Mechanical Instrument Cluster from the seat belt switch input or whenever certain indicators are turned on.

3.5 COMPASS/MINI-TRIP COMPUTER

DESCRIPTION

The JR Compass/Mini-Trip Computer (CMTC) is located in the instrument panel between the center A/C outlets. The CMTC has two function buttons and a vacuum fluorescent (VF) display that provides the outside temperature, Trip Computer information, and one of eight compass headings to indicate the direction the vehicle is facing. The compass heading and the outside temperature are displayed at the same time.

The BCM calculates much of the information displayed by the CMTC. The BCM receives this information from PCI Bus messages, the PCM, and the Ambient Temperature Sensor. The Ambient Temperature Sensor (ATS) monitors the outside temperature and is hardwired to the PCM. The CMTC receives filtered outside temperature data via PCI Bus messages from the BCM. The ambient temperature sensor may receive invalid data whenever the vehicle is operated at low speeds, or the ignition is off for a short period of time. These causes for inaccuracy will be filtered out by the BCM.

The CMTC receives dedicated PCI Bus messages with the calculated information from the BCM for the trip computer displays.

The CMTC cannot be repaired and, if faulty or damaged it must be replaced. The incandescent lamp for the STEP and US/M button illumination is serviceable.

OPERATION

Actuation of the STEP button will cause the CMTC to change modes of operation. Actuation of the US/M button will toggle the display between English and Metric units. Trip Computer resets are accomplished by pressing the STEP and US/M buttons simultaneously. To reset only the trip information currently being displayed, press and release the STEP and US/M buttons simultaneously for one second until the chime sounds. To reset all trip information, press and hold the STEP and US/M buttons simultaneously until a second chime sounds (approximately 2 seconds) and then release the buttons.

The CMTC operates only when the ignition is on. The following functions are available using the STEP button:

- Compass and outside temperature
- Average fuel economy (AVE ECO)
- Instantaneous Fuel Economy (ECO)
- Distance to Empty (DTE)
- Trip Odometer (ODO)
- Elapsed ignition time (ET)
- Display Off

COMPASS/MINI-TRIP COMPUTER VF DISPLAY MESSAGES

The CMTC will not display information for any of the screens for which it did not receive the proper PCI bus data. Refer to the symptom list in the Diagnostic section in this manual for problems related to the CMTC.

The CMTC receives the following messages from Body Control Module (BCM):

- Verification of US/Metric status
- VF display dimming brightness and exterior lamp status
- Trip Odometer data
- Elapsed Ignition On Time data
- Fuel Economy (Average and Instantaneous
- Distance to Empty
- Outside Temperature

The CMTC transmits the following messages to the BCM:

- Status Request: Beep, Reset, US/M Toggle
- Current Display
- Compass Heading

The CMTC receives the following message from PCM:

- Vehicle Speed

SETTING MAGNETIC ZONE VARIANCE

Variance is the difference between magnetic North and geographic North. For proper compass function, the correct variance zone must be set. Refer to the Zone Variance map for the correct zone. Follow these steps to check or change the variance zone:

- The ignition switch must be in the On position and the CMTC display must not be blank.
- Press and hold the STEP and US/M buttons until VAR is displayed. The CMTC will display the last variance zone stored in memory and the word VAR.
- Use the STEP button to select the proper variance zone number, 1 through 15.
- After selecting the proper zone number, simultaneously press the STEP and US/M buttons or wait approximately 15 seconds. The variance zone is then stored in the memory and the CMTC returns to normal operation.

3.5.2 COMPASS CALIBRATION

The compass module has 2 types of auto-calibration; slow-cal and fast-cal. Slow-cal ensures that during normal vehicle operation the compass performs auto-calibration functions to keep the compass sensors in their proper operating range. Whenever the ignition is On and the CMTC receives PCI bus data indicating that engine RPM is greater than zero, auto-calibration is performed continuously.

If the calibration information stored in the compass module memory is not within the normal range after a power-up cycle, the compass will display CAL. The CMTC with enter into the fast-cal mode until calibration is complete.

To enter the compass into Manual Calibration mode, perform the following steps:

- Drive the vehicle to an area away from any large metal objects or overhead power lines.
- Ensure that the proper variance zone is selected. See “Setting Magnetic Zone Variance.”
- The ignition switch must be in the On position and the CMTC display must not be blank.
- Press the STEP button and scroll to the Compass/Temperature display.
- Press and hold the STEP and US/M buttons simultaneously until CAL begins flashing and then release the buttons.
- CAL is displayed without flashing.
- Drive slowly, less than 4 MPH (8KPH) in 3 complete 360 degree circles.
- CAL will remain illuminated to alert the driver that the compass is in the calibration mode.
- After calibration is complete, CAL will turn off.

If the compass appears unable to be calibrated or the compass displays false indications, the vehicle may need to be demagnetized.

AMBIENT TEMPERATURE SENSOR

DESCRIPTION

The ambient air temperature is monitored by the PCM and displayed by the CMTC. The PCM receives a hardwire input from the ambient temperature sensor (ATS). The ATS is located on the inside of the front bumper beam.

The ATS cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

OPERATION

The ATS is a variable resistor that operates on a 5-volt reference signal circuit hardwired from the PCM. The resistance in the ATS changes as the outside temperature rises or falls. The PCM senses the change in reference voltage through the ATS resistor. Based on the resistance of the ATS, the PCM is programmed to correspond to a specific temperature. The PCM then transmits the proper ambient temperature to the BCM. The BCM filters the ambient temperature data and transmits this data to the CMTC.

DIAGNOSIS AND TESTING

SELF-CHECK DIAGNOSTICS

The CMTC is capable of performing a diagnostic self check on its internal functions. CMTC diagnostics may be performed using a DRBIII® or by using the following procedure:

1. With the ignition switch in the OFF position, depress and hold the STEP and the US/M buttons.
2. Turn the ignition switch to the On position and release the buttons.
3. All of the VFD segments will illuminate for 2-4 seconds. Check for segments that do not illuminate or illuminate all the time.
4. When the self-check is complete the CMTC will display one of the following five messages:

- F (FAIL)
- P (PASS)
- Bus (No PCI bus communication)
- Bus 1 (No PCM bus messages received)
- Bus 2 (No BCM bus messages received)

5. To exit the self-check mode, depress the STEP button or cycle the ignition switch and the CTM will return to normal operation.

If a Bus fault is displayed, refer to the symptom list. If an F is displayed, the CMTC must be replaced. The CMTC will not display an F for a VF segment that does not illuminate.

AMBIENT TEMPERATURE SENSOR

The outside temperature function is supported by the ambient temperature sensor (ATS), a signal and ground circuit hardwired to the PCM, the BCM, and the CMTC display.

If the CMTC display indicates 60°C (140°F) or the ATS sense circuit is shorted to ground, the temp display will be 60°C (140°F) to indicate a SHORT circuit condition.

If the CTM display indicates -45°C (-49°F) or the ATS sense circuit is open, the temp display will be -45°C (-49°F) to indicate an OPEN circuit condition.

If there is an OPEN or SHORT circuit condition, it must be repaired before the CMTC VFD can be tested.

The ATS is supported by the PCM. ATS fault DTC's will be recorded in the PCM. The ATS can be diagnosed using the following Sensor Test. Test the ATS circuits using the diagnostics in the Body Diagnostic Procedures Manual. If the ATS, the circuits, and PCI bus communications are confirmed to be OK, but the CMTC temperature display is inoperative or incorrect, replace the CMTC.

AMBIENT TEMPERATURE SENSOR TEST

1. Turn the ignition OFF.
2. Disconnect the ATS harness connector.
3. Measure the resistance of the ATS using the following min/max values:

- 0°C (32°F) Sensor Resistance = 29.33 – 35.99 Kilohms
- 10°C (50°F) Sensor Resistance = 17.99 – 21.81 Kilohms
- 20°C (68°F) Sensor Resistance = 11.37 – 13.61 Kilohms
- 25°C (77°F) Sensor Resistance = 9.12 – 10.86 Kilohms
- 30°C (86°F) Sensor Resistance = 7.37 – 8.75 Kilohms
- 40°C (104°F) Sensor Resistance = 4.90 – 5.75 Kilohms

The sensor resistance should read between these min/max values. If the resistance values are no OK, replace the Sensor.

3.6 DOOR AJAR SYSTEM

The door ajar and decklid ajar states are used as inputs for the Body Control Module (BCM). The BCM uses these inputs to determine exactly what position the doors and decklid are in. The DRBIII® will display the state of the door ajar and the decklid ajar switches in Inputs/Outputs. It's important to note, that when any door, or the decklid is closed, the switch state on the DRBIII® will show OPEN. When any door, or the decklid is open the switch state on the DRBIII® will show CLOSED. During diagnosis, if a door or the decklid is closed and the DRBIII® displays the switch state as CLOSED, it indicates a shorted ajar circuit. If the door or the decklid is open and the DRBIII® displays the switch state as OPEN, it indicates an open ajar circuit.

3.7 EXTERIOR LIGHTING SYSTEM

3.7.1 HEADLAMP DELAY

The headlamp time delay operates when the ignition switch is turned off while the headlamps are still on, and the headlamps are then turned off within 45 seconds after the ignition is off. This will provide a 90-second time delay before turning off the headlamps.

3.8 HEATING AND A/C SYSTEMS

A single-zone HVAC system is available on all JR series vehicles.

3.8.1 MANUAL TEMPERATURE CONTROL

3.8.2 HVAC CONTROL

The HVAC system maintains incoming air temperature, airflow, fan speed, and fresh air intake for the entire vehicle from the instrument panel mounted A/C — Heater Control. The full range of temperature that the system can produce in any mode for the entire vehicle is available by positioning the blend Control to the desired range.

3.8.3 AIR INTAKE

When the fresh-air door is open, outside air is drawn into the HVAC housing through the cowl opening at the base of the windshield. When the fresh-air door is closed, recirculated air is drawn in to the HVAC housing from under the instrument panel.

3.8.4 AIR DISTRIBUTION

The HVAC unit has four fully adjustable instrument panel outlets. Side-window demister outlets in the instrument panel eliminate the need for door ducts and door-to-instrument panel seals. A single, central mounted outlet delivers air for defrosting the windshield. Two ducts, one on each side of the center console underneath the instrument panel, provide airflow to the driver floor area and the front seat passenger floor area.

3.8.5 A/C-HEATER CONTROL, SWITCH OPERATION

3.8.6 BLOWER SWITCH

The rotary Blower Switch has five positions, Off, Low, M1, M2, and High. Rotating the Blower Switch results in the A/C — Heater Control providing direct blower motor activation, change in blower speed, and blower motor deactivation respectively. The Blower Switch must be in any of the four on positions to request A/C, and also to have the A/C — Heater Control send a signal to the Body Control Module to signal the door actuators to change door position.

3.8.7 MODE SWITCH

The rotary Mode Switch has a total of eight positions. The first three, for A/C request, include Recirc/Bi-level, Panel, and Bi-level. The remaining five positions, for Heat request, include Panel, Bi-level, Floor, Floor/Defrost, and Defrost. The Floor/ Defrost position and the Defrost position also provided an A/C request.

3.8.8 MODE SWITCH, A/C REQUEST

Provided that the Blower Switch is in any of the four on positions, rotating the Mode Switch to any of the three A/C request positions, the Floor/Defrost position, or the Defrost position, will result in the A/C − Heater Control sending a signal to the BCM to send a message to the PCM to provide A/C compressor clutch activation. However, the BCM will only provide this request if EVAP function is found acceptable.

3.8.9 MODE SWITCH, MODE DOOR POSITION CHANGE REQUEST

Provided that the Blower Switch is in any of the four on positions, rotating the Mode Switch will result in the A/C — Heater Control sending a signal to the BCM to signal the actuator to move the mode door. A potentiometer, inside the Mode Door Actuator, and feedback circuits provide the BCM with door position information.

3.8.10 MODE SWITCH, FRESH-AIR DOOR POSITION CHANGE REQUEST

Provided that the Blower Switch is in any of the four on positions, rotating the Mode Switch to the Recirc position will result in the A/C — Heater Control sending a signal to the BCM to signal the actuator to close the fresh-air door. While rotating the mode Switch to any other position results in the A/C — Heater Control sending a signal to the BCM to signal the actuator to open the fresh-air door. When the Blower Switch is off, the fresh-air door closes to prevent outside air from entering the passenger compartment.

3.8.11 BLEND SWITCH

The rotary Blend Switch has multiple detents to control the full range of temperature that the system can produce in any mode. Provided that the Blower Switch is an any of the four on positions, rotating the Blend Switch will result in the A/C — Heater Control sending a signal to the BCM to signal the actuator to move the blend door. A potentionmeter, inside the Blend Door Actuator, and feedback circuits provide the BCM with door position information.

3.8.12 REAR WINDOW DEFOGGER SWITCH

The Rear Window Defogger Switch is a momentary contact switch. Toggling the switch results in the A/C — Heater Control sending a signal to the BCM to provide rear window defogger activation or deactivation respectively. The switch LED illuminates when the switch is on.

3.8.13 DIAGNOSTIC TROUBLE CODES

All HVAC Diagnostic Trouble Codes are stored in the Body Control Module. Stored DTCs indicate that a problem has occurred in the HVAC system, and may still be present. To verify a problem is still present in the HVAC system, use the DRBIII® to erase all stored BCM DTCs. After erasing the DTC(s), use the DRBIII® to see if the DTC(s) reappear. If necessary, actuate the A/C — Heater Control switches with the ignition on and with the engine running while monitoring the DRBIII® to see if the DTC(s) reappear.

3.9 INTERIOR LIGHTING

3.9.1 COURTESY LAMP CONTROL

The body controller has direct control over the majority of the vehicle's courtesy lamps. The body computer will illuminate the courtesy lamps under any of the following conditions:

1. Any door is ajar.
2. The courtesy lamp switch on the instrument panel is closed.
3. A Remote Keyless entry unlock message is received. If the interior lamps are left on after the ignition is turned off, the BCM will turn them off after 15 minutes or until either the dome lamp switch or door ajar switch changes state.

3.9.2 ILLUMINATED ENTRY

Illuminated entry will be initiated when the customer enters the vehicle by unlocking the doors with the key fob, or with the key if the vehicle is equipped with vehicle theft alarm. Upon exiting the vehicle, if the lock button is pressed with a door open, illuminated entry will cancel when the door closes. If the doors are closed and the ignition switch is turned on, the illuminated entry also cancels.

3.10 MECHANICAL INSTRUMENT CLUSTER

The Mechanical Instrument Cluster (MIC) is divided into 4 sections. Primary gauges (Speedometer and Tachometer), secondary gauges (Fuel Level, Engine Coolant Temperature), PCI bus enabled indicator lamps and hardwired enabled indicator lamps.

The gauge mechanisms function in the same way. The main differences are in the face and size of the gauge.

The Oil Pressure, Brake Warning, Turn Signal and Fog Lamp indicators are directly wired to the circuits that they are indicators for. These indicators are located in, but not controlled by, the MIC and are not part of any MIC self test or diagnostic. All indicators are replaceable bulbs or LEDs.

The PCM sends a gauge position message to the BCM through the PCI bus. The MIC receives this message from the BCM, translates it, and positions the gauges. The BCM also sends messages to the MIC to actuate all PCI controlled indicators. These messages are received when the Ignition Switch is in the RUN or START position.

When the ignition Switch is turned to the RUN position, a bulb-check is performed. This consists of activating the PCI bus controlled indicators for approximately 2 to 4 seconds. By holding the TRIP/RESET button in while turning the Ignition Switch to the RUN position, you can activate the MIC Self Test.

The Following indicators are controlled by PCI bus messages:

- Malfunction Indicator Lamp
- Charging System Warning Indicator
- Engine Coolant Temperature Indicator
- Cruise Engaged Indicator
- Airbag Warning Indicator
- Low Fuel Indicator
- ABS Warning Indicator
- High Beam Indicator

The following indicators are hardwired and not controlled by PCI bus messages:

- Seat Belt Indicator
- Oil Pressure Indicator
- Brake Warning Indicator
- VTSS Indicator
- Turn Signal Indicators
- Fog Lamp Indicators

3.11 POWER DOOR LOCK SYSTEM

The door lock switches provide a variable amount of voltage through the multiplexed (MUX) circuit to the BCM. Depending upon that input and various conditions that must be met (i.e. door lock inhibit, etc.), the BCM will determine the action to be taken and activate the proper relay for approximately 250 to 350 msec. If the vehicle is equipped with the vehicle theft security system it will have the central locking feature which locks and unlocks all doors from the cylinder lock switches. These switches are on separate multiplexed circuits to the BCM and have trouble codes relating to each of them.

RKE Remote Keyless Entry- This feature allows locking and unlocking of the vehicle door(s) by remote control using a hand-held transmitter (sometimes referred to as a fob) to activate a radio receiver (RKE module). This module now plugs into the body control module which is directly connected to the junction block. With this feature RKE can now be added to a non-equipped vehicle by installing a module. If the vehicle is equipped with the vehicle theft security system, RKE will also arm and disarm that system. A 4-button transmitter is used which provides lock, unlock, decklid release and panic features. Decklid release is only operable while the vehicle is in the park position. The module is capable of retaining up to 4 transmitter codes. Rolling code, which increases security, is also included in this system. If the transmitter goes out of synchronization it is easily put back in by pressing the lock button when the transmitter is within range. An external antenna has been added which plugs into the module to provide greater range. RKE will also turn on the interior lamps when a valid unlock command is received and will extinguish the interior lamps when a lock command is received and all doors are closed.

Door Lock Inhibit- When the key is in the ignition and the driver front door is open, all door lock switches are disabled. The unlock switches are still functional. This protects against locking the vehicle with the keys still in the ignition.

Automatic (rolling) Door Locks - This feature can be enabled or disabled by using either the DRBIII® or the customer programmable method. When enabled, all doors will lock when the vehicle reaches a speed of 15 mph (24 kmh) and all doors are closed. If a door is opened and the vehicle slows to below 15 mph (24 kmh), the locks will operate again once all doors are closed and the speed is above 15 mph (24 kmh). This feature is not available in European markets.

Decklid Release - Decklid release is now a function of the body control module. Trouble codes are provided to assist in the diagnosis of this system.

Customer programmable features are: Horn chirp, one or two press decklid release, programming a new transmitter (using a previously programmed transmitter), rolling door locks, unlock on exit, and RKE lamp flash.

3.12 POWER CONVERTIBLE TOP

3.12.1 TOP CONTROL

The body control module now controls all the functions of the convertible top. The body control module supplies a multiplexed voltage of approximately 90% of ignition voltage to the power top switch. Through a series of resistors the power top switch switches the circuit to ground depending on the position of the switch. The BCM then supplies the ground path for the up or down relay as requested. The power top switch has a 4.7K-ohm diagnostic resistor that allows the BCM to detect a possible open circuit.

3.12.2 WINDOW DROP RELAY ASSEMBLY

The convertible has a new feature that allows the operator to lower all four windows and lower the top at the same time. This is accomplished by pressing the power top switch to the second detent. Through the multiplexed circuit of the power top switch the BCM will supply the ground for the window drop relay assembly.

The window drop relay assembly is comprised of four separate relays that are in series with the power window circuits. The relay assembly is located in the driver door.

3.13 VEHICLE COMMUNICATION

The Programmable Communication Interface or PCI Bus is a single wire multiplexed network capable of supporting binary encoded messages shared between multiple modules. The PCI bus circuit is identified as D25. The modules are wired in parallel. Connections are made through the BCM. The BCM acts as a splice to connect each module and the Data Link Connector (DLC) together. The following modules are used on 2002 JR:

- Airbag Control Module or referred to as the Occupant Restraint Controller (ORC)
- Left Side Impact Airbag Control Module
- Right Side Impact Airbag Control Module
- Controller Antilock Brake
- Powertrain Control Module
- Radio (if equipped)
- CD Changer (if equipped)
- Compass/Mini-Trip Computer (if equipped)
- Body Control Module
- Sentry Key Immobilizer Module
- Transmission Control Module
- Mechanical Instrument Cluster

Each module provides its own bias and termination in order to transmit and receive messages. The bus voltage is at zero volts when no modules are transmitting and is pulled up to about seven and a half volts when modules are transmitting.

The bus messages are transmitted at a rate averaging 10800 bits per second. Since there is only voltage present when the modules transmit and the message length is only about 500 milliseconds, it is ineffective to try and measure the bus activity with a conventional voltmeter. The preferred method is to use the DRBIII® lab scope. The 12v square wave selection on the 20-volt scale provides a good view of the bus activity. Voltage on the bus should pulse between zero and about seven and a half volts. Refer to the following figure for some typical displays.

The PCI Bus failure modes are broken down into two categories. Complete PCI Bus Communication Failure and individual module no response. Causes of a complete PCI Bus Communication Failure include a short to ground or battery on the PCI circuit. Individual module no response can be caused by an open circuit at the BCM or at the module, or an open battery or ground circuit to the affected module.

Symptoms of a complete PCI Bus Communication Failure would include but are not limited to:

- All gauges on the MIC stay at zero

- All telltales on MIC illuminate
- MIC backlighting at full intensity
- No response received from any module on the PCI bus (except PCM)
- No start (if equipped with Sentry Key Immobilizer)

Symptoms of Individual module failure could include any one or more of the above. The difference would be that at least one or more modules would respond to the DRBIII®.

Diagnosis starts with symptom identification. If a complete PCI Bus Communication Failure is suspected, begin by identifying which modules the vehicle is equipped with and then attempt to get a response from the modules with the DRBIII®. If any modules are responding, the failure is not related to the total bus, but can be caused by one or more modules PCI circuit or power supply and ground circuits. The DRBIII® may display “BUS ± SIGNALS OPEN” OR “NO RESPONSE” to indicate a communication problem. These same messages will be displayed if the vehicle is not equipped with that particular module. The CCD error message is a default message used by the DRBIII® and in no way indicates whether or not the PCI bus is operational. The message is only an indication that a module is either not responding or the vehicle is not equipped.

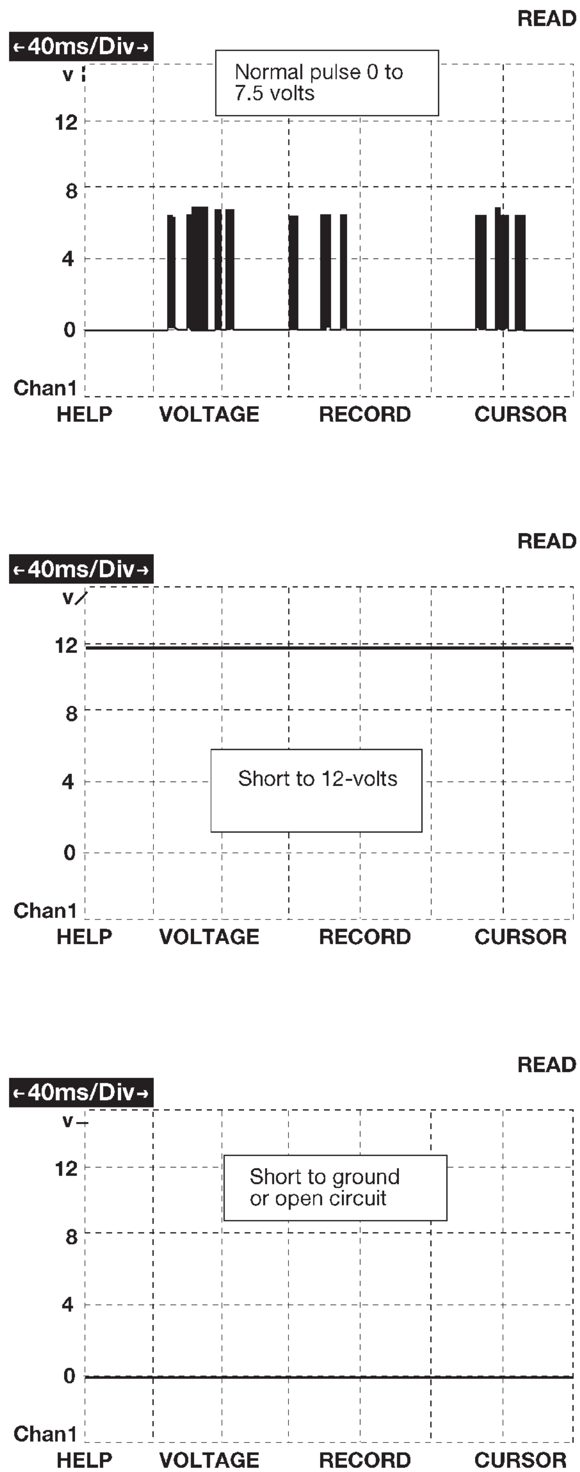
NOTE: Communication over the bus is essential to the proper operation of the vehicles on-board diagnostic systems and the DRBIII®. Problems with the operation of the bus or DRBIII® must be corrected before proceeding with diagnostic testing. If there is a problem, refer to the Communications category of this manual.

3.13.1 BUS FAILURE MESSAGE

Odometer Displays “No Bus” - The Mechanical Instrument Cluster (MIC) cannot communicate over the bus and does not know why.

3.14 VEHICLE THEFT SECURITY SYSTEM

This passive system is designed to protect against vehicle theft. The vehicle theft security system (VTSS) is part of the body control module (BCM), which monitors vehicle doors and the ignition for unauthorized operation. The alarm activates by sounding the horn, flashing the headlamps, courtesy lamps, and the VTSS indicator lamp. Passive arming occurs upon normal vehicle exit by turning the ignition off, opening the driver’s door, locking the doors with the power lock, and closing the driver’s door or locking the doors with RKE. Manual arming occurs by using the key to lock the doors



80bdbcf6

after closing them. The indicator lamp in the instrument cluster will flash for 15 seconds, showing that arming is in progress. If no monitored systems are activated during this period, the system will arm and the indicator will flash at a slow rate. If the indicator lamp remains steadily lit during the arming process, this can indicate a loss of decklid cylinder lock switch. When something triggers the alarm, the system will signal the headlamps, courtesy lamps, and horn for about 3 minutes, then headlamps for an additional 15 minutes if the offending input is still present.

For complaints about the Theft Alarm going off on its own use the DRBIII® and select “Body Computer” then “Input/Output Display” and read the “Last VTSS Cause” status.

Tamper Alert - The VTSS indicator lamp will flash twice quickly and the horn will chirp three times when the system is disarmed to indicate a tamper condition has occurred.

Manual Override - The system will not arm if the doors are locked using the manual lock control (by hand) or if the locks are actuated by an inside occupant after the door is closed.

To verify the system, proceed as follows:

1. Open the driver’s door.
2. Remove the ignition key (but keep it in hand).
3. Lock the doors with the power lock switch or the RKE.
4. Close the driver’s door.

NOTE: After the doors are closed, locking the doors with RKE will also arm the system.

NOTE: If the VTSS indicator lamp flashed, the system is operational and verified. If not, there may be a problem with the system.

Arming/Disarming- Active arming occurs when the remote keyless entry transmitter is used to lock the vehicle doors, whether the doors are open or closed. If one or more doors are open the arming sequence is completed only after all doors are closed.

Passive disarming occurs upon normal vehicle entry (unlocking either front door with the key). This disarming also will halt the alarm once it has been activated.

Active disarming occurs when the remote keyless entry transmitter is used to unlock the vehicle doors. This disarming also will halt the alarm once it has been activated.

NOTE: A Powertrain Control Module from a vehicle equipped with a vehicle theft security system cannot be used in a vehicle that is not equipped with a vehicle theft security system. If the VTSS indicator lamp comes on after ignition ON and stays on, the PCI bus communication with the Powertrain Control Module possibly has been lost.

3.15 WIPER SYSTEM

The wiper system provides the driver with the normal wiper (low and high speeds), intermittent wipe, and wipe after wash. The driver selects the wiper function via the resistive multiplexed stalk switch mounted on the steering column. The BCM uses the input signal from the wiper stalk switch, wiper motor park switch, and the washer switch to control the wiper system. The Body Control Module (BCM) then controls the relays and timing functions to provide the driver selected features.

3.15.1 SYSTEM FEATURES

Speed Sensitive Intermittent Wipe Mode

There are 6 individual delay times with a minimum delay of 1/2 second to a maximum of 18 seconds. When the vehicle speed is under 10 MPH (6 KMH), the delay time is doubled providing a range of 1 second to 36 seconds.

Park after Ignition Off

Because the wiper relays are powered from the battery the BCM can run the wipers to park after the ignition is turned off.

Wipe after Wash

When the driver presses the wash button for over 1/2 second and then releases it, the wiper will continue to run for 2 additional wipe cycles.

The wiper system utilizes the BCM to control the on/off and hi/low relays fro low and hi speed wiper functions, intermittent wiper delay as the switch position changes, pulse wipe, wipe after wash mode, and wiper motor park functions. The BCM uses the vehicle speed input to double the usual delay time below 10 MPH (17 KMH).

3.16 USING THE DRBIII®

Refer to the DRBIII® user’s guide for instructions and assistance with reading DTC’s, erasing DTC’s, and other DRBIII® functions.

3.17 DRBIII® ERROR MESSAGES

Under normal operation, the DRBIII® will display one of only two error messages: user-requested WARM Boot or User-Requested COLD Boot. If the DRBIII® should display any other error message, record the entire display and call the Star Center. This is a sample of such an error message display:

```
ver: 2.14
date: 26 Jul93
file: key_itf.cc
date: Jul 26 1993
line: 548
err: 0x1
User-Requested COLD Boot

Press MORE to switch between this display
   and the application screen.
Press F4 when done noting information.
```

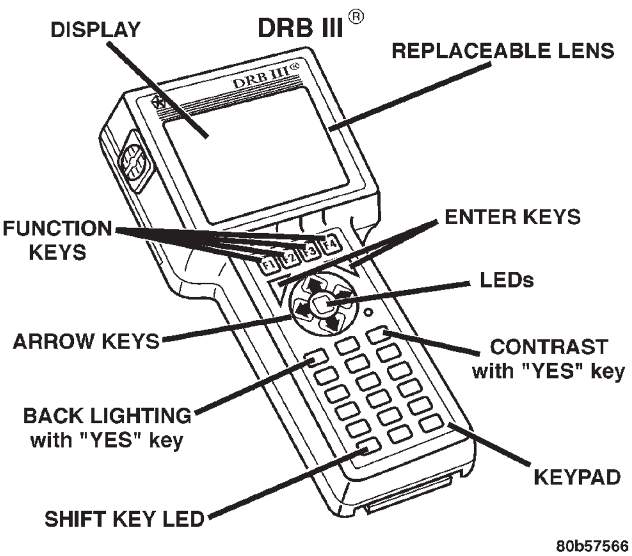
3.18 DRBIII® DOES NOT POWER UP (BLANK SCREEN)

If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link connector cavity 16). A minimum of 11 volts is required to adequately power the DRBIII®. Check for proper grounds at DLC cavities 4 and 5.

If all connections are proper between the DRBIII® and the vehicle or other devices, and the vehicle battery is fully charged, and inoperative DRBIII® may be the result of faulty cable or vehicle wiring.

3.19 DISPLAY IS NOT VISIBLE

Low temperatures will affect the visibility of the display. Adjust the contrast to compensate for this condition.



4.0 DISCLAIMERS, SAFETY, WARNINGS

4.1 DISCLAIMERS

All information, illustrations, and specifications contained in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

4.2 SAFETY

4.2.1 TECHNICIAN SAFETY INFORMATION

WARNING: ENGINES PRODUCE CARBON MONOXIDE THAT IS ODORLESS, CAUSES SLOWER REACTION TIME, AND CAN LEAD TO SERIOUS INJURY. WHEN THE ENGINE IS OPERATING, KEEP SERVICE AREAS WELL VENTILATED OR ATTACH THE VEHICLE EXHAUST SYSTEM TO THE SHOP EXHAUST REMOVAL SYSTEM.

Set the parking brake and block the wheels before testing or repairing the vehicle. It is especially important to block the wheels on front-wheel drive vehicles; the parking brake does not hold the drive wheels.

When servicing a vehicle, always wear eye protection, and remove any metal jewelry such as watchbands or bracelets that might make an inadvertent electrical contact.

When diagnosing a powertrain system problem, it is important to follow approved procedures where applicable. These procedures can be found in this General Information Section or in the service manual procedures. Following these procedures is very important to the safety of individuals performing diagnostic tests.

4.2.2 VEHICLE PREPARATION FOR TESTING

Make sure the vehicle being tested has a fully charged battery. If it does not, false diagnostic codes or error messages may occur.

4.2.3 SERVICING SUB ASSEMBLIES

Some components of the powertrain system are intended to be serviced in assembly only. Attempting to remove or repair certain system subcomponents may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

4.2.4 DRBIII® SAFETY INFORMATION

WARNING: EXCEEDING THE LIMITS OF THE DRBIII® MULTIMETER IS DANGEROUS. IT CAN EXPOSE YOU TO SERIOUS INJURY. CAREFULLY READ AND UNDERSTAND THE CAUTIONS AND THE SPECIFICATION LIMITS.

- Follow the vehicle manufacturer's service specifications at all times.
- Do not use the DRBIII® if it has been damaged.

- Do not use the test leads if the insulation is damaged or if metal is exposed.
- To avoid electrical shock, do not touch the test leads, tips, or the circuit being tested.
- Choose the proper range and function for the measurement. Do not try voltage or current measurements that may exceed the rated capacity.
- Do not exceed the limits shown in the table below:

FUNCTION	INPUT LIMIT
Volts	0 - 500 peak volts AC 0 - 500 volts DC
Ohms (resistance)*	0 - 1.12 megohms
Frequency Measured Frequency Generated	0 - 10 kHz
Temperature	-58 - 1100°F -50 - 600°C

* Ohms cannot be measured if voltage is present. Ohms can be measured only in a non-powered circuit.

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- The circuit being tested must be protected by a 10A fuse or circuit breaker.
- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeding 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- When measuring current, connect the meter in series with the load.
- Disconnect the live test lead before disconnecting the common test lead.
- When using the meter function, keep the DRBIII® away from spark plug or coil wires to avoid measuring error from outside interference.

4.3 WARNINGS

4.3.1 VEHICLE DAMAGE WARNINGS

Before disconnecting any control module, make sure the ignition is “off”. Failure to do so could damage the module.

When testing voltage or continuity at any control module, use the terminal side (not the wire end) of the connector. Do not probe a wire through the insulation; this will damage it and eventually cause it to fail because of corrosion.

Be careful when performing electrical tests so as to prevent accidental shorting of terminals. Such mistakes can damage fuses or components. Also, a second DTC could be set, making diagnosis of the original problem more difficult.

4.3.2 ROAD TEST COMPLAINT VEHICLE

Some complaints will require a test drive as part of the repair verification procedure. The purpose of the test drive is to try to duplicate the diagnostic DTC or symptom condition.

WARNING: BEFORE ROAD TESTING A VEHICLE, BE SURE THAT ALL COMPONENTS ARE REASSEMBLED. DURING THE TEST DRIVE, DO NOT TRY TO READ THE DRBIII® SCREEN WHILE IN MOTION. DO NOT HANG THE DRBIII® FROM THE REAR VIEW MIRROR OR OPERATE IT YOURSELF. HAVE AN ASSISTANT AVAILABLE TO OPERATE THE DRBIII®.

5.0 REQUIRED TOOLS AND EQUIPMENT

DRBIII® (diagnostic read-out box)
Jumper wires
Ohmmeter
Voltmeter
Sentry Key Tester
Test Light
8310 Airbag System Load Tool
8443 SRS Airbag System Load Tool

6.0 GLOSSARY OF TERMS

6.1 ACRONYMS

ABS	antilock brake system
ACM	airbag control module
AECM	airbag electronic control module (ACM)
ASDM	airbag system diagnostic module (ACM)
BCM	body control module
CAB	controller antilock brake
CMTC	compass/mini-trip computer
DAB	driver airbag
DLC	data link connector

DTC	diagnostic trouble code
DR	driver
EBL	electric back lite (rear window defogger)
HVAC	heater ventilation, air conditioning
MIC	mechanical instrument cluster
MTC	manual temperature control
OBD	on board diagnostics
ODO	odometer
ORC	occupant restraint controller (ACM)
PAB	passenger airbag
PASS	passenger
PCI	Programmable Communication Interface (vehicle communication bus)
PCM	powertrain control module
PDC	power distribution center
PWM	pulse width modulated
RKE	remote keyless entry
SAB	seat airbag
SBT	seat belt tensioner
SIACM	side impact airbag control module
SKIM	sentry key immobilizer module
SKIS	sentry key immobilizer system
SQUIB	also called initiator (located inside airbag)
SRS	supplemental restraint system
TCM	transmission control module
VFD	vacuum fluorescent display
VTSS	vehicle theft security system

NOTES

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

Symptom List:

ACCELEROMETER 1
ACCELEROMETER 2
INTERNAL 1
INTERNAL 2
OUTPUT DRIVER 1
OUTPUT DRIVER 2
STORED ENERGY FIRING 1

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be INTERNAL MODULE TEST.

When Monitored and Set Condition:

ACCELEROMETER 1

When Monitored: With the ignition on, the module on board diagnostics continuously performs internal circuit tests.

Set Condition: This DTC will set if the module identifies an out of range internal circuit.

ACCELEROMETER 2

When Monitored: With the ignition on, the module on board diagnostics continuously performs internal circuit tests.

Set Condition: This DTC will set if the module identifies an out of range internal circuit.

INTERNAL 1

When Monitored: With the ignition on, the module on board diagnostics continuously performs internal circuit tests.

Set Condition: This DTC will set if the module identifies an out of range internal circuit.

INTERNAL 2

When Monitored: With the ignition on, the module on board diagnostics continuously performs internal circuit tests.

Set Condition: This DTC will set if the module identifies an out of range internal circuit.

OUTPUT DRIVER 1

When Monitored: With the ignition on the module on board diagnostics continuously performs internal circuit tests.

Set Condition: This DTC will set if the module identifies an out of range internal circuit.

OUTPUT DRIVER 2

When Monitored: With the ignition on the module on board diagnostics continuously performs internal circuit tests.

Set Condition: This DTC will set if the module identifies an out of range internal circuit.

INTERNAL MODULE TEST — Continued

STORED ENERGY FIRING 1

When Monitored: With the ignition on the ACM on board diagnostics continuously performs internal circuit tests.

Set Condition: This DTC will set if the ACM identifies an out of range internal circuit.

POSSIBLE CAUSES
AIRBAG CONTROL MODULE - ACM
LEFT SIDE IMPACT AIRBAG CONTROL MODULE - LSIACM
RIGHT SIDE IMPACT AIRBAG CONTROL MODULE - RSIACM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Ensure the battery is fully charged. **WARNING: IF THE MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED.** **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** From the list below, select the appropriate module reporting this diagnostic trouble code. SELECT ONE: ACM - ACTIVE or STORED DTC WARNING: MAKE SURE THE BATTERY IS DISCONNECTED, THEN WAIT TWO MINUTES BEFORE PROCEEDING. Replace the Airbag Control Module in accordance with Service Instructions. Perform AIRBAG VERIFICATION TEST - VER 1. LEFT SIACM - ACTIVE or STORED DTC WARNING: MAKE SURE THE BATTERY IS DISCONNECTED, THEN WAIT TWO MINUTES BEFORE PROCEEDING. Replace the Left Side Impact Airbag Control Module in accordance with Service Instructions. Perform AIRBAG VERIFICATION TEST - VER 1. RIGHT SIACM - ACTIVE or STORED DTC WARNING: MAKE SURE THE BATTERY IS DISCONNECTED, THEN WAIT TWO MINUTES BEFORE PROCEEDING. Replace the Right Side Impact Airbag Control Module in accordance with Service information. Perform AIRBAG VERIFICATION TEST - VER 1. **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

Symptom List:

AIRBAG WARNING INDICATOR OPEN
AIRBAG WARNING INDICATOR SHORT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be AIRBAG WARNING INDICATOR OPEN.

When Monitored and Set Condition:

AIRBAG WARNING INDICATOR OPEN

When Monitored: With ignition on the ACM monitors the PCI Bus for a message from the MIC containing the airbag warning indicator status. The MIC transmits the message one time at ignition on, upon lamp state change, or in response to the ACM lamp message.

Set Condition: This DTC will set immediately if the indicator status is OPEN .

AIRBAG WARNING INDICATOR SHORT

When Monitored: With ignition on the ACM monitors the PCI Bus for a message from the MIC containing the airbag warning indicator status. The MIC transmits the message one time at ignition on, upon lamp state change, or in response to the ACM lamp message.

Set Condition: This DTC will set immediately if the indicator status is SHORT.

POSSIBLE CAUSES
MIC, COMMUNICATION FAILURE
WARNING INDICATOR
ACM, WARNING INDICATOR
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Ensure the battery is fully charged. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

AIRBAG WARNING INDICATOR OPEN — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, ensure PCI Bus communications with the Instrument Cluster. Is the Instrument Cluster communicating on the PCI Bus? Yes → Go To 3 No → Refer to category COMMUNICATION CATEGORY and select the related symptom INSTRUMENT CLUSTER BUS +/- SIGNAL OPEN. Perform BODY VERIFICATION TEST - VER 1.	All
3	With the DRB select PASSIVE RESTRAINTS, AIRBAG and MONITOR DISPLAY. Using the DRB, read the WARNING LAMP MONITOR screen. Select the LAMP STATUS displayed on the DRB monitors screen. Does the DRB show the LAMP STATUS: OK? YES Go To 4 NO Replace Instrument Cluster. Perform BODY VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** If there are no possible causes remaining, view repair. Repair Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
CALIBRATION MISMATCH

When Monitored and Set Condition:

CALIBRATION MISMATCH

When Monitored: With ignition on, the ACM monitors the PCI Bus for the VIN message containing the body style. The PCM transmits the complete VIN message every 14 seconds. Note: The VIN message should match the vehicle VIN plate.

Set Condition: If the Body style stored in ACM does not exactly match the vehicle body style indicated by the PCM, then the fault shall be set.

POSSIBLE CAUSES
PCM, PCI COMMUNICATION FAILURE
COMPARE VEHICLE IDENTIFICATION NUMBERS
ORC CALIBRATION MISMATCH
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	Turn the ignition on. Connect the DRB to the data link connector and select PASSIVE RESTRAINTS, AIRBAG, SYSTEM TEST. With the DRBIII®, read the system test. Does the DRB show PCM Active on the Bus:? Yes → Go To 3 No → Refer to category COMMUNICATION CATEGORY and select the related symptom. Perform AIRBAG VERIFICATION TEST - VER 1.	All

CALIBRATION MISMATCH — Continued

TEST	ACTION	APPLICABILITY
3	With the DRB select ENGINE MISCELLANEOUS, select MISC FUNCTION, and then CHECK VIN to read the Vehicle Identification Number in the Powertrain Control Module. Compare the VIN displayed on the DRB screen and the Vehicle VIN plate. Does the VIN plate and the PCM VIN match? Yes → Go To 4 No → Replace the Powertrain Control Module and program with the correct vehicle identification number. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED.** If there are no possible causes remaining, view repair. Repair Replace the Airbag Control Module in accordance with Service Instructions. WARNING: make sure the battery is disconnected and wait 2 minutes before proceeding. Perform AIRBAG VERIFICATION TEST - VER 1.	All
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
CLUSTER MESSAGE MISMATCH

When Monitored and Set Condition:

CLUSTER MESSAGE MISMATCH

When Monitored: After the MIC bulb test is completed, the ACM compares the Lamp Request by ACM, On or Off, and the Lamp on by MIC, On or Off, PCI Bus messages. Each message is transmitted one time per second or when a change in the lamp state occur.

Set Condition: If the Lamp Request by ACM, On or Off, and the Lamp on by MIC, On or Off, messages do not match, the code will set.

POSSIBLE CAUSES
MIC DIAGNOSTIC CODES
CLUSTER MESSAGE MISMATCH
STORED CODE OR INTERMITTENT CONDITION
ACM, CLUSTER MESSAGE MISMATCH
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Ensure the battery is fully charged. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	Turn the ignition on. With the DRBIII®, read the MIC DTCs. Does the DRBIII® display any active Diagnostic Codes? Yes → Refer to symptom list for problems related to Instrument Cluster. No → Go To 3	All

CLUSTER MESSAGE MISMATCH — Continued

TEST	ACTION	APPLICABILITY
3	With the DRB select PASSIVE RESTRAINTS, AIRBAG, MONITOR DISPLAY and WARNING LAMP STATUS. Cycle the ignition key and observe the LAMP ON BY MIC and LAMP REQ BY ACM monitors after the 6 to 8 second indicator test. Does the LAMP ON BY MIC and LAMP REQ BY ACM monitors match? YES Go To 4 NO Replace Mechanical Instrument Cluster. Perform BODY VERIFICATION TEST - VER 1.	All
4	**WARNING: MAKE SURE THE BATTERY IS DISCONNECTED, THEN WAIT TWO MINUTES BEFORE PROCEEDING.** If there are no possible causes remaining, view repair. Repair Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
CONFIGURATION ERROR

When Monitored and Set Condition:

CONFIGURATION ERROR

When Monitored: With ignition on the Side Impact Airbag Control Module monitors the unused squib terminals for the a valid squib circuit resistance.

Set Condition: When the SIACM detects a valid squib circuit resistance across the unused terminals.

POSSIBLE CAUSES
SELECT MODULE REPORTING DTC
MISS WIRED LEFT SIACM CONNECTOR
MISS WIRED RIGHT SIACM CONNECTOR
LEFT SIDE IMPACT AIRBAG CONTROL MODULE - LSIACM
RIGHT SIDE IMPACT AIRBAG CONTROL MODULE - LSIACM
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Ensure the battery is fully charged. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ONE: LEFT SIACM - ACTIVE DTC Go To 2 LEFT SIACM - STORED DTC Go To 4 RIGHT SIACM - ACTIVE DTC Go To 3 RIGHT SIACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

CONFIGURATION ERROR — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Left SIACM connector. **NOTE: Check connectors - Clean and repair as necessary.** Using the wiring diagram/schematic as a guide, inspect the Left SIACM connector wiring. Is the connector correctly wired? Yes → Replace the Left Side Impact Airbag Control Module in accordance with Service Instructions. WARNING: IF THE SIDE IMPACT AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1. No → Rewire the Left Side Impact Airbag Control Module connector. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Right SIACM connector. **NOTE: Check connectors - Clean and repair as necessary.** Using the wiring diagram/schematic as a guide, inspect the Right SIACM connector wiring. Is the connector correctly wired? Yes → Replace the Right Side Impact Airbag Control Module in accordance with Service Instructions. WARNING: IF THE SIDE IMPACT AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1. No → Rewire the Right Side Impact Airbag Control Module connector. Perform AIRBAG VERIFICATION TEST - VER 1.	All

CONFIGURATION ERROR — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
CURTAIN SQUIB CIRCUIT OPEN

When Monitored and Set Condition:

CURTAIN SQUIB CIRCUIT OPEN

When Monitored: With the ignition is On, the SIACM monitors the resistance of the Curtain Squib circuits.

Set Condition: When the SIACM detects an open circuit or high resistance on the Curtain Squib circuits.

POSSIBLE CAUSES
CURTAIN AIRBAG OPEN
CURTAIN SQUIB LINE 1 OR LINE 2 CIRCUIT OPEN
SIACM, CURTAIN SQUIB CIRCUIT OPEN
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Ensure the battery is fully charged. Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ONE: LEFT SIACM - ACTIVE DTC Go To 2 LEFT SIACM - STORED DTC Go To 4 RIGHT SIACM - ACTIVE DTC Go To 2 RIGHT SIACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

CURTAIN SQUIB CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED CURTAIN AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Curtain Airbag connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Curtain Airbag connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the SIACM active DTC's. Does the DRB show CURTAIN SQUIB CIRCUIT OPEN? Yes → Go To 3 No → Replace Curtain Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED CURTAIN AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Side Impact Airbag Control Module Connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Side Impact Airbag Control Module connector. Measure the resistance of the Curtain Squib Line 1 and Line 2 circuits between the Load Tool SIACM adaptor and the Curtain Airbag connector. Is the resistance below 1.0 ohms on both circuits? Yes → Replace the Side Impact Airbag Control Module in accordance with the Service information. WARNING: IF THE SIDE IMPACT AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1. No → Repair open or high resistance in the Curtain Squib Line 1 or Line 2 circuits. Perform AIRBAG VERIFICATION TEST - VER 1.	All

CURTAIN SQUIB CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
CURTAIN SQUIB CIRCUIT SHORT

When Monitored and Set Condition:

CURTAIN SQUIB CIRCUIT SHORT

When Monitored: When the ignition is on, the SIACM monitors the resistance between the Curtain Squib circuits.

Set Condition: When the SIACM detects a low resistance between the Curtain Squib circuits.

POSSIBLE CAUSES
CURTAIN AIRBAG SHORT
CURTAIN SQUIB LINE 1 SHORT TO LINE 2
SIACM, CURTAIN SQUIB CIRCUIT SHORT
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Ensure the battery is fully charged. Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ONE: LEFT SIACM - ACTIVE DTC Go To 2 LEFT SIACM - STORED DTC Go To 4 RIGHT SIACM - ACTIVE DTC Go To 2 RIGHT SIACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

CURTAIN SQUIB CIRCUIT SHORT — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED CURTAIN AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Curtain Airbag connector. **NOTE: Check connectors - Clean repair as necessary.** Connect the appropriate Load Tool to the Curtain Airbag connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRB, read the SIACM active DTC's. Does the DRB show CURTAIN SQUIB CIRCUIT SHORT? Yes → Go To 3 No → Replace Curtain Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED CURTAIN AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Side Impact Airbag Control Module connector **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the SIACM connector. Measure the resistance between the Curtain Squib Line 1 and Line 2 circuits at the Curtain Airbag connector. Is the resistance below 10K ohms? Yes → Repair Curtain Squib Line 1 shorted to Line 2 circuit. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Side Impact Airbag Control Module in accordance with Service Instructions. WARNING: IF THE SIDE IMPACT AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All

CURTAIN SQUIB CIRCUIT SHORT — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
CURTAIN SQUIB SHORT TO BATTERY

When Monitored and Set Condition:

CURTAIN SQUIB SHORT TO BATTERY

When Monitored: When the ignition is on, the SIACM monitors the voltage of the Curtain Squib circuits.

Set Condition: When the SIACM detects high voltage on the Curtain Squib circuits.

POSSIBLE CAUSES
CURTAIN AIRBAG SHORT TO BATTERY
CURTAIN SQUIB LINE 1 OR LINE 2 SHORTED TO BATTERY
SIACM, CURTAIN SQUIB SHORT TO BATTERY
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Ensure the battery is fully charged. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ONE: LEFT SIACM - ACTIVE DTC Go To 2 LEFT SIACM - STORED DTC Go To 4 RIGHT SIACM - ACTIVE DTC Go To 2 RIGHT SIACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

CURTAIN SQUIB SHORT TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED CURTAIN AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Curtain Airbag connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Curtain Airbag connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read SIACM active DTC's. Does the DRBIII® display CURTAIN SQUIB SHORT TO BATTERY? Yes → Go To 3 No → Replace Curtain Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED CURTAIN AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Side Impact Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool SIACM adaptor to the SIACM connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** Measure the voltage of the Curtain Squib Line 1 and Line 2 circuits between the Curtain Airbag connector and ground. Is any voltage present on either circuit? Yes → Repair Curtain Squib Line 1 or Line 2 shorted to battery. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Side Impact Airbag Control Module in accordance with Service Instructions. WARNING: IF THE SIDE IMPACT AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All

CURTAIN SQUIB SHORT TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
CURTAIN SQUIB SHORT TO GROUND

When Monitored and Set Condition:

CURTAIN SQUIB SHORT TO GROUND

When Monitored: When the ignition is on, the SIACM monitors the resistance of the Curtain Squib circuits.

Set Condition: When the SIACM detects a short to ground on the Curtain Squib circuits.

POSSIBLE CAUSES
CURTAIN AIRBAG SHORT TO GROUND
CURTAIN SQUIB LINE 1 OR LINE 2 SHORTED TO GROUND
SIACM, CURTAIN SQUIB SHORT TO GROUND
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Ensure the battery is fully charged. Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ONE: LEFT SIACM - ACTIVE DTC Go To 2 LEFT SIACM - STORED DTC Go To 4 RIGHT SIACM - ACTIVE DTC Go To 2 RIGHT SI ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

CURTAIN SQUIB SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED CURTAIN AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Curtain Airbag connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Curtain Airbag connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read SIACM active DTC's. Does the DRBIII® display CURTAIN SQUIB SHORT TO GROUND? Yes → Go To 3 No → Replace the Curtain Airbag in accordance with Service Instructions. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED CURTAIN AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Side Impact Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool SIACM adaptor to the SIACM connector. Measure the resistance of the Curtain Squib Line 1 and Line 2 circuits between the Curtain Squib connector and ground. Is the resistance below 10K ohms on either circuit? Yes → Repair Curtain Squib Line 1 or Line 2 shorted to ground. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Side Impact Airbag Control Module in accordance with Service Instructions. WARNING: IF THE SIDE IMPACT AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All

CURTAIN SQUIB SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
DRIVER SEAT BELT TENSIONER CIRCUIT OPEN

When Monitored and Set Condition:

DRIVER SEAT BELT TENSIONER CIRCUIT OPEN

When Monitored: With the ignition on the ACM monitors the resistance of the Driver Seat Belt Tensioner circuits.

Set Condition: The ACM has detected an open circuit or high resistance on the Driver Seat Belt Tensioner circuits.

POSSIBLE CAUSES
DRIVER SBT CIRCUITS OPEN
DRIVER SEAT BELT TENSIONER LINE 1 OR LINE 2 CIRCUITS OPEN
ACM, DRIVER SEAT BELT TENSIONER CIRCUITS OPEN
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Ensure the battery is fully charged. Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	**NOTE: Ensure the battery is fully charged.** **WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Driver SBT. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Driver SBT connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active DTC's. Does the DRBIII® display DRIVER SBT CIRCUIT OPEN? Yes → Go To 3 No → Replace Driver Seat Belt Tensioner in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All

DRIVER SEAT BELT TENSIONER CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module Connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Disconnect the Load Tool Driver SBT connector. Measure the resistance of the Driver SBT Line 1 and Line 2 circuits between the Load Tool Adaptor and the Diver SBT connector. Is the resistance below 1.0 ohms on both circuit? Yes → Replace the Airbag Control Module in accordance with the Service information. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1. No → Repair open or high resistance in Driver Seat Belt Tensioner Line 1 Line 2 circuits. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
DRIVER SEAT BELT TENSIONER CIRCUIT SHORT

When Monitored and Set Condition:

DRIVER SEAT BELT TENSIONER CIRCUIT SHORT

When Monitored: With the ignition on the ACM monitors the resistance of the Driver Seat Belt Tensioner circuits

Set Condition: The ACM has detected low resistance in the Driver Seat Belt Tensioner circuits.

POSSIBLE CAUSES
DRIVER SEAT BELT TENSIONER SHORT
DRIVER SEAT BELT TENSIONER LINE 1 SHORT TO LINE 2
ACM, DRIVER SEAT BELT TENSIONER CIRCUIT SHORT
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.**	All
2	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Driver SBT connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Driver SBT connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active DTC's. Does the DRBIII® display DRIVER SEAT BELT TENSIONER CIRCUIT SHORT? Yes → Go To 3 No → Replace Driver Seat Belt Tensioner in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All

DRIVER SEAT BELT TENSIONER CIRCUIT SHORT — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Disconnect the Load Tool from the Driver SBT connector. Measure the resistance between the Driver SBT Line 1 and Line 2 circuit at the Driver SBT connector. Is the resistance below 10K Ohms? Yes → Repair Driver Seat Belt Tensioner Line 1 circuit shorted to Driver Seat Belt Tensioner Line 2 circuit. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with the Service information. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
DRIVER SEAT BELT TENSIONER SHORT TO BATTERY

When Monitored and Set Condition:

DRIVER SEAT BELT TENSIONER SHORT TO BATTERY

When Monitored: With the ignition on the ACM monitors the voltage of the Driver Seat Belt Tensioner circuits.

Set Condition: The ACM has detected high voltage on the Driver Seat Belt Tensioner circuits.

POSSIBLE CAUSES
DRIVER SEAT BELT TENSIONER SHORT TO BATTERY
DRIVER SBT LINE 1 SHORT TO BATTERY
ACM, DRIVER SEAT BELT TENSIONER CIRCUITS SHORT TO BATTERY
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.**	All
2	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Driver Seat Belt Tensioner connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Driver SBT connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active DTC's. Does the DRBIII® display DRIVER SEAT BELT TENSIONER SHORT TO BATTERY? Yes → Go To 3 No → Replace Driver Seat Belt Tensioner in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All

DRIVER SEAT BELT TENSIONER SHORT TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module Connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** Disconnect the Load Tool from the Driver SBT connector. Measure the voltage of the Driver SBT Line 1 and Line 2 circuits between the Driver SBT connector and ground. Is there any voltage present? Yes → Repair Driver Seat Belt Tensioner Line 1 circuit shorted to battery. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with the Service information. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1. **NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.**	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
DRIVER SEAT BELT TENSIONER SHORT TO GROUND

When Monitored and Set Condition:

DRIVER SEAT BELT TENSIONER SHORT TO GROUND

When Monitored: With the ignition on the ACM monitors the voltage of the Driver Seat Belt Tensioner circuits.

Set Condition: The ACM has detected a short to ground in the Driver Seat Belt Tensioner circuits.

POSSIBLE CAUSES
DRIVER SEAT BELT TENSIONER SHORT TO GROUND
DRIVER SEAT BELT LINE 1 OR LINE 2 SHORT TO GROUND
ACM, DRIVER SEAT BELT TENSIONER CIRCUITS SHORT TO GROUND
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.**	All
2	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Driver SBT connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Driver SBT connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active DTC's. Does the DRBIII® display DRIVER SEAT BELT TENSIONER SHORT TO GROUND? Yes → Go To 3 No → Replace the Driver Seat Belt Tensioner in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All

DRIVER SEAT BELT TENSIONER SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module Connector **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Disconnect the Load Tool from the Driver SBT connector. Measure the resistance of the Driver SBT Line 1 and Line 2 circuits between the Driver SBT connector and ground. Is the resistance below 10K ohms on either circuit? Yes → Repair Driver Seat Belt Tensioner Line 1 or Line 2 circuits shorted to ground. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with the Service information. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
DRIVER SQUIB 1 CIRCUIT OPEN

When Monitored and Set Condition:

DRIVER SQUIB 1 CIRCUIT OPEN

When Monitored: With the ignition on the ACM monitors the resistance of the Driver Squib 1 circuits.

Set Condition: The ACM detects an open circuit or high resistance in the Driver Squib 1 circuits.

POSSIBLE CAUSES
DRIVER AIRBAG OPEN
CLOCKSPRING SQUIB CIRCUITS OPEN
DRIVER SQUIB 1 LINE 1 OR LINE 2 CIRCUIT OPEN
ACM, DRIVER SQUIB 1 CIRCUIT OPEN
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: Ensure that the battery is fully charged.** **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

DRIVER SQUIB 1 CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Driver Airbag. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Driver Airbag connectors. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show DRIVER SQUIB 1 CIRCUIT OPEN? Yes → Go To 3 No → Replace the Driver Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Clockspring connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Clockspring connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRB, read the active Airbag DTCs. Does the DRB show DRIVER SQUIB 1 CIRCUIT OPEN? Yes → Go To 4 No → Replace the Clockspring in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Disconnect the Load Tool from the Clockspring connector. Measure the resistance of the Driver Squib 1 Line 1 and Line 2 circuit between the ACM adaptor and the Clockspring connector. Is the resistance below 1.0 ohms on both circuits? Yes → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1. No → Repair open or high resistance in the Driver Squib 1 Line 1 or Line 2 circuit. Perform AIRBAG VERIFICATION TEST - VER 1.	All

DRIVER SQUIB 1 CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
DRIVER SQUIB 1 CIRCUIT SHORT

When Monitored and Set Condition:

DRIVER SQUIB 1 CIRCUIT SHORT

When Monitored: With the ignition on the ACM monitors the resistance of the Driver Squib 1 circuits.

Set Condition: The ACM has detected low resistance on the Driver Squib 1 circuits.

POSSIBLE CAUSES
DRIVER AIRBAG CIRCUIT SHORT
CLOCKSPRING, DRIVER SQUIB 1 CIRCUIT SHORT
DRIVER SQUIB 1 LINE 1 SHORT TO LINE 2
ACM, DRIVER SQUIB 1 CIRCUIT SHORT
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: Ensure that the battery is fully charged.** **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.**	All
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Driver Airbag. **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Driver Airbag connectors. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show DRIVER SQUIB 1 CIRCUIT SHORT? Yes → Go To 3 No → Replace Driver Airbag. Perform AIRBAG VERIFICATION TEST - VER 1.	All

DRIVER SQUIB 1 CIRCUIT SHORT — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Clockspring connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Clockspring connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show DRIVER SQUIB 1 CIRCUIT SHORT? Yes → Go To 4 No → Replace Clockspring. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Disconnect the Load Tool from the Clockspring connector. Measure the resistance between the Driver Squib 1 Line 1 and Line 2 at the Clockspring connector. Is the resistance below 10K ohms? Yes → Repair the Driver Squib 1 Line 1 circuit shorted to Driver Squib 1 Line 2 circuit. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All

DRIVER SQUIB 1 CIRCUIT SHORT — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
DRIVER SQUIB 1 SHORT TO BATTERY

When Monitored and Set Condition:

DRIVER SQUIB 1 SHORT TO BATTERY

When Monitored: With the ignition on the ACM monitors the voltage of the Driver Squib 1 circuits.

Set Condition: The ACM has detected high voltage on the Driver Squib 1 circuits.

POSSIBLE CAUSES
DRIVER AIRBAG CIRCUIT SHORT TO BATTERY
CLOCKSPRING, DRIVER SQUIB 1 CIRCUIT SHORT TO BATTERY
DRIVER SQUIB 1 LINE 1 OR LINE 2 SHORT TO BATTERY
ACM, DRIVER SQUIB 1 CIRCUITS SHORT TO BATTERY
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: Ensure that the battery is fully charged.** **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED ACM DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

DRIVER SQUIB 1 SHORT TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Driver Airbag. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Driver Airbag connectors. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCS. Does the DRB show DRIVER SQUIB 1 SHORT TO BATTERY? Yes → Go To 3 No → Replace the Driver Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Clockspring connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Clockspring connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show DRIVER SQUIB 1 SHORT TO BATTERY ? Yes → Go To 4 No → Replace the Clockspring in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED.** Disconnect the Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** Disconnect the Load Tool from the Clockspring connector. Measure the voltage on the Driver Squib 1 Line 1 circuit between the Clockspring connector and ground. Is there any voltage present? Yes → Repair the Driver Squib 1 Line 1 or Line 2 circuits shorted to battery. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All

DRIVER SQUIB 1 SHORT TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
DRIVER SQUIB 1 SHORT TO GROUND

When Monitored and Set Condition:

DRIVER SQUIB 1 SHORT TO GROUND

When Monitored: With the ignition on the ACM monitors the resistance of the Driver Squib 1 circuits.

Set Condition: The ACM has detected a short to ground in the Driver Squib 1 circuits.

POSSIBLE CAUSES
DRIVER AIRBAG CIRCUIT SHORT TO GROUND
CLOCKSPRING, DRIVER SQUIB 1 CIRCUIT SHORT TO GROUND
DRIVER SQUIB 1 LINE 1 OR LINE 2 SHORTED TO GROUND
ACM, DRIVER SQUIB 1 CIRCUITS SHORT TO GROUND
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: Ensure that the battery is fully charged.** **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

DRIVER SQUIB 1 SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Driver Airbag Module. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Driver Airbag connectors. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show DRIVER SQUIB 1 SHORT TO GROUND? Yes → Go To 3 No → Replace the Driver Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Clockspring connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Clockspring connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show DRIVER SQUIB 1 SHORT TO GROUND? Yes → Go To 4 No → Replace the Clockspring. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Disconnect the Load Tool from the Clockspring connector. Measure the resistance of the Driver Squib 1 Line 1 and Line 2 circuits between Clockspring connector and ground. Is the resistance below 10K ohms on either circuit? Yes → Repair Driver Squib 1 Line 1 or Line 2 circuits shorted to ground. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All

DRIVER SQUIB 1 SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
DRIVER SQUIB 2 CIRCUIT OPEN

When Monitored and Set Condition:

DRIVER SQUIB 2 CIRCUIT OPEN

When Monitored: With the ignition on the ACM monitors the resistance of the Driver Squib 2 circuits.

Set Condition: The ACM has detected an open circuit or high resistance in the Driver Squib 2 circuits.

POSSIBLE CAUSES
DRIVER AIRBAG CIRCUIT OPEN
CLOCKSPRING, DRIVER SQUIB 2 CIRCUIT OPEN
DRIVER SQUIB 2 LINE 1 OR LINE 2 CIRCUIT OPEN
ACM, DRIVER SQUIB 2 CIRCUIT OPEN
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: Ensure that the battery is fully charged.** **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.**	All

DRIVER SQUIB 2 CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Driver Airbag connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Driver Airbag connectors. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRBIII® show DRIVER SQUIB 2 CIRCUIT OPEN? Yes → Go To 3 No → Replace the Driver Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Clockspring connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Clockspring connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRB, read the active Airbag DTCs. Does the DRB show DRIVER SQUIB 2 CIRCUIT OPEN? Yes → Go To 4 No → Replace the Clockspring in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control module connector. Disconnect the Load Tool from the Clockspring connector. Measure the resistance of the Driver Squib 2 Line 1 and Line 2 circuits between the ACM adaptor and the Clockspring connector. Is the resistance below 1.0 ohms on both circuits? Yes → Replace the Airbag Control Module in accordance with the Service information. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1. No → Repair the open or high resistance in the Driver Squib 2 Line 1 or Line 2 circuits. Perform AIRBAG VERIFICATION TEST - VER 1.	All

DRIVER SQUIB 2 CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
DRIVER SQUIB 2 CIRCUIT SHORT

When Monitored and Set Condition:

DRIVER SQUIB 2 CIRCUIT SHORT

When Monitored: With the ignition on the ACM monitors the resistance of the Driver Squib 2 circuits.

Set Condition: The ACM has detected low resistance on the Driver Squib 2 circuits.

POSSIBLE CAUSES
DRIVER AIRBAG CIRCUIT SHORT
CLOCKSPRING, DRIVER SQUIB 2 CIRCUIT SHORT
DRIVER SQUIB 2 LINE 1 SHORT TO LINE 2
ACM, DRIVER SQUIB 2 CIRCUIT SHORT
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: Ensure that the battery is fully charged.** **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

DRIVER SQUIB 2 CIRCUIT SHORT — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Driver Airbag. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Driver Airbag connectors. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show DRIVER SQUIB 2 CIRCUIT SHORT? Yes → Go To 3 No → Replace Driver Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Clockspring connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Clockspring connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show DRIVER SQUIB 2 CIRCUIT SHORT? Yes → Go To 4 No → Replace Clockspring in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Disconnect the Load Tool from the Clockspring connector. Measure the resistance between the Driver Squib 2 Line 1 and Line 2 at the Clockspring connector. Is the resistance below 10K ohms? Yes → Repair the Driver Squib 2 Line 1 circuit shorted to Driver Squib 2 Line 2 circuit. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All

DRIVER SQUIB 2 CIRCUIT SHORT — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
DRIVER SQUIB 2 SHORT TO BATTERY

When Monitored and Set Condition:

DRIVER SQUIB 2 SHORT TO BATTERY

When Monitored: With the ignition on the ACM monitors the voltage of the Driver Squib 2 circuits.

Set Condition: The ACM has detected high voltage on the Driver Squib 2 circuits.

POSSIBLE CAUSES
DRIVER AIRBAG CIRCUIT SHORT TO BATTERY
CLOCKSPRING, DRIVER SQUIB 2 CIRCUIT SHORT TO BATTERY
DRIVER SQUIB 2 LINE 1 OR LINE 2 SHORT TO BATTERY
ACM, DRIVER SQUIB 2 CIRCUIT SHORT TO BATTERY
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

DRIVER SQUIB 2 SHORT TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Driver Airbag. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Driver Airbag connectors. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTC's. Does the DRB show DRIVER SQUIB 2 SHORT TO BATTERY? Yes → Go To 3 No → Replace the Driver Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Clockspring connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Clockspring connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show DRIVER SQUIB 2 SHORT TO BATTERY ? Yes → Go To 4 No → Replace the Clockspring in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** Disconnect the Load Tool from the Clockspring connector. Measure the voltage on the Driver Squib 2 Line 1 and Line 2 from the Clockspring connector to ground. Is there any voltage present? Yes → Repair the Driver Squib 2 Line 1 or Line 2 circuits shorted to battery. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All

DRIVER SQUIB 2 SHORT TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
DRIVER SQUIB 2 SHORT TO GROUND

When Monitored and Set Condition:

DRIVER SQUIB 2 SHORT TO GROUND

When Monitored: With the ignition on the ACM monitors the resistance of the Driver Squib 2 circuits.

Set Condition: The ACM has detected a short to ground in the Driver Squib 2 circuits.

POSSIBLE CAUSES
DRIVER AIRBAG, CIRCUIT SHORT TO GROUND
CLOCKSPRING, DRIVER SQUIB 2 CIRCUIT SHORT TO GROUND
DRIVER SQUIB 2 LINE 1 OR LINE 2 SHORT TO GROUND
ACM, DRIVER SQUIB 2 CIRCUIT SHORT TO GROUND
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

DRIVER SQUIB 2 SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Driver Airbag. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Driver Airbag connectors. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show DRIVER SQUIB 2 SHORT TO GROUND? Yes → Go To 3 No → Replace the Driver Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Clockspring connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Clockspring connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show DRIVER SQUIB 2 SHORT TO GROUND? Yes → Go To 4 No → Replace the Clockspring in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Disconnect the Load Tool from the Clockspring connector. Measure the resistance of the Driver Squib 2 Line 1 and Line 2 circuits between Clockspring connector and ground. Is the resistance below 10K ohms on either circuit? Yes → Repair Driver Squib 2 Line 1 or Line 2 circuits shorted to ground. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All

DRIVER SQUIB 2 SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
INTERROGATE LEFT SIACM

When Monitored and Set Condition:

INTERROGATE LEFT SIACM

When Monitored: With ignition on, the ACM monitors the PCI Bus for a Left SIACM status message containing the airbag warning lamp ″On or OFF″ request. The status message is sent to the ACM once each second or upon any change in the active DTCs.

Set Condition: The Code will set, if the ACM receives an Lamp On status message from the Left SIACM. NOTE: This indicates that there was an active diagnostic trouble code in the Left SIACM.

POSSIBLE CAUSES
INTERROGATE LEFT SIACM
ACM, NO ACTIVE LEFT SIACM DTCS
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Ensure the battery is fully charged. Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	Turn the ignition on. With the DRB read the Left SIACM active DTCs. Did the DRB show any active DTCs? Yes → Refer to symptom list for problems related to Left SIACM. Perform AIRBAG VERIFICATION TEST - VER 1. No → Go To 3	All

INTERROGATE LEFT SIACM — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** If there are no possible causes remaining, view repair. Repair Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
INTERROGATE RIGHT SIACM

When Monitored and Set Condition:

INTERROGATE RIGHT SIACM

When Monitored: With ignition on, the ACM monitors the PCI Bus for a Right SIACM status message containing the airbag warning indicator On - OFF request. The status message is sent to the ACM once each second or upon any change in the active DTCs.

Set Condition: The Code will set, if the ACM receives an Lamp On status message from the Right SIACM. NOTE: This indicates that there is an active diagnostic trouble code in the Right SIACM.

POSSIBLE CAUSES
INTERROGATE RIGHT SIACM
NO ACTIVE RIGHT SIACM DTCS
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Ensure the battery is fully charged. Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	Turn the ignition on. With the DRB read the Right SIACM active DTCs. Did the DRB show any active DTCs? Yes → Refer to symptom list for problems related to Right SIACM. Perform AIRBAG VERIFICATION TEST - VER 1. No → Go To 3	All

INTERROGATE RIGHT SIACM — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** If there are no possible causes remaining, view repair. Repair Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
LOSS OF IGNITION RUN - START

When Monitored and Set Condition:

LOSS OF IGNITION RUN - START

When Monitored: With the ignition in the Run or Start position the module monitors the Run - Start circuit for proper system voltage.

Set Condition: The code will set, if the voltage on the Run - Start circuit drops below approximately 6.0 volts for the ACM or 6.7 volts for the SIACM.

POSSIBLE CAUSES
AIRBAG SYSTEM COMPONENT SHORTED TO GROUND
IGNITION SWITCH RUN-START CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT RUN-START CIRCUIT OPEN
ACM, FUSED IGNITION OUTPUT RUN-START CIRCUIT OPEN
MODULE RUN - START SHORTED TO GROUND
RSIACM, LOW IGNITION RUN - START VOLTAGE
LSIACM - LOW IGNITION RUN - START VOLTAGE
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: Ensure that the battery is fully charged.** **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** From the list below, select the appropriate module and DTC type for the this diagnostic trouble code. SELECT ONE: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 6 LEFT SIACM - ACTIVE DTC Go To 7 RIGHT SIACM - ACTIVE DTC Go To 8 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

LOSS OF IGNITION RUN - START — Continued

<table>
<tr><th>TEST</th><th>ACTION</th><th>APPLICABILITY</th></tr>
<tr><td>2</td><td>Turn ignition off.
Remove and inspect the Airbag Run-Start Fuse.
NOTE: Check connectors - Clean and repair as necessary.
Is the Fuse open?

Yes → Go To 3

No → Go To 4</td><td>All</td></tr>
<tr><td>3</td><td>WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.
Measure the resistance of the Fused Ignition Switch Output Run-Start circuit between the Airbag Run-Start Fuse and ground.
While monitoring the ohmmeter, disconnect each airbag system component on the Run - Start circuit one at a time.
Is the resistance above 10K ohms:

after removing a component?
Replace the shorted airbag system component in accordance with Service Instructions and replace the airbag Run - Start fuse. WARNING: IF THE MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED.
Perform AIRBAG VERIFICATION TEST - VER 1.

after all components are removed?
Repair the Fused Ignition Run - Start circuit shorted to ground and replace Airbag Run-Start Fuse.
Perform AIRBAG VERIFICATION TEST - VER 1.</td><td>All</td></tr>
<tr><td>4</td><td>Turn the ignition on.
Measure the voltage of the Ignition Switch Output circuit between the Airbag Run-Start Fuse and ground.
Is the voltage above approximately 6.0 volts?

Yes → Go To 5

No → Repair the open Ignition Switch Output Run-Start circuit.
Perform AIRBAG VERIFICATION TEST - VER 1.</td><td>All</td></tr>
<tr><td>5</td><td>WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.
Disconnect the Airbag Control Module connector.
NOTE: Check connectors - Clean and repair as necessary.
Reinstall the previously removed Airbag Run-Start Fuse.
WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.
Measure the voltage of the Fused Ignition Switch Output Run-Start Circuit between the Airbag Control Module connector ground.
Is the voltage above approximately 6.0 volts?

Yes → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED.
Perform AIRBAG VERIFICATION TEST - VER 1.

No → Repair open Fused Ignition Switch Output Run-Start circuit.
Perform AIRBAG VERIFICATION TEST - VER 1.</td><td>All</td></tr>
</table>

LOSS OF IGNITION RUN - START — Continued

TEST	ACTION	APPLICABILITY
6	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All
7	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** If there are no possible causes remaining, view repair. Repair Replace the Left Side Impact Airbag Control Module in accordance with Service Instructions. WARNING: IF THE MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
8	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** If there are no possible causes remaining, view repair. Repair Replace the Right Side Impact Airbag Control Module in accordance with Service information. WARNING: IF THE MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All

Symptom:
LOSS OF IGNITION RUN ONLY

When Monitored and Set Condition:

LOSS OF IGNITION RUN ONLY

When Monitored: With the ignition in the run position the module monitors the Run Only circuit for proper system voltage.

Set Condition: If the voltage on the Run Only circuit drops below 6.0 volts, the code will set.

POSSIBLE CAUSES
IGNITION SWITCH OUTPUT RUN CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT RUN CIRCUIT OPEN
ACM, FUSED IGNITION OUTPUT RUN CIRCUIT OPEN
CHECKING FOR A SHORTED RUN CIRCUIT
FUSED IGNITION SWITCH OUTPUT RUN CIRCUIT SHORT TO GROUND
ACM, FUSED IGNITION RUN CIRCUIT SHORT TO GROUND
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Ensure the battery is fully charged. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 8 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	Turn Ignition off. Remove and inspect the Airbag Run circuit fuse. Is the Fuse open? Yes → Go To 3 No → Go To 6	All

LOSS OF IGNITION RUN ONLY — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition on. Measure the voltage of the Ignition Switch Output Run circuit between the Airbag Run circuit fuse and ground. Is the voltage above approximately 6.0 volts? Yes → Go To 4 No → Repair the open Ignition Switch Output Run circuit. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Reinstall the airbag Run fuse. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** Measure the voltage of the Fused Ignition Switch Output Run circuit at the Airbag Control Module connector. Is the voltage above approximately 6.0 volts? Yes → Go To 5 No → Repair the an open or high resistance in the Fused Ignition Switch Output Run circuit. Perform AIRBAG VERIFICATION TEST - VER 1.	All
5	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** If there are no possible causes remaining, view repair. Repair Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
6	Remove the Airbag Run fuse. **NOTE: Check connectors - Clean and repair as necessary.** Measure the resistance of the Fused Ignition Switch Output Run circuit between the Run Fuse and ground. Is the resistance below 10.0 ohms ? Yes → Go To 7 No → Replace the defective fuse. Perform AIRBAG VERIFICATION TEST - VER 1.	All

LOSS OF IGNITION RUN ONLY — Continued

TEST	ACTION	APPLICABILITY
7	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Measure the resistance of the Fused Ignition Switch Output Run circuit between the ACM connector and ground. Is the resistance below 10K ohms ? Yes → Repair the Fused Ignition Switch Output Run circuit for a short to ground and replace Airbag Run Fuse. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
8	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
MODULE NOT CONFIGURED FOR SAB

When Monitored and Set Condition:

MODULE NOT CONFIGURED FOR SAB

When Monitored: With ignition on, the ORC monitors the PCI Bus for a message containing an ″A″ in the 4 th position of the VIN. This character identifies the type of safety equipment and should match the VIN. The PCM transmits the VIN every 13.76 seconds.

Set Condition: The code will set, if the ORC detects a Side Impact Airbag Module active on the PCI Bus and the 4 th character of the VIN message is not an ″A″.

POSSIBLE CAUSES
PCM, PCI COMMUNICATION FAILURE
CHECK PCM VIN
ACM, NOT CONFIGURED FOR SIDE AIRBAGS
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Ensure the battery is fully charged. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	Turn the ignition on. Connect the DRB to the data link connector and select PASSIVE RESTRAINTS, AIRBAG, SYSTEM TEST With the DRBIII®, read the PCM Active on the Bus Does the DRB show PCM Active on the Bus:? Yes → Go To 3 No → Refer to category COMMUNICATION and select the related symptom. Perform AIRBAG VERIFICATION TEST - VER 1.	All

MODULE NOT CONFIGURED FOR SAB — Continued

TEST	ACTION	APPLICABILITY
3	With the DRB read the Vehicle Identification Number in the Powertrain Control Module. Compare the VIN displayed on the DRB screen and the Vehicle VIN plate. Does the VIN plate and the PCM VIN match? Yes → Go To 4 No → Replace the Powertrain Control Module and program with the correct vehicle identification number. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** If there are no possible causes remaining, view repair. Repair Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
NO CLUSTER MESSAGE

When Monitored and Set Condition:

NO CLUSTER MESSAGE

When Monitored: With ignition on, the ACM monitors the PCI Bus for a message from the MIC containing the airbag warning indicator status. The MIC transmits the message one time at ignition on, lamp state change, or in response to the ACM message.

Set Condition: If the MIC message is not received for 10 consecutive seconds, the code will set.

POSSIBLE CAUSES
MIC, COMMUNICATION FAILURE
ACM, NO CLUSTER MESSAGES
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the battery is fully charged.** **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** Turn the ignition on. SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	Turn the ignition on. With the DRBIII®, ensure PCI Bus communications with the Instrument Cluster. Is the Instrument Cluster communicating on the PCI Bus? Yes → Go To 3 No → Refer to category COMMUNICATION CATEGORY and select the related symptom INSTRUMENT CLUSTER BUS +/- SIGNAL OPEN. Perform AIRBAG VERIFICATION TEST - VER 1.	All

NO CLUSTER MESSAGE — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** If there are no possible causes remaining, view repair. Repair Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1. **NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.**	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
NO LEFT SIACM MESSAGE

When Monitored and Set Condition:

NO LEFT SIACM MESSAGE

When Monitored: With ignition on, the ACM monitors the PCI Bus for the Left Side Impact Airbag Control Module status message. The Left SIACM transmits the status message to the ACM at 1 - second intervals.

Set Condition: If the ACM fails to see the Left SIACM status message on the PCI Bus for 10 seconds the code will set.

POSSIBLE CAUSES
NO LEFT SIACM MESSAGE
ACM, NO LEFT SIACM MESSAGE
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4	All
2	With the DRB select PASSIVE RESTRAINTS, SIDE AIRBAG then LEFT SIDE from the DRB menu. Does the DRB show NO RESPONSE or BUS +/- SIGNAL OPEN? Yes → Refer to the Communication category for the related symptom. Perform AIRBAG VERIFICATION TEST - VER 1. No → Go To 3	All
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** If there are no possible causes remaining, view repair. Repair Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All

NO LEFT SIACM MESSAGE — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
NO ODOMETER MESSAGE

When Monitored and Set Condition:

NO ODOMETER MESSAGE

When Monitored: With ignition on, the ACM monitors the PCI Bus for the Odometer message from the Body Control Module. The BCM transmits the odometer message at 1 second intervals.

Set Condition: The code will set, if the ACM does not see the odometer message for 10 seconds.

POSSIBLE CAUSES
PCM, PCI COMMUNICATION FAILURE
NO ODOMETER MESSAGE
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT
ORC, NO ODOMETER MESSAGE

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the battery is fully charged.** **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** Turn the ignition on. SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	Turn the ignition on. Connect the DRBIII® to the data link connector and select PASSIVE RESTRAINTS, AIRBAG, SYSTEM TEST. With the DRBIII®, read the PCM Active on the Bus:. Does the DRB show PCM ACTIVE ON THE BUS? Yes → Go To 3 No → Refer to category ″ COMMUNICATION CATEGORY″ and select the related symptom. Perform AIRBAG VERIFICATION TEST - VER 1.	All

NO ODOMETER MESSAGE — Continued

TEST	ACTION	APPLICABILITY
3	With the DRB select ENGINE, MISCELLANEOUS, SELECT MISC FUNCTION, and then CHECK VIN to read the Vehicle Identification Number in the Powertrain Control Module. Compare the VIN displayed on the DRB screen and the Vehicle VIN plate. Does the VIN plate and the PCM VIN match? Yes → Go To 4 No → Replace the Powertrain Control Module and program with the correct vehicle identification number. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED.** If there are no possible causes remaining, view repair. Repair Replace the Airbag Control Module in accordance with Service Instructions. WARNING: make sure the battery is disconnected and wait 2 minutes before proceeding. Perform AIRBAG VERIFICATION TEST - VER 1. **NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.**	All
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
NO PCI TRANSMISSION

When Monitored and Set Condition:

NO PCI TRANSMISSION

When Monitored: With the ignition on and the module transmitting information on the PCI BUS.

Set Condition: The code will set if the onboard diagnostic cannot detect the module transmitting information on the PCI BUS for 4 consecutive seconds. NOTE: Any PCI Bus Failure will may cause a stored code to set.

POSSIBLE CAUSES
AIRBAG CONTROL MODULE - ACM
LEFT SIDE IMPACT AIRBAG CONTROL MODULE - LSIACM
RIGHT SIDE IMPACT AIRBAG CONTROL MODULE - RSIACM
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

NO PCI TRANSMISSION — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the battery is fully charged.** IF THE MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Turn the ignition on. From the list below, select the appropriate module and DTC type for the this diagnostic trouble code. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** Select the appropriate module and type of DTC ACM - ACTIVE WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING. Replace the Airbag Control Module in accordance with Service Instructions. Perform AIRBAG VERIFICATION TEST - VER 1. ACM - STORED Go To 2 LEFT SIACM - ACTIVE WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING. Replace the Left Side Impact Airbag Control Module in accordance with Service Instructions. Perform AIRBAG VERIFICATION TEST - VER 1. LEFT SIACM - STORED Go To 2 RIGHT SIACM - ACTIVE WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING. Replace the Right Side Impact Airbag Control Module in accordance with Service information. Perform AIRBAG VERIFICATION TEST - VER 1. RIGHT SIACM - STORED Go To 2	All

NO PCI TRANSMISSION — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
NO RIGHT SIACM MESSAGE

When Monitored and Set Condition:

NO RIGHT SIACM MESSAGE

When Monitored: With ignition on, the ACM monitors the PCI Bus for the Right Side Impact Airbag Control Module status message. The Right SIACM transmits the status message to the ACM at 1 - second intervals.

Set Condition: If the ACM fails to see the Right SIACM status message on the PCI Bus for 10 seconds the code will set.

POSSIBLE CAUSES
NO RIGHT SIACM MESSAGE
ACM, NO RIGHT SIACM MESSAGE
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	With the DRB select SIDE AIRBAG and the RIGHT SIDE AIRBAG from the DRB menu. Does the DRB show NO RESPONSE or BUS +/- SIGNAL OPEN? Yes → Refer to the COMMUNICATION category for the related symptom. Perform AIRBAG VERIFICATION TEST - VER 1. No → Go To 3	All

NO RIGHT SIACM MESSAGE — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** If there are no possible causes remaining, view repair. Repair Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1. **NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.**	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
PASSENGER SEAT BELT TENSIONER CIRCUIT OPEN

When Monitored and Set Condition:

PASSENGER SEAT BELT TENSIONER CIRCUIT OPEN

When Monitored: When the ignition is On, the ACM monitors the resistance of the Passenger Seat Belt Tensioner circuits.

Set Condition: The ACM has detected an open circuit or high resistance or open circuit in the Passenger Seat Belt Tensioner circuits.

POSSIBLE CAUSES
PASSENGER SEAT BELT TENSIONER OPEN
PASSENGER SEAT BELT TENSIONER LINE 1 OR LINE 2 CIRCUIT OPEN
ACM, PASSENGER SEAT BELT TENSIONER CIRCUIT OPEN
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Ensure the battery is fully charged. Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	**NOTE: Ensure the battery is fully charged.** **WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Passenger SBT connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool and jumper to the Passenger SBT connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active DTC's. Does the DRBIII® display PASSENGER SBT CIRCUIT OPEN? Yes → Go To 3 No → Replace the Passenger Seat Belt Tensioner in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1. **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

PASSENGER SEAT BELT TENSIONER CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag connector. Disconnect the Load Tool jumper from the Passenger SBT connector. Measure the resistance of the Passenger Seat Belt Tensioner Line 1 and Line 2 circuits between the Load Tool adaptor and the Passenger SBT connector. Is the resistance below 1.0 ohms on either circuit ? Yes → Replace the Airbag Control Module in accordance with the Service information. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1. No → Repair open or high resistance in Passenger Seat Belt Tensioner Line 1 or Line 2 circuits. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
PASSENGER SEAT BELT TENSIONER CIRCUIT SHORT

When Monitored and Set Condition:

PASSENGER SEAT BELT TENSIONER CIRCUIT SHORT

When Monitored: When the ignition is on, the ACM monitors the resistance of the Passenger Seat Belt Tensioner circuits.

Set Condition: The ACM has detected low resistance in the Passenger Seat Belt Tensioner circuits.

POSSIBLE CAUSES
PASSENGER SEAT BELT TENSIONER LINE 1 SHORT TO LINE 2
PASSENGER SEAT BELT TENSIONER CIRCUITS SHORT
ACM, PASSENGER SEAT BELT TENSIONER CIRCUIT SHORT
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Ensure the battery is fully charged. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Passenger Seat Belt Tensioner connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Airbag Control Module connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active DTC's. Does the DRB show PASSENGER SEAT BELT TENSIONER CIRCUIT SHORT? Yes → Go To 3 No → Replace the Passenger Seat Belt Tensioner in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All

PASSENGER SEAT BELT TENSIONER CIRCUIT SHORT — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Measure the resistance between the Passenger SBT Line 1 and line 2 circuit at the Passenger SBT connector. Is the resistance below 10K ohms? Yes → Repair the Passenger SBT Line 1 circuit for a short to the Passenger SBT Line 2 circuit. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with the Service information. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
PASSENGER SEAT BELT TENSIONER SHORT TO BATTERY

When Monitored and Set Condition:

PASSENGER SEAT BELT TENSIONER SHORT TO BATTERY

When Monitored: When the ignition is on, the ACM monitors the voltage of the Passenger Seat Belt Tensioner circuits.

Set Condition: The ACM has detected high voltage on the Passenger Seat Belt Tensioner circuits.

POSSIBLE CAUSES
PASSENGER SBT CIRCUITS SHORT TO BATTERY
PASSENGER SEAT BELT TENSIONER LINE 1 OR LINE 2 SHORTED TO BATTERY
ACM, PASSENGER SBT SHORT TO BATTERY
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Ensure the battery is fully charged. Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Passenger SBT connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Airbag Control Module connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active DTC's. Does the DRBIII® display PASSENGER SBT SHORT TO BATTERY? Yes → Go To 3 No → Replace the Passenger Seat Belt Tensioner in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All

PASSENGER SEAT BELT TENSIONER SHORT TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module Connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** Measure the voltage of the Passenger SBT Line 1 and Line 2 circuits between the Passenger SBT connector and ground. Is there any voltage on either circuit? Yes → Repair the Passenger Seat Belt Tensioner Line 1 or Line 2 shorted to battery. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with the Service information. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
PASSENGER SEAT BELT TENSIONER SHORT TO GROUND

When Monitored and Set Condition:

PASSENGER SEAT BELT TENSIONER SHORT TO GROUND

When Monitored: When the ignition is on, the ACM monitors the voltage of the Passenger Seat Belt Tensioner circuits.

Set Condition: The ACM has detected a short to ground in the Passenger Seat Belt Tensioner circuits.

POSSIBLE CAUSES
PAS SEAT BELT TENSIONER SHORT TO GROUND
PASSENGER SEAT BELT TENSIONER LINE 1 OR LINE 2 SHORTED TO GROUND
ACM, PASSENGER SBT SHORT TO GROUND
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Ensure the battery is fully charged. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Passenger SBT connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Airbag Control Module connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active DTC's. Does the DRBIII® display PASSENGER SBT SHORT TO GROUND? Yes → Go To 3 No → Replace the Passenger Seat Belt Tensioner in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All

PASSENGER SEAT BELT TENSIONER SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module Connector **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Measure the resistance of the Passenger SBT Line 1 and Line 2 circuits between the Passenger SBT connector and ground. Is the resistance below 10K Ohms on either circuit? Yes → Repair the Passenger SBT Line 1 or Line 2 shorted to ground. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with the Service information. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
PASSENGER SQUIB 1 CIRCUIT OPEN

When Monitored and Set Condition:

PASSENGER SQUIB 1 CIRCUIT OPEN

When Monitored: When the ignition is On, the ACM monitors the resistance of the Passenger Squib 1 circuits.

Set Condition: The ACM has detected an open circuit or high resistance on the Passenger Squib 1 circuits.

POSSIBLE CAUSES
PASSENGER AIRBAG OPEN
PASSENGER SQUIB 1 LINE 1 OR LINE 2 CIRCUIT OPEN
STORED CODE OR INTERMITTENT CONDITION
ACM, PASSENGER SQUIB 1 CIRCUIT OPEN
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

PASSENGER SQUIB 1 CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Passenger Airbag. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Passenger Airbag connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show PASSENGER SQUIB 1 CIRCUIT OPEN? Yes → Go To 3 No → Replace the Passenger Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Disconnect the Load Tool from the Passenger Airbag connector. Measure the resistance of the Passenger Squib 1 Line 1 and Line 2 circuit between the ACM Adaptor and the Passenger Airbag connector. Is the resistance below 1.0 ohms on both circuits? Yes → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1. No → Repair open or high resistance in Passenger Squib 1 Line 1 and Line 2 circuits. Perform AIRBAG VERIFICATION TEST - VER 1. **NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.**	All

PASSENGER SQUIB 1 CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
PASSENGER SQUIB 1 CIRCUIT SHORT

When Monitored and Set Condition:

PASSENGER SQUIB 1 CIRCUIT SHORT

When Monitored: When the ignition is on, the ACM monitors the resistance of the Passenger Squib 1 circuits.

Set Condition: The ACM has detected low resistance in the Passenger Squib 1 circuits.

POSSIBLE CAUSES
PASSENGER AIRBAG CIRCUIT SHORT
PASSENGER SQUIB 1 LINE 1 SHORT TO LINE 2
ACM, PASSENGER SQUIB 1 CIRCUIT SHORT
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Passenger Airbag. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Passenger Airbag connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active airbag DTCs. Does the DRB show PASSENGER SQUIB 1 CIRCUIT SHORT? Yes → Go To 3 No → Replace Passenger Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All

PASSENGER SQUIB 1 CIRCUIT SHORT — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adapter to the Airbag Control Module connector. Disconnect the Load Tool from the Passenger airbag connector. Measure the resistance between Passenger Squib 1 Line 1 and Squib 1 Line 2 circuit at the Passenger Airbag connector. Is the resistance below 10K ohms? Yes → Repair Passenger Squib 1 Line 1 circuit short to Passenger Squib 1 Line 2 circuit. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1. **NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.**	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
PASSENGER SQUIB 1 SHORT TO BATTERY

When Monitored and Set Condition:

PASSENGER SQUIB 1 SHORT TO BATTERY

When Monitored: When the ignition is on, the ACM monitors the voltage of the Passenger Squib 1 circuits.

Set Condition: The ACM has detected high voltage on the Passenger Squib 1 circuits.

POSSIBLE CAUSES
PASSENGER AIRBAG CIRCUIT SHORT TO BATTERY
PASSENGER SQUIB 1 LINE 1 SHORT TO BATTERY
ACM, PASSENGER SQUIB 1 CIRCUIT SHORT TO BATTERY
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Passenger Airbag connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Passenger Airbag connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show PASSENGER SQUIB 1 CIRCUIT SHORT TO BATTERY? Yes → Go To 3 No → Replace Passenger Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All

PASSENGER SQUIB 1 SHORT TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. **WARNING: TURN IGNITION ON, THEN RECONNECT THE BATTERY.** Disconnect the Load Tool from the Passenger Airbag connector. Measure the voltage on the Passenger Squib 1 Line 1 and Line 2 circuits between the Passenger Airbag connector and ground. Is there any voltage present? Yes → Repair Passenger Squib 1 Line 1 circuit short to battery. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
PASSENGER SQUIB 1 SHORT TO GROUND

When Monitored and Set Condition:

PASSENGER SQUIB 1 SHORT TO GROUND

When Monitored: When the ignition is on, the ACM monitors the resistance of the Passenger Squib 1 circuits for low resistance.

Set Condition: The ACM has detected a short to ground in the Passenger Squib 1 circuits.

POSSIBLE CAUSES
PASSENGER AIRBAG CIRCUIT SHORT TO GROUND
PASSENGER SQUIB 1 LINE 1 AND LINE 2 SHORT TO GROUND
STORED CODE OR INTERMITTENT CONDITION
ACM, PASSENGER SQUIB 1 CIRCUIT SHORT TO GROUND
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the battery is fully charged.** Turn the ignition on. **NOTE: Connect the appropriate Load Tool to the Passenger Airbag connector.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Passenger Airbag connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Passenger Airbag connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show PASSENGER SQUIB 1 CIRCUIT SHORT TO GROUND? Yes → Go To 3 No → Replace the Passenger Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All

PASSENGER SQUIB 1 SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector **NOTE: Check connectors - Clean repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Disconnect the Load Tool from the Passenger Airbag connector. Measure the resistance of the Passenger Squib 1 Line 1 or Line 2 circuit between the Passenger Airbag Module Connector and ground. Is the resistance below 10K ohms on either circuit? Yes → Repair Passenger Squib 1 Line 1 and Line 2 circuits for a short to ground. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
PASSENGER SQUIB 2 CIRCUIT OPEN

When Monitored and Set Condition:

PASSENGER SQUIB 2 CIRCUIT OPEN

When Monitored: When the ignition is On, the ACM monitors the resistance of the Passenger Squib 2 circuits.

Set Condition: The ACM has detected an open circuit or high resistance on the Passenger Squib 2 circuits.

POSSIBLE CAUSES
PASSENGER AIRBAG OPEN
PASSENGER SQUIB 2 LINE 1 OR LINE 2 CIRCUIT OPEN
ACM, PASSENGER SQUIB 2 CIRCUIT OPEN
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

PASSENGER SQUIB 2 CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Passenger Airbag connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Passenger Airbag connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show PASSENGER SQUIB 2 CIRCUIT OPEN? Yes → Go To 3 No → Replace Passenger Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Disconnect the Load Tool from the Passenger Airbag connector. Measure the resistance of the Passenger Squib 2 Line 1 and Line 2 circuits between the ACM adaptor and the Passenger Airbag connector. Is the resistance below 1.0 ohms on both circuits? Yes → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1. No → Repair open or high resistance in Passenger Squib 2 Line 1 or Line 2 circuits. Perform AIRBAG VERIFICATION TEST - VER 1.	All

PASSENGER SQUIB 2 CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
PASSENGER SQUIB 2 CIRCUIT SHORT

When Monitored and Set Condition:

PASSENGER SQUIB 2 CIRCUIT SHORT

When Monitored: When the ignition is on, the ACM monitors the resistance of the Passenger Squib 2 circuits.

Set Condition: The ACM has detected low resistance in the Passenger Squib 2 circuits.

POSSIBLE CAUSES
PASSENGER AIRBAG CIRCUIT SHORT
PASSENGER SQUIB 1 LINE 1 SHORT TO LINE 2
STORED CODE OR INTERMITTENT CONDITION
ACM, PASSENGER SQUIB 2 CIRCUIT SHORT
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Passenger Airbag. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Passenger Airbag connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active DTCs. Does the DRB show PASSENGER SQUIB 2 CIRCUIT SHORT? Yes → Go To 3 No → Replace Passenger Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All

PASSENGER SQUIB 2 CIRCUIT SHORT — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connectors. Disconnect the Load Tool from the Passenger Airbag connector. Measure the resistance between the Passenger Squib 2 Line 1 and line 2 circuits at the Passenger Airbag connector. Is the resistance below 10K ohms? Yes → Repair Passenger Squib 2 Line 1 circuit short to Passenger Squib 2 Line 2 circuit. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
PASSENGER SQUIB 2 SHORT TO BATTERY

When Monitored and Set Condition:

PASSENGER SQUIB 2 SHORT TO BATTERY

When Monitored: When the ignition is on, the ACM monitors the voltage of the Passenger Squib 2 circuits.

Set Condition: The ACM has detected high voltage on the Passenger Squib 2 circuits.

POSSIBLE CAUSES
PASSENGER AIRBAG CIRCUIT SHORT TO BATTERY
PASSENGER SQUIB 2 LINE 1 OR LINE 2 SHORTED TO BATTERY
ACM, PASSENGER SQUIB 2 CIRCUIT SHORT TO BATTERY
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Passenger Airbag connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Passenger Airbag connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show PASSENGER SQUIB 2 CIRCUIT SHORT TO BATTERY? Yes → Go To 3 No → Replace Passenger Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All

PASSENGER SQUIB 2 SHORT TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Airbag Control Module connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** Disconnect the Load Tool from the Passenger Airbag connector. Measure the voltage on the Passenger Squib 2 Line 1 and Line 2 circuits between the Passenger Airbag connector and ground. Is there any voltage present? Yes → Repair Passenger Squib 2 Line 1 or Line 2 circuit shorted to battery. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
PASSENGER SQUIB 2 SHORT TO GROUND

When Monitored and Set Condition:

PASSENGER SQUIB 2 SHORT TO GROUND

When Monitored: When the ignition is on, the ACM monitors the resistance of the Passenger Squib 2 circuits for low resistance.

Set Condition: The ACM has detected a short to ground in the Passenger Squib 2 circuits.

POSSIBLE CAUSES
PASSENGER AIRBAG CIRCUIT SHORTED TO GROUND
PASSENGER SQUIB 2 LINE 1 OR LINE 2 SHORT TO GROUND
ACM, PASSENGER SQUIB 2 CIRCUIT SHORT TO GROUND
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the battery is fully charged.** Turn the ignition on. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 4 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Passenger Airbag connector. **NOTE: Check connectors - Clean and repair as necessary.** Connect the appropriate Load Tool to the Passenger Airbag connector. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, read the active Airbag DTCs. Does the DRB show PASSENGER SQUIB 2 CIRCUIT SHORT TO GROUND? Yes → Go To 3 No → Replace the Passenger Airbag in accordance with the Service Information. Perform AIRBAG VERIFICATION TEST - VER 1.	All

PASSENGER SQUIB 2 SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A HARD SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED, AND COULD RESULT IN SERIOUS OR FATAL INJURY.** Disconnect the Airbag Control Module connector **NOTE: Check connectors - Clean repair as necessary.** Connect the appropriate Load Tool adaptor to the Airbag Control Module connector. Disconnect the Load Tool from the Passenger Airbag connector. Measure the resistance of the Passenger Squib 2 Line 1 and Line 2 circuits between the Passenger Airbag Module connector and ground. Is the resistance below 10K ohms on either circuit? Yes → Repair Passenger Squib 2 Line 1 or Line 2 circuit for a shorted to ground. Perform AIRBAG VERIFICATION TEST - VER 1. No → Replace the Airbag Control Module in accordance with Service Instructions. WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
VEHICLE BODY STYLE UNKNOWN

When Monitored and Set Condition:

VEHICLE BODY STYLE UNKNOWN

When Monitored: When the ignition is on, the ACM monitors the PCI Bus for the VIN message containing the vehicle body style from the Powertrain Control Module. The PCM transmits the VIN message every 14 seconds.

Set Condition: With ignition on, If the ACM does not receive 2 consecutive matching (vehicle Body Style) VIN messages on the bus the code will set.

POSSIBLE CAUSES
PCM, PCI COMMUNICATION FAILURE
VEHICLE BODY STYLE UNKNOWN
ACM, VEHICLE BODY STYLE UNKNOWN
STORED CODE OR INTERMITTENT CONDITION
ACTIVE CODE PRESENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Ensure the battery is fully charged. **NOTE: For the purpose of this test, the AECM and ORC modules will be referred to as an ACM.** SELECT ACTIVE or STORED DTC: ACM - ACTIVE DTC Go To 2 ACM - STORED DTC Go To 5 **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	Turn the ignition on. Connect the DRBIII® to the data link connector and select PASSIVE RESTRAINTS, AIRBAG, SYSTEM TEST. With the DRBIII®, read the PCM Active on the Bus:. Does the DRB show PCM ACTIVE ON THE BUS:? Yes → Go To 3 No → Refer to category COMMUNICATION CATEGORY and select the related symptom. Perform AIRBAG VERIFICATION TEST - VER 1.	All

VEHICLE BODY STYLE UNKNOWN — Continued

TEST	ACTION	APPLICABILITY
3	With the DRB select ENGINE, MISCELLANEOUS, SELECT MISC FUNCTION, and then CHECK VIN to read the Vehicle Identification Number in the Powertrain Control Module. Compare the VIN displayed on the DRB screen and the Vehicle VIN plate. Does the VIN plate and the PCM VIN match? Yes → Go To 4 No → Replace the Powertrain Control Module and program with the correct vehicle identification number. Perform AIRBAG VERIFICATION TEST - VER 1.	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** **WARNING: IF THE AIRBAG CONTROL MODULE IS DROPPED AT ANY TIME, IT MUST BE REPLACED.** If there are no possible causes remaining, view repair. Repair Replace the Airbag Control Module in accordance with Service Instructions. WARNING: make sure the battery is disconnected and wait 2 minutes before proceeding. Perform AIRBAG VERIFICATION TEST - VER 1. **NOTE: When reconnecting airbag system components the Ignition must be turned off and the Battery must be disconnected.**	All
5	**NOTE: Ensure the battery is fully charged.** Remove any special tools or jumper wires and reconnect all previously disconnected components - except the battery. **WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** With the DRBIII®, record and erase all DTCs from all modules. All active codes must be resolved before diagnosing any stored codes. Maintain a safe distance from all airbags while performing the following steps. With the DRB III monitor active codes as you work through the system. **NOTE: If equipped with Passenger Airbag On-Off switch, read the DTC's in all switch positions.** Wiggle the wiring harness and connectors of the appropriate airbag system and rotate the steering wheel from stop to stop. **NOTE: Check connectors - Clean and repair as necessary.** You have just attempted to simulate the condition that initially set the trouble code message. The following additional checks may assist you in identifying a possible intermittent problem: - Visually inspect related wire harness connectors. Look for broken, bent, pushed out, spread, corroded, or contaminated terminals. - Visually inspect the related harnesses. Look for chafed, pierced, pinched or partially broken wire. - Refer to Wiring Diagrams and Technical Service Bulletins that may apply. Did the DTC become active ? Yes → Select appropriate symptom from Symptom List. No → No problem found at this time. Erase all codes before returning vehicle to customer.	All

Symptom:
*AIRBAG INDICATOR ON WITHOUT ACM TROUBLE CODES

POSSIBLE CAUSES
AIRBAG INDICATOR ON WITHOUT ACM TROUBLE CODES
INSTRUMENT CLUSTER PROBLEMS

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Make sure that all active DTC's have been repaired before performing this procedure. With the DRBIII select PASSIVE RESTRAINTS, AIRBAG, MONITOR DISPLAY, WARNING LAMP STATUS and read the WARNING LAMP STATUS. Does the DRB show LAMP REQ BY ACM: ON? Yes → WARNING: MAKE SURE THE BATTERY IS DISCONNECTED, THEN WAIT TWO MINUTES BEFORE PROCEEDING. Replace the Occupant Restraint Controller in accordance with Service Instructions. Perform AIRBAG VERIFICATION TEST - VER 1. No → Refer to INSTRUMENT CLUSTER CATEGORY symptom list for problems related to Instrument Cluster. Perform AIRBAG VERIFICATION TEST - VER 1. **NOTE: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

Symptom:
ALL OUTPUTS SHORT - PREMIUM AUDIO SYSTEM

When Monitored and Set Condition:

ALL OUTPUTS SHORT - PREMIUM AUDIO SYSTEM

When Monitored: Ignition in RUN and IOD fuse installed.

Set Condition: The radio has sensed a short on the output for more than 10 seconds.

POSSIBLE CAUSES
DETERMINE FAULT
SPEAKER SECTION OF POWER AMPLIFIER
(+) CIRCUIT SHORTED TO GROUND
(-) CIRCUIT SHORTED TO GROUND
SPEAKER (+) & (-) CIRCUITS SHORTED TOGETHER
SPEAKER SECTION OF RADIO

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Turn the Radio on. With the DRBIII®, erase the audio DTC's. Cycle the ignition switch from off to on and wait 10 seconds. With the DRBIII®, read the audio DTC's. Does the DRBIII® display ALL OUTPUTS SHORT? Yes → Go To 2 No → Refer to the wiring diagrams located in the service information to help isolate a possible intermittent short. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the Power Amplifier harness connector. Turn the ignition on. Turn the radio on. With the DRBIII®, erase the audio DTCs. Cycle the ignition switch from off to on and wait 10 seconds. With the DRBIII®, read DTC's. Does the DRBIII® display ALL OUTPUTS SHORT? Yes → Go To 3 No → Replace the Power Amplifier in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1.	All

ALL OUTPUTS SHORT - PREMIUM AUDIO SYSTEM — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Power Amplifier harness connector. Disconnect the Radio C1 harness connector. Measure the resistance between ground and any speaker (+) circuit. Is the resistance below 1000.0 (1K) ohms? Yes → Repair the speaker (+) circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the Power Amplifier harness connector. Disconnect the Radio C1 harness connector. Measure the resistance between ground and any speaker (-) circuit. Is the resistance below 1000.0 (1K) ohms? Yes → Repair the speaker (-) circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the Power Amplifier harness connector. Disconnect the Radio C1 harness connector. Measure the resistance between each speaker (+) circuit and each speaker (-) circuit. Is the resistance below 1000.0 (1K) ohms for any of the measurements? Yes → Repair the speaker circuits shorted together. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Radio. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
ALL OUTPUTS SHORT- BASE AUDIO SYSTEM

When Monitored and Set Condition:

ALL OUTPUTS SHORT- BASE AUDIO SYSTEM

When Monitored: Ignition in RUN and IOD fuse installed.

Set Condition: The radio has sensed a short on the output for more than 10 seconds.

POSSIBLE CAUSES
DETERMINE FAULT
FRONT SHORTED SPEAKER
REAR SHORTED SPEAKER
(+) CIRCUIT SHORTED TO GROUND
(-) CIRCUIT SHORTED TO GROUND
SPEAKER (+) & (-) CIRCUITS SHORTED TOGETHER
SPEAKER SECTION OF RADIO

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Turn the Radio on. With the DRBIII®, erase the audio DTC's. Cycle the ignition switch from off to on and wait 10 seconds. With the DRBIII®, read the audio DTC's. Does the DRBIII® display ALL OUTPUTS SHORT? Yes → Go To 2 No → Refer to the wiring diagrams located in the service information to help isolate a possible intermittent short. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. **NOTE: Perform this procedure after disconnecting each front speaker and each I/P speaker (if equipped) connector.** Disconnect each front speaker and each I/P speaker (if equipped) harness connector one at a time. Turn the ignition on. Turn the radio on. With the DRBIII®, erase the audio DTCs. Cycle the ignition switch from off to on and wait 10 seconds. With the DRBIII®, read DTC's. Does the DRBIII® display ALL OUTPUTS SHORT with all the speakers disconnected? Yes → Go To 3 No → Replace the Speaker that when disconnected the DTC did not reset. Perform BODY VERIFICATION TEST - VER 1.	All

ALL OUTPUTS SHORT- BASE AUDIO SYSTEM — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **NOTE: Perform this procedure after disconnecting each rear speaker connector.** Disconnect each rear speaker harness connector one at a time. Turn the ignition on. Turn the radio on. With the DRBIII®, erase the audio DTCs. Cycle the ignition switch from off to on and wait 10 seconds. With the DRBIII®, read DTC's. Does the DRBIII® display ALL OUTPUTS SHORT with all the rear speakers disconnected? Yes → Go To 4 No → Replace the Speaker that when disconnected the DTC did not reset. Perform BODY VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Disconnect each front and rear speaker harness connector. Disconnect the Radio C1 harness connector. Measure the resistance between ground and each speaker (+) circuit. Is the resistance below 1000.0 (1K) ohms? Yes → Repair the speaker (+) circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect each front and rear speaker harness connector. Disconnect the Radio C1 harness connector. Measure the resistance between ground and each speaker (-) circuit. Is the resistance below 1000.0 (1K) ohms? Yes → Repair the speaker (-) circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Disconnect each front and rear speaker harness connector. Disconnect the Radio C1 harness connector. Measure the resistance between each speaker (+) circuit and each speaker (-) circuit. Is the resistance below 1000.0 (1K) ohms for any of the measurements? Yes → Repair the speaker circuits shorted together. Perform BODY VERIFICATION TEST - VER 1. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the Radio. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom List:

CASSETTE PLAYER INOP
CD MECHANICAL FAILURE
***AM/FM SWITCH INOPERATIVE**
***ANY STATION PRESET SWITCH INOPERATIVE**
***BALANCE INOPERATIVE**
***CD EJECT SWITCH INOPERATIVE**
***EQUALIZER INOPERATIVE**
***FADER INOPERATIVE**
***FF/RW SWITCH INOPERATIVE**
***HOUR/MINUTE SWITCHES INOPERATIVE**
***PAUSE/PLAY SWITCH INOPERATIVE**
***PWR SWITCH INOPERATIVE**
***SCAN SWITCH INOPERATIVE**
***SEEK SWITCH INOPERATIVE**
***SET SWITCH INOPERATIVE**
***TAPE EJECT SWITCH INOPERATIVE**
***TIME SWITCH INOPERATIVE**
***TUNE SWITCH INOPERATIVE**

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be CASSETTE PLAYER INOP.

When Monitored and Set Condition:

CASSETTE PLAYER INOP

When Monitored: Continuously with the ignition and radio turned on.

Set Condition: The code will set if the radio detects a internal cassette failure.

CD MECHANICAL FAILURE

When Monitored: Continuously with the ignition and CD player turned on.

Set Condition: The code will set if the radio detects a CD mechanical failure.

POSSIBLE CAUSES
INTERNAL FAILURE

CASSETTE PLAYER INOP — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: If a DTC is set, erase the DTC and attempt to reset the DTC. If DTC resets, follow this test.** This is an internal radio failure. View repair Repair Replace the Radio. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
CD CHANGER MECHANICAL FAILURE

When Monitored and Set Condition:

CD CHANGER MECHANICAL FAILURE

When Monitored: Continuously with the ignition and CD Changer turned on.

Set Condition: The code will set if the CD Changer detects a mechanical failure.

POSSIBLE CAUSES
INTERNAL FAILURE

TEST	ACTION	APPLICABILITY
1	**NOTE: Erase DTC and attempt to reset. If DTC resets, follow this test.** This is an internal CD Changer failure. View repair Repair Replace the CD Changer. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
CD CHANGER READ FAILURE

When Monitored and Set Condition:

CD CHANGER READ FAILURE

When Monitored: Continuously with the ignition and CD Changer turned on.

Set Condition: The code will set if a CD that is not formatted as a music CD is installed in the CD Changer.

POSSIBLE CAUSES
CD CHANGER READ FAILURE

TEST	ACTION	APPLICABILITY
1	Replace the problem CD with a good, clean, unscratched, music CD. Turn the radio on and select the good CD. With the DRBIII®, read DTC's. Does the DRBIII® display CD CHANGER READ FAILURE? Yes → Replace the CD Changer. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
CD CHANGER TEMPERATURE HIGH

When Monitored and Set Condition:

CD CHANGER TEMPERATURE HIGH

When Monitored: Continuously with the ignition and CD Changer turned on.

Set Condition: The code will set if the temperature inside the CD Changer is above +65° C (+145° F).

POSSIBLE CAUSES
HIGH TEMPERATURE FAILURE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase the audio DTC's. Start the engine and allow the engine to reach normal operating temperature. If the vehicle has been in the hot sunlight or extreme cold move the vehicle indoors and open the doors to allow the inside temperature to stabilize. The CD Changer will operate between -23° C and 65° C (-10° F and +145° F). With the DRBIII®, read DTC's. Does the DRBIII® display CD CHANGER TEMPERATURE HIGH? Yes → Replace the CD Changer. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
CD READ FAILURE

When Monitored and Set Condition:

CD READ FAILURE

When Monitored: Continuously with the ignition and the radio CD player turned on.

Set Condition: The code will set if a CD that is not formatted as a music CD is installed in the radio CD player.

POSSIBLE CAUSES
CD READ FAILURE

TEST	ACTION	APPLICABILITY
1	Replace the problem CD with a good, clean, unscratched, music CD. Turn the radio CD player on. With the DRBIII®, read DTC's. Does the DRBIII® display CD READ FAILURE? Yes → Replace the Radio. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
CD TEMPERATURE HIGH

When Monitored and Set Condition:

CD TEMPERATURE HIGH

When Monitored: Continuously with the ignition and the radio CD player turned on.

Set Condition: The code will set if the temperature inside the radio CD player is above +70° C (+156° F).

POSSIBLE CAUSES
HIGH TEMPERATURE FAILURE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase the audio DTC's. Start the engine and allow the engine to reach normal operating temperature. If the vehicle has been in the hot sunlight or extreme cold move the vehicle indoors and open the doors to allow the inside temperature to stabilize. The radio CD player will operate between -23° C and 70° C (-10° F and +156° F). With the DRBIII®, read DTC's. Does the DRBIII® display CD TEMPERATURE HIGH? Yes → Replace the Radio. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
NO ANTENNA CONNECTION

When Monitored and Set Condition:

NO ANTENNA CONNECTION

When Monitored: With the ignition on and the radio in seek up/down mode.

Set Condition: With the radio in seek or scan mode for two minutes and the radio does not detect an antenna connection or does not receive a radio station signal.

POSSIBLE CAUSES
BAD ANTENNA CONNECTION
TEST ANTENNA
RADIO

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Radio Antenna connector. Inspect the Radio Antenna connection. Was the Antenna connection clean and tight? Yes → Go To 2 No → Repair Antenna connection as needed. Perform BODY VERIFICATION TEST - VER 1.	All
2	Refer to the Audio System in the service information and test the Antenna in accordance with the service procedure. Is the Antenna ok? Yes → Go To 3 No → Repair or replace the Antenna assembly as necessary. Perform BODY VERIFICATION TEST - VER 1.	All
3	**Note: Reconnect all previously disconnected components.** Turn the ignition and Radio on. With the DRBIII®, erase the audio DTC's, put the radio in seek up and seek down mode for approximately 2 minutes before proceeding. With the DRBIII®, read the audio DTC's. Did this DTC reset? Yes → Replace the Radio. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
POWER AMP SHUTDOWN - BASE AUDIO SYSTEM

When Monitored and Set Condition:

POWER AMP SHUTDOWN - BASE AUDIO SYSTEM

When Monitored: Ignition in RUN and IOD fuse installed.

Set Condition: The radio has sensed a short on the output for more than 10 seconds.

POSSIBLE CAUSES
DETERMINE FAULT
FRONT SHORTED SPEAKER
REAR SHORTED SPEAKER
(+) CIRCUIT SHORTED TO GROUND
(-) CIRCUIT SHORTED TO GROUND
SPEAKER (+) & (-) CIRCUITS SHORTED TOGETHER
SPEAKER SECTION OF RADIO

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Turn the Radio on. With the DRBIII®, erase the audio DTC's. Cycle the ignition switch from off to on and wait 10 seconds. With the DRBIII®, read the audio DTC's. Does the DRBIII® display POWER AMP SHUTDOWN? Yes → Go To 2 No → Refer to the wiring diagrams located in the service information to help isolate a possible intermittent short. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. **NOTE: Perform this procedure after disconnecting each front speaker and each I/P speaker (if equipped) connector.** Disconnect each front speaker and each I/P speaker (if equipped) harness connector one at a time. Turn the ignition on. Turn the radio on. With the DRBIII®, erase the audio DTCs. Cycle the ignition switch from off to on and wait 10 seconds. With the DRBIII®, read DTC's. Does the DRBIII® display POWER AMP SHUTDOWN with all the speakers disconnected? Yes → Go To 3 No → Replace the Speaker that when disconnected the DTC did not reset. Perform BODY VERIFICATION TEST - VER 1.	All

POWER AMP SHUTDOWN - BASE AUDIO SYSTEM — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **NOTE: Perform this procedure after disconnecting each rear speaker connector.** Disconnect each rear speaker harness connector one at a time. Turn the ignition on. Turn the radio on. With the DRBIII®, erase the audio DTCs. Cycle the ignition switch from off to on and wait 10 seconds. With the DRBIII®, read DTC's. Does the DRBIII® display POWER AMP SHUTDOWN with all the rear speakers disconnected? Yes → Go To 4 No → Replace the Speaker that when disconnected the DTC did not reset. Perform BODY VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Disconnect each front and rear speaker harness connectors. Disconnect the Radio C1 harness connector. Measure the resistance between ground and each speaker (+) circuit. Is the resistance below 1000.0 (1K) ohms? Yes → Repair the speaker (+) circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect each front and rear speaker harness connector. Disconnect the Radio C1 harness connector. Measure the resistance between ground and each speaker (-) circuit. Is the resistance below 1000.0 (1K) ohms? Yes → Repair the speaker (-) circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Disconnect each front and rear speaker harness connectors. Disconnect the Radio C1 harness connector. Measure the resistance between each speaker (+) circuit and each speaker (-) circuit. Is the resistance below 1000.0 (1K) ohms for any of the measurements? Yes → Repair the speaker circuits shorted together. Perform BODY VERIFICATION TEST - VER 1. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the Radio. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
POWER AMP SHUTDOWN - PREMIUM AUDIO SYSTEM

When Monitored and Set Condition:

POWER AMP SHUTDOWN - PREMIUM AUDIO SYSTEM

When Monitored: Ignition in RUN and IOD fuse installed.

Set Condition: The radio has sensed a short on the output for more than 10 seconds.

POSSIBLE CAUSES
DETERMINE FAULT
SPEAKER SECTION OF POWER AMPLIFIER
(+) CIRCUIT SHORTED TO GROUND
(-) CIRCUIT SHORTED TO GROUND
SPEAKER (+) & (-) CIRCUITS SHORTED TOGETHER
SPEAKER SECTION OF RADIO

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Turn the Radio on. With the DRBIII®, erase the audio DTC's. Cycle the ignition switch from off to on and wait 10 seconds. With the DRBIII®, read the audio DTC's. Does the DRBIII® display POWER AMP SHUTDOWN? Yes → Go To 2 No → Refer to the wiring diagrams located in the service information to help isolate a possible intermittent short. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the Power Amplifier harness connector. Turn the ignition on. Turn the radio on. With the DRBIII®, erase the audio DTCs. Cycle the ignition switch from off to on and wait 10 seconds. With the DRBIII®, read DTC's. Does the DRBIII® display POWER AMP SHUTDOWN? Yes → Go To 3 No → Replace the Power Amplifier. Perform BODY VERIFICATION TEST - VER 1.	All

POWER AMP SHUTDOWN - PREMIUM AUDIO SYSTEM — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Power Amplifier harness connector. Disconnect the Radio C1 harness connector. Measure the resistance between ground and any speaker (+) circuit. Is the resistance below 1000.0 (1K) ohms? Yes → Repair the speaker (+) circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the Power Amplifier harness connector. Disconnect the Radio C1 harness connector. Measure the resistance between ground and any speaker (-) circuit. Is the resistance below 1000.0 (1K) ohms? Yes → Repair the speaker (-) circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the Power Amplifier harness connector. Disconnect the Radio C1 harness connector. Measure the resistance between each speaker (+) circuit and each speaker (-) circuit. Is the resistance below 1000.0 (1K) ohms for any of the measurements? Yes → Repair the speaker circuits shorted together. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Radio. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*CHIME INOPERATIVE AT ALL TIMES

POSSIBLE CAUSES
USE DRB TO ACTUATE CHIME
BODY CONTROL MODULE - CHIME INOPERATIVE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Close both doors. With the DRBIII®, actuate the Chime. Does the chime sound when actuated by the DRB? Yes → The chime operates as it should. Check other reasons for the chime being inoperative and select from the symptom list. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:

*CHIME INOPERATIVE WITH DRIVER SEAT BELT UNFASTENED

POSSIBLE CAUSES
SEAT BELT SWITCH STATUS ON DRBIII®
SEAT BELT SWITCH SHORTED
SEAT BELT SWITCH SENSE SHORT TO GROUND
INSTRUMENT CLUSTER - SEAT BELT SWITCH SHORTED

TEST	ACTION	APPLICABILITY
1	Ensure the drivers seat belt is unfastened. With the DRBIII®, select Electro Mech Cluster Input/Output. Turn the ignition on. Read the Seat Belt Sw status. Does the DRBIII display Seat Belt Sw: Closed Yes → Go To 2 No → Replace the Instrument Cluster. Perform BODY VERIFICATION TEST - VER 1.	All
2	Disconnect the Seat Belt Switch connector. With the DRBIII®, select Electro Mech Cluster Input/Output. Turn the ignition on. Read the seat Belt Sw status. Does the DRBIII display Seat Belt Sw: Closed Yes → Go To 3 No → Repair the Seat Belt switch pigtail wiring or replace the Buckle assembly. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Removed the Instrument Cluster from the instrument panel. Disconnect the Seat Belt Switch connector. Measure the resistance between ground and the Seat Belt Switch Sense circuit. Is the resistance below 100.0 ohms? Yes → Repair the Seat Belt Switch Sense wire for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	If there are no possible causes remaining, view repair. Repair Replace the Instrument Cluster. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:

*CHIME INOPERATIVE WITH EXTERIOR LIGHTS ON AND DRIVERS DOOR OPEN

POSSIBLE CAUSES
OPEN HEADLAMP SWITCH OUTPUT
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	The Driver's Door Ajar switch must be operational for the result of this test to be valid. The Key-In Ignition switch chime function must be operational for the result of this test to be valid. Turn the ignition off. Remove the Body Control Module from the Junction Block. Turn the headlamps on. Measure the voltage of the Headlamp Switch Output circuit in the Junction Block internal 12-way connector. Is the voltage above 10.0 volts? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Head Lamp Switch Output circuit for an open from the headlamp switch. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*CHIME INOPERATIVE WITH KEY-IN IGNITION AND DRIVER DOOR OPEN

POSSIBLE CAUSES
OBSERVE THE KEY-IN IGNITION SWITCH STATUS
KEY-IN IGNITION SWITCH OPEN
KEY-IN IGNITION SWITCH GROUND CIRCUIT OPEN
KEY-IN IGNITION SWITCH SENSE CIRCUIT OPEN
BCM - INCORRECT KEY - IN IGNITION SWITCH STATUS

TEST	ACTION	APPLICABILITY
1	The door ajar switch must be operational for the result of this test to be valid. **NOTE: Ensure that the Key is still in the Ignition Switch.** With the DRBIII® enter Body Computer then Input Output and read the Key-In Ignition Switch status. Does the DRB display: KEY-IN IGN: CLOSED? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition on. Disconnect the Ignition Switch C3 harness connector. Connect a jumper between the Key-In Ignition Switch Sense circuit and the Ground circuit. With the DRBIII®, enter Body Computer then Input/Output and observe the Key-In Ignition Switch status. Does the DRBIII display Key-In Ign: Closed? Yes → Replace the Ignition Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the Ignition Switch C3 harness connector. Turn all lights off. Measure the resistance between ground and the ground circuit in the ignition switch connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

*CHIME INOPERATIVE WITH KEY-IN IGNITION AND DRIVER DOOR OPEN — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Ignition Switch C3 harness connector. Disconnect the Body Control Module C1 harness connector. Measure the resistance of the Key-In Ignition Switch Sense circuit between the ignition switch connector and the BCM harness C1 connector . Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Key-In Ignition Switch Sense circuit for an open Perform BODY VERIFICATION TEST - VER 1.	All
5	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*CHIME SOUNDS WITH DRIVER SEAT BELT FASTENED

POSSIBLE CAUSES
SEAT BELT SW STATUS WRONG-OPEN
SEAT BELT SWITCH OPEN
GROUND WIRE OPEN
SEAT BELT SW SEN OPEN
INSTRUMENT CLUSTER - SEAT BELT SENSE OPEN

TEST	ACTION	APPLICABILITY
1	Ensure the drivers seat belt is fastened. With the DRB III select: Electro Mech Cluster Input/Outputs. Turn the ignition on. Read the Seat Belt SW status. Does the DRB III show Seat Belt SW: CLOSED? Yes → Replace the Instrument Cluster. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Disconnect the Seat Belt Switch connector. Turn all lights off. Trip the door lock latch to turn the courtesy lamps off. Measure the resistance of the Ground circuit in the Seat Belt connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open ground wire. Perform BODY VERIFICATION TEST - VER 1.	All
3	Disconnect the Seat Belt Switch connector. Connect a jumper wire between Seat Belt Switch Sense CKT and the Ground CKT in the Seat Belt Switch connector. With the DRB III select: Electro Mech Cluster Input/Outputs. Turn the ignition on. Read the Seat Belt SW status. Does the DRB III show Seat Belt SW: CLOSED? Yes → Repair the Seat Belt switch pigtail wiring or replace the Buckle assembly. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Remove the Instrument Cluster from the instrument panel. Disconnect the Seat Belt Switch connector. Measure the resistance of the Seat Belt Switch Sense circuit between the Instrument Cluster connector and the Seat Belt Switch connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open Seat Belt Switch Sense circuit. Perform BODY VERIFICATION TEST - VER 1.	All

*CHIME SOUNDS WITH DRIVER SEAT BELT FASTENED — Continued

TEST	ACTION	APPLICABILITY
5	If there are no possible causes remaining, view repair. Repair Replace the Instrument Cluster. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*CHIME SOUNDS WITH DRIVERS DOOR OPEN AND KEY REMOVED FROM IGNITION

POSSIBLE CAUSES
KEY-IN IGNITION SWITCH STATUS WRONG
KEY-IN IGNITION SWITCH STATUS WRONG
KEY-IN IGNITION SW SENSE SHORT TO GROUND
BODY CONTROL MODULE - KEY-IN IGNITION SHORTED

TEST	ACTION	APPLICABILITY
1	Ensure all exterior lamps are off. With the DRB III select: Body Computer Input/Output. Remove the key from the ignition switch. Read the Key-In Ignition status. Does the DRB III show Key-In Ign: CLOSED? Yes → Go To 2 No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the Ignition Switch C3 harness connector. Disconnect the Body Control Module C1 harness connector. Measure the resistance of the Key-in Ignition Switch Sense circuit to ground. Is the resistance below 100.0 ohms? Yes → Repair the Key-in Ignition Switch Sense circuit to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Disconnect the Ignition Switch C3 connector. With the DRBIII® select: Body Computer Input/Output. Read the Key-In Ignition Status. Does the DRBIII® display Key-In Ign CLOSED? Yes → Go To 4 No → Replace the Ignition Switch. Perform BODY VERIFICATION TEST - VER 1.	All
4	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*VEHICLE SPEED WARNING CHIME PROBLEM

POSSIBLE CAUSES
INCORRECT COUNTRY CODE PROGRAMMED IN BCM
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Note: The vehicle speed warning chime is for Gulf Coast Countries only. With the DRBIII®, check the Body Control Module country code setting. Is the country code incorrect? Yes → Program the correct country code setting. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
BATTERY POWER TO MODULE DISCONNECTED

When Monitored and Set Condition:

BATTERY POWER TO MODULE DISCONNECTED

When Monitored: With the ignition on.

Set Condition: The BCM receives ignition on voltage, but no battery power feed.

POSSIBLE CAUSES
VERIFYING ACTIVE DTC
FUSED B+ CIRCUIT - JUNCTION BLOCK
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Connect the DRB to the Data Link Connector. Turn the ignition on. With the DRB, erase BCM DTC's. Turn the ignition off then turn the ignition on. With the DRB, read BCM DTC's. Did this DTC reset? Yes → Go To 2 No → No problem found at this time. Use the wiring diagrams located in the service information to help isolate a possible intermittent wiring problem. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Remove the BCM from the Junction Block. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused B+ circuit in the Junction Block Body Control Module connector cavity 12. Is the test light illuminated? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Junction Block in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
BOOTLOADER CHECKSUM FAILURE

When Monitored and Set Condition:

BOOTLOADER CHECKSUM FAILURE

When Monitored: At battery connect.

Set Condition: The BCM fails the bootloader checksum test.

POSSIBLE CAUSES
BOOTLOADER CHECKSUM FAILURE

TEST	ACTION	APPLICABILITY
1	Connect the DRB to the Data Link Connector. Turn the ignition on. With the DRB, erase BCM DTC's. Turn the ignition off then turn the ignition on. With the DRB, read BCM DTC's. Did this DTC reset? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
EEPROM CHECKSUM FAILURE

When Monitored and Set Condition:

EEPROM CHECKSUM FAILURE

When Monitored: Continuously.

Set Condition: The BCM fails EEPROM checksum test.

POSSIBLE CAUSES
EEPROM CHECKSUM FAILURE

TEST	ACTION	APPLICABILITY
1	Connect the DRB to the Data Link Connector. Turn the ignition on. With the DRB, erase BCM DTC's. Turn the ignition off then turn the ignition on. With the DRB, read BCM DTC's. Did this DTC reset? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
MIC MESSAGES NOT RECEIVED

When Monitored and Set Condition:

MIC MESSAGES NOT RECEIVED

When Monitored: With the ignition on.

Set Condition: The BCM does not receive any messages from the Instrument Cluster (MIC) for at least 14 seconds.

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE INSTRUMENT CLUSTER (MIC)
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, enter Body then Electro/Mech Cluster. Was the DRB able to I/D or communicate with the Instrument Cluster (MIC)? Yes → Go To 2 No → Refer to the Communication category for the related symptom(s). Perform BODY VERIFICATION TEST - VER 1.	All
2	With the DRB, erase DTC's. Turn the ignition on and wait approximately 1 minute. With the DRB, read DTC's. Did this DTC reset? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
ORC MESSAGES NOT RECEIVED

When Monitored and Set Condition:

ORC MESSAGES NOT RECEIVED

When Monitored: With the ignition on.

Set Condition: The BCM does not receive any messages from the Airbag Control Module (ORC) for at least 10 seconds.

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE AIRBAG CONTROL MODULE (ORC)
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, attempt to communicate with the Airbag Control Module (ORC). Was the DRB able to I/D or communicate with the Airbag Control Module (ORC)? Yes → Go To 2 No → Refer to the Communication category for the related symptom(s). Perform BODY VERIFICATION TEST - VER 1.	All
2	With the DRB, erase DTC's. Turn the ignition on and wait approximately 1 minute. With the DRB, read DTC's. Did this DTC reset? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
PCM MESSAGES NOT RECEIVED

When Monitored and Set Condition:

PCM MESSAGES NOT RECEIVED

When Monitored: With the ignition on.

Set Condition: The BCM does not receive any messages from the Powertrain Control Module (PCM) for at least 12 seconds.

POSSIBLE CAUSES
VERIFYING ACTIVE DTC
PCM MESSAGES NOT RECEIVED
ATTEMPT TO COMMUNICATE WITH THE PCM
POWERTRAIN CONTROL MODULE
PCI BUS CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	With the DRB, erase DTC's. Turn the ignition on and wait approximately 1 minute. With the DRB, read DTC's. Did this DTC reset? Yes → Go To 2 No → Refer to the wiring diagrams located in the service information to help isolate a possible intermittent open or shorted wiring condition. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition on. With the DRB, enter Body Computer, System Tests then PCM Monitor. Does the DRB display: PCM is active on BUS? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition on. With the DRB, attempt to communicate with the PCM. Was the DRB able to communicate with the PCM? Yes → Go To 4 No → Refer to the communication category and perform the appropriate symptom. Perform BODY VERIFICATION TEST - VER 1.	All

PCM MESSAGES NOT RECEIVED — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM C2 harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the PCM C2 connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace the Powertrain Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM C2 harness connector. Disconnect the BCM C3 harness connector. Measure the resistance of the PCI bus circuit between the PCM C2 connector and the BCM C3 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Repair the PCI Bus circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
POST FAILURE

When Monitored and Set Condition:

POST FAILURE

When Monitored: At battery connect.

Set Condition: The BCM fails ROM checksum test.

POSSIBLE CAUSES
POST FAILURE

TEST	ACTION	APPLICABILITY
1	Connect the DRB to the Data Link Connector. Turn the ignition on. With the DRB, erase BCM DTC's. Turn the ignition off then turn the ignition on. With the DRB, read BCM DTC's. Did this DTC reset? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
SKIM MESSAGES NOT RECEIVED

When Monitored and Set Condition:

SKIM MESSAGES NOT RECEIVED

When Monitored: With the ignition on.

Set Condition: The BCM does not receive any messages from the Sentry Key Immobilizer Module (SKIM) for at least 12 seconds.

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE SENTRY KEY IMMOBILIZER MODULE
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, attempt to communicate with the SKIM. Was the DRB able to I/D or communicate with the SKIM? Yes → Go To 2 No → Refer to the Communication category for the related symptom(s). Perform BODY VERIFICATION TEST - VER 1.	All
2	With the DRB, erase DTC's. Turn the ignition on and wait approximately 1 minute. With the DRB, read DTC's. Did this DTC reset? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
TCM MESSAGES NOT RECEIVED

When Monitored and Set Condition:

TCM MESSAGES NOT RECEIVED

When Monitored: With the ignition on.

Set Condition: The BCM does not receive any messages from the Transmission Control Module (TCM) for at least 18 seconds.

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE TCM
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, enter Transmission. Was the DRB able to I/D or communicate with the TCM? Yes → Go To 2 No → Refer to the Communication category for the related symptom(s). Perform BODY VERIFICATION TEST - VER 1.	All
2	With the DRB, erase DTC's. Turn the ignition on and wait approximately 1 minute. With the DRB, read DTC's. Did this DTC reset? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
TRAVELER MESSAGES NOT RECEIVED (CMTC)

When Monitored and Set Condition:

TRAVELER MESSAGES NOT RECEIVED (CMTC)

When Monitored: With the ignition on.

Set Condition: The BCM does not receive any messages from the Traveler (Compass/Mini Trip Computer) for at least 14 seconds.

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE TRAVELER (CMTC)
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, enter Body then Traveler. Was the DRB able to I/D or communicate with the Traveler (CMTC)? Yes → Go To 2 No → Refer to the Communication category for the related symptom(s). Perform BODY VERIFICATION TEST - VER 1.	All
2	With the DRB, erase DTC's. Turn the ignition on and wait approximately 1 minute. With the DRB, read DTC's. Did this DTC reset? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
*BUS +/- SIGNALS OPEN OR NO RESPONSE FROM BODY CONTROL MODULE

POSSIBLE CAUSES
OPEN GROUND CIRCUITS
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**NOTE: Make sure the DRB can communicate with other modules before proceeding, if not refer to the PCI Bus Communication Failure symptom.** Turn the ignition off. Disconnect the BCM C2 and C3 harness connectors. **NOTE: Ensure all lights are turned off.** Using a 12-volt test light connected to 12-volts, probe each ground circuit. Is the test light illuminated for each circuit? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Ground circuit(s) for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*BUS +/- SIGNALS OPEN OR NO RESPONSE FROM INSTRUMENT CLUSTER

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE BCM
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
FUSED B+ CIRCUIT OPEN
GROUND CIRCUIT OPEN
INSTRUMENT CLUSTER
PCI BUS CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, enter Body then Body Computer. Was the DRB able to I/D or communicate with the BCM? Yes → Go To 2 No → Refer to the symptom list for problems related to no communication with the BCM. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the Instrument Cluster harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output circuit. Is the test light illuminated? Yes → Go To 3 No → Repair the Fused Ignition Switch Output circuit for an open or short. Refer to the wiring diagrams in the service information. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Disconnect the Instrument Cluster harness connector. Using a 12-volt test light connected to ground, probe the Fused B+ circuit. Is the test light illuminated? Yes → Go To 4 No → Repair the Fused B+ circuit for an open or short. Refer to the wiring diagrams in the service information. Perform BODY VERIFICATION TEST - VER 1.	All

*BUS +/- SIGNALS OPEN OR NO RESPONSE FROM INSTRUMENT CLUSTER — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Instrument Cluster harness connector. **NOTE: Ensure all lights are turned off.** Using a 12-volt test light connected to 12-volts, probe each ground circuit. Is the test light illuminated for each circuit? Yes → Go To 5 No → Repair the Ground circuit(s) for an open. Refer to the wiring diagrams located in the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
5	**Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.** Disconnect the Instrument Cluster harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus (MIC) circuit in the Instrument Cluster connector (cav 2). Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace the Instrument Cluster in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the Instrument Cluster harness connector. Disconnect the BCM C2 harness connector. Measure the resistance of the PCI bus circuit between the Instrument Cluster connector and the BCM C2 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Repair the PCI Bus circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*BUS +/- SIGNALS OPEN OR NO RESPONSE FROM SENTRY KEY IMMOBILIZER MODULE

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE BCM
GROUND CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
FUSED B(+) CIRCUIT OPEN
SENTRY KEY IMMOBILIZER MODULE (SKIM)
PCI BUS CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, enter Body then Body Computer. Was the DRB able to I/D or communicate with the BCM? Yes → Go To 2 No → Refer to the symptom list for problems related to no communication with the BCM. Perform SKIS VERIFICATION.	All
2	Turn the ignition off. Disconnect the SKIM harness connector. Using a 12-volt test light connected to 12-volts, probe the ground circuit. Is the test light illuminated? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Disconnect the SKIM harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output circuit. Is the test light illuminated? Yes → Go To 4 No → Repair the Fused Ignition Switch Output circuit for an open. Refer to the wiring diagrams in the service information. Perform SKIS VERIFICATION.	All

*BUS +/- SIGNALS OPEN OR NO RESPONSE FROM SENTRY KEY IMMOBILIZER MODULE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the SKIM harness connector. Using a 12-volt test light connected to ground, probe the Fused B(+) circuit. Is the test light illuminated? Yes → Go To 5 No → Repair the Fused B+ circuit for an open. Refer to the wiring diagrams in the service information. Perform SKIS VERIFICATION.	All
5	**Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.** Disconnect the SKIM harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the SKIM connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace the Sentry Key Immobilizer Module (SKIM) in accordance with the service information. Perform SKIS VERIFICATION. No → Go To 6	All
6	Turn the ignition off. Disconnect the SKIM harness connector. Disconnect the BCM C2 harness connector. Measure the resistance of the PCI bus circuit between the SKIM connector and the BCM C2 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module in accordance with the service information. Perform SKIS VERIFICATION. No → Repair the PCI Bus circuit for an open. Perform SKIS VERIFICATION.	All

Symptom:
*BUS +/- SIGNALS OPEN OR NO RESPONSE FROM TRAVELER (CMTC)

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE BCM AND THE MIC
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
FUSED B+ CIRCUIT OPEN
GROUND CIRCUIT OPEN
COMPASS/MINI TRIP COMPUTER (CMTC)
PCI BUS CIRCUIT OPEN
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, enter Body then Body Computer. With the DRB, enter Body then Electro/Mech Cluster. Was the DRB able to I/D or communicate with the BCM and the MIC? Yes → Go To 2 No → Refer to the symptom list for problems related to no communication with the BCM or the MIC. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the Compass/Mini Trip Computer harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output circuit. Is the test light illuminated? Yes → Go To 3 No → Repair the Fused Ignition Switch Output circuit for an open or short. Refer to the wiring diagrams in the service information. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Disconnect the Compass/Mini Trip Computer harness connector. Using a 12-volt test light connected to ground, probe the Fused B+ circuit. Is the test light illuminated? Yes → Go To 4 No → Repair the Fused B+ circuit for an open or short. Refer to the wiring diagrams in the service information. Perform BODY VERIFICATION TEST - VER 1.	All

*BUS +/- SIGNALS OPEN OR NO RESPONSE FROM TRAVELER (CMTC) — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Compass/Mini Trip Computer harness connector. Using a 12-volt test light connected to 12-volts, probe the ground circuit. Is the test light illuminated? Yes → Go To 5 No → Repair the Ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
5	**Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.** Disconnect the Compass/Mini Trip Computer harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the CMTC connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace the Compass/Mini Trip Computer in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the Compass/Mini Trip Computer harness connector. Disconnect the Instrument Cluster harness connector. Measure the resistance of the PCI Bus circuit between the CMTC connector and the Instrument Cluster connector (cav 3). Is the resistance below 5.0 ohms? Yes → Replace the Instrument Cluster in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Repair the PCI Bus circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*NO RESPONSE FROM CONTROLLER ANTILOCK BRAKE

POSSIBLE CAUSES
NO RESPONSE FROM CAB
CHECK JUNCTION BLOCK FUSE
GROUND CIRCUIT OPEN
OPEN FUSED IGNITION SWITCH OUTPUT CIRCUIT
CONTROLLER ANTILOCK BRAKE (CAB) MODULE
PCI BUS CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **Note: As soon as one or more module communicates with the DRB, answer the question.** With the DRB, attempt to communicate with the Airbag Control Module. With the DRB, attempt to communicate with the Body Control Module (BCM). Was the DRB able to I/D or establish communications with either of the modules? Yes → Go To 2 No → Refer to the Communications category and perform the symptom PCI Bus Communication Failure. Perform ABS VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Remove and inspect fuse #4 in the junction block. Is the fuse open? Yes → Check the Fused Ignition Switch Output circuit for a short to ground, refer to the wiring diagrams located in the service information. Replace Fuse #4. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the CAB harness connector. Using a 12-volt test light connected to 12-volts, probe both ground circuits. Is the test light illuminated for both circuits? Yes → Go To 4 No → Repair the ground circuit(s) for an open. Perform ABS VERIFICATION TEST - VER 1.	All

*NO RESPONSE FROM CONTROLLER ANTILOCK BRAKE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. **NOTE: Ensure fuse #4 is installed in the junction block.** Disconnect the CAB harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output circuit. Is the test light illuminated? Yes → Go To 5 No → Repair the Fused Ignition Switch Output circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
5	**Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.** Disconnect the CAB harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the CAB connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace the Controller Antilock Brake (CAB) in accordance with the service information. Perform ABS VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the CAB harness connector. Disconnect the BCM C3 harness connector. Measure the resistance of the PCI bus circuit between the CAB connector and the BCM C3 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module in accordance with the service information. Perform ABS VERIFICATION TEST - VER 1. No → Repair the PCI Bus circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:
*NO RESPONSE FROM LEFT SIACM

POSSIBLE CAUSES
INTERROGATE ORC
GROUND CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT RUN/START CIRCUIT OPEN
LEFT SIDE IMPACT AIRBAG CONTROL MODULE
PCI BUS CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**Note: Ensure the battery is fully charged.** Turn the ignition on. With the DRBIII®, select Passive Restraints. With the DRBIII®, select Airbag and read the active DTC's. Is the Loss Of Ignition Run/Start DTC set? Yes → Refer to the symptom list and perform the Loss Of Ignition Run/Start symptom. Perform AIRBAG VERIFICATION TEST - VER 1. No → Go To 2	All
2	**Ensure that the battery is fully charged.** **Warning: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Left Side Impact Airbag Control Module harness connector. Using a 12-volt test light connected to 12-volts, probe both Ground circuits. Is the test light illuminated for each circuit? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform AIRBAG VERIFICATION TEST - VER 1. **Note: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
3	**Warning: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Left Side Impact Airbag Control Module harness connector. Turn the ignition on and then reconnect the Battery. Measure the voltage of the Fused Ignition Switch Output Run/Start circuit. Is the voltage above 6.0 volts? Yes → Go To 4 No → Repair the Fused Ignition Switch Output Run/Start circuit for an open. Perform AIRBAG VERIFICATION TEST - VER 1. **Note: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

*NO RESPONSE FROM LEFT SIACM — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Ensure there is PCI bus communication with other modules. If not, refer to the PCI Bus Communication Failure symptom and repair as necessary.** **WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Left Side Impact Airbag Control Module harness connector. Turn the ignition on and then reconnect the Battery. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the Left Side Impact Airbag Control Module connector. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace the Left Side Impact Airbag Control Module (LSIACM) in accordance with the Service Information. WARNING: Make sure the battery is disconnected and wait 2 minutes before proceeding. Perform AIRBAG VERIFICATION TEST - VER 1. No → Go To 5	All
5	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Left Side Impact Airbag Control Module harness connector. Disconnect the BCM C2 harness connector. Measure the resistance of the PCI bus circuit between the Left SIACM connector and the BCM C2 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module in accordance with the service information. Perform AIRBAG VERIFICATION TEST - VER 1. No → Repair the PCI Bus circuit for an open. Perform AIRBAG VERIFICATION TEST - VER 1.	All

Symptom:
*NO RESPONSE FROM ORC

POSSIBLE CAUSES
CHECKING FOR VOLTAGE AT ORC
ORC GROUND CIRCUIT OPEN
OCCUPANT RESTRAINT CONTROLLER
PCI BUS CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Ensure that the battery is fully charged. **WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Occupant Restraint Controller harness connector. Turn the ignition on and then reconnect the Battery. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output Run Circuit and the Fused Ignition Switch Output Run/Start Circuit. NOTE: One open circuit will not cause a NO RESPONSE condition. Is the test light illuminated on both circuits? Yes → Go To 2 No → Repair the Fused Ignition Switch Output Run and Fused Ignition Switch Output Run/Start circuits for an open. Replace the fuse(s) if necessary. Perform AIRBAG VERIFICATION TEST - VER 1. **NOTE: When reconnecting airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
2	**Ensure that the battery is fully charged.** **WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Occupant Restraint Controller harness connector. Using a 12-volt test light connected to 12-volts, probe the ground circuit. Is the test light illuminated? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform AIRBAG VERIFICATION TEST - VER 1. **When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

*NO RESPONSE FROM ORC — Continued

TEST	ACTION	APPLICABILITY
3	**Note: Ensure there is PCI bus communication with other modules. If not, refer to the PCI Bus Communication Failure symptom and repair as necessary.** **WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Occupant Restraint Controller harness connector. Turn the ignition on and then reconnect the Battery. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the ORC connector. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace the Occupant Restraint Controller in accordance with the service information. WARNING: Make sure the battery is disconnected and wait 2 minutes before proceeding. Perform AIRBAG VERIFICATION TEST - VER 1. No → Go To 4	All
4	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Occupant Restraint Controller harness connector. Disconnect the BCM C2 harness connector. Measure the resistance of the PCI bus circuit between the ORC connector and the BCM C2 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module in accordance with the service information. Perform AIRBAG VERIFICATION TEST - VER 1. No → Repair the PCI Bus circuit for an open. Perform AIRBAG VERIFICATION TEST - VER 1.	All

Symptom:
*NO RESPONSE FROM PCM (PCI BUS)

POSSIBLE CAUSES
PCM PCI NO RESPONSE
POWERTRAIN CONTROL MODULE
PCI BUS CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **NOTE: As soon as one or more module communicates with the DRB, answer the question.** With the DRB, enter Body then Body Computer. With the DRB, enter Body then Electro/Mechanical Cluster (MIC). Were you able to establish communications with any of the modules? Yes → Go To 2 No → Refer to symptom PCI Bus Communication Failure in the Communications category. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	With the DRB read PCM Diagnostic Trouble Codes. This is to ensure power and grounds to the PCM are operational. **NOTE: If the DRB will not read PCM DTC's, follow the NO RESPONSE TO PCM (SCI only) symptom path.** Turn the ignition off. Disconnect the PCM C2 harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the PCM C2 connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 3	All

*NO RESPONSE FROM PCM (PCI BUS) — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM C2 harness connector. Disconnect the BCM C3 harness connector. Measure the resistance of the PCI bus circuit between the PCM C2 connector and the BCM C3 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module in accordance with the service information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the PCI Bus circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*NO RESPONSE FROM PCM (SCI ONLY)

POSSIBLE CAUSES
CHECK PCM POWERS AND GROUNDS
SCI TRANSMIT CIRCUIT SHORTED TO VOLTAGE
TRANSMISSION CONTROL MODULE
SCI RECEIVE CIRCUIT SHORTED TO VOLTAGE
SCI CIRCUITS SHORTED TOGETHER
SCI TRANSMIT CIRCUIT SHORTED TO GROUND
SCI RECEIVE CIRCUIT SHORTED TO GROUND
SCI RECEIVE CIRCUIT OPEN
SCI TRANSMIT CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Perform the symptom Checking PCM Power and Ground Circuits in the Driveability category. **NOTE: With the DRBIII® in the generic scan tool mode, attempt to communicate with the PCM.** **NOTE: If the DRBIII® can communicate with the PCM in the generic scan tool mode, it may not be necessary to perform this step.** Did the vehicle pass this test? Yes → Go To 2 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRB from the DLC. Measure the resistance between ground and the SCI Transmit circuit. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Go To 4	All
3	Turn the ignition off. Disconnect the TCM harness connector (if equipped). **NOTE: If vehicle is not equipped with a TCM, answer yes to the question.** Measure the resistance between ground and the SCI Transmit circuit. Is the resistance below 5.0 ohms? Yes → Repair the SCI Transmit circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace the Transmission Control Module in accordance with the service information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO RESPONSE FROM PCM (SCI ONLY) — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the DRB from the DLC. Disconnect the PCM harness connector. Disconnect the TCM harness connector (if equipped). Turn the ignition on. Measure the voltage of the SCI Transmit circuit at the DLC connector (cav 7). Is the voltage above 1.0 volt? Yes → Repair the SCI Transmit circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the DRB from the DLC. Disconnect the PCM harness connector. Turn the ignition on. Measure the voltage of the SCI Receive circuit at the DLC connector (cav 6). Is the voltage above 1.0 volt? Yes → Repair the SCI Receive circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the DRB from the DLC. Disconnect the PCM harness connector. Measure the resistance between the SCI Transmit circuit and the SCI Receive circuit at the PCM connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the SCI Transmit and the SCI Receive circuits. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRB from the DLC. Measure the resistance between ground and the SCI Receive circuit. Is the resistance below 5.0 ohms? Yes → Repair the SCI Receive circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 8	All
8	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRB from the DLC. Measure the resistance of the SCI Receive circuit between the PCM connector and the DLC. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the SCI Receive circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO RESPONSE FROM PCM (SCI ONLY) — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the DRB from the DLC. Measure the resistance of the SCI Transmit circuit between the PCM connector and the DLC. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the SCI Transmit circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
10	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*NO RESPONSE FROM RADIO

POSSIBLE CAUSES
NO RESPONSE FROM RADIO
REPLACE FUSE #14
RADIO SHORTED TO GROUND
FUSED IGNITION SWITCH OUTPUT CIRCUIT SHORTED TO GROUND
JUNCTION BLOCK SHORTED TO GROUND
OPEN FUSED IGNITION SWITCH OUTPUT CIRCUIT
OPEN FUSED B+ CIRCUIT
RADIO GROUND CIRCUIT OPEN
RADIO INTERNALLY OPEN
PCI BUS CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **Note: As soon as one or more module communicates with the DRB, answer the question.** With the DRB, attempt to communicate with the Airbag Control Module. With the DRB, attempt to communicate with the Body Control Module (BCM). Was the DRB able to I/D or establish communications with either of the modules? Yes → Go To 2 No → Refer to the Communications category and perform the symptom PCI Bus Communication Failure. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Remove and inspect fuse #14 in the junction block. Is the fuse open? Yes → Go To 3 No → Go To 6	All
3	Turn the ignition off. Replace Fuse #14 in the junction block. Turn the ignition on. Turn the Radio on. Remove and inspect Fuse #14 in the junction block. Is the fuse open? Yes → Go To 4 No → Check the Fused Ignition Switch Output circuit for an intermittent short to ground, refer to the wiring diagrams in the service information. Perform BODY VERIFICATION TEST - VER 1.	All

*NO RESPONSE FROM RADIO — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Replace Fuse #14 in the junction block. Disconnect the Radio C1 harness connector. Turn the ignition on. Remove and inspect fuse #14 in the junction block. Is the fuse open? Yes → Go To 5 No → Replace the Radio. Perform BODY VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the Radio C1 harness connector. Disconnect the Junction Block C7 harness connector. Measure the resistance between ground and the Fused Ignition Switch Output circuit. Is the resistance below 5.0 ohms? Yes → Repair the Fused Ignition Switch Output circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Junction Block in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. **NOTE: Ensure fuse #14 is installed in the junction block.** Disconnect the Radio C1 harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output circuit. Is the test light illuminated? Yes → Go To 7 No → Repair the Fused Ignition Switch Output circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Disconnect the Radio C1 harness connector. Using a 12-volt test light connected to ground, probe the Fused B+ circuit. Is the test light illuminated? Yes → Go To 8 No → Repair the Fused B+ circuit for an open. Refer to the wiring diagrams located in the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
8	Turn the ignition off. Disconnect the Radio C1 harness connector. Using a 12-volt test light connected to 12-volts, probe the ground circuit. Is the test light illuminated? Yes → Go To 9 No → Repair the ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

*NO RESPONSE FROM RADIO — Continued

TEST	ACTION	APPLICABILITY
9	**Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.** Disconnect the Radio C1 harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the Radio connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace the Radio. Perform BODY VERIFICATION TEST - VER 1. No → Go To 10	All
10	Disconnect the Radio C1 harness connector. Disconnect the BCM C2 harness connector. Measure the resistance of the PCI bus circuit between the Radio connector and the BCM C2 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1. No → Repair the PCI Bus circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*NO RESPONSE FROM RIGHT SIACM

POSSIBLE CAUSES
INTERROGATE ORC
GROUND CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT RUN/START CIRCUIT OPEN
RIGHT SIDE IMPACT AIRBAG CONTROL MODULE
PCI BUS CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**Note: Ensure the battery is fully charged.** Turn the ignition on. With the DRBIII®, select Passive Restraints. With the DRBIII®, select Airbag and read the active DTC's. Is the Loss Of Ignition Run/Start DTC set? Yes → Refer to the symptom list and perform the Loss Of Ignition Run/Start symptom. Perform AIRBAG VERIFICATION TEST - VER 1. No → Go To 2	All
2	**Ensure that the battery is fully charged.** **Warning: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Right Side Impact Airbag Control Module harness connector. Using a 12-volt test light connected to 12-volts, probe the ground circuit. Is the test light illuminated? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform AIRBAG VERIFICATION TEST - VER 1. **Note: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All
3	**Warning: TURN IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Right Side Impact Airbag Control Module harness connector. Turn the ignition on and then reconnect the Battery. Measure the voltage of the Fused Ignition Switch Output Run/Start circuit. Is the voltage above 6.0 volts? Yes → Go To 4 No → Repair the Fused Ignition Switch Output Run/Start circuit for an open. Perform AIRBAG VERIFICATION TEST - VER 1. **Note: When reconnecting Airbag system components, the ignition must be turned off and the battery must be disconnected.**	All

*NO RESPONSE FROM RIGHT SIACM — Continued

TEST	ACTION	APPLICABILITY
4	**NOTE: Ensure there is PCI bus communication with other modules. If not, refer to the PCI Bus Communication Failure symptom and repair as necessary.** **WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Right Side Impact Airbag Control Module harness connector. Turn the ignition on and then reconnect the Battery. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the Right Side Impact Airbag Control Module connector. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace the Right Side Impact Airbag Control Module (RSIACM) in accordance with the Service Information. WARNING: Make sure the battery is disconnected and wait 2 minutes before proceeding. Perform AIRBAG VERIFICATION TEST - VER 1. No → Go To 5	All
5	**WARNING: TURN THE IGNITION OFF, DISCONNECT THE BATTERY AND WAIT TWO MINUTES BEFORE PROCEEDING.** Disconnect the Right Side Impact Airbag Control Module harness connector. Disconnect the BCM C2 harness connector. Measure the resistance of the PCI bus circuit between the Right SIACM connector and the BCM C2 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module in accordance with the service information. Perform AIRBAG VERIFICATION TEST - VER 1. No → Repair the PCI Bus circuit for an open. Perform AIRBAG VERIFICATION TEST - VER 1.	All

Symptom:
*NO RESPONSE FROM TRANSMISSION CONTROL MODULE

POSSIBLE CAUSES
NO RESPONSE FROM TRANSMISSION CONTROL MODULE
FUSED IGNITION SWITCH OUTPUT (RUN/ST) CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT (START) CIRCUIT OPEN
FUSED B(+) CIRCUIT OPEN
GROUND CIRCUIT(S) OPEN
TRANSMISSION CONTROL MODULE
PCI BUS CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, attempt to communicate with the Powertrain Control Module (PCM). With the DRB, attempt to communicate with the Body Control Module (BCM). Was the DRB able to I/D or establish communications with both of the modules? Yes → Go To 2 No → Refer to the Communications category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the TCM harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output (Run/St) circuit. **Note: The light must illuminate brightly, if it does not light, or lights dimly, the circuit must be repaired. If there is any doubt, compare the brightness when testing the circuit, to the brightness when connected directly to the battery positive post.** Is the test light illuminated? Yes → Go To 3 No → Repair the Fused Ignition Switch Output (Run/St) circuit for an open. Refer to the wiring diagrams located in the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

*NO RESPONSE FROM TRANSMISSION CONTROL MODULE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the TCM harness connector. Remove the starter relay from the PDC. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output (Start) circuit. **Note: The light must illuminate brightly, if it does not light, or lights dimly, the circuit must be repaired. If there is any doubt, compare the brightness when testing the circuit, to the brightness when connected directly to the battery positive post.** Observe the test light while momentarily turning the ignition switch to the Start position. Is the test light illuminated? Yes → Go To 4 No → Repair the Fused Ignition Switch Output (Start) circuit for an open. Refer to the wiring diagrams located in the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. **Note: Reinstall the original Starter Relay.**	All
4	Turn the ignition off. Disconnect the TCM harness connector. Using a 12-volt test light connected to ground, probe the Fused B(+) circuit. **Note: The light must illuminate brightly, if it does not light, or lights dimly, the circuit must be repaired. If there is any doubt, compare the brightness when testing the circuit, to the brightness when connected directly to the battery positive post.** Is the test light illuminated? Yes → Go To 5 No → Repair the Fused B(+) circuit for an open. Refer to the wiring diagrams located in the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the TCM harness connector. Using a 12-volt test light connected to 12-volts, probe each ground circuit in the TCM connector. **NOTE: The light must illuminate brightly, if it does not light, or lights dimly, the circuit must be repaired. If there is any doubt, compare the brightness when testing the circuit, to the brightness when connected directly to the battery negative post.** Is the light illuminated at all ground circuits? Yes → Go To 6 No → Repair the Ground circuit(s) for an open. Check the main ground connection to engine block and/or chassis. Refer to the wiring diagrams located in the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

*NO RESPONSE FROM TRANSMISSION CONTROL MODULE — Continued

TEST	ACTION	APPLICABILITY
6	**Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.** Disconnect the TCM harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the TCM connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace the Transmission Control Module in accordance with the service information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 7	All
7	Disconnect the TCM harness connector. Disconnect the BCM C3 harness connector. Measure the resistance of the PCI bus circuit between the TCM connector and the BCM C3 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module in accordance with the service information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Repair the PCI Bus circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
*PCI BUS COMMUNICATION FAILURE

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
OPEN PCI BUS CIRCUIT AT THE DATA LINK CONNECTOR (DLC)
HIGH VOLTAGE ON THE PCI BUS CIRCUITS AT THE BCM CONNECTORS
MODULE (PCI BUS SHORT TO VOLTAGE)
PCI BUS CIRCUIT SHORTED TO VOLTAGE
LOW RESISTANCE TO GROUND ON THE PCI BUS CIRCUITS AT THE BCM CONNECTORS
MODULE (PCI BUS SHORT TO GROUND)
PCI BUS CIRCUIT SHORTED TO GROUND

TEST	ACTION	APPLICABILITY
1	**Note: Determine which modules this vehicle is equipped with before beginning.** **Note: When attempting to communicate with any of the modules on this vehicle, the DRB will display 1 of 2 different communication errors: a NO RESPONSE message or a BUS +/- SIGNALS OPEN message.** Turn the ignition on. Using the DRB, attempt to communicate with the following control modules: Body Control Module (BCM) Instrument Cluster (MIC) Occupant Restraint Controller (ORC) Controller Antilock Brake (CAB) Was the DRB able to communicate with one or more Module(s)? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: If the DRB can not communicate with a single module, refer to the category list for the related symptom.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

*PCI BUS COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the DRB from the Data Link Connector (DLC). Measure the resistance of the PCI Bus circuit between the Data Link Connector (DLC) and the BCM C2 connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the PCI Bus circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
4	**NOTE: Reconnect the BCM C2 harness connector.** Turn the ignition on. Measure the voltage of the PCI Bus circuit at the Data Link Connector (DLC). Is the voltage above 4.0 volts? Yes → Go To 5 No → Go To 7	All
5	**Note: Determine which modules this vehicle is equipped with before beginning.** Turn the ignition off. Disconnect the BCM C2 and C3 harness connectors. Turn the ignition on. Measure the voltage of each PCI Bus circuit at the BCM C2 and C3 connectors. Is the voltage steadily above 4.0 volts for any measurement? Yes → Go To 6 No → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Disconnect the module that corresponds to the PCI Bus circuit that measured steadily above 4.0 volts. Turn the ignition on. **NOTE: If the PCI Bus circuit for the Radio was above 4.0 volts and is equipped with a CD Changer, disconnect the CD Changer before the Radio.** **NOTE: If the PCI Bus circuit for the Instrument Cluster (MIC) was above 4.0 volts and is equipped with a Compass/Mini Trip Computer (CMTC), disconnect the CMTC before the MIC.** **NOTE: If the PCI Bus circuit for the side airbags (if equipped) was above 4.0 volts, disconnect each module one at a time.** Measure the voltage of the PCI Bus circuit that previously measured above 4.0 volts. Is the voltage steadily above 4.0 volts with the module disconnected? Yes → Repair the PCI Bus circuit that measured over 4.0 volts for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Replace the module that caused the short to voltage on the PCI Bus circuit. Perform BODY VERIFICATION TEST - VER 1.	All

*PCI BUS COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	**Note: Determine which modules this vehicle is equipped with before beginning.** Turn the ignition off. Disconnect the negative battery cable. Disconnect the BCM C2 and C3 harness connectors. Measure the resistance between ground and each of the PCI Bus circuits at the BCM C2 and C3 connectors. Is the resistance below 1000.0 ohms for any of the measurements? Yes → Go To 8 No → Replace the Body Control Module in accordance with the service information. Perform BODY VERIFICATION TEST - VER 1.	All
8	Turn the ignition off. Disconnect the negative battery cable. Disconnect the module that corresponds to the PCI Bus circuit that resistance measured below 1000.0 ohms. **NOTE: If the PCI Bus circuit for the Radio was below 1000.0 ohms and is equipped with a CD Changer, disconnect the CD Changer before the Radio.** **NOTE: If the PCI Bus circuit for the Instrument Cluster (MIC) was below 1000.0 ohms and is equipped with a Compass/Mini Trip Computer (CMTC), disconnect the CMTC before the MIC.** **NOTE: If the PCI Bus circuit for the side airbags (if equipped) was below 1000.0 ohms, disconnect each module one at a time.** Measure the resistance between ground and the PCI Bus circuit that previously measured below 1000.0 ohms. Is the resistance below 1000.0 ohms with the module disconnected? Yes → Repair the PCI Bus circuit that resistance measured below 1000.0 ohms for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the module that caused the short to ground on the PCI Bus circuit. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
BCM MESSAGE NOT RECEIVED

When Monitored and Set Condition:

BCM MESSAGE NOT RECEIVED

When Monitored: With the ignition on.

Set Condition: This DTC will set if the Compass/Mini Trip Computer (CMTC) does not receive messages from the BCM.

POSSIBLE CAUSES
DTC PRESENT
INTERMITTENT CONDITION
COMPASS/MINI TRIP COMPUTER

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, attempt to communicate with the BCM. Was the DRBIII® able to I/D or communicate with the BCM? Yes → Go To 2 No → Refer to the Communication category and perform the appropriate symptom. Perform BODY VERIFICATION TEST - VER 1.	All
2	With the DRBIII®, erase DTC's. Turn the ignition on and wait approximately 1 minute. With the DRBIII®, read DTC's. Did this DTC reset? Yes → Replace the Compass/Mini Trip Computer in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Refer to the wiring diagrams located in the service information to help isolate a possible intermittent open or shorted wiring condition. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
COMPASS FAILURE

POSSIBLE CAUSES
COMPASS WILL NOT CALIBRATE
COMPASS/MINI-TRIP COMPUTER

TEST	ACTION	APPLICABILITY
1	Perform the Compass/Mini-Trip Computer Self Test. Turn the ignition off. Press and hold the Step and the Compass/Temp buttons. Turn the ignition on. **NOTE: The Compass/Mini-Trip Computer Self Test can also be initiated using the DRBIII®.** During the Self Test the Compass/Mini-Trip Computer will perform the following checks: Illuminate all VF display segments Check the CMTC memory, Communications, and Compass internal Check the CMTC/UGDO communications (if equipped) Display Pass, Fail, Bus, Bus 1, or Bus 2 when complete. Did the Compass Mini-Trip Computer display "Fail"? Yes → Replace the Compass/Mini-Trip Computer in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Move the vehicle to an area away from any large metal objects or overhead power lines. Attempt to calibrate the compass. Turn the ignition on. Press and hold the STEP and US/M buttons at the same time until the CAL indicator begins to flash then release. Drive the vehicle in 3 complete 360 degree circles, at less than 5 MPH (8 KPH). The CAL indicator should turn off. With the DRBIII®, erase DTCs. Turn the ignition on and wait approximately 1 minute. With the DRBIII®, read DTCs. Did this DTC reset? Yes → Replace the Compass/Mini-Trip Computer in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → If the compass will not calibrate, the vehicle may require demagnetizing, refer to the Service Information. Attempt to re-calibrate the compass after demagnetizing. If the compass does not calibrate, relace the CMTC. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
INTERNAL FAILURE

POSSIBLE CAUSES
COMPASS/MINI-TRIP COMPUTER

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase the DTC. Cycle the ignition, wait approximately 1 minute. With the DRBIII®, read DTCs. Did the DTC reset? Yes → Replace the Compass/Mini Trip Computer in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
PCM MESSAGE NOT RECEIVED

When Monitored and Set Condition:

PCM MESSAGE NOT RECEIVED

When Monitored: With the ignition on.

Set Condition: This DTC will set if the Compass/Mini Trip Computer (CMTC) does not receive messages from the PCM.

POSSIBLE CAUSES
INTERMITTENT CONDITION
DTC PRESENT
COMPASS/MINI-TRIP COMPUTER

TEST	ACTION	APPLICABILITY
1	With the DRB, erase DTC's. Turn the ignition on and wait approximately 1 minute. With the DRB, read DTC's. Did this DTC reset? Yes → Go To 2 No → Refer to the wiring diagrams located in the service information to help isolate a possible intermittent open or shorted wiring condition. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition on. With the DRB, enter Body Computer, System Tests then PCM Monitor. Does the DRB display: PCM is active on BUS? Yes → Replace the Compass/Mini-Trip Computer in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Refer to the Communication category and perform the appropriate symptom. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom List:

***AVERAGE FUEL ECONOMY INOPERATIVE OR WRONG**
***DISTANCE TO EMPTY INOPERATIVE OR WRONG**
***ELAPSED TIME INOPERATIVE OR WRONG**
***INSTANTANEOUS FUEL ECONOMY INOPERATIVE OR WRONG**
***TRIP ODOMETER INOPERATIVE OR WRONG**

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be *AVERAGE FUEL ECONOMY INOPERATIVE OR WRONG.

POSSIBLE CAUSES
COMPASS MINI-TRIP COMPUTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose and repair any BCM, PCM, or COMMUNICATION DTCs before proceeding** If all the possible causes above are operating correctly, view repair. Repair Replace the Compass Mini-Trip Computer in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*COMPASS/MINI-TRIP COMPUTER INOPERATIVE

POSSIBLE CAUSES
FUSED B(+) CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
GROUND CIRCUIT OPEN
COMPASS MINI-TRIP COMPUTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Diagnose and repair any BCM, PCM, or COMMUNICATION DTCs before proceeding.** Turn the ignition off. Disconnect the Compass/Mini-Trip Computer harness connector. Measure the voltage between the Fused B+ circuit and ground. Is the voltage above 10.5 volts? Yes → Go To 2 No → Repair the Fused B(+) circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the Compass/Mini-Trip Computer harness connector. Turn the ignition on. Measure the voltage between the Fused Ignition Switch Output circuit and ground. Is the voltage below 10.5 volts? Yes → Repair the Fused Ignition Switch Output circuit for an open. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the Compass/Mini-Trip Computer harness connector. Measure the resistance between ground and the CMTC ground circuit. Is the resistance above 5.0 ohms? Yes → Repair the Ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Compass Mini-Trip Computer in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*OUTSIDE TEMPERATURE DISPLAY INACCURATE OR INOPERATIVE

POSSIBLE CAUSES
AMBIENT TEMPERATURE SENSOR
COMPASS/MINI-TRIP COMPUTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the CMTC is communicating on the PCI Bus before proceeding with this test.** **NOTE: The Ambient Temperature Sensor is hardwired to the PCM. Diagnose and repair any PCM DTCs before proceeding with this test.** Turn the ignition off. Disconnect the Ambient Temperature Sensor harness connector. Measure the resistance of the Ambient Temperature Sensor using the following temperature/resistance values: 10°C (50°F) Sensor Resistance = 17.99 - 21.81 Kilohms 20°C (68°F) Sensor Resistance = 11.37 - 13.61 Kilohms 25°C (77°F) Sensor Resistance = 9.12 - 10.88 Kilohms 30°C (86°F) Sensor Resistance = 7.37 - 8.75 Kilohms 40°C (104°F) Sensor Resistance = 4.90 - 5.75 Kilohms 50°C (122°F) Sensor Resistance = 3.33 - 3.88 Kilohms Is the Ambient Temperature Sensor resistance measurement between the min/max specifications? Yes → Test Complete. No → Replace the Ambient Temperature Sensor. NOTE: After any repair for an Ambient Temperature Sensor problem, the vehicle must be driven over 3 miles above 25 MPH to update the CMTC display. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*DECKLID AJAR CIRCUIT OPEN

POSSIBLE CAUSES
DECKLID RELEASE SOLENOID/AJAR SWITCH CASE GROUND OPEN
INTERMITTENT CONDITION
DECKLID RELEASE SOLENOID/AJAR SWITCH
DECKLID AJAR SWITCH SENSE CIRCUIT OPEN
BODY CONTROL MODULE INTERNAL MALFUNCTION

TEST	ACTION	APPLICABILITY
1	Open the Decklid. With the DRBIII® in Inputs/Outputs, read the DECKLID AJAR SW state. Does the DRBIII® display CLOSED? Yes → The condition that caused this symptom is currently not present. Inspect the related wiring harness for a possible intermittent condition. Look for any chafed, pierced, pinched or partially broken wires. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Disconnect the Decklid Ajar switch connector. Using a 12-volt Test Light connected to 12-volts, test the Case Ground for continuity. Does the light illuminate? Yes → Go To 3 No → Repair the Case Ground for an open. Perform BODY VERIFICATION TEST - VER 1.	All
3	Disconnect the Decklid Ajar Switch connector. With the DRBIII® in Inputs/Outputs, read the DECKLID AJAR SW state. Connect a jumper wire between Sense circuit and body ground. Does the DRBIII® display DECKLID AJAR SW: CLOSED? Yes → Replace the Decklid Release Solenoid/Ajar Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Disconnect the Body Control Module C4 harness connector. Disconnect the Decklid Ajar Switch harness connector. Measure the resistance of the Sense circuit. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Decklid Ajar Switch Sense circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*DECKLID AJAR CIRCUIT SHORTED TO GROUND

POSSIBLE CAUSES
DECKLID RELEASE SOLENOID/AJAR SWITCH SHORTED TO GROUND
DECKLID AJAR SWITCH SENSE CIRCUIT SHORTED TO GROUND
BODY CONTROL MODULE INTERNAL MALFUNCTION

TEST	ACTION	APPLICABILITY
1	With the DRBIII® in Inputs/Outputs, read the DECKLID AJAR SW state. Disconnect the Decklid Ajar Switch harness connector. With the DRBIII® in Inputs/Outputs, read the DECKLID AJAR SW state. Did the Switch State change from CLOSED to OPEN? Yes → Replace the Decklid Release Solenoid/Ajar Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Disconnect the Body Control Module C4 harness connector. Disconnect the Decklid Ajar Switch harness connector. Using a 12-volt Test Light connected to 12-volts, test the Sense circuit for a short to ground. Does the Test Light illuminate? Yes → Repair the Decklid Ajar Switch Sense circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*DRIVER DOOR AJAR CIRCUIT OPEN

POSSIBLE CAUSES
DRIVER DOOR AJAR SWITCH GROUND CIRCUIT OPEN
INTERMITTENT CONDITION
DRIVER DOOR LOCK MOTOR/AJAR SWITCH
DRIVER DOOR AJAR SWITCH SENSE CIRCUIT OPEN
BODY CONTROL MODULE INTERNAL MALFUNCTION

TEST	ACTION	APPLICABILITY
1	Open the driver door. With the DRBIII® in Inputs/Outputs, read the DRV DR AJAR SW state. Does the DRBIII® display CLOSED? Yes → The condition that caused this symptom is currently not present. Inspect the related wiring harness for a possible intermittent condition. Look for any chafed, pierced, pinched or partially broken wires. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Disconnect the Driver Door Lock Motor/Ajar switch connector. Using a 12-volt Test Light connected to 12-volts, test the Ground circuit for continuity. Does the light illuminate? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
3	Disconnect the Driver Door Lock Motor/Ajar Switch connector. With the DRBIII® in Inputs/Outputs, read the DRV DR AJAR SW state. Connect a jumper wire between Sense circuit and the Ground circuit. Does the DRBIII® display DRV DR AJAR SW: CLOSED? Yes → Replace the Driver Door Lock Motor/Ajar Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Disconnect the Body Control Module C4 harness connector. Disconnect the Driver Door Lock Motor/Ajar Switch harness connector. Measure the resistance of the Sense circuit. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Driver Door Ajar Switch Sense circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*DRIVER DOOR AJAR CIRCUIT SHORTED TO GROUND

POSSIBLE CAUSES
DRIVER DOOR LOCK MOTOR/AJAR SWITCH SHORTED TO GROUND
DRIVER DOOR AJAR SWITCH SENSE CIRCUIT SHORTED TO GROUND
BODY CONTROL MODULE INTERNAL MALFUNCTION

TEST	ACTION	APPLICABILITY
1	With the DRBIII® in Inputs/Outputs, read the DRV DR AJAR SW state. Disconnect the Driver Door Lock Motor/Ajar Switch harness connector. With the DRBIII® in Inputs/Outputs, read the DRV DR AJAR SW state. Does the Switch State change from CLOSED to OPEN? Yes → Replace the Driver Door Lock Motor/Ajar Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Disconnect the Body Control Module C4 harness connector. Disconnect the Driver Door Lock Motor/Ajar Switch harness connector. Using a 12-volt Test Light connected to 12-volts, test the Sense circuit for a short to ground. Does the Test Light illuminate? Yes → Repair the Driver Door Ajar Switch Sense circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*LEFT REAR DOOR AJAR CIRCUIT OPEN

POSSIBLE CAUSES
INTERMITTENT CONDITION
LEFT REAR DOOR AJAR SWITCH GROUND CIRCUIT OPEN
LEFT REAR DOOR LOCK MOTOR/AJAR SWITCH
LEFT REAR DOOR AJAR SWITCH SENSE CIRCUIT OPEN
BODY CONTROL MODULE INTERNAL MALFUNCTION

TEST	ACTION	APPLICABILITY
1	Open the left rear door. With the DRBIII® in Inputs/Outputs, read the LR DR AJAR SW state. Does the DRBIII® display CLOSED? Yes → The condition that caused this symptom is currently not present. Inspect the related wiring harness for a possible intermittent condition. Look for any chafed, pierced, pinched or partially broken wires. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Disconnect the Left Rear Door Lock Motor/Ajar switch connector. Using a 12-volt Test Light connected to 12-volts, test the Ground circuit for continuity. Does the light illuminate? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
3	Disconnect the Left Rear Door Lock Motor/Ajar Switch connector. With the DRBIII® in Inputs/Outputs, read the LR DR AJAR SW state. Connect a jumper wire between the Sense circuit and the Ground circuit. Does the DRBIII® display LR DR AJAR SW: CLOSED? Yes → Replace the Left Rear Door Lock Motor/Ajar Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Disconnect the Body Control Module C4 harness connector. Disconnect the Left Rear Door Lock Motor/Ajar Switch harness connector. Measure the resistance of the Sense circuit. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Left Rear Door Ajar Switch Sense circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*LEFT REAR DOOR AJAR CIRCUIT SHORTED TO GROUND

POSSIBLE CAUSES
LEFT REAR DOOR LOCK MOTOR/AJAR SWITCH SHORTED TO GROUND
LEFT REAR DOOR AJAR SWITCH SENSE CIRCUIT SHORTED TO GROUND
BODY CONTROL MODULE INTERNAL MALFUNCTION

TEST	ACTION	APPLICABILITY
1	With the DRBIII® in Inputs/Outputs, read the LR DR AJAR SW state. Disconnect the Left Rear Door Lock Motor/Ajar Switch harness connector. With the DRBIII® in Inputs/Outputs, read the LR DR AJAR SW state. Does the Switch State change from CLOSED to OPEN? Yes → Replace the Left Rear Door Lock Motor/Ajar Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Disconnect the Body Control Module C4 harness connector. Disconnect the Left Rear Door Lock Motor/Ajar Switch harness connector. Using a 12-volt Test Light connected to 12-volts, test the Sense circuit for a short to ground. Does the Test Light illuminate? Yes → Repair the Left Rear Door Ajar Switch Sense circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*PASSENGER DOOR AJAR CIRCUIT OPEN

POSSIBLE CAUSES
INTERMITTENT CONDITION
PASSENGER DOOR AJAR SWITCH GROUND CIRCUIT OPEN
PASSENGER DOOR LOCK MOTOR/AJAR SWITCH
PASSENGER DOOR AJAR SWITCH SENSE CIRCUIT OPEN
BODY CONTROL MODULE INTERNAL MALFUNCTION

TEST	ACTION	APPLICABILITY
1	Open the passenger door. With the DRBIII® in Inputs/Outputs, read the PAS DR AJAR SW state. Does the DRBIII® display CLOSED? Yes → The condition that caused this symptom is currently not present. Inspect the related wiring harness for a possible intermittent condition. Look for any chafed, pierced, pinched or partially broken wires. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Disconnect the Passenger Door Lock Motor/Ajar switch connector. Using a 12-volt Test Light connected to 12-volts, test the Ground circuit for continuity. Does the light illuminate? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
3	Disconnect the Passenger Door Lock Motor/Ajar Switch connector. With the DRBIII® in Inputs/Outputs, read the PAS DR AJAR SW state. Connect a jumper wire between the Sense circuit and the Ground circuit. Does the DRBIII® display PAS DR AJAR SW: CLOSED? Yes → Replace the Passenger Door Lock Motor/Ajar Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Disconnect the Body Control Module C4 harness connector. Disconnect the Passenger Door Lock Motor/Ajar Switch harness connector. Measure the resistance of the Sense circuit. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Passenger Door Ajar Switch Sense circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*PASSENGER DOOR AJAR CIRCUIT SHORTED TO GROUND

POSSIBLE CAUSES
PASSENGER DOOR LOCK MOTOR/AJAR SWITCH SHORTED TO GROUND
PASSANGER FRONT DOOR AJAR SWITCH SENSE CIRCUIT SHORTED TO GROUND
BODY CONTROL MODULE INTERNAL MALFUNCTION

TEST	ACTION	APPLICABILITY
1	With the DRBIII® in Inputs/Outputs, read the PAS DR AJAR SW state. Disconnect the Passenger Door Lock Motor/Ajar Switch harness connector. With the DRBIII® in Inputs/Outputs, read the PAS DR AJAR SW state. Does the Switch State change from CLOSED to OPEN? Yes → Replace the Passenger Door Lock Motor/Ajar Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Disconnect the Body Control Module C4 harness connector. Disconnect the Passenger Door Lock Motor/Ajar Switch harness connector. Using a 12-volt Test Light connected to 12-volts, test the Sense circuit for a short to ground. Does the Test Light illuminate? Yes → Repair the Passenger Door Ajar Switch Sense circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*RIGHT REAR DOOR AJAR CIRCUIT OPEN

POSSIBLE CAUSES
INTERMITTENT CONDITION
RIGHT REAR DOOR AJAR SWITCH GROUND CIRCUIT OPEN
RIGHT REAR DOOR LOCK MOTOR/AJAR SWITCH
RIGHT REAR DOOR AJAR SWITCH SENSE CIRCUIT OPEN
BODY CONTROL MODULE INTERNAL MALFUNCTION

TEST	ACTION	APPLICABILITY
1	Open the right rear door. With the DRBIII® in Inputs/Outputs, read the RR DR AJAR SW state. Does the DRBIII® display CLOSED? Yes → The condition that caused this symptom is currently not present. Inspect the related wiring harness for a possible intermittent condition. Look for any chafed, pierced, pinched or partially broken wires. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Disconnect the Right Rear Door Lock Motor/Ajar switch connector. Using a 12-volt Test Light connected to 12-volts, test the Ground circuit for continuity. Does the light illuminate? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
3	Disconnect the Right Rear Door Lock Motor/Ajar Switch connector. With the DRBIII® in Inputs/Outputs, read the RR DR AJAR SW state. Connect a jumper wire between the Sense circuit and the Ground circuit. Does the DRBIII® display RR DR AJAR SW: CLOSED? Yes → Replace the Right Rear Door Lock Motor/Ajar Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Disconnect the Body Control Module C4 harness connector. Disconnect the Right Rear Door Lock Motor/Ajar Switch harness connector. Measure the resistance of the Sense circuit. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Right Rear Door Ajar Switch Sense circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:

*RIGHT REAR DOOR AJAR CIRCUIT SHORTED TO GROUND

POSSIBLE CAUSES
RIGHT REAR DOOR LOCK MOTOR/AJAR SWITCH SHORTED TO GROUND
RIGHT REAR DOOR AJAR SWITCH SENSE CIRCUIT SHORTED TO GROUND
BODY CONTROL MODULE INTERNAL MALFUNCTION

TEST	ACTION	APPLICABILITY
1	With the DRBIII® in Inputs/Outputs, read the RR DR AJAR SW state. Disconnect the Right Rear Door Lock Motor/Ajar Switch harness connector. With the DRBIII® in Inputs/Outputs, read the RR DR AJAR SW state. Does the Switch State change from CLOSED to OPEN? Yes → Replace the Right Rear Door Lock Motor/Ajar Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Disconnect the Body Control Module C4 harness connector. Disconnect the Right Rear Door Lock Motor/Ajar Switch harness connector. Using a 12-volt Test Light connected to 12-volts, test the Sense circuit for a short to ground. Does the Test Light illuminate? Yes → Repair the Right Rear Door Ajar Switch Sense circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*HEADLAMP DELAY RELAY INOPERATIVE

POSSIBLE CAUSES
FUSED B+ CIRCUIT OPEN
HEADLAMP DELAY RELAY
OPEN FUSE
INTERMITTENT CONDITION
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Check the PDC fuse 4. Is the fuse open? Yes → Replace the open Fuse. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition on. Measure the voltage of the Fused B+ Circuit between the PDC and the Junction Block. Is the voltage above 10.0 volts? Yes → Go To 3 No → Repair the Fuse B+ Circuit for an open condition. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Install a known good relay in place of the Headlamp Delay Relay. Actuate the Headlamp Delay system. Does the Headlamp Delay system operate normally? Yes → Replace the Headlamp Delay Relay. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition on. With the DRBIII®, read the Ignition Voltage. Does the DRBIII® display voltage above 10.0 volts? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*HI BEAM HEADLAMPS WILL NOT TURN OFF

POSSIBLE CAUSES
HEADLAMP DELAY RELAY OUTPUT CIRCUIT SHORT TO VOLTAGE
HEADLAMP DELAY RELAY
HEADLAMP DELAY RELAY CONTROL CIRCUIT SHORT TO VOLTAGE
MULTIFUNCTION SWITCH

TEST	ACTION	APPLICABILITY
1	Remove the Headlamp Delay Relay from the junction block. Did the High Beam Headlamps turn off? Yes → Go To 2 No → Repair the Headlamp Delay Relay Output Circuit for a short to voltage. Perform BODY VERIFICATION TEST - VER 1.	All
2	Remove the Headlamp Delay Relay. Measure the voltage of the Headlamp Delay Relay Control circuit in the relay connector. Is the voltage above 1.0 volts? Yes → Go To 3 No → Replace the Headlamp Delay Relay. Perform BODY VERIFICATION TEST - VER 1.	All
3	Remove the Headlamp Delay Relay from the junction block. Disconnect the Multifunction Switch connector. Measure the voltage of the Switched Headlamp Delay Relay Control circuit to ground. Is the voltage above 1.0 volts? Yes → Repair the Headlamp Delay Relay Control Circuit for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Multifunction Switch. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*HIGH BEAM HEADLAMPS WILL NOT TURN ON

POSSIBLE CAUSES
OPEN FUSED B+
FUSED LOW BEAM OUTPUT CIRCUIT SHORT TO GROUND
FUSED HIGH BEAM OUTPUT CIRCUIT SHORT TO GROUND
HEADLAMP DELAY RELAY
FUSED LOW BEAM OUTPUT CIRCUIT OPEN
HEADLAMP DELAY RELAY CONTROL CIRCUIT OPEN
MULTIFUNCTION SWITCH

TEST	ACTION	APPLICABILITY
1	Turn the Headlamps on. Gain access to the High Beam Headlamp Relay in the junction block. Cycle the high beam switch on the multifunction switch and listen to or feel the High Beam Relay for a click. Does the relay click? Yes → Go To 2 No → Go To 3	All
2	Remove the Headlamp Delay Relay. Measure the voltage of the Fused B+ circuit at the Headlamp Delay Relay connector. Is the voltage above 10.0 volts? Yes → Go To 3 No → Repair the open fused B+ circuit from PDC fuse 4. Perform BODY VERIFICATION TEST - VER 1.	All
3	Remove fuse 4 from the PDC. Disconnect the Multifunction Switch connector. Measure the resistance of the Fused Low Beam Output Circuit to ground. Is the resistance below 5.0 ohms? Yes → Repair the Fused Low Beam output circuit for a short to ground condition. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Remove the Headlamp Delay Relay from the junction block. Disconnect the Multifunction Switch connector. Measure the resistance of the Headlamp Delay Relay Control circuit to ground. Is the resistance below 5.0 ohms? Yes → Repair the Fused High Beam Output Circuit for a short to ground condition. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All

*HIGH BEAM HEADLAMPS WILL NOT TURN ON — Continued

TEST	ACTION	APPLICABILITY
5	Disconnect the Multifunction Switch connector. Turn the headlamps on. Measure the voltage of the Fused Low Beam Relay Output circuit in the multifunction switch connector. Is the voltage below 10.0 volts? Yes → Replace the Headlamp Delay Relay. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	Disconnect the Multifunction Switch connector. Turn the headlamps on. Measure the voltage of the Fused Low Beam Relay Output circuit in the multifunction switch connector. Is the voltage above 5.0 volts? Yes → Go To 7 No → Repair the open Fused Low Beam Output circuit. Perform BODY VERIFICATION TEST - VER 1.	All
7	Disconnect the Multifunction Switch connector. Turn the headlamps on. Ensure the Headlamp Delay Relay is installed. Connect a jumper wire between the Fused Low Beam Relay Output and the Switched High Beam Relay Control circuits in the multifunction switch connector. Did the High Beam Headlamps come on? Yes → Repair the Headlamp Delay Relay Control Circuit for an open condition. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Multifunction Switch. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*LOW BEAM HEADLAMPS WILL NO TURN OFF

POSSIBLE CAUSES
MULTIFUNCTION SWITCH
HEADLAMP DELAY RELAY OUTPUT CIRCUIT SHORT TO VOLTAGE
HEADLAMP DELAY RELAY
JUNCTION BLOCK
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the headlamp switch to the off position. With the DRBIII®, read the Headlamp Switch Voltage. Does the DRBIII® display Headlamp Switch Voltage between 4.3 and 4.8 Volts? Yes → Go To 2 No → Replace the Multifunction Switch. Perform BODY VERIFICATION TEST - VER 1.	All
2	Remove the Headlamp Delay Relay from the junction block. Did the Low Beams turn off? Yes → Go To 3 No → Repair the Headlamp Delay Relay Output Circuit for a short to voltage condition. Perform BODY VERIFICATION TEST - VER 1.	All
3	Substitute a known good relay in place of the Headlamp Delay Relay. Does the system operate normally? Yes → Replace the Headlamp Delay Relay. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Remove the Headlamp Delay Relay. Remove the Body Control Module from the junction block. Measure the resistance of the Headlamp Delay Relay Control Circuit and ground. Is the resistance below 100.0 ohms? Yes → Replace the Junction Block Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*LOW BEAM HEADLAMPS WILL NOT TURN ON

POSSIBLE CAUSES
MULTIFUNCTION SWITCH
JUNCTION BLOCK
FUSED LOW BEAM OUTPUT CIRCUIT OPEN
HEADLAMP DELAY RELAY
HEADLAMP DELAY RELAY
JUNCTION BLOCK
BODY CONTROL MODULE
OPEN FUSED B+ TO JUNCTION BLOCK
B+ CIRCUIT FUSE
FUSED B+ CIRCUIT SHORT TO GROUND

TEST	ACTION	APPLICABILITY
1	Turn the Headlamps on. With the DRBIII® read the Multifunction Switch voltage. Does the DRBIII® display Multifunction Switch voltage between 1.4 and 1.8 volts? Yes → Go To 2 No → Replace the Multifunction Switch. Perform BODY VERIFICATION TEST - VER 1.	All
2	With the DRBIII® actuate the Headlamp Delay Relay. Listen to or touch the Headlamp Delay Relay. Does the relay click during actuation? Yes → Go To 3 No → Go To 5	All
3	Remove the Headlamp Delay Relay. Measure the voltage of the Fused B+ circuit in the Headlamp Delay Relay. Is the voltage above 10.0 volts? Yes → Go To 4 No → Replace the Junction Block Perform BODY VERIFICATION TEST - VER 1.	All
4	Remove the Headlamp Delay Relay from the junction block. Ensure fuses 13 and 12 are OK and are installed in the junction block. Connect a jumper wire between the Fused B+ Circuit and the Headlamp Delay Relay Output Circuit in the relay connector. Did the low beam headlamps come on? Yes → Replace the Headlamp Delay Relay. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Fused Low Beam Output Circuit for an open condition. Perform BODY VERIFICATION TEST - VER 1.	All

*LOW BEAM HEADLAMPS WILL NOT TURN ON — Continued

TEST	ACTION	APPLICABILITY
5	Remove the Headlamp Delay Relay. Measure the voltage of the Fused B+ circuit in the Headlamp Delay Relay. Is the voltage above 10.0 volts? Yes → Go To 6 No → Go To 8	All
6	Remove the Headlamp Delay Relay from the junction block. Connect a 12 volt test light between the Headlamp Delay Relay Control circuit, and the Fused B+ circuit in the Relay connector. With the DRBIII® actuate the Headlamp Relay. Did the test light flash during actuation? Yes → Replace the Headlamp Delay Relay. Perform BODY VERIFICATION TEST - VER 1. No → Go To 7	All
7	Turn the ignition off. Remove the Headlamp Delay Relay from the junction block. Remove the Body Control Module from the junction block. Measure resistance of the Headlamp Delay Relay control circuit. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Junction Block. Perform BODY VERIFICATION TEST - VER 1.	All
8	Remove and test the PDC Fuse 4. Is the Fuse open? Yes → Go To 9 No → Repair the open Fused B+ circuit between the Headlamp Delay Relay connector in the junction block and the PDC Fuse 4 connector. Perform BODY VERIFICATION TEST - VER 1.	All
9	Remove Fuse 4 from the PDC Measure the resistance of the Fused B+ circuit in the fuse connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Fused B+ circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the fuse and retest the system. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
A/C BLEND DOOR INPUT SHORTED TO BATTERY

When Monitored and Set Condition:

A/C BLEND DOOR INPUT SHORTED TO BATTERY

When Monitored: With the engine running.

Set Condition: The BCM reads the signal from the A/C - Heater Control blend request and positions the blend door accordingly. If the voltage on this pin exceeds 90% of ignition voltage, the DTC will set, and the BCM will place the blend door in a default position.

POSSIBLE CAUSES
CONTROL HEAD - TEMPERATURE SELECT SIGNAL SHORTED TO VOLTAGE
TEMPERATURE SELECT SIGNAL CIRCUIT SHORTED TO VOLTAGE
BODY CONTROL MODULE - TEMPERATURE SELECT SIGNAL SHORTED TO VOLTAGE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, record and erase Body Computer DTC's. Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Turn the ignition on. Measure the voltage of the Temperature Select Signal circuit. Is the voltage above 0.3 volts? Yes → Go To 2 No → Replace the A/C - Heater Control in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Disconnect the Body Control Module C2 harness connector. Turn the ignition on. Measure the voltage of the Temperature Select Signal circuit. Is there any voltage present? Yes → Repair the Temperature Select Signal circuit for a short to voltage. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
A/C BLEND DR INPUT OPEN/SHORT TO GROUND

When Monitored and Set Condition:

A/C BLEND DR INPUT OPEN/SHORT TO GROUND

When Monitored: With the engine running.

Set Condition: The BCM reads the signal from the A/C - Heater Control blend request and positions the blend door accordingly. If the voltage on this pin is below 0.1 volts, the DTC will set, and the BCM will place the blend door in a default position.

POSSIBLE CAUSES
ADDITIONAL CODE(S) PRESENT
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
TEMPERATURE SELECT SIGNAL CIRCUIT SHORTED TO GROUND
TEMPERATURE SELECT SIGNAL CIRCUIT SHORTED TO SENSOR GROUND
TEMPERATURE SELECT SIGNAL CIRCUIT OPEN
CONTROL HEAD - TEMPERATURE SELECT SIGNAL OPEN/SHORTED TO GROUND
BODY CONTROL MODULE - TEMPERATURE SELECT SIGNAL OPEN/SHORTED TO GROUND

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® read the Body Computer DTCs. Are Mode Door Input Open/STG and Blend Door Input Open/STG DTCs present? (May set TCM Msg Not Recd). Yes → If JB Fuse 11 is open, check for short to ground in Junction Block, BCM, and Fused Ign Sw Output Ckt. If JB Fuse 11 is not open, check for an open between JB Fuse 11 Pin 19, and JB C7-10 harness connector, and splice 210 in Fused Ign Sw Output Ckt. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output circuit. Is the test light illuminated? Yes → Go To 3 No → Repair the Fused Ignition Switch Output circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

A/C BLEND DR INPUT OPEN/SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Disconnect the Body Control Module C2 harness connector. Measure the resistance between ground and the Temperature Select Signal circuit. Is the resistance below 10K ohms? Yes → Repair the Temperature Select Signal circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Disconnect the Body Control Module C2 harness connector. Measure the resistance between the Sensor Ground circuit and the Temperature Select Signal circuit at the A/C - Heater Control C1 harness connector. Is the resistance below 10K ohms? Yes → Repair the Temperature Select Signal circuit for a short to the Sensor Ground circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Disconnect the Body Control Module C2 harness connector. Measure the resistance of the Temperature Select Signal circuit between the A/C - Heater Control C1 harness connector and the BCM C2 harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Temperature Select Signal circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

A/C BLEND DR INPUT OPEN/SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Reconnect the A/C - Heater Control C1 harness connector. Disconnect the Body Control Module C2 harness connector. Put the Blend Control switch in the full cold position. Turn the ignition on. Measure the voltage of the Temperature Select Signal circuit. Move the Blend Control switch from full cold to full hot while observing the voltmeter. Does the voltage change fluidly from approximately 9.0 volts (full cold) to 11.89 volts (full hot)? Yes → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace the A/C - Heater Control in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
A/C HEAD, A/C SWITCH FAILURE

When Monitored and Set Condition:

A/C HEAD, A/C SWITCH FAILURE

When Monitored: With the engine running and the Blower Control switch on.

Set Condition: This DTC will set if the BCM sees a request for A/C from the A/C - Heater Control with the Mode Control switch in the Panel-Heater position, Mix-Heater position, or Floor-Heater mode position.

POSSIBLE CAUSES
CONTROL HEAD - A/C SWITCH SENSE INCORRECT
BODY CONTROL MODULE - A/C SWITCH SENSE INCORRECT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, record and erase Body Computer DTCs. Ensure that the Rear Window Defogger is off. Put the Mode Control switch in the Recirc/Bi-Level (full left) position. Start the engine. With the DRBIII® in Sensor Display, read the A/C EBL Switch voltage and the Mode Switch voltage in each door position. Look for the following approximate voltage readings: Recirc-A/C position: A/C EBL Switch, 4.42 volts, Mode Switch, 1.32 volts. Panel-A/C position: A/C EBL Switch, 4.42 volts, Mode Switch, 3.20 volts. Mix-A/C position: A/C EBL Switch 4.42 volts, Mode Switch 5.07 volts. Panel-Heater position: A/C EBL Switch 10.79 volts, Mode Switch 3.20 volts. Mix-Heater position: A/C EBL Switch 10.79 volts, Mode Switch 5.07 volts. Floor-Heater position: A/C EBL Switch 10.79 volts, Mode Switch 7.16 volts. Does DRBIII® display the approximate voltages for each Mode Control switch position? Yes → Go To 2 No → Replace the A/C - Heater Control in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition on. With the DRBIII®, erase Body Computer DTCs. Start the engine. Turn the Blower Control switch on. With the DRBIII®, read DTCs while slowly turning the Mode Control switch to each of the door positions several times. Does the DRBIII® display: A/C Head, A/C Switch Failure? Yes → Replace and program the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
A/C HEAD, EBL INPUT SHORTED TO BATTERY

When Monitored and Set Condition:

A/C HEAD, EBL INPUT SHORTED TO BATTERY

When Monitored: With the ignition on.

Set Condition: This DTC will set if voltage on the A/C Switch Sense pin exceeds 90% of ignition voltage for 10 seconds.

POSSIBLE CAUSES
A/C SWITCH SENSE CIRCUIT SHORTED TO VOLTAGE
BODY CONTROL MODULE - A/C SWITCH SENSE SHORTED TO VOLTAGE
A/C HEATER CONTROL
INTERMITTENT WIRING PROBLEM

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, record and erase Body Computer DTC's. Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Turn the ignition on. Measure the voltage of the A/C Switch Sense circuit. Is the voltage above 10.0 volts? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Disconnect the Body Control Module C2 harness connector. Turn the ignition on. Measure the voltage of the A/C Switch Sense circuit. Is there any voltage present? Yes → Repair the A/C Switch Sense circuit for a short to voltage. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

A/C HEAD, EBL INPUT SHORTED TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: Make sure that the A/C - Heater Control C1 harness connector is connected to the A/C - Heater Control.** Turn the ignition on. With the DRBIII®, record and erase Body Computer DTC's. With the DRBIII®, read Body Computer DTCs. Does the DRBIII® display: A/C Head, EBL Input Shorted To Batt? Yes → Replace the A/C - Heater Control in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Using the wiring diagram/schematic as a guide, inspect the wiring and connectors for conditions causing an intermittent short. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
A/C HEAD, EBL INPUT SHORTED TO GROUND

When Monitored and Set Condition:

A/C HEAD, EBL INPUT SHORTED TO GROUND

When Monitored: With the ignition on.

Set Condition: This DTC will set if the BCM detects voltage below 0.1 volts on its A/C Switch Sense circuit.

POSSIBLE CAUSES
CONTROL HEAD - SHORT TO GROUND
A/C SWITCH SENSE CIRCUIT SHORT TO GROUND
A/C SW SENSE CIRCUIT SHORT TO SENSOR GROUND
BODY CONTROL MODULE - A/C SWITCH SENSE SHORT TO GROUND
CONTROL HEAD - A/C SWITCH SENSE INCORRECT
BODY CONTROL MODULE - A/C SWITCH SENSE INCORRECT
INTERMITTENT WIRING PROBLEM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Put the Mode Control switch in the Recirc/Bi-Level (full left) position. With the DRBIII®, record and erase Body Computer DTC's. With the DRBIII® in Sensor Display, read the A/C EBL voltage. Is the voltage below 0.5 volts? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Turn the ignition on. With the DRBIII® in Sensor Display, read the A/C EBL voltage. Is the voltage above 3.0 volts? Yes → Replace the A/C - Heater Control in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All

A/C HEAD, EBL INPUT SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Disconnect the Body Control Module C2 harness connector. Measure the resistance between ground and the A/C Switch Sense circuit. Is the resistance below 10K ohms? Yes → Repair the A/C Switch Sense circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Disconnect the Body Control Module C2 harness connector. Measure the resistance between the Sensor Ground circuit and the A/C Switch Sense circuit at the A/C - Heater Control C1 harness connector. Is the resistance below 10K ohms? Yes → Repair the A/C Switch Sense circuit for a short to the Sensor Ground circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition on. With the DRBIII®, record and erase DTCs. Ensure that the Rear Window Defogger is off. Put the Mode Control switch in the Recirc/Bi-Level (full left) position. Start the engine. With the DRBIII® in Sensor Display, read the A/C ABLE Switch voltage and the Mode Switch voltage in each door position. Look for the following approximate voltage readings: Recirc-A/C position: A/C EBL Switch, 4.42 volts, Mode Switch, 1.32 volts. Panel-A/C position: A/C EBL Switch, 4.42 volts, Mode Switch, 3.20 volts. Mix-A/C position: A/C EBL Switch 4.42 volts, Mode Switch 5.07 volts. Panel-Heater position: A/C EBL Switch 10.79 volts, Mode Switch 3.20 volts. Mix-Heater position: A/C EBL Switch 10.79 volts, Mode Switch 5.07 volts. Floor-Heater position: A/C EBL Switch 10.79 volts, Mode Switch 7.16 volts. Does DRBIII® display the approximate voltages for each Mode Control switch position? Yes → Go To 7 No → Replace the A/C - Heater Control in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

A/C HEAD, EBL INPUT SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition on. With the DRBIII®, erase DTCs. Start the engine. Turn the Blower Control switch on. With the DRBIII®, read DTCs while slowly turning the Mode Control switch to each of the door positions several times. Does the DRBIII® display: A/C Head, EBL Input Shorted to Ground? Yes → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Using the wiring diagram/schematic as a guide, inspect the wiring and connectors for conditions causing an intermittent short. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
A/C HEAD, EBL SWITCH STUCK

When Monitored and Set Condition:

A/C HEAD, EBL SWITCH STUCK

When Monitored: With the ignition on.

Set Condition: This DTC will set if the BCM detects the EBL switch stuck in the depressed position for at least 30 seconds.

POSSIBLE CAUSES
ADDITIONAL CODE(S) PRESENT
REAR DEFOGGER SWITCH STUCK
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the Body Computer DTCs. Does the DRBIII® display any additional code(s)? Yes → Return to the Symptom List and choose the code(s). Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition on. With the DRBIII® in Sensor Display, read the A/C EBL voltage while pressing and releasing the Rear Defogger switch several times. Does the voltage decrease when pressing the switch and increase when the switch is released? Yes → Go To 3 No → Replace the A/C - Heater Control in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition on. With the DRBIII®, erase Body Computer DTCs. With the DRBIII®, read Body Computer DTCs. Does the DRBIII® display A/C Head, EBL Switch Stuck? Yes → Replace and program the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
A/C MODE DOOR INPUT OPEN/SHORT TO GROUND

When Monitored and Set Condition:

A/C MODE DOOR INPUT OPEN/SHORT TO GROUND

When Monitored: With the ignition on.

Set Condition: The A/C - Heater Control provides a 5 volt pull-up to the mode request selector. The BCM reads the signal from the A/C - Heater Control mode request and positions the mode door accordingly. If the voltage on this pin is below 0.1 volts, the DTC will set, and the BCM will place the mode door in a default position.

POSSIBLE CAUSES
ADDITIONAL CODE(S) PRESENT
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
A/C MODE SWITCH MUX CIRCUIT SHORT GROUND
A/C MODE SWITCH MUX CIRCUIT SHORT SENSOR GROUND
A/C MODE SWITCH MUX CIRCUIT OPEN
CONTROL HEAD - MODE SWITCH MUX OPEN/SHORTED TO GROUND
BODY CONTROL MODULE - MODE SWITCH MUX OPEN/SHORTED TO GROUND

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® read the Body Computer DTCs. Are Mode Door Input Open/STG and Blend Door Input Open/STG DTCs present? (May set TCM Msg Not Recd). Yes → If JB Fuse 11 is open, check for short to ground in Junction Block, BCM, and Fused Ign Sw Output Ckt. If JB Fuse 11 is not open, check for an open between JB Fuse 11 Pin 19, and JB C7-10 harness connector, and splice 210 in Fused Ign Sw Output Ckt. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output circuit. Is the test light illuminated? Yes → Go To 3 No → Repair the Fused Ignition Switch Output circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

A/C MODE DOOR INPUT OPEN/SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Disconnect the Body Control Module C2 harness connector. Measure the resistance between ground and the A/C Mode Switch Mux circuit. Is the resistance below 10K ohms? Yes → Repair the A/C Mode Switch MUX circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Disconnect the Body Control Module C2 harness connector. Measure the resistance between the Sensor Ground circuit and the A/C Mode Switch MUX circuit at the A/C - Heater Control C! harness connector. Is the resistance below 10K ohms? Yes → Repair the A/C Mode Switch MUX circuit for a short to the Sensor Ground circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Reconnect the A/C - Heater Control C1 harness connector. Disconnect the Body Control Module C2 harness connector. Measure the resistance of the A/C Mode Switch MUX circuit between the A/C Heater Control C1 harness connector and the BCM C2 harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the A/C Mode Switch MUX circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

A/C MODE DOOR INPUT OPEN/SHORT TO GROUND — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Reconnect the A/C - Heater Control C1 harness connector. Disconnect the Body Control Module C2 harness connector. Put the Mode Control switch in the Recirc/Bi-Level (full left) position. Turn the ignition on. Measure the voltage of the A/C Mode Switch MUX circuit. Move the Mode Control switch from Recirc to Defrost while observing the voltmeter. Does the voltage change fluidly from approximately 8.8 volts (Recirc) to 11.7 volts (Defrost)? Yes → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace the A/C - Heater Control in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
A/C MODE DOOR INPUT SHORTED TO BATTERY

When Monitored and Set Condition:

A/C MODE DOOR INPUT SHORTED TO BATTERY

When Monitored: With the engine running.

Set Condition: The BCM reads the signal from the A/C - Heater Control mode request and positions the mode door accordingly. If the voltage on this pin exceeds 90% of ignition voltage, the DTC will set, and the BCM will place the mode door in a default position.

POSSIBLE CAUSES
CONTROL HEAD - A/C MODE SWITCH MUX SHORTED TO VOLTAGE
A/C MODE SWITCH MUX CIRCUIT SHORTED TO VOLTAGE
BODY CONTROL MODULE - A/C MODE SWITCH MUX SHORTED TO VOLTAGE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, record and erase Body Computer DTC's. Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Turn the ignition on. Measure the voltage of the A/C Mode Switch MUX circuit. Is the voltage above 0.3 volts? Yes → Go To 2 No → Replace the A/C - Heater Control in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the A/C - Heater Control C1 harness connector. Disconnect the Body Control Module C2 harness connector. Turn the ignition on. Measure the voltage of the A/C Mode Switch MUX circuit. Is there any voltage present? Yes → Repair the A/C Mode Switch MUX circuit for a short to voltage. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
BLEND DOOR FEEDBACK FAILURE

When Monitored and Set Condition:

BLEND DOOR FEEDBACK FAILURE

When Monitored: With the ignition on.

Set Condition: This DTC will set if the BCM detects voltage below 0.06 volts or above 4.8 volts on the Blend Door Feedback Signal input/Mode Door Feedback Signal input.

POSSIBLE CAUSES
CHECK CODE(S) PRESENT
MODE DOOR FEEDBACK FAILURE DTC PRESENT
5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5 VOLT SUPPLY CIRCUIT OPEN
5 VOLT SUPPLY CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
BODY CONTROL MODULE - 5 VOLT SUPPLY SIGNAL OPEN/SHORTED LOW
MODE DOOR ACTUATOR SHORTED LOW
5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5 VOLT SUPPLY CIRCUIT OPEN
5 VOLT SUPPLY CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
BLEND DOOR ACTUATOR SHORTED LOW
5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
BODY CONTROL MODULE - 5 VOLTS SUPPLY HIGH
SENSOR GROUND CIRCUIT OPEN
BLEND DOOR ACTUATOR OPEN
SENSOR GROUND CIRCUIT OPEN
BODY CONTROL MODULE
BLEND DOOR FEEDBACK SIGNAL CIRCUIT SHORTED TO GROUND
BLEND DOOR FEEDBACK SIGNAL CIRCUIT OPEN
BLEND DOOR FEEDBACK SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
BLEND DOOR ACTUATOR OPEN/SHORTED TO GROUND
BODY CONTROL MODULE - BLEND DOOR FEEDBACK SIGNAL OPEN/SHORTED TO GROUND
BLEND DOOR FEEDBACK SIGNAL CIRCUIT SHORTED TO VOLTAGE
BODY CONTROL MODULE- BLEND DOOR FEEDBACK SIGNAL SHORTED TO VOLTAGE

BLEND DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, record and erase Body Computer DTC's. Start the engine. With the DRBIII® in Miscellaneous, actuate Calibrate HVAC Door Motors. With the DRBIII®, read the Body Computer DTCs. What code(s) does the DRBIII® display? Mode/Blend Dr Fdbk Fail and addit DTC(s) If Mode/Blend Door Feedback Failure and additional DTC(s) set, return to the Symptom List and choose the code(s) to diagnose the additional DTC(s) first. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. Mode Door Feedback Failure only Return to the Symptom List and choose the code. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. Mode & Blend Door Feedback Failure only Go To 2 Blend Door Feedback Failure only Go To 11	All
2	Turn the ignition off. Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit (cavity #6) in the in-line connector (I/P harness side). What voltage is present? Zero volts. Go To 3 Approximately 4.5 to 5.5 volts Go To 6 Greater than 5.5 volts Go To 10	All
3	Turn the ignition off. Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Disconnect the Body Control Module C2 harness connector. Measure the resistance between ground and the 5 Volt Supply circuit (I/P harness side). Is the resistance below 10K ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All

BLEND DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Disconnect the Body Control Module C2 harness connector. Measure the resistance of the 5 Volt Supply circuit between the BCM C2 harness connector and the in-line C200 harness connector (I/P harness side). Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the 5 Volt Supply circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Disconnect the Body Control Module C2 harness connector. Measure the resistance between the 5 Volt Supply circuit and the Sensor Ground circuit in the Body Control Module C2 harness connector. Is the resistance below 10K ohms? Yes → Repair the 5 Volt Supply circuit for a short to the Sensor Ground circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Ensure the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal is connected. Disconnect the Mode Door Actuator harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the Mode Door Actuator harness connector. What voltage is present? Approximately 4.5 to 5.5 volts Replace the Mode Door Actuator. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. Zero volts Go To 7 Over 5.5 Volts Go To 10	All

BLEND DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the Body Control Module C2 harness connector. Disconnect the Mode Door Actuator harness connector. Disconnect the Blend Door Actuator harness connector. Measure the resistance between ground and the 5 Volt Supply circuit in the Body Control Module C2 harness connector. Is the resistance below 10K ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off. Disconnect the Body Control Module C2 harness connector. Disconnect the Mode Door Actuator harness connector. Disconnect the Blend Door Actuator harness connector. Measure the resistance of the 5 Volt Supply circuit between the BCM C2 harness connector and the Mode Door Actuator harness connector. Measure the resistance of the 5 Volt Supply circuit between the BCM C2 harness connector and the Blend Door Actuator harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the 5 Volt Supply circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
9	Turn the ignition off. Disconnect the Body Control Module C2 harness connector. Disconnect the Mode Door Actuator harness connector. Disconnect the Blend Door Actuator harness connector. Measure the resistance between the 5 Volt Supply circuit and the Sensor Ground in the Body Control Module C2 harness connector. Is the resistance below 10K ohms? Yes → Repair the 5 Volt Supply circuit for a short to the Sensor Ground circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Blend Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

BLEND DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
10	Disconnect the Body Control Module C2 harness connector. Turn the ignition on. Measure the voltage of the 5 volt supply circuit. Is there any voltage present? Yes → Repair the 5 Volt Supply circuit for a short to voltage. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
11	Ensure the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal is connected. Turn the ignition on. With the DRBIII® in Sensor Display, read the Blend Door voltage. What voltage is present? From 0.3 to 5.5 volts Go To 12 Less than 0.3 volts Go To 15 Above 5.5 volts Go To 19	All
12	Turn the ignition off. Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Turn off all lights and close the driver door latch so the courtesy lamps will go off. Measure the resistance between ground and the Sensor Ground circuit (cavity #5) in the inline connector (I/P harness side). Is the resistance below 10.0 ohms? Yes → Go To 13 No → Go To 14	All

BLEND DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Disconnect the Blend Door Actuator harness connector. Measure the resistance of the Sensor Ground circuit between the C200 in-line connector (cavity #5) (HVAC harness side) and the Blend Door Actuator harness connector. Is the resistance below 5.0 ohms? Yes → Replace the Blend Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Sensor Ground circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
14	Turn the ignition off. Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Disconnect the Body Control Module C2 harness connector Measure the resistance of the Sensor Ground circuit between the C200 in-line connector (cavity #5) (I/P harness side) and the BCM C2 harness connector. Is the resistance below 5.0 ohms? Yes → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Sensor Ground circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
15	Turn the ignition off. Ensure the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal is connected. Disconnect the Body Control Module C2 harness connector. Disconnect the Blend Door Actuator harness connector. Measure the resistance between ground and the Blend Door Feedback Signal circuit in the Body Control Module C2 harness connector. Is the resistance below 10K ohms? Yes → Repair the Blend Door Feedback Signal circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 16	All

BLEND DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
16	Turn the ignition off. Ensure the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal is connected. Disconnect the Body Control Module C2 harness connector. Disconnect the Blend Door Actuator harness connector. Measure the resistance of the Blend Door Feedback Signal circuit between the BCM C2 harness connector and the Blend Door Actuator harness connector. Is the resistance below 5.0 ohms? Yes → Go To 17 No → Repair the Blend Door Feedback Signal circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
17	Turn the ignition off. Ensure the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal is connected. Disconnect the Body Control Module C2 harness connector. Disconnect the Blend Door Actuator harness connector. Measure the resistance between the Blend Door Feedback Signal circuit and the Sensor Ground circuit in the BCM C2 harness connector. Is the resistance below 10K ohms? Yes → Repair the Blend Door Feedback Signal circuit for a short to the Sensor Ground circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 18	All
18	Turn the ignition off. Ensure the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal is connected. Disconnect the Blend Door Actuator harness connector. Connect a jumper wire between the Blend Door Feedback Signal circuit and the 5 Volt Supply circuit. Turn the ignition on. With the DRBIII® in Sensor Display, read the Blend Door voltage. Is the voltage approximately 4.5 to 5.5 volts? Yes → Replace the Blend Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

BLEND DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
19	Disconnect the Body Control Module C2 harness connector. Turn the ignition on. Measure the voltage of the Blend Door Feedback Signal circuit. Is there any voltage present? Yes → Repair the Blend Door Feedback Signal circuit for a short to voltage. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
BLEND DOOR OUTPUT SHORTED TO BATTERY

When Monitored and Set Condition:

BLEND DOOR OUTPUT SHORTED TO BATTERY

When Monitored: Whenever the BCM attempts to move the Blend Door Actuator.

Set Condition: This DTC will set if the BCM detects a short to voltage on the Blend Door Driver circuit.

POSSIBLE CAUSES
SHORT TO VOLTAGE BETWEEN BCM AND C200
BLEND DOOR DRIVER CIRCUIT SHORTED TO OTHER DRIVER CIRCUIT
BCM
DRIVER CIRCUITS SHORTED TOGETHER
BLEND DOOR ACTUATOR
WIRING HARNESS INSPECTION

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, erase all BCM DTC's. Turn the Blower switch to low. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Blend Control switch to the full cold position for 30 seconds. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Mode Control switch to each available position pausing for 20 seconds at each position. Turn the Mode Control switch to the Defrost position for 20 seconds. Turn the Mode Control switch to the Recirculation position for 20 seconds. Turn the Mode Control switch to the Defrost position for 20 seconds. With the DRBIII®, read the BCM DTC's. Does the DRBIII® display this DTC? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the In-Line C200 harness connector. Disconnect the BCM C2 harness connector. Turn the ignition on. Measure the voltage of the Blend Door Driver circuit. Is the voltage below 1.0 volt? Yes → Go To 3 No → Repair the Blend Door Driver circuit for a short to voltage. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

BLEND DOOR OUTPUT SHORTED TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the In-Line C200 harness connector. Disconnect the BCM C2 harness connector. Measure the resistance between the Blend Door Driver circuit and each of the following circuits: Recirculation Door Driver circuit, the Mode Door Driver circuit, Common Door Driver circuit. Is the resistance below 100.0 ohms for any of the measurements? Yes → Repair the Blend Door Driver circuit for a short to other driver circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Make sure that the BCM C2 harness connector is connected to the BCM. Disconnect the C200 In-Line harness connector. Turn the ignition on. Measure the voltage of the Blend Door Driver circuit at the C200 In-Line harness connector (BCM side). Is the voltage above 1.0 volt? Yes → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the C200 In-Line harness connector. Disconnect the Blend Door Actuator harness connector. Inspect the Blend Door Driver circuit between the C200 harness connector and the Blend Door Actuator harness connector for a short to any other circuit at the connector or the harness. Were any problems found? Yes → Repair the Blend Door Driver circuit for a short to voltage or other driver circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Blend Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

BLEND DOOR OUTPUT SHORTED TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
BLEND DOOR OUTPUT SHORTED TO GROUND

When Monitored and Set Condition:

BLEND DOOR OUTPUT SHORTED TO GROUND

When Monitored: Whenever the BCM attempts to move one of the HVAC actuators.

Set Condition: This DTC will set if the BCM detects one or more of the following outputs shorted to ground: mode door driver, blend door driver, recirculation door driver or the common door driver.

POSSIBLE CAUSES
BLEND AIR DOOR DRIVER CIRCUIT SHORT TO GROUND
BLEND AIR DOOR DRIVER CKT SHORT TO SENSOR GROUND
BLEND AIR DOOR DRIVER WIRE SHORT TO SENSOR GROUND
BLEND DOOR ACTUATOR
WIRING HARNESS INSPECTION

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, erase all BCM DTC's. Turn the Blower switch to low. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Blend Control switch to the full cold position for 30 seconds. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Mode Control switch to each available position pausing for 20 seconds at each position. Turn the Mode Control switch to the Defrost position for 20 seconds. Turn the Mode Control switch to the Recirculation position for 20 seconds. Turn the Mode Control switch to the Defrost position for 20 seconds. With the DRBIII®, read the BCM DTC's. Does the DRBIII® display this DTC? Yes → Go To 2 No → Go To 5	All
2	Turn all lights off. Close the driver door latch to turn courtesy lamps off. Disconnect the Body Control Module C2 harness connector. Measure the resistance between ground and the Blend Air Door Driver circuit. Is the resistance below 100.0 ohms? Yes → Repair the Blend Air Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All

BLEND DOOR OUTPUT SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	Disconnect the Body Control Module C2 harness connector. Measure the resistance between the Blend Air Door Driver circuit and the Sensor Ground circuit in the BCM C2 connector. Is the resistance below 100.0 ohms? Yes → Go To 4 No → Replace the Body Control Module. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
4	Disconnect the Body Control Module C2 harness connector. Disconnect the Blend Door Actuator harness connector. Measure the resistance between the Blend Air Door Driver circuit and the Sensor Ground circuit in the BCM C2 connector. Is the resistance below 100.0 ohms? Yes → Repair the Blend Air Door Driver circuit for a short to the Sensor Ground circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Blend Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
BLEND DOOR STALL TEST FAILURE

When Monitored and Set Condition:

BLEND DOOR STALL TEST FAILURE

When Monitored: During HVAC motor calibration.

Set Condition: This DTC will set if the BCM is unable to detect the end of travel for the blend door.

POSSIBLE CAUSES
BLEND DOOR ACTUATOR
BLEND DOOR DRIVER CIRCUIT OPEN BETWEEN THE BCM AND C200
BLEND DOOR DRIVER CIRCUIT OPEN BETWEEN THE C200 AND ACTUATOR
BLEND DOOR DRIVER CIRCUIT SHORTED TO GROUND BETWEEN C200 AND THE ACTUATR
BLEND DOOR DRIVER CIRCUIT SHORTED TO GROUND BETWEEN THE BCM AND C200
COMMON DOOR DRIVER CIRCUIT OPEN BETWEEN THE BCM AND C200
COMMON DOOR DRIVER CIRCUIT OPEN BETWEEN THE C200 AND ACTUATOR
COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND BETWEEN THE BCM AND C200
COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND BETWEEN THE C200 AND ACTUATOR
WIRING HARNESS INSPECTION
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, erase all BCM DTC's. Turn the Blower switch to low. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Blend Control switch to the full cold position for 30 seconds. Turn the Blend Control switch to the full hot position for 30 seconds. With the DRBIII®, read the BCM DTC's. Is this DTC present? Yes → Go To 2 No → Go To 11	All

BLEND DOOR STALL TEST FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the C200 In-Line harness connector. Measure the resistance between ground and the Blend Door Driver circuit at the BCM C2 harness connector. Is the resistance below 100.0 ohms? Yes → Repair the Blend Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the C200 In-Line harness connector. Connect a jumper wire between ground and the Blend Door Driver circuit in the C200 harness connector (BCM side). Using a 12-volt test light connected to 12-volts, check the Blend Door Driver circuit in the BCM C2 harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the Blend Door Driver circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the C200 In-Line harness connector. Measure the resistance between ground and the Common Door Driver circuit in the BCM C2 harness connector. Is the resistance below 100.0 ohms? Yes → Repair the Common Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the C200 In-Line harness connector. Connect a jumper wire between ground and the Common Door Driver circuit in the C200 harness connector (BCM side). Using a 12-volt test light connected to 12-volts, check the Common Door Driver circuit in the BCM C2 harness connector. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Common Door Driver circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

BLEND DOOR STALL TEST FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the C200 In-Line harness connector. Connect a test light between the Blend Door Driver circuit and the Common Door Driver circuit at the C200 harness connector (BCM side). Start the engine. With the DRBIII®, select Body, Body Computer, System Tests then Actuate Mode Doors. Select Blend Door. While observing the test light, press and hold the DRB right arrow key for several seconds. While observing the test light, press and hold the DRB left arrow key for several seconds. Is the test light on while the right and left arrow keys are pressed? Yes → Go To 7 No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Disconnect the Blend Door Actuator harness connector. Disconnect the C200 In-Line harness connector. Measure the resistance between ground and the Blend Door Driver circuit in the C200 harness connector (Actuator side). Is the resistance below 100.0 ohms? Yes → Repair the Blend Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off. Disconnect the Blend Door Actuator harness connector. Disconnect the C200 In-Line harness connector. Connect a jumper wire between ground and the Blend Door Driver circuit in the C200 harness connector (Actuator side). Using a 12-volt test light connected to 12-volts, check the Blend Door Driver circuit in the Blend Door Actuator harness connector. Does the test light illuminate brightly? Yes → Go To 9 No → Repair the Blend Door Driver circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

BLEND DOOR STALL TEST FAILURE — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the Blend Door Actuator harness connector. Disconnect the C200 In-Line harness connector. Measure the resistance between ground and the Common Door Driver circuit in the C200 harness connector (Actuator side). Is the resistance below 100.0 ohms? Yes → Repair the Common Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 10	All
10	Turn the ignition off. Disconnect the Blend Door Actuator harness connector. Disconnect the C200 In-Line harness connector. Connect a jumper wire between ground and the Common Door Driver circuit in the C200 harness connector (Actuator side). Using a 12-volt test light connected to 12-volts, check the Common Door Driver circuit at the Blend Door Actuator harness connector. Does the test light illuminate brightly? Yes → Replace the Blend Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Common Door Driver circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
11	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
COMMON OUTPUT SHORTED TO BATTERY

When Monitored and Set Condition:

COMMON OUTPUT SHORTED TO BATTERY

When Monitored: Whenever the BCM attempts to move one of the HVAC actuators.

Set Condition: This DTC will set if the BCM detects a short to voltage on the Common Door Driver circuit.

POSSIBLE CAUSES
BCM
BLEND DOOR ACTUATOR
COMMON DOOR DRIVER CIRCUIT SHORTED TO VOLTAGE OR OTHER DRIVER CIRCUIT
COMMON DRIVER CIRCUIT SHORTED TO OTHER DRIVER CIRCUIT
MODE DOOR ACTUATOR
RECIRCULATION DOOR ACTUATOR
SHORT TO VOLTAGE BETWEEN BCM AND C200
WIRING HARNESS INSPECTION

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, erase all BCM DTC's. Turn the Blower switch to low. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Blend Control switch to the full cold position for 30 seconds. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Mode Control switch to each available position pausing for 20 seconds at each position. Turn the Mode Control switch to the Defrost position for 20 seconds. Turn the Mode Control switch to the Recirculation position for 20 seconds. Turn the Mode Control switch to the Defrost position for 20 seconds. With the DRBIII®, read the BCM DTC's. Does the DRBIII® display this DTC? Yes → Go To 2 No → Go To 8	All

COMMON OUTPUT SHORTED TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the In-Line C200 harness connector. Disconnect the BCM C2 harness connector. Turn the ignition on. Measure the voltage of the Common Door Driver circuit. Is the voltage below 1.0 volt? Yes → Go To 3 No → Repair the Common Door Driver circuit for a short to voltage. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Disconnect the In-Line C200 harness connector. Disconnect the BCM C2 harness connector. Measure the resistance between the Common Door Driver circuit and each of the following circuits: Recirculation Door Driver circuit, the Mode Door Driver circuit, Blend Door Driver circuit. Is the resistance below 100.0 ohms for any of the measurements? Yes → Repair the Common Door Driver circuit for a short to other driver circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the C200 In-Line harness connector. Turn the ignition on. Measure the voltage of the Common Door Driver circuit at the C200 In-Line harness connector (BCM side). Is the voltage above 1.0 volt? Yes → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All

COMMON OUTPUT SHORTED TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Reconnect all connectors. Disconnect the Recirculation Door Actuator harness connector. Start the engine. Turn the Blower switch on low. Turn the Mode Control switch to the Defrost position for 20 seconds. Turn the Mode Control switch to the Recirc position for 20 seconds. Turn the Mode Control switch to the Defrost position for 20 seconds. With the DRBIII®, read the BCM DTC's. Does the DRBIII® display this DTC? Yes → Go To 6 No → Replace the Recirculation Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Reconnect all connectors. Disconnect the Blend Door Actuator harness connector. Start the engine. Turn the Blower switch on low. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Blend Control switch to the full cold position for 30 seconds. Turn the Blend Control switch to the full hot position for 30 seconds. With the DRBIII®, read the BCM DTC's. Does the DRBIII® display this DTC? Yes → Go To 7 No → Replace the Blend Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Reconnect all connectors. Disconnect the Mode Door Actuator harness connector. Start the engine. Turn the Blower switch on low. Turn the Mode Control switch to each available position pausing for 20 seconds at each position. With the DRBIII®, read the BCM DTC's. Does the DRBIII® display this DTC? Yes → Repair the Common Door Driver circuit for a short to voltage or short to other driver circuit between the C200 harness connector and the HVAC housing unit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Mode Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

COMMON OUTPUT SHORTED TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
COMMON OUTPUT SHORTED TO GROUND

When Monitored and Set Condition:

COMMON OUTPUT SHORTED TO GROUND

When Monitored: Whenever the BCM attempts to move one of the HVAC actuators.

Set Condition: This DTC will set if the BCM detects one or more of the following outputs shorted to ground: mode door driver, blend door driver, recirculation door driver or the common door driver.

POSSIBLE CAUSES
COMMON DOOR DRIVER CIRCUIT SHORT TO GROUND
COMMON DOOR DRIVER CKT SHORT TO SENSOR GROUND
BLEND DOOR ACTUATOR SHORT TO COMMON DOOR DRIVER CIRCUIT
MODE DOOR ACTUATOR SHORT TO COMMON DOOR DRIVER CIRCUIT
COMMON DOOR DRIVER WIRE SHORT TO SENSOR GROUND
WIRING HARNESS INSPECTION

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, erase all BCM DTC's. Turn the Blower switch to low. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Blend Control switch to the full cold position for 30 seconds. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Mode Control switch to each available position pausing for 20 seconds at each position. Turn the Mode Control switch to the Defrost position for 20 seconds. Turn the Mode Control switch to the Recirculation position for 20 seconds. Turn the Mode Control switch to the Defrost position for 20 seconds. With the DRBIII®, read the BCM DTC's. Does the DRBIII® display this DTC? Yes → Go To 2 No → Go To 6	All
2	Turn all lights off. Close the driver door latch to turn courtesy lamps off. Disconnect the Body Control Module C2 harness connector. Measure the resistance between ground and the Common Door Driver circuit. Is the resistance below 100.0 ohms? Yes → Repair the Common Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All

COMMON OUTPUT SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	Disconnect the Body Control Module C2 harness connector. Measure the resistance between the Common Door Driver circuit and the Sensor Ground circuit in the BCM C2 connector. Is the resistance below 100.0 ohms? Yes → Go To 4 No → Replace the Body Control Module. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
4	Disconnect the Body Control Module C2 harness connector. Disconnect the Blend Door Actuator harness connector. Measure the resistance between the Common Door Driver circuit and the Sensor Ground circuit in the BCM C2 connector. Is the resistance below 100.0 ohms? Yes → Go To 5 No → Replace the Blend Door Actuato in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
5	Disconnect the Body Control Module C2 harness connector. Disconnect the Mode Door Actuator harness connector. Measure the resistance between the Common Door Driver circuit and the Sensor Ground circuit in the BCM C2 connector. Is the resistance below 100.0 ohms? Yes → Repair the Common Door Driver circuit for a short to the Sensor Ground circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Mode Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
EVAPORATOR SENSOR FAILURE

When Monitored and Set Condition:

EVAPORATOR SENSOR FAILURE

When Monitored: With the ignition on.

Set Condition: This DTC will set if the BCM detects voltage below 0.06 volts or above 4.8 volts on the evaporator temperature sensor signal input.

POSSIBLE CAUSES
EVAPORATOR TEMPERATURE SENSOR SIGNAL CKT SHORT TO VOLTAGE
EVAPORATOR TEMPERATURE SENSOR OPEN
EVAPORATOR TEMP SENSOR SIGNAL CKT OPEN
SENSOR GROUND OPEN
BODY CONTROL MODULE - EVAPORATOR TEMP SENSOR STAYS HIGH
EVAPERATOR TEMPERATURE SENSOR
INTERMITTENT WIRING PROBLEM
EVAPORATOR TEMP SENSOR SIGNAL CIRCUIT SHORT TO GROUND
EVAPORATOR TEMP SENSOR SIGNAL CKT SHORT TO SENSOR GROUND
BODY CONTROL MODULE - EVAPORATOR TEMP SENSOR STAYS LOW

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® in Sensors, read the Evaporator Temperature Sensor voltage. Is the voltage above 5.0 volts? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Evaporator Temperature Sensor harness connector. Turn the ignition on. Measure the voltage of the Evaporator Temperature Sensor Signal circuit. Is the voltage above 5.1 volts? Yes → Repair the Evaporator Temperature Sensor Signal ckt for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All

EVAPORATOR SENSOR FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Evaporator Temperature Sensor harness connector. Turn the ignition on. Connect a jumper wire between the Evaporator Temperature Sensor Signal circuit and the Sensor Ground circuit. With the DRBIII® in Sensors, read the Evaporator Temperature Sensor voltage. Does the DRBIII® display EVAP TEMP: 4.9 VOLTS or greater? Yes → Go To 4 No → Replace the Evaporator Temperature Sensor in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Disconnect the Evaporator Temperature Sensor harness connector. Disconnect the Body Control Module C2 harness connector. Measure the resistance of the Evaporator Temp Sensor Signal circuit between the BCM C2 connector and the Evaporator Temperature Sensor connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Evaporator Temperature Sensor Signal circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the Evaporator Temperature Sensor harness connector. Disconnect the Body Control Module C2 harness connector. Measure the resistance of the Sensor Ground circuit between the BCM C2 connector and the Evaporator Temp Sensor connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Sensor Ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
6	If there are no possible causes remaining, view repair. Repair Replace and program the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Disconnect the Evaporator Temperature Sensor harness connector. Turn the ignition on. With the DRBIII® in Sensors, read the Evaporator Temperature Sensor voltage. Does the DRBIII® display EVAP TEMP: 4.9 VOLTS or greater? Yes → Go To 8 No → Go To 9	All

EVAPORATOR SENSOR FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Place the vehicle out of direct sunlight. Lower the windows. Allow the vehicle to come to ambient temperature. Place a thermometer in one of the instrument panel outlets, and a second thermometer in the intake duct. Disconnect the Evaporator Temperature Sensor harness connector. Turn the ignition on. Turn the Mode Control switch to the Panel or Bi-level position (Recirc off). Turn the Blower switch on high and allow it to run until both temperature readings are within 2° of one another and constant. Measure and record the Evaporator Temperature Sensor resistance. Consult the following specifications to determine if the Evaporator Temperature Sensor resistance is within the specification. 8.3K to 8.8K ohms at 12.7°C (55°F). 7.2K to 7.7K ohms at 15.5°C (60°F). 6.3K to 6.8K ohms at 18.3°C (65°F). 5.6K to 6.1k ohms at 21.1°C (70°F). 4.9K to 5.4K ohms at 23.8°C (75°F). 4.4K to 4.8K ohms at 26.6°C (80°F). 3.8K to 4.1K ohms at 29.4°C (85°F). 3.2K to 3.5K ohms at 32.2°C (90°F). Is the Evaporator Temperature Sensor resistance within the specification? Yes → Using the wiring diagram/schematic as a guide, inspect the wiring and connectors for conditions causing an intermittent short or open. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Evaporator Temperature Sensor in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
9	Turn the ignition off. Disconnect the Evaporator Temperature Sensor harness connector. Disconnect the Body Control Module C2 harness connector. Measure the resistance between ground and the Evaporator Temperature Sensor Signal circuit at the BCM C2 connector. Is the resistance below 1000.0 ohms? Yes → Repair the Evaporator Temperature Sensor Signal circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 10	All
10	Turn the ignition off. Disconnect the Evaporator Temperature Sensor harness connector. Disconnect the Body Control Module C2 harness connector. Measure the resistance between the Evaporator Temp Sensor Signal circuit and the Sensor Ground circuit in the Evaporator Temperature Sensor connector. Is the resistance below 1000.0 ohms? Yes → Repair the Evaporator Temperature Sensor Signal circuit for a short to the Sensor Ground circuit. Perform BODY VERIFICATION TEST - VER 1. No → Go To 11	All

EVAPORATOR SENSOR FAILURE — Continued

TEST	ACTION	APPLICABILITY
11	If there are no possible causes remaining, view repair. Repair Replace and program the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:

MODE DOOR FEEDBACK FAILURE

When Monitored and Set Condition:

MODE DOOR FEEDBACK FAILURE

When Monitored: With the ignition on.

Set Condition: This DTC will set if the BCM detects voltage below 0.06 volts or above 4.8 volts on the Blend Door Feedback Signal input/Mode Door Feedback Signal input.

POSSIBLE CAUSES
CHECK CODE(S) PRESENT
BLEND DOOR FEEDBACK FAILURE DTC PRESENT
5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5 VOLT SUPPLY CIRCUIT OPEN
5 VOLT SUPPLY CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
BODY CONTROL MODULE - 5 VOLT SUPPLY SIGNAL OPEN/SHORTED LOW
MODE DOOR ACTUATOR SHORTED LOW
5 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
5 VOLT SUPPLY CIRCUIT OPEN
5 VOLT SUPPLY CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
BLEND DOOR ACTUATOR SHORTED LOW
5 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
BODY CONTROL MODULE - 5 VOLTS SUPPLY HIGH
SENSOR GROUND CIRCUIT OPEN
MODE DOOR ACTUATOR OPEN
SENSOR GROUND CIRCUIT OPEN
BODY CONTROL MODULE
MODE DOOR FEEDBACK SIGNAL CIRCUIT SHORTED TO GROUND
MODE DOOR FEEDBACK SIGNAL CIRCUIT OPEN
MODE DOOR FEEDBACK SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
MODE DOOR ACTUATOR OPEN/SHORTED TO GROUND
BODY CONTROL MODULE - MODE DOOR FEEDBACK SIGNAL OPEN/SHORTED TO GROUND
MODE DOOR FEEDBACK SIGNAL CIRCUIT SHORTED TO VOLTAGE
BODY CONTROL MODULE- MODE DOOR FEEDBACK SIGNAL SHORTED TO VOLTAGE

MODE DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, record and erase Body Computer DTC's. Start the engine. With the DRBIII® in Miscellaneous, actuate Calibrate HVAC Door Motors. With the DRBIII®, read the Body Computer DTCs. What code(s) does the DRBIII® display? Mode/Blend Dr Fdbk Fail and addit DTC(s) If Mode/Blend Door Feedback Failure and additional DTC(s) set, return to the Symptom List and choose the code(s) to diagnose the additional DTC(s) first. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. Blend Door Feedback Failure only Return to the Symptom List and choose the code. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. Mode & Blend Door Feedback Failure only Go To 2 Mode Door Feedback Failure only Go To 11	All
2	Turn the ignition off. Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit (cavity #6) in the in-line connector (I/P harness side). What voltage is present? Zero volts. Go To 3 Approximately 4.5 to 5.5 volts Go To 6 Greater than 5.5 volts Go To 10	All
3	Turn the ignition off. Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Disconnect the Body Control Module C2 harness connector. Measure the resistance between ground and the 5 Volt Supply circuit (I/P harness side). Is the resistance below 10K ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All

MODE DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Disconnect the Body Control Module C2 harness connector. Measure the resistance of the 5 Volt Supply circuit between the BCM C2 harness connector and the in-line C200 harness connector (I/P harness side). Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the 5 Volt Supply circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Disconnect the Body Control Module C2 harness connector. Measure the resistance between the 5 Volt Supply circuit and the Sensor Ground circuit in the Body Control Module C2 harness connector. Is the resistance below 10K ohms? Yes → Repair the 5 Volt Supply circuit for a short to the Sensor Ground circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Ensure the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal is connected. Disconnect the Mode Door Actuator harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit in the Mode Door Actuator harness connector. What voltage is present? Approximately 4.5 to 5.5 volts Replace the Mode Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. Zero volts Go To 7 Over 5.5 Volts Go To 10	All

MODE DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the Body Control Module C2 harness connector. Disconnect the Mode Door Actuator harness connector. Disconnect the Blend Door Actuator harness connector. Measure the resistance between ground and the 5 Volt Supply circuit in the Body Control Module C2 harness connector. Is the resistance below 10K ohms? Yes → Repair the 5 Volt Supply circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off. Disconnect the Body Control Module C2 harness connector. Disconnect the Mode Door Actuator harness connector. Disconnect the Blend Door Actuator harness connector. Measure the resistance of the 5 Volt Supply circuit between the BCM C2 harness connector and the Mode Door Actuator harness connector. Measure the resistance of the 5 Volt Supply circuit between the BCM C2 harness connector and the Blend Door Actuator harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the 5 Volt Supply circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
9	Turn the ignition off. Disconnect the Body Control Module C2 harness connector. Disconnect the Mode Door Actuator harness connector. Disconnect the Blend Door Actuator harness connector. Measure the resistance between the 5 Volt Supply circuit and the Sensor Ground in the Body Control Module C2 harness connector. Is the resistance below 10K ohms? Yes → Repair the 5 Volt Supply circuit for a short to the Sensor Ground circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Blend Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

MODE DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
10	Disconnect the Body Control Module C2 harness connector. Turn the ignition on. Measure the voltage of the 5 volt supply circuit. Is there any voltage present? Yes → Repair the 5 Volt Supply circuit for a short to voltage. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
11	Ensure the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal is connected. Turn the ignition on. With the DRBIII® in Sensor Display, read the Mode Door voltage. What voltage is present? From 0.3 to 5.5 volts Go To 12 Less than 0.3 volts Go To 15 Above 5.5 volts Go To 19	All
12	Turn the ignition off. Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Turn off all lights and close the driver door latch so the courtesy lamps will go off. Measure the resistance between ground and the Sensor Ground circuit (cavity #5) in the inline connector (I/P harness side). Is the resistance below 10.0 ohms? Yes → Go To 13 No → Go To 14	All

MODE DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Disconnect the Mode Door Actuator harness connector. Measure the resistance of the Sensor Ground circuit between the C200 in-line connector (cavity #5) (HVAC harness side) and the Mode Door Actuator harness connector. Is the resistance below 5.0 ohms? Yes → Replace the Mode Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Sensor Ground circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
14	Turn the ignition off. Disconnect the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal. Disconnect the Body Control Module C2 harness connector Measure the resistance of the Sensor Ground circuit between the C200 in-line connector (cavity #5) (I/P harness side) and the BCM C2 harness connector. Is the resistance below 5.0 ohms? Yes → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Sensor Ground circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
15	Turn the ignition off. Ensure the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal is connected. Disconnect the Body Control Module C2 harness connector. Disconnect the Mode Door Actuator harness connector. Measure the resistance between ground and the Mode Door Feedback Signal circuit in the Body Control Module C2 harness connector. Is the resistance below 10K ohms? Yes → Repair the Mode Door Feedback Signal circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 16	All

MODE DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
16	Turn the ignition off. Ensure the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal is connected. Disconnect the Body Control Module C2 harness connector. Disconnect the Mode Door Actuator harness connector. Measure the resistance of the Mode Door Feedback Signal circuit between the BCM C2 harness connector and the Mode Door Actuator harness connector. Is the resistance below 5.0 ohms? Yes → Go To 17 No → Repair the Mode Door Feedback Signal circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
17	Turn the ignition off. Ensure the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal is connected. Disconnect the Body Control Module C2 harness connector. Disconnect the Mode Door Actuator harness connector. Measure the resistance between the Mode Door Feedback Signal circuit and the Sensor Ground circuit in the BCM C2 harness connector. Is the resistance below 10K ohms? Yes → Repair the Mode Door Feedback Signal circuit for a short to the Sensor Ground circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 18	All
18	Turn the ignition off. Ensure the C200 in-line connector (HVAC) located in the center of the instrument panel above the accelerator pedal is connected. Disconnect the Mode Door Actuator harness connector. Connect a jumper wire between the Mode Door Feedback Signal circuit and the 5 Volt Supply circuit. Turn the ignition on. With the DRBIII® in Sensor Display, read the Mode Door voltage. Is the voltage approximately 4.5 to 5.5 volts? Yes → Replace the Mode Door Actuato in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

MODE DOOR FEEDBACK FAILURE — Continued

TEST	ACTION	APPLICABILITY
19	Disconnect the Body Control Module C2 harness connector. Turn the ignition on. Measure the voltage of the Mode Door Feedback Signal circuit. Is there any voltage present? Yes → Repair the Mode Door Feedback Signal circuit for a short to voltage. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
MODE DOOR OUTPUT SHORTED TO BATTERY

When Monitored and Set Condition:

MODE DOOR OUTPUT SHORTED TO BATTERY

When Monitored: Whenever the BCM attempts to move the Mode Door Actuator.

Set Condition: This DTC will set if the BCM detects a short to voltage on the Mode Door Driver circuit.

POSSIBLE CAUSES
SHORT TO VOLTAGE BETWEEN BCM AND C200
MODE DOOR DRIVER CIRCUIT SHORTED TO OTHER DRIVER CIRCUIT
BCM
DRIVER CIRCUITS SHORTED TOGETHER
MODE DOOR ACTUATOR
WIRING HARNESS INSPECTION

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, erase all BCM DTC's. Turn the Blower switch to low. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Blend Control switch to the full cold position for 30 seconds. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Mode Control switch to each available position pausing for 20 seconds at each position. Turn the Mode Control switch to the Defrost position for 20 seconds. Turn the Mode Control switch to the Recirculation position for 20 seconds. Turn the Mode Control switch to the Defrost position for 20 seconds. With the DRBIII®, read the BCM DTC's. Does the DRBIII® display this DTC? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the In-Line C200 harness connector. Disconnect the BCM C2 harness connector. Turn the ignition on. Measure the voltage of the Mode Door Driver circuit. Is the voltage below 1.0 volt? Yes → Go To 3 No → Repair the Mode Door Driver circuit for a short to voltage. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

MODE DOOR OUTPUT SHORTED TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the In-Line C200 harness connector. Disconnect the BCM C2 harness connector. Measure the resistance between the Mode Door Driver circuit and each of the following circuits: Recirculation Door Driver circuit, the Blend Door Driver circuit, Common Door Driver circuit. Is the resistance below 100.0 ohms for any of the measurements? Yes → Repair the Mode Door Driver circuit for a short to other driver circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the C200 In-Line harness connector. Turn the ignition on. Measure the voltage of the Mode Door Driver circuit at the C200 In-Line harness connector (BCM side). Is the voltage above 1.0 volt? Yes → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the C200 In-Line harness connector. Disconnect the Mode Door Actuator harness connector. Inspect the Mode Door Driver circuit between the C200 harness connector and the Mode Door Actuator harness connector for a short to any other circuit at the connector or the harness. Were any problems found? Yes → Repair the Mode Door Driver circuit for a short to voltage or other driver circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Mode Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

MODE DOOR OUTPUT SHORTED TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
MODE DOOR OUTPUT SHORTED TO GROUND

When Monitored and Set Condition:

MODE DOOR OUTPUT SHORTED TO GROUND

When Monitored: Whenever the BCM attempts to move one of the HVAC actuators.

Set Condition: This DTC will set if the BCM detects one or more of the following outputs shorted to ground: mode door driver, blend door driver, recirculation door driver or the common door driver.

POSSIBLE CAUSES
MODE DOOR DRIVER CIRCUIT SHORT TO GROUND
MODE DOOR DRIVER CKT SHORT TO SENSOR GROUND
MODE DOOR DRIVER WIRE SHORT TO SENSOR GROUND
MODE DOOR ACTUATOR
WIRING HARNESS INSPECTION

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, erase all BCM DTC's. Turn the Blower switch to low. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Blend Control switch to the full cold position for 30 seconds. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Mode Control switch to each available position pausing for 20 seconds at each position. Turn the Mode Control switch to the Defrost position for 20 seconds. Turn the Mode Control switch to the Recirculation position for 20 seconds. Turn the Mode Control switch to the Defrost position for 20 seconds. With the DRBIII®, read the BCM DTC's. Does the DRBIII® display this DTC? Yes → Go To 2 No → Go To 5	All
2	Turn all lights off. Close the driver door latch to turn courtesy lamps off. Disconnect the Body Control Module C2 harness connector. Measure the resistance between ground and the Mode Door Driver circuit. Is the resistance below 100.0 ohms? Yes → Repair the Mode Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All

MODE DOOR OUTPUT SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	Disconnect the Body Control Module C2 harness connector. Measure the resistance between the Mode Door Driver circuit and the Sensor Ground circuit in the BCM C2 connector. Is the resistance below 100.0 ohms? Yes → Go To 4 No → Replace the Body Control Module. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
4	Disconnect the Body Control Module C2 harness connector. Disconnect the Mode Door Actuator harness connector. Measure the resistance between the Mode Door Driver circuit and the Sensor Ground circuit in the BCM C2 connector. Is the resistance below 100.0 ohms? Yes → Repair the Mode Door Driver circuit for a short to the Sensor Ground circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Mode Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
MODE DOOR STALL TEST FAILURE

When Monitored and Set Condition:

MODE DOOR STALL TEST FAILURE

When Monitored: During HVAC motor calibration.

Set Condition: This DTC will set if the BCM is unable to detect the end of travel for the mode door.

POSSIBLE CAUSES
COMMON DOOR DRIVER CIRCUIT OPEN BETWEEN THE BCM AND C200
COMMON DOOR DRIVER CIRCUIT OPEN BETWEEN THE C200 AND ACTUATOR
COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND BETWEEN THE BCM AND C200
COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND BETWEEN THE C200 AND ACTUATOR
MODE DOOR ACTUATOR
MODE DOOR DRIVER CIRCUIT OPEN BETWEEN THE BCM AND C200
MODE DOOR DRIVER CIRCUIT OPEN BETWEEN THE C200 AND ACTUATOR
MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND BETWEEN C200 AND THE ACTUATR
MODE DOOR DRIVER CIRCUIT SHORTED TO GROUND BETWEEN THE BCM AND C200
WIRING HARNESS INSPECTION
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, erase all BCM DTC's. Turn the Blower switch to low. Turn the Mode Control switch to the each available position pausing for 20 seconds at each position. With the DRBIII®, read the BCM DTC's. Is this DTC present? Yes → Go To 2 No → Go To 11	All

MODE DOOR STALL TEST FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the C200 In-Line harness connector. Measure the resistance between ground and the Mode Door Driver circuit at the BCM C2 harness connector. Is the resistance below 100.0 ohms? Yes → Repair the Mode Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the C200 In-Line harness connector. Connect a jumper wire between ground and the Mode Door Driver circuit in the C200 harness connector (BCM side). Using a 12-volt test light connected to 12-volts, check the Mode Door Driver circuit in the BCM C2 harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the Mode Door Driver circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the C200 In-Line harness connector. Measure the resistance between ground and the Common Door Driver circuit in the BCM C2 harness connector. Is the resistance below 100.0 ohms? Yes → Repair the Common Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the C200 In-Line harness connector. Connect a jumper wire between ground and the Common Door Driver circuit in the C200 harness connector (BCM side). Using a 12-volt test light connected to 12-volts, check the Common Door Driver circuit in the BCM C2 harness connector. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Common Door Driver circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

MODE DOOR STALL TEST FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the C200 In-Line harness connector. Connect a test light between the Mode Door Driver circuit and the Common Door Driver circuit at the C200 harness connector (BCM side). Start the engine. With the DRBIII®, select Body, Body Computer, System Tests then Actuate Mode Doors. Select Mode Door. While observing the test light, press and hold the DRB right arrow key for several seconds. While observing the test light, press and hold the DRB left arrow key for several seconds. Is the test light on while the right and left arrow keys are pressed? Yes → Go To 7 No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Disconnect the Mode Door Actuator harness connector. Disconnect the C200 In-Line harness connector. Measure the resistance between ground and the Mode Door Driver circuit in the C200 harness connector (Actuator side). Is the resistance below 100.0 ohms? Yes → Repair the Mode Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off. Disconnect the Mode Door Actuator harness connector. Disconnect the C200 In-Line harness connector. Connect a jumper wire between ground and the Mode Door Driver circuit in the C200 harness connector (Actuator side). Using a 12-volt test light connected to 12-volts, check the Mode Door Driver circuit in the Mode Door Actuator harness connector. Does the test light illuminate brightly? Yes → Go To 9 No → Repair the Mode Door Driver circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

MODE DOOR STALL TEST FAILURE — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the Mode Door Actuator harness connector. Disconnect the C200 In-Line harness connector. Measure the resistance between ground and the Common Door Driver circuit in the C200 harness connector (Actuator side). Is the resistance below 100.0 ohms? Yes → Repair the Common Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 10	All
10	Turn the ignition off. Disconnect the Mode Door Actuator harness connector. Disconnect the C200 In-Line harness connector. Connect a jumper wire between ground and the Common Door Driver circuit in the C200 harness connector (Actuator side). Using a 12-volt test light connected to 12-volts, check the Common Door Driver circuit at the Mode Door Actuator harness connector. Does the test light illuminate brightly? Yes → Replace the Mode Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Common Door Driver circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
11	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
RECIRC DOOR OUTPUT SHORTED TO BATTERY

When Monitored and Set Condition:

RECIRC DOOR OUTPUT SHORTED TO BATTERY

When Monitored: Whenever the BCM attempts to move the Recirculation Door Actuator.

Set Condition: This DTC will set if the BCM detects a short to voltage on the Recirculation Door Driver circuit.

POSSIBLE CAUSES
SHORT TO VOLTAGE BETWEEN BCM AND C200
RECIRCULATION DOOR DRIVER CIRCUIT SHORTED TO OTHER DRIVER CIRCUIT
BCM
DRIVER CIRCUITS SHORTED TOGETHER
RECIRCULATION DOOR ACTUATOR
WIRING HARNESS INSPECTION

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, erase all BCM DTC's. Turn the Blower switch to low. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Blend Control switch to the full cold position for 30 seconds. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Mode Control switch to each available position pausing for 20 seconds at each position. Turn the Mode Control switch to the Defrost position for 20 seconds. Turn the Mode Control switch to the Recirculation position for 20 seconds. Turn the Mode Control switch to the Defrost position for 20 seconds. With the DRBIII®, read the BCM DTC's. Does the DRBIII® display this DTC? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the In-Line C200 harness connector. Disconnect the BCM C2 harness connector. Turn the ignition on. Measure the voltage of the Recirculation Door Driver circuit. Is the voltage below 1.0 volt? Yes → Go To 3 No → Repair the Recirculation Door Driver circuit for a short to voltage. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

RECIRC DOOR OUTPUT SHORTED TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the In-Line C200 harness connector. Disconnect the BCM C2 harness connector. Measure the resistance between the Recirculation Door Driver circuit and each of the following circuits: Blend Door Driver circuit, the Mode Door Driver circuit, Common Door Driver circuit. Is the resistance below 100.0 ohms for any of the measurements? Yes → Repair the Recirculation Door Driver circuit for a short to other driver circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the C200 In-Line harness connector. Turn the ignition on. Measure the voltage of the Recirculation Door Driver circuit at the C200 In-Line harness connector (BCM side). Is the voltage above 1.0 volt? Yes → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the C200 In-Line harness connector. Disconnect the Recirculation Door Actuator harness connector. Inspect the Recirculation Door Driver circuit between the C200 harness connector and the Recirculation Door Actuator harness connector for a short to any other circuit at the connector or the harness. Were any problems found? Yes → Repair the Recirculation Door Driver circuit for a short to voltage or other driver circuit. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Recirculation Door Actuato in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

RECIRC DOOR OUTPUT SHORTED TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
RECIRC DOOR OUTPUT SHORTED TO GROUND

When Monitored and Set Condition:

RECIRC DOOR OUTPUT SHORTED TO GROUND

When Monitored: Whenever the BCM attempts to move one of the HVAC actuators.

Set Condition: This DTC will set if the BCM detects one or more of the following outputs shorted to ground: mode door driver, blend door driver, recirculation door driver or the common door driver.

POSSIBLE CAUSES
RECIRCULATION DOOR DRIVER CIRCUIT SHORT TO GROUND
BODY CONTROL MODULE
WIRING HARNESS INSPECTION

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, erase all BCM DTC's. Turn the Blower switch to low. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Blend Control switch to the full cold position for 30 seconds. Turn the Blend Control switch to the full hot position for 30 seconds. Turn the Mode Control switch to each available position pausing for 20 seconds at each position. Turn the Mode Control switch to the Defrost position for 20 seconds. Turn the Mode Control switch to the Recirculation position for 20 seconds. Turn the Mode Control switch to the Defrost position for 20 seconds. With the DRBIII®, read the BCM DTC's. Does the DRBIII® display this DTC? Yes → Go To 2 No → Go To 3	All
2	Turn all lights off. Close the driver door latch to turn courtesy lamps off. Disconnect the Body Control Module C2 harness connector. Measure the resistance between ground and the Recirculation Door Driver circuit. Is the resistance below 5.0 ohms? Yes → Repair the Recirculation Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

RECIRC DOOR OUTPUT SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
RECIRCULATION DOOR TEST FAILURE (INOPERATIVE OR STALL)

When Monitored and Set Condition:

RECIRCULATION DOOR TEST FAILURE (INOPERATIVE OR STALL)

When Monitored: During HVAC motor calibration.

Set Condition: This DTC will set if the BCM is unable to detect the end of travel for one or more of the HVAC doors.

POSSIBLE CAUSES
COMMON DOOR DRIVER CIRCUIT OPEN BETWEEN THE BCM AND C200
COMMON DOOR DRIVER CIRCUIT OPEN BETWEEN THE C200 AND ACTUATOR
COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND BETWEEN THE BCM AND C200
COMMON DOOR DRIVER CIRCUIT SHORTED TO GROUND BETWEEN THE C200 AND ACTUATOR
RECIRCULATION DOOR ACTUATOR
RECIRCULATION DOOR DRIVER CIRCUIT OPEN BETWEEN THE BCM AND C200
RECIRCULATION DOOR DRIVER CIRCUIT OPEN BETWEEN THE C200 AND ACTUATOR
RECIRCULATION DOOR DRIVER CIRCUIT SHORTED TO GROUND BETWEEN C200 AND THE ACTUATR
RECIRCULATION DOOR DRIVER CIRCUIT SHORTED TO GROUND BETWEEN THE BCM AND C200
WIRING HARNESS INSPECTION
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRBIII®, erase all BCM DTC's. Turn the Blower switch to low. Turn the Mode Control switch to the Defroster position and for 30 seconds. Turn the Mode Control switch to the Recirculation position for 30 seconds. Turn the Mode Control switch to the Defroster position for 30 seconds. With the DRBIII®, read the BCM DTC's. Is this DTC present? Yes → Go To 2 No → Go To 11	All

RECIRCULATION DOOR TEST FAILURE (INOPERATIVE OR STALL) — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the C200 In-Line harness connector. Measure the resistance between ground and the Recirculation Door Driver circuit at the BCM C2 harness connector. Is the resistance below 100.0 ohms? Yes → Repair the Recirculation Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the C200 In-Line harness connector. Connect a jumper wire between ground and the Recirculation Door Driver circuit in the C200 harness connector (BCM side). Using a 12-volt test light connected to 12-volts, check the Recirculation Door Driver circuit in the BCM C2 harness connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the Recirculation Door Driver circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the C200 In-Line harness connector. Measure the resistance between ground and the Common Door Driver circuit in the BCM C2 harness connector. Is the resistance below 100.0 ohms? Yes → Repair the Common Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the BCM C2 harness connector. Disconnect the C200 In-Line harness connector. Connect a jumper wire between ground and the Common Door Driver circuit in the C200 harness connector (BCM side). Using a 12-volt test light connected to 12-volts, check the Common Door Driver circuit in the BCM C2 harness connector. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Common Door Driver circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

RECIRCULATION DOOR TEST FAILURE (INOPERATIVE OR STALL) — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the C200 In-Line harness connector. Connect a test light between the Recirculation Door Driver circuit and the Common Door Driver circuit at the C200 harness connector (BCM side). Turn the ignition on. With the DRBIII®, select Body, Body Computer, System Tests then Actuate Mode Doors. Select Recirc Door. While observing the test light, press and hold the DRB right arrow key for several seconds. While observing the test light, press and hold the DRB left arrow key for several seconds. Is the test light on while the right and left arrow keys are pressed? Yes → Go To 7 No → Replace and program the Body Control Module in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Disconnect the Recirculation Door Actuator harness connector. Disconnect the C200 In-Line harness connector. Measure the resistance between ground and the Recirculation Door Driver circuit in the C200 harness connector (Actuator side). Is the resistance below 100.0 ohms? Yes → Repair the Recirculation Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off. Disconnect the Recirculation Actuator harness connector. Disconnect the C200 In-Line harness connector. Connect a jumper wire between ground and the Recirculation Door Driver circuit in the C200 harness connector (Actuator side). Using a 12-volt test light connected to 12-volts, check the Recirculation Door Driver circuit in the Recirculation Door Actuator harness connector. Does the test light illuminate brightly? Yes → Go To 9 No → Repair the Recirculation Door Driver circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All

RECIRCULATION DOOR TEST FAILURE (INOPERATIVE OR STALL) — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the Recirculation Door Actuator harness connector. Disconnect the C200 In-Line harness connector. Measure the resistance between ground and the Common Door Driver circuit in the C200 harness connector (Actuator side). Is the resistance below 100.0 ohms? Yes → Repair the Common Door Driver circuit for a short to ground. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Go To 10	All
10	Turn the ignition off. Disconnect the Recirculation Actuator harness connector. Disconnect the C200 In-Line harness connector. Connect a jumper wire between ground and the Common Door Driver circuit in the C200 harness connector (Actuator side). Using a 12-volt test light connected to 12-volts, check the Common Door Driver circuit at the Recirculation Door Actuator harness connector. Does the test light illuminate brightly? Yes → Replace the Recirculation Door Actuator in accordance with the Service Information. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Common Door Driver circuit for an open. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1.	All
11	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Calibration must be performed after repair/replacement is completed. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
*A/C - HEATER CONTROL ILLUMINATION INOPERATIVE

POSSIBLE CAUSES
A/C - HEATER CONTROL ILLUMINATION INOPERATIVE

TEST	ACTION	APPLICABILITY
1	View Repair. Repair Refer to Instrument Panel Illumination Inoperative in the Interior Lighting catagory for the diagnostic procedure. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*A/C SYSTEM TEST

POSSIBLE CAUSES
ATTEMPT TO COMMUNICATE WITH THE PCM AND THE BCM
CHECK FOR HVAC RELATD DTCS IN THE PCM AND THE BCM
MONITOR THE DRBIII® FOR HVAC DTCS
CHECK FOR HVAC RELATD DTCS IN THE PCM
MANUAL A/C SYSTEM TEST

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, attempt to communicate with the Powertrain Control Module. With the DRBIII®, attempt to communicate with the Body Control Module. Was the DRBIII® able to communicate with the PCM and the BCM? Yes → Go To 2 No → Refer to the communication category for the related symptom. Perform BODY VERIFICATION TEST - VER 1.	All
2	With the DRBIII®, read Powertrain Computer DTC's. With the DRBIII®, read Body Computer DTC's. Are any HVAC related DTCs present? Yes → Refer to the appropriate catagory for the related symptom. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition on. Turn the Rear Defogger off. Turn the Blend Control switch to the full cold position. Turn the Mode Control switch to the Panel - Heater position. Turn the Blower switch off. With the DRBIII®, record and erase Powertrain Computer DTC's. With the DRBIII®, record and erase Body Computer DTCs. Start the engine. **NOTE: Proceed directly to the conclusion of this test and answer Yes to the question if the DRBIII® displays any HVAC related DTC(s) while performing anyone of the following steps.** Monitor the DRBIII® for HVAC related DTCs in the Body Computer while performing the following. Turn the Blower switch on. With the DRBIII® in Miscellaneous, actuate Calibrate HVAC Door Motors. Slowly turn the Blend Control switch from full cold to full hot, then back to full cold. Turn the Mode Control switch to each position, waiting 20 seconds in each position. Press and release the Rear Defogger button, wait 20 seconds, then press and release it again to turn the Rear Defogger off. Does the DRBIII® display any HVAC related Body Computer DTCs? Yes → Return to the Symptom List and choose the code(s). If multiple codes appear, repair any that relate to a short circuit first. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All

*A/C SYSTEM TEST — Continued

TEST	ACTION	APPLICABILITY
4	With the DRBIII®, read PCM DTC's. Are any HVAC related DTCs present? Yes → Refer to the appropriate catagory for the related symptom. Perform BODY VERIFICATION TEST - VER 1. No → Recheck the climate control system performance. Refer to Service Information for additional information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*BLOWER MOTOR INOPERATIVE

POSSIBLE CAUSES
JUNCTION BLOCK FUSE #1
BLOWER MOTOR FEED CIRCUIT SHORTED TO GROUND
BLOWER MOTOR SHORTED TO GROUND
GROUND CIRCUIT OPEN
A/C - HEATER CONTROL OPEN
BLOWER MOTOR DRIVER CIRCUIT OPEN
RESISTOR-OPEN HI BLOWER MOTOR DRIVER
BLOWER MOTOR DRIVER CIRCUIT OPEN
BLOWER MOTOR FEED CIRCUIT OPEN
BLOWER MOTOR OPEN

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Remove and inspect Junction Block Fuse #1. Is the fuse open? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. Replace Junction Block Fuse #1. Turn the ignition on. Turn the blower on and operate it in all speeds and modes. Does the blower motor operate properly without blowing the fuse? Yes → Check the Blower Motor Feed circuit for an intermittent short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Turn the Blower switch off. Disconnect the Blower Motor harness connector. Measure the resistance between ground and the Blower Motor Feed circuit. Is the resistance below 10K ohms? Yes → Repair the Blower Motor Feed circuit for a short to ground and replace the fuse. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Blower Motor and fuse in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

*BLOWER MOTOR INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
4	Ensure Junction Block Fuse #1 is installed. Turn the Blower switch off. Disconnect the Blower Motor Resistor Block harness connector. Turn the ignition on. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Using a 12-volt test light connected to ground, back probe the Blower Motor Driver circuit in the Blower Motor Resistor Block harness connector. Does the test light illuminate brightly? Yes → Go To 5 No → Go To 8	All
5	Turn the ignition off. Disconnect the A/C - Heater Control C2 harness connector. Connect a jumper wire between ground and the High Blower Motor Driver circuit in the A/C - Heater Control C2 harness connector. Turn the ignition on. Does the blower motor run at high speed? Yes → Go To 6 No → Go To 7	All
6	Turn the ignition off. Disconnect the A/C - Heater Control C2 harness connector. Measure the resistance between ground and the Ground circuit. Is the resistance below 5.0 ohms? Yes → Replace the A/C - Heater Control in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Disconnect the A/C - Heater Control C2 harness connector. Disconnect the Blower Motor Resistor Block harness connector. Measure the resistance of the High Blower Motor Driver circuit between the A/C - Heater Control C2 harness connector and the Blower Motor Resistor Block harness connector. Is the resistance below 5.0 ohms? Yes → Replace the Blower Motor Resistor Block in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Repair the High Blower Motor Driver circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

*BLOWER MOTOR INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the Blower switch off. Turn the ignition on. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Using a 12-volt test light connected to ground, back probe the Blower Motor Driver circuit in the Blower Motor harness connector. Does the test light illuminate brightly? Yes → Repair the Blower Motor Driver circuit for an open. Perform BODY VERIFICATION TEST - VER 1. No → Go To 9	All
9	Turn the Blower switch off. Turn the ignition on. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Using a 12-volt test light connected to ground, back probe the Blower Motor Feed circuit in the Blower Motor harness connector. Does the test light illuminate brightly? Yes → Replace the Blower Motor in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Blower Motor Feed circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*BLOWER MOTOR SPEEDS INCORRECT

POSSIBLE CAUSES
BLOWER MOTOR DRIVER CIRCUIT(S) SHORTED TO GROUND
BLOWER MOTOR DRIVER CIRCUIT SHORTED TO GROUND
A/C - HEATER CONTROL
BLOWER MOTOR DRIVER CIRCUIT(S) SHORTED TO VOLTAGE
BLOWER MOTOR DRIVER CIRCUITS SHORTED TOGETHER
A/C - HEATER CONTROL - SPEEDS INCORRECT
BLOWER MOTOR DRIVER CIRCUIT(S) OPEN
BLOWER MOTOR RESISTOR BLOCK - OPEN SPEED

TEST	ACTION	APPLICABILITY
1	Turn the Blower switch off. Turn the ignition on. Does the blower run? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. Disconnect the A/C - Heater Control C2 harness connector. Disconnect the Blower Motor Resistor Block harness connector. Measure the resistance between ground and each of the Blower Motor Driver circuits. Is the resistance below 10K ohms on any of the circuits? Yes → Repair the Blower Motor Driver circuit(s) for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the Blower Motor harness connector. Disconnect the Blower Motor Resistor Block harness connector. Measure the resistance between ground and the Blower Motor Driver circuit in the Blower Motor harness connector. Is the resistance below 10K ohms? Yes → Repair the Blower Motor Driver circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the A/C - Heater Control in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

*BLOWER MOTOR SPEEDS INCORRECT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the A/C - Heater Control C2 harness connector. Turn the ignition on. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Using a 12-volt test light connected to ground, back probe each of the Blower Motor Driver circuits (cavities 2, 3, 7, and 10) in the A/C - Heater Control C2 harness connector. Does the test light illuminate brightly on each circuit? Yes → Go To 5 No → Go To 7	All
5	Turn the ignition off. Disconnect the A/C - Heater Control C2 harness connector. Disconnect the Blower Motor Resistor Block harness connector. Measure the voltage of each of the Blower Motor Driver circuits (cavities 2, 3, 7, and 10). Is there any voltage present? Yes → Repair the Blower Motor Driver circuit(s) for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the A/C - Heater Control C2 harness connector. Disconnect the Blower Motor Resistor Block harness connector. Measure the resistance between the Low Blower Motor Driver circuit and the M1, M2, and High Blower Motor Driver circuits. Measure the resistance between the M1 Blower Motor Driver circuit and the M2 and High Blower Motor Driver circuits. Measure the resistance between the M2 Blower Motor Driver circuit and the High Blower Motor Driver circuit. Is the resistance below 10K ohms between any of the circuits? Yes → Repair the shorted Blower Motor Driver circuits. Perform BODY VERIFICATION TEST - VER 1. No → Replace the A/C - Heater Control in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Turn the Blower switch to the off position. Disconnect the A/C - Heater Control C2 harness connector. Disconnect the Blower Motor Resistor Block harness connector. Measure the resistance of each Blower Motor Driver circuit between the Blower Motor Resistor Block harness connector and the A/C - Heater Control C2 harness connector. Is the resistance below 5.0 ohms on each of the circuits? Yes → Replace the Blower Motor Resistor Block in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Blower Motor Driver circuit(s) for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom List:

ABS LAMP CIRCUIT OPEN
ABS LAMP CIRCUIT SHORT
AIRBAG LAMP CIRCUIT OPEN
AIRBAG LAMP CIRCUIT SHORT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be ABS LAMP CIRCUIT OPEN.

When Monitored and Set Condition:

ABS LAMP CIRCUIT OPEN

When Monitored: The Instrument Cluster performs an internal diagnostic of the indicator circuit at power up and when the bulb is requested.

Set Condition: When the Instrument Cluster detects a fault in the ABS bulb circuit.

ABS LAMP CIRCUIT SHORT

When Monitored: The Instrument Cluster performs an internal diagnostic at power up and when the bulb is requested.

Set Condition: When the Instrument Clusteris detects a fault in the ABS bulb circuit.

AIRBAG LAMP CIRCUIT OPEN

When Monitored: The Instrument Cluster performs an internal diagnostic of the circuit at power up and when the bulb is requested.

Set Condition: When the Instrument Cluster is detects a fault in the Airbag bulb circuit.

AIRBAG LAMP CIRCUIT SHORT

When Monitored: The Instrument Cluster performs an internal diagnostic at power up and when the bulb is requested.

Set Condition: When the Instrument Cluster detects a fault in the Airbag bulb circuit.

POSSIBLE CAUSES
INDICATOR BULB
INSTRUMENT CLUSTER

ABS LAMP CIRCUIT OPEN — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the Junction Block Fuse #11 is not open. If the fuse is open make sure to check for a short to ground.** Turn the ignition on. With the DRBIII®, record and erase DTC's. Turn the ignition off, wait 15 seconds, then turn the ignition on. With the DRBIII®, read DTCs. Did the Indicator Lamp Open or Short DTC reset? Yes → Go To 2 No → Test Complete.	All
2	Turn the ignition off. Remove and inspect the Indicator Bulb in question. Is the Indicator Bulb in question defective? Yes → Replace the Indicator Bulb in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
FUEL LEVEL SENDING UNIT FAILURE

When Monitored and Set Condition:

FUEL LEVEL SENDING UNIT FAILURE

When Monitored: With the ignition on.

Set Condition: The BCM detects an out of range, open or short circuit on the Fuel Level Sensor Signal circuit.

POSSIBLE CAUSES
FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
FUEL LEVEL SENSOR SIGNAL CIRCUIT OPEN
FUEL LEVEL SENSOR GROUND CIRCUIT OPEN
FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORT TO SENSOR GROUND CIRCUIT
FUEL LEVEL SENSOR SIGNAL CIRCUIT SHORT TO GROUND
FUEL LEVEL SENSOR
INTERMITTENT CONDITION
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTCs. Cycle the ignition. Wait approximately 1 minute. With the DRBIII® in Body Computer, read DTCs. Does the DTC reset? Yes → Go To 2 No → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wire harness. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness and connector terminals. Perform BODY VERIFICATION TEST - VER 1.	All

FUEL LEVEL SENDING UNIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the Fuel Tank Module harness connector. Turn the ignition on. **NOTE: The BCM sends out a low current 12 volt signal on the Fuel Level Sensor Signal circuit. This low current should not illuminate a 12 volt test light.** Using a 12-volt test light connected to ground, probe the Fuel Level Sensor Signal circuit in the Fuel Tank Module harness connector. Does the test light illuminate? Yes → Repair the Fuel Level Sensor Signal circuit for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the Fuel Tank Module harness connector. Measure the resistance of the Fuel Level Sensor Ground circuit in the Fuel Tank Module harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the Fuel Level Sensor Ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Disconnect the BCM harness connector. Disconnect the Fuel Tank Module harness connector. Measure the resistance between the Fuel Level Sensor Signal circuit and the Sensor Ground circuit in the BCM connector. Is the resistance below 5.0 ohms? Yes → Repair the Fuel Level Sensor Signal circuit for a short to the Sensor Ground circuit. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the BCM harness connector. Disconnect the Fuel Tank Module harness connector. Measure the resistance between ground and the Fuel Level Sensor Signal circuit. Is the resistance below 5.0 ohms? Yes → Repair the Fuel Level Sensor Signal circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the Fuel Tank Module harness connector. Disconnect the BCM harness connector. Measure the resistance of the Fuel Level Sensor Signal circuit between the Fuel Tank Module harness connector and the BCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Fuel Level Sensor Signal circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

FUEL LEVEL SENDING UNIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the Fuel Tank Module harness connector. Measure the resistance of the Fuel Level Sensor. The Fuel Level Sensor resistance must be within the following values: Full = Approximately 130 Ohms 3/4 = Approximately 340 Ohms 1/2 = Approximately 550 Ohms 1/4 = Approximately 760 Ohms Empty = Approximately 940 Ohms Does the Fuel Level Sensor resistance measure within specifications? Yes → Replace the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Fuel Level Sensor in accordance with the Service Information.. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom List:

NO ABS BUS MESSAGES RECEIVED
NO BCM BUS MESSAGES RECEIVED
NO ORC BUS MESSAGES RECEIVED
NO TCM BUS MESSAGES RECEIVED

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be NO ABS BUS MESSAGES RECEIVED.

When Monitored and Set Condition:

NO ABS BUS MESSAGES RECEIVED

When Monitored: With the ignition on.

Set Condition: The Instrument Cluster detects loss of PCI Bus communication with the ABS module for 10 seconds. The cluster will illuminate the BRAKE and ABS warning lamp indicators.

NO BCM BUS MESSAGES RECEIVED

When Monitored: With the ignition on.

Set Condition: The Instrument Cluster detects no PCI Bus communiaction with the BCM for 5 seconds. The cluster will position the Fuel Gauge needle to ″E″, illuminate the Low Fuel indicator, and illuminate the VF display at full brightness.

NO ORC BUS MESSAGES RECEIVED

When Monitored: With the ignition on.

Set Condition: The Instrument Cluster detects no PCI Bus communication with the ORC for 5 seconds. The cluster will illuminate the Airbag indicator.

NO TCM BUS MESSAGES RECEIVED

When Monitored: With the ignition on.

Set Condition: The Instrument Cluster detects no PCI Bus communication with the TCM for 10 seconds. The cluster will illuminate all gears in the VF display.

POSSIBLE CAUSES
NO COMMUNICATION WITH THE ABS, BCM, ORC, OR TCM MODULE

NO ABS BUS MESSAGES RECEIVED — Continued

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, attempt to communicate with the ABS, BCM, ORC, or TCM module. Was the DRB able to I/D or communicate with the module in question? Yes → Test Complete. No → Refer to the Communication category for the related symptom(s). Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
PANEL DIMMING OUTPUT SHORT

POSSIBLE CAUSES
INTERMITTENT CONDITION
PANEL LAMPS DRIVER CIRCUIT SHORT TO GROUND
COMPONENT SHORTED
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, record and erase Body Control Module DTC's. Turn the ignition off, wait 15 seconds, then turn the ignition on. Turn on the Headlamps. With the DRBIII®, read DTCs. Does the DRBIII® display PANEL DIMMING OUTPUT SHORT? Yes → Go To 2 No → Test Complete.	All
2	Turn the ignition on. With the DRBIII®, erase Body Control Module DTCs. Turn the ignition off. Using the Wiring Diagrams as a guide, disconnect each dimmed component , one at a time while checking for the DTC to reset. Turn the ignition on. Turn the Headlamps on. With the DRBIII®, read DTCs. Does the DRBIII® display PANEL DIMMING OUTPUT SHORT? Yes → Go To 3 No → Replace the shorted component as necessary. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Using the Wiring Diagrams as a guide, disconnect each dimmed component and test the dimming circuit for a short to ground condition. Were there any problems found? Yes → Repair the Panel Lamps Driver circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace and program the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
PCM MESSAGE NOT RECEIVED

When Monitored and Set Condition:

PCM MESSAGE NOT RECEIVED

When Monitored: With the ignition on.

Set Condition: When the Instrument Cluster detects no PCI Bus communication with the PCM for 20 seconds. The cluster will illuminate the CHECK ENGINE indicator and the VF will display NO BUS. The Tachometer, Speedometer, and Temperature gauge pointers will be driven against their pointer stops. The Engine Temp, Charging System, and Cruise indicators will latch to their last known state.

POSSIBLE CAUSES
PCM MESSAGE NOT RECEIVED
NO COMMUNICATION WITH THE PCM
PCI BUS CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, enter Instrument Cluster, System Tests then PCM Monitor. Does the DRBIII® display: PCM is active on the BUS? Yes → Erase the DTC, if DTC resets, replace the Instrument Cluster in accordance with the Service Information.. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, attempt to communicate with the PCM. Was the DRBIII® able to communicate with the PCM? Yes → Go To 3 No → Refer to the Communication category and perform the appropriate symptom. Perform BODY VERIFICATION TEST - VER 1.	All

PCM MESSAGE NOT RECEIVED — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM C2 harness connector. Connect the diagnostic junction port tester #8339 to the diagnostic junction port. **NOTE: Do not connect the tester to the DRBIII®.** Measure the resistance of the PCI Bus circuit between the diagnostic junction port tester and the PCM C2 connector. Is the resistance below 5.0 ohms? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Repair the PCI Bus circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*BRAKE WARNING INDICATOR ALWAYS ON

POSSIBLE CAUSES
BRAKE FLUID LEVEL SWITCH
PARK BRAKE SWITCH
RED BRAKE WARNING INDICATOR DRIVER CIRCUIT SHORT TO GROUND
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	**NOTE: If vehicle is equipped with ABS, diagnose and repair any ABS Lamp or Communication DTCs before proceeding with this test.** **NOTE: If vehicle is NOT equipped with ABS, ensure that the Instrument Cluster is not configured for ABS.** **NOTE: Ensure that the Brake Fluid is correctly filled and that the Base Brakes are operating properly before proceeding with this test.** Turn the ignition off. Disconnect the Brake Fluid Level Switch harness connector. Turn the ignition on. Observe the Brake Warning Indicator. Is the Brake Warning Indicator illuminated? Yes → Go To 2 No → Replace the Brake Fluid Level Switch in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the Park Brake Switch harness connector. Turn the ignition on. Observe the Brake Warning Indicator. Is the Brake Warning Indicator illuminated? Yes → Go To 3 No → Replace the Park Brake Switch in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Disconnect the Brake Fluid Level Switch harness connector. Disconnect the Park Brake Switch harness connector. Disconnect the Instrument Cluster harness connector. Measure the resistance between ground and the Red Brake Warning Indicator circuit. Is the resistance below 5.0 ohms? Yes → Repair the Red Brake Warning Indicator Driver circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*BRAKE WARNING INDICATOR INOPERATIVE

POSSIBLE CAUSES
INDICATOR BULB
PARK BRAKE SWITCH
PARK BRAKE SWITCH RED BRAKE WARNING INDICATOR DRIVER CIRCUIT OPEN
BRAKE FLUID LEVEL SWITCH
BRAKE FLUID LEVEL SWITCH GROUND CIRCUIT OPEN
BRAKE FLUID LEVEL SWITCH RED BRAKE WARNING INDICATOR DRIVER CIRCUIT OPEN
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	Perform the Instrument Cluster Self Test. Turn the ignition off. Press and hold the Trip Reset button. Turn the ignition to the Unlock position. Release the Trip Reset button when the Self Test begins. Observe the Brake Warning Indicator during the Self Test. Did the Brake Warning Indicator illuminate for approximately 4 seconds and turn off? Yes → Go To 2 No → Remove and inspect the Brake Warning Indicator bulb and socket, if found to be defective, replace as necessary. If the bulb and socket check OK, replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
2	Is the fault condition related to the Park Brake? Yes → Go To 3 No → Go To 5	All
3	Turn the ignition off. Disconnect the Park Brake Switch harness connector. Connect a jumper wire between the Red Brake Warning Indicator circuit and ground. Turn the ignition on. Observe the Brake Warning Indicator. Did the Brake Warning Indicator illuminate? Yes → Replace the Park Brake Switch in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All

*BRAKE WARNING INDICATOR INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Park Brake Switch harness connector. Disconnect the Instrument Cluster harness connector. Measure the resistance of the Red Brake Warning Indicator circuit between the Park Brake Switch connector and the Instrument Cluster connector. Is the resistance above 5.0 ohms? Yes → Repair the Red Brake Warning Indicator Driver circuit between the Park Brake Switch and the Instrument Cluster for an open. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the Brake Fluid Level Switch harness connector. Connect a jumper wire between cavity 1 and cavity 2. Turn the ignition on. Observe the Brake Warning Indicator. Did the Brake Warning Indicator illuminate? Yes → Replace the Brake Fluid Level Switch in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the Brake Fluid Level Switch harness connector. Measure the resistance between ground and the Brake Fluid Level Switch Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Brake Fluid Level Switch Ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Disconnect the Brake Fluid Level Switch harness connector. Disconnect the Instrument Cluster harness connector. Measure the resistance of the Red Brake Warning Indicator Driver circuit between the Brake Fluid Level Switch connector and the Instrument Cluster connector. Is the resistance below 5.0 ohms? Yes → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Red Brake Warning Indicator Driver circuit between the Brake Fluid Level Switch and the Instrument Cluster for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*CHARGING SYSTEM WARNING INDICATOR NOT OPERATING PROPERLY

POSSIBLE CAUSES
DTC PRESENT
INTERMITTENT CONDITION
INDICATOR BULB
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the Junction Block Fuse #11 is not open. If the fuse is open make sure to check for a short to ground.** **NOTE: Ensure that there is communication between the PCM, BCM, and the Instrument Cluster before proceeding with this test.** Perform the Instrument Cluster Self Test. Turn the ignition off. Press and hold the Trip Reset button. Turn the ignition to the Unlock position. Release the Trip Reset button when the Self Check begins. Observe the Charging System Warning Indicator during the Self Test. Did the Charging System Warning Indicator illuminate for approximately 4 seconds and then turn off? Yes → Go To 2 No → Go To 3	All
2	Using the DRBIII®, read DTC's. Are there any DTC's present? Yes → Refer to symptom list for problems related to the DTC. Perform BODY VERIFICATION TEST - VER 1. No → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wire harness. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness and connector terminals. Perform BODY VERIFICATION TEST - VER 1.	All
3	Remove and inspect the Charging System Warning Indicator bulb and socket. Is the indicator bulb or socket defective? Yes → Replace the Indicator bulb or socket as necessary in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*CRUISE ENGAGED INDICATOR INOPERATIVE

POSSIBLE CAUSES
NO CRUISE OPERATION
INDICATOR BULB
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the Junction Block Fuse #11 is not open. If the fuse is open make sure to check for a short to ground.** **NOTE: Ensure that there is communication between the PCM, BCM, and the Instrument Cluster before proceeding with this test.** Perform the Instrument Cluster Self Test. Turn the ignition off. Press and hold the Trip Reset button. Turn the ignition to the Unlock position. Release the Trip Reset button when the Self Test begins. Observe the Cruise Indicator during the Self Test. Did the Cruise indicator illuminate for approximately 4 seconds and then turn off? Yes → Go To 2 No → Go To 3	All
2	Start the engine. Drive the vehicle. Activate the Cruise system. Does the Cruise system operate properly? Yes → Test Complete. No → Refer to Cruise diagnostics for the related symptom(s). Perform BODY VERIFICATION TEST - VER 1.	All
3	Remove and inspect the Cruise Engaged Indicator Lamp bulb and socket. Is the bulb or socket defective? Yes → Replace the Cruise Indicator bulb or socket as necessary in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:

*ENGINE COOLANT TEMPERATURE GAUGE INOPERATIVE OR INACCURATE

POSSIBLE CAUSES
DTC PRESENT
ENGINE COOLANT TEMPERATURE BUS MESSAGE
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	Using the DRBIII® read EMIC, PCM, and BCM DTC's. Are there any DTC's present? Yes → Refer to DRIVEABILITY information for the related symptom(s). Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Perform the Instrument Cluster Self Test. Turn the ignition off. Press and hold the Trip Reset button. Turn the ignition to the Unlock position. Observe the Engine Coolant Temperature gauge during the Self Test. The gauge will position the indicator needle at the following calibration points: C, H, 1/2, C Did the Engine Coolant Temperature Gauge position the needle correctly? Yes → Go To 3 No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition on. With the DRBIII®, read the Engine Coolant Temperature in the PCM, EMIC and the BCM. Does either the EMIC or BCM display a different Engine Coolant Temperature than the PCM? Yes → Refer to symptom list for problems related to inaccurate Engine Coolant Temperature reading and communications. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*ENGINE COOLANT TEMPERATURE INDICATOR NOT OPERATING PROPERLY

POSSIBLE CAUSES
DTC PRESENT
ENGINE COOLANT TEMPERATURE WARNING INDICATOR LED
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that there is communication between the PCM, BCM, and the Instrument Cluster before proceeding with this test.** Perform the Instrument Cluster Self Test. Turn the ignition off. **NOTE: The Instrument Cluster will illuminate the Engine Coolant Temperature indicator at 124°C (255°F). The indicator will turn off at 121°C (250°F).** Press and hold the Trip Reset button. Turn the ignition to the Unlock position. Release the Trip Reset button when the Self Test begins. Observe the Engine Coolant Temperature Warning indicator during the Self Test. Did the Engine Coolant Temperature indicator illuminate for approximately 4 seconds and then turn of Yes → Go To 2 No → Go To 3	All
2	Turn the ignition on. Using the DRBIII® read DTC's. Are there any DTC's present? Yes → Refer to symptom list for problems related to DRIVEABILITY. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Remove the Engine Coolant Temperature Warning Indicator LED. Using a DVOM, select ″Diode Mode″ and connect the leads across the LED. **CAUTION: Ensure that the RED lead is on the ″+″ of the LED.** Did the Engine Coolant Temperature Warning Indicator LED illuminate? Yes → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Engine Coolant Temperature Warning Indicator LED in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*FUEL GAUGE NOT OPERATING PROPERLY

POSSIBLE CAUSES
INTERMITTENT CONDITION
FUEL LEVEL SENSOR
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that there is communication between the PCM, BCM, and the Instrument Cluster before proceeding with this test.** Perform the Instrument Cluster Self Test. Turn the ignition off. Press and hold the Trip/Reset button. Turn the ignition to the Unlock position. Observe the Fuel Gauge during the Self Test. The Fuel Gauge should position the indicator needle at the following calibration points: E, F, 1/2, E Did the Fuel Gauge position the needle correctly? Yes → Go To 2 No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the Fuel Pump Module harness connector. Measure the resistance of the Fuel Level Sensor. The Fuel Level Sensor resistance must be within the following values: Full = Approximately 130 Ohms 3/4 = Approximately 340 Ohms 1/2 = Approximately 550 Ohms 1/4 = Approximately 760 Ohms Empty = Approximately 940 Ohms Does the Fuel Level Sensor resistance measure within specifications? Yes → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wire harness. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness and connector terminals. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Fuel Level Sensor in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*HIGH BEAM INDICATOR ALWAYS ON

POSSIBLE CAUSES
DIMMER SWITCH HIGH BEAM OUTPUT CIRCUIT SHORT TO VOLTAGE
JUNCTION BLOCK SHORT TO VOLTAGE
MULTI- FUNCTION SWITCH
BODY CONTROL MODULE
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII® in Body Control Inputs/Outputs, read the Hi Beams state. Does the DRBIII® Inputs/Outputs, display On? Yes → Go To 2 No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the Multi- Function Switch harness connector. Turn the ignition on. With the DRBIII® in Body Control Inputs/Outputs, read the Hi Beams state. Does the DRBIII® display On? Yes → Go To 3 No → Replace the Multi- Function Switch in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Disconnect the Multi- Function Switch harness connector. Disconnect the Junction Block C6 harness connector. Turn the ignition on. Measure the voltage between the Dimmer Switch High Beam Output circuit and ground. Is there any voltage present? Yes → Repair the Dimmer Switch High Beam Output circuit between the Multi- Function Switch and the Junction Block for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All

*HIGH BEAM INDICATOR ALWAYS ON — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Junction Block C6 harness connector. Turn the ignition on. Measure the voltage between the #3 Fuse in the Junction Block and ground. Is there any voltage present? Yes → Replace the Junction Block in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*HIGH BEAM INDICATOR INOPERATIVE

POSSIBLE CAUSES
INDICATOR BULB
DIMMER SWITCH HIGH BEAM OUTPUT CIRCUIT OPEN
BODY CONTROL MODULE
JUNCTION BLOCK
MULTI- FUNCTION SWITCH OPEN
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the Junction Block Fuse #11 is not open. If the fuse is open make sure to check for a short to ground.** **NOTE: Ensure that the Exterior High Beam Headlamps operate properly before proceeding with this test.** Turn the ignition on. With the DRBIII® in MIC Actuators, actuate the Hi Beam Lamp. Did the High Beam Indicator illuminate? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition on. With the DRBIII® in Body Control Inputs/Outputs, read the Hi Beams state while actuating the High Beam Headlamps. Does the DRBIII® Inputs/Outputs display On? Yes → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the Junction Block C6 harness connector. Actuate the High Beam Headlamps. Measure the voltage between the Dimmer Switch High Beam Output circuit and ground at the Junction Block C6 harness connector. Is the voltage above 10.5 volts? Yes → Go To 4 No → Go To 5	All

*HIGH BEAM INDICATOR INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect and isolate the Negative Battery cable. Disconnect the Junction Block C6 harness connector. Disconnect the BCM from the Junction Block. Using the Wiring Diagrams as a guide, measure the resistance of the Dimmer Switch High Beam Output circuit through the Junction Block. Is the resistance above 10 ohms? Yes → Replace the Junction Block in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the Junction Block C6 harness connector. Disconnect the Multi- Function Switch harness connector. Measure the resistance of the Dimmer Switch High Beam Output circuit. Is the resistance above 5.0 ohms? Yes → Repair the Dimmer Switch High Beam Output circuit between the Multi- Function Switch and the Junction Block for an open. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Multi- Function Switch in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Remove and inspect the High Beam Indicator bulb and socket. Is the bulb or socket defective? Yes → Replace the High Beam Indicator Bulb or socket in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*LOW FUEL WARNING INDICATOR NOT OPERATING PROPERLY

POSSIBLE CAUSES
DTC PRESENT
INTERMITTENT CONDITION
INDICATOR LED
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the Junction Block Fuse #11 is not open. If the fuse is open make sure to check for a short to ground.** **NOTE: Ensure that there is communication between the PCM, BCM, and the Instrument Cluster before proceeding with this test.** Perform the Instrument Cluster Self Test. Turn the ignition off. Press and hold the Trip/Reset button. Turn the ignition to the Unlock position. During the Self Test all of the Indicators should illuminate for approximately 4 seconds. Observe the Low Fuel Warning Indicator during the Self Test. Did the Low Fuel Warning Indicator illuminate for approximately 4 seconds then turn off? Yes → Go To 2 No → Go To 3	All
2	Using the DRBIII® read DTC's. Is the DTC FUEL LEVEL SENDING UNIT INOP present? Yes → Refer to symptom list for diagnosis of the DTC. Perform BODY VERIFICATION TEST - VER 1. No → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wire harness. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness connector terminals. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Remove and test the Low Fuel Warning Indicator LED. Using a DVOM, select ″Diode Mode″ and connect the leads across the LED. **NOTE: Ensure that the RED lead is on the ″+″ of the LED.** Did the Low Fuel Warning Indicator LED illuminate? Yes → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Low Fuel Warning Indicator LED in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*MALFUNCTION INDICATOR LAMP NOT OPERATING PROPERLY

POSSIBLE CAUSES
DTC PRESENT
INTERMITTENT CONDITION
INDICATOR BULB OR SOCKET
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that there is communication between the PCM, BCM, and the Instrument Cluster before proceeding with this test.** Perform the Instrument Cluster Self Test. Turn the ignition off. Press and hold the Trip/Reset button. Turn the ignition to the Unlock position. During the self test all Indicators should illuminate for approximately 4 seconds. Observe the Malfunction Indicator Lamp during the Self Test. Did the Malfunction Indicator Lamp Indicator illuminate for approximately 4 seconds then turn off? Yes → Go To 2 No → Go To 3	All
2	Using the DRBIII® read DTC's. Are there any DTC's present? Yes → Refer to symptom list for problems related to the DTC. Perform BODY VERIFICATION TEST - VER 1. No → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wire harness. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness and connector terminals. Perform BODY VERIFICATION TEST - VER 1.	All
3	Remove and inspect the Malfunction Indicator Lamp bulb and socket. Is there a problem with the bulb or socket? Yes → Replace the Indicator bulb or socket as necessary in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*OIL PRESSURE INDICATOR NOT OPERATING PROPERLY

POSSIBLE CAUSES
INTERMITTENT CONDITION
OIL PRESSURE INDICATOR CIRCUIT SHORT TO GROUND
OIL PRESSURE SWITCH ALWAYS CLOSED
OIL PRESSURE SWITCH ALWAYS OPEN
OIL PRESSURE WARNING LAMP INDICATOR BULB OR SOCKET
OIL PRESSURE INDICATOR CIRCUIT SHORT TO VOLTAGE
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
OIL PRESSURE INDICATOR CIRCUIT OPEN
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the engine has normal operating oil pressure before proceeding with test. Refer to the Service Manual for specifications.** Without starting the engine, turn the ignition on. Does the Oil Pressure Indicator illuminate? Yes → Go To 2 No → Go To 4	All
2	Start the engine. Does the Oil Pressure Indicator turn off? Yes → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wire harness. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness and connector terminals. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the Instrument Cluster harness connector. Disconnect the Oil Pressure Switch harness connector. Measure the resistance between ground and the Oil Pressure Switch circuit. Is the resistance below 5.0 ohms? Yes → Repair the Oil Pressure Indicator circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Oil Pressure Switch in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

*OIL PRESSURE INDICATOR NOT OPERATING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
4	Remove and inspect the Oil Pressure Warning Indicator Lamp bulb and socket. Is there a problem with the bulb or socket? Yes → Replace the Indicator bulb or socket as necessary in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the Instrument Cluster harness connector. Disconnect the Oil Pressure Switch harness connector. Turn the ignition on. Measure the voltage between the Oil Pressure Indicator circuit and ground. Is there any voltage present? Yes → Repair the Oil Pressure Indicator circuit for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Disconnect the Instrument Cluster harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the Fused Ignition Switch Output circuit. Does the test light illuminate brightly? Yes → Go To 7 No → Repair the Fused Ignition Switch Output circuit for an open or high resistance circuit. If the fuse is open make sure to check for a short to ground and repair as necessary. Perform BODY VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Disconnect the Oil Pressure Switch harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, check the Oil Pressure Indicator circuit. Does the test light illuminate brightly? Yes → Go To 8 No → Repair the Oil Pressure Indicator circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
8	Turn the ignition off. Disconnect the Oil Pressure Switch harness connector. Measure the resistance between the Oil Pressure Switch terminal pin and ground. **NOTE: With the engine not running the Oil Pressure Switch should be closed to ground.** Does the Oil Pressure Switch terminal pin have continuity to ground? Yes → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Oil Pressure Switch in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*PRND OR AUTOSTICK INDICATOR INACCURATE OR INOPERATIVE

POSSIBLE CAUSES
DTC PRESENT
INTERMITTENT CONDITION
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the correct Instrument Cluster is installed and is correctly configured for the vehicle.** **NOTE: Ensure that there is communication between the MIC, PCM, and the TCM before proceeding with this test.** **NOTE: Diagnose and repair any DTCs before proceeding with this test.** **NOTE: Ensure that the TCM passes the Shift Lever Test with the DRBIII® before proceeding with this test.** Turn the ignition on. With the DRBIII®, read DTCs. Does the DRBIII® display any MIC, PCM, or TCM DTCs? Yes → Refer to symptom list for problems related to DTC's. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Perform the Instrument Cluster Self Test. Turn the ignition off. Press and hold the Trip Reset button. Turn the ignition on. Observe the PRND / AutoStick VF display during the Self Test. Did any part of the VF display fail to illuminate? Yes → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wire harness. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness and connector terminals. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*SEAT BELT INDICATOR ALWAYS ON

POSSIBLE CAUSES
SEAT BELT SWITCH
SEAT BELT SWITCH GROUND CIRCUIT OPEN
SEAT BELT SWITCH SENSE CIRCUIT OPEN
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Seat Belt Switch harness connector. Connect a jumper wire between cavity 1 and cavity 2. **NOTE: For vehicles equipped with Seat Belt Pre- Tensioner, use the Wiring Diagrams as a guide to ensure proper terminal selection.** Turn the ignition on. Observe the Seat Belt Indicator. Did the Seat Belt Indicator illuminate for approximately 4 seconds and turn off? Yes → Replace the Seat Belt Buckle in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition off. Disconnect the Seat Belt Switch harness connector. Measure the resistance between ground and the Seat Belt Switch Ground circuit. Is the resistance above 5.0 ohms? Yes → Repair the Seat Belt Switch Ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the Seat Belt Switch harness connector. Disconnect the Instrument Cluster harness connector. Measure the resistance of the Seat Belt Switch Sense circuit between the Seat Belt Switch connector and the Instrument Cluster connector. Is the resistance above 5.0 ohms? Yes → Repair the Seat Belt Switch Sense circuit for an open. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*SEAT BELT INDICATOR INOPERATIVE

POSSIBLE CAUSES
SEAT BELT SWITCH
SEAT BELT SWITCH SENSE CIRCUIT SHORT TO GROUND
SEAT BELT INDICATOR LED
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure that the Junction Block Fuse #11 is not open. If the fuse is open make sure to check for a short to ground.** **NOTE: Ensure that the Instrument Cluster is configured with the correct code.** Perform the Instrument Cluster Self Test. Turn the ignition off. Press and hold the Trip/Reset button. Turn the ignition to the Unlock position. Observe the Seat Belt Indicator during the Self Test. Did the Seat Belt indicator illuminate for approximately 4 seconds then turn off? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. Disconnect the Seat Belt Switch harness connector. **NOTE: Performing this test on vehicles equipped with Pre- Tensioners will set a DTC in the ACM. Clear codes after repairs are complete.** Turn the ignition on. Observe the Seat Belt Indicator Did the Seat Belt indicator illuminate? Yes → Replace the Seat Belt Buckle in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the Instrument Cluster harness connector. Disconnect the Seat Belt Switch harness connector. Measure the resistance between ground and the Seat Belt Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Repair the Seat Belt Switch Sense circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

*SEAT BELT INDICATOR INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove and test the Seat Belt Indicator LED. Using a DVOM, select ″Diode Mode″ and connect the leads across the LED. **NOTE: Ensure that the RED lead is on the ″+″ of the LED.** Did the Seat Belt Indicator illuminate? Yes → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Seat Belt Indicator LED in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*SPEEDOMETER NOT OPERATING PROPERLY

POSSIBLE CAUSES
DTC PRESENT
INTERMITTENT CONDITION
MISSING OR INCORRECT PINION FACTOR
VEHICLE SPEED MESSAGE
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	Using the DRBIII® read EMIC, PCM, ABS and BCM DTC's. Are there any DTC's present? Yes → Refer to the symptom list for problems related to the DTC. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Perform the Instrument Cluster Self Test. Turn the ignition off. Press and hold the Trip/Reset button. Turn the ignition to the Unlock position. Observe the Speedometer during the Self Test. The Speedometer should position the indicator needle at the following calibration points: 0, 100, 75, 55, 20, 0 (MPH) Did the Speedometer needle position correctly? Yes → Go To 3 No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
3	With the DRBIII®, verify that the pinion factor is correctly programmed. Is the pinion factor programmed correctly? Yes → Go To 4 No → Using the Diagnostic (Transmission, or Chassis)/Service Manual Information as a guide, program the correct Pinion Factor. Perform BODY VERIFICATION TEST - VER 1.	All

*SPEEDOMETER NOT OPERATING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition on. Drive the vehicle With the DRBIII® in Monitors, read the Vehicle Speed in the EMIC, BCM and the PCM. Does the EMIC or BCM Monitor display a different Vehicle Speed than the PCM Wheel Speed? Yes → Refer to symptom list for problems related to inaccurate Vehicle Speed and communications. Perform BODY VERIFICATION TEST - VER 1. No → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wire harness. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness and connector terminals. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*TACHOMETER NOT OPERATING PROPERLY

POSSIBLE CAUSES
DTC PRESENT
INTERMITTENT CONDITION
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	Using the DRBIII® read EMIC, PCM and BCM DTC's. Are there any DTC's present? Yes → Refer to symptom list for problems related to the DTC. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Perform the Instrument Cluster Self Test. Turn the ignition off. Press and hold the Trip/Reset button. Turn the ignition to the Unlock position. Observe the Tachometer during the Self Test. The Tachometer should position the indicator needle at the following calibration points: 0, 6000, 3000, 1000, 0 Did the Tachometer needle position correctly? Yes → The condition is not present at this time. Monitor DRBIII® parameters while wiggling the related wire harness. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness and connector terminals. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*VTSS INDICATOR INOPERATIVE

POSSIBLE CAUSES
BCM OR SKIM DTC PRESENT
VTSS INDICATOR DRIVER CIRCUIT OPEN
BODY CONTROL MODULE
INSTRUMENT CLUSTER

TEST	ACTION	APPLICABILITY
1	**NOTE: Verify the vehicle is equipped with VTSS/SKIM.** **NOTE: Ensure that the VTSS is enabled before proceeding with this test.** **NOTE: Observe the VTSS indicator during the Bulb Check. If the indicator does not illuminate, replace the Instrument Cluster.** Turn the ignition on. With the DRBIII®, read Body Control Module / SKIM DTCs. Does the DRBIII® display any DTCs? Yes → Refer to the VEHICLE THEFT / SECURITY category and perform the appropriate symptom. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition off. Disconnect the BCM C1 harness connector. Measure the voltage between the VTSS Indicator Driver circuit and ground. Is the voltage above 10.5 volts? Yes → Replace and program the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the Instrument Cluster Harness connector. Disconnect the BCM C1 harness connector. Measure the resistance of the VTSS Indicator Driver circuit. Is the resistance above 5.0 ohms? Yes → Repair the VTSS Indicator Driver circuit for an open. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Instrument Cluster in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
COURTESY LAMP OUTPUT FAILURE

When Monitored and Set Condition:

COURTESY LAMP OUTPUT FAILURE

When Monitored: Any time the courtesy lamps should be on - door ajar, illuminated entry, or dimmer switch placed in dome lamp position.

Set Condition: BCM detects an over - voltage condition on its courtesy lamp output.

POSSIBLE CAUSES
INTERMITTENT CONDITION
SHORT TO BATTERY
SHORT TO GROUND
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, clear all BCM DTC's. Actuate the Courtesy Lamps. With the DRBIII®, read the DTC information. Does the DRBIII® read: Courtesy Lamp Output Failure? Yes → Go To 2 No → The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires. Perform BODY VERIFICATION TEST - VER 1.	All
2	Disconnect the Junction Block harness connector. Turn on all overhead, map and rear rearing lamps by their own individual switches. This will disconnect each lamp from the Courtesy Lamp Driver Circuit. Did any lamp fail to light when it was turned on by it's own switch? Yes → Repair the short to Battery condition. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the Junction Block Harness Connector from the front of the junction block. Remove the Body Control Module from the junction block. Measure the voltage of the Courtesy Lamps Driver circuit. Is there any voltage on the Courtesy Lamps Driver Circuit? Yes → Repair the short to ground condition. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
DIMMING LEVEL SWITCH INPUT FAILURE

When Monitored and Set Condition:

DIMMING LEVEL SWITCH INPUT FAILURE

When Monitored: Continuously.

Set Condition: BCM detects an open or short circuit condition for 10 consecutive seconds on the dimming level switch input.

POSSIBLE CAUSES
INTERMITTENT CONDITION
OPEN CIRCUIT
SHORT TO GROUND
SHORT TO BATTERY
FAILED DIMMER SWITCH
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, clear all BCM DTC's. Actuate the Dimming Level Switch. With the DRBIII®, read the DTC information. Does the DRBIII® read: Dimming Level Switch Input Failure? Yes → Go To 2 No → The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires. Perform BODY VERIFICATION TEST - VER 1.	All
2	Disconnect the Junction Block C11 Harness Connector from the front of the junction block. Cycle the ignition switch off than back on. Did the remaining courtesy lamps, door lamps come on? Yes → Go To 3 No → Repair the open circuit condition. Perform BODY VERIFICATION TEST - VER 1.	All

DIMMING LEVEL SWITCH INPUT FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Ensure the Junction Block Harness connector on the front of the junction block is connected before proceeding. Turn on all overhead, map and rear rearing lamps by their own individual switches. This will disconnect each lamp from the Courtesy Lamp Driver Circuit. Did any lamp fail to light when it was turned on by it's own switch? Yes → Repair the short to ground condition. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Ensure the Junction Block Harness connector on the front of the junction block is connected before proceeding. Turn on all overhead, map and rear rearing lamps by their own individual switches. This will disconnect each lamp from the Courtesy Lamp Driver Circuit. Did any lamp fail to light when it was turned on by it's own switch? Yes → Repair the short to battery condition. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the Junction Block Harness Connector from the front of the junction block. Remove the Body Control Module from the junction block. Measure the voltage of the Courtesy Lamps Driver circuit. Is there any voltage on the Courtesy Lamps Driver Circuit? Yes → Replace the Dimmer Switch. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*COURTESY LAMP INOPERATIVE - ALL LAMPS

POSSIBLE CAUSES
JUNCTION BLOCK
OPEN FUSE
COURTESY LAMPS DRIVER CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Gain access to the junction block C10 Harness connector but do not disconnect. While back probing, measure the voltage of the Fused B+ circuit. Is the voltage above 10.0 volts? Yes → Go To 2 No → Replace the Junction Block Perform BODY VERIFICATION TEST - VER 1.	All
2	Check Junction Block Fuse 5 Is Fuse 5 open? Yes → Replace the open fuse. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Back probe a jumper wire from the Courtesy Lamps Driver circuit to the Junction Block C10 connector and ground. Do the courtesy lamps come on? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → Repair the open Courtesy Lamp Driver circuit. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*I/P ILLUMINATION LAMPS NOT WORKING PROPERLY

POSSIBLE CAUSES
DEFECTIVE BULB OR SOCKET
PANEL DIMMING CIRCUIT OPEN
PANEL DIMMING GROUND CIRCUIT OPEN
BODY CONTROL MODULE
ILLUMINATED COMPONENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Turn on the Headlamps. Turn the Dimmer Switch to the maximum brightness setting. Observe all I/P illumination. What was observed? No I/P illumination. Go To 7 Some I/P illumination. Go To 2	All
2	Remove and inspect the I/P illumination bulbs and sockets of the affected component. Is there a problem with any bulb or socket? Yes → Replace the defective bulb or socket as needed in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off to the lock position. Disconnect the Body Control Module harness connector. Disconnect the affected component harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Panel Dimming circuit between the Body Control Module connector and the affected component harness connector. Is the resistance above 5.0 ohms? Yes → Repair the Panel Dimming circuit for an open. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All

*I/P ILLUMINATION LAMPS NOT WORKING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off to the lock position. Disconnect the affected component harness connector. **Note: Check connectors - Clean/repair as necessary.** Using a 12-volt test light connected to 12-volts, check the Panel Dimming Ground circuit of the affected component. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Repair the Panel Dimming ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Ignition on, engine not running. Using a 12-volt test light connected to ground, back probe the affected component Dimming circuit at the BCM harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 6 No → Go To 7	All
6	If there are no possible causes remaining, view repair. Repair Replace the illuminated component. Perform BODY VERIFICATION TEST - VER 1.	All
7	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
DECKLID RELEASE SOLENOID OUTPUT FAILURE

When Monitored and Set Condition:

DECKLID RELEASE SOLENOID OUTPUT FAILURE

When Monitored: During decklid release solenoid actuation.

Set Condition: The BCM detects an open or short on the decklid release solenoid driver circuit.

POSSIBLE CAUSES
GROUND CIRCUIT OPEN
DECKLID RELEASE SOLENOID DRIVER CIRCUIT SHORTED TO VOLTAGE
DECKLID RELEASE SOLENOID OPEN
WIRING HARNESS INTERMITTENT DEFECT
DECKLID RELEASE SOLENOID DRIVER CIRCUIT SHORTED TO GROUND
DECKLID RELEASE SOLENOID DRIVER CIRCUIT OPEN
BODY CONTROL MODULE - DECKLID RELEASE SOLENOID DRIVER CIRCUIT SHORT TO VOLTAGE
BODY CONTROL MODULE - DECKLID RELEASE SOLENOID DRIVER INOPERATIVE

TEST	ACTION	APPLICABILITY
1	With the DRBIII, erase DTC's. Press the decklid release switch several times. With the DRBIII, read DTC's. Did this DTC reset? Yes → Go To 2 No → Go To 10	All
2	Disconnect the Decklid Release Solenoid/Ajar Switch harness connector. Turn the ignition on. Using a 12-volt Test Light connected to ground, check the Decklid Release Solenoid Driver circuit. Is the test light illuminated? Yes → Go To 3 No → Go To 5	All

DECKLID RELEASE SOLENOID OUTPUT FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Decklid Release Solenoid/Ajar Switch harness connector. Disconnect the Body Control Module C4 connector. Turn the ignition on. Measure the voltage of the Decklid Release Solenoid Driver circuit in the Decklid Release Solenoid connector. Is there any voltage present? Yes → Repair the Decklid Release Solenoid Driver circuit for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the Decklid Release Solenoid/Ajar Switch harness connector. Measure the resistance between ground and the ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Disconnect the Decklid Release Solenoid/Ajar Switch harness connector. Connect a 12-volt Test Light between the Decklid Release Solenoid Driver ckt and the ground circuit (cavs 1 and 3). Press the decklid release switch several times and observe the test light. Did the test light illuminate when the switch was pressed? Yes → Replace the Decklid Release Solenoid. Perform BODY VERIFICATION TEST - VER 1. No → Go To 7	All
7	Turn the ignition off. Disconnect the Decklid Release Solenoid/Ajar Switch harness connector. Disconnect the Body Control Module C4 connector. Measure the resistance between ground and the Decklid Release Solenoid Driver circuit. Is the resistance below 5.0 ohms? Yes → Repair the Decklid Release Solenoid Driver circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 8	All

DECKLID RELEASE SOLENOID OUTPUT FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the Decklid Release Solenoid/Ajar Switch harness connector. Disconnect the Body Control Module C4 connector Measure the resistance of the Decklid Release Solenoid Driver circuit between the Decklid Release Solenoid/Ajar Switch connector and the BCM C4 connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the Decklid Release Solenoid Driver circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
9	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All
10	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
DECKLID RELEASE SWITCH FAILURE

When Monitored and Set Condition:

DECKLID RELEASE SWITCH FAILURE

When Monitored: Continuously.

Set Condition: The BCM detects the decklid release switch stuck in the depressed condition for more than 30 seconds.

POSSIBLE CAUSES
DECKLID RELEASE SWITCH SHORTED
DECKLID RELEASE SWITCH SENSE CIRCUIT SHORT TO GROUND
WIRING HARNESS INTERMITTENT DEFECT
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	With the DRBIII, erase DTC's. Cycle the ignition switch from off to on and wait at least 30 seconds. With the DRBIII, read DTC's. Did this DTC reset? Yes → Go To 2 No → Go To 5	All
2	Disconnect the Decklid Release Switch harness connector. With the DRBIII, erase DTC's. Cycle the ignition switch from off to on and wait at least 30 seconds. With the DRBIII, read DTC's. Did this DTC reset? Yes → Go To 3 No → Replace the Decklid Release Switch. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Disconnect the Decklid Release Switch harness connector. Disconnect the BCM ″C2″ harness connector. Turn the ignition on. Measure the resistance between ground and the Decklid Release Switch Sense circuit. Is the resistance below 100.0 ohms? Yes → Repair the Decklid Release Switch Sense circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All

DECKLID RELEASE SWITCH FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module Module. Perform BODY VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
DOOR LOCK SWITCH FAILURE

When Monitored and Set Condition:

DOOR LOCK SWITCH FAILURE

When Monitored: Continuously

Set Condition: When the BCM detects a signal on the Driver or Passenger Door Lock Switch for over 8 seconds this code will set. If the voltage is over 5.5 volts for over 8 seconds, both door lock switches will be inoperative until the offending input is corrected. This is an active code only.

POSSIBLE CAUSES
DRIVER DOOR LOCK SWITCH SHORTED
PASSENGER DOOR LOCK SWITCH SHORTED
DRIVER DOOR LOCK SWITCH MUX CIRCUIT SHORTED TO VOLTAGE
PASSENGER DOOR LOCK SWITCH MUX CIRCUIT SHORTED TO VOLTAGE
SYSTEM INTERMITTENT
BODY CONTROL MODULE - DOOR LOCK SWITCH SHORTED

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTC's. Operate both door lock switches to the lock and unlock positions several times. With the DRBIII®, read DTC's. Did this DTC reset? Yes → Go To 2 No → Go To 7	All
2	Disconnect the Driver Door Lock Switch harness connector. Turn the ignition on. With the DRBIII, enter BODY COMPUTER then SENSORS and observe the Dr Lock SW voltage Is there any voltage present? Yes → Go To 3 No → Replace the Driver Door Lock Switch. Perform BODY VERIFICATION TEST - VER 1.	All
3	Disconnect the Passenger Door Lock Switch harness connector. Turn the ignition on. With the DRBIII, enter BODY COMPUTER then SENSORS and observe the Dr Lock SW voltage Is there any voltage present? Yes → Go To 4 No → Replace the Passenger Door Lock Switch. Perform BODY VERIFICATION TEST - VER 1.	All

DOOR LOCK SWITCH FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the BCM ″C4″ harness connector. Disconnect the Driver Door Lock Switch connector. Turn the ignition on. Measure the voltage of the Driver Door Lock Switch Mux circuit. Is there any voltage present? Yes → Repair the Driver Door Lock Switch Mux circuit for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the BCM ″C4″ harness connector. Disconnect the Passenger Door Lock Switch connector. Turn the ignition on. Measure the voltage of the Passenger Door Lock Switch Mux circuit. Is there any voltage present? Yes → Repair the Passenger Door Lock Switch Mux circuit for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Check for either switch possibly sticking Were any problems found? Yes → Repair or replace as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
DRIVER DOOR CENTRAL LOCK (ARM)/UNLOCK (DISARM) SWITCH FAILURE

When Monitored and Set Condition:

DRIVER DOOR CENTRAL LOCK (ARM)/UNLOCK (DISARM) SWITCH FAILURE

When Monitored: Continuously

Set Condition: If the BCM detect a signal on the Driver Cylinder Lock Switch Mux circuit for over 10 seconds this code will set and will ignore the offending input until it is corrected.

POSSIBLE CAUSES
BINDING DRIVER CYLINDER LOCK SWITCH
DRIVER CYLINDER LOCK SWITCH SHORTED TO VOLTAGE
DRIVER CYLINDER LOCK SWITCH MUX CIRCUIT SHORTED TO VOLTAGE
WIRING HARNESS INTERMITTENT DEFECT
BODY CONTROL MODULE - DRIVER CYLINDER LOCK SWITCH FAILURE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTC's. Insert the key in the Driver Cylinder Lock Switch and rotate the key to the lock and unlock positions several times. With the DRBIII®, read DTC's. Did this DTC reset? Yes → Go To 2 No → Go To 6	All
2	Insert the key in the Driver Cylinder Lock Switch and rotate the key to the lock and unlock positions. Does the key bind in any position? Yes → Repair or replace the Driver Cylinder Lock Switch as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Disconnect the Driver Cylinder Lock Switch harness connector. Turn the ignition on. With the DRBIII, enter ″Body Computer″ then ″Sensors″ and observe the Dr Door Disarm SW voltage Is there any voltage present? Yes → Go To 4 No → Replace the Driver Cylinder Lock Switch. Perform BODY VERIFICATION TEST - VER 1.	All

DRIVER DOOR CENTRAL LOCK (ARM)/UNLOCK (DISARM) SWITCH FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Driver Cylinder Lock Switch harness connector. Disconnect the BCM ″C4″ harness connector. Turn the ignition on. Measure the voltage of the Driver Cylinder Lock Switch Mux circuit. Is there any voltage present? Yes → Repair the Driver Cylinder Lock Switch Mux circuit for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. **NOTE: Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.** Were any problems found? Yes → Repair wiring harness or connectors as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:

PASSENGER DOOR CENTRAL LOCK (ARM)/UNLOCK (DISARM) SWITCH FAILURE

When Monitored and Set Condition:

PASSENGER DOOR CENTRAL LOCK (ARM)/UNLOCK (DISARM) SWITCH FAILURE

When Monitored: Continuously

Set Condition: If the BCM detects a signal on the Passenger Cylinder Lock Switch Mux circuit for over 10 seconds this code will set and will ignore the offending input until it is corrected.

POSSIBLE CAUSES
PASSENGER CYLINDER LOCK SWITCH BINDING
PASSENGER CYLINDER LOCK SWITCH SHORTED TO VOLTAGE
PASSENGER CYLINDER LOCK SWITCH MUX CIRCUIT SHORTED TO VOLTAGE
WIRING HARNESS INTERMITTENT DEFECT
BODY CONTROL MODULE - PASSENGER CYLINDER LOCK SWITCH FAILURE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTC's. Insert the key in the Passenger Cylinder Lock Switch and rotate the key to the lock and unlock positions several times. With the DRBIII®, read DTC's. Did this DTC reset? Yes → Go To 2 No → Go To 6	All
2	Insert the key in the Passenger Cylinder Lock Switch and rotate the key to the lock and unlock positions. Does the key bind in any position? Yes → Repair or replace the Passenger Cylinder Lock Switch as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Disconnect the Passenger Cylinder Lock Switch harness connector. Turn the ignition on. With the DRBIII, enter ″Body Computer″ then ″Sensors″ and observe the Pas Door Disarm SW voltage Is there any voltage present? Yes → Go To 4 No → Replace the Passenger Cylinder Lock Switch. Perform BODY VERIFICATION TEST - VER 1.	All

PASSENGER DOOR CENTRAL LOCK (ARM)/UNLOCK (DISARM) SWITCH FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Passenger Cylinder Lock Switch harness connector. Disconnect the BCM ″C4″ harness connector. Turn the ignition on. Measure the voltage of the Passenger Cylinder Lock Switch Mux circuit. Is there any voltage present? Yes → Repair the Passenger Cylinder Lock Switch Mux circuit for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. **NOTE: Using the wiring diagram/schematic as a guide, inspect the wiring and connectors.** Were any problems found? Yes → Repair wiring harness or connectors as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
RKE FOB BATTERY LOW

When Monitored and Set Condition:

RKE FOB BATTERY LOW

When Monitored: Anytime an RKE message is received from the transmitter.

Set Condition: RKE receiver detects an RKE FOB battery low signal (less than 3 volts) for 5 consecutive button presses.

POSSIBLE CAUSES
BATTERIES LOW
TRANSMITTER - LOW VOLTAGE OUTPUT

TEST	ACTION	APPLICABILITY
1	To determine which transmitter set the code, press any button on each transmitter. If a chime in the BCM is heard when a button is pressed, that is the problem transmitter. Test the voltage of each battery in the problem transmitter.. Is the voltage at or above 3.0 in each battery? Yes → Replace the RKE Transmitter. Perform BODY VERIFICATION TEST - VER 1. No → Replace the batteries. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
RKE PROGRAM MODE ENTERED WITHOUT PROGRAM REQUEST

When Monitored and Set Condition:

RKE PROGRAM MODE ENTERED WITHOUT PROGRAM REQUEST

When Monitored: Continuously.

Set Condition: The BCM receives an indication from the RKE module that it has entered program mode without the BCM requesting so.

POSSIBLE CAUSES
REMOTE KEYLESS ENTRY MODULE
RKE PROGRAM MODE ENTERED WITHOUT PROGRAM REQUEST

TEST	ACTION	APPLICABILITY
1	**Note: This DTC will only set if the BCM receives an indication from the RKE module that it has entered program mode without the BCM requesting so.** Replace the Remote Keyless Entry Module and program a transmitter.. With the DRBIII, clear DTCs. Operate the Door Locks several times with the RKE transmitter. With the DRBIII®, read DTC's. Did this DTC reset? Yes → Replace the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → If the replaced module was a test unit only, replace the RKE module. Program all transmitters used with this vehicle. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
RKE UNABLE TO ENTER PROGRAM MODE

When Monitored and Set Condition:

RKE UNABLE TO ENTER PROGRAM MODE

When Monitored: While attempting to program RKE.

Set Condition: Lack of response from the RKE module while attempting to put it in program mode.

POSSIBLE CAUSES
REMOTE KEYLESS ENTRY MODULE
RKE UNABLE TO ENTER PROGRAM MODE

TEST	ACTION	APPLICABILITY
1	**Note: This DTC will only set when attempting to enter the program RKE mode.** Replace the Remote Keyless Entry Module. With the DRB, Clear DTC's With the DRB, attempt to enter the RKE program mode. With the DRB, check DTC's. Did this DTC reset? Yes → Replace the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. No → If the replaced module was a test unit only, replace the RKE module. Program all transmitters used with this vehicle. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*ALL DOORS EXCEPT DRIVER FAILING TO UNLOCK FROM ANY SWITCH

POSSIBLE CAUSES
DOOR UNLOCK RELAY OUTPUT CIRCUIT SHORT TO GROUND
BODY CONTROL MODULE - UNLOCK RELAY

TEST	ACTION	APPLICABILITY
1	Disconnect the Body Control Module C4 connector. Measure the resistance between ground and the any Unlock Relay Output circuits in the BCM C4 connector.. Is the resistance below 1000.0 ohms (should be infinite)? Yes → Repair the Door Unlock Relay Output circuits as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	If there are no possible causes remaining, view repair Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*ALL DOORS FAILING TO LOCK AND UNLOCK FROM ANY SWITCH

POSSIBLE CAUSES
JUNCTION BLOCK - FUSED B(+) OPEN
OPEN FUSE #9
OBSERVE THE DOOR LOCK SWITCH VOLTAGE STATUS
OBSERVE THE DOOR LOCK SWITCH VOLTAGE STATUS WITH SWITCH IN THE LOCK POSITION
FUSED B+ CKT OPEN
LOCK OR UNLOCK RELAY OUTPUT OPEN
DRIVER DOOR SWITCH MUX CIRCUIT SHORT TO GROUND
DRIVER DOOR SWITCH MUX CIRCUITSHORT TO GROUND
PASSENGER DOOR LOCK SWITCH SHORT TO GROUND
GROUND CIRCUIT OPEN
PASSENAGER DOOR SWITCH MUX CIRCUITSHORT TO GROUND
BODY CONTROL MODULE - LOCK RELAY CIRCUIT OPEN
BODY CONTROL MODULE- CONTROL SHORTED

TEST	ACTION	APPLICABILITY
1	Lower the drivers window. Remove the ignition key. Unlock all doors. With the DRBIII®, actuate the Door Lock Relay. Do the doors lock during the actuation test? Yes → Go To 2 No → Go To 10	All
2	With the DRBIII, observe the Door Lock Switch Voltage. Is the voltage above 0.2 volts? Yes → Refer to symptom DOOR LOCK SWITCH FAILURE in the POWER DOOR LOCK/RKE category. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII, observe the Door Lock Switch voltage Press and hold the Driver Door Lock Switch in the lock position and observe the DRB. Is the voltage above 2.2 volts with the switch pressed in the lock position? Yes → Replace the Body Control Module - Control open. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All

*ALL DOORS FAILING TO LOCK AND UNLOCK FROM ANY SWITCH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Driver Door Lock Switch connector. Measure the voltage of the Fused B+ circuit. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the open Fused B+ circuit. Perform BODY VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the Driver Door Lock Switch connector. Disconnect the BCM ″C4″ harness connector. Measure the resistance of the Driver Door Switch MUX circuit to ground. Is the resistance below 1000.0 ohms? Yes → Repair the Driver Door Switch MUX circuit to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Ensure the Driver Door Lock Switch is connected before proceeding Disconnect the BCM ″C4″ harness connector. Measure the resistance of the Driver Door Switch MUX circuit in the BCM C4 connector to ground. Is the resistance below 1000.0 ohms? Yes → Replace the Driver Door Lock Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 7	All
7	Turn the ignition off. Ensure the Passenger Door Lock Switch is connected before proceeding Disconnect the BCM ″C4″ harness connector. Measure the resistance of the Passenger Door Switch MUX circuit in the BCM C4 connector to ground. Is the resistance below 1000.0 ohms? Yes → Replace the Passenger Door Lock Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off. Disconnect the Passenger Door Lock Switch connector. Disconnect the BCM ″C4″ harness connector. Measure the resistance of the Passenger Door Switch MUX circuit to ground. Is the resistance below 1000.0 ohms? Yes → Repair the Passenger Door Switch MUX circuit to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 9	All
9	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

*ALL DOORS FAILING TO LOCK AND UNLOCK FROM ANY SWITCH — Continued

TEST	ACTION	APPLICABILITY
10	Test both sides of fuse #9 for battery voltage. Is the fuse or circuit open? Yes → Replace the fuse or repair the open circuit as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Go To 11	All
11	Disconnect the Body Control Module C4 connector. Connect a jumper wire from the ground to the Passenger Unlock Relay Output circuit in the C4 connector. Momentarily connect the jumper wire from a fused B(+) supply to the Passenger Lock Output circuit in the C4 connector and observe the door locks. Reverse the jumper wires to drive the motor in the unlock position. Did the door lock and unlock? Yes → Using the wiring diagram/schmatic as a guide, repair the open Lock or Unlock Relay Output circuits as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Go To 12	All
12	Turn the ignition off. Remove the Body Control Module from the Junction Block. Using a 12-volt test light connected to 12-volts, check the Ground circuit. Does the test light illuminate brightly? Yes → Go To 13 No → Repair the open Ground circuit through the junction block. Perform BODY VERIFICATION TEST - VER 1.	All
13	Turn the ignition off. Remove the Body Control Module from the Junction Block. Measure the voltage between the Fused B(+) circuit and ground. Is the voltage above 10.0 volts? Yes → Go To 14 No → Replace the Junction Block. Perform BODY VERIFICATION TEST - VER 1.	All
14	If there are no possible causes remaining, view repair Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:

*ALL DOORS FAILING TO LOCK AND UNLOCK FROM ONE SWITCH

POSSIBLE CAUSES
FUSED B(+) CIRCUIT OPEN
FUSED B(+) CIRCUIT OPEN
DOOR CYLINDER LOCK SWITCH MUX CIRCUIT SHORT TO GROUND
DOOR SWITCH MUX CIRCUIT SHORT TO GROUND
DOOR CYLINDER LOCK SWITCH MUX CIRCUIT OPEN
DOOR SWITCH MUX CIRCUIT OPEN
POWER DOOR LOCK SWITCH OPEN
DOOR CYLINDER LOCK SWITCH OPEN
BODY CONTROL MODULE - DOOR CYLINDER LOCK SWITCH SENSE OPEN
BODY CONTROL MODULE - DOOR LOCK SWITCH SENSE OPEN

TEST	ACTION	APPLICABILITY
1	Operate the door locks from the door lock switches and the door cylinder lock switches (if equipped). Is the problem with a Door Cylinder Lock Switch (VTSS)? Yes → Go To 2 No → Go To 7	All
2	Disconnect the inoperative Door Cylinder Lock Switch connector. Measure the voltage between the Fused B(+) circuit and ground. Is the voltage above 10.0 volts? Yes → Go To 3 No → Repair the Fused B(+) circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
3	Disconnect the inoperative Door Cylinder Lock Switch connector. Disconnect the BCM C4 connector. Measure the resistance between ground and the Cylinder Lock Switch Mux circuit. Is the resistance below 1000.0 ohms? Yes → Repair the Door Cylinder Lock Switch Mux circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All

*ALL DOORS FAILING TO LOCK AND UNLOCK FROM ONE SWITCH — Continued

TEST	ACTION	APPLICABILITY
4	Disconnect the inoperative Door Cylinder Lock Switch connector. Disconnect the BCM C4 connector. Measure the resistance of the Cylinder Lock Switch Mux circuit between the Switch connector and the BCM C4 connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Door Cylinder Lock Switch Mux circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
5	Disconnect the inoperative Door Cylinder Lock Switch connector. Connect a jumper wire between the appropriate Cylinder Lock Switch Mux circuit and Fused B(+). With the DRBIII® in Sensors, read the appropriate Door Arm/Disarm Switch voltage. Is the voltage above 9.0 volts? Yes → Replace the appropriate Door Cylinder Lock Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All
7	Disconnect the inoperative Door Lock Switch connector. Measure the voltage between the Fused B(+) circuit and ground. Is the voltage above 10.0 volts? Yes → Go To 8 No → Repair the Fused B(+) circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
8	Disconnect the inoperative Door Lock Switch connector. Disconnect the BCM C4 connector. Measure the resistance between ground and the Door Switch Mux circuit. Is the resistance below 1000.0 ohms? Yes → Repair the Door Switch Mux circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 9	All
9	Disconnect the inoperative Door Lock Switch connector. Disconnect the Body Control Module C4 connector. Measure the resistance of the Door Switch Mux circuit between the Door Lock Switch connector and the BCM C4 connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the Door Switch Mux circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

*ALL DOORS FAILING TO LOCK AND UNLOCK FROM ONE SWITCH — Continued

TEST	ACTION	APPLICABILITY
10	Disconnect the inoperative Door Lock Switch connector. Connect a jumper wire between the Door Switch Mux circuit and Fused B(+). With the DRBIII®, read the Door Lock Sw Volts status. Is the voltage above 9.0 volts? Yes → Replace the Power Door Lock Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 11	All
11	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*ALL DOORS FAILING TO LOCK FROM ANY SWITCH

POSSIBLE CAUSES
LOCK RELAY OUTPUT CIRCUIT SHORT TO GROUND
BODY CONTROL MODULE - LOCK RELAY OPEN

TEST	ACTION	APPLICABILITY
1	Disconnect the Body Control Module C4 connector. Measure the resistance between ground and the any Lock Relay Output circuits in the BCM C4 connector.. Is the resistance below 1000.0 ohms (should be infinite)? Yes → Repair the Lock Relay Output circuits as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	If there are no possible causes remaining, view repair Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*ALL DOORS FAILING TO LOCK FROM ONE SWITCH

POSSIBLE CAUSES
DOOR LOCK SWITCH OR DOOR CYLINDER LOCK SWITCH OPERATION

TEST	ACTION	APPLICABILITY
1	Lower the driver door window. Operate the power door lock switch or the door cylinder lock switch in the lock position. Is a Power Door Lock Switch or a Door Cylinder Lock Switch inoperative in the lock position? Yes → Replace the Power Door Lock Switch or Door Cylinder Lock Switch. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
*ALL DOORS FAILING TO UNLOCK FROM ONE SWITCH

POSSIBLE CAUSES
DOOR LOCK SWITCH OR DOOR CYLINDER LOCK SWITCH OPERATION

TEST	ACTION	APPLICABILITY
1	Operate the power door lock switch or the door cylinder lock switch in the unlock position. Is a Power Door Lock Switch or a Door Cylinder Lock Switch inoperative in the unlock position? Yes → Replace the Power Door Lock Switch or Door Cylinder Lock Switch. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
*AUTOMATIC (ROLLING) DOOR LOCKS INOPERATIVE

POSSIBLE CAUSES
CHECK THE DOOR AJAR SWITCH STATUS
WITH THE DRB CHECK FOR PCM DTC'S
WITH THE DRB ENABLE AUTO DOOR LOCKS
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Ensure all doors are closed. With the DRBIII, enter ″Body Computer″ then ″Input/Output″ and observe all of the Door Ajar states. Does the DRBIII display CLOSED for any door ajar state? Yes → Refer to symptom for the appropriate DOOR AJAR CIRCUIT SHORTED in the DOOR AJAR category. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	With the DRBIII read ″Engine″ DTC's. Does the DRBIII display any TPS or VSS related DTC's? Yes → Refer to symptom list for problems related to DRIVEABILITY. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII, enter ″Body Computer″ then ″Miscellaneous″ and observe the Rolling Door Lock status. Does the DRBIII display ROLLING DOOR LOCKS: ENABLED Yes → Go To 4 No → With the DRBIII, enable the Auto Door Locks. Perform BODY VERIFICATION TEST - VER 1.	All
4	If there are no possible causes remaining, view repair. Repair Replace and program the Body Control Module Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*DECKLID RELEASE INOPERATIVE

POSSIBLE CAUSES
CHECK DTC'S
DECKLID RELEASE SWITCH GROUND CIRCUIT OPEN
GROUND CIRCUIT OPEN
DECKLID RELEASE SOLENOID OPEN
DECKLID RELEASE SWITCH OPEN
DECKLID RELEASE SWITCH SENSE WIRE OPEN
DECKLID RELEASE SOLENOID DRIVER WIRE OPEN
BODY CONTROL MODULE
BODY CONTROL MODULE - DECKLID RELEASE SWITCH SENSE OPEN

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read DTCs. Does the DRBIII® display either DECKLID RELEASE DTC'? Yes → Refer to symptom DECKLID RELEASE DTC's in the POWER DOOR LOCK/RKE category. Perform BODY VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition off. Disconnect the Decklid Release Solenoid/Ajar Switch harness connector. Measure the resistance between ground and the ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition on. Disconnect the Decklid Release Solenoid/Ajar Switch harness connector. Connect a 12-volt Test Light between the Decklid Release Solenoid Driver circuit and the Ground circuit. Have someone press the decklid release switch while you observe the test light. Did the test light illuminate when the switch was pressed? Yes → Replace the Decklid Release Solenoid. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	Disconnect the Decklid Release Switch harness connector. Measure the voltage between Decklid Release Switch Sense circuit and ground. Is the voltage above 10.0 volts? Yes → Go To 5 No → Go To 9	All

*DECKLID RELEASE INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the Decklid Release Switch harness connector. Measure the resistance between ground and the Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
6	Ensure the Decklid Release Solenoid/Ajar Switch harness is connected before proceeding. Disconnect the Decklid Release Switch harness connector. Momentarily connect a jumper wire between the Ground circuit and the Decklid Release Switch Sense circuit in the Decklid Release Switch harness connector and listen for the solenoid to operate. Did the solenoid release operate? Yes → Replace the Decklid Release Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 7	All
7	Turn the ignition off. Disconnect the Decklid Release Solenoid/Ajar Switch harness connector. Disconnect the Body Control Module C4 connector. Measure the resistance of the Decklid Release Solenoid Driver wire between the Decklid Release Solenoid/Ajar Switch connector and the Body Control Module C4 connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the Decklid Release Solenoid Driver wire for an open. Perform BODY VERIFICATION TEST - VER 1.	All
8	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All
9	Turn the ignition off. Disconnect the Decklid Release Switch harness connector. Disconnect the BCM ″C2″ harness connector. Measure the resistance of the Decklid Release Switch Sense wire between the BCM ″C2″ connector and the Decklid Release Switch connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → Repair the Decklid Release Switch Sense wire for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*DOOR LOCK INHIBIT INOPERATIVE

POSSIBLE CAUSES
CHECK THE DRIVER DOOR AJAR SWITCH STATUS
OBSERVE THE KEY-IN IGNITION SWITCH STATUS
IGNITION SWITCH OPEN
KEY-IN IGNITION SWITCH GROUND CIRCUIT OPEN
KEY-IN IGNITION SWITCH SENSE CIRCUIT OPEN
BCM - INCORRECT KEY-IN IGNITION SWITCH STATUS

TEST	ACTION	APPLICABILITY
1	Open the Driver's front door. With the DRBIII, enter ″Body Computer″ then ″Input/Output″ and observe the Driver Door Ajar status. Does the DRBIII display DRV DR AJAR SW: CLOSED? Yes → Go To 2 No → Refer to symptom DRIVER DOOR AJAR OPEN CIRCUIT in the DOOR AJAR category. Perform BODY VERIFICATION TEST - VER 1.	All
2	**NOTE: Ensure that the Key is still in the Ignition Switch.** With the DRBIII, enter ″Body Computer″ then ″Input/Output″ and read the Key-In Ignition Switch status. Does the DRBIII display: KEY-IN IGN SW: CLOSED? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the Ignition Switch C3 connector. Connect a jumper between the Key-In Ignition Switch Sense circuit and Ground circuit. With the DRBIII, enter ″Body Computer″ then ″Input/Output″ and observe the Key-In Ignition Switch status. Does the DRBIII display KEY-IN IGN: CLOSED? Yes → Replace the Ignition Switch. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All

*DOOR LOCK INHIBIT INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Ignition Switch C3 connector. Turn all lights off. Measure the resistance between ground and the Ground circuit in the Ignition Switch C3 connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the Ignition Switch C3 connector. Disconnect the Body Control Module ″C1″ harness connector. Measure the resistance of the Key-In Ignition Switch Sense circuit between the ignition switch connector and the BCM ″C2″ connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Key-In Ignition Switch Sense circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*DRIVER DOOR FAILS TO LOCK FROM ANY SWITCH

POSSIBLE CAUSES
DRIVER LOCK RELAY OUTPUT SHORT TO GROUND
BODY CONTROL MODULE - DRIVER UNLOCK RELAY GROUND OPEN

TEST	ACTION	APPLICABILITY
1	Disconnect the Body Control Module C4 connector. Measure the resistance between ground and the Driver Lock Relay Output circuit. Is the resistance below 100.0 ohms? Yes → Repair the Driver Lock Relay Output circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module - Driver Unlock Relay Ground open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*DRIVER DOOR FAILS TO UNLOCK FROM ANY SWITCH

POSSIBLE CAUSES
DRIVER DOOR UNLOCK RELAY OUTPUT CKT SHORT TO GROUND
BODY CONTROL MODULE - DRIVER DOOR UNLOCK RELAY DRIVER OPEN

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Body Control Module C4 connector. Measure the resistance between ground and the Driver Unlock Relay Output circuit in the Body Control Module C4 connector Is the resistance below 100.0 ohm? No → Replace the Body Control Module in accordance with the Service Information. Perform BODY VERIFICATION TEST - VER 1. Yes → Repair the Driver Unlock Relay Output circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*ONE DOOR FAILS TO LOCK AND UNLOCK FROM ANY SWITCH

POSSIBLE CAUSES
DOOR LOCK MOTOR - OPEN
DRIVER LOCK RELAY OUTPUT CIRCUIT OPEN
DRIVER DOOR LOCK MOTOR - OPEN
DRIVER UNLOCK RELAY OUTPUT CIRCUIT OPEN
LOCK RELAY OUTPUT CIRCUIT OPEN
UNLOCK RELAY OUTPUT CIRCUIT OPEN
BODY CONTROL MODULE DRIVER DOOR UNLOCK RELAY OPEN

TEST	ACTION	APPLICABILITY
1	Operate the door locks to determine which door lock is not operating properly. Is there a problem with the Driver Door Lock? Yes → Go To 2 No → Go To 6	All
2	**NOTE: This test is for a motor that is completely inoperative. If the motor either locks OR unlocks refer to symptom list for problems related to DRIVER DOOR FAILING TO-.** Disconnect the Driver Door Lock Motor/Ajar Switch connector. Connect a 12-volt Test Light between the Driver Unlock Relay Output and the Driver Lock Relay Output circuits in the door lock motor connector. Press the Door Lock Switch in the Lock and Unlock positions and observe the test light. Does the Test Light flash on and off as the switch is pressed? Yes → Replace the Driver Door Lock Motor. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Disconnect the Driver Door Lock Motor/Ajar Switch connector. Disconnect the Body Control Module C4 connector. Measure the resistance of the Driver Lock Relay Output circuit between the BCM C4 connector and the Driver Door Lock Motor connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the Lock Relay Output circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

*ONE DOOR FAILS TO LOCK AND UNLOCK FROM ANY SWITCH — Continued

TEST	ACTION	APPLICABILITY
4	Disconnect the Driver Door Lock Motor/Ajar Switch connector. Disconnect the Body Control Module C4 connector. Measure the resistance of the Driver Unlock Relay Output circuit between the BCM C4 connector and the Driver Door Lock Motor connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Driver Unlock Relay Output circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
5	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module - Driver Door Unlock Relay open. Perform BODY VERIFICATION TEST - VER 1.	All
6	Disconnect the Door Lock Motor/Ajar Switch connector. Connect a 12-volt Test Light between the Unlock Relay Output and the Lock Relay Output circuits in the door lock motor connector. Press the Door Lock Switch in the Lock and Unlock positions and observe the test light. Does the Test Light flash on and off as the switch is pressed? Yes → Replace the Door Lock Motor. Perform BODY VERIFICATION TEST - VER 1. No → Go To 7	All
7	Disconnect the appropriate Door Lock Motor/Ajar Switch connector. Using a 12-volt test light connected to ground, check the Lock Relay Output circuit. With the DRBIII®, actuate the Door Lock Relay and observe the Test Light. Did the Test Light flash as the relay was actuated? Yes → Go To 8 No → Repair the Lock Relay Output circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
8	Disconnect the appropriate Door Lock Motor/Ajar Switch connector. Using a 12-volt test light connected to ground, check the Unlock Relay Output circuit. With the DRBIII®, actuate the Door Unlock Relay and observe the Test Light. Did the Test Light flash as the relay was actuated? Yes → Test Complete. No → Repair the Unlock Relay Output circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*REMOTE KEYLESS ENTRY PROBLEM

POSSIBLE CAUSES
TESTING THE REMOTE KEYLESS ENTRY MODULE
REPLACE TRANSMITTER

TEST	ACTION	APPLICABILITY
1	Secure a known good transmitter from another JR or LH vehicle. With the DRBIII, enter BODY, BODY COMPUTER, MISCELLANEOUS then PROGRAM RKE and follow the instructions to program the substitute transmitter. **NOTE: If the RKE module will not go into programming mode, replace the RKE module and continue testing.** With the DRBIII, enter BODY, BODY COMPUTER, MISCELLANEOUS then RKE FOB TEST and follow the instructions on the DRB. Did the substitute RKE Transmitter respond correctly? No → Replace the Remote Keyless Entry (RKE) Module and reprogram all vehicle transmitters following the instructions on the DRBIII. Perform BODY VERIFICATION TEST - VER 1. Yes → Replace the RKE transmitter and reprogram all others used with this vehicle.. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*RKE HORN CHIRP INOPERATIVE

POSSIBLE CAUSES
CHECK THE HORN OPERATION
CHECK THE RKE HORN CHIRP STATUS
BODY CONTROL MODULE - HORN RELAY CONTROL OPEN

TEST	ACTION	APPLICABILITY
1	Press the horn button on the steering wheel. Does the horn sound? Yes → Go To 2 No → Refer to symptom HORNS FAIL TO SOUND in the VEHICLE THEFT SECURITY SYSTEM category. Perform BODY VERIFICATION TEST - VER 1.	All
2	With the DRBIII, enter ″Body Computer″, ″Miscellaneous″ then ″RKE Horn Chirp″ and observe the horn chirp status. Does the DRBIII display HORN CHIRP: DISABLED? Yes → With the DRBIII, enable the Horn Chirp. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
POWER TOP SWITCH OPEN OR SHORTED TO BATTERY

When Monitored and Set Condition:

POWER TOP SWITCH OPEN OR SHORTED TO BATTERY

When Monitored: Whenever the ignition is on.

Set Condition: Normal power top switch voltage is approximately 1.0 to 11.5 volts. When the BCM senses voltage above this threshold for over 10 seconds, this code will set.

POSSIBLE CAUSES
DTC PRESENT
CONVERTIBLE TOP SWITCH GROUND OPEN
CONVERTIBLE TOP SWITCH MUX WIRE OPEN
CONVERTIBLE TOP SWITCH MUX WIRE SHORT TO BATTERY
CONVERTIBLE TOP SWITCH OPEN
CONVERTIBLE TOP SWITCH SHORT TO BATTERY
BODY CONTROL MODULE - CONVERTIBLE TOP SWITCH MUX OPEN

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTCs. Turn the ignition on. Operate the power top in all positions including the 4 window drop position. With the DRBIII®, read DTCs. Does the DRBIII® display POWER TOP SWITCH OPEN OR SHORTED TO BATTERY? Yes → Go To 2 No → Using the wiring diagram/schematic as a guide, inspect the wiring and connectors for a possible intermittent open or short to battery. Perform BODY VERIFICATION TEST - VER 1.	All
2	Disconnect the Body Control Module C4 connector. Measure the voltage of the Convertible Top Switch Mux circuit to ground. Is there any voltage present? Yes → Go To 3 No → Go To 4	All

POWER TOP SWITCH OPEN OR SHORTED TO BATTERY — Continued

TEST	ACTION	APPLICABILITY
3	Disconnect the Body Control Module C4 connector. Disconnect the Power Top Switch connector. Measure the voltage of the Convertible Top Switch Mux circuit to ground. Is there any voltage present? Yes → Repair the Convertible Top Switch Mux wire for a short to battery. Perform BODY VERIFICATION TEST - VER 1. No → Replace Convertible Top Switch. Perform BODY VERIFICATION TEST - VER 1.	All
4	Disconnect the Body Control Module C4 connector. Measure the resistance between ground and the Convertible Top Switch Mux circuit. Is the resistance between 4500.0 and 4900,0 ohms? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → Go To 5	All
5	Disconnect the Power Top Switch connector. Using a 12-volt test light connected to 12-volts, check the Ground circuit in the Power Top Switch connector. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Ground circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
6	Disconnect the Body Control Module C4 connector. Disconnect the Power Top Switch connector. Measure the resistance of the Convertible Top Switch Mux circuit from the BCM C4 connector to the Power Top Switch connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Convertible Top Switch Mux wire for an open. Perform BODY VERIFICATION TEST - VER 1.	All
7	If there are no possible causes remaining, view repair. Repair Replace the Convertible Top Switch. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
POWER TOP SWITCH SHORTED TO GROUND

When Monitored and Set Condition:

POWER TOP SWITCH SHORTED TO GROUND

When Monitored: Whenever the ignition is on.

Set Condition: Normal power top switch voltage is approximately 1.0 to 11.5 volts. When the BCM senses voltage under 1.0 volts for over 10 seconds, this code will set.

POSSIBLE CAUSES
DTC PRESENT
POWER TOP SWITCH SHORTED TO GROUND
CONVERTIBLE TOP SWITCH MUX WIRE SHORT TO GROUND
BODY CONTROL MODULE - CONVERTIBLE TOP SWITCH MUX SHORT TO GROUND

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTCs. Turn the ignition on. Operate the power top in all positions including the 4 window drop position. With the DRBIII®, read DTCs. Does the DRBIII® display POWER TOP SWITCH SHORTED TO GROUND? Yes → Go To 2 No → Using the wiring diagram/schematic as a guide, inspect the wiring and connectors for a possible intermittent short to ground. Perform BODY VERIFICATION TEST - VER 1.	All
2	Disconnect the Power Top Switch connector. With the DRBIII®, erase DTCs. Cycle the ignition switch from OFF to ON. With the DRBIII®, read DTCs. Does the DRBIII® display POWER TOP SWITCH SHORTED TO GROUND? Yes → Go To 3 No → Replace the Power Top Switch. Perform BODY VERIFICATION TEST - VER 1.	All
3	Disconnect the Body Control Module C4 connector. Disconnect the Power Top Switch connector. Measure the resistance between ground and the Convertible Top Switch Mux circuit. Is the resistance below 100.0 ohms? Yes → Repair the Convertible Top Switch Mux wire for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All

POWER TOP SWITCH SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
4	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
POWER TOP SWITCH STUCK

When Monitored and Set Condition:

POWER TOP SWITCH STUCK

When Monitored: Whenever the ignition is on.

Set Condition: Normal operation of this switch consists of pressing it for only a few seconds. If the BCM detects the switch stuck in a depressed condition for more than 28 seconds, this code will set and the BCM will ignore the input until the condition is corrected.

POSSIBLE CAUSES
DTC PRESENT
POWER TOP SWITCH STUCK
CONVERTIBLE TOP SWITCH MUX WIRE SHORT TO GROUND
BODY CONTROL MODULE - CONVERTIBLE TOP SWITCH MUX

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTCs. Turn the ignition on. Operate the power top in all positions including the 4 window drop position. With the DRBIII®, read DTCs. Does the DRBIII® display POWER TOP SWITCH STUCK? Yes → Go To 2 No → Check the switch for a possible sticking condition. Using the wiring diagram/schematic as a guide, inspect the wiring and connectors for a possible intermittent short to ground. Perform BODY VERIFICATION TEST - VER 1.	All
2	Disconnect the Power Top Switch connector. With the DRBIII®, erase DTCs. Cycle the ignition switch from OFF to ON. Wait one minute. With the DRBIII®, read DTCs. Does the DRBIII® display POWER TOP SWITCH STUCK? Yes → Go To 3 No → Replace the Power Top Switch. Perform BODY VERIFICATION TEST - VER 1.	All

POWER TOP SWITCH STUCK — Continued

TEST	ACTION	APPLICABILITY
3	Disconnect the Body Control Module C4 connector. Disconnect the Power Top Switch connector. Measure the resistance between ground and the Convertible Top Switch Mux circuit. Is the resistance below 100.0 ohms? Yes → Repair the Convertible Top Switch Mux wire for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All
4	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*FOUR WINDOW DROP INOPERATIVE

POSSIBLE CAUSES
DTC PRESENT
CONVERTIBLE TOP SWITCH
FUSED IGNITION SWITCH OUTPUT OPEN
WINDOW DOWN RELAY CONTROL OPEN
WINDOW DROP RELAY ASSEMBLY OPEN
BODY CONTROL MODULE - WINDOW DOWN RELAY CONTROL OPEN

TEST	ACTION	APPLICABILITY
1	**NOTE: Ensure the power windows are operating properly from the master switch before proceeding.** Turn the ignition on. With the DRBIII®, read DTCs. Does the DRBIII® display any POWER TOP SWITCH ----DTC's? No → Go To 2 Yes → Refer to symptom POWER TOP SWITCH --- in the POWER TOP category. Perform BODY VERIFICATION TEST - VER 1.	All
2	Prepare the vehicle for the top to operate. With the DRBIII®, read the CONVERT TOP SW voltage Press the Top Switch to the second detent and observe the voltage. Is the voltage between 1.6 and 2.2 volts when the switch is pressed? Yes → Go To 3 No → Replace the Power Top Switch. Perform BODY VERIFICATION TEST - VER 1.	All
3	Disconnect the Window Drop Relay Assembly connector. Turn the ignition on. Using a 12-volt test light connected to ground, check all Fused Ignition Switch Output circuits. Does the test light illuminate brightly on all circuits? Yes → Go To 4 No → Using the schematic as a guide, repair the Fused Ignition Switch Output circuit(s) for an open. Perform BODY VERIFICATION TEST - VER 1.	All

*FOUR WINDOW DROP INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
4	Disconnect the Window Drop Relay Assembly connector. Disconnect the Body Control Module C4 connector. Turn the ignition off. Measure the resistance of the Window Down Relay Control circuit between the Window Drop Relay Assembly connector and the BCM C4 connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Window Down Relay Control circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
5	Disconnect the Body Control Module C4 connector. Turn the ignition on. Momentarily connect a jumper wire between ground and the Window Down Relay Control circuit in the BCM C4 connector. Did all four windows go down when the wire was grounded? Yes → Go To 6 No → Replace the Window Drop Relay Assembly. Perform BODY VERIFICATION TEST - VER 1.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
DECKLID SWITCH DISARM FAILURE

When Monitored and Set Condition:

DECKLID SWITCH DISARM FAILURE

When Monitored: Continuously

Set Condition: If the decklid disarm switch is sensed in the open position for greater than 30 seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
DECKLID CYLINDER LOCK SWITCH GROUND OPEN
BODY CONTROL MODULE INTERNAL MALFUNCTION
DECKLID CYLINDER LOCK SWITCH OPEN
DECKLID SECURITY SWITCH SENSE CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	NOTE: When this code is present, the VTSS indicator will illuminate solid during the arming process. With the DRBIII®, record and erase DTC's. Cycle the ignition switch from ON to OFF. With the DRBIII®, read DTC's. Operate the Decklid Cylinder Lock Switch several times while monitoring the DRBIII®. Does the DRBIII® display DECKLID SWITCH DISARM FAILURE? Yes → Go To 2 No → The condition that caused this symptom is currently not present. Using the wiring diagram/schematic as a guide, inspect the related wiring harness and connectors for a possible intermittent condition.	All
2	Disconnect the Decklid Cylinder Lock Switch connector. Using a 12-volt test light connected to 12-volts, test the Ground circuit for continuity. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the Ground circuit for an open. Perform VTSS VERIFICATION TEST - 1A.	All

DECKLID SWITCH DISARM FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Disconnect the Decklid Cylinder Lock Switch connector. Connect a jumper wire between the Decklid Security Switch Sense circuit and the ground wire. With the DRBIII® in Inputs/Outputs, read the DECKLID KEY CYL SW state. Does the DRBIII® display CLOSED? Yes → Replace the Decklid Cylinder Lock Switch. Perform VTSS VERIFICATION TEST - 1A. No → Go To 4	All
4	Disconnect the Body Control Module C4 harness connector. Disconnect the Decklid Cylinder Lock Switch harness connector. Measure the resistance of the Sense circuit. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A. No → Repair the Decklid Security Switch Sense circuit for an open. Perform VTSS VERIFICATION TEST - 1A.	All

Symptom:
*ALARM TRIPS ON ITS OWN

POSSIBLE CAUSES
ALARM INPUT STATUS
INTERMITTENT CONDITION

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read the ALARM TRIP BY status. Were there any causes displayed? Yes → Refer to symptom list for problems related to the component indicated by the DRBIII®. No → The condition that caused this symptom is currently not present. Inspect the related wiring harness for a possible intermittent condition. Look for any chafed, pierced, pinched or partially broken wires.	All

Symptom:
*COURTESY LAMPS INOPERATIVE WITH ALARM TRIPPED

POSSIBLE CAUSES
COURTESY LAMPS INOPERATIVE
BODY CONTROL MODULE INTERNAL MALFUNCTION

TEST	ACTION	APPLICABILITY
1	Turn the Courtesy Lamps on. Do the Courtesy Lamps operate properly? Yes → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A. No → Refer to symptom COURTESY LAMPS INOPERATIVE - ALL LAMPS in the INTERIOR LIGHTING category.	All

Symptom:

*DRIVER DOOR KEY FAILS TO ARM OR DISARM VTSS

POSSIBLE CAUSES
DOOR SWITCH FAILURE

TEST	ACTION	APPLICABILITY
1	For this failure, proceed with diagnosis. For this condition: Refer to symptom DOOR CENTRAL LOCK/UNLOCK SWITCH FAILURE in the POWER DOOR LOCKS/RKE CATAGORY.	All

Symptom:
*HEADLAMPS INOPERATIVE WITH ALARM TRIPPED (IF ENABLED)

POSSIBLE CAUSES
LOW BEAM HEADLAMPS INOPERATIVE
BODY CONTROL MODULE INTERNAL MALFUNCTION
BODY CONTROL MODULE INTERNAL MALFUNCTION
HEADLAMP DELAY RELAY
JUNCTION BLOCK - OPEN FUSED B(+) CIRCUIT
JUNCTION BLOCK - OPEN HEADLAMP DELAY RELAY CONTROL CIRCUIT
HEADLAMP DELAY RELAY

TEST	ACTION	APPLICABILITY
1	Turn the Low Beam Headlamps on. Do the Low Beam Headlamps operate properly? Yes → Go To 2 No → Refer to symptom LOW BEAM HEADLAMPS WILL NOT TURN ON in the EXTERIOR LIGHTING category.	All
2	Turn the Headlamps off. With the DRBIII®, actuate the Headlamp Delay Relay. Do the Headlamps flash while actuating the Headlamp Delay Relay? Yes → Replace the Body Control Module. No → Go To 3	All
3	Remove the Headlamp Delay Relay from the Junction Block. Temporarily remove the Horn Relay from the Junction Block. Reinstall the Horn Relay in place of the Headlamp Delay Relay. With the DRBIII®, actuate the Headlamp Delay Relay. Do the Headlamps flash while actuating the Headlamp Delay Relay? Yes → Replace the Headlamp Delay Relay. No → Go To 4	All
4	Remove the Horn Relay from the Headlamp Delay Relay location in the Junction Block. Reinstall the Horn Relay to its original location. Measure the voltage of the Fused B(+) circuits at the Headlamp Delay Relay connector. Is the voltage above 10.0 volts at each cavity? Yes → Go To 5 No → Refer to symptom HEADLAMP TIME DELAY INOPERATIVE in the EXTERIOR LIGHTING category.	All

*HEADLAMPS INOPERATIVE WITH ALARM TRIPPED (IF ENABLED) — Continued

TEST	ACTION	APPLICABILITY
5	Remove the Headlamp Delay Relay from the junction block. Remove the BCM from the junction block. Connect a jumper wire between the Fused B(+) circuit and the Headlamp Delay Relay Control circuit at the Headlamp Delay Relay connector. Measure the voltage of the Headlamp Delay Relay Control circuit (cavity 5) in the BCM internal connector. Is the voltage above 10.0 volts? Yes → Go To 6 No → Replace the Junction Block. Perform VTSS VERIFICATION TEST - 1A.	All
6	Disconnect the jumper wire. Reinstall the Headlamp Delay Relay in the Junction Block. Remove the BCM from the junction block. Measure the voltage of the Headlamp Delay Relay Control circuit (cavity 5) in the BCM internal connector. Is the voltage above 10.0 volts? Yes → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A. No → Replace the Headlamp Delay Relay. Perform VTSS VERIFICATION TEST - 1A.	All

Symptom:
*HORNS FAIL TO SOUND

POSSIBLE CAUSES
HORN RELAY
BODY CONTROL MODULE INTERNAL MALFUNCTION
OPEN HORN SWITCH
OPEN HORN SWITCH SENSE CIRCUIT
CLOCKSPRING
OPEN HORN SWITCH SENSE CIRCUIT
BODY CONTROL MODULE INTERNAL MALFUNCTION
OPEN FUSE #8
JUNCTION BLOCK - OPEN FUSED B(+) CIRCUIT
JUNCTION BLOCK - OPEN HORN RELAY CONTROL CIRCUIT
HORN RELAY
BODY CONTROL MODULE INTERNAL MALFUNCTION
HORN RELAY
JUNCTION BLOCK - OPEN HORN RELAY OUTPUT CIRCUIT
OPEN HORN RELAY OUTPUT CIRCUIT
OPEN GROUND CIRCUIT
OPEN HORN(S)

TEST	ACTION	APPLICABILITY
1	A failure in the Horn Switch Sense circuit, Horn Relay Control circuit, or the Horn Relay Output circuit could cause this failure. The Horn Relay Control circuit will be diagnosed first. Continue to the Horn Functional Test for further diagnosis. Horn Functional Test. Go To 2	All
2	With the DRBIII®, actuate the HORN RELAY. Do the Horns sound while actuating the Horn Relay. Yes → Go To 3 No → Go To 8	All
3	**NOTE: The following test will diagnose the Horn Switch Sense circuit.** Press and hold the Horn button. With the DRBIII® in Inputs/Outputs, read the HORN SW state. Does the DRBIII® display CLOSED? Yes → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A. No → Go To 4	All

*HORNS FAIL TO SOUND — Continued

TEST	ACTION	APPLICABILITY
4	**WARNING: Turn the Ignition Off, disconnect the Battery and wait 2 minutes before proceeding.** **CAUTION: Do not place an intact undeployed Airbag face down on a hard surface, the Airbag will propel into the air if accidently deployed.** Disconnect the Driver Airbag Module. Disconnect the Horn Switch connector. Connect a jumper wire between the Horn Switch Sense circuit and ground. With the DRBIII® in Inputs/Outputs, read the HORN SW state. Does the DRBIII® display HORN SW: CLOSED? Yes → Replace the Horn Switch. Perform VTSS VERIFICATION TEST - 1A. No → Go To 5	All
5	Disconnect the Clockspring connector. Connect a jumper wire between the Horn Switch Sense circuit (BCM side) and ground. With the DRBIII® in Inputs/Outputs, read the HORN SW state. Does the DRBIII® display HORN SW: CLOSED? Yes → Go To 6 No → Go To 7	All
6	**WARNING: Turn the Ignition Off, disconnect the Battery and wait 2 minutes before proceeding.** **CAUTION: Do not place an intact undeployed Airbag face down on a hard surface, the Airbag will propel into the air if accidently deployed.** Disconnect the Driver Airbag Module. Disconnect the Clockspring harness connector. Disconnect the Horn Switch harness connector. Measure the resistance of the Horn Switch Sense circuit between the Horn Switch and Clockspring. Is the resistance below 5.0 ohms? Yes → Replace the Clockspring. Perform VTSS VERIFICATION TEST - 1A. No → Repair the Horn Switch Sense circuit for an open between the Clockspring and the Horn switch. Perform VTSS VERIFICATION TEST - 1A.	All
7	Disconnect the Body Control Module C1 harness connector. Disconnect the Clockspring harness connector. Measure the resistance of the Horn Switch Sense circuit between the BCM and the Clockspring. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A. No → Repair the Horn Switch Sense circuit for an open between the Clockspring and the BCM. Perform VTSS VERIFICATION TEST - 1A.	All

*HORNS FAIL TO SOUND — Continued

TEST	ACTION	APPLICABILITY
8	With the DRBIII®, actuate the HORN RELAY. Examine the Horn Relay during the actuation. Does the Horn Relay click while actuating. Yes → Go To 9 No → Go To 13	All
9	**NOTE: The following test will diagnose the Horn Relay Output circuit.** Disconnect the Horn Relay. Connect a jumper wire between the Fused B(+) circuit and the Horn Relay Output circuit at the Horn Relay connector. Does the horn sound with the jumper wire connected? Yes → Replace the Horn Relay. Perform VTSS VERIFICATION TEST - 1A. No → Go To 10	All
10	Disconnect the jumper wire. Disconnect connector C2 at the Junction Block. Connect a jumper wire between the Horn Relay Output circuit at the Junction Block C2 connector and B(+). Does the horn sound with the jumper wire connected? Yes → Replace the Junction Block. Perform VTSS VERIFICATION TEST - 1A. No → Go To 11	All
11	Connect a jumper wire between the Horn Relay Output circuit at the Junction Block C2 connector and B(+). Disconnect the Horn connectors. Measure the voltage of the Horn Relay Output circuit at each Horn connector. Is the voltage above 10.0 volts? Yes → Go To 12 No → Repair the Horn Relay Output circuit for an open. Perform VTSS VERIFICATION TEST - 1A.	All
12	Disconnect the jumper wire. Disconnect the Horn connectors. Measure the resistance of the Ground circuit at each Horn connector. Is the resistance below 5.0 ohms? Yes → Replace the Horn(s). Perform VTSS VERIFICATION TEST - 1A. No → Repair the Ground circuit for an open. Perform VTSS VERIFICATION TEST - 1A.	All
13	**NOTE: The following test will diagnose the Horn Relay Control circuit.** Remove and inspect Fuse #8 in the Junction Block. Is the fuse open? Yes → Inspect/repair the Fused B(+) circuit for a short to ground. Replace the Fuse. Perform VTSS VERIFICATION TEST - 1A. No → Go To 14	All

*HORNS FAIL TO SOUND — Continued

TEST	ACTION	APPLICABILITY
14	Reinstall Fuse #8 in the Junction Block. Remove the Horn Relay from the Junction Block. Temporarily remove the Headlamp Delay Relay from the Junction Block. Reinstall the Headlamp Delay Relay in place of the Horn Relay. With the DRBIII®, actuate the HORN RELAY. Do the Horns sound while actuating the Horn Relay? Yes → Replace the Horn Relay. Perform VTSS VERIFICATION TEST - 1A. No → Go To 15	All
15	Remove the Headlamp Delay Relay from the Horn Relay location in the Junction Block. Reinstall the Headlamp Delay Relay to its original location. Measure the voltage of the Fused B(+) circuits at the Horn Relay connector. Is the voltage above 10.0 volts at each cavity? Yes → Go To 16 No → Replace the Junction Block. Perform VTSS VERIFICATION TEST - 1A.	All
16	Remove the Horn Relay from the junction block. Remove the BCM from the junction block. Connect a jumper wire between the Fused B(+) circuit and the Horn Relay Control circuit at the Horn Relay connector. Measure the voltage of the Horn Relay Control circuit (cavity 7) in the BCM internal connector. Is the voltage above 10.0 volts? Yes → Go To 17 No → Replace the Junction Block. Perform VTSS VERIFICATION TEST - 1A.	All
17	Disconnect the jumper wire. Reinstall the Horn Relay in the Junction Block. Remove the BCM from the junction block. Measure the voltage of the Horn Relay Control circuit (cavity 7) in the BCM internal connector. Is the voltage above 10.0 volts? Yes → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A. No → Replace the Horn Relay. Perform VTSS VERIFICATION TEST - 1A.	All

Symptom:
*HORNS FAIL TO SOUND WITH ALARM TRIPPED (IF ENABLED)

POSSIBLE CAUSES
HORN CIRCUIT MALFUNCTION
OPEN DOOR AJAR CIRCUIT
BODY CONTROL MODULE INTERNAL MALFUNCTION

TEST	ACTION	APPLICABILITY
1	A failure in the Horn Relay Control circuit, Horn Relay Output circuit, or the Door Ajar circuits could cause this failure. The Horn Relay Control circuit will be diagnosed first. Continue to the Horn Functional Test for further diagnosis. Horn Functional Test. Go To 2	All
2	With the DRBIII®, actuate the HORN RELAY. Do the Horns sound while actuating the Horn Relay. Yes → Go To 3 No → Refer to HORNS FAIL TO SOUND symptom in the VTSS catagory.	All
3	With the DRBIII®, in Inputs/Outputs, read the following Door/Decklid Ajar Switch states. DRV DR AJAR SW PAS DR AJAR SW LR DR AJAR SW (4 Door) RR DR AJAR SW (4 Door) DECKLID AJAR SW Do the Door/Decklid Ajar Switch states appear correct? Yes → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A. No → Refer to the appropriate DOOR AJAR test in the DOOR AJAR catagory.	All

Symptom:
*PASSENGER DOOR KEY FAILS TO ARM OR DISARM VTSS

POSSIBLE CAUSES
DOOR SWITCH FAILURE

TEST	ACTION	APPLICABILITY
1	For this failure, proceed with diagnosis. For this condition: Refer to symptom DOOR CENTRAL LOCK/UNLOCK SWITCH FAILURE in the POWER DOOR LOCKS/RKE CATAGORY.	All

Symptom:
*VTSS DOES NOT TRIP FROM DRIVER DOOR

POSSIBLE CAUSES
BODY CONTROL MODULE
INVALID DOOR AJAR INPUT

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read the DRV DR AJAR SW status. Open the driver door. Does the DRBIII® display CLOSED? Yes → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1. No → Refer to symptom DRIVER DOOR AJAR CKT OPEN in the DOOR AJAR category.	All

Symptom:
*VTSS DOES NOT TRIP FROM LEFT REAR DOOR

POSSIBLE CAUSES
INVALID DOOR AJAR INPUT
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read the LR DR AJAR SW status. Open the left rear door. Does the DRBIII® display CLOSED? Yes → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A. No → Refer to symptom LEFT REAR DOOR AJAR CKT OPEN in the DOOR AJAR category.	All

Symptom:
*VTSS DOES NOT TRIP FROM PASSENGER DOOR

POSSIBLE CAUSES
INVALID DOOR AJAR INPUT
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read the PAS DR AJAR SW status. Open the passenger door. Does the DRBIII® display CLOSED? Yes → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A. No → Refer to symptom PASSENGER DOOR AJAR CKT OPEN in the DOOR AJAR category.	All

Symptom:
*VTSS DOES NOT TRIP FROM RIGHT REAR DOOR

POSSIBLE CAUSES
INVALID DOOR AJAR INPUT
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read the RR DR AJAR SW status. Open the right rear door. Does the DRBIII® display CLOSED? Yes → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A. No → Refer to symptom RIGHT REAR DOOR AJAR CKT OPEN in the DOOR AJAR category.	All

Symptom:
*VTSS INDICATOR INOPERATIVE

POSSIBLE CAUSES
VTSS INDICATOR LAMP TEST
OPEN FUSED B(+) CIRCUIT
OPEN JUNCTION BLOCK
INSTRUMENT CLUSTER
OPEN VTSS LED
VTSS INDICATOR DRIVER CIRCUIT OPEN
BODY CONTROL MODULE INTERNAL MALFUNCTION
OPEN FUSE #7

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, actuate the VTSS LAMP. Does the VTSS Lamp flash while actuating the Lamp? Yes → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A. No → Go To 2	All
2	Remove and inspect Fuse #7 in the Junction Block. Is the fuse open? Yes → Inspect/repair the Fused B(+) circuit for a short to ground. Replace the Fuse. Perform VTSS VERIFICATION TEST - 1A. No → Go To 3	All
3	Reinstall Fuse #7 in the Junction Block. Gain access to the Junction Block connector C7. While back probing, measure the voltage of the Fused B(+) circuit at the Junction Block connector C7. Is the voltage above 10.0 volts? Yes → Go To 4 No → Replace the Junction Block. Perform VTSS VERIFICATION TEST - 1A.	All
4	Disconnect the Instrument Cluster harness connector. Measure the voltage of the Fused B(+) circuit at cavity 21. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the Fused B(+) circuit for an open. Perform VTSS VERIFICATION TEST - 1A.	All

*VTSS INDICATOR INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
5	Remove the VTSS Indicator Bulb from the Instrument Cluster. Inspect the VTSS Indicator Bulb and socket. Is there a problem with the bulb or socket? Yes → Repair or replace the VTSS Indicator Bulb or socket as needed. Perform VTSS VERIFICATION TEST - 1A. No → Go To 6	All
6	Disconnect the Instrument Cluster harness connector. Connect a voltmeter positive probe to a 12.0 volt supply and connect the ground probe to the VTSS Indicator Driver circuit at the Instrument Cluster connector. Turn the ignition on. With the DRB in Vehicle Theft, actuate the VTSS Indicator lamp. Is the voltage above 10.0 volts when the VTSS Indicator lamp is actuated? Yes → Replace the Instrument Cluster assembly. Perform VTSS VERIFICATION TEST - 1A. No → Go To 7	All
7	Disconnect the Instrument Cluster harness connector. Disconnect the BCM C1 harness connector. Measure the resistance of the VTSS Indicator Driver circuit between the Instrument Cluster connector and the BCM C1 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A. No → Repair the VTSS Indicator Driver circuit for an open. Perform VTSS VERIFICATION TEST - 1A.	All

Symptom:
*VTSS NO TRIP FROM DECKLID

POSSIBLE CAUSES
INVALID DECKLID AJAR INPUT
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read the DECKLID AJAR SW status. Open the decklid. Does the DRBIII® display CLOSED? Yes → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A. No → Refer to symptom DECKLID DOOR AJAR CKT OPEN in the DOOR AJAR category.	All

Symptom:
*VTSS WILL NOT ARM

POSSIBLE CAUSES
CHECK THE VTSS STATUS
CHECK THE BCM FOR DTCS
BODY CONTROL MODULE INTERNAL MALFUNCTION

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, check that the Theft Alarm is enabled. Was the Theft Alarm enabled? Yes → Go To 2 No → With the DRBIII®, enable the Vehicle Theft Security System (VTSS). Perform VTSS VERIFICATION TEST - 1A.	All
2	With the DRBIII®, read the active DTC's. Are any VTSS related DTC's present? Yes → Refer to the Symptom List and diagnose the appropriate symptom. No → Replace the Body Control Module. Perform VTSS VERIFICATION TEST - 1A.	All

Symptom:
WIPER ON/OFF RELAY OUTPUT SHORTED HIGH

When Monitored and Set Condition:

WIPER ON/OFF RELAY OUTPUT SHORTED HIGH

When Monitored: Continuoulsy.

Set Condition: BCM detects a high level on the wiper on/off relay output when it is attempting to turn on the wipers.

POSSIBLE CAUSES
INTERMITTENT CONDITION
SHORT TO BATTERY
HI/LO WIPER RELAY
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, clear all BCM DTC's. Actuate the Wipers. With the DRBIII®, read the DTC information. Does the DRBIII® read: Wiper On/Off Relay Output Shorted High? Yes → Go To 2 No → The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the HI/LO Wiper Relay. Disconnect the BCM from the junction block. Measure the voltage of the HI/LO Wiper Relay Control Circuit. Is the voltage below 5.0 volts? Yes → Repair the Wiper HI/LO Relay Control Circuit for a short to battery Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Install a known good relay in place of the HI/LO Wiper Relay. Turn the Wipers on. Do the Wipers operate normally? Yes → Replace the HI/LO Wiper Relay. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
WIPER ON/OFF RELAY OUTPUT SHORTED LOW

When Monitored and Set Condition:

WIPER ON/OFF RELAY OUTPUT SHORTED LOW

When Monitored: Continuously.

Set Condition: BCM detects a low (ground) signal on the wiper on/off relay output.

POSSIBLE CAUSES
INTERMITTENT CONDITION
OPEN CIRCUIT
SHORT TO GROUND
HI/LO WIPER RELAY
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, clear all BCM DTC's. Actuate the Wipers. With the DRBIII®, read the DTC information. Does the DRBIII® read: Wiper On/Off Relay Output Shorted Low? Yes → Go To 2 No → The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires. Perform BODY VERIFICATION TEST - VER 1.	All
2	Disconnect the BCM from the junction block. Connect a jumper wire between the HI/LO Wiper Relay Control Circuit and ground With the DRBIII®, monitor the wiper relay. Does the Wiper Relay show CLOSED? Yes → Repair the HI/LO Wiper Relay Control Circuit for an open condition. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Remove the HI/LO Wiper Relay. Disconnect the BCM from the junction block. Measure the resistance of the HI/LO Wiper Relay Output Circuit. Is the resistance below 5.0 ohms? Yes → Repair the HI/LO Wiper Relay Output Circuit for a short to ground condition. Perform BODY VERIFICATION TEST - VER 1. No → Go To 4	All

WIPER ON/OFF RELAY OUTPUT SHORTED LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Install a known good relay in place of the HI/LO Wiper Relay. Turn the wipers on. Do the Wipers operate normally? Yes → Replace the Wiper HI/LO Relay. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
WIPER PARK SWITCH OPEN CIRCUIT

When Monitored and Set Condition:

WIPER PARK SWITCH OPEN CIRCUIT

When Monitored: With the wipers on (any speed).

Set Condition: BCM fails to detect a park signal from the wiper motor for 18 consecutive seconds.

POSSIBLE CAUSES
INTERMITTENT CONDITION
OPEN WIPER PARK SWITCH SENSE CIRCUIT
SHORT TO BATTERY
WIPER MOTOR
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, clear all BCM DTC's. Actuate the Wipers. With the DRBIII®, read the DTC information. Does the DRBIII® read: Wiper Park Switch Open Circuit? Yes → Go To 2 No → The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires. Perform BODY VERIFICATION TEST - VER 1.	All
2	Disconnect the BCM C3 harness connector. Connect a jumper wire between the Wiper Park Switch Sense Circuit and ground. With the DRBIII®, monitor the Wiper Park Switch. Does the Wiper Park Switch show CLOSED? Yes → Repair the Wiper Park Switch Sense Circuit for an open condition. Perform BODY VERIFICATION TEST - VER 1. No → Go To 3	All

WIPER PARK SWITCH OPEN CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Wiper Park Switch. Disconnect the BCM from the junction block. Measure the voltage of the Wiper Relay Control Circuit. Is the voltage below 5.0 volts? Yes → Go To 4 No → Repair the HI/LO Wiper Relay Control Circuit for a short to voltage. Perform BODY VERIFICATION TEST - VER 1.	All
4	Turn the Wipers off. Disconnect the Wiper Motor Connector. With the DRBIII®, monitor the Wiper Park Switch. Connect a jumper wire between the Wiper Park Switch Sense Circuit and ground. Does the Wiper Park Switch show CLOSED? Yes → Replace the Wiper Motor. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
WIPER PARK SWITCH SHORTED TO GROUND

When Monitored and Set Condition:

WIPER PARK SWITCH SHORTED TO GROUND

When Monitored: With the wipers on (any speed).

Set Condition: BCM fails to detect a park signal from the wiper motor.

POSSIBLE CAUSES
INTERMITTENT CONDITION
SHORT TO GROUND
WIPER SWITCH
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, clear all BCM DTC's. Actuate the Wipers. With the DRBIII®, read the DTC information. Does the DRBIII® read: Wiper Park Switch Shorted to Ground? Yes → Go To 2 No → The condition that caused the symptom is currently not present. Inspect the related wiring for a possible intermittent condition. Look for any chafed, pierced, pinched, or partially broken wires. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the Junction Block Harness Connector from the front of the junction block. Disconnect the Wiper Park Switch harness connector. Remove the Body Control Module from the junction block. Using a 12-volt test light connected to ground, check the Wiper Park Switch Sense circuit. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the Wiper Park Switch Sense Circuit for a short to ground condition. Perform BODY VERIFICATION TEST - VER 1.	All

WIPER PARK SWITCH SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
3	Disconnect the Junction Block harness connector. Disconnect the Wiper Switch connector. Measure the resistance of the Wiper Switch MUX Circuit. Is the resistance below 5.0 ohms? Yes → Replace the Wiper Switch. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:
*HEADLAMP WASHER INOPERATIVE

POSSIBLE CAUSES
OPEN GROUND CIRCUIT
FUSED B+ CIRCUIT OPEN
HEADLAMP WASHER RELAY CONTROL CIRCUIT OPEN
HEADLAMP WASHER RELAY OUTPUT CIRCUIT OPEN
HEADLAMP WASHER PUMP MOTOR
HEADLAMP WASHER RELAY
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Washer Pump connector. Measure the resistance of the Washer Pump ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 2 No → Repair the open Washer Pump ground circuit. Perform BODY VERIFICATION TEST - VER 1.	All
2	Turn the ignition on. Disconnect the Headlamp Washer Relay. Measure the voltage of the Fused B+ Circuit. Is the voltage above 10.0 volts? Yes → Go To 3 No → Repair the Fused B+ Circuit for an open condition. Perform BODY VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Disconnect the Headlamp Washer Relay. Disconnect the BCM C3 harness connector. Measure the resistance of the Headlamp Washer Relay Control Circuit. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the Headlamp Washer Relay Control Circuit for a open. Perform BODY VERIFICATION TEST - VER 1.	All
4	Disconnect the Headlamp Washer Relay. Disconnect the Headlamp Washer Pump Motor. Measure the resistance of the Headlamp Washer Relay Output Circuit. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Headlamp Washer Relay Output Circuit for a open. Perform BODY VERIFICATION TEST - VER 1.	All

*HEADLAMP WASHER INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition on. Disconnect the Headlamp Washer Pump Motor connector. Actuate the washers. Measure the voltage of the Washer Pump Output Circuit. Is the voltage above 10.0 volts? Yes → Replace the Headlamp Washer Pump Motor. Perform BODY VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off. Install a known good relay in place of the Headlamp Washer Relay. Turn the Washers on. Do the Headlamp Washers operate normally? Yes → Replace the Headlamp Washer Relay. Perform BODY VERIFICATION TEST - VER 1. No → Replace the Body Control Module. Perform BODY VERIFICATION TEST - VER 1.	All

VERIFICATION TESTS

41TE TRANSMISSION VERIFICATION TEST - VER 1	APPLICABILITY
1. Connect the DRBIII® to the Data Link Connector (DLC). 2. Reconnect any disconnected components. 3. With the DRBIII®, erase all Transmission DTC's, also erase the PCM DTC's. **4. NOTE: Erase DTC P0700 in the PCM to turn the Malfunction Indicator Lamp (MIL) off after making Transmission repairs.** 5. With the DRBIII®, display Transmission Temperature. Start and run the engine until the Transmission Temperature is HOT - above 43° C or 110° F. 6. Check the Transmission Fluid and adjust if necessary. Refer to the Service information for the Fluid Fill procedure. **7. NOTE: If the Transmission Control Module or the Transmission has been repaired or replaced it is necessary to perform the DRBIII® Quick Learn Procedure and reset the "Pinion Factor"** 8. Road test the vehicle. With the DRBIII®, monitor the engine RPM. Make 15 to 20 1-2, 2-3, 3-4 upshifts. Perform these shifts from a standing start to 45 MPH with a constant throttle opening of 20 to 25 degrees. 9. Below 25 MPH, make 5 to 8 wide open throttle kickdowns to 1st gear. Allow at least 5 seconds each in 2nd and 3rd gear between each kickdown. 10. For a specific DTC, drive the vehicle to the Symptom's When Monitored/When Set conditions to verify the DTC repair. 11. If equipped with AutoStick®, up-shift and down-shift several times using the AutoStick® feature during the road test. **12. NOTE: Use the EATX OBDII Task Manager to run Good Trip time in each gear, this will confirm the repair and to ensure that the DTC has not re-matured.** 13. Check for Diagnostic Trouble Codes (DTC's) during the road test. If a DTC sets during the road test , return to the Symptom list and perform the appropriate Symptom. Were there any Diagnostic Trouble Codes (DTCs) set during the road test? Yes → Refer to the Symptom List for appropriate Symptom(s). No → Repair is complete.	All

ABS VERIFICATION TEST - VER 1	APPLICABILITY
1. Turn the ignition off. 2. Connect all previously disconnected components and connectors. 3. Ensure all accessories are turned off and the battery is fully charged. 4. Ensure that the Ignition is on, and with the DRBIII®, erase all Diagnostic Trouble Codes from ALL modules. Start the engine and allow it to run for 2 minutes and fully operate the system that was malfunctioning. 5. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII, read DTC's from ALL modules. 6. If any Diagnostic Trouble Codes are present, return to Symptom list and troubleshoot new or recurring symptom. 7. If there are no DTC's present after turning ignition on, road test the vehicle for at least 5 minutes. Perform several antilock braking stops. **8. Caution: Ensure braking capability is available before road testing.** 9. Again, with the DRBIII® read DTC's. If any DTC's are present, return to Symptom list. 10. If there are no Diagnostic Trouble Codes (DTC's) present, and the customer's concern can no longer be duplicated, the repair is complete. Are any DTC's present or is the original concern still present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

VERIFICATION TESTS — Continued

AIRBAG VERIFICATION TEST - VER 1	APPLICABILITY
1. Remove any special tools or jumper wires and reconnect all previously disconnected components - except the Battery. **2. WARNING: TURN THE IGNITION ON, THEN RECONNECT THE BATTERY.** 3. Connect the DRB to the Data Link Connector - use the most current software available. 4. Use the DRB III and erase the stored codes in all airbag system modules. 5. Turn the Ignition Off, and wait 15 seconds before turning the Ignition On. 6. Wait one minute, and read active codes and if there are none present read the stored codes. 7. Note: If equipped with Airbag On-Off switch, read the DTC's in all switch positions. 8. Note: Read the DTC's in all airbag system related modules. 9. If the DRB shows any active or stored codes, return to the Symptom list and follow path specified for that trouble code. If no active or stored codes are present, the repair is complete. Are any DTC's present or is the original condition still present? YES Repair is not complete, refer to appropriate symptom list. NO Repair is complete.	All

VERIFICATION TESTS — Continued

BODY VERIFICATION TEST - VER 1	APPLICABILITY
1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors. 2. If the Sentry Key Immobilizer Module (SKIM) or the Powertrain Control Module (PCM) was replaced, proceed to number 6. If the SKIM or PCM was not replaced, continue to the next number. 3. If the Body Control Module was replaced, turn the ignition on for 15 seconds (to allow the new BCM to learn VIN) or engine may not start (if VTSS equipped). If the vehicle is equipped with VTSS, use the DRBIII® and enable VTSS. 4. Program all other options as needed. 5. If any repairs were made to the HVAC System, disconnect the battery or, using the DRBIII®, recalibrate the HVAC doors. Proceed to number 13. 6. Obtain the Vehicle's unique PIN assigned to it's original SKIM from either the vehicle's invoice or from Chrysler's Customer Assistance Center (1-800-992-1997). 7. NOTE: Once Secured Access Mode is active, the SKIM will remain in that mode for 60 seconds. 8. With the DRBIII®, select THEFT ALARM, SKIM, MISCELLANEOUS and select SKIM REPLACED. Enter the 4 digit PIN to put the SKIM in Secured Access Mode. 9. The DRBIII® will prompt for the following steps. (1) Program the country code into the SKIM's memory. (2) Program the vehicle's VIN into the SKIM memory. (3) Transfer the vehicle's Secret Key data from the PCM. 10. Using the DRBIII®, program all customer keys into the SKIM memory. This requires that the SKIM be in Secured Access Mode, using the 4 digit PIN. 11. Note: If the PCM is replaced, the VIN and the unique Secret Key data must be transferred from the SKIM to the PCM. This procedure requires the SKIM to be placed in Secured Access Mode using the 4-digit PIN. 12. Note: After 3 attempts at entering Secured Access Mode with an incorrect PIN, Secured Access Mode will be locked out for 1 hour and the DRBIII® will display "Bus +\- Signals Open" or "No Response". To exit this mode, turn ignition to Run for 1 hour. 13. Ensure that all accessories are turned off and the battery is fully charged. 14. Ensure that the Ignition is on. 15. With the DRBIII®, record and erase all DTCs from ALL modules. Start and run the engine for 2 minutes. Operate all functions of the system that caused the original concern. 16. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII®, read DTCs from ALL modules. Are any DTC's present or is the original condition still present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

VERIFICATION TESTS — Continued

POWERTRAIN VERIFICATION TEST VER - 1	APPLICABILITY
1. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM. **2. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.** 3. Inspect the vehicle to ensure that all components related to the repair are connected properly. 4. Inspect the engine oil for fuel contamination. Replace the oil and filter as necessary. 5. Attempt to start the engine. 6. If the No Start condition is still present, refer to the symptom list and perform the diagnostic testing as necessary. refer to and Technical Service Bulletins that may apply. 7. Run the engine for one warm-up cycle to verify operation. 8. With the DRBIII®, confirm that no DTCs or Secondary Indicators are present and that all components are functioning properly. 9. If a DTC is present, refer to the appropriate category and select the corresponding symptom. Are any DTCs present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

SKIS VERIFICATION	APPLICABILITY
1. Reconnect all previously disconnected components and connectors. 2. Obtain the vehicle's unique Personal Identification Number (PIN) assigned to it's original SKIM. This number can be obtained from the vehicle's invoice or Chrysler's Customer Center (1-800-992-1997). **3. NOTE: When entering the PIN, care should be taken because the SKIM will only allow 3 consecutive attempts to enter the correct PIN. If 3 consecutive incorrect PIN's are entered the SKIM will Lock Out the DRB III for 1 hour.** 4. To exit Lock Out mode, the ignition key must remain in the Run position continually for 1 hour. Turn off all accessories and connect a battery charger if necessary. 5. With the DRB III, select Theft Alarm, SKIM and Miscellaneous. Then select desired procedure and follow the steps that will be displayed. 6. If the SKIM has been replaced, ensure all of the vehicle ignition keys are programmed to the new SKIM. **7. NOTE: Prior to returning vehicle to the costumer, perform a module scan to be sure that all DTC's are erased. Erase any DTC's that are found.** 8. With the DRB III erase all DTC's. Perform 5 ignition key cycles leaving the key on for at least 90 seconds per cycle. 9. With the DRB III, read the SKIM DTC's. Are there any SKIM DTC's? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

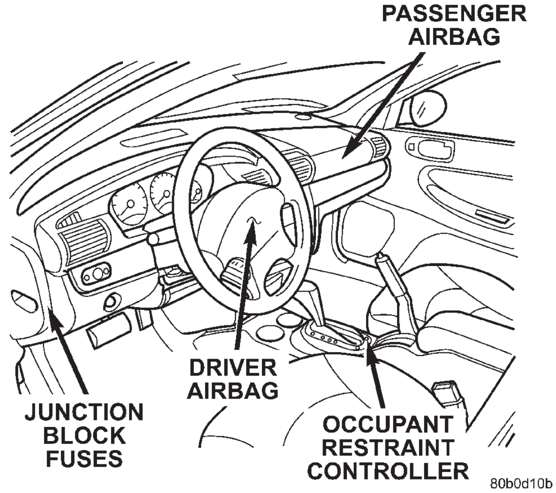
VERIFICATION TESTS — Continued

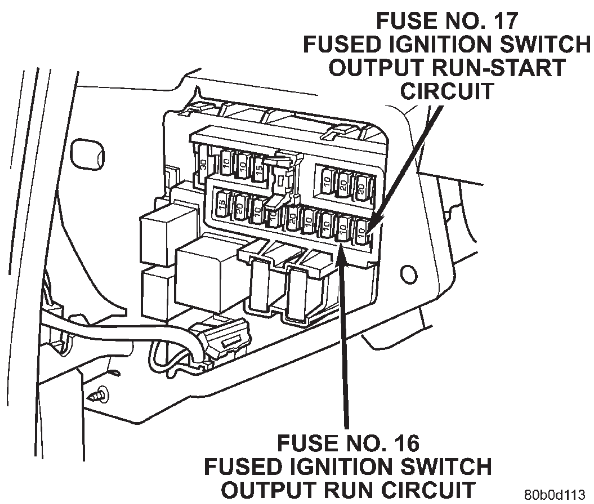
VTSS VERIFICATION TEST - 1A	APPLICABILITY
1. Ensure all doors and the decklid are closed. 2. Open the driver door. 3. Remove the ignition key (but keep in hand). 4. Lock the doors with RKE transmitter. 5. Close the driver door. 6. - If the VTSS Indicator Lamp flashes rapidly and after approximately 15 seconds changes to a slower flash, the system is operational. 7. - If the indicator fails to flash as described, there is a problem with the system. Select the Identifying VTSS symptom from the Symptom List to troubleshoot. Does the VTSS Indicator Lamp flash as specified? Yes → Repair is complete. No → Repair is not complete, refer to appropriate symptom.	All

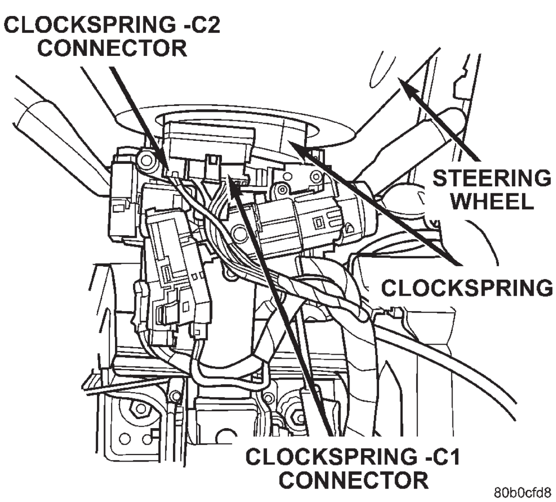
NOTES

8.0 COMPONENT LOCATIONS

8.1 AIRBAG SYSTEM

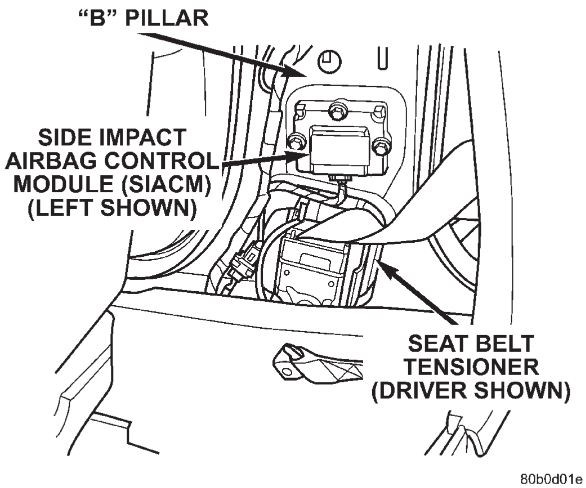


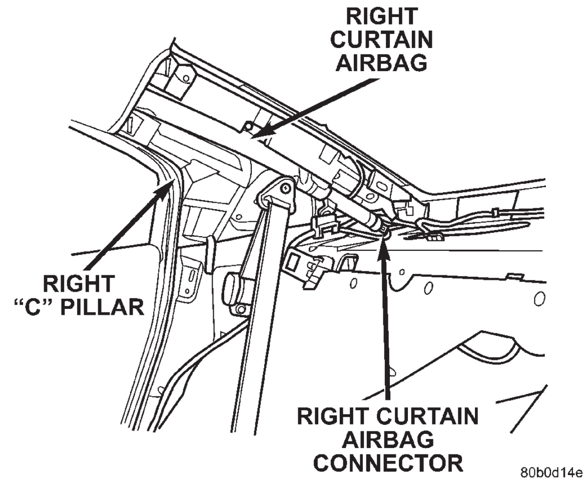




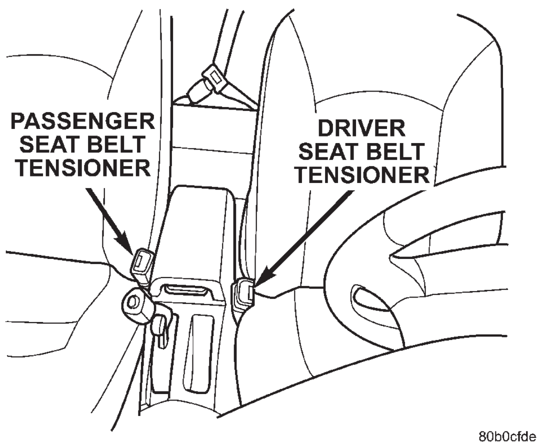
8.1 AIRBAG SYSTEM (Continued)

4-Door Models

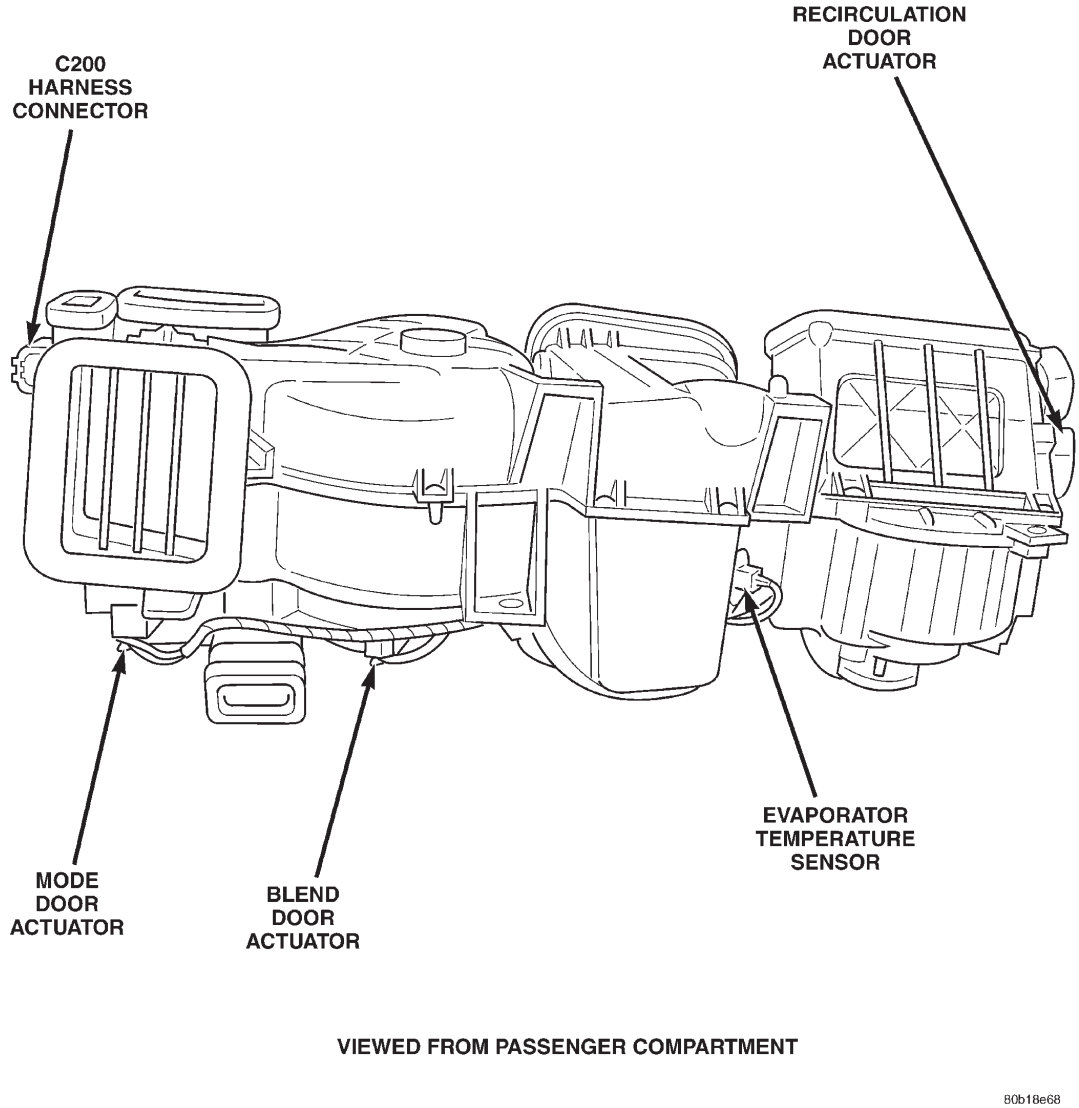




Convertible Models

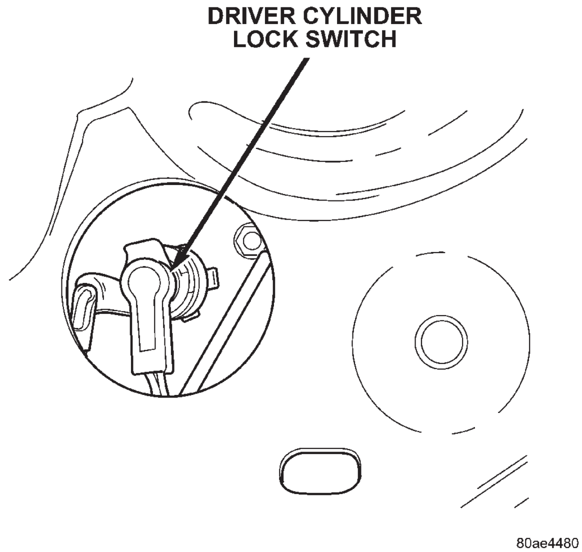


8.2 HVAC UNIT

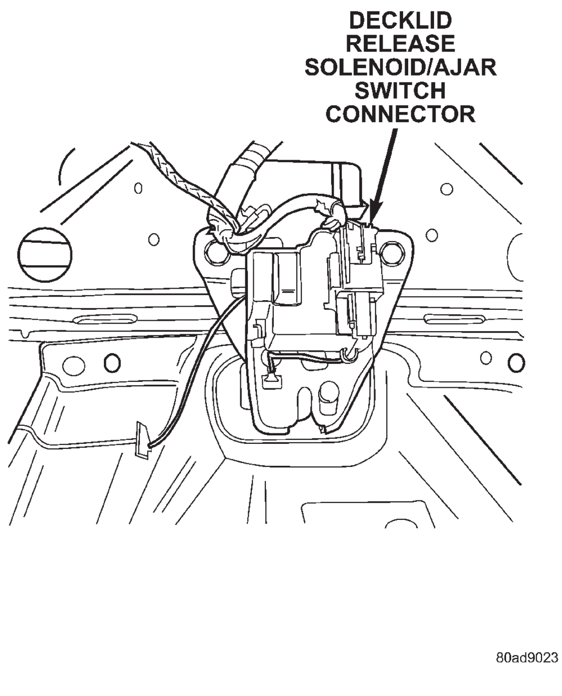

RECIRCULATION DOOR ACTUATOR
C200 HARNESS CONNECTOR
EVAPORATOR TEMPERATURE SENSOR
MODE DOOR ACTUATOR
BLEND DOOR ACTUATOR
VIEWED FROM PASSENGER COMPARTMENT
80b18e68

8.3 POWER DOOR LOCKS/RKE

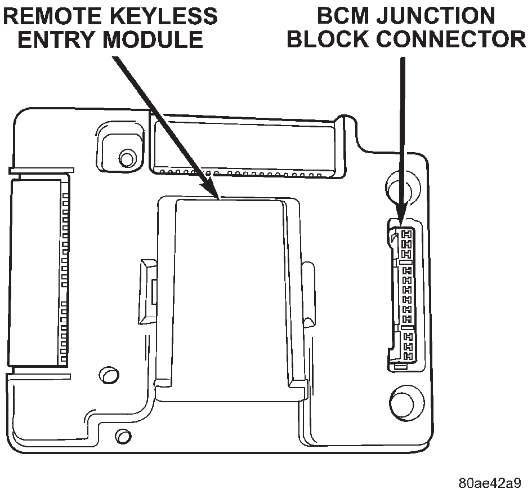
8.3.1 DRIVER CYLINDER LOCK SWITCH



8.3.2 DECKLID RELEASE SOLENOID

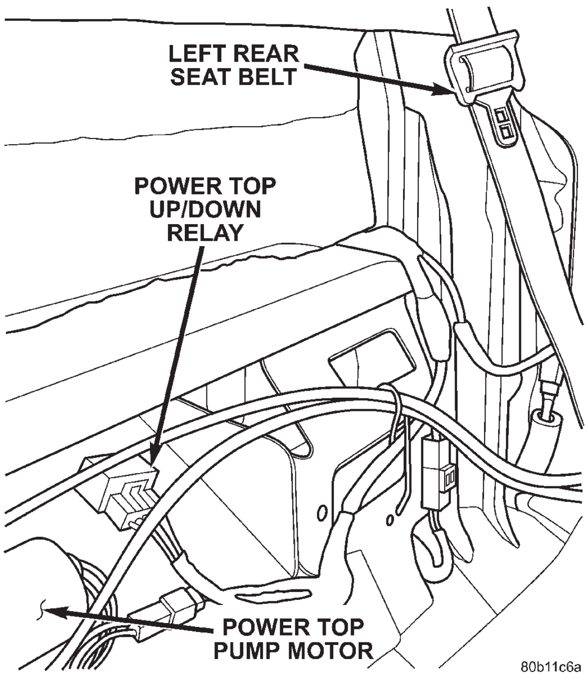


8.3.3 REMOTE KEYLESS ENTRY MODULE

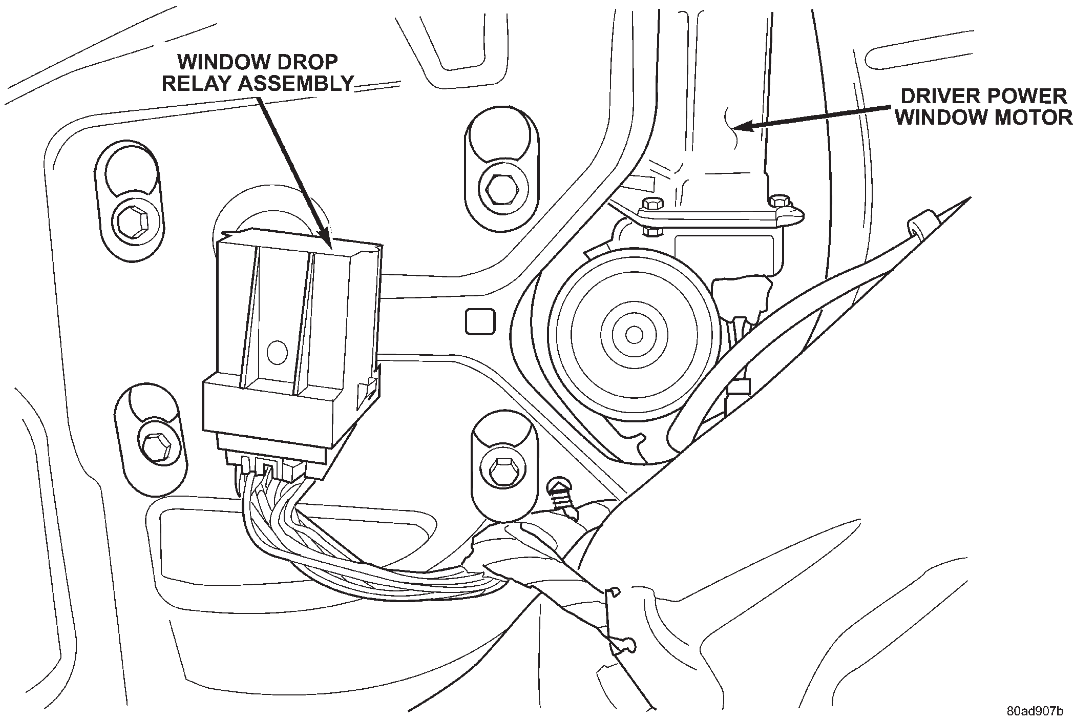


8.4 POWER TOP

8.4.1 POWER TOP RELAY

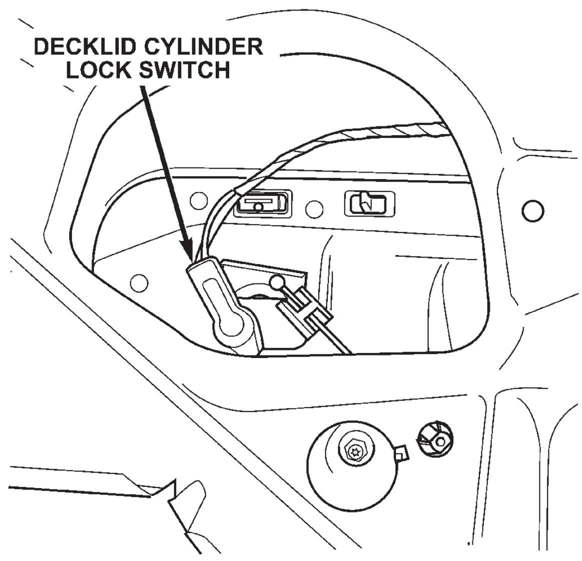


8.4 POWER TOP (Continued)
8.4.2 WINDOW DROP RELAY ASSEMBLY

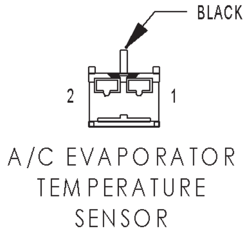


8.5 VEHICLE THEFT SECURITY SYSTEM

8.5.1 DECKLID CYLINDER LOCK SWITCH

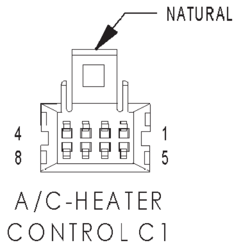


9.0 CONNECTOR PINOUTS



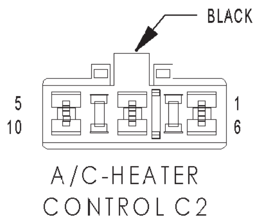
A/C EVAPORATOR TEMPERATURE SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	C12 20LG/BK	EVAPORATOR TEMPERATURE SENSOR SIGNAL
2	C57 20DB/GY	SENSOR GROUND



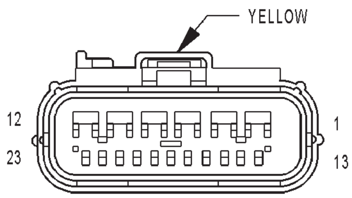
A/C-HEATER CONTROL C1 - NATURAL 8 WAY

CAV	CIRCUIT	FUNCTION
1	C57 20DB/GY	SENSOR GROUND
2	C16 20LB/YL	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
3	E17 18YL/BK	DAY BRIGHTNESS SENSE
4	E2 20OR	PANEL LAMPS DRIVER
5	C21 20DB/OR	A/C SWITCH SENSE
6	C58 20RD/TN	A/C MODE SWITCH MUX
7	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
8	C82 20YL/OR	TEMPERATURE SELECT SIGNAL



A/C-HEATER CONTROL C2 - BLACK 10 WAY

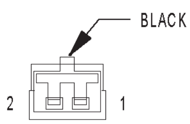
CAV	CIRCUIT	FUNCTION
1	-	-
2	C4 16TN	LOW BLOWER MOTOR DRIVER
3	C6 14LB	M2 BLOWER MOTOR DRIVER
4	-	-
5	Z119 14BK/GY	GROUND
6	-	-
7	C5 16LG	M1 BLOWER MOTOR DRIVER
8	-	-
9	-	-
10	C7 12BK/TN	HIGH BLOWER MOTOR DRIVER



AIRBAG CONTROL MODULE (ORC)

AIRBAG CONTROL MODULE (ORC) - YELLOW 23 WAY

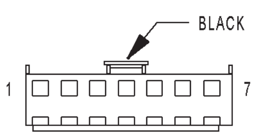
CAV	CIRCUIT	FUNCTION
1	R56 20LB/DG	PASSENGER SEAT BELT TENSIONER LINE 1
2	R54 20LB/YL	PASSENGER SEAT BELT TENSIONER LINE 2
3	R62 20OR/YL	PASSENGER SQUIB 2 LINE 1
4	R64 20TN/YL	PASSENGER SQUIB 2 LINE 2
5	R42 20BK/YL	PASSENGER SQUIB 1 LINE 1
6	R44 20DG/YL	PASSENGER SQUIB 1 LINE 2
7	R55 20LG/DG	DRIVER SEAT BELT TENSIONER LINE 1
8	R53 20LG/YL	DRIVER SEAT BELT TENSIONER LINE 2
9	R61 20OR/LB	DRIVER SQUIB 2 LINE 1
10	R63 20TN/LB	DRIVER SQUIB 2 LINE 2
11	R43 20BK/LB	DRIVER SQUIB 1 LINE 1
12	R45 20DG/LB	DRIVER SQUIB 1 LINE 2
13	-	-
14	F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
15	F23 20DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
16	Z100 18BK	GROUND
17	-	-
18	-	-
19	-	-
20	-	-
21	D25 20VT/YL (JR27)	PCI BUS
21	D25 20VT (JR41)	PCI BUS
22	-	-
23	-	-



ASH RECEIVER LAMP

ASH RECEIVER LAMP - BLACK 2 WAY

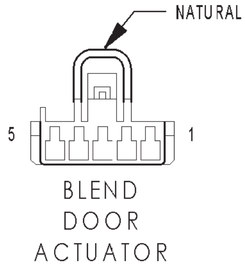
CAV	CIRCUIT	FUNCTION
1	E2 20OR/WT	PANEL LAMPS DRIVER
2	Z158 20BK/LG	GROUND



AUTOMATIC DAY/NIGHT MIRROR (JR27)

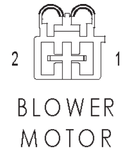
AUTOMATIC DAY/NIGHT MIRROR (JR27) - BLACK 7 WAY

CAV	CIRCUIT	FUNCTION
1	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
2	Z312 18BK	GROUND
3	L1 18VT/BK	BACK-UP LAMP FEED
4	-	-
5	-	-
6	M2 18YL	COURTESY LAMPS DRIVER
7	M1 18PK	FUSED B(+)



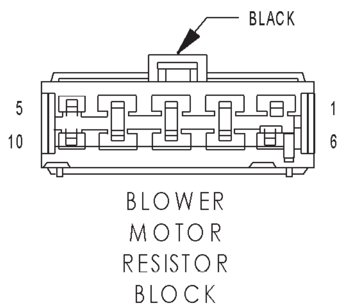
BLEND DOOR ACTUATOR - NATURAL 5 WAY

CAV	CIRCUIT	FUNCTION
1	C33 20DB/RD	BLEND AIR DOOR DRIVER
2	C57 20DB/GY	SENSOR GROUND
3	C36 20RD/WT	BLEND DOOR FEEDBACK SIGNAL
4	C26 20PK/DB	5V SUPPLY
5	C34 20DB/WT	COMMON DOOR DRIVER



BLOWER MOTOR - 2 WAY

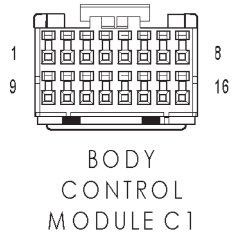
CAV	CIRCUIT	FUNCTION
1	C7 12BK	BLOWER MOTOR DRIVER
2	C1 12DG	FUSED B(+)



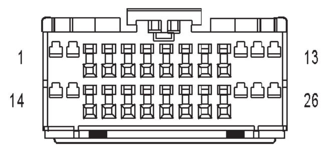
BLOWER MOTOR RESISTOR BLOCK - BLACK 10 WAY

CAV	CIRCUIT	FUNCTION
1	C7 12BK	BLOWER MOTOR DRIVER
2	C7 12BK/TN	HIGH BLOWER MOTOR DRIVER
3	C6 16LB	M2 BLOWER MOTOR DRIVER
4	C5 14LG	M1 BLOWER MOTOR DRIVER
5	C4 14TN	LOW BLOWER MOTOR DRIVER
6	-	-
7	-	-
8	-	-
9	-	-
10	-	-

BODY CONTROL MODULE C1 - 16 WAY



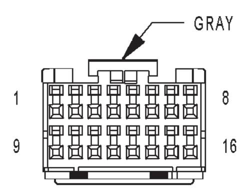
CAV	CIRCUIT	FUNCTION
1	E19 20RD	PANEL LAMPS DIMMER SIGNAL
2	X3 20BK/RD	HORN SWITCH SENSE
3	G69 20BK/OR	VTSS INDICATOR DRIVER
4	G26 20LB	KEY-IN IGNITION SWITCH SENSE
5	X11 20OR (JR27) (PREMI-UM)	TOP DOWN AUDIO EQUAL
6	P58 20WT	RKE EXTERNAL ANTENNA
7	P158 20BK	RKE EXTERNAL ANTENNA
8	-	-
9	-	-
10	D19 20VT/OR	BODY CONTROL MODULE FLASH ENABLE
11	-	-
12	A31 18BK/LB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
13	Z380 18BK/DG (PREMIUM)	GROUND
14	E17 18YL/BK	DAY BRIGHTNESS SENSE
15	-	-
16	-	-



BODY CONTROL MODULE C2

BODY CONTROL MODULE C2 - 26 WAY

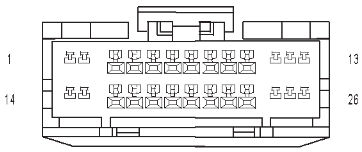
CAV	CIRCUIT	FUNCTION
1	C26 20PK/DB	5V SUPPLY
2	Z132 16BK/GY	GROUND
3	P1 18BK/WT	DECKLID RELEASE SWITCH SENSE
4	V52 20DG/RD	FRONT WIPER SWITCH MUX
5	C7 18BK/TN	HIGH BLOWER MOTOR DRIVER
6	C21 20DB/OR	A/C SWITCH SENSE
7	C37 20YL	MODE DOOR FEEDBACK SIGNAL
8	C36 18RD/WT	BLEND DOOR FEEDBACK SIGNAL
9	C12 20LG/BK	EVAPORATOR TEMPERATURE SENSOR SIGNAL
10	C57 20DB/GY	SENSOR GROUND
11	E2 18OR/BR	PANEL LAMPS DRIVER
12	E2 20OR	PANEL LAMPS DRIVER
13	E2 20OR/WT	PANEL LAMPS DRIVER
14	C82 20YL/OR	TEMPERATURE SELECT SIGNAL
15	C34 20DB/WT	COMMON DOOR DRIVER
16	D25 20VT/YL	PCI BUS (RADIO)
17	D25 20VT/YL (JR27)	PCI BUS (AIRBAG)
17	D25 20VT (JR41)	PCI BUS (AIRBAG)
18	D25 20VT/PK	PCI BUS (SKIM)
19	D25 20VT/OR	PCI BUS (MIC)
20	D25 20VT/GY	PCI BUS (DLC)
21	D25 18VT/LG (JR41)	PCI BUS (SAB)
22	E2 20OR	PANEL LAMPS DRIVER
23	C58 20RD/TN	A/C MODE SWITCH MUX
24	C32 20GY/DB	RECIRCULATION DOOR DRIVER
25	C33 20DB/RD	BLEND AIR DOOR DRIVER
26	C35 20DG/YL	MODE DOOR DRIVER



BODY CONTROL MODULE C3

BODY CONTROL MODULE C3 - GRAY 16 WAY

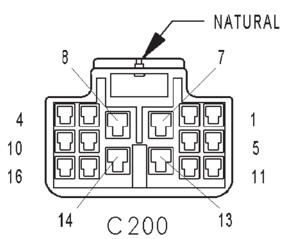
CAV	CIRCUIT	FUNCTION
1	D25 20OR	PCI BUS (PCM)
2	D25 18YL/VT	PCI BUS (ABS)
3	D25 20VT/YL	PCI BUS (TCM)
4	V55 20TN/RD	FRONT WIPER PARK SWITCH SENSE
5	V14 20RD/VT	FRONT WIPER ON/OFF RELAY CONTROL
6	V16 20VT/PK	FRONT WIPER HIGH/LOW RELAY CONTROL
7	-	-
8	-	-
9	V58 18BR/YL (JR41 BUILT-UP-EXPORT)	HEADLAMP WASHER RELAY CONTROL
10	V10 18BR	FRONT WASHER PUMP MOTOR CONTROL
11	-	-
12	-	-
13	Z132 18BK	GROUND
14	-	-
15	-	-
16	P340 18LG/YL	BATTERY FEED



BODY CONTROL MODULE C4

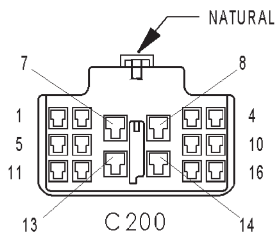
BODY CONTROL MODULE C4 - 26 WAY

CAV	CIRCUIT	FUNCTION
1	P2 18BK/WT	DECKLID RELEASE SOLENOID DRIVER
2	Q17 20RD/WT (JR27)	WINDOW DROP RELAY CONTROL
3	G72 20DG/OR (VTSS)	PASSENGER CYLINDER LOCK SWITCH MUX
4	G73 20LG/OR (VTSS)	DRIVER CYLINDER LOCK SWITCH MUX
5	G75 20TN	DRIVER DOOR AJAR SWITCH SENSE
6	G74 20TN/RD	PASSENGER DOOR AJAR SWITCH SENSE
7	G77 20TN/OR (JR41)	LEFT REAR DOOR AJAR SWITCH SENSE
8	G76 20TN/YL (JR41)	RIGHT REAR DOOR AJAR SWITCH SENSE
9	P175 18OR/BK	DRIVER LOCK RELAY OUTPUT
10	P179 18OR/BR (JR41)	LEFT REAR LOCK RELAY OUTPUT
11	P180 18OR/TN (JR41)	RIGHT REAR LOCK RELAY OUTPUT
12	P176 18PK/BK	PASSENGER LOCK RELAY OUTPUT
13	P177 18DB/WT	DRIVER UNLOCK RELAY OUTPUT
14	G38 18GY (JR27)	GARAGE DOOR OPENER ENABLE
15	P97 20WT/DG	DRIVER DOOR SWITCH MUX
16	P96 20WT/LG	PASSENGER DOOR SWITCH MUX
17	Q31 20WT/BK (JR27)	CONVERTIBLE TOP SWITCH MUX
18	G78 18TN/BK	DECKLID AJAR SWITCH SENSE
19	E2 20OR	PANEL LAMPS DRIVER
20	P6 20RD/WT (JR27)	TOP UP RELAY CONTROL
21	G71 20VT/YL (VTSS)	DECKLID SECURITY SWITCH SENSE
22	G4 18DB	FUEL LEVEL SENSOR SIGNAL
23	P5 20 YL/BK (JR27)	TOP DOWN RELAY CONTROL
24	P182 18PK/DB (JR41)	RIGHT REAR UNLOCK RELAY OUTPUT
25	P178 18PK/LB	PASSENGER UNLOCK RELAY OUTPUT
26	P181 18PK/BK (JR41)	LEFT REAR UNLOCK RELAY OUTPUT



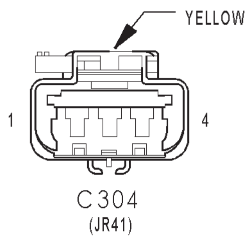
C200 - NATURAL (HVAC SIDE)

CAV	CIRCUIT
1	C34 20DB/WT
2	C35 20DG/YL
3	C33 20DB/RD
4	C4 14TN
5	C57 20DB/GY
6	C26 20PK/DB
7	C7 12BK/TN
8	C1 12DG
9	C12 20LG/BK
10	C36 20RD/WT
11	C37 20YL
12	C5 14LG
13	-
14	-
15	C6 16LB
16	C32 20GY/DB



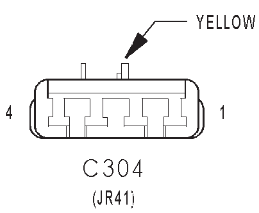
C200 - NATURAL (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	C34 20DB/WT
2	C35 20DG/YL
3	C33 20DB/RD
4	C4 16TN
5	C57 20DB/GY
6	C26 20PK/DB
7	C7 14BK/TN
8	C1 14DG
9	C12 20LG/BK
10	C36 18RD/WT
11	C37 20YL
12	C5 16LG
13	-
14	-
15	C6 14LB
16	C32 20GY/DB



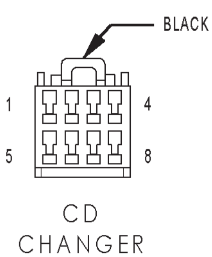
C304 (JR41) - YELLOW (BODY SIDE)

CAV	CIRCUIT
1	R53 18LG/YL
2	R55 18LG/DG
3	R54 18LB/YL
4	R56 18LB/DG



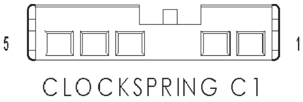
C304 (JR41) - YELLOW (INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	R53 20LG/YL
2	R55 20LG/DG
3	R54 20LB/YL
4	R56 20LB/DG



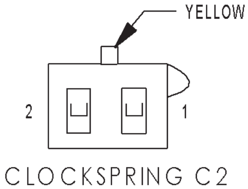
CD CHANGER - BLACK 8 WAY

CAV	CIRCUIT	FUNCTION
1	X40 22GY/WT	AUDIO OUT RIGHT
2	E14 22OR/TN	PANEL LAMPS DIMMER SIGNAL
3	D25 22VT/YL	PCI BUS
4	X112 22RD	IGNITION SWITCH OUTPUT (RUN-ACC)
5	X41 22WT/DG	AUDIO OUT LEFT
6	Z4 22WT/BK	GROUND
7	Z140 22BK/OR	GROUND
8	X160 22GY/YL	B(+)



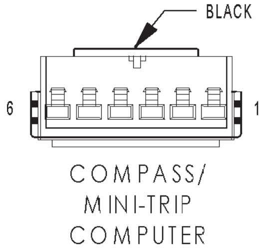
CLOCKSPRING C1 - 5 WAY

CAV	CIRCUIT	FUNCTION
1	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
2	Z123 20BK/OR	GROUND
3	X3 20BK/RD	HORN SWITCH SENSE
4	R63 20TN/LB	DRIVER SQUIB 2 LINE 2
5	R61 20OR/LB	DRIVER SQUIB 2 LINE 1



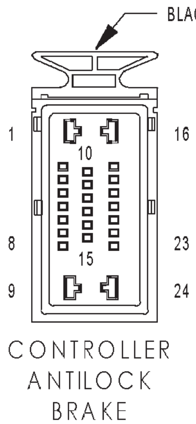
CLOCKSPRING C2 - YELLOW 2 WAY

CAV	CIRCUIT	FUNCTION
1	R43 20BK/LB	DRIVER SQUIB 1 LINE 1
2	R45 20DG/LB	DRIVER SQUIB 1 LINE 2



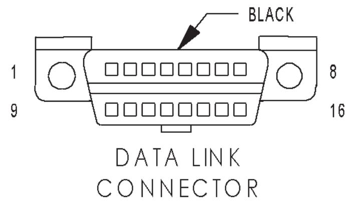
COMPASS/MINI-TRIP COMPUTER - BLACK 6 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/RD	PCI BUS
3	M1 20PK	FUSED B(+)
4	Z104 20BK	GROUND
5	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
6	-	-



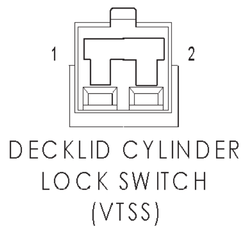
CONTROLLER ANTILOCK BRAKE - BLACK 24 WAY

CAV	CIRCUIT	FUNCTION
1	Z101 12BK	GROUND
2	B1 18YL/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL
3	B2 18YL	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
4	-	-
5	D25 18YL/VT	PCI BUS
6	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
7	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
8	-	-
9	A20 12RD/DB	FUSED B(+)
10	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	Z102 12BK	GROUND
17	-	-
18	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
19	B3 18LG/DB	LEFT REAR WHEEL SPEED SENSOR SIGNAL
20	B4 18LG	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
21	-	-
22	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR SIGNAL
23	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
24	A10 12RD/DG	FUSED B(+)



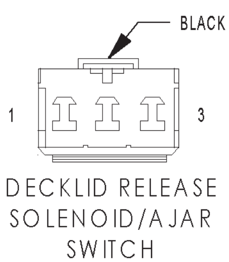
DATA LINK CONNECTOR - BLACK 16 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/GY	PCI BUS
3	-	-
4	Z305 20BK/YL	GROUND
5	Z306 20BK/VT	GROUND
6	D20 20LG	SCI RECEIVE
7	D21 20PK	SCI TRANSMIT
8	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
9	D19 20VT/OR	BODY CONTROL MODULE FLASH ENABLE
10	-	-
11	-	-
12	-	-
13	-	-
14	D6 20PK/LB	SCI RECEIVE
15	-	-
16	M1 20PK	FUSED B(+)



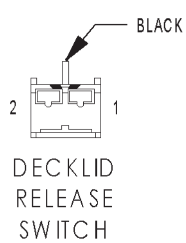
DECKLID CYLINDER LOCK SWITCH (VTSS) - 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z236 20BK	GROUND
2	G71 20VT/YL	DECKLID SECURITY SWITCH SENSE



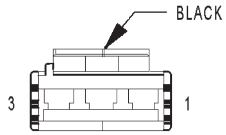
DECKLID RELEASE SOLENOID/AJAR SWITCH - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	P2 18BK/WT	DECKLID RELEASE CONTROL
2	Z217 16BK/VT (JR41)	GROUND
2	Z217 16BK (JR27)	GROUND
3	G78 18TN/BK	DECKLID AJAR SWITCH SENSE



DECKLID RELEASE SWITCH - BLACK 2 WAY

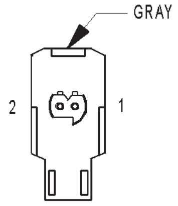
CAV	CIRCUIT	FUNCTION
1	P1 18BK/WT	DECKLID RELEASE SWITCH SENSE
2	Z223 20BK/DB	GROUND



DOME LAMP
(JR41)

DOME LAMP (JR41) - BLACK 3 WAY

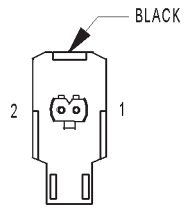
CAV	CIRCUIT	FUNCTION
1	-	-
2	M1 20PK	FUSED B(+)
3	M2 20YL (PREMIUM)	COURTESY LAMPS DRIVER
3	M2 20YL	COURTESY LAMPS DRIVER



DRIVER AIRBAG
SQUIB 1

DRIVER AIRBAG SQUIB 1 - GRAY 2 WAY

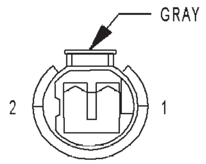
CAV	CIRCUIT	FUNCTION
1	R45 20DG/LB	DRIVER SQUIB 1 LINE 2
2	R43 20BK/LB	DRIVER SQUIB 1 LINE 1



DRIVER AIRBAG
SQUIB 2

DRIVER AIRBAG SQUIB 2 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	R63 20DG/LB	DRIVER SQUIB 2 LINE 2
2	R61 20BK/LB	DRIVER SQUIB 2 LINE 1

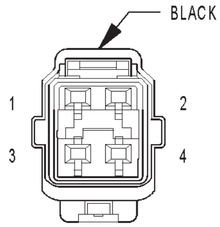


DRIVER CYLINDER
LOCK SWITCH
(VTSS)

DRIVER CYLINDER LOCK SWITCH (VTSS) - GRAY 2 WAY

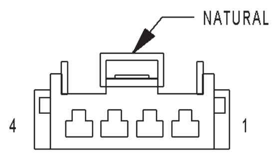
CAV	CIRCUIT	FUNCTION
1	G73 20LG/OR	DRIVER CYLINDER LOCK SWITCH MUX
2	M1 20PK	FUSED B(+)

CONNECTOR PINOUTS



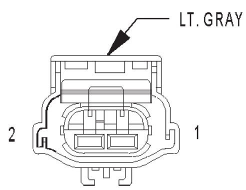
DRIVER DOOR LOCK MOTOR/AJAR SWITCH - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	G75 20TN	DRIVER DOOR AJAR SWITCH SENSE
2	Z314 18BK (JR27)	GROUND
2	Z243 18BK (JR41)	GROUND
3	P177 18DB/WT	DRIVER UNLOCK RELAY OUTPUT
4	P175 18OR/BK	DRIVER LOCK RELAY OUTPUT



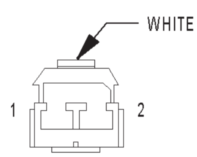
DRIVER DOOR LOCK SWITCH - NATURAL 4 WAY

CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
3	Z314 20BK	GROUND
4	P97 20WT/DG	DRIVER DOOR SWITCH MUX



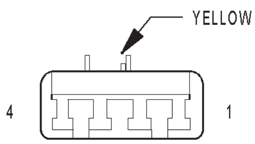
DRIVER POWER WINDOW MOTOR - LT. GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	Q21 14WT (JR27)	MASTER WINDOW SWITCH LEFT FRONT DOWN
1	Q21 16WT (JR41)	MASTER WINDOW SWITCH LEFT FRONT DOWN
2	Q11 14LB (JR27)	DRIVER WINDOW DRIVER (UP)
2	Q11 16LB (JR41)	DRIVER WINDOW DRIVER (UP)



DRIVER SEAT BELT SWITCH (JR41 EXCEPT BUILT-UP-EXPORT) - WHITE 2 WAY

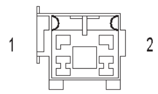
CAV	CIRCUIT	FUNCTION
1	Z237 20BK	GROUND
2	G10 20LG/RD	SEAT BELT SWITCH SENSE



DRIVER
SEAT BELT
TENSIONER
(JR27)

DRIVER SEAT BELT TENSIONER (JR27) - YELLOW 4 WAY

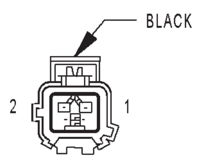
CAV	CIRCUIT	FUNCTION
1	Z237 20BK (EXCEPT BUILT-UP-EXPORT)	GROUND
2	G10 20LG/RD (EXCEPT BUILT-UP-EXPORT)	SEAT BELT SWITCH SENSE
3	R53 20LG/YL	DRIVER SEAT BELT TENSIONER LINE 2
4	R55 20LG/DG	DRIVER SEAT BELT TENSIONER LINE 1



DRIVER
SEAT BELT
TENSIONER
(JR41)

DRIVER SEAT BELT TENSIONER (JR41) - 2 WAY

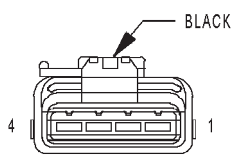
CAV	CIRCUIT	FUNCTION
1	R53 18LG/YL	DRIVER SEAT BELT TENSIONER LINE 2
2	R55 18LG/DG	DRIVER SEAT BELT TENSIONER LINE 1



FRONT
WASHER
PUMP
MOTOR

FRONT WASHER PUMP MOTOR - BLACK 2 WAY

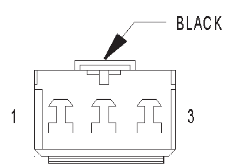
CAV	CIRCUIT	FUNCTION
1	Z216 18BK	GROUND
2	V10 18BR	FRONT WASHER PUMP MOTOR CONTROL



FRONT
WIPER
MOTOR

FRONT WIPER MOTOR - BLACK 4 WAY

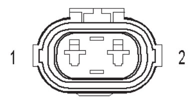
CAV	CIRCUIT	FUNCTION
1	V55 20TN/RD	FRONT WIPER PARK SWITCH SENSE
2	Z114 16BK	GROUND
3	V3 14BR/WT	FRONT WIPER LOW SPEED OUTPUT
4	V4 14RD/YL	FRONT WIPER HIGH SPEED OUTPUT



HEADLAMP
LEVELING SWITCH
(BUILT-UP-EXPORT)

HEADLAMP LEVELING SWITCH (BUILT-UP-EXPORT) - BLACK 3 WAY

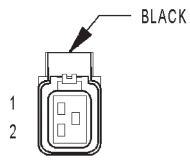
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
2	Z3 16BK/OR (JR27)	GROUND
2	Z3 16BK (JR41)	GROUND
3	L101 18RD	HEADLAMP ADJUST SIGNAL



HEADLAMP WASHER PUMP MOTOR (JR41 BUILT-UP-EXPORT)

HEADLAMP WASHER PUMP MOTOR (JR41 BUILT-UP-EXPORT) - 2 WAY

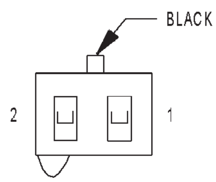
CAV	CIRCUIT	FUNCTION
1	V53 14RD/YL	HEADLAMP WASHER PUMP MOTOR CONTROL
2	Z216 14BK	GROUND



HIGH NOTE HORN

HIGH NOTE HORN - BLACK 2 WAY

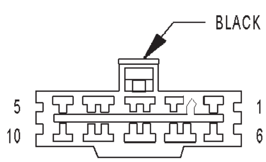
CAV	CIRCUIT	FUNCTION
1	Z308 18BK	GROUND
2	X2 18DG/RD	HORN RELAY OUTPUT



IGNITION SWITCH C1

IGNITION SWITCH C1 - BLACK 2 WAY

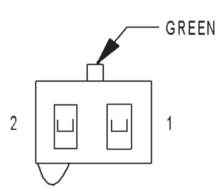
CAV	CIRCUIT	FUNCTION
1	A51 20RD/WT	FUSED B(+)
2	A81 20DG/RD	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)



IGNITION SWITCH C2

IGNITION SWITCH C2 - BLACK 10 WAY

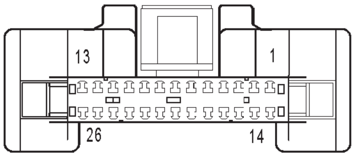
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	A2 12PK/BK	FUSED B(+)
4	A22 12BK/OR	FUSED IGNITION SWITCH OUTPUT (RUN)
5	-	-
6	-	-
7	A1 16RD	FUSED B(+)
8	A31 18BK/LB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
8	A31 16BK/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
9	A21 16DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
10	A41 16YL	FUSED IGNITION SWITCH OUTPUT (START)



IGNITION SWITCH C3

IGNITION SWITCH C3 - GREEN 2 WAY

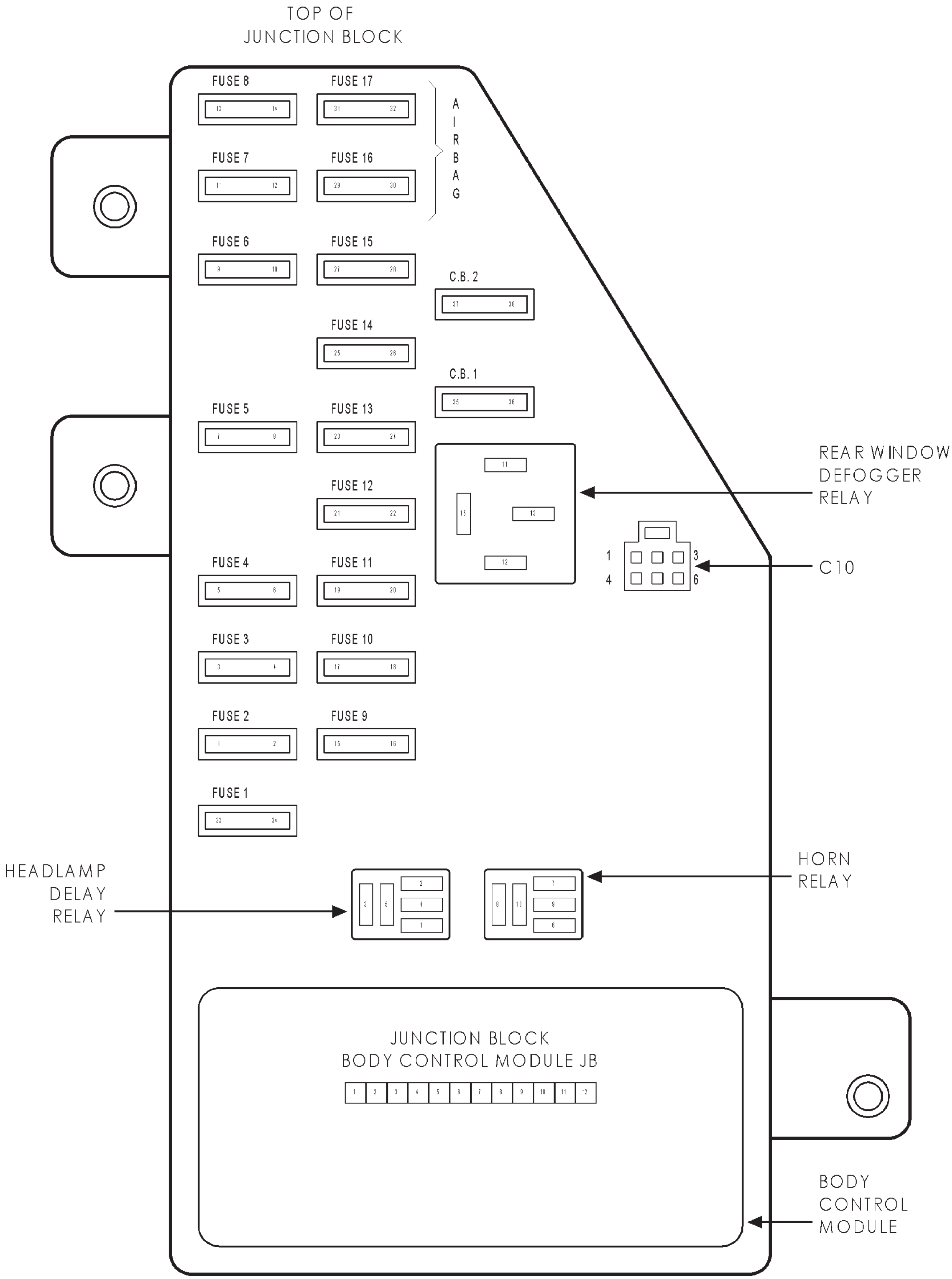
CAV	CIRCUIT	FUNCTION
1	Z233 20BK/WT	GROUND
2	G26 20LB	KEY-IN IGNITION SWITCH SENSE



INSTRUMENT CLUSTER

INSTRUMENT CLUSTER - 26 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/OR	PCI BUS (MIC)
3	D25 20VT/RD	PCI BUS (TRAVELER)
4	-	-
5	G69 20BK/OR	VTSS INDICATOR DRIVER
6	-	-
7	-	-
8	-	-
9	-	-
10	Z105 18BK/LB	GROUND
11	Z106 18BK/OR	GROUND
12	E2 20OR	PANEL LAMPS DRIVER
13	L36 18LG	REAR FOG LAMP INDICATOR
14	G6 20GY	ENGINE OIL PRESSURE SWITCH SENSE
15	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
16	-	-
17	-	-
18	L61 18LG/TN	LEFT TURN SIGNAL
19	L60 18TN/BR	RIGHT TURN SIGNAL
20	-	-
21	F33 20PK/WT	FUSED B(+)
22	G9 18GY/BK	RED BRAKE WARNING INDICATOR DRIVER
23	Z104 20BK	GROUND
24	G10 20LG/RD (EXCEPT BUILT-UP-EXPORT)	SEAT BELT SWITCH SENSE
25	G29 20BK/TN	LOW WASHER FLUID SWITCH SENSE
26	L39 18LB	FOG LAMP SWITCH OUTPUT


TOP OF
JUNCTION BLOCK
FUSE 8
FUSE 17
FUSE 7
FUSE 16
AIRBAG
FUSE 6
FUSE 15
C.B. 2
FUSE 14
C.B. 1
FUSE 5
FUSE 13
REAR WINDOW
DEFOGGER
RELAY
FUSE 12
C10
FUSE 4
FUSE 11
FUSE 3
FUSE 10
FUSE 2
FUSE 9
FUSE 1
HEADLAMP
DELAY
RELAY
HORN
RELAY
JUNCTION BLOCK
BODY CONTROL MODULE JB
BODY
CONTROL
MODULE

FUSES (JB)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	30A	C1 12DG (ATC)	FUSED IGNITION SWITCH OUTPUT (RUN)
1	30A	C1 14DG (MTC)	FUSED IGNITION SWITCH OUTPUT (RUN)
2	10A	INTERNAL	FUSED RIGHT HIGH BEAM OUTPUT
3	10A	L33 18LG/BR	FUSED LEFT HIGH BEAM OUTPUT
4	15A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN)
5	10A	INTERNAL	FUSED B(+)
6	10A	INTERNAL	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
7	20A	INTERNAL	FUSED B(+)
8	20A	INTERNAL	FUSED B(+)
9	15A	INTERNAL	FUSED B(+)
10	20A	INTERNAL (EXCEPT BUILT-UP-EXPORT)	FUSED B(+)
10	20A	L25 20BR (BUILT-UP-EXPORT)	FUSED B(+)
11	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
12	10A	INTERNAL	FUSED LEFT LOW BEAM OUTPUT
13	20A	INTERNAL	FUSED RIGHT LOW BEAM OUTPUT
14	10A	X12 18RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
15	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
16	10A	F23 20DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
17	10A	F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
17	10A	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)

HEADLAMP DELAY RELAY

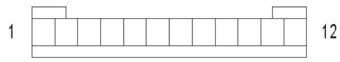
CAV	CIRCUIT	FUNCTION
1	INTERNAL	FUSED B(+)
2	INTERNAL	HEADLAMP DELAY RELAY CONTROL
3	INTERNAL	FUSED B(+)
4	-	-
5	INTERNAL	HEADLAMP DELAY RELAY OUTPUT

HORN RELAY

CAV	CIRCUIT	FUNCTION
6	INTERNAL	FUSED B(+)
7	INTERNAL	HORN RELAY CONTROL
8	INTERNAL	FUSED B(+)
9	-	-
10	X2 18DG/RD	HORN RELAY OUTPUT

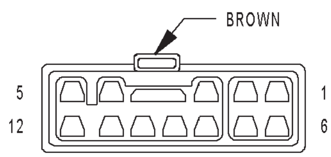
REAR WINDOW DEFOGGER RELAY

CAV	CIRCUIT	FUNCTION
11	INTERNAL	REAR WINDOW DEFOGGER RELAY CONTROL
12	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
13	INTERNAL	FUSED B(+)
15	INTERNAL	REAR WINDOW DEFOGGER RELAY OUTPUT



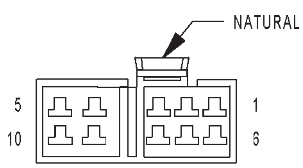
JUNCTION BLOCK BODY CONTROL MODULE JB - 12 WAY

CAV	CIRCUIT	FUNCTION
1	L3 14RD/OR	DIMMER SWITCH HIGH BEAM OUTPUT
2	INTERNAL	FUSED B(+)
3	INTERNAL	REAR WINDOW DEFOGGER RELAY CONTROL
4	INTERNAL	HEADLAMP DELAY RELAY OUTPUT
5	INTERNAL	HEADLAMP DELAY RELAY CONTROL
6	INTERNAL	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
7	INTERNAL	HORN RELAY CONTROL
8	INTERNAL	HEADLAMP SWITCH OUTPUT
9	M2 18YL (JR27)	COURTESY LAMPS DRIVER
9	M2 20YL (JR41)	COURTESY LAMPS DRIVER
10	INTERNAL	GROUND
11	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	INTERNAL	FUSED B(+)



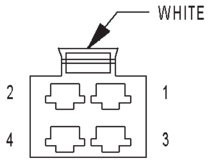
JUNCTION BLOCK C1 - BROWN 12 WAY

CAV	CIRCUIT	FUNCTION
1	G9 20GY/DB	RED BRAKE WARNING INDICATOR DRIVER
2	-	-
3	L34 18RD/OR	FUSED RIGHT HIGH BEAM OUTPUT
4	L60 16TN	RIGHT TURN SIGNAL
5	L61 16LG	LEFT TURN SIGNAL
6	L33 18LG/BR	FUSED LEFT HIGH BEAM OUTPUT
7	-	-
8	L7 18BK/YL (JR27)	HEADLAMP SWITCH OUTPUT
8	L7 16BK/YL (JR41)	HEADLAMP SWITCH OUTPUT
9	L7 18BK/BR (JR27)	HEADLAMP SWITCH OUTPUT
9	L7 16BK/BR (JR41)	HEADLAMP SWITCH OUTPUT
10	L39 18LB/OR (FRONT FOG LAMPS)	HEADLAMP SWITCH OUTPUT
11	L39 18LB (FRONT FOG LAMPS)	HEADLAMP SWITCH OUTPUT
12	L43 18VT	FUSED LEFT LOW BEAM OUTPUT



JUNCTION BLOCK C2 - NATURAL 10 WAY

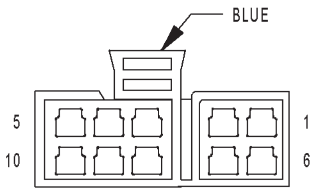
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN (ABS)	BRAKE LAMP SWITCH OUTPUT
2	A7 16RD/BK	FUSED B(+)
3	L50 16WT/TN	BRAKE LAMP SWITCH OUTPUT
4	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
5	L44 18VT/RD	FUSED RIGHT LOW BEAM OUTPUT
6	F11 18RD/WT (EATX)	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
7	A21 16DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
8	X2 18DG/RD	HORN RELAY OUTPUT
8	X2 18DG/RD	HORN RELAY OUTPUT
9	F20 18WT/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
10	F13 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)



JUNCTION
BLOCK C3

JUNCTION BLOCK C3 - WHITE 4 WAY

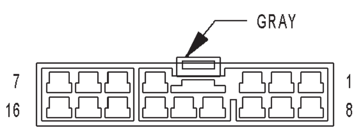
CAV	CIRCUIT	FUNCTION
1	A7 16RD/BK	FUSED B(+)
2	A13 12PK/WT	FUSED B(+)
3	A3 12RD/WT	FUSED B(+)
4	A4 12BK/PK	FUSED B(+)



JUNCTION
BLOCK C4

JUNCTION BLOCK C4 - BLUE 10 WAY

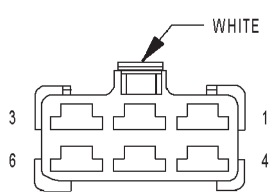
CAV	CIRCUIT	FUNCTION
1	-	-
2	Z106 18BK/OR	GROUND
3	Z239 18BK/LB	GROUND
4	F23 20DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
5	G9 20GY/BK	RED BRAKE WARNING INDICATOR DRIVER
6	Z3 16BK/OR (JR27) (BUILT-UP-EXPORT)	GROUND
6	Z3 16BK (JR41)(BUILT-UP-EXPORT)	GROUND
7	Z305 20BK/YL	GROUND
8	-	-
9	Z115 16BK/RD	GROUND
10	Z126 18BK/LG	GROUND



JUNCTION
BLOCK C5

JUNCTION BLOCK C5 - GRAY 16 WAY

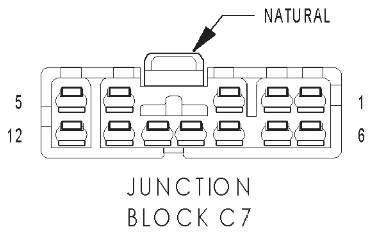
CAV	CIRCUIT	FUNCTION
1	F75 16VT	FUSED B(+)
2	-	-
3	L7 16BK/YL	HEADLAMP SWITCH OUTPUT
4	-	-
5	L39 20LB/WT	FOG LAMP SWITCH OUTPUT
6	G9 18GY/BK	RED BRAKE WARNING INDICATOR DRIVER
7	-	-
8	-	-
9	A21 16DB	FUSED IGNITION SWITCH OUTPUT (RUN-START)
10	L39 18LB	FOG LAMP SWITCH OUTPUT
11	-	-
12	M1 18PK	FUSED B(+)
13	M1 16PK/DB	FUSED B(+)
14	A31 16BK/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
15	Z110 20BK	GROUND
16	F14 18LG/YL (JR41)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
16	F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)



JUNCTION
BLOCK C6

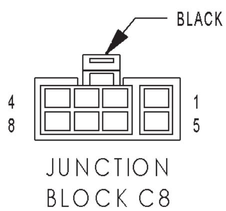
JUNCTION BLOCK C6 - WHITE 6 WAY

CAV	CIRCUIT	FUNCTION
1	A22 12BK/OR	FUSED IGNITION SWITCH OUTPUT (RUN)
2	L4 16VT/WT	DIMMER SWITCH LOW BEAM OUTPUT
2	L4 16VT/WT	DIMMER SWITCH LOW BEAM OUTPUT
3	L3 14RD/OR	DIMMER SWITCH HIGH BEAM OUTPUT
4	A3 16RD/WT	FUSED B(+)
4	A3 16RD/WT	FUSED B(+)
5	-	-
6	C1 14DG	BLOWER MOTOR FEED



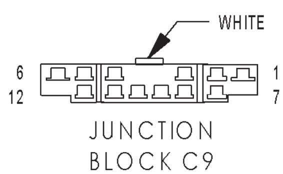
JUNCTION BLOCK C7 - NATURAL 12 WAY

CAV	CIRCUIT	FUNCTION
1	F13 18DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
2	A81 20DG/RD	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
3	L60 18TN/BR	RIGHT TURN SIGNAL
4	L44 20VT/RD (EXCEPT BUILT-UP-EXPORT)	FUSED RIGHT LOW BEAM OUTPUT
5	C16 20LB/YL	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
6	X12 18RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
7	L61 16LG	LEFT TURN SIGNAL
8	L60 16TN	RIGHT TURN SIGNAL
9	L61 18LG/TN	LEFT TURN SIGNAL
10	F11 18RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
11	F33 20PK/WT	FUSED B(+)
12	F33 16PK/RD	FUSED B(+)



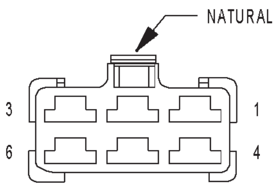
JUNCTION BLOCK C8 - BLACK 8 WAY

CAV	CIRCUIT	FUNCTION
1	Q1 14YL (JR41)	POWER WINDOW SWITCH FEED
2	M1 16PK	FUSED B(+)
3	C16 20LB/YL (JR27) (JR41 BUILT-UP-EXPORT)	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
4	C16 20LB/OR (JR27) (JR41 BUILT-UP-EXPORT)	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
5	F21 14TN	FUSED IGNITION SWITCH OUTPUT (RUN)
6	Q1 14YL/VT (JR41)	POWER WINDOW SWITCH FEED
7	Q1 14YL/WT (JR41)	POWER WINDOW SWITCH FEED
8	Q1 14YL/TN (JR41)	POWER WINDOW SWITCH FEED



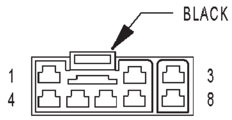
JUNCTION BLOCK C9 - WHITE 12 WAY

CAV	CIRCUIT	FUNCTION
1	F35 16RD (POWER SEATS)	FUSED B(+)
2	F20 20WT (JR27)	FUSED IGNITION SWITCH OUTPUT (RUN)
3	Z313 14BK	GROUND
4	L60 20TN	RIGHT TURN SIGNAL
5	L61 20LG (JR27)	LEFT TURN SIGNAL
5	L61 20LG/TN (JR41)	LEFT TURN SIGNAL
6	C15 12BK/WT	REAR WINDOW DEFOGGER RELAY OUTPUT
7	M1 18PK/VT (JR27) (JR41 BUILT-UP-EXPORT)	FUSED B(+)
8	-	-
9	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
9	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
10	L7 20BK/YL (JR27)	HEADLAMP SWITCH OUTPUT
10	L7 20BK/YL	HEADLAMP SWITCH OUTPUT
11	-	-
12	M1 18PK	FUSED B(+)



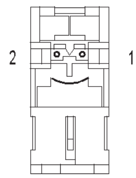
JUNCTION BLOCK C10 - NATURAL 6 WAY

CAV	CIRCUIT	FUNCTION
1	M2 18YL (JR27)	COURTESY LAMPS DRIVER
1	M2 18YL (JR27)	COURTESY LAMPS DRIVER
1	M2 20YL (JR41)	COURTESY LAMPS DRIVER
1	M2 20YL (JR41)	COURTESY LAMPS DRIVER
2	-	-
3	F21 18TN (JR41) (PREMI-UM)	FUSED IGNITION SWITCH OUTPUT (RUN)
4	Z312 18BK (JR27)	GROUND
4	Z312 18BK (EXCEPT JR41 BASE)	GROUND
5	-	-
6	M1 18PK (JR27)	COURTESY LAMPS DRIVER
6	M1 20PK (JR41)	FUSED B(+)



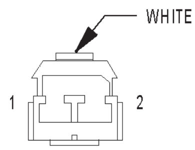
JUNCTION BLOCK C11 (BUILT-UP-EXPORT) - BLACK 8 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	L25 20BR	FUSED FOG LAMP SWITCH FEED
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-



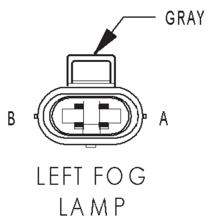
LEFT CURTAIN AIRBAG (JR41) - 2 WAY

CAV	CIRCUIT	FUNCTION
1	R77 20LB/BR	LEFT CURTAIN AIRBAG LINE 2
2	R75 20LB/OR	LEFT CURTAIN AIRBAG LINE 1



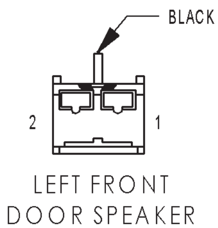
LEFT DOOR COURTESY LAMP (JR27) - WHITE 2 WAY

CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	M2 20YL	COURTESY LAMPS DRIVER



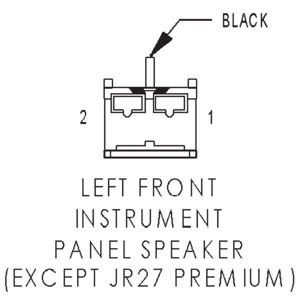
LEFT FOG LAMP - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
A	L39 18LB/OR	FOG LAMP SWITCH OUTPUT
B	Z145 18BK	GROUND



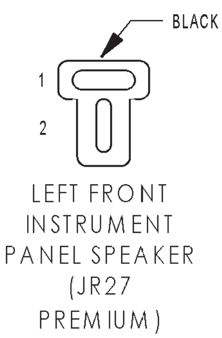
LEFT FRONT DOOR SPEAKER - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	X87 18LG/VT (PREMIUM)	AMPLIFIED LEFT FRONT SPEAKER (+)
1	X87 18LG/VT (BASE)	LEFT FRONT SPEAKER (+)
2	X85 18LG/DG (PREMIUM)	AMPLIFIED LEFT FRONT SPEAKER (-)
2	X85 18LG/DG (BASE)	LEFT FRONT SPEAKER (-)



LEFT FRONT INSTRUMENT PANEL SPEAKER (EXCEPT JR27 PREMIUM) - BLACK 2 WAY

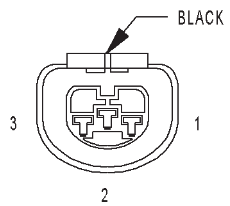
CAV	CIRCUIT	FUNCTION
1	X55 18BR/RD (JR27)	LEFT INSTRUMENT PANEL SPEAKER (-)
1	X81 18YL/BK (JR41)	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (-)
2	X53 18DG (JR27)	LEFT INSTRUMENT PANEL SPEAKER (+)
2	X83 18YL/RD (JR41)	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (+)



LEFT FRONT INSTRUMENT PANEL SPEAKER (JR27 PREMIUM) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	X83 18YL/RD	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (+)
2	X81 18YL/BK	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (-)

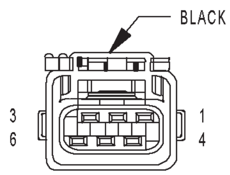
CONNECTOR PINOUTS



LEFT HEADLAMP
(EXCEPT BUILT-UP-EXPORT)

LEFT HEADLAMP (EXCEPT BUILT-UP-EXPORT) - BLACK 3 WAY

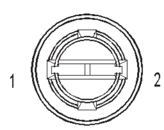
CAV	CIRCUIT	FUNCTION
1	L43 18VT	FUSED LEFT LOW BEAM OUTPUT
2	Z141 18BK	GROUND
3	L33 18LG/BR	FUSED LEFT HIGH BEAM OUTPUT



LEFT LAVALIER
MODULE
(BUILT-UP-EXPORT)

LEFT LAVALIER MODULE (BUILT-UP-EXPORT) - BLACK 6 WAY

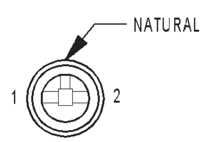
CAV	CIRCUIT	FUNCTION
1	Z163 14BK	GROUND
2	L101 18RD	HEADLAMP ADJUST SIGNAL
3	L33 18LG/BR	FUSED LEFT HIGH BEAM OUTPUT
4	L61 16LG	LEFT TURN SIGNAL
5	L7 18BK/BR (JR27)	HEADLAMP SWITCH OUTPUT
5	L7 16BK/BR (JR41)	HEADLAMP SWITCH OUTPUT
6	L43 18VT	FUSED LEFT LOW BEAM OUTPUT



LEFT LICENSE
LAMP
(JR27)

LEFT LICENSE LAMP (JR27) - 2 WAY

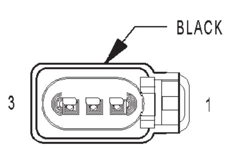
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
2	Z149 18BK	GROUND



LEFT LICENSE
LAMP
(JR41
BUILT-UP-EXPORT)

LEFT LICENSE LAMP (JR41 BUILT-UP-EXPORT) - NATURAL 2 WAY

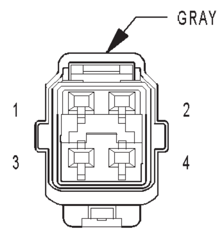
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
2	Z150 18BK	GROUND



LEFT PARK/
TURN SIGNAL
LAMP
(EXCEPT BUILT-
UP-EXPORT)

LEFT PARK/TURN SIGNAL LAMP (EXCEPT BUILT-UP-EXPORT) - BLACK 3 WAY

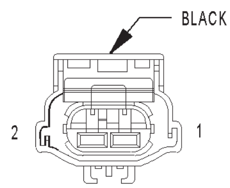
CAV	CIRCUIT	FUNCTION
1	L61 16LG	LEFT TURN SIGNAL
2	L7 18BK/BR (JR27)	HEADLAMP SWITCH OUTPUT
2	L7 16BK/BR (JR41)	HEADLAMP SWITCH OUTPUT
3	Z148 18BK	GROUND



LEFT REAR
DOOR LOCK MOTOR/
AJAR SWITCH
(JR41)

LEFT REAR DOOR LOCK MOTOR/AJAR SWITCH (JR41) - GRAY 4 WAY

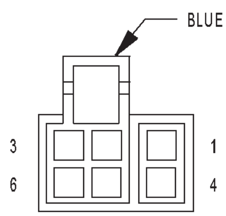
CAV	CIRCUIT	FUNCTION
1	G77 20TN/YL	LEFT REAR DOOR AJAR SWITCH SENSE
2	Z317 18BK	GROUND
3	P181 18PK/DB	LEFT REAR UNLOCK RELAY OUTPUT
4	P179 18OR/TN	LEFT REAR LOCK RELAY OUTPUT



LEFT REAR
POWER WINDOW
MOTOR

LEFT REAR POWER WINDOW MOTOR - BLACK 2 WAY

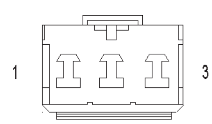
CAV	CIRCUIT	FUNCTION
1	Q23 14RD/WT (JR27)	WINDOW LEFT REAR B(+) DOWN
1	Q14 14GY (JR41)	WINDOW LEFT REAR B(+) UP
2	Q13 14DB (JR27)	WINDOW LEFT REAR B(+) UP
2	Q24 14DG (JR41)	WINDOW LEFT REAR B(+) DOWN



LEFT REAR
POWER WINDOW
SWITCH
(JR41)

LEFT REAR POWER WINDOW SWITCH (JR41) - BLUE 6 WAY

CAV	CIRCUIT	FUNCTION
1	Q24 14DG	WINDOW LEFT REAR B(+) DOWN
2	Q17 14GY/BK	LEFT REAR WINDOW DRIVER (UP)
3	-	-
4	Q27 14DG/WT	MASTER WINDOW SWITCH LEFT REAR DOWN
5	Q14 14GY	WINDOW LEFT REAR B(+) UP
6	Q1 14YL	WINDOW SWITCH FEED

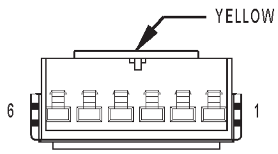


LEFT REAR
SPEAKER

LEFT REAR SPEAKER - 3 WAY

CAV	CIRCUIT	FUNCTION
1	X91 18WT/BK (PREMIUM)	AMPLIFIED LEFT REAR SPEAKER (-)
1	X91 18WT/BK (BASE)	LEFT REAR SPEAKER (-)
2	-	-
3	X93 18WT/RD (PREMIUM)	AMPLIFIED LEFT REAR SPEAKER (+)
3	X93 18WT/RD (BASE)	LEFT REAR SPEAKER (+)

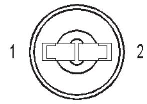
CONNECTOR PINOUTS



LEFT SIDE IMPACT AIRBAG CONTROL MODULE (JR41)

LEFT SIDE IMPACT AIRBAG CONTROL MODULE (JR41) - YELLOW 6 WAY

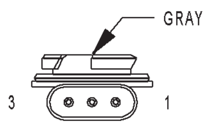
CAV	CIRCUIT	FUNCTION
1	F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	D25 20VT/YL	PCI BUS
3	R75 20LB/OR	LEFT CURTAIN AIRBAG LINE 1
4	R77 20LB/BR	LEFT CURTAIN AIRBAG LINE 2
5	Z134 20BK	GROUND
6	Z134 20BK	GROUND



LEFT TAIL/SIDE MARKER LAMP

LEFT TAIL/SIDE MARKER LAMP - 2 WAY

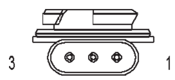
CAV	CIRCUIT	FUNCTION
1	Z149 18BK (JR27)	GROUND
1	Z150 18BK (JR41)	GROUND
2	L7 18BK/YL	HEADLAMP SWITCH OUTPUT



LEFT TAIL/STOP LAMP

LEFT TAIL/STOP LAMP - GRAY 3 WAY

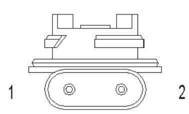
CAV	CIRCUIT	FUNCTION
1	Z149 18BK (JR27)	GROUND
1	Z150 18BK (JR41)	GROUND
2	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
3	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT



LEFT TAIL/ TURN SIGNAL LAMP (JR41 DODGE)

LEFT TAIL/TURN SIGNAL LAMP (JR41/DODGE) - 3 WAY

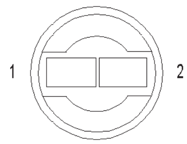
CAV	CIRCUIT	FUNCTION
1	Z150 18BK	GROUND
2	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
3	L61 18LG	LEFT TURN SIGNAL



LEFT TURN LAMP (CHRYSLER/EXCEPT JR41 DODGE)

LEFT TURN LAMP (CHRYSLER/EXCEPT JR41 DODGE) - 2 WAY

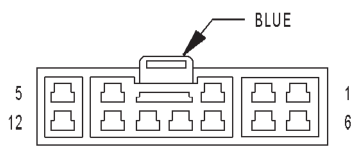
CAV	CIRCUIT	FUNCTION
1	L61 18LG	LEFT TURN SIGNAL
2	Z149 18BK (JR27)	GROUND
2	Z150 18BK (JR41)	GROUND



LICENSE LAMP (JR41 EXCEPT BUILT-UP-EXPORT)

LICENSE LAMP (JR41 EXCEPT BUILT-UP-EXPORT) - 2 WAY

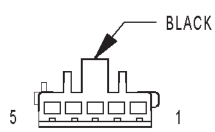
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
2	Z150 18BK	GROUND



MASTER POWER WINDOW SWITCH

MASTER POWER WINDOW SWITCH - BLUE 12 WAY

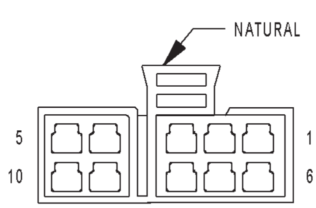
CAV	CIRCUIT	FUNCTION
1	F21 14TN	FUSED IGNITION SWITCH OUTPUT (RUN)
2	Q17 14DB/WT	LEFT REAR WINDOW DRIVER (UP)
3	Q290 14LG (JR27)	MASTER WINDOW SWITCH LEFT REAR DOWN
3	Q27 14RD/BK (JR41)	MASTER WINDOW SWITCH LEFT REAR DOWN
4	Q18 14GY/BK	RIGHT REAR WINDOW DRIVER (UP)
5	Q1 14YL (JR41)	WINDOW SWITCH FEED
6	-	-
7	Q11 14LB (JR27)	LEFT FRONT WINDOW DRIVER (UP)
7	Q11 16LB (JR41)	LEFT FRONT WINDOW DRIVER (UP)
8	Q21 16WT (JR41)	MASTER WINDOW SWITCH LEFT FRONT DOWN
8	Q19 14OR/WT (JR27)	MASTER WINDOW SWITCH LEFT FRONT DOWN
9	Q28 14DG/WT (JR41)	MASTER WINDOW SWITCH RIGHT REAR DOWN
9	Q32 14VT (JR27)	MASTER WINDOW SWITCH RIGHT REAR DOWN
10	Z314 14BK	GROUND
11	Q38 14PK (JR27)	MASTER WINDOW SWITCH RIGHT FRONT DOWN
11	Q26 14VT/WT (JR41)	MASTER WINDOW SWITCH RIGHT FRONT DOWN
12	Q16 14BR/WT	MASTER WINDOW SWITCH RIGHT FRONT UP



MODE DOOR ACTUATOR

MODE DOOR ACTUATOR - BLACK 5 WAY

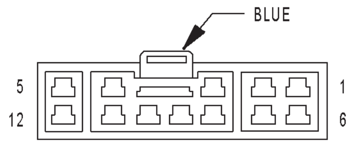
CAV	CIRCUIT	FUNCTION
1	C35 20DG/YL	MODE DOOR DRIVER
2	C57 20DB/GY	SENSOR GROUND
3	C37 20YL	MODE DOOR FEEDBACK SIGNAL
4	C26 20PK/DB	5V SUPPLY
5	C34 20DB/WT	COMMON DOOR DRIVER



MULTI-FUNCTION SWITCH C1

MULTI-FUNCTION SWITCH C1 - NATURAL 10 WAY

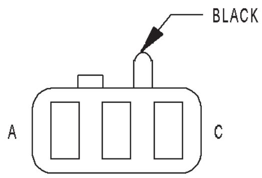
CAV	CIRCUIT	FUNCTION
1	L61 16LG	LEFT TURN SIGNAL
2	L60 16TN	RIGHT TURN SIGNAL
3	V10 18BR	FRONT WASHER PUMP MOTOR CONTROL
4	V52 20DG/RD	FRONT WIPER SWITCH MUX
5	Z234 16BK	GROUND
6	-	-
7	-	-
8	A15 16PK	FUSED B(+)
9	F13 18DB (JR27)	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
9	F13 18DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
10	-	-



MULTI-FUNCTION SWITCH C2

MULTI-FUNCTION SWITCH C2 - BLUE 12 WAY

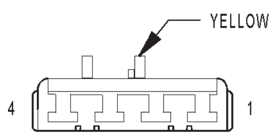
CAV	CIRCUIT	FUNCTION
1	L4 16VT/WT	DIMMER SWITCH LOW BEAM OUTPUT
2	L4 16VT/WT	DIMMER SWITCH LOW BEAM OUTPUT
3	L3 14RD/OR	DIMMER SWITCH HIGH BEAM OUTPUT
4	A3 16RD/WT	FUSED B(+)
5	A3 16RD/WT	FUSED B(+)
6	L7 16BK/YL	HEADLAMP SWITCH OUTPUT
7	F33 16PK/RD	FUSED B(+)
8	E19 20RD	PANEL LAMPS DIMMER SIGNAL
9	C57 20DB/GY	SENSOR GROUND
10	L36 18LG (EXCEPT JR41 DOMESTIC)	REAR FOG LAMP INDICATOR
11	L25 20BR (BUILT-UP-EXPORT)	FOG LAMP DRIVER
11	L44 20VT/RD (EXCEPT BUILT-UP-EXPORT)	FRONT FOG LAMP OUTPUT
12	L39 20LB/WT	FOG LAMP SWITCH OUTPUT



OVERHEAD MAP/
COURTESY LAMPS
(JR41)

OVERHEAD MAP/COURTESY LAMPS (JR41) - BLACK 3 WAY

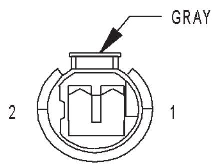
CAV	CIRCUIT	FUNCTION
A	Z312 20BK	GROUND
B	M1 20PK	FUSED B(+)
C	M2 20YL	COURTESY LAMPS DRIVER



PASSENGER
AIRBAG

PASSENGER AIRBAG - YELLOW 4 WAY

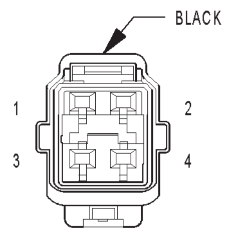
CAV	CIRCUIT	FUNCTION
1	R42 20BK/YL	PASSENGER SQUIB 1 LINE 1
2	R44 20DG/YL	PASSENGER SQUIB 1 LINE 2
3	R62 20OR/YL	PASSENGER SQUIB 2 LINE 1
4	R64 20TN/YL	PASSENGER SQUIB 2 LINE 2



PASSENGER
CYLINDER
LOCK SWITCH
(JR41)
(VTSS)

PASSENGER CYLINDER LOCK SWITCH (JR41) (VTSS) - GRAY 2 WAY

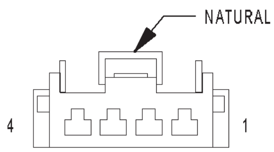
CAV	CIRCUIT	FUNCTION
1	G72 20DG/OR	PASSENGER CYLINDER LOCK SWITCH MUX
2	M1 20PK	FUSED B(+)



PASSENGER DOOR LOCK MOTOR/ AJAR SWITCH

PASSENGER DOOR LOCK MOTOR/AJAR SWITCH - BLACK 4 WAY

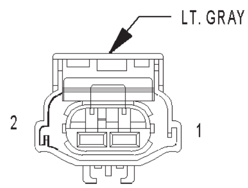
CAV	CIRCUIT	FUNCTION
1	G74 20TN/RD	PASSENGER DOOR AJAR SWITCH SENSE
2	Z315 18BK (JR27)	GROUND
2	Z242 18BK (JR41)	GROUND
3	P178 18PK/LB	PASSENGER UNLOCK RELAY OUTPUT
4	P176 18PK/BK	PASSENGER LOCK RELAY OUTPUT



PASSENGER DOOR LOCK SWITCH

PASSENGER DOOR LOCK SWITCH - NATURAL 4 WAY

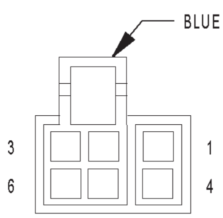
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
3	Z315 20BK	GROUND
4	P96 20WT/LG	PASSENGER DOOR SWITCH MUX



PASSENGER POWER WINDOW MOTOR

PASSENGER POWER WINDOW MOTOR - LT. GRAY 2 WAY

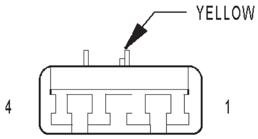
CAV	CIRCUIT	FUNCTION
1	Q22 14VT (JR27)	RIGHT FRONT WINDOW DRIVER (DOWN)
1	Q22 16VT (JR41)	RIGHT FRONT WINDOW DRIVER (DOWN)
2	Q12 14BR (JR27)	LEFT FRONT WINDOW DRIVER (UP)
2	Q12 16BR (JR41)	LEFT FRONT WINDOW DRIVER (UP)



PASSENGER POWER WINDOW SWITCH

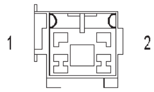
PASSENGER POWER WINDOW SWITCH - BLUE 6 WAY

CAV	CIRCUIT	FUNCTION
1	Q22 14VT (JR27)	RIGHT FRONT WINDOW DRIVER (DOWN)
1	Q22 16VT (JR41)	RIGHT FRONT WINDOW DRIVER (DOWN)
2	Q16 14BR/WT	MASTER WINDOW SWITCH RIGHT FRONT UP
3	-	-
4	Q26 14VT/WT	MASTER WINDOW SWITCH RIGHT FRONT DOWN
5	Q12 14BR (JR27)	RIGHT FRONT WINDOW DRIVER (UP)
5	Q12 16BR (JR41)	RIGHT FRONT WINDOW DRIVER (UP)
6	F21 14TN (JR27)	FUSED IGNITION SWITCH OUTPUT (RUN)
6	Q1 14YL (JR41)	WINDOW SWITCH FEED



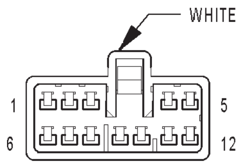
PASSENGER SEAT BELT TENSIONER (JR27) - YELLOW 4 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	R54 20LB/YL	PASSENGER SEAT BELT TENSIONER LINE 2
4	R56 20LB/DG	PASSENGER SEAT BELT TENSIONER LINE 1



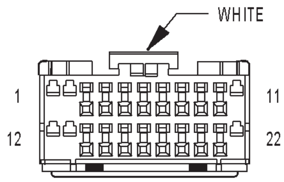
PASSENGER SEAT BELT TENSIONER (JR41) - 2 WAY

CAV	CIRCUIT	FUNCTION
1	R54 18LB/YL	PASSENGER SEAT BELT TENSIONER LINE 2
2	R56 18LB/DG	PASSENGER SEAT BELT TENSIONER LINE 1



POWER AMPLIFIER C1 (JR27 PREMIUM) - WHITE 12 WAY

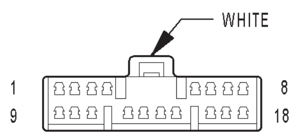
CAV	CIRCUIT	FUNCTION
1	X82 18LB/VT	AMPLIFIED RIGHT DOOR SPEAKER (+)
2	X87 18LG/VT	AMPLIFIED LEFT DOOR SPEAKER (+)
3	X92 18TN/BK	AMPLIFIED RIGHT REAR SPEAKER (-)
4	X86 18OR/RD	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (+)
5	X83 18YL/RD	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (+)
6	X80 18LB/BK	AMPLIFIED RIGHT DOOR SPEAKER (-)
7	X85 18LG/BK	AMPLIFIED LEFT DOOR SPEAKER (-)
8	X94 18TN/VT	AMPLIFIED RIGHT REAR SPEAKER (+)
9	X93 18WT/RD	AMPLIFIED LEFT REAR SPEAKER (+)
10	X91 18 WT/BK	AMPLIFIED LEFT REAR SPEAKER (-)
11	X84 18OR/BK	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (-)
12	X81 18YL/BK	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (-)



POWER AMPLIFIER C1 (JR41 PREMIUM)

POWER AMPLIFIER C1 (JR41 PREMIUM) - WHITE 22 WAY

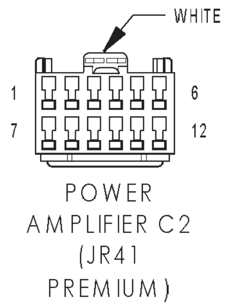
CAV	CIRCUIT	FUNCTION
1	F75 16VT	FUSED B(+)
2	Z115 16BK/RD	GROUND
3	X60 18DG/RD	RADIO 12V OUTPUT
4	X54 18VT	RIGHT FRONT SPEAKER (+)
5	X53 18DG	LEFT FRONT SPEAKER (+)
6	X52 18DB/WT	RIGHT REAR SPEAKER (+)
7	X51 18BR/YL	LEFT REAR SPEAKER (+)
8	-	-
9	-	-
10	X93 18WT/RD	AMPLIFIED LEFT REAR SPEAKER (+)
11	X94 18TN/VT	AMPLIFIED RIGHT REAR SPEAKER (+)
12	F75 16VT	FUSED B(+)
13	Z126 16BK/LG	GROUND
14	-	-
15	X56 18DB/RD	RIGHT FRONT SPEAKER (-)
16	X55 18BR/RD	LEFT FRONT SPEAKER (-)
17	X58 18DB/OR	RIGHT REAR SPEAKER (-)
18	X57 18BR/LB	LEFT REAR SPEAKER (-)
19	-	-
20	-	-
21	X91 18WT/BK	AMPLIFIED LEFT REAR SPEAKER (-)
22	X92 18TN/BK	AMPLIFIED RIGHT REAR SPEAKER (-)



POWER AMPLIFIER C2 (JR27 PREMIUM)

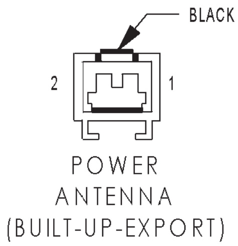
POWER AMPLIFIER C2 (JR27 PREMIUM) - WHITE 18 WAY

CAV	CIRCUIT	FUNCTION
1	F75 16VT	FUSED B(+)
2	-	-
3	-	-
4	-	-
5	X52 18DB/WT	RIGHT REAR SPEAKER (+)
6	X51 18BR/YL	LEFT REAR SPEAKER (+)
7	X54 18VT	RIGHT FRONT SPEAKER (+)
8	X53 18DG	LEFT FRONT SPEAKER (+)
9	Z115 16BK/RD	GROUND
10	-	-
11	-	-
12	-	-
13	X11 20OR	TOP DOWN AUDIO EQUAL
14	X60 18DG/RD	RADIO 12V OUTPUT
15	X58 18DB/OR	RIGHT REAR SPEAKER (-)
16	X57 18BR/LB	LEFT REAR SPEAKER (-)
17	X56 18DB/RD	RIGHT FRONT SPEAKER (-)
18	X55 18BR/RD	LEFT FRONT SPEAKER (-)



POWER AMPLIFIER C2 (JR41 PREMIUM) - WHITE 12 WAY

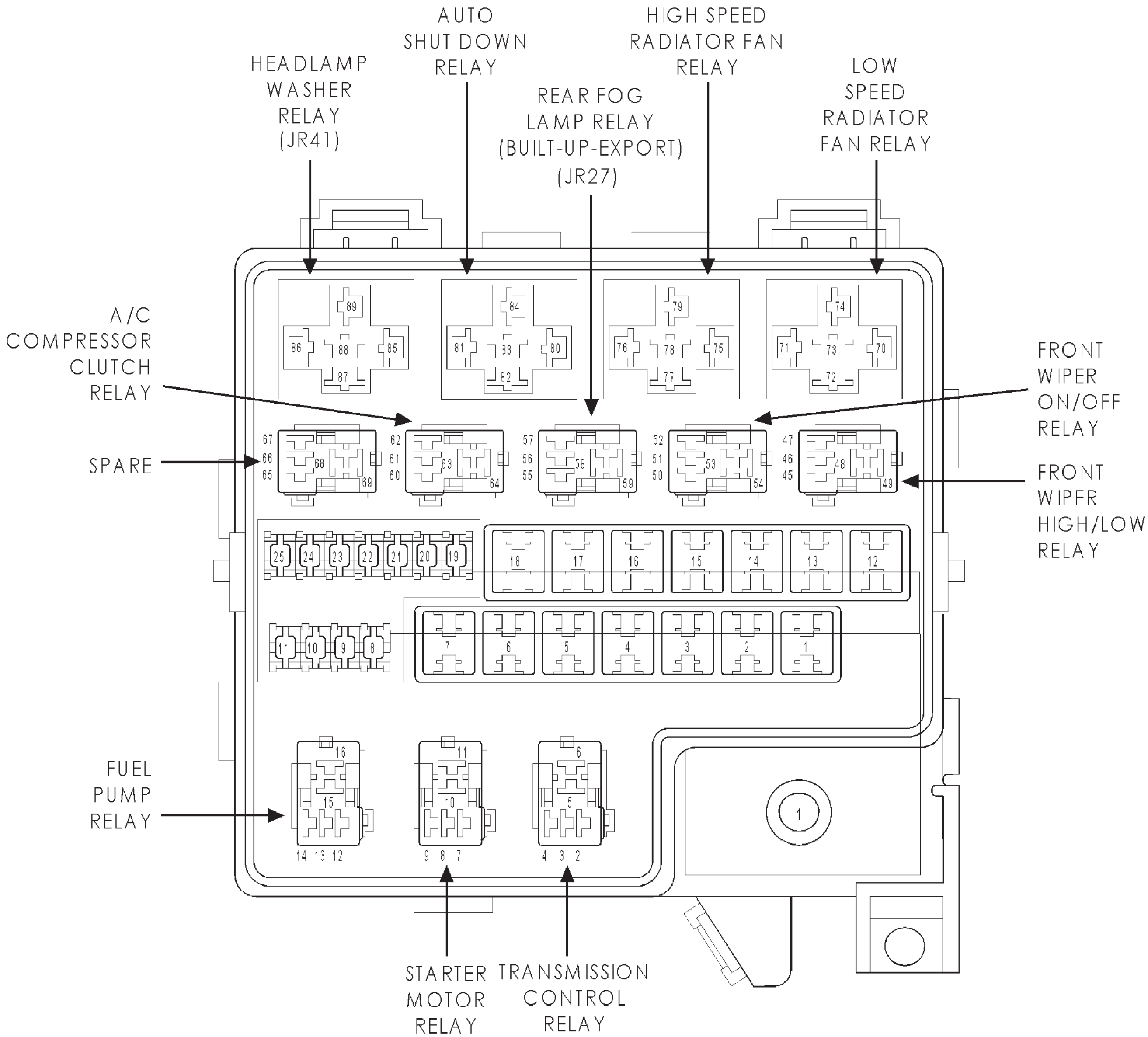
CAV	CIRCUIT	FUNCTION
1	X87 18LG/VT	AMPLIFIED LEFT FRONT SPEAKER (+)
2	X82 18LB/VT	AMPLIFIED RIGHT FRONT SPEAKER (+)
3	X83 18YL/RD	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (+)
4	X86 18OR/RD	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (+)
5	-	-
6	-	-
7	X85 18LG/DG	AMPLIFIED LEFT FRONT SPEAKER (-)
8	X80 18LB/BK	AMPLIFIED RIGHT FRONT SPEAKER (-)
9	X81 18YL/BK	AMPLIFIED LEFT INSTRUMENT PANEL SPEAKER (-)
10	X84 18OR/BK	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (-)
11	-	-
12	-	-



POWER ANTENNA (BUILT-UP-EXPORT) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	M1 18PK	FUSED B(+)
2	X60 20DG/RD	RADIO 12V OUTPUT

POWER DISTRIBUTION CENTER



FUSES (PDC)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	40A	A2 12PK/BK	FUSED B(+)
2	20A	F30 16RD	FUSED B(+)
3	30A	A53 14RD/YL (JR41 BUILT-UP-EXPORT)	FUSED B(+)
4	40A	A3 12RD/WT	FUSED B(+)
5	-	SPARE	FUSED B(+)
6	40A	A4 12BK/PK	FUSED B(+)
7	-	SPARE	FUSED B(+)
8	20A	A1 16RD	FUSED B(+)
9	20A	A24 16BK (EATX)	FUSED B(+)
10	10A	A51 20RD/WT	FUSED B(+)
11	20A	A7 16RD/BK	FUSED B(+)
12	40A	A16 12RD/LG	FUSED B(+)
13	20A	P86 16PK/BK (JR41 BUILT-UP-EXPORT)	FUSED B(+)
14	30A	A14 14RD/TN	FUSED B(+)
15	40A	A10 12RD/DG	FUSED B(+)
16	40A	A13 12PK/WT	FUSED B(+)
17	40A	A25 12DB (JR27)	FUSED B(+)
18	40A	A5 12RD/GY	FUSED B(+)
19	20A	A45 18BR (JR27)	FUSED B(+)
20	20A	A15 16PK	FUSED B(+)
21	-	SPARE	FUSED B(+)
22	20A	A20 12RD/DB	FUSED B(+)
23	20A	F12 18DB/WT (JR27)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
23	10A	F12 18DB/WT (JR41)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
24	20A	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
25	20A	F142 16OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT

FRONT WIPER HI/LOW RELAY

CAV	CIRCUIT	FUNCTION
45	V16 20VT/PK	FRONT WIPER HIGH/LOW RELAY CONTROL
46	V3 14BR/WT	FRONT WIPER HIGH/LOW RELAY LOW SPEED OUTPUT
47	F13 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
48	V4 14RD/YL	FRONT WIPER HIGH/LOW RELAY HIGH SPEED OUTPUT
49	V5 14DG/VT	FRONT WIPER RELAY COMMON

FRONT WIPER ON/OFF RELAY

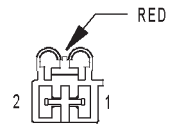
CAV	CIRCUIT	FUNCTION
50	V14 20RD/VT	FRONT WIPER ON/OFF RELAY CONTROL
51	Z247 16BK	GROUND
52	A5 14RD/GY	FUSED B(+)
53	A5 12RD/GY	FUSED B(+)
54	V5 14DG/VT	FRONT WIPER RELAY COMMON

HEADLAMP WASHER RELAY (JR 41) - 5 WAY

CAV	CIRCUIT	FUNCTION
85	V58 18BR/YL	HEADLAMP WASHER RELAY CONTROL
86	A53 16RD/YL	FUSED B(+)
87	V53 14RD/YL	HEADLAMP WASHER RELAY OUTPUT
88	-	-
89	A53 14RD/YL	FUSED B(+)

REAR FOG LAMP RELAY (JR27) (BUILT-UP-EXPORT)

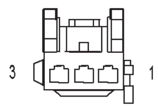
CAV	CIRCUIT	FUNCTION
55	L36 18LG	REAR FOG LAMP RELAY CONTROL
56	-	-
57	Z247 18BK	GROUND
58	L95 18DG/YL	REAR FOG LAMP RELAY OUTPUT
59	A7 16RD/BK	FUSED B(+)



POWER TOP PUMP MOTOR (JR27)

POWER TOP PUMP MOTOR (JR27) - RED 2 WAY

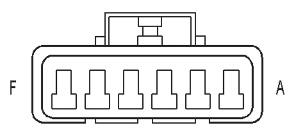
CAV	CIRCUIT	FUNCTION
1	P3 12YL	TOP UP RELAY OUTPUT
2	P4 12RD	TOP DOWN RELAY OUTPUT



POWER TOP SWITCH (JR27)

POWER TOP SWITCH (JR27) - 3 WAY

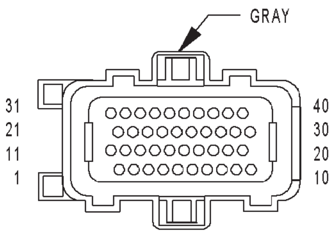
CAV	CIRCUIT	FUNCTION
1	F20 20YL/BK	FUSED IGNITION SWITCH OUTPUT (RUN)
2	Z249 20BK	GROUND
3	Q31 20WT	CONVERTIBLE TOP SWITCH MUX



POWER TOP UP/DOWN RELAYS (JR27)

POWER TOP UP/DOWN RELAYS (JR27) - 6 WAY

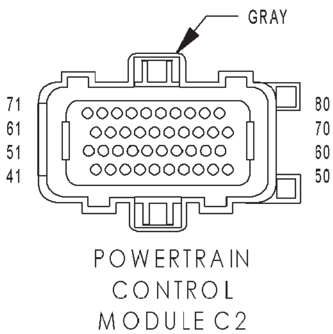
CAV	CIRCUIT	FUNCTION
A	P6 20RD/WT	TOP UP RELAY CONTROL
B	P3 12YL	TOP UP RELAY OUTPUT
C	A25 12DB	FUSED B(+)
D	Z253 12BK	GROUND
E	P4 12RD	TOP DOWN RELAY OUTPUT
F	P5 20YL/BK	TOP DOWN RELAY CONTROL



POWERTRAIN CONTROL MODULE C1

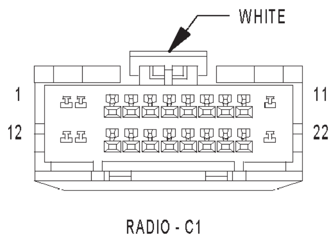
POWERTRAIN CONTROL MODULE C1 - GRAY 40 WAY

CAV	CIRCUIT	FUNCTION
1	K94 16TN/LG (2.7L)	COIL ON PLUG DRIVER NO. 4
2	K93 16TN/OR (2.7L)	COIL ON PLUG DRIVER NO. 3
3	K17 16DB/TN (2.0L/2.4L)	IGNITION COIL NO. 2 DRIVER
3	K92 16TN/PK (2.7L)	COIL ON PLUG DRIVER NO. 2
4	K96 16TN/LB (2.7L)	COIL ON PLUG DRIVER NO. 6
5	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
6	A142 14DG/OR	AUTOMATIC SHUTDOWN RELAY OUTPUT
7	K13 18YL/WT	INJECTOR NO. 3 DRIVER
8	K20 18DG	GENERATOR FIELD DRIVER
9	-	-
10	Z108 14BK/TN	GROUND
11	K91 16TN/RD (2.7L)	COIL ON PLUG DRIVER NO. 1
11	K19 16BK/GY (2.0L/2.4L)	IGNITION COIL NO. 1 DRIVER
12	-	-
13	K11 18WT/DB	INJECTOR NO. 1 DRIVER
14	K58 18BR/DB (2.7L)	INJECTOR NO. 6 DRIVER
15	K38 18GY (2.7L)	INJECTOR NO. 5 DRIVER
16	K14 18LB/BR	INJECTOR NO. 4 DRIVER
17	K12 18TN	INJECTOR NO. 2 DRIVER
18	K79 18OR/RD (2.0L/2.4L)	OXYGEN SENSOR 1/1 HEATER CONTROL
19	-	-
20	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
21	K95 16TN/DG (2.7L)	COIL ON PLUG DRIVER NO. 5
22	-	-
23	-	-
24	-	-
25	K42 18DB/LG	KNOCK SENSOR SIGNAL
26	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
27	K127 18DB/OR (2.0L/2.4L)	OXYGEN SENSOR GROUND
27	K127 18DB/LG (2.7L)	OXYGEN SENSOR GROUND
28	-	-
29	K241 20LG/RD (2.7L)	OXYGEN SENSOR 2/1 SIGNAL
30	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL
31	K90 20TN	ENGINE STARTER MOTOR RELAY CONTROL
32	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
33	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
34	K235 20LG/PK (2.7L)	EGR SENSOR SIGNAL
35	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
36	K1 20DG/RD	MAP SENSOR SIGNAL
37	K21 20BK/RD	INTAKE AIR TEMPERATURE SIGNAL
38	-	-
39	K36 18VT/RD (2.7L)	MANIFOLD SOLENOID CONTROL
40	K35 20GY/YL	EGR SOLENOID CONTROL



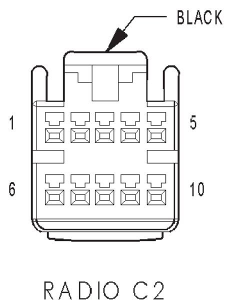
POWERTRAIN CONTROL MODULE C2 - GRAY 40 WAY

CAV	CIRCUIT	FUNCTION
41	V37 20PK/LG	SPEED CONTROL SWITCH SIGNAL
42	C18 20DB	A/C PRESSURE SIGNAL
43	K4 18BK/LB	SENSOR GROUND
44	K7 18OR/WT	8V SUPPLY
45	K10 20DB/OR (2.0L/2.4L)	STEERING PRESSURE SWITCH SENSE
46	A14 14RD/TN	FUSED B(+)
47	Z109 14BK	GROUND
48	K40 20BR/WT	IDLE AIR CONTROL MOTOR NO. 3 DRIVER
49	K60 20YL/BK	IDLE AIR CONTROL MOTOR NO. 2 DRIVER
50	Z107 14BK/TN	GROUND
51	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL
52	K25 18VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
53	K341 20PK/WT (2.7L) (EATX)	OXYGEN SENSOR 2/2 SIGNAL
54	-	-
55	C24 20DB/TN	LOW SPEED RADIATOR FAN RELAY CONTROL
56	V36 20TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
57	K39 20GY/RD	IDLE AIR CONTROL MOTOR NO. 1 DRIVER
58	K59 20VT/BK	IDLE AIR CONTROL MOTOR NO. 4 DRIVER
59	D25 20OR	PCI BUS
60	-	-
61	K6 18VT/WT	5V SUPPLY
62	K29 20WT/PK	BRAKE SWITCH SENSE
63	T10 20YL/DG (EATX)	TORQUE MANAGEMENT REQUEST SENSE
64	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
65	D21 20PK	SCI TRANSMIT
66	G7 18WT/OR	VEHICLE SPEED SENSOR SIGNAL
67	K51 20DB/VT	AUTOMATIC SHUTDOWN RELAY CONTROL
68	K52 18PK/BK	EVAPORATIVE EMISSION SOLENOID CONTROL
69	C27 20DB/PK	HIGH SPEED RADIATOR FAN RELAY CONTROL
70	K108 18WT/TN	EVAPORATIVE SOLENOID SENSE
71	K71 20WT/RD (EATX)	EATX RPM SIGNAL
72	K107 18OR	LEAK DETECTION PUMP SWITCH SENSE
73	-	-
74	K31 20BR/LG	FUEL PUMP RELAY CONTROL
75	D20 20LG	SCI RECEIVE
76	T41 20BK/LB (EATX)	TRS T41 SENSE
77	K106 18WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
78	-	-
79	-	-
80	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL



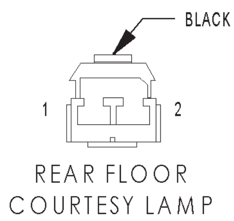
RADIO C1 - WHITE 22 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	X12 18RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
3	E2 18OR/BR	PANEL LAMPS DRIVER
4	-	-
5	-	-
6	-	-
7	X54 18VT	RIGHT FRONT DOOR SPEAKER (+)
8	X56 18DB/RD	RIGHT FRONT DOOR SPEAKER (-)
9	X55 18BR/RD	LEFT FRONT DOOR SPEAKER (-)
10	X53 18DG	LEFT FRONT DOOR SPEAKER (+)
11	Z1 18BK	GROUND
12	M1 20PK	FUSED B(+)
13	X60 18DG/RD	RADIO 12V OUTPUT
14	D25 20VT/YL	PCI BUS
15	-	-
16	-	-
17	-	-
18	X51 18BR/YL	LEFT REAR SPEAKER (+)
19	X57 18BR/LB	LEFT REAR SPEAKER (-)
20	X58 18DB/OR	RIGHT REAR SPEAKER (-)
21	X52 18DB/WT	RIGHT REAR SPEAKER (+)
22	-	-



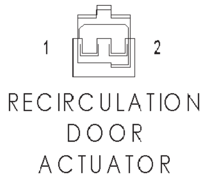
RADIO C2 - BLACK 10 WAY

CAV	CIRCUIT	FUNCTION
1	X40 24GY/WT	AUDIO OUT RIGHT
2	Z4 22BK/OR	GROUND
3	C235 WT/LB	CD GROUND SHIELD
4	D25 22VT/YL	PCI BUS
5	X112 22RD	IGNITION SWITCH OUTPUT (RUN-ACC)
6	X41 22WT/DG	AUDIO OUT LEFT
7	Z140 22BK/OR	GROUND
8	-	-
9	E14 22OR/TN	PANEL LAMPS DIMMER SIGNAL
10	X160 22GY/YL	B(+)



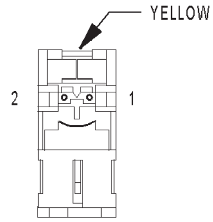
REAR FLOOR COURTESY LAMP - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	M1 18PK	FUSED B(+)
2	M2 18YL	COURTESY LAMPS DRIVER



RECIRCULATION DOOR ACTUATOR - 2 WAY

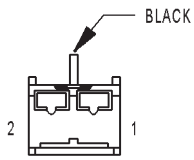
CAV	CIRCUIT	FUNCTION
1	C32 20GY/DB	RECIRCULATION DOOR DRIVER
2	C34 20DB/WT	COMMON DOOR DRIVER



RIGHT CURTAIN AIRBAG (JR41)

RIGHT CURTAIN AIRBAG (JR41) - YELLOW 2 WAY

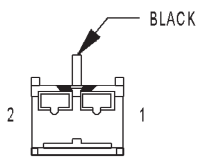
CAV	CIRCUIT	FUNCTION
1	R76 20LB/WT	RIGHT CURTAIN AIRBAG LINE 2
2	R74 20LB/YL	RIGHT CURTAIN AIRBAG LINE 1



RIGHT FRONT DOOR SPEAKER

RIGHT FRONT DOOR SPEAKER - BLACK 2 WAY

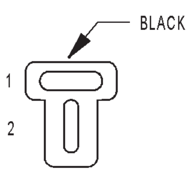
CAV	CIRCUIT	FUNCTION
1	X82 18LB/VT (PREMIUM)	AMPLIFIED RIGHT FRONT SPEAKER (+)
1	X82 18LB/VT (BASE)	RIGHT FRONT SPEAKER (+)
2	X80 18LB/BK (PREMIUM)	AMPLIFIED RIGHT FRONT SPEAKER (-)
2	X80 18LB/BK (BASE)	RIGHT FRONT SPEAKER (-)



RIGHT FRONT INSTRUMENT PANEL SPEAKER (EXCEPT JR27 PREMIUM)

RIGHT FRONT INSTRUMENT PANEL SPEAKER (EXCEPT JR27 PREMIUM) - BLACK 2 WAY

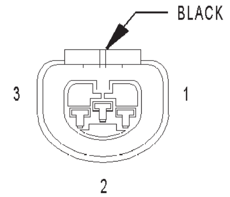
CAV	CIRCUIT	FUNCTION
1	X56 18DB/RD (JR27)	RIGHT INSTRUMENT PANEL SPEAKER (-)
1	X84 18OR/BK (JR41)	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (-)
2	X54 18VT (JR27)	RIGHT INSTRUMENT PANEL SPEAKER (+)
2	X86 18OR/RD (JR41)	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (+)



RIGHT FRONT INSTRUMENT PANEL SPEAKER (JR27 PREMIUM)

RIGHT FRONT INSTRUMENT PANEL SPEAKER (JR27 PREMIUM) - BLACK 2 WAY

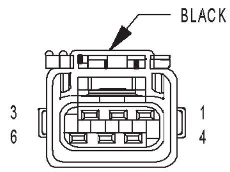
CAV	CIRCUIT	FUNCTION
1	X84 18OR/BK	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (-)
2	X86 18OR/RD	AMPLIFIED RIGHT INSTRUMENT PANEL SPEAKER (+)



RIGHT HEADLAMP (EXCEPT BUILT-UP-EXPORT)

RIGHT HEADLAMP (EXCEPT BUILT-UP-EXPORT) - BLACK 3 WAY

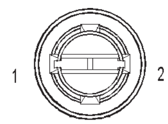
CAV	CIRCUIT	FUNCTION
1	L44 18VT/RD	FUSED RIGHT LOW BEAM OUTPUT
2	Z142 18BK	GROUND
3	L34 18RD/OR	FUSED RIGHT HIGH BEAM OUTPUT



RIGHT LAVALIER MODULE (BUILT-UP-EXPORT)

RIGHT LAVALIER MODULE (BUILT-UP-EXPORT) - BLACK 6 WAY

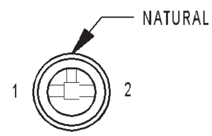
CAV	CIRCUIT	FUNCTION
1	Z162 14BK	GROUND
2	L101 18RD	HEADLAMP ADJUST SIGNAL
3	L34 18RD/OR	FUSED RIGHT HIGH BEAM OUTPUT
4	L60 16TN	RIGHT TURN SIGNAL
5	L7 18BK/YL (JR27)	HEADLAMP SWITCH OUTPUT
5	L7 16BK/YL (JR41)	HEADLAMP SWITCH OUTPUT
6	L44 18VT/RD	FUSED RIGHT LOW BEAM OUTPUT



RIGHT LICENSE LAMP (JR27)

RIGHT LICENSE LAMP (JR27) - 2 WAY

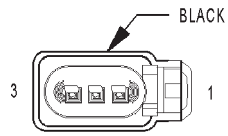
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
2	Z149 18BK	GROUND



RIGHT LICENSE LAMP (JR41 BUILT-UP-EXPORT)

RIGHT LICENSE LAMP (JR41 BUILT-UP-EXPORT) - NATURAL 2 WAY

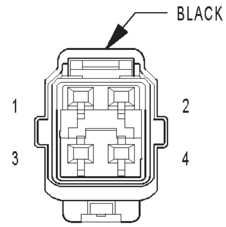
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
2	Z150 18BK	GROUND



RIGHT PARK/ TURN SIGNAL LAMP (EXCEPT BUILT-UP-EXPORT)

RIGHT PARK/TURN SIGNAL LAMP (EXCEPT BUILT-UP-EXPORT) - BLACK 3 WAY

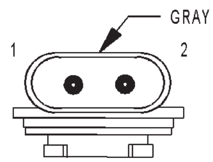
CAV	CIRCUIT	FUNCTION
1	L60 16TN	RIGHT TURN SIGNAL
2	L7 18BK/YL (JR27)	HEADLAMP SWITCH OUTPUT
2	L7 16BK/YL (JR41)	HEADLAMP SWITCH OUTPUT
3	Z147 18BK	GROUND



RIGHT REAR
DOOR LOCK MOTOR/
AJAR SWITCH
(JR41)

RIGHT REAR DOOR LOCK MOTOR/AJAR SWITCH (JR41) - BLACK 4 WAY

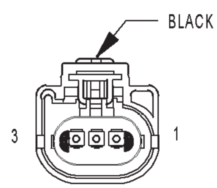
CAV	CIRCUIT	FUNCTION
1	G76 20TN/YL	RIGHT REAR DOOR AJAR SWITCH SENSE
2	Z318 18BK	GROUND
3	P182 18PK/DB	RIGHT REAR UNLOCK RELAY OUTPUT
4	P180 18OR/TN	RIGHT REAR LOCK RELAY OUTPUT



RIGHT REAR
FOG LAMP
(JR27
BUILT-UP-EXPORT)

RIGHT REAR FOG LAMP (JR27 BUILT-UP-EXPORT) - GRAY 2 WAY

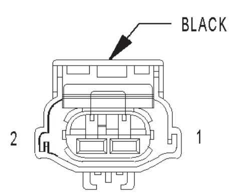
CAV	CIRCUIT	FUNCTION
1	Z149 18BK	GROUND
2	L36 18LG	REAR FOG LAMP RELAY OUTPUT



RIGHT REAR
FOG LAMP
(JR-41
BUILT-UP-EXPORT)

RIGHT REAR FOG LAMP (JR41 BUILT-UP-EXPORT) - BLACK 3 WAY

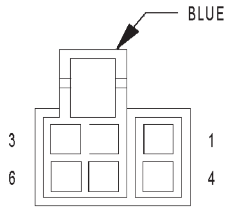
CAV	CIRCUIT	FUNCTION
1	Z150 18BK	GROUND
2	-	-
3	L36 18LG	REAR FOG LAMP RELAY OUTPUT



RIGHT REAR
POWER WINDOW
MOTOR

RIGHT REAR POWER WINDOW MOTOR - BLACK 2 WAY

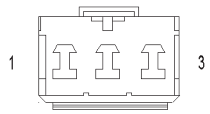
CAV	CIRCUIT	FUNCTION
1	Q24 14DG (JR27)	WINDOW RIGHT REAR B(+) DOWN
1	Q14 14GY (JR41)	WINDOW RIGHT REAR B(+) UP
2	Q14 14GY (JR27)	WINDOW RIGHT REAR B(+) UP
2	Q24 14DG (JR41)	WINDOW RIGHT REAR B(+) DOWN



RIGHT REAR POWER WINDOW SWITCH (JR41)

RIGHT REAR POWER WINDOW SWITCH (JR41) - BLUE 6 WAY

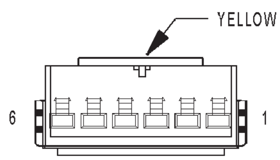
CAV	CIRCUIT	FUNCTION
1	Q24 14DG	WINDOW RIGHT REAR B(+) DOWN
2	Q18 14GY/BK	RIGHT REAR WINDOW DRIVER (UP)
3	-	-
4	Q28 14DG/WT	MASTER WINDOW SWITCH RIGHT REAR DOWN
5	Q14 14GY	WINDOW RIGHT REAR B(+) UP
6	Q1 14YL	WINDOW SWITCH FEED



RIGHT REAR SPEAKER

RIGHT REAR SPEAKER - 3 WAY

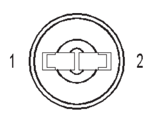
CAV	CIRCUIT	FUNCTION
1	X92 18TN/BK (PREMIUM)	AMPLIFIED RIGHT REAR SPEAKER (-)
1	X92 18TN/BK (BASE)	RIGHT REAR SPEAKER (-)
2	-	-
3	X94 18TN/VT (PREMIUM)	AMPLIFIED RIGHT REAR SPEAKER (+)
3	X94 18TN/VT (BASE)	RIGHT REAR SPEAKER (+)



RIGHT SIDE IMPACT AIRBAG CONTROL MODULE (JR41)

RIGHT SIDE IMPACT AIRBAG CONTROL MODULE (JR41) - YELLOW 6 WAY

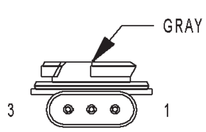
CAV	CIRCUIT	FUNCTION
1	F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	D25 20VT/YL	PCI BUS
3	R74 20LB/YL	RIGHT CURTAIN AIRBAG LINE 1
4	R76 20LB/WT	RIGHT CURTAIN AIRBAG LINE 2
5	-	-
6	Z135 20BK	GROUND



RIGHT TAIL/SIDE MARKER LAMP

RIGHT TAIL/SIDE MARKER LAMP - 2 WAY

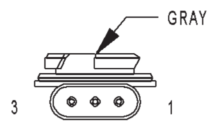
CAV	CIRCUIT	FUNCTION
1	Z151 18BK	GROUND
2	L7 18BK/YL	HEADLAMP SWITCH OUTPUT



RIGHT TAIL/STOP LAMP

RIGHT TAIL/STOP LAMP - GRAY 3 WAY

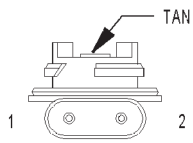
CAV	CIRCUIT	FUNCTION
1	Z151 18BK	GROUND
2	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
3	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT



RIGHT TAIL/
TURN SIGNAL
LAMP
(JR41/DODGE)

RIGHT TAIL/TURN SIGNAL LAMP (JR41/DODGE) - GRAY 3 WAY

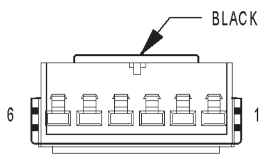
CAV	CIRCUIT	FUNCTION
1	Z151 18BK	GROUND
2	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
3	L60 18TN	RIGHT TURN SIGNAL



RIGHT TURN
LAMP
(CHRYSLER/
BUILT-UP-EXPORT/
JR27)

RIGHT TURN LAMP (CHRYSLER/BUILT-UP-EXPORT/JR27) - TAN 2 WAY

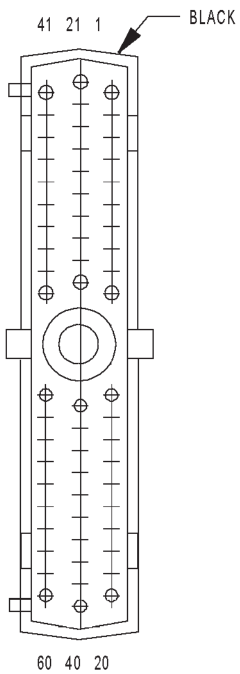
CAV	CIRCUIT	FUNCTION
1	L60 18LG	RIGHT TURN SIGNAL
2	Z151 18BK	GROUND



SENTRY KEY
IMMOBILIZER
MODULE

SENTRY KEY IMMOBILIZER MODULE - BLACK 6 WAY

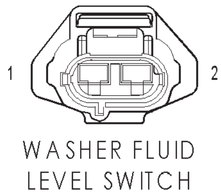
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/PK	PCI BUS
3	-	-
4	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	Z110 20BK	GROUND
6	A51 20RD/WT	FUSED B(+)



TRANSMISSION CONTROL MODULE

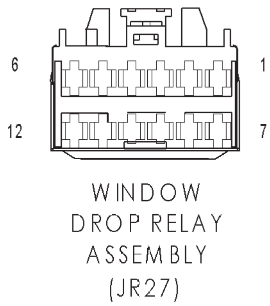
TRANSMISSION CONTROL MODULE - BLACK 60 WAY

CAV	CIRCUIT	FUNCTION
1	T1 20LG/BK	TRS T1 SENSE
2	-	-
3	T3 18VT	TRS T3 SENSE
4	-	-
5	T5 20LG (AUTOSTICK)	AUTOSTICK UPSHIFT SWITCH SENSE
6	K71 20WT/RD	EATX RPM SIGNAL
7	D21 20PK	SCI TRANSMIT
8	A41 16YL	FUSED IGNITION SWITCH OUTPUT (START)
9	T9 18OR/BK	OVERDRIVE PRESSURE SWITCH SENSE
10	T10 20YL/DG	TORQUE MANAGEMENT REQUEST SENSE
11	F11 18RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
12	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
13	T13 20DB/BK	SPEED SENSOR GROUND
14	T14 20LG/WT	OUTPUT SPEED SENSOR SIGNAL
15	T15 20LG	TRANSMISSION CONTROL RELAY CONTROL
16	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
17	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
18	-	-
19	T19 18WT	2-4 SOLENOID CONTROL
20	T20 18LB	LOW/REVERSE SOLENOID CONTROL
21	-	-
22	-	-
23	-	-
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	-	-
30	-	-
31	-	-
32	-	-
33	-	-
34	-	-
35	-	-
36	-	-
37	-	-
38	-	-
39	-	-
40	-	-
41	T41 20BK/WT	TRS T41 SENSE
42	T42 18VT/WT	TRS T42 SENSE
43	D25 20VT/YL	PCI BUS
44	T44 20YL (AUTOSTICK)	AUTOSTICK DOWNSHIFT SWITCH SENSE
45	-	-
46	D6 20PK/LB	SCI RECEIVE
47	T47 18YL/BK	2-4 PRESSURE SWITCH SENSE
48	-	-
49	-	-
50	T50 18DG	LOW/REVERSE PRESSURE SWITCH SENSE
51	K4 18BK/LB	SENSOR GROUND
52	T52 20RD/BK	INPUT SPEED SENSOR SIGNAL
53	Z112 16BK/YL	GROUND
54	T54 18VT/YL	TRANSMISSION TEMPERATURE SENSOR SIGNAL
55	-	-
56	A24 16BK	FUSED B(+)
57	Z113 16BK/RD	GROUND
58	G7 18WT/OR	VEHICLE SPEED SENSOR SIGNAL
59	T59 18PK	UNDERDRIVE SOLENOID CONTROL
60	T60 18BR	OVERDRIVE SOLENOID CONTROL



WASHER FLUID LEVEL SWITCH - 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z261 20BK	GROUND
2	G29 20BK/TN	WASHER FLUID SWITCH SENSE

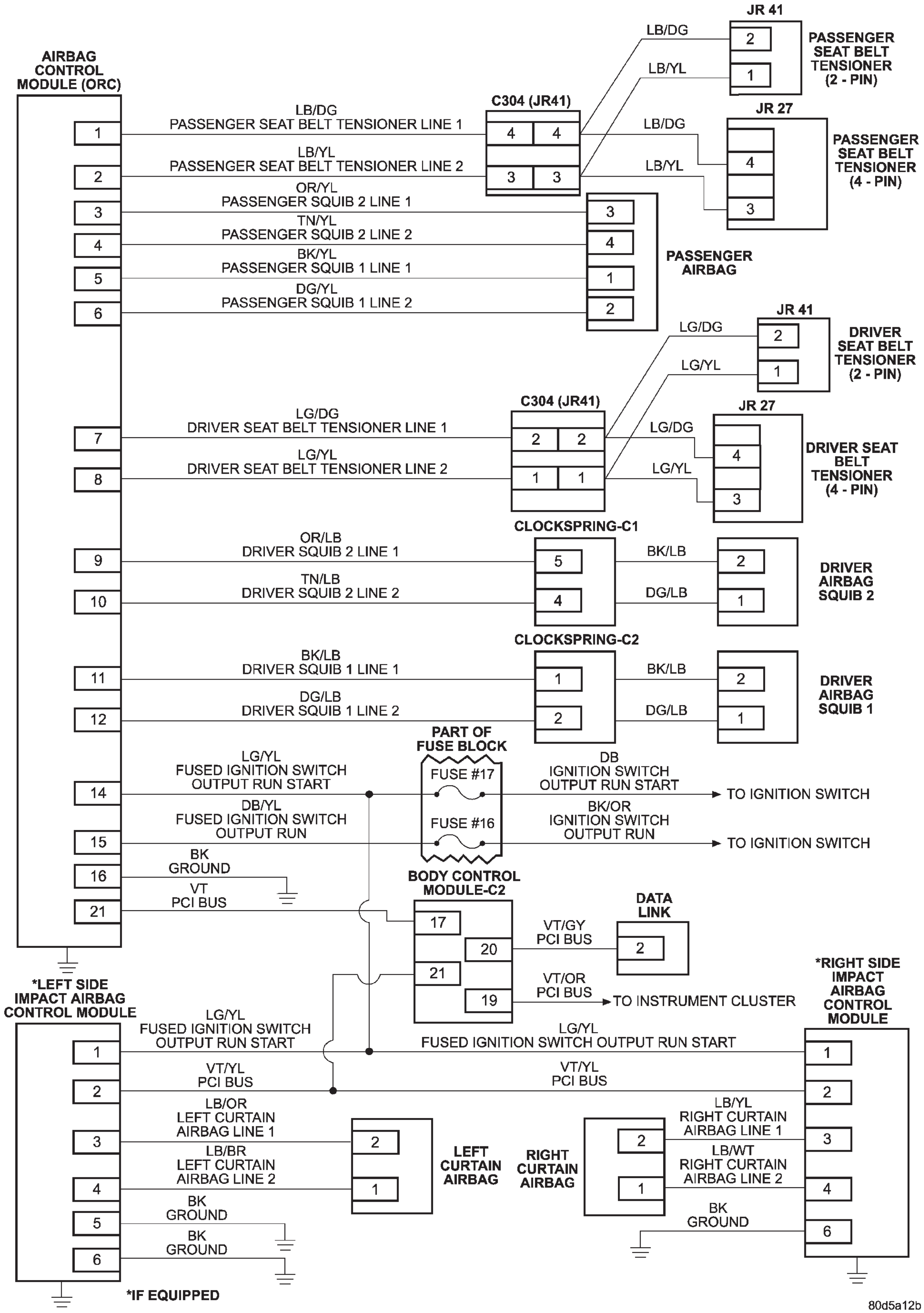


WINDOW DROP RELAY ASSEMBLY (JR27) - 12 WAY

CAV	CIRCUIT	FUNCTION
1	Q19 14OR/WT	MASTER WINDOW SWITCH LEFT FRONT DOWN
2	Q290 14LG	MASTER WINDOW SWITCH LEFT REAR DOWN
3	Q38 14PK	MASTER WINDOW SWITCH RIGHT FRONT (DOWN)
4	Q32 14VT	MASTER WINDOW SWITCH RIGHT REAR (DOWN)
5	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
6	Q37 20RD/WT	WINDOW DROP RELAY CONTROL
7	Q21 14WT	LEFT FRONT WINDOW DRIVER (DOWN)
8	Q27 14RD/BK	LEFT REAR WINDOW DRIVER (DOWN)
9	Q26 14VT/WT	RIGHT FRONT WINDOW DRIVER (DOWN)
10	Q28 14DG/WT	WINDOW DROP RELAY RIGHT FRONT (DOWN)
11	F21 14TN	FUSED IGNITION SWITCH OUTPUT (RUN)
12	F21 14TN	FUSED IGNITION SWITCH OUTPUT (RUN)

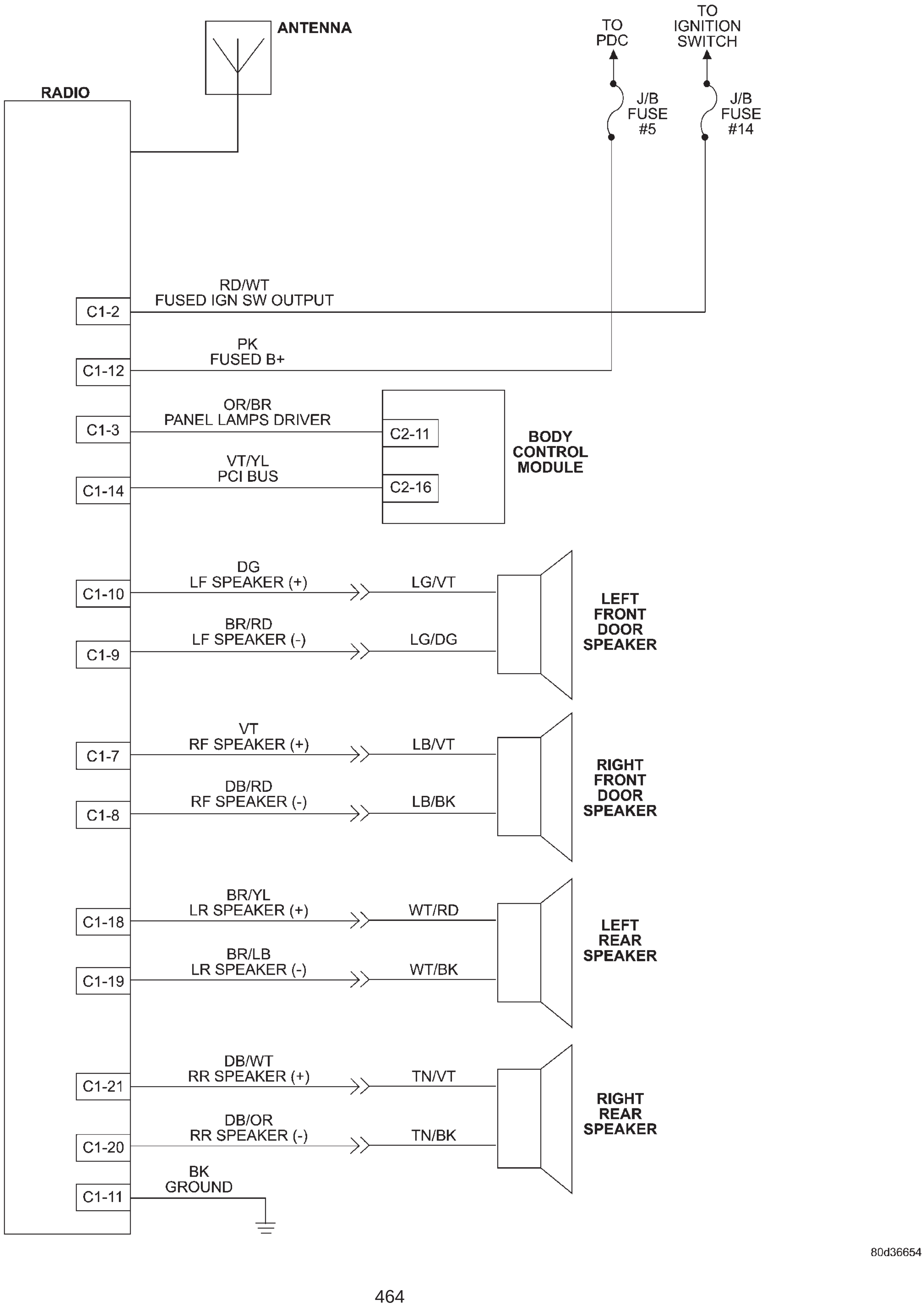
10.0 SCHEMATIC DIAGRAMS

10.1 AIRBAG SYSTEMS

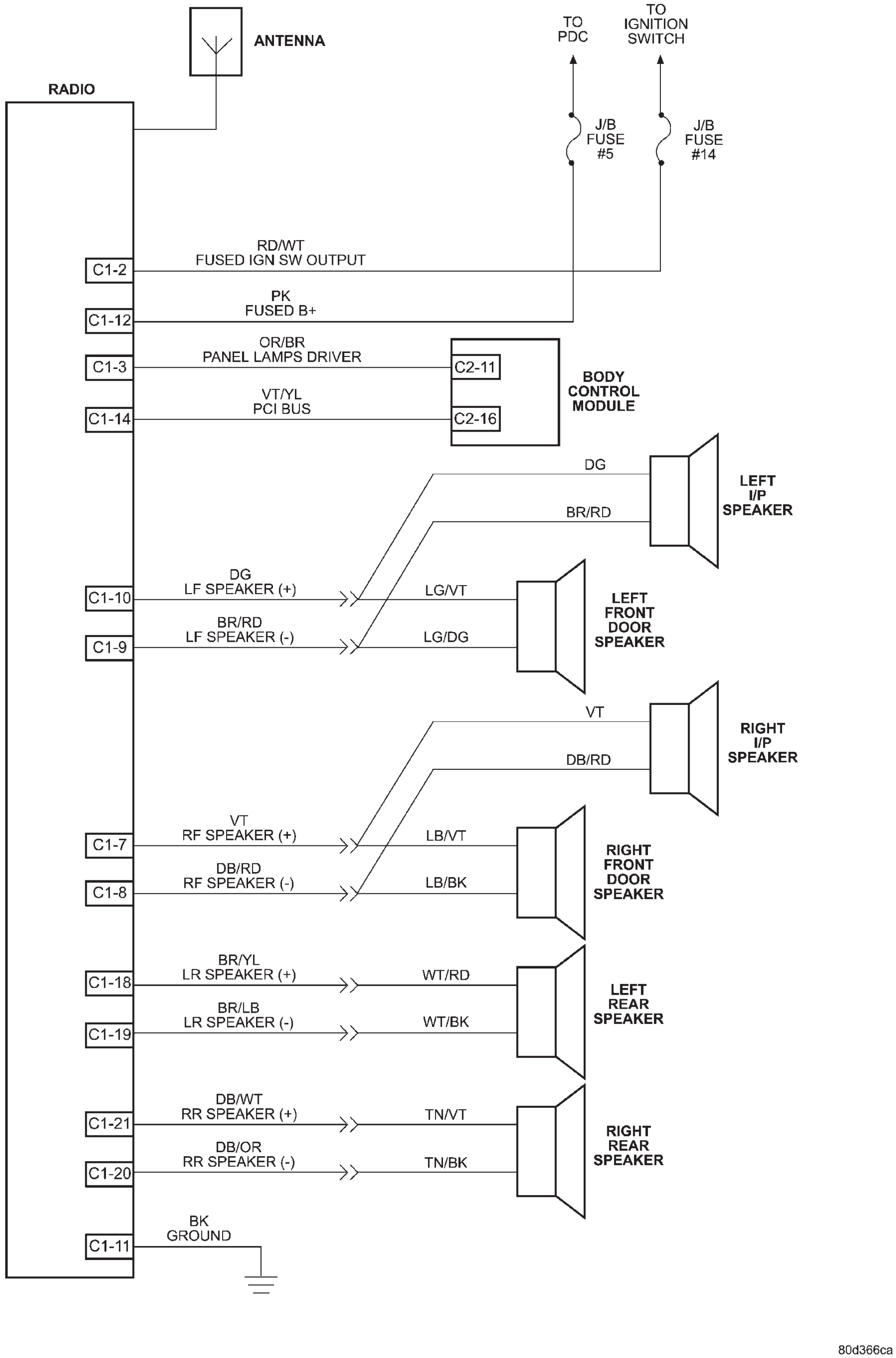


10.2 AUDIO SYSTEM

10.2.1 BASE RADIO–JR41

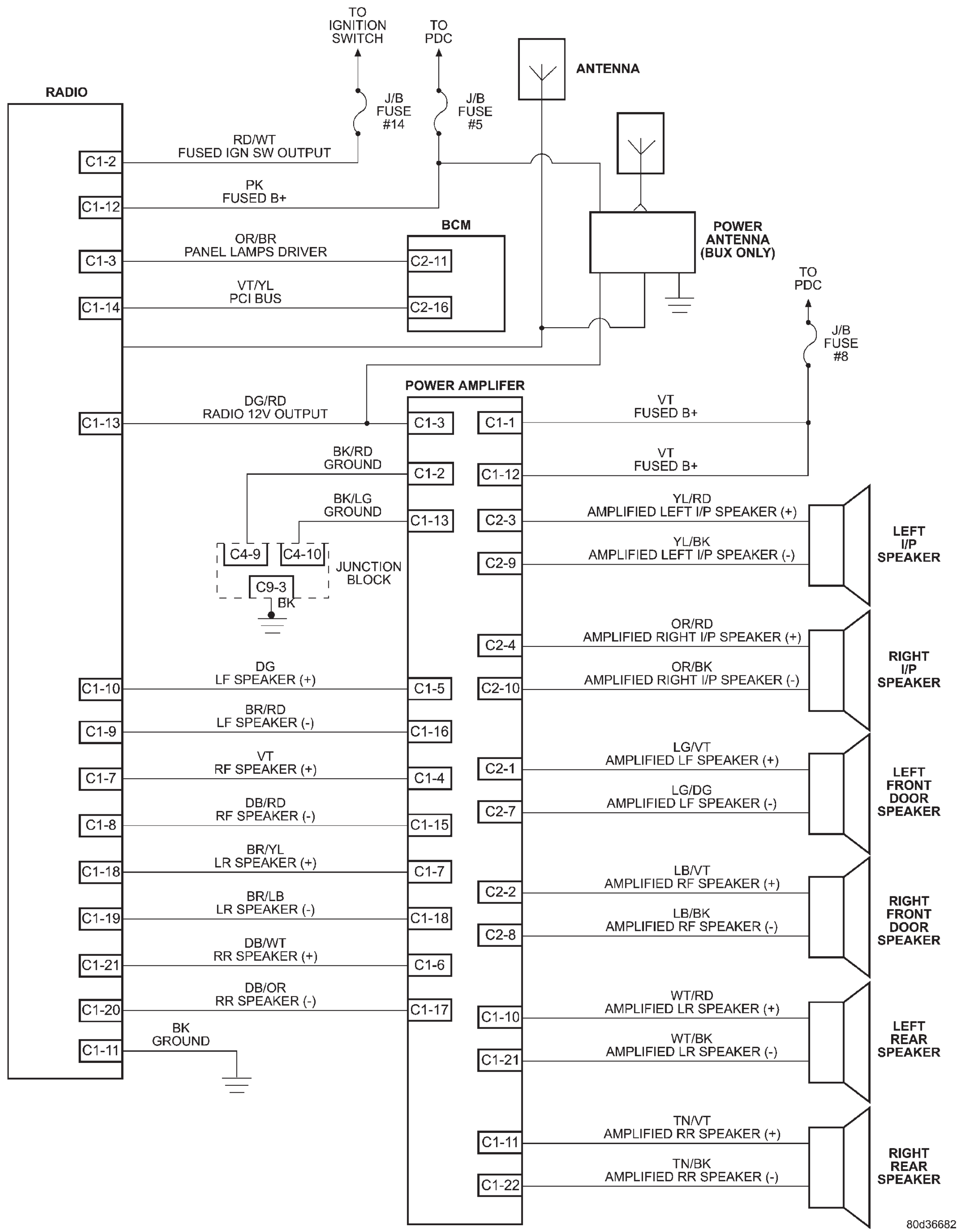


10.2.2 BASE RADIO–JR27

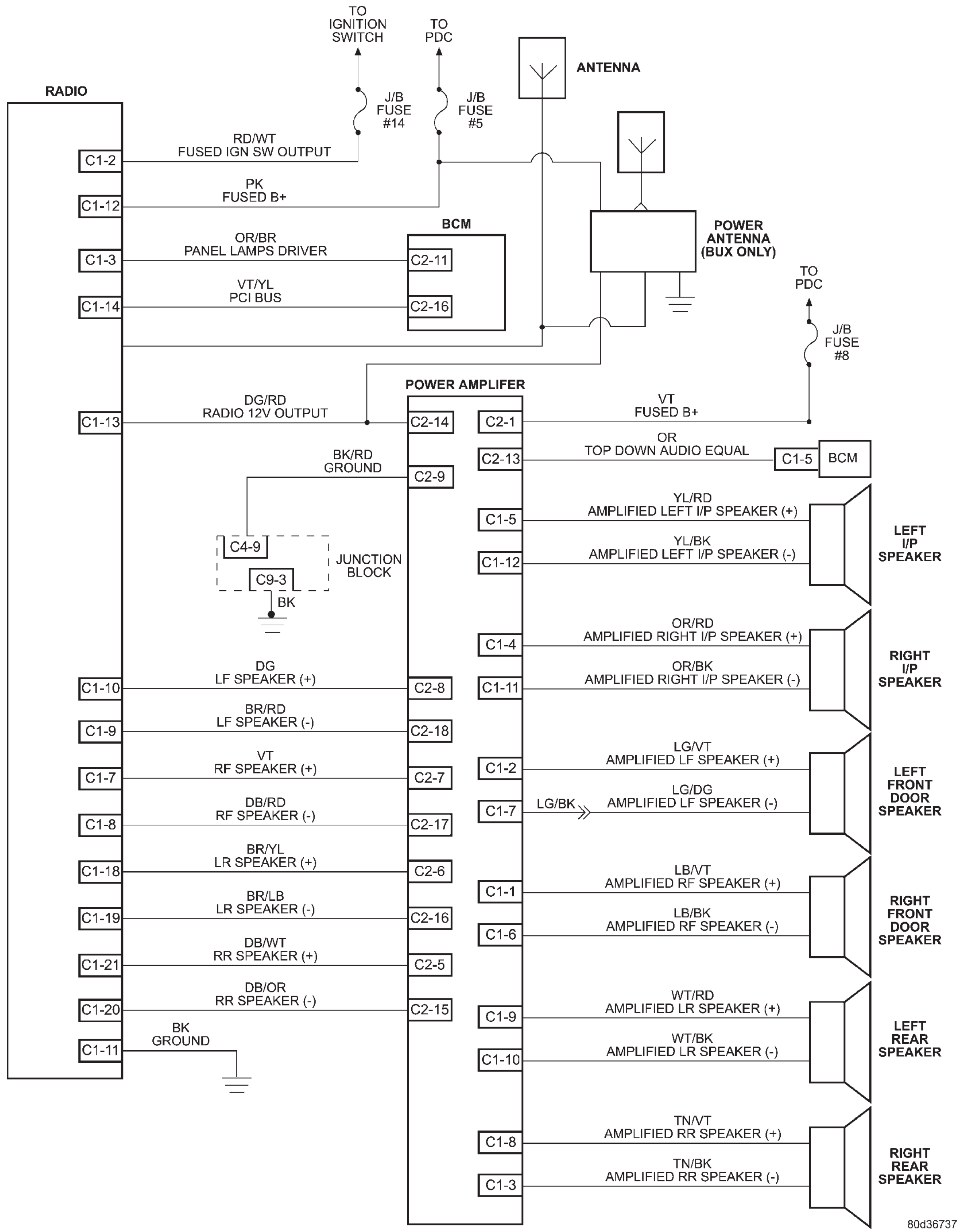


SCHEMATIC DIAGRAMS

10.2 AUDIO SYSTEM (Continued)
10.2.3 PREMIUM SYSTEM–JR41



10.2.4 PREMIUM SYSTEM–JR27



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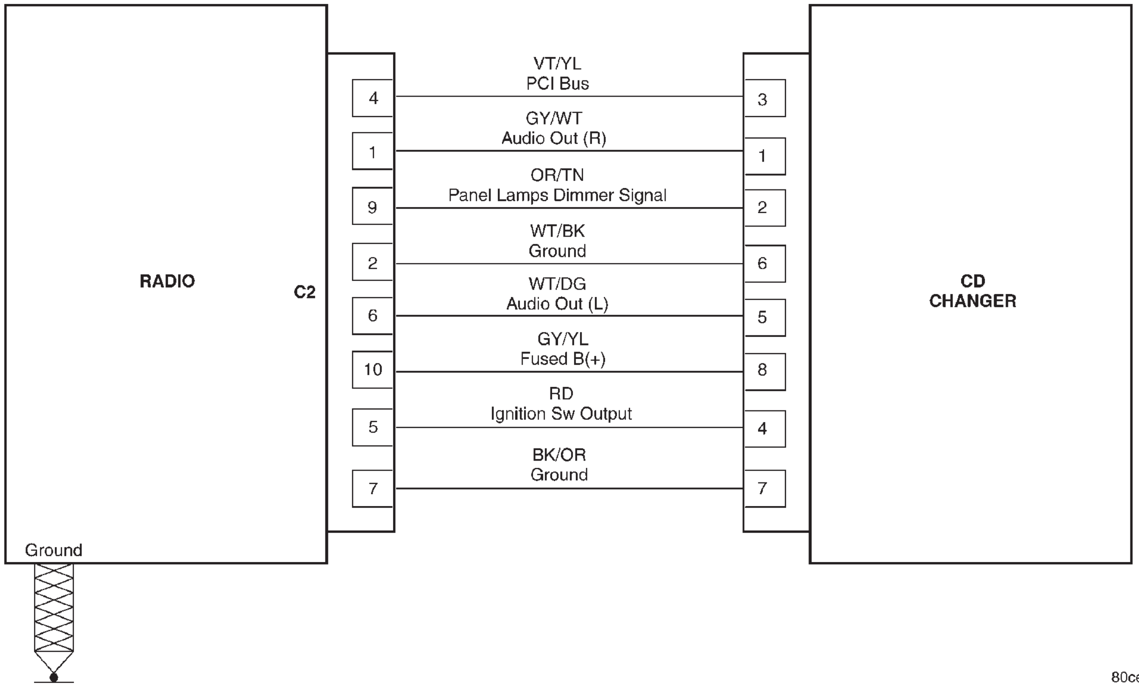
10.2 AUDIO SYSTEM (Continued)
10.2.5 CD CHANGER



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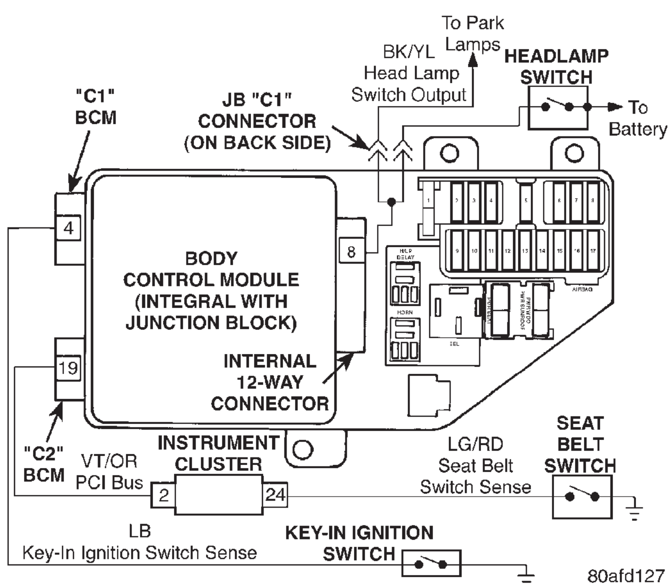
10.3 CHIME SYSTEM



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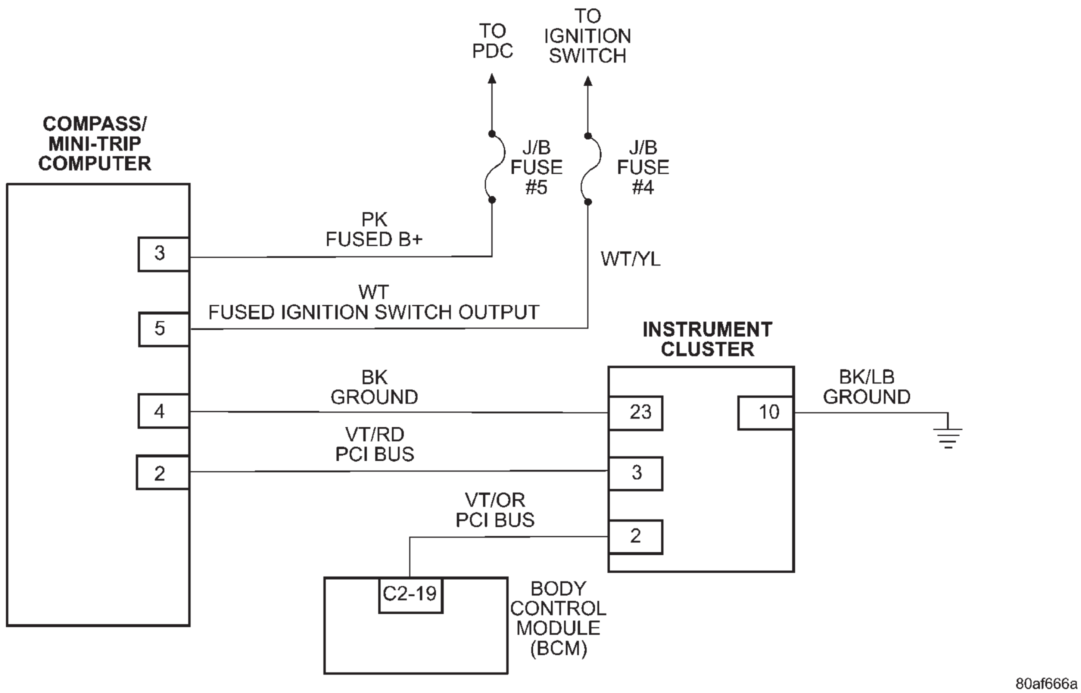
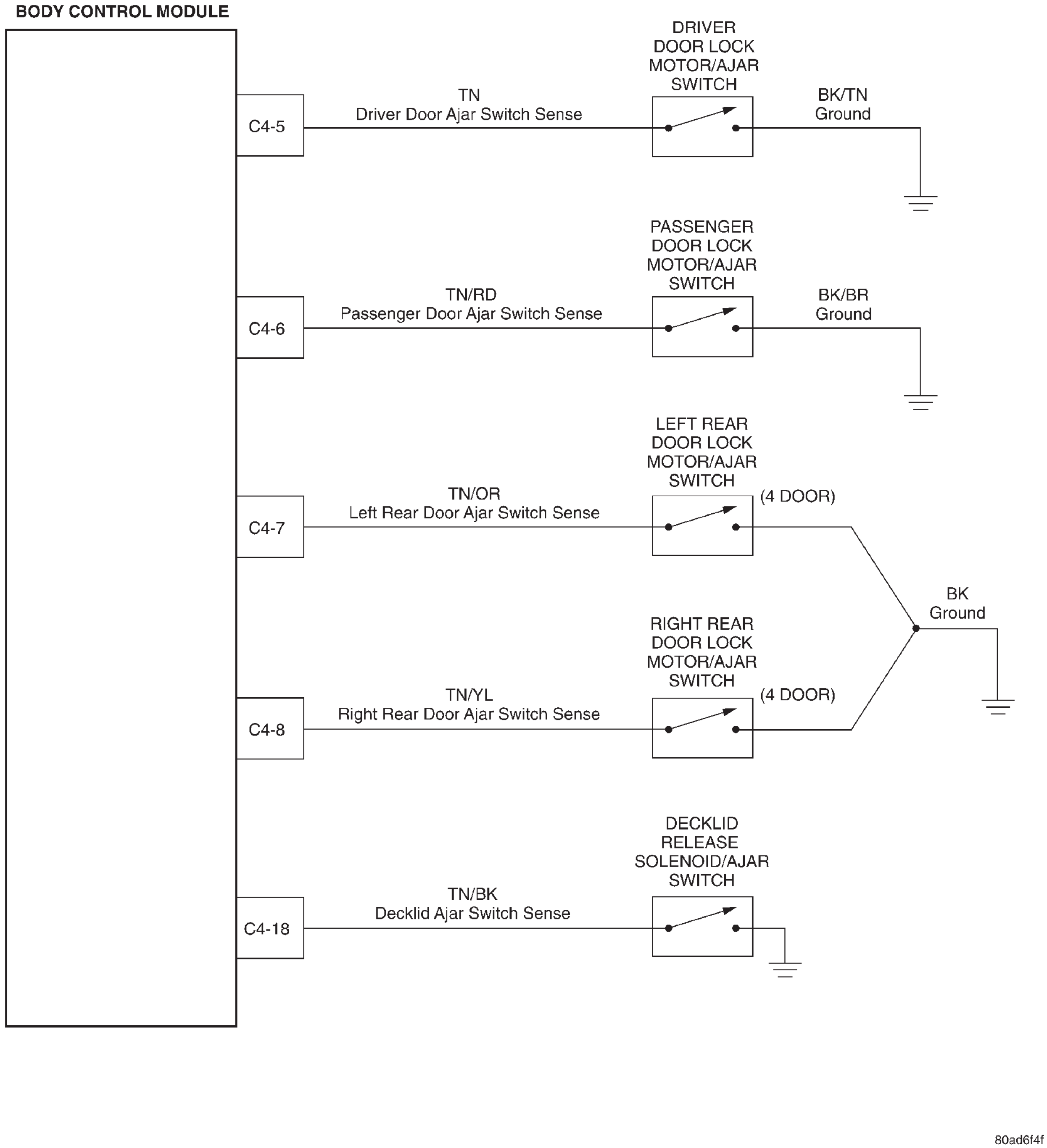
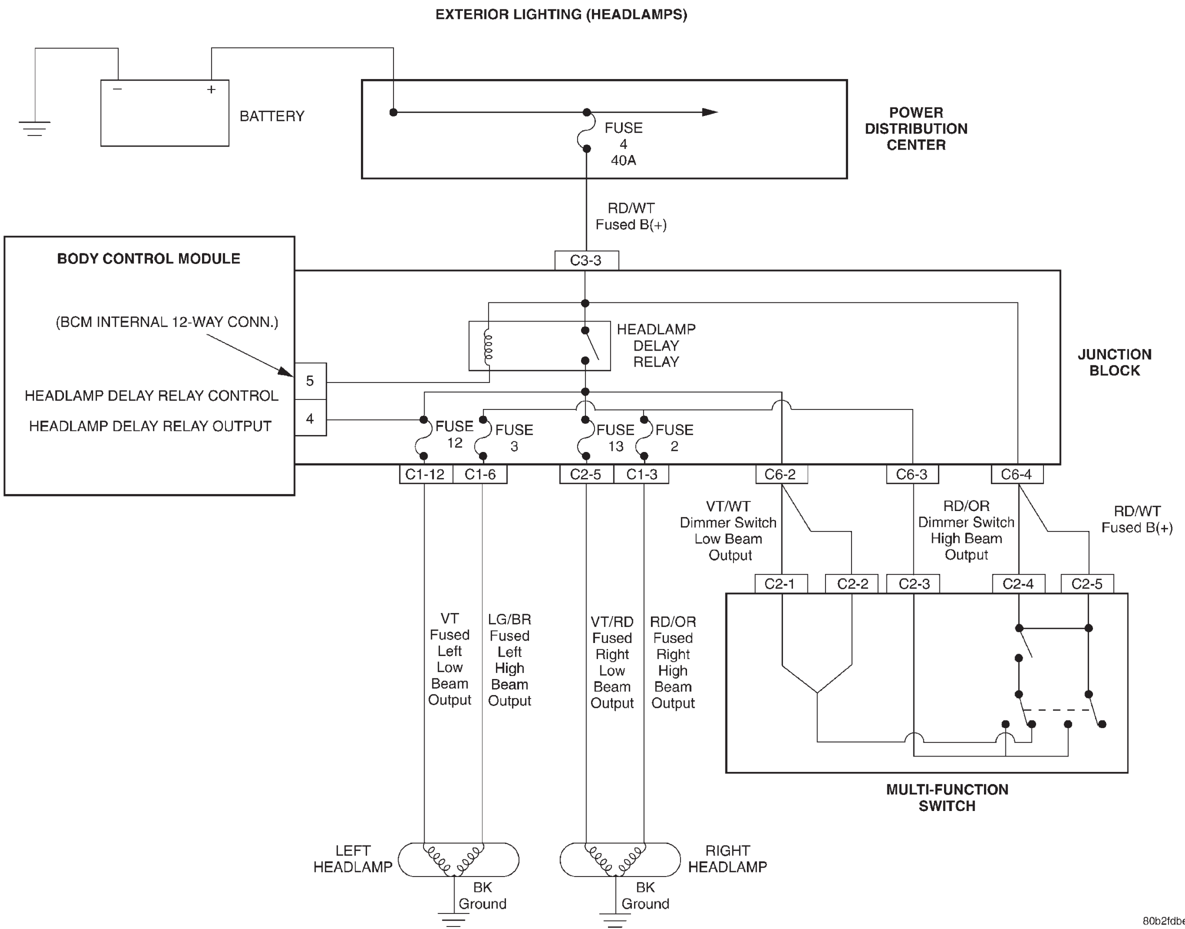
10.4 COMPASS/MINI TRIP COMPUTER (CMTC)



10.5 DOOR AJAR



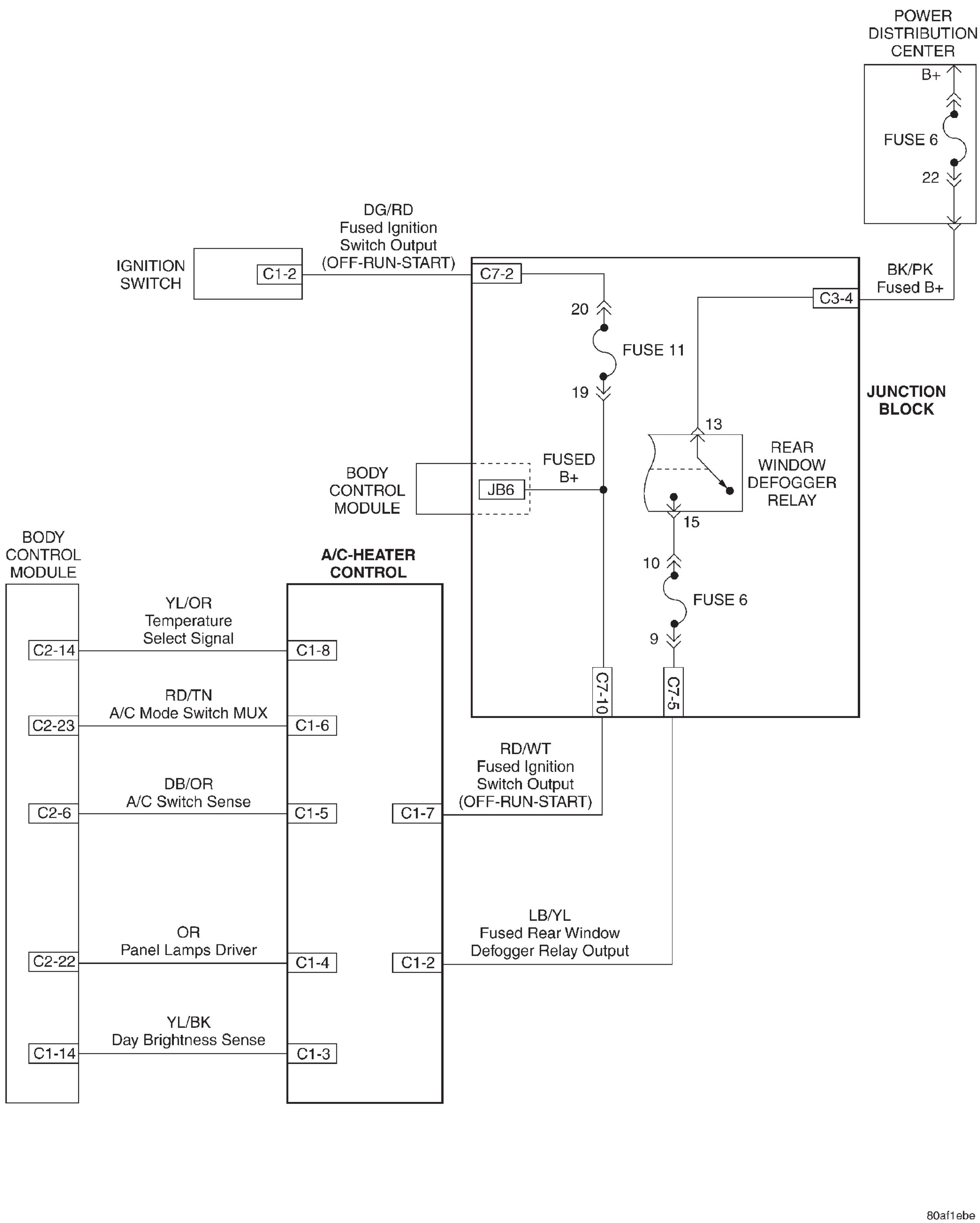
10.6 EXTERIOR LIGHTING (HEADLAMPS)



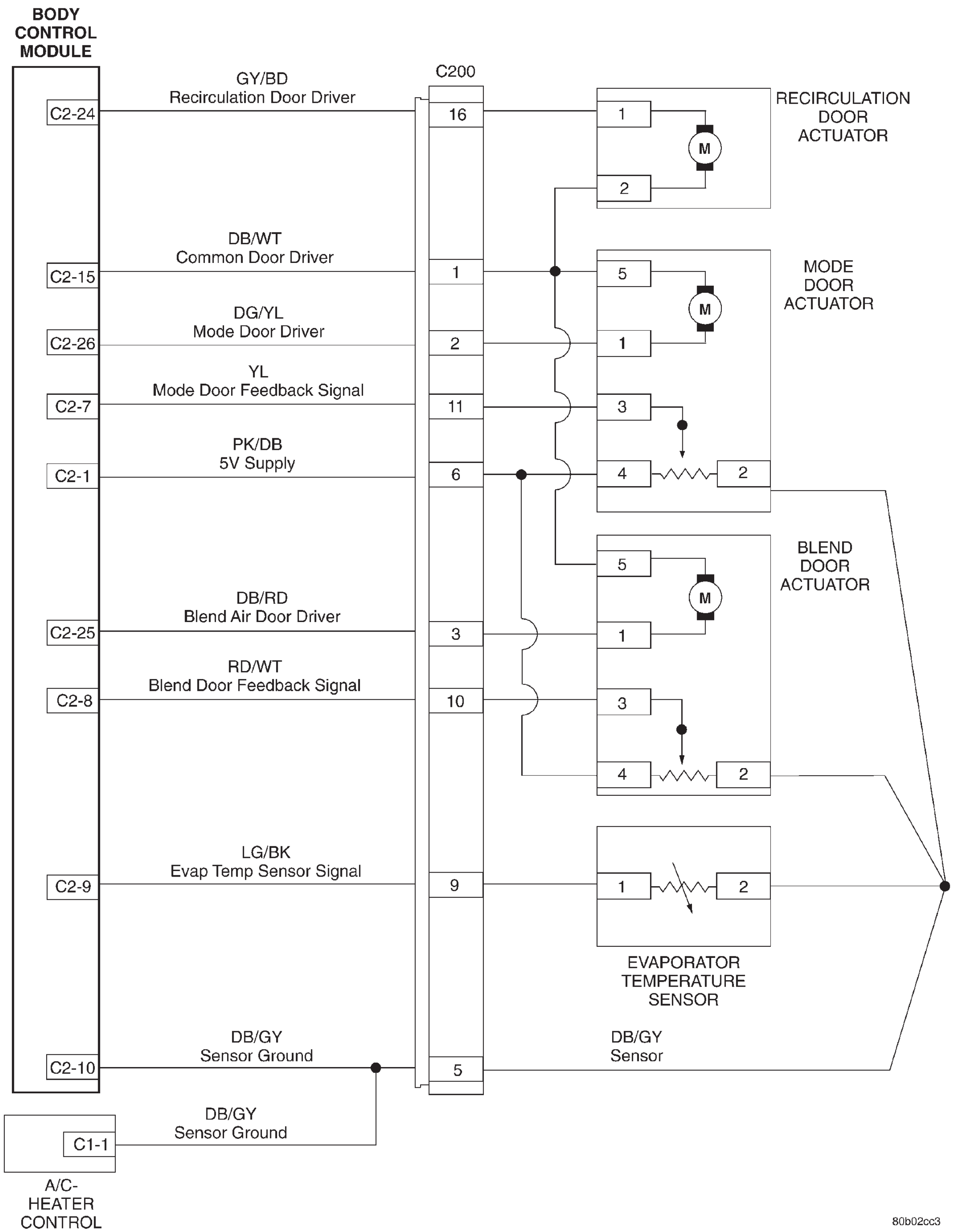
SCHEMATIC DIAGRAMS

10.7 HEATING AND A/C

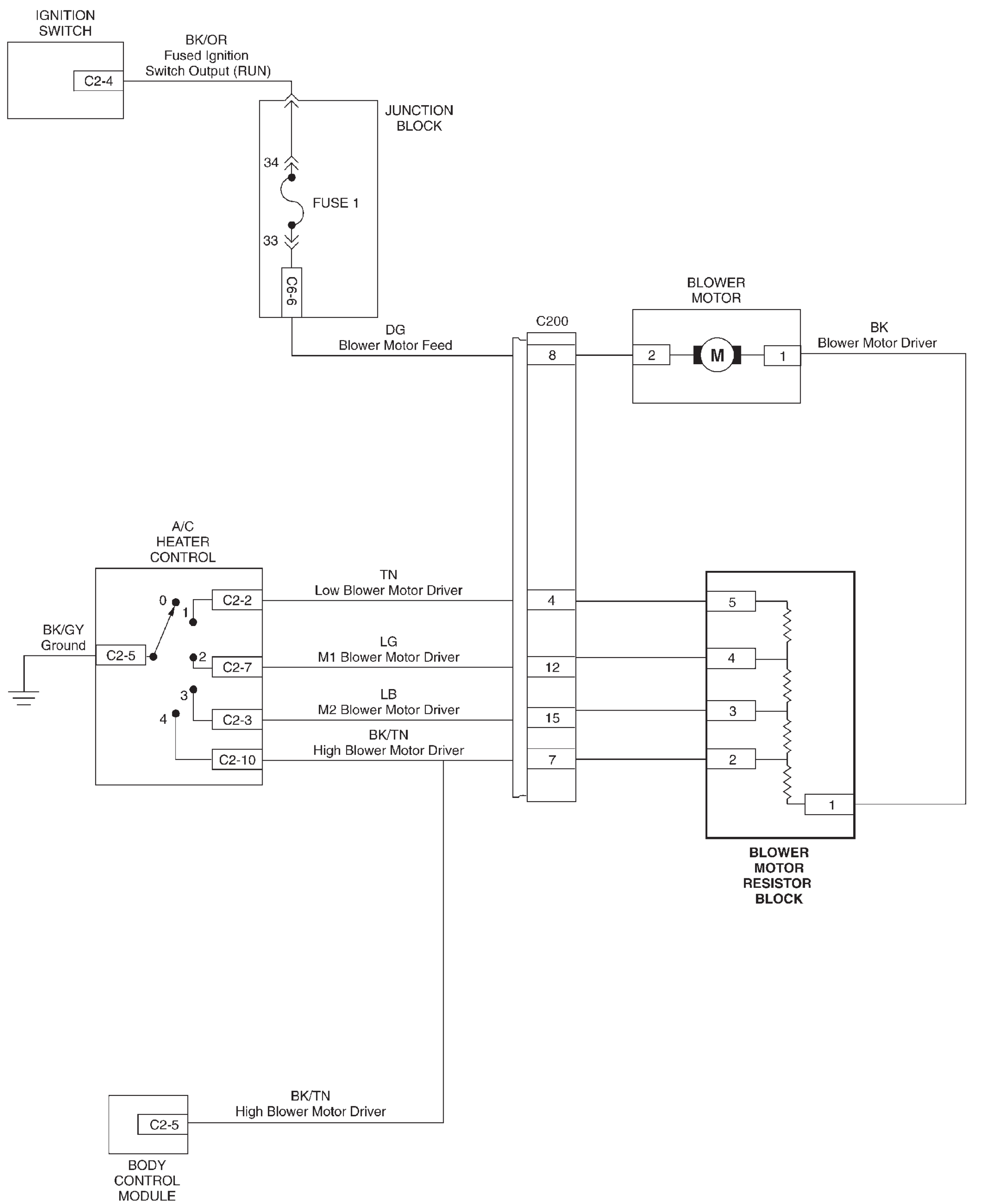
10.7.1 A/C HEATER CONTROL



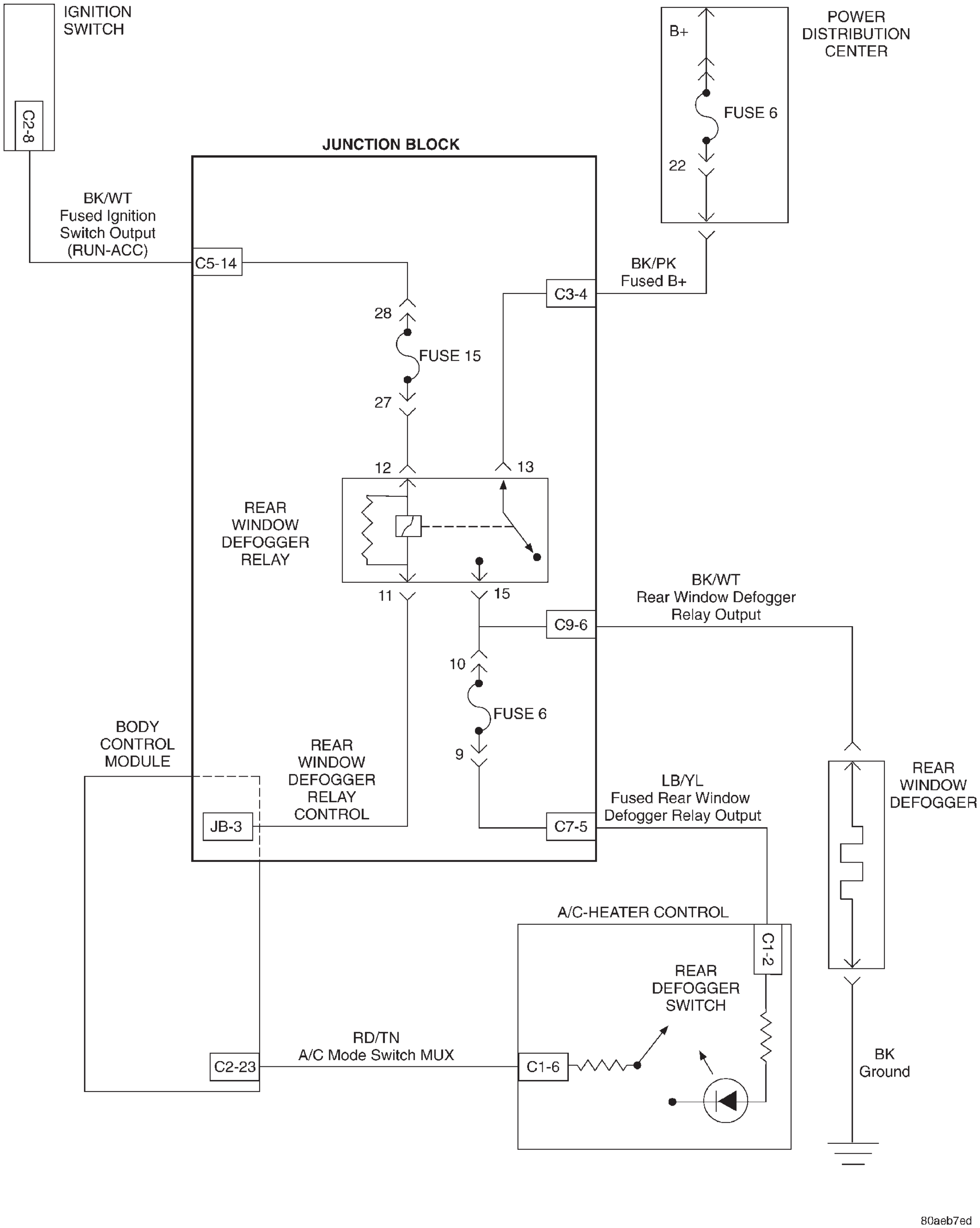
10.7.2 HVAC ACTUATORS & EVAP TEMPERATURE SENSOR



10.7 HEATING AND A/C (Continued)
10.7.3 BLOWER MOTOR

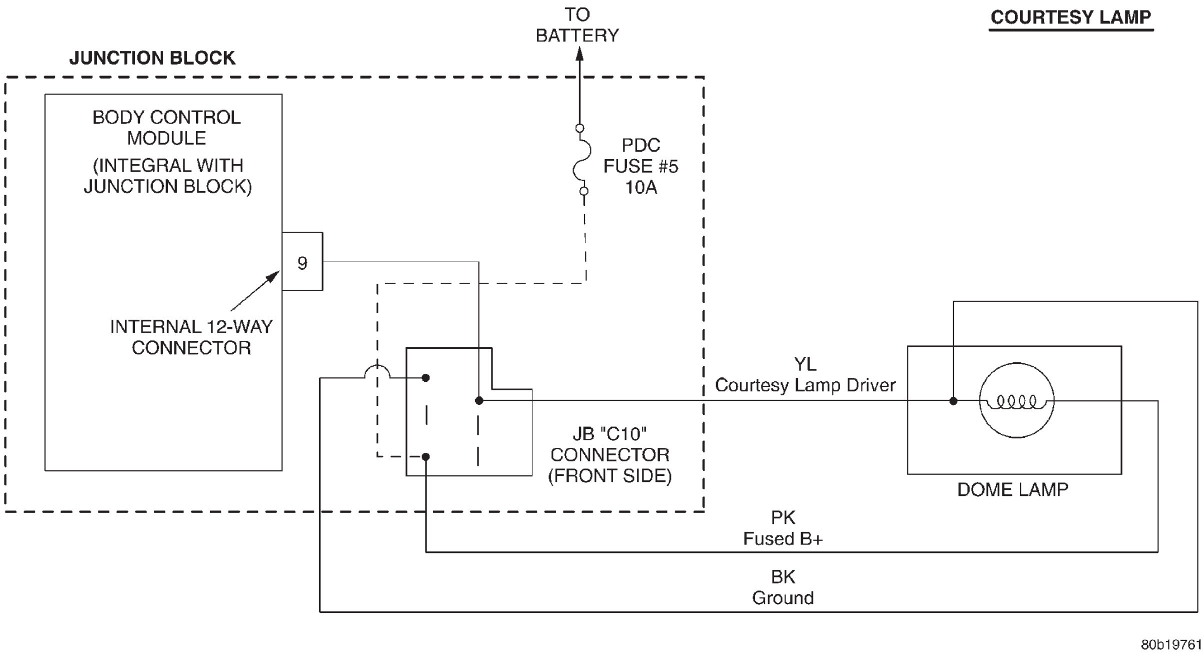


10.7.4 REAR WINDOW DEFOGGER

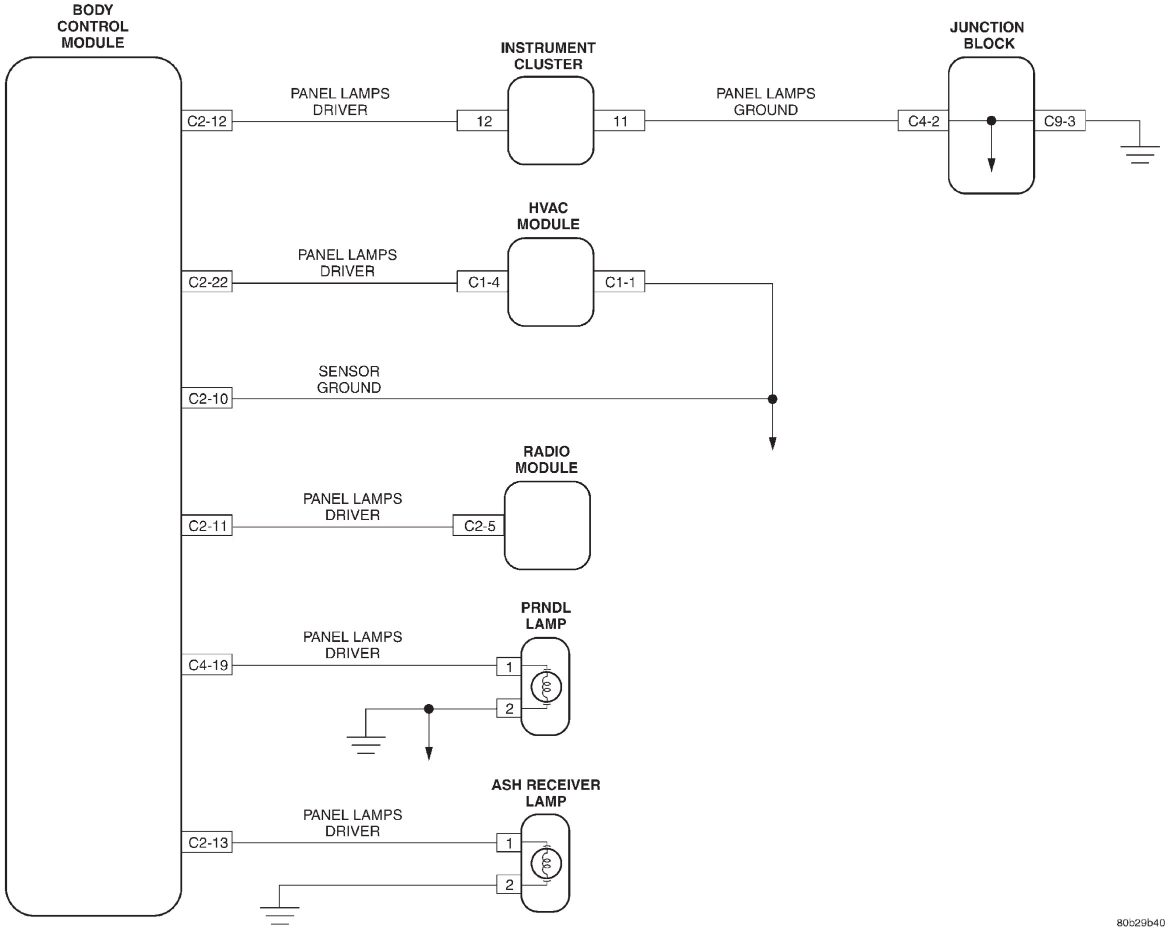


10.8 INTERIOR LIGHTING

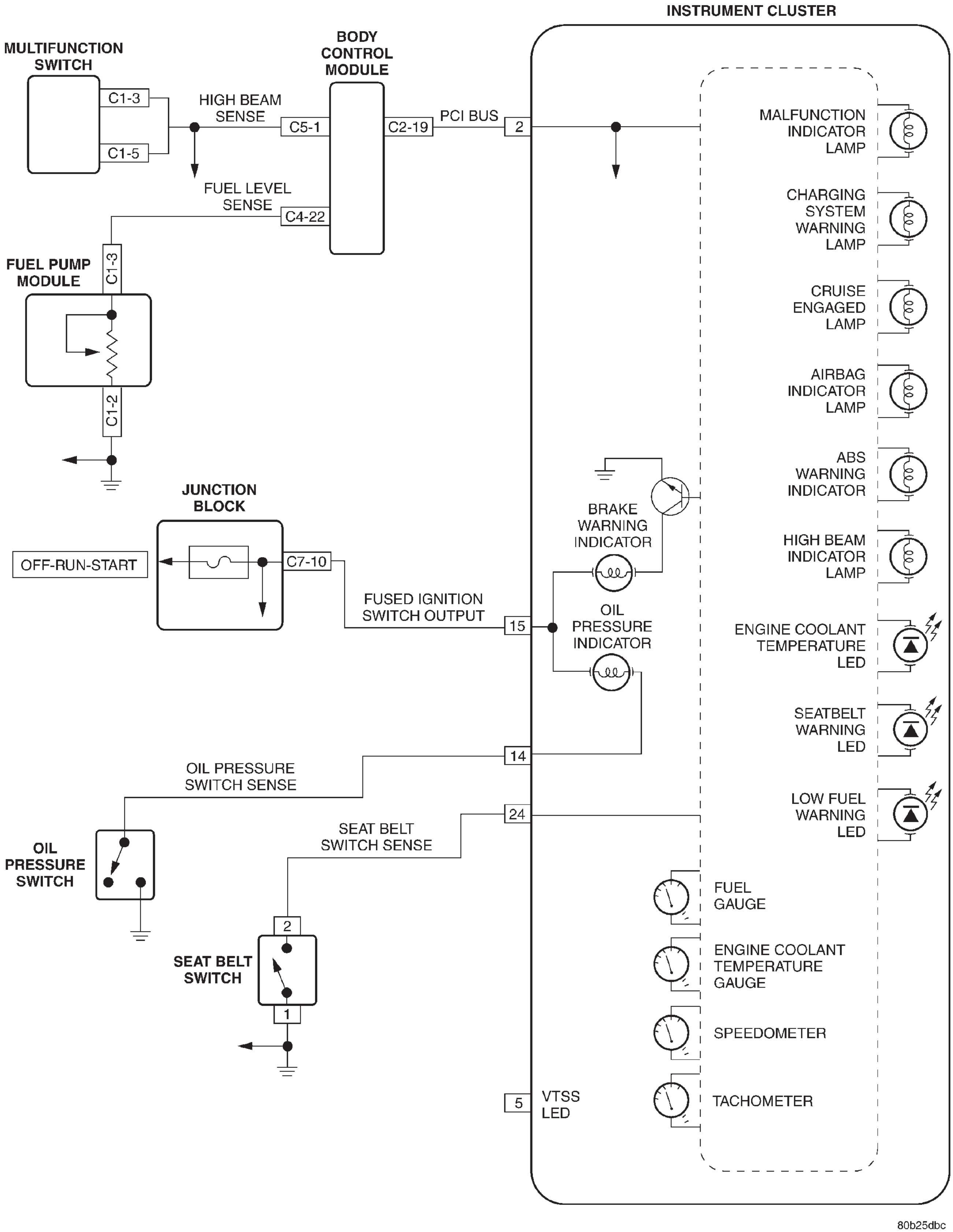
10.8.1 COURTESY LAMPS



10.8.2 PANEL LAMPS

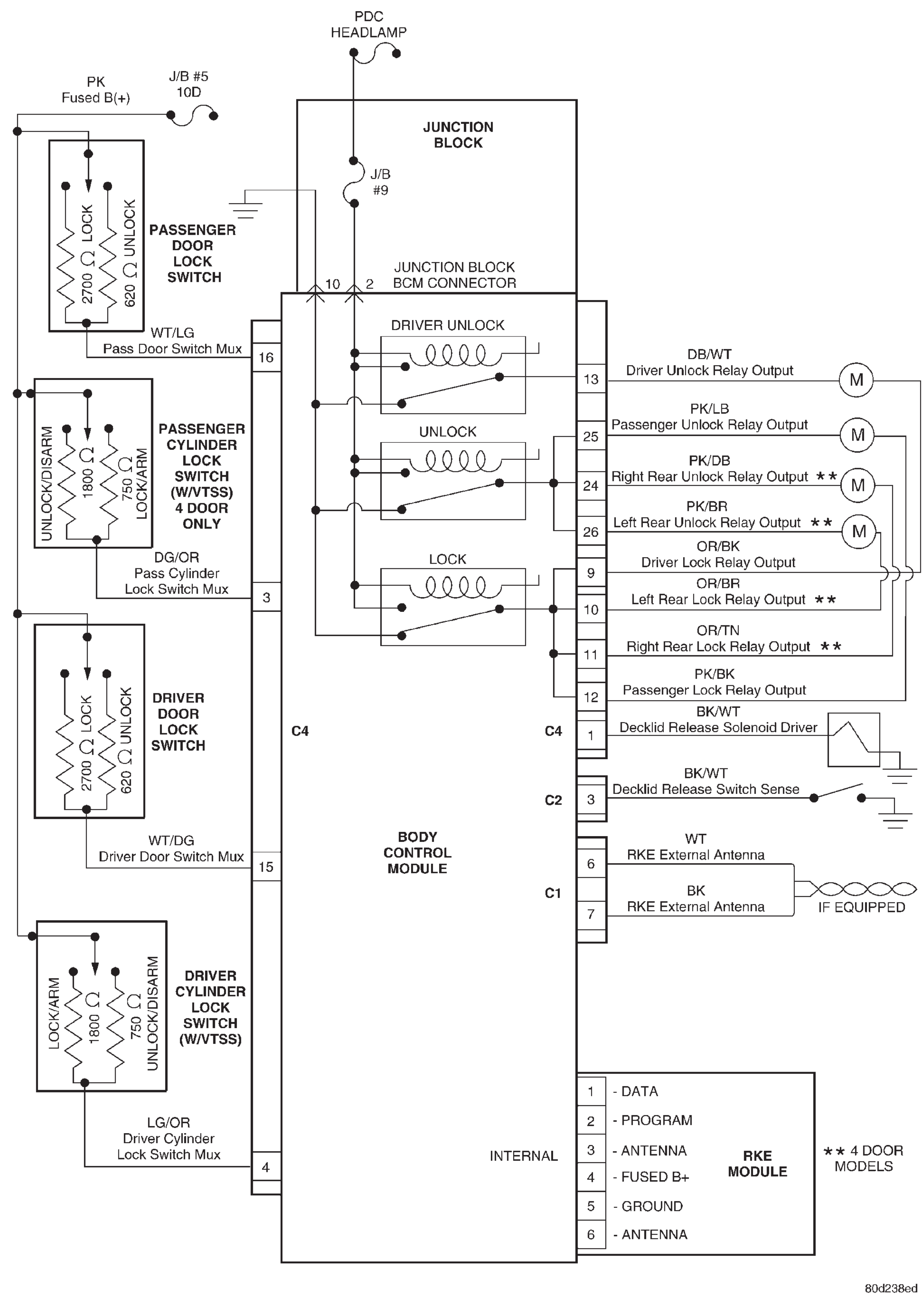


10.9 MECHANICAL INSTRUMENT CLUSTER



S C H E M A T I C D I A G R A M S

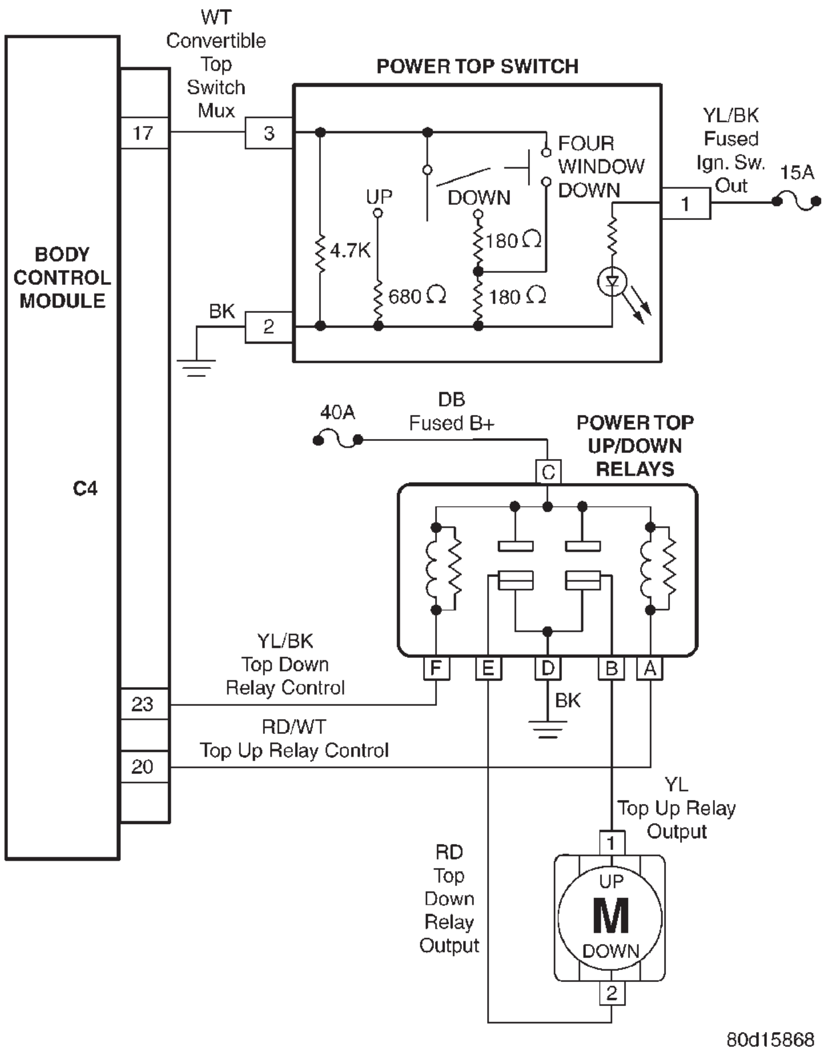
10.10 POWER DOOR LOCKS/RKE



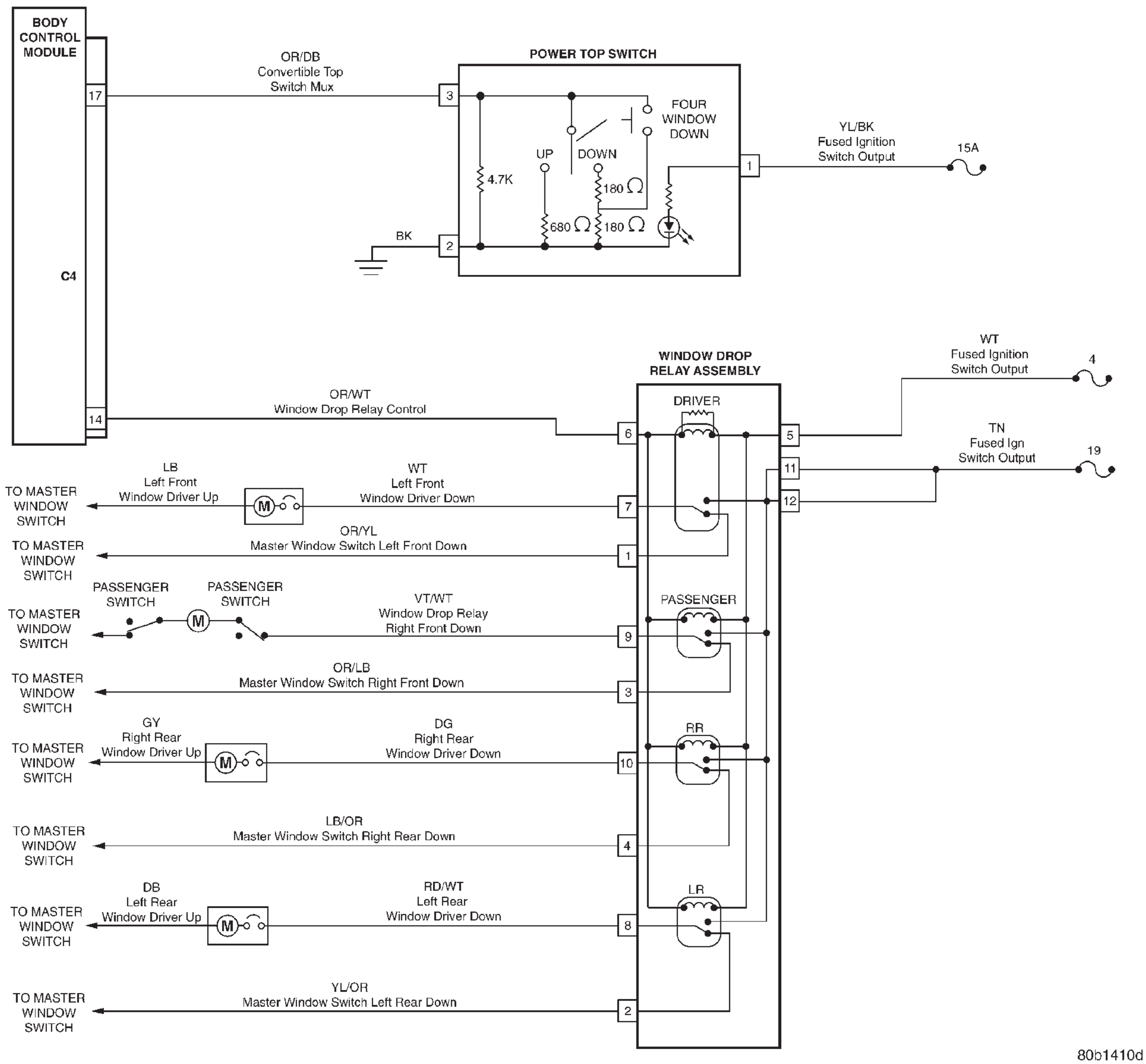
SCHEMATIC DIAGRAMS

10.11 POWER TOP

10.11.1 CONVERTIBLE TOP

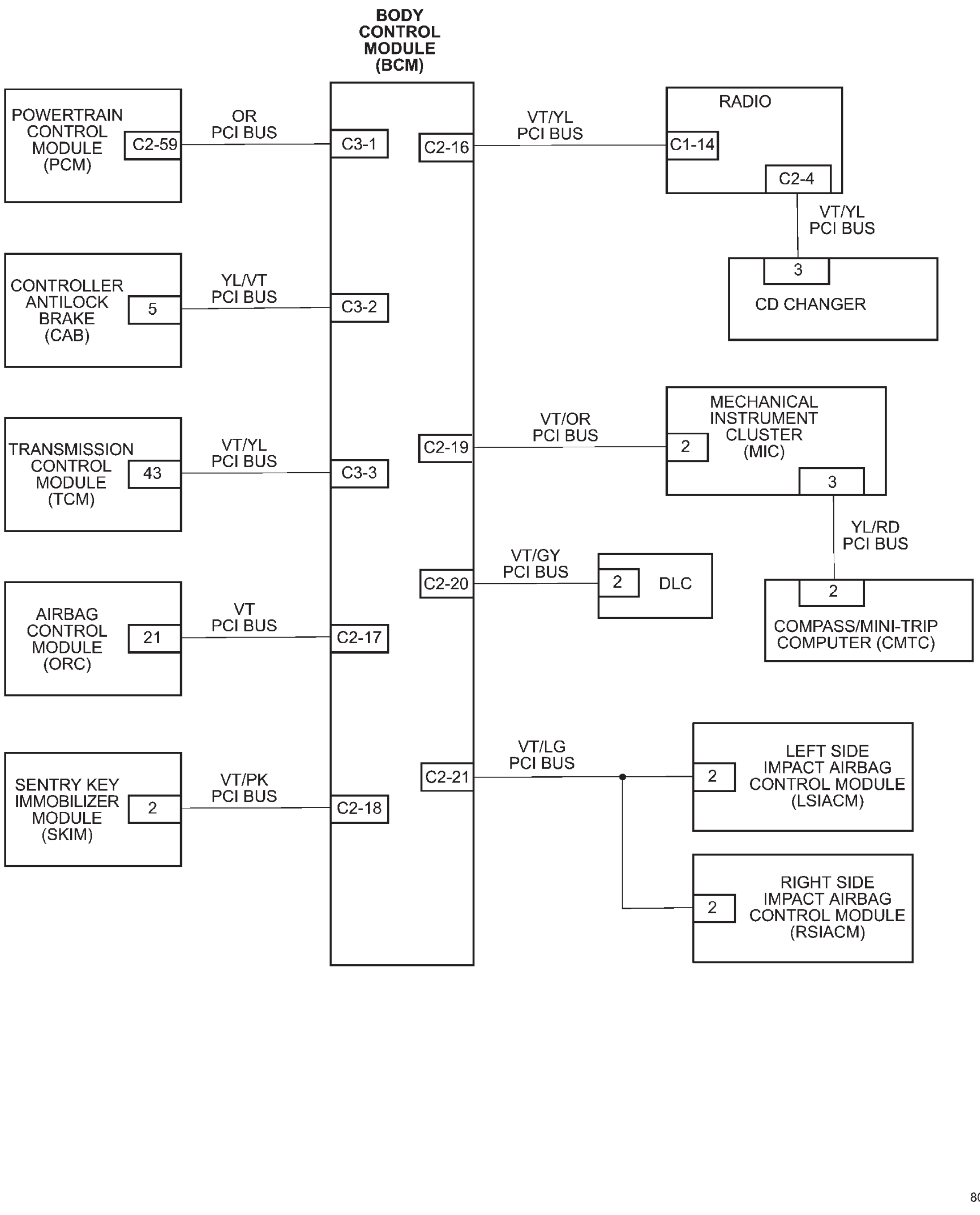


10.11.2 POWER TOP/4 WINDOW DROP

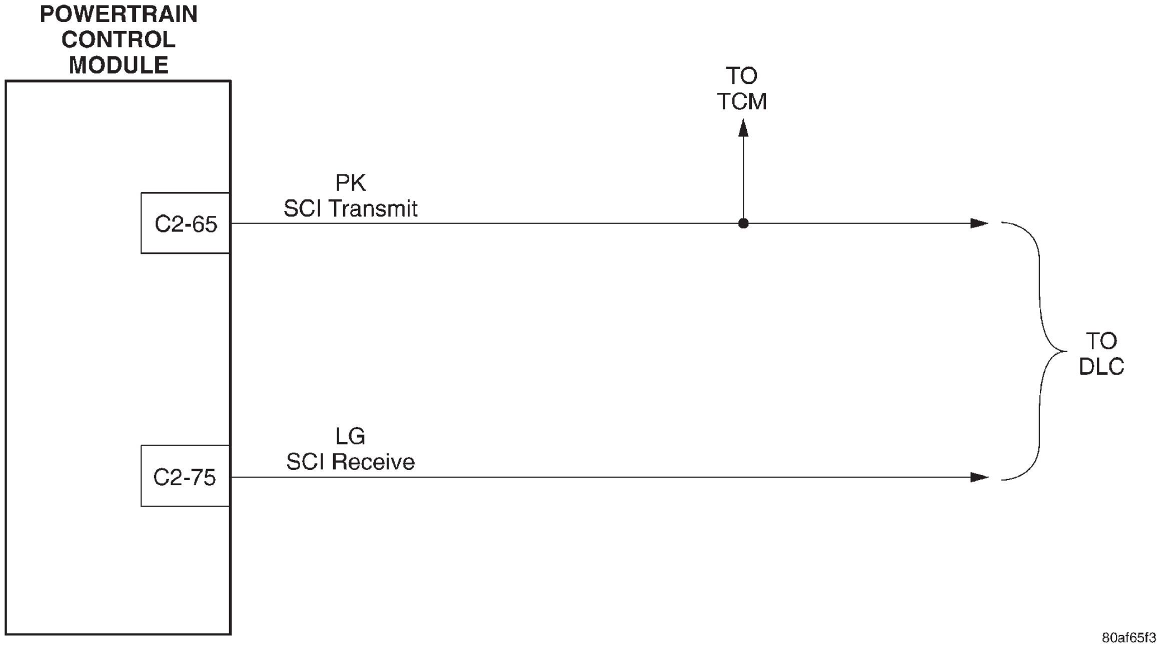


10.12 VEHICLE COMMUNICATION

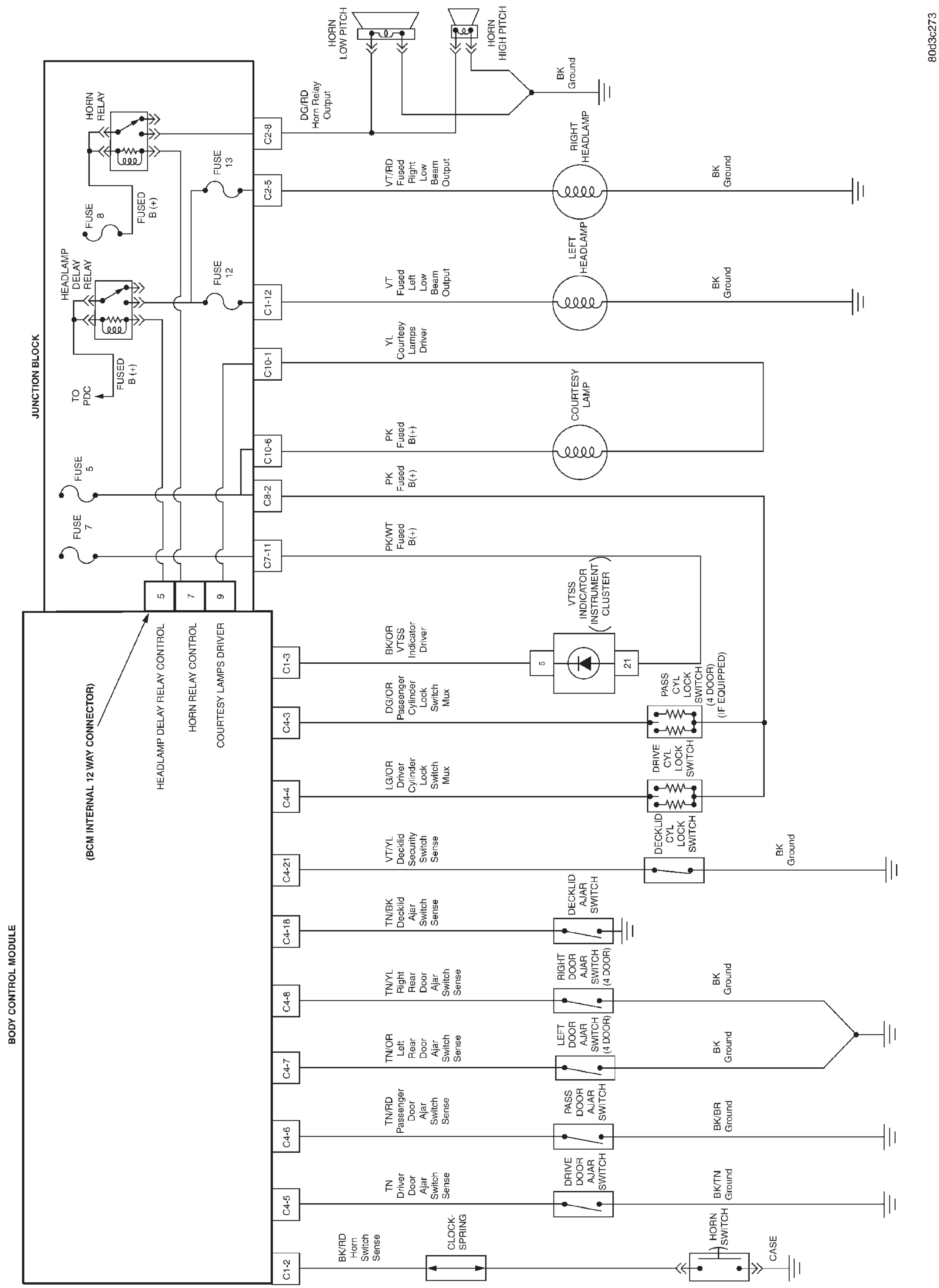
10.12.1 PCI BUS COMMUNICATION



10.12.2 PCM COMMUNICATION

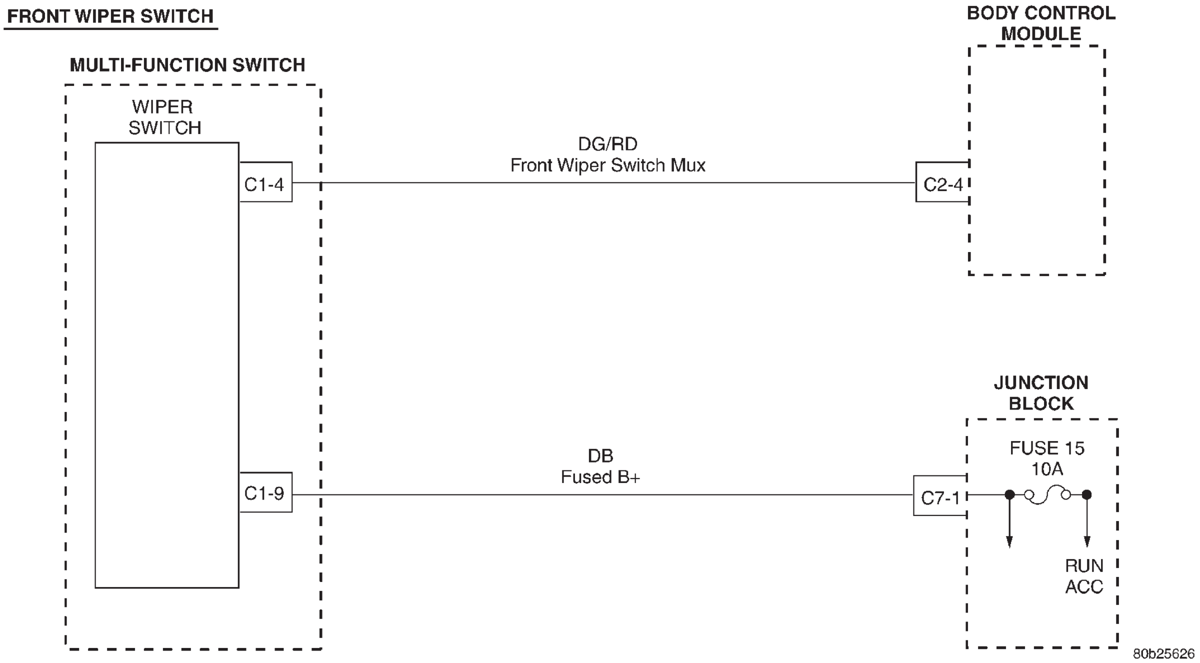


10.13 VEHICLE THEFT SECURITY SYSTEM

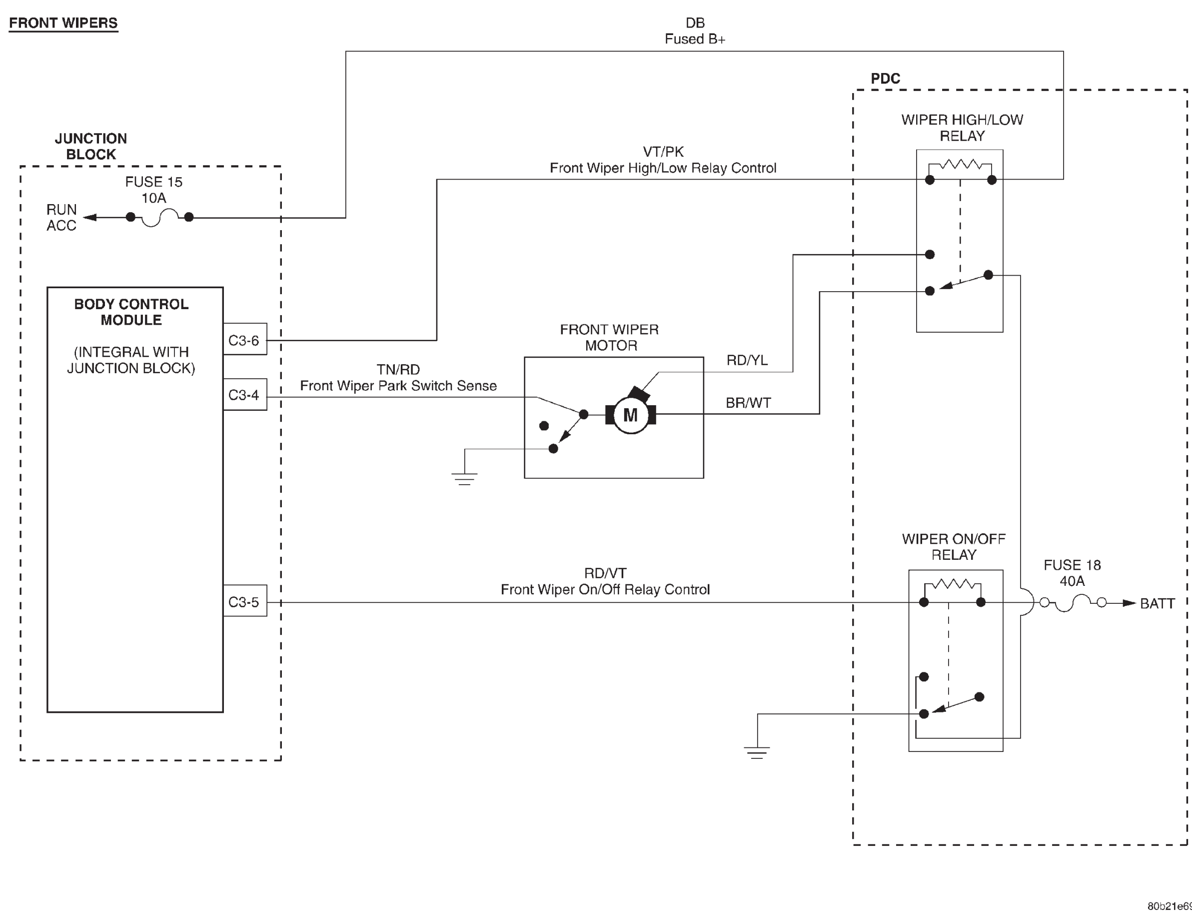


10.14 WIPER SYSTEM

10.14.1 WIPER SWITCH



10.14.2 FRONT WIPERS



SCHEMATIC DIAGRAMS

NOTES

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1.0 INTRODUCTION

The procedures contained in this manual include all the specifications, instructions, and graphics needed to diagnose Mark 20 Antilock Braking System (ABS). The diagnostics in this manual are based on the failure condition or symptom being present at time of diagnosis.

Please follow the recommendations below when choosing your diagnostic path.

1. First make sure the DRBIII® is communicating with the CAB. If the DRBIII® displays a "No Response" condition, you must diagnose that first.
2. Read DTC's (diagnostic trouble codes) with the DRBIII®.
3. If no DTC's are present, identify the customer complaint.
4. Once the DTC or customer complaint is identified, locate the matching test in the Table of Contents and begin to diagnose the symptom.

All component location views are in Section 8.0. All connector pinouts are in Section 9.0. All schematics are in Section 10.0.

An * placed before the symptom description indicated a customer complaint.

When repairs are required, refer to the appropriate service manual for the proper removal and repair procedure.

Diagnostic procedures change every year. New diagnostic systems may be added; carryover systems may be enhanced. READ THIS MANUAL BEFORE TRYING TO DIAGNOSE A VEHICLE CODE. It is recommended that you review the entire manual to become familiar with all new and changed diagnostic procedures.

After using this book, if you have any comments or recommendations, please fill out the form at the back of the book and mail it back to us.

1.1 SYSTEM COVERAGE

This diagnostic procedure manual covers the antilock braking system (ABS) and traction control system found on the Chrysler Sebring.

1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the controller antilock brake module is done in six basic steps:

- verification of complaint
- verification of any related symptoms
- symptom analysis
- problem isolation
- repair of isolated problem
- verification of proper operation

2.0 IDENTIFICATION OF SYSTEM

Vehicles equipped with the Teves Mark 20 antilock brake system can be identified by the presence of the controller antilock brake module located along with HCU. The CAB/HCU are on the left side beneath the air cleaner.

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 TEVES MARK 20 SYSTEM DESCRIPTION

The controller antilock brake module is used to monitor wheel speeds and to modulate (control) hydraulic pressure in each brake channel. The modulated hydraulic pressure is used to prevent wheel lock-up during braking.

The Teves Mark 20 system uses a diagonal split hydraulic brake system. In the standard brake mode the master cylinder primary circuit supplies pressure to the right front and left rear wheel brakes, and the secondary master cylinder circuit supplies pressure to the left front and right rear wheel brakes.

During and antilock stop the Mark 20 system uses four-channel operation. This means that each wheel brake is independently controlled. By using a separate hydraulic channel for each wheel, the system is able to retain directional stability and steering control while applying maximum braking. The system provides maximum braking even when road conditions vary.

3.2 ABS PLUS DESCRIPTION

ABS Plus operates like Traction Control except that the brake pedal must be applied for ABS Plus to be activated. Also, in contrast to the ABS function, a brake is applied rather than released. When the brake pedal is depressed far enough to close the brake lamp switch, the Controller Antilock Brake (CAB) will monitor and compare the speeds of the front (driven) wheels. When the CAB detects that a wheel is turning disproportionately faster then vehicle speed, it will apply the brake at that wheel to control a possible skid and help maintain directional control.

The driver may report the sound of the ABS pump motor running when the brake is not applied hard enought to cause an ABS event.

3.3 SYSTEM COMPONENTS

- controller antilock brake (CAB)
- vacuum booster
- master cylinder
- ABS integrated control unit hydraulic control unit (HCU), valve block assembly: 8 valve solenoids (4 inlet valves, 4 outlet valves, 2 accumulators) 1 motor, 2 pump
- 4 wheel speed sensor/tone wheel assemblies
- ABS warning indicator
- fuses and wiring harness
- fluid reservoir

3.3.1 ABS AND BRAKE WARNING LAMPS

The amber ABS warning indicator is located in the instrument cluster. It is used to inform the driver that the antilock function has been turned off. The ABS warning indicator is controlled by the CAB. If the 25 way CAB connector is not connected, the BCM will not receive a message from the CAB via the PCI bus and the BCM will send a message to the instrument cluster to turn on the ABS warning indicator.

The ABS Warning Indicator will remian lit during every key cycle until a circuit or component fault is repaired and the CAB no longer detects the fault. After repair of a sensor signal fault or a pump motor fault, the CAB must sense all four wheeels at 25 km/h (15 mph) before it will extinguish the ABS Indicator.

The Instrument Cluster will illuminate the ABS Warning Indicator if it loses communication with the CAB.

The red BRAKE warning indicator is also located in the instrument cluster. It can be activated in several ways. Application of the parking brake or a low fluid signal from the fluid level switch located in the master cylinder reservoir will cause the indicator to come on. The status of the red BRAKE warning indicator is not monitored by the CAB.

3.3.2 CONTROLLER ANTILOCK BRAKE (CAB)

The Controller Antilock Brake (CAB) is a microprocessor-based device that monitors wheel speeds and controls the antilock functions. The CAB contains two microprocessors that receive identical sensor signals and then independently process the information. The results are then compared to make sure that they agree. Otherwise, the CAB will turn off the antilock system and turn on the ABS warning indicator.

The primary functions of the CAB are to:

- detect wheel locking tendencies
- control fluid pressure modulation to the brakes during an antilock stop
- monitor the system for proper operation
- provide communication to the DRBIII® while in diagnostic mode
- store diagnostic information in non-volatile memory

The CAB continuously monitors the speed of each wheel. When a wheel locking tendency is detected, the CAB will command the appropriate valve to modulate brake fluid pressure via the hydraulic control unit (HCU). Brake pedal position is maintained during an antilock stop by being a closed system with the use of 2 accumulators. The CAB continues to control pressure in individual hydraulic circuits until a wheel locking tendency is no longer present. The CAB turns on the pump motor during an antilock stop.

The antilock brake system is constantly monitored by the CAB for proper operation. If the CAB detects a system malfunction, it can disable the antilock system and turn on the ABS warning indicator. If the antilock function is disabled, the system will revert to standard base brake system operation.

The CAB inputs include the following:

- diagnostic communication
- four wheel speed sensors
- ignition switch
- fused B+
- brake switch

The CAB outputs include the following:

- ABS warning indicator actuation
- ABS pump control
- eight valve control signals
- diagnostic communication
- body controller communication

3.3.3 HYDRAULIC CONTROL UNIT

The hydraulic control unit (HCU) contains the valve block assembly, two accumulators, and pump motor assembly. The HCU and the CAB are mounted as an assembly and are not separately serviceable.

Valve Block Assembly: The valve block assembly contains valves with four inlet valves and four outlet valves. The inlet valves are spring-loaded in the open position and the outlet valves are spring loaded in the closed position. During an antilock stop, these valves are cycled to maintain the proper slip ratio for each wheel. If the CAB detects slip, the inlet valve is closed to prevent any further pressure increase. If necessary, the outlet valve is opened to release the pressure to the accumulators until the wheel is no longer slipping. Once the wheel is no longer slipping, the outlet valve is closed and the inlet valve is opened to reapply pressure. If the wheel is decelerating within its predetermined limits (proper slip ratio), the inlet valve will close to hold the pressure constant.

Pump Motor Assembly: The pump motor assembly provides the extra amount of fluid needed during antilock braking. The pump is supplied fluid that is released to the accumulators when the outlet valve is opened during and antilock stop. The pump is also used to drain the accumulator circuits after the antilock stop is complete. The pump is operated by an integral electric motor. This motor is controlled by the CAB. The CAB will turn on the pump motor when an antilock stop is detected. The pump continues to run during the antilock stop and is turned off after the stop is complete. Under some conditions, the pump/motor will run to drain the accumulators during the next drive off. The CAB monitors the pump motor operation internally.

Accumulators: The accumulators provide temporary fluid storage during an antilock stop and are drained by the pump/motor. Each of the diagonal circuits uses a 3cc. accumulator.

3.3.4 SWITCHES/SENSORS

Master Cylinder: A fluid level switch is located in the master cylinder fluid reservoir. The switch closes when a fluid level is detected. The fluid level switch turns on the brake warning indicator by grounding the indicator circuit. This switch does not disable the ABS system.

Wheel Speed Sensors and Tone Wheels: One Wheel Speed Sensor (WSS) is located at each wheel and sends a low voltage AC signal to the control module (CAB). This voltage is generated by magnetic induction when a toothed sensor ring (tone wheel) passes by a stationary sensor (wheel speed sensor). The CAB converts the AC signals into digital signals for each wheel.

The front wheel speed sensor is attached to a boss in the steering knuckle. The tone wheel is an integral part of the front axle shaft. The rear sensors are mounted to the rear disc adapters. The rear tone wheels are pressed on the rear hub. The wheel speed sensor air gap is not adjustable. Refer to Service Manual for wheel speed sensor air gap specifications.

The four wheel speed sensors are serviced individually. The front tone wheels are serviced as an assembly with the outer C.V. joint housing. The rear tone wheels are serviced as an assembly.

Correct antilock system operation is dependent on tone wheel speed signals from the wheel speed sensors. The vehicle's wheels and tires should all be the same size and type to generate accurate signals. In addition, the tires should be inflated to the recommended pressures for optimum system operation. Variation in wheel and tire size or significant variations in inflation pressure can produce inaccurate wheel speed signals; however, the system will continue to function when using the mini-spare.

3.3.5 SYSTEM INITIALIZATION

System initialization starts when the key is turned to "run". At this point, the CAB performs a complete self-check of all electrical components in the antilock systems.

Between 8-17 km/h (5-10 mph), a dynamic test is performed. This will momentarily cycle the inlet and outlet valves and check wheel speed sensor circuitry. At 25 km/h (15 mph), the CAB will try to test the pump motor. If the brake pedal is applied, the test will be run at 40 km/h (24 mph) regardless of brake switch state. If, during the dynamic test, the brake pedal is applied, brake pedal pulsations may be felt. This is a normal condition.

If any component exhibits a trouble condition during system initialization or dynamic check, the CAB will illuminate the ABS warning indicator.

3.3.6 DIAGNOSTIC MODE

To enter diagnostic mode, a vehicle speed must be below 10 km/h (6mph) and no ABS condition present. If vehicle speed is not below 10 km/h (6 mph), a "No Response" message could be displayed by the DRBIII®. The following are characteristics of diagnostic mode:

– The amber ABS warning indicator will blink rapidly (about 1/2 second ON and 1/2 second OFF). If a hard trouble code, such as CAB Power Feed Circuit Failure code is present, the indicator will be illuminated without blinking until the trouble condition is cleared.
– Antilock operation is disabled.
– You will be unable to actuate the valves in the valve body when the vehicle speed is above 8 km/h (5 mph). If valve actuation is attempted above 8 km/h (5mph), a "No Response" message will be displayed on the DRBIII®.

3.4 DIAGNOSTIC TROUBLE CODES

The controller antilock brake may report any of the following diagnostic trouble codes:

CLUSTER LAMP FAILURE

VALVE POWER FEED FAILURE

BUS SYSTEM COMMUNICATION FAILURE

CAB INTERNAL FAILURE

INCORRECT TONE WHEEL FAILURE

LEFT FRONT SENSOR CIRCUIT FAILURE

LEFT FRONT WHEEL SPEED SIGNAL FAILURE

LEFT REAR SENSOR CIRCUIT FAILURE

LEFT REAR WHEEL SPEED SIGNAL FAILURE

PUMP CIRCUIT FAILURE

RIGHT FRONT SENSOR CIRCUIT FAILURE

RIGHT FRONT WHEEL SPEED SIGNAL FAILURE

RIGHT REAR SENSOR CIRCUIT FAILURE

RIGHT REAR WHEEL SPEED SIGNAL FAILURE

SYSTEM OVERVOLTAGE

SYSTEM UNDERVOLTAGE

3.5 DRBIII® ERROR MESSAGES AND BLANK SCREEN

Under normal operation, the DRBIII® will display one of only two error messages:

– User-Requested WARM Boot or User-Requested COLD Boot

This is a sample of such an error message display:

```
ver: 2.14
date: 26 Jul93
file: key_itf.cc
date: Jul 26 1993
line: 548
err: 0x1
User-Requested COLD Boot

Press MORE to switch between this display
   and the application screen.
Press F4 when done noting information.
```

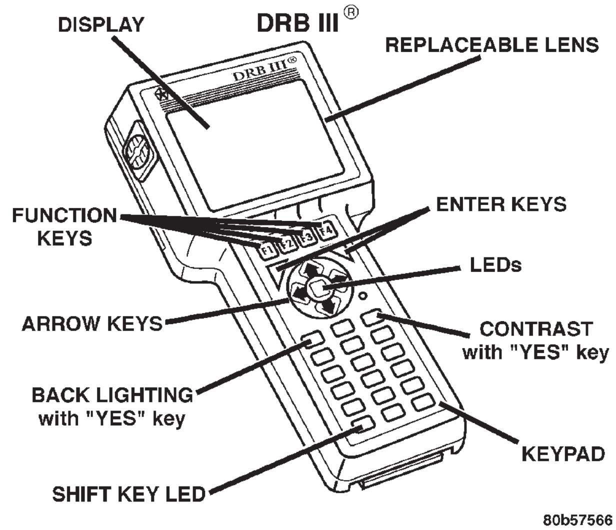
3.5.1 DRBIII® DOES NOT POWER UP

If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link connector cavity 16). A minimum of 11 volts is required to adequately power the DRBIII®.

If all connections are proper between the DRBIII® and the vehicle or other devices, and the vehicle battery is fully charged, and inoperative DRBIII® may be the result of faulty cable or vehicle wiring.

3.5.2 DISPLAY IS NOT VISABLE

Low temperatures will affect the visibility of the display. Adjust the contrast to compensate for this condition.



4.0 DISCLAIMERS, SAFETY, WARNINGS

4.1 DISCLAIMERS

All information, illustrations, and specifications contained in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

4.2 SAFETY

4.2.1 TECHNICIAN SAFETY INFORMATION

WARNING: ENGINES PRODUCE CARBON MONOXIDE THAT IS ODORLESS, CAUSES SLOWER REACTION TIME, AND CAN LEAD TO SERIOUS INJURY. WHEN THE ENGINE IS OPERATING, KEEP SERVICE AREAS WELL VENTILATED OR ATTACH THE VEHICLE EXHAUST SYSTEM TO THE SHOP EXHAUST REMOVAL SYSTEM.

Set the parking brake and block the wheel before testing or repairing the vehicle. It is especially important to block the wheels on front-wheel drive vehicles; the parking brake does not hold the drive wheels.

When servicing a vehicle, always wear eye protection, and remove any metal jewelry such as rings, watchbands or bracelets that might make an inadvertent electrical contact.

When diagnosing a chassis system problem, it is important to follow approved procedures where applicable. These procedures can be found in the service manual. Following these procedures is very important to safety of individuals performing diagnostic tests.

4.2.2 VEHICLE PREPARATION FOR TESTING

Make sure the vehicle being tested has a fully charged battery. If is does not, false diagnostic codes or error messages may occur.

4.2.3 SERVICING SUB-ASSEMBLIES

Some components of the chassis system are intended to be serviced as an assembly only. Attempting to remove or repair certain system subcomponents may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

4.2.4 DRBIII® SAFETY INFORMATION

WARNING: Exceeding the limits of the DRBIII® multimeter is dangerous. It can expose you to serious or possibly fatal injury. Carefully read and understand the cautions and the specification limits.

- Follow the vehicle manufacturer's service specifications at all times.
- Do not use the DRBIII® if it has been damaged.
- Do not use the test leads if the insulation is damaged or if metal is exposed.
- To avoid electrical shock, do not touch the test leads, tips, or the circuit being tested.
- Choose the proper range and functions for the measurement. Do not try voltage or current measurement that may exceed the rated capacity.
- Do not exceed the limits shown in the table below:

FUNCTION	INPUT LIMIT
Volts	0 - 500 peak volts AC 0 - 500 volts DC
Ohms (resistance)*	0 -1.12 megohms
Frequency Measured Frequency Generated	0 - 10 kHz
Temperature	-58 - 1100°F -50 - 600°C

* Ohms cannot be measured if voltage is present. Ohms can be measured only in a non-powered circuit.

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeding 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- When measuring current, connect the meter in series with the load.
- Disconnect the live test lead before disconnecting the common test lead.
- When using the meter function, keep the DRBIII® away from spark plug or coil wires to avoid measuring error from outside interference.

4.3 WARNINGS

4.3.1 VEHICLE DAMAGE WARNINGS

Before disconnecting any control module, make sure the ignition is "off". Failure to do so could damage the module.

When testing voltage or continuity at any control module, use the terminal side (not the wire end) of the connector. Do not probe a wire through the insulation, this will damage it and eventually cause it to fail because of corrosion.

Be careful when performing electrical tests so as to prevent accidental shorting of terminals. Such mistakes can damage fuses or components. Also, a second code could be set, making diagnosis of the original problem more difficult.

4.3.2 ROAD TESTING A COMPLAINT VEHICLE

Some complaints will require a test drive as part of the repair verification procedure. The purpose of the test drive is to try to duplicate the diagnostic code or symptom condition.

WARNING: BEFORE ROAD TESTING A VEHICLE, BE SURE THAT ALL COMPONENTS ARE REASSEMBLED. DURING THE TEST DRIVE, DO NOT TRY TO READ THE DRBIII® SCREEN WHILE IN MOTION. DO NOT HANG THE DRBIII® FROM THE REAR VIEW MIRROR OR OPERATE IT YOURSELF. HAVE AN ASSISTANT AVAILABLE TO OPERATE THE DRBIII®.

4.4 DIAGNOSIS

1. A diagnostic test procedure must begin with a thorough visual inspection of the ABS system for damaged components or disconnected connectors. The brake lamps must be operational, and if they are not, repair them prior to continuing.

2. Connect the DRBIII® to the data link connector, which is located under the dash to the left of the steering column. If the DRBIII® does not power up, check the power and ground supplies to the connector.
3. Turn the ignition on. Select "Antilock Brakes". If the DRBIII® displays "No Response" condition you must diagnose that first.
4. Read and record all ABS Diagnostic Trouble Codes (DTC's). If the "CAB Power Feed Circuit" diagnostic trouble code is present, it must be repaired prior to addressing any other DTC's. If any additional DTC's are present, proceed to the appropriate test by locating the matching test in the Table of Contents and begin to diagnose the symptom.
5. If there are no diagnostic trouble codes present, identify the customer complaint, select "Inputs/Outputs" and read the brake switch input as you press and release the brake pedal. If the display does not match the state of the pedal, perform the proper test by locating the matching test in the Table of Contents and begin to diagnose the symptom. If a problem exists with the ABS warning indicator or the red Brake warning indicator exists, perform the proper tests by locating the matching test in the Table of Contents and begin to diagnose the symptom.
6. If no other problems are found, it will be necessary to road test the vehicle. Perform several antilock stops from above 50 Km/h (30 mph) and then repeat step 4. If any diagnostic trouble codes are present, proceed to the appropriate test.
7. The following conditions should be considered "NORMAL" operation, and no repairs should be attempted to correct them.
   – Brake pedal feedback during an ABS stop (clicking, vibrating)
   – Clicking, groaning or buzzing at 25 Km/h (15 mph) or 40 Km/h (24 mph) (drive off self test)
   – Groaning noise during an ABS stop
   – Slight brake pedal drop and pop noise when ignition is initially turned on
   – Brake pedal ratcheting down at the end of an ABS stop
8. If the complaint is ABS "cycling" at the end of a stop at low speeds, it may be caused by a marginal wheel speed sensor signal. The sensor air gap, tone wheel condition, and/or brakes hanging up are possible causes of this condition.
9. After a road test in which no problems were found, refer to any Technical Service Bulletins that may apply.

5.0 REQUIRED TOOLS AND EQUIPMENT

DRBIII® (diagnostic read-out box)
jumper wires
ohmmeter
voltmeter
test light

6.0 GLOSSARY OF TERMS

ABS	antilock brake system
AC	alternating current BCM-Body Control Module
CAB	controller antilock brake
CCD	Chrysler Collision Detection
DC	direct current
DLC	data link connector
DRBIII®	diagnostic read-out box
DTC	diagnostic trouble code
EDW	electrical distribution wiring
EMI	electro magnetic interference
HCU	hydraulic control unit
ICU	integrated control unit
JBLK	junction block
PDC	power distribution center
P/M	pump motor
RFI	radio frequency interference
WSS	wheel speed sensor

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

Symptom:
BUS SYSTEM COMMUNICATION FAILURE

When Monitored and Set Condition:

BUS SYSTEM COMMUNICATION FAILURE

When Monitored: Ignition ON, every 7 ms.

Set Condition: When the CAB does not receive a message from the instrument cluster for 10 seconds.

POSSIBLE CAUSES
CHECK COMMUNICATION TO MIC
INTERMITTENT DTC
CAB-- INTERNAL FAULT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, attempt to communicate with the MIC Was the DRB able to I/D or communicate with the MIC? Yes → Go To 2 No → Refer to the Communication category and perform the symptom Bus +/- Signals Open from the Controller Anti-Lock Brake. Perform ABS VERIFICATION TEST - VER 1.	All
2	With the DRB, erase DTC's. Turn the ignition on and wait approximately 1 minute. With the DRB, read DTC's. Did this DTC reappear? Yes → Replace the Controller Anti-Lock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
CAB INTERNAL FAILURE

When Monitored and Set Condition:

CAB INTERNAL FAILURE

When Monitored: Ignition on. The CAB monitors its internal microprocessors for correct operation.

Set Condition: If the CAB detects an internal fault, the DTC is set.

POSSIBLE CAUSES
CAB - INTERNAL CONCERN

TEST	ACTION	APPLICABILITY
1	The only possible cause is a CAB internal concern. If there are no possible causes remaining, view repair. View repair. Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:
CLUSTER LAMP FAILURE

When Monitored and Set Condition:

CLUSTER LAMP FAILURE

When Monitored: Key ON. After Key-ON bulb check.

Set Condition: When the instrument cluster informs the CAB that the cluster cannot turn on the ABS Lamp.

POSSIBLE CAUSES
CLUSTER DTC PRESENT
CLUSTER INTERNAL FAULT
CAB -- NO ABS INDICATOR MESSAGE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTCs. Are there any Instrument Cluster DTCs present? Yes → Refer to the INSTRUMENT CLUSTER category for the related symptom(s). Perform ABS VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition off. Observe the instrument cluster indicators. Turn the ignition on. Did the ABS Indicator illuminate for several seconds and then go out? Yes → Go To 3 No → Go To 3	All
3	**NOTE: The DRBIII® communication with the CAB must be operational for the result of this test to be valid.** Turn the ignition off. Remove Fuse 21 (ABS valve power) from the IPM. Perform the Key-on Bulb Check. Does the ABS Indicator remain on after the bulb check? Yes → Replace the Instrument Cluster in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:
INCORRECT TONE WHEEL FAILURE

When Monitored and Set Condition:

INCORRECT TONE WHEEL FAILURE

When Monitored: Key ON. Vehicle speed above 40 km/h (25mph) for 2 minutes.

Set Condition: When the CAB detects an unexpected wheel speed condition caused by a tire size that does not meet vehicle specification.

POSSIBLE CAUSES
CAB - SETTING FALSE CODE
TIRES NOT TO SPECIFICATION

TEST	ACTION	APPLICABILITY
1	Inspect the tires. Do the tires meet vehicle specification? Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Replace the tires not meeting vehicle specification. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom List:

LEFT FRONT SENSOR CIRCUIT FAILURE
LEFT REAR SENSOR CIRCUIT FAILURE
RIGHT FRONT SENSOR CIRCUIT FAILURE
RIGHT REAR SENSOR CIRCUIT FAILURE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be LEFT FRONT SENSOR CIRCUIT FAILURE.

When Monitored and Set Condition:

LEFT FRONT SENSOR CIRCUIT FAILURE

When Monitored: Ignition on. The CAB monitors the wheel speed circuit every 7 milliseconds (ms).

Set Condition: If the CAB detects an open or shorted wheel speed sensor circuit, the Diagnostic Trouble Code (DTC) will set.

LEFT REAR SENSOR CIRCUIT FAILURE

When Monitored: Ignition on. The CAB monitors the wheel speed circuit every 7 milliseconds (ms).

Set Condition: If the CAB detects an open or shorted wheel speed sensor circuit, the Diagnostic Trouble Code (DTC) will set.

RIGHT FRONT SENSOR CIRCUIT FAILURE

When Monitored: Ignition on. The CAB monitors the wheel speed circuit every 7 milliseconds (ms).

Set Condition: If the CAB detects an open or shorted wheel speed sensor circuit, the Diagnostic Trouble Code (DTC) will set.

RIGHT REAR SENSOR CIRCUIT FAILURE

When Monitored: Ignition on. The CAB monitors the wheel speed circuit every 7 milliseconds (ms).

Set Condition: If the CAB detects an open or shorted wheel speed sensor circuit, the Diagnostic Trouble Code (DTC) will set.

POSSIBLE CAUSES
SENSOR OR CONNECTOR DAMAGE
WHEEL SPEED SENSOR FAULT
SENSOR CIRCUITS SHORTED OR OPEN

LEFT FRONT SENSOR CIRCUIT FAILURE — Continued

POSSIBLE CAUSES
CAB - INTERNAL FAULT
INTERMITTENT CIRCUIT DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, record and erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTC's. Does the DRBIII® display a Wheel Speed Sensor Circuit Failure DTC? Yes → Go To 2 No → Go To 5	All
2	Turn the ignition off. Inspect the affected Wheel Speed Sensor and Connector. Is the Sensor or Connector Damaged? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off. Disconnect the affected Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Using a 12-volt test light connected to ground, check the Sensor 12 volt Supply circuit. Measure the resistance between ground and the Sensor Signal circuit. Was the test light bright and the resistance between 100 and 300 ohms? Yes → Replace the Wheel Speed Sensor in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the affected Wheel Speed Sensor connector. **Note: Check connector - Clean/repair as necessary.** Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Check the Wheel Speed Sensor 12 volt Supply and Signal circuits for a short to battery, ground, to each other and for an open. For the purposes of this test, a short to ground must be below 15k ohms. Was any circuit short or open found? Yes → Repair the Wheel Speed Sensor circuit short or open. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

LEFT FRONT SENSOR CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom List:

LEFT FRONT WHEEL SPEED SIGNAL FAILURE
LEFT REAR WHEEL SPEED SIGNAL FAILURE
RIGHT FRONT WHEEL SPEED SIGNAL FAILURE
RIGHT REAR WHEEL SPEED SIGNAL FAILURE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be LEFT FRONT WHEEL SPEED SIGNAL FAILURE.

When Monitored and Set Condition:

LEFT FRONT WHEEL SPEED SIGNAL FAILURE

When Monitored: Wheel speed comparison is checked at drive off or every 7 milliseconds (ms). Sensor signal continuity is checked every 7 milliseconds. Wheel speed phase length supervision is checked every 7 milliseconds.

Set Condition: If, during an ABS stop, the CAB commands any valve solenoid on for an extended length of time, and does not see a corresponding wheel speed change, the Diagnostic Trouble Code (DTC) is set. The DTC can also set if the signal is missing or erratic.

LEFT REAR WHEEL SPEED SIGNAL FAILURE

When Monitored: Wheel speed comparison is checked at drive off or every 7 milliseconds (ms). Wheel speed circuit continuity is checked every 7 milliseconds. Wheel speed phase length supervision is checked every 7 milliseconds.

Set Condition: If, during an ABS stop, the CAB commands any valve solenoid on for an extended length of time, and does not see a corresponding wheel speed change, the Diagnostic Trouble Code (DTC) is set. The DTC can also set if the signal is missing or erratic.

RIGHT FRONT WHEEL SPEED SIGNAL FAILURE

When Monitored: Wheel speed comparison is checked at drive off or every 7 milliseconds (ms). Wheel speed continuity is checked every 7 milliseconds. Wheel speed phase length supervision is checked every 7 milliseconds.

Set Condition: If, during an ABS stop, the CAB commands any valve solenoid on for an extended length of time, and does not see a corresponding wheel speed change, the Diagnostic Trouble Code (DTC) is set. The DTC can also set if the signal is missing or erratic.

LEFT FRONT WHEEL SPEED SIGNAL FAILURE — Continued

RIGHT REAR WHEEL SPEED SIGNAL FAILURE

When Monitored: Wheel speed comparison is checked at drive off or every 7 milliseconds (ms). Wheel speed circuit continuity is checked every 7 milliseconds. Wheel speed phase length supervision is checked every 7 milliseconds.

Set Condition: If, during an ABS stop, the CAB commands any valve solenoid on for an extended length of time, and does not see a corresponding wheel speed change, the Diagnostic Trouble Code (DTC) is set. The DTC can also set if the signal is missing or erratic.

POSSIBLE CAUSES
SENSOR OR TONE WHEEL CONCERN
SENSOR OUTPUT INTERMITTENT OR OPEN
CAB SETTING FALSE DTC
WHEEL SPEED SENSOR INOPERATIVE
INTERMITTENT SIGNAL DTC

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase DTCs. Turn the ignition off. Start the engine. With an assistant, drive the vehicle as straight as possible and maintain a steady speed above 24 km/h (15 mph). With the DRBIII®, monitor all wheel speed sensors. Note whether the speed of the affected wheel is zero. Note whether the speed of the affected wheel differs from others by 5 km/h (3 mph) or more. Is the affected wheel speed zero or differing from others? Yes → Go To 2 No → Go To 3	All
2	Inspect the Wheel Speed Sensor, Connector and Tone Wheel at the affected wheel. **NOTE: Inspect components for damage, correct installation and sensor/tone wheel air gap.** Are there any visible Sensor, Connector or Tone Wheel concerns? Yes → Correct the sensor, connector or tone wheel concern as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Wheel Speed Sensor in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

LEFT FRONT WHEEL SPEED SIGNAL FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, read DTCs. Did the DTC reoccur? Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Visually inspect wheel speed sensor. Visually inspect tone wheel. Visually inspect wiring harness. Visually inspect brakes for locking up due to lining contamination or overheating. Inspect all Components for defects which may cause a Signal DTC to set. Is any Component Damaged? Yes → Repair as necessary. The vehicle must be driven at 25 km/h (15 mph) to extinguish the ABS indicator. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
PUMP CIRCUIT FAILURE

When Monitored and Set Condition:

PUMP CIRCUIT FAILURE

When Monitored: Ignition on. The CAB commands the pump on at 20 km/h (12 mph) to check its operation, if the brake switch is not applied. If the brake is applied, the test will run at 40 km/h (25 mph). The CAB monitors pump voltage every 7 milliseconds.

Set Condition: The DTC is stored when the CAB detects: 1) Improper voltage decay after the pump was turned off. 2) Pump not energized by the CAB, but voltage is present for 3.5 seconds. 3) Pump is turned on by the CAB, but without sufficient voltage to operate it.

POSSIBLE CAUSES
CAB - PUMP MOTOR RUNNING CONTINUOUSLY
PUMP HARNESS DISCONNECTED
ABS PUMP MOTOR INTERMITTENT DTC
GROUND CIRCUIT HIGH RESISTANCE
FUSED B(+) CIRCUIT OPEN
GROUND CIRCUIT OPEN
CAB - INTERNAL FAULT
CAB - SETTING FALSE CODE

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Turn the ignition on. Monitor the pump motor for continuous operation. Is the pump motor running continuously? Yes → Replace the Controller Antilock. Perform ABS VERIFICATION TEST - VER 1. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, read DTC's. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. With the DRBIII®, actuate the ABS pump motor. Did the Pump Motor operate when actuated? Yes → Go To 3 No → Go To 4	All

PUMP CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Controller Antilockdance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All
4	Check the short Wiring Harness between the ABS Pump and the CAB. Check for disconnect and damage. Is the harness disconnected or damaged? Yes → Reconnect or repair the Pump Harness as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition on. With the DRBIII®, actuate the pump motor. **NOTE: Pump motor may not operate, but voltage will be applied.** **NOTE: The following test will be done by back probing the CAB ground circuits at the CAB connector.** Measure the voltage drop across the ABS ground circuit connection, with pump motor actuation enabled. Is the voltage below 0.1 volt? Yes → Go To 6 No → Repair the Ground circuit for high resistance. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Turn the ignition on. Using a 12-volt test light connected to ground, check the Pump Motor Fused B+ circuit. Does the test light illuminate brightly? Yes → Go To 7 No → Repair the Fused B(+) circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Disconnect CAB Connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the CAB ground circuits. Is the resistance below 1.0 ohm? Yes → Go To 8 No → Repair the ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All

PUMP CIRCUIT FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	If there are no possible causes remaining, view repair. Repair Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

Symptom:
SYSTEM OVERVOLTAGE

When Monitored and Set Condition:

SYSTEM OVERVOLTAGE

When Monitored: Ignition on. The CAB monitors the Fused B(+) circuit at all times for proper system voltage.

Set Condition: If the voltage is above 16.5 volts for greater than 420 milliseconds (ms), the Diagnostic Trouble Code (DTC) is set.

POSSIBLE CAUSES
CHARGING SYSTEM FAULT
FUSED IGNITION SWITCH OUTPUT HIGH
GROUND CIRCUIT OPEN
CAB - INTERNAL FAULT
INTERMITTENT DTC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. Start the engine. With the DRBIII®, read DTC's. Does the DRBIII® display System Overvoltage DTC? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Turn the ignition on. With the DRBIII®, read DTCs. Does the DRBIII® display any charging system DTCs? Yes → Refer to the Charging information for the related symptom(s). Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All

SYSTEM OVERVOLTAGE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Start the engine. Raise engine speed above 1,800 RPM. Measure the battery voltage. Is the voltage above 16.5 volts ? Yes → Refer to appropriate service information for charging system testing and repair. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the CAB connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the ground circuits. Is the resistance below 1.0 ohm? Yes → Go To 5 No → Repair the Ground circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
5	If there are no potential causes remaining, view repair. Repair Replace the Controller Antilock Brake. Perform ABS VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
SYSTEM UNDERVOLTAGE

When Monitored and Set Condition:

SYSTEM UNDERVOLTAGE

When Monitored: Ignition on. The CAB monitors the Fused Ignition Switch Output circuit voltage above 10 km/h (6 mph) every 7 milliseconds for proper system voltage.

Set Condition: If the voltage is below 9.5 volts, the Diagnostic Trouble Code (DTC) is set.

POSSIBLE CAUSES
BATTERY VOLTAGE LOW
INTERMITTENT DTC
FUSED IGNITION SWITCH OUTPUT CIRCUIT HIGH RESISTANCE
CAB - INTERNAL FAULT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. Start the engine. Drive the vehicle above 16 km/h (10 mph) for at least 20 seconds. Stop the vehicle With the DRBIII®, read DTC's. Does the DRBIII® display System Undervoltage DTC? Yes → Go To 2 No → Go To 5	All
2	Engine Running. Measure the battery voltage. Is the battery voltage below 10 volts? Yes → Refer to appropriate service information for charging system testing and repair. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All
3	Disconnect the CAB harness connector. Turn the ignition on. Measure the voltage of the Fused Ignition Switch circuit. Is the voltage above 10 volts? Yes → Go To 4 No → Repair the Fused Ignition Switch Output Circuit for high resistance Perform ABS VERIFICATION TEST - VER 1.	All

SYSTEM UNDERVOLTAGE — Continued

TEST	ACTION	APPLICABILITY
4	If there are no potential causes remaining, view repair. Repair Replace the Controller Antilock Brake. Perform ABS VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
VALVE POWER FEED FAILURE

When Monitored and Set Condition:

VALVE POWER FEED FAILURE

When Monitored: Ignition ON for at least 3.5 seconds. ABS Power Relay closed. Valve command for a particular solenoid not present.

Set Condition: Low feedback voltage from the low side of all the solenoids for over 20 consecutive controller checks spaced 5 ms apart.

POSSIBLE CAUSES
INTERMITTENT DTC
BLOWN FUSE - FUSED B(+) CIRCUIT
NO B+ SUPPLY TO FUSE
FUSED B(+) CIRCUIT OPEN
B(+) CIRCUIT SHORTED TO GROUND
CAB - FUSED B(+) CIRCUIT OPEN
CAB - FUSED B(+) CIRCUIT SHORTED TO GROUND

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, erase DTC's. Turn the ignition off. Turn the ignition on. Drive the vehicle above 25 km/h (15 mph) for at least 10 seconds. Stop the vehicle. With the DRBIII®, read DTC's. Does the DRBIII® display Valve Power Feed Circuit DTC present right now? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Remove and Inspect the ABS Fuse 22 in the PDC. Is the Fuse blown? Yes → Go To 3 No → Go To 6	All

VALVE POWER FEED FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Remove the ABS Fuse 22 from the PDC. Disconnect the CAB harness connector. **Note: Check connector - Clean/repair as necessary.** Using a test light connected to 12 volts, probe the Fused B(+) Circuit at the PDC fuse terminal. Does the test light illuminate brightly? Yes → Repair the Fused B(+) Circuit short to ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off. Remove the ABS Valves Fuse 22 from the PDC. The CAB must be connected for the results of this test to be valid. Using a test light connected to 12 volts, probe the Fused B(+) Circuit at the PDC fuse terminal. Does the test light illuminate brightly? Yes → Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off. If there are no potential causes remaining, view repair. Continue Replace the Fuse. Perform ABS VERIFICATION TEST - VER 1.	All
6	Remove the ABS Fuse 22 from the PDC. Turn the ignition on. Measure the voltage of the Fused B+ supply to Fuse 22 in the PDC. Is the voltage above 10 volts? Yes → Go To 7 No → Repair the B+ Supply circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
7	Turn the ignition off. Remove the ABS Fuse 22 from the PDC. Disconnect the CAB harness connector. **Note: Check connector - Clean/repair as necessary.** Measure the resistance of the Fused B(+) circuit between PDC Fuse terminal 22 and the CAB connector. Is the resistance below 5 ohms? Yes → Go To 8 No → Repair the Fuse B+ circuit high resistance or open. Perform ABS VERIFICATION TEST - VER 1.	All
8	If there are no possible causes remaining, view repair. Repair Replace the Controller Antilock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

VALVE POWER FEED FAILURE — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals. Refer to any Hotline letters or Technical Service Bulletins that may apply. Were any problems found? Yes → Repair as necessary. Perform ABS VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
*BRAKE LAMP SWITCH

POSSIBLE CAUSES
CHECK BRAKE LAMP SWITCH OUTPUT
BRAKE LAMP SWITCH B+ OPEN
BRAKE LAMP SWITCH OUTPUT CIRCUIT SHORT OR OPEN
BRAKE LAMP SWITCH OUTPUT CIRCUIT SHORT TO GROUND OR BATTERY
BRAKE LAMP SWITCH OPEN
CAB -- INTERNAL OPEN

TEST	ACTION	APPLICABILITY
1	With the DRBIII® in Inputs/Outputs, read the Brake Lamp Switch state. Press and release the brake pedal. Does the DRBIII® display CLOSED and OPEN? Yes → The Brake Lamp Switch is OK. Perform ABS VERIFICATION TEST - VER 1. No → Go To 2	All
2	Disconnect the Brake Lamp Switch harness connector. Disconnect the CAB harness connector. Using a 12-volt test light connected to ground, check the Brake Lamp Switch Output circuit. Using a 12-volt test light connected to battery, check the Brake Lamp Switch Output circuit. Does the test light illuminate brightly for either check? Yes → Repair the Brake Lamp Switch Output circuit for a short to battery or ground. Perform ABS VERIFICATION TEST - VER 1. No → Go To 3	All
3	Disconnect the Brake Lamp Switch harness connector. Using a 12-volt test light connected to ground, check the Brake Lamp Switch Fused B+ circuit. Does the test light illuminate brightly ? Yes → Go To 4 No → Repair the Brake Lamp Switch Fused B+ circuit for an open. Perform ABS VERIFICATION TEST - VER 1.	All
4	Disconnect the Brake Lamp Switch harness connector. Connect a jumper wire between the Brake Lamp Switch B+ and Output circuits. With the DRBIII® in Inputs/Outputs, read the Brake Lamp Switch state. Does the DRBIII® display CLOSED? Yes → Replace the Brake Lamp Switch in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1. No → Go To 5	All

*BRAKE LAMP SWITCH — Continued

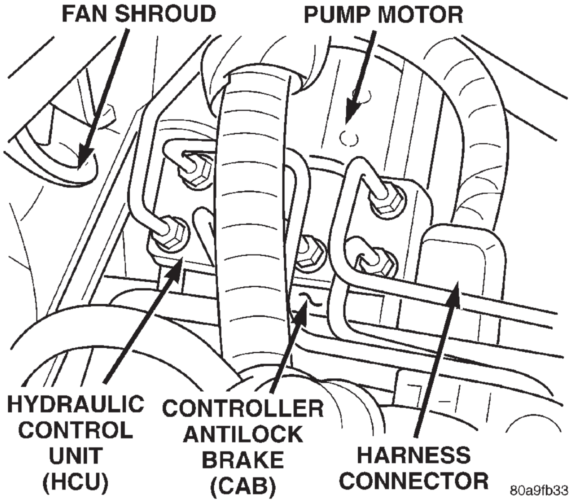
TEST	ACTION	APPLICABILITY
5	Disconnect the CAB harness connector. Disconnect the Brake Lamp Switch harness connector. Check the Brake Lamp Switch Output circuit for a short to voltage, short to ground and for an open. Is the Brake Lamp Switch Output circuit shorted or open? Yes → Repair the Brake Lamp Switch Output circuit for a short to voltage or an open. Perform ABS VERIFICATION TEST - VER 1. No → Replace the Controller Anti-Lock Brake in accordance with the Service Information. Perform ABS VERIFICATION TEST - VER 1.	All

Verification Tests

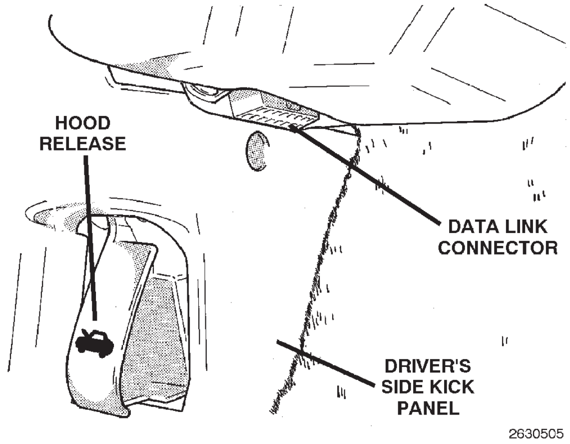
ABS VERIFICATION TEST - VER 1	APPLICABILITY
1. Turn the ignition off. 2. Connect all previously disconnected components and connectors. 3. Ensure all accessories are turned off and the battery is fully charged. 4. Ensure that the Ignition is on, and with the DRBIII®, erase all Diagnostic Trouble Codes from ALL modules. Start the engine and allow it to run for 2 minutes and fully operate the system that was malfunctioning. 5. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII, read DTC's from ALL modules. 6. If any Diagnostic Trouble Codes are present, return to Symptom list and troubleshoot new or recurring symptom. 7. If there are no DTC's present after turning ignition on, road test the vehicle for at least 5 minutes. Perform several antilock braking stops. **8. Caution: Ensure braking capability is available before road testing.** 9. Again, with the DRBIII® read DTC's. If any DTC's are present, return to Symptom list. 10. If there are no Diagnostic Trouble Codes (DTC's) present, and the customer's concern can no longer be duplicated, the repair is complete. Are any DTC's present or is the original concern still present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

8.0 COMPONENT LOCATIONS

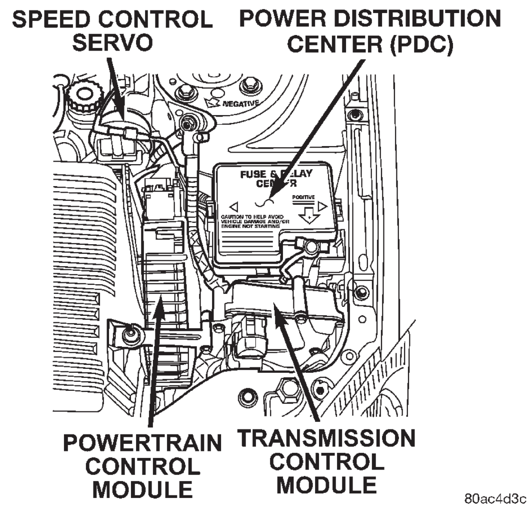
8.1 CONTROLLER ANTILOCK BRAKE (CAB)



8.2 DATA LINK CONNECTOR



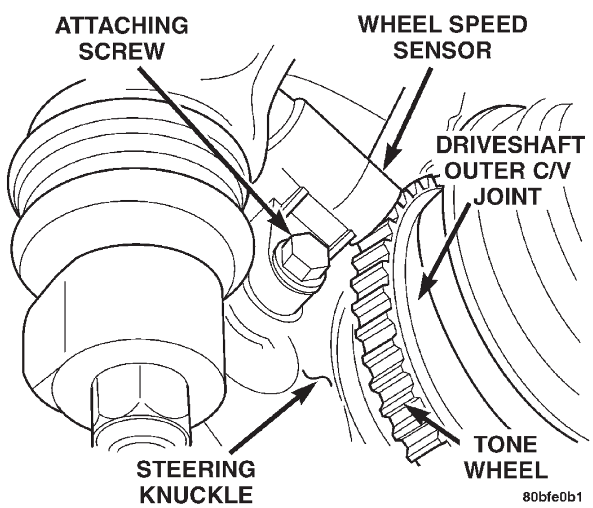
8.3 FUSES



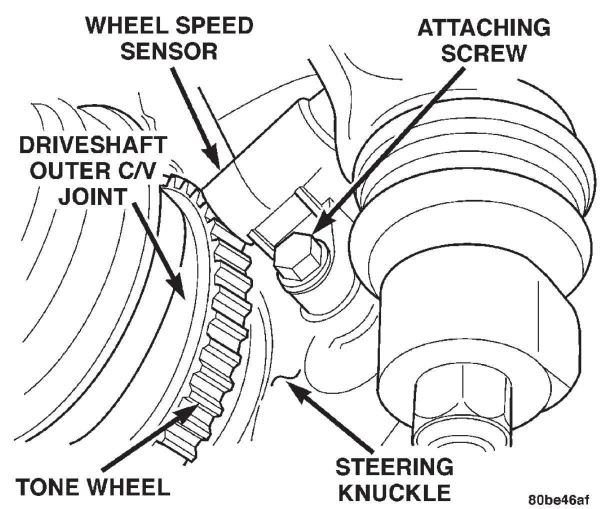
8.4 WHEEL SPEED SENSORS

8.4.1 FRONT

LEFT FRONT

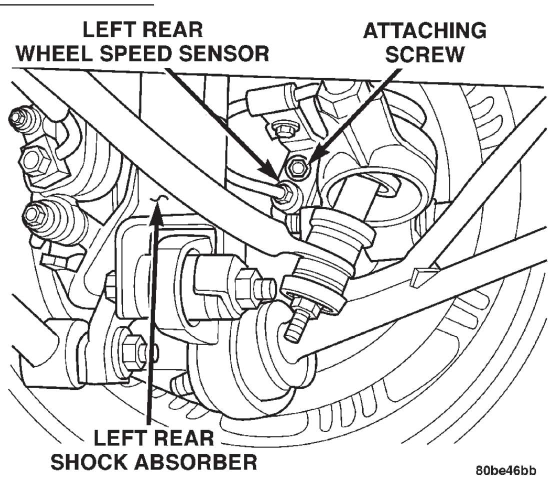


RIGHT FRONT

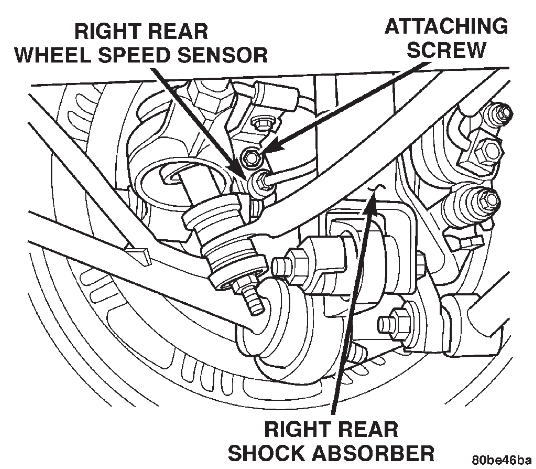


8.4.2 REAR

LEFT REAR



RIGHT REAR

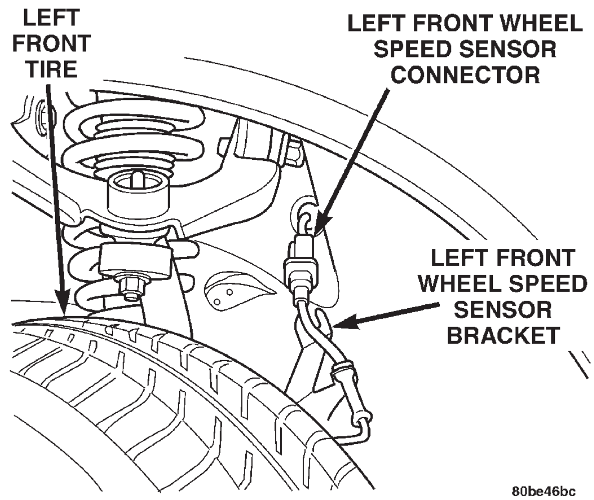


COMPONENT LOCATIONS

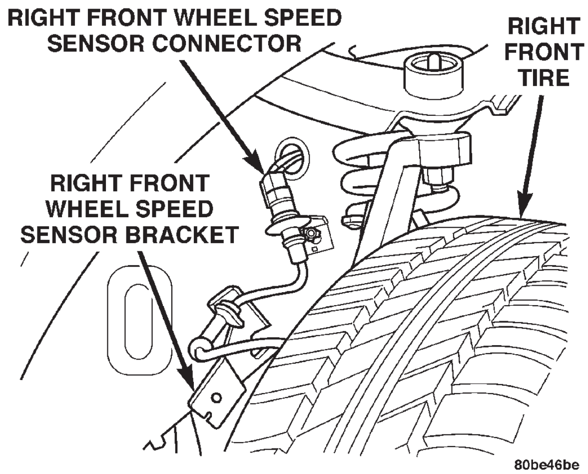
8.5 WHEEL SPEED SENSOR CONNECTORS

8.5.1 FRONT

LEFT FRONT

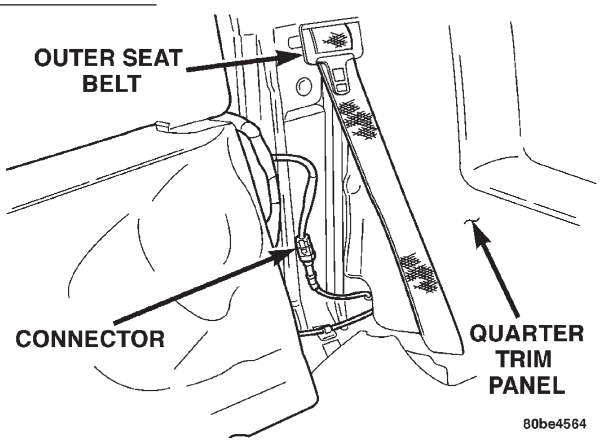


RIGHT FRONT

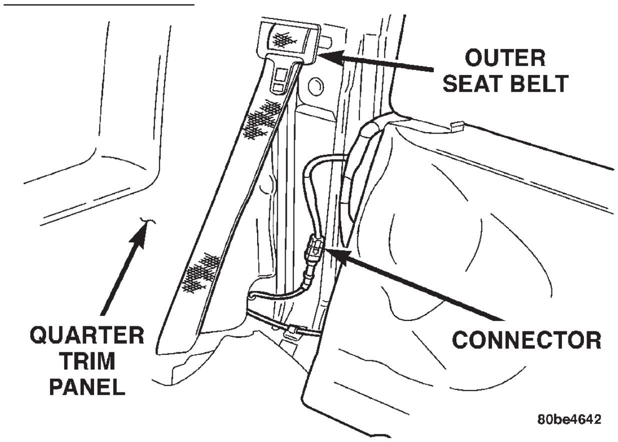


8.5.2 REAR

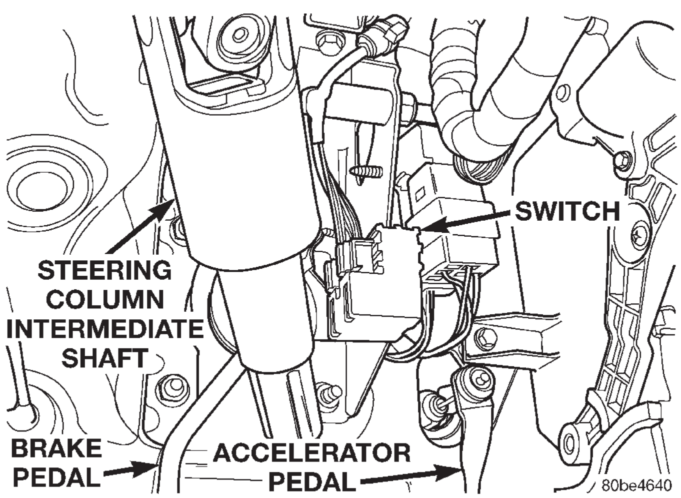
LEFT REAR



RIGHT REAR

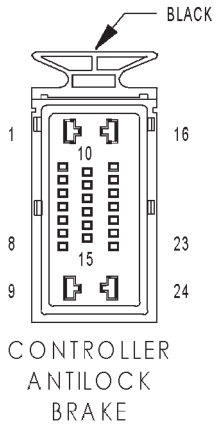


8.6 BRAKE SWITCH



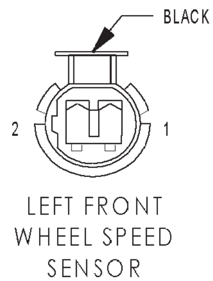
NOTES

9.0 CONNECTOR PINOUTS



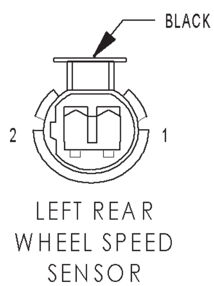
CONTROLLER ANTILOCK BRAKE - BLACK 24 WAY

CAV	CIRCUIT	FUNCTION
1	Z101 12BK	GROUND
2	B1 18YL/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL
3	B2 18YL	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
4	-	-
5	D25 18YL/VT	PCI BUS
6	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL
7	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
8	-	-
9	A20 12RD/DB	FUSED B(+)
10	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	Z102 12BK	GROUND
17	-	-
18	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
19	B3 18LG/DB	LEFT REAR WHEEL SPEED SENSOR SIGNAL
20	B4 18LG	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
21	-	-
22	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR SIGNAL
23	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
24	A10 12RD/DG	FUSED B(+)



LEFT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY

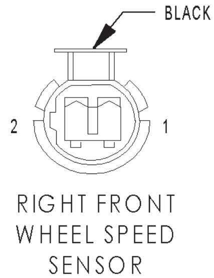
CAV	CIRCUIT	FUNCTION
1	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR SIGNAL



LEFT REAR WHEEL SPEED SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	B4 20LG	LEFT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B3 20LG/DB	LEFT REAR WHEEL SPEED SENSOR SIGNAL

CONNECTOR PINOUTS



RIGHT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY

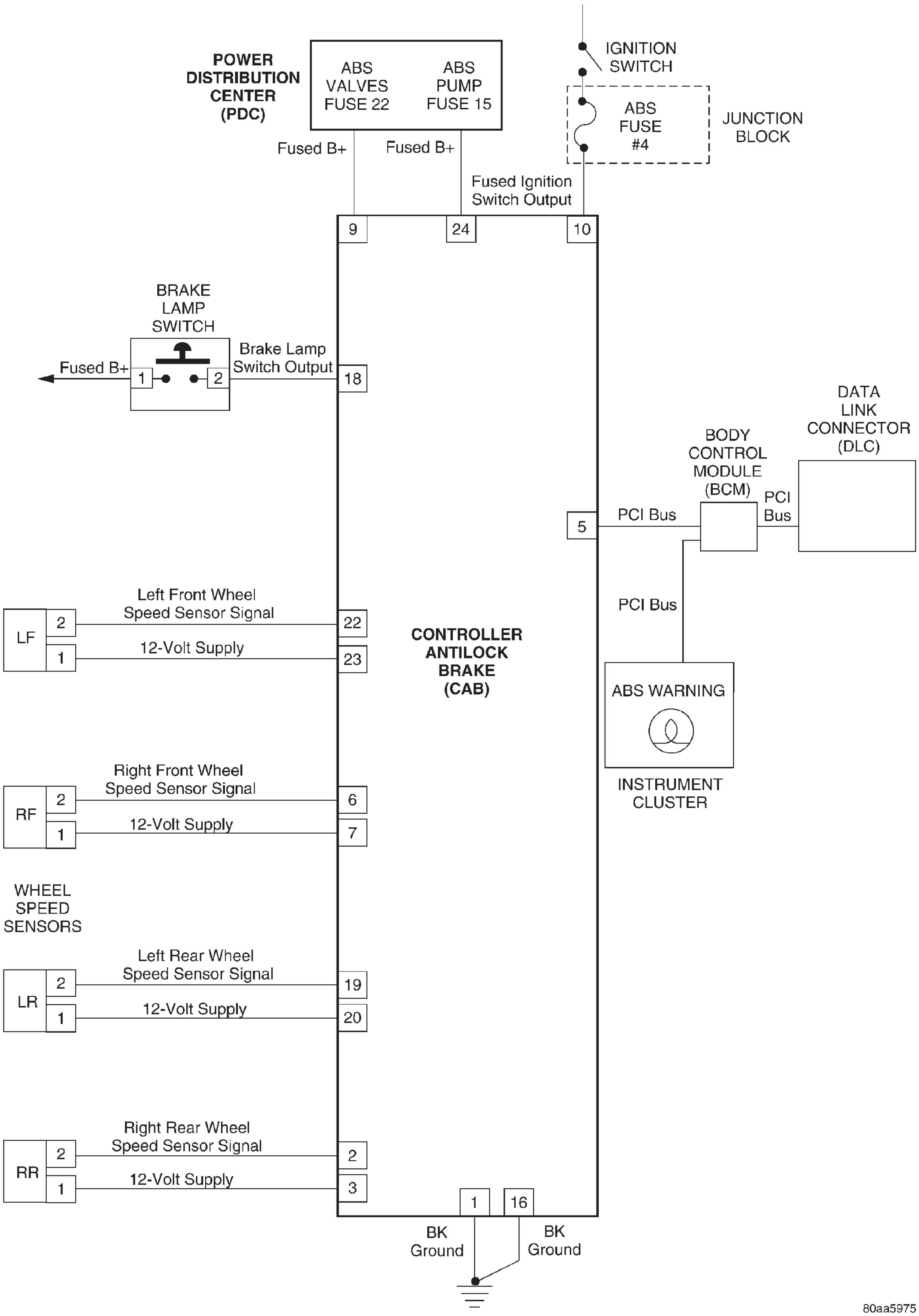
CAV	CIRCUIT	FUNCTION
1	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR SIGNAL

RIGHT REAR WHEEL SPEED SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	B2 20YL	RIGHT REAR WHEEL SPEED SENSOR 12 VOLT SUPPLY
2	B1 20YL/DB	RIGHT REAR WHEEL SPEED SENSOR SIGNAL

10.0 SCHEMATIC DIAGRAMS

JR TEVES MARK 20 ANTILOCK BRAKE SYSTEM



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NOTES

1.0 INTRODUCTION

The procedures contained in this manual include all the specifications, instructions, and graphics needed to diagnose 41TE/AE Electronic Automatic Transaxle (EATX) problems. The diagnostics in this manual are based on the failure condition or symptom being present at time of diagnosis.

When repairs are required, refer to the appropriate volume of the service manual for the proper removal and repair procedure.

Diagnostic procedures change every year. New diagnostic systems may be added and/or carryover systems may be enhanced. READ THIS MANUAL BEFORE TRYING TO DIAGNOSE A VEHICLE TROUBLE CODE. It is recommended that you review the entire manual to become familiar with all new and changed diagnostic procedures.

This book reflects many suggested changes from readers of past issues. After using this book, if you have any comments or recommendations, please fill out the form at the back of the book and mail it back to us.

1.1 SYSTEM COVERAGE

This diagnostic procedures manual covers all 2002 JR41/JR27 equipped with a 41TE/AE transaxle.

1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the 41TE/AE electronic transaxle is done in six basic steps:

- verification of complaint
- verification of any related symptoms
- symptom analysis
- problem isolation
- repair of isolated problem
- verification of proper operation

2.0 IDENTIFICATION OF SYSTEM

Vehicles equipped with a 4 speed transmission and have the Solenoid/Pressure switch, Transmission Range Sensor, Input speed sensor and Output speed sensor located on the same side of the transmission. Refer to the Service Information for transmission ID tag descriptions.

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 GENERAL DESCRIPTION

The 41TE/AE electronic transaxle is a conventional transaxle in that it uses hydraulically applied clutches to shift a planetary gear train. However, the electronic control system replaces many of the mechanical and hydraulic components used in conventional transmission valve bodies.

3.2 FUNCTIONAL OPERATION

The 41TE/AE electronic transaxle has a fully adaptive control system. The system performs it's functions based on continuous real-time sensor feedback information. The control system automatically adapts to changes in engine performance and friction element variations to provide consistent shift quality. The control system ensures that clutch operation during upshifting and downshifting is more responsive without increased harshness.

The Transmission Control Module (TCM) continuously checks for electrical problems, mechanical problems, and some hydraulic problems. When a problem is sensed, the TCM stores a diagnostic trouble code. Some of these codes cause the transaxle to go into Limp-in or default mode. While in this mode, electrical power is taken away from the transaxle via the TCM, de-energizing the transmission control relay, and taking power from the solenoid pack. When this happens, the only transaxle mechanical functions are:

Park and Neutral
Reverse
Second Gear

No upshifts or downshifts are possible. The position of the manual valve alone allows the three ranges that are available. Although vehicle performance is seriously degraded while in this mode, it allows the owner to drive the vehicle in for service.

Once the DRBIII® is in the EATX portion of the diagnostic program, it constantly monitors the TCM to see if the system is in Limp-in mode. If the transaxle is in Limp-in mode, the DRBIII® will flash the red LED.

3.2.1 AUTOSTICK FEATURE (IF APPLICABLE)

This feature allows the driver to manually shift the transaxle when the shift lever is pulled into the AutoStick position. When in AutoStick mode, the instrument cluster displays the current gear.

3.2.2 TRANSMISSION OPERATION AND SHIFT SCHEDULING AT VARIOUS OIL TEMPERATURES

The transmission covered in this manual has unique shift schedules depending on the temperature of the transmission oil. The shift schedule is modified to extend the life of the transmission while operating under extreme conditions.

The oil temperature is measured with a Temperature Sensor on the 41TE/AE transmission. The Temperature Sensor is an integral component of the Transmission Range Sensor (TRS). If the Temperature Sensor is faulty, the transmission will default to a calculated oil temperature DTC P1799(74). Oil temperature will then be calculated through a complex heat transfer equation using engine coolant temperature, battery/ambient temperature, and engine off time from the Body Control Module (BCM). These inputs are received from the PCI bus periodically and used to initialize the oil temperature at start up. Once the engine is started, the TCM updates the transmission oil temperature based on torque converter slip speed, vehicle speed, gear, and engine coolant temperature to determine an estimated oil temperature during vehicle operation. Vehicles using calculated oil temperature track oil temperature reasonably accurate during normal operation. However, if a transmission is overfilled, a transmission oil cooler becomes restricted, or if a customer drives aggressively in low gear, the calculated oil temperature will be inaccurate. Consequently the shift schedule selected may be inappropriate for the current conditions. The key highlights of the various shift schedules are as folows:

Extreme Cold: Oil temperature at start up below 26.6°C (-16°F)

> Goes to Cold schedule above -24°C (-12°F) oil temperature

> Park, Reverse, Neutral and 2nd gear only (prevents shifting which may fail a clutch with frequent shifts)

Cold: Oil temperature at start up above -24°C (-12°F) and below 2.2°C (36°F)

> Goes to Warm schedule above 4.4°C (40°F) oil temperature

> Delayed 2-3 upshift approximately 35-50 Km/h (22 - 31 MPH)

> Delayed 3-4 upshift 72-85 Km/h (45-53 MPH)

> Early 4-3 coastdown shift approximately 48 Km/h (30 MPH)

> Early 3-2 coastdown shift approximately 27 Km/h (17 MPH)

> High speed 4-2, 3-2, 2-1 kickdown shifts are prevented

> No EMCC

Warm: Oil temperature at start up above 2.2° (36°F) and below 27°C (36°F)

> Goes to a Hot schedule above 27°C (80°F) oil temperature

> Normal operation (upshifts, kickdowns, and coastdowns)

> No EMCC

Hot: Oil temperature at start up above 27°C (80°F)

> Goes to a Overheat schedule above 115°C (240°F) oil temperature

> Normal operation (upshifts, kickdowns, and coastdowns)

> Full EMCC, No PEMCC except to engage FEMCC, except at closed throttle at speeds above 113-133 Km/h (70-83 MPH)

Overheat: Oil temperature above 115°C (240°F) or engine coolant temperature above 118C° (244°F)

> Goes to a Hot below 110°C (230°F) oil temperature or a Super Overheat above 115°C (240°F) oil temperature

> Delayed 2-3 upshift 40-51 Km/h (25-32 MPH)

> Delayed 3-4 upshift 66-77 Km/h (41-48 MPH)

> 3rd gear FEMCC from 48-77 Km/h (30-48 MPH)

> 3rd gear PEMCC from 43-50 Km/h (27-31 MPH)

Super Overheat: Oil temperature above 127°C (260°F)

> Goes back to a Overheat below 115°C (240°F) oil temperature

> All a Overheat shift schedules features apply

> 2nd gear PEMCC above 35 Km/h (22 MPH)

> Above 35 Km/h (22 MPH) the torque converter will not unlock unless the throttle is closed (i.e. at 80 Km/h (50 MPH) a 4th FEMCC to 3rd FEMCC shift will be made during a part throttle kickdown or a 4th FEMCC to 2nd PEMCC shift will be made at wide open throttle) or if a wide open throttle 2nd PEMCC to 1 kickdown is made.

Causes for operation in the wrong temperature shift schedule: Extreme Cold or Cold shift schedule at start up:

> Temperature Sensor circuit.

> Overheat or Super Overheat shift schedule after extended operation:

> Operation in city traffic or stop and go traffic

> Engine idle speed too high

> Aggressive driving in low gear

> Trailer towing in OD gear position (use 3 position (or A/S 3rd) if frequent shifting occurs)

> Cooling system failure causing engine to operate over 110°C (230°F)
> Engine coolant temperature stays low too long - If engine coolant temperature drops below 65°C (150°F), the transmission will disengage EMCC. Extended operation with the EMCC disengaged will cause the transmission to overheat.
> Brake switch issue will cause the EMCC to disengage. Extended oepration with the EMCC disengaged will cause the transmission to overheat.
> Tranmission fluid overfilled
> Transmission cooler or cooler lines restricted
> Transmission Temperature Sensor circuit

3.3 DIAGNOSTIC TROUBLE CODES

Diagnostic trouble codes (DTC's) are codes stored by the Transmission Control Module (TCM) that help us diagnose Transmission problems. They are viewed using the DRBIII® scan tool.

Always begin by performing a visual inspection of the wiring, connectors, cooler lines and the transmission. Any obvious wiring problems or leaks should be repaired prior to performing any diagnostic test procedures. Some engine driveability problems can be misinterpreted as a transmission problem. Ensure that the engine is running properly and that no PCM DTC's are present that could cause a transmission complaint.

If there is a communication bus problem, trouble codes will not be accessible until the problem is fixed. The DRBIII® will display an appropriate message. The following is a possible list of causes for a bus problem:

– open or short to ground/battery in PCI bus circuit.
– internal failure of any module or component on the bus

Each diagnostic trouble code is diagnosed by following a specific testing sequence. The diagnostic test procedures contain step-by-step instructions for determining the cause of a transmission diagnostic trouble code. Possible sources of the code are checked and eliminated one by one. It is not necessary to perform all of the tests in this book to diagnose an individual code. These tests are based on the problem being present at the time that the test is run.

All testing should be done with a fully charged battery.

If the TCM records a DTC that will adversely affect vehicle emissions, it will request (via the communication bus) that the PCM illuminate the Malfunction Indicator Lamp (MIL). Although these DTC's will be stored in the TCM immediately as a 1 trip failure, it may take up to five minutes of accumulated trouble confirmation to set the DTC and illuminate the MIL. Three consecutive successful OBDII (EURO STAGE III OBD) trips or clearing the DTC's with a diagnostic tool (DRBIII® or equivalent) is required to extinguish the MIL. When the TCM requests that the PCM illuminate the MIL, the PCM sets a DTC P0700 ($89) to alert the technician that there are DTC's in the TCM. This must also be erased in the PCM in order to extinguish the MIL.

3.3.1 HARD CODE

Any Diagnostic Trouble Code (DTC) that is set whenever the system or component is monitored is a HARD code. This means that the problem is there every time the TCM checks that system or component. Some codes will set immediately at start up and others will require a road test under specific conditions. it must be determined if a code is repeatable (Hard) or intermittent before attempting diagnosis.

3.3.2 ONE TRIP FAILURES

A One Trip Failure, when read from the TCM, is a hard OBDII (EURO STAGE III OBD) code that has not matured for the full 5 minutes. This applies to codes that will only set after 5 minutes of substituted gear operation.

3.3.3 INTERMITTENT CODE

A diagnostic trouble code that is not there every time the TCM checks the circuit or function is an a intermittent code. Some intermittent codes, such as codes P1684(12), P0891(14), P0888(15), P0725(18), P1694(19), P0871(21), P0846(22), P1724(24), P0706(28), P0120(29), P0750(41), P0755(42), P0760(43), P0765(44), P1793(48), P0715(56), P0720(57), P1794(58), P0951(70), P1799(74), P0884(76), P1687(77), and P1652(78) are caused by wiring or connector problems. However intermittent codes 50 - 54 are usually caused by intermittent hydraulic seal leakage in the clutch and/or accumulator circuits. Problems that come and go like this are the most difficult to diagnose, they must be looked for under the specific conditions that cause them.

3.3.4 STARTS SINCE SET COUNTER

For the most recent code, the Starts Since Set counter counts the number of times the vehicle has started since it was last set. The counter will count up to 255 starts. Note that this code only applies to the last or most recent code set.

When there are no diagnostic trouble codes stored in memory, the DRBIII® will display NO DTC'S

PRESENT and the reset counter will show "STARTS SINCE CLEAR =XXX

The number of starts helps determine if the diagnostic trouble code is hard or intermittent.

- If the count is less that 3, the code is usually a hard code.
- If the count is greater than 3, it is considered an intermittent code. This means that the engine has been started most of the time without the code recurring.

3.3.5 TROUBLE CODE ERASURE

A Diagnostic trouble code will be cleared from TCM memory if it has not reset for 40 warm-up cycles.

A warm-up cycle is defined as sufficient vehicle operation such that the coolant temperature has risen by at least 4.4°C (40°F) from engine starting and reaches a minumum temperature of 71°C (160°F).

The Malfunction Indicator Lamp (MIL) will turn off after 3 good trips or when the DTC's are cleared from the TCM.

3.3.6 LIST OF DIAGNOSTIC TROUBLE CODES (DETAILED DESCRIPTIONS FOLLOW LIST)

The TCM may report any of the following DTC's.

The TCM may report any of the following DTC's.				
DTC	**P-Code**	**Name of Code**	**Limp-in**	**MIL**
11	P0613	Internal TCM	Yes	Yes
12	P1684	Battery was disconnected	No	No
13	P0613	Internal TCM	Yes	Yes
14	P0891	Transmission Relay always on	Yes	Yes
15	P0888	Relay output always off	Yes	Yes
16	P0605	Internal TCM	Yes	Yes
17	P0604	Internal TCM	Yes	Yes
18	P0725	Engine speed sensor circuit	Yes	Yes
19	P1694	Bus communication with engine module	No	No
20	P0890	Switched battery	Yes	Yes
21	P0871	OD pressure switch sense circuit	Yes	Yes
22	P0846	2/4 pressure switch sense circuit	Yes	Yes
24	P0841	LR pressure switch sense circuit	Yes	Yes
28	P0706	Check shifter signal	No	No
29	P0120	Throttle position sensor signal circuit	No	Yes
31	P0870	OD hydraulic pressure test failure	Yes	Yes
32	P0845	2/4 hydraulic pressure test failure	Yes	Yes
33	P0992	2-4/OD hydraulic pressure test failure	Yes	Yes
35	P0944	Loss of prime	No	No
36	P1790	Fault immediately after shift	No	No
37	P1775	Solenoid switch valve latched in TCC position	No	Yes
38	P0740	Torque converter clutch control circuit	No	Yes
41	P0750	LR Solenoid circuit	Yes	Yes
42	P0755	2/4 Solenoid circuit	Yes	Yes
43	P0760	OD Solenoid circuit	Yes	Yes
44	P0765	UD Solenoid circuit	Yes	Yes
45	P0613	Internal TCM	No	No
47	P1776	Solenoid switch valve latched in LR position	Yes	Yes
48	P1793	TRD link communication error	No	Yes
50	P0736	Gear ratio error in reverse	Yes	Yes
51	P0731	Gear ratio error in 1st	Yes	Yes
52	P0732	Gear ratio error in 2nd	Yes	Yes
53	P0733	Gear ratio error in 3rd	Yes	Yes
54	P0734	Gear ratio error in 4th	Yes	Yes
56	P0715	Input speed sensor error	Yes	Yes

The TCM may report any of the following DTC's.				
DTC	**P-Code**	**Name of Code**	**Limp-in**	**MIL**
57	P0720	Output speed sensor error	Yes	Yes
58	P1794	Speed sensor ground error	Yes	Yes
70	P0951	AutoStick sensor circuit	No	No
71	P1797	Manual shift overheat	No	No
73	P0897	Worn out/burnt transaxle fluid	No	No
74	P1799	Calculated Oil temp in use	No	No
75	P0218	High temperature operation activated	No	No
76	P0884	Power up at speed	No	No
77	P1687	No communication with the MIC	No	No
78	P1652	Serial communication link malfunction	No	No
79	P0562	Low battery voltage	Yes	Yes
Yes (underlined) indicates that this DTC can take up to five minutes of problem identification before illuminating the MIL.				

3.3.7 DTC DESCRIPTIONS

Name of code: P0613(11, 13, or 45) - Internal Controller

When monitored: Whenever the key is in the Run or Run/Start position.

Set condition: This code is set whenever Transmission Control Module (TCM) senses an internal error

Theory of operation: The TCM is constantly monitoring it's internal processor. If an internal problem is detected, this DTC will be set. This DTC can also be set by a bad ground to the TCM and/or Trans Control Relay.

Transmission Effects: The MIL will illuminate (this DTC can take up to five minutes of problem identification before illuminating the MIL) and the transmission system will default to the Immediate Shutdown routine.

Possible causes:

- > TCM ground circuit.
- > Relay ground circuit
- > TCM

Name of code: P1684(12) - Battery was Disconnected (Informational code Only)

When monitored: Whenever the key is in the Run/Start position.

Set condition: This code is set whenever the Transmission Control Module (TCM) is disconnected from battery power (B+) or ground. It will also be set during the DRBIII® Battery Disconnect procedure.

Theory of operation: A battery backed RAM (Random Access Memory) is used to maintain some learned values. When the battery B(+) is disconnected, the memory is lost. When the B(+) is restored, this memory loss is detected by the TCM. The code is set and the learned values are initialized to known constants or previously learned values from EEPROM (Electronic Erasable Programmable Read Only Memory). This results in the reinitialization of some parameters.

Transmission Effects: Loss of trouble code data. Immediate Limp-in mode if power is lost while operating the vehicle. Normal operation is resumed if the power is restored during the same key start.

Possible causes:

- > Battery voltage removed from TCM
- > TCM disconnected
- > Dead Battery
- > Low battery voltage during cranking
- > Battery Disconnect by DRBIII® or MDS
- > Bad TCM ground circuit.

Name of code: P0891(14) - Transmission Relay Always On

When monitored: Ignition key is turned from off position to run position and/or ignition key is turned from crank position to run position.

Set condition: This code is set if the Transmission Control Module (TCM) senses greater than 3 volts at the Trans Relay Output (switched battery) terminal of the TCM prior to the TCM energizing the relay.

Theory of operation: The transmission control relay is used to supply power to the solenoid pack when the transmission is in normal operating mode. When the relay is off, no power is supplied to the solenoid pack and the transmission is in Limp-in mode. The relay output is fed back to the TCM through pins 16 and 17. It is referred to as Trans Relay Output circuit or switched battery.

Transmission Effects: The MIL will illuminate and the transmission system defaults to Logical Limp-in mode. Logical Limp-in mode results in the same modes of operation as Limp-in. Since the relay is stuck "on", the TCM can not open the relay, and the TCM shifts to 2nd gear.

Possible causes:

> Relay failure (welded contacts)
> Short to battery in 12-volt supply and/or Transmission Control Relay Output circuit(s)
> Short to voltage
> TCM connector problems
> TCM

Name of code: P0888(15) - Relay Output Always Off

When monitored: Continuously

Set condition: This code is set when less than 3 volts are present at the Trans Relay Output (switched battery) terminals at the Transmission Control Module (TCM) when the TCM is energizing the relay.

Theory of operation: The transmission control relay is used to supply power to the solenoid pack when the transmission is in normal operating mode. When the relay is off, no power is supplied to the solenoid pack and the transmission is in Limp-in mode. The relay output is fed back to the TCM through pins 16 and 17. It is referred to as the Trans Relay Output circuit or switched battery.

After a controller reset (ignition key turned to the run position or after cranking engine), the controller energizes the relay. Prior to this the TCM verifies that the contacts are open by checking for no voltage at the switched battery terminals. After the relay is energized, the TCM monitors the terminals to verify that the voltage is greater than 3 volts.

Transmission Effects: The MIL will illuminates and the transmission system defaults to Limp-in mode.

Possible causes:

> Relay failure (intermittent relay function caused by oxidized or contaminated relay contacts)
> Short to ground or open circuit in the Transmission Control Relay circuit(s)
> TCM connector problem
> TCM

Name of code: P0725(18) - Engine Speed Sensor Circuit

NOTE: This code is not a transmission input speed sensor DTC

When monitored: Whenever the engine is running.

Set condition: This code is set when the engine speed sensed by the Transmission Control Module (TCM) is less than 390 RPM or greater than 8000 RPM for more than 2.0 seconds.

Theory of operation: The TCM uses either a EATX RPM signal (simulated Crank Sensor signal) or the TCM uses the Crank Position Sensor signal to calculate engine RPM depending on the engine application. The signal supplied by the PCM and uses a dedicated circuit is called the EATX RPM Signal circuit. The Crank Position sensor signal is a spliced circuit from the engine Crank Position Sensor. Check the wiring schematics to determine which (engine speed sensor circuit) is used in the vehicle. If the TCM interprets this signal to be out of range when the engine is running (as reported by the PCM over the bus) the code is set.

Transmission Effects: The MIL illuminates and the transmission system defaults to Limp-in mode.

Possible causes:

> Open or short in EATX RPM Signal circuit.
> Open or short in Crank Position Sensor Signal circuit.
> Open or short in Crank Position Sensor ground circuit.
> TCM and/or PCM connector problems
> TCM
> PCM

Name of code: P1694(19) - Bus Communication with Engine Module

When monitored: Continuously with key on.

Set condition: If no PCI bus messages are received from the Powertrain Control Module (PCM) for 10 seconds.

Theory of operation: The TCM communicates with the PCM using the PCI bus. It relies on certain information to function properly. The TCM continuously monitors the PCI bus to check for messages broadcast from the PCM.

Transmission Effects: Delayed 3-4 shifts. No EMCC and early 3-4 shifts for a few minutes after engine is started.

Possible causes:

> Open or shorted PCI bus circuit
> TCM
> PCM

Name of code: P0890(20) - Switched Battery

When monitored: Ignition key is turned from off position to run position and/or ignition key is turned from crank position to run position.

Set condition: This code is set if the Transmission Control Module (TCM) senses voltage on any of the pressure switch inputs prior to the TCM energizing the relay.

Theory of operation: The transmission control relay is used to supply power to the solenoid pack when the transmission is in normal operating mode. When the relay is off, no power is supplied to the solenoid pack and the transmission is in Limp-in mode. The relay output is fed back to the TCM through pins 16 and 17. It is referred to as the Trans Relay Output circuit or a switched battery.

Immediately after a controller reset (ignition key turned to the run position or after cranking engine), the TCM verifies that the relay contacts are open by checking for no voltage at the switched battery terminals. After this is verified, the voltage at the Solenoid Pack pressure switches is checked. There should be no voltage on the pressure switches at this time. The TCM will then activate the relay.

Transmission Effects: The MIL illuminates and the transmission system defaults to Limp-in mode.

Possible causes:

> Short to battery on one or more pressure switch sense circuits

> TCM connector problems

> TCM

Name of code: P0871(21) - OD Pressure Switch Sense Circuit

When monitored: Whenever the engine is running.

Set condition: This code is set if the OD pressure switch is open or closed at the wrong time in a given gear (see chart below).

Theory of operation: The Transmission system uses three pressure switches to monitor the fluid pressure in the LR, 2/4, and OD clutch circuits. The pressure switches are continuously monitored for the correct states in each gear as shown below.

41TE PRESSURE SWITCH STATES

SWITCHES	R	N	1ST	2ND	3RD	4TH
L/R	OPEN	CLOSED	CLOSED	OPEN	OPEN	OPEN
2/4	OPEN	OPEN	OPEN	CLOSED	OPEN	CLOSED
O/D	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED

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Transmission Effects: Normal operation will be experienced if no other codes are present. TCM will ignore the code. Limp-in condition will only occur if code P0871(21) is present with a code P0706(28).

Possible causes:

> If code P0944(35) is present, ignore code P0871(21) and perform code P0944 diagnostic procedures

> OD pressure switch sense circuit open or shorted to ground between TCM and solenoid pack

> OD pressure switch sense circuit shorted to battery

> Solenoid pack

> Loose valve body bolts

> Plugged filter - internal transmission or torque converter failure

> TCM

Name of code: P0846(22) - 2/4 Pressure Switch Sense Circuit

When monitored: Whenever the engine is running.

Set condition: This code is set if the 2/4 pressure switch is open or closed at the wrong time in a given gear (see chart below).

Theory of operation: The Transmission system uses three pressure switches to monitor the fluid pressure in the LR, 2/4, and OD elements. The pressure switches are continuously monitored for the correct states in each gear as shown below.

41TE PRESSURE SWITCH STATES

SWITCHES	R	N	1ST	2ND	3RD	4TH
L/R	OPEN	CLOSED	CLOSED	OPEN	OPEN	OPEN
2/4	OPEN	OPEN	OPEN	CLOSED	OPEN	CLOSED
O/D	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED

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Transmission Effects: If the 2/4 pressure switch is identified as closed in P or N, the code will immediately be set and normal operation will be allowed for that given key start. If the problem is identified for 3 successive key starts, the transmission will go into Limp-in mode.

If the 2/4 pressure switch is identified as being closed in 1st or 3rd gear and was not identified as being closed in P or N, then 2nd gear or 4th gear will be substituted for 1st or 3rd gear depending on throttle angle and vehicle speed. A short period of time after the gear substitution, the transmission will return to normal operating mode. If the transmission is shifted back into 1st or 3rd gear through normal operation, and the 2/4 pressure switch remains closed, 2nd or 4th gear will be substituted briefly and then resume normal operation. If four gear substitutions occur in a given key start, the transmission will go into Limp-in mode.

If the 2/4 pressure switch is open (indicating no 2/4 clutch pressure) in 2nd or 4th gear, the TCM sets code P0846(22) and continues with normal operation. The transmission will only go into Limp-in mode if a code P0706(28) is also present. If no 2/4 clutch pressure is present a gear ratio code P0732(52) or P0734(54) will be set and cause the limp-in condition.

Possible causes:

> If code P0944(35) is present, ignore code P0846(22) and perform code P0944 diagnostic procedures

> 2/4 pressure switch sense circuit open or shorted to ground between TCM and solenoid pack

> 2/4 pressure switch sense circuit shorted to battery

> Solenoid pack

> Transmission overheated - Excessive regulator valve leakage in valve body causing high line pressure which results in 2/4 solenoid blow-off in 1st or 3rd gear. May require new valve body if it happens only when hot.

> Loose valve body bolts

> Plugged filter - internal transmission or torque converter failure

> TCM

Name of code: P0841(24) - LR Pressure Switch Sense Circuit

When monitored: Whenever the engine is running.

Set condition: This code is set if the LR pressure switch is either open or closed at the wrong time in a given gear.

Theory of operation: The Transmission system uses three pressure switches to monitor the fluid pressure in the LR, 2/4, and OD elements. The pressure switches are continuously monitored for the correct states in each gear as shown below.

41TE PRESSURE SWITCH STATES

SWITCHES	R	N	1ST	2ND	3RD	4TH
L/R	OPEN	CLOSED	CLOSED	OPEN	OPEN	OPEN
2/4	OPEN	OPEN	OPEN	CLOSED	OPEN	CLOSED
O/D	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED

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Transmission Effects: If a set condition is identified, 1st gear and torque converter lock-up (EMCC) will be inhibited. The vehicle will launch in 2nd gear and shift normally through the gears without allowing EMCC. If during the same key start, the set condition is no longer valid, the transmission will return to normal operation (1st and EMCC available). Limp-in will not occur unless code P0841(24) is accompanied by a code P0706(28) and the MIL will illuminate after 5 minutes of substituted operation.

Possible causes:

> If code P0944(35) is presnet, ignore code P0841(24) and perform code P0944(35) diagnostic procedures

> LR pressure switch sense circuit open or shorted to ground between TCM and solenoid pack

> LR pressure switch sense circuit shorted to battery

> Solenoid pack

> Valve body - solenoid switch valve stuck in LU position. May be accompanied by a code P1775(37)

> Loose valve body bolts

> Plugged filter - internal transmission or torque converter failure

> TCM

Name of code: P0706(28) - Check Shifter Signal

When monitored: Continuously with the key on.

Set condition: 3 occurrences in one key start of an invalid PRNDL code which lasts for more than 0.1 second.

Theory of operation: The C1 through C4 (T1, T3, T41, and T42) sense circuits communicate the shift lever position to the TCM. Each circuit is terminated at the transmission with a switch. Each switch can be either open or closed, depending on the shift lever position. The TCM can decode this information and determine the shift lever position. Each shift lever position has a certain combination of switches which will be open and closed, this is called a PRNDL code. There are 4 switches, therefore: there are many possible combinations of open and closed switches (codes). However, there are only 9 valid codes (8 for AutoStick), one for each gear position and three recognized between gear codes. The remainder of the codes should **never occur**, these are called invalid codes. The following chart shows the normal switch states for each shift lever position.

TRS	Park	T1	Rev	T2	N	T2	OD	T3	3/AS	T3	L
T1 (C4)	OP	OP	OP	CL	CL	CL	CL	CL	OP	CL	CL
T3 (C3)	CL	CL	OP	OP	OP	OP	OP	CL	CL	CL	CL
T41 (C1)	CL	OP	OP	OP	CL	OP	OP	OP	OP	OP	OP
T42 (C2)	CL	CL	CL	CL	CL	CL	OP	OP	OP	OP	CL

OP = OPEN   CL = CLOSED

The following are DRBIII® reported Shift Lever Error codes (chart)

SHIFT LEVER ERROR CODES REPORTED BY THE DRBIII®

ERROR CODE	SWITCH STUCK	POSITION
1	T1/C4 STUCK	OPEN
2	T1/C4 STUCK	CLOSED
3	T3/C3 STUCK	OPEN
4	T3/C3 STUCK	CLOSED
5	T42/C2 STUCK	OPEN
6	T24/C2 STUCK	CLOSED
7	T41/C1 STUCK	OPEN
8	T41/C1 STUCK	CLOSED

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Transmission Effects and possible causes:
Scenario 1) - All PRNDL lights stay illuminated indefinitely in Park following a Key start.

> Wrong Part Number TCM for application

> TRS connector not plugged in

> C1 through C4 (T1, T3, T41, or T42) circuits are open, shorted to ground, or shorted to 12 volts.

> PCI bus failure (Open or shorted resulting in no communication to BCM or Cluster)

> TRS

> TCM

> BCM

Scenario 2) - "P" is indicated following a key start but all PRNDL lights illuminate in "N" following a shift from "R" to "N". If PRNDL lights illuminate in "N" and shifter is moved directly into "3" or "L" position without pausing in "OD", then the "OD" position shift schedule and electronic display will indicate "OD" until the shifter is shifted into the "OD" position and held for at least 3 seconds.

> Worn Manual Lever (Rooster Comb). Check for heavy wearing by TRS switch contacts

> Intermittent C1 through C4 (T1, T3, T41 or T42) circuits. Check for corrosion, terminal push-outs or spread terminals at 60-way and/or TRS switch 10-way connector

> TRS

> TCM

> BCM

Scenario 3) - If an invalid code happens while operating in the "3" or "L" position, the "3" or "L" shift schedule and electronic display will be frozen (regardless of whether "OD"', "3" or "L" is selected). The display will be frozen until the shifter is moved to the "N" position (all PRNDL lights will illuminate) and then back to the "OD" position. The "N" and "OD" position must be held there for at least 3 seconds in order to resume the normal "OD" shift schedule and electronic display.

> Intermittent C1 through C4 (T1, T3, T41 or T42) circuits. Check for corrosion, terminal push-outs or spread terminals at 60-way and/or TRS connector

> TRS

> TCM

> BCM

These same symptoms may occur without the code P0706(28) getting set. It is possible that the invalid code that was sensed by the TCM only occurred once or twice during the given ignition key start and/or did not last for longer than 0.1 second.

Name of code: P0120(29) - Throttle Position Sensor Signal Circuit
When monitored: Whenever the engine is running.
Set condition: This code is set if the throttle angle goes out of range or if throttle angle changes abruptly (ie: faster than the throttle body motion could occur)
Theory of operation: The Transmission Control Module (TCM) receives the throttle position signal from the Throttle Position Sensor (TPS) through a wire spliced into the TPS circuit to the PCM. The TPS has a 5-volt pull up supplied from the Powertrain Control Module (PCM). The signal is checked for out-of-range and intermittent operation (excessive signal changes).
Transmission Effects: Extremely erratic transmission shifting with an intermittent TPS signal just prior to setting the code. If the intermittent does not last long enough to set the code, the customer will say that the transmission violently hunts between gears. The TCM will use a "calculated throttle angle" supplied by the PCM over the PCI bus. If the PCI bus is unavailable, the TCM will use a default throttle angle of 24 degrees for the key start in which the code was set. The TCM will try to use the TPS signal again on the next key start. The MIL will illuminate after 5 minutes of substituted operation if the engine controller is not calibrated for throttle substitution.
Possible causes:

> Open or shorted TPS signal and/or ground circuits

> TCM connector problems
> TPS or TPS connector (Check PCM DTC's)
> PCM
> TCM

Name of code: P0870(31) - OD Hydraulic Pressure Test Failure
P0845(32) - 2-4 Hydraulic Pressure Test Failure
P0992(33) - 2-4/OD Hydraulic Pressure Test Failure
When monitored: In 1st, 2nd, or 3rd gear with engine speed above 1000 RPM shortly after a shift and every minute thereafter.
Set condition: Immediately after a shift into 1st, 2nd, or 3rd gear, with engine speed above 1000 RPM, the TCM momentarily turns on element pressure to the 2-4 and/or OD clutch circuits to identify that the appropriate pressure switch closes. If the pressure switch does not close it is tested again. If the switch does not close the second time, the appropriate code is set.
Theory of operation: The Transmission Control Module (TCM) tests the OD and 2-4 pressure switches when they are off (OD and 2/4 are tested in 1st gear, OD in 2nd gear, and 2/4 in 3rd gear). The test verifies that the switches are operational. The TCM verifies that the switch closes when the corresponding element is applied. If a switch fails to close, it is retested, If it fails the second test, the code is set.
Transmission Effects: The MIL illuminates and the transmission system defaults to Limp-in mode.
Possible causes:

> Pressure switch sense circuit shorted to battery between TCM and solenoid pack.
> Low line pressure
> Solenoid Pack

Name of code: P0944(35) - Loss Of Prime
When monitored: If the transmission is slipping in any forward gear and the pressure switches are not indicating pressure, a loss of prime test is run.
Set condition: If the transmission begins to slip in any forward gear, and the pressure switch or switches that should be closed for a given gear are open, a loss of prime test begins. All available elements (in 1st gear LR, 2/4 and OD, in 2nd, 3rd, and 4th gear 2/4 and OD) are turned on by the Transmission Control Module (TCM) to see if pump prime exists. The code is set if none of the pressure switches respond. The TCM will continue to run the loss of prime test until pump pressure returns.
Theory of operation: The loss of prime test is used to prevent transmission defaults which can be caused by a lack of pump prime.
Transmission Effects: Vehicle will not move or transmission slips. Normal operation will continue if pump prime returns.
Possible causes:

> Low transmission fluid level
> PRNDL indicates a valid OD code in the hydraulic reverse position
> Transmission fluid filter clogged or damaged.
> Transmission fluid filter improperly installed (Bolts loose or O-ring missing)
> Oil pump - If a customer has a problem when the transmission is cold. Where someone shifts to reverse, reverse is engaged, and then shifts to OD and does not get OD (gets a neutral condition), and then can not get reverse or OD for 3-20 seconds, replace the oil pump. High side clearance in the oil pump will set a code 35. The pump will prime upon start-up, but as the torque converter purges air (drain down) the air will leak across the inner rotor into the pump suction port and cause a loss of prime right after the shift into OD. After 3 - 20 seconds, pump prime will return and normal operation will continue. The pump should be replaced only after all other possible causes above have been checked and verified.

Name of code: P1790(36) - Fault Immediately After Shift
When monitored: After a gear ratio error is stored.
Set condition: This code is set if the associated gear ratio code is stored within 1.3 seconds after a shift.
Theory of operation: This code will only be stored along with a 50 series code. If this code is set, it indicates the problem is mechanical in nature. When this code exists, diagnosing the transmission should be based on the associated gear ratio code and primarily mechanical causes should be considered.
Transmission Effects: None
Possible causes:

> Mechanical causes as listed under associated gear ratio code.

Name of code: P1775(37) - Solenoid Switch Valve Latched in TCC Position
When monitored: During an attempted shift into 1st gear.
Set condition: This code is set if three unsuccessful attempts are made to get into 1st gear in one given key start.
Theory of operation: The solenoid switch valve (SSV) controls the direction of the transmission fluid when the L-R/TCC solenoid is energized. The SSV will be in the downshifted position in 1st gear, thus directing the fluid to the L-R clutch circuit. In

2nd, 3rd, and 4th, it will be in the upshifted position and directs the fluid into the torque converter clutch (TCC).

When shifting into 1st gear, a special hydraulic sequence is performed to ensure SSV movement into the downshifted position. The L-R pressure switch is monitored to confirm SSV movement. If movement is not confirmed (the L-R pressure switch does not close), 2nd gear is substituted for 1st.

Transmission Effects: Transmission will have no 1st gear (2nd gear will be substituted), and no EMCC operation and the MIL will illuminate after 5 minutes of substituted operation.

Possible causes:

> PRNDL indicates a valid OD code in the hydraulic reverse position

> Valve body - Solenoid valve stuck in TCC position

> High idle speed

> Solenoid malfunction - L-R pressure switch will not close

> L-R Pressure Switch Sense circuit shorted to battery

Name of code: P0740(38) - Torque Converter Clutch Control Circuit

When monitored: During Electronically Modulated Converter Clutch (EMCC)

Set condition:

(a) The transmission must be in EMCC, with the input speed greater than 1750 RPM. The TCC/L-R solenoid must achieve it's maximum duty cycle and still not be able to pull the engine speed within 60 RPM of input speed.

b) If the transmission is in FEMCC and the engine can slip the TCC by more than 100 RPM (Engine speed - Input speed) for 10 seconds.

The code will be set if one of these event happens three times at a throttle angle less than 30 degrees.

Theory of operation: When in 2nd, 3rd, or 4th gear, the torque converter clutch (TCC) can be locked when certain conditions are met. The TCC piston is electronically modulated by increasing the duty cycle of the L-R/TCC solenoid until the torque converter slip (difference between engine and turbine speed) is within 60 RPM. Then the L-R/TCC solenoid is fully energized (FEMCC / 100% duty cycle). Torque converter slip is monitored in FEMCC to ensure adequate clutch capacity.

Transmission Effects: EMCC will still be available after code is set. MIL will illuminate after 5 minutes of accumulated slip in FEMCC. The transmission will attempt normal operation (no limp-in) even after the MIL is illuminated.

Possible causes:

> Worn pump bushing and/or failed torque converter - both should be replaced during a rebuild with code P0740(38) present

> Solenoid pack.

Name of code: P0750(41) - L-R Solenoid Circuit
P0755(42) - 2-4 Solenoid Circuit
P0760(43) - OD Solenoid Circuit
P0765(44) - UD Solenoid Circuit

When monitored: Ignition key is turned from off position to run position and/or ignition key is turned from crank position to run position, then every 10 seconds thereafter, or when a gear ratio or pressure switch error DTC is detected.

Set condition: All four solenoids are tested for continuity continuously immediately upon start up and during vehicle operation. For solenoids that are currently energized, power is momentarily interrupted, then reenergized. For solenoids that are not currently energized, the solenoid is momentarily energized, then deenergized. Under both situations, if an inductive spike is not sensed by the Transmission Control Module (TCM) during the continuity check, it is retested twice. If it fails the test the third time, the appropriate code is set.

SOLENOID APPLICATION CHART

GEAR	UD	OD	REV	2/4	LR
PARK					X
REVERSE			X		X
NEUTRAL					X
1ST	X				X
2ND	X			X	
3RD	X	X			
4TH		X		X	

80ccf4c0

Theory of operation: Four solenoids are used to control the friction elements (clutches). The continuity of the solenoids circuits are periodically tested. Each solenoid is turned on or off depending on it's current state. An inductive spike should be detected by the TCM during this test. If no spike is detected, the circuit is tested again to verify the failure. In addition to the periodic testing, the solenoid circuits are tested if a gear ratio or pressure switch error occurs. In this case, one failure will result in the appropriate code being set.

Transmission Effects: The MIL will illuminate and the transmission goes into neutral if code is set above 35 Km/h (22 MPH), limp-in mode when vehicle speed is below 35 Km/h (22 MPH).

Possible causes:

> Open or shorted solenoid circuit(s) between TCM and solenoid pack.

> Open ground circuit

> TCM connector problems.

> Solenoid pack connector problem.

> Solenoid Pack

> TCM

Name of code: P1776(47) - Solenoid Switch Valve Latched in LR Position

When monitored: Continuously when doing partial or full EMCC (PEMCC or FEMCC)

Set condition: If the transmission senses the LR pressure switch closing while performing PEMCC or FEMCC. This code will be set after two unsuccessful attempts to perform PEMCC or FEMCC.

Theory of operation: The solenoid switch valve (SSV) controls the direction of the transmission fluid when the LR/TCC solenoid is energized. SSV will be in the downshifted position in 1st gear, thus directing the fluid to the LR clutch circuits. In 2nd, 3rd, and 4th, the SSV will be in the upshifted position and directs the fluid into the torque converter clutch (TCC).

When doing PEMCC or FEMCC, the LR pressure switch should indicate no pressure if the SSV is in the TCC position. If the LR pressure switch indicates pressure while in PEMCC or FEMCC, EMCC operation is aborted and inhibited to avoid inadvertent application of the LR clutch. Partial EMCC will be attempted if the LR pressure switch does not indicate pressure. A second detection of LR pressure results in setting the code.

Transmission Effects: At speeds above 72 Km/h (45 MPH), EMCC is inhibited. Once speed falls below 72 Km/h (45 MPH), the transmission will go into Limp-in mode and the MIL will illuminate after 5 minutes of substituted operation.

Possible causes:

> Valve body - Solenoid valve stuck in LR position

> Intermittent short to ground or open circuit in LR Pressure Switch Sense circuit (with code 24 only)

> Solenoid pack (with code P0841(24) only)

> TCM (with code P0841(24) only)

Name of code: P1793(48) - TRD Link Communication Error

NOTE: The MIL will be lit for some engines that limit throttle after a TRD failure.

When monitored: Whenever the engine is running.

Set condition: This code is set when the TCM sends multiple torque reduction messages to the PCM and the TCM does not receive a response from the PCM.

Theory of operation: During high torque shifts the TCM will send a message requesting that the PCM reduce engine power until the shift is completed. This message is sent from the TCM to the Powertrain Control Module across the Torque Management Request Sense Circuit. The PCM will acknowledge the TCM's request by sending a message across the PCI bus within a specific amount of time. The TRD Link communication is also tested periodically for operation whenever the engine is running and the vehicle is not moving with zero degrees throttle.

Transmission Effects: Maximum throttle angle used by TCM will be 54 degrees. As a result a customer may complain about loss of performance or of short shifting when driving aggressively.

Possible causes:

> Sticky Throttle Position Sensor (TPS)

> Wiring or Connector problems in the Torque Management Request Sense Circuit

> PCM

> TCM

Name of code: P0736(50) - Gear Ratio Error in Reverse
P0731(51) - Gear Ratio Error in 1st
P0732(52) - Gear Ratio Error in 2nd
P0733(53) - Gear Ratio Error in 3rd
P0734(54) - Gear Ratio Error in 4th
P0715(56) - Input Speed Sensor Error
P0720(57) - Output Speed Sensor Error
P1794(58) - Speed Sensor Ground Error

When monitored: The transmission gear ratio is monitored continuously while the transmission is in gear.

Set condition: This code is set if the gear ratio is not correct for a period of time.

– Codes 50 through 54 sets if the ratio of the input RPM (Nt) to the output RPM (No) does not match the given gear ratio.

– Code 56 sets if there is an excessive change in input RPM in any gear

– Code 57 sets if there is an excessive change in output RPM in any gear

– Code 58 sets after a TCM reset in neutral and Nt/No equals a ratio of input to output of 2.50

A hard code sets within 3 seconds, an intermittent code sets within 15 seconds.

Theory of operation: The transmission system uses two speed sensors, one to measure input RPM and one to measure output RPM. These inputs are essential for proper transmission operation. Therefore, the integrity of this data is verified through the following checks:

1) When in gear, if the gear ratio does not compare to a known gear ratio, the corresponding in-gear trouble code is set (codes 50 through 54).

2) An excessive change in input or output speeds

indicating signal intermittent will result in codes 56 and/or 57 being set.

3) After a TCM reset in neutral, observing erratic output and input speed sensor signals indicates a loss of the common speed sensors ground. This sets a code 58.

Transmission Effects: The transmission will not go into Limp-in mode until three gear ratio error events occur in a given key start. This allows for intermittent problems to correct themselves without opening the relay. However, if a gear ratio error develops, a code is always set, but if the condition corrects itself the transmission will continue without requiring the ignition key to be cycled on and off. Many different events could occur given the range of failures possible for codes 50 through 58. The following are a few examples:

– Codes 51, 52, 53, 54, 56, and 57 at speeds above 72 Km/h (45 MPH) - The appropriate code is set, EMCC is aborted and current gear is maintained. If while still traveling above 72 Km/h (45 MPH), the gear ratio becomes valid again, EMCC will reengage and normal operation will resume. If the gear ratio becomes intermittent and recovers three times in a given key start, the current gear will be maintained and EMCC inhibited, then the transmission will go into limp-in mode if throttle is applied below 72 Km/h (45 MPH) or at 35 Km/h (22 MPH) with closed throttle.

– Codes 51, 52, 53, 54, 56, and 57 at speeds between 35 and 72 Km/h (22 and 45 MPH) - If one of these codes is set between 35 and 72 Km/h (22 and 45 MPH), the current gear will be maintained until the gear ratio problem corrects itself. If throttle is applied, the trans will go to 2nd gear. If this happens and the gear ratio problem goes away, normal operation will resume. If three gear ratio problems are identified in a given key start, the current gear will be frozen until throttle is applied. The transmission will then go into Limp-in mode with throttle applied at speeds between 35 and 72 Km/h (22 and 45 MPH).

– Codes 51, 52, 53, 54, 56, and 57 at speeds below 35 Km/h (22 MPH) - If a gear ratio problem is identified below 35 Km/h (22 MPH), the transmission will immediately substitute second gear for the current gear. If the gear ratio problem goes away, normal operation will resume. If three gear ratio problems are identified in a given key start, the transmission will go into Limp-in mode.

Possible causes:

Code P0736(50) - Excludes geartrain failures which should be obvious upon disassembly

> If code P0944(35) is also set, follow diagnostic procedure for code P0944(35) first

> Valve body - #1 ball check or LR switch valve sticking - may also set code P0731(51)

> Speed sensor or associated wiring - may also set codes P0731(51), P0715(56), or P0720(57)

> Failed or slipping LR clutch - may also set code P0731(51)

  – LR seal leakage (Intermittent no drive or reverse)

  – Sticky LR accumulator seals (Intermittent no drive or reverse)

> Failed reverse clutch (hard code)

  – OD/Rev lip seal leakage

  – Worn reaction shaft support seal rings

  – Snap ring out of position

Code P0731(51) - Excludes geartrain failures which should be obvious upon disassembly

> If code P0944(35) is also set, follow diagnostic procedure for code P0944(35) first

> Valve body - #1 ball check or LR switch valve sticking - may also set code P-0736(56) or have no Reverse

> Speed sensor or associated wiring - may also set codes P0736(50), P0715(56), or P0720(57)

> Failed or intermittent slipping UD clutch - may also set P0732(52), or P0733(53)

  – UD seal leakage (intermittent)

  – Worn input clutch hub bushing (hard code at heavy throttle)

  – Sticky UD accumulator seals (intermittent)

  – Worn reaction shaft support seal rings (hard code at heavy throttle)

  – Solenoid pack (UD pressure in 4th gear

> Failed or slipping LR clutch - may also set code P0736(56) or have no Reverse

  – LR seal leakage (Intermittent)

  – Sticky LR accumulator seals (Intermittent)

Code P0732(52) - Excludes geartrain failures which should be obvious upon disassembly

> If code P0944(35) is also set, follow diagnostic procedure for code P0944(35)

> Failed or slipping 2-4 clutch - may also set code P-0734(54)

  – 2-4 seat leakage (intermittent)

  – Sticky accumulator seals (intermittent)

> Failed or intermittent slipping UD clutch - may also set code P-0731(51) and/or P-0733(53)

  – UD seal leakage (intermittent)

  – Worn input clutch hub bushing (hard code at heavy throttle)

– Sticky UD accumulator seals (intermittent)
– Worn reaction shaft support seal rings (hard code at heavy throttle)
– Defective solenoid pack (UD pressure in 4th gear)

Code P0733(53) - Excludes geartrain failures which should be obvious upon disassembly

> If code P0944(35) is also set, follow diagnostic procedure for code P0944(35) first
> Failed or slipping OD clutch - may also set code P0734(54)
  – OD and Reverse inner and outer lip seal leakage (usually hard code)
  – Sticky OD accumulator seals (intermittent)
  – Worn reaction shaft support seal rings (hard code at heavy throttle)
  – Broken OD/UD tapered snap ring - (hard code at heavy throttle)
> Failed or intermittent slipping UD clutch - may also set code P0731(51) and/or P0732(52)
  – UD seal leakage (intermittent)
  – Worn input clutch hub bushing (hard code at heavy throttle)
  – Sticky UD accumulator seals (intermittent)
  – Worn reaction shaft support seal rings (hard code at heavy throttle)
  – Solenoid pack (UD pressure in 4th gear)

Code P0734(54) - Excludes geartrain failures which should be obvious upon disassembly

> If code P0944(35) is also set, follow diagnostic procedure for code P0944(35) first
> Failed or slipping OD clutch - may also set code P0733(53)
  – OD and Reverse inner and outer lip seal leakage (usually hard code)
  – Sticky OD accumulator seals (intermittent)
  – Worn reaction shaft support seal rings (hard code at heavy throttle)
  – Broken OD/UD tapered snap ring - (hard code at heavy throttle)
> Failed or slipping 2-4 clutch - may also set code P0732(52)
  – 2/4 seal leakage (intermittent)
  – Sticky accumulator seals (intermittent)

Codes P0715(56) and P0720(57)

> Failed input or output speed sensor (intermittent or hard code)
> Shorted or open wiring between TCM and speed sensor(s) (intermittent)
> Connector problems at 60 TCM connector and/or speed sensor connector

Code P1794(58)

> Open or shorted speed sensor ground (speed sensor ground is different from chassis ground)
> Open or shorted Temperature Sensor wiring to TRS
> TRS - Will also set code P1799(74)
> TCM

Name of code: P0951(70) - AutoStick Sensor Circuit (If equipped)
When monitored: Whenever the engine is running.
Set condition:
1) The transmission shift lever is not in AutoStick and either the upshift or downshift switches are closed.
2) Upshift and downshift switches are closed at the same time.
Theory of operation: In the AutoStick Mode (manual shift mode), upshifts and downshifts are actuated manually. Shift requests are detected by monitoring the MUXED or the upshift and downshift switches. The Transmission Control Module (TCM) monitors the above set conditions. A set condition will be tolerated for up to 15 seconds before setting a code.
Transmission Effects: The OD position shift schedule is substituted while operating in the AutoStick gear selector position. No Limp-in mode occurs.
Possible causes:

> Wiring or connector problems
> AutoStick switch failure
> TCM

Name of code: P1797(71) - Manual Shift Overheat
When monitored: Whenever the engine is running.
Set condition:
1) If the engine temperature exceeds 124°C (225°F) while operating in AutoStick mode.
2) If the transmission temperature exceeds 135°C (275°F) while in AutoStick mode
Theory of operation: Transmission and engine temperatures are monitored during vehicle operation. If conditions occur causing the engine or transmission to overheat, the AutoStick mode will be canceled, and a code will be set.
Transmission Effects: The 3 position shift schedule that is used in non-AutoStick applications is substituted while operating in the AutoStick gear selector position. No Limp-in mode occurs.
Possible causes:

> Engine overheat - refer to service manual for diagnosis and repair
> Transmission Overheat

– Restricted transmission cooling system
– Transmission fluid overfilled
– Radiator fan not functioning properly
– Extended driving in low gear

NOTE: Strenuous driving conditions may cause the vehicle to overheat. If the driver operates in or initiates autostick with an overheated vehicle, the code will be set.

Name of code: P0897(73) - Worn Out/Burnt Transaxle Fluid
When monitored: At every Fully Electronically Modulated Converter Clutch (FEMCC) to Partial Electronically Modulated Converter Clutch (PEMCC) transition miles when A/C compressor clutch is being cycled.
Set condition: The code will be set if vehicle shudder is detected 20 times when the A/C clutch is cycled.
Theory of operation: While in 3rd or 4th FEMCC and just before the A/C clutch engages, the Powertrain Control Module (PCM) requests the Transmission Control Module (TCM) to momentarily establish PEMCC operation. If vehicle shudder is detected during the FEMCC to PEMCC transition, a counter is incremented. If the count reaches 20, the trouble code is set. The driver may then notice harsh bumps when the A/C clutch is being cycled, but vehicle shudder will be eliminated. After 35 OBDII (EURO STAGE III OBD) warm-up starts or if the code is cleared, PEMCC will be reactivated to see if shudder is still present. If one shudder event occurs, the code will be reset. Clearing the code and running battery disconnect with the DRBIII® is the only way to reset the shudder counter from 20 back to zero.
Transmission Effects: This code does not cause the transmission to go into Limp-in mode. However, once the code is set, FEMCC to PEMCC operation before the A/C clutch engagement will be disabled for 35 OBDII (EURO STAGE III OBD) warm up starts.
Possible causes:

> Degraded transmission fluid
> Wheels severely out of alignment
> Internal torque converter problem

Name of code: P1799(74) - Calculated Oil Temperature in Use
When monitored: Whenever the Engine is running.
Set condition: The code is set if any of the following conditions exist for three consecutive key starts:
> The Temperature Sensor voltage is out of range (below 0.07 volts or greater than 4.94 volts)
> If the TCM senses continuous erratic Temperature Sensor voltage.
> The Temperature Sensor temperature stays below 27°C (80°F) for an extended period of time.
Theory of operation: The TCM uses a Temperature Sensor to monitor the transmission sump temperature. This temperature is used to determine which shift schedule the TCM is to use. (See Transmission Operation and Shift Scheduling at Various Sump Temperatures in this diagnostic manual) If the Temperature Sensor circuit fails to operate properly the TCM will use the calculated oil temperature routine found in prior model year TCM. If this occurs for three consecutive key starts, the code will be set. The TCM will then test the Temperature Sensor circuit after ever 35 OBDII (EURO STAGE III OBD) warm-up starts. If the Temperature Sensor circuit is OK, the Temperature Sensor data is used in place of the Calculated Oil temperature data.
Transmission Effects: If the Transmission Temperature Sensor indicates a temperature below -18° C (0°F) or above 115° C (240°F) at start up, The TCM compares the calculated oil temperature to the indicated Temperature Sensor oil temperature. If the calculated oil temperature differs significantly from the Temperature Sensor value, the calculated oil temperature will be used for that key start.
Possible causes:

> Wiring or Connector problems in the transmission temperature sensor signal circuit.
> TRS
> TCM

Name of code: P0218(75) - High Temperature Operation Activated.
When monitored: Whenever the engine is running.
Set condition: Immediately once the Overheat Shift Schedule is activated.
Theory of operation: If the transmission oil temperature rises above 115°C (240°F), the overheat shift schedule is activated refer to Transmission Operation as a function of Transmission Oil Temperature and the code is set. The DTC is an information code only and is being set to aid the technician in determining root cause of a customer driveability issue. The code is also intended to alert the technician to determine if a cooling system malfunction has occurred or if an additional transmission air to oil cooler should be added to the vehicle if the customer regularly drives in a manner that overheats the transmission. Extended operation above 115°C (240°F) will reduce the durability of the transmission and should be avoided. Correcting the cooling system malfunction or installing an additional transmission oil cooler

will improve transmission durability especially for customers who operate in city/construction stop and go traffic, tow trailers regularly, drive aggressively in low gear or drive regularly in mountainous areas.
Transmission effects: Information only code. - Overheat shift schedule was activated, no Limp-in condition occurs. 2nd gear partial EMCC above 40 Km/h (25 MPH), 3rd gear EMCC from 45-69 Km/h (28-43 MPH), delayed 3-4 upshift at 69 Km/h (43 MPH), early 4-3 coastdown at 66 Km/h (41 MPH), EMCC operation under all conditions above 40 Km/h (25 MPH) except at closed throttle or 1st gear.
Possible causes:

– Transmission Overfilled with Oil
– Engine cooling fan failure
– Engine thermostat stuck closed
– Radiator corroded or packed with dirt
– Transmission Oil Cooler Plugged
– Customer driving pattern requires additional transmission cooling

Name of code: P0884(76) - Power-Up at Speed
When monitored: When TCM (transmission control module) initially powers-up.
Set condition: If the TCM powers up while in the "Drive" position and the vehicle is going above 32 Km/h (20 MPH), the code is set.
Theory of operation: If a vehicle loses power to the TCM, the vehicle will go to the 2nd gear mode since there is no power available to control the transmission solenoids. However if power is restored, the TCM will power-up and normal operation will be restored. This DTC identifies that power to the TCM was restored when the gear selector was in a "Drive" position while the vehicle was moving at speeds above 32 Km/h (20 MPH). If someone shifts to Neutral and cycles the ignition key and quickly shifts to "Drive" while moving before the TCM comes out of its START ROUTINE, the DTC can be set. Therefore it is critical that this DTC diagnosis repair procedure should only be used if the vehicle is experiencing intermittent 2nd gear operation and subsequently a return to normal operation during normal driving.
Transmission effects: No Limp-in condition. The DTC is for information only when trying to diagnosis intermittent 2nd gear operation and subsequently a return to normal operation.
Possible causes:

– No Problem if vehicle is started in "neutral" at speeds above 32 Km/H (20 MPH) and shifted quickly to "Drive" before TCM comes out of the START ROUTINE.

FOR INTERMITTENT 2ND GEAR OPERATION AND THEN A SUBSEQUENT RETURN TO NORMAL OPERATION WITHOUT CYCLING THE IGNITION KEY

– Intermittent Direct Battery connection between TCM (60-way pin 56) and battery.
– Intermittent Fused Ignition Switch Output between TCM (60-way pin 11) and ignition switch.
– Intermittent Ground to TCM (60 way pins 53 and 57).

Name of code: P1687(77) - No Communication with MIC
When monitored: Continuously with key on.
Set condition: If no PCI bus messages are received from the Mechanical Instrument Cluster (MIC) for 25 seconds.
Theory of operation: The TCM communicates with the MIC using the PCI bus. It relies on certain information to function properly. The TCM continuously monitors the PCI bus to check for messages broadcast from the PCM.
Transmission effects: Possible improper TCM AutoStick configuration.
Possible causes:

> Open or shorted PCI bus circuit from MIC
> MIC
> TCM (If other communications codes are stored in the TCM only)

Name of code: P1652(78) - Serial Communication Link Malfunction
When monitored: Continuously with key on.
Set condition: If no PCI bus messages are received by the Transmission Control Module (TCM) for 10 seconds.
Theory of operation: The TCM communicates with the other modules in the vehicle using the PCI bus. It relies on certain information to function properly. The TCM continuously monitors the PCI bus to check for messages broadcast from the certain modules.
Transmission Effects: Possible improper TCM AutoStick configuration and delayed 3-4 shifts. No EMCC and early 3-4 shifts for a few minutes after engine is started.
Possible causes:

> Open or shorted PCI bus circuit from BCM
> TCM

Name of code: P0562(79) Low Battery Voltage
When monitored: Continuously with engine running and Transmission Relay energized.
Set condition: If the voltage sensed at the Transmission Control Relay Output circuit (pins 16 and 17 at TCM) for 15 seconds.
Theory of operation: The Transmission system requires sufficient battery voltage in order to ener-

gize the transmission solenoids. The TCM continuously monitors the voltage available to the solenoids.

Transmission effects: At speeds above 72 Km/h (45 MPH) the transmission system will default to neutral. Below 72 Km/h (45 MPH) the transmission system will default to limp-in mode and the MIL will illuminate after 5 minutes of substituted operation. Manual gear selection of Park, Reverse, Neutral and Second will be available.

Possible causes:

> Charging system problem

> Poor/High resistance connection between TCM and Battery/Alternator

> TCM pin 16 and 17 high resistance or poor connection

> TCM ground pins 53 and 57 high resistance or poor connection

> High resistance in Transmission Control Relay contacts

> TCM

3.3.8 QUICK LEARN

The Quick Learn function customizes adaptive parameters of the TCM to the transmission characteristics of a vehicle. This gives the customer improved “as received” shift quality compared to the initial parameters stored in the TCM.

Notes about Quick Learn Features

The nature of the Quick Learn function requires that certain features must be taken into consideration.

> Quick Learn should generally not be used as a repair procedure unless directed by a repair or diagnostic procedure. If the transmission system is exhibiting a problem that you think is caused by an invalid CVI, you should try to relearn the value by performing the appropriate driving maneuvers. In most cases, if a quick learn makes a vehicle shift better, the vehicle will return with the same problem.

> Before performing Quick Learn, it is imperative that the vehicle be shifted into OD with the engine running and the oil level set to the correct level. This step will purge air from the clutch circuits to prevent erroneous clutch volume values which could cause poor initial shift quality.

> If an unused TCM is installed on a vehicle with a HOT engine, Quick Learn will cause the TCM to report a cold calculated oil temperature. This requires monitoring the calculated oil temperature using the DRBIII®. If the temperature is below 15°C (60°F), the transmission must be run at idle or driven in gear until it goes above 15°C (60°F). If the temperature is above 93°C (200°F), the transmission must cool to below 93°C (200°F).

> First gear is engaged in overdrive after Quick Learn is completed. Place the vehicle in park after performing Quick Learn.

The Quick Learn function should be performed:

- Upon installation of a new service TCM
- After replacement or rebuild of internal transmission components or the torque converter
- If one or more of the clutch volumes indexes (CVI’s) contain skewed readings because of abnormal conditions.

To perform the Quick Learn procedure, the following conditions must be met.

- It is imperative that the vehicle be shifted into OD with the engine running and the oil level set to the correct level. This step will purge the air in the clutch circuits to prevent erroneous clutch volume values, which could cause poor initial shift quality.
- The brakes must be applied.
- The engine must be idling.
- The throttle angle (TP sensor) must be less than 3 degrees.
- The shift lever position must stay in neutral until prompted to shift into OD.
- The shift lever must stay in OD after the “Shift to Overdrive” prompt until the DRBIII® indicates the procedure is complete.
- The oil temperature must be between 15°C (60°F) and 93°C (200°F).

NOTE: The above conditions must be maintained during the procedure to keep the procedure from being aborted.

The Quick Learn procedure is performed with the DRBIII® by selecting “Transmission” system then “Miscellaneous” functions, then “Quick Learn”. Follow the procedure instructions displayed on the DRBIII®.

3.3.9 CLUTCH VOLUMES

The L-R clutch volume is updated when doing a 2-1 or 3-1 coast down shift. The transmission temperature must be between 21-49°C (70-120°F). The clutch volume should be between 35 and 83.

The 2-4 clutch volume is updated when doing a 1-2 shift. The transmission temperature must be above 43°C (110°F). The clutch volume should be between 20 and 77.

The OD clutch volume is updated when doing a 2-3 shift. The transmission temperature must be above 43°C (110°F). The clutch volume should be between 40 and 150.

The UD clutch volume is updated when doing a 4-3 or 4-2 shift. The transmission temperature must be above 43°C (110°F). The clutch volume should be between 24 and 70.

3.3.10 ELECTRONIC PINION FACTOR

The transmission output speed signal supplies distance pulses to the powertrain control module (PCM), which are used to calculate speed and mileage. A pinion factor is stored in the transmission control module (TCM) in order to provide the appropriate distance pulses for the vehicle. The pinion factor is programmed into the TCM at the assembly plant.

Using the following steps, the pinion factor can be checked and/or reset using the DRBIII®:

1. Select Transmission system, then Miscellaneous functions, then Pinion Factor. The DRBIII® will display the current tire size.
2. If the tire size is incorrect, press the Enter key and then select the correct size.
3. Press the Page Back key to exit the reset procedure.

Notes About Electronic Pinion Factor Features

The nature of the electronic pinion factor requires that certain features must be taken into consideration.

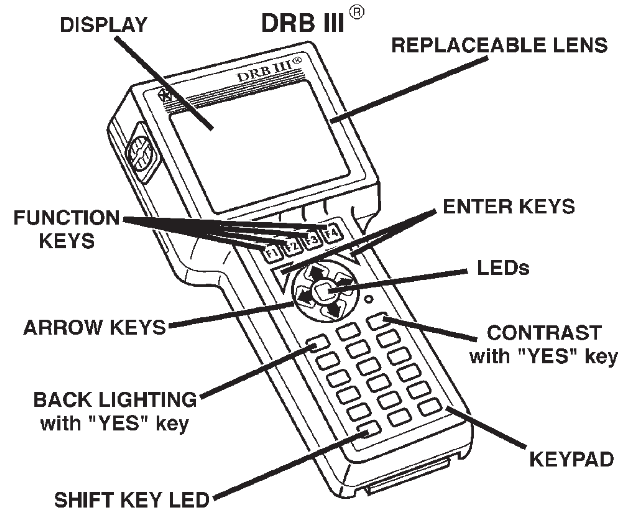
> If no pinion factor is stored in an installed TCM, the vehicle speedometer will not operate, engine speed will be limited to 2300 RPM, and catalyst damage may occur.

> Selecting a wrong tire size will cause the speedometer to be inaccurate and will also cause any speed related features to operate improperly.

NOTE: After replacing the TCM, you must reprogram pinion factor.

3.4 USING THE DRBIII®

Refer to the DRBIII® user's guide for instructions and assistance with reading trouble codes, erasing trouble codes, and other DRBIII® functions.



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3.5 DRBIII® ERROR MESSAGES

Under normal operation, the DRBIII® will display one of only two error messages:

– User−Requested WARM Boot

– User−Requested COLD Boot

If the DRBIII® should display any other error message, record the entire display and call the S.T.A.R. Center.

3.5.1 DRB III® DOES NOT POWER UP (BLANK SCREEN)

If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage and grounds to Data Link connector. A minimum of 11 volts is required to adequately power the DRBIII®.

If all connections are proper between the DRBIII® and the vehicle or other devices, and the vehicle battery is fully charged, an inoperative DRBIII® may be the result of faulty cable or vehicle wiring. For a blank screen, refer to the appropriate Body Diagnostic manual.

3.5.2 DISPLAY IS NOT VISIBLE

Low temperatures will affect the visibility of the display. Adjust the contrast to compensate for this condition.

3.6 TRANSMISSION SIMULATOR (MILLER TOOL #8333) AND FWD ADAPTER (MILLER TOOL #8333-1)

The transmission simulator, simply put, is an electronic device that simulates the electronic functions of any EATX controlled transmission (41TE, 42LE, 45RFE, and 545RFE). It's basic function is to aid the technician in determining if an internal transmission problem exists or if the problem resides in the vehicle wiring or Transmission Control Module (TCM). It is only useful for electrical problems. It will not aid in the diagnosis of a failed mechanical component, but it can tell you that the TCM and wiring are working properly and that the problem is internal.

The ignition switch should be in the lock position before attempting to install the simulator. Follow all instructions included with the simulator. If the feedback from the simulator is in doubt, you can verify it's operation by installing it on a known good vehicle. A "known good vehicle" would be defined as a vehicle that does not set any DTC's and drives and shifts as expected.

One important point to remember is that the Simulator receives it's power from the Trans Relay Output circuit. If the transmission system is in Limp−in (Relay open), the simulator will not operate. This is not really an indication of a problem, but an additional symptom. If the simulator does not power up ("P" led lit), this is an indication that the problem is still present with the simulator hooked up. This indicates that the problem is in the wiring or TCM and not the transmission.

Miller Tool # 8333-1 consists of the adapter cables and overlay necessary to adapt the simulator to 41TE and 42LE transmissions.

4.0 DISCLAIMERS, SAFETY, AND WARNINGS

4.1 DISCLAIMERS

All information, illustrations and specifications contained in this manual are based on the latest information at the time of publication. The right is reserved to make changes at any time without notice.

4.2 SAFETY

4.2.1 TECHNICIAN SAFETY INFORMATION

WARNING: ENGINES PRODUCE CARBON MONOXIDE THAT IS ODORLESS, CAUSES SLOWER REACTION TIMES AND CAN LEAD TO SERIOUS INJURY. WHEN THE ENGINE IS OPERATING, KEEP SERVICE AREAS WELL VENTILATED OR ATTACH THE VEHICLE EXHAUST SYSTEM TO THE SHOP EXHAUST REMOVAL SYSTEM.

Set the parking brake and block the wheels before testing or repairing the vehicle. It is especially important to block the wheels on front-wheel drive vehicles: the parking brake does not hold the drive wheels. Some operations in this manual require that hydraulic tubes, hoses, and fittings, disconnected for inspection or testing purposes. These systems, when fully charged contains fluid at high pressure. Before disconnecting any hydraulic tubes, hoses or fittings, be sure that the system is fully depressurized.

When servicing a vehicle, always wear eye protection and remove any metal jewelry such as watchbands or bracelets that might make an inadvertent electrical contact.

When diagnosing a transmission system problem, it is important to follow approved procedures where applicable. Following these procedures is very important to the safety of individuals performing diagnostic tests.

4.2.2 VEHICLE PREPARATION FOR TESTING

Make sure the vehicle being tested has a fully charged battery. If it does not, false diagnostic codes or error messages may occur. It is extremely important that accurate shift lever position data be available to the TCM. The accuracy of any diagnostic trouble code found in memory is doubtful unless the Shift Lever Test, performed on the DRBIII® Scan Tool, passes without failure.

4.2.3 SERVICING SUB-ASSEMBLIES

Some components of the powertrain system are intended to be serviced in assembly only. Attempting to remove or repair certain system subcomponents may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service instructions should be serviced.

4.2.4 DRBIII® SAFETY INSTRUCTIONS

WARNING: EXCEEDING THE LIMITS OF THE DRBIII® MULTIMETER IS DANGEROUS. IT CAN EXPOSE YOU TO SERIOUS OR POSSIBLY FATAL INJURY. CAREFULLY READ AND UNDERSTAND THE CAUTIONS AND THE SPECIFICATION LIMITS.

- Follow the vehicle manufacturer's service specifications at all times.
- Do not use the DRBIII® if it has been damaged.
- Do not use the test leads if the insulation is damaged or if metal is exposed.
- To avoid electrical shock, do not touch the test leads, tips, or the circuit being tested.

- Choose the proper range and function for the measurement. Do not try voltage or current measurements that may exceed the rated capacity.
- Do not exceed the limits shown in the table.

FUNCTION	INPUT LIMIT
Volts	0 - 500 peak volts AC 0 - 500 volts DC
Ohms (resistance)*	0 - 1.12 megohms
Frequency Measured Frequency Generated	0 - 10 kHz
Temperature	-58 - 1100°F -50 - 600°C

*Ohms cannot be measured if voltage is present. Ohms can be measured only in a non-powered circuit.

- Voltage between any terminal and ground must not exceed 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- The circuit being tested must be protected by a 10A fuse or circuit breaker.
- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeds 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before attempting a zero reading.
- When measuring current, connect the meter in series with the load.
- Disconnect the live test lead before disconnecting the common test lead.
- When using the meter function, keep the DRBIII® away from spark plug or coil wires to avoid measuring error from outside interference.

4.3 WARNINGS

4.3.1 VEHICLE DAMAGE WARNINGS

Before disconnecting any control module, make sure the ignition is “lock” position. Failure to do so could damage the module.

When testing voltage or continuity at any control module, use the terminal side (not the wire end) of the connector. Do not probe a wire through the insulation; this will damage it and eventually cause it to fail because of corrosion.

Be careful when performing electrical tests so as to prevent accidental shorting of terminals. Such mistakes can damage fuses or components. Also, a second code could be set, making diagnosis of the original problem more difficult.

When replacing a blown fuse, it is important to use only a fuse having the correct amperage rating. The use of a fuse with a rating other than indicated may result in a dangerous electrical system overload. If a properly rated fuse continues to blow, it indicates a problem in the circuit that must be corrected.

4.3.2 ROAD TEST COMPLAINT VEHICLE

Some complaints will require a test drive as part of the repair verification procedure. The purpose of the test drive is to try to duplicate the diagnostic DTC or symptom condition.

CAUTION: Before road testing a vehicle, be sure that all components are reassembled. During the test drive, do not try to read the DRBIII® screen while in motion. Do not hang the DRBIII® from the rear view mirror or operate it yourself. Have an assistant available to operate the DRBIII®.

Road testing is an essential step in the diagnostic process that must not be overlooked. Along with diagnostic information obtained from the DRBIII® Scan Tool and the original customer concern, the road test helps to verify the problem and observe operation under actual vehicle driving conditions.

Just as important as the road test is, there are preliminary inspections that should be carried out prior to the road test. Always check the fluid level and condition before taking the vehicle on a road test. Determine if an incorrect fluid type is being used, improper fluid will result in erratic transmission operation. Improper fluid can result in problems. Additionally, a variety of complaints can be caused by incorrect fluid level. Some of the conditions caused by incorrect fluid level are as follows:

- Delayed engagement
- Poor shifting or erratic shifts
- Excessive noise
- Overheating

The next step is to verify that the shift linkage is correctly adjusted. If the gearshift linkage is incorrectly adjusted, a number of complaints can result.

The TCM monitors the Shift Lever Position (SLP) Sensor continuously. If the linkage is incorrectly adjusted, the TCM will sense a shift lever position that is not correct for the gear chosen by the driver. This may cause a DTC to be set.

The following complaints may also be the result of an incorrectly adjusted or worn linkage:

- Delayed clutch engagement
- Erratic shifts

- Vehicle will drive in neutral
- Engine will not crank in park or neutral
- Gearshift linkage will be able to be shifted without the key in the ignition
- Not able to remove the ignition key in park
- Parking pawl will not engage properly

The shift linkage should also be adjusted when replacing the Transmission, repairing the valve body, or when repairing any component between the shift lever and the Transmission.

Some questions to ask yourself when performing the road test are as follows:

- Is the complaint or concern what you think the problem is, based on the driver's description of the problem?
- Is the Transmission operating normally, or is there a real problem?
- When does the problem occur?
- Is the problem only in one gear range?
- What temperature does the problem occur?
- Does the vehicle have to sit over night for the problem to occur?
- Does the transmission go into Limp-in mode?

4.3.3 ELECTRONIC PINION FACTOR WARNINGS (IF APPLICABLE)

The pinion factor must be set when replacing the TCM. Note: The pinion factor is a fixed number and cannot be changed or updated in some vehicle applications. If the pinion factor is not set or incorrectly set, any speed related functions will not operate correctly i.e. speedometer, speed control, rolling door locks, and other control modules will be affected that depend on speed information.

4.3.4 BULLETINS AND RECALLS

Always perform all Safety Recalls and Technical Service Bulletins that are applicable to the problem.

5.0 REQUIRED TOOLS AND EQUIPMENT

> DRBIII® (diagnostic read−out box) − Must be at latest release level.
> Transmission Simulator (Miller #8333)
> Transmission Simulator (Miller #8333-1) Adapter harness kit and panel overlay for FWD vehicles.
> Jumper wires
> Test Light (minimum of 25 ohms of resistance)
> Ohmmeter
> Voltmeter
> Pressure gauge (0−300 PSI)

6.0 GLOSSARY OF TERMS

6.1 ACRONYMS

BCM	-Body Control Module
CKT	-Circuit
CVI	-Clutch Volume Index
DLC	-Data Link Connector
DRBIII®	-Diagnostic Readout Box
DTC	-Diagnostic Trouble Code
EATX	-Electronic Automatic Transaxle
EMCC	-Electronically Modulated Converter Clutch
FCM	-Front Control Module (part of the IPM system)
IOD	-Ignition off−draw
IPM	-Intelligent Power Module
IRT	-Intelligent Recovery Timer
ISS	-Input Speed Sensor
LED	-Light Emitting Diode
LR	-Low/reverse Clutch
LU	-Lockup
MIC	-Mechanical Instrument Cluster
MIL	-Malfunction Indicator Lamp
OBDII	-On Board Diagnostics
OD	-Overdrive Clutch or Pressure Switch
OSS	-Output Speed Sensor
PCM	-Powertrain Control Module
PEMCC	-Partial Electronically Modulated Converter Clutch
PLU	-Partial Lockup
REV	-Reverse Clutch
SLPK	-Solenoid Pack
SSV	-Solenoid Switch Valve
SW	-Switch
TCC	-Torque Converter Clutch
TCM	-Transmission Control Module
TP	-Throttle Position
TRD	-Torque Reduction
TRS	-Transmission Range Sensor
UD	-Underdrive Clutch
2/4	-2nd and 4th gear Clutch or Pressure Switch

6.2 DEFINITIONS

OBDII (EURO STAGE III OBD) Trip - A vehicle start and drive cycle such that all once per trip diagnostic monitors have run.

Key Start - A vehicle start and run cycle of at least 20 seconds.

Warm-up Cycle - A vehicle start and run cycle such that the engine coolant must rise to at least 71°C (160°F) and must rise by at least 4.4°C (40°F) from initial start up. To count as a warm-up cycle, no DTC may occur during the cycle.

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

Symptom:
*NO RESPONSE FROM TRANSMISSION CONTROL MODULE

POSSIBLE CAUSES
NO RESPONSE FROM TRANSMISSION CONTROL MODULE
FUSED IGNITION SWITCH OUTPUT (RUN/ST) CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT (START) CIRCUIT OPEN
FUSED B(+) CIRCUIT OPEN
GROUND CIRCUIT(S) OPEN
TRANSMISSION CONTROL MODULE
PCI BUS CIRCUIT OPEN
BODY CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, attempt to communicate with the Powertrain Control Module (PCM). With the DRB, attempt to communicate with the Body Control Module (BCM). Was the DRB able to I/D or establish communications with both of the modules? Yes → Go To 2 No → Refer to the Communications category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
2	Turn the ignition off. Disconnect the TCM harness connector. Turn the ignition on. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output (Run/St) circuit. **Note: The light must illuminate brightly, if it does not light, or lights dimly, the circuit must be repaired. If there is any doubt, compare the brightness when testing the circuit, to the brightness when connected directly to the battery positive post.** Is the test light illuminated? Yes → Go To 3 No → Repair the Fused Ignition Switch Output (Run/St) circuit for an open. Refer to the wiring diagrams located in the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

*NO RESPONSE FROM TRANSMISSION CONTROL MODULE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the TCM harness connector. Remove the starter relay from the PDC. Using a 12-volt test light connected to ground, probe the Fused Ignition Switch Output (Start) circuit. **Note: The light must illuminate brightly, if it does not light, or lights dimly, the circuit must be repaired. If there is any doubt, compare the brightness when testing the circuit, to the brightness when connected directly to the battery positive post.** Observe the test light while momentarily turning the ignition switch to the Start position. Is the test light illuminated? Yes → Go To 4 No → Repair the Fused Ignition Switch Output (Start) circuit for an open. Refer to the wiring diagrams located in the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. **Note: Reinstall the original Starter Relay.**	All
4	Turn the ignition off. Disconnect the TCM harness connector. Using a 12-volt test light connected to ground, probe the Fused B(+) circuit. **Note: The light must illuminate brightly, if it does not light, or lights dimly, the circuit must be repaired. If there is any doubt, compare the brightness when testing the circuit, to the brightness when connected directly to the battery positive post.** Is the test light illuminated? Yes → Go To 5 No → Repair the Fused B(+) circuit for an open. Refer to the wiring diagrams located in the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the TCM harness connector. Using a 12-volt test light connected to 12-volts, probe each ground circuit in the TCM connector. **NOTE: The light must illuminate brightly, if it does not light, or lights dimly, the circuit must be repaired. If there is any doubt, compare the brightness when testing the circuit, to the brightness when connected directly to the battery negative post.** Is the light illuminated at all ground circuits? Yes → Go To 6 No → Repair the Ground circuit(s) for an open. Check the main ground connection to engine block and/or chassis. Refer to the wiring diagrams located in the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

*NO RESPONSE FROM TRANSMISSION CONTROL MODULE — Continued

TEST	ACTION	APPLICABILITY
6	**Note: Ensure there is PCI Bus communication with other modules on the vehicle before proceeding. If not, refer to the symptom list from the menu and repair as necessary.** Disconnect the TCM harness connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. With the DRBIII®, select Pep Module Tools. Select lab scope. Select Live Data. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Set Probe to x10. Press F2 again when complete. Connect the Black lead to the chassis ground. Connect the Red lead to the PCI Bus circuit in the TCM connector. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. Does the voltage pulse from 0 to approximately 7.5 volts? Yes → Replace the Transmission Control Module in accordance with the service information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 7	All
7	Disconnect the TCM harness connector. Disconnect the BCM C3 harness connector. Measure the resistance of the PCI bus circuit between the TCM connector and the BCM C3 connector. Is the resistance below 5.0 ohms? Yes → Replace the Body Control Module in accordance with the service information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Repair the PCI Bus circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P0120-THROTTLE POSITION SENSOR SIGNAL CIRCUIT

When Monitored and Set Condition:

P0120-THROTTLE POSITION SENSOR SIGNAL CIRCUIT

When Monitored: Whenever the engine is running.

Set Condition: This code is set if the throttle angle goes out of range or if throttle angle changes abruptly (i.e.: faster than the throttle body motion could occur).

POSSIBLE CAUSES
RELATED PCM DTC'S PRESENT
INTERMITTENT WIRING & CONNECTORS
SENSOR GROUND CIRCUIT OPEN TO TCM
TPS SIGNAL CIRCUIT OPEN TO TCM
TPS VOLTAGE CHANGE NOT SMOOTH
TCM - TPS SIGNAL CIRCUIT

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	With the DRBIII®, check Powertrain Control Module DTC's. Are the DTCs P0122, P0123, or P0121 present in the PCM? Yes → Refer to the Driveability category for the related symptom(s). Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All

P0120-THROTTLE POSITION SENSOR SIGNAL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Start the engine. Allow the engine to idle. With the DRBIII® in Transmission Sensors, read the TPS voltage. Is the TPS voltage below 0.3 or above 1.0 volts? Yes → Go To 4 No → Go To 7	All
4	Turn the ignition off to the lock position. Disconnect the TPS harness connector. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Sensor Ground circuit between the TPS harness connector and the Transmission Control Module harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Sensor Ground circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
5	Turn the ignition off to the lock position. Disconnect the Throttle Position Sensor harness connector. Disconnect the Transmission Control Module harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the TPS Signal Circuit from the TCM harness connector to the TPS harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the TPS Signal circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
7	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wires while checking for shorts and open circuits. Pay particular attention to the the point where the TPS signal and sensor ground circuits splice off from the engine circuits. Were there any problems found? Yes → Repair wiring and/or connector as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition on. With the DRBIII®, monitor the TPS VOLTS. Slowly open and close the Throttle. Is the voltage change smooth? Yes → Test Complete. No → Replace the Throttle Position Sensor per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P0218-HIGH TEMPERATURE OPERATION ACTIVATED

When Monitored and Set Condition:

P0218-HIGH TEMPERATURE OPERATION ACTIVATED

When Monitored: Whenever the engine is running.

Set Condition: Immediately when the Overheat shift schedule is activated 116 C (240 F) Transmission oil temp.

POSSIBLE CAUSES
ENGINE COOLING SYSTEM MALFUNCTION
INCORRECT FLUID LEVEL
TRANSMISSION OIL COOLER PLUGGED
HIGH TEMPERATURE OPERATIONS ACTIVATED

TEST	ACTION	APPLICABILITY
1	Perform Engine Cooling System diagnostics per the Service Information Is the Engine Cooling System functioning properly? Yes → Go To 2 No → Repair the cause of the Engine Overheating. Refer to the Service Information for additional repair information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
2	Check the Transmission Fluid level per the Service Information. Is the Transmission Fluid Level at the proper level? Yes → Go To 3 No → Repair any Transmission Fluid leak as necessary and adjust the Transmission Fluid Level per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
3	Perform the Transmission Cooler Flow Test per the Service Information. Did the Transmission Cooler Flow Test pass? Yes → Go To 4 No → Repair the cause of the plugged Transmission Oil Cooler and flush or replace the Transmission Oil cooler as necessary per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P0218-HIGH TEMPERATURE OPERATION ACTIVATED — Continued

TEST	ACTION	APPLICABILITY
4	This DTC is an informational DTC designed to aid the Technician in diagnosing shift quality complaints. This DTC indicates that the Transmission has been operating in the ″Overheat″ shift schedule which may generate a customer complaint. The customer driving patterns may indicate the need for an additional Transmission Oil Cooler. Were there any problems found? Yes → Repair the cause of the Transmission Overheating per the Service Information. If indicated install an additional Transmission Oil Cooler. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0562-LOW BATTERY VOLTAGE

When Monitored and Set Condition:

P0562-LOW BATTERY VOLTAGE

When Monitored: With the engine running and the TCM has closed the Transmission Control Relay.

Set Condition: If battery voltage at TCM Transmission Control Relay Output Sense circuit is less than 10.0 volts for 15 seconds. *This DTC generally indicates a gradually falling battery voltage or resistive connections to the TCM.

POSSIBLE CAUSES
RELATED CHARGING SYSTEM DTCS
INTERMITTENT WIRING AND CONNECTORS
FUSED B+ CIRCUIT OPEN OR HIGH RESISTANCE
GROUND CIRCUIT OPEN OR HIGH RESISTANCE
TRANS CONTROL RELAY OUTPUT TO TCM OPEN OR HIGH RESISTANCE
TRANSMISSION CONTROL RELAY OPEN OR HIGH RESISTANCE
TCM - LOW BATTERY VOLTAGE

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0562-LOW BATTERY VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, read the PCM DTC's. Are there any Charging System related DTC's stored in the PCM? Yes → Refer to the Charging System category and repair any PCM Charging System DTC's first. NOTE: After repairing the PCM charging system DTC's, perform the Transmission Verification test to verify the transmission was not damaged. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	**NOTE: Generator, battery, and charging system must be fully functional before performing this test.** With the DRBIII®, read Transmission DTC's. With the DRBIII®, Check the STARTS SINCE SET counter for P0562. **Note: This counter only applies to the last DTC set.** Is the Starts Since Set counter for P0562 set at 0? Yes → Go To 4 No → Go To 9	All
4	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Remove the Transmission Control Relay. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Fused B+ circuit in the TCM harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 5 No → Repair the Fused B+ circuit for an open or high resistance. If the fuse is open make sure to check for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
5	Turn the ignition off to the lock position. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Using a 12-volt test light connected to 12-volts, check the ground circuits in the TCM harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly for all the ground circuits? Yes → Go To 6 No → Repair the Ground circuit(s) for an open or high resistance. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P0562-LOW BATTERY VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Using a 12-volt test light connected to ground, check both Transmission Control Relay Output circuits in the TCM harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 7 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
7	Turn the ignition off to the lock position. Install a substitute Relay in place of the Transmission Control Relay. Start the engine. Using a voltmeter, measure the battery voltage. With the DRBIII®, monitor the Transmission Switched Battery Voltage. Compare the DRBIII® Transmission Switched Battery voltage to the actual battery voltage. Is the DRBIII® voltage within 2.0 volts of the battery voltage? Yes → Replace the Transmission Control Relay. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
9	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:

P0604-INTERNAL TCM

POSSIBLE CAUSES
TCM - INTERNAL ERROR

TEST	ACTION	APPLICABILITY
1	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:

P0605-INTERNAL TCM

POSSIBLE CAUSES
TCM - INTERNAL ERROR

TEST	ACTION	APPLICABILITY
1	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P0613-INTERNAL TCM

POSSIBLE CAUSES
TCM - INTERNAL ERROR

TEST	ACTION	APPLICABILITY
1	**NOTE: Make sure this DTC is set in the TCM before making repair.** If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P0706-CHECK SHIFTER SIGNAL

When Monitored and Set Condition:

P0706-CHECK SHIFTER SIGNAL

When Monitored: Continuously with the ignition key on.

Set Condition: 3 occurrences in one key start of an invalid PRNDL code which lasts for more than 0.1 second.

POSSIBLE CAUSES
CONDITION P0706 PRESENT
INTERMITTENT WIRING AND CONNECTORS
TRS T1 SENSE CIRCUIT OPEN
TRS T3 SENSE CIRCUIT OPEN
TRS T41 SENSE CIRCUIT OPEN
TRS T42 SENSE CIRCUIT OPEN
TRS T1 SENSE CIRCUIT SHORT TO GROUND
TRS T3 SENSE CIRCUIT SHORT TO GROUND
TRS T41 SENSE CIRCUIT SHORT TO GROUND
TRS T42 SENSE CIRCUIT SHORT TO GROUND
TRS T1 SENSE CIRCUIT SHORT TO VOLTAGE
TRS T3 SENSE CIRCUIT SHORT TO VOLTAGE
TRS T41 SENSE CIRCUIT SHORT TO VOLTAGE
TRS T42 SENSE CIRCUIT SHORT TO VOLTAGE
TRANSMISSION RANGE SENSOR
TCM - TRS T1 SENSE CIRCUIT
TCM - TRS T3 SENSE CIRCUIT
TCM - TRS T41 SENSE CIRCUIT
TCM - TRS T42 SENSE CIRCUIT

P0706-CHECK SHIFTER SIGNAL — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC’s. Check and repair all engine DTC’s prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC’s. Record all DTC’s and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC’s, check and record all CVI’s. Most DTC’s set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB’s related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	Using the DRBIII®, perform the Shift Lever Position Test. Select the test outcome from the following: Test passes Go To 3 Test fails with DTC Go To 4 Test fails without DTC Adjust the shift linkage per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
3	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

P0706-CHECK SHIFTER SIGNAL — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install the Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. Ignition on, engine not running. With the DRBIII®, perform the Shift Lever Position Test. When the DRBIII ® instructs you to put the Gear Selector in a particular position, you must do so using the Transmission Simulator. The LED for the gear position in question must be illuminated prior to hitting ″enter″ on the DRBIII®. Did the test pass? Yes → Go To 5 No → Go To 6 **NOTE: Disconnect the Transmission Simulator and reconnect all the harness connectors.**	All
5	If there are no possible causes remaining, view repair. Repair Replace the Transmission Range Sensor per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
6	Ignition on, engine not running. With the DRBIII® in Inputs/Outputs, read the TRS Sense circuits C1 thru C4. Move the shift lever thru all gear positions, pausing momentarily in each gear position. Watch for one of the circuits to not change state. Pick the one that did not change state. TRS T1 sense (C4) Go To 7 TRS T3 sense (C3) Go To 11 TRS T41 sense (C1) Go To 15 TRS T42 sense (C2) Go To 19	All
7	Turn the ignition off to the lock position. Disconnect the TRS harness connector. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the TRS T1 Sense circuit from the TCM harness connector to the TRS harness connector. Is the resistance above 5.0 ohms? Yes → Repair the TRS T1 Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All

P0706-CHECK SHIFTER SIGNAL — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off to the lock position. Disconnect the TRS harness connector. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the TRS T1 circuit in the TCM harness connector. Is the resistance below 5.0 ohms? Yes → Repair the TRS T1 Sense circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All
9	Turn the ignition off to the lock position. Disconnect the TRS harness connector. Disconnect the TCM harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the TRS T1 Sense circuit at the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the TRS T1 Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 10	All
10	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
11	Turn the ignition off to the lock position. Disconnect the TRS harness connector. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the TRS T3 Sense circuit from the TCM harness connector to the TRS harness connector. Is the resistance above 5.0 ohms? Yes → Repair the TRS T3 Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 12	All
12	Turn the ignition off to the lock position. Disconnect the TRS harness connector. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the TRS T3 Sense circuit in the TCM harness connector. Is the resistance below 5.0 ohms? Yes → Repair the TRS T3 Sense circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 13	All

P0706-CHECK SHIFTER SIGNAL — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off to the lock position. Disconnect the TRS harness connector. Disconnect the TCM harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PCM. Ignition on, engine not running. Measure the voltage of the TRS T3 Sense circuit at the TCM connector. Is the voltage above 1 volt? Yes → Repair the TRS T3 Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 14	All
14	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
15	Turn the ignition off to the lock position. Disconnect the TRS harness connector. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the TRS T41 Sense circuit from the TCM connector to the TRS connector. Is the resistance above 5.0 ohms? Yes → Repair the TRS T41 Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 16	All
16	Turn the ignition off to the lock position. Disconnect the TRS harness connector. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the TRS T41 Sense circuit in the TCM harness connector. Is the resistance below 5.0 ohms? Yes → Repair the TRS T41 Sense circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 17	All

P0706-CHECK SHIFTER SIGNAL — Continued

TEST	ACTION	APPLICABILITY
17	Turn the ignition off to the lock position. Disconnect the TRS harness connector. Disconnect the TCM harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the TRS T41 Sense circuit at the TCM harness connector. Is the voltage above 1 volt? Yes → Repair the TRS T41 Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 18	All
18	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
19	Turn the ignition off to the lock position. Disconnect the TRS harness connector. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the TRS T42 Sense circuit from the TCM harness connector to the TRS harness connector. Is the resistance above 5.0 ohms? Yes → Repair the TRS T42 Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 20	All
20	Turn the ignition off to the lock position. Disconnect the TRS harness connector. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the TRS T42 Sense circuit in the TCM harness connector. Is the resistance below 5.0 ohms? Yes → Repair the TRS T42 Sense circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 21	All

P0706-CHECK SHIFTER SIGNAL — Continued

TEST	ACTION	APPLICABILITY
21	Turn the ignition off to the lock position. Disconnect the TRS harness connector. Disconnect the TCM harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the TRS T42 Sense circuit at the TCM connector. Is the voltage above 0.5 volt? Yes → Repair the TRS T42 Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 22	All
22	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P0715-INPUT SPEED SENSOR ERROR

When Monitored and Set Condition:

P0715-INPUT SPEED SENSOR ERROR

When Monitored: The transmission gear ratio is monitored continuously while the transmission is in gear.

Set Condition: If there is an excessive change in input RPM in any gear.

POSSIBLE CAUSES
INTERMITTENT WIRING AND CONNECTORS
INPUT SPEED SENSOR SIGNAL CIRCUIT OPEN
SPEED SENSOR GROUND CIRCUIT OPEN
INPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO GROUND
INPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE
SPEED SENSOR GROUND CIRCUIT SHORT TO VOLTAGE
INPUT SPEED SENSOR ERROR
TCM - INPUT SPEED SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0715-INPUT SPEED SENSOR ERROR — Continued

TEST	ACTION	APPLICABILITY
2	Start the engine in park. With the DRBIII®, read the Input RPM. Is the Input RPM reading below 400 RPM? Yes → Go To 3 No → Go To 11	All
3	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. Ignition on, engine not running. With the Transmission Simulator, set the ″Input/Output Speed″ switch to ″ON″ and the rotary switch to the ″3000/1250″ position. With the DRBIII®, monitor the Input and Output RPM. Does the Input RPM read 3000 RPM and the Output RPM read 1250 RPM +/- 50 RPM? Yes → Go To 4 No → Go To 5 **NOTE: Disconnect the Transmission Simulator and reconnect all harness connectors.**	All
4	If there are no possible causes remaining, view repair. Repair Replace the Input Speed Sensor per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
5	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Input Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Input Speed Sensor Signal circuit from the TCM harness connector to the Input Speed Sensor harness connector. Is the resistance above 5.0 ohms? Yes → Repair the Input Speed Sensor Signal circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Input Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Speed Sensor Ground circuit from the TCM harness connector to the Input Speed Sensor harness connector. Is the resistance above 5.0 ohms? Yes → Repair the Speed Sensor Ground circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 7	All

P0715-INPUT SPEED SENSOR ERROR — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Input Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Input Speed Sensor signal circuit. Is the resistance Below 5.0 ohms? Yes → Repair the Input Speed Sensor Signal circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the Input Speed Sensor harness connector. Disconnect the TCM harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector. Ignition on, engine not running. Measure the voltage of the Input Speed Sensor Signal circuit in the TCM harness connector. Is the voltage above 0.5 volts? Yes → Repair the Input Speed Sensor Signal circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All
9	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the TRS harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the Speed Sensor Ground circuit in the TCM harness connector. Is the voltage above 0.5 volts? Yes → Repair the Speed Sensor Ground circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 10	All
10	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P0715-INPUT SPEED SENSOR ERROR — Continued

TEST	ACTION	APPLICABILITY
11	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0720-OUTPUT SPEED SENSOR ERROR

When Monitored and Set Condition:

P0720-OUTPUT SPEED SENSOR ERROR

When Monitored: The transmission gear ratio is monitored continuously while the transmission is in gear.

Set Condition: If there is an excessive change in output RPM in any gear.

POSSIBLE CAUSES
INTERMITTENT WIRING AND CONNECTORS
OUTPUT SPEED SENSOR SIGNAL CIRCUIT OPEN
SPEED SENSOR GROUND CIRCUIT OPEN
OUTPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO GROUND
OUTPUT SPEED SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE
SPEED SENSOR GROUND CIRCUIT SHORT TO VOLTAGE
OUTPUT SPEED SENSOR ERROR
TCM - OUTPUT SPEED SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0720-OUTPUT SPEED SENSOR ERROR — Continued

TEST	ACTION	APPLICABILITY
2	Start the engine in park. Raise the drive wheels off of the ground. **WARNING: PROPERLY SUPPORT THE VEHICLE.** Place transmission in drive, release foot from brake. **WARNING: BE SURE TO KEEP HANDS AND FEET CLEAR OF ROTATING WHEELS.** **Note: The drive wheels must be turning at this point.** With the DRBIII®, read the Output RPM Is the Output RPM below 100 RPM? Yes → Go To 3 No → Go To 11	All
3	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. Ignition on, engine not running. With the Transmission Simulator, set the ″Input/Output Speed″ switch to ″ON″ and the rotary switch to the ″3000/1250″ position. With the DRBIII®, read the Input RPM and Output RPM. Does the Input RPM read 3000 and the Output RPM read 1250 +/- 50 RPM? Yes → Go To 4 No → Go To 5	All
4	If there are no possible causes remaining, view repair. Repair Replace the Output Speed Sensor per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
5	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Output Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Output Speed Sensor Signal circuit from the TCM harness connector to the Output Speed Sensor harness connector. Is the resistance above 5.0 ohms? Yes → Repair the Output Speed Sensor Signal circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Output Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Speed Sensor Ground circuit from the TCM harness connector to the Output Speed Sensor harness connector. Is the resistance above 5.0 ohms? Yes → Repair the Speed Sensor Ground circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 7	All

P0720-OUTPUT SPEED SENSOR ERROR — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Output Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Output Speed Sensor Signal circuit. Is the resistance Below 5.0 ohms? Yes → Repair the Output Speed Sensor Signal circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Simulator. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B(+) and Transmission Control Relay Output circuits in the Transmission Control Relay connector (In PDC). Ignition on, engine not running. Measure the voltage of the Output Speed Sensor Signal circuit in the TCM connector. Is the voltage above 3.0 volts? Yes → Repair Output Speed Sensor Signal circuit short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All
9	Turn ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the TRS harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B(+) and Transmission Control Relay Output circuits in the Transmission Control Relay connector (In PDC). Ignition on, engine not running. Measure the voltage of the Speed Sensor Ground circuit in the TCM connector. Is the voltage above 3.0 volts? Yes → Repair the Speed Sensor Ground circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 10	All
10	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P0720-OUTPUT SPEED SENSOR ERROR — Continued

TEST	ACTION	APPLICABILITY
11	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0725-ENGINE SPEED SENSOR CIRCUIT

When Monitored and Set Condition:

P0725-ENGINE SPEED SENSOR CIRCUIT

When Monitored: Whenever the engine is running.

Set Condition: Engine RPM less than 390 or greater than 8000 for more than 2 seconds while the engine is running.

POSSIBLE CAUSES
INTERMITTENT WIRING & CONNECTORS CONDITIONS
EATX RPM SIGNAL CIRCUIT OPEN
EATX RPM SIGNAL CIRCUIT SHORTED TO GROUND
EATX RPM SIGNAL CIRCUIT SHORTED TO VOLTAGE
PCM-INTERNAL CONTROLLER
TCM-INTERNAL CONTROLLER

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0725-ENGINE SPEED SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: This code is not a Transmission Input Speed Sensor DTC** With the DRBIII®, Check the STARTS SINCE SET counter. **NOTE: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter set at 0? Yes → Go To 3 No → Go To 8	All
3	Turn ignition off to the lock position. Disconnect the Powertrain Control Module (PCM) harness connector. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the EATX RPM signal circuit between the TCM connector and the PCM connector. Is the resistance above 5.0 ohms? Yes → Repair the open EATX RPM Signal circuit. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn ignition off to the lock position. Disconnect the Powertrain Control Module (PCM) harness connector. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the EATX RPM Signal circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the EATX RPM Signal circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn ignition off to the lock position. Disconnect the PCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Measure the voltage of the EATX RPM Signal circuit in the PCM connector. Is the voltage above 10.0 volts? Yes → Repair the EATX RPM Signal circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off to the lock position. Disconnect the Powertrain Control Module-PCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Measure the voltage between the EATX RPM Signal circuit and ground at the PCM harness connector. Is the voltage between 4.5 and 5.5 volts? Yes → Replace the PCM. Replace and program the PCM Module in accordance with the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 7	All

P0725-ENGINE SPEED SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
8	The conditions necessary to set the DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wires while checking for shorts and open circuits. Check the power and ground circuits of the Transmission Control Module. Check the vehicles battery condition. Were any problems found? Yes → Repair wiring and/or connectors as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0731-GEAR RATIO ERROR IN 1ST

When Monitored and Set Condition:

P0731-GEAR RATIO ERROR IN 1ST

When Monitored: The Transmission Gear Ratio is monitored continuously while the Transmission is in gear.

Set Condition: If the ratio of the input RPM to the output RPM does not match the current Gear Ratio.

POSSIBLE CAUSES
RELATED DTC'S PRESENT
INTERMITTENT GEAR RATIO ERRORS
TRANSMISSION - INTERNAL

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	With the DRBIII®, read Transmission DTC's If any of these DTC's are present, perform their respective tests first. Are the DTC's P0944, P0715, P0720, P1794, or P0867 present also? Yes → Refer to the Transmission category and perform the appropriate symptom. If any of these DTC's are present, they will cause a gear ratio error. If the DTC P0944 is present perform its respective test first. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All

P0731-GEAR RATIO ERROR IN 1ST — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, perform the 1st Gear Clutch Test. Follow the instructions on the DRBIII®. Increase the throttle angle, TPS Degree, to 30° for no more than a few seconds. **CAUTION: Do not overheat the transmission.** Did the Clutch Test pass, Input Speed remain at 0? Yes → Go To 4 No → Go To 5	All
4	The conditions to set this DTC are not present at this time. Check the gearshift linkage adjustment. Gear ratio DTC's can be set by problems in the Input and Output Speed Sensor circuits. If the vehicle passes the clutch test and still sets gear ratio DTC('s), check the Speed Sensors for proper operation. **NOTE: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Check the Speed Sensor wiring and connectors for good connection, then perform a wiggle test using the Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. This DTC can also be set under extreme temperature conditions, this is usually caused by an internal problem. Verify if the problem is only experienced under extreme hot or cold conditions. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All
5	If there are no possible causes remaining, view repair. Repair Repair internal transmission problem. Check all components related to the Underdrive and L/R clutches. Inspect the Oil Pump per the Service Information and repair or replace as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P0732-GEAR RATIO ERROR IN 2ND

When Monitored and Set Condition:

P0732-GEAR RATIO ERROR IN 2ND

When Monitored: The Transmission Gear Ratio is monitored continuously while the Transmission is in Gear.

Set Condition: If the ratio of the input RPM to the output RPM does not match the current Gear Ratio.

POSSIBLE CAUSES
RELATED DTC'S PRESENT
RELATED PRESSURE SWITCH DTC'S PRESENT
INTERMITTENT GEAR RATIO ERRORS
TRANSMISSION - INTERNAL

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0732-GEAR RATIO ERROR IN 2ND — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, read Transmission DTC's If any of these DTC's are present, perform their respective tests first. Are the DTC's P0944, P0715, P0720, P1794, or P0867 present also? Yes → Refer to the Transmission category and perform the appropriate symptom. If any of these DTC's are present, they will cause a gear ratio error. If the DTC P0944 is present perform its respective tests first. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII®, perform the 2nd Gear Clutch Test. Follow the instructions on the DRBIII®. Increase the Throttle Angle, TPS Degree, to 30° for no more than a few seconds. **CAUTION: Do not overheat the transmission.** Did the Clutch Test pass, Input Speed remain at 0? Yes → Go To 4 No → Go To 5	All
4	The conditions to set this DTC are not present at this time. Check the gearshift linkage adjustment. Gear ratio DTC's can be set by problems in the Input and Output Speed Sensor circuits. If the vehicle passes the clutch test and still sets Gear Ratio DTC(s), check the Speed Sensors for proper operation. **NOTE: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Check the Speed Sensor wiring and connectors for good connection, then perform a wiggle test using the Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. This DTC can also be set under extreme temperature conditions, this is usually caused by an internal problem. Verify if the problem is only experienced under extreme hot or cold conditions. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All
5	With the DRBIII®, read Transmission DTC's. Is the DTC P0845 and/or P0846 present also? Yes → Replace the Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Repair internal transmission problem. Check all of the components related to the Underdrive and 2/4 clutches. Inspect the Oil Pump per the Service Information and repair or replace as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P0733-GEAR RATIO ERROR IN 3RD

When Monitored and Set Condition:

P0733-GEAR RATIO ERROR IN 3RD

When Monitored: The Transmission Gear Ratio is monitored continuously while the Transmission is in Gear.

Set Condition: If the ratio of the input RPM to the output RPM does not match the current Gear Ratio.

POSSIBLE CAUSES
RELATED DTC'S PRESENT
RELATED PRESSURE SWITCH DTC'S PRESENT
INTERMITTENT GEAR RATIO ERRORS
TRANSMISSION - INTERNAL

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0733-GEAR RATIO ERROR IN 3RD — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, read Transmission DTC's If any of these DTC's are present, perform their respective tests first. Are the DTC's P0944, P0715, P0720, P1794, or P0867 present also? Yes → Refer to the Transmission category and perform the appropriate symptom. If any of these DTC's are present, they will cause a gear ratio error. If the DTC P0944 is present perform its respective tests first. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII®, perform the 3rd gear clutch test. Follow the instructions on the DRBIII®. Increase the throttle angle, TPS Degree, to 30° for no more than a few seconds. **CAUTION: Do not overheat the transmission.** Did the Clutch Test pass, Input Speed remain at 0? Yes → Go To 4 No → Go To 5	All
4	The conditions to set this DTC are not present at this time. Check the gearshift linkage adjustment. Gear ratio DTC's can be set by problems in the Input and Output Speed Sensor circuits. If the vehicle passes the clutch test and still sets Rear Ratio DTC(s), check the Speed Sensors for proper operation. **NOTE: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Check the speed sensor wiring and connectors for good connection, then perform a wiggle test using the Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. This DTC can also be set under extreme temperature conditions, this is usually caused by an internal problem. Verify if the problem is only experienced under extreme hot or cold conditions. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All
5	With the DRBIII®, read Transmission DTC's. Is the DTC P0870 and/or P0871 present also? Yes → Replace the Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Repair internal transmission problem. Check all of the components related to the Underdrive and Overdrive clutches. Inspect the Oil Pump per the Service Information and repair or replace as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P0734-GEAR RATIO ERROR IN 4TH

When Monitored and Set Condition:

P0734-GEAR RATIO ERROR IN 4TH

When Monitored: The Transmission Gear Ratio is monitored continuously while the Transmission is in Gear.

Set Condition: If the ratio of the input RPM to the output RPM does not match the current Gear Ratio.

POSSIBLE CAUSES
RELATED DTC'S PRESENT
RELATED PRESSURE SWITCH DTC'S PRESENT
INTERMITTENT GEAR RATIO ERRORS
TRANSMISSION - INTERNAL

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0734-GEAR RATIO ERROR IN 4TH — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, read Transmission Control Module DTC's If any of these DTC's are present, perform their respective tests first. Are the DTC's P0944, P0715, P0720, P1794, or P0867 present also? Yes → Refer to the Transmission category and perform the appropriate symptom. If any of these DTC's are present, they will cause a gear ratio error. If the DTC P0944 is present perform its respective tests first. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII®, perform the 4th gear clutch test. Follow the instructions on the DRBIII®. Increase the throttle angle, TPS Degree, to 30° for no more than a few seconds. **CAUTION: Do not overheat the transmission.** Did the Clutch Test pass, Input Speed remain at 0? Yes → Go To 4 No → Go To 5	All
4	The conditions to set this DTC are not present at this time. Check the gearshift linkage adjustment. Gear Ratio DTC's can be set by problems in the Input and Output Speed Sensor circuits. If the vehicle passes the clutch test and still sets Gear Ratio DTC(s), check the Speed Sensors for proper operation. **NOTE: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Check the Speed Sensor wiring and connectors for good connection, then perform a wiggle test using the Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. This DTC can also be set under extreme temperature conditions, this is usually caused by an internal problem. Verify if the problem is only experienced under extreme hot or cold conditions. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All
5	With the DRBIII®, read Transmission DTC's. Is the DTC P0845 and/or P0846 present also? Yes → Replace the Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Repair internal transmission problem. Check all of the components related to the Overdrive and 2/4 clutches. Inspect the Oil Pump per the Service Information and repair or replace as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P0736-GEAR RATIO ERROR IN REVERSE

When Monitored and Set Condition:

P0736-GEAR RATIO ERROR IN REVERSE

When Monitored: The Transmission Gear Ratio is monitored continuously while the Transmission is in Gear.

Set Condition: If the ratio of the input RPM to the output RPM does not match the current Gear Ratio.

POSSIBLE CAUSES
RELATED DTC'S PRESENT
INTERMITTENT GEAR RATIO ERRORS
TRANSMISSION - INTERNAL

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	With the DRBIII®, read Transmission DTC's If any of these DTC's are present, perform their respective tests first. Are the DTC's P0944, P0715, P0720, P1794, or P0867 present also? Yes → Refer to the Transmission category and perform the appropriate symptom. If any of these DTC's are present, they will cause a gear ratio error. If the DTC P0944 is present perform its respective tests first. No → Go To 3	All

P0736-GEAR RATIO ERROR IN REVERSE — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, perform the Reverse gear clutch test. Follow the instructions on the DRBIII®. Increase the throttle angle, TPS Degree, to 30° for no more than a few seconds. **CAUTION: Do not overheat the Transmission.** Did the Clutch Test pass, Input Speed remain at 0? Yes → Go To 4 No → Go To 5	All
4	The conditions to set this DTC are not present at this time. Check the gearshift linkage adjustment. Gear Ratio DTC's can be set by problems in the Input and Output Speed Sensor circuits. If the vehicle passes the clutch test and still sets Gear Ratio DTC(s), check the Speed Sensors for proper operation. **NOTE: Remove the starter relay before installing the Transmission Simulator.** Check the speed sensor wiring and connectors for good connection, then perform a wiggle test using the Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. This DTC can also be set under extreme temperature conditions, this is usually caused by an internal problem. Verify if the problem is only experienced under extreme hot or cold conditions. Were there any problems found? Yes → Repair as necessary. No → Test Complete.	All
5	If there are no possible causes remaining, view repair. Repair Repair internal transmission problem. Check all of the components related to the Reverse and L/R clutches. Inspect the Oil Pump per the Service Information and repair or replace as necessary.	All

Symptom:
P0740-TORQUE CONVERTER CLUTCH CONTROL CIRCUIT

When Monitored and Set Condition:

P0740-TORQUE CONVERTER CLUTCH CONTROL CIRCUIT

When Monitored: During Electronically Modulated Converter Clutch (EMCC) Operation.

Set Condition: A) Transmission must be in EMCC, with input speed > than 1750 RPM. TCC/L-R sol achieves the maximum duty cycle & can't pull engine RPM within 60 RPM of input speed. B) Transmissions is in FEMCC & engine slips TCC > than 100 RPM for 10 seconds.

POSSIBLE CAUSES
RELATED DTC'S PRESENT
INTERMITTENT OPERATION
INTERNAL TRANSMISSION PROBLEM - TCC OUT OF RANGE

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	Ignition on, engine not running. With the DRBIII®, read Transmission DTC's Is the DTC P0750 and/or P0841 present also? Yes → Refer to the Transmission category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All

P0740-TORQUE CONVERTER CLUTCH CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Ignition on, engine not running. With the DRBIII®, record and erase Transmission DTCs. Drive the vehicle until it is fully warmed up to at least 43° C or 110° F. Perform the following steps 3 times. With the DRBIII®, monitor TPS degree. Drive the vehicle to the speed of 83 Km/h or 50 MPH and allow 4th gear to engage for at least 10 seconds. Close the throttle, then tip back in until the throttle angle, TPS degrees, is between 25 and 29 degrees. **NOTE: If you go over 30 TPS degrees, you must back off of the throttle and retry.** Did the TCC engage during any of the attempts? Yes → Go To 4 No → Go To 5	All
4	The conditions necessary to set the DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wires while checking for shorts and open circuits. This DTC can also be set under extreme temperature conditions, this is usually caused by an internal problem. Verify if the problem is only experienced under extreme hot or cold conditions. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All
5	If there are no possible causes remaining, view repair. Repair Disassemble and inspect the Valve Body per the Service Information and repair or replace as necessary. If no problems are found in the Valve Body, replace the Transmission Solenoid/Pressure Switch Assembly. Replace the Torque Converter in either case. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P0750-LR SOLENOID CIRCUIT

When Monitored and Set Condition:

P0750-LR SOLENOID CIRCUIT

When Monitored: Initially at power-up, then every 10 seconds thereafter. The solenoids will also be tested immediately after a Gear Ratio or Pressure Switch error is detected.

Set Condition: Three consecutive solenoid continuity test failures, or one failure if a test is run in response to a Gear Ratio or Pressure Switch error.

POSSIBLE CAUSES
RELATED RELAY DTC'S PRESENT
INTERMITTENT WIRING AND CONNECTORS
TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN
L/R SOLENOID CONTROL CIRCUIT OPEN
L/R SOLENOID CONTROL CIRCUIT SHORT TO GROUND
L/R SOLENOID CONTROL CIRCUIT SHORT TO VOLTAGE
L/R SOLENOID
TCM - L/R SOLENOID

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0750-LR SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	Ignition on, engine not running. With the DRBIII®, read Transmission Control Module DTC's Are there any Transmission Control Relay related DTC's P0890, P0891, or P0888 present? Yes → Refer to symptom list and perform the appropriate symptom for Transmission Control Relay related DTC's. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII®, Check the STARTS SINCE SET counter for P0750. **NOTE: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter for P0750 set at 0? Yes → Go To 4 No → Go To 11	All
4	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. Ignition on, engine not running. With the DRBIII®, actuate the L/R Solenoid. With the Transmission Simulator, monitor the L/R Solenoid LED. Did the L/R Solenoid LED on the Transmission Simulator blink on and off during actuation? Yes → Go To 5 No → Go To 6	All
5	If there are no possible causes remaining, view repair. Repair Replace the Transmission Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
6	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Solenoid/Pressure Switch Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 7 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P0750-LR SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Measure the resistance of the L/R Solenoid Control circuit from the TCM harness connector to the Transmission Solenoid/Pressure Switch Assembly harness connector. Is the resistance above 5.0 ohms? Yes → Repair the L/R Solenoid Control circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Measure the resistance between ground and the L/R Solenoid Control circuit. Is the resistance below 5.0 ohms? Yes → Repair the L/R Solenoid Control circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All
9	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the L/R Solenoid Control circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the L/R Solenoid Control circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 10	All
10	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
11	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0755-2/4 SOLENOID CIRCUIT

When Monitored and Set Condition:

P0755-2/4 SOLENOID CIRCUIT

When Monitored: Initially at power-up, then every 10 seconds thereafter. They will also be tested immediately after a Gear Ratio or Pressure Switch error is detected.

Set Condition: Three consecutive Solenoid continuity test failures, or one failure if test is run in response to a Gear Ratio or Pressure Switch error.

POSSIBLE CAUSES
RELATED RELAY DTC'S PRESENT
INTERMITTENT WIRING AND CONNECTORS
TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN
2/4 SOLENOID CONTROL CIRCUIT OPEN
2/4 SOLENOID CONTROL CIRCUIT SHORT TO GROUND
2/4 SOLENOID CONTROL CIRCUIT SHORT TO VOLTAGE
2/4 SOLENOID
TCM - 2/4 SOLENOID

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0755-2/4 SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, read Transmission Control Module DTC's Are there any Transmission Control Relay related DTC's P0890, P0891, or P0888 present?. Yes → Refer to symptom list and perform the appropriate symptom for Transmission Control Relay related DTC's. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII®, Check the STARTS SINCE SET counter. **NOTE: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter for P0755 set at 0? Yes → Go To 4 No → Go To 11	All
4	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. Ignition on, engine not running. With the DRBIII®, actuate the 2/4 Solenoid. With the Transmission Simulator, monitor the 2/4 Solenoid LED. Did the 2/4 Solenoid LED on the Transmission Simulator blink on and off during actuation? Yes → Go To 5 No → Go To 6	All
5	If there are no possible causes remaining, view repair. Repair Replace the Transmission Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
6	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Transmission Solenoid/Pressure Switch Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 7 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P0755-2/4 SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the 2/4 Solenoid Control circuit from the TCM harness connector to the Transmission Solenoid/Pressure Switch Assembly harness connector. Is the resistance above 5.0 ohms? Yes → Repair the 2/4 Solenoid Control circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the 2/4 Solenoid Control circuit. Is the resistance below 5.0 ohms? Yes → Repair the 2/4 Solenoid Control circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All
9	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the 2/4 Solenoid Control circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the 2/4 Solenoid Control circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 10	All
10	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module .WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
11	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0760-OD SOLENOID CIRCUIT

When Monitored and Set Condition:

P0760-OD SOLENOID CIRCUIT

When Monitored: Initially at power-up, then every 10 seconds thereafter. They will also be tested immediately after a Gear Ratio or Pressure Switch error is detected.

Set Condition: Three consecutive solenoid continuity test failures, or one failure if test is run in response to a Gear Ratio or Pressure Switch error.

POSSIBLE CAUSES
RELATED RELAY DTC'S PRESENT
INTERMITTENT WIRING AND CONNECTORS
TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN
OD SOLENOID CONTROL CIRCUIT OPEN
OD SOLENOID CONTROL CIRCUIT SHORT TO GROUND
OD SOLENOID CONTROL CIRCUIT SHORT TO VOLTAGE
OD SOLENOID
TCM - OD SOLENOID

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0760-OD SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, read Transmission Control Module DTC's Are there any Transmission Control Relay related DTC's P0888, P0890, or P0891 present? Yes → Refer to the Transmission category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII®, Check the STARTS SINCE SET counter for P0760. **NOTE: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter for P0760 set at 0? Yes → Go To 4 No → Go To 11	All
4	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. Ignition on, engine not running. With the Transmission Simulator, monitor the OD Solenoid LED. With the DRBIII®, actuate the OD Solenoid. Did the OD Solenoid LED on the Transmission Simulator blink on and off during actuation? Yes → Go To 5 No → Go To 6	All
5	If there are no possible causes remaining, view repair. Repair Replace the Transmission Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
6	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Solenoid/Pressure Switch Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 7 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P0760-OD SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the OD Solenoid Control circuit from the TCM harness connector to the Transmission Solenoid/Pressure Switch Assembly harness connector. Is the resistance above 5.0 ohms? Yes → Repair the OD Solenoid Control circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the OD Solenoid Control circuit. Is the resistance below 5.0 ohms? Yes → Repair the OD Solenoid Control circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All
9	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the OD Solenoid Control circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the OD Solenoid Control circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 10	All
10	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
11	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0765-UD SOLENOID CIRCUIT

When Monitored and Set Condition:

P0765-UD SOLENOID CIRCUIT

When Monitored: Initially at power-up, then every 10 seconds thereafter. They will also be tested immediately after a Gear Ratio or Pressure Switch error is detected.

Set Condition: Three consecutive Solenoid continuity test failures, or one failure if test is run in response to a Gear Ratio or Pressure Switch error.

POSSIBLE CAUSES
RELATED RELAY DTC'S PRESENT
INTERMITTENT WIRING AND CONNECTORS
TRANSMISSION RELAY OUTPUT CIRCUIT OPEN
UD SOLENOID CONTROL CIRCUIT OPEN
UD SOLENOID CONTROL CIRCUIT SHORT TO GROUND
UD SOLENOID CONTROL CIRCUIT SHORT TO VOLTAGE
UD SOLENOID
TCM - UD SOLENOID

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0765-UD SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, read Transmission Control Module DTC's Are there any Transmission Control Relay related DTC's P0890, P0891, or P0988 present? Yes → Refer to the Transmission category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII®, Check the STARTS SINCE SET counter. **NOTE: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter for P0765 set at 0? Yes → Go To 4 No → Go To 11	All
4	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. Ignition on, engine not running. With the DRBIII®, actuate the UD Solenoid. With the Transmission Simulator, monitor the UD Solenoid LED. Did the UD Solenoid LED on the Transmission Simulator blink on and off? Yes → Go To 5 No → Go To 6	All
5	If there are no possible causes remaining, view repair. Repair Replace Transmission Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
6	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Transmission Solenoid/Pressure Switch Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 7 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P0765-UD SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the UD Solenoid Control circuit from the TCM harness connector to the Transmission Solenoid/Pressure Switch Assembly harness connector. Is the resistance above 5.0 ohms? Yes → Repair the UD Solenoid Control circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the UD Solenoid Control circuit. Is the resistance below 5.0 ohms? Yes → Repair the UD Solenoid Control circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All
9	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. Connect a jumper wire between the Fused B+ circuits and Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. **Note: Check connectors - Clean/repair as necessary.** Measure the voltage of the UD Solenoid Control circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the UD Solenoid Control circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 10	All
10	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
11	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0841-LR PRESSURE SWITCH SENSE CIRCUIT

When Monitored and Set Condition:

P0841-LR PRESSURE SWITCH SENSE CIRCUIT

When Monitored: Whenever the engine is running.

Set Condition: The appropriate DTC is set if one of the Pressure Switches are open or closed at the wrong time in a given gear .

POSSIBLE CAUSES
LOSS OF PRIME DTC P0944 PRESENT
TRANSMISSION CONTROL RELAY DTCS PRESENT
TCM AND WIRING - L/R PRESSURE SWITCH
INTERMITTENT WIRING AND CONNECTORS
TRANSMISSION RELAY OUTPUT CIRCUIT OPEN
L/R PRESSURE SWITCH SENSE CIRCUIT OPEN
L/R PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
L/R PRESSURE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
TCM - L/R PRESSURE SWITCH CIRCUIT

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0841-LR PRESSURE SWITCH SENSE CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, check for other Transmission DTC's. Is the DTC P0944 present also? Yes → Refer to the Transmission category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII®, read Transmission DTC's Are there any Transmission Control Relay related DTC's P0888, P0890, or P0891 present? Yes → Refer to symptom list and perform the appropriate test for Transmission Relay related DTC's. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 4	All
4	With the DRBIII®, Check the STARTS SINCE SET counter for P0841. **NOTE: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter 2 or less? Yes → Go To 5 No → Go To 11	All
5	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. On the Transmission Simulator select L/R on the Pressure Switch selector switch. With the DRBIII®, monitor the L/R Pressure Switch state while pressing the Pressure Switch Test button on the Transmission Simulator. Did the Pressure Switch state change from OPEN to CLOSED when the test button was pressed? Yes → Replace the Transmission Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All

P0841-LR PRESSURE SWITCH SENSE CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Solenoid/Pressure Switch Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 7 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. If the fuse is open make sure to check for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
7	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the L/R Pressure Switch Sense circuit from the TCM harness connector to the Transmission Solenoid/Pressure Switch Assembly harness connector. Is the resistance above 5.0 ohms? Yes → Repair the L/R Pressure Switch Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the L/R Pressure Switch Sense circuit in the Transmission Solenoid/Pressure Switch Assembly harness connector. Is the resistance below 5.0 ohms? Yes → Repair the L/R Pressure Switch circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All

P0841-LR PRESSURE SWITCH SENSE CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the L/R Pressure Switch Sense circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the L/R Pressure Switch Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 10	All
10	If there are no possible causes remaining, view repair Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
11	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:

P0845-2/4 HYDRAULIC PRESSURE TEST FAILURE

When Monitored and Set Condition:

P0845-2/4 HYDRAULIC PRESSURE TEST FAILURE

When Monitored: In any forward gear with engine speed above 1000 RPM shortly after a shift and every minute thereafter.

Set Condition: After a shift into a forward gear, with engine speed > 1000 RPM, the TCM momentarily turns on element pressure to the clutch ckts that don't have pressure to identify the correct pressure sw closes. If the pressure sw does not close 2 times the code sets.

POSSIBLE CAUSES
LOSS OF PRIME P0944 PRESENT
RELATED DTC'S PRESENT
INTERMITTENT WIRING AND CONNECTORS
TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN
2/4 PRESSURE SWITCH SENSE CIRCUIT OPEN
2/4 PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
2/4 PRESSURE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
INTERNAL TRANSMISSION
TCM - 2/4 HYDRAULIC PRESSURE

P0845-2/4 HYDRAULIC PRESSURE TEST FAILURE — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	With the DRBIII®, check for other Transmission DTCs. Is the DTC P0944 present also? Yes → Refer to the Transmission category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII®, read Transmission DTC's. Is the DTC P0732, P0734 and/or P0846 present also? Yes → Repair internal transmission as necessary. Refer to the Service Information for the proper repair procedure for components related to the OD clutch. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 4	All
4	With the DRBIII®, Check the STARTS SINCE SET counter for P0845. **NOTE: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter 2 or less? Yes → Go To 5 No → Go To 12	All

P0845-2/4 HYDRAULIC PRESSURE TEST FAILURE — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. With the Transmission Simulator, select ″2/4″ on the Pressure Switch rotary switch. With the DRBIII®, monitor the 2/4 Pressure Switch state while pressing the Pressure Switch Test button on the Transmission Simulator. Wiggle the wiring leading to the TCM while pressing the button. Did the 2-4 Pressure Switch state change to closed and remain closed while wiggling the wires? Yes → Go To 6 No → Go To 7	All
6	If there are no possible causes remaining, view repair. Repair Disassemble and inspect the Valve Body per the Service Information and repair or replace as necessary. If there are no problems found in the Valve Body, replace the Transmission Solenoid/ Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
7	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Solenoid/Pressure Switch Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 8 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. If the fuse is open make sure to check for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
8	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the 2/4 Pressure Switch Sense circuit from the TCM harness connector to the Transmission Solenoid/Pressure Switch Assembly harness connector. Is the resistance above 5.0 ohms? Yes → Repair the 2/4 Pressure Switch Sense circuit or an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All

P0845-2/4 HYDRAULIC PRESSURE TEST FAILURE — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the 2/4 Pressure Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Repair the 2/4 Pressure Switch Sense circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 10	All
10	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the 2/4 Pressure Switch Sense circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the 2/4 Pressure Switch Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 11	All
11	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
12	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0846-2/4 PRESSURE SWITCH SENSE CIRCUIT

When Monitored and Set Condition:

P0846-2/4 PRESSURE SWITCH SENSE CIRCUIT

When Monitored: Whenever the engine is running.

Set Condition: The appropriate DTC is set if one of the Pressure Switches are open or closed at the wrong time in a given gear .

POSSIBLE CAUSES
TRANSMISSION RELAY DTC'S PRESENT
INTERMITTENT WIRING AND CONNECTORS
TRANSMISSION RELAY OUTPUT CIRCUIT OPEN
2/4 PRESSURE SWITCH SENSE CIRCUIT OPEN
2/4 PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
2/4 PRESSURE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
2/4 PRESSURE SWITCH
TCM - 2/4 PRESSURE SWITCH CIRCUIT

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0846-2/4 PRESSURE SWITCH SENSE CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, read Transmission DTC's Are there any Transmission Control Relay related DTC's P0890, P0891, or P0888 present? Yes → Refer to the Transmission category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII®, Check the STARTS SINCE SET counter. **NOTE: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter 2 or less for P0846? Yes → Go To 4 No → Go To 11	All
4	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. With the Transmission Simulator, select 2/4 on the Pressure Switch selector switch. With the DRBIII®, monitor the 2/4 Pressure Switch state while pressing the Pressure Switch Test button on the Transmission Simulator. Did the Pressure Switch state change from OPEN to CLOSED when the test button was pressed? Yes → Go To 5 No → Go To 6	All
5	If there are no possible causes remaining, view repair. Repair Replace Transmission Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
6	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Solenoid/Pressure Switch Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 7 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P0846-2/4 PRESSURE SWITCH SENSE CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the 2/4 Pressure Switch Sense circuit from the TCM harness connector to the Transmission Solenoid/Pressure Switch Assembly harness connector. Is the resistance above 5.0 ohms? Yes → Repair the 2/4 Pressure Switch Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the 2/4 Pressure Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Repair the 2/4 Pressure Switch Sense circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All
9	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the 2/4 Pressure Switch Sense circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the 2/4 Pressure Switch Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 10	All
10	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
11	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0870-OD HYDRAULIC PRESSURE TEST FAILURE

When Monitored and Set Condition:

P0870-OD HYDRAULIC PRESSURE TEST FAILURE

When Monitored: In any forward gear with engine speed above 1000 RPM shortly after a shift and every minute thereafter.

Set Condition: After a shift into a forward gear, with engine speed > 1000 RPM, the TCM momentarily turns on element pressure to the clutch ckts that don't have pressure to identify the correct pressure sw closes. If the pressure sw does not close 2 times the code sets

POSSIBLE CAUSES
LOSS OF PRIME DTC P0944 PRESENT
RELATED DTC'S PRESENT
INTERMITTENT WIRING AND CONNECTORS
TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN
OD PRESSURE SWITCH SENSE CIRCUIT OPEN
OD PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
OD PRESSURE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
INTERNAL TRANSMISSION
TCM - O/D HYDRAULIC TEST FAILURE

P0870-OD HYDRAULIC PRESSURE TEST FAILURE — Continued

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	With the DRBIII®, check for other Transmission DTCs. Is the DTC P0944 present also? Yes → Refer to the Transmission category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII®, read Transmission DTC's. Is the DTC P0733 and/or P0871 present also? Yes → Replace the Transmission or Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 4	All
4	With the DRBIII®, Check the STARTS SINCE SET counter for P0870. **NOTE: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter 2 or less? Yes → Go To 5 No → Go To 12	All

P0870-OD HYDRAULIC PRESSURE TEST FAILURE — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. **Note: Check connectors - Clean/repair as necessary.** With the Transmission Simulator, select ″OD″ on the Pressure Switch rotary switch. With the DRBIII®, monitor the OD Pressure Switch state while pressing the Pressure Switch Test button on the Transmission Simulator. Wiggle the wires leading to the TCM while pressing the button. Did the O/D Pressure Switch state change to closed and remain closed while wiggling the wires? Yes → Go To 6 No → Go To 7	All
6	If there are no possible causes remaining, view repair. Repair Disassemble and inspect the Valve Body per the Service Information and repair or replace as necessary. If no problems are found in the Valve Body, replace the Transmission Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
7	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Solenoid/Pressure Switch Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 8 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. If the fuse is open make sure to check for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
8	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the OD Pressure Switch Sense circuit in the Transmission Solenoid/Pressure Switch Assembly harness connector.. Is the resistance above 5.0 ohms? Yes → Repair the O/D Pressure Switch Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All

P0870-OD HYDRAULIC PRESSURE TEST FAILURE — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the OD Pressure Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Repair the OD Pressure Switch Sense circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 10	All
10	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the OD Pressure Switch Sense circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair OD Pressure Switch Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 11	All
11	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
12	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0871-OD PRESSURE SWITCH SENSE CIRCUIT

When Monitored and Set Condition:

P0871-OD PRESSURE SWITCH SENSE CIRCUIT

When Monitored: Whenever the engine is running.

Set Condition: The appropriate DTC is set if one of the Pressure Switches are open or closed at the wrong time in a given gear.

POSSIBLE CAUSES
TRANSMISSION RELAY DTCS PRESENT
INTERMITTENT WIRING AND CONNECTORS
TRANSMISSION RELAY OUTPUT CIRCUIT OPEN
O/D PRESSURE SWITCH SENSE CIRCUIT OPEN
O/D PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
O/D PRESSURE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
O/D PRESSURE SWITCH INOPERATIVE
TCM - O/D PRESSURE SWITCH

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0871-OD PRESSURE SWITCH SENSE CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, read Transmission DTC's Are there any Transmission Control Relay related DTC's P0890, P0891, or P0888 present? Yes → Refer to the Transmission category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII®, Check the STARTS SINCE SET counter. **NOTE: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter 2 or less for P0871? Yes → Go To 4 No → Go To 11	All
4	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. On the Transmission Simulator select OD on the Pressure Switch selector switch. With the DRBIII®, monitor the OD Pressure Switch state while pressing the Pressure Switch Test button on the Transmission Simulator. Did the Pressure Switch state change from OPEN to CLOSED when the test button was pressed? Yes → Go To 5 No → Go To 6	All
5	If there are no possible causes remaining, view repair. Repair Replace Transmission Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
6	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Solenoid/Pressure Switch Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 7 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. If the fuse is open make sure to check for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P0871-OD PRESSURE SWITCH SENSE CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the O/D Pressure Switch Sense circuit from the TCM harness connector to the Transmission Solenoid/Pressure Switch Assembly harness connector. Is the resistance above 5.0 ohms? Yes → Repair the O/D Pressure Switch Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the O/D Pressure Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Repair the O/D Pressure Switch circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All
9	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the IPM. Ignition on, engine not running. Measure the voltage of the O/D Pressure Switch Sense circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the O/D Pressure Switch Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 10	All
10	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
11	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0884-POWER UP AT SPEED

When Monitored and Set Condition:

P0884-POWER UP AT SPEED

When Monitored: When Transmission Control Module initially powers-up.

Set Condition: If the TCM powers up and senses a valid forward gear PRNDL DTC and the Output RPM is above 800 RPM (approximately 32 Km/h or 20 MPH) then the DTC will set.

POSSIBLE CAUSES
POWER UP AT SPEED

TEST	ACTION	APPLICABILITY
1	This DTC is set when the TCM is initialized while the vehicle is moving down the road in a valid forward gear. Check all of the Fused B+, Fused Ignition Switch Output, and Ground circuits to the TCM for an intermittent open or short to ground. Were there any problems found? Yes → Repair wiring and/or connectors as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0888-RELAY OUTPUT ALWAYS OFF

When Monitored and Set Condition:

P0888-RELAY OUTPUT ALWAYS OFF

When Monitored: Continuously

Set Condition: This code is set when less than 3 volts are present at the transmission control relay output circuits at the Transmission Control Module when the TCM is energizing the relay.

POSSIBLE CAUSES
INTERMITTENT WIRING AND CONNECTORS
FUSED B+ CIRCUIT OPEN
TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN
TRANSMISSION RELAY CONTROL CIRCUIT OPEN
TRANSMISSION CONTROL RELAY GROUND CIRCUIT OPEN
TRANSMISSION CONTROL RELAY STUCK OPEN
TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT SHORT TO GROUND
TRANSMISSION RELAY CONTROL CIRCUIT SHORT TO GROUND
TCM - TRANSMISSION CONTROL RELAY ALWAYS OFF

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0888-RELAY OUTPUT ALWAYS OFF — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, Check the STARTS SINCE SET counter for P0888. **Note: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter set at 0? Yes → Go To 3 No → Go To 10	All
3	Turn the ignition off to the lock position. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Fused B+ circuit in the Transmission Control Relay connector in the PDC. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 4 No → Repair the Fused B+ circuit for an open or high resistance. If the fuse is open make sure to check for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
4	Turn the ignition off to the lock position. Remove the Transmission Control Relay from the PDC. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Transmission Control Relay Control circuit between the Transmission Control Relay connector and the TCM harness connector. Is the resistance above 5.0 ohms? Yes → Repair the Transmission Control Relay Control circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off to the lock position. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Using a 12-volt test light connected to 12-volts, check the Transmission Control Relay Ground circuit. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Transmission Control Relay Ground circuit for an open or high resistance. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P0888-RELAY OUTPUT ALWAYS OFF — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the three Transmission Control Relay Output circuits. **NOTE: There are three Transmission Relay Output circuits. Two are located in the TCM harness connector and one located in the Transmission Solenoid/Pressure Switch Assembly harness connector** **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly on all three Transmission Control Relay Output circuits? Yes → Go To 7 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
7	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Transmission Control Relay Output circuit. Is the resistance below 5.0 ohms? Yes → Repair the Transmission Control Relay Output circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Transmission Relay Control circuit. Is the resistance below 5.0 ohms? Yes → Repair the Transmission Control Relay Control circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All

P0888-RELAY OUTPUT ALWAYS OFF — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Install a substitute Relay in place of the Transmission Control Relay. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. With the DRBIII®, actuate the Transmission Control Relay. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Transmission Solenoid /Pressure Switch Assembly harness connector. Does the test light blink on and off? Yes → Replace the Transmission Control Relay. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Replace the TCM. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
10	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0890-SWITCHED BATTERY

When Monitored and Set Condition:

P0890-SWITCHED BATTERY

When Monitored: Ignition key is turned from the OFF position to RUN position and/or ignition key is turned from the CRANK position to RUN position.

Set Condition: This DTC is set if the Transmission Control Module senses voltage on any of the Pressure Switch Inputs prior to the TCM energizing the Transmission Control Relay.

POSSIBLE CAUSES
INTERMITTENT WIRING AND CONNECTORS
2/4 PRESSURE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
L/R PRESSURE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
OD PRESSURE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
TCM - SWITCHED BATTERY

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	With the DRBIII®, Check the STARTS SINCE SET counter for P0890. **Note: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter for P0890 set at 0? Yes → Go To 3 No → Go To 7	All

P0890-SWITCHED BATTERY — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the 2-4 Pressure Switch Sense circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the 2/4 Pressure Switch Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the L/R Pressure Switch Sense circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the L/R Pressure Switch Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the OD Pressure Switch Sense circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the OD Pressure Switch Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P0890-SWITCHED BATTERY — Continued

TEST	ACTION	APPLICABILITY
7	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0891-TRANSMISSION RELAY ALWAYS ON

When Monitored and Set Condition:

P0891-TRANSMISSION RELAY ALWAYS ON

When Monitored: When ignition key is turned from the OFF position to the RUN position and/or ignition is turned from the CRANK position to RUN position.

Set Condition: This DTC is set if the Transmission Control Module senses greater than 3 volts at the Transmission Control Relay Output terminal of the TCM prior to the TCM energizing the relay.

POSSIBLE CAUSES
INTERMITTENT WIRING AND CONNECTORS
TRANSMISSION CONTROL RELAY STUCK CLOSED
TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT SHORT TO VOLTAGE
TRANSMISSION RELAY CONTROL CIRCUIT SHORT TO VOLTAGE
TCM - TRANSMISSION RELAY ALWAYS ON

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0891-TRANSMISSION RELAY ALWAYS ON — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, check the STARTS SINCE SET counter for P0891. **Note: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter set to 0? Yes → Go To 3 No → Go To 7	All
3	Turn the ignition off to the lock position. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the Fused B+ circuit and the Transmission Control Relay Output Circuit in the Transmission Control Relay. Is the resistance above 5.0 ohms? Yes → Go To 4 No → Replace the Transmission Control Relay. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
4	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Measure the voltage of the Transmission Control Relay Output circuit in the Solenoid/Pressure Switch Assembly harness connector. Is the voltage above 0.5 volt? Yes → Repair the Transmission Control Relay Output circuit for a short to voltage Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off to the lock position. Remove the Transmission Control Relay from the PDC. Ignition on, engine not running. **Note: Check connectors - Clean/repair as necessary.** Measure the voltage of the Transmission Relay Control circuit in the PDC connector. Is the voltage above 0.5 volt? Yes → Repair Transmission Relay Control Circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P0891-TRANSMISSION RELAY ALWAYS ON — Continued

TEST	ACTION	APPLICABILITY
7	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0897-WORN OUT/BURNT TRANSAXLE FLUID

When Monitored and Set Condition:

P0897-WORN OUT/BURNT TRANSAXLE FLUID

When Monitored: With each transition from full Torque Convertor to partial Torque Convertor engagement for A/C bump prevention.

Set Condition: When vehicle shudder is detected during partial engagement (PEMCC).

POSSIBLE CAUSES
WORN OUT/ BURNT TRANSMISSION FLUID

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0897-WORN OUT/BURNT TRANSAXLE FLUID — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Remove the Transmission Oil Pan and Oil Filter per the Service Information. Install a new Transmission Oil Filter per Service Information. Reinstall Transmission Oil Pan, and refill with new Transmission Fluid per the Service Information. **Note: The Transmission Cooler must be flushed before prodceeding.** Start the engine, check and adjust the Transmission Fluid Level per Service Information. Allow the engine to idle for 10 minutes, in Park. Flush the Transmission Oil Cooler per the Service Information. Turn the ignition off. Drain and refill the Transmission Fluid. Flush the Transmission Oil Cooler again. Start the engine, check and adjust the Transmission Fluid Level per Service Information. With the DRBIII®, perform a Battery Disconnect. **Note: This must be done to re enable EMCC during an A/C Clutch engagement.** The vehicle may exhibit intermittent shudder during the first few hundred miles. **Note: The oil will gradually penetrate the TCC friction material and the shudder should disappear.** Erase the DTC and return the vehicle to the customer. Did the Code reset or does the vehicle still shudder after a few thousand miles? Yes → Replace the Torque Convertor per the Service Information. Note: After replacing the Torque Convertor, use the DRBIII to perform the TCC Break In procedure. This will prevent a possible shudder condition. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0944-LOSS OF PRIME

When Monitored and Set Condition:

P0944-LOSS OF PRIME

When Monitored: If the transmission is slipping in any forward gear and the pressure switches are not indicating pressure, a loss of prime test is run.

Set Condition: If the Trans. begins to slip in a forward gear & the press. switch(s) that should be closed are open a loss of prime test begins. Available elements are turned on by the TCM to see if pump prime exists.The code sets if no pressure switches respond.

POSSIBLE CAUSES
PLUGGED TRANSMISSION OIL FILTER
SHIFT LEVER POSITION
TRANSMISSION FLUID LEVEL
INTERMITTENT WIRING AND CONNECTORS
TRANSMISSION OIL PUMP

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P0944-LOSS OF PRIME — Continued

TEST	ACTION	APPLICABILITY
2	The Transmission Fluid temperature must be above 21° C or 70° F prior to checking fluid level. Adjusting fluid level on a cold transmission will result in an overfilled transmission. Check the Transmission Fluid Level per the Service Information. Is the Transmission Fluid Level at the proper level? Yes → Go To 3 No → If the Transmission Fluid is low, repair any Transmission Fluid leak as necessary and adjust the Transmission Fluid Level per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
3	Place the gear selector in park. Start the engine. **NOTE: The TRANS TEMP DEG must be at least 43° C or 110° F before performing the following steps.** The Transmission must be at operating temperature prior to checking pressure. A cold Transmission will give higher readings. Place the Transmission in Reverse. With the DRBIII®, observe the Transmission Pressure Switch states. Are any of the Pressure Switches closed? Yes → Go To 4 No → Go To 6	All
4	The conditions necessary to set this DTC are not present at this time. Test drive the vehicle. Allow the Transmission to shift through all gears and ranges. Did you experience a delayed engagement and/or a no drive condition? Yes → Go To 6 No → Go To 5	All
5	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All
6	Remove and inspect the Transmission Oil Pan and Transmission Oil Filter per the Service Information. Does the Transmission Oil Pan contain excessive debris and/or is the Oil Filter plugged? Yes → Repair the cause of the plugged Transmission Oil Filter. Refer to the Service Information for the proper repair procedure. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 7	All

P0944-LOSS OF PRIME — Continued

TEST	ACTION	APPLICABILITY
7	With the DRBIII®, perform a Shift Lever Position test. Follow the instructions on the DRBIII®. Did the Shift Lever Position Test pass? Yes → Go To 8 No → Refer to symptom list and perform test for DTC P0706. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
8	If there are no possible causes remaining, view repair. Repair Replace the Transmission Oil Pump per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P0951-AUTOSTICK SENSOR CIRCUIT

When Monitored and Set Condition:

P0951-AUTOSTICK SENSOR CIRCUIT

When Monitored: Whenever the engine is running.

Set Condition: The transmission shift lever is not in the AutoStick Position and either the Upshift or Downshift switch is closed. This code will also set if both switches are closed at the same time.

POSSIBLE CAUSES
INTERMITTENT WIRING AND CONNECTORS
UPSHIFT/DOWNSHIFT SENSE CIRCUITS SHORT TO GROUND
AUTOSTICK SWITCH
TCM - AUTOSTICK

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	With the DRBIII®, Check the STARTS SINCE SET counter. **Note: This counter only applies to the last DTC set.** Is the Starts Since Set counter equal to 0? Yes → Go To 3 No → Go To 7	All

P0951-AUTOSTICK SENSOR CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off to the lock position. Disconnect the AutoStick switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the upshift and downshift circuits in the AutoStick switch harness connector. Is the voltage above 5.0 volts? Yes → Go To 4 No → Go To 5	All
4	Turn the ignition off to the lock position. Replace the AutoStick switch. Ignition on, engine not running. With the DRBIII®, erase DTCs. Start the engine. While driving the vehicle, upshift and downshift multiple times using the AutoStick. Did the DTC return? Yes → Go To 6 No → Test Complete. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
5	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the AutoStick harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Upshift and Downshift Sense circuits. Is the resistance below 5.0 ohms? Yes → Repair the Upshift and/or Downshift Sense circuit shorted to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the TCM. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
7	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P0992- 2-4/OD HYDRAULIC PRESSURE TEST FAILURE

When Monitored and Set Condition:

P0992- 2-4/OD HYDRAULIC PRESSURE TEST FAILURE

When Monitored: In any forward gear with engine speed above 1000 RPM shortly after a shift and every minute thereafter.

Set Condition: After a shift into a forward gear, with engine speed > 1000 RPM, the TCM momentarily turns on element pressure to the clutch ckts that don't have pressure to identify the correct pressure sw closes. If the pressure sw does not close 2 times the code sets.

POSSIBLE CAUSES
CONDITION P0992 PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	**NOTE: The vehicle must be driven to set this DTC, the transmission must be warm or hot with the Engine RPM above 1000 RPM.** This DTC is an indicator of a 2/4 and/or O/D Hydraulic Pressure Switch DTC's present. Perform the tests for P0870 and/or P0845 to determine which switch is failing. If there are no possible causes remaining, view repair. Repair Refer to the Transmission category and perform the appropriate symptom for P0870 and/or P0845. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P1652-SERIAL COMMUNICATION LINK MALFUNCTION

When Monitored and Set Condition:

P1652-SERIAL COMMUNICATION LINK MALFUNCTION

When Monitored: Continuously with engine running.

Set Condition: The DTC sets in approximately 20 seconds if no BUS messages are received by the TCM.

POSSIBLE CAUSES
NO COMMUNICATION WITH MIC
NO COMMUNICATION WITH PCM
INTERMITTENT WIRING AND CONNECTORS
TCM - INTERNAL ERROR

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, erase TCM DTC's. **Note: Erase P0700 DTC in the PCM to turn the MIL light off after making transmission repairs.** Start the engine in park. Did the DTC reset after the engine was started? Yes → Go To 2 No → Go To 5	All
2	Ignition on, engine not running. With the DRBIII®, attempt communication with the MIC Can you communicate with the MIC? Yes → Go To 3 No → Refer to the Communication category for the related symptom(s). Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
3	Ignition on, engine not running. With the DRBIII®, select the following screens in order: ″BODY″ ″MIC″ ″MONITOR DISPLAY″ ″PCI BUS ENGINE INFO″. Does the DRBIII®, read ″NO RESPONSE″ from any of the listed PCM monitors? Yes → Refer to Communication Category for the related symptom(s). Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 4	All
4	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P1652-SERIAL COMMUNICATION LINK MALFUNCTION — Continued

TEST	ACTION	APPLICABILITY
5	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P1684-BATTERY WAS DISCONNECTED

When Monitored and Set Condition:

P1684-BATTERY WAS DISCONNECTED

When Monitored: Whenever the key is in the Run/Start position.

Set Condition: This code is set whenever Transmission Control Module (TCM) is disconnected from battery power B+ or ground. It will also be set during the DRBIII® Quick Battery Disconnect procedure.

POSSIBLE CAUSES
QUICK LEARN WAS PERFORMED
RECENT BATTERY DISCONNECTION
TCM WAS REPLACED OR DISCONNECTED
INTERMITTENT WIRING AND CONNECTORS
FUSED B+ CIRCUIT TO TCM OPEN
GROUND CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P1684-BATTERY WAS DISCONNECTED — Continued

TEST	ACTION	APPLICABILITY
2	Turn ignition off to the lock position. Disconnect the TCM harness connector. Ignition on, engine not running. Measure the voltage of the Fused B+ circuit in the TCM harness connector. Is the voltage below 10.0 volts? Yes → Go To 3 No → Go To 5	All
3	Turn the ignition off to the lock position. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Fused B+ circuit in the TCM harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 4 No → Repair the Fused B+ circuit for an open or high resistance. If the fuse is open make sure to check for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
4	Turn ignition off to the lock position. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Using a 12-volt test light connected to 12-volts, check all the ground circuits in the TCM harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the light illuminate brightly at all the ground circuits? Yes → Test Complete. No → Repair the Ground circuit(s) as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
5	Has the Quick Learn procedure been performed? Yes → This is the cause of the DTC. Erase the DTC and return the vehicle to the customer. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All
6	Has the battery been disconnected, lost it's charge, or been replaced recently? Yes → This is the cause of the DTC. Erase the DTC and return the vehicle to the customer. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 7	All
7	Has the TCM been replaced or disconnected? Yes → Replacing or disconnecting the TCM will set this DTC. Erase the DTC and return the vehicle to the customer. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All

P1684-BATTERY WAS DISCONNECTED — Continued

TEST	ACTION	APPLICABILITY
8	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P1687-NO COMMUNICATION WITH THE MIC

When Monitored and Set Condition:

P1687-NO COMMUNICATION WITH THE MIC

When Monitored: Continuously with engine running.

Set Condition: The code sets in approximately 25 seconds if no BUS messages are received form the MIC.

POSSIBLE CAUSES
OTHER BUS PROBLEMS PRESENT
INTERMITTENT WIRING AND CONNECTORS
MIC - NO COMMUNICATION
TCM - BUS COMMUNICATION

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, Check the STARTS SINCE SET counter for P1687. **Note: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter set at 0? Yes → Go To 2 No → Go To 5	All
2	With the DRBIII®, check all of the other modules on the vehicle for evidence of a vehicle bus problem. Bus related DTC's in other modules point to an overall vehicle bus problem. Other symptoms such as a customer complaint of intermittent operation of bus controlled features also indicate a bus problem. Does the PRNDL display indicate ″No Bus″ or is there any evidence of an overall vehicle bus problem? Yes → Refer to the Communications category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	Ignition on, engine not running. With the DRBIII®, clear all DTC's. Start the engine in park. With the DRBIII®, read the MIC DTC's. Can the DRBIII® communicate with the MIC? Yes → Go To 4 No → Refer to the Communication category and perform the appropriate symptom related to No Response to MIC. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P1687-NO COMMUNICATION WITH THE MIC — Continued

TEST	ACTION	APPLICABILITY
4	Ignition on, engine not running. With the DRBIII®, erase TCM DTC's. Start the engine in park. With the DRBIII®, read Transmission DTC's. Is the DTC, P1687- No Communication with the MIC, present? Yes → Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All
5	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P1694-BUS COMMUNICATION WITH ENGINE MODULE

When Monitored and Set Condition:

P1694-BUS COMMUNICATION WITH ENGINE MODULE

When Monitored: Continuously with ignition key on.

Set Condition: If no bus messages are received from the Powertrain Control Module for 10 seconds.

POSSIBLE CAUSES
NO COMMUNICATION WITH PCM
OTHER BUS PROBLEMS PRESENT
INTERMITTENT WIRING AND CONNECTORS
TCM - BUS COMMUNICATION

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, Check the STARTS SINCE SET counter for P1694. **Note: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter for P1694 set to 0? Yes → Go To 2 No → Go To 5	All
2	Ignition on, engine not running. With the DRBIII®, attempt to communicate with the Powertrain Control Module (PCM). Can the DRBIII® communicate with the PCM? Yes → Go To 3 No → Refer to the Communication category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
3	With the DRBIII®, check all of the other modules on the vehicle for evidence of a vehicle bus problem. Bus related DTC's in other modules point to an overall vehicle bus problem. Other symptoms such as a customer complaint of intermittent operation of bus controlled features also indicate a bus problem. Does the PRNDL display indicate ″No Bus″ or is there any evidence of an overall vehicle bus problem? Yes → Refer to the Communication category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 4	All

P1694-BUS COMMUNICATION WITH ENGINE MODULE — Continued

TEST	ACTION	APPLICABILITY
4	Ignition on, engine not running. With the DRBIII®, erase TCM DTC's. Start the engine in park. With the DRBIII®, read Transmission DTC's. Did the DTC, P1694, return? Yes → Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 5	All
5	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P1775-SOLENOID SWITCH VALVE LATCHED IN TCC POSITION

When Monitored and Set Condition:

P1775-SOLENOID SWITCH VALVE LATCHED IN TCC POSITION

When Monitored: During an attempted shift into 1st gear.

Set Condition: This DTC is set if three unsuccessful attempts are made to shift into 1st gear in one given ignition start.

POSSIBLE CAUSES
RELATED DTC P0841 PRESENT
L/R PRESSURE SWITCH INOPERATIVE
INTERMITTENT OPERATION
TRANSMISSION CONTROL RELAY OUTPUT CIRCUIT OPEN
L/R PRESSURE SWITCH SENSE CIRCUIT OPEN
L/R PRESSURE SWITCH CIRCUIT SHORT TO GROUND
L/R PRESSURE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
TCM - SOLENOID SWITCH VALVE

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P1775-SOLENOID SWITCH VALVE LATCHED IN TCC POSITION — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, check for other Transmission DTC's Is the DTC P0841 present also? Yes → Refer to the Transmission category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	Perform a visual inspection of all connectors, wiring, and cooler connections before proceeding. Repair as necessary. With the DRBIII®, Check the STARTS SINCE SET counter for P1775. **NOTE: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter 2 or less? Yes → Go To 4 No → Go To 10	All
4	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install the Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. Ignition on, engine not running. With the DRBIII®, monitor the L/R Pressure Switch state while pressing the Pressure Switch Test button on the Transmission Simulator. With the Transmission Simulator, select the L/R on the Pressure Switch selector. While observing the LR pressure switch state with the DRBIII®, depress the Pressure Switch Test button. Did the L/R Pressure Switch state change from OPEN to CLOSED when the test button was pressed? Yes → Inspect the Solenoid Switch Valve in the Valve Body per the Service Information and repair or replace as necessary. If no problems are found in Valve Body, replace the Transmission Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between Fused B+ circuit and the Transmission Control Relay Output circuit in the PDC. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Solenoid/Pressure Switch Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P1775-SOLENOID SWITCH VALVE LATCHED IN TCC POSITION — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the L/R Pressure Switch Sense circuit from the TCM harness connector to the Transmission Solenoid/Pressure Switch Assembly harness connector. Is the resistance above 5.0 ohms? Yes → Repair the L/R Pressure Switch Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 7	All
7	Turn ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the L/R Pressure Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Repair the L/R Pressure Switch Sense circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the L/R Pressure Switch Sense circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the L/R Pressure Switch Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All
9	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P1775-SOLENOID SWITCH VALVE LATCHED IN TCC POSITION — Continued

TEST	ACTION	APPLICABILITY
10	The conditions necessary to set this DTC are not present at this time. Test drive the vehicle. Did you experience any 2nd gear launches or no TCC engagement? Yes → Inspect the Valve Body for signs of a stuck valve or other problem in the SSV area. If no problems are found, replace the Solenoid/ Pressure Switch Assembly. If excessive debris is present in the Pan or Valve Body, repair cause of the debris as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P1776-SOLENOID SWITCH VALVE LATCHED IN LR POSITION

When Monitored and Set Condition:

P1776-SOLENOID SWITCH VALVE LATCHED IN LR POSITION

When Monitored: Continuously when doing partial or full EMCC (PEMCC or FEMCC).

Set Condition: This DTC will set if the TCM senses the L/R Pressure Switch closing while performing PEMCC or FEMCC or after two unsuccessful attempts to perform PEMCC or FEMCC.

POSSIBLE CAUSES
RELATED DTC P0841 PRESENT
L/R PRESSURE SWITCH INOPERATIVE
INTERMITTENT OPERATION
TRANSMISSION RELAY OUTPUT CIRCUIT OPEN
L/R PRESSURE SWITCH SENSE CIRCUIT OPEN
L/R PRESSURE SWITCH SENSE CIRCUIT SHORT TO GROUND
L/R PRESSURE SWITCH SENSE CIRCUIT SHORT TO VOLTAGE
TCM - SOLENOID SWITCH VALVE

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P1776-SOLENOID SWITCH VALVE LATCHED IN LR POSITION — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, check for other Transmission DTCs Is the DTC P0841 present also? Yes → Refer to symptom list and perform test for DTC P0841. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	Perform a visual inspection of all connectors, wiring, and cooler connections before proceeding. Repair as necessary. With the DRBIII®, Check the STARTS SINCE SET counter for P1776. **NOTE: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter 2 or less? Yes → Go To 4 No → Go To 10	All
4	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. Ignition on, engine not running. On the Transmission Simulator select L/R on the Pressure Switch selector switch. With the DRBIII®, monitor the L/R Pressure Switch state while pressing the Pressure Switch Test button on the Transmission Simulator. Did the Pressure Switch state change from OPEN to CLOSED when the test button was pressed? Yes → Inspect the Solenoid Switch Valve in the Valve Body per the Service Information and repair or replace as necessary. If no problems are found in Valve Body, replace the Transmission Solenoid/Pressure Switch Assembly per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off to the lock position. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Using a 12-volt test light connected to ground, check the Transmission Control Relay Output circuit in the Solenoid/Pressure Switch Assembly harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 6 No → Repair the Transmission Control Relay Output circuit for an open or high resistance. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P1776-SOLENOID SWITCH VALVE LATCHED IN LR POSITION — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the L/R Pressure Switch Sense circuit from the TCM harness connector to the Transmission Solenoid/Pressure Switch Assembly harness connector. Is the resistance above 5.0 ohms? Yes → Repair the L/R Pressure Switch Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 7	All
7	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the L/R Pressure Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Repair the L/R Pressure Switch Sense circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the Transmission Solenoid/Pressure Switch Assembly harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the L/R Pressure Switch Sense circuit in the TCM harness connector. Is the voltage above 0.5 volts? Yes → Repair the L/R Pressure Switch Sense circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All
9	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P1776-SOLENOID SWITCH VALVE LATCHED IN LR POSITION — Continued

TEST	ACTION	APPLICABILITY
10	The conditions necessary to set this DTC are not present at this time. Test drive the vehicle. Did you experience any 2nd gear launches or no TCC engagement? Yes → Inspect the Valve Body for signs of a stuck valve or other problem in the SSV area. If no problems are found, replace the Solenoid/ Pressure Switch Assembly. If excessive debris is present in the Pan or Valve Body, repair the cause of debris as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P1790-FAULT IMMEDIATELY AFTER SHIFT

When Monitored and Set Condition:

P1790-FAULT IMMEDIATELY AFTER SHIFT

When Monitored: After a speed ratio error is stored.

Set Condition: This code is set if the associated speed ratio code is stored within 1.3 seconds after a shift.

POSSIBLE CAUSES
CONDITION P1790 PRESENT

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	This DTC is set along with a gear ratio DTC. Perform the appropriate test for the Gear Ratio DTC stored. **NOTE: Check 1 trip failures if there are no Gear Ratio DTC's current.** If there are no possible causes remaining, view repair. Repair Refer to the Transmission category and perform the appropriate symptom. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P1793-TRD LINK COMMUNICATION ERROR

When Monitored and Set Condition:

P1793-TRD LINK COMMUNICATION ERROR

When Monitored: The transmission controller pulses the 12 volt TRD signal from the PCM to ground, during torque managed shifts with the throttle angle above 54 degrees. The TRD system is also tested whenever the vehicle is stopped and the engine speed is at idle.

Set Condition: This code is set when the Transmission Control Module (TCM) sends two subsequent torque reduction messages to the Powertrain Control Module (PCM) via the TRD link circuit and does not receive a confirmation from the PCM over the communication bus.

POSSIBLE CAUSES
RELATED DTC’S PRESENT
INTERMITTENT WIRING AND CONNECTORS
TORQUE MANAGEMENT REQUEST SENSE CIRCUIT OPEN
TORQUE MANAGEMENT REQUEST SENSE SHORT TO GROUND
TORQUE MANAGEMENT REQUEST SENSE CIRCUIT SHORT TO VOLTAGE
PCM - TRD LINK
TCM - TRD LINK

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC’s. Check and repair all engine DTC’s prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC’s. Record all DTC’s and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC’s, check and record all CVI’s. Most DTC’s set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB’s related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P1793-TRD LINK COMMUNICATION ERROR — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, read Transmission DTC's. Are any of the following DTCs P1694, P0731, P0732, P0733, P0734, P0736 present also? Yes → If any of these codes are present, disregard the P1793 DTC and refer to the symptom list for the other DTC'(s). Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	With the DRBIII®, Check the STARTS SINCE SET counter. **Note: This counter only applies to the last DTC set.** Is the STARTS SINCE SET equal to 0? Yes → Go To 4 No → Go To 9	All
4	Turn the ignition off to the lock position. Disconnect the PCM harness connector. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Torque Management Request Sense circuit from the TCM harness connector to the PCM harness connector. Is the resistance above 5.0 ohms? Yes → Repair the Torque Management Request Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off to the lock position. Disconnect the PCM harness connector. Disconnect the TCM harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Torque Management Request Sense circuit. Is the resistance below 5.0 ohms? Yes → Repair Torque Management Request Sense circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All
6	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Ignition on, engine not running. Measure the voltage of the Torque Management Request Sense circuit in the TCM harness connector. Is the voltage above 10.5 volts? Yes → Repair Torque Management Request Sense circuit short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 7	All

P1793-TRD LINK COMMUNICATION ERROR — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Ignition on, engine not running. Measure the voltage of the Torque Management Request Sense circuit in the TCM harness connector. Is the voltage above 7.0 volts? Yes → Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module per the Service Information. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
9	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P1794-SPEED SENSOR GROUND ERROR

When Monitored and Set Condition:

P1794-SPEED SENSOR GROUND ERROR

When Monitored: The transmission gear ratio is monitored continuously while the transmission is in gear.

Set Condition: After a TCM reset in neutral and Input/Output equals a ratio of input to output of 2.50

POSSIBLE CAUSES
INTERMITTENT WIRING AND CONNECTORS
SPEED SENSOR GROUND CIRCUIT OPEN
TCM - SPEED SENSOR GROUND

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	Start the engine in park. With the DRBIII®, observe the Input and Output Speed Sensor readings. Is the Output Speed Sensor reading twice the Input Speed Sensor reading? Yes → Go To 4 No → Go To 3	All

P1794-SPEED SENSOR GROUND ERROR — Continued

TEST	ACTION	APPLICABILITY
3	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 4	All
4	Turn ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. Ignition on, engine not running. Using the Transmission Simulator, set the selector switch to the 3000/1250 position. Turn the Input/Output switch to ON. With the DRBIII®, read the Input and Output Speed Sensor RPM. Does the Input Speed read 3000 RPM and the Output Speed read 1250 RPM within 50 RPM? Yes → Go To 5 No → Go To 5	All
5	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the TRS harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Input Speed Sensor Ground circuit from the TCM harness connector to the Speed Sensor harness connector. Is the resistance above 5.0 ohms? Yes → Repair the Speed Sensor Ground circuit for an open or high resistance.. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Transmission Control Module. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom:
P1797-MANUAL SHIFT OVERHEAT

When Monitored and Set Condition:

P1797-MANUAL SHIFT OVERHEAT

When Monitored: Whenever engine is running and transmission is in the AutoStick mode.

Set Condition: If the engine temperature exceeds 124° C or 255° F or the transmission temperature exceeds 135° C or 275° F while in AutoStick mode. Note: Aggressive driving or driving in low for extended periods of time in AutoStick® mode will set this DTC.

POSSIBLE CAUSES
MANUAL SHIFT OVERHEAT

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All
2	This is an informational DTC only. Check the Engine and Transmission Cooling Systems for proper operation. Check the Radiator Cooling Fan operation. Check the Transmission Cooling Fan operation if equipped. Check the Transmission Fluid Level. Make sure it is not overfilled. **NOTE: Aggressive driving or driving in low for extended periods of time in Autostick® mode will set this DTC.** Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
P1799-CALCULATED OIL TEMP IN USE

When Monitored and Set Condition:

P1799-CALCULATED OIL TEMP IN USE

When Monitored: Whenever the engine is running. The DTC is set if any of the following conditions exist for three consecutive ignition starts: The thermistor voltage is out of range (below 0.70 volts or greater than 4.94 volts)

Set Condition: If continuous erratic thermistor voltage is sensed. The thermistor temperature stays below 27° C or 80° F for an extended period time.

POSSIBLE CAUSES
INTERMITTENT WIRING AND CONNECTORS
SPEED SENSOR GROUND CIRCUIT OPEN
TRANSMISSION TEMPERATURE SENSOR SIGNAL CIRCUIT OPEN
TRANSMISSION TEMPERATURE SENSOR SIGNAL CIRCUIT SHORT TO GROUND
SPEED SENSOR GROUND CIRCUIT SHORT TO VOLTAGE
TRANSMISSION TEMPERATURE SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE
TRANSMISSION TEMPERATURE SENSOR INOPERATIVE
TCM - HI TRANSMISSION TEMPERATURE SENSOR
TCM - LO TRANSMISSION TEMPERATURE SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Low fluid level can be the cause of many Transmission problems. If the fluid level is low locate and repair the leak then check and adjust the fluid level per the Service Information.** **NOTE: Always perform diagnostics with a fully charged battery to avoid false symptoms.** With the DRBIII®, read the engine DTC's. Check and repair all engine DTC's prior to performing Transmission Symptom Diagnostics. With the DRBIII®, read Transmission DTC's. Record all DTC's and 1 Trip Failures. **NOTE: Diagnose 1 Trip Failures as a fully matured DTC.** Using the wiring diagram/schematic as a guide, inspect the wiring and connectors. Repair as necessary. Perform the Shift Lever Position Test. If the test does not pass, refer to Symptom test for P0706 Check Shifter Signal. For Gear Ratio DTC's, check and record all CVI's. Most DTC's set on start up but some must be set by driving the vehicle such that all diagnostic monitors have run. **NOTE: Verify flash level of Transmission Control Module. Some problems are corrected by software upgrades to the Transmission Control Module.** **NOTE: Check for applicable TSB's related to the symptom.** Perform this procedure prior to Symptom diagnosis. Continue Go To 2	All

P1799-CALCULATED OIL TEMP IN USE — Continued

TEST	ACTION	APPLICABILITY
2	With the DRBIII®, Check the STARTS SINCE SET counter. **NOTE: This counter only applies to the last DTC set.** Is the STARTS SINCE SET counter 2 or less? Yes → Go To 3 No → Go To 12	All
3	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. Ignition on, engine not running. With the DRBIII®, monitor the Trans Temp Volts. On the Transmission Simulator place the Thermistor Voltage Selector Switch to all three positions. Compare the DRBIII® reading with the numbers on the Transmission Simulator. Pick one that best matches your readings. DRBIII® readings always high. Go To 4 DRBIII® readings = simulator +/- 0.25 V Go To 9 DRBIII® readings always low Go To 10 DRBIII® readings erratic. Go To 12	All
4	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the TRS harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Speed Sensor Ground circuit from the TCM harness connector to the TRS harness connector. Is the resistance above 5.0 ohms? Yes → Repair the Speed Sensor Ground circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 5	All
5	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the TRS harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Transmission Temperature Sensor Signal circuit from the TCM harness connector to the TRS harness connector. Is the resistance above 5.0 ohms? Yes → Repair the Transmission Temperature Sensor Signal circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 6	All

P1799-CALCULATED OIL TEMP IN USE — Continued

TEST	ACTION	APPLICABILITY
6	Turn ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the TRS harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the Speed Sensor Ground circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair Speed Sensor Ground circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 7	All
7	Turn ignition off to the lock position. Disconnect the TCM harness connector. Remove the Transmission Control Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Fused B+ circuit and the Transmission Control Relay Output circuit in the Transmission Control Relay connector in the PDC. Ignition on, engine not running. Measure the voltage of the Transmission Temperature Sensor Signal circuit in the TCM harness connector. Is the voltage above 8.0 volts? Yes → Repair Transmission Temperature Sensor Signal circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace the TCM. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
9	If there are no possible causes remaining, view repair. Repair If the temperature readings are correct with the simulator installed, the problem must be internal.Replace TRS assembly as required. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P1799-CALCULATED OIL TEMP IN USE — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the TRS harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Transmission Temperature Sensor Signal circuit. Is the resistance below 5.0 ohms? Yes → Repair Transmission Temperature Sensor Signal circuit shorted to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 11	All
11	If there are no possible causes remaining, view repair. Repair Replace the TCM. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
12	The conditions necessary to set this DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
*BACKUP LAMPS COME ON WHILE SHIFTER IS NOT IN REVERSE POSITION

POSSIBLE CAUSES
BACKUP LAMPS ALWAYS ON
INTERMITTENT WIRING AND CONNECTORS
BACKUP LAMP SUPPLY CIRCUIT SHORT TO VOLTAGE

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. Firmly apply brakes. Place the shift lever in the position which causes the Backup Lamps to come on other than Reverse. Do the Backup Lamps come on with the shift lever not in the Reverse position? Yes → Go To 2 No → Go To 4	All
2	Ignition on, engine not running. Place the Shift Lever in the position that causes the Backup Lamps to come on other than Reverse. Disconnect the TRS harness connector. **NOTE: This will cause a DTC P0706 and possibly other DTC's to be stored in the TCM. They must be erased before returning the vehicle to the customer.** Did the Backup Lamps go out when the TRS harness connector was disconnected? Yes → Replace the Transmission Range Sensor. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	Turn the ignition off to the lock position. Disconnect the Transmission TRS harness connector. **NOTE: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Measure the voltage of the Back-up Lamp Supply circuit in the TCM harness connector. Is the voltage above 0.5 volt? Yes → Repair the Backup Lamp Supply circuit for a short to voltage. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All
4	The condition is not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
*BACKUP LAMPS INOPERATIVE

POSSIBLE CAUSES
OPEN LEFT BACKUP LAMP BULB
OPEN RIGHT BACKUP LAMP BULB
INTERMITTENT WIRING AND CONNECTORS
BACKUP LAMP GROUND CIRCUIT OPEN
BACKUP LAMP SUPPLY CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
BACKUP LAMP SUPPLY CIRCUIT SHORT TO GROUND
TRANSMISSION RANGE SENSOR

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. Place foot firmly on brake pedal. Place the shift lever in the reverse position. Do either of the Backup Lamps work? Yes → Go To 2 No → Go To 3	All
2	The condition is not present at this time. Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wiring while checking for shorts and open circuits. Were there any problems found? Yes → Repair as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All
3	Remove the left Backup Lamp bulb. Measure the resistance of the Backup Lamp bulb. Is the resistance above 5.0 ohms? Yes → Replace the Backup Lamp bulb. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 4	All
4	Remove the right Backup Lamp bulb. Measure the resistance of the Backup Lamp bulb. Is the resistance above 5.0 ohms? Yes → Replace the Backup Lamp bulb. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 5	All

*BACKUP LAMPS INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off to the lock position. **CAUTION: Remove the Starter Relay from the PDC. This will prevent the vehicle from being started in gear.** Install Transmission Simulator, Miller tool #8333 and the FWD Adapter Cable kit, Miller tool #8333-1. Ignition on, engine not running. Press the "Reverse Light Test" button on the Transmission Simulator while observing the backup lamps. Do either of the back-up lamps come on? Yes → Go To 6 No → Go To 7	All
6	If there are no possible causes remaining, view repair. Repair Replace Transmission Range Sensor. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
7	Remove the Backup Lamp bulb. Using a 12-volt test light connected to 12-volts, check the Backup Lamp Ground circuit in the Backup Lamp socket. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 8 No → Repair the Backup Lamp ground circuit for an open or high resistance. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
8	Turn the ignition off to the lock position. Remove the Backup Lamp bulb. Disconnect the Transmission TRS harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Backup Lamp Supply circuit from the Backup Lamp Socket to the TRS harness connector. Is the resistance above 5.0 ohms? Yes → Repair the Backup Lamp Supply circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 9	All
9	Turn the ignition off to the lock position. Disconnect the Transmission TRS harness connector. Ignition on, engine not running. Using a 12-volt test light connected to ground, check the Fused Ignition Switch Output circuit in the TRS harness connector. **NOTE: The test light must illuminate brightly. Compare the brightness to that of a direct connection to the battery.** Does the test light illuminate brightly? Yes → Go To 10 No → Repair the Fused Ignition Switch Output circuit for an open. If the fuse is open make sure to check for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

*BACKUP LAMPS INOPERATIVE — Continued

TEST	ACTION	APPLICABILITY
10	Turn ignition off to the lock position. Remove the Backup Lamp bulb. Disconnect the Transmission TRS harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Backup Lamp Supply circuit. Is the resistance below 5.0 ohms? Yes → Repair Backup Lamp Supply circuit for a short to ground. Check the fuse and replace if necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
*CHECKING PARK/NEUTRAL SWITCH OPERATION

POSSIBLE CAUSES
P/N POSITION SWITCH SENSE CIRCUIT OPEN
P/N POSITION SWITCH SENSE CIRCUIT SHORTED TO GROUND
TRANSMISSION RANGE SENSOR
PCM - P/N POSITION SWITCH

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read the Park/Neutral Position Switch input state. While moving the gear selector through all gear positions, Park to 1 and back to Park, watch the DRBIII® display. Did the DRBIII® display show P/N and D/R in the correct gear positions? Yes → Test Complete. No → Go To 2	All
2	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Transmission Range Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the P/N Position Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the P/N Position Switch Sense circuit for an open.	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Transmission Range Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the P/N Position Switch Sense circuit. Is the resistance above 100k ohms? Yes → Go To 4 No → Repair the P/N Position Switch Sense circuit for a short to ground.	All
4	Turn the ignition off. Disconnect the PCM harness connectors. Move the Gear selector through all gear positions, from Park to 1st and back. While moving the gear selector through each gear, measure the resistance between ground and the P/N Position Switch Sense circuit. Did the resistance change from above 10.0 ohms to below 10.0 ohms? Yes → Go To 5 No → Replace the Transmission Range Sensor.	All

*CHECKING PARK/NEUTRAL SWITCH OPERATION — Continued

TEST	ACTION	APPLICABILITY
5	If there are no possible causes remaining, view repair. Repair Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

*INCORRECT TRANSMISSION FLUID LEVEL

POSSIBLE CAUSES
INCORRECT FLUID LEVEL

TEST	ACTION	APPLICABILITY
1	The transmission must be above 70 degree F. prior to checking fluid level. Adjusting fluid level on a cold transmission will result in an overfilled transmission. Check the transmission fluid level per the service information. Is the fluid level OK? Yes → Test Complete. No → Adjust fluid level. Repair cause of incorrect fluid level.	All

Symptom:
*NO MANUAL AUTOSTICK OPERATION

POSSIBLE CAUSES
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
GROUND CIRCUIT OPEN
UPSHIFT/DOWNSHIFT CIRCUITS OPEN
UPSHIFT/DOWNSHIFT SENSE CIRCUITS SHORT TO VOLTAGE
AUTOSTICK SWITCH
TCM - AUTOSTICK

TEST	ACTION	APPLICABILITY
1	Turn the ignition off to the lock position. Disconnect the AutoStick® switch harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Upshift and Downshift Sense circuits in the AutoStick® harness connector. Is the voltage above 10.0 volts? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off to the lock position. Disconnect the AutoStick® harness connector. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Measure the voltage of the Fused Ignition Switch Output circuit in the AutoStick® harness connector. Is the voltage above 10.0 volts? Yes → Go To 3 No → Repair the Fused Ignition Switch Output circuit for an open.	All
3	Turn ignition off to the lock position. Disconnect the AutoStick® harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Autostick® Ground circuit at the AutoStick® harness connector. Is the resistance above 5.0 ohms? Yes → Repair the Ground circuit for an open. No → Go To 4	All

*NO MANUAL AUTOSTICK OPERATION — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the AutoStick® harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the Fused Ignition Switch Output and the Upshift and Downshift Sense circuits in the Autostick® harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Upshift and/or Downshift Sense circuit for a short to voltage. No → Go To 5	All
5	Turn the ignition off to the lock position. Replace the AutoStick® Switch. Ignition on, engine not running. With the DRBIII®, erase DTCs. Start the engine. While driving the vehicle, upshift and downshift multiple times using the Auto-Stick®. Does the vehicle shift properly using the AutoStick®? Yes → Test Complete. No → Go To 7	All
6	Turn the ignition off to the lock position. Disconnect the TCM harness connector. Disconnect the AutoStick® harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Upshift and Downshift Sense circuits between the TCM harness connector and the Autostick® harness connector. Is the resistance above 5.0 ohms? Yes → Repair the Upshift and/or Downshift Sense circuit for an open. No → Go To 7	All
7	If no possible causes remain,view repair. Repair Replace and program the Transmission Control Module in accordance with the Service Information. WITH THE DRBIII® PERFORM QUICK LEARN AND REPROGRAM PINION FACTOR.	All

Symptom:

*NO SPEEDOMETER OPERATION

POSSIBLE CAUSES
NO SPEEDOMETER OPERATION

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, check the pinion factor setting in the TCM. Is the pinion factor missing or set incorrectly? Yes → One possible cause is the pinion factor is not set or is set incorrectly in the TCM. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
*TRANSMISSION NOISY WITH NO DTC'S PRESENT

POSSIBLE CAUSES
INCORRECT FLUID LEVEL
INTERNAL TRANSMISSION PROBLEM - NOISY
INTERNAL TRANSMISSION PROBLEM - NOISY WHILE STANDING STILL

TEST	ACTION	APPLICABILITY
1	Check the Transmission Fluid Level per the Service Information. Is the fluid level OK? Yes → Go To 2 No → Adjust fluid level and repair cause of incorrect fluid level.	All
2	Place vehicle on hoist. **WARNING: BE SURE TO KEEP HANDS AND FEET CLEAR OF ROTATING WHEELS.** Run vehicle on hoist under conditions necessary to duplicate the noise. **NOTE: It may be necessary to test drive the vehicle to duplicate the noise.** Using Chassis Ears or other suitable listening device, verify the source of the noise. Is the noise coming from the transmission? Yes → Go To 3 No → Test Complete.	All
3	With the shift lever in neutral, raise the engine speed and listen to the noise. **NOTE: THE RADIO MUST BE TURNED OFF. Alternator noise can come through the speakers and be misinterpreted as Transmission Pump Whine. This can happen even with the volume turned down.** Does the noise get louder or change pitch while the engine speed is changing? Yes → Go To 4 No → Go To 5	All
4	If there are no possible causes remaining, view repair. Repair Repair internal transmission problem as necessary. Inspect all of the transmission components for signs of wear. If no problems found, replace the Transmission oil pump..	All
5	If there are no possible causes remaining, view repair. Repair Repair internal transmission problem as necessary. Inspect all of the transmission components for signs of wear. Pay particular attention to bearings, pinion gears, etc. Repair or replace as necessary.	All

Symptom:
*TRANSMISSION SHIFTS EARLY WITH NO DTC'S

POSSIBLE CAUSES
BUS PROBLEMS
CHECK FOR INTERMITTENT WIRING & CONNECTORS
COLD TRANSMISSION

TEST	ACTION	APPLICABILITY
1	Using the DRBIII®, check all other Modules for signs of a PCI bus problem such as bus related DTC's and/or communication problems. Check and diagnose all 1 trip failures as a hard code. Although it takes two occurences of a missed TRD link message to set the DTC P1793, one missed message will cause the transmission to short shift until the next start up. If the vehicle has any indications of a bus problem, the bus must be repaired first Do any of the other modules show signs of a bus problem? Yes → Repair the PCI bus problem. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 2	All
2	**NOTE: If the Transmission shifts too early when the Transmission is cold, this is a normal condition. The software is designed to protect the Transmission from high torque and/or high RPM shifts during cold operation.** Did the problem occur when the Transmission temperature was cold? Yes → This is a normal condition. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Go To 3	All
3	The conditions necessary to set the DTC are not present at this time. Using the schematics as a guide, inspect the wiring and connectors. Wiggle the wires while checking for shorts and open circuits. Although it takes two occurences of a missed TRD link message to set the DTC P1793, one missed message will cause the transmission to short shift until the next start up. If the vehicle has any indications of a bus problem, the bus must be repaired first Were any problems found? Yes → Repair wiring and/or connector as necessary. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Test Complete.	All

Symptom:
*TRANSMISSION SIMULATOR 8333 WILL NOT POWER UP

TEST	ACTION	APPLICABILITY
1	**NOTE: If the Transmission Simulator Miller tool #8333 will not power up, this is a symptom of the Transmission Relay being open, such as Limp-in, and/or this also could be a indication of the Transmission Simulator not installed correctly on the vehicle.** **NOTE: Check the Simulator ground cable connection.** **NOTE: Check all Transmission Simulator harness connections.** Repair these symptoms before having the Transmission Simulator Miller Tool #8333 repaired. Continue Test Complete.	All

Verification Tests

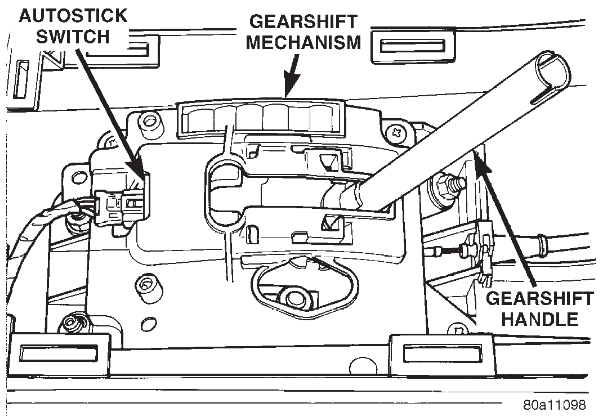
41TE TRANSMISSION VERIFICATION TEST - VER 1	APPLICABILITY
1. Connect the DRBIII® to the Data Link Connector (DLC). 2. Reconnect any disconnected components. 3. With the DRBIII®, erase all Transmission DTC's, also erase the PCM DTC's. **4. NOTE: Erase DTC P0700 in the PCM to turn the Malfunction Indicator Lamp (MIL) off after making Transmission repairs.** 5. With the DRBIII®, display Transmission Temperature. Start and run the engine until the Transmission Temperature is HOT - above 43° C or 110° F. 6. Check the Transmission Fluid and adjust if necessary. Refer to the Service information for the Fluid Fill procedure. **7. NOTE: If the Transmission Control Module or the Transmission has been repaired or replaced it is necessary to perform the DRBIII® Quick Learn Procedure and reset the "Pinion Factor"** 8. Road test the vehicle. With the DRBIII®, monitor the engine RPM. Make 15 to 20 1-2, 2-3, 3-4 upshifts. Perform these shifts from a standing start to 45 MPH with a constant throttle opening of 20 to 25 degrees. 9. Below 25 MPH, make 5 to 8 wide open throttle kickdowns to 1st gear. Allow at least 5 seconds each in 2nd and 3rd gear between each kickdown. 10. For a specific DTC, drive the vehicle to the Symptom's When Monitored/When Set conditions to verify the DTC repair. 11. If equipped with AutoStick®, up-shift and down-shift several times using the AutoStick® feature during the road test. **12. NOTE: Use the EATX OBDII Task Manager to run Good Trip time in each gear, this will confirm the repair and to ensure that the DTC has not re-matured.** 13. Check for Diagnostic Trouble Codes (DTC's) during the road test. If a DTC sets during the road test , return to the Symptom list and perform the appropriate Symptom. Were there any Diagnostic Trouble Codes (DTCs) set during the road test? Yes → Refer to the Symptom List for appropriate Symptom(s). No → Repair is complete.	All

POWERTRAIN VERIFICATION TEST VER - 2	APPLICABILITY
1. NOTE: If the PCM has been replaced and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS Module, Airbag Module and the SKIM. **2. NOTE: If the vehicle is equipped with a Sentry Key Immobilizer System, Secret Key data must be updated. Refer to the Service Information for the PCM, SKIM and the Transponder (ignition key) for programming information.** 3. Inspect the vehicle to ensure that all components related to the repair are connected properly. 4. With the DRBIII®, clear DTCs and Reset Memory all engine values. 5. Run the engine for one warm-up cycle to verify proper operation. 6. Road test the vehicle. Use all accessories that may be related to this repair. 7. With the DRBIII®, confirm that no DTC's or Secondary Indicators are present and that all components are functioning properly. 8. If this test is being performed after a No Trouble Code test, verify the symptom is no longer present. 9. If the symptom is still present, or any other symptom or DTC is present refer to the appropriate category and perform the corresponding symptom. 10. Refer to any Technical Service Bulletins that may apply. 11. If there are no DTCs present and all components are functional properly, the repair is complete. Are any DTCs present? Yes → Repair is not complete, refer to appropriate symptom. No → Repair is complete.	All

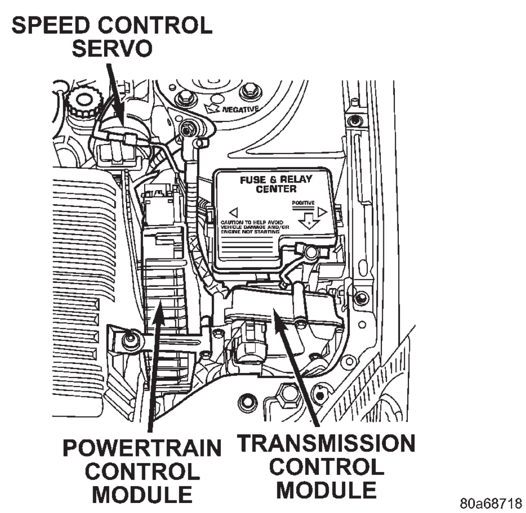
NOTES

8.0 COMPONENT LOCATIONS

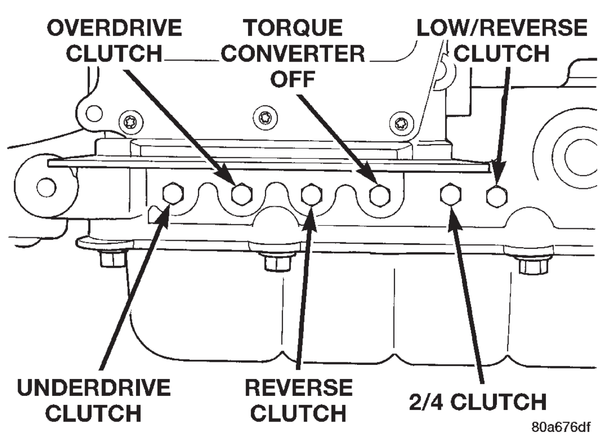
8.1 AUTOSTICK SWITCH



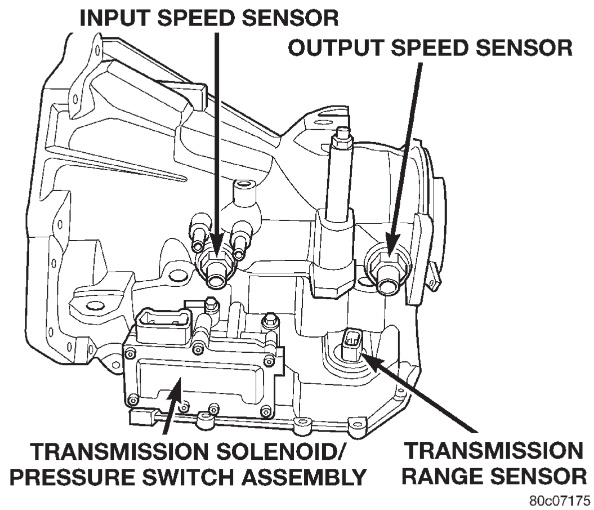
8.2 POWERTRAIN CONTROL MODULE



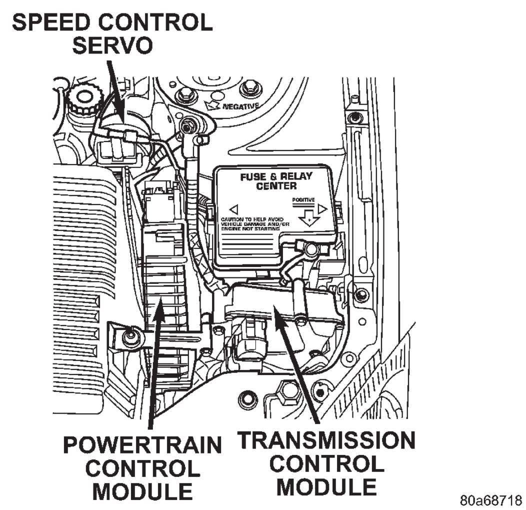
8.3 PRESSURE PORT LOCATIONS



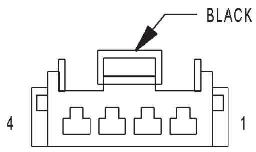
8.4 TRANSMISSION COMPONENT LOCATIONS



8.5 TRANSMISSION CONTROL MODULE



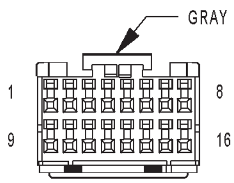
9.0 CONNECTOR PINOUTS



AUTOSTICK SWITCH

AUTOSTICK SWITCH - BLACK 4 WAY

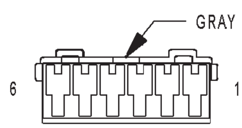
CAV	CIRCUIT	FUNCTION
1	T44 20YL (JR27)	AUTOSTICK DOWNSHIFT SWITCH SENSE
1	T44 20YL/LB (JR41)	AUTOSTICK DOWNSHIFT SWITCH SENSE
2	T5 20LG (JR27)	AUTOSTICK UPSHIFT SWITCH SENSE
2	T5 20LG/LB (JR41)	AUTOSTICK UPSHIFT SWITCH SENSE
3	Z191 20BK	GROUND
4	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)



BODY CONTROL MODULE C3

BODY CONTROL MODULE C3 - GRAY 16 WAY

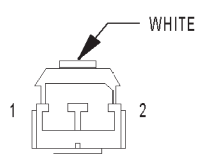
CAV	CIRCUIT	FUNCTION
1	D25 20OR	PCI BUS (PCM)
2	D25 18YL/VT	PCI BUS (ABS)
3	D25 20VT/YL	PCI BUS (TCM)
4	V55 20TN/RD	FRONT WIPER PARK SWITCH SENSE
5	V14 20RD/VT	FRONT WIPER ON/OFF RELAY CONTROL
6	V16 20VT/PK	FRONT WIPER HIGH/LOW RELAY CONTROL
7	-	-
8	-	-
9	V58 18BR/YL (JR41 BUILT-UP-EXPORT)	HEADLAMP WASHER RELAY CONTROL
10	V10 18BR	FRONT WASHER PUMP MOTOR CONTROL
11	-	-
12	-	-
13	Z132 18BK	GROUND
14	-	-
15	-	-
16	P340 18LG/YL	BATTERY FEED



BRAKE LAMP SWITCH

BRAKE LAMP SWITCH - GRAY 6 WAY

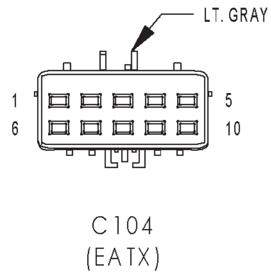
CAV	CIRCUIT	FUNCTION
1	K29 20WT/PK	BRAKE SWITCH SENSE
2	Z241 20BK/LG	GROUND
3	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
4	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
5	L50 16WT/TN	BRAKE LAMP SWITCH OUTPUT
6	A7 16RD/BK	FUSED B(+)



BRAKE TRANSMISSION SHIFT INTERLOCK SOLENOID

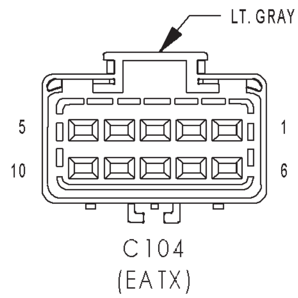
BRAKE TRANSMISSION SHIFT INTERLOCK SOLENOID - WHITE 2 WAY

CAV	CIRCUIT	FUNCTION
1	K29 18 WT/PK (JR27)	BRAKE SWITCH SENSE
1	K29 20WT/PK (JR41)	BRAKE SWITCH SENSE
2	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)



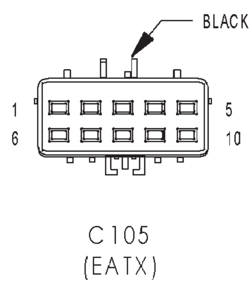
C104 (EATX) - LT. GRAY (AUTOMATIC TRANSMISSION SIDE)

CAV	CIRCUIT
1	T9 20OR/BK (JR27)
1	T9 18OR/BK (JR41)
2	T54 18VT/YL
3	T41 20BK/WT
4	-
5	T16 16RD
6	T19 18WT
7	T41 20BK/LB
8	T50 18DG
9	T59 18PK
10	T60 18BR



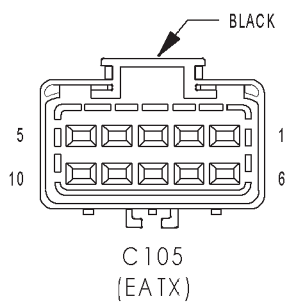
C104 (EATX) - LT. GRAY (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	T9 18OR/BK
2	T54 18VT/YL
3	T41 20BK/WT
4	-
5	T16 16RD
6	T19 18WT
7	T41 20BK/LB
8	T50 18DG
9	T59 18PK
10	T60 18BR



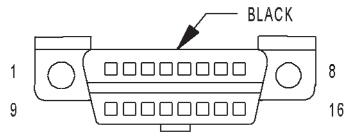
C105 (EATX) - BLACK (AUTOMATIC TRANSMISSION SIDE)

CAV	CIRCUIT
1	F20 18WT
2	T1 20LG/BK
3	T3 18VT
4	T13 18DB/BK
5	T14 18LG/WT
6	T20 18LB
7	T42 20VT/WT
8	T47 18YL/BK
9	T52 18RD/BK
10	L1 18VT/BK



C105 (EATX) - BLACK (HEADLAMP AND DASH SIDE)

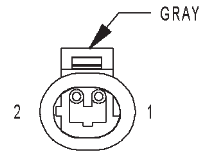
CAV	CIRCUIT
1	F20 18WT
2	T1 20LG/BK
3	T3 18VT
4	T13 20DB/BK
5	T14 20LG/WT
6	T20 18LB
7	T42 18VT/WT
8	T47 18YL/BK
9	T52 20RD/BK
10	L1 18VT/BK



DATA LINK CONNECTOR

DATA LINK CONNECTOR - BLACK 16 WAY

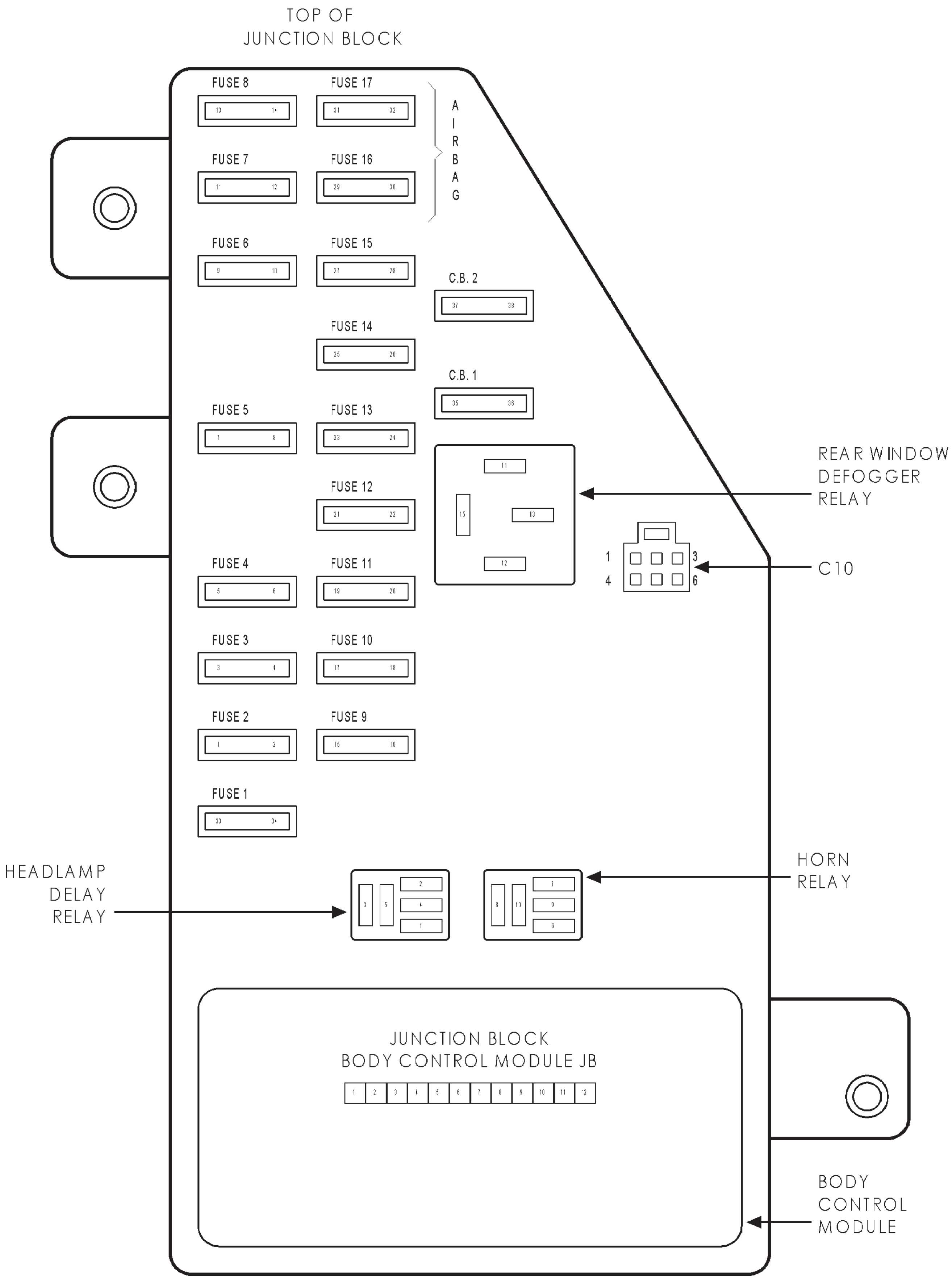
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/GY	PCI BUS
3	-	-
4	Z305 20BK/YL	GROUND
5	Z306 20BK/VT	GROUND
6	D20 20LG	SCI RECEIVE
7	D21 20PK	SCI TRANSMIT
8	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
9	D19 20VT/OR	BODY CONTROL MODULE FLASH ENABLE
10	-	-
11	-	-
12	-	-
13	-	-
14	D6 20PK/LB	SCI RECEIVE
15	-	-
16	M1 20PK	FUSED B(+)



INPUT SPEED SENSOR

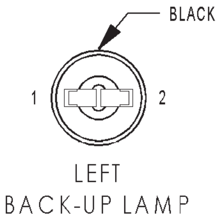
INPUT SPEED SENSOR - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	T13 18DB/BK	SPEED SENSOR GROUND
2	T52 18RD/BK	INPUT SPEED SENSOR SIGNAL


TOP OF
JUNCTION BLOCK
FUSE 8
FUSE 17
FUSE 7
FUSE 16
AIRBAG
FUSE 6
FUSE 15
C.B. 2
FUSE 14
C.B. 1
FUSE 5
FUSE 13
REAR WINDOW
DEFOGGER
RELAY
FUSE 12
C10
FUSE 4
FUSE 11
FUSE 3
FUSE 10
FUSE 2
FUSE 9
FUSE 1
HEADLAMP
DELAY
RELAY
HORN
RELAY
JUNCTION BLOCK
BODY CONTROL MODULE JB
BODY
CONTROL
MODULE

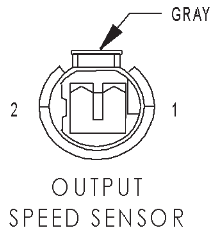
FUSES (JB)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	30A	C1 12DG (ATC)	FUSED IGNITION SWITCH OUTPUT (RUN)
1	30A	C1 14DG (MTC)	FUSED IGNITION SWITCH OUTPUT (RUN)
2	10A	INTERNAL	FUSED RIGHT HIGH BEAM OUTPUT
3	10A	L33 18LG/BR	FUSED LEFT HIGH BEAM OUTPUT
4	15A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN)
5	10A	INTERNAL	FUSED B(+)
6	10A	INTERNAL	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
7	20A	INTERNAL	FUSED B(+)
8	20A	INTERNAL	FUSED B(+)
9	15A	INTERNAL	FUSED B(+)
10	20A	INTERNAL (EXCEPT BUILT-UP-EXPORT)	FUSED B(+)
10	20A	L25 20BR (BUILT-UP-EXPORT)	FUSED B(+)
11	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
12	10A	INTERNAL	FUSED LEFT LOW BEAM OUTPUT
13	20A	INTERNAL	FUSED RIGHT LOW BEAM OUTPUT
14	10A	X12 18RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
15	10A	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
16	10A	F23 20DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
17	10A	F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
17	10A	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)



LEFT BACK-UP LAMP - BLACK 2 WAY

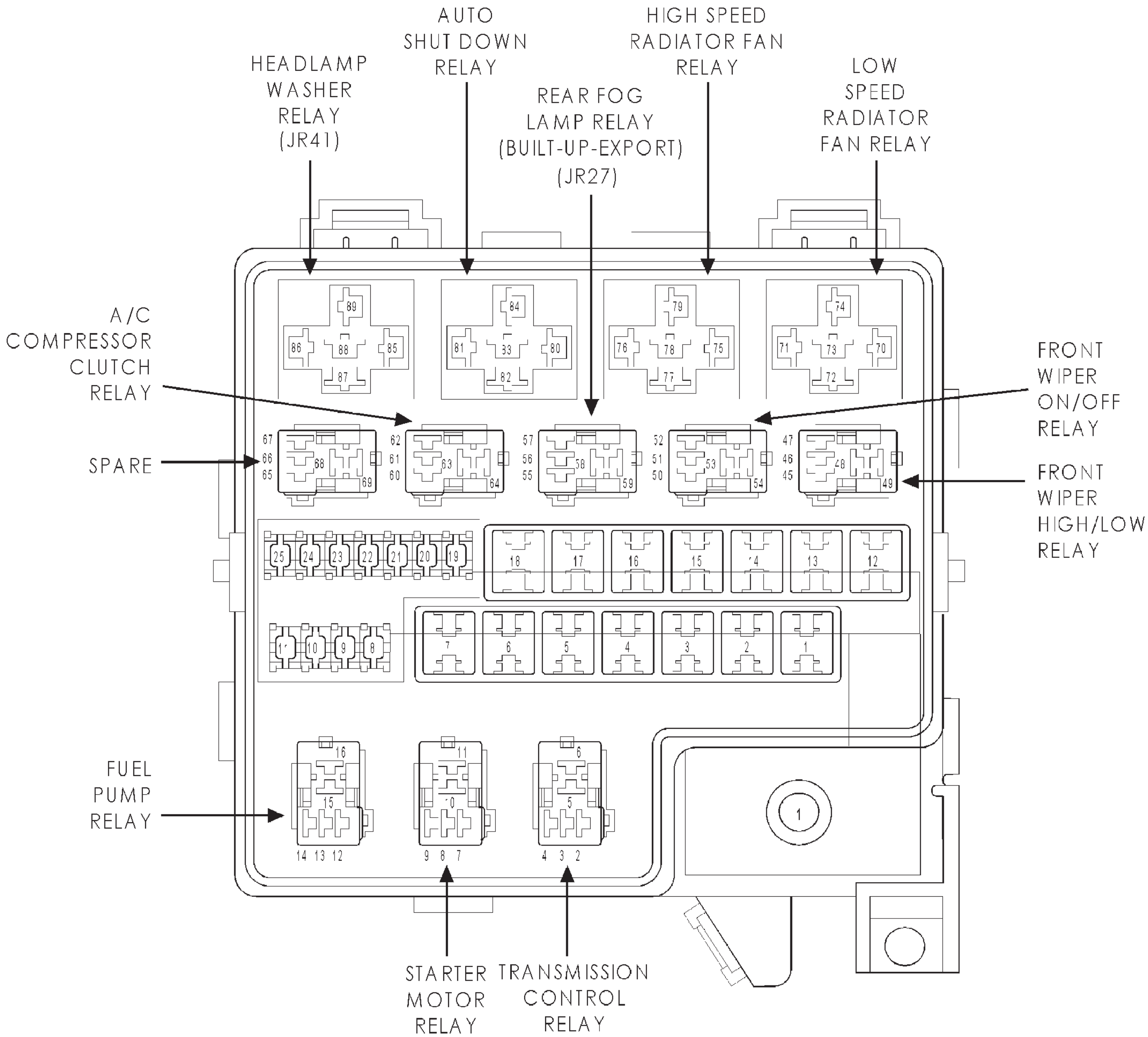
CAV	CIRCUIT	FUNCTION
1	Z149 18BK (JR27)	GROUND
1	Z150 18BK (JR41)	GROUND
2	L1 18VT/BK	BACK-UP LAMP FEED



OUTPUT SPEED SENSOR - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	T13 18DB/BK	SPEED SENSOR GROUND
2	T14 18LG/WT	OUTPUT SPEED SENSOR SIGNAL

POWER DISTRIBUTION CENTER

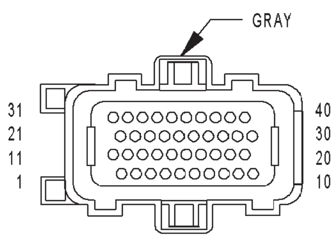


FUSES (PDC)

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	40A	A2 12PK/BK	FUSED B(+)
2	20A	F30 16RD	FUSED B(+)
3	30A	A53 14RD/YL (JR41 BUILT-UP-EXPORT)	FUSED B(+)
4	40A	A3 12RD/WT	FUSED B(+)
5	-	SPARE	FUSED B(+)
6	40A	A4 12BK/PK	FUSED B(+)
7	-	SPARE	FUSED B(+)
8	20A	A1 16RD	FUSED B(+)
9	20A	A24 16BK (EATX)	FUSED B(+)
10	10A	A51 20RD/WT	FUSED B(+)
11	20A	A7 16RD/BK	FUSED B(+)
12	40A	A16 12RD/LG	FUSED B(+)
13	20A	P86 16PK/BK (JR41 BUILT-UP-EXPORT)	FUSED B(+)
14	30A	A14 14RD/TN	FUSED B(+)
15	40A	A10 12RD/DG	FUSED B(+)
16	40A	A13 12PK/WT	FUSED B(+)
17	40A	A25 12DB (JR27)	FUSED B(+)
18	40A	A5 12RD/GY	FUSED B(+)
19	20A	A45 18BR (JR27)	FUSED B(+)
20	20A	A15 16PK	FUSED B(+)
21	-	SPARE	FUSED B(+)
22	20A	A20 12RD/DB	FUSED B(+)
23	20A	F12 18DB/WT (JR27)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
23	10A	F12 18DB/WT (JR41)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
24	20A	F42 16DG/LG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT
25	20A	F142 16OR/DG	FUSED AUTOMATIC SHUTDOWN RELAY OUTPUT

TRANSMISSION CONTROL RELAY

CAV	CIRCUIT	FUNCTION
2	Z246 20BK/RD	GROUND
3	-	-
4	T15 20LG	TRANSMISSION CONTROL RELAY CONTROL
5	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
6	A24 16BK	FUSED B(+)

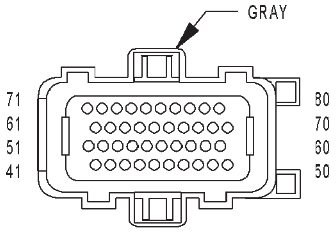


POWERTRAIN CONTROL MODULE C1 - GRAY 40 WAY

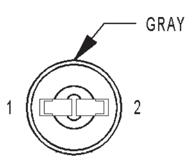
CAV	CIRCUIT	FUNCTION
1	K94 16TN/LG (2.7L)	COIL ON PLUG DRIVER NO. 4
2	K93 16TN/OR (2.7L)	COIL ON PLUG DRIVER NO. 3
3	K17 16DB/TN (2.0L/2.4L)	IGNITION COIL NO. 2 DRIVER
3	K92 16TN/PK (2.7L)	COIL ON PLUG DRIVER NO. 2
4	K96 16TN/LB (2.7L)	COIL ON PLUG DRIVER NO. 6
5	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
6	A142 14DG/OR	AUTOMATIC SHUTDOWN RELAY OUTPUT
7	K13 18YL/WT	INJECTOR NO. 3 DRIVER
8	K20 18DG	GENERATOR FIELD DRIVER
9	-	-
10	Z108 14BK/TN	GROUND
11	K91 16TN/RD (2.7L)	COIL ON PLUG DRIVER NO. 1
11	K19 16BK/GY (2.0L/2.4L)	IGNITION COIL NO. 1 DRIVER
12	-	-
13	K11 18WT/DB	INJECTOR NO. 1 DRIVER
14	K58 18BR/DB (2.7L)	INJECTOR NO. 6 DRIVER
15	K38 18GY (2.7L)	INJECTOR NO. 5 DRIVER
16	K14 18LB/BR	INJECTOR NO. 4 DRIVER
17	K12 18TN	INJECTOR NO. 2 DRIVER
18	K79 18OR/RD (2.0L/2.4L)	OXYGEN SENSOR 1/1 HEATER CONTROL
19	-	-
20	F12 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
21	K95 16TN/DG (2.7L)	COIL ON PLUG DRIVER NO. 5
22	-	-
23	-	-
24	-	-
25	K42 18DB/LG	KNOCK SENSOR SIGNAL
26	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
27	K127 18DB/OR (2.0L/2.4L)	OXYGEN SENSOR GROUND
27	K127 18DB/LG (2.7L)	OXYGEN SENSOR GROUND
28	-	-
29	K241 20LG/RD (2.7L)	OXYGEN SENSOR 2/1 SIGNAL
30	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL
31	K90 20TN	ENGINE STARTER MOTOR RELAY CONTROL
32	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
33	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
34	K235 20LG/PK (2.7L)	EGR SENSOR SIGNAL
35	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
36	K1 20DG/RD	MAP SENSOR SIGNAL
37	K21 20BK/RD	INTAKE AIR TEMPERATURE SIGNAL
38	-	-
39	K36 18VT/RD (2.7L)	MANIFOLD SOLENOID CONTROL
40	K35 20GY/YL	EGR SOLENOID CONTROL

POWERTRAIN CONTROL MODULE C2 - GRAY 40 WAY

CAV	CIRCUIT	FUNCTION
41	V37 20PK/LG	SPEED CONTROL SWITCH SIGNAL
42	C18 20DB	A/C PRESSURE SIGNAL
43	K4 18BK/LB	SENSOR GROUND
44	K7 18OR/WT	8V SUPPLY
45	K10 20DB/OR (2.0L/2.4L)	STEERING PRESSURE SWITCH SENSE
46	A14 14RD/TN	FUSED B(+)
47	Z109 14BK	GROUND
48	K40 20BR/WT	IDLE AIR CONTROL MOTOR NO. 3 DRIVER
49	K60 20YL/BK	IDLE AIR CONTROL MOTOR NO. 2 DRIVER
50	Z107 14BK/TN	GROUND
51	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL
52	K25 18VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
53	K341 20PK/WT (2.7L) (EATX)	OXYGEN SENSOR 2/2 SIGNAL
54	-	-
55	C24 20DB/TN	LOW SPEED RADIATOR FAN RELAY CONTROL
56	V36 20TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
57	K39 20GY/RD	IDLE AIR CONTROL MOTOR NO. 1 DRIVER
58	K59 20VT/BK	IDLE AIR CONTROL MOTOR NO. 4 DRIVER
59	D25 20OR	PCI BUS
60	-	-
61	K6 18VT/WT	5V SUPPLY
62	K29 20WT/PK	BRAKE SWITCH SENSE
63	T10 20YL/DG (EATX)	TORQUE MANAGEMENT REQUEST SENSE
64	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
65	D21 20PK	SCI TRANSMIT
66	G7 18WT/OR	VEHICLE SPEED SENSOR SIGNAL
67	K51 20DB/VT	AUTOMATIC SHUTDOWN RELAY CONTROL
68	K52 18PK/BK	EVAPORATIVE EMISSION SOLENOID CONTROL
69	C27 20DB/PK	HIGH SPEED RADIATOR FAN RELAY CONTROL
70	K108 18WT/TN	EVAPORATIVE SOLENOID SENSE
71	K71 20WT/RD (EATX)	EATX RPM SIGNAL
72	K107 18OR	LEAK DETECTION PUMP SWITCH SENSE
73	-	-
74	K31 20BR/LG	FUEL PUMP RELAY CONTROL
75	D20 20LG	SCI RECEIVE
76	T41 20BK/LB (EATX)	TRS T41 SENSE
77	K106 18WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
78	-	-
79	-	-
80	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL



POWERTRAIN CONTROL MODULE C2

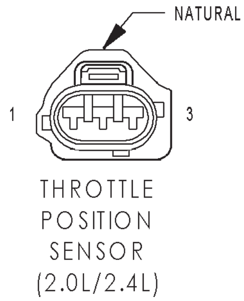


RIGHT BACK-UP LAMP

RIGHT BACK-UP LAMP - GRAY 2 WAY

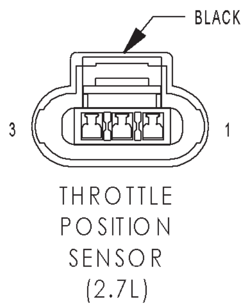
CAV	CIRCUIT	FUNCTION
1	Z151 18BK	GROUND
2	L1 18VT/BK	BACK-UP LAMP FEED

CONNECTOR PINOUTS



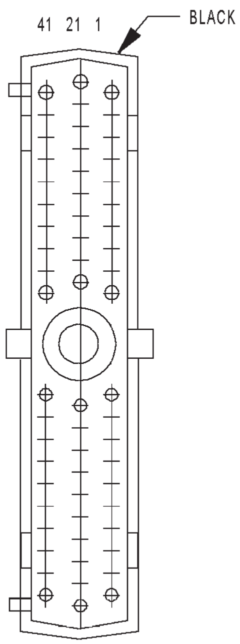
THROTTLE POSITION SENSOR (2.0L/2.4L) - NATURAL 3 WAY

CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5 VOLT SUPPLY
2	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
3	K4 20BK/LB	SENSOR GROUND



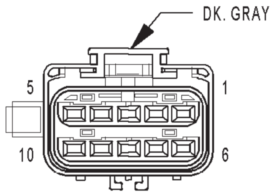
THROTTLE POSITION SENSOR (2.7L) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
3	K4 20BK/LB	SENSOR GROUND



TRANSMISSION CONTROL MODULE - BLACK 60 WAY

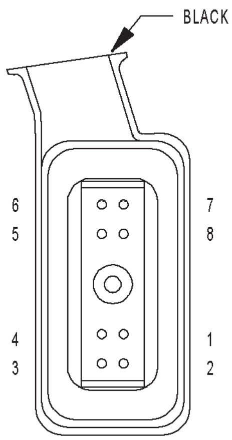
CAV	CIRCUIT	FUNCTION
1	T1 20LG/BK	TRS T1 SENSE
2	-	-
3	T3 18VT	TRS T3 SENSE
4	-	-
5	T5 20LG (AUTOSTICK)	AUTOSTICK UPSHIFT SWITCH SENSE
6	K71 20WT/RD	EATX RPM SIGNAL
7	D21 20PK	SCI TRANSMIT
8	A41 16YL	FUSED IGNITION SWITCH OUTPUT (START)
9	T9 18OR/BK	OVERDRIVE PRESSURE SWITCH SENSE
10	T10 20YL/DG	TORQUE MANAGEMENT REQUEST SENSE
11	F11 18RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
12	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
13	T13 20DB/BK	SPEED SENSOR GROUND
14	T14 20LG/WT	OUTPUT SPEED SENSOR SIGNAL
15	T15 20LG	TRANSMISSION CONTROL RELAY CONTROL
16	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
17	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
18	-	-
19	T19 18WT	2-4 SOLENOID CONTROL
20	T20 18LB	LOW/REVERSE SOLENOID CONTROL
21	-	-
22	-	-
23	-	-
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	-	-
30	-	-
31	-	-
32	-	-
33	-	-
34	-	-
35	-	-
36	-	-
37	-	-
38	-	-
39	-	-
40	-	-
41	T41 20BK/WT	TRS T41 SENSE
42	T42 18VT/WT	TRS T42 SENSE
43	D25 20VT/YL	PCI BUS
44	T44 20YL (AUTOSTICK)	AUTOSTICK DOWNSHIFT SWITCH SENSE
45	-	-
46	D6 20PK/LB	SCI RECEIVE
47	T47 18YL/BK	2-4 PRESSURE SWITCH SENSE
48	-	-
49	-	-
50	T50 18DG	LOW/REVERSE PRESSURE SWITCH SENSE
51	K4 18BK/LB	SENSOR GROUND
52	T52 20RD/BK	INPUT SPEED SENSOR SIGNAL
53	Z112 16BK/YL	GROUND
54	T54 18VT/YL	TRANSMISSION TEMPERATURE SENSOR SIGNAL
55	-	-
56	A24 16BK	FUSED B(+)
57	Z113 16BK/RD	GROUND
58	G7 18WT/OR	VEHICLE SPEED SENSOR SIGNAL
59	T59 18PK	UNDERDRIVE SOLENOID CONTROL
60	T60 18BR	OVERDRIVE SOLENOID CONTROL



TRANSMISSION RANGE SENSOR

TRANSMISSION RANGE SENSOR - DK. GRAY 10 WAY

CAV	CIRCUIT	FUNCTION
1	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
2	-	-
3	T13 20DB/BK	SPEED SENSOR GROUND
4	T54 18VT/YL	TRANSMISSION TEMPERATURE SENSOR SIGNAL
5	T41 20BK/LB	TRS T41 SENSE
6	L1 18VT/BK	BACK-UP LAMP FEED
7	T1 20LG/BK	TRS T1 SENSE
8	T3 18VT	TRS T3 SENSE
9	T42 20VT/WT	TRS T42 SENSE
10	T41 20BK/WT	TRS T41 SENSE

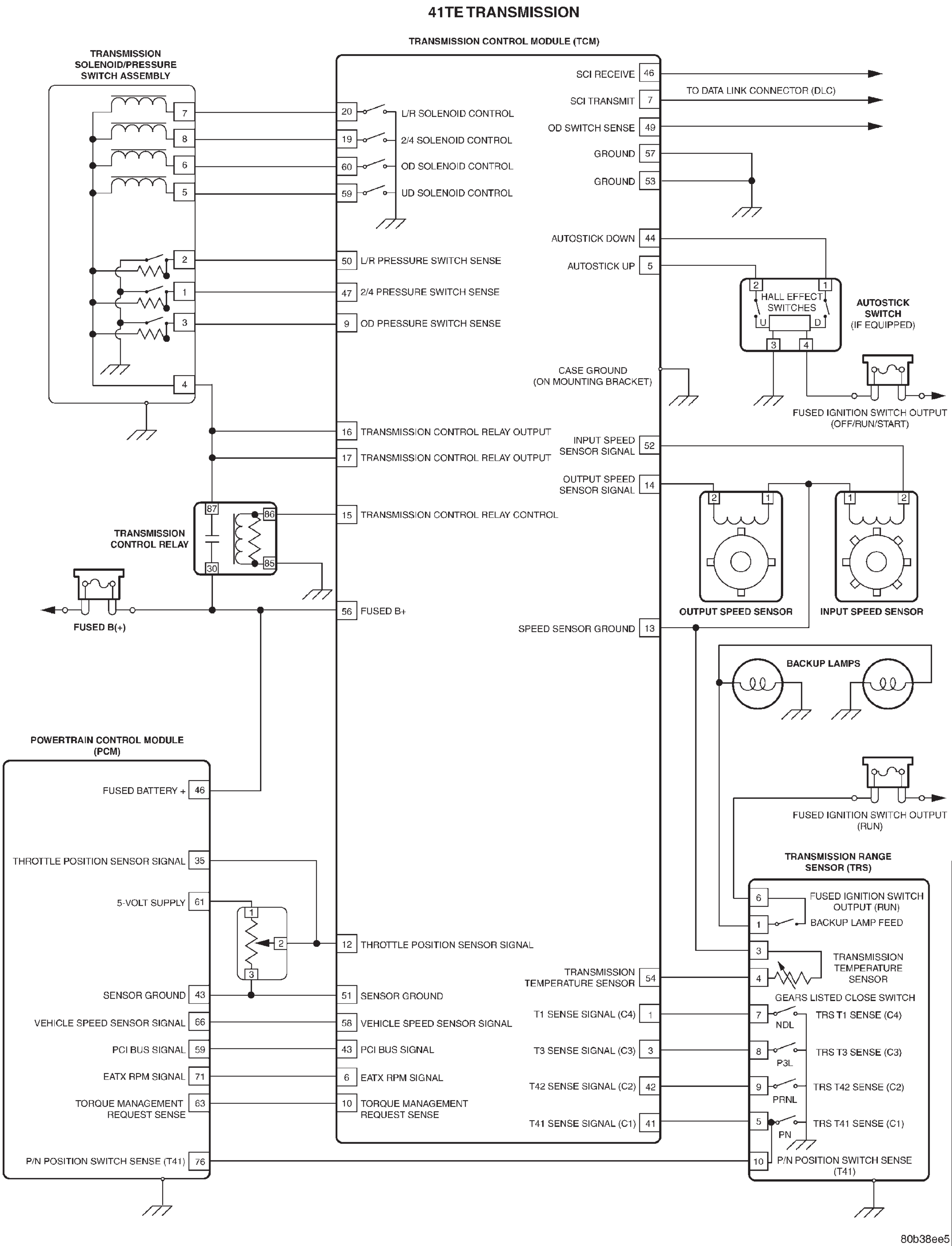


TRANSMISSION SOLENOID/ PRESSURE SWITCH ASSEMBLY

TRANSMISSION SOLENOID/PRESSURE SWITCH ASSEMBLY - BLACK 8 WAY

CAV	CIRCUIT	FUNCTION
1	T47 18YL/BK	2-4 PRESSURE SWITCH SENSE
2	T50 18DG	LOW/REVERSE PRESSURE SWITCH SENSE
3	T9 18OR/BK	OVERDRIVE PRESSURE SWITCH SENSE
4	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
5	T59 18PK	UNDERDRIVE SOLENOID CONTROL
6	T60 18BR	OVERDRIVE SOLENOID CONTROL
7	T20 18LB	LOW/REVERSE SOLENOID CONTROL
8	T19 18WT	2-4 SOLENOID CONTROL

10.0 SCHEMATIC DIAGRAMS



S C H E M A T I C D I A G R A M S

NOTES

11.0 CHARTS AND GRAPHS

11.1 SHIFT LEVER ERROR CODES

SHIFT LEVER ERROR CODES REPORTED BY THE DRBIII®

ERROR CODE	SWITCH STUCK	POSITION
1	T1/C4 STUCK	OPEN
2	T1/C4 STUCK	CLOSED
3	T3/C3 STUCK	OPEN
4	T3/C3 STUCK	CLOSED
5	T42/C2 STUCK	OPEN
6	T24/C2 STUCK	CLOSED
7	T41/C1 STUCK	OPEN
8	T41/C1 STUCK	CLOSED

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11.2 SOLENOID APPLICATION CHART

SOLENOID APPLICATION CHART

GEAR	UD	OD	REV	2/4	LR
PARK					X
REVERSE			X		X
NEUTRAL					X
1ST	X				X
2ND	X			X	
3RD	X	X			
4TH		X		X	

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11.3 TRANSMISSION PRESSURE SWITCH STATES

41TE PRESSURE SWITCH STATES

SWITCHES	R	N	1ST	2ND	3RD	4TH
L/R	OPEN	CLOSED	CLOSED	OPEN	OPEN	OPEN
2/4	OPEN	OPEN	OPEN	CLOSED	OPEN	CLOSED
O/D	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED

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11.4 TRANSMISSION RANGE SENSOR STATES

41TE TRANSMISSION RANGE SENSOR STATES

TRS	PARK	T1	REVERSE	T2	NEUTRAL	T2	OD	T3	D3/AS	T3	L
T1 (C4)	OPEN	OPEN	OPEN	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
T3 (C3)	CLOSED	CLOSED	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED	CLOSED	CLOSED
T41 (C1)	CLOSED	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN
T42 (C2)	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	OPEN	OPEN	OPEN	OPEN	CLOSED

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