

1996 Volkswagen Golf All Categories All Sections
Title List for Volkswagen Technical Site
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Friday, August 20, 1999 12:01AM

* A/C-HEATER SYSTEM UNIFORM INSPECTION GUIDELINES *
* ANTI-LOCK BRAKES UNIFORM INSPECTION GUIDELINE *
* BRAKE SYSTEM UNIFORM INSPECTION GUIDELINES *
* ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES *
* ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES *
* EXHAUST SYSTEM UNIFORM INSPECTION GUIDELINES *
* STEERING UNIFORM INSPECTION GUIDELINES *
* SUSPENSION UNIFORM INSPECTION GUIDELINES *
* SYMPTOM CHECK LIST *

A - ENGINE/VIN ID

A/C-HEATER SYSTEM - MANUAL

AA - USING THIS SECTION (GENERAL HELP INFORMATION)

ABBREVIATIONS

AIR BAG RESTRAINT SYSTEM

ALTERNATOR & REGULATOR

ANTI-LOCK BRAKE SAFETY PRECAUTIONS

ANTI-LOCK BRAKE SYSTEM & TRACTION CONTROL

AUTO TRANS DIAGNOSIS - 01M

AXLE SHAFT

B - EMISSION APPLICATION

BRAKE SYSTEM

C - SPECIFICATIONS

CLUTCH

COMPUTER RELEARN PROCEDURES

D - ADJUSTMENTS

E - THEORY/OPERATION - GASOLINE

ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

ELECTROSTATIC DISCHARGE WARNING - BASIC INFORMATION

ENGINE OVERHAUL PROCEDURES - GENERAL INFORMATION

F - BASIC TESTING - GASOLINE

FUSES & CIRCUIT BREAKERS

G - TESTS W/CODES - GASOLINE

GEAR TOOTH CONTACT PATTERNS

GENERAL COOLING SYSTEM SERVICING

H - TESTS W/O CODES - GASOLINE

HEATER SYSTEM

HOW TO USE SYSTEM WIRING DIAGRAMS

I - SYSTEM/COMPONENT TESTS - GASOLINE

INTERFERENCE VERIFICATION CHECK FOR OHC ENGINE

J - PIN VOLTAGE CHARTS

K - SENSOR RANGE CHARTS

L - WIRING DIAGRAMS

M - VACUUM DIAGRAMS - GASOLINE

MAINTENANCE INFORMATION

MAINTENANCE REMINDER LIGHT RESET PROCEDURES

METRIC CONVERSIONS

N - REMOVE/INSTALL/OVERHAUL - GASOLINE

SCHEDULED SERVICES

STARTER

STEERING COLUMN

STEERING SYSTEM - POWER RACK & PINION

SUSPENSION - FRONT

SUSPENSION - REAR

SYSTEM WIRING DIAGRAMS

TRANSMISSION REMOVAL & INSTALLATION - A/T

TRANSMISSION REMOVAL & INSTALLATION - M/T

TRANSMISSION SERVICING - A/T

TRANSMISSION SERVICING - M/T

TROUBLE SHOOTING - BASIC PROCEDURES

WAVEFORMS - INJECTOR PATTERN TUTORIAL

WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES

WHEEL ALIGNMENT THEORY/OPERATION

POOR PERFORMANCE/EXHAUST SMOKE VISIBLE

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ARTICLE BEGINNING

TECHNICAL SERVICE BULLETIN

POOR PERFORMANCE, EXHAUST SMOKE VISIBLE

Model(s): 1993-97 Volkswagen Golf, Jetta with (engine Code AAZ)
1993 & 1995 Volkswagen Passat with (engine code AAZ)
Group: 13 - Engine - Crankshaft/Crankcase
Bulletin No.: 97-07
Date: November 12, 1997

NOTE: This bulletin supersedes Technical Bulletin Group 13, No. 97-02 dated January 28, 1997.

CONDITION

Poor performance, visible smoke from exhaust system.

May be caused by the crankshaft sprocket bolt (M14 x 1.5 x 47) loosening.

PRODUCTION

Crankshaft sprocket bolt tensile strength increased to 12.9.

SERVICE

If this condition exists:

- Check injection pump timing.

If timing is incorrect:

- Turn crankshaft to TDC for No. 1 cyl.
- Remove crankshaft sprocket, see applicable Repair Manual for Models listed above.
- Check Crankshaft and sprocket for wear.

If crankshaft or crankshaft sprocket show signs of wear:

- Replace crankshaft, crankshaft sprocket and bolt. See applicable Repair Manual for Models listed.

END OF ARTICLE

NEW COOLANT G 012 A8D A1

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ARTICLE BEGINNING

TECHNICAL SERVICE BULLETIN

NEW COOLANT

Model(s): Volkswagen, All Watercooled Models
Group: 19 - Engine - Cooling System
Bulletin No.: 96-01
Date: October 30, 1996

PRODUCTION

A new coolant, G 012 A8D A1 is being used in production as follows:

- * German production: from 07.96
- * Mexican production: running change scheduled for 01.97

Coolant G 012 A8D A1 is red in color.

This newly developed product permits a cooling system fill that lasts the service life of the engine and was designed with all-aluminum engines in mind.

ADVANTAGES

- * Improved corrosion protection
- * Improved thermal stability
- * Improved heat transfer/control
- * Improved hard water tolerance
- * Improved environmental protection

CAUTION: G 012 A8D A1 must NEVER be mixed with ANY other coolant.
Engine damage will result!

Contamination of G 012 A8D A1 with other colored coolants is identifiable by discoloration (brown, purple etc.). This mixture causes a foamy deposit to appear in the expansion tank/radiator.

This mixture is to be drained immediately and the cooling system flushed as described below.

FLUSHING PROCEDURE

Engine at operating temperature (older vehicles with heater valve: heater on).

- Drain coolant. See Repair Manual, General Engine, Repair Group 19.
- Apply compressed air to expansion tank or radiator to blow out remaining coolant.

NEW COOLANT G 012 A8D A1

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- Close cooling system, fill with distilled water.
- Run engine for a minimum of 2 minutes.
- Drain water and apply compressed air to expansion tank as before.
- Close cooling system and fill with appropriate mixture ratio of G 012 A8D A1 and distilled water. See Repair Manual, General Engine, Repair Group 19.
- Test drive, check coolant level and add if necessary.

NOTE: Coolant G 012 A8D 01 may be used in older vehicles when the original coolant is drained and cooling system flushed as described above.

- Inform customer that a new coolant is used and that ONLY water or G 012 A8D A1 be used to replenish.

CAUTION: * Never reuse old coolant when performing engine repairs.
* Dispose of old coolant properly.

Flushing as specified above, or engine damage resulting from the use of a mixture of G 012 A8D A1 and other coolants is not covered by the new vehicle warranty.

CAUTION: Part numbers are for reference only. Always check with your Parts Dept. for the latest parts information.

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MAIN BEARING CAP TIGHTENING TORQUE

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TECHNICAL SERVICE BULLETIN

MAIN BEARING CAP TIGHTENING TORQUE

Model(s): 1993-on Volkswagen Golf, GTI, Jetta, Cabrio
with 2.0 liter engine code ABA
Group: 13 - Engine - Crankshaft/Crankcase
Bulletin No.: 96-01
Date: July 1, 1996

File this Technical Bulletin in Repair Manual No.: W42 011 294 105.

SERVICE INFORMATION

The following repair information includes a corrected tightening torque specification that will be integrated with the next Repair Manual update.

This information replace pages 13-2 and 13-26 in the current 04.94 edition Repair Manual 2.0 Liter General, Engine (W42 011 294 105).

CRANKSHAFT, REMOVING AND INSTALLING

Refer to Fig. 1.

- 1 - Main bearing shells 1, 2, 4, 5
 - * Without oil groove: for main bearing caps 1, 2 and 5.
 - * With oil groove: for main bearing cap 4 and cylinder block.
 - * Do not interchange used main bearing shells.
- 2 - 65 N.m (48 ft-lb) plus additional 1/4-turn (90°)
- 3 - Main bearing caps
 - * Main bearing cap 1: pulley side.
 - * Main bearing cap 3 with recesses for thrust washers.
 - * Holding tabs on cylinder block/main bearing cap, bearing shells must face each other.
- 4 - Main bearing shell 3
 - * Without oil groove: for main bearing cap.
 - * With oil groove: for cylinder block.
- 5 - Thrust washer
 - * For main bearing cap 3.
 - * Note installation positions.
- 6 - Sensor gear
 - * For Engine Speed (RPM) Sensor -G28-.
 - * Always replace.

MAIN BEARING CAP TIGHTENING TORQUE

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7 - 10 N.m (7 ft-lb) plus 1/4 turn (90°)

* Always replace.

8 - Crankshaft

* Axial clearance new: 0.07 - 0.17 mm (0.0028 - 0.0067 in.)

* Reconditioning limit: 0.25 mm (0.0098 in.).

* Measure radial clearance with Plastigage.

- new: 0.02 - 0.06 mm (0.0008 - 0.0024 in.)

- wear limit: 0.17 mm (0.0067 in)

CAUTION: Do Not turn crankshaft when measuring radial clearance.

9 - Thrust washer

* For cylinder block, main bearing 3.

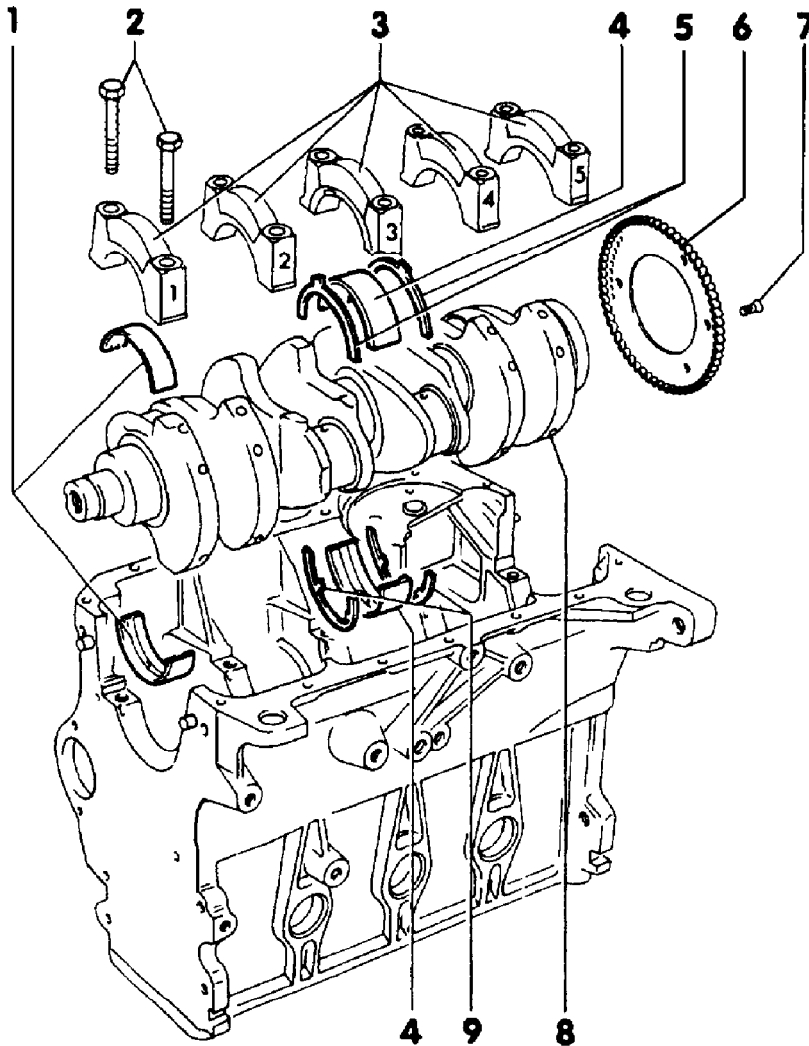


Fig. 1: Crankshaft & Main Bearings Assembly

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FLUID CAPACITY CHART

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ARTICLE BEGINNING

TECHNICAL SERVICE BULLETIN

FLUID CAPACITY CHART

Model(s): 1990-on Volkswagen, All Models
Group: 00 - General
Bulletin No.: 97-08
Date: September 17, 1997

NOTE: This bulletin supersedes Technical Bulletin Group 00, No. 97-04 dated May 16, 1997.

SERVICE INFORMATION

The following fluid capacity information covers all vehicles from 1991 and some from 1990.

Retain the fluid chart, covering vehicles from 1980 through 1990, as a supplement for older vehicles.

CAUTION: Part numbers are for reference only. Always check with your Parts Department for latest information.

FLUID CAPACITY CHART

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JETTA/GOLF - 1991-95

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Engine Oil (1)..... 4 cyl. 4.0L (4.2 qt.)
V6 5.0L (5.3 qt.)
Diesel 4.5L (4.7 qt.)

Manual Trans. (1993-1995«)
02A Trans. 2.0L (2.1 qt.)
G50 synthetic oil, SAE 75W/90
VR6 02A Trans. 2.0L (2.1 qt.)
G 005 100 A1
(1995«-1997)
020 Trans. 1.9L (2.0 qt.)
G50 synthetic oil, SAE 75W/90
VR6 020 Trans. 1.9L (2.0 qt.)
G 005 100 A1

Auto Trans. (1993-1995«)
096 tran. 3.0L (3.2 qt.)
0.7L (0.74 qt.)
Dexron II/III or
VWATF G052 162 A2
(1995«-1997)
01M Dry Fill 5.3L (5.5 qt.)
Refill 3.0L (3.2 qt.)
VWATF G052 162 A2 ONLY

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Auto Trans. 098 tran. 3.0L (3.2 qt.)
0.7L (0.74 qt.)

FLUID CAPACITY CHART

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Dexron II/III or
VWATF G052 162 A2
(1992-1995«)

Auto Diff. 1.15L (1.22 qt.)
G052 145 A2 (Synthetic Oil)
(1992-1995«)

Cooling System (2) Diesel 11.5L (12.2 qt.)
5 cyl. 9L (9.5 qt.)
V6 1 heat/ex 9L (9.5 qt.)
2 heat/ex 10.8L (11.4 qt.) (6)

Power Steering (3) 1L (1.05 qt.) P/N G 002 000
Do not use ATF fluid

Windshield Washer (4) 7.0L (7.3 qt.)

A/C Refrigerant R-12/R-134 (5).. 950 + 50 grams (33.25 + 1.75 oz.)
One evaporator
1350 + 50 grams (47.25 + 1.75 oz.)
Two evaporators

A/C Refrigerant Oil 135 cm3 4.72 oz One evaporator
240 cm3 8.4 oz Two evaporators
Use PAG oil with R 134a.

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EUROVAN - 1995-97

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Engine Oil (1) Gas 5.0L (5.7 qt.)
Diesel 5.5 qt. (6.0 qt.) (Canada)
V6 W/FI. 5.5L (5.8 qt.)

Manual Trans. 2.3L (2.5 qt.)
G50 SAE 75W90 (Synthetic) or
GL4 SAE 75W90
(1995«-1997)
02B 2.5L (2.7 qt) G50

Auto Trans. 01P Dry Fill 5.3 (5.5 qt.)
Refill 3.0L (3.2 qt.)
VWATF G052 162 A3 ONLY
(1995«-1997)

Auto Diff. 1.15L (1.22 qt.)
G052 145 A2 (Synthetic)
(1995«-1997)

Cooling System (2) Diesel 11.5L (12.2 qt.)
5 cyl. 9L (9.5 qt.)
V6 1 heat/ex 9L (9.5 qt.)
2 heat/ex 10.8L (11.4 qt.) (6)

Power Steering (3) 1L (1.05 qt.) P/N G 002 000
Do not use ATF fluid

Windshield Washer (4) 7.0L (7.3 qt.)

A/C Refrigerant R-12/R-134 (5).. 950 + 50 grams (33.25 + 1.75 oz.)
One evaporator
1350 + 50 grams (47.25 + 1.75 oz.)
Two evaporators

A/C Refrigerant Oil 135 cm3 4.72 oz One evaporator
240 cm3 8.4 oz Two evaporators
Use PAG oil with R 134a.

FLUID CAPACITY CHART

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CABRIO 1995-97

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Engine Oil (1) 4 cyl. 4.0L (4.2 qt.)
V6 5.0L (5.3 qt.)
Diesel 4.5L (4.7 qt.)
Manual Trans. 020 Trans. 1.9L (2.0 qt.) 75W90.
MIL-L-2105. API GL-4 or
G50 synthetic 75W90
020 Trans. 1.9L (2.0 qt.) 75W90.
MIL-L-2105. API GL-4 or
G50 synthetic 75W90
(1995«-1997)
Auto Trans. 096 tran. 3.0L (3.2 qt.)
0.7L (0.74 qt.)
Dexron II/III or
VWATF G052 162 A2
01M Dry Fill 5.3L (5.5 qt.)
Refill 3.0L (3.2 qt.)
VWATF G052 162 A2 ONLY
(1995«-1997)
Auto Diff. 0.75L (0.79 qt.)
G052 145 A2 (Synthetic Oil)
0.75L (0.79 qt.)
G052 145 A2 (Synthetic Oil)
(1995«-1997)
Cooling System (2) 1.9 TD 6.5L (6.8 qt.)
1.8 Gas 5.5L (5.8 qt.)
2L Eng. 5.8L (6.1 qt.)
2.8 V6 10L (10.6 qt.)
Power Steering (3) 77L (.85 qt.) ATF Dexron II
Windshield Washer (4) 4.2L (4.5 qt.)
A/C Refrigerant R-12/R-134 (5) . 800 ñ 50 grams (28.2 oz. ñ 1.8 oz.)
A/C Refrigerant Oil 115 cc ñ 15cc (3.9oz ñ 0.5 oz.)
Use PAG Oil With R 134a.

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CABRIOLET 1985-94

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Engine Oil (1) 3.5L (3.7 qt.) 4.0L (4.3 qt.)/Filter
Manual Trans. 020 Trans. 1.9L (2.0 qt.) 75W90.
MIL-L-2105. API GL-4 or
G50 synthetic 75W90
Auto Trans. ATF DexronII/III or VWATF G052 162 A2
Dry Fill 6.0L (6.3 qt.)
Refill 3.0L (3.1 qt.)
Auto Diff. 75L (.8 qt.)
G052 145 A2 (synthetic oil)
Cooling System (2) 4.6L (5.1 qt.)
Power Steering (3) 77L (.85 qt.) ATF Dexron II
Windshield Washer (4) 1.6L (1.8 qt.) Front
A/C Refrigerant R-12/R-134 (5) . 1134 ñ 56 grams (33.0 oz. ñ 3.0 oz.)
A/C Refrigerant Oil 135 cc (4.75 oz)

FLUID CAPACITY CHART

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Use PAG oil with R 134a.

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PASSAT 1991-95

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Engine Oil (1) 4 cyl. 3.5L (3.7 qt.) W/O Filter,
4.0L (4.3 qt.) W/Filter
V6 5.0L (5.3 qt.) W/O Filter,
6.0L (6.3 qt.) W/Filter

Manual Trans. (1990-1995«)
02A Trans. 2.0L (2.1 qt.)
02C Trans. 2.4L (2.5 qt.)
API GL 4 MIL-L2105, SAE 75W/90 or
G50 Synthetic SAE 75W/90

Auto Trans. (1990-1995«)
Dexron II/III or VWATF G052 162 A2

Auto Diff. (1990-1995«)
0.75L (0.79 qt.)
G052 145 A2 (Synthetic Oil)

Cooling System (2) 4 cyl. 5.6L (5.9 qt.)
V6 8.6L (9.1 qt.)

Power Steering (3) 07-0.9L (0.74-0.5 qt.)

Windshield Washer (4) 5.0L (5.3 qt.)

A/C Refrigerant R-12/R-134 (5).. 1150 ñ 50 grams (40.25 oz. ñ 1.7 oz.)

A/C Refrigerant Oil 115 cc (4.02 oz.)

Use PAG oil with R-134-a.

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PASSAT 1995-97

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Engine Oil (1) 4 cyl. 3.5L (3.7 qt.) W/O Filter,
4.0L (4.3 qt.) W/Filter
V6 5.0L (5.3 qt.) W/O Filter,
5.5L (5.7 qt.) W/Filter

Diesel 4.5L (4.75 qt.)

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Manual Trans. VR6 eng. G 005 100 A1
02A Trans. 2.0L (2.1 qt.)
02C Trans. 2.4L (2.5 qt.)
API GL 4 Mil-L2105, or
G50 Synthetic SAE 75W90
(1995«-1997)

Auto Trans. (1995«-1997)
01M Dry Fill 5.3L (5.5 qt.)
Refill 3.0L (3.2 qt.)
VWATF G052 162 A2 ONLY
(1995«-1997)

Auto Diff. 0.75L (0.79 qt.) G052 145 A2
(Synthetic Oil)
(1995«-1997)

Cooling System (2) 4 cyl. W/Auto Tr. 6.2L (6.5 qt.)
W/Std. Tr. 5.6L (5.8 qt.)

(3) = POWER STEERING: Hydraulic oil G002 000 / G002 012 instead of ATF.

FLUID CAPACITY CHART

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(4) = WASHER SOLVENT: 9.0L (9.5 QT.) w/headlight washers. Concentrated
ZVW 177 901/903/904/906.

(5) = A/C REFRIGERANT. Use R-12 through 1992, R 134a begins in 1993.

(6) = 2 heat/ex & aux. heater 11.4L (12.1 qt.)

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CAUTION: Part numbers are for reference only. Always check with your
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COOLING SYSTEM ANTI-FREEZE PROTECTION LEVEL CHECKING

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ARTICLE BEGINNING

TECHNICAL SERVICE BULLETIN

COOLING SYSTEM ANTI-FREEZE PROTECTION LEVEL, CHECKING

Model(s): 1993-on Volkswagen Golf, GTI, Jetta, Cabrio
Group: Maintenance Bulletin
Bulletin No.: 96-04
Date: November 9, 1996

File this Technical Bulletin in Repair Manual No.: W42 011 294 118.

COOLING SYSTEM ANTI-FREEZE PROTECTION LEVEL, CHECKING

Special tool CEN5021 (Fig. 1), Leica Hand-Held Refractometer, is available and recommended for use as the only accurate way of determining the anti-freeze protection of the new Volkswagen engine coolant G 012 A8D A1.

This tool automatically provides immediate temperature compensation and direct reading of the coolant with only a few drops of sample.

Check your test equipment inventory to make sure you have this minimum requirement tool. Special Tool CEN5021 can be ordered through Equipment Solutions at (800) 892-9650.

Refer to Technical Bulletin, GROUP 19, NO. 96-01, October 30, 1996, for information about Volkswagen coolant G 012 A8D A1.

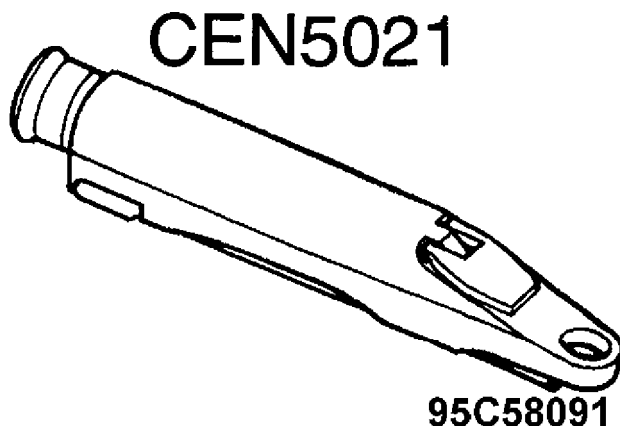


Fig. 1: Special Tool CEN5021

END OF ARTICLE

2.0L - METAL CYLINDER HEAD GASKET

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ARTICLE BEGINNING

TECHNICAL SERVICE BULLETIN

METAL CYLINDER HEAD GASKET

Model(s): 1995-on Volkswagen Golf, GTI, Jetta built from 03/95
with 2.0 liter, engine code ABA
Group: 15 - Engine - Cylinder Heads Valve Drive
Bulletin No.: 96-03
Date: May 15, 1996

File this Technical Bulletin in Repair Manual No.: W42 011 294 105.

SERVICE INFORMATION

The following Repair Manual information is new and will be integrated with the next Repair Manual update.

CYLINDER HEAD, REMOVING AND INSTALLING

Refer to Fig. 1.

- 11 - Cylinder head bolt
 - * Always replace.
 - * Different versions depending on cylinder head gasket type.
- 14 - Cylinder head gasket
 - * Always replace.
 - * New metal gasket from 03/95.
 - * Installing replacement metal gasket requires different cylinder head bolts.
 - * When replacing gasket, replace engine coolant.

CHECKING CYLINDER HEAD FOR DISTORTION

Maximum permissible distortion: 0.1 mm (0.004 in.) See Fig. 2.

CYLINDER HEAD BOLT IDENTIFYING FEATURES

See Fig. 3.

- A - Bolt with smooth head
For previous version cylinder head gasket
- B - Bolt with raised markings on bolt head (arrows)
For metal cylinder head gasket

CYLINDER HEAD, REMOVING AND INSTALLING

Special tools, testers and auxiliary items

2.0L - METAL CYLINDER HEAD GASKET

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- * Guide pin 3070
- * Torque wrench - 40-200 N.m (30-150 ft-lb)

Conditions

- * Engine cold
- * Pistons not at Top Dead Center (TDC)

CAUTION: * Only remove the new cylinder head gasket from its package immediately before installing.

- * Handle the new gasket with extreme care. Damage to the silicone coating or around the beading will lead to leaks.
- * If a metal gasket is being installed as a replacement for the previous softer gasket, new cylinder head bolts must also be installed.

REMOVING

- Follow sequence when loosening cylinder head. See Fig. 4.
- Carefully remove remains of gasket, making sure that no scoring or long scratches are formed (abrasive materials must be 100 grit minimum).
- Carefully remove metal particles and remains of abrasive materials.

INSTALLING

- To align cylinder head, install guide pins from 3070 into holes for cylinder head bolts -8- and -10-. See Fig. 5.
- Install cylinder head gasket.
 - * Lettering (Part No.) faces up.
- Install cylinder head and 8 remaining bolts, and tighten by hand.
- Remove guide pins using removal tool from 3070, then install 2 remaining cylinder head bolts.
- Tighten cylinder head in sequence shown in Fig. 6, following same sequence for each of for stages.
- First pre-tighten with torque wrench.
 - * Stage I = 40 N.m (30 ft-lb)
 - * Stage II = 60 N.m (44 ft-lb)
- Turn further with standard wrench.
 - * Stage III = 1/4 turn (90°)
 - * Stage IV = 1/4 turn (90°)

2.0L - METAL CYLINDER HEAD GASKET

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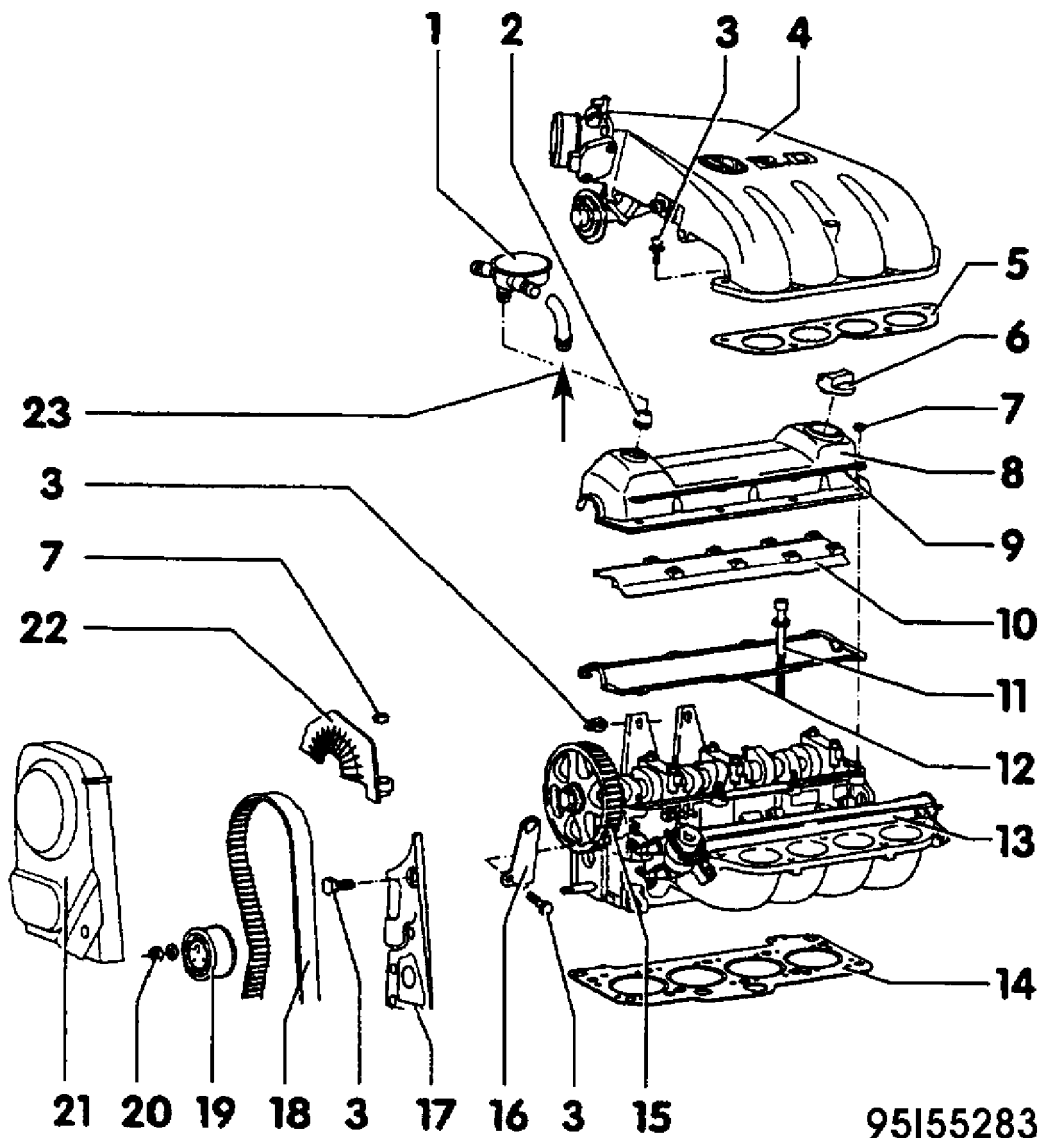


Fig. 1: Cylinder Head, Gaskets & Covers

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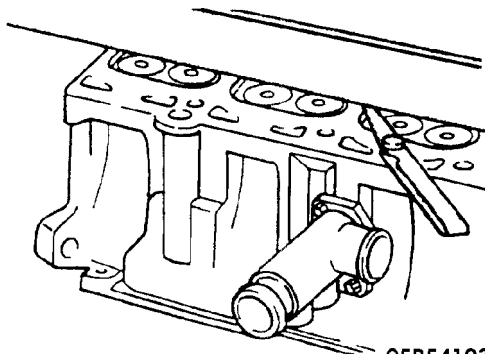


Fig. 2: Checking Cylinder Head Distortion

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2.0L - METAL CYLINDER HEAD GASKET

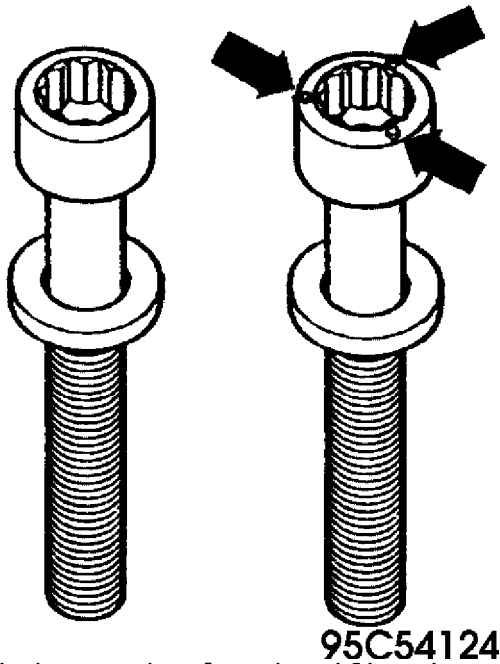
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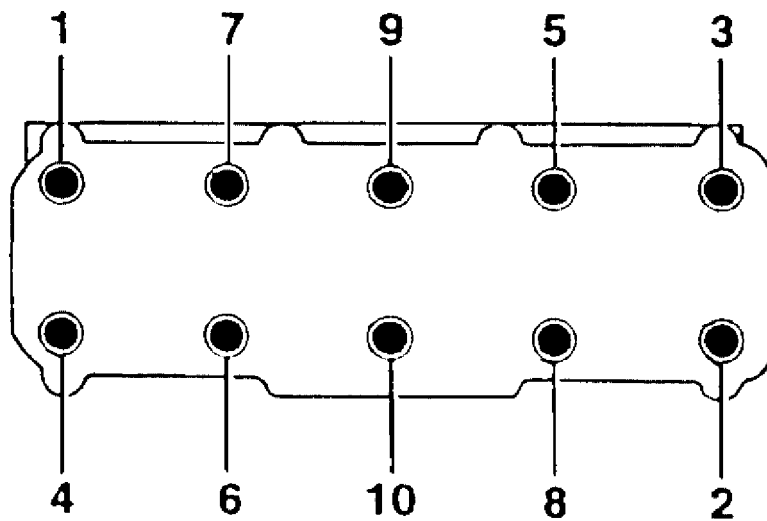
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Fig. 3: Cylinder Head Bolt Identification



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Fig. 4: Cylinder Head Bolt Loosening Sequence

2.0L - METAL CYLINDER HEAD GASKET

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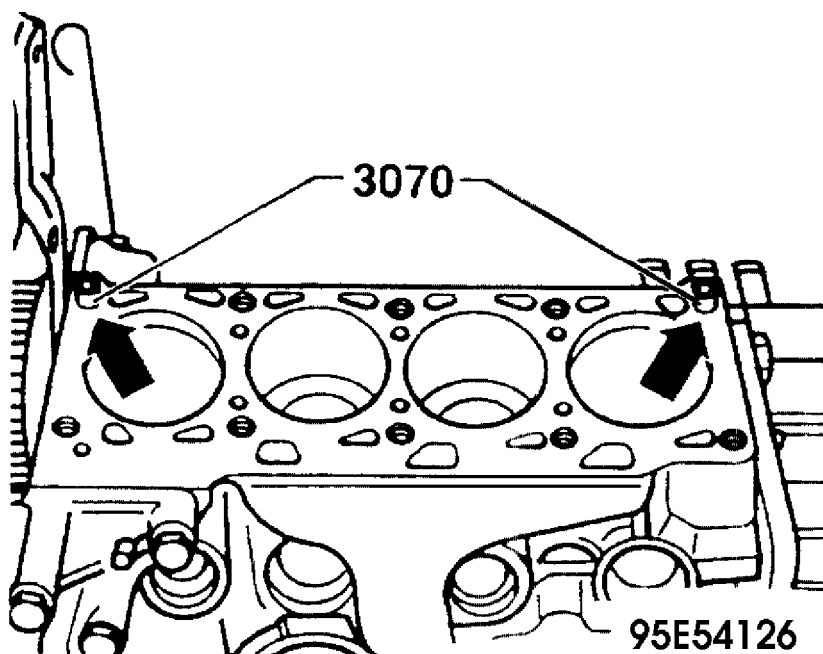


Fig. 5: Guide Pin Locations

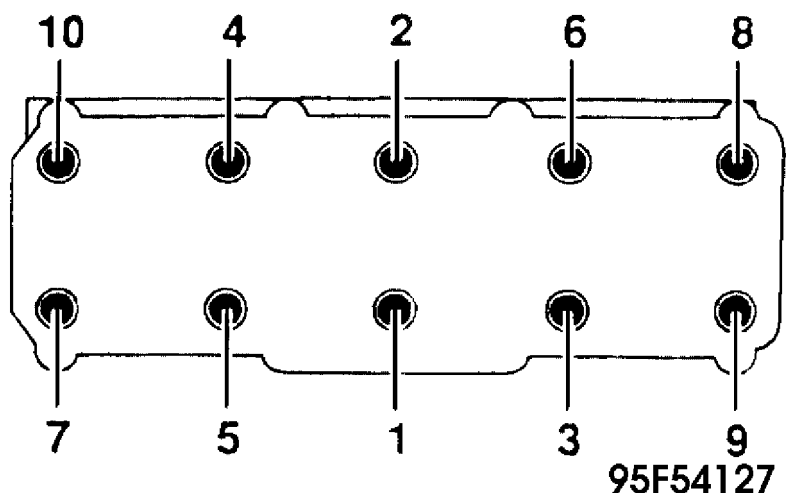


Fig. 6: Cylinder Head Bolt Tightening Sequence

END OF ARTICLE

2.0L (ENGINE CODE ABA) - LUBRICATION SYSTEM

Article Text

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ARTICLE BEGINNING

TECHNICAL SERVICE BULLETIN

ENGINE LUBRICATION SYSTEM - 2.0 LITER ENGINE CODE ABA

Model(s): 1996-on Volkswagen Golf III, Jetta III, Cabrio
Group: 17 - Engine - Lubrication System
Bulletin No.: 95-01
Date: October 16, 1995

File this Technical Bulletin in Repair Manual No.: W42 011 294 105.

SERVICE INFORMATION

This information describes changes in engine components and specifications for the 2.0 liter engine starting with August, 1995 production (OBD II).

The following information will be integrated into the Repair Manual during the next update.

LUBRICATION SYSTEM, COMPONENTS

Refer to Fig. 1.

- 5 - 0.3 bar oil pressure switch -F22-
 - * 25 N.m (18 ft-lb)
 - * Wire: blue/black
 - * If leaking, cut seal and replace.Engines up to 07.95
 - * 0.3 bar (4.4 psi)
 - * Housing: brownEngines 08.95-on
 - * 0.25 bar (3.6 psi)
 - * Housing: blue
- 6 - Oil pressure switch -F1-
 - * 1.8 bar (26 psi)
 - * 25 N.m (18 ft-lb)
 - * Housing: white
 - * Wire: yellow
 - * If leaking, cut seal and replace.
- 23 - Sound deflector
 - * To remove, remove oil pump cover or suction line.
 - * Not applicable from 08.95-on.
- 25 - Pressure relief valve
 - * 25 N.m (18 ft-lb)
 - * Not applicable from 08.95-on.
- 26 - Oil spray nozzle
 - * For piston cooling.

2.0L (ENGINE CODE ABA) - LUBRICATION SYSTEM

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* Not applicable from 08.95-on.

OIL PRESSURE AND OIL PRESSURE SWITCHES CHECKING

For functional testing and repair of the optical warning light) and acoustic (buzzer) oil pressure warning systems, see Electrical Wiring Diagrams, Troubleshooting & Component Locations binder.

- Remove 0.3 bar oil pressure switch -F22- (brown insulation) and install in VAG 1342 tester. See Fig. 2.

NOTE: From 08.95: 0.25 bar oil pressure switch -F22- with blue insulation.

- Connect tester to cylinder head in place of oil pressure switch -F22-.
- Connect brown wire -3- from tester to Ground (GND).
- Connect VAG 1527B voltage tester to battery positive voltage (B+) and oil pressure switch -A- using adapters from VW 1594 connector test kit. See Fig. 2.

* LED should light up.

- Start engine and increase RPM slowly.

* At 0.15-0.45 bar (2.1-6.5 psi) LED should go out.

If NO:

- Replace oil pressure switch -F22-.
- Connect voltage tester with 1.8 bar oil pressure switch -F1- (white insulation) -B-.

* At 1.6-2.0 bar (23-29 psi) LED must light up.

- Replace oil pressure switch -F1-.

- Increase RPM further.

* At 2000 RPM and 80°C (176°F) oil temperature, oil pressure must be min. 2.0 bar (29 psi).

* At higher RPM, oil pressure must not exceed 7.0 bar (101 psi). If necessary, replace oil pump cover with pressure relief valve.

2.0L (ENGINE CODE ABA) - LUBRICATION SYSTEM

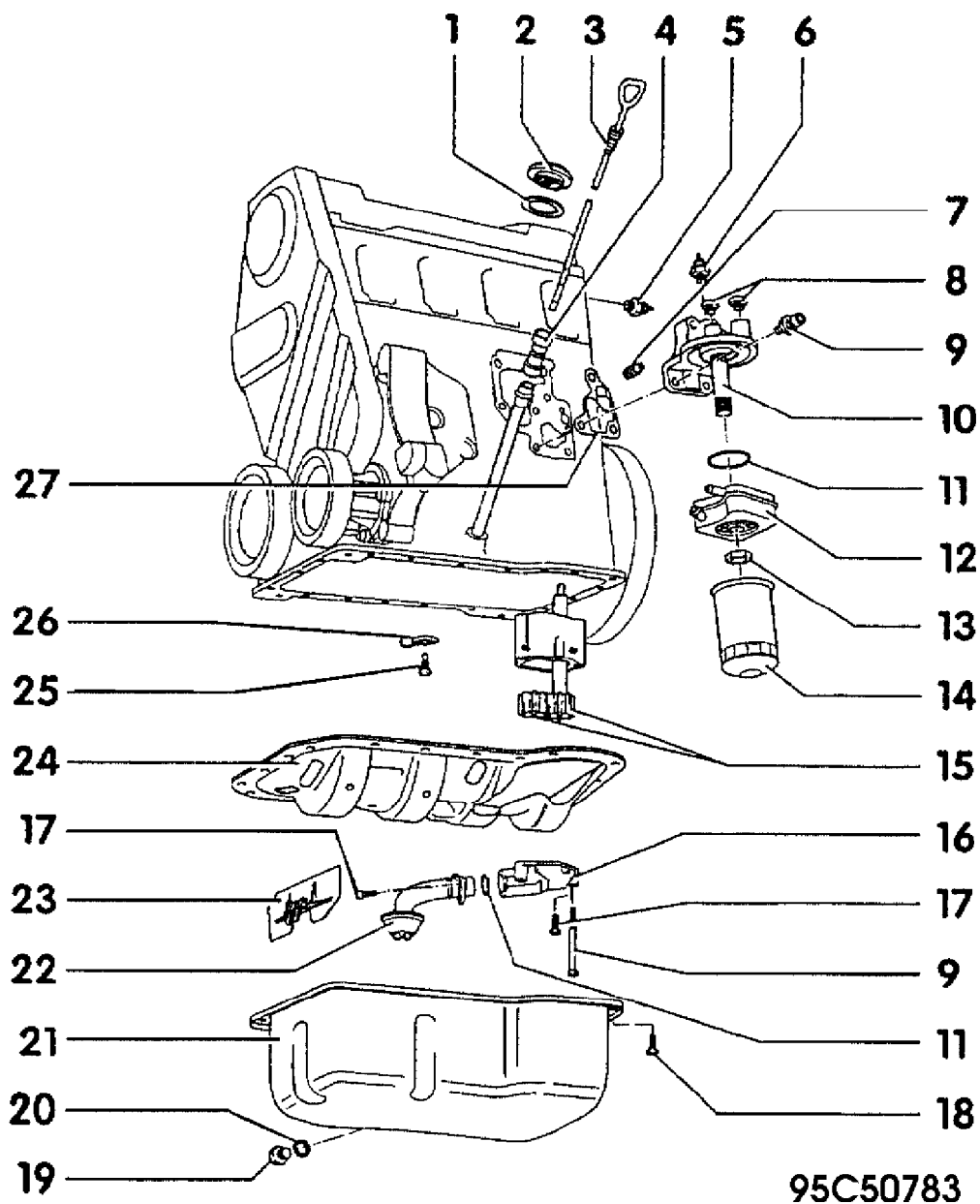
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Fig. 1: Lubrication System Components

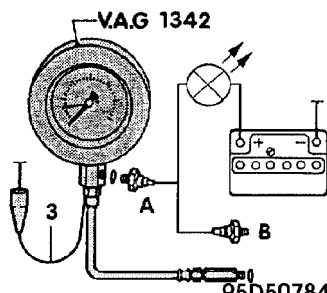


Fig. 2: VAG 1342 Tester Connections

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2.0L (ENGINE CODE ABA) - CYLINDER HEAD, VALVE DRIVE

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ARTICLE BEGINNING

TECHNICAL SERVICE BULLETIN

ENGINE CYLINDER HEAD VALVE DRIVE - 2.0 LITER ENGINE CODE ABA

Model(s): 1996-on Volkswagen Golf III, Jetta III, Cabrio
Group: 15 - Engine - Cylinder Heads Valve Drive
Bulletin No.: 95-01
Date: October 16, 1995

File this Technical Bulletin in Repair Manual No.: W42 011 294 105.

SERVICE INFORMATION

This information describes changes in engine components and specifications for the 2.0 liter engine starting with August, 1995 production (OBD II).

The following information will be integrated in to the Repair Manual during the next update.

CYLINDER HEAD DISASSEMBLING AND ASSEMBLING

Refer to Fig. 1.

2 - up to 07.95: 20 N.m (15 ft-lb)
08.95-on: 35 N.m (26 ft-lb)

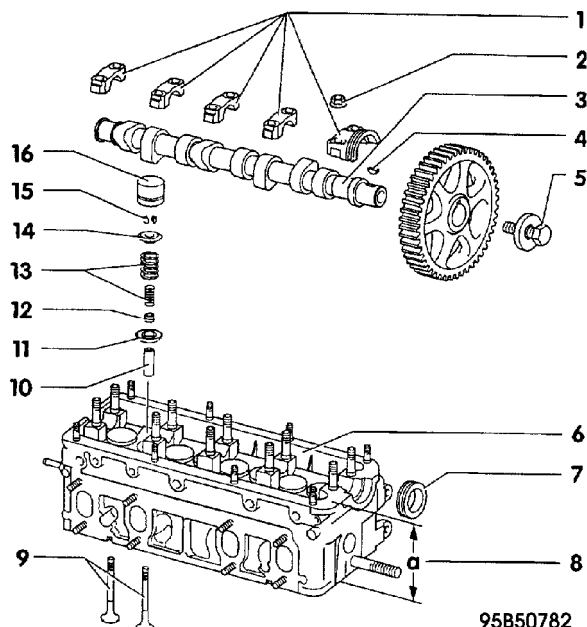


Fig. 1: Exploded View Of Cylinder Head Assembly

END OF ARTICLE

2.0L (ENGINE CODE ABA) - CRANKSHAFT, CYLINDER BLOCK

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ARTICLE BEGINNING

TECHNICAL SERVICE BULLETIN

ENGINE CRANKSHAFT CYLINDER BLOCK - 2.0 LITER ENGINE CODE ABA

Model(s): 1996-on Volkswagen Golf III, Jetta III, Cabrio
Group: 13 - Engine - Crankshaft/Crankcase
Bulletin No.: 95-01
Date: October 16, 1995

File this Technical Bulletin in Repair Manual No.: W42 011 294 105.

SERVICE INFORMATION

This information describes changes in engine components and specifications for the 2.0 liter engine starting with August, 1995 production (OBD II).

The following information will be integrated into the Repair Manual during the next update.

PISTON AND CONNECTING ROD DISASSEMBLING/ASSEMBLING

Refer to Fig. 1.

- 6 - Pressure relief valve
 - * Tightening torque: 27 N.m (20 ft-lb)
 - * Opening pressure: 2.5 - 3.2 bar (36 - 46 psi)
 - * Not applicable from 08.95-on.
- 7 - Oil spray nozzle
 - * For piston cooling.
 - * Not applicable from 08.95-on.

NOTE: The oil spray nozzles and pressure relief valves have been discontinued with production from 08.95.

PISTON DIMENSIONS

Refer to Fig. 2.

PISTON DIMENSIONS TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Engine Code	³ ABA	³ ABA
	³ up to 07.95	³ 08.95-on
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Dimension -a-	ÄÄ mm (in.) ³ 20.1	³ 20.1
	³ (0.791)	³ (.791)
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Dimension -b-	ÄÄ mm (in.) ³ 5.5	³ 7.1

2.0L (ENGINE CODE ABA) - CRANKSHAFT, CYLINDER BLOCK

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	³ (0.217)	³ (0.280)
Combustion Chamber Dia. -c- ÄÄ mm (in.)	³ 64.0	³ 65.0
	³ (2.520)	³ (2.559)
Piston Pin Diameter -d- ÄÄ mm (in.)	³ 21.0	³ 21.0
	³ (0.827)	³ (0.827)

NOTE: Only pistons and piston rings of the same type and pistons of the same weight class may be installed.

PISTON AND CYLINDER DIMENSIONS TABLE - UP TO > 07.95

Reconditioning Dimension	³ Piston diameter	³ Cylinder Bore Diameter
Basic dimension ÄÄ mm (in.)	³ 82.485	³ 82.51
	³ (3.24744)	³ (3.2484)
1st oversize ÄÄ mm (in.)	³ 82.735	³ 82.76
	³ (3.25728)	³ (3.2583)
2nd oversize ÄÄ mm (in.)	³ 82.985	³ 83.01
	³ (3.26713)	³ (3.2681)

PISTON AND CYLINDER DIMENSIONS TABLE - 08.95-ON

Reconditioning Dimension (1)	³ Piston diameter	³ Cylinder Bore Diameter
Basic dimension ÄÄ mm (in.)	³ 82.470	³ 82.51
	³ (3.24685)	³ (3.2484)
1st oversize ÄÄ mm (in.)	³ 82.720	³ 82.76
	³ (3.25669)	³ (3.2583)
2nd oversize ÄÄ mm (in.)	³ 82.970	³ 83.01
	³ (3.26654)	³ (3.2681)
(1) = Add 0.015 mm (0.00059 in.) for phosphate layer		

2.0L (ENGINE CODE ABA) - CRANKSHAFT, CYLINDER BLOCK

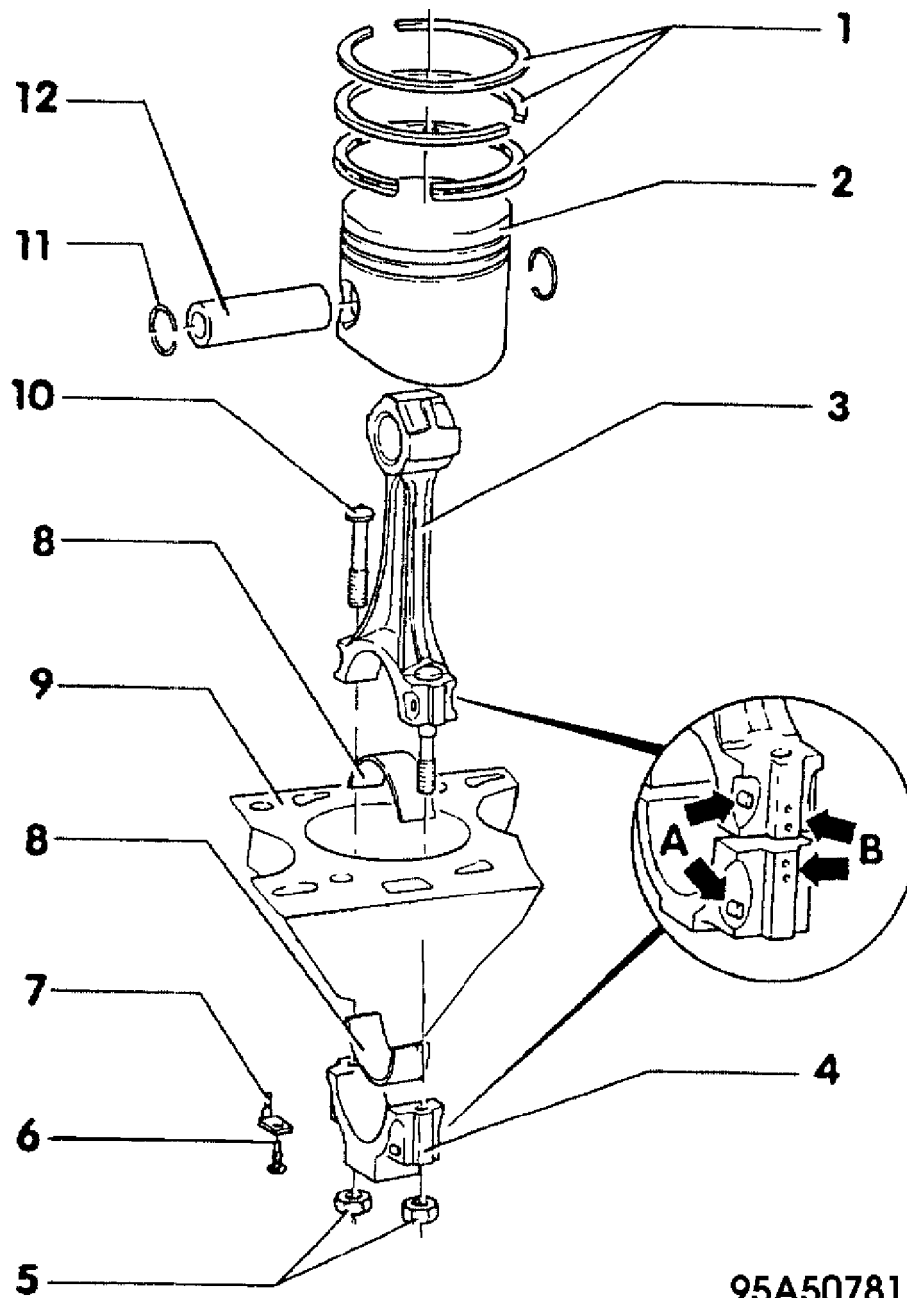
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Fig. 1: Exploded View Of Piston/Connecting Rod Assembly

2.0L (ENGINE CODE ABA) - CRANKSHAFT, CYLINDER BLOCK

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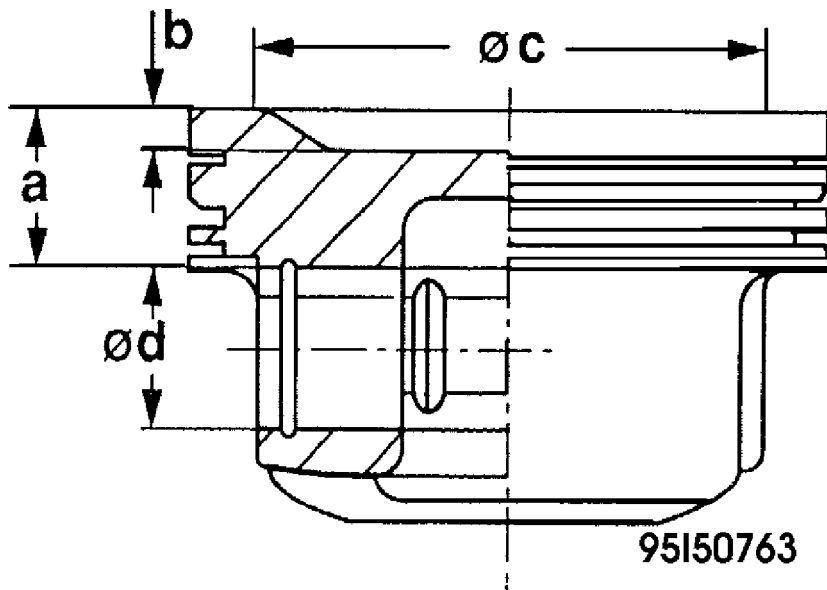


Fig. 2: Piston Dimensions

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1.9L - TOOTHED BELT RUNS TOWARDS OUTSIDE/JUMPS OFF

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ARTICLE BEGINNING

TECHNICAL SERVICE BULLETIN

TOOTHED BELT RUNS TOWARDS OUTSIDE, WEARS OUT, JUMPS OFF, CRACKS

Model(s): 1994-97 Volkswagen Golf, Jetta, Passat with 1.9L
(Engine code AAZ, 1Z)
Group: 15 - Engine - Cylinder Heads Valve Drive
Bulletin No.: 97-01
Date: June 4, 1997

NOTE: This bulletin supersedes Technical Bulletin Group 13, No. 97-01 dated January 28, 1997.

CONDITION

Toothed belt runs toward outside and wears out, jumps off, cracks or is noisy.

SERVICE

If this condition exists:

- Replace toothed belt and automatic tensioning roller
Part No: 028 109 243F see the appropriate Repair Manual for Models listed above.

NOTE: Prior to installing the new belt, clean idler pulley, crankshaft and Diesel Injection pump sprockets.

After installing new belt but prior to installing vibration damper pulley:

- Using a second Technician, start and run engine (AT IDLE) for a few seconds while observing toothed belt.
- Switch ignition OFF, then check toothed belt.
- * Belt must NOT protrude beyond face of crankshaft sprocket.

If belt protrudes beyond face of crankshaft sprocket, adjust Diesel Injection pump mounting bracket as follows:

- Remove injection pump.
- Slightly loosen three fasteners securing bracket to engine. See Fig. 1, -arrows-.
- Press bracket down at point -A- and lift at point -B- while a second Technician torques fasteners -arrows- to 25 N.m. (18 ft-lb.). See

1.9L - TOOTHED BELT RUNS TOWARDS OUTSIDE/JUMPS OFF

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Fig. 1.

- Reinstall injection pump.

After installing belt but prior to installing vibration damper pulley:

- Using a second Technician, start and run engine (AT IDLE) for a few seconds while observing toothed belt.
- Switch ignition OFF, then check toothed belt.
 - * Belt must NOT protrude beyond face of crankshaft sprocket.

If belt is correctly positioned:

- Reinstall remaining parts as outlined in applicable Repair Manual.

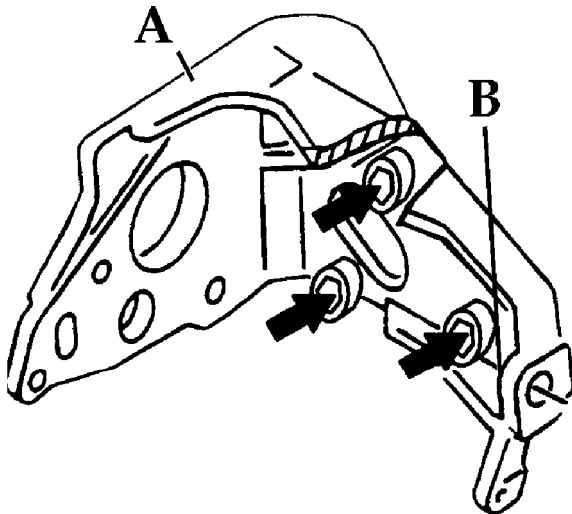
If belt protrudes beyond face of crankshaft sprocket:

- Contact the VW Technicians Helpline at:
 - US 1-800-678-2389
 - CAN 1-800-697-8655

WARRANTY INFORMATION

When procedure applies to vehicles within warranty use the following:

PART IDENTIFIER: 1527
LABOR OPERATION: 1527510 200 TU



97B51251

Fig. 1: Injection Pump Bracket & Mounting Bolts

END OF ARTICLE

2.0L, A/C Circuit

SYSTEM WIRING DIAGRAMS

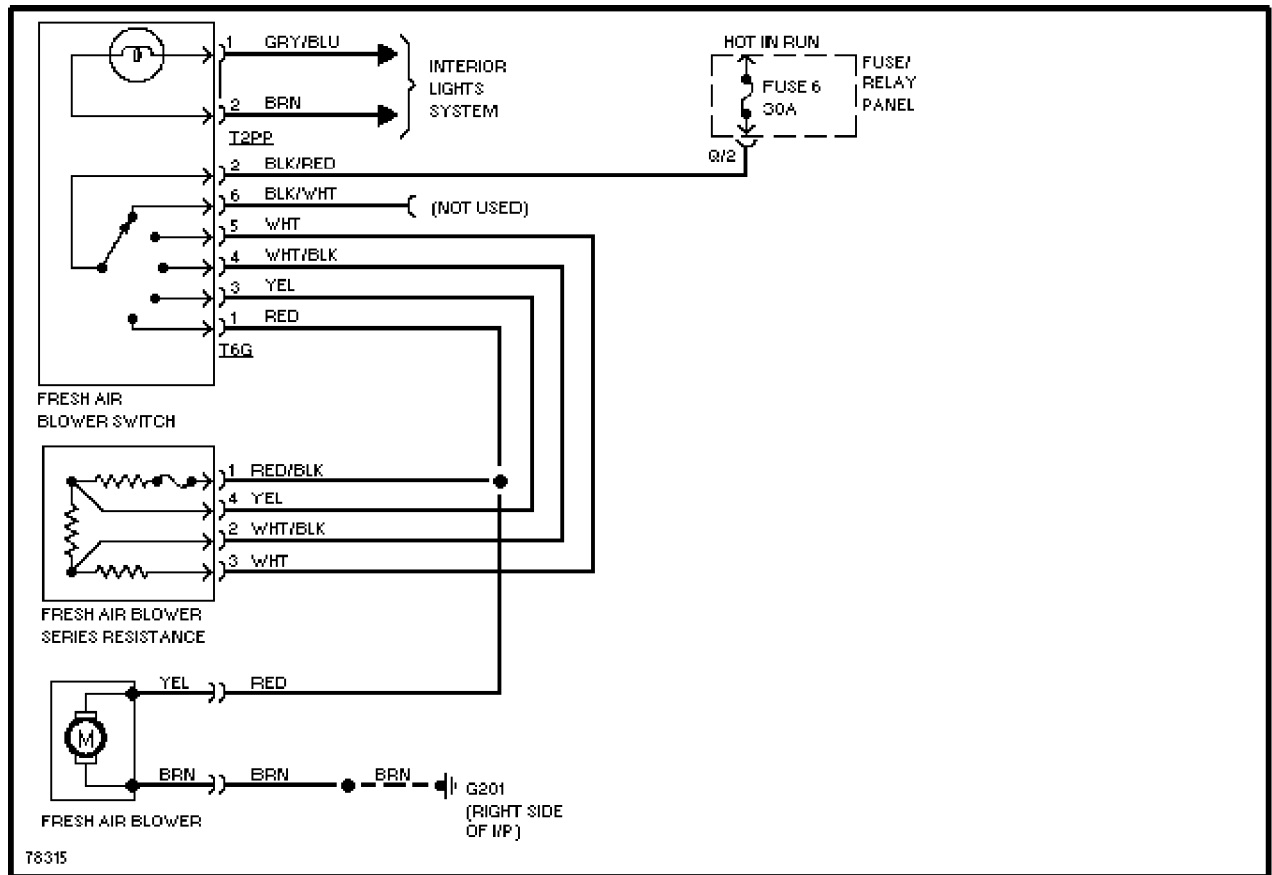
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2.0L, Heater Circuit

ANTI-LOCK BRAKES

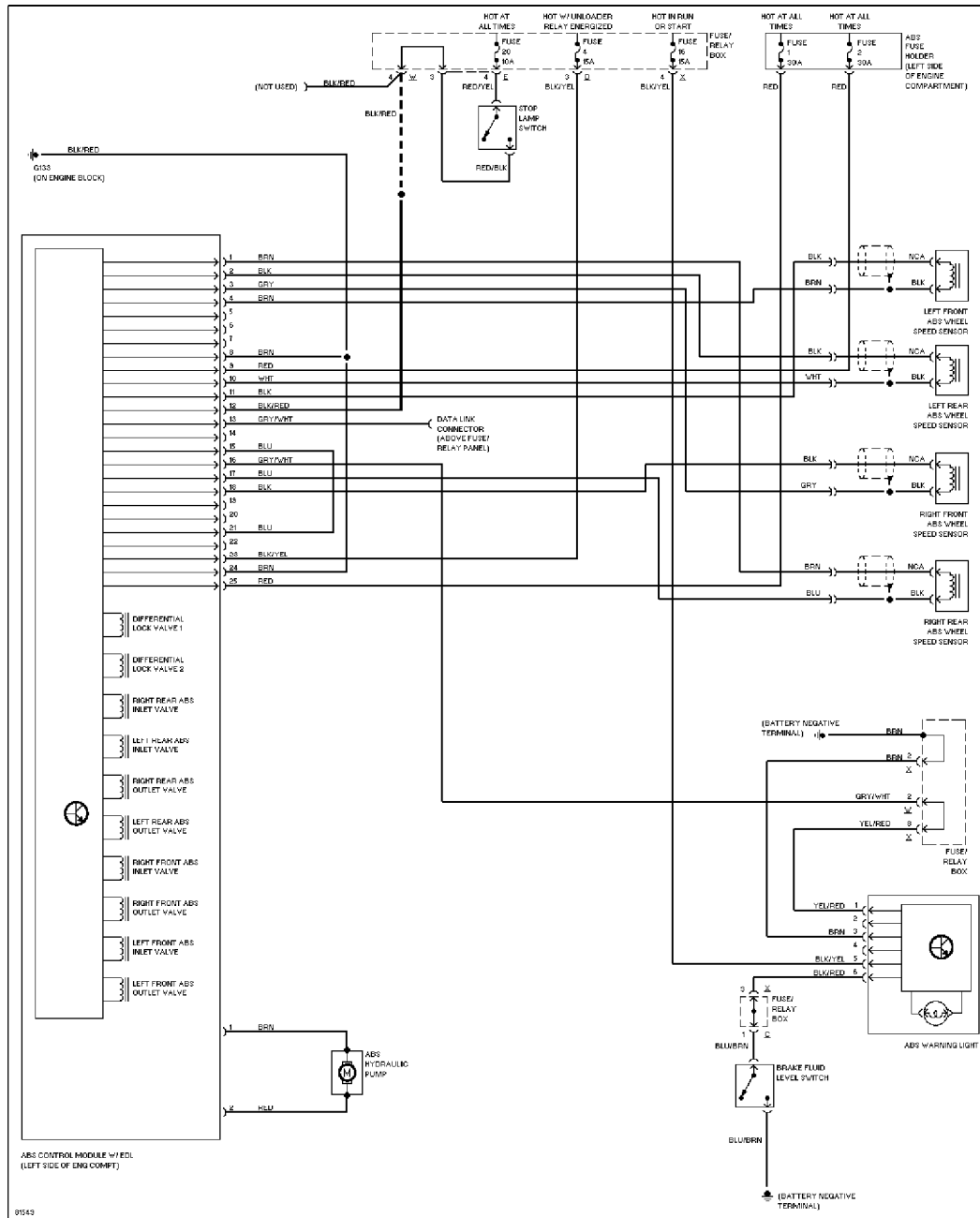
SYSTEM WIRING DIAGRAMS

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Anti-lock Brake Circuits

ANTI-THEFT

SYSTEM WIRING DIAGRAMS

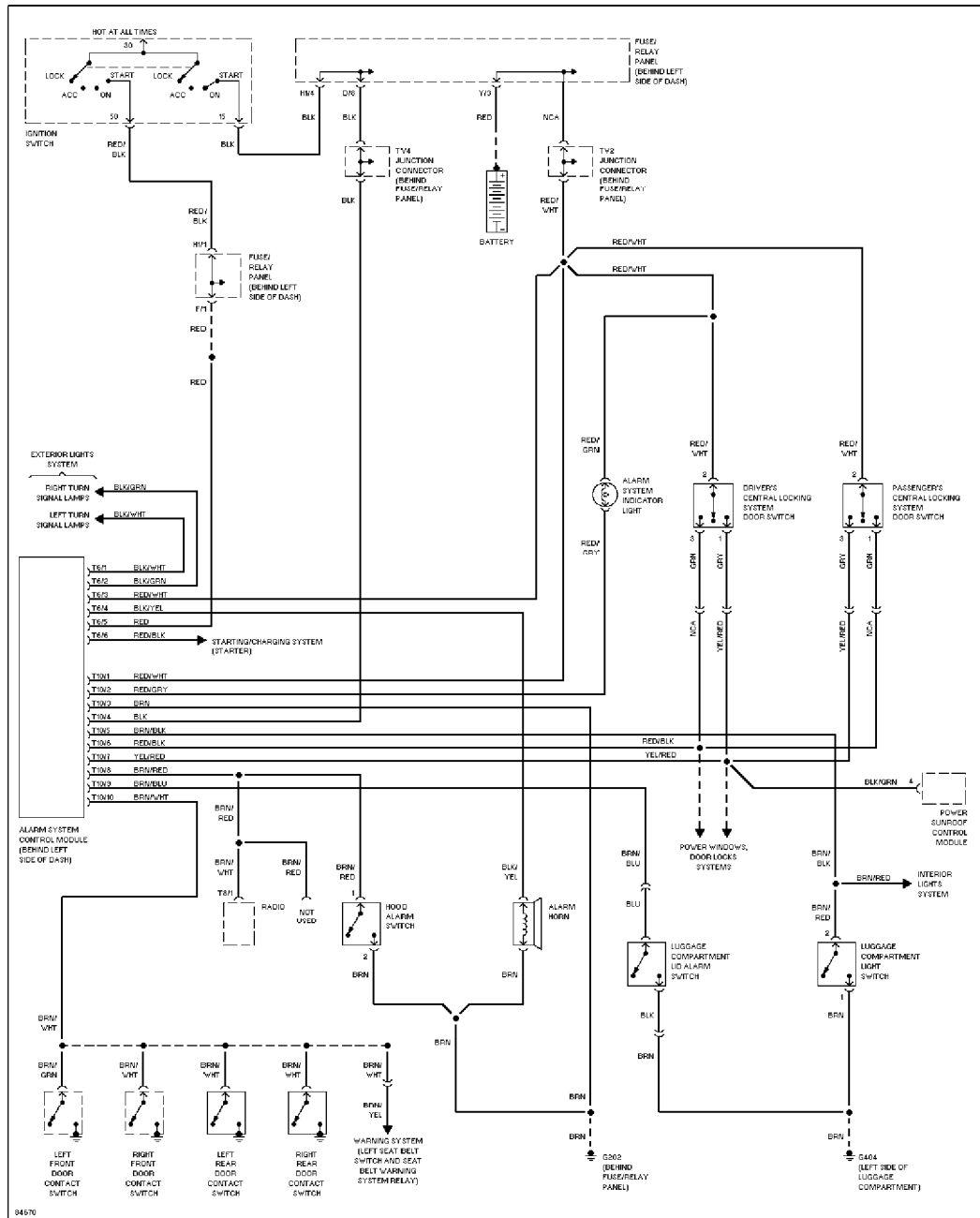
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Anti-theft Circuit

COMPUTER DATA LINES

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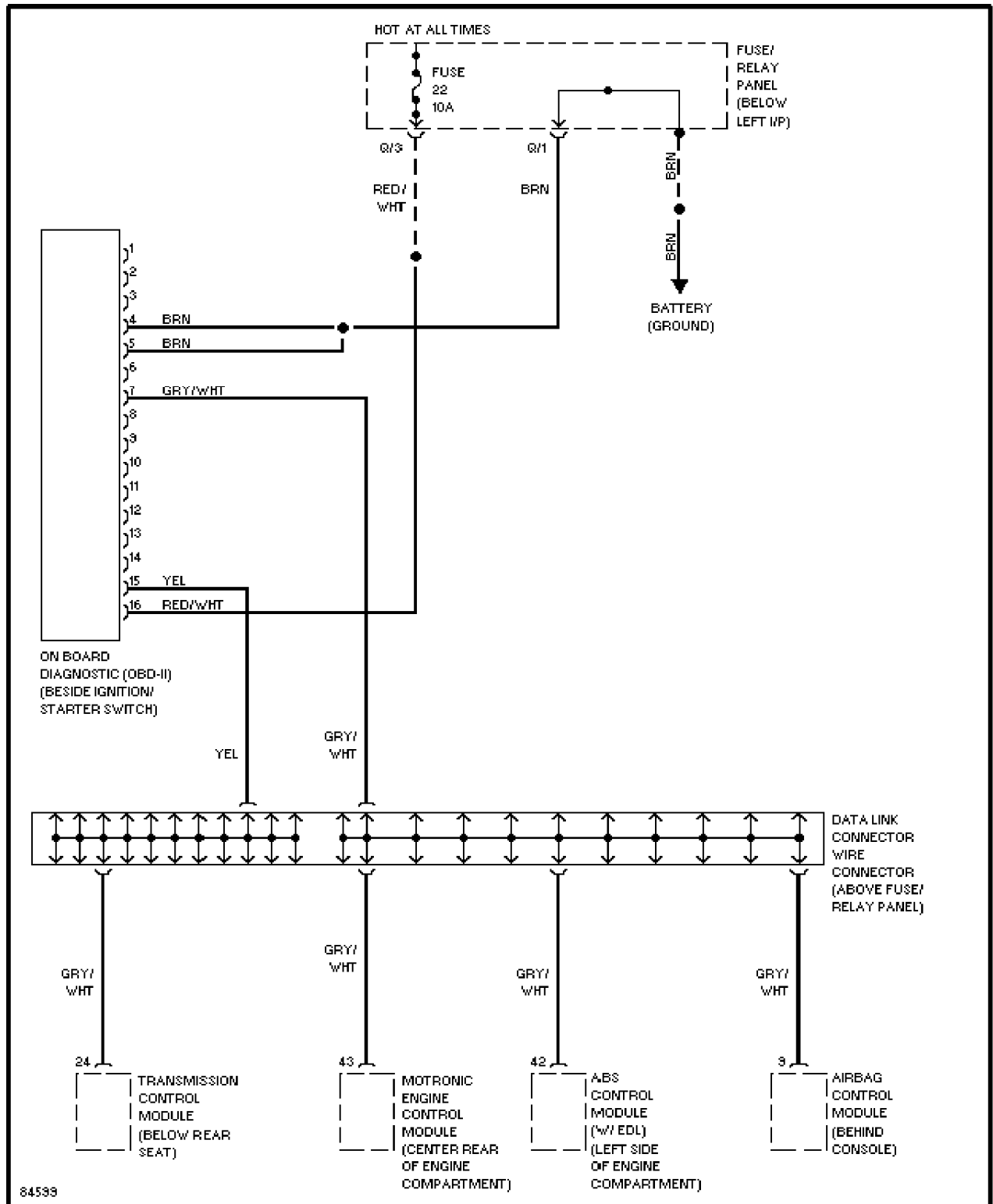
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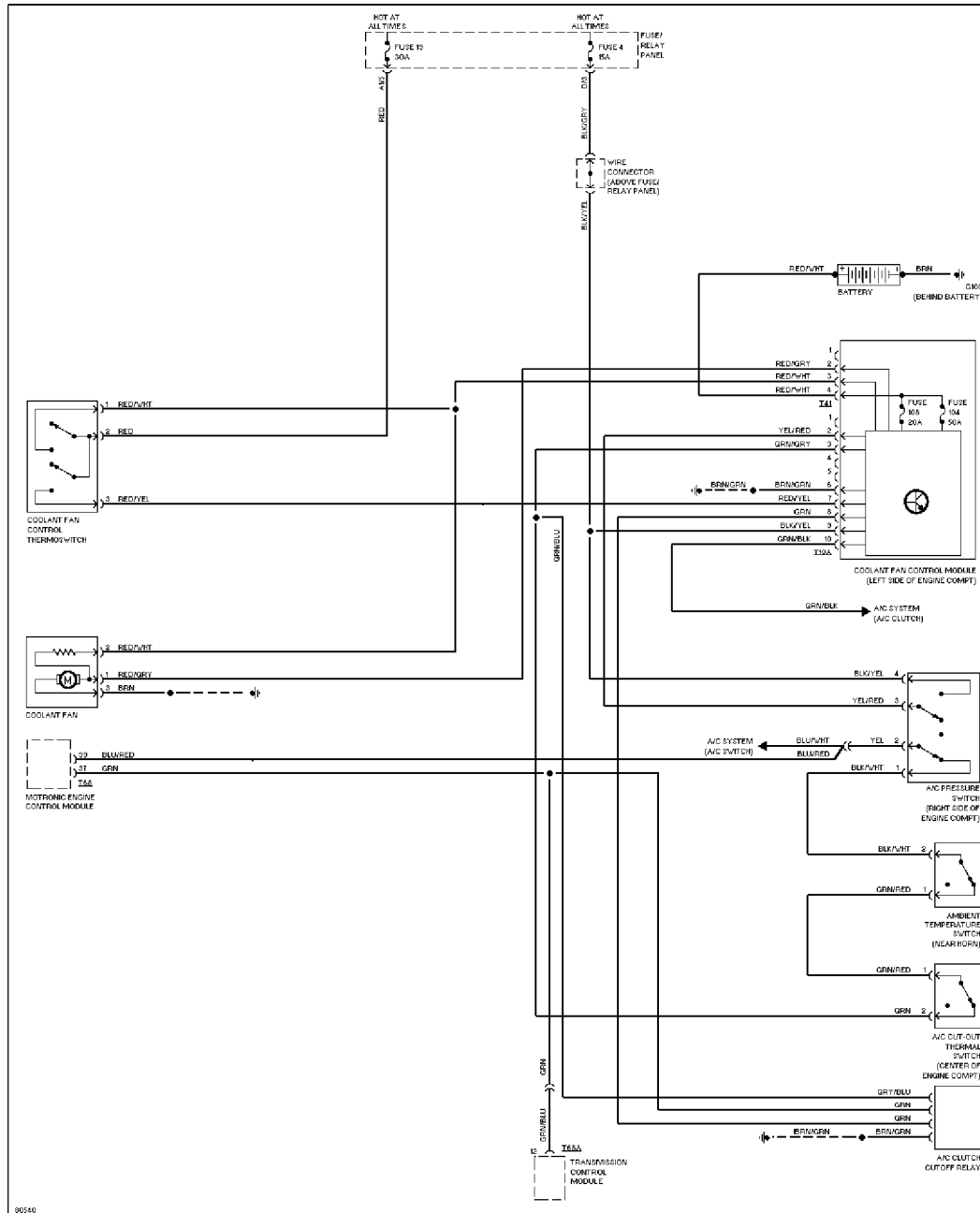


Computer Data Lines

COOLING FAN

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2.0L



2.0L, Cooling Fan Circuit

CRUISE CONTROL

SYSTEM WIRING DIAGRAMS

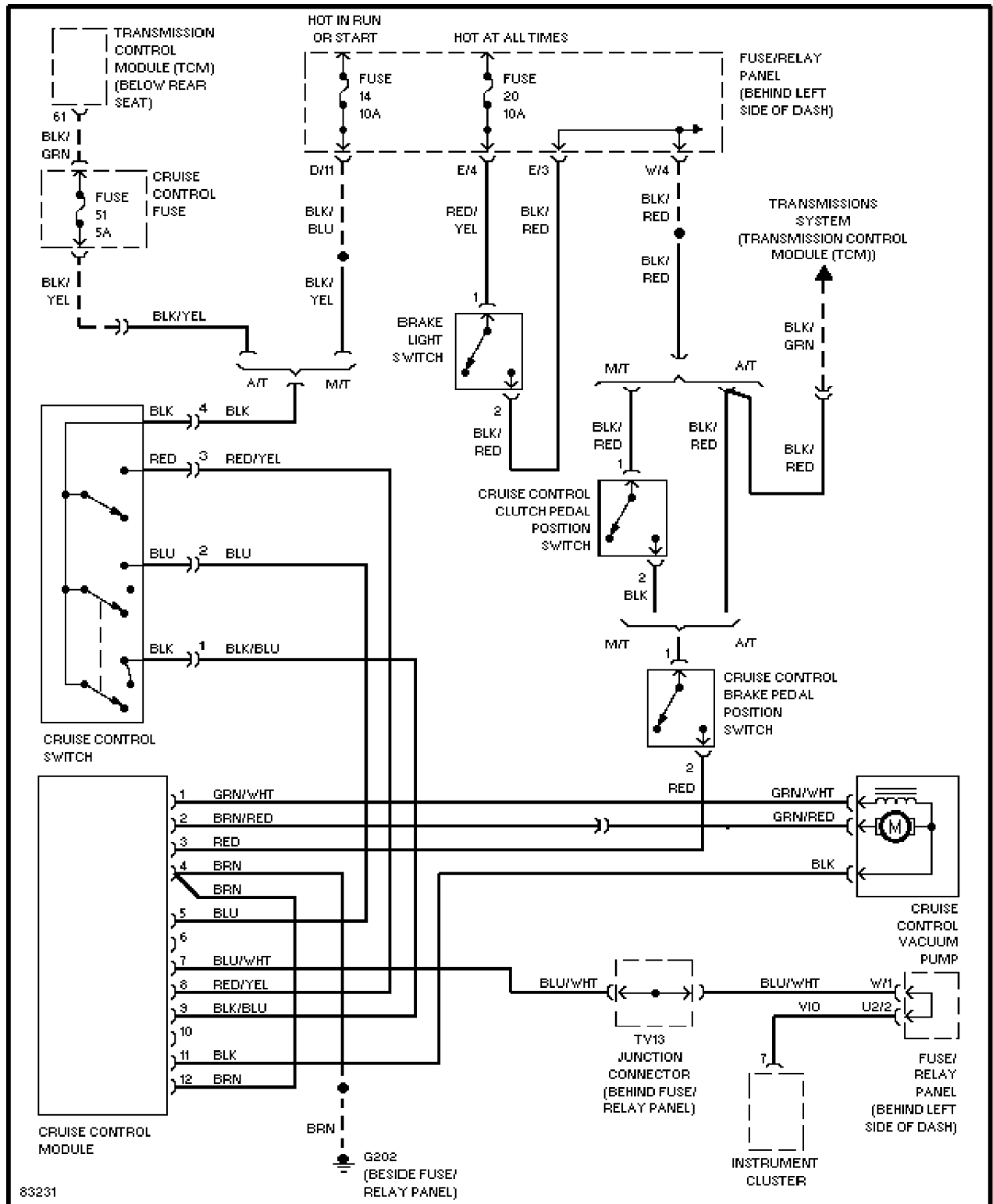
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Cruise Control Circuit

DEFOGGERS

SYSTEM WIRING DIAGRAMS

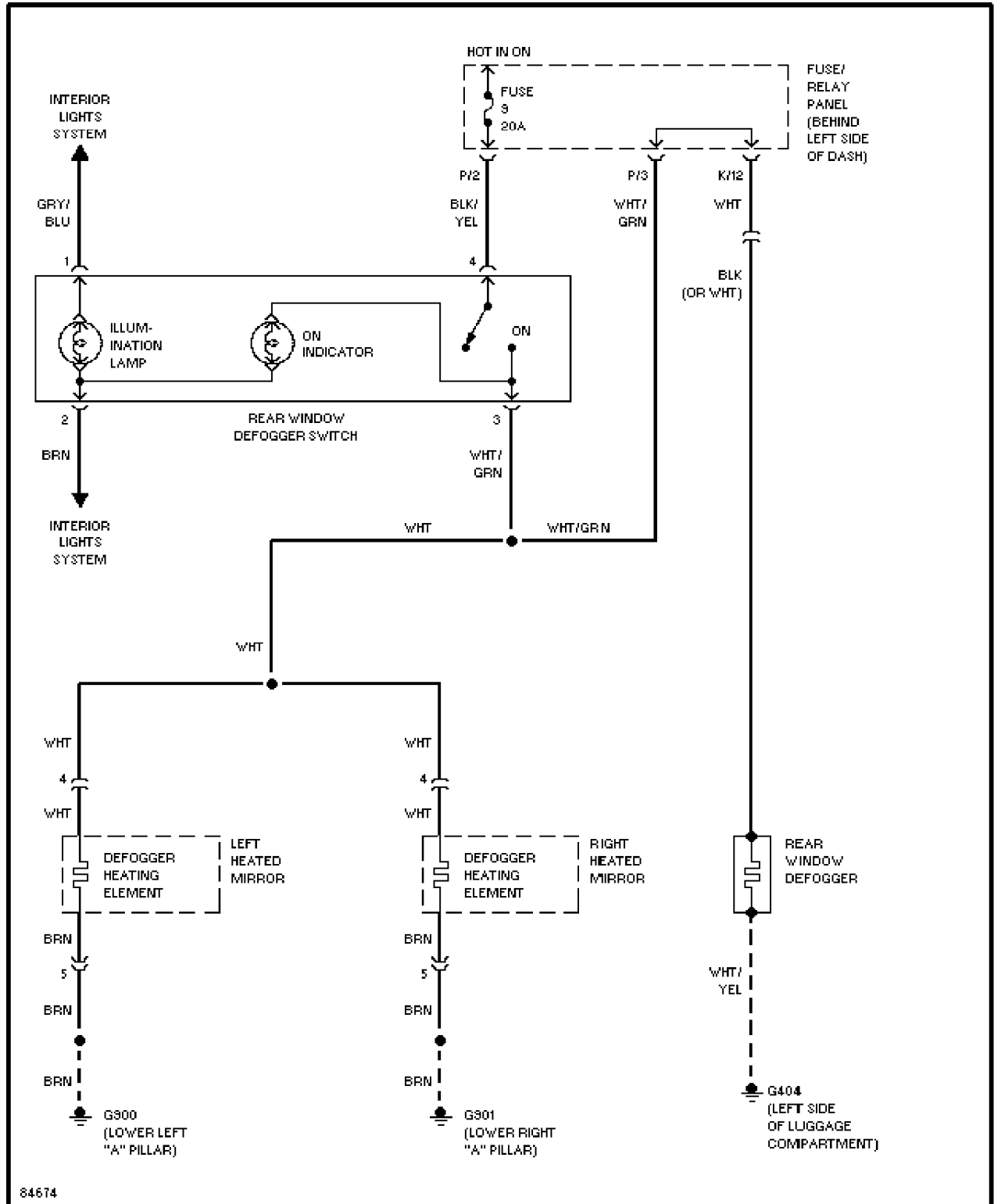
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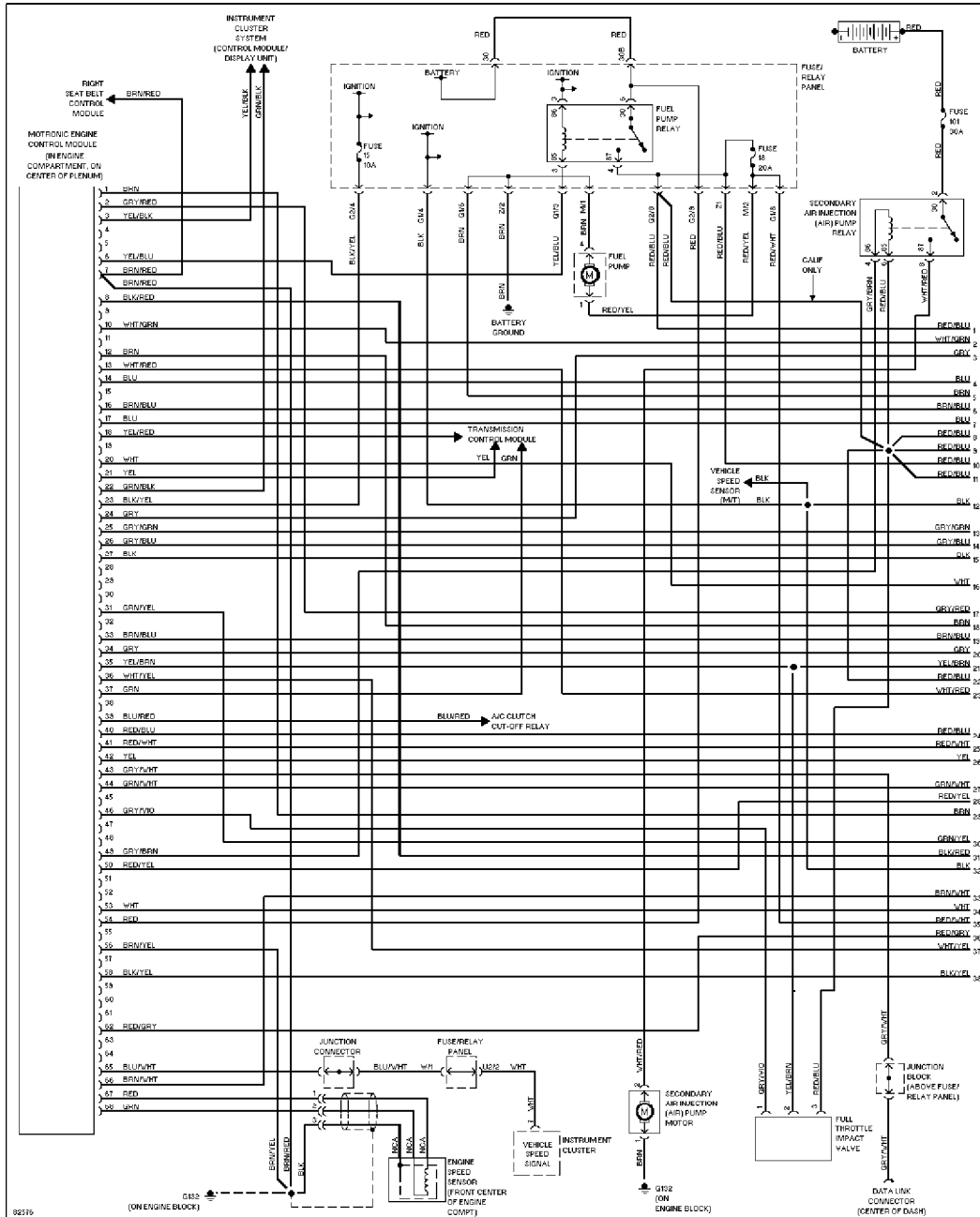


Defogger Circuit

SYSTEM WIRING DIAGRAMS
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ENGINE PERFORMANCE

2.0L



2.0L, Engine Performance Circuits (1 of 2)

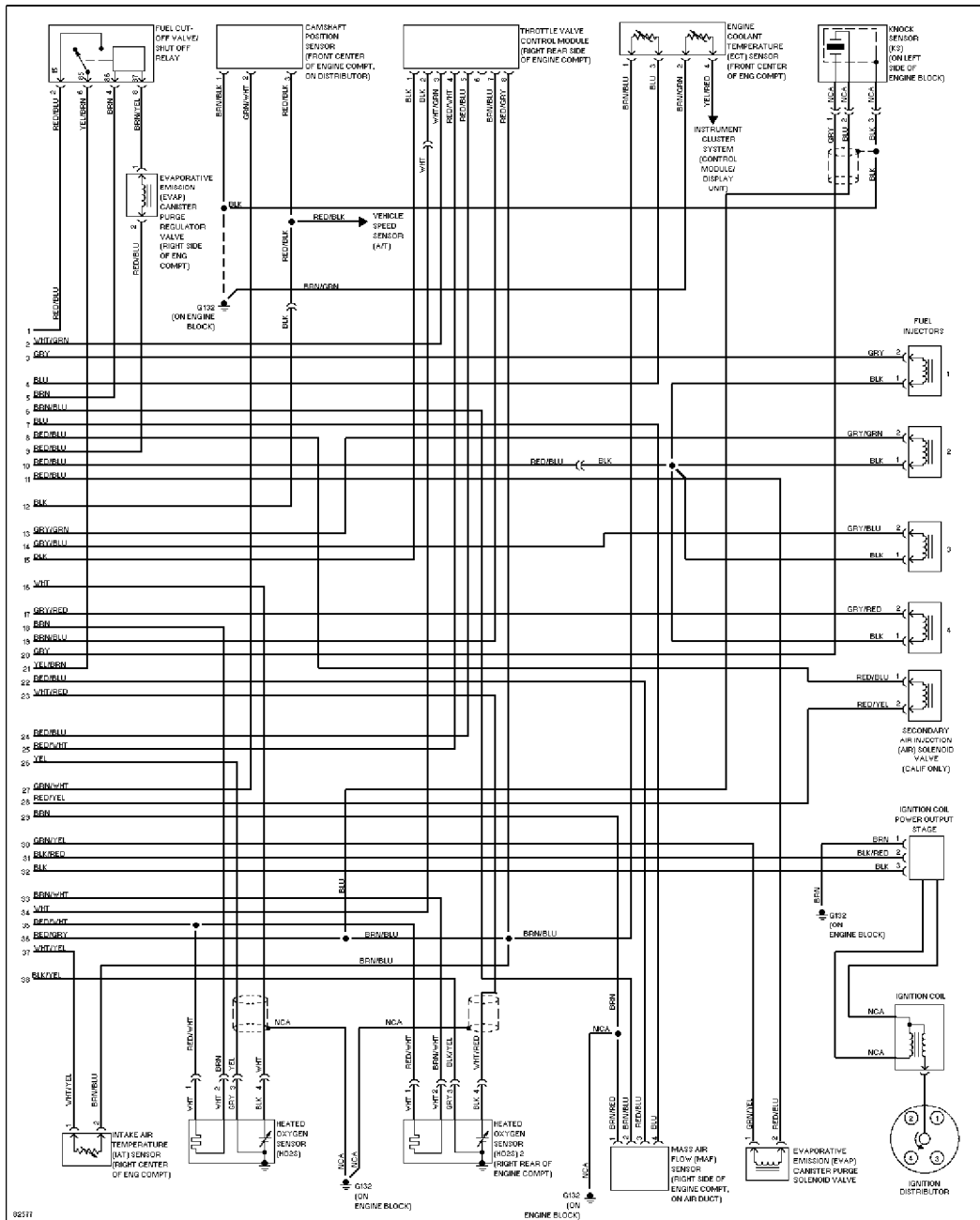
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2.0L, Engine Performance Circuits (2 of 2)

EXTERIOR LIGHTS

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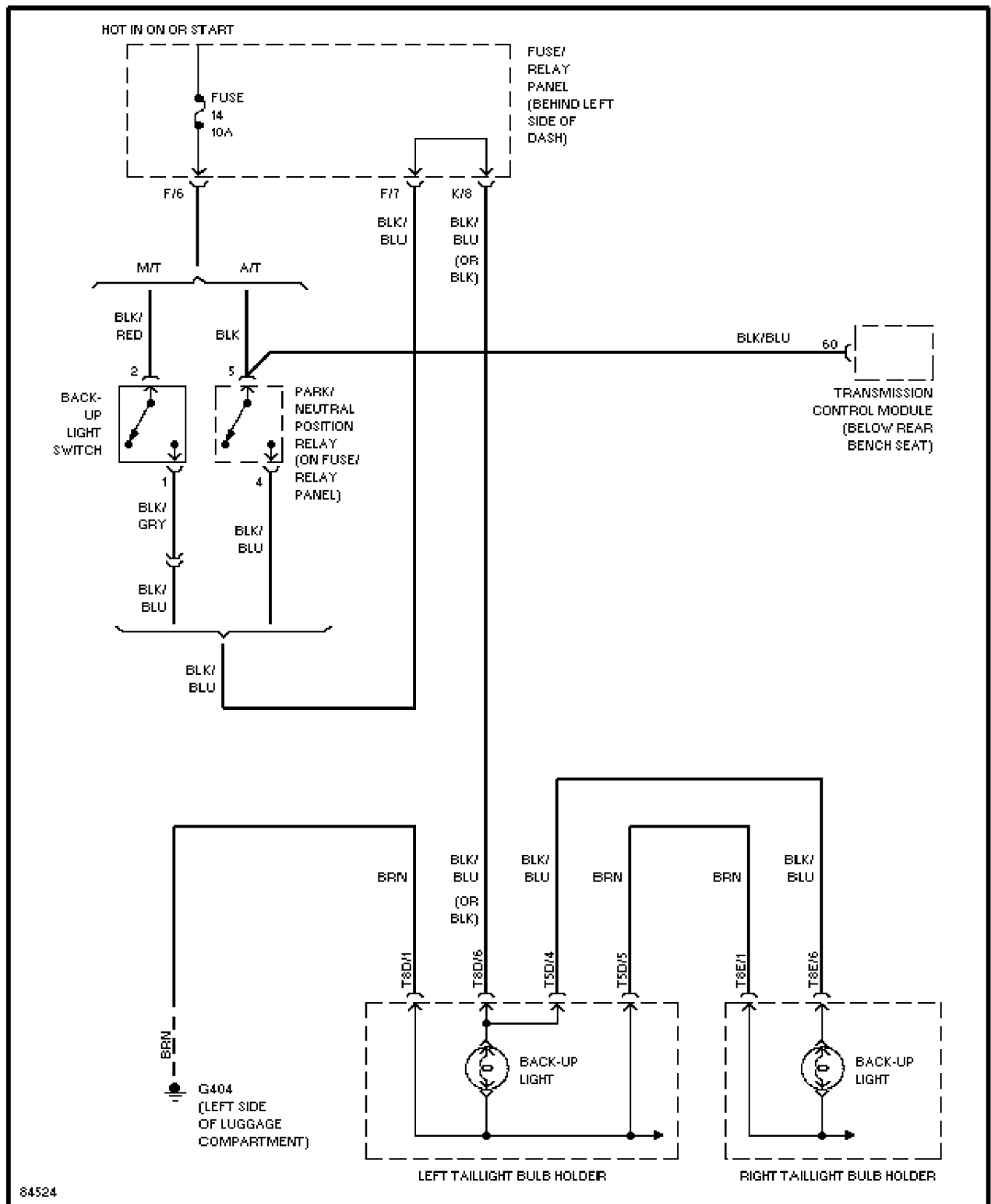
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Back-up Lamps Circuit

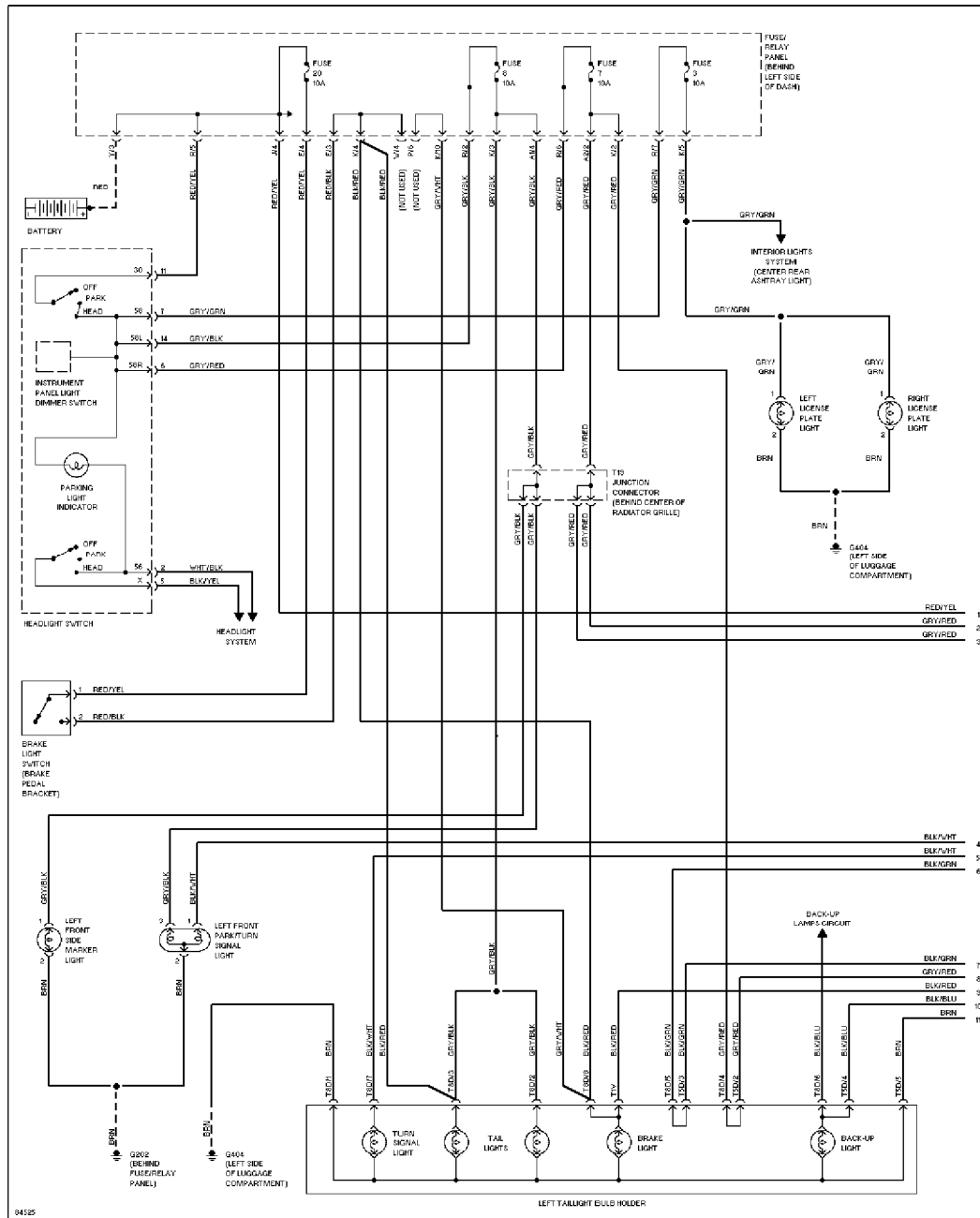
SYSTEM WIRING DIAGRAMS

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Exterior Lamps Circuit (1 of 2)

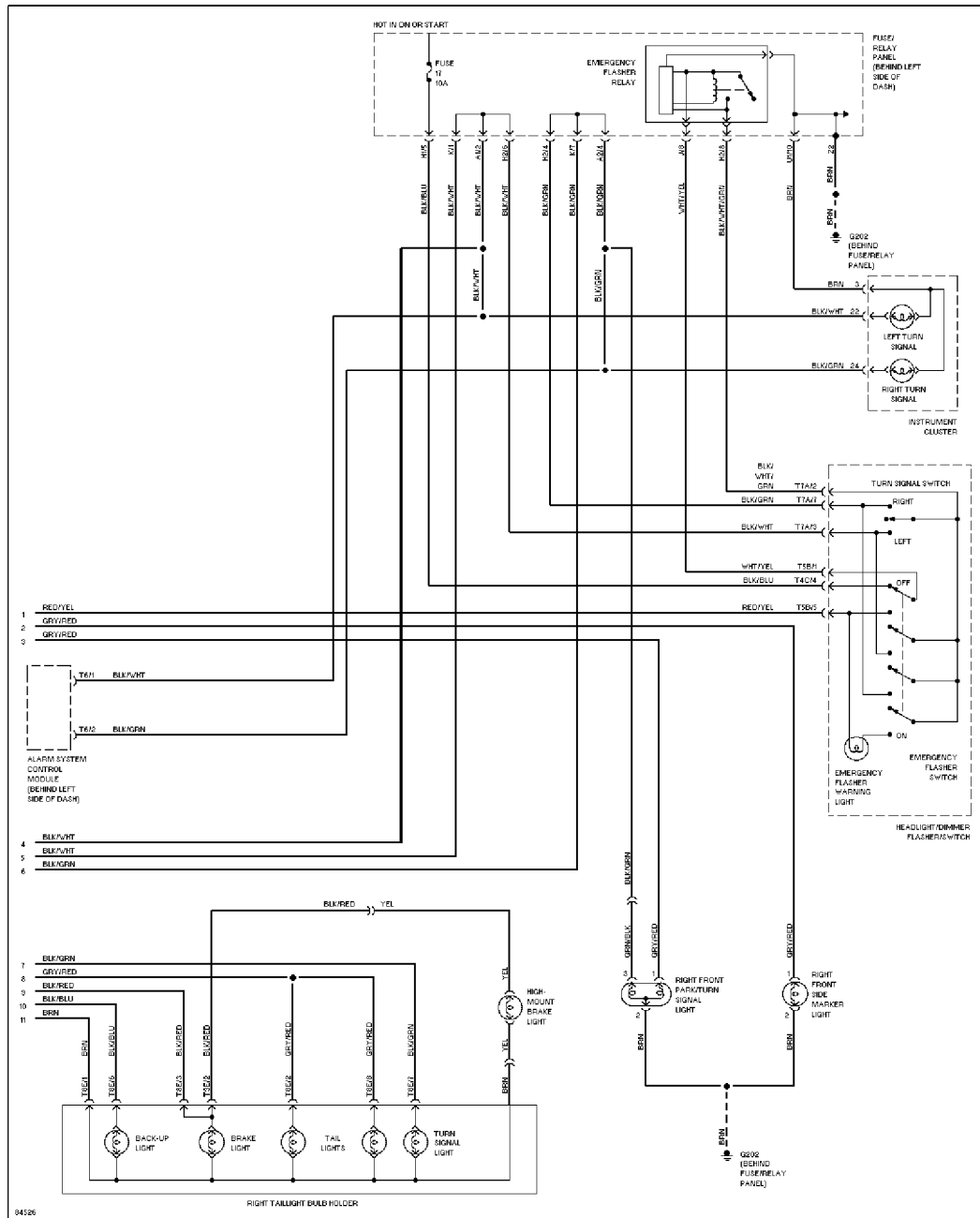
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Exterior Lamps Circuit (2 of 2)

GROUND DISTRIBUTION

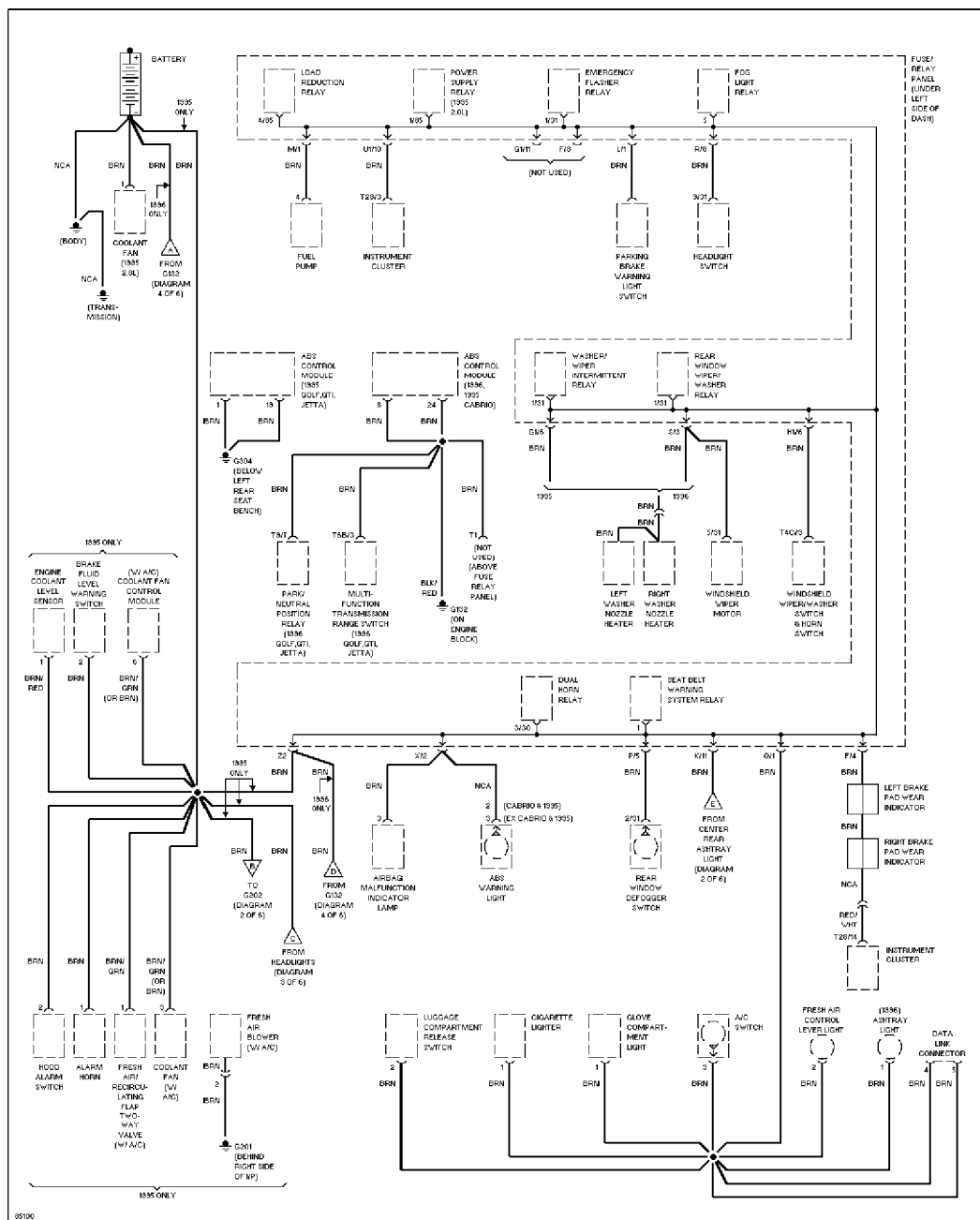
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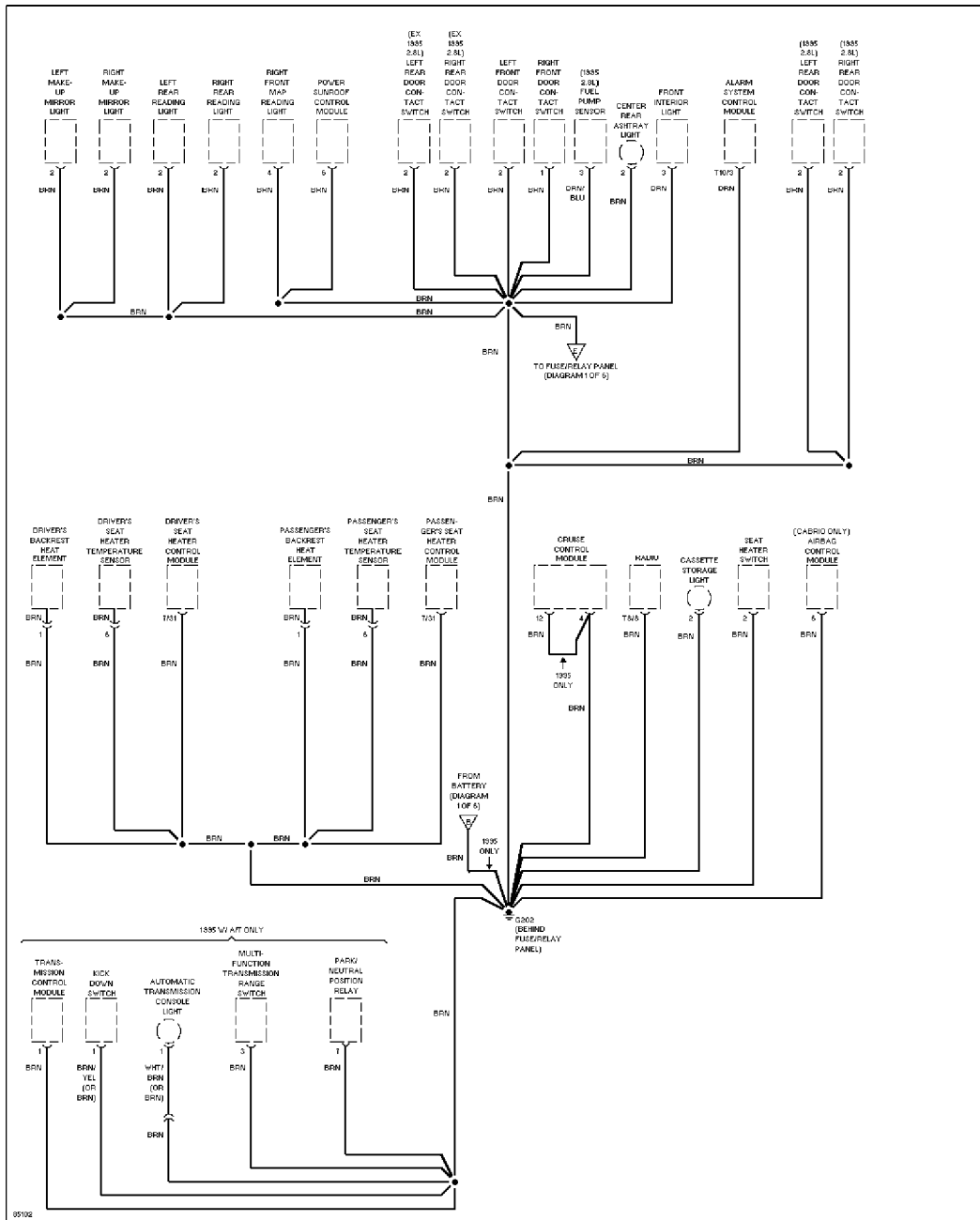
Ground Distribution Circuit (1 of 6)

SYSTEM WIRING DIAGRAMS

Article Text (p. 15)

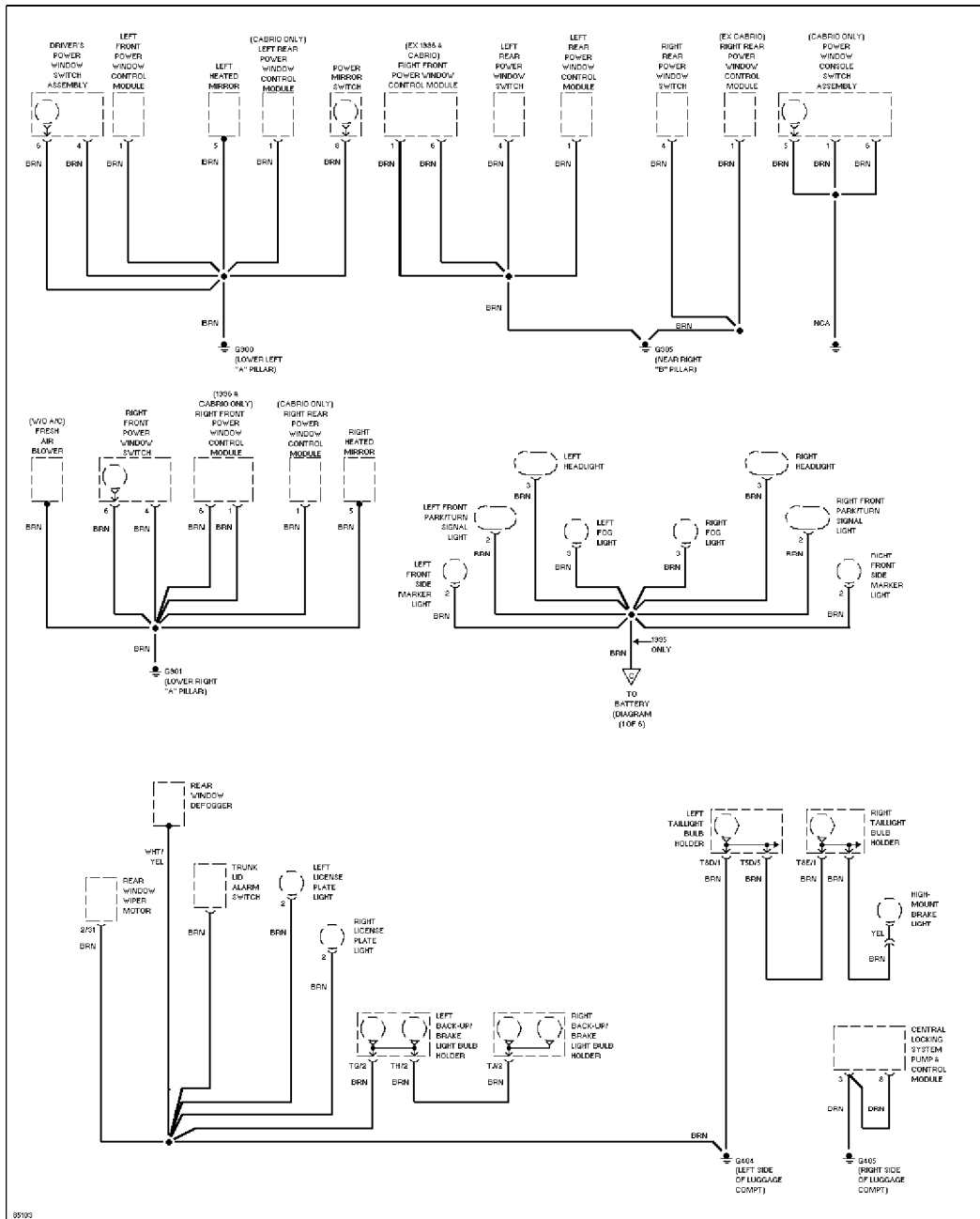
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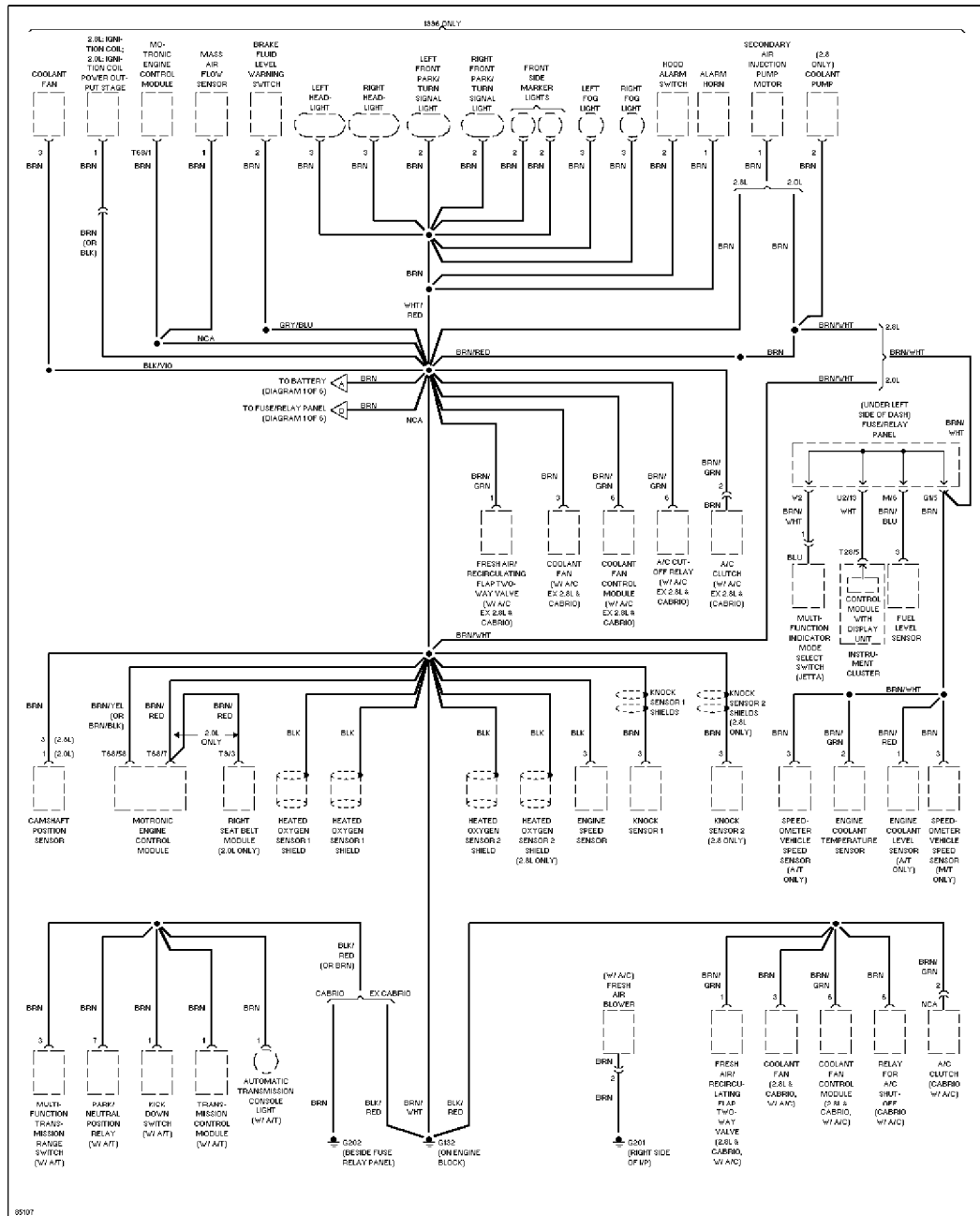
Ground Distribution Circuit (3 of 6)

SYSTEM WIRING DIAGRAMS

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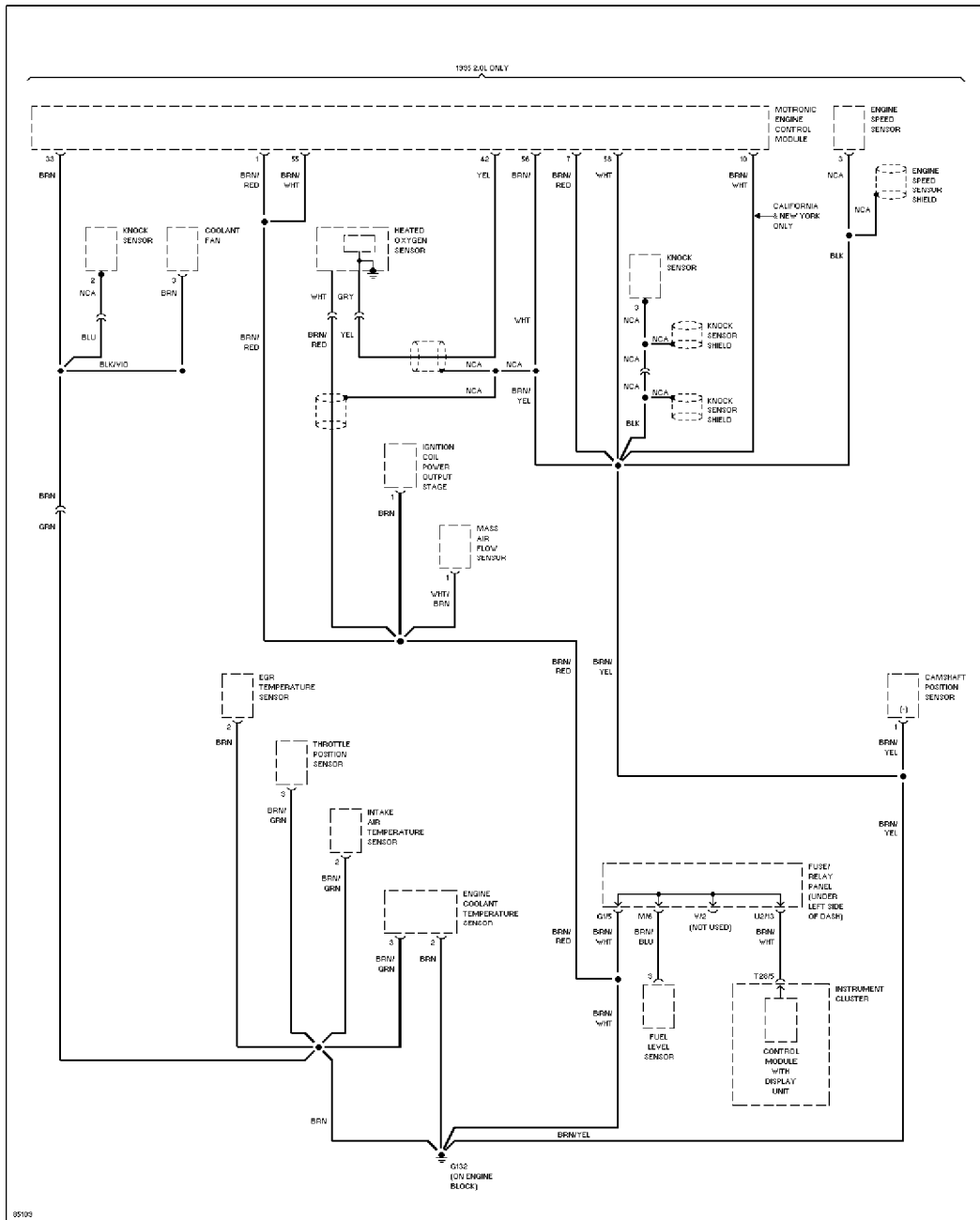
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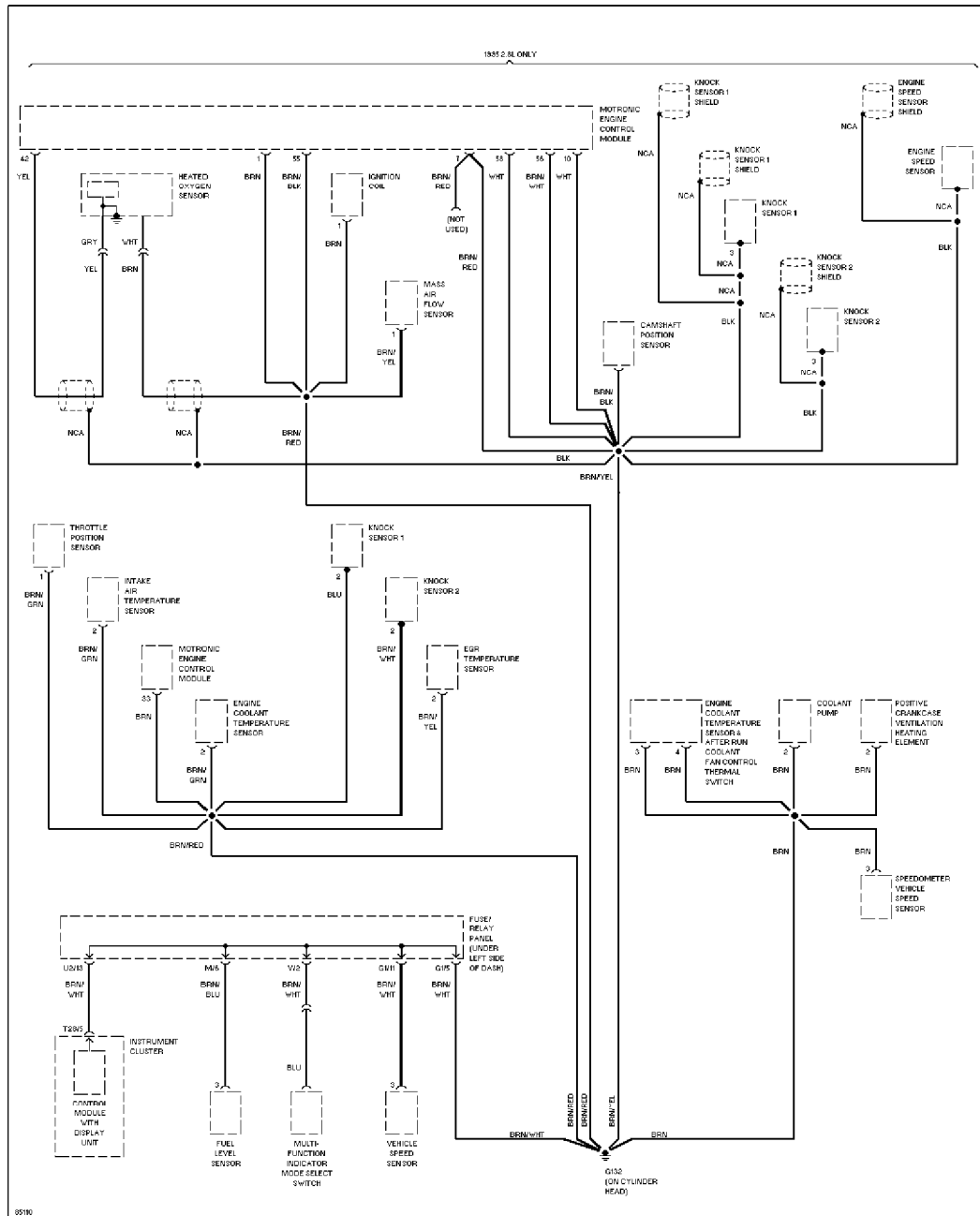
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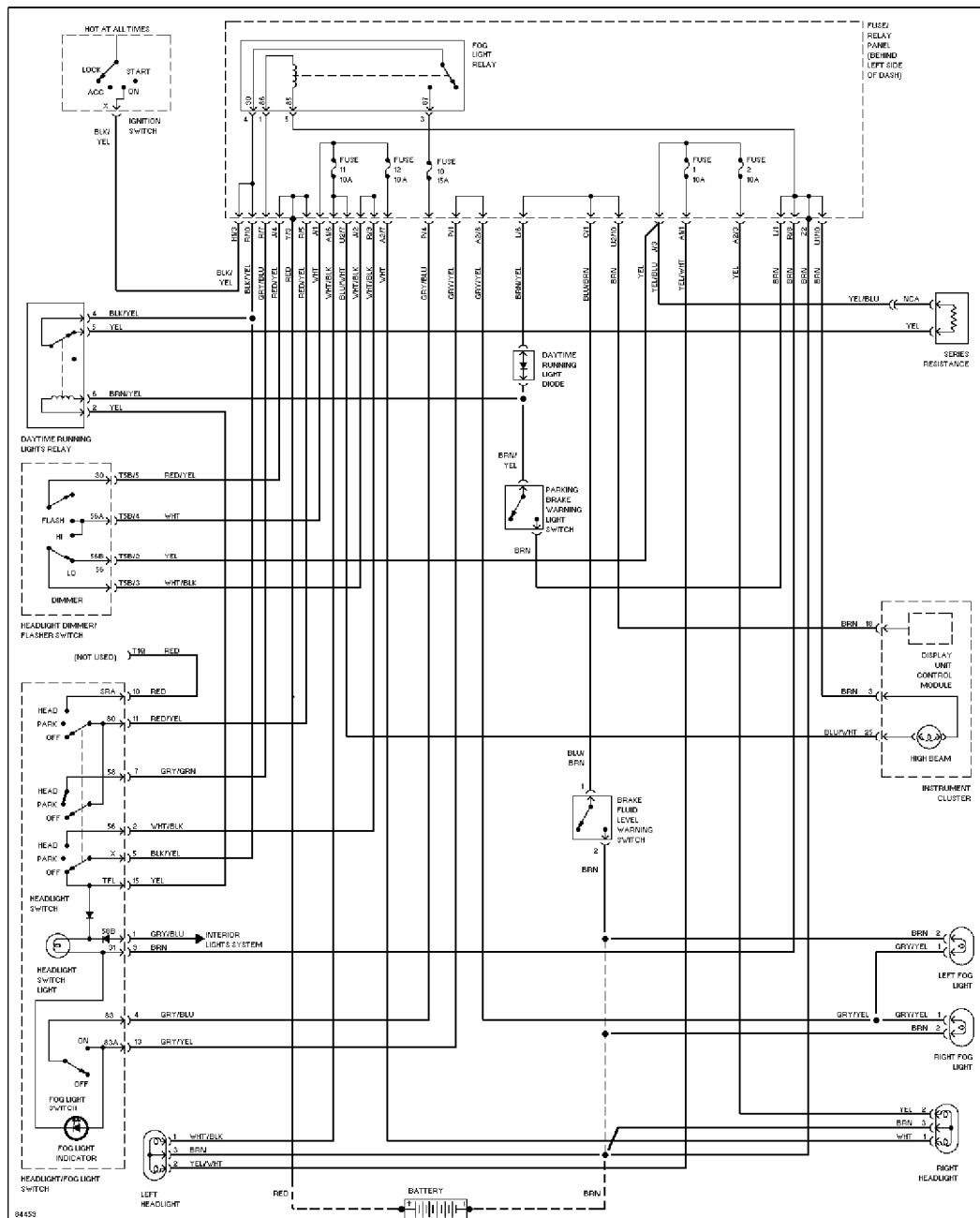
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Ground Distribution Circuit (6 of 6)

HEADLIGHTS

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Headlight Circuit, W/ DRL

HORN

SYSTEM WIRING DIAGRAMS

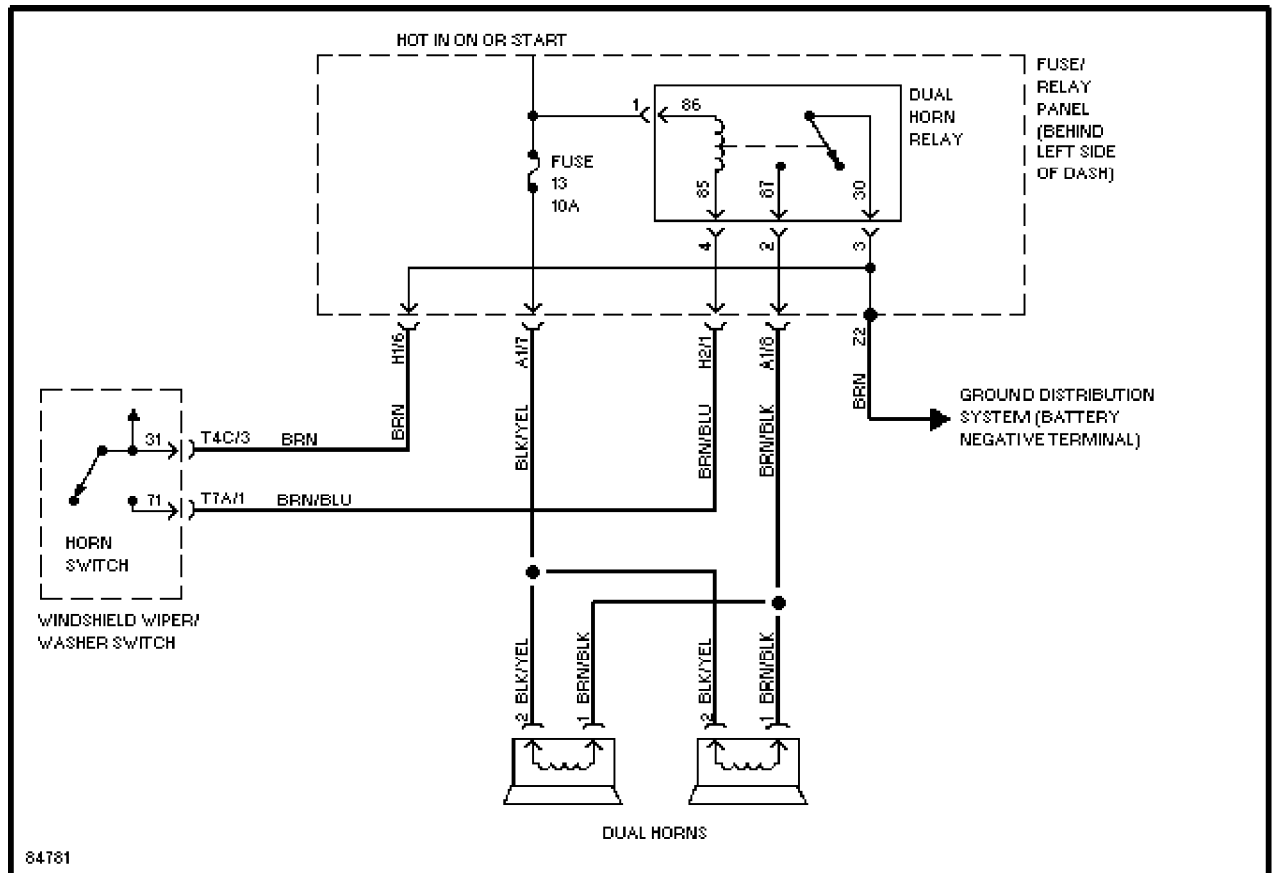
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Horn Circuit

INSTRUMENT CLUSTER

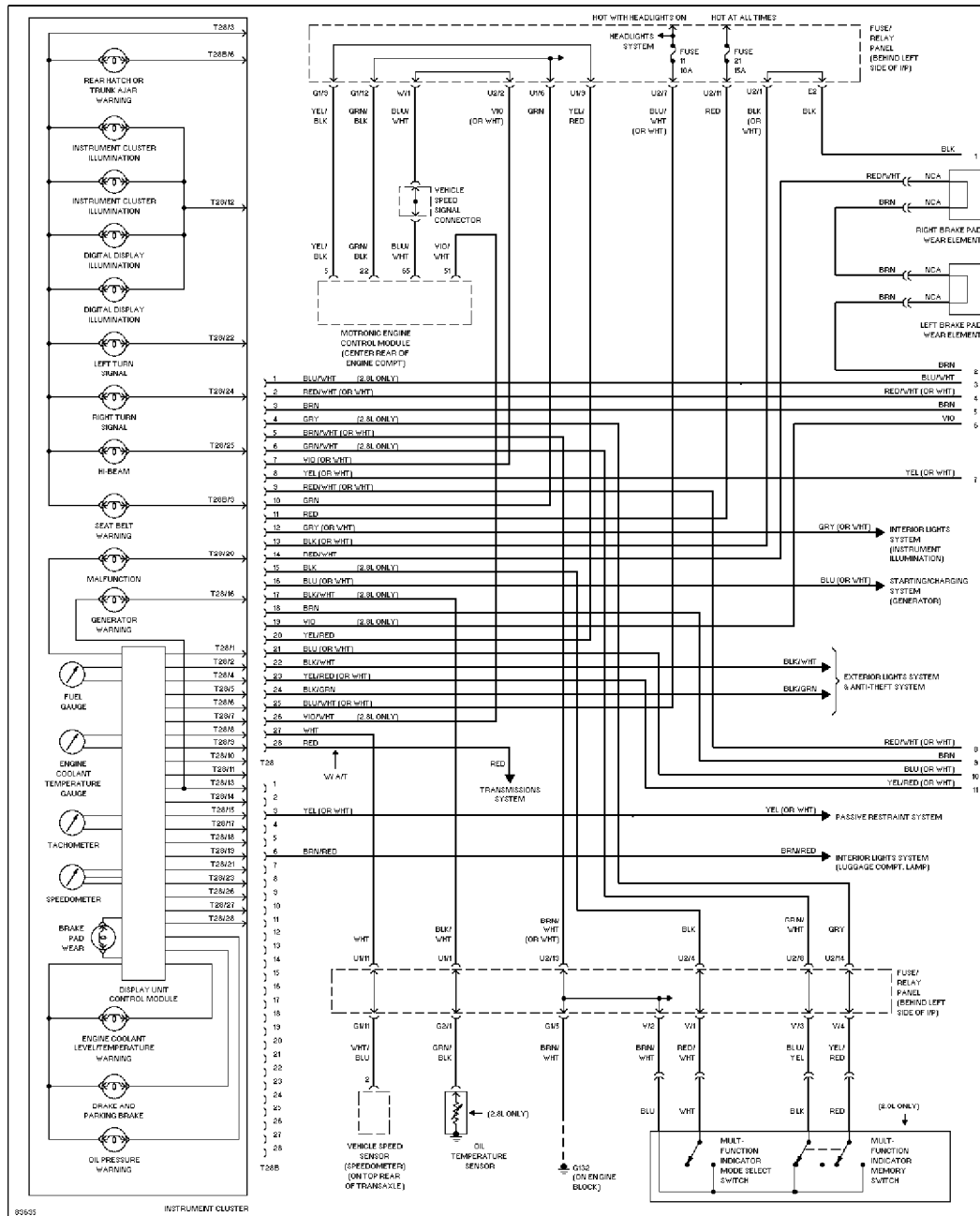
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Instrument Cluster Circuit (1 of 2)

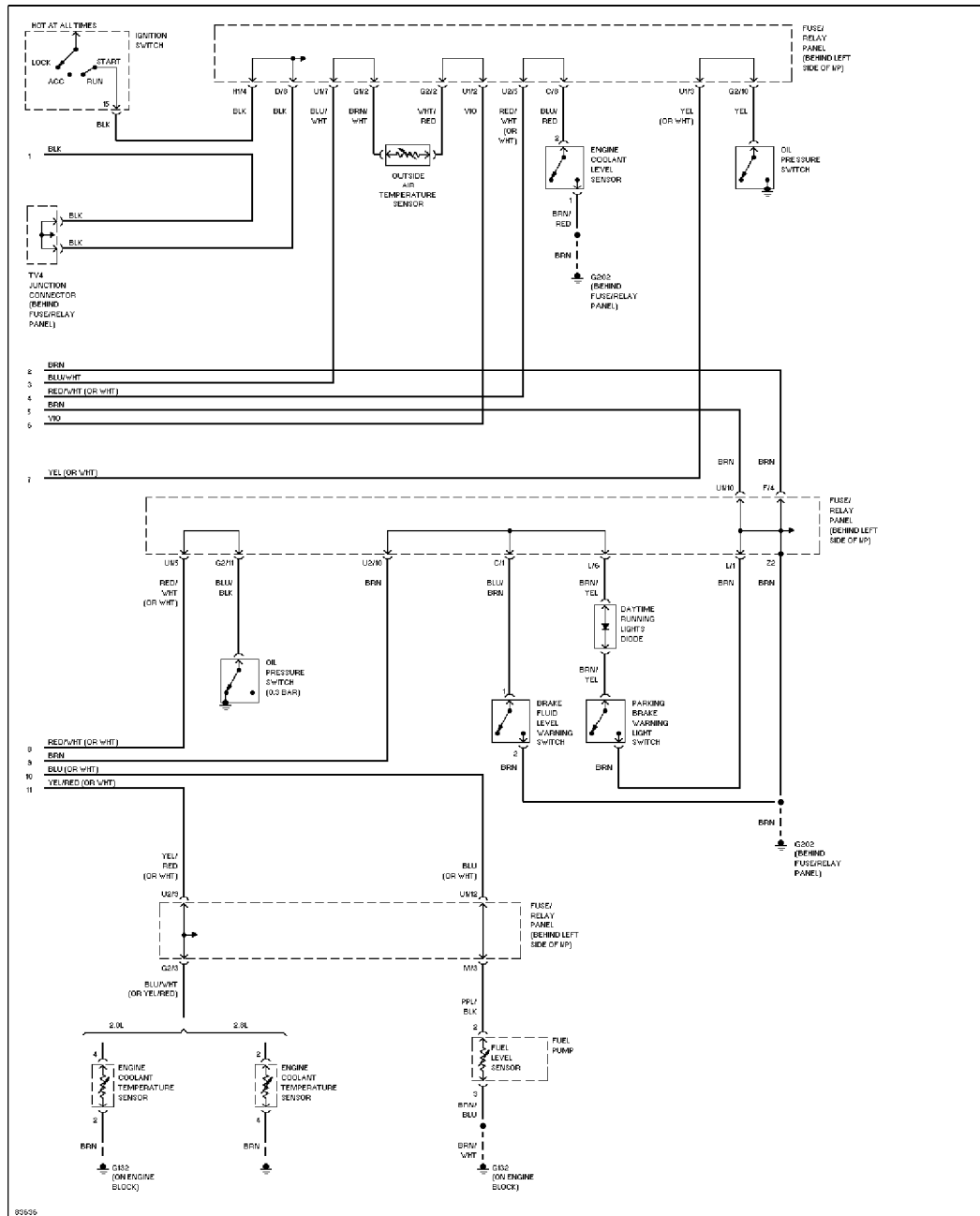
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Instrument Cluster Circuit (2 of 2)

INTERIOR LIGHTS

SYSTEM WIRING DIAGRAMS

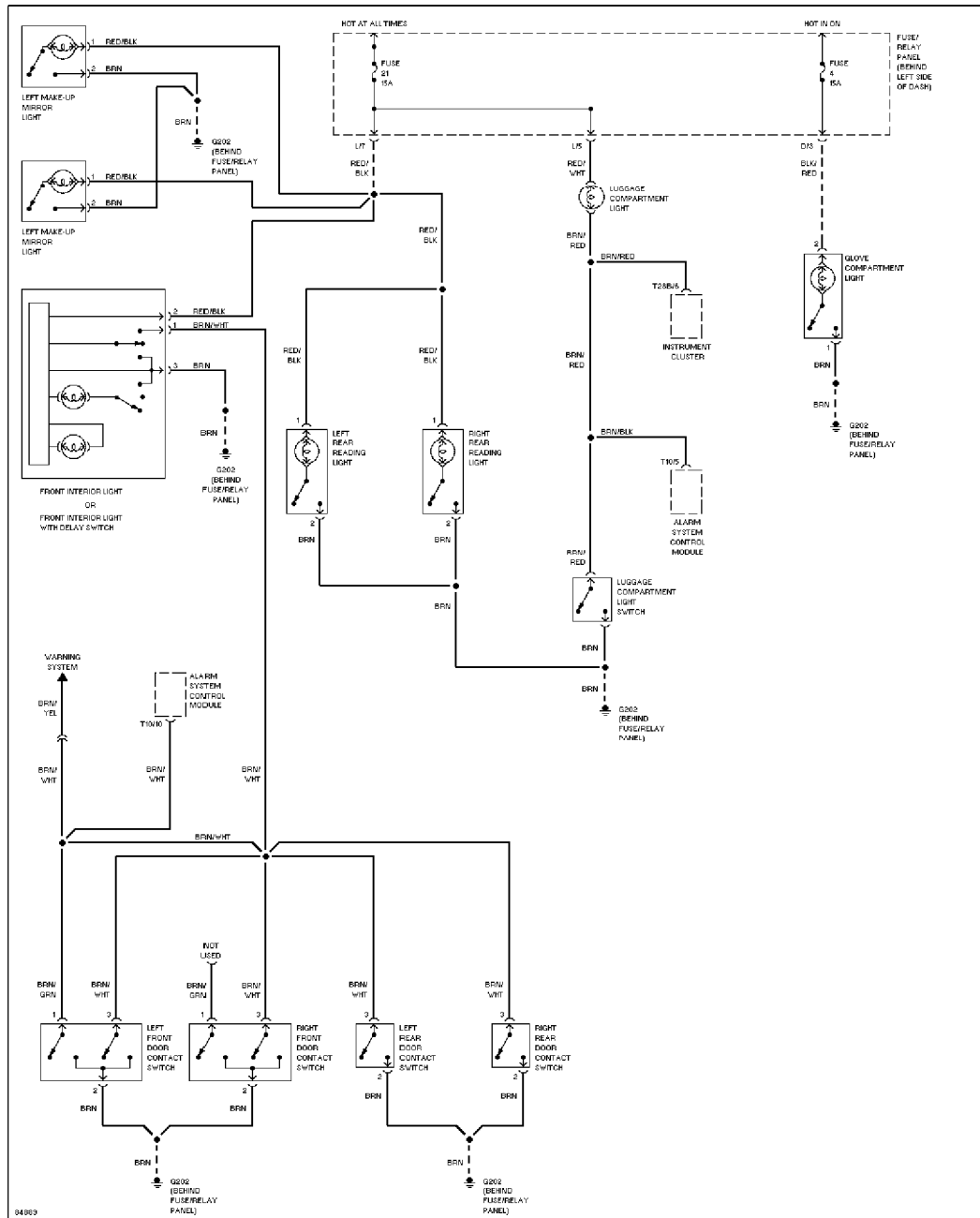
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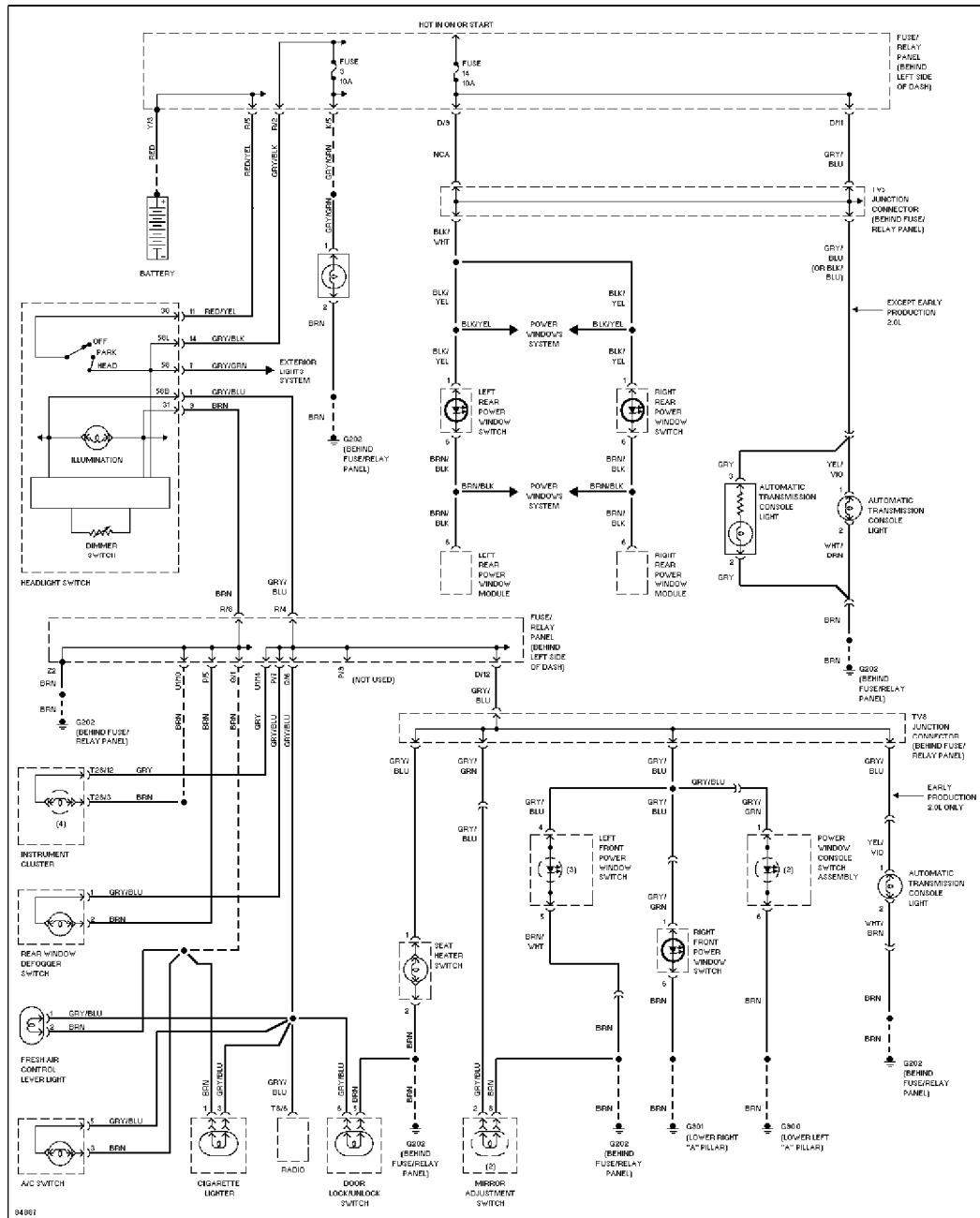
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Courtesy Lamp Circuit

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Instrument Illumination Circuit

POWER DISTRIBUTION

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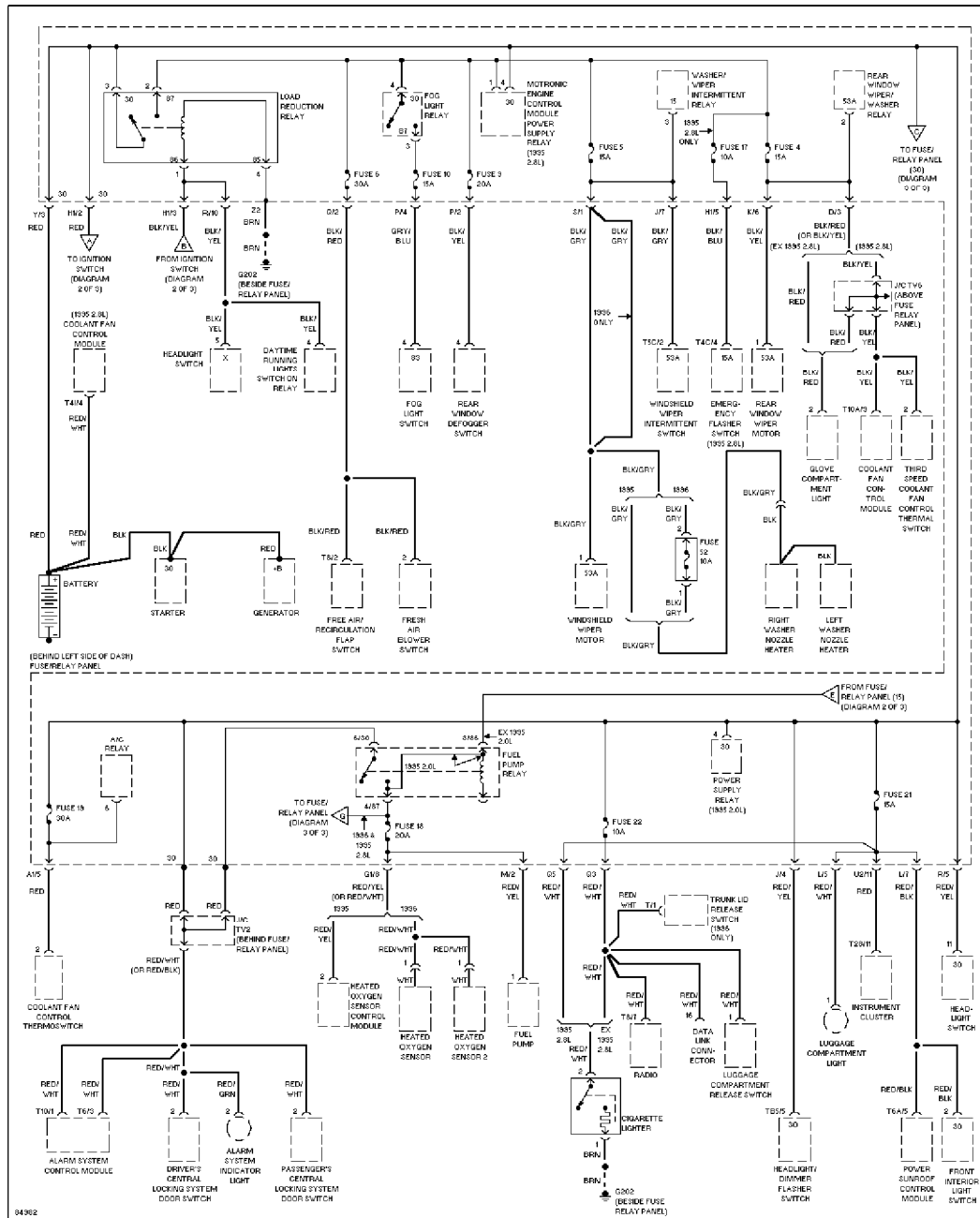
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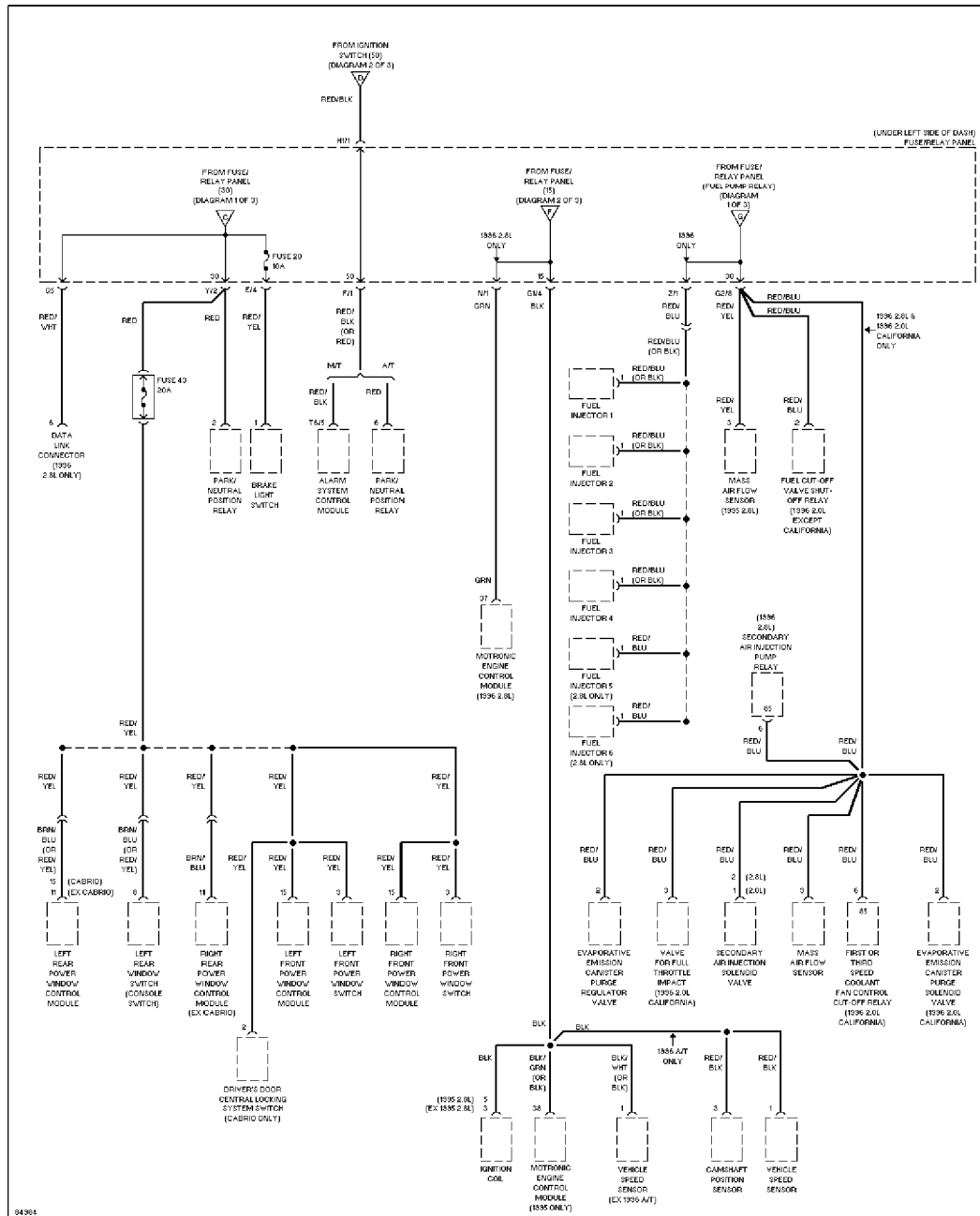
Power Distribution Circuit (1 of 3)

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Power Distribution Circuit (2 of 3)

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Power Distribution Circuit (3 of 3)

POWER DOOR LOCKS

SYSTEM WIRING DIAGRAMS

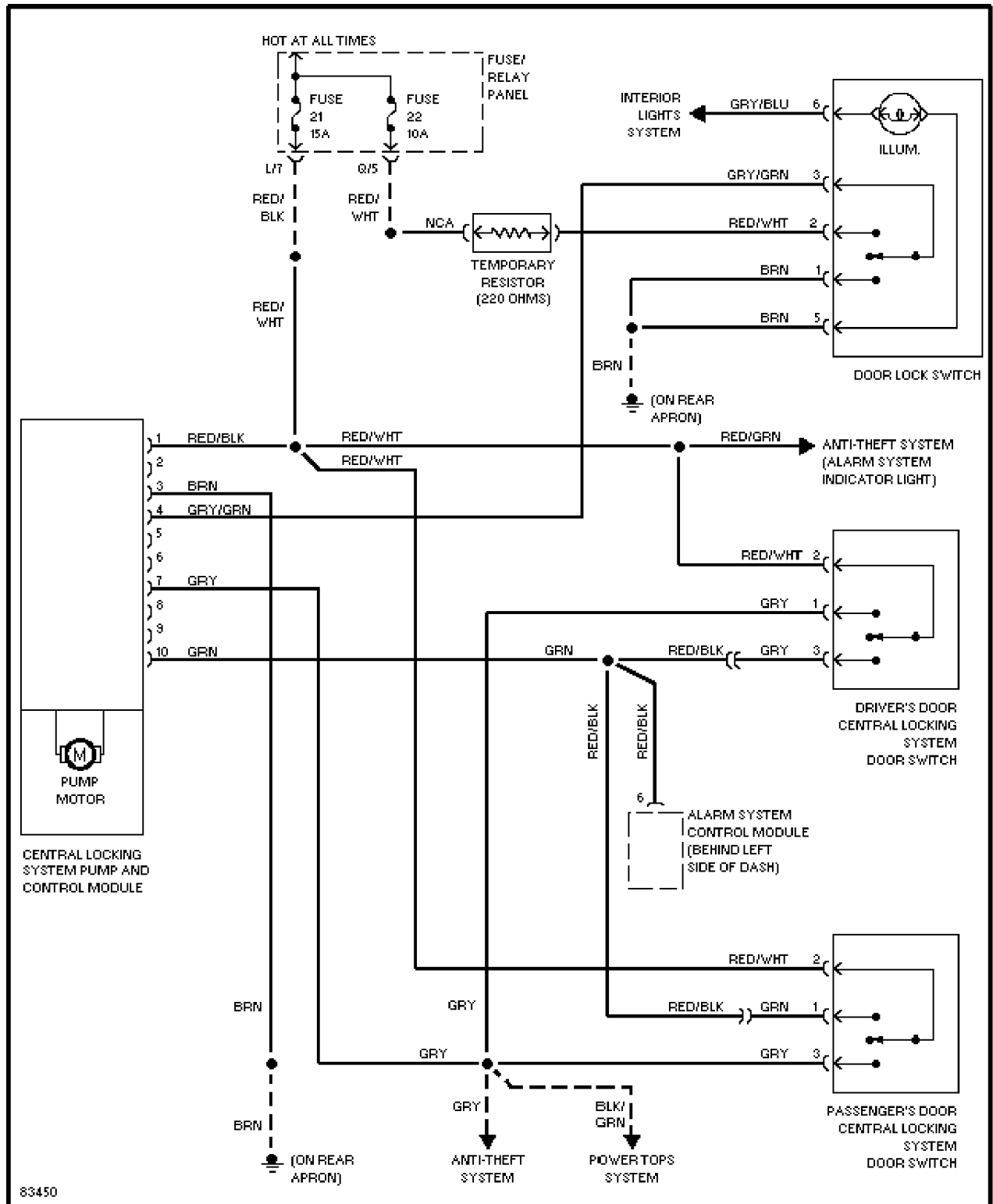
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Power Door Lock Circuit

POWER MIRRORS

SYSTEM WIRING DIAGRAMS

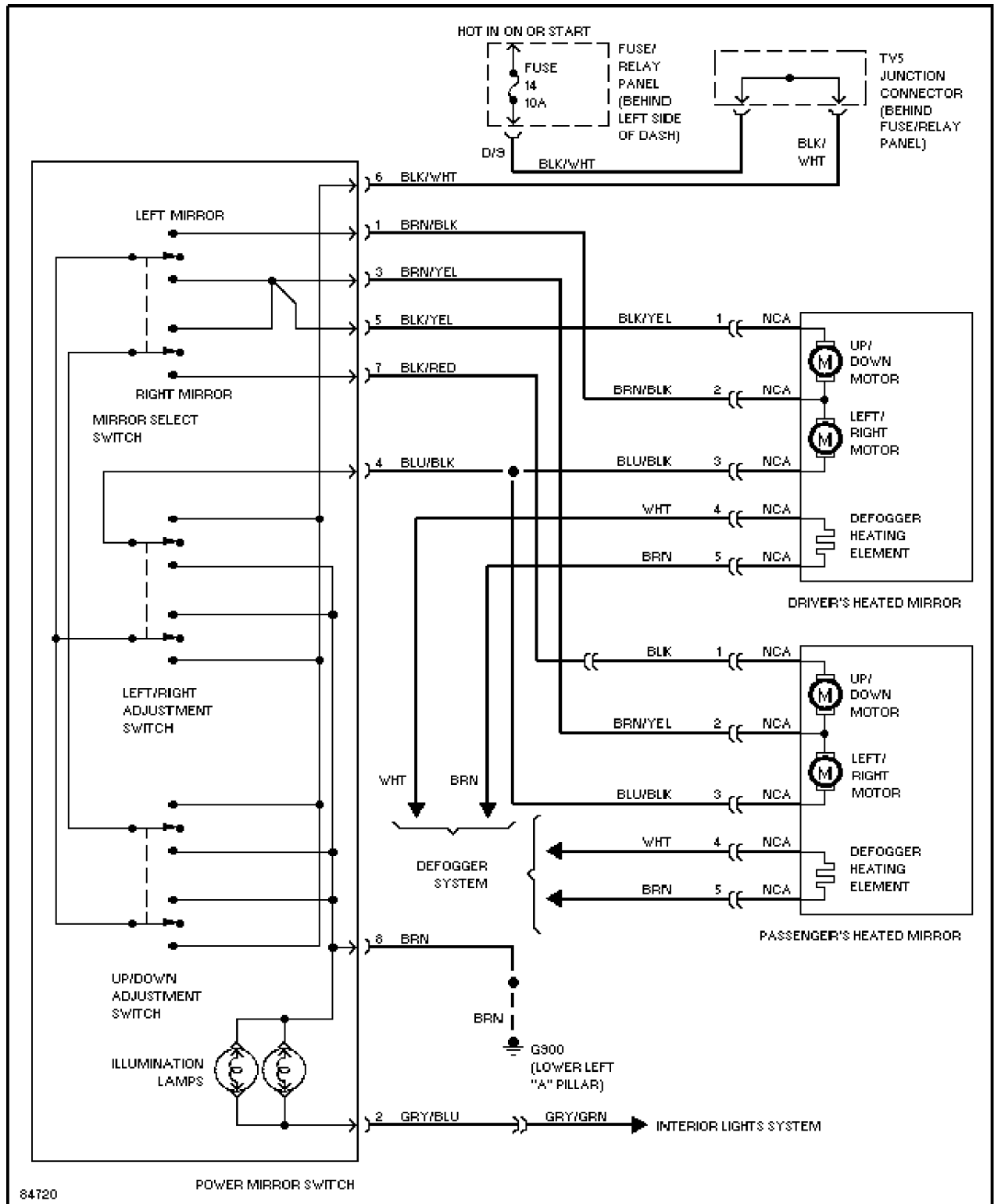
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Power Mirror Circuit

SYSTEM WIRING DIAGRAMS

Article Text (p. 31)

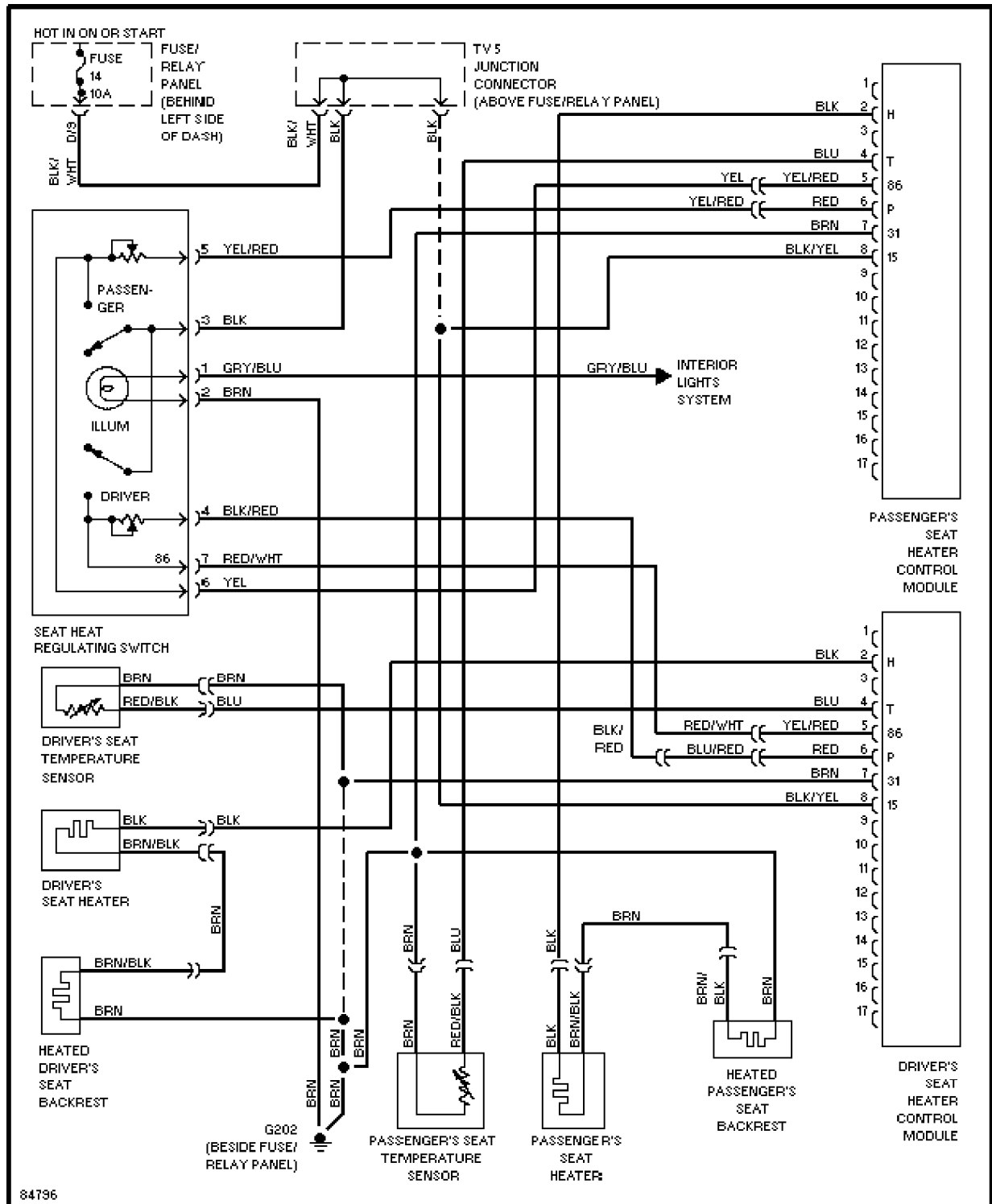
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POWER SEATS



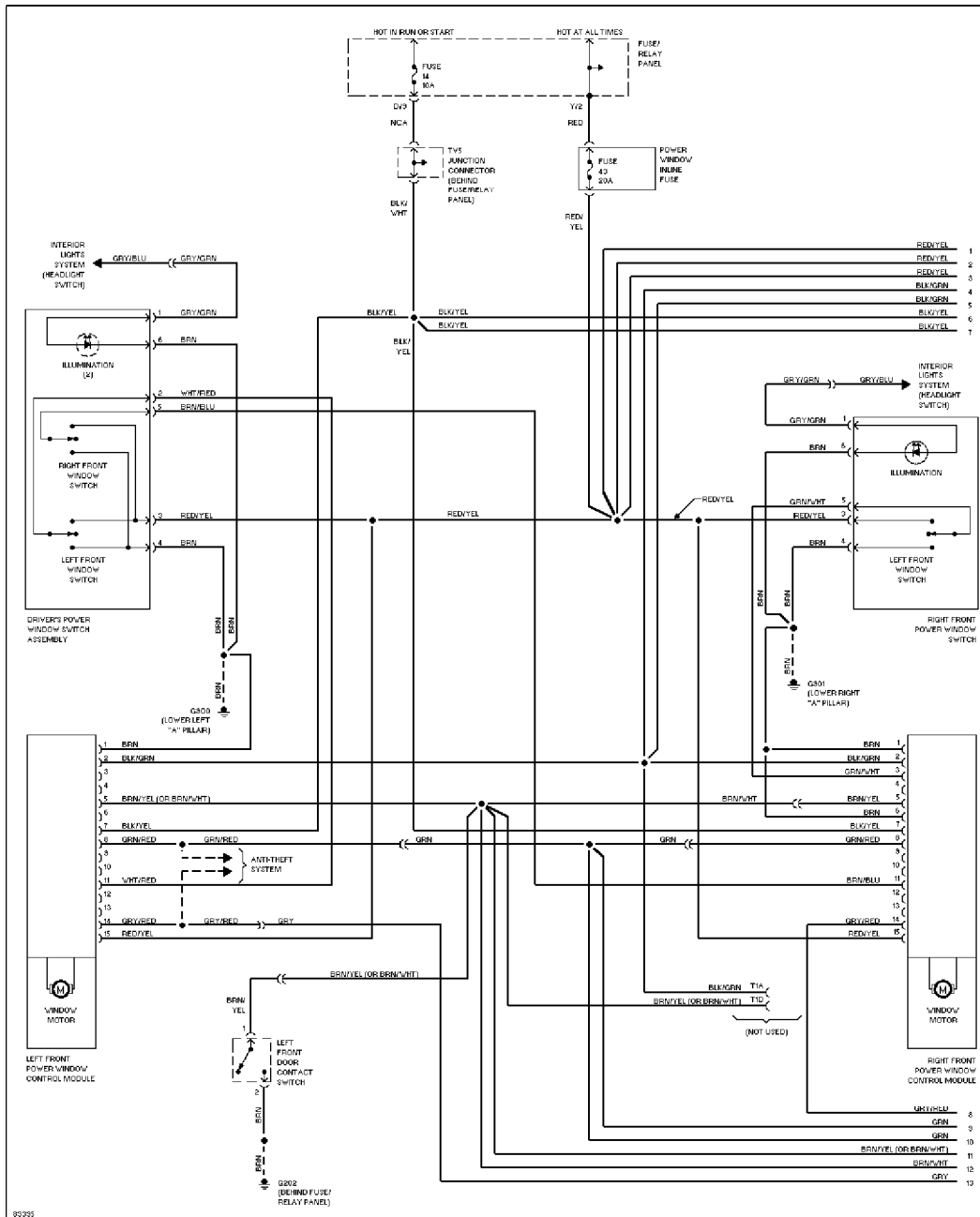
Heated Seats Circuit

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Sunroof Circuit

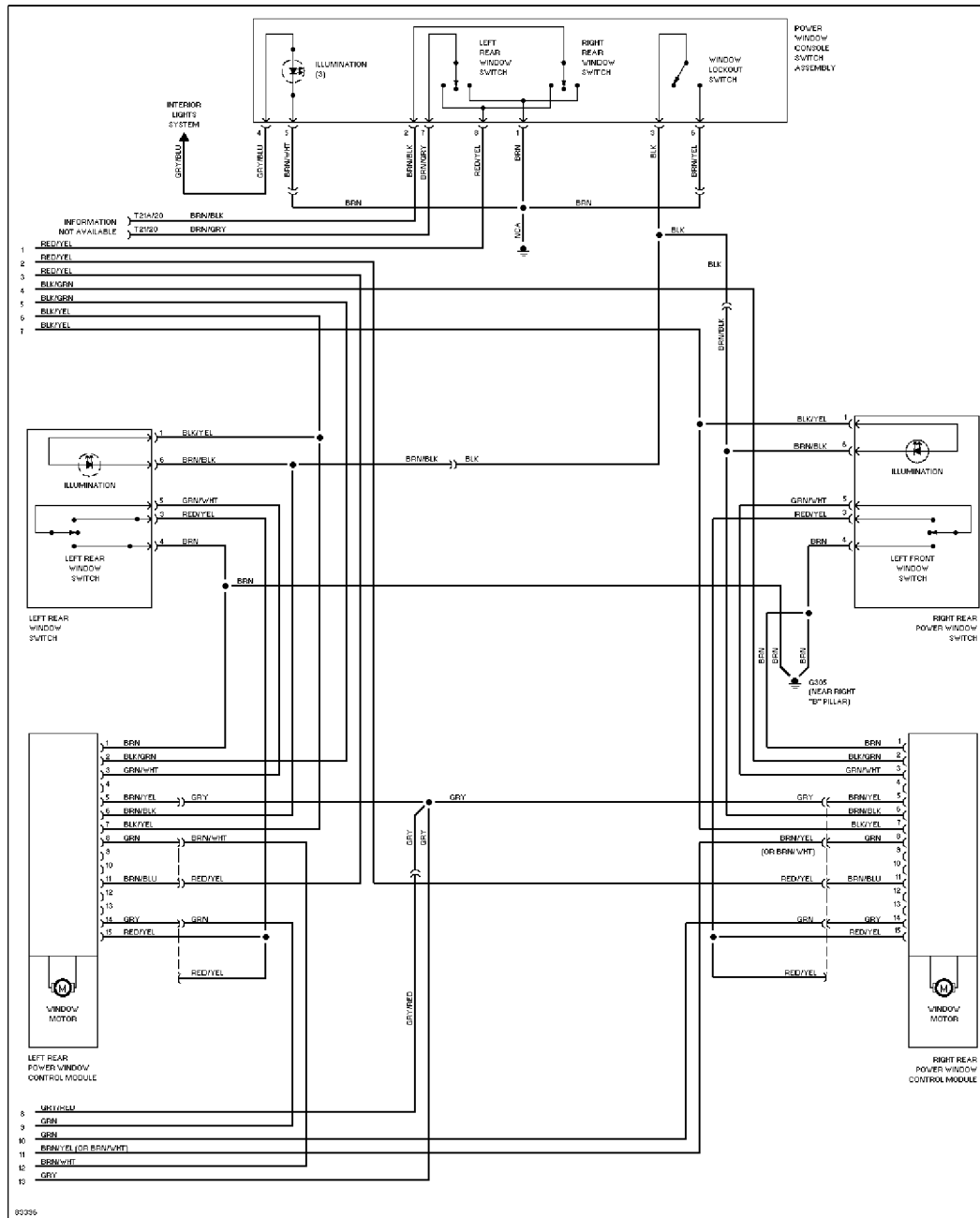
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POWER WINDOWS



Power Window Circuit (1 of 2)

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Power Window Circuit (2 of 2)

SHIFT INTERLOCKS

SYSTEM WIRING DIAGRAMS

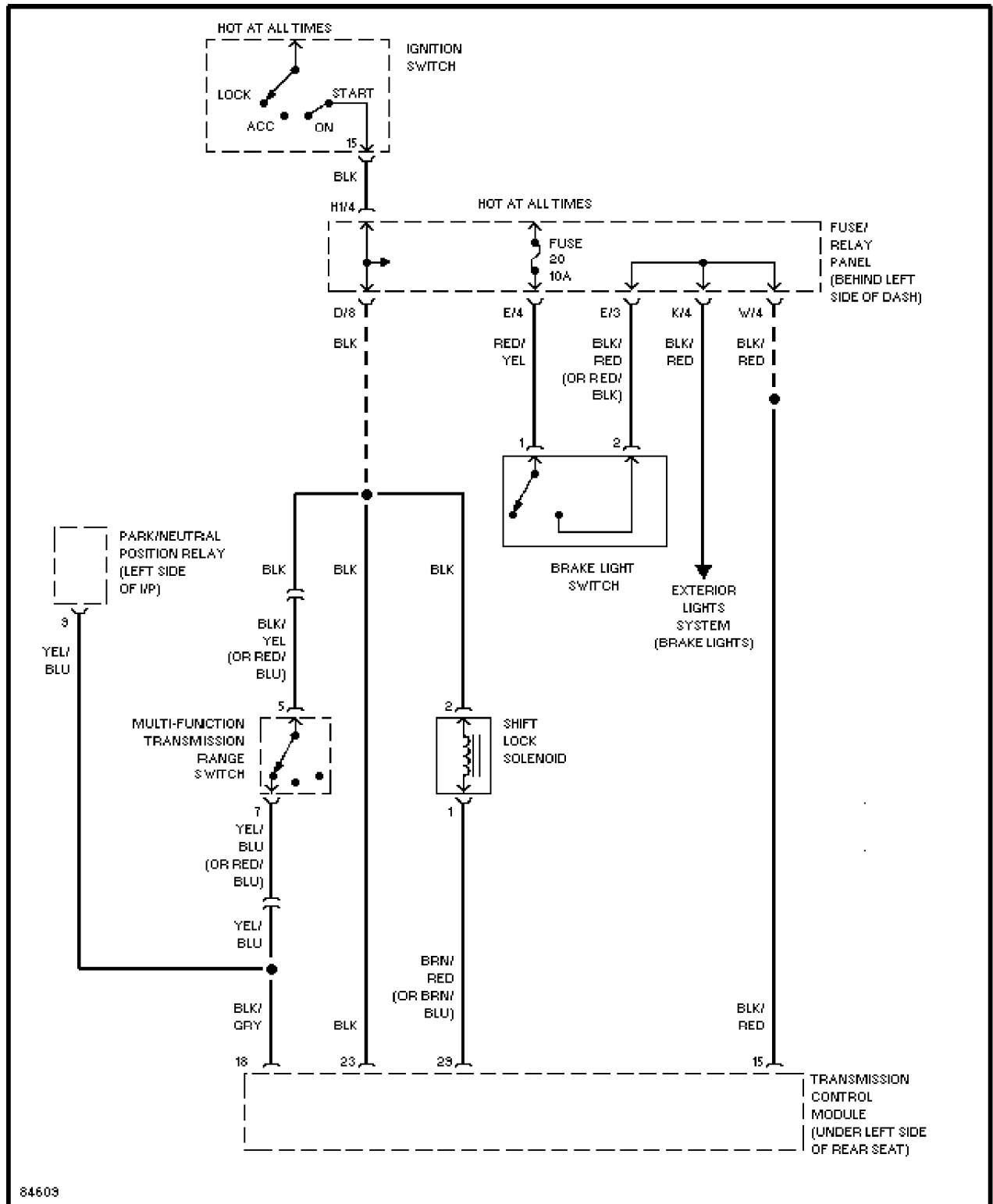
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Shift Interlock Circuit

STARTING/CHARGING

SYSTEM WIRING DIAGRAMS

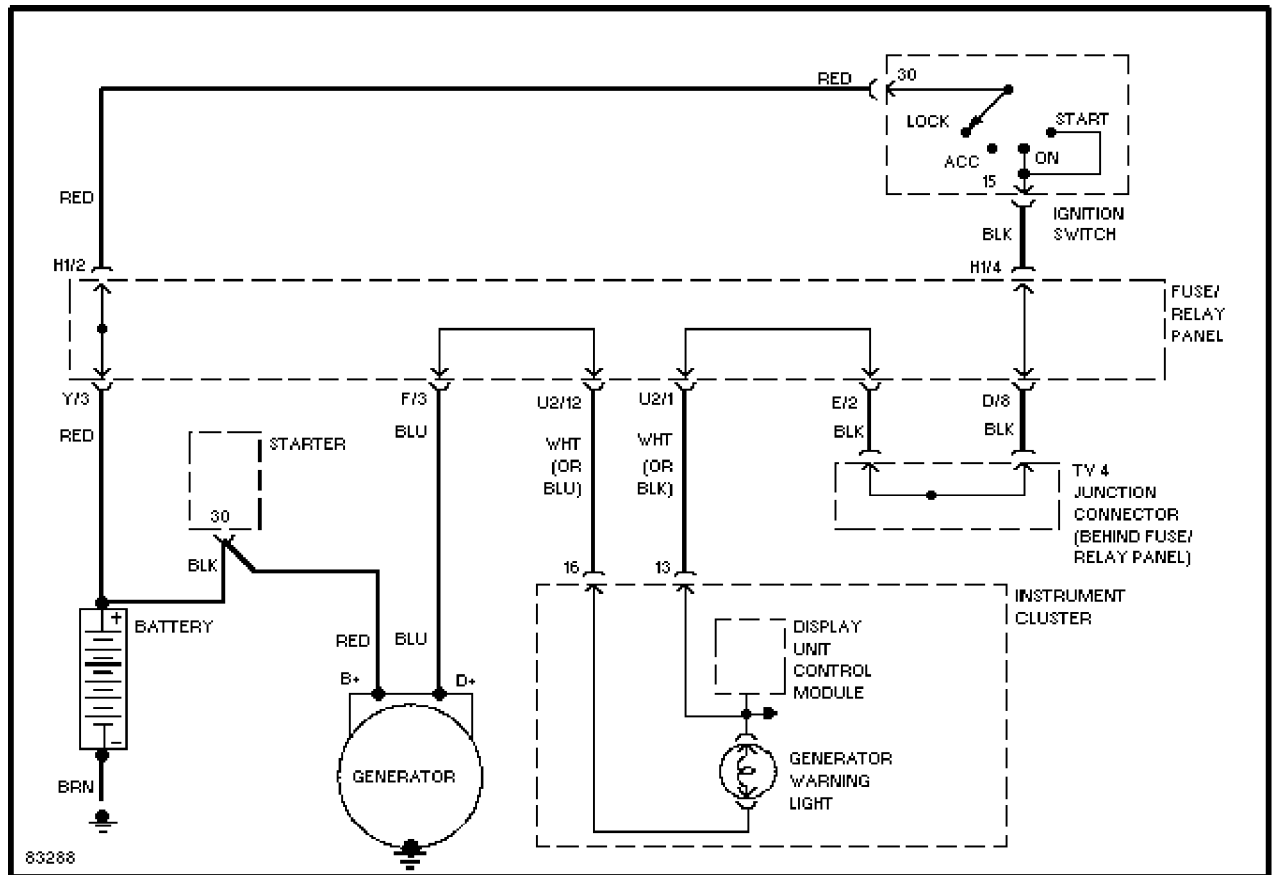
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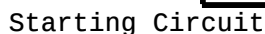
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Charging Circuit

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SUPPLEMENTAL RESTRAINTS

SYSTEM WIRING DIAGRAMS

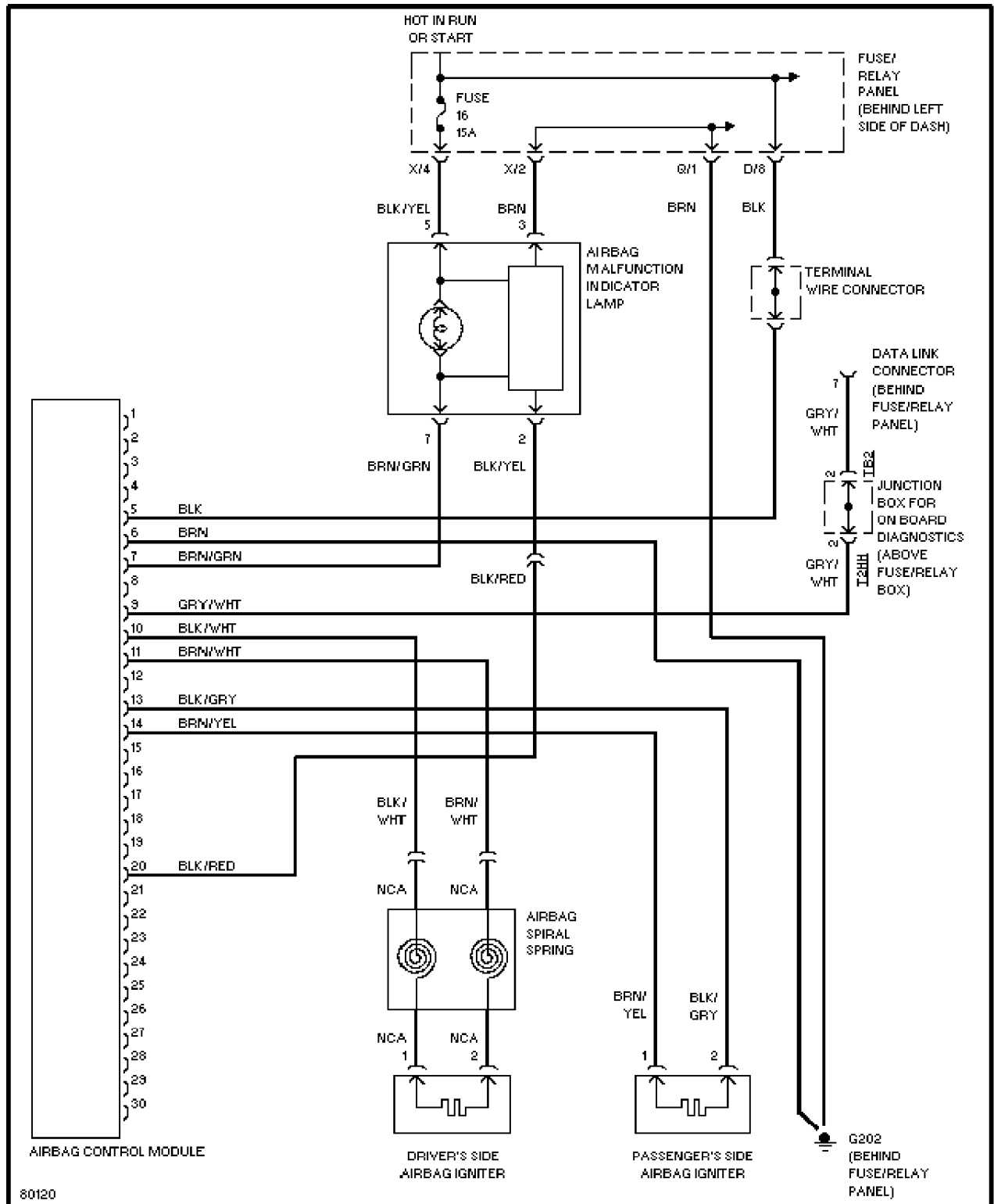
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Supplemental Restraint Circuit, Early Production

SYSTEM WIRING DIAGRAMS

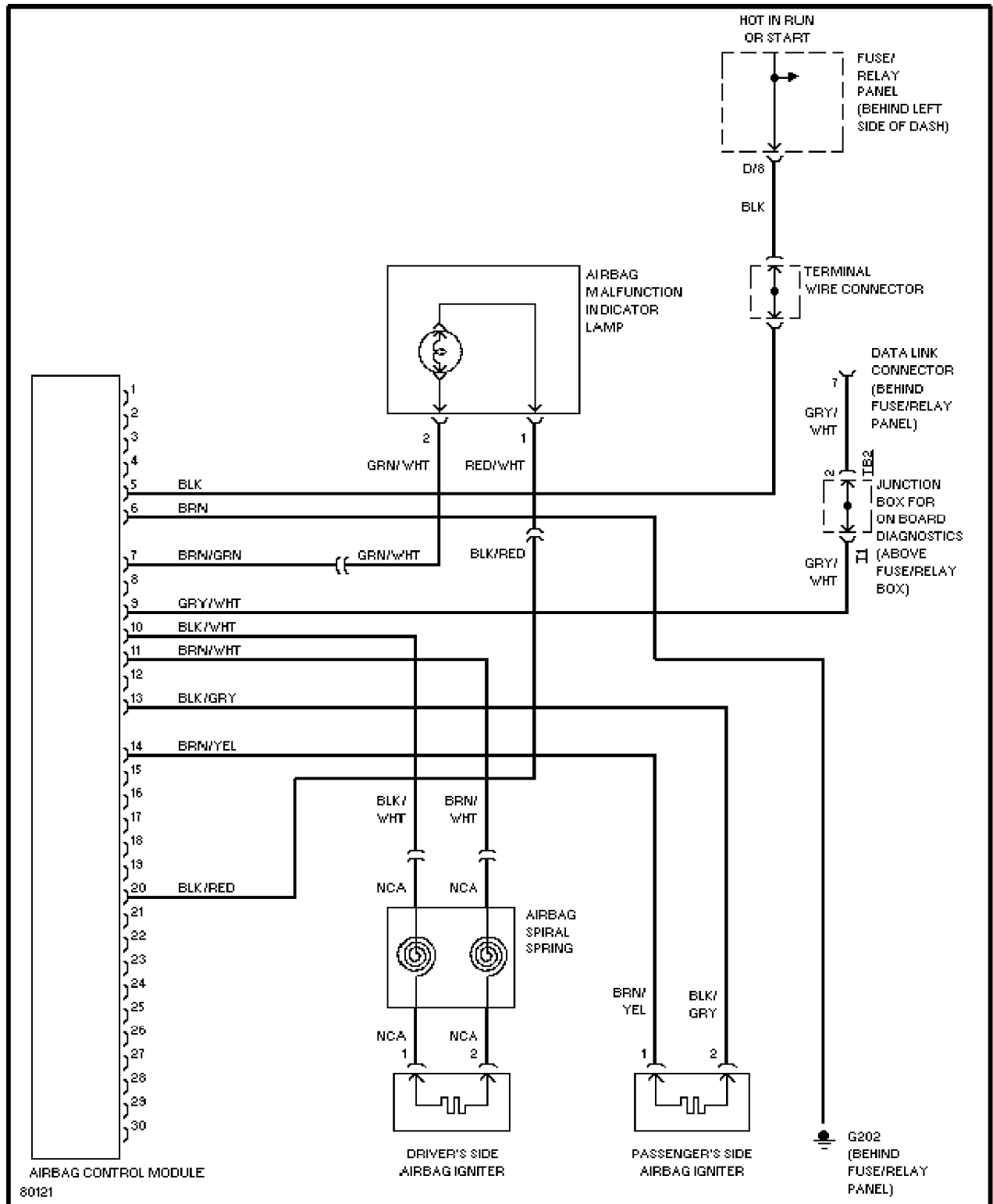
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Supplemental Restraint Circuit, Late Production

SYSTEM WIRING DIAGRAMS

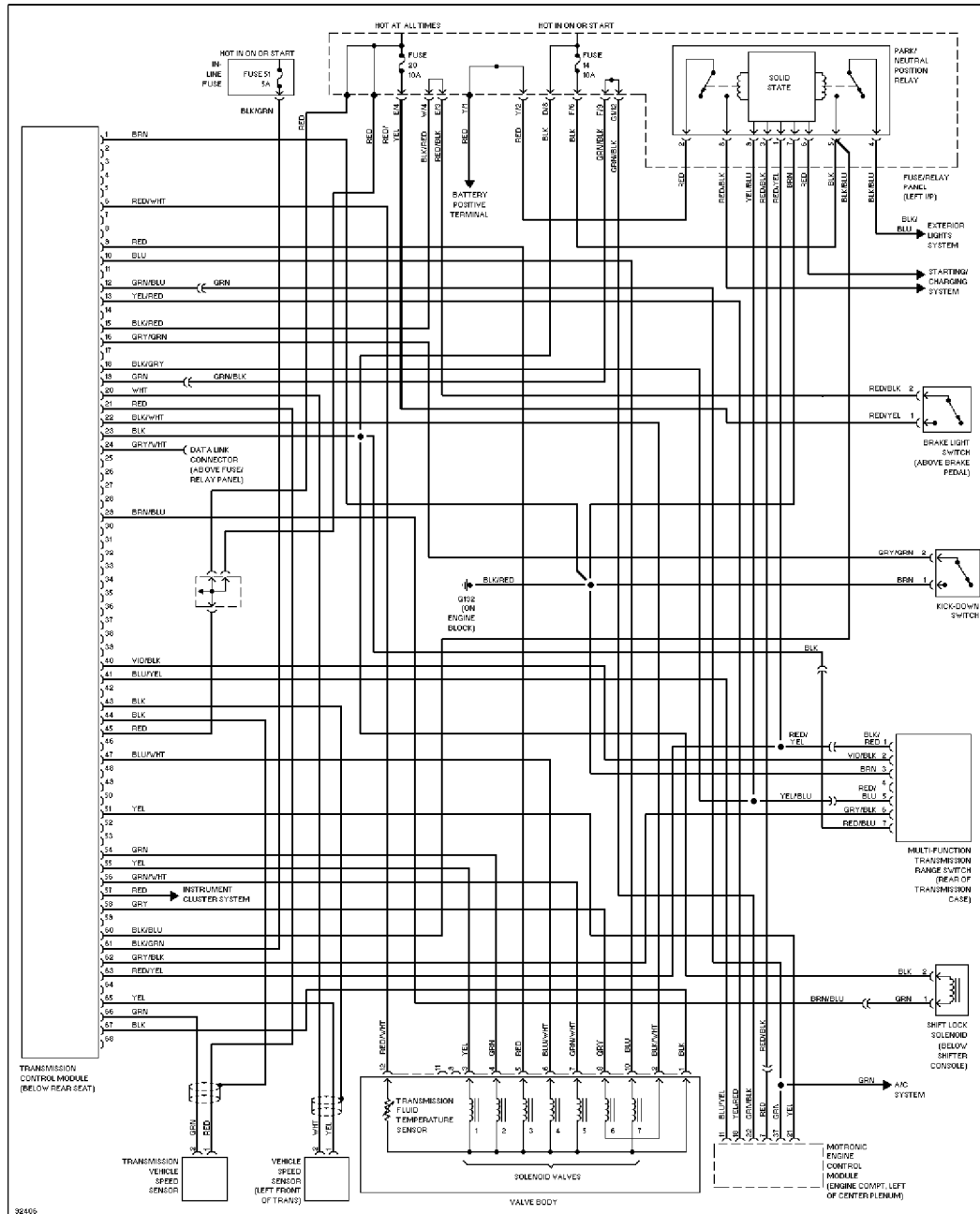
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2.0L



2.0L, Transmission Circuit

TRUNK, TAILGATE, FUEL DOOR

SYSTEM WIRING DIAGRAMS

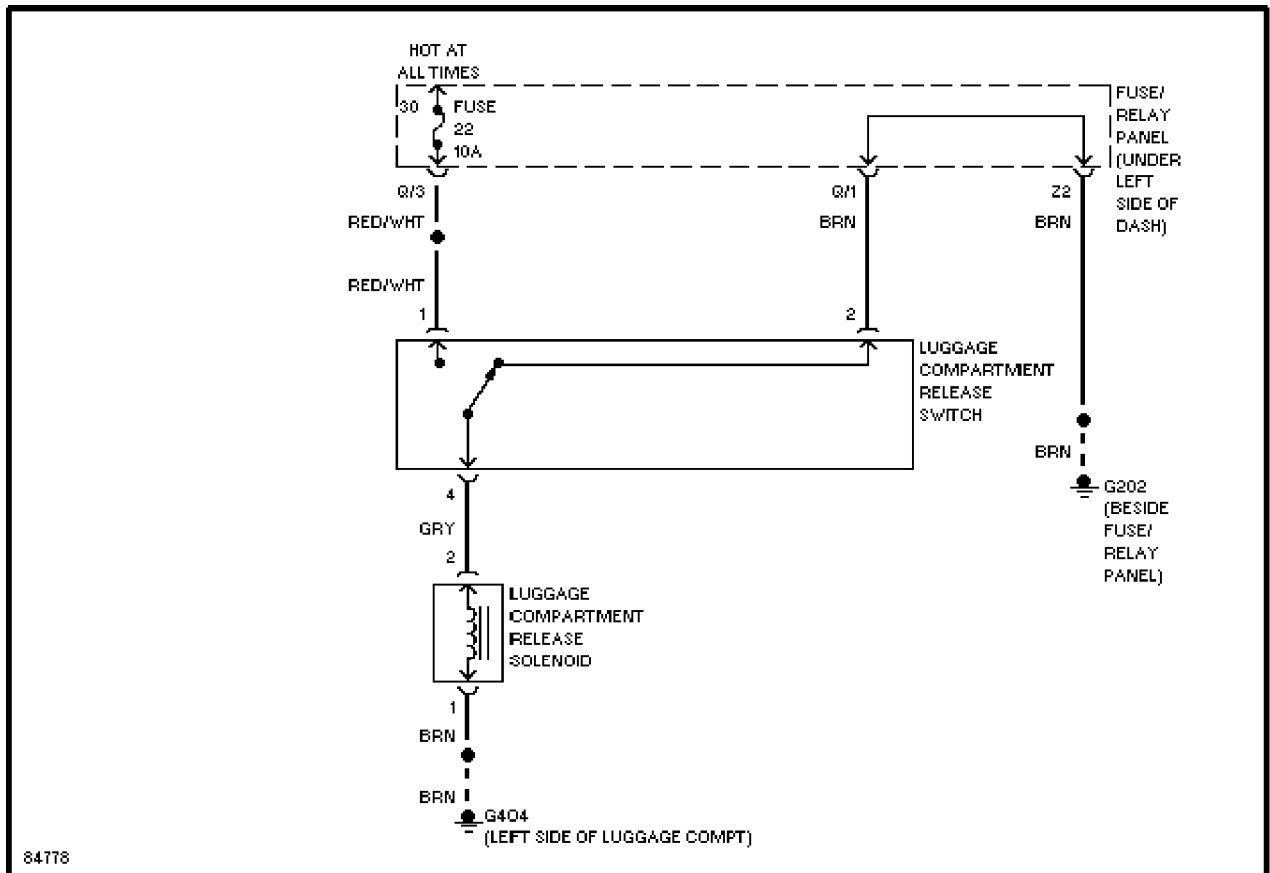
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Trunk Release Circuit

WARNING SYSTEMS

SYSTEM WIRING DIAGRAMS

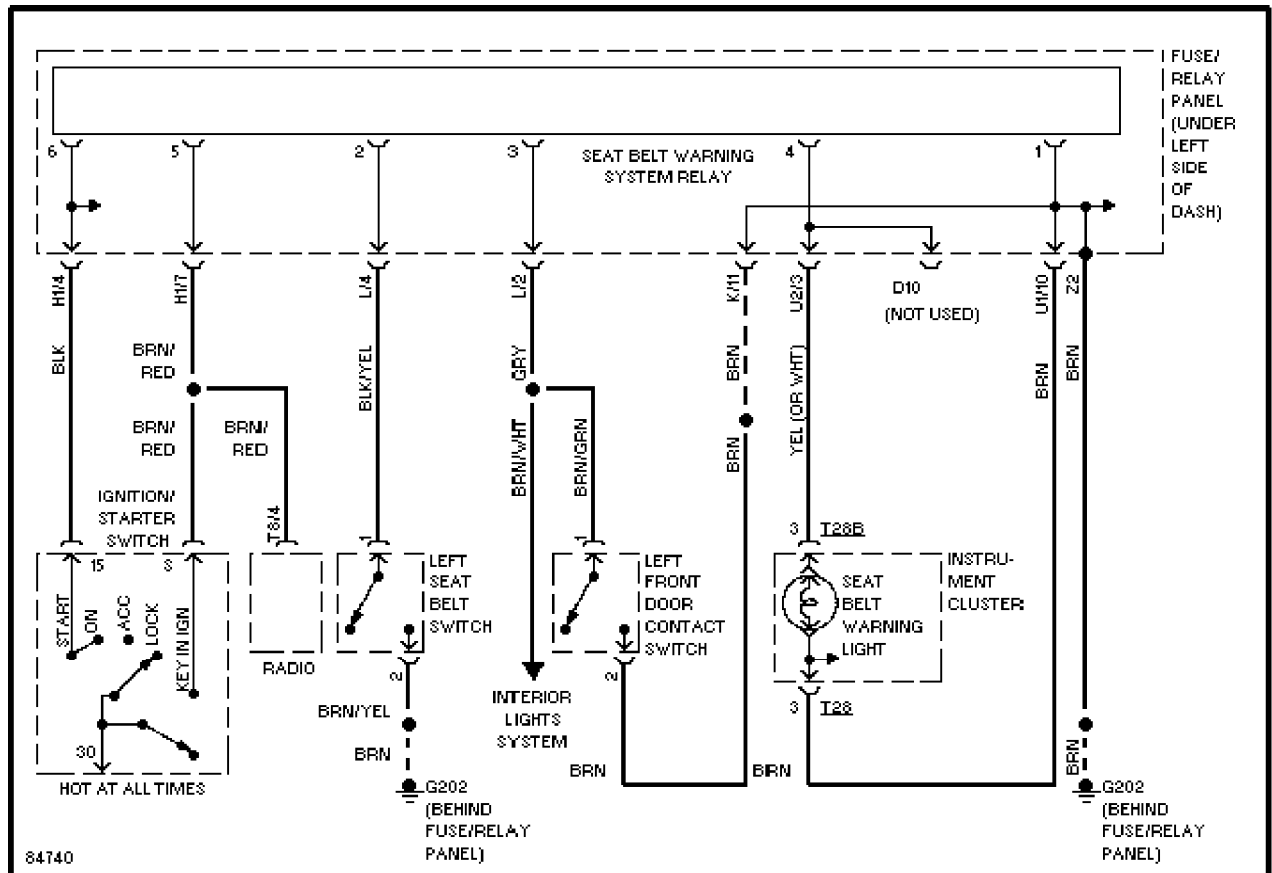
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Warning System Circuits

WIPER/WASHER

SYSTEM WIRING DIAGRAMS

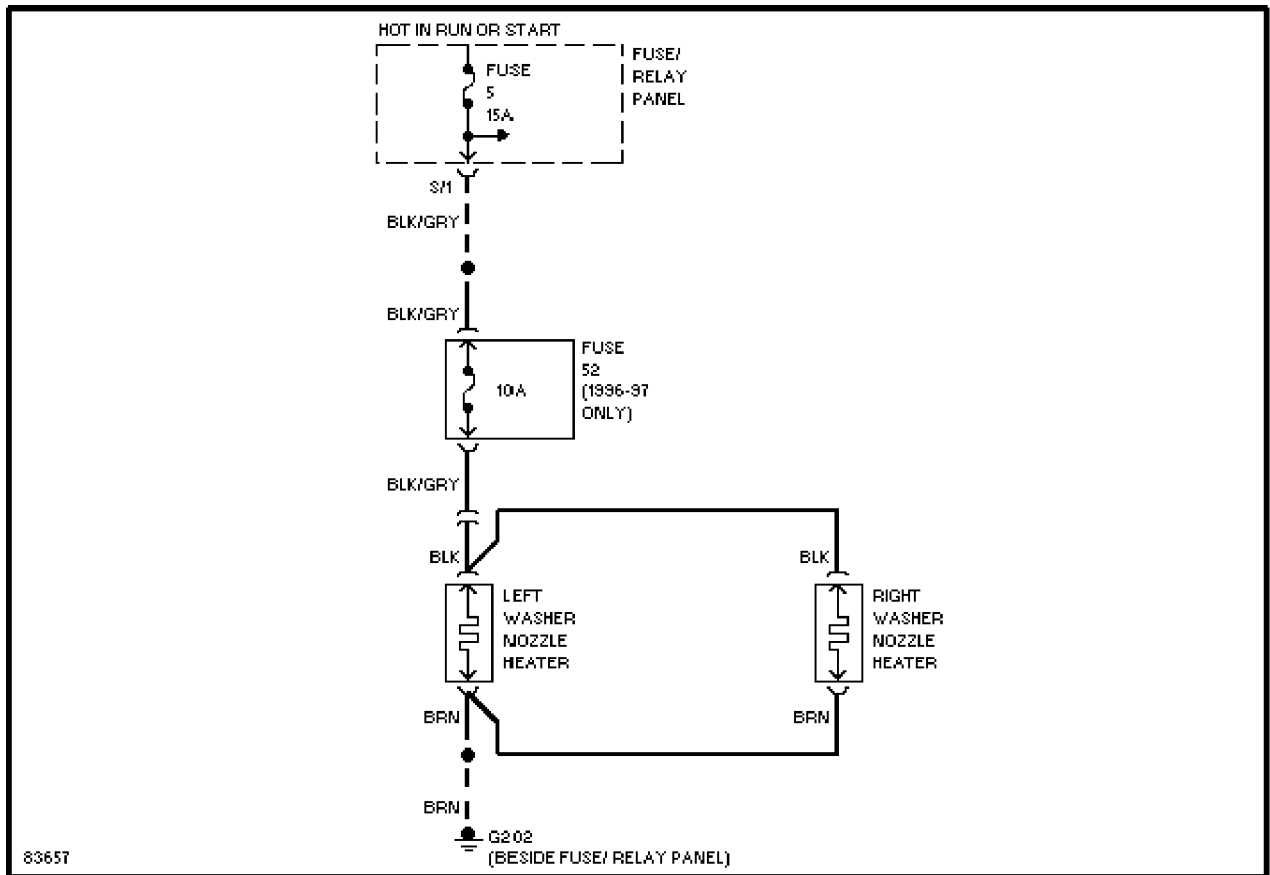
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Heated Windshield Washer Circuit

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Wiper/Washer Circuit

END OF ARTICLE

HOW TO USE SYSTEM WIRING DIAGRAMS

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ARTICLE BEGINNING

GENERAL INFORMATION
Using Wiring Diagrams

All Models

INTRODUCTION

Mitchell obtains wiring diagrams and technical service bulletins, containing wiring diagram changes from the domestic and import manufacturers. These are checked for accuracy and are all redrawn into a consistent format for easy use.

In the past, when cars were simpler, diagrams were simpler. All components were connected by wires and diagrams seldom exceeded 4 pages in length. Today, some wiring diagrams require more than 16 pages. It would be impractical to expect a service technician to trace a wire from page 1 across every page to page 16.

Removing some of the wiring maze reduces eyestrain and time wasted searching across several pages. Today the majority of Mitchell diagrams follow a much improved format, which permits space for internal switch details.

Wiring diagrams are drawn in a "top-down" format. The diagrams are drawn with the power source at the top of the diagram and the ground point at the bottom of the diagram. Components locations are identified on the wiring diagrams. Any wires that don't connect directly to a component are identified on the diagram to indicate where they go.

COLOR ABBREVIATIONS

COLOR ABBREVIATIONS TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Color	Normal		Optional
Black		BLK	 BK
Blue		BLU	 BU
Brown		BRN	 BN
Clear		CLR	 CR
Dark Blue		DK BLU	 DK BU
Dark Green		DK GRN	 DK GN
Green		GRN	 GN
Gray		GRY	 GY
Light Blue		LT BLU	 LT BU
Light Green		LT GRN	 LT GN
Orange		ORG	 OG
Pink		PNK	 PK
Purple		PPL	 PL
Red		RED	 RD
Tan		TAN	 TN

HOW TO USE SYSTEM WIRING DIAGRAMS

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Violet		VIO		VI
White		WHT		WT
Yellow		YEL		YL
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				

IDENTIFYING WIRING DIAGRAM ABBREVIATIONS

NOTE: Abbreviations used on Mitchell diagrams are normally self-explanatory. If necessary see ABBREVIATIONS article in GENERAL INFORMATION.

IDENTIFYING WIRING DIAGRAM SYMBOLS

NOTE: Standard wiring symbol are used in Mitchell diagrams. The illustration below will help clarify any symbols that are not easily understood at a glance. Most components are labeled "Motor", "Switch" or "Relay" in addition to being drawn with the standard symbol.

HOW TO USE SYSTEM WIRING DIAGRAMS

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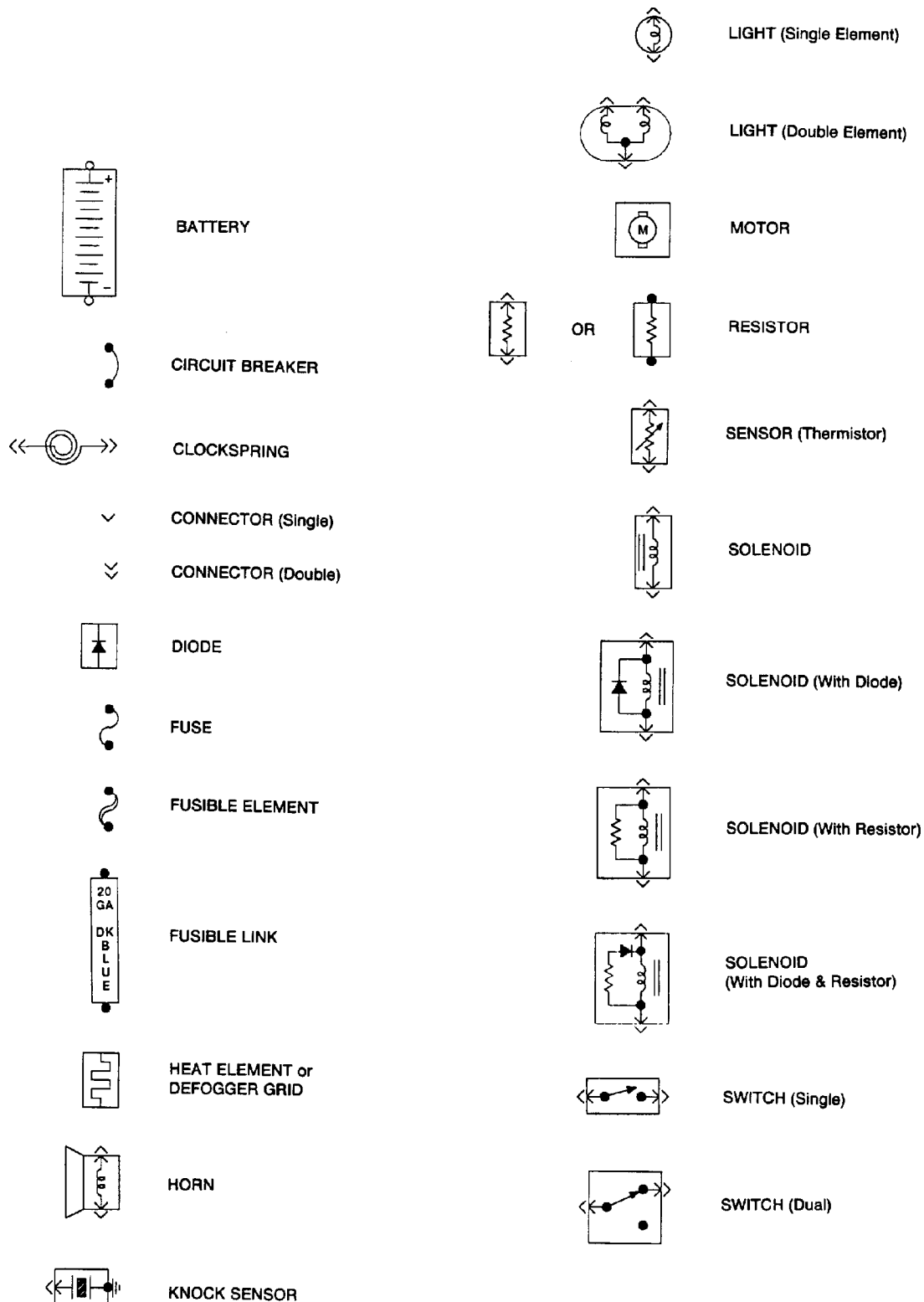


Fig. 1: Identifying Wiring Diagram Symbols

WIRING DIAGRAM COMPONENT LOCATIONS

HOW TO USE SYSTEM WIRING DIAGRAMS

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When trying to locate a component in a wiring diagram and you don't know the specific system where it is located, use this handy component locator to find the system wiring diagram in which the component is located. Then, go to that system and locate the component within the wiring diagram.

For example, if you don't know the specific system in which the ignition switch is located, look up ignition switch in the wiring diagram component location tables and go to the appropriate wiring diagram(s) which contain either full or partial views of the ignition switch. The full view of the ignition switch is located in Power Distribution.

The first listing for the component will be the full or most complete view of the component. Additional listings will be partial views of the component. Not all components are used on all models.

All components will have a partial view in Ground Distribution and Power Distribution. Data Link Connectors show connecting circuits between modules. Alternate names for components may be listed in wiring diagram component locations tables.

WIRING DIAGRAM COMPONENT LOCATIONS TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Component Wiring Diagram

ABS Electronic Control Unit	.....	Anti-Lock Brakes Data Link Connectors
ABS Hydraulic Unit	.....	Anti-Lock Brakes
Acceleration Sensor	.....	Anti-Lock Brakes
Accessory Delay Relay	.....	Power Windows
A/C Compressor Clutch Relay	.....	Engine Performance
A/C Sensor	.....	Engine Performance
A/C Pressure Switch	.....	Engine Performance
Adaptive Lamp Control Module	.....	Exterior Lights
Air Bag(s)	.....	Air Bag Restraint System
Air Bag Module	.....	Air Bag Restraint System
Air Bag Sensor(s)	.....	Air Bag Restraint System
Air Injection Pump Relay	.....	Engine Performance
Air Temperature Sensor	.....	Overhead Console
Alternator (Generator)	.....	Generators & Regulators
Anti-Theft Control Module	.....	Anti-Theft System Starters
Autolamp Control Relay	.....	Headlight Systems Daytime Running Lights
Automatic Shutdown (ASD) Relay	.....	Engine Performance Generators & Regulators
Autostick Switch	.....	Engine Performance
Auxiliary Battery Relay	.....	Generators & Regulators
Back-Up Lights	.....	Back-Up Lights Exterior Lights
Barometric (BARO) Pressure Sensor	.....	Engine Performance
Battery	.....	Power Distribution
Battery Temperature Sensor		Engine Performance

HOW TO USE SYSTEM WIRING DIAGRAMS

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Body Control Module	Body Control Computer Anti-Theft System Daytime Running Lights Engine Performance Headlight Systems Warning Systems
Boost Control Solenoid	Engine Performance
Boost Sensor	Engine Performance
Brake Fluid Level Switch	Analog Instrument Panels
Brake On/Off (B00) Switch	Cruise Control Systems Engine Performance Shift Interlock Systems
Buzzer Module	Warning Systems
Camshaft Position (CMP) Sensor	Engine Performance
Central Control Module	Anti-Theft System
Clockspring	Air Bag Restraint System Cruise Control Systems Steering Column Switches
Clutch Pedal Position Switch	Starters
Clutch Start Switch	Starters
Combination Meter	Analog Instrument Panels
Constant Control Relay Module (CCRM)	Engine Performance Electric Cooling Fans
Convenience Center	Power Distribution Illumination/Interior Lights
Convertible Top Motor	Power Convertible Top
Convertible Top Switch	Power Convertible Top
Crankshaft Position (CKP) Sensor	Engine Performance
Cruise Control Module	Cruise Control Systems
Cruise Control Switch	Cruise Control Systems
Condenser Fan Relay(s)	Electric Cooling Fans
Data Link Connector (DLC)	Engine Performance
Daytime Running Lights Module	Daytime Running Lights Exterior Lights
Defogger Relay	Rear Window Defogger
Diagnostic Energy Reserve Module (DERM) ...	Air Bag Restraint System
Discriminating Sensor (Air Bag)	Air Bag Restraint System
Distributor	Engine Performance
Door Lock Actuators	Power Door Locks Remote Keyless Entry
Door Lock Relay(s)	Power Door Locks
Electrochromic Mirror	Power Mirrors
Electronic Level Control (ELC) Height Sensor	Electronic Suspension
Electronic Level Control (ELC) Module	Electronic Suspension
Engine Coolant Temperature (ECT) Sending Unit	Analog Instrument Panels
Engine Coolant Temperature (ECT) Sensor	Engine Performance
Engine Control Module	Engine Performance Generators & Regulators Starters
ETACS ECU	Warning Systems

HOW TO USE SYSTEM WIRING DIAGRAMS

Article Text (p. 6)

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	Power Windows
	Remote Keyless Entry
Evaporative (EVAP) Emissions Canister	Engine Performance
EVAP Canister Purge Solenoid	Engine Performance
EVAP Canister Vent Solenoid	Engine Performance
Exhaust Gas Recirculation (EGR) Valve	Engine Performance
Fuel Tank Vacuum Sensor	Engine Performance
Fog Lights	Headlight Systems
	Daytime Running Lights
Fog Light Relay	Headlight Systems
	Daytime Running Lights
Fuel Door Release Solenoid	Power Fuel Door Release
Fuel Gauge Sending Unit	Analog Instrument Panels
Fuel Injectors	Engine Performance
Fuel Pump	Engine Performance
Fuel Pump Relay	Engine Performance
	Power Distribution
Fuse/Relay Block	Power Distribution
Fusible Links	Power Distribution
	Generators & Regulators
	Starters
Generator	Generators & Regulators
	Engine Performance
	Power Distribution
Generic Electronic Module (GEM)	Body Control Modules
	Electronic Suspension
Glow Plug Relay	Engine Performance
Glow Plugs	Engine Performance
Grounds	Ground Distribution
Headlight Door Module	Headlight Doors
Headlight Relay	Headlight Systems
	Daytime Running Lights
Headlights	Headlight Systems
	Daytime Running Lights
Heated Oxygen Sensor(s) (HO2S)	Engine Performance
Heated Windshield Control Module	Heated Windshields
Height Sensor	Electronic Suspension
Horns	Steering Column Switches
Horn Relay	Steering Column Switches
Idle Air Control (IAC) Motor/Valve	Engine Performance
Ignition Coil(s)	Engine Performance
Ignition Key Lock Cylinder	Anti-Theft System
Ignition Module	Engine Performance
Ignition Switch	Power Distribution
	Engine Performance
	Generators & Regulators
	Starters
Illuminated Entry Module	Illumination/Interior Lights
Illumination Lights	Illumination/Interior Lights
Impact Sensor	Air Bag Restraint System
Inertia Fuel Shutoff Switch	Engine Performance
Inhibit Relay	Starters

HOW TO USE SYSTEM WIRING DIAGRAMS

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Instrument Cluster	Analog Instrument Panels
Intake Air Temperature (IAT) Sensor	Engine Performance
Interior Lights	Illumination/Interior Lights
Interlock Switch	Starters
Junction Block	Power Distribution
Keyless Entry Receiver	Remote Keyless Entry
Key Reminder Switch	Starters
Knock Sensor	Engine Performance
Lamp Control Module	Exterior Lights
License Plate Lamp	Exterior Lights
Lighting Control Module	Lighting Control Modules
	Anti-Theft System
	Daytime Running Lights
	Headlight Systems
Lower Relay	Power Convertible Top
Malfunction Indicator Light (MIL)	Engine Performance
	Instrument Panels
Manifold Absolute Pressure (MAP) Sensor	Engine Performance
Mass Airflow (MAF) Sensor	Engine Performance
Mega Fuse	Generators & Regulators
Memory Seat/Mirror Module	Memory Systems
Mirror Defogger	Rear Window Defogger
Moon Roof Motor	Power Moon Roof
Moon Roof Relay	Power Moon Roof
Multi-Function Control Module	Warning Systems
Neutral Safety Switch	Starters
Oil Level Switch	Engine Performance
Oil Pressure Switch/Sending Unit	Analog Instrument Panels
	Engine Performance
Overhead Console	Overhead Console
Oxygen Sensor(s) (O2S)	Engine Performance
Parking Brake Switch	Analog Instrument Panels
Park Lights	Exterior Lights
Park/Neutral Position Switch	Starters
	Engine Performance
	Anti-Theft System
	Body Control Module
Perimeter Lighting Control Relay	Exterior Lights
Power Amplifier	Power Antennas
Power Antenna Module	Power Antennas
Power Antenna Motor	Power Antennas
Power Distribution Center	Power Distribution
	Generators & Regulators
	Starters
Power Door Lock Motors	Power Door Locks
Power Mirror Motors	Power Mirrors
	Memory Systems
Power Sliding Door Controller	Power Sliding Side Door
Power Seat Motors	Power Seats
	Memory Systems
Power Steering Pressure Switch	Engine Performance
Power Top Motor	Power Convertible Top

HOW TO USE SYSTEM WIRING DIAGRAMS

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Power Top Relay(s)	Power Convertible Top
Powertrain Control Module	Engine Performance
	Analog Instrument Panels
	Cruise Control Systems
	Data Link Connectors
	Generators & Regulators
	Starters
Power Window Motors	Power Windows
Power Window Relay(s)	Power Windows
Radiator Fan Motor(s)	Electric Cooling Fans
Radiator Fan Relay(s)	Engine Performance
	Electric Cooling Fans
Rainsense Module	Wiper/Washer Systems
Raise Relay	Power Convertible Top
Remote Anti-Theft Personality (RAP) Module	Anti-Theft System
	Starters
	Warning Systems
Seat Belt Pretensioners	Air Bag Restraint System
Seat Belt Retractor Solenoid	Passive Restraints
Seat Belt Switch	Air Bag Restraint System
	Passive Restraints
Shift Interlock Solenoid	Shift Interlock Systems
Shift Lock Actuator	Shift Interlock Systems
Side Marker Lights	Exterior Lights
SIR Coil Assembly (Clockspring)	Air Bag Restraint System
Slip Ring (Clockspring)	Air Bag Restraint System
	Steering Column Switches
SRS Control Module	Air Bag Restraint System
Starter Motor	Starters
Starter Interrupt Relay	Starters
Starter Solenoid	Starters
Starter Relay	Starters
Steering Wheel Position Sensor	Anti-Lock Brakes
Stoplights	Exterior Lights
Stoplight Switch	Engine Performance
	Cruise Control Systems
	Anti-Lock Brakes
Sun Roof ECU	Power Sun Roof
Sun Roof Motor	Power Sun Roof
Sun Roof Position Sensor	Power Sun Roof
Taillights	Exterior Lights
Throttle Position (TP) Sensor	Engine Performance
Torque Converter Clutch Solenoid/Switch	Engine Performance
Traction Control Switch	Anti-Lock Brakes
Trailer Tow Connector	Exterior Lights
Trailer Tow Relay	Exterior Lights
Transmission/Transaxle	Engine Performance
Transmission Control Module (TCM)	Engine Performance
	Starters
Transmission Range Sensor	Starters
	Back-Up Lights
	Engine Performance

HOW TO USE SYSTEM WIRING DIAGRAMS

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Transmission Range Switch Back-Up Lights
Engine Performance
Anti-Theft System
Turn Signal Flasher Exterior Lights
Turn Signal Lights Exterior Lights
Twilight Sentinel Switch Headlight Systems
Daytime Running Lights
Vapor Canister Leak Detection Pump Engine Performance
Vehicle Control Module (VCM) Engine Performance
Vehicle Dynamic Module Electronic Suspension
Vehicle Speed Control Servo Cruise Control Systems
Vehicle Speed Sensor Data Link Connectors
Analog Instrument Panels
Cruise Control Systems
Electronic Suspension
Voltage Regulator Generators & Regulators
Water-In-Fuel Sensor Engine Performance
Analog Instrument Panels
Wheel Speed Sensors Anti-Lock Brakes
Window Timer Module Power Convertible Top
Windshield Intermittent Wiper Relay Wiper/Washer Systems
Windshield Washer Motor Wiper/Washer Systems
Wiper Motor Wiper/Washer Systems
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END OF ARTICLE

WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES

Article Text

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ARTICLE BEGINNING

1995-96 WHEEL ALIGNMENT
Volkswagen - Specifications & Procedures

Golf

*** PLEASE READ FIRST ***

NOTE: Prior to performing wheel alignment, perform preliminary visual and mechanical inspection of wheels, tires and suspension components. See PRE-ALIGNMENT INSTRUCTIONS in WHEEL ALIGNMENT THEORY/OPERATION article.

RIDING HEIGHT ADJUSTMENT

NOTE: On vehicles with electronic chassis controls, all systems should be functional before attempting riding height or wheel alignment adjustment.

Before adjusting alignment, ensure difference in riding height between left and right sides of vehicle is less than 1" (25.4 mm). Riding height must be checked with vehicle on level floor and tires properly inflated. Bounce vehicle several times and allow suspension to settle.

Visually inspect vehicle for signs of abnormal height from front to rear or side to side. Check passenger and luggage compartments for extra heavy items and remove if present. If difference in riding height between left and right sides of vehicle is NOT less than 1" (25.4 mm), check suspension components and repair or replace as necessary.

WHEEL ALIGNMENT PROCEDURES

CAMBER ADJUSTMENT

To adjust front camber, loosen lower strut mounting bolt/nut. Using Camber Adjusting Tool (3270) move strut to align and retighten bolt/nut to 70 ft. lbs. (95 N.m). Additional information is not available at time of publication.

CASTER ADJUSTMENT

Caster is not adjustable. Additional information is not available at time of publication.

TOE-IN ADJUSTMENT

To adjust front toe-in, rotate right tie rod end only. Additional information is not available at time of publication.

WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES

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WHEEL ALIGNMENT SPECIFICATIONS

WHEEL ALIGNMENT SPECIFICATIONS TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application	Preferred	Range

1995

Camber (1)		
Front	-0.67	-1 To -0.33
Rear	-1.5	-1.67 To -1.33
Caster (Front) (1)	3.42	2.92 To 3.92
Toe-In (2)		
Front	0 (0)	-0.08 To 0.08 (-2 To 2)
Rear	0.17 (4)	0.08 To 0.25 (2 To 6.5)
Toe-In (1)		
Front	0	-0.17 To 0.17
Rear	0.33	0.17 To 0.5

1996 (3)

1.9L

Camber (1)		
Front	-0.5	-0.83 To -0.17
Rear	-1.5	-1.67 To -1.33
Caster (Front) (1)	1.75	1.25 To 2.25
Toe-In (2)		
Front	0 (0)	-0.08 To 0.08 (-2 To 2)
Rear	0.17 (4)	0.08 To 0.25 (2 To 6.5)
Toe-In (1)		
Front	0	-0.17 To 0.17
Rear	0.33	0.17 To 0.5

2.0L

Camber (1)		
Front	-0.58	-0.92 To -0.25
Rear	-1.5	-1.67 To -1.33
Caster (Front) (1)	1.83	1.33 To 2.33
Toe-In (2)		
Front	0 (0)	-0.08 To 0.08 (-2 To 2)
Rear	0.17 (4)	0.08 To 0.25 (2 To 6.5)
Toe-In (1)		
Front	0	-0.17 To 0.17
Rear	0.33	0.17 To 0.5

2.8L

Camber (1)		
Front	-0.5	-0.83 To -0.17

WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES

Article Text (p. 3)

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Rear		-1.5		-1.67 To -1.33
Caster (Front) (1)	...	3.27		2.77 To 3.37
Toe-In (2)				
Front		0 (0)		-0.08 To 0.08 (-2 To 2)
Rear	.....	0.17 (4)	.....	0.08 To 0.25 (2 To 6.5)
Toe-In (1)				
Front	.....	0	.....	-0.17 To 0.17
Rear	.....	0.33	.....	0.17 To 0.5

(1) - Measurement is in degrees.

(2) - Measurement is in inches (mm).

(3) - Not all engine sizes are available for all models.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

END OF ARTICLE

SUSPENSION - REAR

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ARTICLE BEGINNING

1995-96 SUSPENSION
Rear

Golf III

DESCRIPTION

Suspension uses control arms and axle beam for stabilization. Control arms and axle beam are combined as one unit. Brake drums or discs rotate on stub axles bolted to control arms. See Fig. 1.

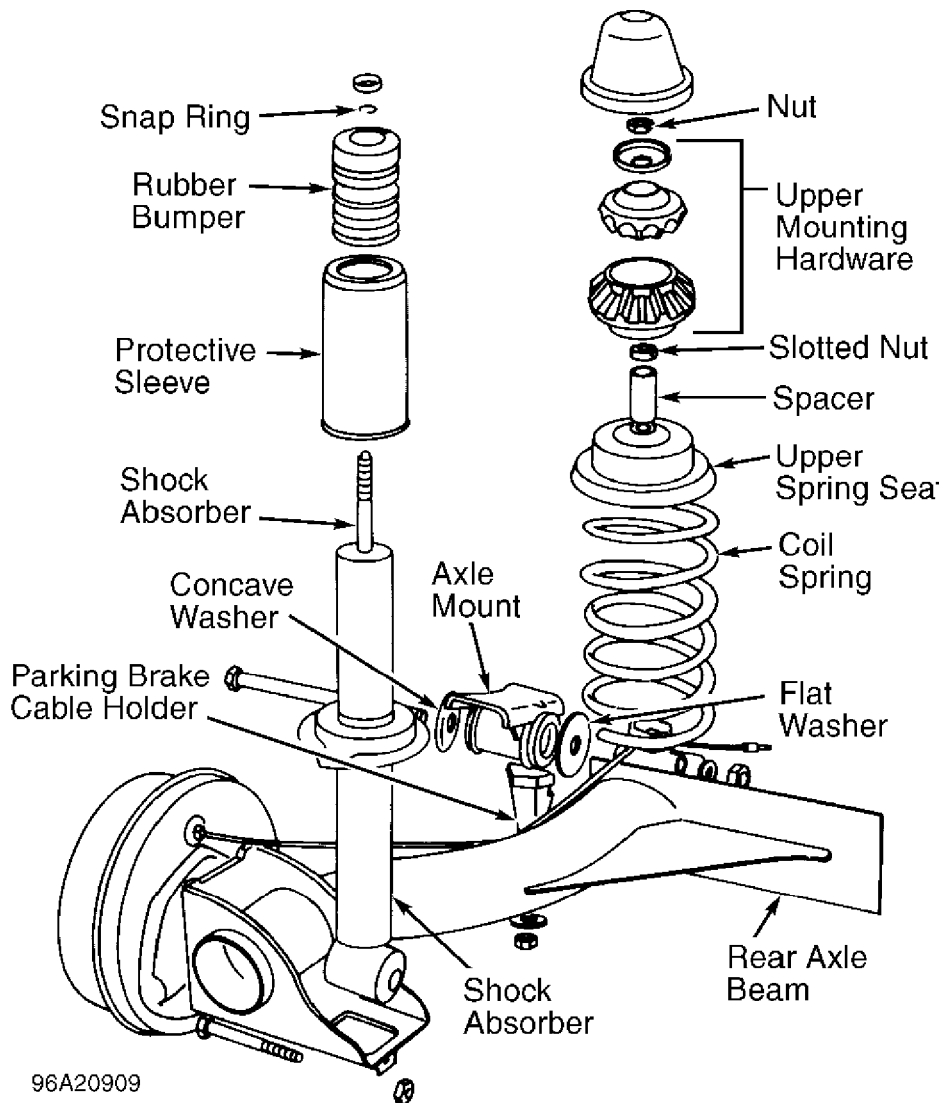


Fig. 1: Identifying Rear Suspension Components (Typical)
Courtesy of Volkswagen United States, Inc.

ADJUSTMENTS & INSPECTION

WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES

NOTE: See WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT section.

WHEEL BEARING

While rotating brake disc or drum by hand, insert tip of screwdriver between thrust washer and hub. Adjustment is correct when light finger pressure against screwdriver moves thrust washer. Turn hub nut to adjust. Install castellated nut and NEW cotter pin.

REMOVAL & INSTALLATION

AXLE BEAM PIVOT BUSHING

NOTE: The following procedure is for replacing bushing with axle beam installed in vehicle.

Removal

Raise and support vehicle. With no pressure on beam, remove axle beam-to-body nuts. Tap out pivot bolt. Using Bushing Remover/Installer (VW 3111), press out bushing. Press new bushing into place.

Installation

1) Loosely install mounting pad onto axle beam. Using remover/installer, install bushing until it protrudes from axle beam .28-.35" (7.0-9.0 mm). Concave washer and bolt head must face toward outside of vehicle. Bolt head must recess into washer.

2) Using Mounting Bracket Aligner (3021), align mount until aligner reads about 12 degrees. If aligner is not available, follow directions in illustration. See Fig. 2. With vehicle on ground, tighten pivot bolt nut to specification.

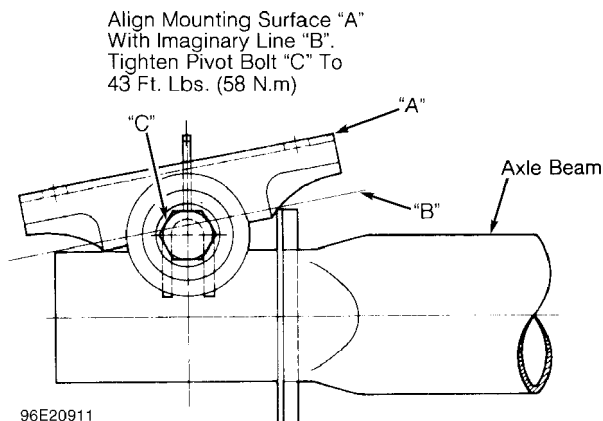


Fig. 2: Aligning Axle Beam Mounting Pad
Courtesy of Volkswagen United States, Inc.

SUSPENSION - REAR

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STRUT ASSEMBLY

Removal

1) With vehicle on floor, remove plastic cap covering upper strut nuts. Remove strut upper nuts. Slowly raise vehicle until weight is off spring. Remove strut-to-axle beam bolt. Raise vehicle until strut can be removed. Place strut assembly in vise.

2) Hold piston rod. Remove piston rod nut and related components. See Fig. 1. Remove slotted nut (some models). Remove spacer and coil spring. If coil spring is to be replaced, ensure paint stripe color on replacement spring matches original spring color stripe.

Installation

1) Install protective cap and tube onto shock absorber. Install rubber bumper with small end downward. Install snap ring and washer. Place spring into lower seat. Install upper retainer with spacer sleeve.

2) Tighten piston rod nut. Install upper mounting hardware. Tighten piston rod. To complete installation, reverse removal procedure. Tighten bolts and nuts to specification. See TORQUE SPECIFICATIONS.

SUSPENSION ASSEMBLY

CAUTION: When removing suspension assembly, add weight to rear of vehicle to prevent tipping due to change in center of gravity.

Removal

1) With vehicle on floor, remove plastic cap covering upper strut nuts. Remove strut nuts. Raise and support vehicle. Disconnect parking brake at bracket near axle mount.

2) Disconnect and plug brakelines. Leave flex hose attached to suspension. Separate brake pressure regulator spring from axle beam. Remove axle beam-to-body nuts.

NOTE: DO NOT install bolts and nuts fouled with undercoating. With waxy coating on threads, true tightening torque cannot be measured. Clean or replace bolts and nuts.

Installation

1) If axle beam mounting has been removed, adjust mounting pad. See step 2) under INSTALLATION under AXLE BEAM PIVOT BUSHING. If pad is not correctly aligned, torsional preload of mounting bushings will be incorrect.

2) Position rear suspension assembly on body. Install axle beam-to-body nuts. Raise wheel. Guide upper end of strut into body mount.

3) Connect parking brake cables. Connect brakelines. Lower vehicle. Tighten upper strut nuts. Tighten all bolts and nuts to specification. See TORQUE SPECIFICATIONS. Bleed brake system.

SUSPENSION - REAR

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WHEEL BEARING

Removal (Disc Brakes)

Raise and support vehicle. Remove wheel. Remove caliper assembly and support it aside. Remove dust cap, cotter pin, hub nut, and thrust washer. Remove brake disc. Using a long drift, tap bearings, races, and grease seal from disc hub.

Installation

1) Clean hub cavity thoroughly. Using Bearing Race Installer (VW 411 and VW 432), press inner and outer bearing races into bore. Lubricate and install inner bearing. Using Seal Installer (VW 295 and 3074), tap grease seal into bore.

2) Install brake disc, outer bearing, thrust washer, and hub nut. Reverse removal procedure to complete installation. Adjust wheel bearing. See WHEEL BEARING under ADJUSTMENTS & INSPECTION. Install NEW cotter pin.

Removal (Drum Brakes)

Raise and support vehicle. Remove wheel. Remove dust cap, cotter pin, hub nut, and thrust washer. Remove brake drum. Using a long drift, tap bearings, races, and grease seal from hub.

Installation

1) Clean hub cavity thoroughly. Using Bearing Race Installer (VW 411 and VW 432), press outer bearing race into bore. Using same bearing race installer, press inner bearing race into bore. Lubricate and install inner bearing. Using Seal Installer (VW 295 and 3074), tap grease seal into bore.

2) Install brake drum, outer bearing, thrust washer, and hub nut. Reverse removal procedure to complete installation. Adjust wheel bearing. See WHEEL BEARING under ADJUSTMENTS & INSPECTION. Install NEW cotter pin.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application Ft. Lbs. (N.m)

Brake Backing Plate Bolt	44 (60)
Brake Caliper Bracket Bolt	41 (56)
Coil Spring Retainer-To-Piston Rod Nut	11 (15)
Rear Axle Beam Pivot Bushing Bolt	60 (80)
Rear Axle Mounting Pad-To-Body Bolt	63 (85)
Strut-To-Axle Beam Nut	52 (70)
Strut-To-Body Bolt	18 (25)
Stub Axle-To-Control Arm Bolt	44 (60)
Wheel Lug Bolt	81 (110)

SUSPENSION - REAR

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END OF ARTICLE

SUSPENSION - FRONT

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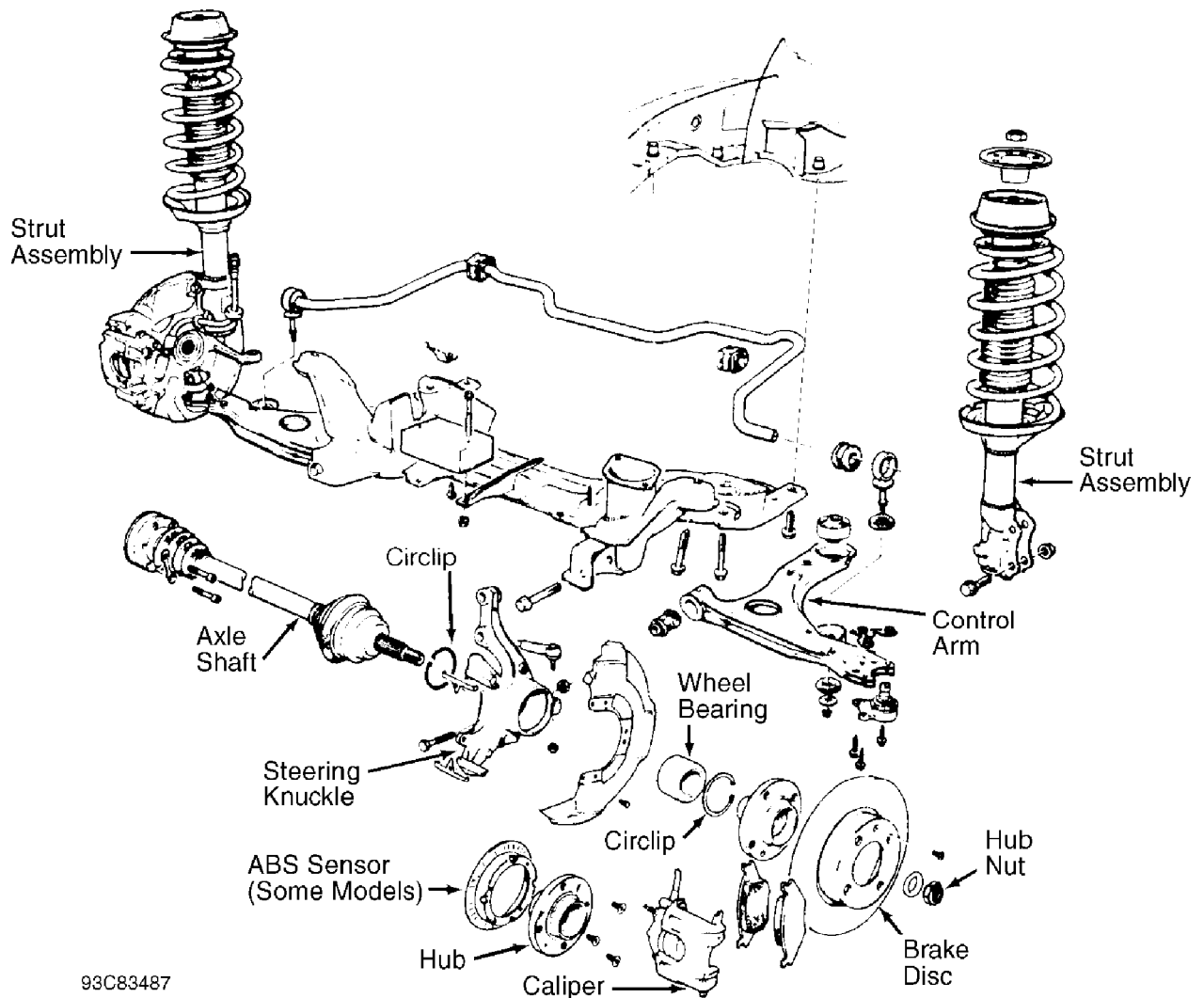
ARTICLE BEGINNING

1995-96 SUSPENSION
Front

Golf III

DESCRIPTION

FWD suspension system is equipped with MacPherson struts. Steering knuckles are supported by lower control arms and vertically mounted strut assemblies. See Fig. 1.



93C83487

Fig. 1: Exploded View Of Front Suspension (Typical)
Courtesy of Volkswagen United States, Inc.

ADJUSTMENTS & INSPECTION

SUSPENSION - FRONT

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WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES

NOTE: See WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT section.

WHEEL BEARING

Wheel bearing is not adjustable.

BALL JOINT CHECKING

Raise and support vehicle. Inspect ball joints for excessive play and damaged rubber boots. There should be no vertical or horizontal ball joint play. Replace ball joint if any play is present.

REMOVAL & INSTALLATION

HUB & KNUCKLE ASSEMBLY

Use exploded view illustration when removing or installing hub and knuckle assembly. See Fig. 1.

LOWER CONTROL ARM & BALL JOINT

Removal

1) Raise and support vehicle. Remove ball joint-to-steering knuckle bolts. Separate ball joint from housing. Leave control arm hanging in mounts at subframe.

NOTE: On vehicles with automatic transmission, engine may have to be lifted slightly to gain access to pivot bolts.

2) If ball joint is to be removed, remove ball joint bolts. Remove ball joint. If control arm is to be removed from vehicle, remove stabilizer bar link rod nut, washers, and bushings. Remove pivot bolt and "U" bracket housing inner pivot pin. Slide out control arm.

Inspection

Check lower control arm bushings for excessive wear, cracks or contamination. Replace bushings if necessary. To replace bushings, press out worn bushing. Select new bushing and press into position. Ensure bushing does not twist when seating into place.

Installation

Slide new ball joint into slot in control arm. Install and tighten ball joint bolts. Install lower control arm to subframe. Install ball joint into steering knuckle. To complete installation, reverse removal procedure. Tighten control arm bolts with vehicle on ground. Tighten all bolts and nuts to specification. See TORQUE SPECIFICATIONS. Check wheel alignment. See WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT section.

SUSPENSION - FRONT

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STRUT ASSEMBLY

Removal

1) Raise and support vehicle. Remove wheel. Disconnect and wire caliper aside. Remove strut-to-steering knuckle bolts.

2) Support front suspension arm and components. Pry strut from steering knuckle. Remove upper strut nuts from inside engine compartment. Remove strut.

Installation

To install, reverse removal procedure. Tighten bolts and nuts to specification. See TORQUE SPECIFICATIONS. Check wheel alignment. See WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT section.

FRONT SUSPENSION ASSEMBLY

Removal

1) Raise and support vehicle at center with safety stands. Disconnect brake line and plug openings. Leave flex line in place. Remove stabilizer link rod nut, bushings and washers.

2) Remove tie rod nut. Separate tie rod from steering knuckle. Disconnect inner portion of constant velocity joint from transaxle drive flange.

NOTE: On vehicles with automatic transmission, engine may have to be lifted slightly to gain access to pivot bolts.

3) Remove lower control arm front pivot bolt. Remove "U" shaped bracket bolts at control arm rear pivot.

4) Support suspension assembly. Remove upper strut nuts. Remove suspension assembly from vehicle.

Installation

To install, reverse removal procedure. Ensure convex side of thrust washer faces pivot bolt head. Tighten bolts and nuts to specification. See TORQUE SPECIFICATIONS. Check wheel alignment. See WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT section.

WHEEL BEARING

Removal

1) Remove axle shaft nut with front wheels on ground. Raise and support vehicle. Allow suspension to hang free. Remove wheel. Remove brake caliper bolts. Remove caliper and wire aside. Remove brake disc screw and remove disc.

2) Disconnect tie rod from steering knuckle. Remove ball joint clamp nut and bolt. Disconnect ball joint from steering knuckle. Remove steering knuckle.

3) Remove 2 wheel bearing circlips. Using Hub Remover (VW

SUSPENSION - FRONT

Article Text (p. 4)

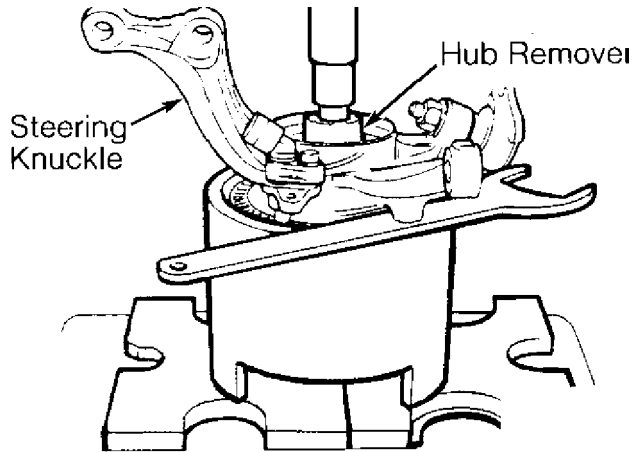
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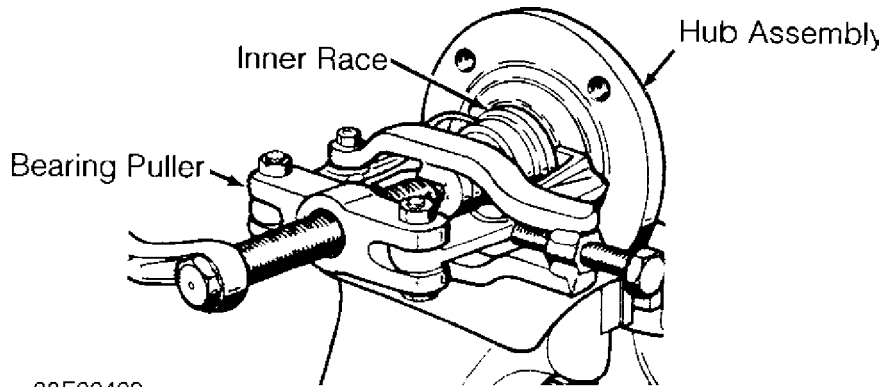
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295a), press wheel bearing out of steering knuckle. See Fig. 2. Using a bearing puller, remove wheel bearing inner race from hub assembly. See Fig. 3. Using Bearing Remover (40-105), press wheel bearing from outboard side of steering knuckle.



93D83488

Fig. 2: Pressing Wheel Bearing Out Of Steering Knuckle
Courtesy of Volkswagen United States, Inc.



93E83489

Fig. 3: Removing Wheel Bearing Inner Race
Courtesy of Volkswagen United States, Inc.

NOTE: When installing hub, ensure press adapter contacts inner bearing race only.

Installation

1) Press new wheel bearing race onto hub. Using Bearing & Hub Installer (VW 412), and Adapter (VW 472/1), press new bearing into steering knuckle from outboard side. Using same installer and adapter, press wheel hub into steering knuckle. See Fig. 4. Apply a small bead of locking compound to axle splines before installing axle into hub.

2) To complete installation, reverse removal procedure. Always replace self-locking axle shaft nut. Tighten bolts and nuts to specification. See TORQUE SPECIFICATIONS. Check wheel alignment. See WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT section.

SUSPENSION - FRONT

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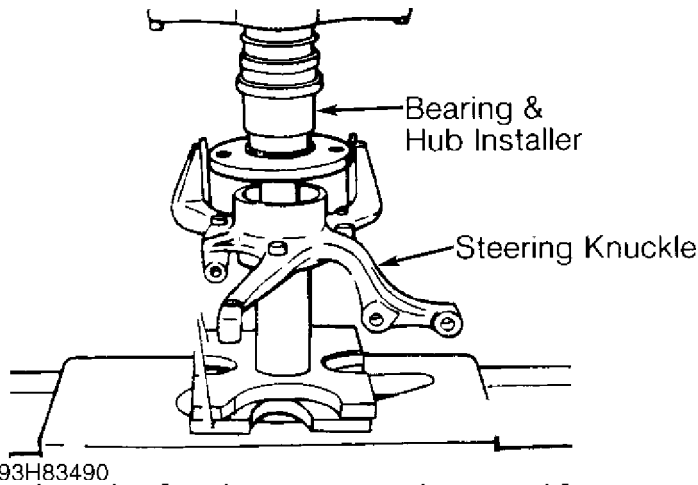


Fig. 4: Pressing Wheel Hub Into Steering Knuckle
Courtesy of Volkswagen United States, Inc.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application	Ft. Lbs. (N.m)

Axle Nut

4-Cyl.	195 (265)

VR6	66 (90) plus 1/8 turn

Axle Shaft-To-Transaxle Bolt	33 (45)

Ball Joint Clamp Bolt (4-Cyl.)	37 (50)

Ball Joint Nut (VR6)	33 (45)

Ball Joint-To-Control Arm Bolt	26 (35)

Caliper Pin Bolt	26 (35)

Caliper Bracket Bolts	92 (125)

Control Arm Front Bushing Bolt

4-Cyl.	52 (70)

VR6	37 (50) plus 1/4 turn

Control Arm-To-Subframe Rear Bushing Bolt	96 (130)

Strut Piston Rod Nut	44 (60)

Strut-To-Steering Knuckle Bolt	70 (95)

Subframe Bolts

4-Cyl.	47 (65)

VR6	52 (70) plus 1/4 turn

Tie Rod Castle Nut	26 (35)

Wheel Lug Bolt	81 (110)

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END OF ARTICLE

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Article Text

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ARTICLE BEGINNING

GENERAL INFORMATION

Steering & Suspension Systems - (Including Wheels & Tires)

All Makes & Models

Updated: January, 1997

MAP UNIFORM INSPECTION GENERAL GUIDELINES

OVERVIEW OF MOTORIST ASSURANCE PROGRAM

The Motorist Assurance Program (MAP) is the consumer outreach effort of the Automotive Maintenance and Repair Association, Inc. (AMRA). Participation in the Motorist Assurance Program is drawn from retailers, suppliers, independent repair facilities, vehicle manufacturers and industry associations.

The Motorist Assurance Program was established as an industry-wide effort to address concerns raised by regulators, the media and consumers questioning our ethics and methods of doing business. The automotive repair industry had been bombarded by months of negative stories in the media and scrutiny from state and federal regulators who focused on how the need for repairs is determined. MAP was formed as an industry response to this issue.

Our mission is to strengthen the relationship between the consumer and the auto repair industry. We produce materials that give motorists the information and encouragement to take responsibility for their vehicles - through proper, manufacturer-recommended, maintenance. We encourage participating service and repair shops (including franchisees and dealers) to adopt a Pledge to their Customers and the Motorist Assurance Program developed Standards of Service. All participating service providers have agreed to subscribe to this Pledge and to adhere to the promulgated Standards of Service which demonstrates to their customers that they are serious about customer satisfaction.

These Standards of Service require that an inspection of the vehicle's (problem) system be made according to industry guidelines. After learning that neither the car manufacturers nor any other source had complete guidelines, leading industry organizations, along with other industry participants banded together to address this challenging task. During the past two and a half years, they successfully developed industry inspection guidelines for the following systems: Exhaust, Brakes, ABS, Steering and Suspension, Engine Maintenance and Performance, HVAC, and Electrical systems. Guidelines for Drive Train and Transmission are currently being promulgated. Revisions to the inspection guidelines for Exhaust, Brakes/ABS and Steering and Suspension Systems, which were issued two years ago, are now being published for implementation beginning spring 1997. Participating shops utilize these Uniform Inspection Guidelines as part of the inspection process and for communicating their findings

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to their customers.

The Motorist Assurance Program continues to work cooperatively and proactively with government agencies and consumer groups toward solutions that both benefit the customer and are mutually acceptable to both regulators and industry. We maintain the belief that industry must retain control over how we conduct our business, and we must be viewed as part of the solution and not part of the problem. Meetings with state and other government officials concerned with auto repair and/or consumer protection are conducted. Feedback from these representatives are brought back to members, and the program adjusted as needed.

To assure auto repair customers recourse if they were not satisfied with a repair transaction, the Motorist Assurance Program offers arbitration through MAP/BBB-CARE in cooperation with the Council of Better Business Bureaus and individual participating Bureaus. MAP "piloted" in Indianapolis and Pittsburgh during spring, 1996 - and publicized "roll-outs" in New Jersey, Detroit (MI), Chicago (IL) and Richmond (VA) were conducted. To put some "teeth" in the program, and accreditation requirement for shops was initiated. The requirements are stringent and a self-policing method has been incorporated which includes the "mystery shopping" of outlets. In addition, a committee of service providers had been working diligently developing standards for newspaper, television and Internet advertising.

We welcome you to join us as we continue our outreach ... with your support, both the automotive repair industry and your customers will reap the benefits. Please visit MAP at our Internet site: www.hunter.com/map.htm or contact us at:

808 17th Street, NW Suite 200

Washington, D.C. 20006

Ph. (202) 466-7050 Fax (202) 223-9569

OVERVIEW OF SERVICE REQUIREMENTS & SUGGESTIONS

It is MAP policy that all exhaust, brake, ABS, steering and suspension, wheel alignment, tires and wheels, driveline, engine performance and maintenance and heating, ventilation and air conditioning services be offered and performed under the guidelines and procedures specified in these sections.

Before any service is performed on a vehicle, an inspection of the appropriate system must be performed. The results of this inspection must be explained to the customer and documented on an inspection form. The condition of the vehicle and its components will indicate what services/part replacements may be required or suggested. In addition, suggestions may be made to satisfy the needs expressed by the customer.

This section lists the various parts and conditions that indicate required or suggested service or part replacement. Although this list is extensive, it is not inclusive. In addition to this list, a technician may make a suggestion. This suggestion must be based on substantial and informed experience or the vehicle manufacturer's

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recommended service interval.

Some conditions indicate that service or part replacement is required because the part in question is no longer providing the function for which it is intended, does not meet a vehicle manufacturer's design specification or is missing.

- * Example: An exhaust pipe has corroded severely and has a hole in it through which exhaust gases are leaking. Replacement of the exhaust pipe in this case is required due to functional failure.
- * Example: A brake rotor has been worn to the point where it measures less than the vehicle manufacturer's specifications. Replacement of the rotor is required because it does not meet design specifications.

Some conditions indicate that a service or part replacement is suggested because the part is close to the end of its useful life or to address a customer's need, convenience or request. If a customer's vehicle has one of these conditions, the procedure may only be to suggest service.

- * Example: An exhaust pipe is rusted, corroded or weak, but no leaks are present. In this case, the exhaust pipe has not failed. However, there is evidence that the pipe may need replacement in the near future. Replacement of the pipe may be suggested for the customer's convenience in avoiding a future problem.
- * Example: The customer desires improved ride and/or handling, but the vehicle's shocks or struts have not failed. In this case, replacement may be suggested to satisfy the customer's wishes. In this case, replacement of the shocks or struts may not be sold as a requirement.

A customer, of course, has the choice of whether or not a shop will service his or her vehicle. He or she may decide not to follow some of your suggestions. When a customer declines to authorize a service or repair indicated in the MAP Uniform Inspection Guidelines as "required," a MAP shop may refuse service on that system, if proceeding with the work could create or continue an unsafe or unsatisfactory condition.

The following reasons may be used for required and suggested services. These codes are shown in the "Code" column of the Uniform Inspection Guidelines that follow.

PART REPLACEMENT CODE IDENTIFICATION

NOTE: Refer to the following tables for definitions of the codes listed in the condition/procedure tables for the specific components that may need to be replaced.

NOTE: When replacing steering and/or suspension components which may affect an alignment angle, you are required to check and

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adjust alignment as needed. Refer to the OEM specifications.

CAUTION: DO NOT use ride height altering or load compensating components, such as variable rate springs and coil over shocks, on vehicles with height or load sensing proportioning valve-equipped braking systems, unless these components are original equipment.

AIR RIDE SUSPENSION

NOTE: Depending on the air suspension design, there are some aftermarket products available to eliminate the air ride suspension on certain vehicles. If the system has been eliminated with one of these products, then no service is suggested or required.

AIR RIDE SUSPENSION - AIR SHOCKS & AIR STRUTS

NOTE: This section covers the air spring portion of the air shock or strut. For dampening portion of shock or strut conditions and procedures, refer to the "Shock Absorbers, Strut Cartridges, and Strut Assemblies" section.

AIR RIDE SUSPENSION - AIR SHOCKS & AIR STRUTS

Condition			3	Code	3	Procedure
Inner fabric of air bag						
damaged			3	A	3	Require replacement.
Leaking						
			3	A	3	Require repair or replacement.
Outer covering of air bag						
is cracked to the extent			3	A,1	3	Suggest replacement.
that inner fabric of air			3		3	
bag is visible			3		3	

AIR RIDE SUSPENSION - AIR SPRING VALVES

AIR RIDE SUSPENSION - AIR SPRING VALVES

Condition			3	Code	3	Procedure
Attaching hardware						
incorrect			3	A	3	Require replacement of incorrect part.
Attaching hardware loose						
			3	A	3	Require repair or replacement of loose part.
Attaching hardware missing						
			3	C	3	Require replacement of missing part.

* SUSPENSION UNIFORM INSPECTION GUIDELINES *

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AIR RIDE SUSPENSION - AIR SPRINGS

AIR RIDE SUSPENSION - AIR SPRINGS

Condition	Code	Procedure
Attaching hardware broken	A	Require replacement of broken part.
Attaching hardware incorrect	A	Require replacement of incorrect part.
Attaching hardware loose	A	Require repair or replacement of loose part.
Attaching hardware missing	C	Require replacement of missing part.
Attaching hardware threads damaged	A	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	A	Require replacement of part with stripped threads.
Collar cracked	A	Require replacement.
End cap cracked	A	Require replacement.
Inner fabric of bag damaged	A	Require replacement.

Condition	Code	Procedure
Attaching hardware bent	B	Require repair or replacement of bent part.
Attaching hardware broken	A	Require replacement of broken part.
Attaching hardware loose	A	Require repair or replacement of loose part.
Attaching hardware missing	C	Require replacement of missing part.
Attaching hardware threads damaged	A	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	A	Require replacement of part with stripped threads.
Connector bent	A	Require repair or replacement.
Connector broken	A	Require replacement.
Connector loose	A	Require repair or replacement.
Does not build pressure	A	Further inspection required. See note (1) below.
Excessive run time	B	Further inspection required. See note (2) below.
Inoperative	A	Require replacement.
Leaking	A	Require repair or replacement.
Missing	C	Require replacement.

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*** SUSPENSION UNIFORM INSPECTION GUIDELINES ***

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Condition	³ Code	³ Procedure
Broken	³ A	³ Require replacement.
Missing	³ C	³ Require replacement.
Output signal incorrect	³ A	³ Require replacement.

AIR RIDE SUSPENSION - TORSION SPRINGS (COUNTER BALANCING)

Condition	³ Code	³ Procedure
Attaching hardware bent	³ B	³ Require repair or replacement of bent part.
Attaching hardware broken	³ A	³ Require replacement of broken part.
Attaching hardware incorrect	³ A	³ Require replacement of incorrect part.
Attaching hardware loose	³ A	³ Require repair or replacement of loose part.
Attaching hardware missing	³ C	³ Require replacement of missing part.
Attaching hardware threads damaged	³ A	³ Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	³ A	³ Require replacement of part with stripped threads.
Broken	³ A	³ Require replacement.
Missing	³ C	³ Require replacement.

AIR RIDE SUSPENSION - TUBING

Condition	³ Code	³ Procedure
Attaching hardware incorrect	³ A	³ Require replacement of incorrect part.
Attaching hardware loose	³ A	³ Require repair or replacement of

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3 3 loose part.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware missing 3 C 3 Require replacement of missing
3 3 part.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Blocked 3 A 3 Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Fitting incorrect 3 B 3 Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking 3 A 3 Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Line type incorrect 3 B 3 Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Missing 3 C 3 Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Restricted 3 A 3 Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Routed incorrectly 3 B 3 Require routing correction.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AIR RIDE SUSPENSION - WARNING LAMPS

AIR RIDE SUSPENSION - WARNING LAMPS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition 3 Code 3 Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Bulb burned out 3 A 3 Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Warning light does not come 3 3

on during bulb check 3 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Warning light flashes 3 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Warning light is intermittent 3 3 Further inspection required to

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Warning light stays on after 3 3

initial bulb check 3 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AIR RIDE SUSPENSION - WIRING HARNESES

AIR RIDE SUSPENSION - WIRING HARNESES

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition 3 Code 3 Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Connector bent 3 A 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Connector broken 3 A 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Connector loose 3 A 3 Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged (cut, burned, or 3 A 3

[illegible]

*** SUSPENSION UNIFORM INSPECTION GUIDELINES ***

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Condition	3	Code	3	Procedure
Attaching hardware bent	3	B	3	Require repair or replacement of bent part if available; otherwise, replace ball joint.
Attaching hardware broken	3	A	3	Require replacement of broken part if available; otherwise, replace ball joint.
Attaching hardware corroded affecting structural integrity	3	A	3	Require replacement of broken part if available; otherwise, replace ball joint.
Attaching hardware incorrect	3	A	3	Require replacement of incorrect part if available; otherwise, replace ball joint.
Attaching hardware loose	3	A	3	Require repair or replacement of loose part if available; otherwise, replace ball joint.
Attaching hardware missing	3	C	3	Require replacement of missing part if available; otherwise, replace ball joint.
Attaching hardware threads damaged	3	A	3	Require repair or replacement of part with damaged threads if available; otherwise, replace ball joint.
Attaching hardware threads stripped (threads missing)	3	A	3	Require replacement of part with stripped threads if available; otherwise, replace ball joint.
Binding	3	A	3	Further inspection required. See note (1) below.
Grease boot cracked	3	B,2	3	Suggest replacement. See note (2).
Grease boot missing	3	B,2	3	Suggest replacement. See note (3).
Grease boot torn	3	B,2	3	Suggest replacement. See note (4).
Grease fitting broken	3	A	3	Require replacement of grease fitting.
Grease fitting missing	3	C	3	Require replacement of grease fitting.
Grease fitting won't seal	3	A	3	Require replacement of grease fitting.

*** SUSPENSION UNIFORM INSPECTION GUIDELINES ***

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Greaseable ball joint will ³ B,2 ³ Suggest replacement of grease
not take grease ³ ³ fitting. See note (5) below.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Nut on ball joint loose ³ A ³ Require repair or replacement.
³ ³ See note (6) below.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Pre-load adjustment ³ B ³ Require repair or replacement.
incorrect ³ ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Seized ³ A ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Stud bent ³ B ³ Require replacement. See note (7).

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Stud broken ³ A ³ Require replacement. See note (7).

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Threads damaged ³ A ³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Threads stripped (threads ³ A ³ Require replacement. See note (7).
missing) ³ ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Wear exceeds manufacturer's ³ B ³ Require replacement.
specifications ³ ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

- NOTE: (1) If greaseable, grease ball joint. If problem persists or
joint is non-greaseable, require replacement.
(2) Cracked grease boot will allow contaminants to enter the
ball joint and will accelerate wear.
(3) Lack of grease boot will allow contaminants to enter the
ball joint and will accelerate wear.
(4) Torn grease boot will allow contaminants to enter the ball
joint and will accelerate wear.
(5) If the greaseable ball joint still will not take grease
after replacing the grease fitting, suggest replacement of
ball joint.
(6) Check for bent stud or damaged taper hole.
(7) Check for damaged taper hole.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

BUSHINGS

BUSHINGS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition ³ Code ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware bent ³ B ³ Require repair or replacement of
³ ³ bent part if available; otherwise,
³ ³ replace bushing.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware broken ³ A ³ Require replacement of broken part
³ ³ if available; otherwise, replace
³ ³ bushing.

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Attaching hardware corroded ³	A	³	Require replacement of corroded
affecting structural	³	³	part if available; otherwise,
integrity	³	³	replace bushing.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Attaching hardware	³ A	³	Require replacement of incorrect
incorrect	³	³	part if available; otherwise,
	³	³	replace bushing.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Attaching hardware loose	³ A	³	Require repair or replacement of
	³	³	loose part if available;
	³	³	otherwise, replace bushing.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Attaching hardware missing	³ C	³	Require replacement of missing
	³	³	part if available; otherwise,
	³	³	replace bushing.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Attaching hardware threads	³ A	³	Require repair or replacement of
damaged	³	³	part with damaged threads if
	³	³	available; otherwise, replace
	³	³	bushing.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Attaching hardware threads	³ A	³	Require replacement of part with
stripped (threads missing) ³	³	³	stripped threads if available;
	³	³	otherwise, replace bushing.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Binding	³ A	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Deteriorated, affecting	³ A	³	Require repair or replacement.
performance	³	³	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Distorted, affecting	³ A	³	Require repair or replacement.
performance	³	³	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Leaking (fluid-filled type) ³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Missing	³ A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Noisy	³ B,2	³	Further inspection required.
	³	³	See note (1) and caution below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Rubber separating from	³ A	³	Require replacement.
internal metal sleeve on	³	³	
bonded bushing	³	³	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Seized	³ A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Shifted (out of position)	³ B	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Split	³ A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Surface cracking	³	³	No service suggested or required.

[illegible]

- NOTE:
- (1) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.
 - (2) Cracked grease boot will allow contaminants to enter the joint and will accelerate wear.
 - (3) Lack of grease boot will allow contaminants to enter the joint and will accelerate wear.
 - (4) Torn grease boot will allow contaminants to enter the joint and will accelerate wear.
 - (5) Lack of grease seal will allow contaminants to enter the joint and will accelerate wear.
 - (6) Torn grease seal will allow contaminants to enter the joint and will accelerate wear.
 - (7) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method

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such as the dry park check.

(8) Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.

(9) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.

(10) Check for damaged taper hole.

(11) Check for damaged stud.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

CONTROL ARM SHAFTS

CONTROL ARM SHAFTS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	3	Code	3	Procedure
Attaching hardware broken	3	A	3	Require replacement of broken part, if available; otherwise, replace shaft.
Attaching hardware loose	3	A	3	Require repair or replacement of loose part, if available; otherwise, replace shaft.
Attaching hardware missing	3	C	3	Require replacement of missing part, if available; otherwise, replace shaft.
Attaching hardware threads damaged	3	A	3	Require repair or replacement of part with damaged threads, if available; otherwise, replace shaft.
Attaching hardware threads stripped (threads missing)	3	A	3	Require replacement of part with stripped threads, if available; otherwise, replace shaft.
Bent	3	B	3	Require replacement.
Shaft bushing surface undersized (worn)	3	B	3	Require replacement.
Threads damaged	3	A	3	Require repair or replacement.
Threads stripped (threads missing)	3	A	3	Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

CONTROL ARMS

CONTROL ARMS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	3	Code	3	Procedure
Attaching hardware bent	3	B	3	Require repair or replacement of bent part, if available; otherwise, replace control arm.
Attaching hardware broken	3	A	3	Require replacement of broken part, if available; otherwise,

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	3	3	replace control arm.
Attaching hardware corroded affecting structural integrity	3 A 3	3	Require replacement of corroded part, if available; otherwise, replace control arm.
Attaching hardware incorrect	3 A 3	3	Require replacement of incorrect part, if available; otherwise, replace control arm.
Attaching hardware loose	3 A 3	3	Require repair or replacement of loose part, if available; otherwise, replace control arm.
Attaching hardware missing	3 C 3	3	Require replacement of missing part, if available; otherwise, replace control arm.
Attaching hardware threads damaged	3 A 3	3	Require repair or replacement of part with damaged threads, if available; otherwise, replace control arm.
Attaching hardware threads stripped (threads missing)	3 A 3	3	Require replacement of part with stripped threads, if available; otherwise, replace control arm.
Bent	3 B 3	3	Require replacement.
Bushing hole oversized	3 B 3	3	Require replacement.
Ball joint hole oversized (loose interference or press fit)	3 B 3	3	Further inspection required. See note (1) below.
Corroded, affecting structural integrity	3 A 3	3	Require replacement.
Holes distorted	3 A 3	3	Require replacement.
Threads damaged	3 A 3	3	Require repair or replacement.
Threads stripped (threads missing)	3 A 3	3	Require replacement.

NOTE: (1) If oversized ball joint is available, require replacement of ball joint. If oversized ball joint is not available, require replacement of control arm.

DRAG LINKS

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DRAG LINKS

Condition			3	Code	3	Procedure
Attaching hardware incorrect			3	A	3	Require replacement of incorrect part, if available; otherwise, replace drag link.
Attaching hardware loose			3	A	3	Require repair or replacement of loose part, if available; otherwise, replace drag link.
Attaching hardware missing			3	C	3	Require replacement of missing part, if available; otherwise, replace drag link.
Attaching hardware threads damaged			3	A	3	Require repair or replacement of part with damaged threads, if available; otherwise, replace drag link.
Attaching hardware threads stripped (threads missing)			3	A	3	Require replacement of part with stripped threads, if available; otherwise, replace drag link.
Bent			3	B	3	Require replacement.
Binding			3	A	3	Further inspection required. See note (1) below.
Grease boot cracked			3	B,2	3	Suggest replacement. See note (2).
Grease boot missing			3	B,2	3	Suggest replacement. See note (3).
Grease boot torn			3	B,2	3	Suggest replacement. See note (4).
Grease fitting broken			3	A	3	Require replacement of grease fitting.
Grease fitting missing			3	C	3	Require replacement of grease fitting.
Grease fitting won't seal			3	A	3	Require replacement of grease fitting.
Grease seal missing			3	B,2	3	Suggest replacement. See note (5).
Grease seal torn			3	B,2	3	Suggest replacement. See note (4).
Looseness (perceptible horizontal movement)			3	A,1	3	Suggest replacement. See note (6).

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CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Looseness that is excessive³ B ³ Require replacement. See notes (6) and (7), caution below.

CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Seized ³ A ³ Require replacement.

Stud bent ³ B ³ Require replacement. See note (8).

Stud broken ³ A ³ Require replacement. See note (8).

Stud loose in taper hole ³ A ³ Require repair or replacement. See note (8) below.

Taper hole elongated ³ A ³ Require replacement. See note (9).

Threads damaged ³ A ³ Require repair or replacement.

Threads stripped (threads missing) ³ A ³ Require replacement. See note (8).

Wear exceeds manufacturer's³ B ³ Require replacement. specifications

NOTE: (1) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.

(2) Cracked grease boot will allow contaminants to enter the joint and will accelerate wear.

(3) Lack of grease boot will allow contaminants to enter the joint and will accelerate wear.

(4) Torn grease boot will allow contaminants to enter the joint and will accelerate wear.

(5) Missing grease seal will allow contaminants to enter the joint and will accelerate wear.

(6) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.

(7) Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.

(8) Check for damaged taper hole.

(9) Check for damaged stud.

ELECTRONIC RIDE CONTROL SHOCKS & STRUTS

NOTE: This section covers the electronic damping control portion of the electronic shock or strut. For dampening portion of shock or strut conditions and procedures, refer to the "Shock

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Absorbers, Strut Cartridges, and Strut Assemblies" section.

ELECTRONIC RIDE CONTROL SHOCKS & STRUTS

Condition	³	Code	³	Procedure
Connector bent	³	A	³	Require repair or replacement.
Connector broken	³	A	³	Require repair or replacement.
Connector loose	³	A	³	Require repair or replacement.
Electronic valve control inoperative	³	B,2	³	Suggest replacement. See note (1).
Terminal bent	³	A	³	Require repair or replacement.
Terminal broken	³	A	³	Require repair or replacement.
Terminal corroded	³	A	³	Require repair or replacement.
Terminal loose	³	A	³	Require repair or replacement.

NOTE: (1) It is acceptable to replace with a non-electronically controlled unit, where available.

IDLER ARMS

IDLER ARMS

Condition	³	Code	³	Procedure
Attaching hardware broken	³	A	³	Require replacement of broken part, if available; otherwise, replace idler arm.
Attaching hardware incorrect	³	A	³	Require replacement of incorrect part, if available; otherwise, replace idler arm.
Attaching hardware loose	³	A	³	Require repair or replacement of loose part, if available; otherwise, replace idler arm.
Attaching hardware missing	³	C	³	Require replacement of missing part, if available; otherwise, replace idler arm.
Attaching hardware threads damaged	³	A	³	Require repair or replacement of part with damaged threads, if available; otherwise, replace

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3 3 idler arm.

AAAAAA
Attaching hardware threads 3 A 3 Require replacement of part with
stripped (threads missing)3 3 stripped threads, if available;
3 3 otherwise, replace idler arm.

AAAAAA
Binding 3 A 3 Further inspection required.
3 3 See note (1) below.

AAAAAA
Grease boot cracked 3 B,2 3 Suggest replacement. See note (2).
AAAAAA
Grease boot missing 3 B,2 3 Suggest replacement. See note (3).
AAAAAA
Grease boot torn 3 B,2 3 Suggest replacement. See note (4).
AAAAAA
Grease fitting broken 3 A 3 Require replacement of grease
3 3 fitting.

AAAAAA
Grease fitting missing 3 C 3 Require replacement of grease
3 3 fitting.

AAAAAA
Grease fitting won't seal 3 A 3 Require replacement of seal.
AAAAAA
Grease seal missing 3 B,2 3 Suggest replacement. See note (5).
AAAAAA
Grease seal torn 3 B,2 3 Suggest replacement. See note (4).
AAAAAA
Greaseable joint will not 3 B,2 3 Suggest replacement of grease
take grease 3 3 fitting. See note (6) below.

AAAAAA
Looseness at frame bracket 3 B 3 Require repair or replacement.
end 3 3 See notes (7) and (8) below.

AAAAAA
Looseness at link end 3 A,1 3 Suggest replacement. See note (7).
(perceptible horizontal 3 3
movement) 3 3

AAAAAA
CAUTION: DO NOT use pliers or pry bar to check ball and socket
movement. Use only moderate hand pressure.

AAAAAA
Looseness at link end that 3 B 3 Require replacement. See notes (7)
is excessive 3 3 and (9) and caution below.

AAAAAA
CAUTION: DO NOT use pliers or pry bar to check ball and socket
movement. Use only moderate hand pressure.

AAAAAA
Mounted out of position 3 B 3 Require repositioning.
(center link not parallel)3 3

AAAAAA
Nut on stud loose 3 A 3 Require repair or replacement.
3 3 See note (10) below.

AAAAAA

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Seized	³	A	³	Require replacement.
AAAAAA				
Stud bent	³	B	³	Require replacement. See note (11)
AAAAAA				
Stud broken	³	A	³	Require replacement. See note (11)
AAAAAA				
Taper hole elongated	³	A	³	Require replacement. See note (12)
AAAAAA				
Threads damaged	³	A	³	Require repair or replacement.
AAAAAA				
Threads stripped (threads missing)	³	A	³	Require replacement. See note (11)
AAAAAA				
Wear exceeds manufacturer's specifications	³	B	³	Require replacement.
AAAAAA				

- NOTE: (1) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.
- (2) Cracked grease boot will allow contaminants to enter joint and will accelerate wear.
- (3) Lack of grease boot will allow contaminants to enter joint and will accelerate wear.
- (4) Torn grease boot will allow contaminants to enter joint and will accelerate wear.
- (5) Missing grease seal will allow contaminants to enter joint and will accelerate wear.
- (6) If greaseable joint will not take grease after replacing the grease fitting, suggest replacement of idler arm.
- (7) If manufacturer's procedures and specifications exist, use those procedures and specifications; otherwise, use an approved inspection method such as the dry park check.
- (8) Looseness is defined as movement that creates excessive toe change.
- (9) Excessive looseness is defined as significant enough to affect vehicle handling or structural integrity.
- (10) Check for bent stud or damaged taper hole.
- (11) Check for damaged taper hole.
- (12) Check for damaged stud.

AAAAAA

KING PINS

You are not required to replace king pins in axle sets. However, when replacing a king pin due to wear exceeding manufacturer's specifications, you may suggest replacement of the other king pin on the axle if its measurement shows it is close to the end of its useful life.

KING PINS

Condition	³	Code	³	Procedure
AAAAAA				

NOTE: (1) If king pin will not take grease after replacement of grease

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Looseness (perceptible horizontal movement) ³ A,1 ³ Suggest replacement. See note (7)

CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Looseness that is excessive ³ B ³ Require replacement. See notes (7)

CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Nut on stud loose ³ A ³ Require repair or replacement.

Seized ³ A ³ Require replacement.

Splines damaged ³ A ³ Require repair or replacement.

Splines stripped (splines missing) ³ A ³ Require replacement.

Stud bent ³ B ³ Require replacement. See note (10)

Stud broken ³ A ³ Require replacement. See note (10)

Stud loose in taper hole ³ A ³ Require repair or replacement.

Taper hole elongated ³ A ³ Require replacement. See note (11)

Threads damaged ³ A ³ Require repair or replacement.

Threads stripped (threads missing) ³ A ³ Require replacement. See note (10)

NOTE: (1) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.

(2) Cracked grease boot will allow contaminants to enter joint and will accelerate wear.

(3) Lack of grease boot will allow contaminants to enter joint and will accelerate wear.

(4) Torn grease boot will allow contaminants to enter joint and will accelerate wear.

(5) Lack of grease seal will allow contaminants to enter joint and will accelerate wear.

(6) Torn grease seal will allow contaminants to enter joint and will accelerate wear.

(7) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.

[illegible]

[illegible]

Attaching hardware threads ³ A ³ Require replacement of part with

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stripped (threads missing)³ ³ stripped threads.
AAAAAA
Bent ³ B ³ Require replacement.
AAAAAA
Corroded, affecting ³ A ³ Require replacement.
structural integrity ³ ³
AAAAAA
Holes distorted ³ A ³ Require replacement.
AAAAAA
Threads damaged ³ A ³ Require repair or replacement.
AAAAAA
Threads stripped (threads ³ A ³ Require replacement.
missing) ³ ³
AAAAAA

RELAY RODS

RELAY RODS
AAAAAA
Condition ³ Code ³ Procedure
AAAAAA
Attaching hardware ³ A ³ Require replacement of incorrect
incorrect ³ ³ part, if available; otherwise,
 ³ ³ replace relay rod.
AAAAAA
Attaching hardware loose ³ A ³ Require repair or replacement of
 ³ ³ loose part, if available;
 ³ ³ otherwise, replace relay rod.
AAAAAA
Attaching hardware missing ³ C ³ Require replacement of missing
 ³ ³ part, if available; otherwise,
 ³ ³ replace relay rod.
AAAAAA
Attaching hardware threads ³ A ³ Require repair or replacement of
damaged ³ ³ part with damaged threads, if
 ³ ³ available; otherwise, replace
 ³ ³ relay rod.
AAAAAA
Attaching hardware threads ³ A ³ Require replacement of part with
stripped (threads missing)³ ³ stripped threads, if available;
 ³ ³ otherwise, replace relay rod.
AAAAAA
Bent ³ B ³ Require replacement.
AAAAAA
Binding ³ A ³ Further inspection required.
 ³ ³ See note (1) below.
AAAAAA
Grease boot cracked ³ B,2 ³ Suggest replacement. See note (2).
AAAAAA
Grease boot missing ³ B,2 ³ Suggest replacement. See note (3).
AAAAAA
Grease boot torn ³ B,2 ³ Suggest replacement. See note (4).

(5) Lack of grease seal will allow contaminants to enter joint and will accelerate wear.

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- (6) Torn grease seal will allow contaminants to enter joint and will accelerate wear.
- (7) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.
- (8) Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.
- (9) Check for damaged taper hole.
- (10) Check for damaged stud.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

SHOCK ABSORBERS, STRUT CARTRIDGES, & STRUT ASSEMBLIES

You are not required to replace shocks or struts in axle sets. However, when replacing a shock or strut due to the conditions that follow, you may suggest replacement of the other shock or strut on the same axle for improved performance and preventive maintenance.

- * part is close to the end of its useful life
- * to extend tire life
- * to balance ride and handling
- * to improve stopping distance

When replacing steering and/or suspension components which may affect an alignment angle, you are required to check and adjust alignment as needed. Refer to the OEM specifications.

Under no circumstances should a technician bend struts or strut housings.

A vehicle's load-carrying and handling abilities are limited by its suspension, tires, brakes, and driveline. Installing coil over shocks or any other load assist device does not increase the vehicle's load capacity. See the vehicle owner's manual for more details.

NOTE: If vehicle is equipped with original equipment coil over shocks, apply the conditions for coil springs from the "Springs: Coil, Leaf, and Torsion Bar" section of the Steering and Suspension guidelines. If the vehicle is equipped with add-on coil over shocks, you may suggest replacing the shocks with standard shocks for any spring-related condition.

SHOCK ABSORBERS, STRUT CARTRIDGES, & STRUT ASSEMBLIES

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	3	Code	3	Procedure
Attaching hardware bent	3	B	3	Require repair or replacement of bent part, if available; otherwise, replace shock or strut.
Attaching hardware broken	3	A	3	Require replacement of broken part, if available; otherwise, replace shock or strut.

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching hardware corroded³ A ³ Require replacement of corroded
affecting structural ³ ³ part, if available; otherwise,
integrity ³ ³ replace shock or strut.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching hardware ³ A ³ Require replacement of incorrect
incorrect ³ ³ part, if available; otherwise,
³ ³ replace shock or strut.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching hardware loose ³ A ³ Require repair or replacement of
³ ³ loose part, if available;
³ ³ otherwise, replace shock or strut.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching hardware missing ³ C ³ Require replacement of missing
³ ³ part, if available; otherwise,
³ ³ replace shock or strut.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching hardware threads ³ A ³ Require repair or replacement of
damaged ³ ³ part with damaged threads, if
³ ³ available; otherwise, replace
³ ³ shock or strut.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Attaching hardware threads ³ A ³ Require replacement of part with
stripped (threads missing)³ ³ stripped threads, if available;
³ ³ otherwise, replace shock or strut.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Binding ³ A ³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Body dented ³ A ³ Further inspection required.
³ ³ See note (1) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Body punctured ³ A ³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Brake hose bracket bent ³ B ³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Brake hose bracket missing ³ C ³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Brake hose bracket threads ³ C ³ Require repair or replacement.
damaged ³ ³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Brake hose bracket threads ³ C ³ Require replacement.
stripped (threads missing)³ ³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Compression bumper missing ³ C ³ Require replacement of compression
³ ³ bumper.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Compression bumper split ³ A,1 ³ Suggest replacement of compression
³ ³ bumper.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damping (none) ³ A ³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Dust boot (bellows) split ³ B,2 ³ Suggest replacement of boot.

[illegible]

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Piston rod threads damaged ³ A ³ Require repair or replacement.
Piston rod threads stripped³ A ³ Require replacement.
(threads missing) ³ ³
Seized ³ A ³ Require replacement.
Shock missing ³ C ³ Require replacement.
Strut housing bent ³ A ³ Require replacement.
Strut housing cap (gland ³ A ³ Require replacement of nut and/or
nut) is not removable ³ ³ housing. See note (5) below.
using appropriate tool ³ ³
Strut housing cap (gland ³ A ³ Require repair or replacement of
nut) threads damaged ³ ³ nut.
Strut housing cap (gland ³ A ³ Require replacement of nut.
nut) threads stripped ³ ³
(threads missing) ³ ³
Strut housing severely ³ A ³ Require replacement.
corroded, affecting ³ ³
structural integrity ³ ³
Strut housing threads ³ A ³ Require repair or replacement.
damaged ³ ³
Strut housing threads ³ A ³ Require replacement.
stripped (threads missing)³ ³
Tire cupping ³ A ³ Further inspection required.
³ ³ See note (8) below

NOTE: (1) Require replacement of units where dents restrict shock or
strut piston rod movement. If dents don't restrict movement,
no service is suggested or required. Especially critical on
mono-tube shocks.
(2) This condition can lead to damage of the piston rod, which,
in turn, causes premature piston rod seal wear.
(3) This condition can lead to damage of the piston rod, which
causes piston rod seal wear.
(4) This condition can lead to damage of the piston rod, which,
in turn, causes premature piston rod seal wear.
(5) Only required if replacing cartridge.
(6) Require replacement of units where dents restrict shock or
strut piston rod movement. If dents don't restrict movement,
no service is suggested or required. Especially critical on
mono-tube shocks.
(7) If noise is isolated to shock or strut, suggest replacement.
(8) Although shocks or struts may have contributed to tire

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cupping, an inspection is needed of the entire suspension system. If the shock or strut is found to be contributing to the tire cupping, require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

SPINDLES

SPINDLES

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	³	Code	³	Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware broken	³	A	³	Require replacement of broken part

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware loose	³	A	³	Require repair or replacement of

³ loose part.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware missing	³	C	³	Require replacement of missing

³ part.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware threads	³	A	³	Require repair or replacement of

damaged ³ part with damaged threads.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware threads	³	A	³	Require replacement of part with

stripped (threads missing)³ stripped threads.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Bent	³	B	³	Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Broken	³	A	³	Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Race seat area undersized	³	B	³	Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Scored	³	A	³	Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Threads damaged	³	A	³	Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Threads stripped (threads	³	A	³	Require replacement.

missing)

³ ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

SPRINGS: COIL, LEAF, & TORSION BAR

When springs are replaced, it is suggested, but not required, that both springs on an axle be replaced to maintain equal height from side to side and to provide a balanced ride and proper handling.

When variable rate springs are installed in place of conventional coil springs, they must be installed in axle sets to ensure proper handling, uniform ride, and proper chassis height.

Erroneous height measurements may result from: improper tire inflation, non-standard tire or wheel size, and heavy load in vehicle or trunk.

SPRINGS: COIL, LEAF, & TORSION BAR

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Condition	³	Code	³	Procedure
Attaching hardware bent	³	B	³	Require repair or replacement of bent part.
Attaching hardware broken	³	A	³	Require replacement of broken part.
Attaching hardware corroded affecting structural integrity	³	A	³	Require replacement of corroded part.
Attaching hardware incorrect	³	A	³	Require replacement of incorrect part.
Attaching hardware loose	³	A	³	Require repair or replacement of loose part.
Attaching hardware missing	³	C	³	Require replacement of missing part.
Attaching hardware threads damaged	³	A	³	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	³	A	³	Require replacement of part with stripped threads.
Broken (all springs except secondary leave(s) on multi-leaf springs)	³	A	³	Require replacement.
Coil clash	³		³	Require ride height check. See note (1) below.
Coil spring insulator deteriorated	³	B,2	³	Suggest replacement of insulator.
Coil spring insulator missing	³	B,2	³	Suggest replacement of insulator.
Coil spring insulator split	³	B,2	³	Suggest replacement of insulator.
Coil spring plastic coating deteriorated - rust present	³	A	³	Refer to manufacturer's service requirements. See note (2) below.
Composite spring damaged	³	A	³	Further inspection required. See note (3) below.
Cracked (all springs except composite leaf and	³	A	³	Require replacement.

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secondary leave(s) on	3	3	
multi-leaf springs)	3	3	
AAAAAA			
Installed incorrectly	3	B	3 Require repair.
AAAAAA			
Leaf spring insulators	3	B,2	3 Suggest replacement of insulators.
missing	3	3	
AAAAAA			
Secondary leaf on multi-	3	A,1	3 Suggest repair or replacement
leaf spring broken	3	3	
AAAAAA			
Secondary leaf on multi-	3	A,1	3 Suggest repair or replacement
leaf spring cracked	3	3	
AAAAAA			
Torsion bar adjuster bent	3	A	3 Require repair or replacement of
	3	3	adjuster. See note (4) below.
AAAAAA			
Torsion bar adjuster seized	3	A	3 Require repair or replacement of
	3	3	adjuster. See note (4) below.
AAAAAA			
Torsion bar adjuster	3	A	3 Require repair or replacement of
threads damaged	3	3	part with damaged threads.
	3	3	See note (4) below.
AAAAAA			
Torsion bar adjuster	3	A	3 Require replacement of part with
threads stripped (threads	3	3	stripped threads.
missing)	3	3	
AAAAAA			
Vehicle suspension height	3	B	3 Require adjustment or replacement.
not within OEM specs	3	3	

NOTE: (1) If vehicle is within manufacturer's height specifications,
no service is suggested or required.
(2) Some manufacturers require replacement under these
conditions.
(3) Check vehicle ride height. If ride height is OK, no service
is suggested or required.
(4) Only required if ride height needs to be adjusted.

STEEL POWER STEERING LINES

CAUTION: When replacing steel power steering lines, be sure to use
a replacement product that meets or exceeds OEM design
specifications.

STEEL POWER STEERING LINES

Condition	3	Code	3	Procedure
AAAAAA				
Attaching hardware bent	3	B	3	Require repair or replacement of
	3	3	3	bent part.

Condition	Code	Procedure
Attaching hardware bent	B	Require repair or replacement of bent part.
Attaching hardware broken	A	Require replacement of broken part.
Attaching hardware incorrect	A	Require replacement of incorrect part.

Condition	Code	Procedure
Attaching hardware bent	B	Require repair or replacement of bent part, if available; otherwise, replace steering damper.
Attaching hardware broken	A	Require replacement of broken part, if available; otherwise, replace steering damper.
Attaching hardware corroded affecting structural integrity	A	Require replacement of corroded part, if available; otherwise, replace steering damper.
Attaching hardware incorrect	A	Require replacement of incorrect part, if available; otherwise,

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	3	3	replace steering damper.
Attaching hardware loose	3 A	3	Require repair or replacement of
	3	3	loose part, if available;
	3	3	otherwise, replace steering
	3	3	damper.
Attaching hardware missing	3 C	3	Require replacement of missing
	3	3	part, if available; otherwise,
	3	3	replace steering damper.
Attaching hardware threads	3 A	3	Require repair or replacement of
damaged	3	3	part with damaged threads, if
	3	3	available; otherwise, replace
	3	3	steering damper.
Attaching hardware threads	3 A	3	Require replacement of part with
stripped (threads missing)	3	3	stripped threads, if available;
	3	3	otherwise, replace steering
	3	3	damper.
Binding	3 A	3	Require replacement.
Damper body dented	3 A	3	Further inspection required.
	3	3	See note (1) below.
Damper body punctured	3 A	3	Require replacement.
Damping (none)	3 A	3	Require replacement.
Dust boot (bellows) missing	3 B,2	3	Suggest replacement of boot.
	3	3	See note (2) below.
Dust boot (bellows) split	3 B,2	3	Suggest replacement of boot.
	3	3	See note (2) below.
Dust shield broken	3 B,2	3	Suggest replacement. See note (2).
Dust shield missing	3 B,2	3	Suggest replacement. See note (2).
Leaking oil, enough for	3 A	3	Require replacement.
fluid to be running down	3	3	
the body	3	3	
Loose	3 A	3	Require repair or replacement.
Missing	3 C	3	Require replacement.
Noise	3 B,2	3	Further inspection required.
	3	3	See note (3) below.
Piston rod bent	3 A	3	Require replacement.

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Flex coupler binding	3	A	3	Require repair or replacement of
	3		3	coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Flex coupler loose	3	A	3	Require repair or replacement of
	3		3	coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Flex coupler missing parts	3	A	3	Require repair or replacement of
	3		3	coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Flex coupler soft/spongy	3	A	3	Require replacement of coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Flex coupler torn	3	A	3	Require replacement of coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Fluid contaminated	3	B	3	Require flushing and refilling
	3		3	of the system. See note (1) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Gasket leaking	3	A	3	Require repair or replacement of
	3		3	gasket.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Housing leaking	3	A	3	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Hydraulic fittings leaking	3	A	3	Require repair or replacement of
	3		3	fittings.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Inadequate power assist	3	A	3	Further inspection required.
	3		3	See note (2) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Lash exceeds manufacturer's	3	B	3	Require repair or replacement.
specifications	3		3	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Seal leaking	3	A	3	Require repair or replacement of
	3		3	seal and/or mating part.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Splines damaged	3	A	3	Require repair or replacement of
	3		3	splines.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Splines stripped	3	A	3	Require replacement of splines.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Steering coupler shield	3	B,2	3	Suggest replacement.
cracked	3		3	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Steering coupler shield	3	C	3	Require replacement.
missing	3		3	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Threads damaged	3	A	3	Require repair or replacement of
	3		3	part with damaged threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Threads stripped (threads	3	A	3	Require replacement of part with
missing)	3		3	stripped threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
U-joint binding	3	A	3	Require repair or replacement of
	3		3	joint.

Bellows boot cracked (not ³ B.2 ³ Suggest replacement of bellows

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through) 3 3 boot.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bellows boot missing 3 C 3 Require replacement of bellows
3 3 boot.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bellows boot not sealing 3 A 3 Require repair or replacement of
3 3 bellows boot.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bellows boot torn 3 A 3 Require replacement of bellows
3 3 boot.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bellows boot twisted (from 3 B 3 Require repair.
toe adjustment) 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Fitting leaking 3 A 3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Fitting missing 3 A 3 Require replacement of fitting.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Fitting threads damaged 3 A 3 Require repair or replacement of
3 3 part with damaged threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Fitting threads stripped 3 A 3 Require replacement of part with
(threads missing) 3 3 stripped threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Flex coupler binding 3 A 3 Require repair or replacement of
3 3 coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Flex coupler loose 3 A 3 Require repair or replacement of
3 3 coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Flex coupler missing parts 3 A 3 Require repair or replacement of
3 3 coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Flex coupler soft/spongy 3 A 3 Require replacement of coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Flex coupler torn 3 A 3 Require replacement of coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Fluid contaminated 3 B 3 Require flushing and refilling of
3 3 the system. See note (1) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Gasket leaking 3 A 3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Hard steering on cold 3 A,1 3 Suggest repair or replacement.
start-up 3 3 See note (2) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Housing cracked, affecting 3 B 3 Require replacement.
structural integrity 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Housing leaking 3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Inadequate power assist 3 A 3 Further inspection required.
3 3 See note (3) below.

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Lash exceeds manufacturer's³ B³ Require repair or replacement.
specifications³³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Seal leaking³ A³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Splines damaged³ A³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Splines stripped (splines³ A³ Require replacement.
missing)³³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steel line blocked³ A³ Require repair or replacement of
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA' line.
Steel line leaking³ A³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steel line missing³ C³ Require replacement of line.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steel line restricted³ A³ Require repair or replacement of
³³ line.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steering coupler shield³ B,2³ Suggest replacement.
cracked³³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steering coupler shield³ C³ Require replacement.
missing³³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steering coupler shield³ B,2³ Suggest replacement.
torn³³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Threads damaged³ A³ Require repair or replacement of
³³ part with damaged threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Threads stripped (threads³ A³ Require replacement of part with
missing)³³ stripped threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
U-joint binding³ A³ Require repair or replacement of
³³ joint.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
U-joint loose³ A³ Require repair or replacement of
³³ joint.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Unequal power assist³ A³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
NOTE: (1) Determine and correct source of contamination.
Follow OE specifications for fluid type.
(2) Indicates internal wear.
(3) If steering gear is source of inadequate assist, require
repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

STEERING KNUCKLES

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STEERING KNUCKLES

Condition			3	Code	3	Procedure
Attaching hardware bent			3	B	3	Require repair or replacement of bent part.
Attaching hardware broken			3	A	3	Require replacement of broken part.
Attaching hardware incorrect			3	A	3	Require replacement of incorrect part.
Attaching hardware loose			3	A	3	Require repair or replacement of loose part.
Attaching hardware missing			3	C	3	Require replacement of missing part.
Attaching hardware threads damaged			3	A	3	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)			3	A	3	Require replacement of part with stripped threads.
Bent			3	B	3	Require replacement.
Broken			3	A	3	Require replacement.
Pinch bolt incorrect			3	B	3	Require replacement with bolt that meets OE design.
Pinch bolt loose			3	B	3	Require repair.
Pinch bolt missing			3	B	3	Require replacement.
Pinch bolt tabs deformed (pinched together), .032" or more before clamping			3	B	3	Require replacement. See note (1) below.
Taper hole elongated			3	A	3	Require replacement. See note (2).
Threads damaged			3	A	3	Require repair or replacement.
Threads stripped (threads missing)			3	A	3	Require repair or replacement.

NOTE: (1) Steering knuckle deformation can cause pinch bolt breakage.
(2) Check for damaged stud.

STRIKE OUT BUMPERS

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STRIKE OUT BUMPERS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	³ Code ³	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware broken	³ A ³	Require replacement of broken ³ part.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware corroded	³ A ³	Require replacement of corroded affecting structural ³ part. ³ integrity ³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware loose	³ A ³	Require repair or replacement of ³ loose part.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware missing	³ C ³	Require replacement of missing ³ part.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware threads	³ A ³	Require repair or replacement of damaged ³ part with damaged threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware threads	³ A ³	Require replacement of part with stripped (threads missing) ³ stripped threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Missing	³ C ³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Split	³ A,1 ³	Suggest replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

STRUT RODS

STRUT RODS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	³ Code ³	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Adjusting nut seized	³ A ³	Require repair or replacement. ³ See note (1) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware bent	³ B ³	Require repair or replacement of ³ bent part, if available; ³ otherwise, replace strut rod.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware broken	³ A ³	Require replacement of broken ³ part, if available; otherwise, ³ replace strut rod.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware incorrect	³ A ³	Require replacement of incorrect ³ part, if available; otherwise, ³ replace strut rod.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware loose	³ A ³	Require repair or replacement of ³ loose part, if available;

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	³		³	otherwise, replace strut rod.
Attaching hardware missing	³	C	³	Require replacement of missing
	³		³	part, if available; otherwise,
	³		³	replace strut rod.
Attaching hardware threads	³	A	³	Require repair or replacement of
damaged	³		³	part with damaged threads, if
	³		³	available; otherwise, replace
	³		³	strut rod.
Attaching hardware threads	³	A	³	Require replacement of part with
stripped (threads missing)	³		³	stripped threads, if available;
	³		³	otherwise, replace strut rod.
Attaching (mating) hole	³	A	³	Require repair or replacement of
oversized	³		³	frame.
Attaching point on frame	³	A	³	Require repair of frame.
corroded, affecting	³		³	
structural integrity	³		³	
Bent	³	A	³	Require replacement.
Mating (attaching) hole	³	A	³	Require repair or replacement of
oversized	³		³	frame.
Threads damaged	³	A	³	Require repair or replacement.
Threads stripped (threads	³	A	³	Require replacement.
missing)	³		³	
NOTE: (1) Only required if an alignment is being performed.				

STRUT UPPER BEARING PLATE ASSEMBLIES

NOTE: When the following guidelines indicate replacement of bearing, only the bearing should be replaced if it is available separately; otherwise, replace the bearing plate assembly.

STRUT UPPER BEARING PLATE ASSEMBLIES

Condition	³	Code	³	Procedure
Attaching hardware broken	³	A	³	Require replacement of broken
	³		³	part, if available; otherwise,
	³		³	replace bearing plate assembly.
Attaching hardware loose	³	A	³	Require repair or replacement of
	³		³	loose part, if available;

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	3	3	otherwise, replace bearing plate
	3	3	assembly.
Attaching hardware missing	3 C	3	Require replacement of missing
	3	3	part, if available; otherwise,
	3	3	replace bearing plate assembly.
Attaching hardware threads	3 A	3	Require repair or replacement of
damaged	3	3	part with damaged threads, if
	3	3	available; otherwise, replace
	3	3	bearing plate assembly.
Attaching hardware threads	3 A	3	Require replacement of part with
stripped (threads missing)	3	3	stripped threads, if available;
	3	3	otherwise, replace bearing plate
	3	3	assembly.
Bearing axial or radial	3 B	3	Require replacement of bearing.
movement exceeds vehicle	3	3	
manufacturer's specs	3	3	
Bearing binding	3 A	3	Require replacement of bearing.
Bearing missing	3 C	3	Require replacement of bearing.
Bearing seized	3 A	3	Require replacement of bearing.
Bent	3 B	3	Require replacement.
Holes distorted	3 A	3	Require replacement.
Missing	3 C	3	Require replacement.
Severely corroded,	3 A	3	Require replacement.
affecting structural	3	3	
integrity	3	3	

SWAY BAR LINKS

SWAY BAR LINKS			
Condition	3	Code	3 Procedure
Attaching hardware	3 A	3	Require replacement of incorrect
incorrect	3	3	part, if available; otherwise,
	3	3	replace link.
Attaching hardware loose	3 A	3	Require repair or replacement of
	3	3	loose part, if available;
	3	3	otherwise, replace link.

NOTE: (1) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method

missing)

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TIE ROD ENDS (INNER & OUTER)

TIE ROD ENDS (INNER & OUTER)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	³	Code	³	Procedure
Attaching hardware incorrect	³	A	³	Require replacement of incorrect part, if available; otherwise, replace tie rod end.
Attaching hardware loose	³	A	³	Require repair or replacement of loose part, if available; otherwise, replace tie rod end.
Attaching hardware missing	³	C	³	Require replacement of missing part, if available; otherwise, replace tie rod end.
Attaching hardware threads damaged	³	A	³	Require repair or replacement of part with damaged threads, if available; otherwise, replace tie rod end.
Attaching hardware threads stripped (threads missing)	³	A	³	Require replacement of part with stripped threads, if available; otherwise, replace tie rod end.
Adjusting sleeve bent	³	B	³	Require replacement of sleeve or tie rod end.
Adjusting sleeve clamps out of position	³	B	³	Require repair.
Adjusting sleeve corroded, affecting structural integrity	³	A	³	Require replacement of sleeve or tie rod end.
Adjusting sleeve missing	³	C	³	Require replacement of sleeve or tie rod end.
Adjusting sleeve seized	³	A	³	Require repair or replacement. See note (1) below.
Adjusting sleeve threads damaged	³	A	³	Require repair or replacement of sleeve or tie rod end.
Adjusting sleeve threads stripped (threads missing)	³	A	³	Require replacement of sleeve or tie rod end.
Binding	³	A	³	Further inspection required.

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3 3 See note (2) below.

Grease boot cracked 3 3 Suggest replacement. See note (3).

Grease boot missing 3 3 Suggest replacement. See note (4).

Grease boot torn 3 3 Suggest replacement. See note (5).

Grease fitting broken 3 A 3 Require replacement of grease fitting.

Grease fitting missing 3 C 3 Require replacement of grease fitting.

Grease fitting won't seal 3 A 3 Require replacement of grease fitting.

Grease seal missing 3 B,2 3 Suggest replacement of seal. 3 3 See note (4) below.

Grease seal torn 3 B,2 3 Suggest replacement of seal. 3 3 See note (5) below.

Greaseable tie rod end 3 B,2 3 Suggest replacement of grease will not take grease 3 3 fitting. See note (6) below.

Looseness (perceptible horizontal movement) 3 A,1 3 Suggest replacement. See note (7). 3 3

CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Looseness exceeds manufacturer's specs 3 B 3 Require replacement. 3 3

Looseness that is excessive 3 B 3 Require replacement. See notes (7) 3 3 and (8), caution.

Nut on stud loose 3 A 3 Require repair or replacement of 3 3 nut. See note (9) below.

Seized 3 A 3 Require replacement

Stud bent 3 B 3 Require replacement. See note (10)

Stud broken 3 A 3 Require replacement. See note (10)

Threads damaged 3 A 3 Require repair or replacement.

Threads stripped (threads missing) 3 A 3 Require replacement. See note (10) 3 3

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- NOTE: (1) Only required if toe needs to be adjusted.
(2) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.
(3) Cracked grease boot will allow contaminants to enter joint and will accelerate wear.
(4) Lack of grease boot will allow contaminants to enter joint and will accelerate wear.
(5) Torn grease boot will allow contaminants to enter joint and will accelerate wear.
(6) If greaseable tie rod end will not take grease after replacing the grease fitting, suggest replacement of tie rod end.
(7) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.
(8) Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.
(9) Check for bent stud or damaged taper hole.
(10) Check for damaged taper hole.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

TRACK BARS

TRACK BARS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	3	Code	3	Procedure
Attaching hardware incorrect	3	A	3	Require replacement of incorrect part, if available; otherwise, replace track bar.
Attaching hardware loose	3	A	3	Require repair or replacement of loose part, if available; otherwise, replace track bar.
Attaching hardware missing	3	C	3	Require replacement of missing part, if available; otherwise, replace track bar.
Attaching hardware threads damaged	3	A	3	Require repair or replacement of part with damaged threads, if available; otherwise, replace track bar.
Attaching hardware threads stripped (threads missing)	3	A	3	Require replacement of part with stripped threads, if available; otherwise, replace track bar.
Bent	3	B	3	Require replacement.
Corroded, affecting structural integrity	3	A	3	Require replacement.

TRAILING ARMS

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TRAILING ARMS

Condition			Code	Procedure
Attaching hardware broken			A	Require replacement of broken part, if available; otherwise, replace trailing arm.
Attaching hardware loose			A	Require repair or replacement of loose part, if available; otherwise, replace trailing arm.
Attaching hardware missing			C	Require replacement of missing part, if available; otherwise, replace trailing arm.
Attaching hardware threads damaged			A	Require repair or replacement of part with damaged threads, if available; otherwise, replace trailing arm.
Attaching hardware threads stripped (threads missing)			A	Require replacement of part with stripped threads, if available; otherwise, replace trailing arm.
Bent			B	Require replacement.
Bushings oversized			B	Require replacement.
Corroded, affecting structural integrity			A	Require replacement.
Holes distorted			A	Require replacement.
Threads damaged			A	Require repair or replacement.
Threads stripped (threads missing)			A	Require replacement.

WHEEL ALIGNMENT

WHEEL ALIGNMENT

Wheel alignment is defined as the measurement, analysis, and adjustment of steering and suspension angles to conform to OEM specifications. These angles usually include, but are not limited to: caster, camber, toe, and thrust angle. Where these angles are not adjustable and not in specification, component replacement or correction kits may be required. Errors in set-back and steering axis inclination (SAI) are often attributable to failed or damaged components and must be corrected prior to performing an alignment.

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Failure to replace or correct suggested or required parts or service may prevent a proper alignment.

Before performing an alignment check, inspect and verify the following:

- * Tire pressure and size
- * Vehicle loading
- * Ride height
- * Steering and suspension parts

Only if the inspection reveals that all the above are within published specifications, should a wheel alignment check and an alignment, if needed, be performed.

CAUTION: Under no circumstances should a technician bend or heat any steering or suspension component, unless specified by the vehicle manufacturer, for example, Ford forged twin "I" beam axles. All measurements and suggestions must be noted on the inspection report.

WHEEL ALIGNMENT

Condition			3	Code	3	Procedure
Dog tracking, shown to be						
caused by faulty alignment			3	B,2	3	Suggest repair.
Lead, shown to be caused						
by faulty alignment			3	B	3	Require alignment.
Part has been changed that						
may affect alignment			3	B	3	Require alignment check.
Pull, shown to be caused						
by faulty alignment			3	B	3	Require alignment.
Steering wheel off-center						
			3	B,2	3	Suggest alignment.
Tire wear, shown to be						
caused by faulty alignment			3	B	3	Require alignment.
Wander, shown to be caused						
by faulty alignment			3	B	3	Require alignment.

WHEEL BEARINGS, RACES, & SEALS

NOTE: When replacing or repacking wheel bearings, grease seal replacement is required. You are not required to replace these components in axle sets. Determine the need to replace based upon the individual component conditions that follow.

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1996 Volkswagen Golf

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Thursday, August 19, 1999 11:58PM

WHEEL BEARINGS, RACES, & SEALS

Condition			3	Code	3	Procedure
Rear axle seal on rear-wheel drive leaking			3	A	3	Require replacement of seal and inspection of axle, bearing, housing, and vent tube
Seal bent			3	A,1	3	Suggest replacement.
Seal leaking			3	A	3	Require replacement of seal and inspection of bearings.
Seal missing			3	C	3	Require replacement.
Seal torn			3	A	3	Require replacement.
Wheel bearing assembly feels rough when rotated			3	A	3	Require replacement of bearing assembly.
Wheel bearing balls are pitted			3	A	3	Require replacement of bearing assembly.
Wheel bearing balls are worn			3	A	3	Require replacement of bearing assembly.
Wheel bearing end-play exceeds vehicle manufacturer's specs			3	A	3	Require adjustment of bearing, if possible. If proper adjustment cannot be obtained, require repair or replacement of worn component.
Wheel bearing race is loose in the hub bore			3	A	3	Require replacement of hub assembly and wheel bearings.
Wheel bearing races are pitted			3	A	3	Require replacement of bearing assembly.
Wheel bearing races are worn			3	A	3	Require replacement of bearing assembly.
Wheel bearing rollers are pitted			3	A	3	Require replacement of bearing assembly.
Wheel bearing rollers are worn			3	A	3	Require replacement of bearing assembly.

WHEELS & TIRES

TIRES

WARNING: These guidelines do not apply to split rims.

*** SUSPENSION UNIFORM INSPECTION GUIDELINES ***

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Some vehicle manufacturers restrict replacement of tires to specific brands, types, or sizes.

High pressure temporary compact spare tires should not be used with any other rims or wheels, nor should standard tires, snow tires, wheel covers, or trim rings be used with high pressure compact spare rims or wheels.

Attempting to mount a tire of one diameter on a wheel of a different diameter or flange type may result in serious injury or death.

Only specially trained persons should de-mount or mount tires. Explosions of tire and wheel assembly can result from improper mounting, possibly causing serious injury or death.

Consult the vehicle owner's manual or vehicle placard for correct size, speed rating, designation, and cold inflation pressure of the original tires. DO NOT exceed the maximum load or inflation capacity of the tire specified by the Tire and Rim Association

When replacing tires, it is suggested that the replacement tires match or exceed the OEM speed rating designation. If tires of different speed rating designations are mixed on the same vehicle, the tires may vary in handling characteristics. DO NOT mix different speed rating designations on the same axle.

DO NOT mix radials with non-radial tires on the same axle, as this may affect vehicle handling and stability. If radial tires and bias or bias-belted ply tires are mixed on the same vehicle, the radials must be on the rear. High-pressure temporary compact spare tires are exempt from this rule.

DO NOT mix size or type (all season, performance, mud and snow) of tires on the same axle.

TIRES

Condition	³	Code ³	Procedure
Air pressure incorrect	³	B	³ Require repair
Bead broken	³	A	³ Require replacement.
Bead leaking, caused by tire	³	A	³ Require repair or replacement.
Bead wire/cord exposed	³	A	³ Require replacement.
Cord or belt material exposed	³	A	³ Require replacement.
Cord ply separations	³	A	³ Require replacement.
Directional/asymmetrical tires mounted incorrectly	³	B	³ Require remounting and/or repositioning.
Irregular tread wear, affecting performance	³	A	³ Suggest replacement.
	³		³ See note (1) below.

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Load ratings less than OEM specifications 3 B 3 Require replacement.

Mixed tire size designations on same axle 3 A 3 Require rotation or replacement.

Mixed tread types (all season, performance, mud and snow) on same axle 3 A 3 Require rotation or replacement.

Number of punctures exceeds manufacturer's limit 3 B 3 Require replacement.

Out of balance 3 B 3 Require rebalance of tire/wheel assembly.

Ply separation 3 A 3 Require replacement.

Pull or lead, caused by tire 3 A 3 Require rotation or replacement.

Radial and bias or bias-belted ply tires on same axle 3 B 3 Require rotation or replacement.

Radials are on the front and not on the rear 3 B 3 Require rotation or replacement. See note (2).

Run flat damage 3 A 3 Require replacement.

Shoulder cut 3 A 3 Require replacement.

Shoulder puncture 3 A 3 Require replacement.

Shoulder with plug 3 A 3 Require replacement.

Sidewall bulge 3 A 3 Require replacement.

Sidewall cut 3 A 3 Require replacement.

Sidewall indentation 3 3 No service required/suggested.

Sidewall puncture 3 A 3 Require replacement.

Sidewall with plug 3 A 3 Require replacement.

Speed rating designations different on same axle 3 B 3 Suggest rotation or replacement.

Tire and wheel assembly has excessive run-out 3 B 3 Require repair or replacement of appropriate part. See note (3) below.

Condition	Code	Procedure
Bent	A,1	Suggest replacement.
Broken	A	Require replacement.
Cut, but not leaking	A,1	Suggest replacement.
Deteriorated (cracking, dry rot)	A,1	Suggest replacement.

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Leaking	³ A	³ Require repair/replacement.
Missing	³ C	³ Require replacement.
Threads damaged	³ A	³ Require repair/replacement.
Threads stripped (threads missing)	³ A	³ Require replacement.
Valve cap missing	³ C	³ Require replacement of cap.
Weather-checking	³ A,1	³ Suggest replacement.
Won't take air	³ A	³ Require repair/replacement.

WHEEL ATTACHMENT HARDWARE

For conditions noted below, also check conditions of wheel stud holes.

CAUTION: Proper lug nut torque is essential. Follow manufacturer's torque specifications and tightening sequence. DO NOT lubricate threads unless specified by the vehicle manufacturer.

WHEEL ATTACHMENT HARDWARE

Condition	³ Code	³ Procedure
Bent	³ A	³ Require replacement.
Broken	³ A	³ Require replacement.
	³	³ See note (1) below.
Loose	³ B	³ Require repair or replacement of affected component.
Lug nut installed backward	³ B	³ Require repair.
Lug nut mating type incorrect	³ B	³ Require replacement of nut.
Lug nut mating surface dished	³ A	³ Require replacement of nut.
Lug nut flats rounded	³ A	³ Require replacement of nut.
	³	³ See note (2) below.
Lug nut seized	³ A	³ Require replacement of nut and/or stud. See note (2) below.
Stud incorrect	³ B	³ Require replacement of stud.
Threads damaged	³ A	³ Require repair or replacement of

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3 3 component with damaged threads.
Threads stripped (threads 3 A 3 Require replacement of
missing) 3 3 component with stripped threads.

NOTE: (1) Some manufacturers require replacement of all studs on that
wheel if two or more studs or nuts on the same wheel are
broken or missing.

(2) Only required if removing wheel.

WHEELS

WARNING: Mounting a regular tire on a high-pressure compact spare
wheel is not permitted. Attempting to mount a tire of one
diameter on a wheel of a different diameter or flange type
may result in serious injury or death. If the wheel
identification stamp is not legible, or cannot be found,
DO NOT use the wheel until the size and type have been
properly identified. Wheels of different diameter, offset,
or width cannot be mixed on the same axle. Bead seat tapers
cannot be interchanged.

WHEELS

Condition	3	Code	3	Procedure
Bead leaking, caused by wheel rim flange	3	A	3	Require repair or replacement. See caution below.
CAUTION: DO NOT attempt to correct a bent wheel rim.				
Bent wheel hub mounting surface	3	A	3	Require replacement.
Bent wheel rim, causing vibration	3	B,2	3	Suggest replacement. See caution above.
Broken	3	A	3	Require replacement.
Cast wheel porous, causing a leak	3	A	3	Require repair or replacement.
Clip-on balance weight is incorrect type for wheel rim flange	3	B,2	3	Suggest replacement.
Corrosion, affecting structural integrity	3	A	3	Require replacement.
Corrosion build-up on wheel hub mounting surface	3	A	3	Require repair.

END OF ARTICLE

STEERING SYSTEM - POWER RACK & PINION

Article Text

1996 Volkswagen Golf

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ARTICLE BEGINNING

1995-96 STEERING

Volkswagen - Power Rack & Pinion

Golf III

DESCRIPTION & OPERATION

System consists of a vane pump, rack and pinion steering gear, and an oil reservoir. Vane pump draws fluid from reservoir and supplies it to flow control valve. Control valve directs fluid to appropriate side of rack piston.

LUBRICATION

CAPACITY

Fluid capacity is about 1 qt. (.95L).

FLUID TYPE

Recommended fluid type is VW Hydraulic Oil No. G 002 000.

FLUID LEVEL CHECK

Remove reservoir cover. Start engine and let it idle. Fluid level should be between MIN and MAX marks on reservoir.

HYDRAULIC SYSTEM BLEEDING

1) Start engine and let it idle. Fill fluid reservoir to MAX mark. Turn steering wheel left and right several times to bring fluid to normal operating temperature.

CAUTION: DO NOT hold steering wheel to left or right lock for longer than 5 seconds, or oil pump damage may occur.

2) Add fluid to MAX mark as needed during bleeding procedure. Turn steering wheel from lock to lock. Repeat procedure until air bubbles are no longer present in fluid and fluid level stabilizes. Shut off engine.

ADJUSTMENTS

POWER STEERING PUMP BELT

NOTE: VR6 engines are equipped with a serpentine belt which is automatically adjusted by tensioner.

4-Cylinder

STEERING SYSTEM - POWER RACK & PINION

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Loosen nuts on pump mounting bracket. Turn adjuster bolt until belt deflection is 62 INCH lbs. (7 N.m) on new belt, or 35 INCH lbs. (4 N.m) on used belt.

TESTING

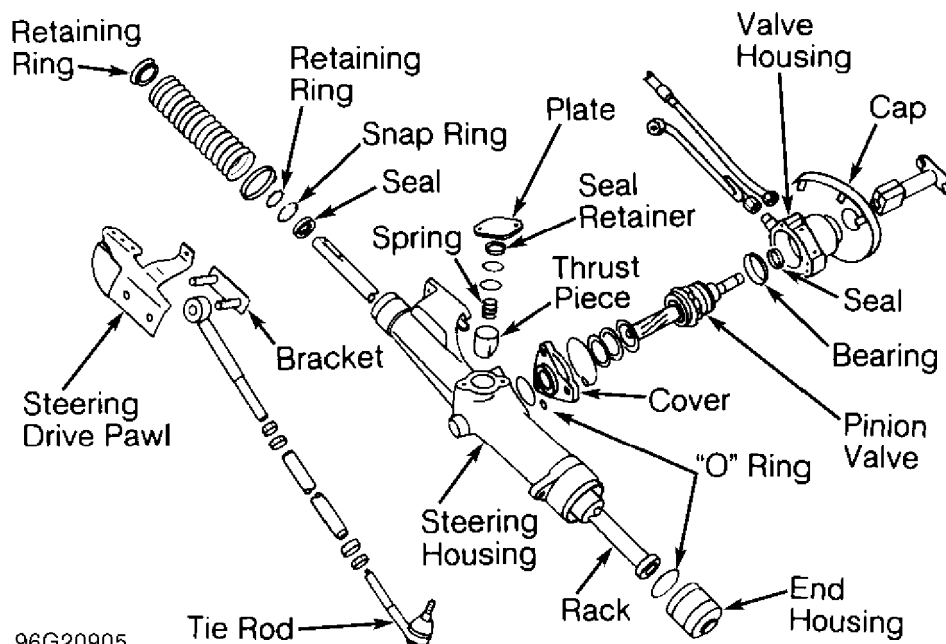
HYDRAULIC SYSTEM INSPECTION

Ensure fluid level is okay. See FLUID LEVEL CHECK under LUBRICATION. Check power steering pump belt condition and adjustment. See POWER STEERING PUMP BELT under ADJUSTMENTS. Ensure hoses are not kinked or leaking.

PUMP PRESSURE TEST

1) Install Pressure Gauge (US 1074 B) between pressure hose and pressure line of valve housing. See Fig. 1. Start engine and let it idle.

2) Close pressure gauge valve. Leave valve closed for no longer than 5 seconds. Pressure should be 85-95 bar (1232-1378 psi). If pump pressure is not within specification, replace pump.



96G20905
Fig. 1: Identifying Power Rack & Pinion Components (Typical)
Courtesy of Volkswagen United States, Inc.

STEERING GEAR INSPECTION

Remove rack and pinion assembly. See POWER RACK & PINION under REMOVAL & INSTALLATION. Loosen lock nut. Turn adjuster bolt until pinion shaft can be turned by hand without binding. Hold adjuster bolt in position while tightening lock nut.

STEERING SYSTEM - POWER RACK & PINION

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REMOVAL & INSTALLATION

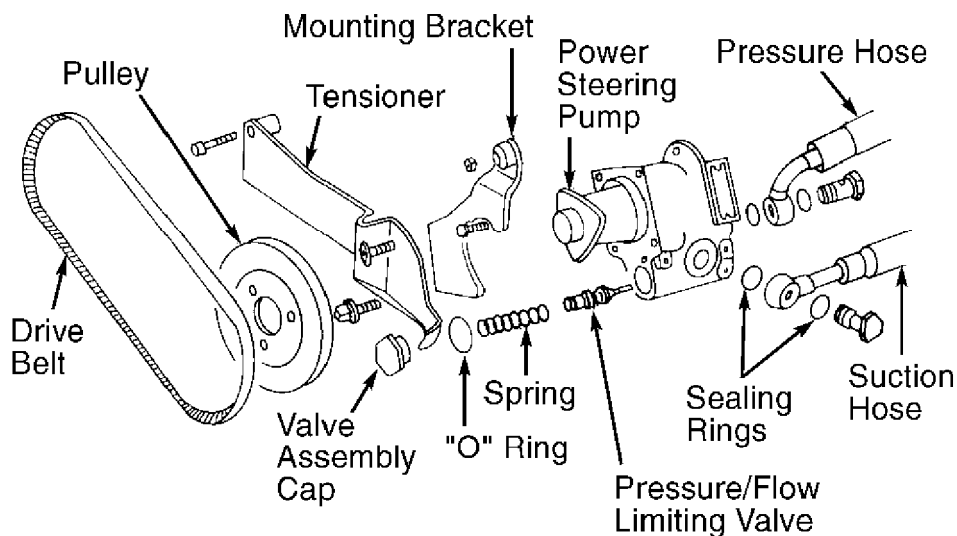
POWER STEERING PUMP

Removal

Remove generator and pump belts. Disconnect hydraulic lines from pump. Cap lines to prevent contamination. Remove bracket bolts. Remove pump. See Fig. 2.

Installation

To install, reverse removal procedure. Adjust belt tension. See POWER STEERING PUMP BELT under ADJUSTMENTS. Tighten nuts and bolts to specification. See TORQUE SPECIFICATIONS. Fill and bleed hydraulic system. See HYDRAULIC SYSTEM BLEEDING under LUBRICATION. Start engine and check for leaks.



NOTE: Always replace sealing rings & self-locking nuts.

96L20907

Fig. 2: Identifying Power Steering Pump Components (Typical)
Courtesy of Volkswagen United States, Inc.

POWER RACK & PINION

NOTE: Refer to illustration for exploded view of power rack and pinion components. See Fig. 1.

Removal

- 1) Disconnect return line from pump. Drain fluid from pump and line. Disconnect tie rod ends from steering knuckles.
- 2) Support engine and transmission with Engine Support (10-222A and 10-222A/1 on 4-cylinder engine, or 10-222A and 10-222A/3 on VR6 engine). Remove steering gear boot. Remove transmission mount bolts.
- 3) Disconnect hydraulic lines from steering gear. Plug openings. Remove steering gear nuts. Remove steering gear. Lower

STEERING SYSTEM - POWER RACK & PINION

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engine/transmission sufficiently to separate steering shaft halves.

Installation

To install, reverse removal procedure. Tighten nuts and bolts to specification. See TORQUE SPECIFICATIONS. Fill and bleed hydraulic system. See HYDRAULIC SYSTEM BLEEDING. Check wheel alignment. See WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT section.

OVERHAUL

Manufacturer recommends that power steering pump and steering gear be replaced, rather than be repaired.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application		Ft. Lbs. (N.m)
Lower Valve Body Nut		
4-Cyl.	22	(30)
VR6	30	(40)
Power Steering Pump		
Banjo Bolt		
4-Cyl.	26	(35)
VR6	22	(30)
Mounting Bolt		
4-Cyl.	15	(20)
VR6	18	(25)
Pressure Line Fitting	22	(30)
Steering Gear		
Adjusting Plug	44	(60)
Bracket/Bushing Clamp Nut	22	(30)
Tie Rod Lock Nut	42	(55)
Tie Rod-To-Steering Arm Nut	52	(70)

END OF ARTICLE

STEERING COLUMN

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ARTICLE BEGINNING

1995-96 STEERING

Volkswagen - Steering Columns

Golf III

WARNING: All models are equipped with a Supplemental Restraint System (SRS) that includes an air bag located in steering wheel. Use caution when working around steering column. Ensure battery is disconnected before attempting any repair. DO NOT apply electrical power to any component on steering column without disconnecting air bag module (air bag could deploy).

NOTE: For information on air bag DIAGNOSIS & TESTING or DISPOSAL PROCEDURES, see appropriate AIR BAG RESTRAINT SYSTEM article in ACCESSORIES/SAFETY EQUIPMENT section:

- * AIR BAG RESTRAINT SYSTEM - 1995
- * AIR BAG RESTRAINT SYSTEM - 1996

DESCRIPTION

Steering column shaft is held together by a nylon button. During an accident, the nylon button shears and upper part of shaft slides down over lower part of shaft. This allows SRS to maintain proper alignment during inflation while absorbing impact of collision.

DISABLING & ACTIVATING AIR BAG SYSTEM

To disable air bag system, disconnect and isolate negative battery cable. No waiting time is necessary before working on vehicle. To activate system, turn ignition switch to ON position and exit vehicle. Reconnect negative battery cable. Perform a system operational check to ensure proper system operation. See SYSTEM OPERATION CHECK.

SERVICE PRECAUTIONS

Observe these precautions when working with air bag systems:

- * Disable air bag system before servicing any air bag system or steering column component. See DISABLING & ACTIVATING AIR BAG SYSTEM.
- * Because of critical operating requirements of system, DO NOT attempt to service any air bag system component.
- * Air bag parts should not be left unattended. They should be installed in vehicle immediately after removing them from their packaging.
- * Air bag components which have been dropped onto a hard surface should not be used.

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- * Chemical cleaners, oil and grease should not contact vinyl covering on air bag module.
- * Always disable air bag system before performing electric welding on vehicle.
- * Air bag system can only be tested using Diagnostic Tester (VAG 1551). Never use test light on air bag system.

SYSTEM OPERATION CHECK

An air bag light is located on left side of instrument cluster. Air bag light is used to indicate readiness of system. Light glows when ignition switch is on or engine is started. Light should stay on about 3 seconds while air bag control unit performs an electronic test of system.

If air bag light does not glow when ignition is on or does not go out after 3 seconds, a fault probably exists in system. If a fault occurs while ignition is on, it is stored in fault memory. Warning light will then glow and air bag system will be switched off. If warning light glows or flickers while driving, air bag system should be tested. See DIAGNOSIS & TESTING in appropriate AIR BAG RESTRAINT SYSTEM article in ACCESSORIES/SAFETY EQUIPMENT section.

- * AIR BAG RESTRAINT SYSTEM - 1995
- * AIR BAG RESTRAINT SYSTEM - 1996

ADJUSTMENTS

AIR BAG SPIRAL SPRING

To center spiral spring assembly, turn spring assembly 3 turns from stop in either direction.

REMOVAL & INSTALLATION

WARNING: Failure to follow air bag service precautions may result in air bag deployment and personal injury. See SERVICE PRECAUTIONS. After component replacement, perform a system operational check to ensure proper system operation. See SYSTEM OPERATION CHECK.

AIR BAG MODULE

Removal

1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Air bag module is located in steering wheel. See Fig. 1. Remove air bag module Torx head screws from rear of steering wheel. Lift off air bag module from steering wheel, and tilt air bag module downward. Disconnect air bag module connector.

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Installation

To install, reverse removal procedure. Tighten air bag module retaining screws to specification. See TORQUE SPECIFICATIONS. Reactivate air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Check air bag indicator lights to ensure system is functioning properly. See SYSTEM OPERATION CHECK.

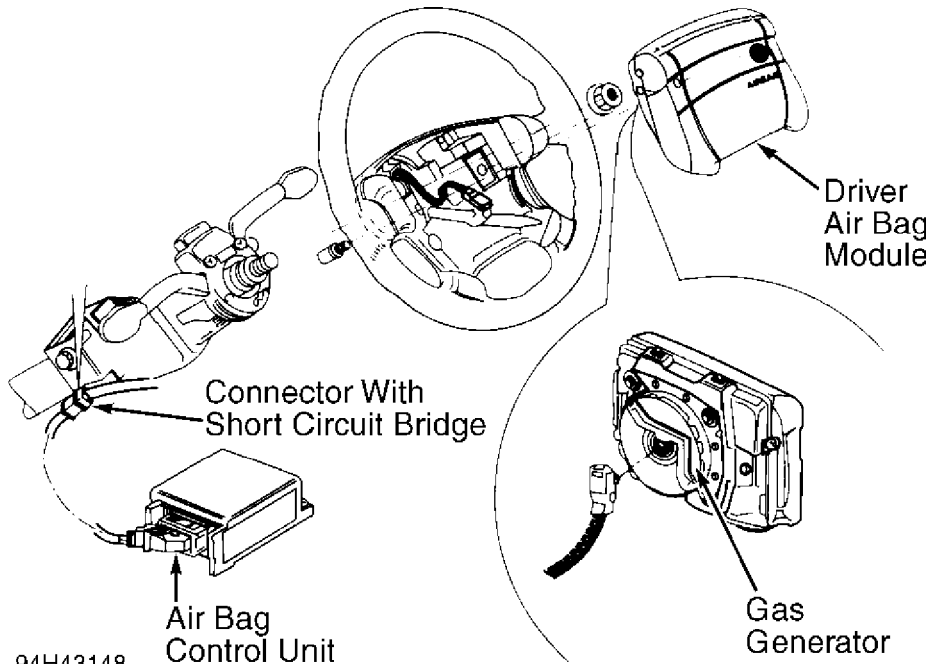


Fig. 1: Exploded View Of SRS Components
Courtesy of Volkswagen of United States, Inc.

IGNITION SWITCH

Removal & Installation

- 1) Remove steering wheel. See STEERING WHEEL. Remove lower cover from steering column.
- 2) Remove turn signal and windshield wiper switches. See TURN SIGNAL SWITCH and WINDSHIELD WIPER SWITCH. Remove lock washer, spring and horn contact ring. Remove steering column tube-to-steering column housing bolt.
- 3) Disconnect ignition switch connector. Unlock steering with ignition key. Remove steering column housing, ignition lock and upper half of steering column switch cover. Remove and ignition switch screw and ignition switch. To install ignition switch, reverse removal procedure.

SPIRAL SPRING

Removal

- 1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.
- 2) Remove air bag module. See AIR BAG MODULE. Remove steering

STEERING COLUMN

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wheel. See STEERING WHEEL. Remove knee bar panel and steering column lower trim. Disconnect 2-pin connector at base of steering column. Remove 3 spiral spring screws, and remove spiral spring. See Fig. 2.

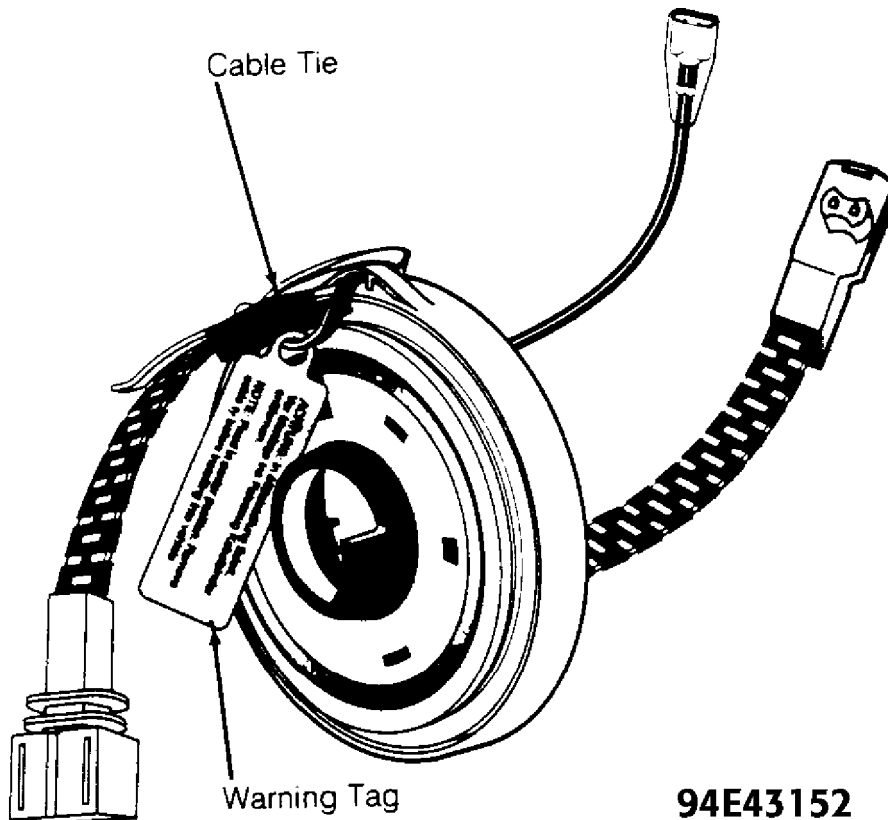


Fig. 2: Installing Spiral Spring
Courtesy of Volkswagen of United States, Inc.

Installation

- 1) New spiral spring assemblies have a cable tie which locks assembly in its centered position. Cable tie must be removed before installing new spring assembly.
- 2) If a spiral spring assembly is reinstalled, it must be centered. To center, turn spring assembly 4 turns from stop, in either direction.
- 3) To install spiral spring assembly, reverse removal procedure. Reactivate air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Check air bag indicator lights to ensure system is functioning properly. See SYSTEM OPERATION CHECK.

STEERING COLUMN

WARNING: Remove air bag from vehicle before working on steering column. See AIR BAG MODULE. Failure to remove air bag may result in personal injury.

NOTE: Refer to appropriate illustration for exploded view of steering column. See Fig. 3 or 4.

STEERING COLUMN

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Removal

1) Disconnect negative battery cable. Remove steering wheel. See STEERING WHEEL. Remove bolt and screw from switch housing recess. Tilt switch unit toward instrument panel. Pry spacer sleeve from column.

2) Pull up combination switch to disconnect connector. Remove combination switch. Disconnect steering shaft from "U" joint shaft. Disconnect brake pedal push rod.

3) Disconnect clutch cable from clutch pedal (if equipped). Remove steering column bolts under instrument panel. Drill out shear bolts. Remove column assembly from vehicle.

Installation

To install, reverse removal procedure. Place wheels in straight-ahead position. Tighten pinch bolt. Install spacer. Install combination switch and steering wheel. Adjust brake pedal and clutch pedal height.

STEERING WHEEL

CAUTION: Applying excessive pressure or causing impact to mainshaft during service may cause the column to disengage.

Removal

1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Turn front wheels to straight-ahead position. Remove air bag module. See AIR BAG MODULE. Remove steering wheel nut and spring washer. Mark steering wheel and shaft for reassembly reference. Remove steering wheel.

Installation

To install, reverse removal procedure. Tighten steering wheel nut to specification. See TORQUE SPECIFICATIONS. Reactivate air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Check air bag indicator lights to ensure system is functioning properly. See SYSTEM OPERATION CHECK.

TURN SIGNAL SWITCH

Removal & Installation

Remove steering wheel. See STEERING WHEEL. Disconnect turn signal switch connector. Remove turn signal switch. To install, reverse removal procedure.

WINDSHIELD WIPER SWITCH

Removal & Installation

Remove steering wheel. See STEERING WHEEL. Remove turn signal switch. See TURN SIGNAL SWITCH. Disconnect windshield wiper switch

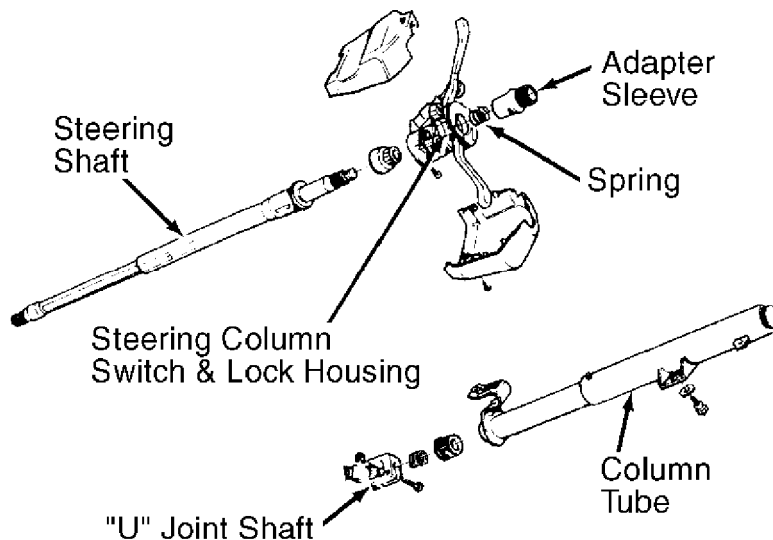
STEERING COLUMN
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connector. Remove windshield wiper switch. To install, reverse removal procedure.

OVERHAUL

STEERING COLUMN

NOTE: Refer to appropriate illustration for exploded view of steering column. See Fig. 3.



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Fig. 3: Exploded View Of Steering Column
Courtesy of Volkswagen United States, Inc.

Disassembly

Press steering shaft (column) from column tube. Remove bearings from steering shaft.

Inspection

Check upper bracket for damage and upper bearing for smooth rotation. Check shafts for signs of bending, damaged splines, or damaged "U" joints. Check column tube for bending or other damage. Repair or replace components as necessary.

Reassembly

Press in steering shaft and new bearings. DO NOT use more than 200 lbs. (90 kg) force to press shaft and bearings into column tube.

"U" JOINT SHAFT

Disassembly

1) Remove lower "U" joint shaft-to-steering gear pinion shaft pinch bolt. Separate manual gearshift linkage from steering box (if equipped). Remove steering gear nuts.

STEERING COLUMN

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2) Pull box down to separate from lower "U" joint. Remove rubber boot from lower "U" joint. Remove upper "U" joint pinch bolt. Pull down joint and remove shaft with "U" joints.

Inspection

Inspect "U" joints for wear or excessive play. If abnormal wear or play exists, replace as necessary.

Reassembly

1) Fit "U" joint to steering shaft. Align steering shaft notch with lower "U" joint slot. Install boot and damping grommet. Fit steering box to frame while guiding pinion shaft into lower "U" joint.

2) Hand-tighten steering gear retaining nuts. Place wheels in straight-ahead position. Align steering shaft (column) and "U" joint. Tighten pinch bolt. Tighten steering gear nuts. Connect gearshift linkage. Check linkage for smooth operation.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application	Ft. Lbs. (N.m)

Pinch Bolt	22 (30)

Shear Bolt	(1)

Steering Column-To-Instrument Panel Bolt	16 (22)

Steering Gear Nut	22 (30)

Steering Wheel Nut	37 (50)

INCH Lbs. (N.m)

Air Bag Module-To-Steering Wheel Screws	57 (6.5)

(1) - Tighten until bolt head snaps off.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

END OF ARTICLE

*** STEERING UNIFORM INSPECTION GUIDELINES ***

Article Text

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ARTICLE BEGINNING

GENERAL INFORMATION

Steering & Suspension Systems - (Including Wheels & Tires)

All Makes & Models

Updated: January, 1997

MAP UNIFORM INSPECTION GENERAL GUIDELINES

OVERVIEW OF MOTORIST ASSURANCE PROGRAM

The Motorist Assurance Program (MAP) is the consumer outreach effort of the Automotive Maintenance and Repair Association, Inc. (AMRA). Participation in the Motorist Assurance Program is drawn from retailers, suppliers, independent repair facilities, vehicle manufacturers and industry associations.

The Motorist Assurance Program was established as an industry-wide effort to address concerns raised by regulators, the media and consumers questioning our ethics and methods of doing business. The automotive repair industry had been bombarded by months of negative stories in the media and scrutiny from state and federal regulators who focused on how the need for repairs is determined. MAP was formed as an industry response to this issue.

Our mission is to strengthen the relationship between the consumer and the auto repair industry. We produce materials that give motorists the information and encouragement to take responsibility for their vehicles - through proper, manufacturer-recommended, maintenance. We encourage participating service and repair shops (including franchisees and dealers) to adopt a Pledge to their Customers and the Motorist Assurance Program developed Standards of Service. All participating service providers have agreed to subscribe to this Pledge and to adhere to the promulgated Standards of Service which demonstrates to their customers that they are serious about customer satisfaction.

These Standards of Service require that an inspection of the vehicle's (problem) system be made according to industry guidelines. After learning that neither the car manufacturers nor any other source had complete guidelines, leading industry organizations, along with other industry participants banded together to address this challenging task. During the past two and a half years, they successfully developed industry inspection guidelines for the following systems: Exhaust, Brakes, ABS, Steering and Suspension, Engine Maintenance and Performance, HVAC, and Electrical systems. Guidelines for Drive Train and Transmission are currently being promulgated. Revisions to the inspection guidelines for Exhaust, Brakes/ABS and Steering and Suspension Systems, which were issued two years ago, are now being published for implementation beginning spring 1997. Participating shops utilize these Uniform Inspection Guidelines as part of the inspection process and for communicating their findings

*** STEERING UNIFORM INSPECTION GUIDELINES ***

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1996 Volkswagen Golf

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to their customers.

The Motorist Assurance Program continues to work cooperatively and proactively with government agencies and consumer groups toward solutions that both benefit the customer and are mutually acceptable to both regulators and industry. We maintain the belief that industry must retain control over how we conduct our business, and we must be viewed as part of the solution and not part of the problem. Meetings with state and other government officials concerned with auto repair and/or consumer protection are conducted. Feedback from these representatives are brought back to members, and the program adjusted as needed.

To assure auto repair customers recourse if they were not satisfied with a repair transaction, the Motorist Assurance Program offers arbitration through MAP/BBB-CARE in cooperation with the Council of Better Business Bureaus and individual participating Bureaus. MAP "piloted" in Indianapolis and Pittsburgh during spring, 1996 - and publicized "roll-outs" in New Jersey, Detroit (MI), Chicago (IL) and Richmond (VA) were conducted. To put some "teeth" in the program, and accreditation requirement for shops was initiated. The requirements are stringent and a self-policing method has been incorporated which includes the "mystery shopping" of outlets. In addition, a committee of service providers had been working diligently developing standards for newspaper, television and Internet advertising.

We welcome you to join us as we continue our outreach ... with your support, both the automotive repair industry and your customers will reap the benefits. Please visit MAP at our Internet site: www.hunter.com/map.htm or contact us at:

808 17th Street, NW Suite 200
Washington, D.C. 20006
Ph. (202) 466-7050 Fax (202) 223-9569

OVERVIEW OF SERVICE REQUIREMENTS & SUGGESTIONS

It is MAP policy that all exhaust, brake, ABS, steering and suspension, wheel alignment, tires and wheels, driveline, engine performance and maintenance and heating, ventilation and air conditioning services be offered and performed under the guidelines and procedures specified in these sections.

Before any service is performed on a vehicle, an inspection of the appropriate system must be performed. The results of this inspection must be explained to the customer and documented on an inspection form. The condition of the vehicle and its components will indicate what services/part replacements may be required or suggested. In addition, suggestions may be made to satisfy the needs expressed by the customer.

This section lists the various parts and conditions that indicate required or suggested service or part replacement. Although this list is extensive, it is not inclusive. In addition to this list, a technician may make a suggestion. This suggestion must be based on substantial and informed experience or the vehicle manufacturer's

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recommended service interval.

Some conditions indicate that service or part replacement is required because the part in question is no longer providing the function for which it is intended, does not meet a vehicle manufacturer's design specification or is missing.

- * Example: An exhaust pipe has corroded severely and has a hole in it through which exhaust gases are leaking. Replacement of the exhaust pipe in this case is required due to functional failure.
- * Example: A brake rotor has been worn to the point where it measures less than the vehicle manufacturer's specifications. Replacement of the rotor is required because it does not meet design specifications.

Some conditions indicate that a service or part replacement is suggested because the part is close to the end of its useful life or to address a customer's need, convenience or request. If a customer's vehicle has one of these conditions, the procedure may only be to suggest service.

- * Example: An exhaust pipe is rusted, corroded or weak, but no leaks are present. In this case, the exhaust pipe has not failed. However, there is evidence that the pipe may need replacement in the near future. Replacement of the pipe may be suggested for the customer's convenience in avoiding a future problem.
- * Example: The customer desires improved ride and/or handling, but the vehicle's shocks or struts have not failed. In this case, replacement may be suggested to satisfy the customer's wishes. In this case, replacement of the shocks or struts may not be sold as a requirement.

A customer, of course, has the choice of whether or not a shop will service his or her vehicle. He or she may decide not to follow some of your suggestions. When a customer declines to authorize a service or repair indicated in the MAP Uniform Inspection Guidelines as "required," a MAP shop may refuse service on that system, if proceeding with the work could create or continue an unsafe or unsatisfactory condition.

The following reasons may be used for required and suggested services. These codes are shown in the "Code" column of the Uniform Inspection Guidelines that follow.

PART REPLACEMENT CODE IDENTIFICATION

NOTE: Refer to the following tables for definitions of the codes listed in the condition/procedure tables for the specific components that may need to be replaced.

NOTE: When replacing steering and/or suspension components which may affect an alignment angle, you are required to check and

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adjust alignment as needed. Refer to the OEM specifications.

CAUTION: DO NOT use ride height altering or load compensating components, such as variable rate springs and coil over shocks, on vehicles with height or load sensing proportioning valve-equipped braking systems, unless these components are original equipment.

AIR RIDE SUSPENSION

NOTE: Depending on the air suspension design, there are some aftermarket products available to eliminate the air ride suspension on certain vehicles. If the system has been eliminated with one of these products, then no service is suggested or required.

AIR RIDE SUSPENSION - AIR SHOCKS & AIR STRUTS

NOTE: This section covers the air spring portion of the air shock or strut. For dampening portion of shock or strut conditions and procedures, refer to the "Shock Absorbers, Strut Cartridges, and Strut Assemblies" section.

AIR RIDE SUSPENSION - AIR SHOCKS & AIR STRUTS

Condition			3	Code	3	Procedure
Inner fabric of air bag			3	A	3	Require replacement.
damaged			3		3	
Leaking			3	A	3	Require repair or replacement.
Outer covering of air bag			3	A,1	3	Suggest replacement.
is cracked to the extent			3		3	
that inner fabric of air			3		3	
bag is visible			3		3	

AIR RIDE SUSPENSION - AIR SPRING VALVES

AIR RIDE SUSPENSION - AIR SPRING VALVES

Condition			3	Code	3	Procedure
Attaching hardware			3	A	3	Require replacement of incorrect
incorrect			3		3	part.
Attaching hardware loose			3	A	3	Require repair or replacement of
			3		3	loose part.
Attaching hardware missing			3	C	3	Require replacement of missing
			3		3	part.

Condition	Code	Procedure
Attaching hardware broken	A	Require replacement of broken part.
Attaching hardware incorrect	A	Require replacement of incorrect part.
Attaching hardware loose	A	Require repair or replacement of loose part.
Attaching hardware missing	C	Require replacement of missing part.
Attaching hardware threads damaged	A	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	A	Require replacement of part with stripped threads.
Collar cracked	A	Require replacement.
End cap cracked	A	Require replacement.
Inner fabric of bag damaged	A	Require replacement.

Condition	Code	Procedure
Attaching hardware bent	B	Require repair or replacement of bent part.
Attaching hardware broken	A	Require replacement of broken part.
Attaching hardware loose	A	Require repair or replacement of loose part.
Attaching hardware missing	C	Require replacement of missing part.
Attaching hardware threads damaged	A	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	A	Require replacement of part with stripped threads.
Connector bent	A	Require repair or replacement.
Connector broken	A	Require replacement.
Connector loose	A	Require repair or replacement.
Does not build pressure	A	Further inspection required. See note (1) below.
Excessive run time	B	Further inspection required. See note (2) below.
Inoperative	A	Require replacement.
Leaking	A	Require repair or replacement.
Missing	C	Require replacement.

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Condition	³ Code	³ Procedure
Broken	³ A	³ Require replacement.
Missing	³ C	³ Require replacement.
Output signal incorrect	³ A	³ Require replacement.

AIR RIDE SUSPENSION - TORSION SPRINGS (COUNTER BALANCING)

Condition	³ Code	³ Procedure
Attaching hardware bent	³ B	³ Require repair or replacement of bent part.
Attaching hardware broken	³ A	³ Require replacement of broken part.
Attaching hardware incorrect	³ A	³ Require replacement of incorrect part.
Attaching hardware loose	³ A	³ Require repair or replacement of loose part.
Attaching hardware missing	³ C	³ Require replacement of missing part.
Attaching hardware threads damaged	³ A	³ Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	³ A	³ Require replacement of part with stripped threads.
Broken	³ A	³ Require replacement.
Missing	³ C	³ Require replacement.

AIR RIDE SUSPENSION - TUBING

Condition	³ Code	³ Procedure
Attaching hardware incorrect	³ A	³ Require replacement of incorrect part.
Attaching hardware loose	³ A	³ Require repair or replacement of

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3 3 loose part.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware missing 3 C 3 Require replacement of missing
3 3 part.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Blocked 3 A 3 Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Fitting incorrect 3 B 3 Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking 3 A 3 Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Line type incorrect 3 B 3 Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Missing 3 C 3 Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Restricted 3 A 3 Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Routed incorrectly 3 B 3 Require routing correction.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AIR RIDE SUSPENSION - WARNING LAMPS

AIR RIDE SUSPENSION - WARNING LAMPS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition 3 Code 3 Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Bulb burned out 3 A 3 Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Warning light does not come 3 3

on during bulb check 3 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Warning light flashes 3 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Warning light is intermittent 3 3 Further inspection required to

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Warning light stays on after 3 3

initial bulb check 3 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AIR RIDE SUSPENSION - WIRING HARNESSSES

AIR RIDE SUSPENSION - WIRING HARNESSSES

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition 3 Code 3 Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Connector bent 3 A 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Connector broken 3 A 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Connector loose 3 A 3 Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged (cut, burned, or 3 A 3

[illegible]

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Condition	3	Code	3	Procedure
Attaching hardware bent	3	B	3	Require repair or replacement of bent part if available; otherwise, replace ball joint.
Attaching hardware broken	3	A	3	Require replacement of broken part if available; otherwise, replace ball joint.
Attaching hardware corroded affecting structural integrity	3	A	3	Require replacement of broken part if available; otherwise, replace ball joint.
Attaching hardware incorrect	3	A	3	Require replacement of incorrect part if available; otherwise, replace ball joint.
Attaching hardware loose	3	A	3	Require repair or replacement of loose part if available; otherwise, replace ball joint.
Attaching hardware missing	3	C	3	Require replacement of missing part if available; otherwise, replace ball joint.
Attaching hardware threads damaged	3	A	3	Require repair or replacement of part with damaged threads if available; otherwise, replace ball joint.
Attaching hardware threads stripped (threads missing)	3	A	3	Require replacement of part with stripped threads if available; otherwise, replace ball joint.
Binding	3	A	3	Further inspection required. See note (1) below.
Grease boot cracked	3	B,2	3	Suggest replacement. See note (2).
Grease boot missing	3	B,2	3	Suggest replacement. See note (3).
Grease boot torn	3	B,2	3	Suggest replacement. See note (4).
Grease fitting broken	3	A	3	Require replacement of grease fitting.
Grease fitting missing	3	C	3	Require replacement of grease fitting.
Grease fitting won't seal	3	A	3	Require replacement of grease fitting.

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Greaseable ball joint will ³ B,2 ³ Suggest replacement of grease
not take grease ³ ³ fitting. See note (5) below.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Nut on ball joint loose ³ A ³ Require repair or replacement.
³ ³ See note (6) below.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Pre-load adjustment ³ B ³ Require repair or replacement.
incorrect ³ ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Seized ³ A ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Stud bent ³ B ³ Require replacement. See note (7).

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Stud broken ³ A ³ Require replacement. See note (7).

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Threads damaged ³ A ³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Threads stripped (threads ³ A ³ Require replacement. See note (7).
missing) ³ ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Wear exceeds manufacturer's ³ B ³ Require replacement.
specifications ³ ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

- NOTE: (1) If greaseable, grease ball joint. If problem persists or
joint is non-greaseable, require replacement.
(2) Cracked grease boot will allow contaminants to enter the
ball joint and will accelerate wear.
(3) Lack of grease boot will allow contaminants to enter the
ball joint and will accelerate wear.
(4) Torn grease boot will allow contaminants to enter the ball
joint and will accelerate wear.
(5) If the greaseable ball joint still will not take grease
after replacing the grease fitting, suggest replacement of
ball joint.
(6) Check for bent stud or damaged taper hole.
(7) Check for damaged taper hole.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

BUSHINGS

BUSHINGS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition ³ Code ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware bent ³ B ³ Require repair or replacement of
³ ³ bent part if available; otherwise,
³ ³ replace bushing.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware broken ³ A ³ Require replacement of broken part
³ ³ if available; otherwise, replace
³ ³ bushing.

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Attaching hardware corroded ³	A	³	Require replacement of corroded
affecting structural	³	³	part if available; otherwise,
integrity	³	³	replace bushing.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Attaching hardware	³ A	³	Require replacement of incorrect
incorrect	³	³	part if available; otherwise,
	³	³	replace bushing.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Attaching hardware loose	³ A	³	Require repair or replacement of
	³	³	loose part if available;
	³	³	otherwise, replace bushing.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Attaching hardware missing	³ C	³	Require replacement of missing
	³	³	part if available; otherwise,
	³	³	replace bushing.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Attaching hardware threads	³ A	³	Require repair or replacement of
damaged	³	³	part with damaged threads if
	³	³	available; otherwise, replace
	³	³	bushing.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Attaching hardware threads	³ A	³	Require replacement of part with
stripped (threads missing) ³	³	³	stripped threads if available;
	³	³	otherwise, replace bushing.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Binding	³ A	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Deteriorated, affecting	³ A	³	Require repair or replacement.
performance	³	³	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Distorted, affecting	³ A	³	Require repair or replacement.
performance	³	³	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Leaking (fluid-filled type) ³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Missing	³ A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Noisy	³ B,2	³	Further inspection required.
	³	³	See note (1) and caution below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Rubber separating from	³ A	³	Require replacement.
internal metal sleeve on	³	³	
bonded bushing	³	³	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Seized	³ A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Shifted (out of position)	³ B	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Split	³ A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Surface cracking	³	³	No service suggested or required.

Acknowledgements:

- NOTE:
- (1) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.
 - (2) Cracked grease boot will allow contaminants to enter the joint and will accelerate wear.
 - (3) Lack of grease boot will allow contaminants to enter the joint and will accelerate wear.
 - (4) Torn grease boot will allow contaminants to enter the joint and will accelerate wear.
 - (5) Lack of grease seal will allow contaminants to enter the joint and will accelerate wear.
 - (6) Torn grease seal will allow contaminants to enter the joint and will accelerate wear.
 - (7) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method

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such as the dry park check.

(8) Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.

(9) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.

(10) Check for damaged taper hole.

(11) Check for damaged stud.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

CONTROL ARM SHAFTS

CONTROL ARM SHAFTS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	3	Code	3	Procedure
Attaching hardware broken	3	A	3	Require replacement of broken part, if available; otherwise, replace shaft.
Attaching hardware loose	3	A	3	Require repair or replacement of loose part, if available; otherwise, replace shaft.
Attaching hardware missing	3	C	3	Require replacement of missing part, if available; otherwise, replace shaft.
Attaching hardware threads damaged	3	A	3	Require repair or replacement of part with damaged threads, if available; otherwise, replace shaft.
Attaching hardware threads stripped (threads missing)	3	A	3	Require replacement of part with stripped threads, if available; otherwise, replace shaft.
Bent	3	B	3	Require replacement.
Shaft bushing surface undersized (worn)	3	B	3	Require replacement.
Threads damaged	3	A	3	Require repair or replacement.
Threads stripped (threads missing)	3	A	3	Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

CONTROL ARMS

CONTROL ARMS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	3	Code	3	Procedure
Attaching hardware bent	3	B	3	Require repair or replacement of bent part, if available; otherwise, replace control arm.
Attaching hardware broken	3	A	3	Require replacement of broken part, if available; otherwise,

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	3	3	replace control arm.
Attaching hardware corroded affecting structural integrity	3 A 3	3	Require replacement of corroded part, if available; otherwise, replace control arm.
Attaching hardware incorrect	3 A 3	3	Require replacement of incorrect part, if available; otherwise, replace control arm.
Attaching hardware loose	3 A 3	3	Require repair or replacement of loose part, if available; otherwise, replace control arm.
Attaching hardware missing	3 C 3	3	Require replacement of missing part, if available; otherwise, replace control arm.
Attaching hardware threads damaged	3 A 3	3	Require repair or replacement of part with damaged threads, if available; otherwise, replace control arm.
Attaching hardware threads stripped (threads missing)	3 A 3	3	Require replacement of part with stripped threads, if available; otherwise, replace control arm.
Bent	3 B 3	3	Require replacement.
Bushing hole oversized	3 B 3	3	Require replacement.
Ball joint hole oversized (loose interference or press fit)	3 B 3	3	Further inspection required. See note (1) below.
Corroded, affecting structural integrity	3 A 3	3	Require replacement.
Holes distorted	3 A 3	3	Require replacement.
Threads damaged	3 A 3	3	Require repair or replacement.
Threads stripped (threads missing)	3 A 3	3	Require replacement.
NOTE: (1) If oversized ball joint is available, require replacement of ball joint. If oversized ball joint is not available, require replacement of control arm.			

DRAG LINKS

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DRAG LINKS

Condition			3	Code	3	Procedure
Attaching hardware incorrect			3	A	3	Require replacement of incorrect part, if available; otherwise, replace drag link.
Attaching hardware loose			3	A	3	Require repair or replacement of loose part, if available; otherwise, replace drag link.
Attaching hardware missing			3	C	3	Require replacement of missing part, if available; otherwise, replace drag link.
Attaching hardware threads damaged			3	A	3	Require repair or replacement of part with damaged threads, if available; otherwise, replace drag link.
Attaching hardware threads stripped (threads missing)			3	A	3	Require replacement of part with stripped threads, if available; otherwise, replace drag link.
Bent			3	B	3	Require replacement.
Binding			3	A	3	Further inspection required. See note (1) below.
Grease boot cracked			3	B,2	3	Suggest replacement. See note (2).
Grease boot missing			3	B,2	3	Suggest replacement. See note (3).
Grease boot torn			3	B,2	3	Suggest replacement. See note (4).
Grease fitting broken			3	A	3	Require replacement of grease fitting.
Grease fitting missing			3	C	3	Require replacement of grease fitting.
Grease fitting won't seal			3	A	3	Require replacement of grease fitting.
Grease seal missing			3	B,2	3	Suggest replacement. See note (5).
Grease seal torn			3	B,2	3	Suggest replacement. See note (4).
Looseness (perceptible horizontal movement)			3	A,1	3	Suggest replacement. See note (6).

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CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Looseness that is excessive³ B ³ Require replacement. See notes (6) and (7), caution below.

CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Seized ³ A ³ Require replacement.

Stud bent ³ B ³ Require replacement. See note (8).

Stud broken ³ A ³ Require replacement. See note (8).

Stud loose in taper hole ³ A ³ Require repair or replacement. See note (8) below.

Taper hole elongated ³ A ³ Require replacement. See note (9).

Threads damaged ³ A ³ Require repair or replacement.

Threads stripped (threads missing) ³ A ³ Require replacement. See note (8).

Wear exceeds manufacturer's³ B ³ Require replacement. specifications

NOTE: (1) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.

(2) Cracked grease boot will allow contaminants to enter the joint and will accelerate wear.

(3) Lack of grease boot will allow contaminants to enter the joint and will accelerate wear.

(4) Torn grease boot will allow contaminants to enter the joint and will accelerate wear.

(5) Missing grease seal will allow contaminants to enter the joint and will accelerate wear.

(6) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.

(7) Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.

(8) Check for damaged taper hole.

(9) Check for damaged stud.

ELECTRONIC RIDE CONTROL SHOCKS & STRUTS

NOTE: This section covers the electronic damping control portion of the electronic shock or strut. For dampening portion of shock or strut conditions and procedures, refer to the "Shock

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Absorbers, Strut Cartridges, and Strut Assemblies" section.

ELECTRONIC RIDE CONTROL SHOCKS & STRUTS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	³ Code ³	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Connector bent	³ A ³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Connector broken	³ A ³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Connector loose	³ A ³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Electronic valve control inoperative	³ B,2 ³	Suggest replacement. See note (1).
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Terminal bent	³ A ³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Terminal broken	³ A ³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Terminal corroded	³ A ³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Terminal loose	³ A ³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
NOTE: (1) It is acceptable to replace with a non-electronically controlled unit, where available.		
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

IDLER ARMS

IDLER ARMS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	³ Code ³	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware broken	³ A ³	Require replacement of broken part, if available; otherwise, replace idler arm.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware incorrect	³ A ³	Require replacement of incorrect part, if available; otherwise, replace idler arm.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware loose	³ A ³	Require repair or replacement of loose part, if available; otherwise, replace idler arm.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware missing	³ C ³	Require replacement of missing part, if available; otherwise, replace idler arm.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Attaching hardware threads damaged	³ A ³	Require repair or replacement of part with damaged threads, if available; otherwise, replace

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³ idler arm.

Attaching hardware threads ³ A ³ Require replacement of part with
stripped (threads missing) ³ ³ stripped threads, if available;
³ ³ otherwise, replace idler arm.

Binding ³ A ³ Further inspection required.
³ ³ See note (1) below.

Grease boot cracked ³ B,2 ³ Suggest replacement. See note (2).

Grease boot missing ³ B,2 ³ Suggest replacement. See note (3).

Grease boot torn ³ B,2 ³ Suggest replacement. See note (4).

Grease fitting broken ³ A ³ Require replacement of grease
³ ³ fitting.

Grease fitting missing ³ C ³ Require replacement of grease
³ ³ fitting.

Grease fitting won't seal ³ A ³ Require replacement of seal.

Grease seal missing ³ B,2 ³ Suggest replacement. See note (5).

Grease seal torn ³ B,2 ³ Suggest replacement. See note (4).

Greaseable joint will not ³ B,2 ³ Suggest replacement of grease
take grease ³ ³ fitting. See note (6) below.

Looseness at frame bracket ³ B ³ Require repair or replacement.
end ³ ³ See notes (7) and (8) below.

Looseness at link end ³ A,1 ³ Suggest replacement. See note (7).
(perceptible horizontal ³ ³
movement) ³ ³

CAUTION: DO NOT use pliers or pry bar to check ball and socket
movement. Use only moderate hand pressure.

Looseness at link end that ³ B ³ Require replacement. See notes (7)
is excessive ³ ³ and (9) and caution below.

CAUTION: DO NOT use pliers or pry bar to check ball and socket
movement. Use only moderate hand pressure.

Mounted out of position ³ B ³ Require repositioning.
(center link not parallel) ³ ³

Nut on stud loose ³ A ³ Require repair or replacement.
³ ³ See note (10) below.

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Seized	³	A	³	Require replacement.
AAAAAA				
Stud bent	³	B	³	Require replacement. See note (11)
AAAAAA				
Stud broken	³	A	³	Require replacement. See note (11)
AAAAAA				
Taper hole elongated	³	A	³	Require replacement. See note (12)
AAAAAA				
Threads damaged	³	A	³	Require repair or replacement.
AAAAAA				
Threads stripped (threads missing)	³	A	³	Require replacement. See note (11)
AAAAAA				
Wear exceeds manufacturer's specifications	³	B	³	Require replacement.
AAAAAA				

- NOTE: (1) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.
- (2) Cracked grease boot will allow contaminants to enter joint and will accelerate wear.
- (3) Lack of grease boot will allow contaminants to enter joint and will accelerate wear.
- (4) Torn grease boot will allow contaminants to enter joint and will accelerate wear.
- (5) Missing grease seal will allow contaminants to enter joint and will accelerate wear.
- (6) If greaseable joint will not take grease after replacing the grease fitting, suggest replacement of idler arm.
- (7) If manufacturer's procedures and specifications exist, use those procedures and specifications; otherwise, use an approved inspection method such as the dry park check.
- (8) Looseness is defined as movement that creates excessive toe change.
- (9) Excessive looseness is defined as significant enough to affect vehicle handling or structural integrity.
- (10) Check for bent stud or damaged taper hole.
- (11) Check for damaged taper hole.
- (12) Check for damaged stud.

AAAAAA

KING PINS

You are not required to replace king pins in axle sets. However, when replacing a king pin due to wear exceeding manufacturer's specifications, you may suggest replacement of the other king pin on the axle if its measurement shows it is close to the end of its useful life.

KING PINS

Condition	³	Code	³	Procedure
AAAAAA				

NOTE: (1) If king pin will not take grease after replacement of grease

Condition	Code	Procedure
Attaching hardware incorrect	A	Require replacement of incorrect part, if available; otherwise, replace pitman arm.
Attaching hardware loose	A	Require repair or replacement of loose part, if available; otherwise, replace pitman arm.
Attaching hardware missing	C	Require replacement of missing part, if available; otherwise, replace pitman arm.
Attaching hardware threads damaged	A	Require repair or replacement of part with damaged threads, if available; otherwise, replace pitman arm.
Attaching hardware threads stripped (threads missing)	A	Require replacement of part with stripped threads, if available; otherwise, replace pitman arm.
Bent	B	Require replacement.
Binding	A	Further inspection required. See note (1) below.
Grease boot cracked	B,2	Suggest replacement. See note (2).
Grease boot missing	B,2	Suggest replacement. See note (3).
Grease boot torn	B,2	Suggest replacement. See note (4).
Grease fitting broken	A	Require replacement grease fitting.
Grease fitting missing	C	
Grease fitting won't seal	A	
Grease seal missing	B,2	Suggest replacement of seal. See note (5) below.
Grease seal torn	B,2	Suggest replacement of seal. See note (6) below.

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Looseness (perceptible horizontal movement) ³ A,1 ³ Suggest replacement. See note (7)

CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Looseness that is excessive ³ B ³ Require replacement. See notes (7)

CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Nut on stud loose ³ A ³ Require repair or replacement.

Seized ³ A ³ Require replacement.

Splines damaged ³ A ³ Require repair or replacement.

Splines stripped (splines missing) ³ A ³ Require replacement.

Stud bent ³ B ³ Require replacement. See note (10)

Stud broken ³ A ³ Require replacement. See note (10)

Stud loose in taper hole ³ A ³ Require repair or replacement.

Taper hole elongated ³ A ³ Require replacement. See note (11)

Threads damaged ³ A ³ Require repair or replacement.

Threads stripped (threads missing) ³ A ³ Require replacement. See note (10)

NOTE: (1) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.

(2) Cracked grease boot will allow contaminants to enter joint and will accelerate wear.

(3) Lack of grease boot will allow contaminants to enter joint and will accelerate wear.

(4) Torn grease boot will allow contaminants to enter joint and will accelerate wear.

(5) Lack of grease seal will allow contaminants to enter joint and will accelerate wear.

(6) Torn grease seal will allow contaminants to enter joint and will accelerate wear.

(7) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.

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- (11) Check for damaged stud.

[illegible]

POWER STEERING HOSES

[illegible]

Condition	³ Code ³	Procedure

[illegible]

Blistered 3 B 3 Require replacement.

AAAAA

Blocked 3 A 3 Require repair or replacement.

[illegible]

Fitting threads damaged	3	A	3	Require repair or replacement.

[illegible]

Fitting threads stripped 3 A 3 Require replacement.

```
(threads missing)      3      3
```

[illegible]

Inner fabric (webbing) cut ³ A ³ Require replacement.

[illegible]

Leaking 3 A 3 Require repair or replacement.

[illegible]

Missing 3 C 3 Require replacement.

[illegible]

Outer covering is cracked 3 B 3 Require replacement.

to the extent that the

inner fabric of hose is 3 3

visible	3	3

[illegible]

Restricted ³ A ³ Require repair or replacement.

[illegible]

POWER STEERING (HYDRAULIC) PUMPS

À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ ß à á â ã

Condition	³ Code ³	Procedure

[illegible]

Attaching hardware bent 3 B 3 Require repair or replacement of

3 bent part.

[illegible]

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[illegible]

Attaching hardware threads ³ A ³ Require replacement of part with

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stripped (threads missing)³ ³ stripped threads.
AAAAAA
Bent ³ B ³ Require replacement.
AAAAAA
Corroded, affecting ³ A ³ Require replacement.
structural integrity ³ ³
AAAAAA
Holes distorted ³ A ³ Require replacement.
AAAAAA
Threads damaged ³ A ³ Require repair or replacement.
AAAAAA
Threads stripped (threads ³ A ³ Require replacement.
missing) ³ ³
AAAAAA

RELAY RODS

RELAY RODS
AAAAAA
Condition ³ Code ³ Procedure
AAAAAA
Attaching hardware ³ A ³ Require replacement of incorrect
incorrect ³ ³ part, if available; otherwise,
 ³ ³ replace relay rod.
AAAAAA
Attaching hardware loose ³ A ³ Require repair or replacement of
 ³ ³ loose part, if available;
 ³ ³ otherwise, replace relay rod.
AAAAAA
Attaching hardware missing ³ C ³ Require replacement of missing
 ³ ³ part, if available; otherwise,
 ³ ³ replace relay rod.
AAAAAA
Attaching hardware threads ³ A ³ Require repair or replacement of
damaged ³ ³ part with damaged threads, if
 ³ ³ available; otherwise, replace
 ³ ³ relay rod.
AAAAAA
Attaching hardware threads ³ A ³ Require replacement of part with
stripped (threads missing)³ ³ stripped threads, if available;
 ³ ³ otherwise, replace relay rod.
AAAAAA
Bent ³ B ³ Require replacement.
AAAAAA
Binding ³ A ³ Further inspection required.
 ³ ³ See note (1) below.
AAAAAA
Grease boot cracked ³ B,2 ³ Suggest replacement. See note (2).
AAAAAA
Grease boot missing ³ B,2 ³ Suggest replacement. See note (3).
AAAAAA
Grease boot torn ³ B,2 ³ Suggest replacement. See note (4).

- NOTE: (1) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.
- (2) Cracked grease boot will allow contaminants to enter the joint and will accelerate wear.
- (3) Lack of grease boot will allow contaminants to enter the joint and will accelerate wear.
- (4) Torn grease boot will allow contaminants to enter the joint and will accelerate wear.
- (5) Lack of grease seal will allow contaminants to enter joint and will accelerate wear.

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- (6) Torn grease seal will allow contaminants to enter joint and will accelerate wear.
- (7) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.
- (8) Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.
- (9) Check for damaged taper hole.
- (10) Check for damaged stud.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

SHOCK ABSORBERS, STRUT CARTRIDGES, & STRUT ASSEMBLIES

You are not required to replace shocks or struts in axle sets. However, when replacing a shock or strut due to the conditions that follow, you may suggest replacement of the other shock or strut on the same axle for improved performance and preventive maintenance.

- * part is close to the end of its useful life
- * to extend tire life
- * to balance ride and handling
- * to improve stopping distance

When replacing steering and/or suspension components which may affect an alignment angle, you are required to check and adjust alignment as needed. Refer to the OEM specifications.

Under no circumstances should a technician bend struts or strut housings.

A vehicle's load-carrying and handling abilities are limited by its suspension, tires, brakes, and driveline. Installing coil over shocks or any other load assist device does not increase the vehicle's load capacity. See the vehicle owner's manual for more details.

NOTE: If vehicle is equipped with original equipment coil over shocks, apply the conditions for coil springs from the "Springs: Coil, Leaf, and Torsion Bar" section of the Steering and Suspension guidelines. If the vehicle is equipped with add-on coil over shocks, you may suggest replacing the shocks with standard shocks for any spring-related condition.

SHOCK ABSORBERS, STRUT CARTRIDGES, & STRUT ASSEMBLIES

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	3	Code	3	Procedure
Attaching hardware bent	3	B	3	Require repair or replacement of bent part, if available; otherwise, replace shock or strut.
Attaching hardware broken	3	A	3	Require replacement of broken part, if available; otherwise, replace shock or strut.

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Attaching hardware corroded³ A ³ Require replacement of corroded
affecting structural ³ ³ part, if available; otherwise,
integrity ³ ³ replace shock or strut.

Attaching hardware ³ A ³ Require replacement of incorrect
incorrect ³ ³ part, if available; otherwise,
³ ³ replace shock or strut.

Attaching hardware loose ³ A ³ Require repair or replacement of
³ ³ loose part, if available;
³ ³ otherwise, replace shock or strut.

Attaching hardware missing ³ C ³ Require replacement of missing
³ ³ part, if available; otherwise,
³ ³ replace shock or strut.

Attaching hardware threads ³ A ³ Require repair or replacement of
damaged ³ ³ part with damaged threads, if
³ ³ available; otherwise, replace
³ ³ shock or strut.

Attaching hardware threads ³ A ³ Require replacement of part with
stripped (threads missing)³ ³ stripped threads, if available;
³ ³ otherwise, replace shock or strut.

Binding ³ A ³ Require replacement.

Body dented ³ A ³ Further inspection required.
³ ³ See note (1) below.

Body punctured ³ A ³ Require replacement.

Brake hose bracket bent ³ B ³ Require repair or replacement.

Brake hose bracket missing ³ C ³ Require replacement.

Brake hose bracket threads ³ C ³ Require repair or replacement.
damaged ³ ³

Brake hose bracket threads ³ C ³ Require replacement.
stripped (threads missing)³ ³

Compression bumper missing ³ C ³ Require replacement of compression
³ ³ bumper.

Compression bumper split ³ A,1 ³ Suggest replacement of compression
³ ³ bumper.

Damping (none) ³ A ³ Require replacement.

Dust boot (bellows) split ³ B,2 ³ Suggest replacement of boot.

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[illegible]

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Piston rod threads damaged ³ A ³ Require repair or replacement.
Piston rod threads stripped³ A ³ Require replacement.
(threads missing) ³ ³
Seized ³ A ³ Require replacement.
Shock missing ³ C ³ Require replacement.
Strut housing bent ³ A ³ Require replacement.
Strut housing cap (gland ³ A ³ Require replacement of nut and/or
nut) is not removable ³ ³ housing. See note (5) below.
using appropriate tool ³ ³
Strut housing cap (gland ³ A ³ Require repair or replacement of
nut) threads damaged ³ ³ nut.
Strut housing cap (gland ³ A ³ Require replacement of nut.
nut) threads stripped ³ ³
(threads missing) ³ ³
Strut housing severely ³ A ³ Require replacement.
corroded, affecting ³ ³
structural integrity ³ ³
Strut housing threads ³ A ³ Require repair or replacement.
damaged ³ ³
Strut housing threads ³ A ³ Require replacement.
stripped (threads missing)³ ³
Tire cupping ³ A ³ Further inspection required.
³ ³ See note (8) below

NOTE: (1) Require replacement of units where dents restrict shock or
strut piston rod movement. If dents don't restrict movement,
no service is suggested or required. Especially critical on
mono-tube shocks.
(2) This condition can lead to damage of the piston rod, which,
in turn, causes premature piston rod seal wear.
(3) This condition can lead to damage of the piston rod, which
causes piston rod seal wear.
(4) This condition can lead to damage of the piston rod, which,
in turn, causes premature piston rod seal wear.
(5) Only required if replacing cartridge.
(6) Require replacement of units where dents restrict shock or
strut piston rod movement. If dents don't restrict movement,
no service is suggested or required. Especially critical on
mono-tube shocks.
(7) If noise is isolated to shock or strut, suggest replacement.
(8) Although shocks or struts may have contributed to tire

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cupping, an inspection is needed of the entire suspension system. If the shock or strut is found to be contributing to the tire cupping, require replacement.

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SPINDLES

SPINDLES

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	³	Code	³	Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware broken	³	A	³	Require replacement of broken part

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware loose	³	A	³	Require repair or replacement of

³ loose part.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware missing	³	C	³	Require replacement of missing

³ part.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware threads	³	A	³	Require repair or replacement of

damaged ³ part with damaged threads.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Attaching hardware threads	³	A	³	Require replacement of part with

stripped (threads missing)³ stripped threads.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Bent	³	B	³	Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Broken	³	A	³	Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Race seat area undersized	³	B	³	Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Scored	³	A	³	Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Threads damaged	³	A	³	Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Threads stripped (threads	³	A	³	Require replacement.

missing)³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

SPRINGS: COIL, LEAF, & TORSION BAR

When springs are replaced, it is suggested, but not required, that both springs on an axle be replaced to maintain equal height from side to side and to provide a balanced ride and proper handling.

When variable rate springs are installed in place of conventional coil springs, they must be installed in axle sets to ensure proper handling, uniform ride, and proper chassis height.

Erroneous height measurements may result from: improper tire inflation, non-standard tire or wheel size, and heavy load in vehicle or trunk.

SPRINGS: COIL, LEAF, & TORSION BAR

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Condition	³	Code	³	Procedure
Attaching hardware bent	³	B	³	Require repair or replacement of bent part.
Attaching hardware broken	³	A	³	Require replacement of broken part.
Attaching hardware corroded affecting structural integrity	³	A	³	Require replacement of corroded part.
Attaching hardware incorrect	³	A	³	Require replacement of incorrect part.
Attaching hardware loose	³	A	³	Require repair or replacement of loose part.
Attaching hardware missing	³	C	³	Require replacement of missing part.
Attaching hardware threads damaged	³	A	³	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	³	A	³	Require replacement of part with stripped threads.
Broken (all springs except secondary leave(s) on multi-leaf springs)	³	A	³	Require replacement.
Coil clash	³		³	Require ride height check. See note (1) below.
Coil spring insulator deteriorated	³	B,2	³	Suggest replacement of insulator.
Coil spring insulator missing	³	B,2	³	Suggest replacement of insulator.
Coil spring insulator split	³	B,2	³	Suggest replacement of insulator.
Coil spring plastic coating deteriorated - rust present	³	A	³	Refer to manufacturer's service requirements. See note (2) below.
Composite spring damaged	³	A	³	Further inspection required. See note (3) below.
Cracked (all springs except composite leaf and	³	A	³	Require replacement.

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secondary leave(s) on	3	3	
multi-leaf springs)	3	3	
AAAAAA			
Installed incorrectly	3	B	3 Require repair.
AAAAAA			
Leaf spring insulators	3	B,2	3 Suggest replacement of insulators.
missing	3	3	
AAAAAA			
Secondary leaf on multi-	3	A,1	3 Suggest repair or replacement
leaf spring broken	3	3	
AAAAAA			
Secondary leaf on multi-	3	A,1	3 Suggest repair or replacement
leaf spring cracked	3	3	
AAAAAA			
Torsion bar adjuster bent	3	A	3 Require repair or replacement of
	3	3	adjuster. See note (4) below.
AAAAAA			
Torsion bar adjuster seized	3	A	3 Require repair or replacement of
	3	3	adjuster. See note (4) below.
AAAAAA			
Torsion bar adjuster	3	A	3 Require repair or replacement of
threads damaged	3	3	part with damaged threads.
	3	3	See note (4) below.
AAAAAA			
Torsion bar adjuster	3	A	3 Require replacement of part with
threads stripped (threads	3	3	stripped threads.
missing)	3	3	
AAAAAA			
Vehicle suspension height	3	B	3 Require adjustment or replacement.
not within OEM specs	3	3	

NOTE: (1) If vehicle is within manufacturer's height specifications,
no service is suggested or required.
(2) Some manufacturers require replacement under these
conditions.
(3) Check vehicle ride height. If ride height is OK, no service
is suggested or required.
(4) Only required if ride height needs to be adjusted.

STEEL POWER STEERING LINES

CAUTION: When replacing steel power steering lines, be sure to use
a replacement product that meets or exceeds OEM design
specifications.

STEEL POWER STEERING LINES

Condition	3	Code	3	Procedure
AAAAAA				
Attaching hardware bent	3	B	3	Require repair or replacement of
	3	3	3	bent part.

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[illegible]

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[illegible]

Attaching hardware	A	Require replacement of incorrect
incorrect	3	part, if available; otherwise,

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	3	3	replace steering damper.
Attaching hardware loose	3 A	3	Require repair or replacement of
	3	3	loose part, if available;
	3	3	otherwise, replace steering
	3	3	damper.
Attaching hardware missing	3 C	3	Require replacement of missing
	3	3	part, if available; otherwise,
	3	3	replace steering damper.
Attaching hardware threads	3 A	3	Require repair or replacement of
damaged	3	3	part with damaged threads, if
	3	3	available; otherwise, replace
	3	3	steering damper.
Attaching hardware threads	3 A	3	Require replacement of part with
stripped (threads missing)	3	3	stripped threads, if available;
	3	3	otherwise, replace steering
	3	3	damper.
Binding	3 A	3	Require replacement.
Damper body dented	3 A	3	Further inspection required.
	3	3	See note (1) below.
Damper body punctured	3 A	3	Require replacement.
Damping (none)	3 A	3	Require replacement.
Dust boot (bellows) missing	3 B,2	3	Suggest replacement of boot.
	3	3	See note (2) below.
Dust boot (bellows) split	3 B,2	3	Suggest replacement of boot.
	3	3	See note (2) below.
Dust shield broken	3 B,2	3	Suggest replacement. See note (2).
Dust shield missing	3 B,2	3	Suggest replacement. See note (2).
Leaking oil, enough for	3 A	3	Require replacement.
fluid to be running down	3	3	
the body	3	3	
Loose	3 A	3	Require repair or replacement.
Missing	3 C	3	Require replacement.
Noise	3 B,2	3	Further inspection required.
	3	3	See note (3) below.
Piston rod bent	3 A	3	Require replacement.

[illegible]

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Flex coupler binding	³ A	³ Require repair or replacement of
	³	³ coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Flex coupler loose	³ A	³ Require repair or replacement of
	³	³ coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Flex coupler missing parts	³ A	³ Require repair or replacement of
	³	³ coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Flex coupler soft/spongy	³ A	³ Require replacement of coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Flex coupler torn	³ A	³ Require replacement of coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Fluid contaminated	³ B	³ Require flushing and refilling
	³	³ of the system. See note (1) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Gasket leaking	³ A	³ Require repair or replacement of
	³	³ gasket.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Housing leaking	³ A	³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Hydraulic fittings leaking	³ A	³ Require repair or replacement of
	³	³ fittings.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Inadequate power assist	³ A	³ Further inspection required.
	³	³ See note (2) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Lash exceeds manufacturer's specifications	³ B	³ Require repair or replacement.
	³	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Seal leaking	³ A	³ Require repair or replacement of
	³	³ seal and/or mating part.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Splines damaged	³ A	³ Require repair or replacement of
	³	³ splines.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Splines stripped	³ A	³ Require replacement of splines.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Steering coupler shield cracked	³ B,2	³ Suggest replacement.
	³	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Steering coupler shield missing	³ C	³ Require replacement.
	³	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Threads damaged	³ A	³ Require repair or replacement of
	³	³ part with damaged threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Threads stripped (threads missing)	³ A	³ Require replacement of part with
	³	³ stripped threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
U-joint binding	³ A	³ Require repair or replacement of
	³	³ joint.

Bellows boot cracked (not ³ B.2 ³ Suggest replacement of bellows

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through) 3 3 boot.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bellows boot missing 3 C 3 Require replacement of bellows
3 3 boot.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bellows boot not sealing 3 A 3 Require repair or replacement of
3 3 bellows boot.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bellows boot torn 3 A 3 Require replacement of bellows
3 3 boot.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Bellows boot twisted (from 3 B 3 Require repair.
toe adjustment) 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Fitting leaking 3 A 3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Fitting missing 3 A 3 Require replacement of fitting.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Fitting threads damaged 3 A 3 Require repair or replacement of
3 3 part with damaged threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Fitting threads stripped 3 A 3 Require replacement of part with
(threads missing) 3 3 stripped threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Flex coupler binding 3 A 3 Require repair or replacement of
3 3 coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Flex coupler loose 3 A 3 Require repair or replacement of
3 3 coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Flex coupler missing parts 3 A 3 Require repair or replacement of
3 3 coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Flex coupler soft/spongy 3 A 3 Require replacement of coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Flex coupler torn 3 A 3 Require replacement of coupler.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Fluid contaminated 3 B 3 Require flushing and refilling of
3 3 the system. See note (1) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Gasket leaking 3 A 3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Hard steering on cold 3 A,1 3 Suggest repair or replacement.
start-up 3 3 See note (2) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Housing cracked, affecting 3 B 3 Require replacement.
structural integrity 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Housing leaking 3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Inadequate power assist 3 A 3 Further inspection required.
3 3 See note (3) below.

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Lash exceeds manufacturer's³ B³ Require repair or replacement.
specifications³³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Seal leaking³ A³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Splines damaged³ A³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Splines stripped (splines³ A³ Require replacement.
missing)³³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steel line blocked³ A³ Require repair or replacement of
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA' line.
Steel line leaking³ A³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steel line missing³ C³ Require replacement of line.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steel line restricted³ A³ Require repair or replacement of
³³ line.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steering coupler shield³ B,2³ Suggest replacement.
cracked³³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steering coupler shield³ C³ Require replacement.
missing³³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Steering coupler shield³ B,2³ Suggest replacement.
torn³³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Threads damaged³ A³ Require repair or replacement of
³³ part with damaged threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Threads stripped (threads³ A³ Require replacement of part with
missing)³³ stripped threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
U-joint binding³ A³ Require repair or replacement of
³³ joint.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
U-joint loose³ A³ Require repair or replacement of
³³ joint.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Unequal power assist³ A³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
NOTE: (1) Determine and correct source of contamination.
Follow OE specifications for fluid type.
(2) Indicates internal wear.
(3) If steering gear is source of inadequate assist, require
repair or replacement.
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STEERING KNUCKLES

*** STEERING UNIFORM INSPECTION GUIDELINES ***

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STEERING KNUCKLES

Condition			3	Code	3	Procedure
Attaching hardware bent			3	B	3	Require repair or replacement of bent part.
Attaching hardware broken			3	A	3	Require replacement of broken part.
Attaching hardware incorrect			3	A	3	Require replacement of incorrect part.
Attaching hardware loose			3	A	3	Require repair or replacement of loose part.
Attaching hardware missing			3	C	3	Require replacement of missing part.
Attaching hardware threads damaged			3	A	3	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)			3	A	3	Require replacement of part with stripped threads.
Bent			3	B	3	Require replacement.
Broken			3	A	3	Require replacement.
Pinch bolt incorrect			3	B	3	Require replacement with bolt that meets OE design.
Pinch bolt loose			3	B	3	Require repair.
Pinch bolt missing			3	B	3	Require replacement.
Pinch bolt tabs deformed (pinched together), .032" or more before clamping			3	B	3	Require replacement. See note (1) below.
Taper hole elongated			3	A	3	Require replacement. See note (2).
Threads damaged			3	A	3	Require repair or replacement.
Threads stripped (threads missing)			3	A	3	Require repair or replacement.

NOTE: (1) Steering knuckle deformation can cause pinch bolt breakage.
(2) Check for damaged stud.

STRIKE OUT BUMPERS

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STRIKE OUT BUMPERS

Condition			Code	Procedure
Attaching hardware broken	3	A	3	Require replacement of broken part.
Attaching hardware corroded affecting structural integrity	3	A	3	Require replacement of corroded part.
Attaching hardware loose	3	A	3	Require repair or replacement of loose part.
Attaching hardware missing	3	C	3	Require replacement of missing part.
Attaching hardware threads damaged	3	A	3	Require repair or replacement of part with damaged threads.
Attaching hardware threads stripped (threads missing)	3	A	3	Require replacement of part with stripped threads.
Missing	3	C	3	Require replacement.
Split	3	A,1	3	Suggest replacement.

STRUT RODS

STRUT RODS

Condition			Code	Procedure
Adjusting nut seized	3	A	3	Require repair or replacement. See note (1) below.
Attaching hardware bent	3	B	3	Require repair or replacement of bent part, if available; otherwise, replace strut rod.
Attaching hardware broken	3	A	3	Require replacement of broken part, if available; otherwise, replace strut rod.
Attaching hardware incorrect	3	A	3	Require replacement of incorrect part, if available; otherwise, replace strut rod.
Attaching hardware loose	3	A	3	Require repair or replacement of loose part, if available;

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	³		³	otherwise, replace strut rod.
Attaching hardware missing	³	C	³	Require replacement of missing
	³		³	part, if available; otherwise,
	³		³	replace strut rod.
Attaching hardware threads	³	A	³	Require repair or replacement of
damaged	³		³	part with damaged threads, if
	³		³	available; otherwise, replace
	³		³	strut rod.
Attaching hardware threads	³	A	³	Require replacement of part with
stripped (threads missing)	³		³	stripped threads, if available;
	³		³	otherwise, replace strut rod.
Attaching (mating) hole	³	A	³	Require repair or replacement of
oversized	³		³	frame.
Attaching point on frame	³	A	³	Require repair of frame.
corroded, affecting	³		³	
structural integrity	³		³	
Bent	³	A	³	Require replacement.
Mating (attaching) hole	³	A	³	Require repair or replacement of
oversized	³		³	frame.
Threads damaged	³	A	³	Require repair or replacement.
Threads stripped (threads	³	A	³	Require replacement.
missing)	³		³	
NOTE: (1) Only required if an alignment is being performed.				

STRUT UPPER BEARING PLATE ASSEMBLIES

NOTE: When the following guidelines indicate replacement of bearing, only the bearing should be replaced if it is available separately; otherwise, replace the bearing plate assembly.

STRUT UPPER BEARING PLATE ASSEMBLIES

Condition	³	Code	³	Procedure
Attaching hardware broken	³	A	³	Require replacement of broken
	³		³	part, if available; otherwise,
	³		³	replace bearing plate assembly.
Attaching hardware loose	³	A	³	Require repair or replacement of
	³		³	loose part, if available;

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	³		³	otherwise, replace bearing plate
	³		³	assembly.
Attaching hardware missing	³	C	³	Require replacement of missing
	³		³	part, if available; otherwise,
	³		³	replace bearing plate assembly.
Attaching hardware threads	³	A	³	Require repair or replacement of
damaged	³		³	part with damaged threads, if
	³		³	available; otherwise, replace
	³		³	bearing plate assembly.
Attaching hardware threads	³	A	³	Require replacement of part with
stripped (threads missing)	³		³	stripped threads, if available;
	³		³	otherwise, replace bearing plate
	³		³	assembly.
Bearing axial or radial	³	B	³	Require replacement of bearing.
movement exceeds vehicle	³		³	
manufacturer's specs	³		³	
Bearing binding	³	A	³	Require replacement of bearing.
Bearing missing	³	C	³	Require replacement of bearing.
Bearing seized	³	A	³	Require replacement of bearing.
Bent	³	B	³	Require replacement.
Holes distorted	³	A	³	Require replacement.
Missing	³	C	³	Require replacement.
Severely corroded,	³	A	³	Require replacement.
affecting structural	³		³	
integrity	³		³	

SWAY BAR LINKS

SWAY BAR LINKS				
Condition	³	Code	³	Procedure
Attaching hardware	³	A	³	Require replacement of incorrect
incorrect	³		³	part, if available; otherwise,
	³		³	replace link.
Attaching hardware loose	³	A	³	Require repair or replacement of
	³		³	loose part, if available;
	³		³	otherwise, replace link.

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NOTE: (1) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method

missing)

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TIE ROD ENDS (INNER & OUTER)

TIE ROD ENDS (INNER & OUTER)

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Condition	³	Code	³	Procedure
Attaching hardware incorrect	³	A	³	Require replacement of incorrect part, if available; otherwise, replace tie rod end.
Attaching hardware loose	³	A	³	Require repair or replacement of loose part, if available; otherwise, replace tie rod end.
Attaching hardware missing	³	C	³	Require replacement of missing part, if available; otherwise, replace tie rod end.
Attaching hardware threads damaged	³	A	³	Require repair or replacement of part with damaged threads, if available; otherwise, replace tie rod end.
Attaching hardware threads stripped (threads missing)	³	A	³	Require replacement of part with stripped threads, if available; otherwise, replace tie rod end.
Adjusting sleeve bent	³	B	³	Require replacement of sleeve or tie rod end.
Adjusting sleeve clamps out of position	³	B	³	Require repair.
Adjusting sleeve corroded, affecting structural integrity	³	A	³	Require replacement of sleeve or tie rod end.
Adjusting sleeve missing	³	C	³	Require replacement of sleeve or tie rod end.
Adjusting sleeve seized	³	A	³	Require repair or replacement. See note (1) below.
Adjusting sleeve threads damaged	³	A	³	Require repair or replacement of sleeve or tie rod end.
Adjusting sleeve threads stripped (threads missing)	³	A	³	Require replacement of sleeve or tie rod end.
Binding	³	A	³	Further inspection required.

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3 3 See note (2) below.

Grease boot cracked 3 3 Suggest replacement. See note (3).

Grease boot missing 3 3 Suggest replacement. See note (4).

Grease boot torn 3 3 Suggest replacement. See note (5).

Grease fitting broken 3 A 3 Require replacement of grease fitting.

Grease fitting missing 3 C 3 Require replacement of grease fitting.

Grease fitting won't seal 3 A 3 Require replacement of grease fitting.

Grease seal missing 3 B,2 3 Suggest replacement of seal. 3 3 See note (4) below.

Grease seal torn 3 B,2 3 Suggest replacement of seal. 3 3 See note (5) below.

Greaseable tie rod end 3 B,2 3 Suggest replacement of grease will not take grease 3 3 fitting. See note (6) below.

Looseness (perceptible horizontal movement) 3 A,1 3 Suggest replacement. See note (7). 3 3

CAUTION: DO NOT use pliers or pry bar to check ball and socket movement. Use only moderate hand pressure.

Looseness exceeds manufacturer's specs 3 B 3 Require replacement. 3 3

Looseness that is excessive 3 B 3 Require replacement. See notes (7) 3 3 and (8), caution.

Nut on stud loose 3 A 3 Require repair or replacement of 3 3 nut. See note (9) below.

Seized 3 A 3 Require replacement

Stud bent 3 B 3 Require replacement. See note (10)

Stud broken 3 A 3 Require replacement. See note (10)

Threads damaged 3 A 3 Require repair or replacement.

Threads stripped (threads missing) 3 A 3 Require replacement. See note (10) 3 3

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- NOTE: (1) Only required if toe needs to be adjusted.
(2) If greaseable, grease joint. If problem persists or joint is non-greaseable, require replacement.
(3) Cracked grease boot will allow contaminants to enter joint and will accelerate wear.
(4) Lack of grease boot will allow contaminants to enter joint and will accelerate wear.
(5) Torn grease boot will allow contaminants to enter joint and will accelerate wear.
(6) If greaseable tie rod end will not take grease after replacing the grease fitting, suggest replacement of tie rod end.
(7) If manufacturer's procedures for inspection exist, use those procedures; otherwise, use an approved inspection method such as the dry park check.
(8) Excessive looseness is defined as being significant enough to affect vehicle handling or structural integrity.
(9) Check for bent stud or damaged taper hole.
(10) Check for damaged taper hole.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

TRACK BARS

TRACK BARS

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Condition	3	Code	3	Procedure
Attaching hardware incorrect	3	A	3	Require replacement of incorrect part, if available; otherwise, replace track bar.
Attaching hardware loose	3	A	3	Require repair or replacement of loose part, if available; otherwise, replace track bar.
Attaching hardware missing	3	C	3	Require replacement of missing part, if available; otherwise, replace track bar.
Attaching hardware threads damaged	3	A	3	Require repair or replacement of part with damaged threads, if available; otherwise, replace track bar.
Attaching hardware threads stripped (threads missing)	3	A	3	Require replacement of part with stripped threads, if available; otherwise, replace track bar.
Bent	3	B	3	Require replacement.
Corroded, affecting structural integrity	3	A	3	Require replacement.

TRAILING ARMS

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TRAILING ARMS

Condition			3	Code	3	Procedure
Attaching hardware broken			3	A	3	Require replacement of broken part, if available; otherwise, replace trailing arm.
Attaching hardware loose			3	A	3	Require repair or replacement of loose part, if available; otherwise, replace trailing arm.
Attaching hardware missing			3	C	3	Require replacement of missing part, if available; otherwise, replace trailing arm.
Attaching hardware threads damaged			3	A	3	Require repair or replacement of part with damaged threads, if available; otherwise, replace trailing arm.
Attaching hardware threads stripped (threads missing)			3	A	3	Require replacement of part with stripped threads, if available; otherwise, replace trailing arm.
Bent			3	B	3	Require replacement.
Bushings oversized			3	B	3	Require replacement.
Corroded, affecting structural integrity			3	A	3	Require replacement.
Holes distorted			3	A	3	Require replacement.
Threads damaged			3	A	3	Require repair or replacement.
Threads stripped (threads missing)			3	A	3	Require replacement.

WHEEL ALIGNMENT

WHEEL ALIGNMENT

Wheel alignment is defined as the measurement, analysis, and adjustment of steering and suspension angles to conform to OEM specifications. These angles usually include, but are not limited to: caster, camber, toe, and thrust angle. Where these angles are not adjustable and not in specification, component replacement or correction kits may be required. Errors in set-back and steering axis inclination (SAI) are often attributable to failed or damaged components and must be corrected prior to performing an alignment.

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Failure to replace or correct suggested or required parts or service may prevent a proper alignment.

Before performing an alignment check, inspect and verify the following:

- * Tire pressure and size
- * Vehicle loading
- * Ride height
- * Steering and suspension parts

Only if the inspection reveals that all the above are within published specifications, should a wheel alignment check and an alignment, if needed, be performed.

CAUTION: Under no circumstances should a technician bend or heat any steering or suspension component, unless specified by the vehicle manufacturer, for example, Ford forged twin "I" beam axles. All measurements and suggestions must be noted on the inspection report.

WHEEL ALIGNMENT

Condition			3	Code	3	Procedure
Dog tracking, shown to be						
caused by faulty alignment			3	B,2	3	Suggest repair.
Lead, shown to be caused						
by faulty alignment			3	B	3	Require alignment.
Part has been changed that						
may affect alignment			3	B	3	Require alignment check.
Pull, shown to be caused						
by faulty alignment			3	B	3	Require alignment.
Steering wheel off-center						
			3	B,2	3	Suggest alignment.
Tire wear, shown to be						
caused by faulty alignment			3	B	3	Require alignment.
Wander, shown to be caused						
by faulty alignment			3	B	3	Require alignment.

WHEEL BEARINGS, RACES, & SEALS

NOTE: When replacing or repacking wheel bearings, grease seal replacement is required. You are not required to replace these components in axle sets. Determine the need to replace based upon the individual component conditions that follow.

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WHEEL BEARINGS, RACES, & SEALS

Condition			3	Code	3	Procedure
Rear axle seal on rear-wheel drive leaking						
			3	A	3	Require replacement of seal and inspection of axle, bearing, housing, and vent tube
Seal bent						
			3	A,1	3	Suggest replacement.
Seal leaking						
			3	A	3	Require replacement of seal and inspection of bearings.
Seal missing						
			3	C	3	Require replacement.
Seal torn						
			3	A	3	Require replacement.
Wheel bearing assembly feels rough when rotated						
			3	A	3	Require replacement of bearing assembly.
Wheel bearing balls are pitted						
			3	A	3	Require replacement of bearing assembly.
Wheel bearing balls are worn						
			3	A	3	Require replacement of bearing assembly.
Wheel bearing end-play exceeds vehicle manufacturer's specs						
			3	A	3	Require adjustment of bearing, if possible. If proper adjustment cannot be obtained, require repair or replacement of worn component.
Wheel bearing race is loose in the hub bore						
			3	A	3	Require replacement of hub assembly and wheel bearings.
Wheel bearing races are pitted						
			3	A	3	Require replacement of bearing assembly.
Wheel bearing races are worn						
			3	A	3	Require replacement of bearing assembly.
Wheel bearing rollers are pitted						
			3	A	3	Require replacement of bearing assembly.
Wheel bearing rollers are worn						
			3	A	3	Require replacement of bearing assembly.

WHEELS & TIRES

TIRES

WARNING: These guidelines do not apply to split rims.

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Some vehicle manufacturers restrict replacement of tires to specific brands, types, or sizes.

High pressure temporary compact spare tires should not be used with any other rims or wheels, nor should standard tires, snow tires, wheel covers, or trim rings be used with high pressure compact spare rims or wheels.

Attempting to mount a tire of one diameter on a wheel of a different diameter or flange type may result in serious injury or death.

Only specially trained persons should de-mount or mount tires. Explosions of tire and wheel assembly can result from improper mounting, possibly causing serious injury or death.

Consult the vehicle owner's manual or vehicle placard for correct size, speed rating, designation, and cold inflation pressure of the original tires. DO NOT exceed the maximum load or inflation capacity of the tire specified by the Tire and Rim Association

When replacing tires, it is suggested that the replacement tires match or exceed the OEM speed rating designation. If tires of different speed rating designations are mixed on the same vehicle, the tires may vary in handling characteristics. DO NOT mix different speed rating designations on the same axle.

DO NOT mix radials with non-radial tires on the same axle, as this may affect vehicle handling and stability. If radial tires and bias or bias-belted ply tires are mixed on the same vehicle, the radials must be on the rear. High-pressure temporary compact spare tires are exempt from this rule.

DO NOT mix size or type (all season, performance, mud and snow) of tires on the same axle.

TIRES

Condition	³	Code ³	Procedure
Air pressure incorrect	³	B	³ Require repair
Bead broken	³	A	³ Require replacement.
Bead leaking, caused by tire	³	A	³ Require repair or replacement.
Bead wire/cord exposed	³	A	³ Require replacement.
Cord or belt material exposed	³	A	³ Require replacement.
Cord ply separations	³	A	³ Require replacement.
Directional/asymmetrical tires mounted incorrectly	³	B	³ Require remounting and/or repositioning.
Irregular tread wear, affecting performance	³	A	³ Suggest replacement. ³ See note (1) below.

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Load ratings less than OEM specifications 3 B 3 Require replacement.

Mixed tire size designations on same axle 3 A 3 Require rotation or replacement.

Mixed tread types (all season, performance, mud and snow) on same axle 3 A 3 Require rotation or replacement.

Number of punctures exceeds manufacturer's limit 3 B 3 Require replacement.

Out of balance 3 B 3 Require rebalance of tire/wheel assembly.

Ply separation 3 A 3 Require replacement.

Pull or lead, caused by tire 3 A 3 Require rotation or replacement.

Radial and bias or bias-belted ply tires on same axle 3 B 3 Require rotation or replacement.

Radials are on the front and not on the rear 3 B 3 Require rotation or replacement. See note (2).

Run flat damage 3 A 3 Require replacement.

Shoulder cut 3 A 3 Require replacement.

Shoulder puncture 3 A 3 Require replacement.

Shoulder with plug 3 A 3 Require replacement.

Sidewall bulge 3 A 3 Require replacement.

Sidewall cut 3 A 3 Require replacement.

Sidewall indentation 3 3 No service required/suggested.

Sidewall puncture 3 A 3 Require replacement.

Sidewall with plug 3 A 3 Require replacement.

Speed rating designations different on same axle 3 B 3 Suggest rotation or replacement.

Tire and wheel assembly has excessive run-out 3 B 3 Require repair or replacement of appropriate part. See note (3) below.

Condition	Code	Procedure
Bent	A,1	Suggest replacement.
Broken	A	Require replacement.
Cut, but not leaking	A,1	Suggest replacement.
Deteriorated (cracking, dry rot)	A,1	Suggest replacement.

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Leaking	³ A	³ Require repair/replacement.
Missing	³ C	³ Require replacement.
Threads damaged	³ A	³ Require repair/replacement.
Threads stripped (threads missing)	³ A	³ Require replacement.
Valve cap missing	³ C	³ Require replacement of cap.
Weather-checking	³ A,1	³ Suggest replacement.
Won't take air	³ A	³ Require repair/replacement.

WHEEL ATTACHMENT HARDWARE

For conditions noted below, also check conditions of wheel stud holes.

CAUTION: Proper lug nut torque is essential. Follow manufacturer's torque specifications and tightening sequence. DO NOT lubricate threads unless specified by the vehicle manufacturer.

WHEEL ATTACHMENT HARDWARE

Condition	³ Code	³ Procedure
Bent	³ A	³ Require replacement.
Broken	³ A	³ Require replacement.
	³	³ See note (1) below.
Loose	³ B	³ Require repair or replacement
	³	³ of affected component.
Lug nut installed backward	³ B	³ Require repair.
Lug nut mating type incorrect	³ B	³ Require replacement of nut.
Lug nut mating surface dished	³ A	³ Require replacement of nut.
Lug nut flats rounded	³ A	³ Require replacement of nut.
	³	³ See note (2) below.
Lug nut seized	³ A	³ Require replacement of nut
	³	³ and/or stud. See note (2) below.
Stud incorrect	³ B	³ Require replacement of stud.
Threads damaged	³ A	³ Require repair or replacement of

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3 3 component with damaged threads.

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Threads stripped (threads 3 A 3 Require replacement of
missing) 3 3 component with stripped threads.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

NOTE: (1) Some manufacturers require replacement of all studs on that
wheel if two or more studs or nuts on the same wheel are
broken or missing.

(2) Only required if removing wheel.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

WHEELS

WARNING: Mounting a regular tire on a high-pressure compact spare
wheel is not permitted. Attempting to mount a tire of one
diameter on a wheel of a different diameter or flange type
may result in serious injury or death. If the wheel
identification stamp is not legible, or cannot be found,
DO NOT use the wheel until the size and type have been
properly identified. Wheels of different diameter, offset,
or width cannot be mixed on the same axle. Bead seat tapers
cannot be interchanged.

WHEELS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition 3 Code 3 Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Bead leaking, caused by 3 A 3 Require repair or replacement.
wheel rim flange 3 3 See caution below.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

CAUTION: DO NOT attempt to correct a bent wheel rim.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Bent wheel hub mounting 3 A 3 Require replacement.
surface 3 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Bent wheel rim, causing 3 B,2 3 Suggest replacement.
vibration 3 3 See caution above.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Broken 3 A 3 Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Cast wheel porous, causing 3 A 3 Require repair or replacement.
a leak 3 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Clip-on balance weight is 3 B,2 3 Suggest replacement.
incorrect type for wheel 3 3

rim flange 3 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Corrosion, affecting 3 A 3 Require replacement.
structural integrity 3 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Corrosion build-up on wheel 3 A 3 Require repair.
hub mounting surface 3 3

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Cracked 3 A 3 Require replacement.

Directional/asymmetrical 3 B 3 Require remounting and/or
wheels mounted incorrectly 3 3 repositioning.

Load capacity less than 3 B 3 Require replacement.
OEM specifications 3 3

Offset mismatched on same 3 B 3 Require replacement.
axle 3 3

Rivets leaking 3 A 3 Require replacement.

Run-out beyond OEM specs 3 B 3 Require replacement.

Stud holes elongated 3 A 3 Require replacement. See note (1)

Welded or brazed repair 3 B,2 3 Suggest replacement.

Welds leaking 3 A 3 Require replacement.

Wheel hub centering (pilot) 3 B 3 Require replacement.
hole incorrect 3 3

NOTE: (1) Inspect wheel attaching hardware for damage.

END OF ARTICLE

AXLE SHAFT

Article Text

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ARTICLE BEGINNING

1995-96 DRIVE AXLES
Volkswagen - FWD Axle Shafts

Golf

TROUBLE SHOOTING

NOTE: See TROUBLE SHOOTING - BASIC PROCEDURES article in GENERAL INFORMATION.

REMOVAL, DISASSEMBLY, REASSEMBLY & INSTALLATION

AXLE SHAFT

NOTE: Two different types of joints may be used on axle shaft. Types used are: Constant Velocity (CV) type joint, or tripod-type joint. CV joint uses a 6 ball and cage design, while tripod joint uses a triple-roller design. Three methods may be used to assemble axle shaft to hub assembly depending on hub spline type. Later model design and new replacement parts are revised, and require an updated installation procedure.

NOTE: Tripod-type joints are used on models equipped with a 4-cylinder engine with an automatic transaxle. Engine/transaxle assembly must be raised to remove left-side axle shaft. It is not required to raise engine/transaxle assembly for right-side axle shaft removal.

Removal

1) Remove axle shaft nut. Raise and support vehicle. Remove wheel. Remove air deflector plate from lower control arm (if equipped). On models equipped with tripod-type joint, remove bolt for rear transaxle mount, and bolt for front engine mount.

2) Using Engine Support Bridge (10-222A) and Adapter (10-222 A/1), raise and support engine/transaxle assembly. Disconnect axle shaft(s) from transaxle drive flange. Mark position of lower control arm-to-ball joint bolts.

3) Remove both outer control arm-to-ball joint bolts. Loosen, but DO NOT remove inner control arm-to-ball joint bolt. On models equipped with compressed hub splines, use Press (3283) to press axle shaft from wheel hub. Swing wheel assembly outward and support if necessary. Remove axle shaft assembly.

Disassembly & Reassembly (CV-Type Joint)

1) Remove axle shaft boot(s). Using a drift, remove protective cap from CV joint (if equipped). Remove circlip from transaxle-side CV joint. See Fig. 1. Support CV joint with axle assembly on Support Stand (VW 402).

AXLE SHAFT Article Text (p. 2)

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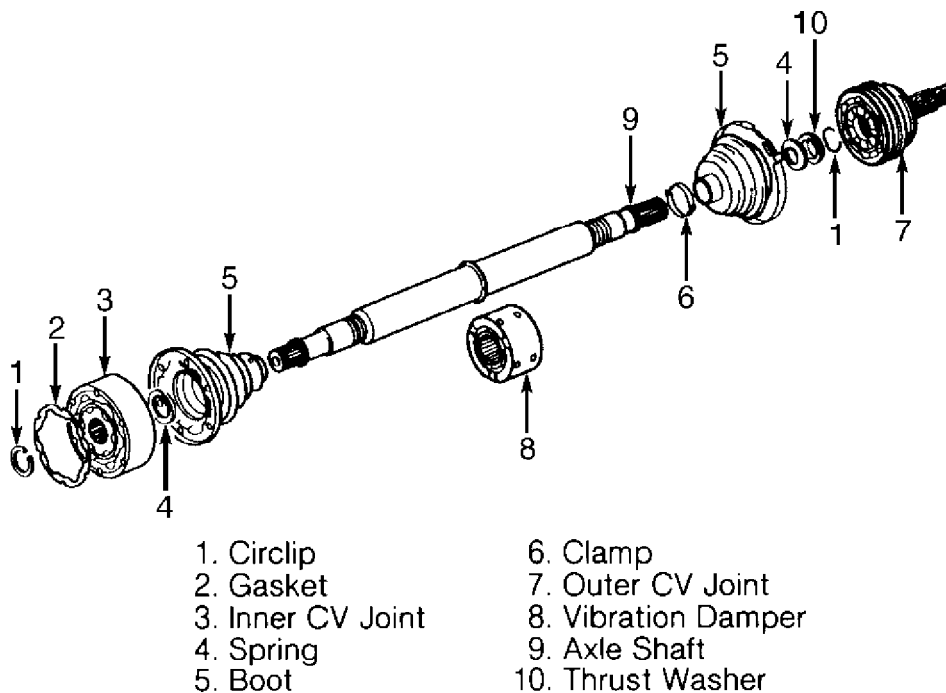
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2) Using Driver (VW 408A), press inner CV joint off axle shaft. Using a soft mallet, drive off outer CV joint from axle shaft. DO NOT disassemble outer CV joint. Outer CV joint is not serviceable, and must be replaced as an assembly if worn.

3) Mark position of ball hub in relation to ball cage and housing for installation reference of inner joint. Rotate inner race and remove balls. Clean and inspect parts for galling or wear. Cover balls with grease and reinstall in race.

4) To reassemble, reverse disassembly procedure. See AXLE SHAFT LENGTH table. Use NEW circlips and boot clamps during assembly.



96H04624

Fig. 1: Exploded View Of Axle Shaft With CV-Type Joint (Typical)
Courtesy of Volkswagen United States, Inc.

Disassembly & Reassembly (Tripod-Type Joint)

1) Remove axle shaft boot(s). Using a drift, remove protective cap from tripod joint. Remove circlip from tripod joint. Remove joint from axle shaft. Mark position of tripod-roller assembly in relation to housing for installation reference.

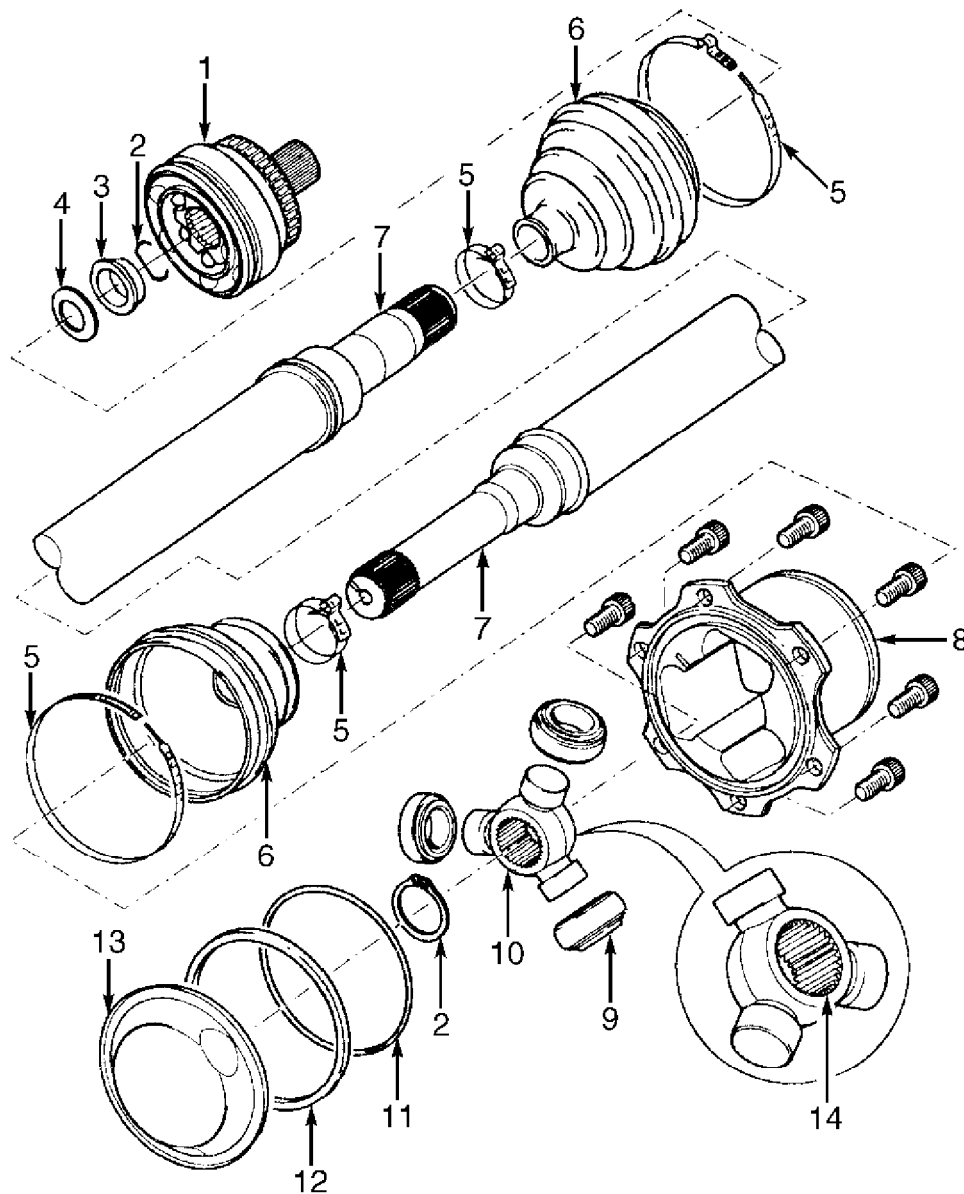
2) Remove tripod-roller assembly from housing. Clean and inspect parts for galling or wear. Install housing with a NEW boot on axle shaft. Cover tripod-roller assembly with grease and install into housing using reference marks made during disassembly.

3) Push tripod-roller assembly onto axle shaft with chamfered side of splines first. See Fig. 2. Install a NEW circlip. Fasten boot using a NEW clamp. Measure axle shaft length. See AXLE SHAFT LENGTH table.

AXLE SHAFT

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1. Outer CV Joint	8. Housing
2. Circlip	9. Roller
3. Thrust Ring	10. Triple-Rotor Star
4. Spring	11. "O" Ring
5. Clamp	12. Sealing Ring
6. Boot	13. Cover
7. Axle Shaft	14. Chamfered Side

96H04600

Fig. 2: Exploded View Of Axle Shaft With Tripod-Type Joint
Courtesy of Volkswagen United States, Inc.

NOTE: Bonded-type axle shafts use a locking fluid on mating axle shaft and hub splines. If reusing original hub assembly, apply Locking Fluid (D 185 400 A2) to axle shaft splines. Locking fluid is not needed if replacing hub assembly with

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revised part, since hub is a compress-fit design.

Installation

To install, reverse removal procedure. Clean bolts and nuts to ensure tightening torque is correct. Install a NEW axle shaft nut. See TORQUE SPECIFICATIONS.

AXLE SHAFT LENGTH TABLE

Application			In. (mm)
Automatic Transaxle (096)			
Left Axle	.....	17.6	(447.4)
Right Axle	.....	26.8	(681.5)
Automatic Transaxle (01M)	.....	(1)	
Manual Transaxle (02A)			
Left Axle	.....	17.6	(447.4)
Right Axle	.....	26.8	(681.5)
Manual Transaxle (020)			
Left Axle	.....	17.9	(455.5)
Right Axle	.....	27.1	(691.5)
Vibration Dampener Position			
1.9L Engine	(2) 20.63-20.71	(524.0-526.0)	
2.0L Engine	(2) 21.26-21.34	(540.0-542.0)	

- (1) - Information not available at time of publication.
(2) - Measured from outer surface of joint to outer surface of vibration damper.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application			Ft. Lbs. (N.m)
Axle Shaft Nut			
With Tripod-Type Joint	.....	195	(265)
With Bonded Axle Shaft Splines	... 66 (90) Plus 1/8 Turn		
With Compressed Hub Splines	.....	(1)	
Axle Shaft-To-Transaxle Flange Bolt			
CV-Type Joint	.....	33	(45)
Tripod-Type Joint	.....	59	(80)
Lower Control Arm-To-Ball Joint Bolt	.....	26	(35)
Wheel Lug Nut	.....	81	(110)

- (1) - Tighten to 148 ft. lbs. (200 N.m), then back off one turn. Retighten to 37 ft. lbs. (50 N.m), plus an additional 30 degrees.

AXLE SHAFT

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END OF ARTICLE

CLUTCH

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ARTICLE BEGINNING

1995-96 CLUTCHES

Volkswagen - FWD

Golf

DESCRIPTION

Clutches are single disc type. A diaphragm spring is used to engage pressure plate. The clutch system is mechanically or hydraulically operated. Mechanically operated clutch is controlled by the clutch pedal, clutch cable, return spring, release fork and release bearing. Hydraulically operated clutch is controlled by clutch pedal, clutch master cylinder, transaxle housing-mounted release cylinder, return spring, release fork and release bearing.

ADJUSTMENTS

NOTE: Cable clutch and hydraulic clutch systems are automatically adjusted and require no manual adjustment.

GEARSHIFT LEVER CABLES

1) Place gearshift lever in Neutral position. Remove gearshift knob and boot. Loosen bolt and nut (at transaxle slotted levers) of both cables.

2) Loosen lock bolt below front of gearshift lever. See Fig. 1. Install Shift Lever Gauge (3193). Pivot gauge locating pin under bearing plate and tighten lock nut.

3) Push gearshift lever to left into detent of slide. Push gearshift lever and slide to left and hold against stop (opposite direction of arrow shown). See Fig. 1. Tighten gauge bolt.

4) Push gearshift lever to right into right side detent (direction of arrow shown). See Fig. 1. Tighten lock bolt. Install Gauge Wedge & Locating Pin (3192/1). See Fig. 2.

5) Push wedge in between lever and cover until there is no free play in lever. DO NOT push in so as to make shift lever ride up. Tighten shift cables to levers. DO NOT disturb wedge or lever positions. Recheck wedge location.

6) Remove shift lever gauge, gauge wedge and locating pin. Check transaxle shifting. If gear engagement is okay, adjustment is complete. If any gear fails to engage smoothly, go to next step.

7) Place gearshift lever in 1st gear. Have an assistant measure actuating arm movement while moving gearshift left. Actuating arm should not move more than .04" (1 mm). If actuating arm movement is as specified, adjustment is complete. If actuating arm movement is not as specified, go next step.

8) Place gearshift lever in Neutral position. Loosen nut No. 1 at actuating arm mounting. See Fig. 3. Move mounting toward bulkhead and tighten nut. If gear selector will not adjust, check for worn or

CLUTCH

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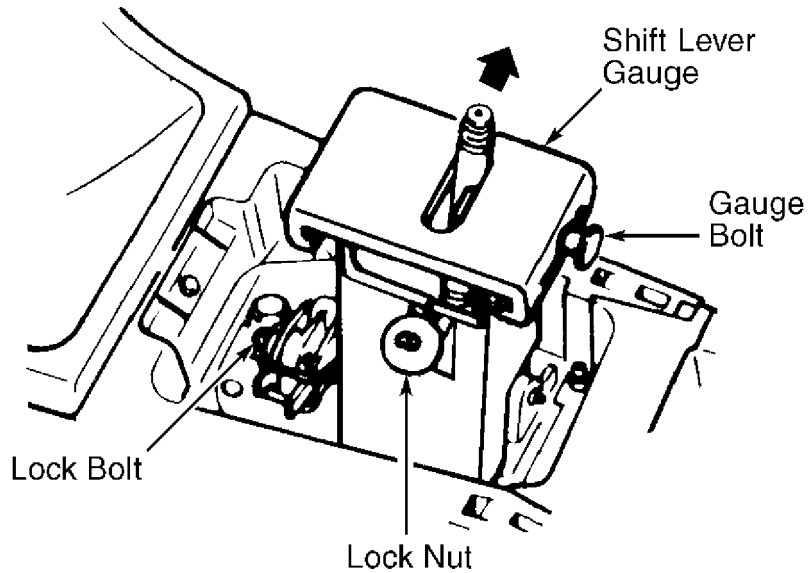
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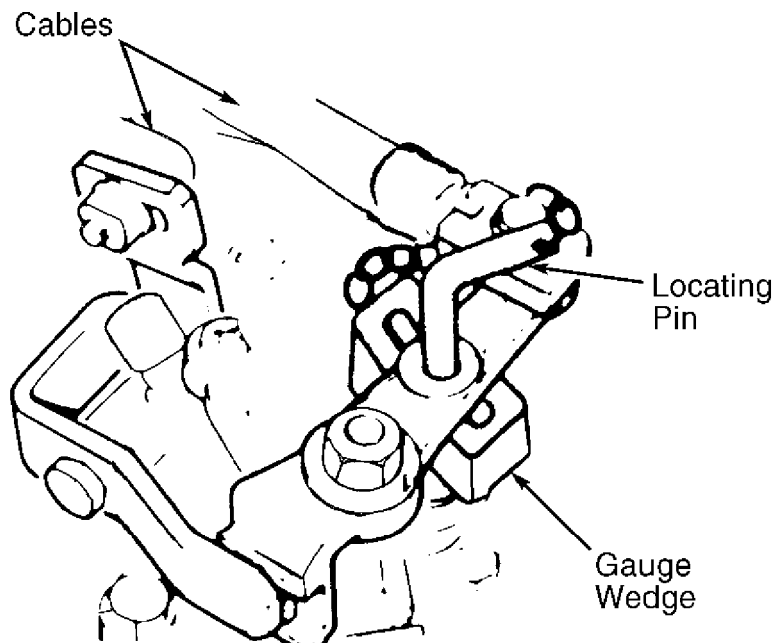
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damaged parts.



93J01004

Fig. 1: Identifying Shift Lever Gauge Installation
Courtesy of Volkswagen United States, Inc.



93C01005

Fig. 2: Identifying Gauge Wedge & Locating Pin Installation
Courtesy of Volkswagen United States, Inc.

CLUTCH

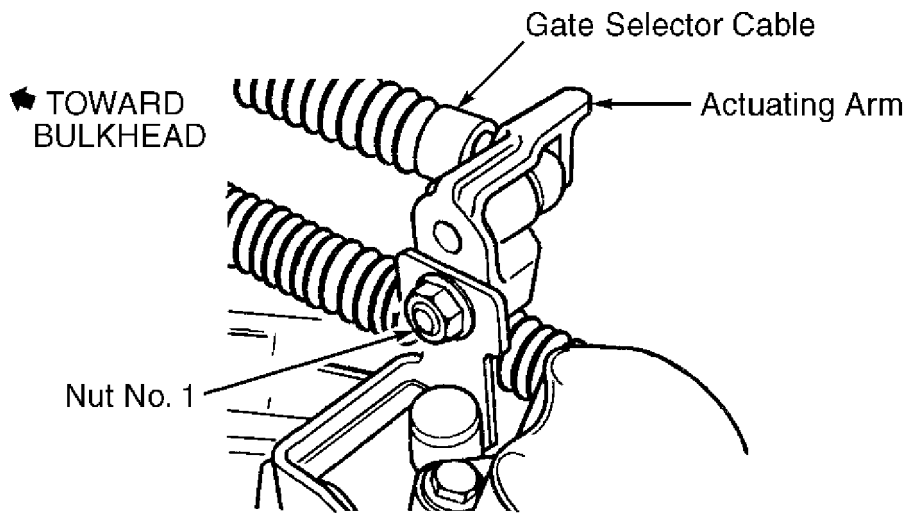
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97J04253

Fig. 3: Adjusting Actuating Arm Position
Courtesy of Volkswagen United States, Inc.

TRANSAXLE ALIGNMENT

Loosen side engine mount. If side engine mount is equipped with a through-bolt, loosen through-bolt only. Loosen transaxle to sub-frame mount. Loosen front engine mount. Rock power train and tighten side engine mount (through-bolt if equipped). Tighten transaxle mount and front engine mount.

REMOVAL & INSTALLATION

NOTE: On models with theft protection system, obtain stereo security code from vehicle owner before disconnecting battery cable.

CLUTCH ASSEMBLY

Removal (Cable Clutch)

1) Disconnect negative battery cable. Remove upper clutch housing-to-transaxle bolts. Disconnect right engine mount. Disconnect back-up light switch wires, speedometer cable and clutch cable at transaxle. See Fig. 4.

2) Disconnect shift linkage at gearshift lever. Disconnect transaxle mounting brackets. Attach Engine Support (10-222) to engine. Disconnect front engine support bracket. Remove starter and clutch shields.

3) Remove exhaust pipe bracket. Support transaxle with floor jack. Remove rear transaxle mount. Disconnect left and right axle shafts at transaxle. See AXLE SHAFTS - FWD article in DRIVE AXLES section. Turn steering full left and secure axle shafts. Remove large clutch cover plate bolts (plate remains on engine). Remove small clutch cover plate bolts and clutch cover plate.

4) Push engine as far to the right as possible. Pull

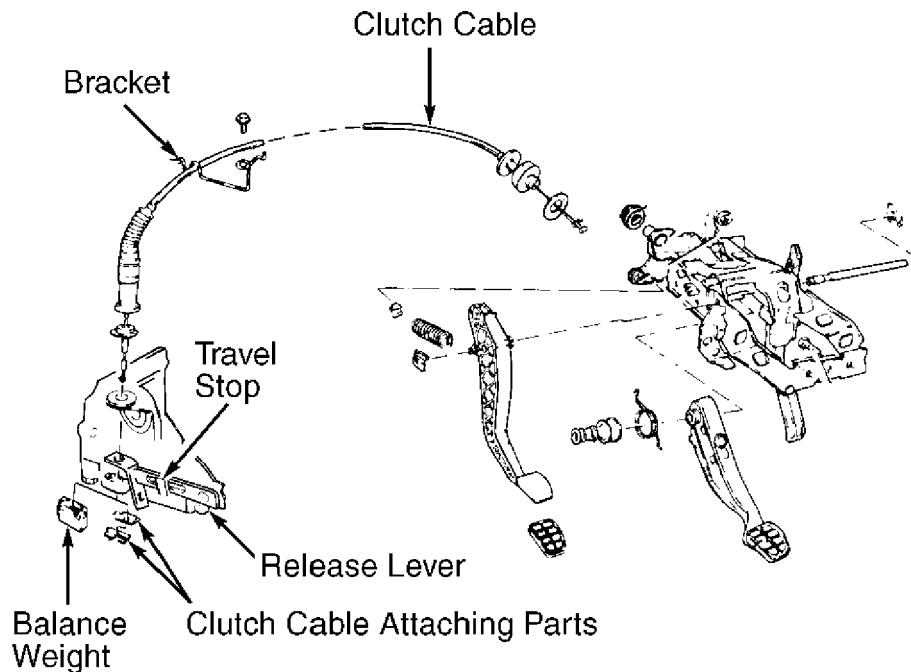
CLUTCH

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transaxle away from engine while positioning engine so right drive flange clears flywheel. Lower and remove transaxle.

5) With transaxle removed, install Flywheel Holder (VW558) on flywheel. Remove pressure plate-to-crankshaft bolts in a diagonal pattern. Pry retaining ring from intermediate plate, and lift intermediate plate from pressure plate. Remove clutch disc and flywheel. See Fig. 4.



93E83208

Fig. 4: Identifying Clutch Cable & Related Components
Courtesy of Volkswagen United States, Inc.

Inspection

1) Inspect pressure plate surface for wear, cracks, burning, or warpage. Measure warpage with straightedge and feeler gauge at several different points. Maximum pressure plate warpage is .008" (.2 mm). Inspect clutch release bearing for smooth operation and looseness. Replace bearings if necessary. DO NOT wash release bearing in solvent.

2) Inspect clutch disc lining for excessive wear and burned or oil-soaked condition. Inspect clutch disc for loose rivets and torsion dampers. Inspect ring and intermediate plate. Measure clutch disc and flywheel runout. Inspect flywheel ring gear teeth for wear and damage. Inspect flywheel for wear, cracks and burned condition.

Installation

1) To install, reverse removal procedure. Apply grease to ball stud and inner surface of release bearing. Clean hub splines of input shaft and apply a light coat of grease. Ensure clutch disc slides smoothly on input shaft spines.

2) Ensure protrusion on intermediate plate points away from

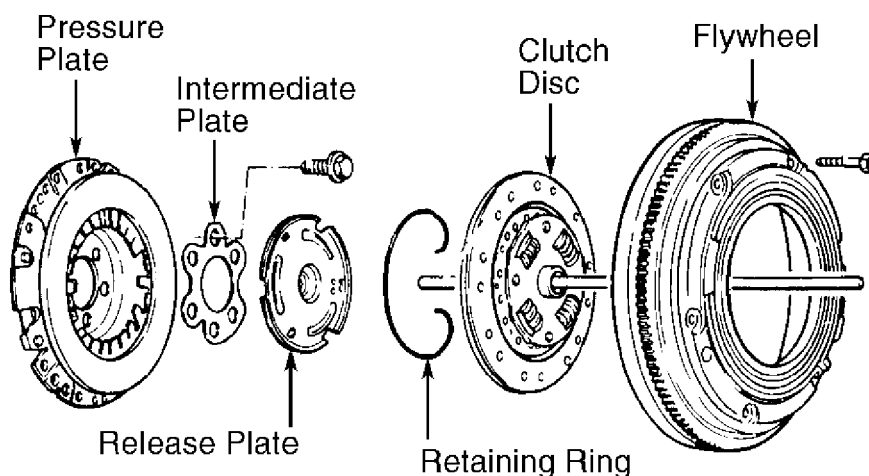
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pressure plate. See Fig. 5. Install pressure plate bolts finger tight. Using Clutch Centering Plug (3190), align clutch disc and pilot bushing holes. Tighten pressure plate bolts to specification using a crisscross pattern.

3) Using flywheel lock or similar device, hold crankshaft from turning. Tighten flywheel bolts, in a crisscross pattern, to specification. See TORQUE SPECIFICATIONS. On diesel models, align transaxle. See TRANSAXLE ALIGNMENT under ADJUSTMENTS. Ensure transaxle oil level is correct. Adjust gearshift lever cables. See GEARSHIFT LEVER CABLES under ADJUSTMENTS.



93F83209

Fig. 5: Exploded View Of Clutch Assembly (Cable Clutch)
Courtesy of Volkswagen United States, Inc.

Removal (Hydraulic Clutch)

1) Disconnect negative battery cable. Disconnect electrical connectors from transmission. Remove connecting tube to intercooler (if equipped).

2) Disconnect gearshift cables, cable supports and linkage from transmission. Remove clutch release cylinder, and wire aside. Disconnect speedometer drive from transmission. Remove upper engine-to-transaxle bolts.

3) Remove 3 right side engine mount-to-engine bolts and one left side transmission mount bracket through-bolt. On vehicles equipped with ABS, it may be necessary to remove coolant overflow reservoir to access left side through-bolt.

4) Remove radiator fan, cover and mount. Remove nut from front transmission mount. Attach Engine Support (10-222A) and Bases(10-222A/1) to engine. Slightly tighten engine support and remove starter. Remove left transaxle mount bracket.

5) Remove long left side transmission support bracket. Remove balance weight from mount. Remove heat shield for right side inner CV joint.

6) Disconnect axle shafts at flanges, and wire aside. See AXLE SHAFTS - FWD article in DRIVE AXLES section. Remove left side transaxle mount from transaxle. Push rearward on mount for clearance to remove long transaxle mount bolt.

CLUTCH

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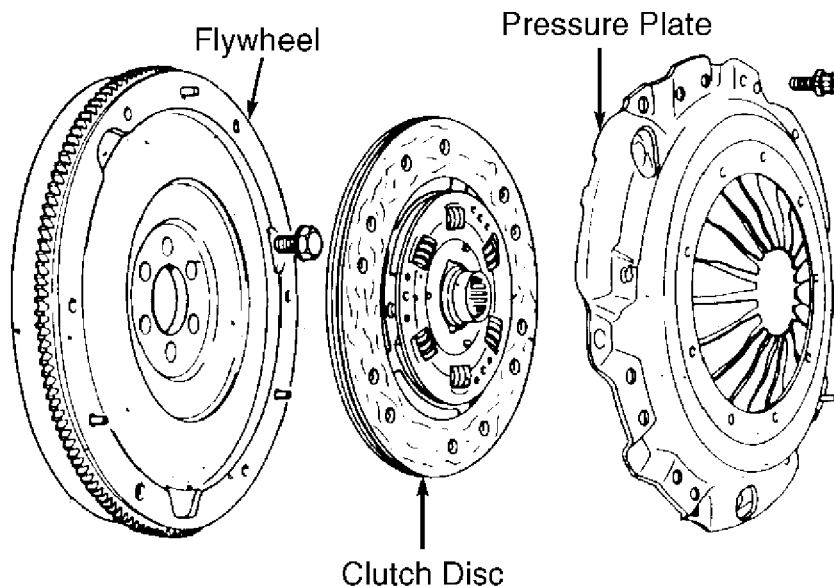
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7) Push transaxle mount to right and pull down to remove from vehicle. Remove small gear carrier housing cover. Support transaxle with floor jack. Remove rear transaxle mount. Remove lower transaxle-to-engine bolts. Carefully pry transaxle from engine and lower. Plug transaxle openings to prevent contamination or fluid loss.

8) Using Flywheel Lock (3067) or similar device, hold crankshaft from turning. Remove pressure plate bolts. Remove pressure plate and clutch disc. See Fig. 6.



93B83247

Fig. 6: Exploded View Of Clutch Assembly (Hydraulic Clutch)
Courtesy of Volkswagen United States, Inc.

Inspection

1) Inspect pressure plate surface for wear, cracks, burning, or warpage. Measure warpage with straightedge and feeler gauge at several different points. Maximum pressure plate warpage is .008" (.2 mm). Inspect clutch release bearing for smooth operation and looseness. Replace bearings if necessary. DO NOT wash release bearing in solvent.

2) Inspect clutch disc lining for excessive wear and burned or oil-soaked condition. Inspect clutch disc for loose rivets and torsion dampers. Measure clutch disc and flywheel runout. Inspect flywheel ring gear teeth for wear and damage. Inspect flywheel for wear, cracks and burned condition.

NOTE: Pressure plate has a protective grease coating. Remove contact surface grease only. Service life will be shortened if remaining portions of pressure plate protective grease are removed.

Installation

1) Replace input shaft "O" ring. See Fig. 7. To install, reverse removal procedure. Apply grease to ball stud and inner surface

CLUTCH

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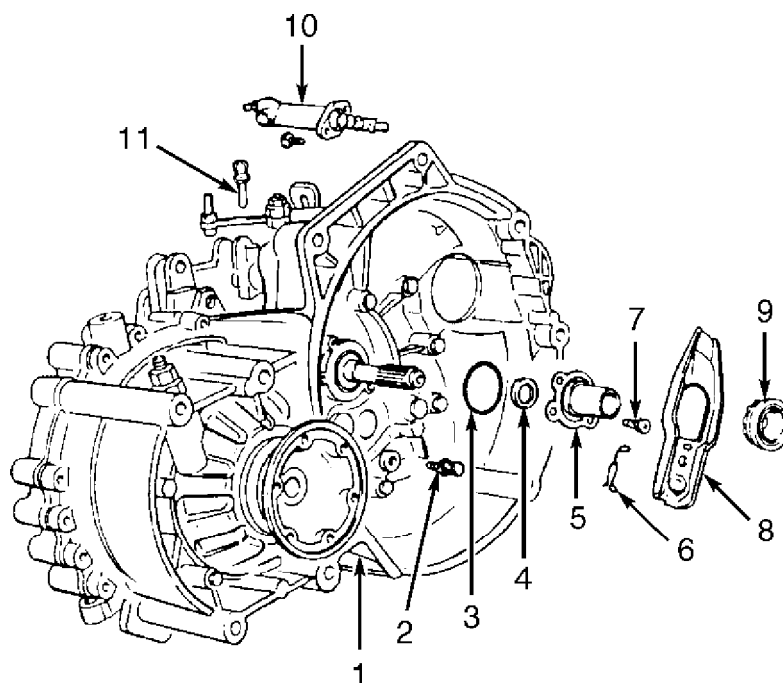
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of release bearing. Clean hub splines of input shaft and apply a light coat of grease. Ensure clutch disc slides on input shaft spines.

2) Install pressure plate bolts finger tight. Using Clutch Centering Plug (3190), align clutch disc and pilot bushing holes. Tighten pressure plate bolts to specification using a crisscross pattern.

3) On diesel models, align transaxle. See TRANSAXLE ALIGNMENT under ADJUSTMENTS. Ensure transaxle oil level is correct. Using Flywheel Lock (3067) or similar device, hold crankshaft from turning. Tighten flywheel bolts to specification. See TORQUE SPECIFICATIONS.

4) Push clutch release lever rearward and temporarily install mounting pin or an 8 x 22 mm bolt through pivot arm. Remove pin or bolt after installation is complete. Adjust gear selector mechanism. See GEARSHIFT LEVER CABLES under ADJUSTMENTS.



1. Transaxle	7. Guide Sleeve Bolt
2. Ball Stud	8. Release Lever
3. Input Shaft "O" Ring	9. Release Bearing
4. Input Shaft Seal	10. Slave Cylinder
5. Guide Sleeve	11. Assembly Pin
6. Retaining Spring	

93G83226
Fig. 7: Exploded View Of Transaxle Assembly (Hydraulic Clutch)
Courtesy of Volkswagen United States, Inc.

CLUTCH CABLE

NOTE: If installing new cable, compress adjusting mechanism using same retaining strap used to compress adjusting mechanism of NEW cable. Strap is included with NEW cable.

CLUTCH

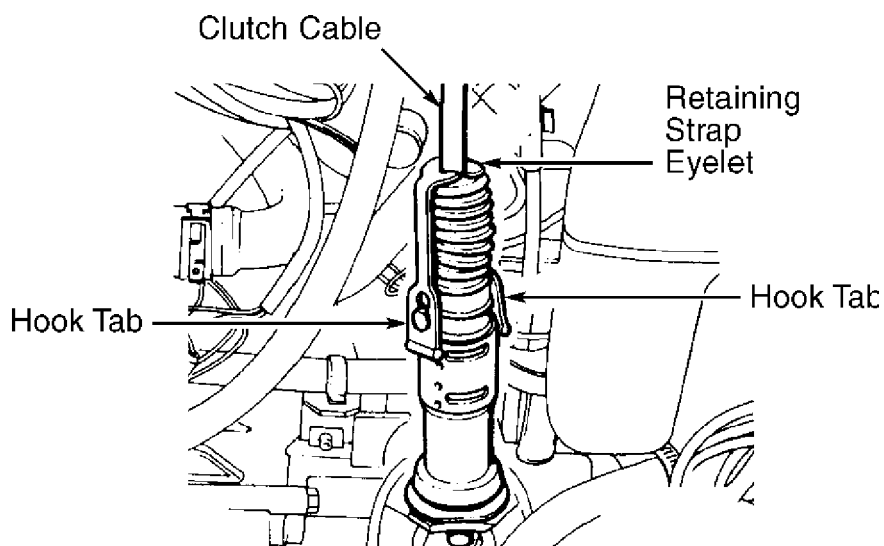
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Removal & Installation

1) Carefully cut 1/2 of retaining strap eyelet. Remove retaining strap from new clutch cable, being careful not to bend clutch cable. Depress clutch pedal at least 5 times. Install retaining strap onto old cable. See Fig. 8.

2) With an assistant, compress adjusting mechanism and hook retaining strap tabs onto pins of adjusting mechanism. If adjusting mechanism cannot be compressed, repair or replace adjusting mechanism. Remove over-center spring and clutch cable.



97B04254

Fig. 8: Removing Clutch Cable
Courtesy of Volkswagen United States, Inc.

CLUTCH MASTER CYLINDER

Removal & Installation

1) Remove coolant expansion tank. With hoses attached move aside. Remove and plug hydraulic line. Remove and plug fluid supply hose located between clutch master cylinder and brake master cylinder reservoir. Remove lower trim plate.

2) Using Clip Release Tool (3309), remove master cylinder push rod. Remove clutch pedal mounting bracket. Remove mounting nuts and master cylinder. To install, reverse removal procedure. Bleed hydraulic system. See BLEEDING CLUTCH HYDRAULIC SYSTEM.

CLUTCH RELEASE CYLINDER

Removal & Installation

1) Disconnect negative battery cable. Remove catalytic converter and heat shield. Remove gear selector cable and lever. Remove relay lever and actuating arm. If equipped, remove balance weight. Remove clutch release cylinder.

2) To install, reverse removal procedure. Bleed hydraulic

CLUTCH

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system. See BLEEDING CLUTCH HYDRAULIC SYSTEM. Adjust gear selector mechanism. See GEARSHIFT LEVER CABLES under ADJUSTMENTS.

BLEEDING CLUTCH HYDRAULIC SYSTEM

Attach hose to bleeder fitting located on clutch release cylinder, next to hydraulic line. Submerge other end of hose in container half full of clean brake fluid. Fill reservoir with DOT 3 brake fluid. Open bleeder fitting. Have assistant press clutch pedal to full release position. Close bleeder fitting. Release clutch pedal. Repeat until air bubbles no longer emerge from hose. Refill reservoir.

OVERHAUL

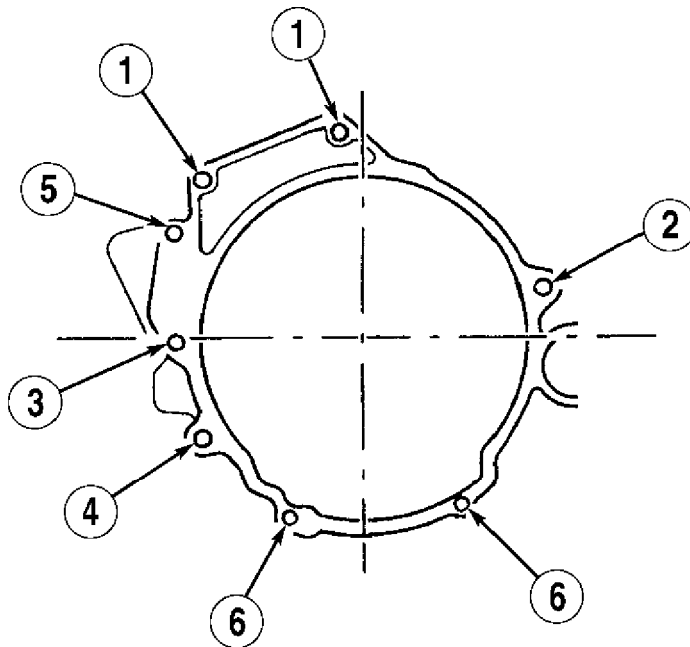
NOTE: Manufacturer recommends replacement of faulty clutch master and release cylinders and does not provide overhaul procedures.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application		Ft. Lbs. (N.m)
Axle Shaft-To-Transaxle Bolt	.....	32 (43)
Balance Weight-To-Mount Bolt	.....	22 (30)
Clutch Master Cylinder Bolt	.....	18 (25)
Clutch Release Cylinder Bolt	.....	18 (25)
Engine Mount-To-Subframe Bolt	.....	37 (50)
Engine-To-Transaxle Bolt (1)		
Flywheel-To-Crankshaft	 44 (60) + 1/4 Turn	
Front Transaxle Mount Bolt	.....	44 (60)
Gearshift Cable Bolt	.....	18 (25)
Gearshift Cable Support Bolt	.....	18 (25)
Pressure Plate Bolt		
Cable Clutch	 22 (30) + 1/4 Turn	
Hydraulic Clutch	.....	15 (20)
Right Engine Bracket Bolt	.....	44 (60)
Starter Bolt		
Cable Clutch	.....	44 (60)
Hydraulic Clutch	.....	18 (25)
Transaxle Bracket Bolt		
Cable Clutch	.....	26 (35)
Hydraulic Clutch	.....	18 (25)

(1) See Fig. 9 or 10.

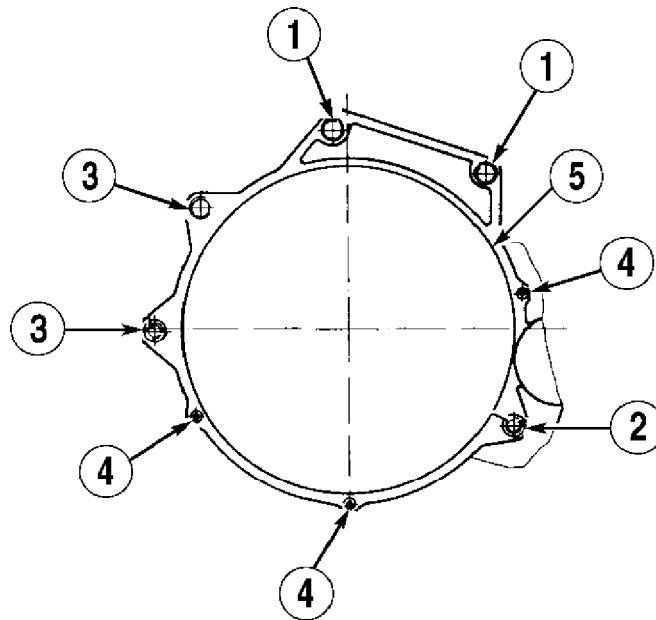


Item	Size	Quantity	Specification
1	M12 x 55	2	59 Ft. Lbs. (80 N.m)
2	M12 x 62	1	59 Ft. Lbs. (80 N.m)
3	M12 x 62	1	59 Ft. Lbs. (80 N.m)
4	M12 x 46	1	59 Ft. Lbs. (80 N.m)
5	M10 x 160	1	44 Ft. Lbs. (60 N.m)
6	M7 x 12	2	7 Ft. Lbs. (10 N.m)

97D04250

Fig. 9: Identifying Bolt Locations & Tightening Specifications
 (Mechanical Clutch)

Courtesy of Volkswagen United States, Inc.



Fastener	Size	Qty.	Tightening torque
1	M12 x 55	2	59 Ft. Lbs. (80 N.m)
2	M12 x 64	1	59 Ft. Lbs. (80 N.m)
3	M10 x 140	2	44 Ft. Lbs. (60 N.m)
4	M7 x 12	3	7 Ft. Lbs. (10 N.m)
5	M6 x 8	1	7 Ft. Lbs. (10 N.m)

97J04248

Fig. 10: Identifying Bolt Locations & Tightening Specifications
(Hydraulic Clutch)

Courtesy of Volkswagen United States, Inc.

END OF ARTICLE

TRANSMISSION SERVICING - M/T

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ARTICLE BEGINNING

MANUAL TRANSMISSION SERVICING
Volkswagen

Cabrio, Golf, Golf III, GTI VR6, Jetta, Jetta III, Passat

IDENTIFICATION

MANUAL TRANSAXLE APPLICATIONS

Application Model

1995

Cabrio & Golf III	020
GTI VR6 & Passat	02A
Jetta III	
4-Cylinder	020
V6	02A

1996

Cabrio	020
Golf & Jetta	
4-Cylinder	
Gas Engine	020
Turbo Diesel	02A
V6	02A
Passat	02A

LUBRICATION

SERVICE INTERVALS

No oil changes are required.

CHECKING FLUID LEVEL

Remove oil filler plug. Oil level should be up to lower edge of filler hole. Add if necessary. Install filler plug.

RECOMMENDED FLUID

Use API G50 75W-90 synthetic gear oil.

FLUID CAPACITIES

TRANSAXLE REFILL CAPACITIES

Transaxle Qts. (L)

02A	2.1 (2.0)

TRANSMISSION SERVICING - M/T

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020 2.0 (1.9)
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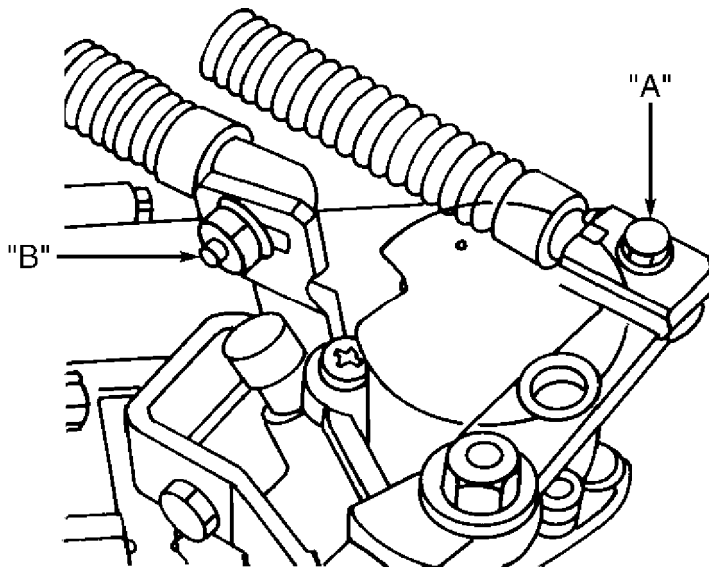
ADJUSTMENTS

GEARSHIFT LINKAGE

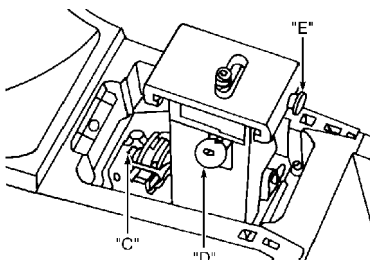
02A Transaxle

1) Place gear selector lever in Neutral position. Remove knob and boot. Remove balance weight. Loosen bolt "A" and nut "B" sufficiently so that operating cables move freely in centering holes. See Fig. 1. Install Shift Linkage Gauge (3192). Loosen bolt "C". See Fig. 2.

2) Pivot locating pin under bearing plate. Tighten nut "D". Place gearshift lever into left detent of slide. Move gearshift lever and slide together to left stop. Tighten slide with bolt "D". Move gearshift lever to right detent. Tighten bolt "E". Move gearshift lever to right detent. Tighten bolt "C".



92G01413
Fig. 1: Identifying Centering Holes (02A Transaxle)
Courtesy of Volkswagen of America, Inc.



92G01414
Fig. 2: Installing Shift Linkage Gauge (02A Transaxle)
Courtesy of Volkswagen of America, Inc.

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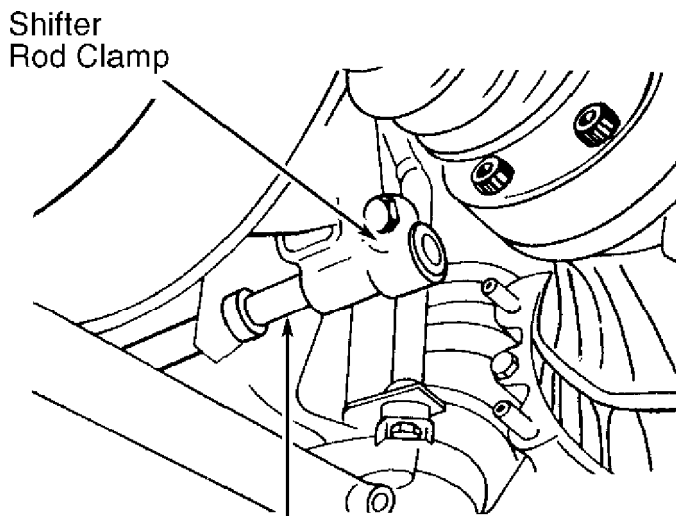
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020 Transaxle

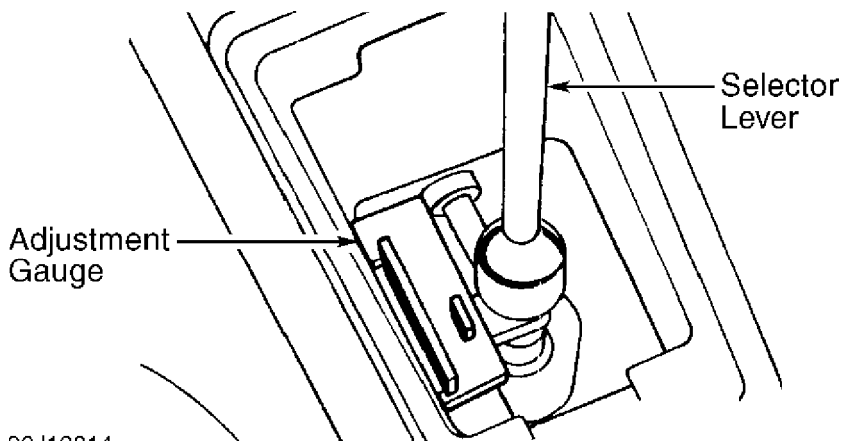
1) Place shift lever in Neutral position. Ensure transaxle is also in Neutral. Loosen lower shifter rod clamp. See Fig. 3. Selector lever must move freely on shifter rod.

2) Remove gearshift knob and boot. Position Adjustment Gauge (3104) over shift rod. See Fig. 4. With transaxle in Neutral, align shift rod with selector lever. Tighten shifter rod clamp to 19 ft. lbs. (26 N.m).

3) Move gearshift lever through all gear positions. Gears must engage smoothly and without jamming. Reinstall gearshift knob and boot.



96I19313
Fig. 3: Loosening Shift Rod Clamp (020 Transaxle)
Courtesy of Volkswagen of America, Inc.



96J19314
Fig. 4: Locating Adjustment Gauge (020 Transaxle)
Courtesy of Volkswagen of America, Inc.

END OF ARTICLE

TRANSMISSION REMOVAL & INSTALLATION - M/T

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ARTICLE BEGINNING

MANUAL TRANSMISSION REMOVAL
Volkswagen

Cabrio, Golf, Golf III, GTI VR6, Jetta, Jetta III, Passat

MODEL IDENTIFICATION

MANUAL TRANSAXLE APPLICATIONS

Application Model

1995

Cabrio & Golf III	020
GTI VR6 & Passat	02A
Jetta III	
4-Cylinder	020
V6	02A

1996

Cabrio	020
Golf & Jetta	
4-Cylinder	
Gas Engine	020
Turbo Diesel	02A
V6	02A
Passat	02A

REMOVAL & INSTALLATION

NOTE: Transaxle may be lowered out of vehicle without removing engine.

CAUTION: On models with theft protection system, obtain stereo security code from vehicle owner before disconnecting battery cable.

CABRIO, GOLF, GTI & JETTA (02A TRANSAXLE)

Removal & Installation

1) Disconnect battery cables and remove battery. Remove power steering fluid reservoir. Remove battery bracket. Disconnect all electrical connections to transaxle and position harness aside.

2) Remove bolt from right-side engine mount. Remove wire harness bracket located next to engine mount if necessary. Remove balance weight located near gear selector cable.

3) Disconnect gear selector cable from gear selector lever. Disconnect gate selector cable at actuating arm/relay lever. Remove cable bracket-to-transmission bolts. Remove clutch slave cylinder (DO NOT open hydraulic system) and position aside.

TRANSMISSION REMOVAL & INSTALLATION - M/T

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4) Remove bolt from left-side transaxle mount. Remove transaxle support (if equipped). Remove connector attachment from front transaxle bracket. Support engine and transaxle with Support Bridge (10-222A) and Adapter Spindles (10-222A3). Slightly lift engine with support.

5) Remove engine undercover. Remove starter. Disconnect both axle shafts from flanges. Turn steering wheel to full-left lock. Tie axle shafts out of way. Remove lower support between engine and transaxle (if equipped).

6) Remove small clutch cover plate. Push engine/transaxle assembly as far right as possible. Remove transaxle mount. Push engine/transaxle assembly rearward, towards bulkhead. Remove lower mounting bolt.

7) Lower engine/transaxle assembly to previous position. Remove clutch cover plate. Remove bolt from transaxle mount above right-side axle flange. Place transmission jack under transaxle.

8) Remove lower engine-to-transaxle bolt. Separate transaxle from engine and remove from vehicle. To install, reverse removal procedure. Ensure engine/transaxle mounts are free of stress when tightening. Tighten bolts to specification. See TORQUE SPECIFICATIONS.

CABRIO, GOLF, GTI & JETTA (020 TRANSAXLE)

Removal & Installation

1) Disconnect negative battery cable. Disconnect all electrical connectors from transaxle and position harness aside. Remove upper transaxle-to-engine bolts.

2) Remove right-side engine support bracket bolt. Remove connector support plate (if equipped). On Cabrio, remove front engine-to-body support. On all models, disconnect both selector rods from selector lever.

3) Remove long selector rod from relay lever. Remove 2 upper bolts from transaxle bracket at left side of transaxle. On Cabrio, remove transaxle-to-body support.

4) On all models, remove front bracket-to-engine mount bolt. Attach Engine Support (10-222A) and Adaptor Spindles (10-222 A/1). Slightly lift engine/transaxle assembly. Remove engine undercover.

5) Remove starter. Remove front bracket. Remove engine mount attaching bolts and large clutch shield. Remove small clutch shield from behind right-side axle shaft flange.

6) Remove left-side transaxle bracket. Using left-side adapter spindle, lower left side of transaxle. Remove left-side transaxle support if equipped. Disconnect both axle shafts from transaxle. If necessary, remove heat shield from inner Constant Velocity (CV) joint.

7) Turn steering wheel to full-left lock. Suspend both axle shafts as high as possible. Push engine/transaxle assembly toward front of vehicle. Place transmission jack under transaxle.

8) Remove lower transaxle-to-engine bolt. Separate transaxle from engine. Carefully lower and remove transaxle from vehicle. To install, reverse removal procedure. Ensure engine/transaxle mounts are free of stress when tightening. Tighten bolts to specification. See

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TORQUE SPECIFICATIONS.

PASSAT (4-CYLINDER ENGINE)

Removal

1) Disconnect battery cables and remove battery. Remove radiator cover. Disconnect all electrical connections to transaxle and position harness aside.

2) Remove balance weight and disconnect gear selector cable from gear selector lever. Remove bolt with threaded sleeve from shift lever. Remove gear selector cable along with washer and square self-locking nut.

3) Disconnect gate selector cable from actuating arm/relay lever. Remove cable bracket support. Remove clutch slave cylinder (DO NOT open hydraulic system) and position aside.

4) Remove air intake duct between air cleaner and intake air elbow. Remove 3 bolts from right-side engine mount. Remove ground strap from upper transaxle-to-engine bolt. Remove upper rear transaxle-to-engine bolts. Loosen, but DO NOT remove front transaxle-to-engine bolts.

5) Remove bolt from left-side transaxle mount, and nut from front mount bracket. Support engine/transaxle assembly with Support Bridge (10-222A) and Adapter Spindles (10-222 A/1). Slightly raise engine. Remove engine undercover.

6) Remove starter. Remove power steering bracket from transaxle. Remove front mounting bracket and engine mount. Mark balance weight at subframe for installation reference. Remove balance weight.

7) Disconnect exhaust system in front of Three-Way Catalytic Converter (TWC). Remove right-side inner Constant Velocity (CV) joint protective cover from engine. Remove left-side air deflector from lower control arm.

8) Disconnect both axle shafts from flanges. Turn steering wheel to full-left lock. Push engine/transaxle assembly as far forward as possible. Tie axle shafts out of way.

9) Remove transaxle-to-mount bracket. Remove adapter spindles and lift engine/transaxle assembly until exhaust system contacts heat shield. Push engine/transaxle assembly forward and remove lower transaxle bracket mounting bolt.

10) Remove small clutch cover from behind right-side axle flange. Remove large clutch cover plate. Lower engine to previous position, then push as far as possible toward right side and lower engine using left-side adapter spindle.

11) Remove lower transaxle-to-engine bolt. Push engine/transaxle assembly forward from underneath vehicle using Set-Up Press (3300A). Place transmission jack under transaxle. Remove forward bolt from upper engine/transaxle support. Separate transaxle from engine. Lower transaxle and remove from vehicle.

Installation

1) To install, reverse removal procedure. Plug transaxle openings to prevent contamination or fluid loss. Push clutch release

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lever rearward and temporarily install mounting pin or an 8 x 35 mm bolt through pivot arm. Remove pin or bolt after installation is complete.

2) Ensure engine/transaxle mounts are free of stress when tightening. Tighten bolts and nuts to specification. See TORQUE SPECIFICATIONS.

PASSAT (V6 ENGINE)

Removal

1) Disconnect battery cables and remove battery. Remove upper section of air cleaner housing. Remove radiator cover. Remove right-side bracket-to-engine mount bolt and bracket. Disconnect all electrical connections to transaxle and position harness aside.

2) Remove balance weight and disconnect gear selector cable from gear selector lever. Disconnect gate selector cable from actuating arm/relay lever. Unclip clutch slave cylinder hose at cable support bracket. Remove cable support bracket.

3) Remove clutch slave cylinder (DO NOT open hydraulic system) and position aside. Remove upper transaxle-to-engine bolts. Remove cooling system recovery tank and position aside.

4) Remove left-side transaxle mount bolt. Remove bracket and mount. Install Engine Support (10-222A) and Adaptor Spindles (10-222 A/1 and 10-222 A/3). Slightly lift engine/transaxle assembly.

5) Remove lower belt guard and engine undercover. Remove starter. Remove balance weight from subframe. Disconnect exhaust system in front of Three-Way Catalytic Converter (TWC).

6) Disconnect both axle shafts from flanges. Turn steering wheel to full-left lock. Tie both axle shafts aside, as high as possible. Push engine/transaxle assembly as far right as possible.

7) Remove accessible transaxle mount-to-bracket bolts. Using adapter spindles, lift engine/transaxle assembly until exhaust system contacts heat shield. Remove remaining bolts and transaxle bracket (push engine/transaxle assembly rearward, toward bulkhead as needed).

8) Lower engine/transaxle assembly to previous position. Using left-side adapter spindle, tilt engine. Remove clutch cover plate. Remove transaxle-to-engine bolts above right-side axle flange.

9) Place transmission jack under transaxle. Remove lower transaxle-to-engine mounting bolt. Separate transaxle from engine. Using Engine Support (3300), push engine forward until it contacts subframe. Lower transaxle and remove from vehicle.

Installation

1) To install, reverse removal procedure. Plug transaxle openings to prevent contamination or fluid loss. Push clutch release lever rearward and temporarily install mounting pin or an 8 x 35 mm bolt through pivot arm. Remove pin or bolt after installation is complete.

2) Ensure engine/transaxle mounts are free of stress when tightening. Tighten bolts and nuts to specification. See TORQUE SPECIFICATIONS.

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TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application Ft. Lbs. (N.m)

Cabriolet, Golf, GTI, & Jetta

02A Transaxle

Axle Shaft-To-Flange Bolts	33 (45)
Left-Side Bracket-To-Engine Bolt	18 (25)
Lower Starter Bolt	44 (60)
Lower Transaxle Support Bolts	33 (45)
Right-Side Bracket-To-Subframe Bolt	44 (60)
Selector Cable Support Bracket Bolts	18 (25)
Selector Cable-To-Selector Lever Bolt	18 (25)
Transaxle Mounting Bolts	
M10 X 30 Bolt	37 (50)
M10 X 45 Bolt	37 (50)
M10 X 62 Bolt	33 (45)
Transaxle-To-Engine Bolts	
M7 Bolt	7 (10)
M10 Bolt	44 (60)
M12 Bolt	59 (80)

020 Transaxle

Axle Shaft-To-Flange Bolts	33 (45)
Engine Mount-To-Subframe Bolt	37 (50)
Engine Support-To-Body (1)	
Bolts	37 (50)
Nuts	37 (50)
Left-Side Bracket-To-Transaxle Bolt	26 (35)
Right-Side Bracket-To-Subframe Bolt	44 (60)
Slave Cylinder-To-Engine Bolt	22 (30)
Transaxle Mounting Bolts	
M10 Nut	7 (10)
M10 X 30 Bolt	44 (60)
M10 X 45 Bolt	44 (60)
M10 X 60 Bolt	33 (45)
Transaxle Support-To-Body Bolts (1)	37 (50)
Transaxle-To-Engine Bolts	
M6 X 8 Bolt	59 (80)
M7 X 12 Bolt	7 (10)
M10 X 140 Bolt	44 (60)
M12 X 55 Bolt	59 (80)
M12 X 64 Bolt	59 (80)

Passat

Axle Shaft-To-Flange Bolts	33 (45)
Balance Weight-To-Assembly Carrier	22 (30)
Balance Weight-To-Selector Lever Bolt	18 (25)
Left-Side Bracket-To-Engine	18 (25)
Lower Starter Bolt	44 (60)
Lower Transaxle Support Bolts	33 (45)
Right-Side Bracket-To-Subframe	44 (60)

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Selector Cable Support Bracket Bolts	18 (25)
Selector Cable-To-Selector Lever Bolt	18 (25)
Transaxle Mounting Bolts	
M10 X 30 Bolt	37 (50)
M10 X 45 Bolt	37 (50)
Transaxle-To-Engine Bolts	
M7 Bolt	7 (10)
M10 Bolt	44 (60)
M12 Bolt	59 (80)

(1) - Cabrio only.

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END OF ARTICLE

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ARTICLE BEGINNING

1993-96 MAINTENANCE
Volkswagen Maintenance & Service Intervals

Golf III,
GTI (1995-96),
Jetta III
Cabrio (1995-96)

*** PLEASE READ THIS FIRST ***

NOTE: All SERVICE SCHEDULES are listed for normal service vehicles. If vehicle is operated under severe service conditions, see SEVERE SERVICE REQUIREMENTS (PERFORM W/SERVICE SCHEDULES) for items requiring additional maintenance.

NOTE: This article contains scheduled maintenance service information. Fluid types and capacities listed with each service in this article are only those necessary to perform that scheduled service. For specifications pertaining to fluid capacities for the entire vehicle, fuse and circuit breaker identification, wheel and tire size, battery type, warranty information, or model identification refer to the MAINTENANCE INFORMATION article in this section.

CAUTIONS & WARNINGS

BATTERY WARNING

WARNING: When battery is disconnected, vehicles equipped with computers may lose memory data. When battery power is restored, driveability problems may exist on some vehicles. These vehicles may require a relearn procedure. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION section.

REPLACING BLOWN FUSES

Before replacing a blown fuse, remove ignition key, turn off all lights and accessories to avoid damaging the electrical system. Be sure to use fuse with the correct indicated amperage rating. The use of an incorrect amperage rating fuse may result in a dangerous electrical system overload.

BRAKE PAD REPLACEMENT

WARNING: Use caution when checking and/or changing brake pads, some pads may contain asbestos which can irritate eyes and may cause other health hazards. A water based solution should be used to clean brake dust from wheel and brake components.

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DO NOT use compressed air to blow off brake dust.

BRAKE SYSTEM

CAUTION: If brake warning light comes on while driving it indicates a low fluid level or failure in one of the braking circuits. If the brake pedal can be depressed further than normal it is an indication that one of the brake circuits is not functioning. Stop vehicle and check brake reservoir fluid level. If level is below MIN mark, DO NOT drive vehicle. Have it towed to a repair shop. If level is between the MIN and MAX marks, proceed cautiously to a repair shop.

BRAKE PAD WEAR INDICATOR

Indicator will cause a squealing or scraping noise, warning that brake pads need replacement.

BRAKE PEDAL PRESSURE WITH ENGINE NOT RUNNING

CAUTION: Brake pedal requires extreme pressure to stop the vehicle when the engine is not running.

CATALYTIC CONVERTER

Continued operation of vehicle with a severe malfunction could cause converter to overheat, resulting in possible damage to converter and vehicle.

Any modification to the exhaust system on turbo models, which reduces exhaust backpressure, will lead to lean fuel mixtures and excessive spark advance. This could cause serious engine damage.

COOLANT (PROPYLENE-GLYCOL FORMULATIONS)

To avoid possible damage to vehicle use only ethylene-glycol based coolants with a mixture ratio from 44-68% anti-freeze. DO NOT use 100% anti-freeze as it will cause the formation of cooling system deposits. This results in coolant temperatures of over 300° F (149°C) which can melt plastics. 100% anti-freeze has a freeze point of only -8° F (-22°C).

CAUTION: Propylene-Glycol Mixtures has a smaller temperature range than Ethylene-Glycol. The temperature range (freeze-boil) of a 50/50 Anti-Freeze/Water Mix is as follows:

Propylene-Glycol -26° F (-32°C) - 257° F (125°C)

Ethylene-Glycol -35° F (-37°C) - 263° F (128°C)

CAUTION: Propylene-Glycol/Ethylene-Glycol Mixtures can cause the destabilization of various corrosion inhibitors. Also Propylene-Glycol/Ethylene-Glycol has a different specific gravity than Ethylene-Glycol coolant, which will result in

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inaccurate freeze point calculations.

ELECTRIC SHOCK HAZARD

WARNING: Contact with live components of ignition system while engine is running could lead to a fatal electric shock.

ELECTROSTATIC DISCHARGE SENSITIVE (ESD) PARTS

WARNING: Many solid state electrical components can be damaged by static electricity (ESD). Some will display a warning label, but many will not. Discharge personal static electricity by touching a metal ground point on the vehicle prior to servicing any ESD sensitive component.

ENGINE OIL

CAUTION: Never use non-detergent or straight mineral oil.

FUEL SYSTEM SERVICE

WARNING: Relieve fuel system pressure prior to servicing any fuel system component (fuel injection models).

HALOGEN BULBS

Halogen bulbs contain pressurized gas which may explode if overheated. DO NOT touch glass portion of bulb with bare hands. Eye protection should be worn when handling or working around halogen bulbs.

RADIATOR CAP

CAUTION: Always disconnect the fan motor when working near the radiator fan. The fan is temperature controlled and could start at any time even when the ignition key is in the OFF position. DO NOT loosen or remove radiator cap when cooling system is hot.

RADIATOR FAN

WARNING: Keep hands away from radiator fan. Fan is controlled by a thermostatic switch which may come on or run for up to 15 minutes even after engine is turned off.

SERVICE POINT LOCATIONS

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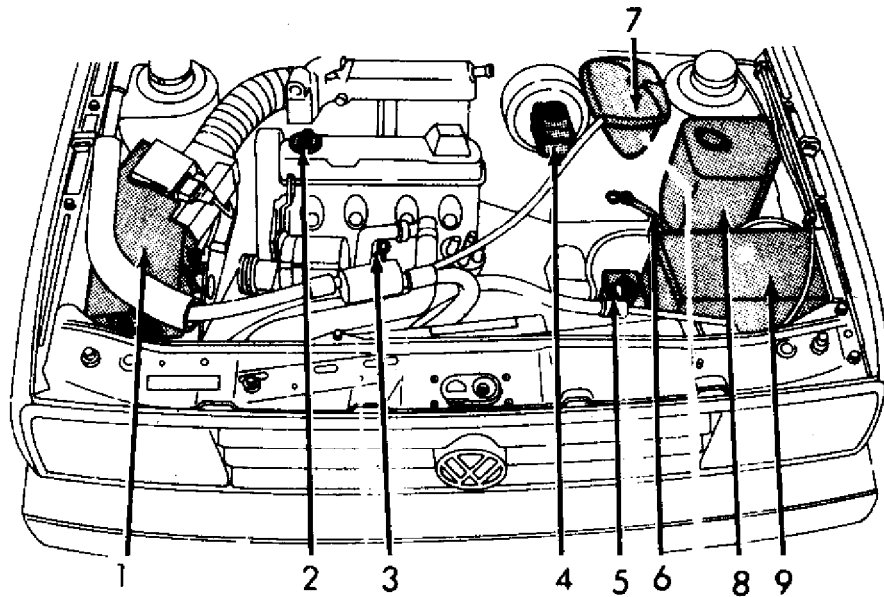
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GASOLINE ENGINE

1. Air Cleaner	6. Automatic Transmission Dipstick
2. Engine Oil Filler Cap	7. Engine Coolant Expansion Tank
3. Engine Oil Dipstick	8. Windshield Washer Reservoir
4. Brake Fluid Reservoir	9. Battery
5. Power Steering Reservoir	10. Diesel Fuel Filter

93C45783

Fig. 1: Service Point Locations (Gasoline Engine)
Courtesy of Volkswagen United States, Inc.

ADDITIONAL SERVICE INFORMATION

ALIGNING CAMSHAFT TIMING MARKS

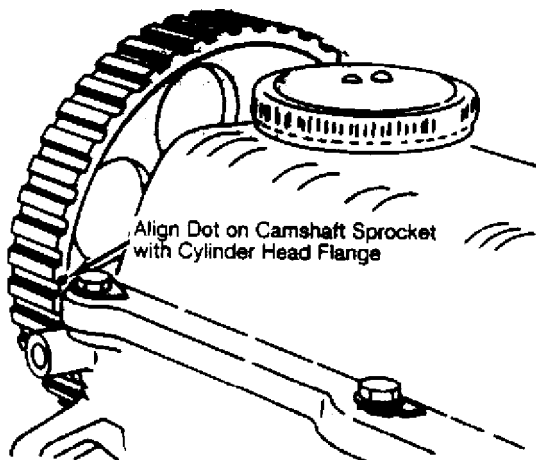


Fig. 2: Camshaft Sprocket Positioning (Gasoline)
Courtesy of Volkswagen United States, Inc.

NOTE: For more information regarding camshaft timing belt service refer to the 1.7L 4-CYL article in the

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ENGINE MECHANICAL section.

VALVE CLEARANCE ADJUSTMENT

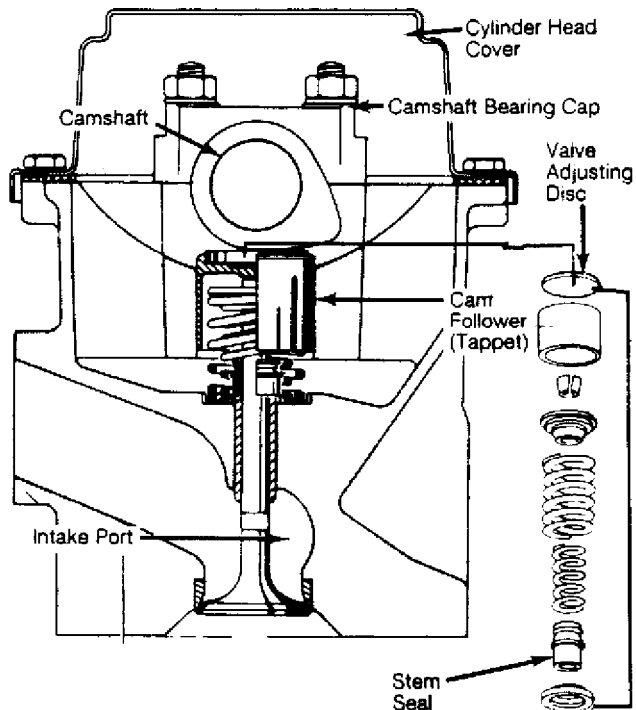
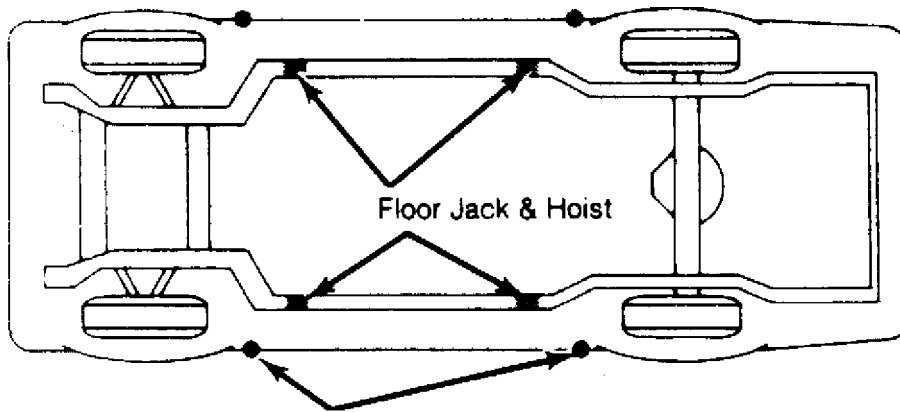


Fig. 3: Assembled View of Valve and Camshaft
Courtesy of Volkswagen United States, Inc.

NOTE: For more information regarding valve clearance adjustments refer to the 1.7L 4-CYL article in the ENGINE MECHANICAL section.

JACKING & HOISTING POINTS



For Vehicle Jack
Fig. 4: Floor Jack, Floor Hoist & Vehicle Jack
Courtesy of Volkswagen United States, Inc.

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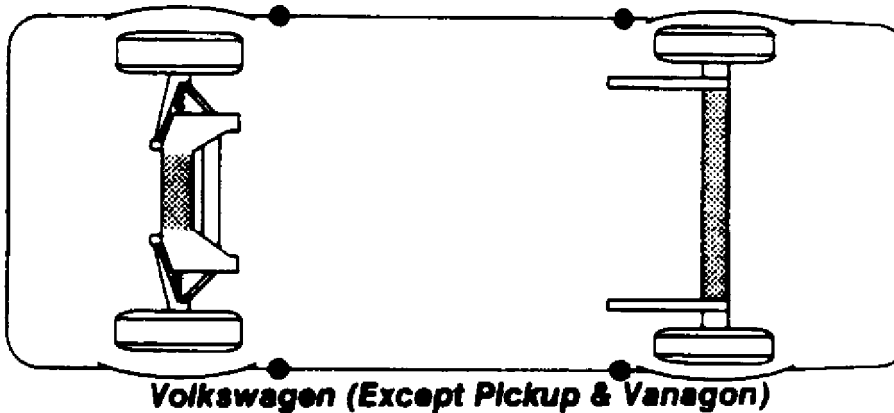


Fig. 5: Vehicle Lifting Points - Except Pickup
Courtesy of Volkswagen United States, Inc.

NOTE: For more information regarding jacking and hoisting points refer to the JACKING & HOISTING article in the WHEEL ALIGNMENT section.

INFORMATION LABEL LOCATIONS

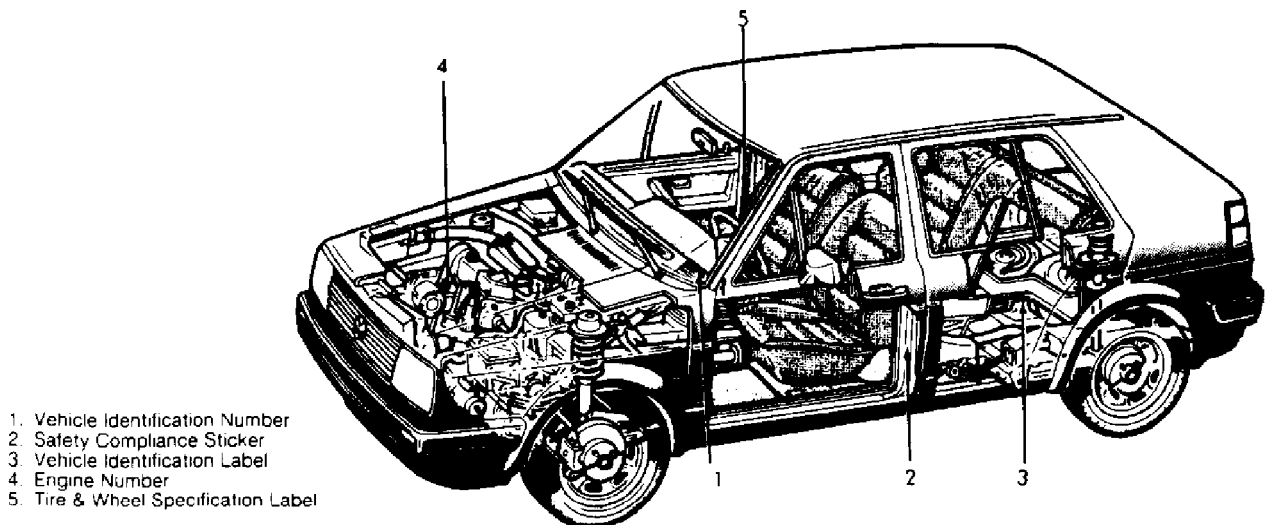


Fig. 6: Information Label Locations
Courtesy of Volkswagen United States, Inc.

CAMSHAFT TIMING BELT REPLACEMENT INFORMATION

CAUTION: Failure to replace a faulty camshaft timing belt may result in serious engine damage.

The condition of camshaft drive belts should always be checked on vehicles which have more than 50,000 miles. Although some manufacturers do not recommend belt replacement at a specified mileage, others require it at 60,000-100,000 miles. A camshaft drive belt failure may cause extensive damage to internal engine components on most engines, although some designs do not allow piston-to-valve

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```
3 Short Trips In 3 Replace 3Engine Oil & 3 3,750 Miles or 3 Months 3
3 Freezing 3 3 Filter 3
3 Temperatures 3 3 3
3 3 Replace 3 A/T Fluid 3 15,000 Miles 3
3 3 3
3 Towing Or Heavily 3 Replace 3Engine Oil & 3 3,750 Miles or 3 Months 3
3 Loaded 3 3 Filter 3
3 3 3
3 3 Replace 3 A/T Fluid 3 15,000 Miles 3
3 3 3
3 Severe Dust 3 Replace 3Engine Oil & 3 3,750 Miles or 3 Months 3
3 Conditions 3 3 Filter 3
3 3 3
3 3 Replace 3 A/T Fluid 3 15,000 Miles 3
3 3 3
3 Hot Weather, 3 Replace 3Engine Oil & 3 3,750 Miles or 3 Months 3
3 Stop-And-Go 3 3 Filter 3
3 Driving 3 3 3
3 3 Replace 3 A/T Fluid 3 15,000 Miles 3
3 3 3
3 Extensive Idling 3 Replace 3Engine Oil & 3 3,750 Miles or 3 Months 3
3 3 3 Filter 3
3 3 3
3 3 Replace 3 A/T Fluid 3 15,000 Miles 3
3 3 3
3(1) - Perform these services at the mileage or number of months 3
3 (since the last time), whichever comes first. 3
3 3
```

NORMAL MAINTENANCE SERVICE SCHEDULES

CAUTION: The following service schedules refer to vehicles driven under normal operating conditions. For vehicles driven under severe conditions, additional services may be necessary. See SEVERE SERVICE REQUIREMENTS (PERFORM W/SERVICE SCHEDULES) above in this article for additional service requirements.

7500 MILE (12,000 KM) SERVICE

7500 MILE (12,000 KM) SERVICE

```
3 3 Service Or Inspect 3
3 3 Check Fluid Levels 3
3 3 Inspect Coolant Hoses and Clamps 3
3 3 Inspect Brake System 3
3 3 Inspect Exhaust System 3
```


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3	3	Check Crankcase Ventilation System	3
3	3	Check Fuel Evaporation System	3
3	3	Check EGR System (Reset Mileage Counter - If Applicable)	3
3	3	Check Fluid Levels	3
3	3	Inspect Coolant Hoses and Clamps	3
3	3	Cooling & Heating System	3
3	3	Check Coolant Strength	3
3	3	Inspect/Adjust Accessory Drive Belts (Replace if Required)	3
3	3	Windshield Washer System	3
3	3	Clean Battery and Battery Terminals	3
3	3	Throttle Linkage	3
3	3	Inspect Fuel/Tank/Cap/Lines	3
3	3	Intake Air System	3
3	3	Clutch Hydraulic System	3
3	3	Inspect CV Joint Boots	3
3	3	Drive Shafts For Leaks & Damage	3
3	3	Check Operation of Horn, Wipers/Washers & All Exterior Lights	3
3	3	Inspect Condition of Wiper Blades	3
3	3	Check Headlight Alignment	3
3	3	Check Seat Belt Webbing and Release Mechanisms	3
3	3	Check Parking Brake Operation	3
3	3	Check Shift/Clutch Interlock Operation	3
3	3	Inspect Brake System Hoses & Lines	3
3	3	Brake Discs & Calipers	3
3	3	Inspect Front Brake Pads & Rotors	3
3	3	Inspect Rear Brake Linings & Drums	3

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3	3	Lubricate Chassis	3
3	3	Inspect Steering Linkage/Front Suspension	3
3	3	Suspension & Wheel Bearings	3
3	3	Steering Operation, Tie Rods, Gear Box & Boots	3
3	3	Lubricate Weatherstripping with Silicone	3
3	3	Lubricate Door Hinges	3
3	3	Lubricate Door Locks	3
3	3	Check Body Drain Holes	3
3	3	Inspect Shocks/Struts for Leakage	3
3	3	Inspect Tire Wear Pattern	3
3	3	Rotate Tires and Adjust Air Pressure (Including Spare)	3
3		Replace	3
3	3	Engine Oil	3
3	3	Oil Filter	3
3	3	Clean Air Filter Element (Replace if Required)	3
3		Lubrication Specifications	3
3		Application	Specification
3			
3		Automatic Transaxle	Dexron-II E ATF
3		Brake Fluid	DOT 4 Brake Fluid (SAE J1703)
3		Coolant	50/50 Mix Water & Ethylene Glycol
3		Engine Oil (1)	
3		Ambient Temperatures	
3		Greater Than 140 F (-100C)	SAE 15W-40 Or 20W-50 API SG/CD
3		140-500F (-100 To +100C)	SAE 10W-30 Or 10W-40 API SG/CD
3		Less Than 500F (100C)	SAE 5W-30 Or 5W-40 API SG/CD
3		Power Steering Fluid	VW Hydraulic Oil G-002-000
3		Manual Transaxle	Hypoid Gear Oil SAE 75W-90 API GL-4
3			Or SAE 75W-90 (G50 Synthetic)
3		Final Drive (A/T & M/T)	
3		(Differential)	SAE 75W-90 (G50 Synthetic Gear Oil)
3		Wheel Bearings	NLGI Grade 2 Category GC-LB
3		Steering Linkage (2)(3)	NLGI Grade 2 Category GC-LB
3		Ball Joints (2)(4)	NLGI Grade 2 Category GC-LB
3		Weatherstrip	Dielectric Silicone Grease
3			

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(1) - SAE 15W-40 or 20W-40 engine oil is recommended for extreme conditions or extended highway operation.

(2) - Use low pressure grease gun to prevent seal damage.

(3) - Fill until lubricant squeezes out from the base of seals.

(4) - Fill ball joint until seal starts to swell.

Fluid Capacities

Application (1) Quantity

Cooling System

Convertible 5.1 Qts. (4.8L)

Engine Oil (2) 4.7 Qts. (4.5L)

Automatic Transaxle

Fluid Change 3.2 Qts. (3.0L)

Dry Fill 5.9 Qts. (5.6L)

Final Drive (Differential)

A/T (3) 0.8 Qt. (.75L)

Manual Transaxle (4) 2.0 Qts. (1.9L)

(1) - Capacities are recommended or calculated levels. Always use dipstick (if available) to measure level.

(2) - Includes filter change.

(3) - Lifetime fill.

(4) - Single case includes manual transaxle & differential.

Service Labor Times

Application (1)(2)(3) Hours

Gasoline Engine

Automatic Transmission 1.5

Manual Transmission 1.7

(1) - Add .2 hr. if equipped with A/C.

(2) - Add .1 hr. if equipped with cruise control.

(3) - Add .5 hr. for 1983-84 Jetta, Rabbit and Pickup.

22,500 MILE (36,000 KM) SERVICE

22,500 MILE (36,000 KM) SERVICE

Service Or Inspect

Verify Last Major Service Was Performed

Check Fluid Levels

Inspect Coolant Hoses and Clamps

Inspect Brake System

[illegible]

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3	3	Perform Compression Test	3
3	3	Check Crankcase Ventilation System	3
3	3	Check Fuel Evaporation System	3
3	3	Check EGR System (Reset Mileage Counter - If Applicable)	3
3	3	Check Fluid Levels	3
3	3	Inspect Coolant Hoses and Clamps	3
3	3	Cooling & Heating System	3
3	3	Crankcase Ventilation System	3
3	3	Check Coolant Strength	3
3	3	Inspect/Adjust Accessory Drive Belts (Replace if Required)	3
3	3	Windshield Washer System	3
3	3	Clean Battery and Battery Terminals	3
3	3	Throttle Linkage	3
3	3	Fuel System	3
3	3	Intake Air System	3
3	3	Clutch Hydraulic System	3
3	3	Inspect CV Joint Boots	3
3	3	Drive Shafts For Leaks & Damage	3
3	3	Check Operation of Horn, Wipers/Washers & All Exterior Lights	3
3	3	Inspect Condition of Wiper Blades	3
3	3	Check Headlight Alignment	3
3	3	Check Seat Belt Webbing and Release Mechanisms	3
3	3	Check Parking Brake Operation	3
3	3	Check Shift/Clutch Interlock Operation	3
3	3	Inspect Brake System Hoses & Lines	3
3	3	Brake Discs & Calipers	3

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3	3	Inspect Front Brake Pads & Rotors	3
3	3	Inspect Rear Brake Linings & Drums	3
3	3	Lubricate Chassis	3
3	3	Inspect Steering Linkage/Front Suspension	3
3	3	Suspension & Wheel Bearings	3
3	3	Steering Operation, Tie Rods, Gear Box & Boots	3
3	3	Lubricate Weatherstripping with Silicone	3
3	3	Lubricate Door Hinges	3
3	3	Lubricate Door Locks	3
3	3	Check Body Drain Holes	3
3	3	Inspect Shocks/Struts for Leakage	3
3	3	Inspect Tire Wear Pattern	3
3	3	Rotate Tires and Adjust Air Pressure (Including Spare)	3
3	3	Replace	3
3	3	Engine Oil	3
3	3	Oil Filter	3
3	3	Air Filter Element	3
3	3	Spark Plugs	3
3	3	Fuel Filter	3
3	3	Change Automatic Transaxle Fluid & Clean Strainer	3
3	3	Drain, Flush and Refill Engine Coolant	3
3	3	Drain, Refill and Bleed Brake System Fluid	3
3	3	Lubrication Specifications	3
3	Application	Specification	3
3	Automatic Transaxle	Dexron-II E ATF	3
3	Brake Fluid	DOT 4 Brake Fluid (SAE J1703)	3
3	Coolant	50/50 Mix Water & Ethylene Glycol	3
3	Engine Oil (1)		3

SCHEDULED SERVICES

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1996 Volkswagen Golf

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3	Ambient Temperatures	3
3	Greater Than 140 F (-100C) .. SAE 15W-40 Or 20W-50 API SG/CD	3
3	140-500F (-100 To +100C) SAE 10W-30 Or 10W-40 API SG/CD	3
3	Less Than 500F (100C) SAE 5W-30 Or 5W-40 API SG/CD	3
3	Power Steering Fluid VW Hydraulic Oil G-002-000	3
3	Manual Transaxle Hypoid Gear Oil SAE 75W-90 API GL-4	3
3	Or SAE 75W-90 (G50 Synthetic)	3
3	Final Drive (A/T & M/T)	3
3	(Differential) SAE 75W-90 (G50 Synthetic Gear Oil)	3
3	Wheel Bearings NLGI Grade 2 Category GC-LB	3
3	Steering Linkage (2)(3) NLGI Grade 2 Category GC-LB	3
3	Ball Joints (2)(4) NLGI Grade 2 Category GC-LB	3
3	Weatherstrip Dielectric Silicone Grease	3
3		3
3	(1) - SAE 15W-40 or 20W-40 engine oil is recommended for extreme	3
3	conditions or extended highway operation.	3
3	(2) - Use low pressure grease gun to prevent seal damage.	3
3	(3) - Fill until lubricant squeezes out from the base of seals.	3
3	(4) - Fill ball joint until seal starts to swell.	3
3	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	3
3	Fluid Capacities	3
3	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	3
3	Application	(1) Quantity 3
3		3
3	Cooling System	3
3	Convertible 5.1 Qts. (4.8L)	3
3	Engine Oil (2) 4.7 Qts. (4.5L)	3
3	Automatic Transaxle	3
3	Fluid Change 3.2 Qts. (3.0L)	3
3	Dry Fill 5.9 Qts. (5.6L)	3
3	Final Drive (Differential)	3
3	A/T (3) 0.8 Qt. (.75L)	3
3	Manual Transaxle (4) 2.0 Qts. (1.9L)	3
3		3
3	(1) - Capacities are recommended or calculated levels. Always use	3
3	dipstick (if available) to measure level.	3
3	(2) - Includes filter change.	3
3	(3) - Lifetime fill.	3
3	(4) - Single case includes manual transaxle & differential.	3
3	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	3
3	Service Labor Times	3
3	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	3
3	Application	(1)(2)(3) Hours 3
3		3
3	Gasoline Engine	3
3	Automatic Transmission 3.2	3
3	Manual Transmission 2.6	3
3		3
3	(1) - Add .2 hr. if equipped with A/C.	3
3	(2) - Add .1 hr. if equipped with cruise control.	3
3	(3) - Add the following times to replace camshaft timing belt.	3
3	2.2 hours on engines with air conditioning and 1.8 hours	3

SCHEDULED SERVICES
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on engines without air conditioning.

37,500 MILE (60,000 KM) SERVICE

37,500 MILE (60,000 KM) SERVICE

Service Or Inspect

Verify Last Major Service Was Performed

Check Fluid Levels

Inspect Coolant Hoses and Clamps

Inspect Brake System

Inspect Exhaust System

Inspect CV Joint Boots

Lubricate Chassis

Replace

Engine Oil

Oil Filter

Lubrication Specifications

Application Specification

Engine Oil

Ambient Temperatures

Greater Than 140 F (-10C) .. SAE 15W-40 Or 20W-50 API SG/CD

140-500F (-10 To +10C) SAE 10W-30 Or 10W-40 API SG/CD

Less Than 500F (10C) SAE 5W-30 Or 5W-40 API SG/CD

Fluid Capacities

Application (1) Quantity

Engine Oil (2) 4.7 Qts. (4.5L)

(1) - Capacities are recommended or calculated levels. Always use

dipstick (if available) to measure level.

(2) - Includes filter change.

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45,000 MILE (72,000 KM) SERVICE

```

0AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      Service Or Inspect                                                  3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Verify Last Major Service Was Performed                      3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Diagnostic System Read Out                                    3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Inspect For Fluid Leaks                                       3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Inspect Camshaft Timing Belt (Replace if Required)          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Check/Adjust Valve Clearance                                  3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Check/Adjust Idle Speed                                        3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Perform Compression Test                                      3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Check Crankcase Ventilation System                          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Check Fuel Evaporation System                                3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Check EGR System (Reset Mileage Counter - If Applicable)    3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Check Fluid Levels                                           3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Inspect Coolant Hoses and Clamps                             3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Cooling & Heating System                                     3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Crankcase Ventilation System                                 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Check Coolant Strength                                       3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Inspect/Adjust Accessory Drive Belts (Replace if Required)  3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Windshield Washer System                                     3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Clean Battery and Battery Terminals                         3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Throttle Linkage                                             3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Fuel System                                                  3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Intake Air System                                            3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Clutch Hydraulic System                                     3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Inspect CV Joint Boots                                       3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3    Drive Shafts For Leaks & Damage                            3

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SCHEDULED SERVICES

Article Text (p. 19)

1996 Volkswagen Golf

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Thursday, August 19, 1999 11:50PM

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Check Operation of Horn, Wipers/Washers & All Exterior Lights 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Inspect Condition of Wiper Blades 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Check Headlight Alignment 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Check Seat Belt Webbing and Release Mechanisms 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Check Parking Brake Operation 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Check Shift/Clutch Interlock Operation 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Inspect Brake System Hoses & Lines 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Brake Discs & Calipers 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Inspect Front Brake Pads & Rotors 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Inspect Rear Brake Linings & Drums 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Lubricate Chassis 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Inspect Steering Linkage/Front Suspension 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Suspension & Wheel Bearings 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Steering Operation, Tie Rods, Gear Box & Boots 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Lubricate Weatherstripping with Silicone 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Lubricate Door Hinges 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Lubricate Door Locks 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Check Body Drain Holes 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Inspect Shocks/Struts for Leakage 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Inspect Tire Wear Pattern 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Rotate Tires and Adjust Air Pressure (Including Spare) 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 Replace 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Engine Oil 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Oil Filter 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Clean Air Filter Element (Replace if Required) 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3 3 Spark Plugs (Except California Models) 3

```

SCHEDULED SERVICES

Article Text (p. 20)

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Thursday, August 19, 1999 11:50PM

3 3 Fuel Filter 3

3 Lubrication Specifications 3

3 Application Specification 3

3

3 Automatic Transaxle Dexron-II E ATF 3

3 Brake Fluid DOT 4 Brake Fluid (SAE J1703) 3

3 Coolant 50/50 Mix Water & Ethylene Glycol 3

3 Engine Oil (1) 3

3 Ambient Temperatures 3

3 Greater Than 140 F (-10°C) .. SAE 15W-40 Or 20W-50 API SG/CD 3

3 140-500F (-10 To +10°C) SAE 10W-30 Or 10W-40 API SG/CD 3

3 Less Than 500F (10°C) SAE 5W-30 Or 5W-40 API SG/CD 3

3 Power Steering Fluid VW Hydraulic Oil G-002-000 3

3 Manual Transaxle Hypoid Gear Oil SAE 75W-90 API GL-4 3
Or SAE 75W-90 (G50 Synthetic) 3

3 Final Drive (A/T & M/T) 3

3 (Differential) SAE 75W-90 (G50 Synthetic Gear Oil) 3

3 Wheel Bearings NLGI Grade 2 Category GC-LB 3

3 Steering Linkage (2)(3) NLGI Grade 2 Category GC-LB 3

3 Ball Joints (2)(4) NLGI Grade 2 Category GC-LB 3

3 Weatherstrip Dielectric Silicone Grease 3

3

3 (1) - SAE 15W-40 or 20W-40 engine oil is recommended for extreme 3
conditions or extended highway operation. 3

3 (2) - Use low pressure grease gun to prevent seal damage. 3

3 (3) - Fill until lubricant squeezes out from the base of seals. 3

3 (4) - Fill ball joint until seal starts to swell. 3

3 Fluid Capacities 3

3 Application (1) Quantity 3

3

3 Cooling System 3

3 Convertible 5.1 Qts. (4.8L) 3

3 Pickup 6.9 Qts. (6.4L) 3

3 Rabbit 5.2 Qts. (5.0L) 3

3 Engine Oil (2) 4.7 Qts. (4.5L) 3

3 Automatic Transaxle 3

3 Fluid Change 3.2 Qts. (3.0L) 3

3 Dry Fill 5.9 Qts. (5.6L) 3

3 Final Drive (Differential) 3

3 A/T (3) 0.8 Qt. (.75L) 3

3 Manual Transaxle (4) 2.0 Qts. (1.9L) 3

3

3 (1) - Capacities are recommended or calculated levels. Always use 3
dipstick (if available) to measure level. 3

3 (2) - Includes filter change. 3

3 (3) - Lifetime fill. 3

3 (4) - Single case includes manual transaxle & differential. 3

60,000 MILE (96,000 KM) SERVICE

Thursday, August 19, 1999 11:50PM

~~~~~ DRIVE SHIFTS FOR Leaks & Damage ~~~~~

## SCHEDULED SERVICES

### Article Text (p. 23)

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|   |   |                                                               |   |
|---|---|---------------------------------------------------------------|---|
| 3 | 3 | Check Operation of Horn, Wipers/Washers & All Exterior Lights | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect Condition of Wiper Blades                             | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Check Headlight Alignment                                     | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Check Seat Belt Webbing and Release Mechanisms                | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Check Parking Brake Operation                                 | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Check Shift/Clutch Interlock Operation                        | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect Brake System Hoses & Lines                            | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Brake Discs & Calipers                                        | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect Front Brake Pads & Rotors                             | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect Rear Brake Linings & Drums                            | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Lubricate Chassis                                             | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect Steering Linkage/Front Suspension                     | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Suspension & Wheel Bearings                                   | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Steering Operation, Tie Rods, Gear Box & Boots                | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Lubricate Weatherstripping with Silicone                      | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Lubricate Door Hinges                                         | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Lubricate Door Locks                                          | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Check Body Drain Holes                                        | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect Shocks/Struts for Leakage                             | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect Tire Wear Pattern                                     | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Rotate Tires and Adjust Air Pressure (Including Spare)        | 3 |
| ~ |   |                                                               |   |
| 3 |   | Replace                                                       | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Engine Oil                                                    | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Oil Filter                                                    | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Spark Plugs                                                   | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Oxygen Sensor (Reset Mileage Counter - If Applicable)         | 3 |
| ~ |   |                                                               |   |

# SCHEDULED SERVICES

## Article Text (p. 24)

1996 Volkswagen Golf

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|   |   |                                                                                                            |                                     |
|---|---|------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 3 | 3 | Air Filter Element                                                                                         | 3                                   |
| 3 | 3 | Fuel Filter                                                                                                | 3                                   |
| 3 | 3 | Change Automatic Transaxle Fluid & Clean Strainer                                                          | 3                                   |
| 3 | 3 | A/T Differential Oil Level (Replace if Required)                                                           | 3                                   |
| 3 | 3 | Manual Transaxle Fluid Level (Replace if Required)                                                         | 3                                   |
| 3 | 3 | Drain, Flush and Refill Engine Coolant                                                                     | 3                                   |
| 3 | 3 | Drain, Refill and Bleed Brake System Fluid                                                                 | 3                                   |
| 3 |   | Lubrication Specifications                                                                                 | 3                                   |
| 3 |   | Application                                                                                                | Specification                       |
| 3 |   | Automatic Transaxle                                                                                        | Dexron-II E ATF                     |
| 3 |   | Brake Fluid                                                                                                | DOT 4 Brake Fluid (SAE J1703)       |
| 3 |   | Coolant                                                                                                    | 50/50 Mix Water & Ethylene Glycol   |
| 3 |   | Engine Oil (1)                                                                                             |                                     |
| 3 |   | Ambient Temperatures                                                                                       |                                     |
| 3 |   | Greater Than 140 F (-10°C)                                                                                 | SAE 15W-40 Or 20W-50 API SG/CD      |
| 3 |   | 140-500F (-10 To +10°C)                                                                                    | SAE 10W-30 Or 10W-40 API SG/CD      |
| 3 |   | Less Than 500F (10°C)                                                                                      | SAE 5W-30 Or 5W-40 API SG/CD        |
| 3 |   | Power Steering Fluid                                                                                       | VW Hydraulic Oil G-002-000          |
| 3 |   | Manual Transaxle                                                                                           | Hypoid Gear Oil SAE 75W-90 API GL-4 |
| 3 |   |                                                                                                            | Or SAE 75W-90 (G50 Synthetic)       |
| 3 |   | Final Drive (A/T & M/T)                                                                                    |                                     |
| 3 |   | (Differential)                                                                                             | SAE 75W-90 (G50 Synthetic Gear Oil) |
| 3 |   | Wheel Bearings                                                                                             | NLGI Grade 2 Category GC-LB         |
| 3 |   | Steering Linkage (2)(3)                                                                                    | NLGI Grade 2 Category GC-LB         |
| 3 |   | Ball Joints (2)(4)                                                                                         | NLGI Grade 2 Category GC-LB         |
| 3 |   | Weatherstrip                                                                                               | Dielectric Silicone Grease          |
| 3 |   | (1) - SAE 15W-40 or 20W-40 engine oil is recommended for extreme conditions or extended highway operation. |                                     |
| 3 |   | (2) - Use low pressure grease gun to prevent seal damage.                                                  |                                     |
| 3 |   | (3) - Fill until lubricant squeezes out from the base of seals.                                            |                                     |
| 3 |   | (4) - Fill ball joint until seal starts to swell.                                                          |                                     |
| 3 |   | Fluid Capacities                                                                                           |                                     |
| 3 |   | Application                                                                                                | (1) Quantity                        |
| 3 |   | Cooling System                                                                                             |                                     |
| 3 |   | Convertible                                                                                                | 5.1 Qts. (4.8L)                     |
| 3 |   | Pickup                                                                                                     | 6.9 Qts. (6.4L)                     |
| 3 |   | Rabbit                                                                                                     | 5.2 Qts. (5.0L)                     |
| 3 |   | Engine Oil (2)                                                                                             | 4.7 Qts. (4.5L)                     |
| 3 |   | Automatic Transaxle                                                                                        |                                     |

```

3      3 Oil Filter
3

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[illegible]

## SCHEDULED SERVICES

### Article Text (p. 27)

1996 Volkswagen Golf

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|   |   |                                                               |   |
|---|---|---------------------------------------------------------------|---|
| 3 | 3 | Cooling & Heating System                                      | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Crankcase Ventilation System                                  | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Check Coolant Strength                                        | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect/Adjust Accessory Drive Belts (Replace if Required)    | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Windshield Washer System                                      | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Clean Battery and Battery Terminals                           | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Throttle Linkage                                              | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Fuel System                                                   | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Intake Air System                                             | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Clutch Hydraulic System                                       | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect CV Joint Boots                                        | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Drive Shafts For Leaks & Damage                               | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Check Operation of Horn, Wipers/Washers & All Exterior Lights | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect Condition of Wiper Blades                             | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Check Headlight Alignment                                     | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Check Seat Belt Webbing and Release Mechanisms                | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Check Parking Brake Operation                                 | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Check Shift/Clutch Interlock Operation                        | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect Brake System Hoses & Lines                            | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Brake Discs & Calipers                                        | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect Front Brake Pads & Rotors                             | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect Rear Brake Linings & Drums                            | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Lubricate Chassis                                             | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Inspect Steering Linkage/Front Suspension                     | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Suspension & Wheel Bearings                                   | 3 |
| ~ |   |                                                               |   |
| 3 | 3 | Steering Operation, Tie Rods, Gear Box & Boots                | 3 |
| ~ |   |                                                               |   |

## SCHEDULED SERVICES

### Article Text (p. 28)

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|   |   |                                                                  |                                     |
|---|---|------------------------------------------------------------------|-------------------------------------|
| 3 | 3 | Lubricate Weatherstripping with Silicone                         | 3                                   |
| 3 | 3 | Lubricate Door Hinges                                            | 3                                   |
| 3 | 3 | Lubricate Door Locks                                             | 3                                   |
| 3 | 3 | Check Body Drain Holes                                           | 3                                   |
| 3 | 3 | Inspect Shocks/Struts for Leakage                                | 3                                   |
| 3 | 3 | Inspect Tire Wear Pattern                                        | 3                                   |
| 3 | 3 | Rotate Tires and Adjust Air Pressure (Including Spare)           | 3                                   |
| 3 |   | Replace                                                          | 3                                   |
| 3 | 3 | Engine Oil                                                       | 3                                   |
| 3 | 3 | Oil Filter                                                       | 3                                   |
| 3 | 3 | Clean Air Filter Element (Replace if Required)                   | 3                                   |
| 3 | 3 | Spark Plugs (Except California Models)                           | 3                                   |
| 3 | 3 | Fuel Filter                                                      | 3                                   |
| 3 |   | Lubrication Specifications                                       | 3                                   |
| 3 |   | Application                                                      | Specification                       |
| 3 |   | Automatic Transaxle                                              | Dexron-II E ATF                     |
| 3 |   | Brake Fluid                                                      | DOT 4 Brake Fluid (SAE J1703)       |
| 3 |   | Coolant                                                          | 50/50 Mix Water & Ethylene Glycol   |
| 3 |   | Engine Oil (1)                                                   |                                     |
| 3 |   | Ambient Temperatures                                             |                                     |
| 3 |   | Greater Than 140 F (-10°C)                                       | SAE 15W-40 Or 20W-50 API SG/CD      |
| 3 |   | 140-500 F (-10° To +10°C)                                        | SAE 10W-30 Or 10W-40 API SG/CD      |
| 3 |   | Less Than 500 F (100°C)                                          | SAE 5W-30 Or 5W-40 API SG/CD        |
| 3 |   | Power Steering Fluid                                             | VW Hydraulic Oil G-002-000          |
| 3 |   | Manual Transaxle                                                 | Hypoid Gear Oil SAE 75W-90 API GL-4 |
| 3 |   |                                                                  | Or SAE 75W-90 (G50 Synthetic)       |
| 3 |   | Final Drive (A/T & M/T)                                          |                                     |
| 3 |   | (Differential)                                                   | SAE 75W-90 (G50 Synthetic Gear Oil) |
| 3 |   | Wheel Bearings                                                   | NLGI Grade 2 Category GC-LB         |
| 3 |   | Steering Linkage (2)(3)                                          | NLGI Grade 2 Category GC-LB         |
| 3 |   | Ball Joints (2)(4)                                               | NLGI Grade 2 Category GC-LB         |
| 3 |   | Weatherstrip                                                     | Dielectric Silicone Grease          |
| 3 |   | (1) - SAE 15W-40 or 20W-40 engine oil is recommended for extreme |                                     |
| 3 |   | conditions or extended highway operation.                        |                                     |
| 3 |   | (2) - Use low pressure grease gun to prevent seal damage.        |                                     |
| 3 |   | (3) - Fill until lubricant squeezes out from the base of seals.  |                                     |



[illegible]

```

UAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3      Service Or Inspect                                              3
~AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3      3 Verify Last Major Service Was Performed                      3
~AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3      3 Diagnostic System Read Out                                    3
~AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3      3 Inspect For Fluid Leaks                                       3
~AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3      3 Inspect Camshaft Timing Belt (Replace if Required)          3
~AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3      3 Check/Adjust Valve Clearance                                  3
~AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3      3 Check/Adjust Idle Speed                                        3
~AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3      3 Perform Compression Test                                      3
~AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~
3      3 Check Crankcase Ventilation System                          3

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## SCHEDULED SERVICES

### Article Text (p. 31)

1996 Volkswagen Golf

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Check Fuel Evaporation System                               3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Check EGR System (Reset Mileage Counter - If Applicable)    3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Check Fluid Levels                                           3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Inspect Coolant Hoses and Clamps                             3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Cooling & Heating System                                     3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Crankcase Ventilation System                                 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Check Coolant Strength                                       3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Inspect/Adjust Accessory Drive Belts (Replace if Required)  3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Windshield Washer System                                     3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Clean Battery and Battery Terminals                         3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Throttle Linkage                                             3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Fuel System                                                  3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Intake Air System                                             3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Clutch Hydraulic System                                       3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Inspect CV Joint Boots                                       3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Drive Shafts For Leaks & Damage                             3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Check Operation of Horn, Wipers/Washers & All Exterior Lights 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Inspect Condition of Wiper Blades                           3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Check Headlight Alignment                                    3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Check Seat Belt Webbing and Release Mechanisms              3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Check Parking Brake Operation                                3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Check Shift/Clutch Interlock Operation                      3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Inspect Brake System Hoses & Lines                          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Brake Discs & Calipers                                       3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Inspect Front Brake Pads & Rotors                           3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3      Inspect Rear Brake Linings & Drums                          3

```

# SCHEDULED SERVICES

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|   |                     |                                                        |   |
|---|---------------------|--------------------------------------------------------|---|
| 3 | 3                   | Lubricate Chassis                                      | 3 |
| 3 | 3                   | Inspect Steering Linkage/Front Suspension              | 3 |
| 3 | 3                   | Suspension & Wheel Bearings                            | 3 |
| 3 | 3                   | Steering Operation, Tie Rods, Gear Box & Boots         | 3 |
| 3 | 3                   | Lubricate Weatherstripping with Silicone               | 3 |
| 3 | 3                   | Lubricate Door Hinges                                  | 3 |
| 3 | 3                   | Lubricate Door Locks                                   | 3 |
| 3 | 3                   | Check Body Drain Holes                                 | 3 |
| 3 | 3                   | Inspect Shocks/Struts for Leakage                      | 3 |
| 3 | 3                   | Inspect Tire Wear Pattern                              | 3 |
| 3 | 3                   | Rotate Tires and Adjust Air Pressure (Including Spare) | 3 |
| 3 |                     | Replace                                                | 3 |
| 3 | 3                   | Engine Oil                                             | 3 |
| 3 | 3                   | Oil Filter                                             | 3 |
| 3 | 3                   | Spark Plugs                                            | 3 |
| 3 | 3                   | Oxygen Sensor (Reset Mileage Counter - If Applicable)  | 3 |
| 3 | 3                   | Air Filter Element                                     | 3 |
| 3 | 3                   | Fuel Filter                                            | 3 |
| 3 | 3                   | Change Automatic Transaxle Fluid & Clean Strainer      | 3 |
| 3 | 3                   | A/T Differential Oil Level (Replace if Required)       | 3 |
| 3 | 3                   | Manual Transaxle Fluid Level (Replace if Required)     | 3 |
| 3 | 3                   | Drain, Flush and Refill Engine Coolant                 | 3 |
| 3 | 3                   | Drain, Refill and Bleed Brake System Fluid             | 3 |
| 3 |                     | Lubrication Specifications                             | 3 |
| 3 | Application         | Specification                                          | 3 |
| 3 | Automatic Transaxle | Dexron-II E ATF                                        | 3 |

## SCHEDULED SERVICES

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3 Brake Fluid ..... DOT 4 Brake Fluid (SAE J1703) 3  
3 Coolant ..... 50/50 Mix Water & Ethylene Glycol 3  
3 Engine Oil (1) 3  
3 Ambient Temperatures 3  
3 Greater Than 140 F (-100C) .. SAE 15W-40 Or 20W-50 API SG/CD 3  
3 140-500F (-100 To +100C) .... SAE 10W-30 Or 10W-40 API SG/CD 3  
3 Less Than 500F (100C) ..... SAE 5W-30 Or 5W-40 API SG/CD 3  
3 Power Steering Fluid ..... VW Hydraulic Oil G-002-000 3  
3 Manual Transaxle ..... Hypoid Gear Oil SAE 75W-90 API GL-4 3  
3 Or SAE 75W-90 (G50 Synthetic) 3  
3 Final Drive (A/T & M/T) 3  
3 (Differential) ..... SAE 75W-90 (G50 Synthetic Gear Oil) 3  
3 Wheel Bearings ..... NLGI Grade 2 Category GC-LB 3  
3 Steering Linkage (2)(3) ..... NLGI Grade 2 Category GC-LB 3  
3 Ball Joints (2)(4) ..... NLGI Grade 2 Category GC-LB 3  
3 Weatherstrip ..... Dielectric Silicone Grease 3

3 (1) - SAE 15W-40 or 20W-40 engine oil is recommended for extreme 3  
3 conditions or extended highway operation. 3

3 (2) - Use low pressure grease gun to prevent seal damage. 3

3 (3) - Fill until lubricant squeezes out from the base of seals. 3

3 (4) - Fill ball joint until seal starts to swell. 3

3 Fluid Capacities 3

3 Application (1) Quantity 3

3 Cooling System 3

3 Convertible ..... 5.1 Qts. (4.8L) 3

3 Pickup ..... 6.9 Qts. (6.4L) 3

3 Rabbit ..... 5.2 Qts. (5.0L) 3

3 Engine Oil (2) ..... 4.7 Qts. (4.5L) 3

3 Automatic Transaxle 3

3 Fluid Change ..... 3.2 Qts. (3.0L) 3

3 Dry Fill ..... 5.9 Qts. (5.6L) 3

3 Final Drive (Differential) 3

3 A/T (3) ..... 0.8 Qt. (.75L) 3

3 Manual Transaxle (4) ..... 2.0 Qts. (1.9L) 3

3 (1) - Capacities are recommended or calculated levels. Always use 3  
3 dipstick (if available) to measure level. 3

3 (2) - Includes filter change. 3

3 (3) - Lifetime fill. 3

3 (4) - Single case includes manual transaxle & differential. 3

3 Service Labor Times 3

3 Application (1)(2)(3) Hours 3

3 Gasoline Engine 3

3 Automatic Transmission ..... 3.2 3

3 Manual Transmission ..... 2.6 3

```

UAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      Service Or Inspect                                                  3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3   Verify Last Major Service Was Performed                      3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3   Check Fluid Levels                                           3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3   Inspect Coolant Hoses and Clamps                             3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3   Inspect Brake System                                          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3   Inspect Exhaust System                                       3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3   Inspect CV Joint Boots                                        3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3   Lubricate Chassis                                             3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      Replace                                                            3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3   Engine Oil                                                    3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      3   Oil Filter                                                    3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3      Lubrication Specifications                                         3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 Application                                                             Specification 3
3
3 Engine Oil                                                              3
3 Ambient Temperatures                                                   3
3 Greater Than 140 F (-100C) .. SAE 15W-40 Or 20W-50 API SG/CD        3
3 140-500F (-100 To +100C) .... SAE 10W-30 Or 10W-40 API SG/CD       3
3 Less Than 500F (100C) ..... SAE 5W-30 Or 5W-40 API SG/CD          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 Fluid Capacities                                                       3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 Application                                                             (1) Quantity 3
3
3 Engine Oil (2) ..... 4.7 Qts. (4.5L)                                3
3
3 (1) - Capacities are recommended or calculated levels. Always use    3
3 dipstick (if available) to measure level.                            3

```

### 3 3 Clutch Hydraulic System 3

```

3 3 Inspect CV Joint Boots
3 3 Drive Shafts For Leaks & Damage
3 3 Check Operation of Horn, Wipers/Washers & All Exterior Lights
3 3 Inspect Condition of Wiper Blades
3 3 Check Headlight Alignment
3 3 Check Seat Belt Webbing and Release Mechanisms
3 3 Check Parking Brake Operation
3 3 Check Shift/Clutch Interlock Operation
3 3 Inspect Brake System Hoses & Lines
3 3 Brake Discs & Calipers
3 3 Inspect Front Brake Pads & Rotors
3 3 Inspect Rear Brake Linings & Drums
3 3 Lubricate Chassis
3 3 Inspect Steering Linkage/Front Suspension
3 3 Suspension & Wheel Bearings
3 3 Steering Operation, Tie Rods, Gear Box & Boots
3 3 Lubricate Weatherstripping with Silicone
3 3 Lubricate Door Hinges
3 3 Lubricate Door Locks
3 3 Check Body Drain Holes
3 3 Inspect Shocks/Struts for Leakage
3 3 Inspect Tire Wear Pattern
3 3 Rotate Tires and Adjust Air Pressure (Including Spare)
3 Replace
3 3 Engine Oil
3 3 Oil Filter

```



## SCHEDULED SERVICES

### Article Text (p. 37)

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|                                                                                                            |                                     |
|------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Clean Air Filter Element (Replace if Required)                                                             |                                     |
| Spark Plugs (Except California Models)                                                                     |                                     |
| Fuel Filter                                                                                                |                                     |
| Lubrication Specifications                                                                                 |                                     |
| Application                                                                                                | Specification                       |
| Automatic Transaxle                                                                                        | Dexron-IIIE ATF                     |
| Brake Fluid                                                                                                | DOT 4 Brake Fluid (SAE J1703)       |
| Coolant                                                                                                    | 50/50 Mix Water & Ethylene Glycol   |
| Engine Oil (1)                                                                                             |                                     |
| Ambient Temperatures                                                                                       |                                     |
| Greater Than 140 F (-100C)                                                                                 | SAE 15W-40 Or 20W-50 API SG/CD      |
| 140-500F (-100 To +100C)                                                                                   | SAE 10W-30 Or 10W-40 API SG/CD      |
| Less Than 500F (100C)                                                                                      | SAE 5W-30 Or 5W-40 API SG/CD        |
| Power Steering Fluid                                                                                       | VW Hydraulic Oil G-002-000          |
| Manual Transaxle                                                                                           | Hypoid Gear Oil SAE 75W-90 API GL-4 |
|                                                                                                            | Or SAE 75W-90 (G50 Synthetic)       |
| Final Drive (A/T & M/T)                                                                                    |                                     |
| (Differential)                                                                                             | SAE 75W-90 (G50 Synthetic Gear Oil) |
| Wheel Bearings                                                                                             | NLGI Grade 2 Category GC-LB         |
| Steering Linkage (2)(3)                                                                                    | NLGI Grade 2 Category GC-LB         |
| Ball Joints (2)(4)                                                                                         | NLGI Grade 2 Category GC-LB         |
| Weatherstrip                                                                                               | Dielectric Silicone Grease          |
| (1) - SAE 15W-40 or 20W-40 engine oil is recommended for extreme conditions or extended highway operation. |                                     |
| (2) - Use low pressure grease gun to prevent seal damage.                                                  |                                     |
| (3) - Fill until lubricant squeezes out from the base of seals.                                            |                                     |
| (4) - Fill ball joint until seal starts to swell.                                                          |                                     |
| Fluid Capacities                                                                                           |                                     |
| Application                                                                                                | (1) Quantity                        |
| Cooling System                                                                                             |                                     |
| Convertible                                                                                                | 5.1 Qts. (4.8L)                     |
| Pickup                                                                                                     | 6.9 Qts. (6.4L)                     |
| Rabbit                                                                                                     | 5.2 Qts. (5.0L)                     |
| Engine Oil (2)                                                                                             | 4.7 Qts. (4.5L)                     |
| Automatic Transaxle                                                                                        |                                     |
| Fluid Change                                                                                               | 3.2 Qts. (3.0L)                     |
| Dry Fill                                                                                                   | 5.9 Qts. (5.6L)                     |
| Final Drive (Differential)                                                                                 |                                     |
| A/T (3)                                                                                                    | 0.8 Qt. (.75L)                      |
| Manual Transaxle (4)                                                                                       | 2.0 Qts. (1.9L)                     |
| (1) - Capacities are recommended or calculated levels. Always use                                          |                                     |

[illegible]

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```

0AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3      Service Or Inspect                                                  ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Verify Last Major Service Was Performed                        ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Diagnostic System Read Out                                     ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Inspect For Fluid Leaks                                         ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Inspect Camshaft Timing Belt (Replace if Required)            ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Check/Adjust Valve Clearance                                   ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Check/Adjust Idle Speed                                          ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Perform Compression Test                                        ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Check Crankcase Ventilation System                             ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Check Fuel Evaporation System                                  ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Check EGR System (Reset Mileage Counter - If Applicable)       ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Check Fluid Levels                                              ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Inspect Coolant Hoses and Clamps                               ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Cooling & Heating System                                       ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Crankcase Ventilation System                                    ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Check Coolant Strength                                          ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Inspect/Adjust Accessory Drive Belts (Replace if Required)     ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Windshield Washer System                                        ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Clean Battery and Battery Terminals                           ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Throttle Linkage                                                ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Fuel System                                                     ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Intake Air System                                               ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Clutch Hydraulic System                                         ^
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA^
3    3   Suspension & Wheel Bearings                                    ^

```

## SCHEDULED SERVICES

### Article Text (p. 40)

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```

~ ~ ~ ~ ~
3   3   Inspect CV Joint Boots   3
~ ~ ~ ~ ~
3   3   Drive Shafts For Leaks & Damage   3
~ ~ ~ ~ ~
3   3   Check Operation of Horn, Wipers/Washers & All Exterior Lights   3
~ ~ ~ ~ ~
3   3   Inspect Condition of Wiper Blades   3
~ ~ ~ ~ ~
3   3   Check Headlight Alignment   3
~ ~ ~ ~ ~
3   3   Check Seat Belt Webbing and Release Mechanisms   3
~ ~ ~ ~ ~
3   3   Check Parking Brake Operation   3
~ ~ ~ ~ ~
3   3   Check Shift/Clutch Interlock Operation   3
~ ~ ~ ~ ~
3   3   Inspect Brake System Hoses & Lines   3
~ ~ ~ ~ ~
3   3   Brake Discs & Calipers   3
~ ~ ~ ~ ~
3   3   Inspect Front Brake Pads & Rotors   3
~ ~ ~ ~ ~
3   3   Inspect Rear Brake Linings & Drums   3
~ ~ ~ ~ ~
3   3   Lubricate Chassis   3
~ ~ ~ ~ ~
3   3   Inspect Steering Linkage/Front Suspension   3
~ ~ ~ ~ ~
3   3   Suspension & Wheel Bearings   3
~ ~ ~ ~ ~
3   3   Steering Operation, Tie Rods, Gear Box & Boots   3
~ ~ ~ ~ ~
3   3   Lubricate Weatherstripping with Silicone   3
~ ~ ~ ~ ~
3   3   Lubricate Door Hinges   3
~ ~ ~ ~ ~
3   3   Lubricate Door Locks   3
~ ~ ~ ~ ~
3   3   Check Body Drain Holes   3
~ ~ ~ ~ ~
3   3   Inspect Shocks/Struts for Leakage   3
~ ~ ~ ~ ~
3   3   Inspect Tire Wear Pattern   3
~ ~ ~ ~ ~
3   3   Rotate Tires and Adjust Air Pressure (Including Spare)   3
~ ~ ~ ~ ~
3   Replace   3
~ ~ ~ ~ ~
3   3   Engine Oil   3
~ ~ ~ ~ ~
3   3   Oil Filter   3

```

|   |   |                                                                                                            |                                     |
|---|---|------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 3 | 3 | Spark Plugs                                                                                                | 3                                   |
| 3 | 3 | Oxygen Sensor (Reset Mileage Counter - If Applicable)                                                      | 3                                   |
| 3 | 3 | Air Filter Element                                                                                         | 3                                   |
| 3 | 3 | Fuel Filter                                                                                                | 3                                   |
| 3 | 3 | Change Automatic Transaxle Fluid & Clean Strainer                                                          | 3                                   |
| 3 | 3 | A/T Differential Oil Level (Replace if Required)                                                           | 3                                   |
| 3 | 3 | Manual Transaxle Fluid Level (Replace if Required)                                                         | 3                                   |
| 3 | 3 | Drain, Flush and Refill Engine Coolant                                                                     | 3                                   |
| 3 | 3 | Drain, Refill and Bleed Brake System Fluid                                                                 | 3                                   |
| 3 | 3 | Lubrication Specifications                                                                                 | 3                                   |
| 3 | 3 | Application                                                                                                | Specification                       |
| 3 | 3 | Automatic Transaxle                                                                                        | Dexron-IIIE ATF                     |
| 3 | 3 | Brake Fluid                                                                                                | DOT 4 Brake Fluid (SAE J1703)       |
| 3 | 3 | Coolant                                                                                                    | 50/50 Mix Water & Ethylene Glycol   |
| 3 | 3 | Engine Oil (1)                                                                                             |                                     |
| 3 | 3 | Ambient Temperatures                                                                                       |                                     |
| 3 | 3 | Greater Than 140 F (-100C)                                                                                 | SAE 15W-40 Or 20W-50 API SG/CD      |
| 3 | 3 | 140-500F (-100 To +100C)                                                                                   | SAE 10W-30 Or 10W-40 API SG/CD      |
| 3 | 3 | Less Than 500F (100C)                                                                                      | SAE 5W-30 Or 5W-40 API SG/CD        |
| 3 | 3 | Power Steering Fluid                                                                                       | VW Hydraulic Oil G-002-000          |
| 3 | 3 | Manual Transaxle                                                                                           | Hypoid Gear Oil SAE 75W-90 API GL-4 |
| 3 | 3 |                                                                                                            | Or SAE 75W-90 (G50 Synthetic)       |
| 3 | 3 | Final Drive (A/T & M/T)                                                                                    |                                     |
| 3 | 3 | (Differential)                                                                                             | SAE 75W-90 (G50 Synthetic Gear Oil) |
| 3 | 3 | Wheel Bearings                                                                                             | NLGI Grade 2 Category GC-LB         |
| 3 | 3 | Steering Linkage (2)(3)                                                                                    | NLGI Grade 2 Category GC-LB         |
| 3 | 3 | Ball Joints (2)(4)                                                                                         | NLGI Grade 2 Category GC-LB         |
| 3 | 3 | Weatherstrip                                                                                               | Dielectric Silicone Grease          |
| 3 | 3 | (1) - SAE 15W-40 or 20W-40 engine oil is recommended for extreme conditions or extended highway operation. |                                     |
| 3 | 3 | (2) - Use low pressure grease gun to prevent seal damage.                                                  |                                     |
| 3 | 3 | (3) - Fill until lubricant squeezes out from the base of seals.                                            |                                     |
| 3 | 3 | (4) - Fill ball joint until seal starts to swell.                                                          |                                     |
| 3 | 3 | Fluid Capacities                                                                                           |                                     |
| 3 | 3 | Application                                                                                                | (1) Quantity                        |
| 3 | 3 | Cooling System                                                                                             |                                     |

Wheel Bearings ..... NLGI Grade 2 Category GC-LB

## SCHEDULED SERVICES

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1996 Volkswagen Golf

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Drive Shaft U-Joints ..... NLGI Grade 2 Category GC-LB  
Steering Linkage (2)(3) ..... NLGI Grade 2 Category GC-LB  
Ball Joints (2)(4) ..... NLGI Grade 2 Category GC-LB  
Weatherstrip ..... Dielectric Silicone Grease

(1) - SAE 15W-40 or 20W-40 engine oil is recommended for extreme conditions or extended highway operation.

(2) - Use low pressure grease gun to prevent seal damage.

(3) - Fill until lubricant squeezes out from the base of seals.

(4) - Fill ball joint until seal starts to swell.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## FLUID CAPACITIES

### FLUID CAPACITIES TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Quantity (1) |
|-------------|--------------|
|-------------|--------------|

|                             |            |
|-----------------------------|------------|
| A/C System R-12 Refrigerant | 29-35 Ozs. |
|-----------------------------|------------|

Cooling System

|             |                 |
|-------------|-----------------|
| Convertible | 5.1 Qts. (4.8L) |
|-------------|-----------------|

|        |                 |
|--------|-----------------|
| Pickup | 6.9 Qts. (6.5L) |
|--------|-----------------|

|        |                 |
|--------|-----------------|
| Rabbit | 5.2 Qts. (5.0L) |
|--------|-----------------|

|                |                 |
|----------------|-----------------|
| Engine Oil (2) | 4.7 Qts. (4.5L) |
|----------------|-----------------|

Fuel Tank

Diesel

|        |                  |
|--------|------------------|
| Pickup | 15 Gals. (56.8L) |
|--------|------------------|

|        |                  |
|--------|------------------|
| Rabbit | 11 Gals. (41.5L) |
|--------|------------------|

Gasoline

|             |                    |
|-------------|--------------------|
| Convertible | 10.5 Gals. (40.0L) |
|-------------|--------------------|

|        |                  |
|--------|------------------|
| Pickup | 15 Gals. (56.8L) |
|--------|------------------|

|        |                  |
|--------|------------------|
| Rabbit | 10 Gals. (38.0L) |
|--------|------------------|

Automatic Transaxle

|              |                 |
|--------------|-----------------|
| Fluid Change | 3.2 Qts. (3.0L) |
|--------------|-----------------|

|          |                 |
|----------|-----------------|
| Dry Fill | 5.9 Qts. (5.6L) |
|----------|-----------------|

Final Drive (Differential)

|         |                |
|---------|----------------|
| A/T (3) | 0.8 Qt. (.75L) |
|---------|----------------|

|                      |                 |
|----------------------|-----------------|
| Manual Transaxle (4) | 2.0 Qts. (1.9L) |
|----------------------|-----------------|

(1) - Capacities are recommended or calculated levels. Always use dipstick (if available) to measure level.

(2) - Includes filter change.

(3) - Lifetime fill.

(4) - Single case includes manual transaxle & differential.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

END OF ARTICLE

# MAINTENANCE REMINDER LIGHT RESET PROCEDURES

## Article Text

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### ARTICLE BEGINNING

1983-96 MAINTENANCE

Volkswagen Maintenance Reminder Light Reset Procedures

### EGR MAINTENANCE LIGHT (IF EQUIPPED)

EGR light comes on at 15,000 mile intervals to indicate EGR servicing is required. After checking EGR system, reset mileage counter. See RESETTING MILEAGE COUNTER.

### OXYGEN SENSOR WARNING LIGHT (IF EQUIPPED)

Oxygen sensor (OXS) light comes on at 30,000 mile intervals to indicate oxygen sensor replacement. After installing new sensor, reset mileage counter. See RESETTING MILEAGE COUNTER.

### RESETTING MILEAGE COUNTER (IF EQUIPPED)

1) On some Rabbit and Pickup models, remove instrument panel cover plate. Reach into opening at top left corner of speedometer and pull release arm to reset counter. See Fig. 1. Left arm resets EGR counter, right arm resets oxygen sensor.

2) On Vanagon models, locate mileage counter under spare tire or under driver's floorboard (in-line with speedometer cable). Using a pointed instrument, depress reset button. Ensure light is out.

3) On all other models, locate mileage counter (in-line with speedometer cable) and push White reset button. See Fig. 1. Ensure light is out.

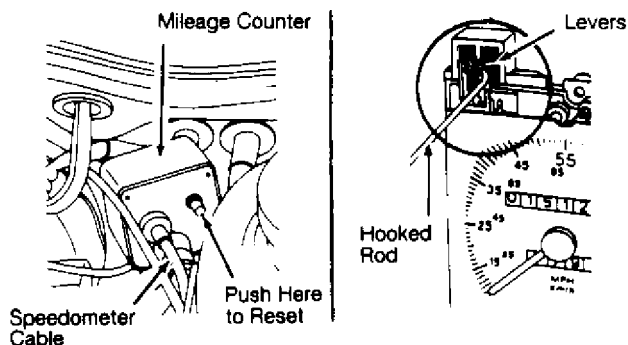


Fig. 1: Resetting Mileage Counters  
Courtesy of Volkswagen United States, Inc.

### SERVICE REMINDER INDICATOR (SRI) DISPLAY

CABRIO, GOLF III, GTI, JETTA III (1993-95) JETTA (1996)

1) One of four service codes may be displayed on instrument cluster according to mileage driven. Each service code displayed determines type or level of maintenance required. Service code will



# MAINTENANCE REMINDER LIGHT RESET PROCEDURES

## Article Text (p. 2)

1996 Volkswagen Golf

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flash for approximately 3 seconds in odometer display window as ignition is turned on. When servicing becomes due (every 7500 miles), appropriate service code will flash for approximately 60 seconds. The four service codes available for display are as follows:

- \* IN 00 (No Service Necessary)
- \* OEL (Oil Change Service) Every 7500 Miles
- \* IN 01 (Inspection Service) Every 15,000 Miles
- \* IN 02 (Additional Servicing Work) Every 30,000 Miles

2) After performing required maintenance, each effected service code displayed must be reset individually. For example, at 15,000 miles service codes OEL and IN 01 will both need to be reset.

3) To reset service codes, turn ignition on. Press and hold odometer reset button located below speedometer. While holding button, press clock reset button (lower button for digital clock) located to left of fuel gauge. Release buttons. Programming mode is now activated. Service code OEL1.S (distance counter) should be displayed.

4) Press clock reset button once more. 7500 miles should now be indicated on display. Desired mileage for reset may be attained by pressing clock reset button. Mileage displayed will decrease in increments of 500 miles each time button is pressed. This feature should only be used to calibrate mileage when instrument cluster is replaced. When desired mileage is displayed, press odometer reset button.

5) Service code OEL2.S (time counter) should be displayed. Press clock reset button. 6 (months) will be indicated on display. Time counter for next oil change may be set by pressing clock reset button if instrument cluster was replaced. When desired time is displayed, press odometer reset button.

6) Service code IN 01.S (time counter) should be displayed. Press clock reset button. 12 (months) will be indicated on display. Time counter for next maintenance interval may be set by pressing clock reset button if instrument cluster was replaced. When desired time is displayed, press odometer reset button.

7) Service code IN 02.S (distance counter) should be displayed. Press clock reset button. 30,000 (miles) will be indicated on display. Desired mileage for reset may be attained by pressing clock reset button. Mileage displayed will decrease in increments of 500 miles each time button is pressed. This feature should only be used to calibrate mileage when instrument cluster is replaced. When desired mileage is displayed, turn ignition off. Programming is now stored in memory.

**END OF ARTICLE**

## Article Text

## ARTICLE BEGINNING

Golf III,  
GTI (1995-96),  
Jetta III  
Cabrio (1995-96)

## MODEL IDENTIFICATION

## VIN CODE ID EXPLANATION

[illegible]

- 1 - Manufacturing Country

|   |   |         |
|---|---|---------|
| W | * | Germany |
| 3 | * | Mexico  |
| 9 | * | Brazil  |

- 2-3 - Manufacturer

VW \* Volkswagen

- #### 4 - Series

```
A * 2-Door Base
B * 2-Door Convertible Cabrio (1995-96)
B * 2-Door Hatch Golf III GL (1994-96)
B * 2-Door Hatch Golf III Sport (1995-96)
```

## MAINTENANCE INFORMATION

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F \* 4-Door Hatch Golf III GL (1993-96)  
H \* 2-Door Coupe GTI V6 (1995-96)  
J \* 4-Door Hatch Golf III City (1995-96)  
K \* 2-Door Hatch Golf III Base (1995-96)  
P \* 4-Door Sedan Jetta III Base (1995-96)  
R \* 4-Door Sedan Jetta III GL (1993-96)  
S \* 4-Door Sedan Jetta III GLS (1994-96)  
T \* 4-Door Sedan Jetta III GLX V6 (1994-96)  
V \* 4-Door Sedan Jetta III City (1995-96)

#### 5 - Engine

A \* 2.0L 4-Cyl. SFI 115 HP  
B \* 2.0L 4-Cyl. SFI 115 HP  
D \* 2.8L V6 SFI 172 HP

#### 6 - Restraint System

2 \* Passive With Manual Lap  
8 \* Active Driver & Passenger With Driver & Passenger Air Bag

#### 7-8 - Model

1H \* Golf III  
1H \* Jetta III  
1H \* GTI (1995-96)  
1E \* Cabrio (1995-96)

#### 9 - VIN Check Digit

2 \* Computer Selected Check Number

#### 10 - Vehicle Model Year

P \* 1993  
R \* 1994  
S \* 1995  
T \* 1996

#### 11 - Assembly Plant

A \* Ingolstadt  
B \* Brussels  
E \* Emden  
G \* Graz  
H \* Hannover  
K \* Osnabruk  
N \* Neckarsulm  
P \* Brazil  
S \* Stuttgart  
W \* Wolfsburg

#### 12-17 - Serial Number

\* Sequential Production Number

## MAINTENANCE SERVICE INFORMATION

### SEVERE & NORMAL SERVICE DEFINITIONS

## MAINTENANCE INFORMATION

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**NOTE:** Use the Severe Service schedule if the vehicle to be serviced is operated under ANY (one or more) of these conditions:

Service is recommended at mileage intervals based on vehicle operation. Service schedules are based on the following primary operating conditions:

#### Normal Service

- \* Driven More Than 10 Miles Daily
- \* No Operating Conditions From Severe Service Schedule

#### Severe Service (Unique Driving Conditions)

- \* Short Trips In Freezing Temperatures
- \* Towing Or Heavily Loaded
- \* Severe Dust Conditions
- \* Hot Weather, Stop-And-Go Driving
- \* Extensive Idling

#### CAMSHAFT TIMING BELT

**CAUTION:** Failure to replace a faulty camshaft timing belt may result in serious engine damage.

The condition of camshaft drive belts should always be checked on vehicles which have more than 50,000 miles. Although some manufacturers do not recommend belt replacement at a specified mileage, others require it at 60,000-100,000 miles. A camshaft drive belt failure may cause extensive damage to internal engine components on most engines, although some designs do not allow piston-to-valve contact. These designs are often called "Free Wheeling".

Many manufacturers changed their maintenance and warranty schedules in the mid-1980's to reflect timing belt inspection and/or replacement at 50,000-60,000 miles. Most service interval schedules in this manual reflect these changes.

Belts or components should be inspected and replaced if any of the following conditions exist:

- \* Cracks Or Tears In Belt Surface
- \* Missing, Damaged, Cracked Or Rounded Teeth
- \* Oil Contamination
- \* Damaged Or Faulty Tensioners
- \* Incorrect Tension Adjustment

Inspect timing belt at 20,000 mile intervals. Replace belt as necessary.

#### SERVICE POINT LOCATIONS

## MAINTENANCE INFORMATION

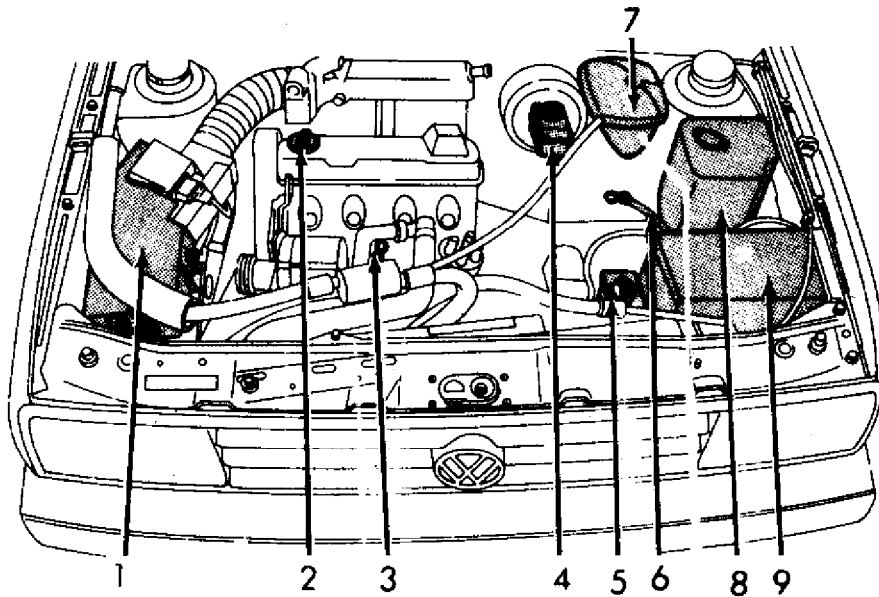
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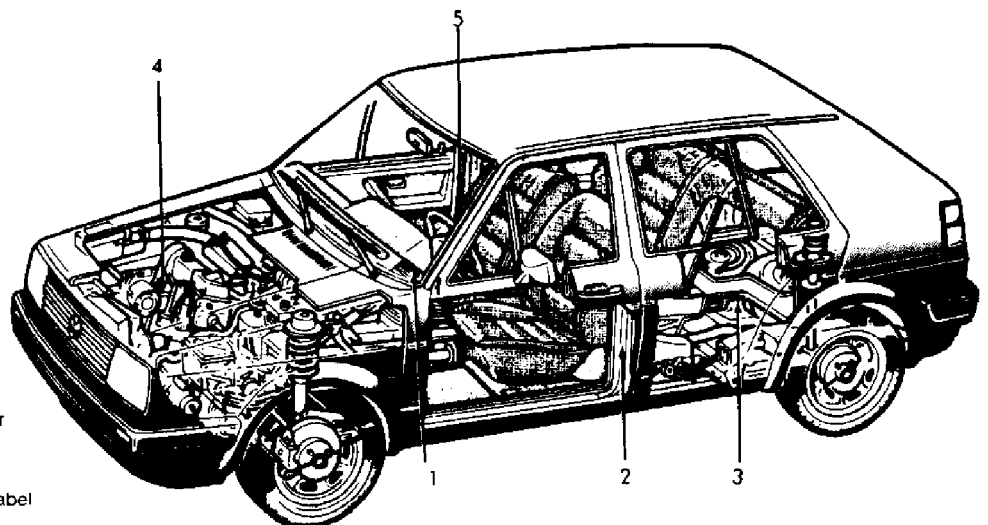
#### GASOLINE ENGINE

- |                             |                                    |
|-----------------------------|------------------------------------|
| 1. Air Cleaner              | 6. Automatic Transmission Dipstick |
| 2. Engine Oil Filler Cap    | 7. Engine Coolant Expansion Tank   |
| 3. Engine Oil Dipstick      | 8. Windshield Washer Reservoir     |
| 4. Brake Fluid Reservoir    | 9. Battery                         |
| 5. Power Steering Reservoir | 10. Diesel Fuel Filter             |

93C45783

Fig. 1: Service Point Locations (Gasoline Engine)  
Courtesy of Volkswagen United States, Inc.

#### INFORMATION LABEL LOCATIONS



- |                                     |
|-------------------------------------|
| 1. Vehicle Identification Number    |
| 2. Safety Compliance Sticker        |
| 3. Vehicle Identification Label     |
| 4. Engine Number                    |
| 5. Tire & Wheel Specification Label |

Fig. 2: Information Label Locations  
Courtesy of Volkswagen United States, Inc.

#### SERVICE LABOR TIMES

## MAINTENANCE INFORMATION

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#### SERVICE LABOR TIMES TABLE (HOURS)

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|                       | 15,000       | 30,000 (60,000) |
|-----------------------|--------------|-----------------|
| Application (1)(2)(3) | Mile Service | Mile Service    |

#### Gasoline Engine

|                        |           |                 |
|------------------------|-----------|-----------------|
| Automatic Transmission | ..... 1.5 | ..... 3.2 (4.1) |
| Manual Transmission    | ..... 1.7 | ..... 2.6 (3.5) |

- (1) - Add .2 hr. if equipped with A/C.
- (2) - Add .1 hr. if equipped with cruise control.
- (3) - Add the following times to replace camshaft timing belt.  
2.2 hours on engines with air conditioning and 1.8 hours  
on engines without air conditioning.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## LUBRICATION SPECIFICATIONS

#### LUBRICATION SPECIFICATIONS TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Fluid Specifications |
|-------------|----------------------|
|-------------|----------------------|

#### Engine Oil

##### Ambient Temperatures

|                             |                            |
|-----------------------------|----------------------------|
| Greater Than 50°F (10°C)    | ..... SAE 20W-50 API SF/CD |
| 14° To 50°F (-10°C To 10°C) | ..... SAE 10W-40 API SF/CD |
| Less Than 14°F (-10°C)      | ..... SAE 5W-30 API SF/CD  |

Brake Fluid ..... SAE J1703 (DOT 3 Or DOT 4)

Power Steering Fluid ..... VW Hydraulic Oil  
(G 002000) Or Equivalent

Automatic Transmission ..... Dexron-IIe ATF Or Equivalent

Manual Transmission ..... Hypoid Gear Oil SAE 75W-90 API GL-4

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## FLUID CAPACITIES

#### FLUID CAPACITIES TABLE (1)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Quantity |
|-------------|----------|
|-------------|----------|

#### A/C System R-134a Refrigerant (2)

1993-96 ..... 26.5-30 Ozs.

#### Cooling System

4-Cylinder Engines ..... 5.0-7.0 Qts. (4.8-6.5L)

V6 Engines ..... 9.1 Qts. (8.6L)

#### Engine Oil (3)

4-Cylinder Engines ..... 4.3 Qts. (4.0L)

V6 Engines ..... 6.3 Qts. (6.0L)

Fuel Tank ..... 14.5 Gals. (55.0L)

Automatic Transmission ..... 3.2 Qts. (3.0L)

Manual Transmission ..... 2.0 Qts. (1.9L)

## MAINTENANCE INFORMATION

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#### Final Drive

Differential (A/T) (4) ..... 0.8 Qt. (.75L)

- (1) - Capacities are recommended or calculated levels. Always use dipstick (if available) to measure level.
- (2) - Use of R-12 in a R134a system will result in SEVERE DAMAGE.
- (3) - Includes oil filter change.
- (4) - Lifetime fill.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## WHEEL & TIRE SPECIFICATIONS

Wheel and tire sizes vary according to vehicle and equipment and can be found on the tire information label on each vehicle. Wheel and tire specifications and tire inflation pressures are listed on a label found on the right door post for 2-door vehicles and the right rear door post on 4-door vehicles.

NOTE: Snow chains must be used on drive wheels, in pairs only.

### WHEEL TIGHTENING

Tighten all wheel lugs to 80 ft. lbs. (110 N.m).

## BATTERY SPECIFICATIONS

CAUTION: When battery is disconnected, vehicles equipped with computers may lose memory data. When battery power is restored, driveability problems may exist on some vehicles. These vehicles may require a relearn procedure. See COMPUTER RELEARN PROCEDURES article in the GENERAL INFORMATION section.

All models use BCI group 42 batteries with cold crank rating of 360 amps.

## CAUTIONS & WARNINGS

### ELECTRIC SHOCK HAZARD

WARNING: Contact with live components of ignition system while engine is running could lead to a fatal electric shock.

### BRAKE PEDAL PRESSURE WITH ENGINE NOT RUNNING

CAUTION: Brake pedal requires extreme pressure to stop the vehicle when the engine is not running.

### SUPPLEMENTAL RESTRAINT SYSTEM (AIR BAG SYSTEM)

NOTE: For information on air bag DIAGNOSIS & TESTING or DISPOSAL

## **MAINTENANCE INFORMATION**

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PROCEDURES, see AIR BAGS article in the ACCESSORIES/SAFETY EQUIPMENT Section.

## **WARRANTY INFORMATION**

CAUTION: Always refer to customer's copy of warranty information for specific model application and/or coverage limitations.

### **BASIC NEW CAR WARRANTY**

The manufacturer warrants that every vehicle imported and sold as a new vehicle to a retail customer will be free of defects in material and workmanship for 2 years or 24,000 miles, whichever comes first, after the date of delivery to the first retail customer, or after the vehicle was first placed in service.

### **LIMITED POWER TRAIN WARRANTY**

Covers the engine, transmission and drivetrain for a period of 5 years or 50,000 miles, whichever occurs first.

### **ANTI-CORROSION**

Covers holes caused by corrosion in body sheet metal for 6 years, without respect to mileage, so long as the inspection and maintenance services are performed.

### **EMISSION CONTROL SYSTEM (ALL MODELS)**

Manufacturer warrants that this vehicle is designed, built, and equipped so as to conform at the time of sale with all U.S. and California Air Resources Board emission regulations applicable at the time of manufacture and that this vehicle is free from defects in materials and workmanship which cause it to fail to conform with applicable regulations within the first 5 years or 50,000 miles, whichever occurs first.

### **EMISSION CONTROL SYSTEM (CALIFORNIA ONLY)**

Vehicles are warranted against failure to conform with applicable standards for 3 years or 50,000 miles, whichever occurs first, under the Performance Warranty. The warranty covers defective emission-related parts for 7 years or 70,000 miles, whichever occurs first.

## **FUSES & CIRCUIT BREAKERS**

The fuse panel is located under the left side of the dash board by the driver's knee on the Jetta. On the Golf and GTI models the panel is located by the driver's right knee, under the dash panel.



## MAINTENANCE INFORMATION

### Article Text (p. 8)

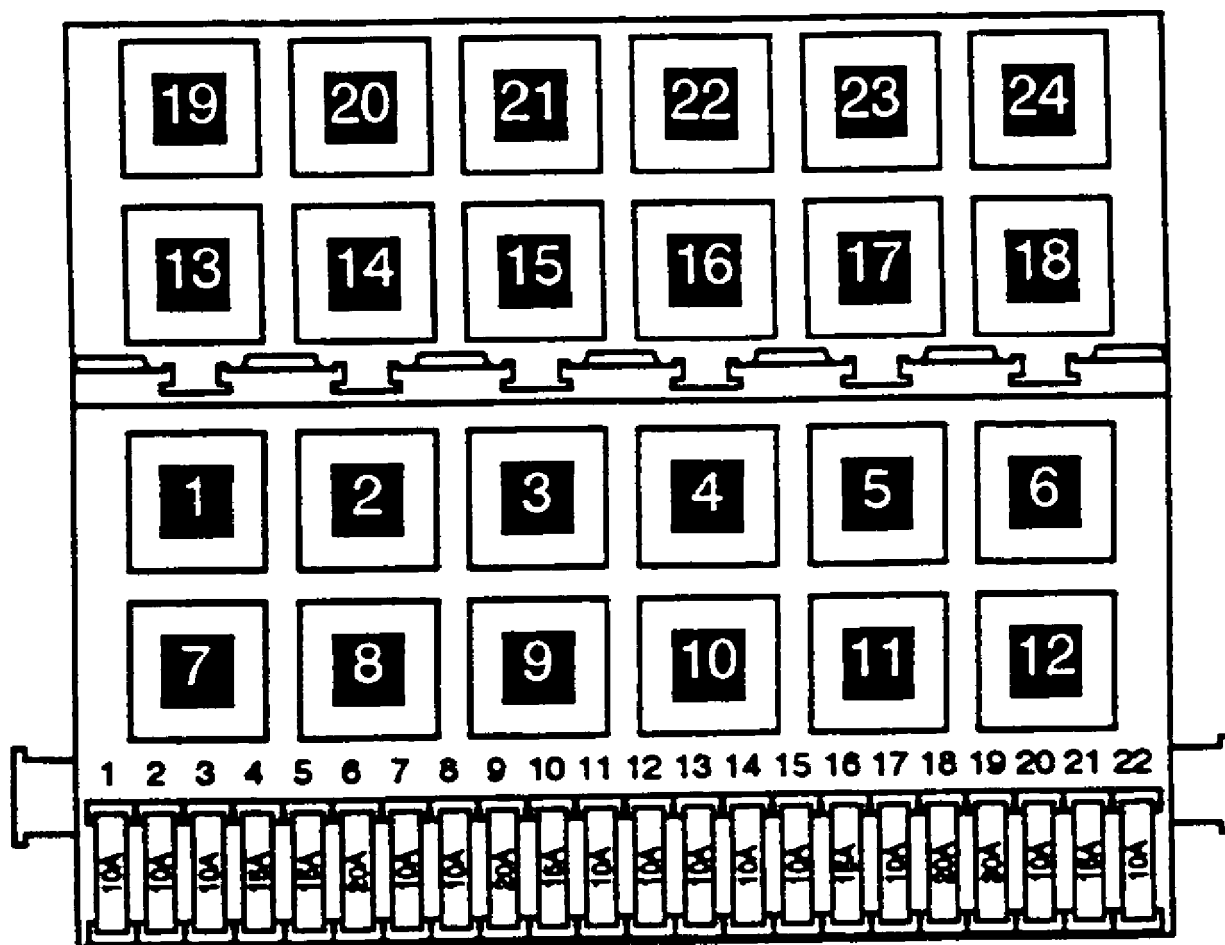
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NOTE: On all models, fuse specifications are listed on inside of panel cover.



50D11968

Fig. 3: Fuse Panel Identification  
Courtesy of Volkswagen United States, Inc.

#### Fuse & Circuit Breaker Identification

- 1 - 10 Amp (Red)  
Left Headlight Low Beam
- 2 - 10 Amp (Red)  
Right Headlight Low Beam
- 3 - 10 Amp (Red)  
Instrument & License Lights
- 4 - 15 Amp (Blue)  
Rear Window Wiper, Glove Box Light
- 5 - 15 Amp (Blue)  
Windshield Wiper/Washer
- 6 - 30 Amp (Green)  
A/C, Fresh Air Fan
- 7 - 10 Amp (Red)  
Right Taillight & Side Marker Light

## MAINTENANCE INFORMATION

### Article Text (p. 9)

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- 8 - 10 Amp (Red)  
Left Taillight & Side Marker Light
- 9 - 20 Amp (Yellow)  
Rear Window Defogger, Mirror Heater
- 10 - 15 Amp (Blue)  
Fog Lights
- 11 - 10 Amp (Red)  
Left Headlight High Beam & High Beam Indicator
- 12 - 10 Amp (Red)  
Right Headlight High Beam
- 13 - 10 Amp (Red)  
Horn, Radiator Cooling Fan
- 14 - 15 Amp (Blue)  
Backup Lights, Electric Mirrors, Heated Front Seats,  
Windshield Washer Jets
- 15 - 10 Amp (Red)  
Engine Electronics
- 16 - 15 Amp (Blue)  
Power Sunroof
- 17 - 10 Amp (Red)  
Emergency Flasher
- 18 - 20 Amp (Yellow)  
Fuel Pump, Oxygen Sensor
- 19 - 30 Amp (Green)  
A/C, Radiator Cooling Fan
- 20 - 10 Amp (Red)  
Brakelights, Cruise Control
- 21 - 15 Amp (Blue)  
Dome/Luggage/Vanity Mirror Lights, Clock, Radio, Central  
Locking System, Multi-Function Indicator, Alarm System
- 22 - 10 Amp (Red)  
Radio, Cigarette Lighter, Remote Luggage Compartment Release

#### Relay Identification

- 1 - 10 Amp (Red)  
Left Headlight Low Beam
- 2 - 10 Amp (Red)  
Right Headlight Low Beam
- 3 - 10 Amp (Red)  
Instrument & License Lights
- 4 - 15 Amp (Blue)  
Rear Window Wiper, Glove Box Light
- 5 - 15 Amp (Blue)  
Windshield Wiper/Washer
- 6 - 30 Amp (Green)  
A/C, Fresh Air Fan
- 7 - 10 Amp (Red)  
Right Taillight & Side Marker Light
- 8 - 10 Amp (Red)  
Left Taillight & Side Marker Light
- 9 - 20 Amp (Yellow)

## **MAINTENANCE INFORMATION**

### **Article Text (p. 10)**

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Rear Window Defogger, Mirror Heater

10 - 15 Amp (Blue)

Fog Lights

11 - 10 Amp (Red)

Left Headlight High Beam & High Beam Indicator

12 - 10 Amp (Red)

Right Headlight High Beam

13 - 10 Amp (Red)

Horn, Radiator Cooling Fan

**END OF ARTICLE**

# INTERFERENCE VERIFICATION CHECK FOR OHC ENGINE

## Article Text

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### ARTICLE BEGINNING

Maintenance & Service Information  
1974-96 Volkswagen - Timing Belt Information

Cabrio, Cabriolet, Corrado, Dasher, Eurovan (Canadian), Fox, Golf, Golf (Canadian), GTI, GTI (Canadian), Jetta, Jetta GLI, Passat, Passat (Canadian), Pickup, Quantum, Rabbit, Scirocco, Scirocco (Canadian), Transporter (Canadian), Vanagon

### TIMING BELT INTERFERENCE VERIFICATION INFORMATION

#### TIMING BELT INTERFERENCE CAUTION

**NOTE:** CAMSHAFT DRIVE BELTS OR TIMING BELTS - The condition of camshaft drive belts should always be checked on vehicles which have more than 50,000 miles. Although some manufacturers do not recommend replacement at a specified mileage, others require it at 60,000-100,000 miles. A camshaft drive belt failure may cause extensive damage to internal engine components on most engines, although some designs do not allow piston-to-valve contact. These designs are often called "Free Wheeling". Many manufacturers changed their maintenance and warranty schedules in the mid-1980's to reflect timing belt inspection and/or replacement at 50,000-60,000 miles. Most service interval schedules shown in this section reflect these changes. Belts or components should be inspected and replaced if any of the following conditions exist:

- \* Crack Or Tears In Belt Surface
- \* Missing, Damaged, Cracked Or Rounded Teeth
- \* Oil Contamination
- \* Damaged Or Faulty Tensioners
- \* Incorrect Tension Adjustment

#### TIMING BELT INTERFERENCE CHECK MENU

TIMING BELT INTERFERENCE VERIF. TABLE - PASSENGER CARS (1)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application |       | Engine             | Replacement Interval<br>(Miles) |
|-------------|-------|--------------------|---------------------------------|
| Cabrio      |       |                    |                                 |
| 1995-96     | ..... | 2.0L 4-Cyl.        | ..... (3) 60,000                |
| Cabriolet   |       |                    |                                 |
| 1985-89     | ..... | 1.8L 4-Cyl. (DOHC) | ..... (3) 60,000                |
|             |       | 1.8L 4-Cyl. (SOHC) | ..... (3) 60,000                |
| 1990-93     | ..... | 1.8L 4-Cyl.        | ..... (3) 60,000                |
| Corrado     |       |                    |                                 |
| 1990-92     | ..... | 1.8L 4-Cyl.        | ..... (3) 60,000                |

# INTERFERENCE VERIFICATION CHECK FOR OHC ENGINE

## Article Text (p. 2)

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### Dasher

|         |                                                |                  |
|---------|------------------------------------------------|------------------|
| 1976-80 | ..... (2) 1.5L 4-Cyl. Diesel                   | ..... (3) 60,000 |
| 1974-80 | ..... 1.6L 4-Cyl.                              | (3) 60,000       |
| 1981-80 | ..... (2) 1.6L 4-Cyl.<br>Diesel & Turbo Diesel | ..... (3) 60,000 |

### Fox

|         |                   |            |
|---------|-------------------|------------|
| 1987-93 | ..... 1.8L 4-Cyl. | (3) 60,000 |
|---------|-------------------|------------|

### Golf

|         |                              |            |
|---------|------------------------------|------------|
| 1985-88 | ..... (2) 1.6L 4-Cyl. Diesel | (3) 60,000 |
| 1985-89 | ..... 1.8L 4-Cyl. (DOHC)     | (3) 60,000 |
| 1985-93 | ..... 1.8L 4-Cyl. (SOHC)     | (3) 60,000 |
| 1990-92 | ..... 1.8L 4-Cyl.            | (3) 60,000 |
| 1993-96 | ..... 2.0L 4-Cyl.            | (3) 60,000 |

### Golf (Canadian)

|         |                              |            |
|---------|------------------------------|------------|
| 1985-92 | ..... (2) 1.6L 4-Cyl. Diesel | (3) 60,000 |
| 1993    | ..... 1.8L 4-Cyl.            | (3) 60,000 |

### GTI

|         |                              |            |
|---------|------------------------------|------------|
| 1983-84 | ..... (2) 1.6L 4-Cyl. Diesel | (3) 60,000 |
|         | (2) 1.6L 4-Cyl. Turbo Diesel | (3) 60,000 |
|         | 1.7L 4-Cyl.                  | (3) 60,000 |
|         | 1.8L 4-Cyl.                  | (3) 60,000 |
| 1985-89 | ..... 1.8L 4-Cyl. (DOHC)     | (3) 60,000 |
| 1983-92 | ..... 1.8L 4-Cyl. (SOHC)     | (3) 60,000 |
| 1990-92 | ..... 1.8L 4-Cyl.            | (3) 60,000 |
| 1990-96 | ..... 2.0L 4-Cyl.            | (3) 60,000 |

### GTI (Canadian)

|      |                   |            |
|------|-------------------|------------|
| 1993 | ..... 2.0L 4-Cyl. | (3) 60,000 |
|------|-------------------|------------|

### Jetta

|         |                                                |            |
|---------|------------------------------------------------|------------|
| 1980    | ..... 1.6L 4-Cyl.                              | (3) 60,000 |
| 1981-92 | ..... (2) 1.6L 4-Cyl.<br>Diesel & Turbo Diesel | (3) 60,000 |
| 1983-84 | ..... 1.7L 4-Cyl.                              | (3) 60,000 |
|         | 1.8L 4-Cyl.                                    | (3) 60,000 |
| 1985-89 | ..... 1.8L 4-Cyl. (DOHC)                       | (3) 60,000 |
| 1983-92 | ..... 1.8L 4-Cyl. (SOHC)                       | (3) 60,000 |
| 1990-92 | ..... 1.8L 4-Cyl.                              | (3) 60,000 |
| 1993-96 | ..... 2.0L 4-Cyl.                              | (3) 60,000 |

### Jetta GLI

|         |                   |            |
|---------|-------------------|------------|
| 1990-92 | ..... 2.0L 4-Cyl. | (3) 60,000 |
|---------|-------------------|------------|

### Passat

|         |                   |            |
|---------|-------------------|------------|
| 1990-96 | ..... 2.0L 4-Cyl. | (3) 60,000 |
|---------|-------------------|------------|

### Passat (Canadian)

|      |                   |            |
|------|-------------------|------------|
| 1993 | ..... 1.8L 4-Cyl. | (3) 60,000 |
|------|-------------------|------------|

### Quantum

|         |                                                |            |
|---------|------------------------------------------------|------------|
| 1981-86 | ..... (2) 1.6L 4-Cyl.<br>Diesel & Turbo Diesel | (3) 60,000 |
| 1981-84 | ..... 1.7L 4-Cyl.                              | (3) 60,000 |
| 1984-85 | ..... 2.1L 5-Cyl.                              | (3) 60,000 |
| 1983-88 | ..... 2.2L 5-Cyl.                              | (3) 60,000 |
| 1985-86 | ..... 1.8L 4-Cyl.                              | (3) 60,000 |

### Rabbit

|         |                   |            |
|---------|-------------------|------------|
| 1974-79 | ..... 1.5L 4-Cyl. | (3) 60,000 |
|---------|-------------------|------------|

# INTERFERENCE VERIFICATION CHECK FOR OHC ENGINE

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|                     |           |                             |            |
|---------------------|-----------|-----------------------------|------------|
|                     |           | 1.6L 4-Cyl. ....            | (3) 60,000 |
| 1976-80             | ..... (2) | 1.5L 4-Cyl. Diesel .....    | (3) 60,000 |
| 1981-84             | ..... (2) | 1.6L 4-Cyl. ....            |            |
|                     |           | Diesel & Turbo Diesel ..... | (3) 60,000 |
| 1983-84             | .....     | 1.7L 4-Cyl. ....            | (3) 60,000 |
|                     |           | 1.8L 4-Cyl. ....            | (3) 60,000 |
| Scirocco            |           |                             |            |
| 1976-79             | .....     | 1.5L 4-Cyl. ....            | (3) 60,000 |
| 1976-80             | .....     | 1.6L 4-Cyl. ....            | (3) 60,000 |
| 1983-84             | .....     | 1.7L 4-Cyl. ....            | (3) 60,000 |
|                     |           | 1.8L 4-Cyl. ....            | (3) 60,000 |
| 1985-89             | .....     | 1.8L 4-Cyl. (DOHC) .....    | (3) 60,000 |
|                     |           | 1.8L 4-Cyl. (SOHC) .....    | (3) 60,000 |
| Scirocco (Canadian) |           |                             |            |
| 1989                | .....     | 1.8L 4-Cyl. (DOHC) .....    | (3) 60,000 |
|                     |           | 1.8L 4-Cyl. (SOHC) .....    | (3) 60,000 |

- (1) - Other interference engine applications may exist which are not indicated here.
- (2) - Interference engine. Check for possible damage to piston(s) or valve(s) if there has been a timing belt failure.
- (3) - Although the vehicle manufacturer does not recommend a specific scheduled maintenance interval, aftermarket belt manufacturers suggest the belt be replaced at 60,000 mile intervals.
- (4) - Vehicle manufacturer recommends replacing all belts at the same time.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

### TIMING BELT INTERFERENCE VERIF. TABLE - LIGHT TRUCKS (1)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Engine | Replacement Interval<br>(Miles) |
|-------------|--------|---------------------------------|
|-------------|--------|---------------------------------|

#### Eurovan (Canadian)

1992-96 ..... 2.5L 5-Cyl. .... (3) 60,000

#### Pickup

1980 ..... (2) 1.5L 4-Cyl. Diesel ..... (3) 60,000

1980-83 ..... 1.6L 4-Cyl. .... (3) 60,000

1981-83 .... (2) 1.6L 4-Cyl. Diesel ..... (3) 60,000

1.7L 4-Cyl. .... (3) 60,000

#### Transporter (Canadian)

1992-96 ..... 2.5L 5-Cyl. .... (3) 60,000

#### Vanagon

1981-82 .... (2) 1.6L 4-Cyl. Diesel ..... (3) 60,000

- (1) - Other interference engine applications may exist which are not indicated here.
- (2) - Interference engine. Check for possible damage to piston(s) or valve(s) if there has been a timing belt failure.

# INTERFERENCE VERIFICATION CHECK FOR OHC ENGINE

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- (3) - Although the vehicle manufacturer does not recommend a specific scheduled maintenance interval, aftermarket belt manufacturers suggest the belt be replaced at 60,000 mile intervals.
- (4) - Vehicle manufacturer recommends replacing all belts at the same time.

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END OF ARTICLE

# WHEEL ALIGNMENT THEORY/OPERATION

## Article Text

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### ARTICLE BEGINNING

#### GENERAL INFORMATION

Wheel Alignment Theory & Operation

ALL MODELS

#### \* PLEASE READ THIS FIRST \*

NOTE: This article is intended for general information purposes only. This information may not apply to all makes and models.

### PRE-ALIGNMENT INSTRUCTIONS

#### GENERAL ALIGNMENT CHECKS

Before adjusting wheel alignment, check the following:

- \* Each axle uses tires of same construction and tread style, equal in tread wear and overall diameter. Verify that radial and axial runout is not excessive. Inflation should be at manufacturer's specifications.
- \* Steering linkage and suspension must not have excessive play. Check for wear in tie rod ends and ball joints. Springs must not be sagging. Control arm and strut rod bushings must not have excessive play. See Fig. 1.

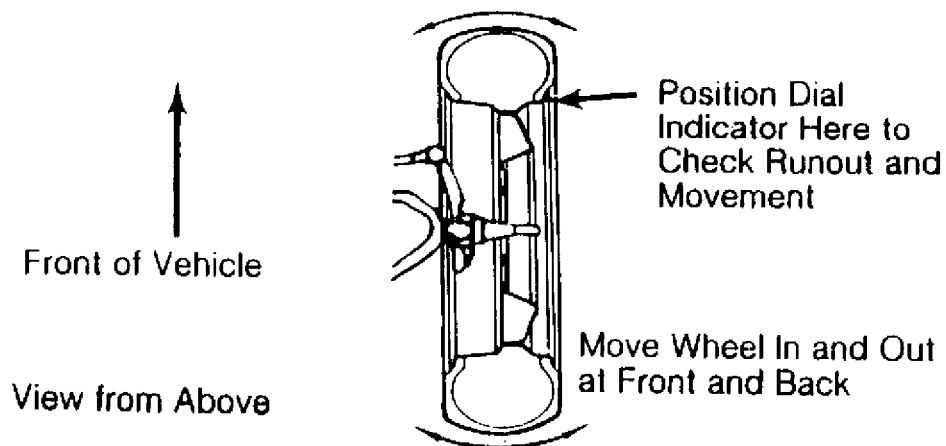


Fig. 1: Checking Steering Linkage

- \* Vehicle must be on level floor with full fuel tank, no passenger load, spare tire in place and no load in trunk. Bounce front and rear end of vehicle several times. Confirm vehicle is at normal riding height.



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- \* Steering wheel must be centered with wheels in straight ahead position. If required, shorten one tie rod adjusting sleeve and lengthen opposite sleeve (equal amount of turns). See Fig. 2.
- \* Wheel bearings should have the correct preload and lug nuts must be tightened to manufacturer's specifications. Adjust camber, caster and toe-in using this sequence. Follow instructions of the alignment equipment manufacturer.

**CAUTION:** Do not attempt to correct alignment by straightening parts. Damaged parts must be replaced.

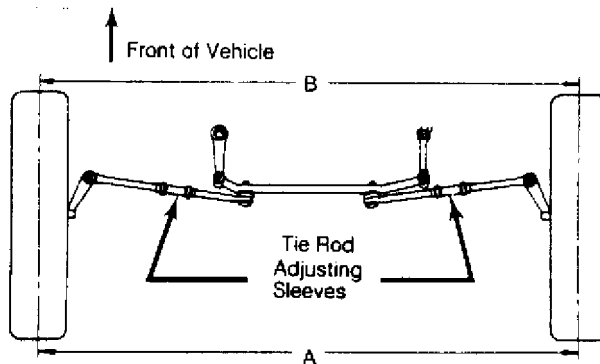


Fig. 2: Adjusting Tie Rod Sleeves (Top View)

### CAMBER

- 1) Camber is the tilting of the wheel, outward at either top or bottom, as viewed from front of vehicle. See Fig. 3.
- 2) When wheels tilts outward at the top (from centerline of vehicle), camber is positive. When wheels tilt inward at top, camber is negative. Amount of tilt is measured in degrees from vertical.

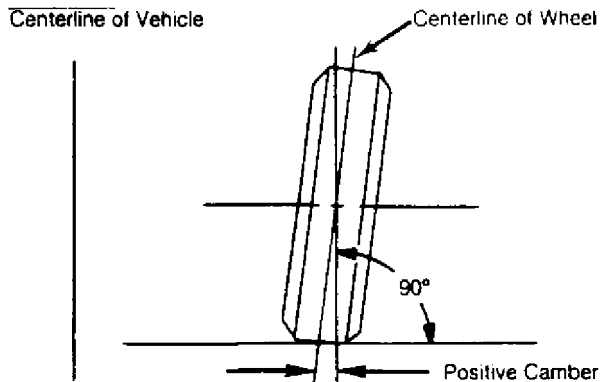


Fig. 3: Determining Camber Angle

### CASTER

- 1) Caster is tilting of front steering axis either forward or backward from vertical, as viewed from side of vehicle. See Fig. 4.
- 2) When axis is tilted backward from vertical, caster is

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positive. This creates a trailing action on front wheels. When axis is tilted forward, caster is negative, causing a leading action on front wheels.

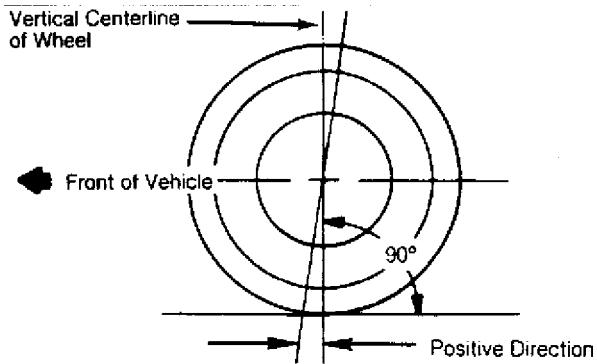


Fig. 4: Determining Caster Angle

### TOE-IN ADJUSTMENT

Toe-in is the width measured at the rear of the tires subtracted by the width measured at the front of the tires at about spindle height. A positive figure would indicate toe-in and a negative figure would indicate toe-out. If the distance between the front and rear of the tires is the same, toe measurement would be zero. To adjust:

- 1) Measure toe-in with front wheels in straight ahead position and steering wheel centered. To adjust toe-in, loosen clamps and turn adjusting sleeve or adjustable end on right and left tie rods. See Figs. 2 and 5.
- 2) Turn equally and in opposite directions to maintain steering wheel in centered position. Face of tie rod end must be parallel with machined surface of steering rod end to prevent binding.
- 3) When tightening clamps, make certain that clamp bolts are positioned so there will be no interference with other parts throughout the entire travel of linkage.

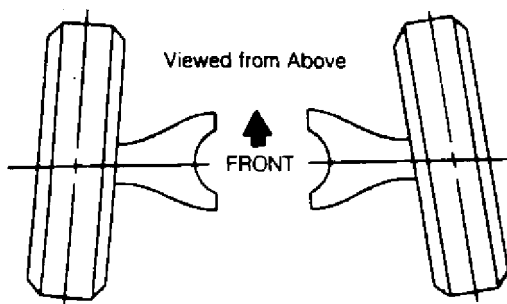


Fig. 5: Wheel Toe-In (Dimension A Less Dimension B)

### TOE-OUT ON TURNS

- 1) Toe-out on turns (turning radius) is a check for bent or damaged parts, and not a service adjustment. With caster, camber, and

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toe-in properly adjusted, check toe-out with weight of vehicle on wheels.

2) Use a full floating turntable under each wheel, repeating test with each wheel positioned for right and left turns. Incorrect toe-out generally indicates a bent steering arm. Replace arm, if necessary, and recheck wheel alignment.

### STEERING AXIS INCLINATION

1) Steering axis inclination is a check for bent or damaged parts, and not a service adjustment. Vehicle must be level and camber should be properly adjusted. See Fig. 6.

2) If camber cannot be brought within limits and steering axis inclination is correct, steering knuckle is bent. If camber and steering axis inclination are both incorrect by approximately the same amount, the upper and lower control arms are bent.

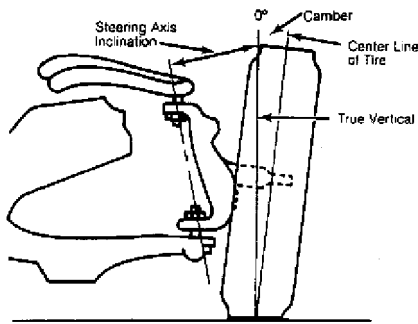


Fig. 6: Checking Steering Axis Inclination

END OF ARTICLE

# WAVEFORMS - INJECTOR PATTERN TUTORIAL

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### ARTICLE BEGINNING

#### GENERAL INFORMATION

Waveforms - Injector Pattern Tutorial

#### **\* PLEASE READ THIS FIRST \***

NOTE: This article is intended for general information purposes only. This information may not apply to all makes and models.

#### PURPOSE OF THIS ARTICLE

Learning how to interpret injector drive patterns from a Lab Scope can be like learning ignition patterns all over again. This article exists to ease you into becoming a skilled injector pattern interpreter.

You will learn:

- \* How a DVOM and noid light fall short of a lab scope.
- \* The two types of injector driver circuits, voltage controlled & current controlled.
- \* The two ways injector circuits can be wired, constant ground/switched power & constant power/switched ground.
- \* The two different pattern types you can use to diagnose with, voltage & current.
- \* All the valuable details injector patterns can reveal.

#### SCOPE OF THIS ARTICLE

This is NOT a manufacturer specific article. All different types of systems are covered here, regardless of the specific year/make/model/engine.

The reason for such broad coverage is because there are only a few basic ways to operate a solenoid-type injector. By understanding the fundamental principles, you will understand all the major points of injector patterns you encounter. Of course there are minor differences in each specific system, but that is where a waveform library helps out.

If this is confusing, consider a secondary ignition pattern. Even though there are many different implementations, each still has a primary voltage turn-on, firing line, spark line, etc.

If specific waveforms are available in On Demand for the engine and vehicle you are working on, you will find them in the Engine Performance section under the Engine Performance category.

#### **IS A LAB SCOPE NECESSARY?**

#### INTRODUCTION

You probably have several tools at your disposal to diagnose injector circuits. But you might have questioned "Is a lab scope

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necessary to do a thorough job, or will a set of noid lights and a multifunction DVOM do just as well?"

In the following text, we are going to look at what noid lights and DVOMs do best, do not do very well, and when they can mislead you. As you might suspect, the lab scope, with its ability to look inside an active circuit, comes to the rescue by answering for the deficiencies of these other tools.

### OVERVIEW OF NOID LIGHT

The noid light is an excellent "quick and dirty" tool. It can usually be hooked to a fuel injector harness fast and the flashing light is easy to understand. It is a dependable way to identify a no-pulse situation.

However, a noid light can be very deceptive in two cases:

- \* If the wrong one is used for the circuit being tested.  
Beware: Just because a connector on a noid light fits the harness does not mean it is the right one.
- \* If an injector driver is weak or a minor voltage drop is present.

#### Use the Right Noid Light

In the following text we will look at what can happen if the wrong noid light is used, why there are different types of noid lights (besides differences with connectors), how to identify the types of noid lights, and how to know the right type to use.

First, let's discuss what can happen if the incorrect type of noid light is used. You might see:

- \* A dimly flashing light when it should be normal.
- \* A normal flashing light when it should be dim.

A noid light will flash dim if used on a lower voltage circuit than it was designed for. A normally operating circuit would appear underpowered, which could be misinterpreted as the cause of a fuel starvation problem.

Here are the two circuit types that could cause this problem:

- \* Circuits with external injector resistors. Used predominately on some Asian & European systems, they are used to reduce the available voltage to an injector in order to limit the current flow. This lower voltage can cause a dim flash on a noid light designed for full voltage.
- \* Circuits with current controlled injector drivers (e.g. "Peak and Hold"). Basically, this type of driver allows a quick burst of voltage/current to flow and then throttles it back significantly for the remainder of the pulse width duration. If a noid light was designed for the other type of driver (voltage controlled, e.g. "Saturated"), it will appear dim because it is expecting full voltage/current to flow for the entire duration of the pulse width.

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Let's move to the other situation where a noid light flashes normally when it should be dim. This could occur if a more sensitive noid light is used on a higher voltage/amperage circuit that was weakened enough to cause problems (but not outright broken). A circuit with an actual problem would thus appear normal.

Let's look at why. A noid light does not come close to consuming as much amperage as an injector solenoid. If there is a partial driver failure or a minor voltage drop in the injector circuit, there can be adequate amperage to fully operate the noid light BUT NOT ENOUGH TO OPERATE THE INJECTOR.

If this is not clear, picture a battery with a lot of corrosion on the terminals. Say there is enough corrosion that the starter motor will not operate; it only clicks. Now imagine turning on the headlights (with the ignition in the RUN position). You find they light normally and are fully bright. This is the same idea as noid light: There is a problem, but enough amp flow exists to operate the headlights ("noid light"), but not the starter motor ("injector").

How do you identify and avoid all these situations? By using the correct type of noid light. This requires that you understand the types of injector circuits that your noid lights are designed for. There are three. They are:

- \* Systems with a voltage controlled injector driver. Another way to say it: The noid light is designed for a circuit with a "high" resistance injector (generally 12 ohms or above).
- \* Systems with a current controlled injector driver. Another way to say it: The noid light is designed for a circuit with a low resistance injector (generally less than 12 ohms) without an external injector resistor.
- \* Systems with a voltage controlled injector driver and an external injector resistor. Another way of saying it: The noid light is designed for a circuit with a low resistance injector (generally less than 12 ohms) and an external injector resistor.

NOTE: Some noid lights can meet both the second and third categories simultaneously.

If you are not sure which type of circuit your noid light is designed for, plug it into a known good car and check out the results. If it flashes normally during cranking, determine the circuit type by finding out injector resistance and if an external injector resistor is used. You now know enough to identify the type of injector circuit. Label the noid light appropriately.

Next time you need to use a noid light for diagnosis, determine what type of injector circuit you are dealing with and select the appropriate noid light.

Of course, if you suspect a no-pulse condition you could plug in any one whose connector fit without fear of misdiagnosis. This is because it is unimportant if the flashing light is dim or bright. It is only important that it flashes.

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In any cases of doubt regarding the use of a noid light, a lab scope will overcome all inherent weaknesses.

### OVERVIEW OF DVOM

A DVOM is typically used to check injector resistance and available voltage at the injector. Some techs also use it check injector on-time either with a built-in feature or by using the dwell/duty function.

There are situations where the DVOM performs these checks dependably, and other situations where it can deceive you. It is important to be aware of these strengths and weaknesses. We will cover the topics above in the following text.

#### Checking Injector Resistance

If a short in an injector coil winding is constant, an ohmmeter will accurately identify the lower resistance. The same is true with an open winding. Unfortunately, an intermittent short is an exception. A faulty injector with an intermittent short will show "good" if the ohmmeter cannot force the short to occur during testing.

Alcohol in fuel typically causes an intermittent short, happening only when the injector coil is hot and loaded by a current high enough to jump the air gap between two bare windings or to break down any oxides that may have formed between them.

When you measure resistance with an ohmmeter, you are only applying a small current of a few milliamps. This is nowhere near enough to load the coil sufficiently to detect most problems. As a result, most resistance checks identify intermittently shorted injectors as being normal.

There are two methods to get around this limitation. The first is to purchase a tool that checks injector coil windings under full load. The Kent-Moore J-39021 is such a tool, though there are others. The Kent-Moore costs around \$240 at the time of this writing and works on many different manufacturer's systems.

The second method is to use a lab scope. Remember, a lab scope allows you to see the regular operation of a circuit in real time. If an injector is having an short or intermittent short, the lab scope will show it.

#### Checking Available Voltage At the Injector

Verifying a fuel injector has the proper voltage to operate correctly is good diagnostic technique. Finding an open circuit on the feed circuit like a broken wire or connector is an accurate check with a DVOM. Unfortunately, finding an intermittent or excessive resistance problem with a DVOM is unreliable.

Let's explore this drawback. Remember that a voltage drop due to excessive resistance will only occur when a circuit is operating? Since the injector circuit is only operating for a few milliseconds at a time, a DVOM will only see a potential fault for a few milliseconds. The remaining 90+% of the time the unloaded injector circuit will show normal battery voltage.

Since DVOMs update their display roughly two to five times a

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second, all measurements in between are averaged. Because a potential voltage drop is visible for such a small amount of time, it gets "averaged out", causing you to miss it.

Only a DVOM that has a "min-max" function that checks EVERY MILLISECOND will catch this fault consistently (if used in that mode). The Fluke 87 among others has this capability.

A "min-max" DVOM with a lower frequency of checking (100 millisecond) can miss the fault because it will probably check when the injector is not on. This is especially true with current controlled driver circuits. The Fluke 88, among others fall into this category.

Outside of using a Fluke 87 (or equivalent) in the 1 mS "min-max" mode, the only way to catch a voltage drop fault is with a lab scope. You will be able to see a voltage drop as it happens.

One final note. It is important to be aware that an injector circuit with a solenoid resistor will always show a voltage drop when the circuit is energized. This is somewhat obvious and normal; it is a designed-in voltage drop. What can be unexpected is what we already covered--a voltage drop disappears when the circuit is unloaded. The unloaded injector circuit will show normal battery voltage at the injector. Remember this and do not get confused.

### Checking Injector On-Time With Built-In Function

Several DVOMs have a feature that allows them to measure injector on-time (mS pulse width). While they are accurate and fast to hookup, they have three limitations you should be aware of:

- \* They only work on voltage controlled injector drivers (e.g. "Saturated Switch"), NOT on current controlled injector drivers (e.g. "Peak & Hold").
- \* A few unusual conditions can cause inaccurate readings.
- \* Varying engine speeds can result in inaccurate readings.

Regarding the first limitation, DVOMs need a well-defined injector pulse in order to determine when the injector turns ON and OFF. Voltage controlled drivers provide this because of their simple switch-like operation. They completely close the circuit for the entire duration of the pulse. This is easy for the DVOM to interpret.

The other type of driver, the current controlled type, start off well by completely closing the circuit (until the injector pintle opens), but then they throttle back the voltage/current for the duration of the pulse. The DVOM understands the beginning of the pulse but it cannot figure out the throttling action. In other words, it cannot distinguish the throttling from an open circuit (de-energized) condition.

Yet current controlled injectors will still yield a millisecond on-time reading on these DVOMs. You will find it is also always the same, regardless of the operating conditions. This is because it is only measuring the initial completely-closed circuit on-time, which always takes the same amount of time (to lift the injector pintle off its seat). So even though you get a reading, it is useless.

The second limitation is that a few erratic conditions can



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cause inaccurate readings. This is because of a DVOM's slow display rate; roughly two to five times a second. As we covered earlier, measurements in between display updates get averaged. So conditions like skipped injector pulses or intermittent long/short injector pulses tend to get "averaged out", which will cause you to miss important details.

The last limitation is that varying engine speeds can result in inaccurate readings. This is caused by the quickly shifting injector on-time as the engine load varies, or the RPM moves from a state of acceleration to stabilization, or similar situations. It too is caused by the averaging of all measurements in between DVOM display periods. You can avoid this by checking on-time when there are no RPM or load changes.

A lab scope allows you to overcome each one of these limitations.

### Checking Injector On-Time With Dwell Or Duty

If no tool is available to directly measure injector millisecond on-time measurement, some techs use a simple DVOM dwell or duty cycle functions as a replacement.

While this is an approach of last resort, it does provide benefits. We will discuss the strengths and weaknesses in a moment, but first we will look at how a duty cycle meter and dwell meter work.

### How A Duty Cycle Meter and Dwell Meter Work

All readings are obtained by comparing how long something has been OFF to how long it has been ON in a fixed time period. A dwell meter and duty cycle meter actually come up with the same answers using different scales. You can convert freely between them. See RELATIONSHIP BETWEEN DWELL & DUTY CYCLE READINGS TABLE.

The DVOM display updates roughly one time a second, although some DVOMs can be a little faster or slower. All measurements during this update period are tallied inside the DVOM as ON time or OFF time, and then the total ratio is displayed as either a percentage (duty cycle) or degrees (dwell meter).

For example, let's say a DVOM had an update rate of exactly 1 second (1000 milliseconds). Let's also say that it has been measuring/tallying an injector circuit that had been ON a total of 250 mS out of the 1000 mS. That is a ratio of one-quarter, which would be displayed as 25% duty cycle or 15° dwell (six-cylinder scale). Note that most duty cycle meters can reverse the readings by selecting the positive or negative slope to trigger on. If this reading were reversed, a duty cycle meter would display 75%.

### Strengths of Dwell/Duty Meter

The obvious strength of a dwell/duty meter is that you can compare injector on-time against a known-good reading. This is the only practical way to use a dwell/duty meter, but requires you to have known-good values to compare against.

Another strength is that you can roughly convert injector mS on-time into dwell reading with some computations.

A final strength is that because the meter averages

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everything together it does not miss anything (though this is also a severe weakness that we will look at later). If an injector has a fault where it occasionally skips a pulse, the meter registers it and the reading changes accordingly.

Let's go back to figuring out dwell/duty readings by using injector on-time specification. This is not generally practical, but we will cover it for completeness. You NEED to know three things:

- \* Injector mS on-time specification.
- \* Engine RPM when specification is valid.
- \* How many times the injectors fire per crankshaft revolution.

The first two are self-explanatory. The last one may require some research into whether it is a bank-fire type that injects every 360° of crankshaft rotation, a bank-fire that injects every 720°, or an SFI that injects every 720°. Many manufacturers do not release this data so you may have to figure it out yourself with a frequency meter.

Here are the four complete steps to convert millisecond on-time:

1) Determine the injector pulse width and RPM it was obtained at. Let's say the specification is for one millisecond of on-time at a hot idle of 600 RPM.

2) Determine injector firing method for the complete 4 stroke cycle. Let's say this is a 360° bank-fired, meaning an injector fires each and every crankshaft revolution.

3) Determine how many times the injector will fire at the specified engine speed (600 RPM) in a fixed time period. We will use 100 milliseconds because it is easy to use.

Six hundred crankshaft Revolutions Per Minute (RPM) divided by 60 seconds equals 10 revolutions per second.

Multiplying 10 times .100 yields one; the crankshaft turns one time in 100 milliseconds. With exactly one crankshaft rotation in 100 milliseconds, we know that the injector fires exactly one time.

4) Determine the ratio of injector on-time vs. off-time in the fixed time period, then figure duty cycle and/or dwell. The injector fires one time for a total of one millisecond in any given 100 millisecond period.

One hundred minus one equals 99. We have a 99% duty cycle. If we wanted to know the dwell (on 6 cylinder scale), multiple 99% times .6; this equals 59.4° dwell.

### Weaknesses of Dwell/Duty Meter

The weaknesses are significant. First, there is no one-to-one correspondence to actual mS on-time. No manufacturer releases dwell/duty data, and it is time-consuming to convert the mS on-time readings. Besides, there can be a large degree of error because the conversion forces you to assume that the injector(s) are always firing at the same rate for the same period of time. This can be a dangerous assumption.

Second, all level of detail is lost in the averaging process. This is the primary weakness. You cannot see the details you need to make a confident diagnosis.

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Here is one example. Imagine a vehicle that has a faulty injector driver that occasionally skips an injector pulse. Every skipped pulse means that that cylinder does not fire, thus unburned O<sub>2</sub> gets pushed into the exhaust and passes the O<sub>2</sub> sensor. The O<sub>2</sub> sensor indicates lean, so the computer fattens up the mixture to compensate for the supposed "lean" condition.

A connected dwell/duty meter would see the fattened pulse width but would also see the skipped pulses. It would tally both and likely come back with a reading that indicated the "pulse width" was within specification because the rich mixture and missing pulses offset each other.

This situation is not a far-fetched scenario. Some early GM 3800 engines were suffering from exactly this. The point is that a lack of detail could cause misdiagnosis.

As you might have guessed, a lab scope would not miss this.

### RELATIONSHIP BETWEEN DWELL & DUTY CYCLE READINGS TABLE (1)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Dwell Meter (2) | Duty Cycle Meter |
|-----------------|------------------|
| 10              | 1%               |
| 150             | 25%              |
| 300             | 50%              |
| 450             | 75%              |
| 600             | 100%             |

(1) - These are just some examples for your understanding.

It is okay to fill in the gaps.

(2) - Dwell meter on the six-cylinder scale.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## THE TWO TYPES OF INJECTOR DRIVERS

### OVERVIEW

There are two types of transistor driver circuits used to operate electric fuel injectors: voltage controlled and current controlled. The voltage controlled type is sometimes called a "saturated switch" driver, while the current controlled type is sometimes known as a "peak and hold" driver.

The basic difference between the two is the total resistance of the injector circuit. Roughly speaking, if a particular leg in an injector circuit has total resistance of 12 or more ohms, a voltage control driver is used. If less than 12 ohms, a current control driver is used.

It is a question of what is going to do the job of limiting the current flow in the injector circuit; the inherent "high" resistance in the injector circuit, or the transistor driver. Without some form of control, the current flow through the injector would cause the solenoid coil to overheat and result in a damaged injector.

### VOLTAGE CONTROLLED CIRCUIT ("SATURATED SWITCH")

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The voltage controlled driver inside the computer operates much like a simple switch because it does not need to worry about limiting current flow. Recall, this driver typically requires injector circuits with a total leg resistance of 12 or more ohms.

The driver is either ON, closing/completing the circuit (eliminating the voltage-drop), or OFF, opening the circuit (causing a total voltage drop).

Some manufacturers call it a "saturated switch" driver. This is because when switched ON, the driver allows the magnetic field in the injector to build to saturation. This is the same "saturation" property that you are familiar with for an ignition coil.

There are two ways "high" resistance can be built into an injector circuit to limit current flow. One method uses an external solenoid resistor and a low resistance injector, while the other uses a high resistance injector without the solenoid resistor. See the left side of Fig. 1.

In terms of injection opening time, the external resistor voltage controlled circuit is somewhat faster than the voltage controlled high resistance injector circuit. The trend, however, seems to be moving toward use of this latter type of circuit due to its lower cost and reliability. The ECU can compensate for slower opening times by increasing injector pulse width accordingly.

**NOTE:** Never apply battery voltage directly across a low resistance injector. This will cause injector damage from solenoid coil overheating.

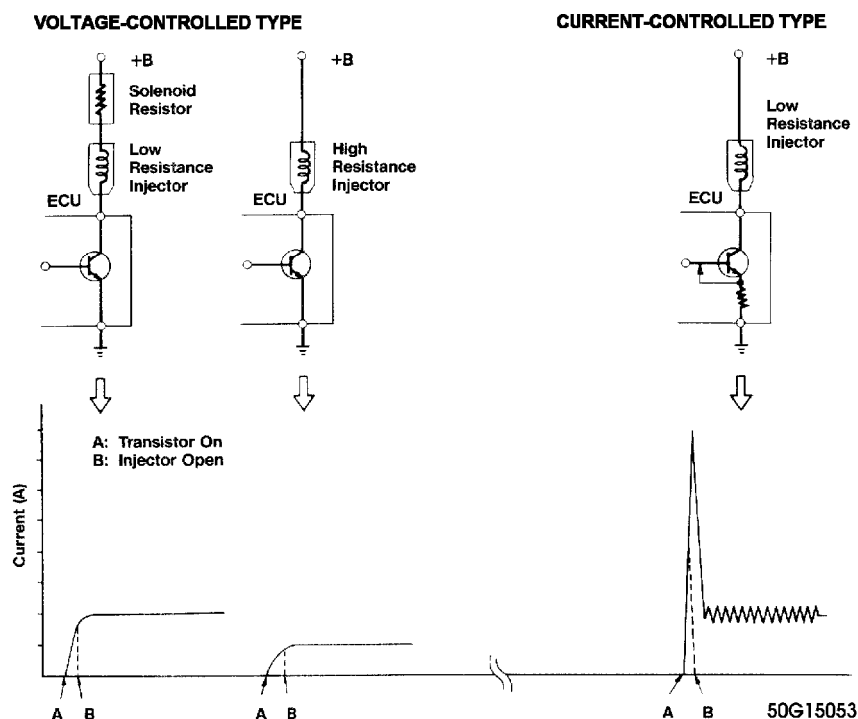


Fig. 1: Injector Driver Types - Current and Voltage

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### CURRENT CONTROLLED CIRCUIT ("PEAK & HOLD")

The current controlled driver inside the computer is more complex than a voltage controlled driver because as the name implies, it has to limit current flow in addition to its ON-OFF switching function. Recall, this driver typically requires injector circuits with a total leg resistance of less than 12 ohms.

Once the driver is turned ON, it will not limit current flow until enough time has passed for the injector pintle to open. This period is preset by the particular manufacturer/system based on the amount of current flow needed to open their injector. This is typically between two and six amps. Some manufacturers refer to this as the "peak" time, referring to the fact that current flow is allowed to "peak" (to open the injector).

Once the injector pintle is open, the amp flow is considerably reduced for the rest of the pulse duration to protect the injector from overheating. This is okay because very little amperage is needed to hold the injector open, typically in the area of one amp or less. Some manufacturers refer to this as the "hold" time, meaning that just enough current is allowed through the circuit to "hold" the already-open injector open.

There are a couple methods of reducing the current. The most common trims back the available voltage for the circuit, similar to turning down a light at home with a dimmer.

The other method involves repeatedly cycling the circuit ON-OFF. It does this so fast that the magnetic field never collapses and the pintle stays open, but the current is still significantly reduced. See the right side of Fig. 1 for an illustration.

The advantage to the current controlled driver circuit is the short time period from when the driver transistor goes ON to when the injector actually opens. This is a function of the speed with which current flow reaches its peak due to the low circuit resistance. Also, the injector closes faster when the driver turns OFF because of the lower holding current.

**NOTE:** Never apply battery voltage directly across a low resistance injector. This will cause injector damage from solenoid coil overheating.

### THE TWO WAYS INJECTOR CIRCUITS ARE WIRED

Like other circuits, injector circuits can be wired in one of two fundamental directions. The first method is to steadily power the injectors and have the computer driver switch the ground side of the circuit. Conversely, the injectors can be steadily grounded while the driver switches the power side of the circuit.

There is no performance benefit to either method. Voltage controlled and current controlled drivers have been successfully implemented both ways.

However, 95% percent of the systems are wired so the driver controls the ground side of the circuit. Only a handful of systems use the drivers on the power side of the circuit. Some examples of the

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latter are the 1970's Cadillac EFI system, early Jeep 4.0 EFI (Renix system), and Chrysler 1984-87 TBI.

### INTERPRETING INJECTOR WAVEFORMS

#### INTERPRETING A VOLTAGE CONTROLLED PATTERN

NOTE: Voltage controlled drivers are also known as "Saturated Switch" drivers. They typically require injector circuits with a total leg resistance of 12 ohms or more.

NOTE: This example is based on a constant power/switched ground circuit.

\* See Fig. 2 for pattern that the following text describes.

Point "A" is where system voltage is supplied to the injector. A good hot run voltage is usually 13.5 or more volts. This point, commonly known as open circuit voltage, is critical because the injector will not get sufficient current saturation if there is a voltage shortfall. To obtain a good look at this precise point, you will need to shift your Lab Scope to five volts per division.

You will find that some systems have slight voltage fluctuations here. This can occur if the injector feed wire is also used to power up other cycling components, like the ignition coil(s). Slight voltage fluctuations are normal and are no reason for concern. Major voltage fluctuations are a different story, however. Major voltage shifts on the injector feed line will create injector performance problems. Look for excessive resistance problems in the feed circuit if you see big shifts and repair as necessary.

Note that circuits with external injector resistors will not be any different because the resistor does not affect open circuit voltage.

Point "B" is where the driver completes the circuit to ground. This point of the waveform should be a clean square point straight down with no rounded edges. It is during this period that current saturation of the injector windings is taking place and the driver is heavily stressed. Weak drivers will distort this vertical line.

Point "C" represents the voltage drop across the injector windings. Point "C" should come very close to the ground reference point, but not quite touch. This is because the driver has a small amount of inherent resistance. Any significant offset from ground is an indication of a resistance problem on the ground circuit that needs repaired. You might miss this fault if you do not use the negative battery post for your Lab Scope hook-up, so it is HIGHLY recommended that you use the battery as your hook-up.

The points between "B" and "D" represent the time in milliseconds that the injector is being energized or held open. This line at Point "C" should remain flat. Any distortion or upward bend indicates a ground problem, short problem, or a weak driver. Alert readers will catch that this is exactly opposite of the current

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controlled type drivers (explained in the next section), because they bend upwards at this point.

How come the difference? Because of the total circuit resistance. Voltage controlled driver circuits have a high resistance of 12+ ohms that slows the building of the magnetic field in the injector. Hence, no counter voltage is built up and the line remains flat.

On the other hand, the current controlled driver circuit has low resistance which allows for a rapid magnetic field build-up. This causes a slight inductive rise (created by the effects of counter voltage) and hence, the upward bend. You should not see that here with voltage controlled circuits.

Point "D" represents the electrical condition of the injector windings. The height of this voltage spike (inductive kick) is proportional to the number of windings and the current flow through them. The more current flow and greater number of windings, the more potential for a greater inductive kick. The opposite is also true. The less current flow or fewer windings means less inductive kick. Typically you should see a minimum 35 volts at the top of Point "D".

If you do see approximately 35 volts, it is because a zener diode is used with the driver to clamp the voltage. Make sure the beginning top of the spike is squared off, indicating the zener dumped the remainder of the spike. If it is not squared, that indicates the spike is not strong enough to make the zener fully dump, meaning the injector has a weak winding.

If a zener diode is not used in the computer, the spike from a good injector will be 60 or more volts.

Point "E" brings us to a very interesting section. As you can see, the voltage dissipates back to supply value after the peak of the inductive kick. Notice the slight hump? This is actually the mechanical injector pintle closing. Recall that moving an iron core through a magnetic field will create a voltage surge. The pintle is the iron core here.

This pintle hump at Point "E" should occur near the end of the downward slope, and not afterwards. If it does occur after the slope has ended and the voltage has stabilized, it is because the pintle is slightly sticking because of a faulty injector

If you see more than one hump it is because of a distorted pintle or seat. This faulty condition is known as "pintle float".

It is important to realize that it takes a good digital storage oscilloscope or analog lab scope to see this pintle hump clearly. Unfortunately, it cannot always be seen.

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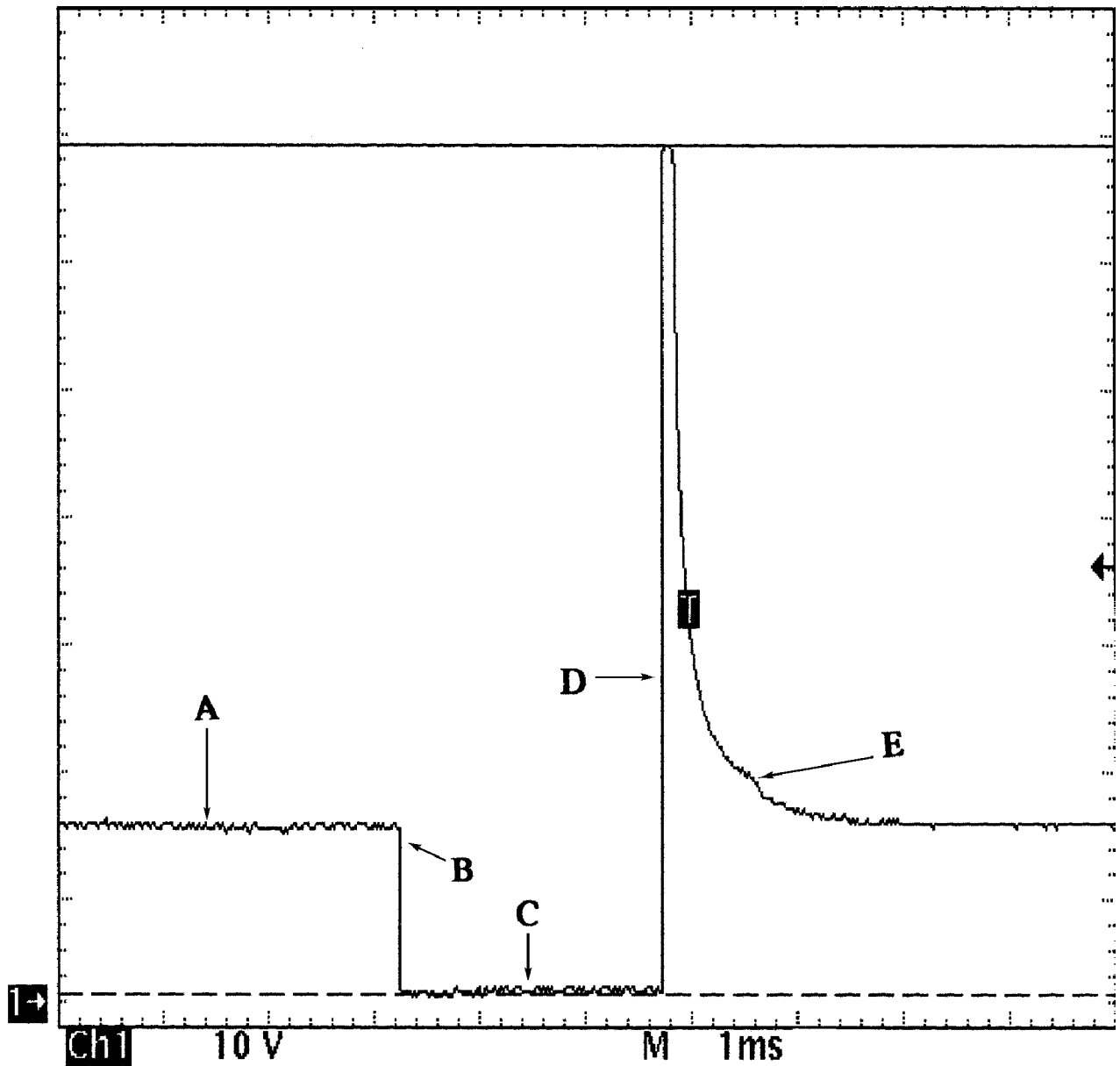


Fig. 2: Identifying Voltage Controlled Type Injector Pattern

#### INTERPRETING A CURRENT CONTROLLED PATTERN

NOTE: Current controlled drivers are also known as "Peak and Hold" drivers. They typically require injector circuits with a total leg resistance with less than 12 ohm.

NOTE: This example is based on a constant power/switched ground circuit.

\* See Fig. 3 for pattern that the following text describes.

Point "A" is where system voltage is supplied to the



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injector. A good hot run voltage is usually 13.5 or more volts. This point, commonly known as open circuit voltage, is critical because the injector will not get sufficient current saturation if there is a voltage shortfall. To obtain a good look at this precise point, you will need to shift your Lab Scope to five volts per division.

You will find that some systems have slight voltage fluctuations here. This could occur if the injector feed wire is also used to power up other cycling components, like the ignition coil(s). Slight voltage fluctuations are normal and are no reason for concern. Major voltage fluctuations are a different story, however. Major voltage shifts on the injector feed line will create injector performance problems. Look for excessive resistance problems in the feed circuit if you see big shifts and repair as necessary.

Point "B" is where the driver completes the circuit to ground. This point of the waveform should be a clean square point straight down with no rounded edges. It is during this period that current saturation of the injector windings is taking place and the driver is heavily stressed. Weak drivers will distort this vertical line.

Point "C" represents the voltage drop across the injector windings. Point "C" should come very close to the ground reference point, but not quite touch. This is because the driver has a small amount of inherent resistance. Any significant offset from ground is an indication of a resistance problem on the ground circuit that needs repaired. You might miss this fault if you do not use the negative battery post for your Lab Scope hook-up, so it is HIGHLY recommended that you use the battery as your hook-up.

Right after Point "C", something interesting happens. Notice the trace starts a normal upward bend. This slight inductive rise is created by the effects of counter voltage and is normal. This is because the low circuit resistance allowed a fast build-up of the magnetic field, which in turn created the counter voltage.

Point "D" is the start of the current limiting, also known as the "Hold" time. Before this point, the driver had allowed the current to free-flow ("Peak") just to get the injector pintle open. By the time point "D" occurs, the injector pintle has already opened and the computer has just significantly throttled the current back. It does this by only allowing a few volts through to maintain the minimum current required to keep the pintle open.

The height of the voltage spike seen at the top of Point "D" represents the electrical condition of the injector windings. The height of this voltage spike (inductive kick) is proportional to the number of windings and the current flow through them. The more current flow and greater number of windings, the more potential for a greater inductive kick. The opposite is also true. The less current flow or fewer windings means less inductive kick. Typically you should see a minimum 35 volts.

If you see approximately 35 volts, it is because a zener diode is used with the driver to clamp the voltage. Make sure the beginning top of the spike is squared off, indicating the zener dumped the remainder of the spike. If it is not squared, that indicates the spike is not strong enough to make the zener fully dump, meaning there

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is a problem with a weak injector winding.

If a zener diode is not used in the computer, the spike from a good injector will be 60 or more volts.

At Point "E", notice that the trace is now just a few volts below system voltage and the injector is in the current limiting, or the "Hold" part of the pattern. This line will either remain flat and stable as shown here, or will cycle up and down rapidly. Both are normal methods to limit current flow. Any distortion may indicate shorted windings.

Point "F" is the actual turn-off point of the driver (and injector). To measure the millisecond on-time of the injector, measure between points "C" and "F". Note that we used cursors to do it for us; they are measuring a 2.56 mS on-time.

The top of Point "F" (second inductive kick) is created by the collapsing magnetic field caused by the final turn-off of the driver. This spike should be like the spike on top of point "D".

Point "G" shows a slight hump. This is actually the mechanical injector pintle closing. Recall that moving an iron core through a magnetic field will create a voltage surge. The pintle is the iron core here.

This pintle hump at Point "E" should occur near the end of the downward slope, and not afterwards. If it does occur after the slope has ended and the voltage has stabilized, it is because the pintle is slightly sticking. Some older Nissan TBI systems suffered from this.

If you see more than one hump it is because of a distorted pintle or seat. This faulty condition is known as "pintle float".

It is important to realize that it takes a good digital storage oscilloscope or analog lab scope to see this pintle hump clearly. Unfortunately, it cannot always be seen.

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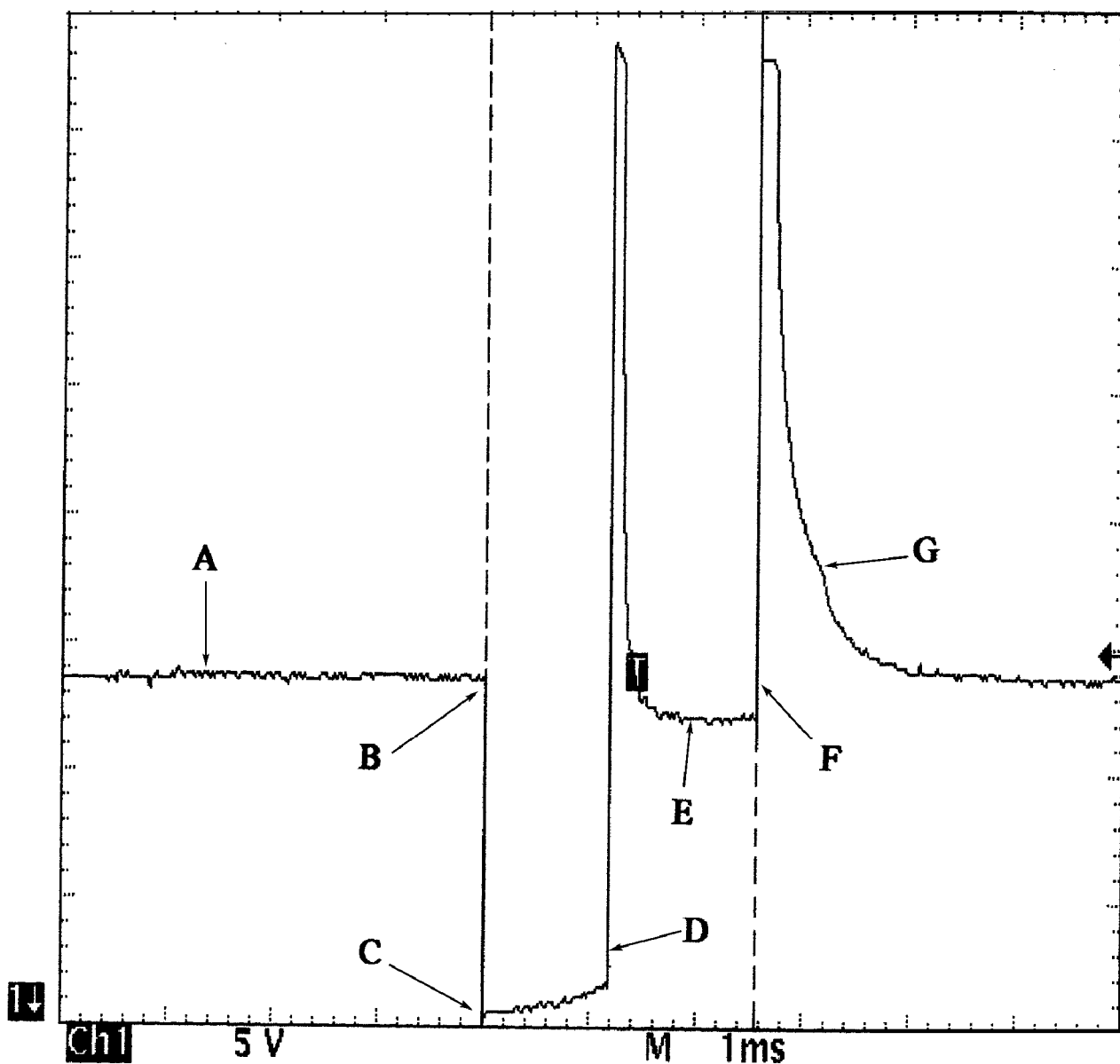
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95C23863  
Fig. 3: Identifying Current Controlled Type Injector Pattern

### CURRENT WAVEFORM SAMPLES

#### EXAMPLE #1 - VOLTAGE CONTROLLED DRIVER

The waveform pattern shown in Fig. 4 indicate a normal current waveform from a Ford 3.0L V6 VIN [U] engine. This voltage controlled type circuit pulses the injectors in groups of three injectors. Injectors No. 1, 3, and 5 are pulsed together and cylinders 2, 4, and 6 are pulsed together. The specification for an acceptable bank resistance is 4.4 ohms. Using Ohm's Law and assuming a hot run voltage of 14 volts, we determine that the bank would draw a current of 3.2 amps.

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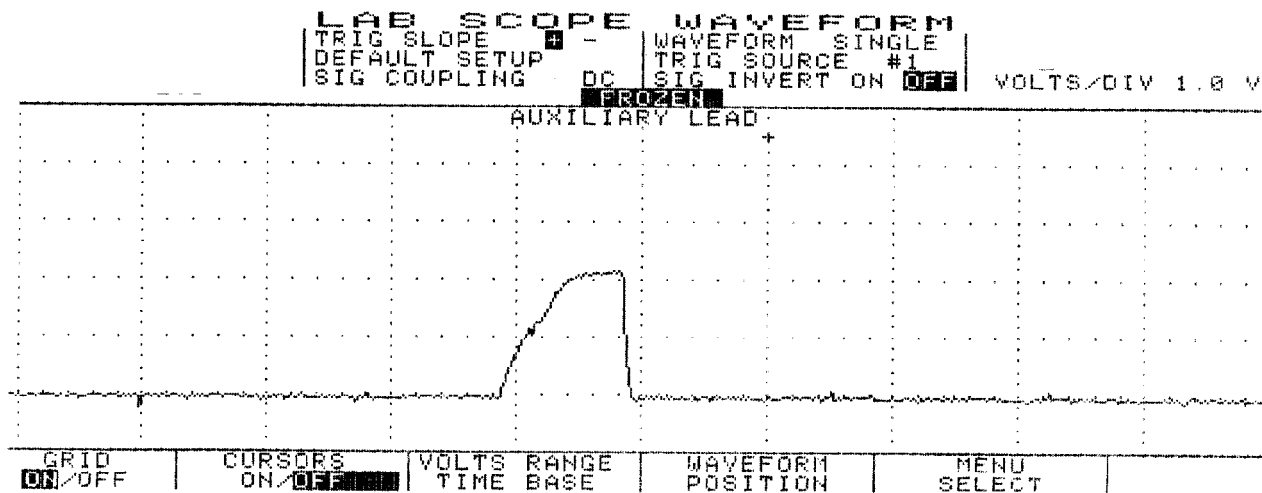
However this is not the case because as the injector windings become saturated, counter voltage is created which impedes the current flow. This, coupled with the inherent resistance of the driver's transistor, impedes the current flow even more. So, what is a known good value for a dynamic current draw on a voltage controlled bank of injectors? The waveform pattern shown below indicates a good parallel injector current flow of 2 amps. See Fig. 4.

Note that if just one injector has a resistance problem and partially shorts, the entire parallel bank that it belongs to will draw more current. This can damage the injector driver.

The waveform pattern in Fig. 5 indicates this type of problem with too much current flow. This is on other bank of injectors of the same vehicle; the even side. Notice the Lab Scope is set on a one amp per division scale. As you can see, the current is at an unacceptable 2.5 amps.

It is easy to find out which individual injector is at fault. All you need to do is inductively clamp onto each individual injector and compare them. To obtain a known-good value to compare against, we used the good bank to capture the waveform in Fig. 6. Notice that it limits current flow to 750 milliamps.

The waveform shown in Fig. 7 illustrates the problem injector we found. This waveform indicates an unacceptable current draw of just over one amp as compared to the 750 milliamp draw of the known-good injector. A subsequent check with a DVOM found 8.2 ohms, which is under the 12 ohm specification.



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Fig. 4: Injector Bank w/Normal Current Flow - Current Pattern

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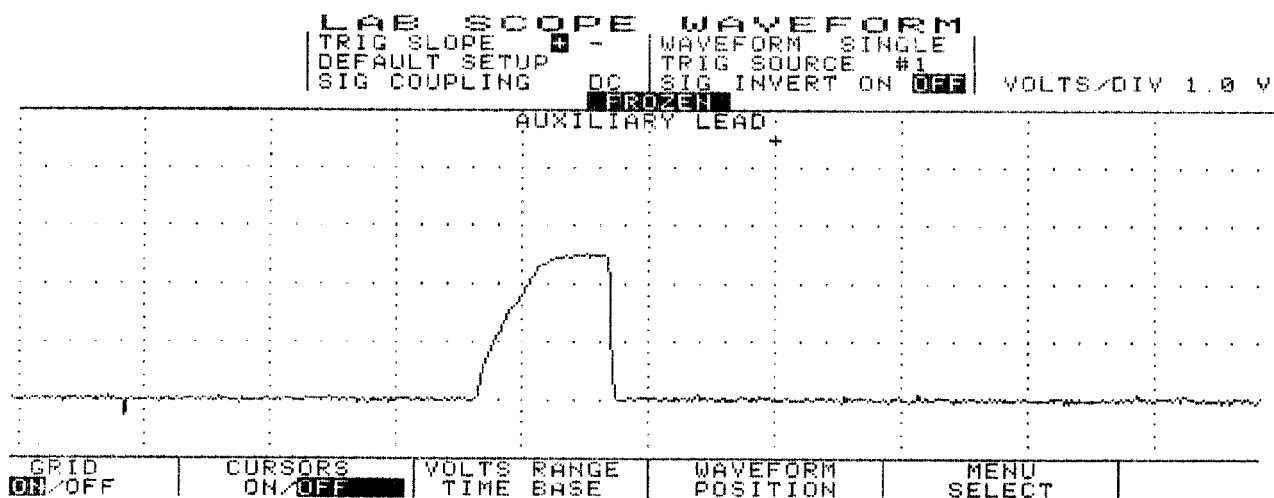


Fig. 5: Injector Bank w/Excessive Current Flow - Current Pattern

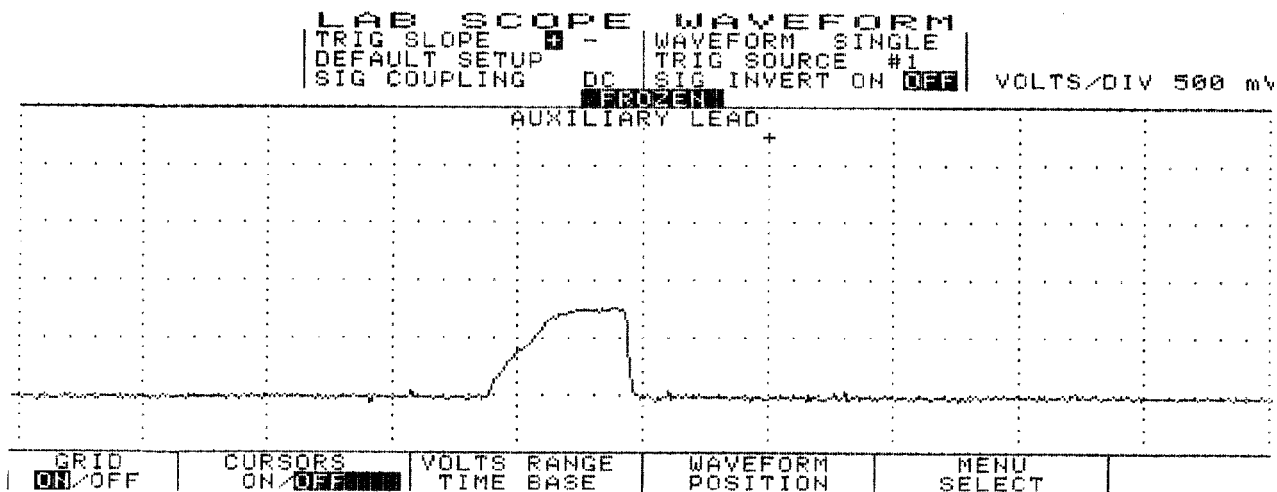


Fig. 6: Single Injector w/Normal Current Flow - Current Pattern

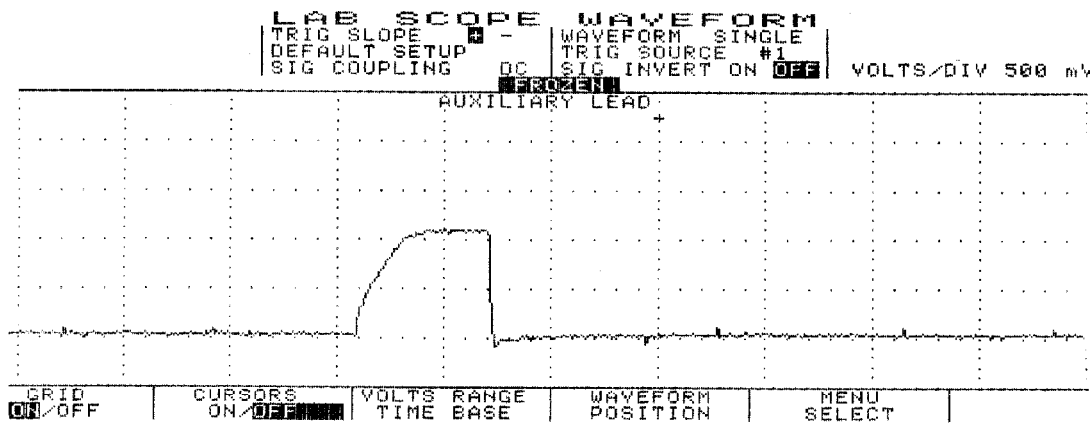


Fig. 7: Single Injector w/Excessive Current Flow - Current Pattern

EXAMPLE #2 - VOLTAGE CONTROLLED DRIVER

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This time we will look at a GM 3.1L V6 VIN [T]. Fig. 8 shows the 1, 3, 5 (odd) injector bank with the current waveform indicating about a 2.6 amp draw at idle. This pattern, taken from a known good vehicle, correctly stays at or below the maximum 2.6 amps current range. Ideally, the current for each bank should be very close in comparison.

Notice the small dimple on the current flow's rising edge. This is the actual injector opening or what engineers refer to as the "set point." For good idle quality, the set point should be uniform between the banks.

When discussing Ohm's Law as it pertains to this parallel circuit, consider that each injector has specified resistance of 12.2 ohms. Since all three injectors are in parallel the total resistance of this parallel circuit drops to 4.1 ohms. Fourteen volts divided by four ohms would pull a maximum of 3.4 amps on this bank of injectors. However, as we discussed in EXAMPLE #1 above, other factors knock this value down to roughly the 2.6 amp neighborhood.

Now we are going to take a look at the even bank of injectors; injectors 2, 4, and 6. See Fig. 9. Notice this bank peaked at 1.7 amps at idle as compared to the 2.6 amps peak of the odd bank (Fig. 8). Current flow between even and odd injectors banks is not uniform, yet it is not causing a driveability problem. That is because it is still under the maximum amperage we figured out earlier. But be aware this vehicle could develop a problem if the amperage flow increases any more.

Checking the resistance of this even injector group with a DVOM yielded 6.2 ohms, while the odd injector group in the previous example read 4.1 ohms.

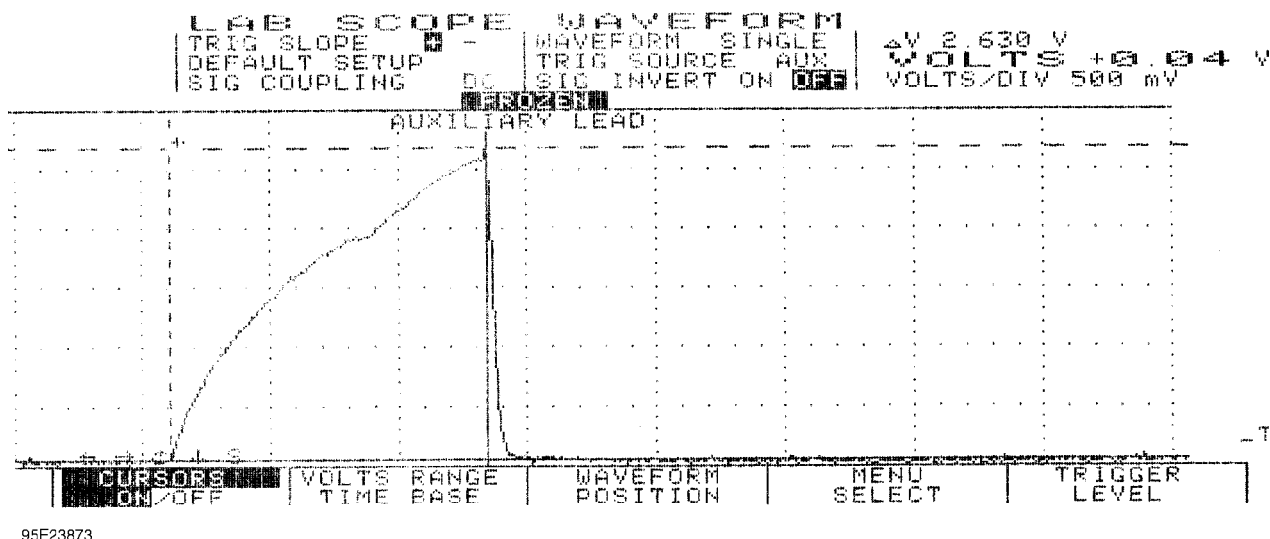


Fig. 8: Injector Odd Bank w/Normal Current Flow - Current Pattern

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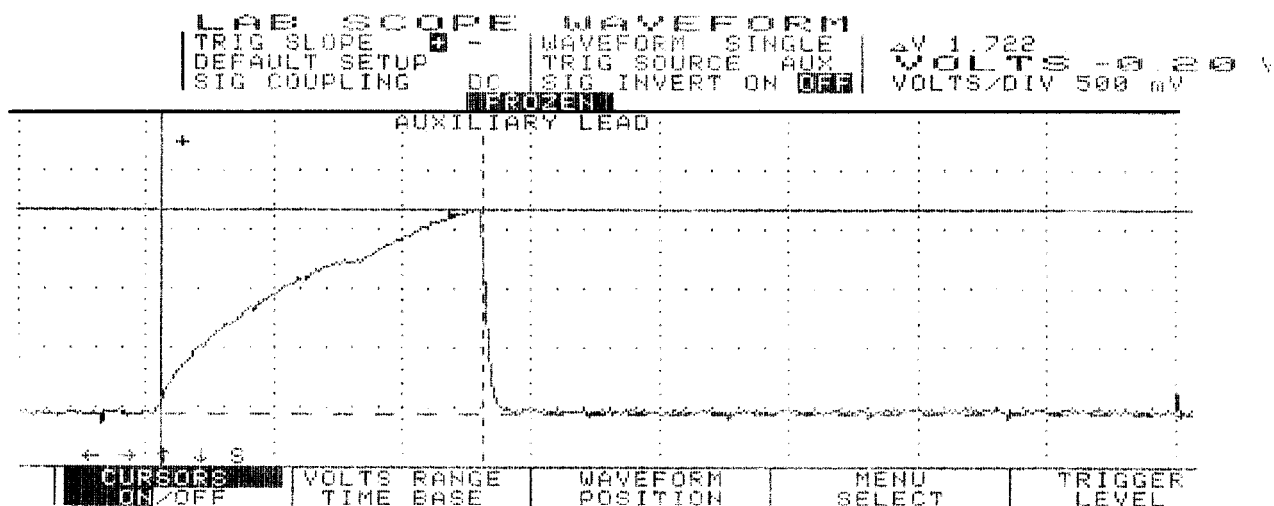


Fig. 9: Injector Even Bank w/Normal Current Flow - Current Pattern

### EXAMPLE #3 - VOLTAGE CONTROLLED DRIVER

Example #3 is of a Ford 5.0L V8 SEFI. Fig. 10 shows a waveform of an individual injector at idle with the Lab Scope set on 200 milliamps per division. Notice the dimple in the rising edge. This dimple indicates the actual opening of the injector (set point) occurred at 400 milliamps and current peaked at 750 milliamps. This is a good specification for this engine.

The next waveform pattern in Fig. 11 shows an abnormality with another injector. With the Lab Scope set on 500 milliamps per division, you can see that the current waveform indicates a 1200 milliamp draw. This is a faulty injector.

Abnormally low resistance injectors create excessive current draw, causing rough idle, and possible computer driver damage.

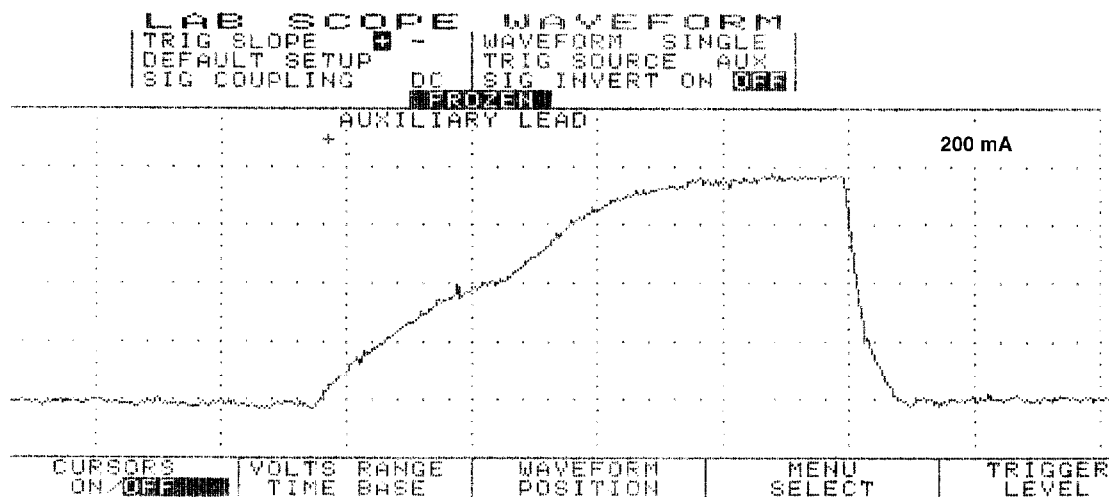


Fig. 10: Single Injector w/Normal Current Flow - Current Pattern

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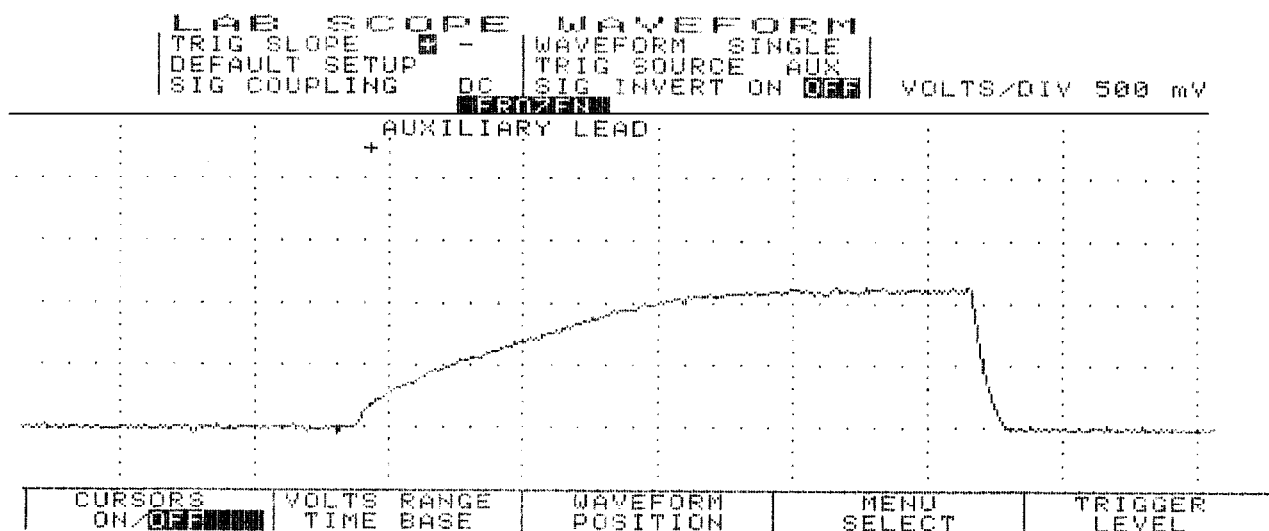
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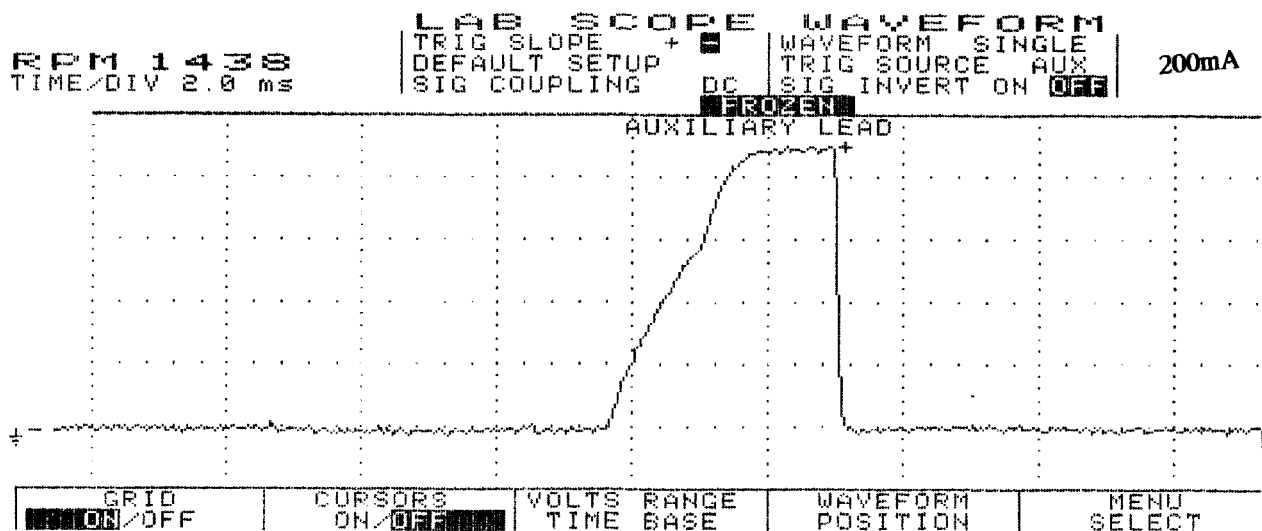


95H23876  
Fig. 11: Single Injector w/Excessive Current Flow - Current Pattern

### EXAMPLE #4 - CURRENT CONTROLLED DRIVER

Example #4 is of a Ford 4.6L SEFI VIN [W]. See Fig. 12 for the known-good waveform pattern. This Ford system is different from the one above in EXAMPLE #3 as it peaks at 900 milliamps and the actual opening of the injector (set point) is just below 600 milliamps.

This is offered as a comparison against the Ford pattern listed above, as they are both Ford SEFI injectors but with different operating ranges. The point is that you should not make any broad assumptions for any manufacturer.



95D23872  
Fig. 12: Single Injector w/Normal Current Flow - Current Pattern

### EXAMPLE #5 - CURRENT CONTROLLED DRIVER



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The known-good waveform in Fig. 13 is from a Chrysler 3.0L V6 PFI VIN [3]. It is a perfect example of the peak and hold theory. The waveform shows a 1-amp per division current flow, ramping to 4 amps and then decreasing to 1-amp to hold the injector open.

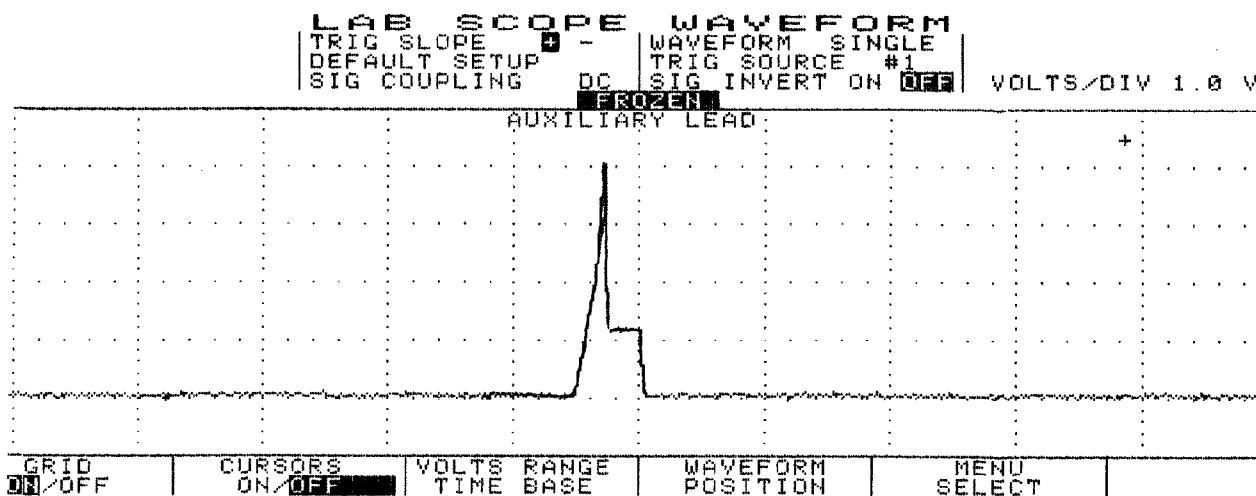


Fig. 13: Injector Bank w/Normal Current Flow - Current Pattern

### EXAMPLE #6 - CURRENT CONTROLLED DRIVER

This next known-good waveform is from a Ford 5.0L V8 CFI VIN [F]. See Fig. 14. The pattern, which is set on a 250 milliamps scale, indicates a 1.25 amp peak draw and a hold at 350 milliamps.

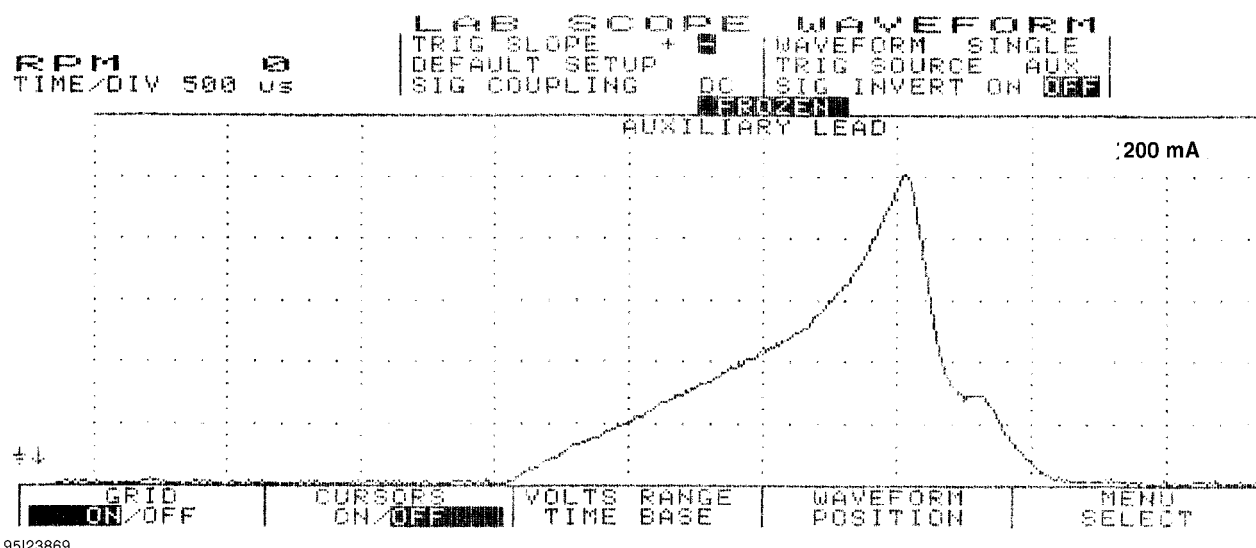


Fig. 14: Single Injector w/Normal Current Flow - Current Pattern

### EXAMPLE #7 - CURRENT CONTROLLED DRIVER

The known-good current controlled type waveform in Fig. 15 is from a GM 2.0L TBI VIN [1]. With the lab scope set at 2 amps per

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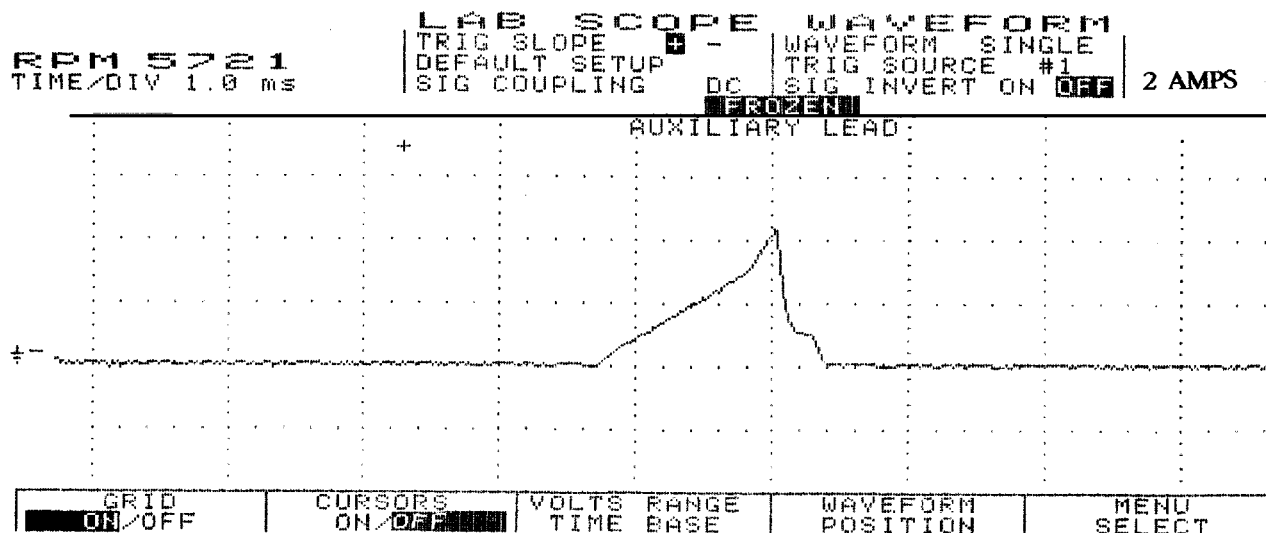
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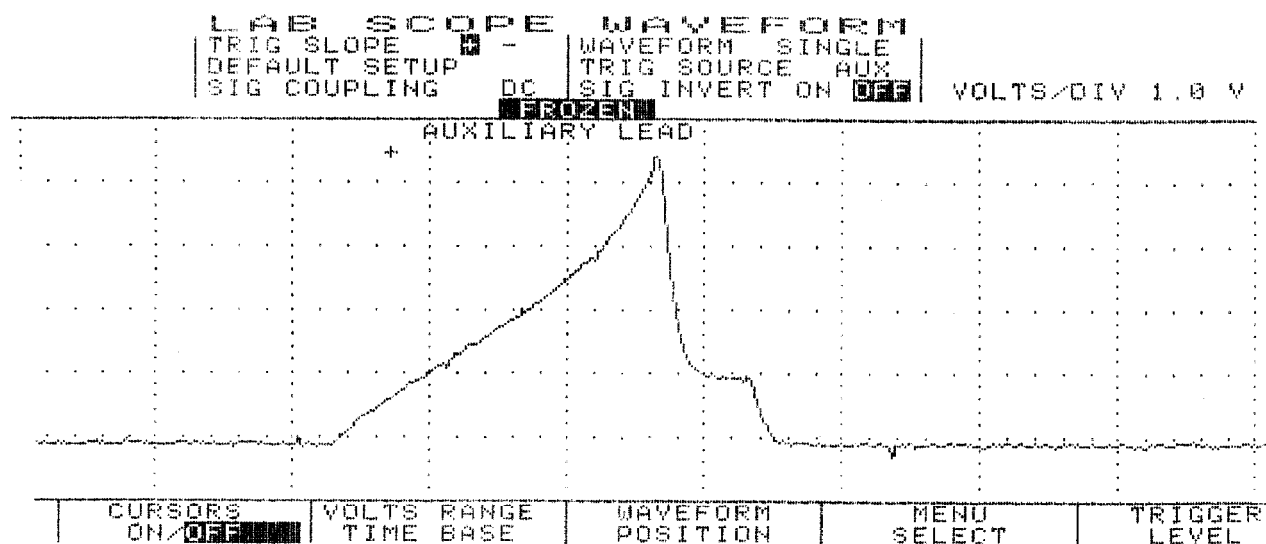
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division, notice that this system peaks at 4 amps and holds at 1 amp.

The next waveform is from the same type of engine, except that it shows a faulty injector. See Fig. 16. Notice that the current went to almost 5 amps and stayed at 1 amp during the hold pattern. Excessive amounts of current flow from bad injectors are a common source of intermittent computer shutdown. Using a current waveform pattern is the most accurate method of pinpointing this problem.



95C23871  
Fig. 15: Single Injector w/Normal Current Flow - Current Pattern



95I23877  
Fig. 16: Single Injector w/Excessive Current Flow - Current Pattern

### EXAMPLE #8 - CURRENT CONTROLLED DRIVER

This known-good CPI system waveform from a GM 4.3L V6 CPI VIN [W] peaks at 4 amps and holds at 1-amp. See Fig. 17 for waveform.

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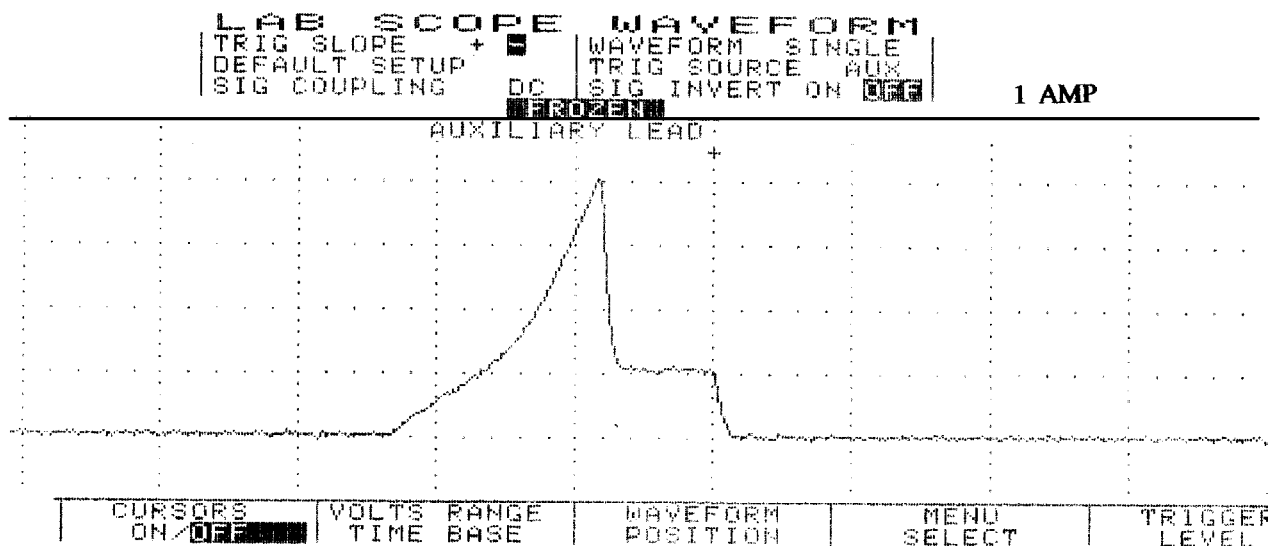
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95B23870

Fig. 17: Single Injector w/Normal Current Flow - Current Pattern

## VOLTAGE WAVEFORM SAMPLES

### EXAMPLE #1 - VOLTAGE CONTROLLED DRIVER

These two known-good waveform patterns are from a Ford 4.6L V8 VIN [W]. Fig. 18 illustrates the 64 volt inductive kick on this engine, indicating no clamping is occurring. The second pattern, Fig. 19, was taken during hot idle, closed loop, and no load.

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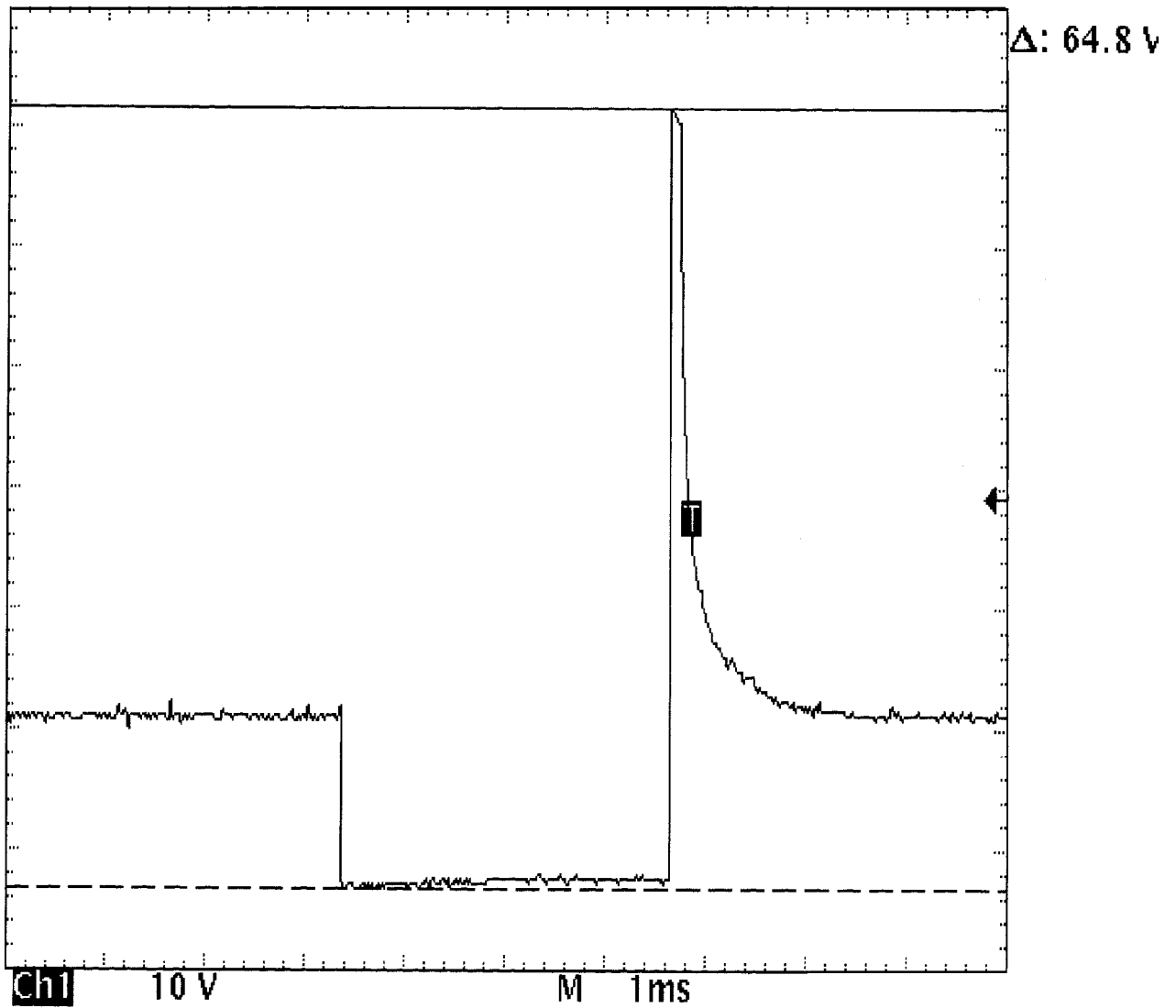


Fig. 18: Injector Bank - Known Good - Voltage Pattern

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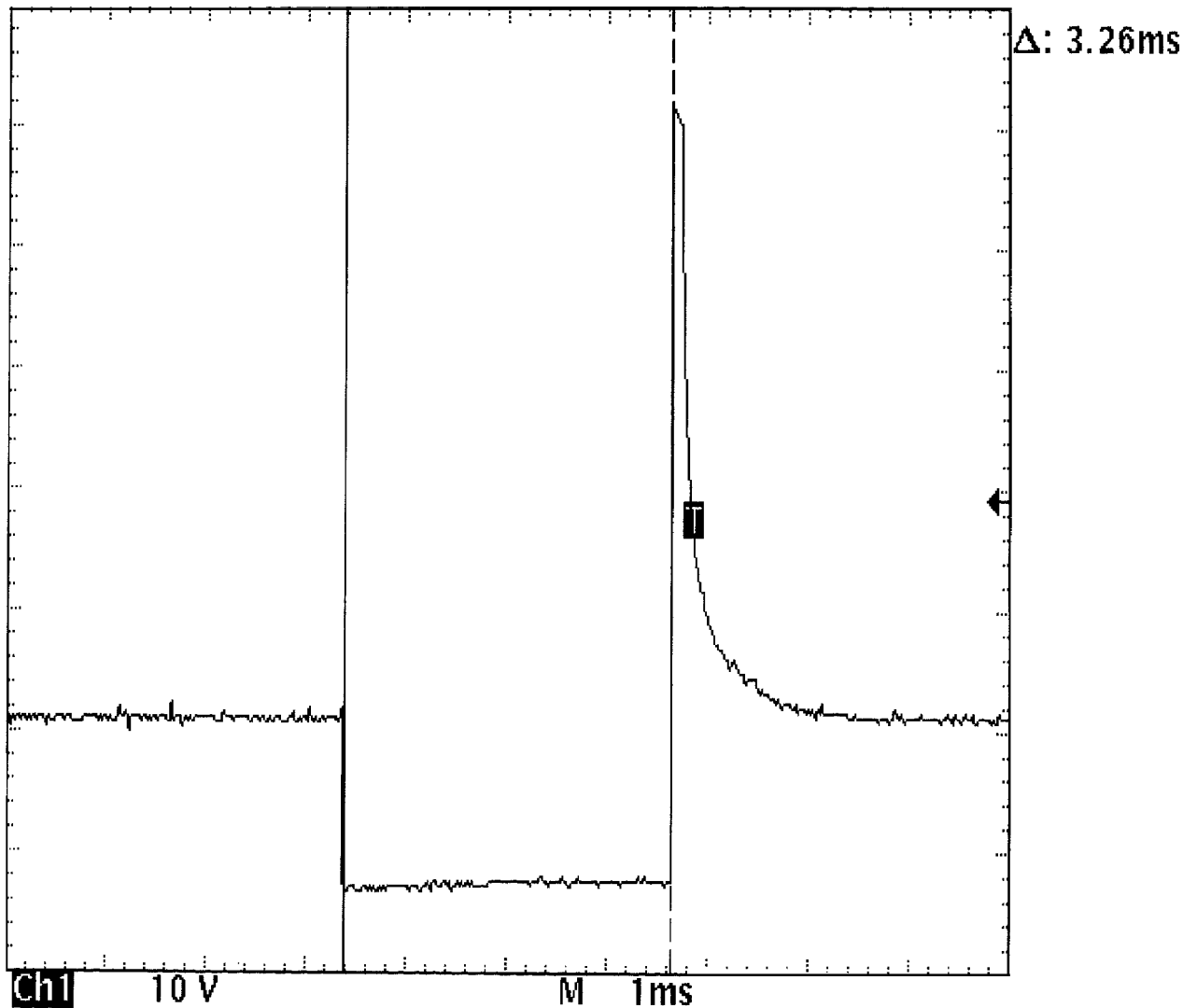


Fig. 19: <sup>95F23858</sup>Injector Bank - Known Good - Voltage Pattern

#### EXAMPLE #2 - VOLTAGE CONTROLLED DRIVER

The known-good waveform pattern in Fig. 20 is from a GM 3.8L V6 PFI VIN [3]. It was taken during hot idle, closed loop and no load.

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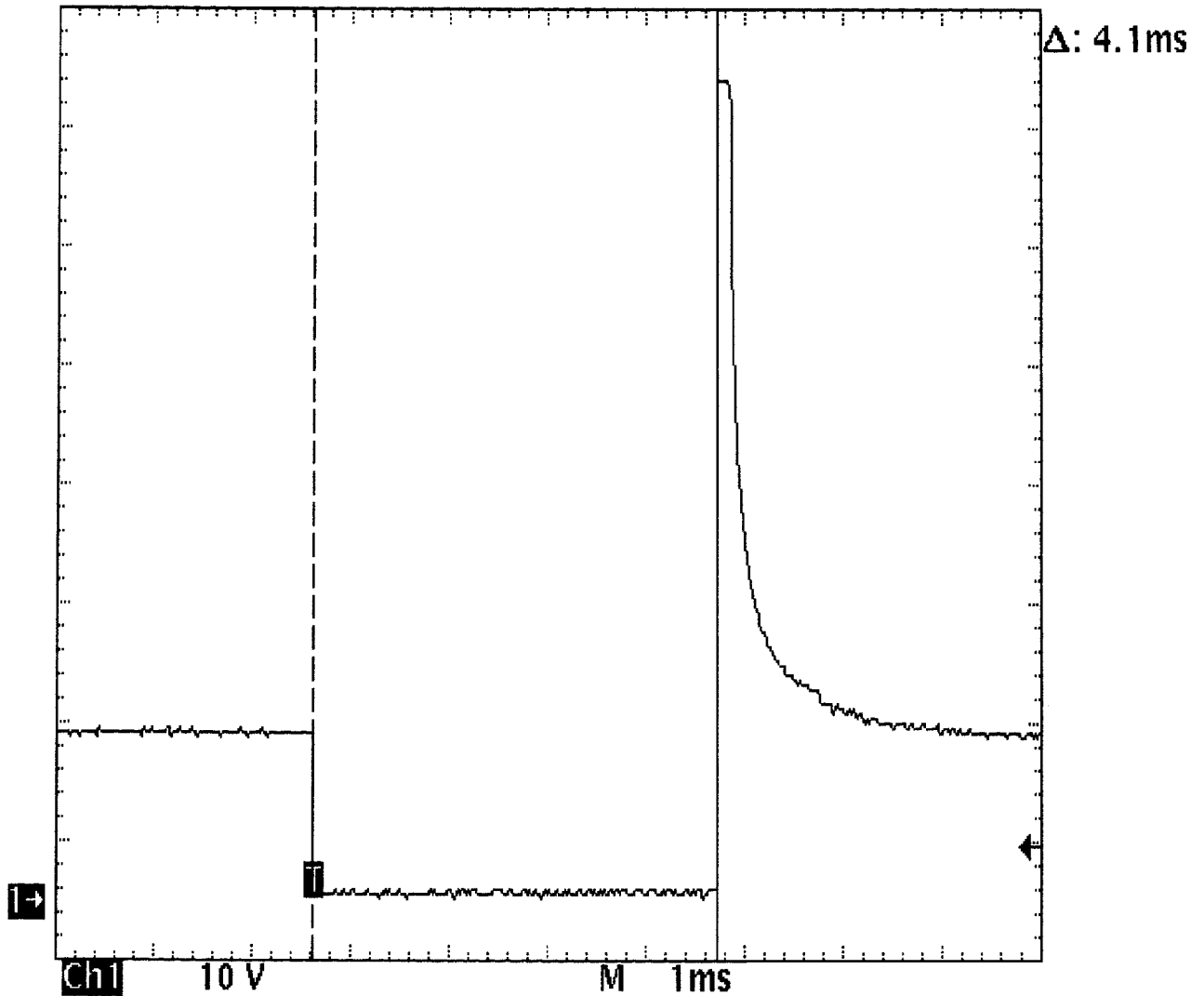


Fig. 20: Injector Bank - Known Good - Voltage Pattern

### EXAMPLE #3 - VOLTAGE CONTROLLED DRIVER

This known-good waveform pattern, Fig. 21, is from a GM 5.0L V8 TPI VIN [F]. It was taken during hot idle, closed loop and no load.

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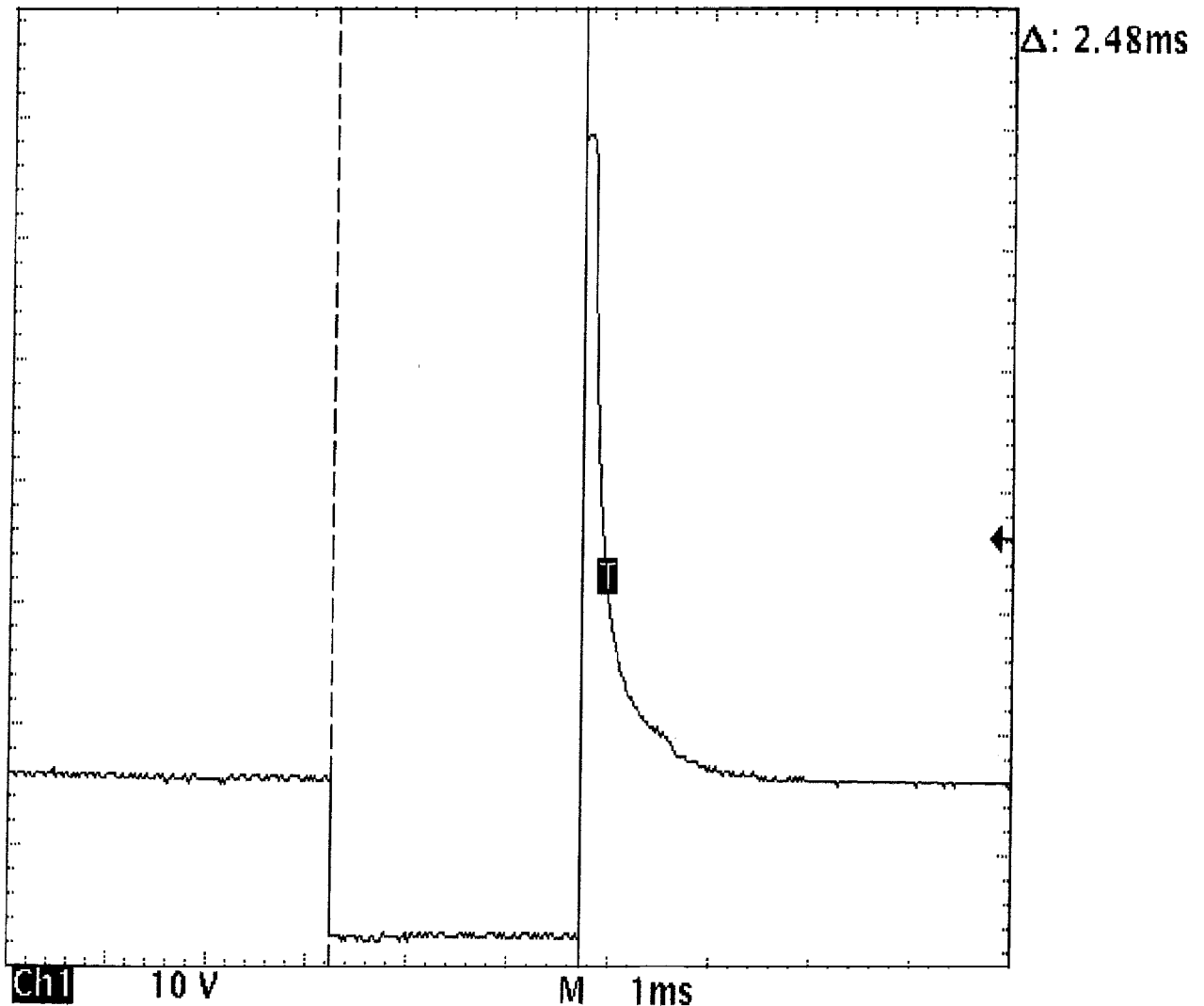


Fig. 21: Injector Bank - Known Good - Voltage Pattern

#### EXAMPLE #4 - CURRENT CONTROLLED DRIVER

From 1984 to 1987, Chrysler used this type injector drive on their TBI-equipped engines. See Fig. 22 for a known-good pattern. Instead of the ground side controlling the injector, Chrysler permanently grounds out the injector and switches the power feed side. Most systems do not work this way.

These injectors peak at 6 amps of current flow and hold at 1 amp.

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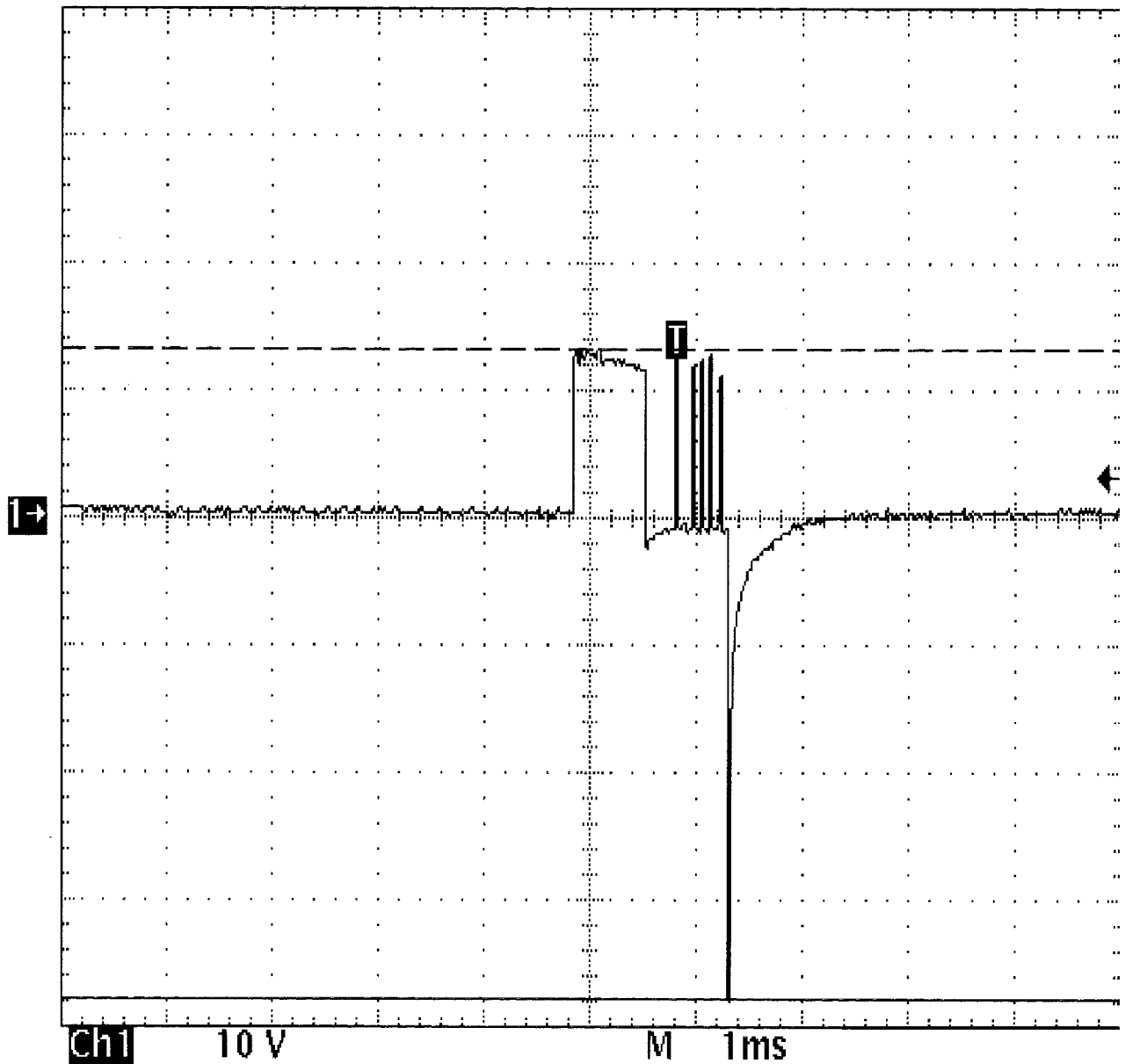
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95J23860  
Fig. 22: Single Injector - Known Good - Voltage Pattern

### EXAMPLE #5 - CURRENT CONTROLLED DRIVER

These two known-good waveform patterns are from a Chrysler 3.0L V6 VIN [3]. The first waveform, Fig. 23, is a dual trace pattern that illustrates how Chrysler uses the rising edge of the engine speed signal to trigger the injectors. The second waveform, Fig. 24, was taken during hot idle, closed loop, and no load.



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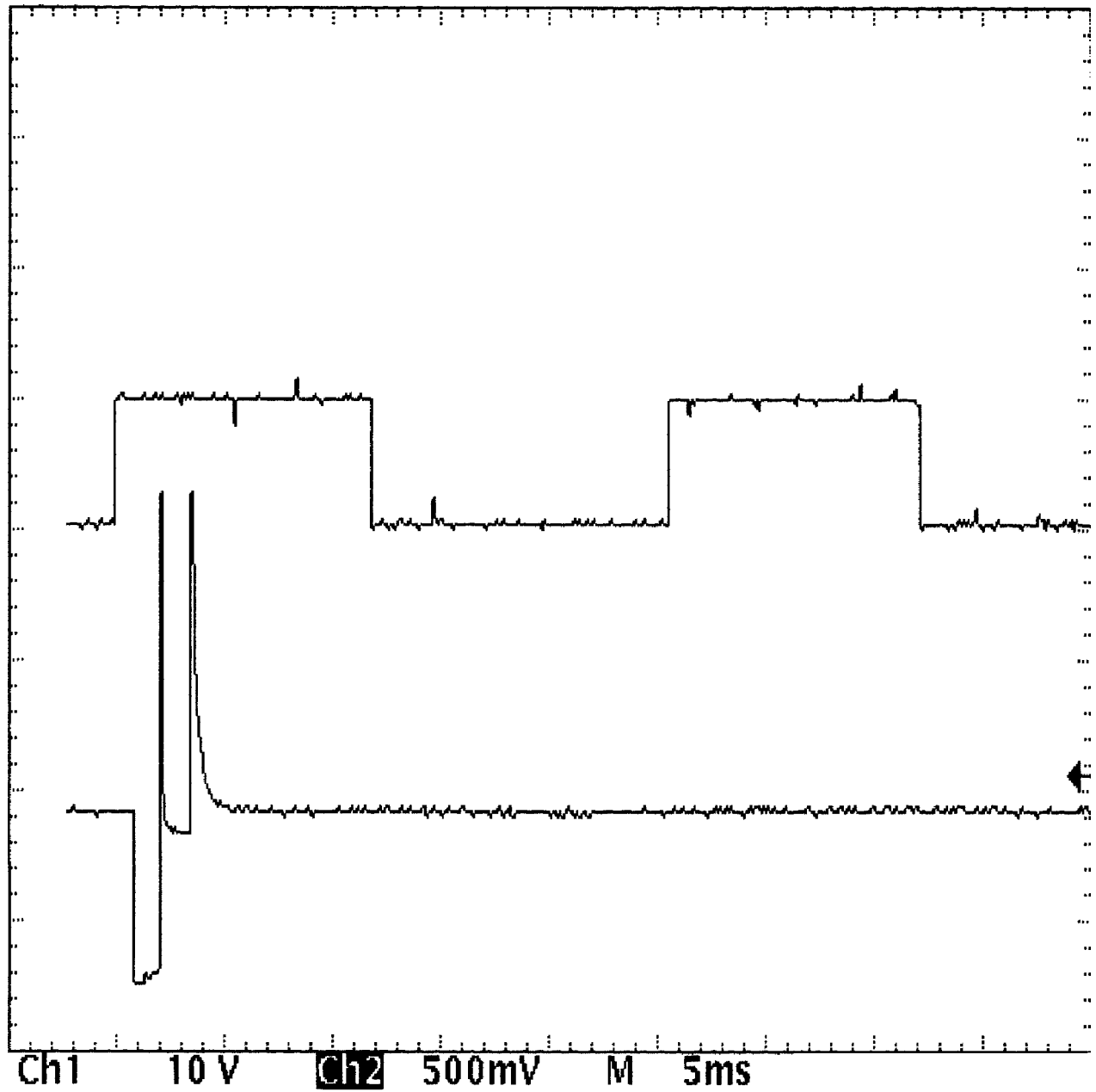
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95A23861  
Fig. 23: Injector Bank - Known Good - Voltage Pattern

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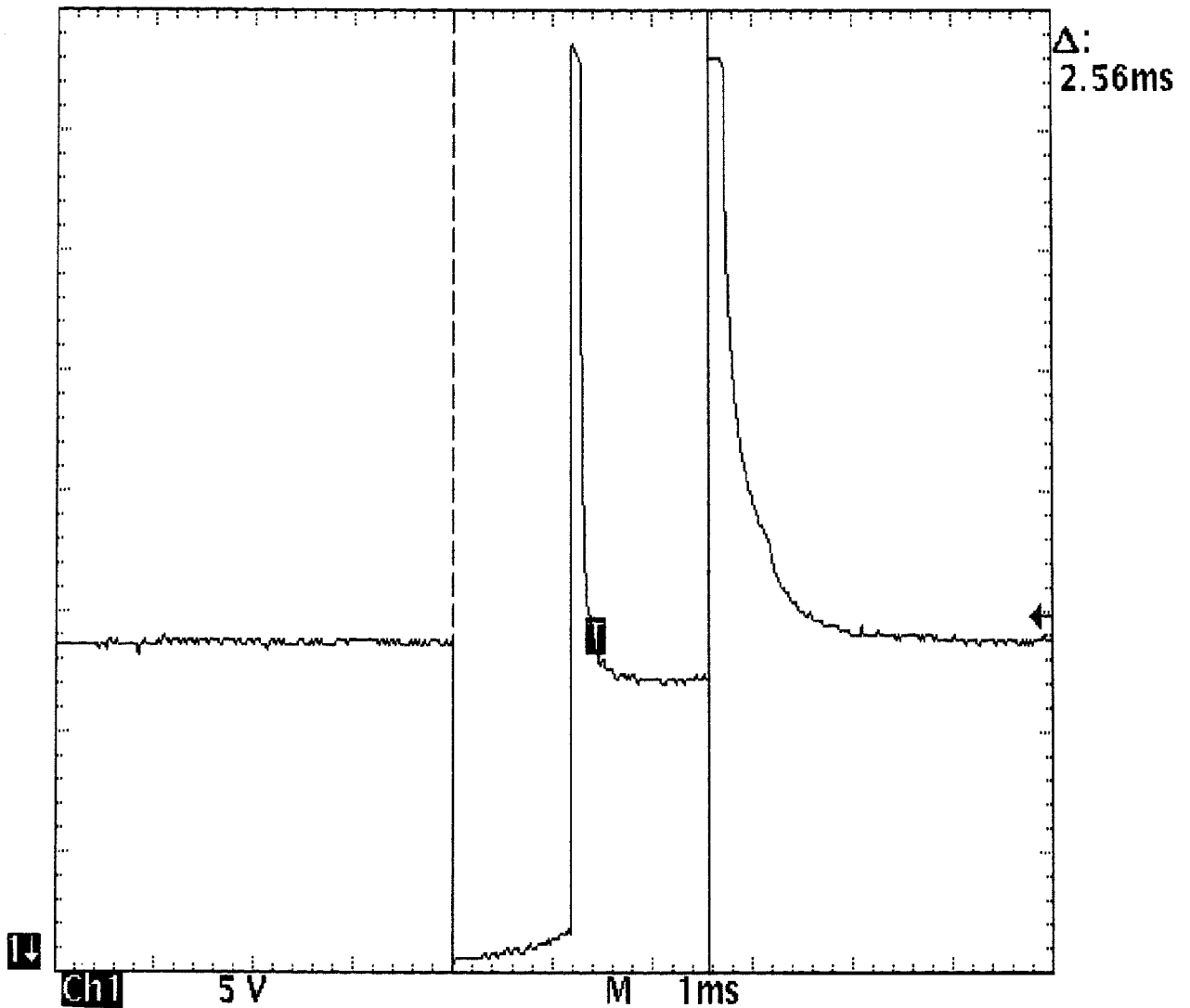


Fig. 24: Injector Bank - Known Good - Voltage Pattern

#### EXAMPLE #6 - CURRENT CONTROLLED DRIVER

This known-good pattern from a Ford 3.0L V6 PFI VIN [U] illustrates that a zener diode inside the computer is used to clamp the injector's inductive kick to 35-volts on this system. See Fig. 25.

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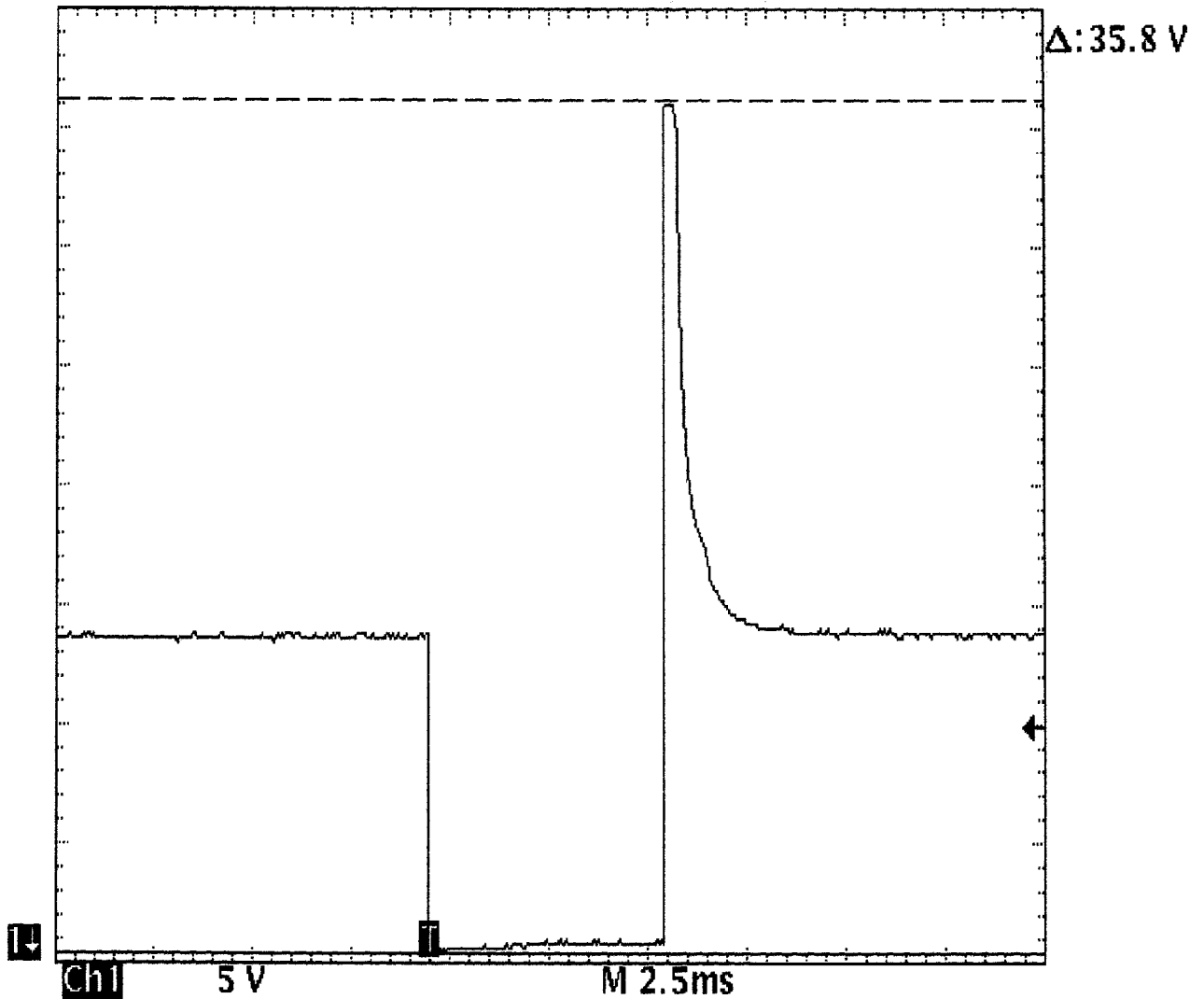


Fig. 25: Injector Bank - Known Good - Voltage Pattern

#### EXAMPLE #7 - CURRENT CONTROLLED DRIVER

This known-good waveform from a Ford 5.0L V8 CFI VIN [F] was taken during hot idle, closed loop, and no load. See Fig. 26.

## WAVEFORMS - INJECTOR PATTERN TUTORIAL

### Article Text (p. 33)

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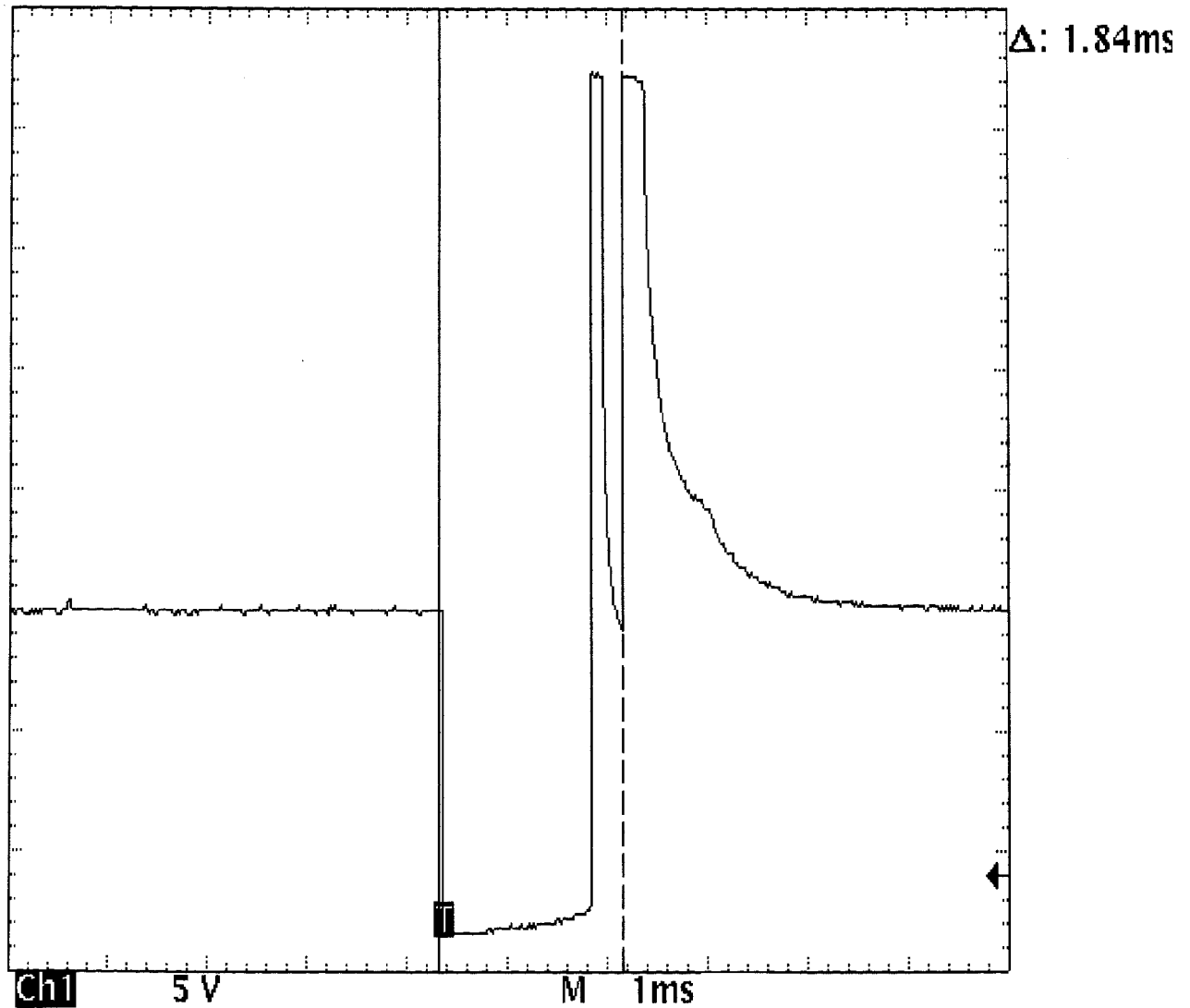


Fig. 26: Single Injector - Known Good - Voltage Pattern

#### EXAMPLE #8 - CURRENT CONTROLLED DRIVER

These two known-good waveform patterns are from a GM 2.0L In-Line 4 VIN [1]. Fig. 27 illustrates the 78 volt inductive spike that indicates a zener diode is not used. The second waveform, Fig. 28, was taken during hot idle, closed loop, and no load.

## WAVEFORMS - INJECTOR PATTERN TUTORIAL

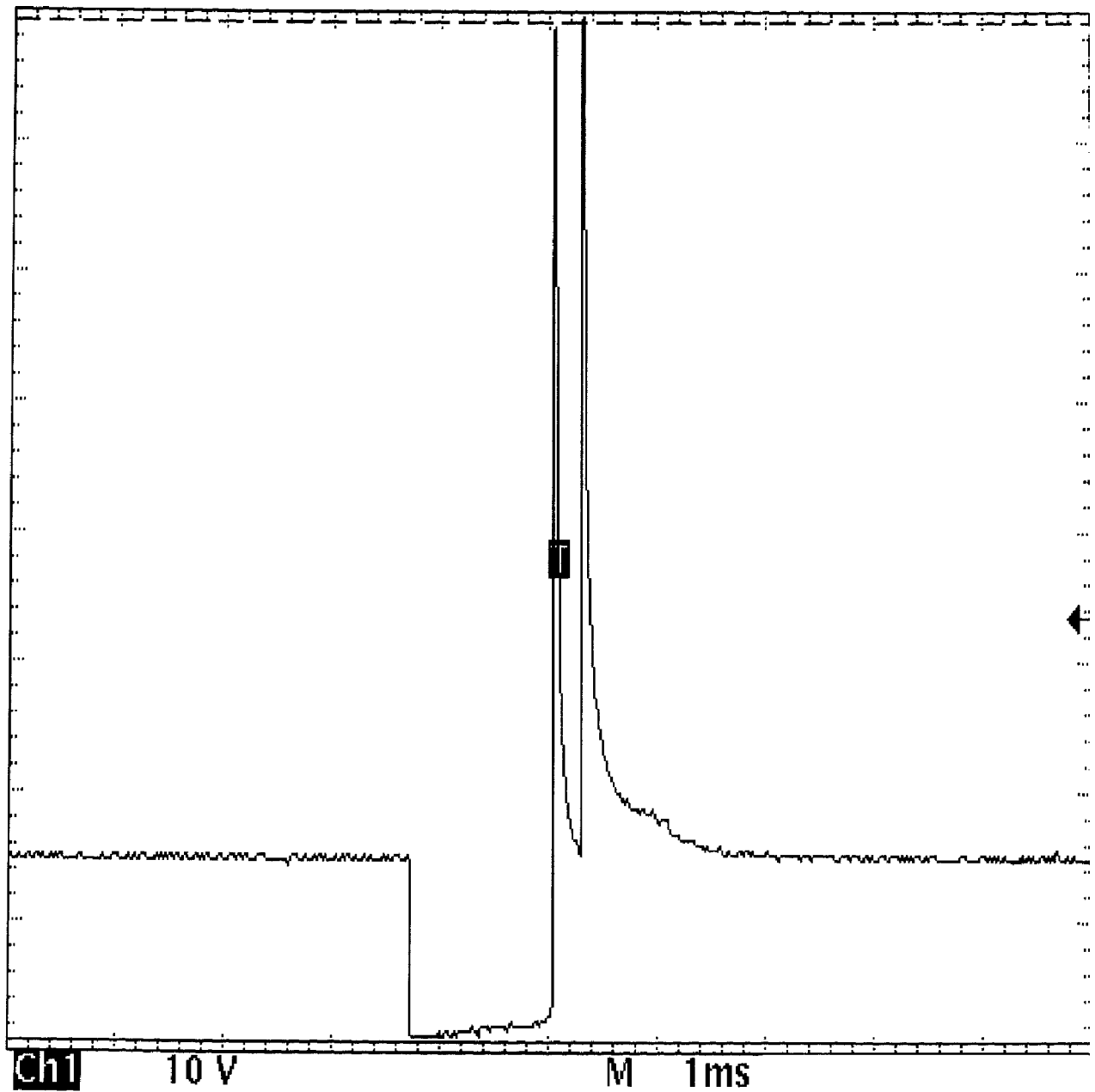
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95D23849

Fig. 27: Single Injector - Known Good - Voltage Pattern

## WAVEFORMS - INJECTOR PATTERN TUTORIAL

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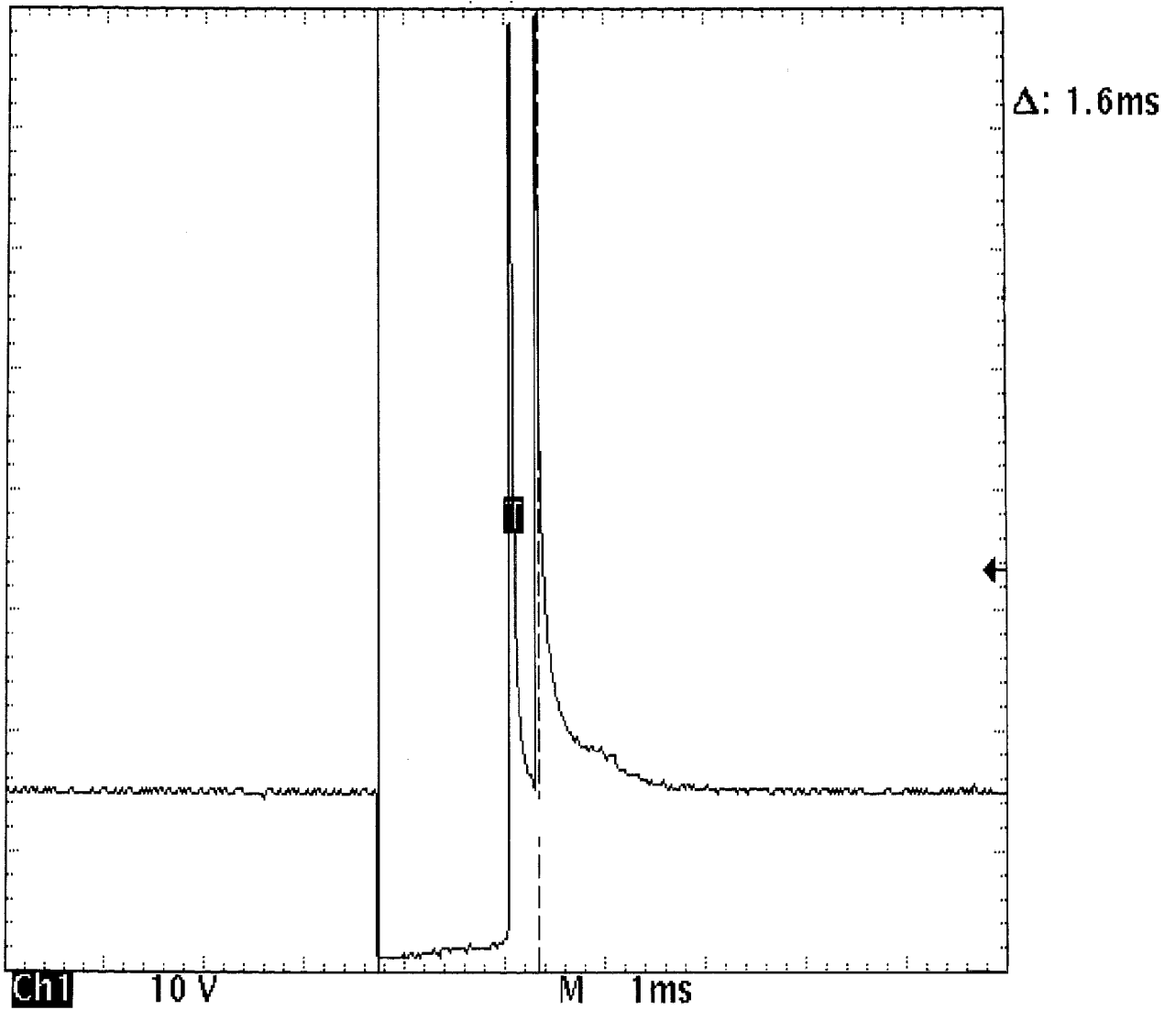


Fig. 28: Single Injector - Known Good - Voltage Pattern

END OF ARTICLE

# METRIC CONVERSIONS

## Article Text

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### ARTICLE BEGINNING

#### GENERAL INFORMATION

### METRIC CONVERSIONS

#### METRIC CONVERSIONS

Metric conversions are making life more difficult for the mechanic. In addition to doubling the number of tools required, metric-dimensioned nuts and bolts are used alongside English components in many new vehicles. The mechanic has to decide which tool to use, slowing down the job. The tool problem can be solved by trial and error, but some metric conversions aren't so simple. Converting temperature, lengths or volumes requires a calculator and conversion charts, or else a very nimble mind. Conversion charts are only part of the answer though, because they don't help you "think" metric, or "visualize" what you are converting. The following examples are intended to help you "see" metric sizes:

#### LENGTH

Meters are the standard unit of length in the metric system. The smaller units are 10ths (decimeter), 100ths (centimeter), and 1000ths (millimeter) of a meter. These common examples might help you to visualize the metric units:

- \* A meter is slightly longer than a yard (about 40 inches).
- \* An aspirin tablet is about one centimeter across (.4 inches).
- \* A millimeter is about the thickness of a dime.

#### VOLUME

Cubic meters and centimeters are used to measure volume, just as we normally think of cubic feet and inches. Liquid volume measurements include the liter and milliliter, like the English quarts or ounces.

- \* One teaspoon is about 4 cubic centimeters.
- \* A liter is about one quart.
- \* A liter is about 61 cubic inches.

#### WEIGHT

The metric weight system is based on the gram, with the most common unit being the kilogram (1000 grams). Our comparable units are ounces and pounds:

- \* A kilogram is about 2.2 pounds.
- \* An ounce is about 28 grams.

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|                                                                                               |  |                                 |  |                      |  |                                       |  |
|-----------------------------------------------------------------------------------------------|--|---------------------------------|--|----------------------|--|---------------------------------------|--|
| UAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |  |                                 |  |                      |  |                                       |  |
| <sup>3</sup> TO CONVERT                                                                       |  | <sup>3</sup> TO                 |  |                      |  | <sup>3</sup> MULTIPLY BY <sup>3</sup> |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA   |  |                                 |  |                      |  |                                       |  |
| <sup>3</sup> LENGTH                                                                           |  | <sup>3</sup>                    |  | <sup>3</sup>         |  | <sup>3</sup>                          |  |
| <sup>3</sup> Millimeters (mm)                                                                 |  | <sup>3</sup> Inches             |  | <sup>3</sup> .03937  |  | <sup>3</sup>                          |  |
| <sup>3</sup> Inches                                                                           |  | <sup>3</sup> Millimeters        |  | <sup>3</sup> 25.4    |  | <sup>3</sup>                          |  |
| <sup>3</sup> Meters (M)                                                                       |  | <sup>3</sup> Feet               |  | <sup>3</sup> 3.28084 |  | <sup>3</sup>                          |  |
| <sup>3</sup> Feet                                                                             |  | <sup>3</sup> Meters             |  | <sup>3</sup> .3048   |  | <sup>3</sup>                          |  |
| <sup>3</sup> Kilometers(Km)                                                                   |  | <sup>3</sup> Miles              |  | <sup>3</sup> .62137  |  | <sup>3</sup>                          |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA   |  |                                 |  |                      |  |                                       |  |
| <sup>3</sup> AREA                                                                             |  | <sup>3</sup>                    |  | <sup>3</sup>         |  | <sup>3</sup>                          |  |
| <sup>3</sup> Square Centimeters (cmý)                                                         |  | <sup>3</sup> Square Inches      |  | <sup>3</sup> .155    |  | <sup>3</sup>                          |  |
| <sup>3</sup> Square Inches                                                                    |  | <sup>3</sup> Square Centimeters |  | <sup>3</sup> 6.45159 |  | <sup>3</sup>                          |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA   |  |                                 |  |                      |  |                                       |  |
| <sup>3</sup> VOLUME                                                                           |  | <sup>3</sup>                    |  | <sup>3</sup>         |  | <sup>3</sup>                          |  |



[illegible]

**METRIC CONVERSIONS**  
**Article Text (p. 4)**  
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|                    |       |       |       |        |              |
|--------------------|-------|-------|-------|--------|--------------|
| <sup>3</sup> 9/32  | ..... | .281  | ..... | 7.144  | <sup>3</sup> |
| <sup>3</sup> 19/64 | ..... | .297  | ..... | 7.541  | <sup>3</sup> |
| <sup>3</sup> 5/16  | ..... | .313  | ..... | 7.938  | <sup>3</sup> |
| <sup>3</sup> 21/64 | ..... | .328  | ..... | 8.334  | <sup>3</sup> |
| <sup>3</sup> 11/32 | ..... | .344  | ..... | 8.731  | <sup>3</sup> |
| <sup>3</sup> 23/64 | ..... | .359  | ..... | 9.128  | <sup>3</sup> |
| <sup>3</sup> 3/8   | ..... | .375  | ..... | 9.525  | <sup>3</sup> |
| <sup>3</sup> 25/64 | ..... | .391  | ..... | 9.992  | <sup>3</sup> |
| <sup>3</sup> 13/32 | ..... | .406  | ..... | 10.319 | <sup>3</sup> |
| <sup>3</sup> 27/64 | ..... | .422  | ..... | 10.716 | <sup>3</sup> |
| <sup>3</sup> 7/16  | ..... | .438  | ..... | 11.113 | <sup>3</sup> |
| <sup>3</sup> 29/64 | ..... | .453  | ..... | 11.509 | <sup>3</sup> |
| <sup>3</sup> 15/32 | ..... | .469  | ..... | 11.906 | <sup>3</sup> |
| <sup>3</sup> 31/64 | ..... | .484  | ..... | 12.303 | <sup>3</sup> |
| <sup>3</sup> 1/2   | ..... | .500  | ..... | 12.700 | <sup>3</sup> |
| <sup>3</sup> 33/64 | ..... | .516  | ..... | 13.097 | <sup>3</sup> |
| <sup>3</sup> 17/32 | ..... | .531  | ..... | 13.494 | <sup>3</sup> |
| <sup>3</sup> 35/64 | ..... | .547  | ..... | 13.891 | <sup>3</sup> |
| <sup>3</sup> 9/16  | ..... | .563  | ..... | 14.288 | <sup>3</sup> |
| <sup>3</sup> 37/64 | ..... | .578  | ..... | 14.684 | <sup>3</sup> |
| <sup>3</sup> 19/32 | ..... | .594  | ..... | 15.081 | <sup>3</sup> |
| <sup>3</sup> 39/64 | ..... | .609  | ..... | 15.478 | <sup>3</sup> |
| <sup>3</sup> 5/8   | ..... | .625  | ..... | 15.875 | <sup>3</sup> |
| <sup>3</sup> 41/64 | ..... | .641  | ..... | 16.272 | <sup>3</sup> |
| <sup>3</sup> 21/32 | ..... | .656  | ..... | 16.669 | <sup>3</sup> |
| <sup>3</sup> 43/64 | ..... | .672  | ..... | 17.066 | <sup>3</sup> |
| <sup>3</sup> 11/16 | ..... | .687  | ..... | 17.463 | <sup>3</sup> |
| <sup>3</sup> 45/64 | ..... | .703  | ..... | 17.859 | <sup>3</sup> |
| <sup>3</sup> 23/32 | ..... | .719  | ..... | 18.256 | <sup>3</sup> |
| <sup>3</sup> 47/64 | ..... | .734  | ..... | 18.653 | <sup>3</sup> |
| <sup>3</sup> 3/4   | ..... | .750  | ..... | 19.050 | <sup>3</sup> |
| <sup>3</sup> 49/64 | ..... | .766  | ..... | 19.447 | <sup>3</sup> |
| <sup>3</sup> 25/32 | ..... | .781  | ..... | 19.844 | <sup>3</sup> |
| <sup>3</sup> 51/64 | ..... | .797  | ..... | 20.241 | <sup>3</sup> |
| <sup>3</sup> 13/16 | ..... | .813  | ..... | 20.638 | <sup>3</sup> |
| <sup>3</sup> 53/64 | ..... | .828  | ..... | 21.034 | <sup>3</sup> |
| <sup>3</sup> 27/32 | ..... | .844  | ..... | 21.431 | <sup>3</sup> |
| <sup>3</sup> 55/64 | ..... | .859  | ..... | 21.828 | <sup>3</sup> |
| <sup>3</sup> 7/8   | ..... | .875  | ..... | 22.225 | <sup>3</sup> |
| <sup>3</sup> 57/64 | ..... | .891  | ..... | 22.622 | <sup>3</sup> |
| <sup>3</sup> 29/32 | ..... | .906  | ..... | 23.019 | <sup>3</sup> |
| <sup>3</sup> 59/64 | ..... | .922  | ..... | 23.416 | <sup>3</sup> |
| <sup>3</sup> 15/16 | ..... | .938  | ..... | 23.813 | <sup>3</sup> |
| <sup>3</sup> 61/64 | ..... | .953  | ..... | 24.209 | <sup>3</sup> |
| <sup>3</sup> 31/32 | ..... | .969  | ..... | 24.606 | <sup>3</sup> |
| <sup>3</sup> 63/64 | ..... | .984  | ..... | 25.003 | <sup>3</sup> |
| <sup>3</sup> 1     | ..... | 1.000 | ..... | 25.400 | <sup>3</sup> |

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END OF ARTICLE

# GENERAL COOLING SYSTEM SERVICING

## Article Text

1996 Volkswagen Golf  
For Volkswagen Technical Site  
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Thursday, August 19, 1999 11:46PM

### ARTICLE BEGINNING

GENERAL INFORMATION  
General Cooling System Servicing

#### \* PLEASE READ THIS FIRST \*

The following article is for general information only.  
Information may not apply to all years, makes and models. See specific article in the ENGINE COOLING section.

### DESCRIPTION

The basic liquid cooling system consists of a radiator, water pump, thermostat, electric or belt-driven cooling fan, pressure cap, heater, and various connecting hoses and cooling passages in the block and cylinder head.

### MAINTENANCE

#### DRAINING

Remove radiator cap and open heater control valve to maximum heat position. Open drain cocks or remove plugs in bottom of radiator and engine block. In-line engines usually have one plug or drain cock, while "V" type engines will have 2, one in each bank of cylinders.

#### CLEANING

A good cleaning compound removes most rust and scale. Follow manufacturer's instructions in the use of cleaner. If considerable rust and scale has to be removed, cooling system should be flushed. Clean radiator air passages with compressed air.

#### FLUSHING

CAUTION: Some manufacturers use an aluminum and plastic radiator. Flushing solution must be compatible with aluminum.

##### Back Flushing

Back flushing is an effective means of removing cooling system rust and scale. The radiator, engine and heater core should be flushed separately.

##### Radiator

To flush radiator, connect flushing gun to water outlet of radiator and disconnect water inlet hose. To prevent flooding engine, use a hose connected to radiator inlet. Use air in short bursts to prevent damage to radiator. Continue flushing until water runs clear.

##### Engine

# GENERAL COOLING SYSTEM SERVICING

## Article Text (p. 2)

1996 Volkswagen Golf

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Thursday, August 19, 1999 11:46PM

To flush engine, remove thermostat and replace housing. Connect flushing gun to water outlet of engine. Flush using short air bursts until water runs clean.

### Heater Core

Flush heater core as described for radiator. Ensure heater control valve is set to maximum heat position before flushing heater.

## REFILLING

To prevent air from being trapped in engine block, engine should be running when refilling cooling system. After system is full, continue running engine until thermostat is open, then recheck fill level. Do not overfill system.

## TESTING

### THERMOSTAT

1) Visually inspect thermostat for corrosion and proper sealing of valve and seat. If okay, suspend thermostat and thermometer in a 50/50 mixture of coolant and water. See Fig. 1. Do not allow thermostat or thermometer to touch bottom of container. Heat water until thermostat just begins to open.

2) Read temperature on thermometer. This is the initial opening temperature and should be within specification. Continue heating water until thermostat is fully open and note temperature. This is the fully opened temperature. If either reading is not to specification, replace thermostat.

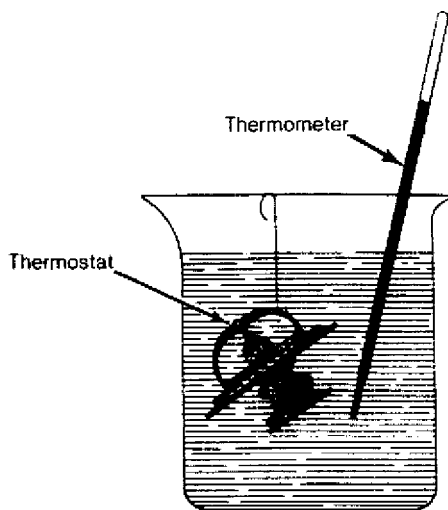


Fig. 1: Testing Thermostat in Anti-Freeze/Water Solution

### PRESSURE TESTING

A pressure tester is used to check both radiator cap and

## GENERAL COOLING SYSTEM SERVICING

### Article Text (p. 3)

1996 Volkswagen Golf

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complete cooling system. Test components as follows, following tool manufacturer's instructions.

#### Radiator Cap

Visually inspect radiator cap, then dip cap into water and connect to tester. Pump tester to bring pressure to upper limit of cap specification. If cap fails to hold pressure, replace cap.

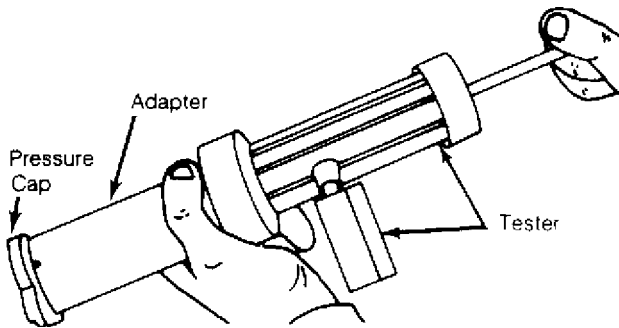


Fig. 2: Testing Radiator Pressure Cap

#### Cooling System

1) With engine off, wipe radiator filler neck seat clean. Fill radiator to correct level. Attach tester to radiator and pump until pressure is at upper level of radiator rating.

2) If pressure drops, inspect for external leaks. If no leaks are apparent, detach tester and run engine until normal operating temperature is reached. Reattach tester and observe. If pressure builds up immediately, a possible leak exists from a faulty head gasket or crack in head or block.

NOTE: Pressure may build up quickly. Release any excess pressure or cooling system damage may result.

3) If there is no immediate pressure build up, pump tester to within system pressure range (on radiator cap). Vibration of gauge pointer indicates compression or combustion leak into cooling system. Isolate leak by shorting each spark plug wire to cylinder block. Gauge pointer should stop or decrease vibration when leaking cylinder is shorted.

**END OF ARTICLE**

# GEAR TOOTH CONTACT PATTERNS

## Article Text

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### ARTICLE BEGINNING

#### GENERAL INFORMATION

#### Gear Tooth Contact Patterns

#### **\* PLEASE READ THIS FIRST \***

The following article is for GENERAL INFORMATION purposes only. Information does not SPECIFICALLY apply to all years, makes and models, but is to be used as a general reference guide.

### INSPECTION

#### PRELIMINARY INSPECTION

Wipe lubricant from internal parts. Rotate gears and inspect for wear or damage. Mount dial indicator to housing, and check backlash at several points around ring gear. Backlash must be within specifications at all points. If no defects are found, check gear tooth contact pattern.

#### GEAR TOOTH CONTACT PATTERN

NOTE: Drive pattern should be well centered on ring gear teeth. Coast pattern should be centered, but may be slightly toward toe of ring gear teeth.

1) Paint ring gear teeth with marking compound. Wrap cloth or rope around drive pinion flange to act as brake. Rotate ring gear until clear tooth contact pattern is obtained.

2) Contact pattern will indicate whether correct pinion bearing mounting shim has been installed and if drive gear backlash has been set properly. Backlash between drive gear and pinion must be maintained within specified limits, until correct tooth pattern is obtained.

# GEAR TOOTH CONTACT PATTERNS

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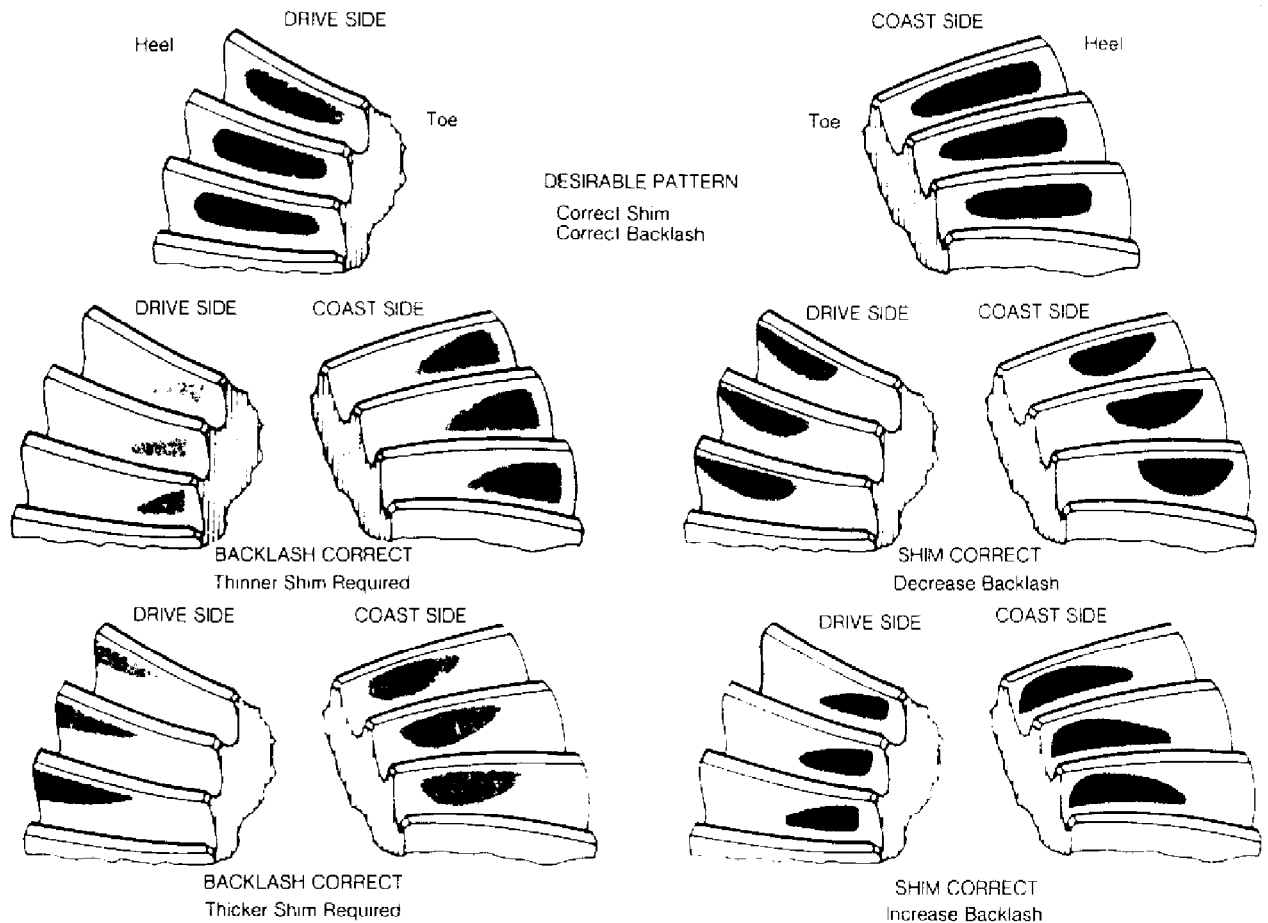


Fig. 1: Drive Axle Gear Tooth Patterns

## ADJUSTMENTS

### GEAR BACKLASH & PINION SHIM CHANGES

**NOTE:** Backlash is adjusted by either moving shims from one side of differential case to the other or by turning adjusting nuts on which side bearing races ride. Changing of pinion shims alters the distance from face of pinion of centerline of ring gear.

1) With no change in backlash, moving pinion further from ring gear moves drive pattern toward heel and top of tooth, and moves coast pattern toward toe and top of tooth.

2) With no change in backlash, moving pinion closer to ring gear moves drive pattern toward toe and bottom of tooth, and moves coast pattern toward heel and bottom of tooth.

3) With no change in pinion shim thickness, an increase in backlash moves ring gear further from pinion. Drive pattern moves toward heel and top of tooth, and coast pattern moves toward heel and top of tooth.

## **GEAR TOOTH CONTACT PATTERNS**

### **Article Text (p. 3)**

1996 Volkswagen Golf

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4) With no change in pinion shim thickness, decrease in backlash moves ring gear closer to pinion gear. Drive pattern moves toward toe and bottom of tooth, and coast pattern moves toward toe and bottom of tooth.

**END OF ARTICLE**



# GEAR TOOTH CONTACT PATTERNS

## Article Text

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### ARTICLE BEGINNING

#### GENERAL INFORMATION

#### Gear Tooth Contact Patterns

#### **\* PLEASE READ THIS FIRST \***

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### INSPECTION

#### PRELIMINARY INSPECTION

Wipe lubricant from internal parts. Rotate gears and inspect for wear or damage. Mount dial indicator to housing, and check backlash at several points around ring gear. Backlash must be within specifications at all points. If no defects are found, check gear tooth contact pattern.

#### GEAR TOOTH CONTACT PATTERN

NOTE: Drive pattern should be well centered on ring gear teeth. Coast pattern should be centered, but may be slightly toward toe of ring gear teeth.

1) Paint ring gear teeth with marking compound. Wrap cloth or rope around drive pinion flange to act as brake. Rotate ring gear until clear tooth contact pattern is obtained.

2) Contact pattern will indicate whether correct pinion bearing mounting shim has been installed and if drive gear backlash has been set properly. Backlash between drive gear and pinion must be maintained within specified limits, until correct tooth pattern is obtained.

# GEAR TOOTH CONTACT PATTERNS

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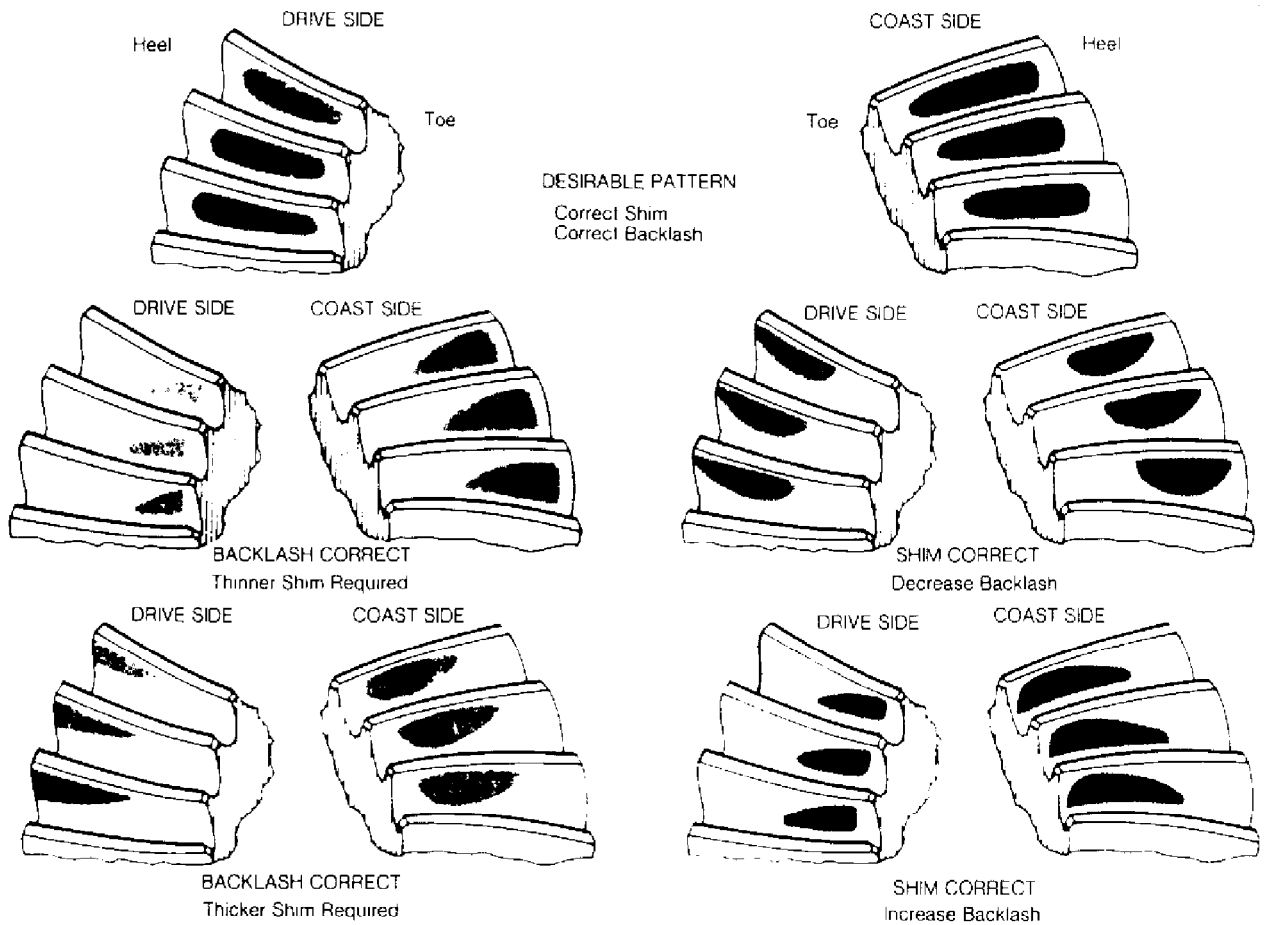


Fig. 1: Drive Axle Gear Tooth Patterns

## ADJUSTMENTS

### GEAR BACKLASH & PINION SHIM CHANGES

**NOTE:** Backlash is adjusted by either moving shims from one side of differential case to the other or by turning adjusting nuts on which side bearing races ride. Changing of pinion shims alters the distance from face of pinion of centerline of ring gear.

1) With no change in backlash, moving pinion further from ring gear moves drive pattern toward heel and top of tooth, and moves coast pattern toward toe and top of tooth.

2) With no change in backlash, moving pinion closer to ring gear moves drive pattern toward toe and bottom of tooth, and moves coast pattern toward heel and bottom of tooth.

3) With no change in pinion shim thickness, an increase in backlash moves ring gear further from pinion. Drive pattern moves toward heel and top of tooth, and coast pattern moves toward heel and top of tooth.

## **GEAR TOOTH CONTACT PATTERNS**

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4) With no change in pinion shim thickness, decrease in backlash moves ring gear closer to pinion gear. Drive pattern moves toward toe and bottom of tooth, and coast pattern moves toward toe and bottom of tooth.

**END OF ARTICLE**

# **ENGINE OVERHAUL PROCEDURES - GENERAL INFORMATION**

## **Article Text**

1996 Volkswagen Golf  
For Volkswagen Technical Site  
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Thursday, August 19, 1999 11:45PM

### **ARTICLE BEGINNING**

Engine Overhaul Procedures - General Information  
ALL PISTON ENGINES

#### **\* PLEASE READ THIS FIRST \***

Examples used in this article are general in nature and do not necessarily relate to a specific engine or system. Illustrations and procedures have been chosen to guide mechanic through engine overhaul process. Descriptions of processes of cleaning, inspection, assembly and machine shop practice are included.

Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

### **ENGINE IDENTIFICATION**

The engine may be identified from its Vehicle Identification Number (VIN) stamped on a metal tab. Metal tab may be located in different locations depending on manufacturer. Engine identification number or serial number is located on cylinder block. Location varies with manufacturer.

### **INSPECTION PROCEDURES**

#### **\* PLEASE READ THIS FIRST \***

NOTE: Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

### **GENERAL**

Engine components must be inspected to meet manufacturer's specifications and tolerances during overhaul. Proper dimensions and tolerances must be met to obtain proper performance and maximum engine life.

Micrometers, depth gauges and dial indicator are used for checking tolerances during engine overhaul. Magnaflux, Magnaglo, dye-check, ultrasonic and x-ray inspection procedures are used for parts inspection.

### **MAGNETIC PARTICLE INSPECTION**

#### **Magnaflux & Magnaglo**

Magnaflux is an inspection technique used to locate material flaws and stress cracks. The part in question is subjected to a strong magnetic field. The entire part, or a localized area, can be magnetized. The part is coated with either a wet or dry material that contains fine magnetic particles.

# ENGINE OVERHAUL PROCEDURES - GENERAL INFORMATION

## Article Text (p. 2)

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Cracks which are outlined by the particles cause an interruption in the magnetic field. The dry powder method of Magnaflux can be used in normal light. A crack will appear as an obvious bright line.

Fluorescent liquid is used in conjunction with a blacklight in a second Magnaflux system called Magnaglo. This type of inspection demands a darkened room. The crack will appear as a glowing line in this process. Both systems require complete demagnetizing upon completion of the inspection. Magnetic particle inspection applies to ferrous materials only.

### PENETRANT INSPECTION

#### Zyglo

The Zyglo process coats the material with a fluorescent dye penetrant. The part is often warmed to expand cracks that will be penetrated by the dye. When the coated part is subjected to inspection with a blacklight, a crack will glow brightly. Developing solution is often used to enhance results. Parts made of any material, such as aluminum cylinder heads or plastics, may be tested using this process.

#### Dye Check

Penetrating dye is sprayed on the previously cleaned component. Dye is left on component for 5-45 minutes, depending upon material density. Component is then wiped clean and sprayed with a developing solution. Surface cracks will show up as a bright line.

### ULTRASONIC INSPECTION

If an expensive part is suspected of internal cracking, Ultrasonic testing is used. Sound waves are used for component inspection.

### X-RAY INSPECTION

This form of inspection is used on highly stressed components. X-ray inspection maybe used to detect internal and external flaws in any material.

### PRESSURE TESTING

Cylinder heads can be tested for cracks using a pressure tester. Pressure testing is performed by plugging all but one of the holes in the head and injecting air or water into the open passage. Leaks are indicated by the appearance of wet or damp areas when using water. When air is used, it is necessary to spray the head surface with a soap solution. Bubbles will indicate a leak. Cylinder head may also be submerged in water heated to specified temperature to check for cracks created during heat expansion.

### CLEANING PROCEDURES

# **ENGINE OVERHAUL PROCEDURES - GENERAL INFORMATION**

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**NOTE:** Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

### **GENERAL**

All components of an engine do not have the same cleaning requirements. Physical methods include bead blasting and manual removal. Chemical methods include solvent blast, solvent tank, hot tank, cold tank and steam cleaning of components.

### **BEAD BLASTING**

Manual removal of deposits may be required prior to bead blasting, followed by some other cleaning method. Carbon, paint and rust may be removed using bead blasting method. Components must be free of oil and grease prior to bead blasting. Beads will stick to grease or oil soaked areas causing area not to be cleaned.

Use air pressure to remove all trapped residual beads from components after cleaning. After cleaning internal engine parts made of aluminum, wash thoroughly with hot soapy water. Component must be thoroughly cleaned as glass beads will enter engine oil resulting in bearing damage.

### **CHEMICAL CLEANING**

Solvent tank is used for cleaning oily residue from components. Solvent blasting sprays solvent through a siphon gun using compressed air.

The hot tank, using heated caustic solvents, is used for cleaning ferrous materials only. DO NOT clean aluminum parts such as cylinder heads, bearings or other soft metals using the hot tank. After cleaning, flush parts with hot water.

A non-ferrous part will be ruined and caustic solution will be diluted if placed in the hot tank. Always use eye protection and gloves when using the hot tank.

Use of a cold tank is for cleaning of aluminum cylinder heads, carburetors and other soft metals. A less caustic and unheated solution is used. Parts may be left in the tank for several hours without damage. After cleaning, flush parts with hot water.

Steam cleaning, with boiling hot water sprayed at high pressure, is recommended as the final cleaning process when using either hot or cold tank cleaning.

### **COMPONENT CLEANING**

**\* PLEASE READ THIS FIRST \***

**NOTE:** Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and

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specifications for the vehicle being repaired.

### SHEET METAL PARTS

Examples of sheet metal parts are the rocker covers, front and side covers, oil pan and bellhousing dust cover. Glass bead blasting or hot tank may be used for cleaning.

Ensure all mating surfaces are flat. Deformed surfaces should be straightened. Check all sheet metal parts for cracks and dents.

### INTAKE & EXHAUST MANIFOLDS

Using solvent cleaning or bead blasting, clean manifolds for inspection. If the intake manifold has an exhaust crossover, all carbon deposits must be removed. Inspect manifolds for cracks, burned or eroded areas, corrosion and damage to fasteners.

Exhaust heat and products of combustion cause threads of fasteners to corrode. Replace studs and bolts as necessary. On "V" type intake manifolds, the sheet metal oil shield must be removed for proper cleaning and inspection. Ensure that all manifold parting surfaces are flat and free of burrs.

### CYLINDER HEAD REPLACEMENT

\* PLEASE READ THIS FIRST \*

NOTE: Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

### REMOVAL

Remove intake and exhaust manifolds and valve cover. Cylinder head and camshaft carrier bolts (if equipped), should be removed only when the engine is cold. On many aluminum cylinder heads, removal while hot will cause cylinder head warpage. Mark rocker arm or overhead cam components for location.

Remove rocker arm components or overhead cam components. Components must be installed in original location. Individual design rocker arms may utilize shafts, ball-type pedestal mounts or no rocker arms. For all design types, wire components together and identify according to the corresponding valve. Remove cylinder head bolts. Note length and location. Some applications require cylinder head bolts be removed in proper sequence to prevent cylinder head damage. See Fig. 1. Remove cylinder head.

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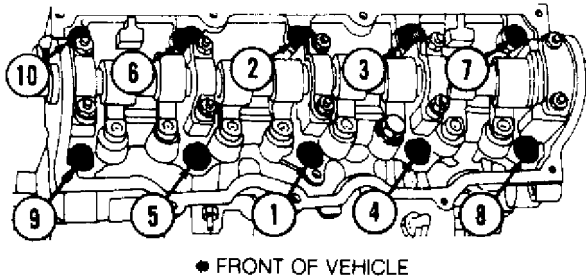


Fig. 1: Typical Cylinder Head Tightening or Loosening Sequence  
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### INSTALLATION

Ensure all surfaces and head bolts are clean. Check that head bolt holes of cylinder block are clean and dry to prevent block damage when bolts are tightened. Clean threads with tap to ensure accurate bolt torque.

Install head gasket on cylinder block. Some manufacturer's may recommend sealant be applied to head gasket prior to installation. Note that all holes are aligned. Some gasket applications may be marked so certain area faces upward. Install cylinder head using care not to damage head gasket. Ensure cylinder head is fully seated on cylinder block.

Some applications require head bolts be coated with sealant prior to installation. This is done if head bolts are exposed to water passages. Some applications require head bolts be coated with light coat of engine oil.

Install head bolts. Head bolts should be tightened in proper steps and sequence to specification. See Fig. 1. Install remaining components. Tighten all bolts to specification. Adjust valves if required. See VALVE ADJUSTMENT in this article.

**NOTE:** Some manufacturers require that head bolts be retightened after specified amount of operation. This must be done to prevent head gasket failure.

### VALVE ADJUSTMENT

Engine specifications will indicate valve train clearance and temperature at which adjustment is to be made on most models. In most cases, adjustment will be made with a cold engine. In some cases, both a cold and a hot clearance will be given for maintenance convenience.

On some models, adjustment is not required. Rocker arms are tightened to specification and valve lash is automatically set. On some models with push rod actuated valve train, adjustment is made at push rod end of rocker arm while other models do not require adjustment.

Clearance will be checked between tip of rocker arm and tip of valve stem in proper sequence using a feeler gauge. Adjustment is made by rotating adjusting screw until proper clearance is obtained. Lock nut is then tightened. Engine will be rotated to obtain all valve adjustments to manufacturer's specifications.



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Some models require hydraulic lifter to be bled down and clearance measured. Different length push rods can be used to obtain proper clearance. Clearance will be checked between tip of rocker arm and tip of valve stem in proper sequence using a feeler gauge.

On overhead cam engines designed without rocker arms actuate valves directly on a cam follower. A hardened, removable disc is installed between the cam lobe and lifter. Clearance will be checked between cam heel and adjusting disc in proper sequence using a feeler gauge. Engine will be rotated to obtain all valve adjustments.

On overhead cam engines designed with rocker arms, adjustment is made at push rod end of rocker arm. Ensure that the valve to be adjusted is riding on the heel of the cam on all engines. Clearance will be checked between tip of rocker arm and tip of valve stem in proper sequence using a feeler gauge. Adjustment is made by rotating adjusting screw until proper clearance is obtained. Lock nut is then tightened. Engine will be rotated to obtain all valve adjustments to manufacturer's specifications.

### CYLINDER HEAD OVERHAUL

\* PLEASE READ THIS FIRST \*

**NOTE:** Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

### DISASSEMBLY

Mark valves for location. Using valve spring compressor, compress valve springs. Remove valve locks. Carefully release spring compressor. Remove retainer or rotator, valve spring, spring seat and valve. See Fig. 2.

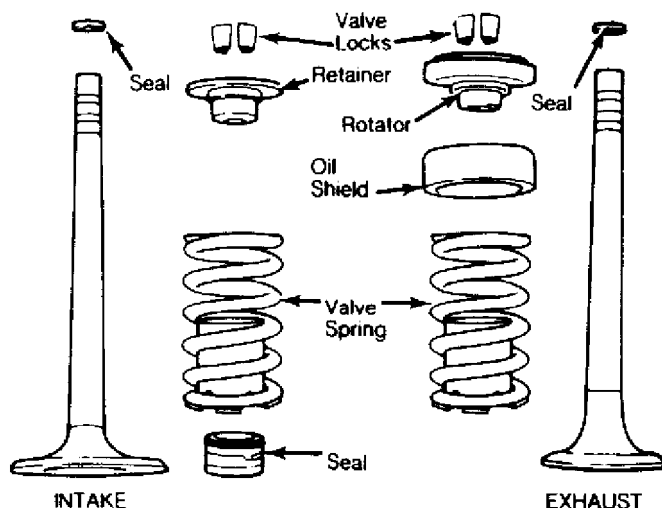


Fig. 2: Exploded View of Intake & Exhaust Valve Assemblies - Typical  
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### CLEANING & INSPECTION

Clean cylinder head and valve components using approved cleaning methods. Inspect cylinder head for cracks, damage or warped gasket surface. Place straightedge across gasket surface. Determine clearance at center of straightedge. Measure across both diagonals, longitudinal centerline and across the head at several points. See Fig. 3.

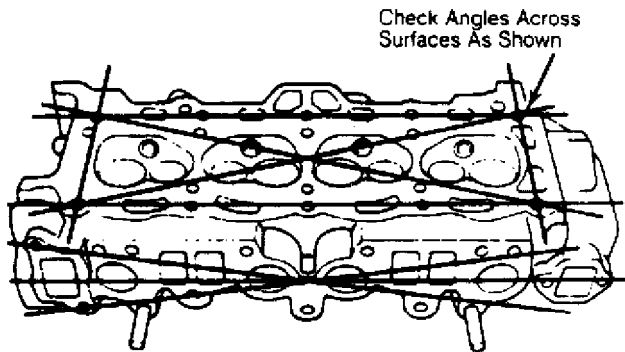


Fig. 3: Checking Cylinder Head for Warpage - Typical  
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On cast cylinder heads, if warpage exceeds .003" (.08 mm) in a 6" span, or .006" (.15 mm) over total length, cylinder head must be resurfaced. On most aluminum cylinder heads, if warpage exceeds .002" (.05 mm) in any area, cylinder head must be resurfaced. Warpage specification may vary with manufacturer.

Cylinder head thickness should be measured to determine amount of material which can be removed before replacement is required. Cylinder head thickness must not be less than manufacturer's specifications.

If cylinder head required resurfacing, it may not align properly with intake manifold. On "V" type engines, misalignment is corrected by machining intake manifold surface that contacts cylinder head. Cylinder head may be machined on surface that contacts intake manifold.

Using oil stone, remove burrs or scratches from all sealing surfaces.

### VALVE SPRINGS

Inspect valve springs for corroded or pitted valve spring surfaces which may lead to breakage. Polished spring ends caused by a rotating spring, indicates that spring surge has occurred. Replace springs showing evidence of these conditions.

Inspect valve springs for squareness using a 90 degree straightedge. See Fig. 4. Replace valve spring if out-of-square exceeds manufacturer's specification.

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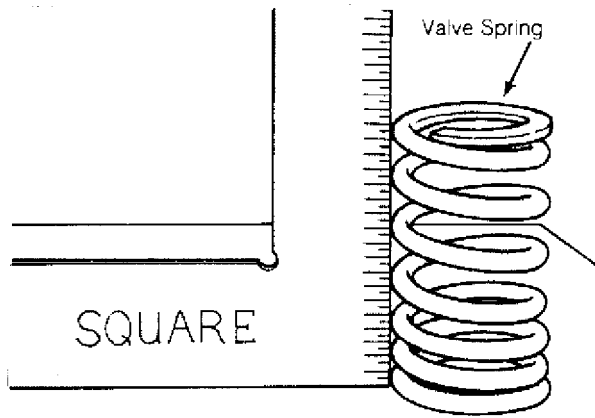


Fig. 4: Checking Valve Spring Squareness - Typical  
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Using vernier caliper, measure free length of all valve springs. Replace springs if not within specification. Using valve spring tester, test valve spring pressure at installed and compressed heights. See Fig. 5.

Usually compressed height is installed height minus valve lift. Replace valve spring if not within specification. It is recommended to replace all valve springs when overhauling cylinder head.

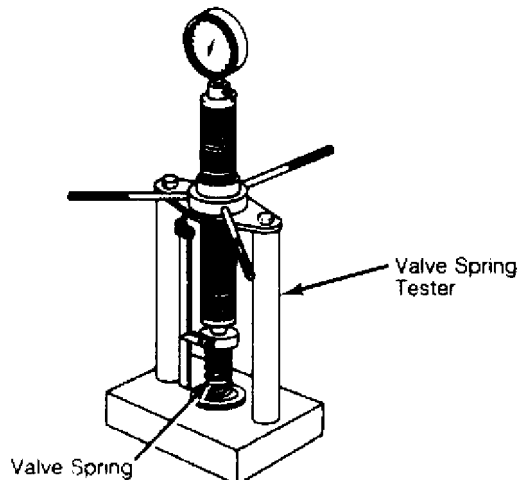


Fig. 5: Checking Valve Spring Pressure - Typical  
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### VALVE GUIDE

#### Measuring Valve Guide Clearance

Check valve stem-to-guide clearance. Ensure valve stem diameter is within specifications. Install valve in valve guide. Install dial indicator assembly on cylinder head with tip resting against valve stem just above valve guide. See Fig. 6.

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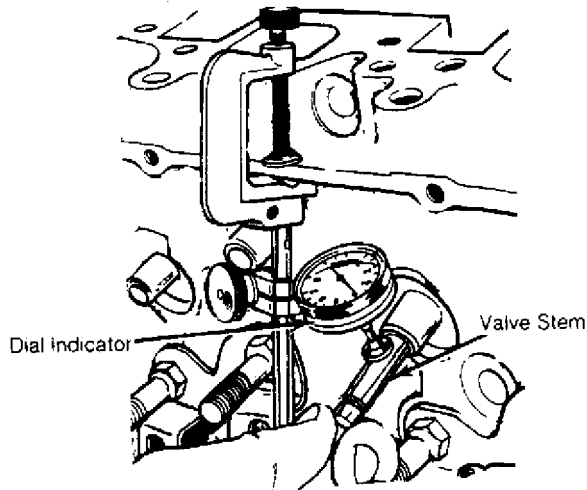


Fig. 6: Measuring Valve Stem-to-Guide Clearance - Typical  
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Lower valve approximately 1/16" below valve seat. Push valve stem against valve guide as far as possible. Adjust dial indicator to zero. Push valve stem in opposite direction and note reading. Clearance must be within specification.

If valve guide clearance exceeds specification, valves with oversize stems may be used or valve guide must be replaced. On some applications, a false guide is installed, then reamed to proper specification. Valve guide reamer set is used to ream valve guide to obtain proper clearance for new valve.

#### Reaming Valve Guide

Select proper reamer for valve stem. Reamer must be of proper length to provide clean cut through entire length of valve guide. Install reamer in valve guide and rotate to cut valve guide. See Fig. 7.

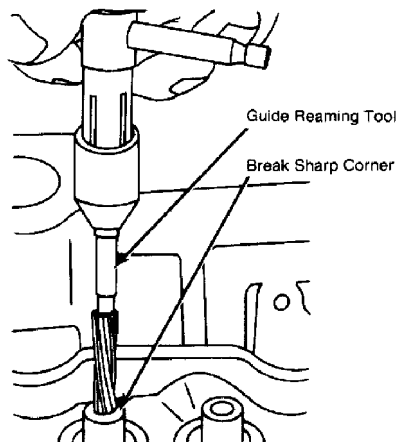


Fig. 7: Reaming Valve Guides - Typical  
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### Replacing Valve Guide

Replace valve guide if clearance exceeds specification. Valve guides are either pressed, hammered or shrunk in place, depending upon cylinder head design and type of metal used.

Remove valve guide from cylinder head by pressing or tapping on a stepped drift. See Fig. 8. Once valve guide is installed, distance from cylinder head to top of valve guide must be checked. This distance must be within specification.

Aluminum heads are often heated before installing valve guide. Guide is sometimes chilled in dry ice before installation. Combination of a heated head and chilled guide insures a tight guide fit upon assembly. The new guide must be reamed to specification.

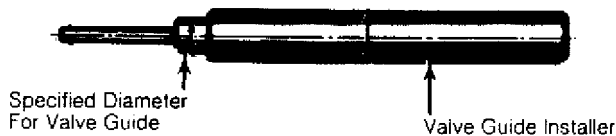


Fig. 8: Typical Valve Guide Remover & Installer  
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### VALVES & VALVE SEATS

#### Valve Grinding

Valve stem O.D. should be measured in several areas to indicate amount of wear. Replace valve if not within specification. Valve margin area should be measured to ensure that valve can be grounded. See Fig. 9.

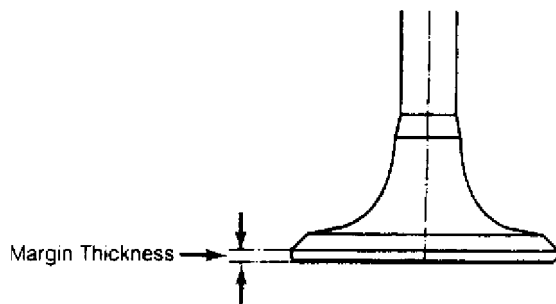


Fig. 9: Measuring Valve Head Margin - Typical  
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If valve margin is less than specification, this will burn the valves. Valve must be replaced. Due to minimum margin dimensions during manufacture, some new type valves cannot be reground.

Resurface valve on proper angle specification using valve grinding machine. Follow manufacturer's instructions for valve grinding machine. Specifications may indicate a different valve face angle than seat angle.

Measure valve margin after grinding. Replace valve if not within specification. Valve stem tip can be refinished using valve

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grinding machine.

### Valve Lapping

During valve lapping of recent designed valves, be sure to follow manufacturers recommendations. Surface hardening and materials used with some valves do not permit lapping. Lapping process will remove excessive amounts of the hardened surface.

Valve lapping is done to ensure adequate sealing between valve face and seat. Use either a hand drill or lapping stick with suction cup attached.

Moisten and attach suction cup to valve. Lubricate valve stem and guide. Apply a thin coat of fine valve grinding compound between valve and seat. Rotate lapping tool between the palms or with hand drill.

Lift valve upward off the seat and change position often. This is done to prevent grooving of valve seat. Lap valve until a smooth polished seat is obtained. Thoroughly clean grinding compound from components. Valve to valve seat concentricity should be checked. See VALVE SEAT CONCENTRICITY.

**CAUTION:** Valve guides must be in good condition and free of carbon deposits prior to valve seat grinding. Some engines contain an induction hardened valve seat. Excessive material removal will damage valve seats.

### Valve Seat Grinding

Select coarse stone of correct size and angle for seat to be ground. Ensure stone is true and has a smooth surface. Select correct size pilot for valve guide dimension. Install pilot in valve guide. Lightly lubricate pilot shaft. Install stone on pilot. Move stone off and on the seat approximately 2 times per second during grinding operation.

Select a fine stone to finish grinding operation. Grinding stones with 30 and 60 degree angles are used to center and narrow the valve seat as required. See Fig. 10.

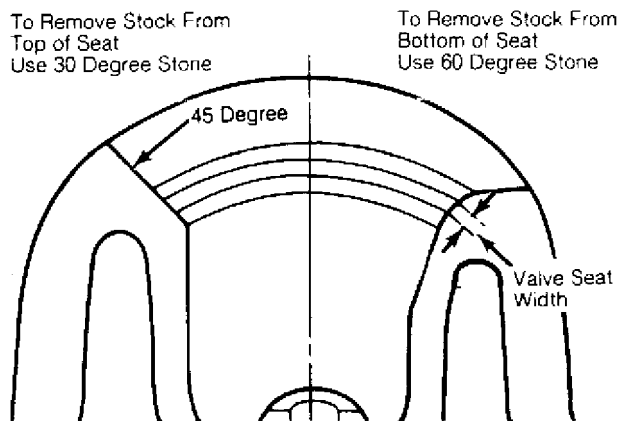


Fig. 10: Adjusting Valve Seat Width - Typical  
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### Valve Seat Replacement

Replacement of valve seat inserts is done by cutting out the old insert and machining an oversize insert bore. Replacement oversize insert is usually chilled and the cylinder head is sometimes warmed. Valve seat is pressed into the head. This operation requires specialized machine shop equipment.

### Valve Seat Concentricity

Using dial gauge, install gauge pilot in valve guide. Position gauge arm on the valve seat. Adjust dial indicator to zero. Rotate arm 360 degrees and note reading. Runout should not exceed specification.

To check valve-to-valve seat concentricity, coat valve face lightly with Prussian Blue dye. Install valve and rotate it on valve seat. If pattern is even and entire seat is coated at valve contact point, valve is concentric with the seat.

## REASSEMBLY

### Valve Stem Installed Height

Valve stem installed height must be checked when new valves are installed or when valves or valve seats have been ground. Install valve in valve guide. Measure distance from tip of valve stem to spring seat. See Fig. 11. Distance must be within specifications.

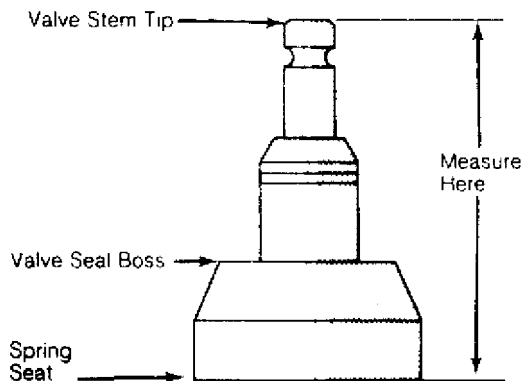


Fig. 11: Measuring Valve Stem Installed Height - Typical  
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Remove valve and grind valve stem tip if height exceeds specification. Valve tips are surface hardened. DO NOT remove more than .010" (.25 mm) from tip. Chamfer sharp edge of reground valve tip. Recheck valve stem installed height.

## VALVE STEM OIL SEALS

Valve stem oil seals must be installed on valve stem. See Fig. 2. Seals are needed due to pressure differential at the ends of valve guides. Atmospheric pressure above intake guide, combined with manifold vacuum below guide, causes oil to be drawn into the cylinder.

Exhaust guides also have pressure differential created by

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exhaust gas flowing past the guide, creating a low pressure area. This low pressure area draws oil into the exhaust system.

### Replacement (On Vehicle)

Mark rocker arm or overhead cam components for location.

Remove rocker arm components or overhead cam components. Components must be installed in original location. Remove spark plugs. Valve stem oil seals may be replaced by holding valves against seats using air pressure.

Air pressure must be installed in cylinder using an adapter for spark plug hole. An adapter can be constructed by welding air hose connection to spark plug body with porcelain removed.

Install adapter in spark plug hole. Apply a minimum of 140 psi (9.8 kg/cm<sup>2</sup>) to adapter. Air pressure should hold valve closed. If air pressure does not hold valve closed, check for damaged or bent valve. Cylinder head must be removed for service.

Using valve spring compressor, compress valve springs. Remove valve locks. Carefully release spring compressor. Remove retainer or rotator and valve spring. Remove valve stem oil seal.

If oversized valves have been installed, oversized oil seals must be used. Coat valve stem with engine oil. Install protective sleeve over end of valve stem. Install new oil seal over valve stem and seat on valve guide. Remove protective sleeve. Install spring seat, valve spring and retainer or rotator. Compress spring and install valve locks. Remove spring compressor. Ensure valve locks are fully seated.

Install rocker arms or overhead cam components. Tighten all bolts to specification. Adjust valves if required. Remove adapter. Install spark plugs, valve cover and gasket.

### VALVE SPRING INSTALLED HEIGHT

Valve spring installed height should be checked during reassembly. Measure height from lower edge of valve spring to the upper edge. DO NOT include valve spring seat or retainer. Distance must be within specifications. If valves and/or seats have been ground, a valve spring shim may be required to correct spring height. See Fig. 12.

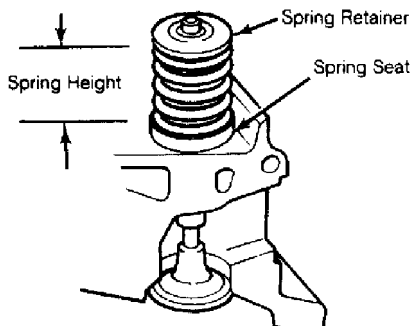


Fig. 12: Measuring Valve Spring Installed Height - Typical  
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### ROCKER ARMS & ASSEMBLIES

#### Rocker Studs

Rocker studs are either threaded or pressed in place.

Threaded studs are removed by locking 2 nuts on the stud. Unscrew the stud by turning the jam nut. Coat the stud threads with Loctite and install. Tighten to specification.

Pressed in stud can be removed using a stud puller. Ream the stud bore to proper specification and press in a new oversize stud. Pressed in studs are often replaced by cutting threads in the stud bore to accept a threaded stud.

#### Rocker Arms & Shafts

Mark rocker arms for location. Remove rocker arm retaining bolts. Remove rocker arms. Inspect rocker arms, shafts, bushings and pivot balls (if equipped) for excessive wear. Inspect rocker arms for wear in valve stem contact area. Measure rocker arm bushing I.D. Replace bushings if excessively worn.

The rocker arm valve stem contact point can be reground, using special fixture for valve grinding machine. Remove minimum amount of material as possible. Ensure all oil passages are clear. Install rocker arms in original locations. Ensure rocker arm is properly seated in push rod. Tighten bolts to specification. Adjust valves if required. See VALVE ADJUSTMENT in this article.

#### Pushrods

Remove rocker arms. Mark push rods for location. Remove push rods. Push rods can be steel or aluminum, solid or hollow. Hollow pushrods must be internally cleaned to ensure oil passage to the rocker arms is cleaned. Check the pushrod for damage, such as loose ends on steel tipped aluminum types.

Check push rod for straightness. Roll push rod on a flat surface. Using feeler gauge, check clearance at center. Replace push rod if bent. The push rod can also be supported at each end and rotated. A dial indicator is used to detect bends in the push rod.

Lubricate ends of push rod and install push rod in original location. Ensure push rod is properly seated in lifter. Install rocker arm. Tighten bolts to specification. Adjust valves if required. See VALVE ADJUSTMENT in this article.

### LIFTERS

#### Hydraulic Lifters

Before replacing a hydraulic lifter for noisy operation, ensure noise is not caused by worn rocker arms or valve tips. Hydraulic lifter assemblies must be installed in original locations. Remove the rocker arm assembly and push rod. Mark components for location. Some applications require intake manifold, or lifter cover removal. Remove lifter retainer plate (if used). To remove lifters, use a hydraulic lifter remover or magnet. Different type lifters are used. See Fig. 13.

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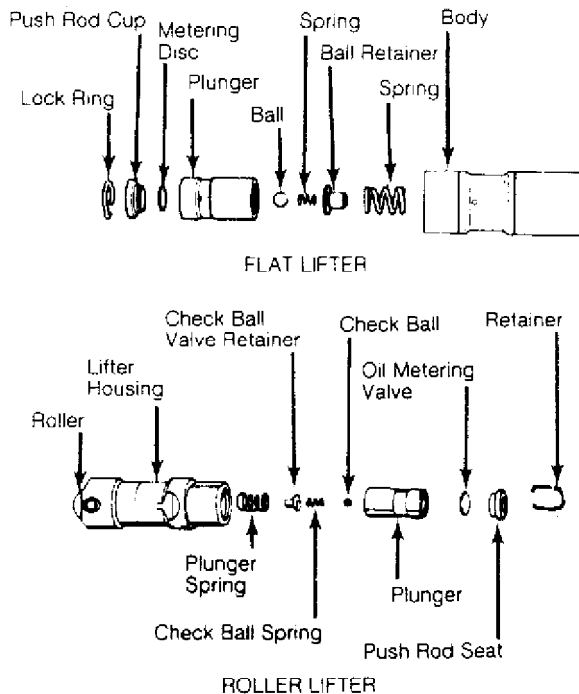


Fig. 13: Typical Hydraulic Valve Lifter Assemblies - Typical  
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On sticking lifters, disassemble and clean lifter. DO NOT mix lifter components or positions. Parts are select-fitted and are not interchangeable. Inspect all components for wear. Note amount of wear in lifter body-to-camshaft contact area. Surface must have smooth and convex contact face. If wear is apparent, carefully inspect cam lobe.

Inspect push rod contact area and lifter body for scoring or signs of wear. If body is scored, inspect lifter bore for damage and lack of lubrication. On roller type lifters, inspect roller for flaking, pitting, loss of needle bearings and roughness during rotation.

Measure lifter body O.D. in several areas. Measure lifter bore I.D. of cylinder block. Some models offer oversized lifters. Replace lifter if damaged.

If lifter check valve is not operating, obstructions may be preventing it from closing or valve spring may be broken. Clean or replace components as necessary.

Check plunger operation. Plunger should drop to bottom of the body by its own weight when assembled dry. If plunger is not free, soak lifter in solvent to dissolve deposits.

Lifter leak-down test can be performed on lifter. Lifter must be filled with special test oil. New lifters contain special test oil. Using lifter leak-down tester, perform leak-down test following manufacturer's instructions. If leak-down time is not within specifications, replace lifter assembly.

Lifters should be soaked in clean engine oil several hours prior to installation. Coat lifter base, roller (if equipped) and lifter body with ample amount of Molykote or camshaft lubricant. See

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Fig. 13. Install lifter in original location. Install remaining components. Valve lash adjustment is not required on most hydraulic lifters. Preload of hydraulic lifter is automatic. Some models may require adjustment.

### Mechanical Lifters

Lifter assemblies must be installed in original locations. Remove rocker arm assembly and push rod. Mark components for location. Some applications require intake manifold or lifter cover removal. Remove lifter retainer plate (if used). To remove lifters, use lifter remover or magnet.

Inspect push rod contact area and lifter body for scoring or signs of wear. If body is scored, inspect lifter bore for damage and lack of lubrication. Note amount of wear in lifter body-to-camshaft contact area. Surface must have smooth and convex contact face. If wear is apparent, carefully inspect cam lobe.

Coat lifter base, roller (if equipped) and lifter body with ample amount of Molykote or camshaft lubricant. Install lifter in original location. Install remaining components. Tighten bolts to specification. Adjust valves. See VALVE ADJUSTMENT in this article.

## PISTONS, CONNECTING RODS & BEARINGS

\* PLEASE READ THIS FIRST \*

NOTE: Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

### RIDGE REMOVAL

Ridge in cylinder wall must be removed prior to piston removal. Failure to remove ridge prior to removing pistons will cause piston damage in piston ring locations.

With the piston at bottom dead center, place a rag in the bore to trap metal chips. Install ridge reamer in cylinder bore. Adjust ridge reamer using manufacturer's instructions. Remove ridge using ridge reamer. DO NOT remove an excessive amount of material. Ensure ridge is completely removed.

### PISTON & CONNECTING ROD REMOVAL

Note top of piston. Some pistons may contain a notch, arrow or be marked "FRONT". Piston must be installed in proper direction to prevent damage with valve operation.

Check that connecting rod and cap are numbered for cylinder location and which side of cylinder block the number faces. Proper cap and connecting rod must be installed together. Connecting rod cap must be installed on connecting rod in proper direction to ensure bearing lock procedure. Mark connecting rod and cap if necessary. Pistons must be installed in original location.

Remove cap retaining nuts or bolts. Remove bearing cap.

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Install stud protectors on connecting rod bolts. This protects cylinder walls from scoring during removal. Ensure proper removal of ridge. Push piston and connecting rod from cylinder. Connecting rod boss can be tapped with a wooden dowel or hammer handle to aid in removal.

### PISTON & CONNECTING ROD

#### Disassembly

Using ring expander, remove piston rings. Remove piston pin retaining rings (if equipped). On pressed type piston pins, special fixtures and procedures according to manufacturer must be used to remove piston pins. Follow manufacturer's recommendations to avoid piston distortion or breakage.

#### Cleaning

Remove all carbon and varnish from piston. Pistons and connecting rods may be cleaned in cold type chemical tank. Using ring groove cleaner, clean all deposits from ring grooves. Ensure all deposits are cleaned from ring grooves to prevent ring breakage or sticking. DO NOT attempt to clean pistons using wire brush.

#### Inspection

Inspect pistons for nicks, scoring, cracks or damage in ring areas. Connecting rod should be checked for cracks using Magnaflux procedure. Piston diameter must be measured in manufacturers specified area.

Using telescopic gauge and micrometer, measure piston pin bore of piston in 2 areas, 90 degrees apart. This is done to check diameter and out-of-round.

Install proper bearing cap on connecting rod. Ensure bearing cap is installed in proper location. Tighten bolts or nuts to specification. Using inside micrometer, measure inside diameter in 2 areas, 90 degrees apart.

Connecting rod I.D. and out-of-round must be within specification. Measure piston pin bore I.D. and piston pin O.D. All components must be within specification. Subtract piston pin diameter from piston pin bore in piston and connecting rod to determine proper fit.

Connecting rod length must be measured from center of crankshaft journal inside diameter to center of piston pin bushing using proper caliper. Connecting rods must be the same length. Connecting rods should be checked on an alignment fixture for bent or twisted condition. Replace all components which are damaged or not within specification.

### PISTON & CYLINDER BORE FIT

Ensure cylinder is checked for taper, out-of-round and properly honed prior to checking piston and cylinder bore fit. See CYLINDER BLOCK in this article. Using dial bore gauge, measure cylinder bore. Measure piston at right angle to piston pin in center

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of piston skirt area. Subtract piston diameter from cylinder bore diameter. The difference is piston-to-cylinder clearance. Clearance must be within specification. Mark piston for proper cylinder location.

### ASSEMBLING PISTON & CONNECTING ROD

Install proper fitted piston on connecting rod for proper cylinder. Ensure piston marking on top of piston marked is in correspondence with connecting rod and cap number. See Fig. 14.

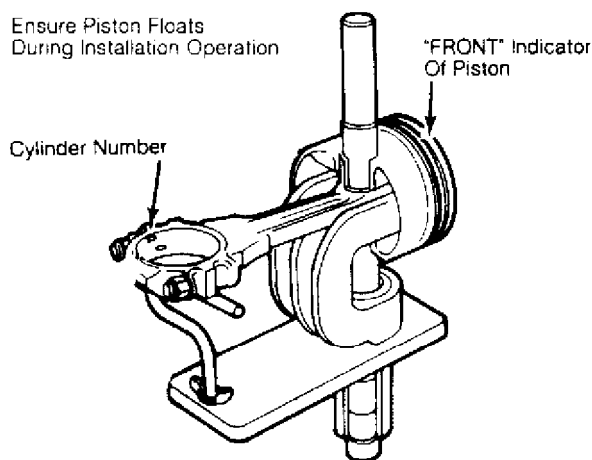


Fig. 14: Piston Pin Installation - Typical  
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Lubricate piston pin and install in connecting rod. Ensure piston pin retainers are fully seated (if equipped). On pressed type piston pins, follow manufacturer's recommended procedure to avoid distortion or breakage.

### CHECKING PISTON RING CLEARANCES

Piston rings must be checked for side clearance and end gap. To check end gap, install piston ring in cylinder which it is to be installed. Using an inverted piston, push ring to bottom of cylinder in smallest cylinder diameter.

Using feeler gauge, check ring end gap. See Fig. 15. Piston ring end gap must be within specification. Ring breakage will occur with insufficient ring end gap.

On some manufacturers, insufficient ring end gap may be corrected by using a fine file while other manufacturers recommend using another ring set. Mark rings for proper cylinder installation after checking end gap.

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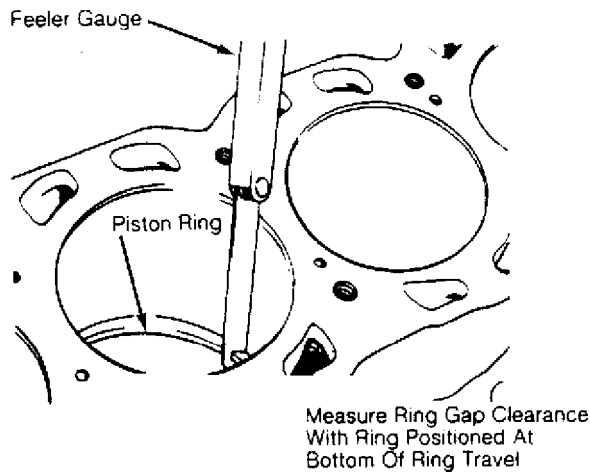


Fig. 15: Checking Piston Ring End Gap - Typical  
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For checking side clearance, install rings on piston. Using feeler gauge, measure clearance between piston ring and piston ring land. Check side clearance in several areas around piston. Side clearance must be within specification.

If side clearance is excessive, piston ring grooves can be machined to accept oversized piston rings (if available). Normal practice is to replace piston.

### PISTON & CONNECTING ROD INSTALLATION

Cylinders must be honed prior to piston installation. See CYLINDER HONING under CYLINDER BLOCK in this article.

Install upper connecting rod bearings. Lubricate upper bearings with engine oil. Install lower bearings in rod caps. Ensure bearing tabs are properly seated. Position piston ring gaps according to manufacturers recommendations. See Fig. 16. Lubricate pistons, rings and cylinder walls.

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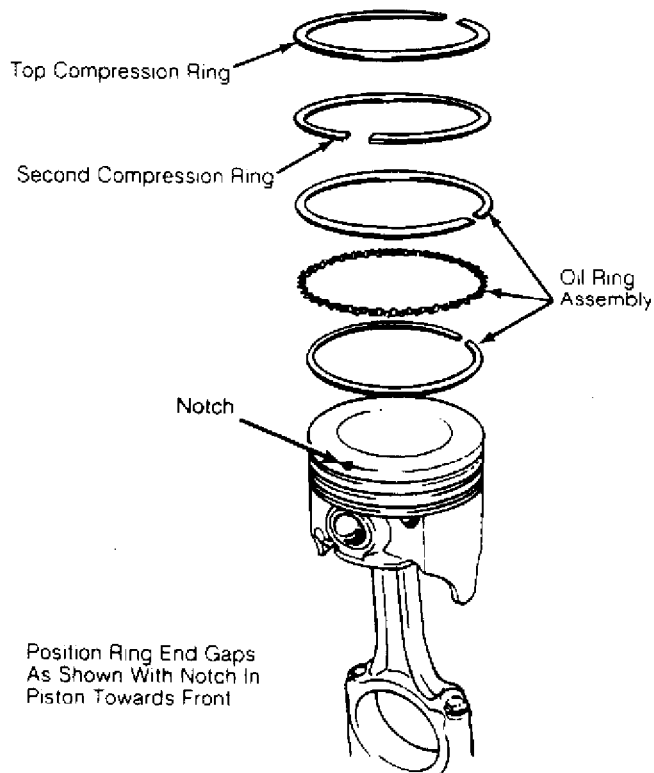


Fig. 16: Typical Piston Ring End Gap Positioning - Typical  
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Install ring compressor. Use care not to rotate piston rings. Compress rings with ring compressor. Install plastic tubing protectors over connecting rod bolts. Install piston and connecting rod assembly. Ensure piston notch, arrow or "FRONT" mark is toward front of engine. See Fig. 17.

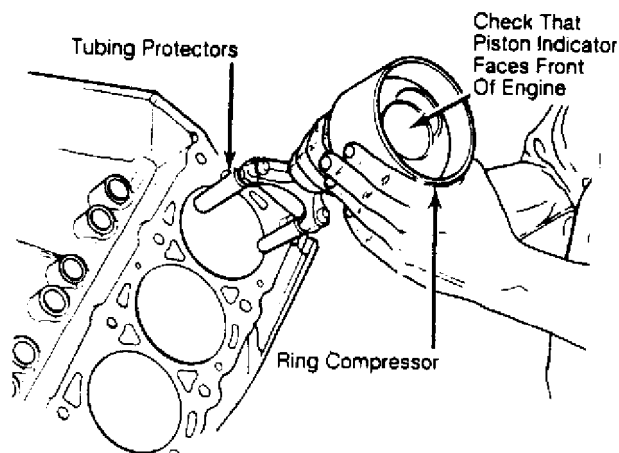


Fig. 17: Installing Piston & Connecting Rod Assembly - Typical  
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Carefully tap piston into cylinder until rod bearing is

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seated on crankshaft journal. Remove protectors. Install rod cap and bearing. Lightly tighten connecting rod bolts. Repeat procedure for remaining cylinders. Check bearing clearance. See MAIN & CONNECTING ROD BEARING CLEARANCE in this article.

Once clearance is checked, lubricate journals and bearings. Install bearing caps. Ensure marks are aligned on connecting rod and cap. Tighten rod nuts or bolts to specification. Ensure rod moves freely on crankshaft. Check connecting rod side clearance. See CONNECTING ROD SIDE CLEARANCE in this article.

### CONNECTING ROD SIDE CLEARANCE

Position connecting rod toward one side of crankshaft as far as possible. Using feeler gauge, measure clearance between side of connecting rod and crankshaft. See Fig. 18. Clearance must be within specifications.

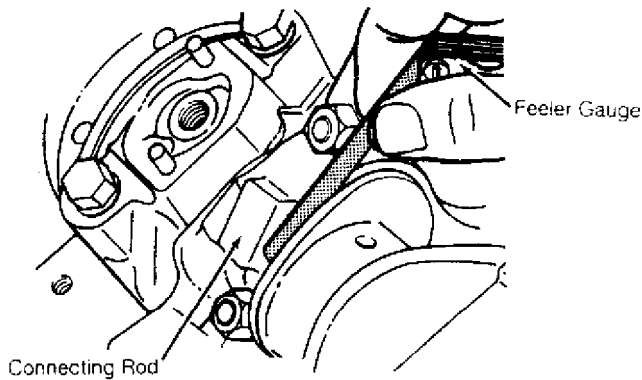


Fig. 18: Measuring Connecting Rod Side Clearance - Typical  
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Check for improper bearing installation, wrong bearing cap or insufficient bearing clearance if side clearance is insufficient. Connecting rod may require machining to obtain proper clearance. Excessive clearance usually indicates excessive wear at crankshaft. Crankshaft must be repaired or replaced.

### MAIN & CONNECTING ROD BEARING CLEARANCE

#### Plastigage Method

Plastigage method may be used to determine bearing clearance. Plastigage can be used with an engine in service or during reassembly. Plastigage material is oil soluble.

Ensure journals and bearings are free of oil or solvent. Oil or solvent will dissolve material and false reading will be obtained. Install small piece of Plastigage along full length of bearing journal. Install bearing cap in original location. Tighten bolts to specification.

**CAUTION:** DO NOT rotate crankshaft while Plastigage is installed. Bearing clearance will not be obtained if crankshaft is



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rotated.

Remove bearing cap. Compare Plastigage width with scale on Plastigage container to determine bearing clearance. See Fig. 19. Rotate crankshaft 90 degrees. Repeat procedure. This is done to check journal eccentricity. This procedure can be used to check oil clearance on both connecting rod and main bearings.

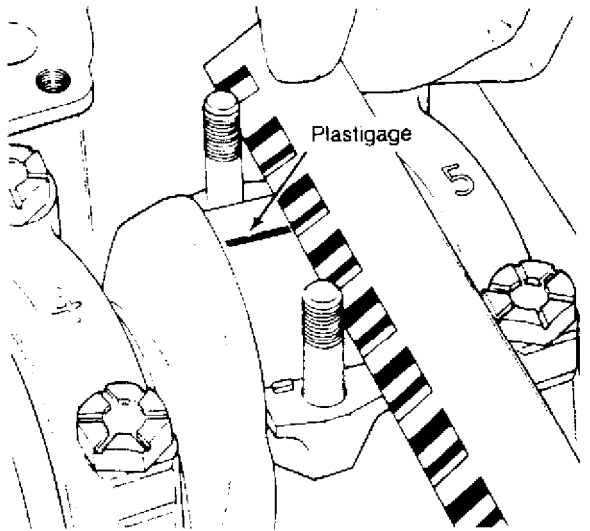


Fig. 19: Measuring Bearing Clearance - Typical  
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### Micrometer & Telescopic Gauge Method

A micrometer is used to determine journal diameter, taper and out-of-round dimensions of the crankshaft. See CLEANING & INSPECTION under CRANKSHAFT & MAIN BEARINGS in this article.

With crankshaft removed, install bearings and caps in original location on cylinder block. Tighten bolts to specification. On connecting rods, install bearings and caps on connecting rods. Install proper connecting rod cap on corresponding rod. Ensure bearing cap is installed in original location. Tighten bolts to specification.

Using a telescopic gauge and micrometer or inside micrometer measure inside diameter of connecting rod and main bearings bores. Subtract each crankshaft journal diameter from the corresponding inside bore diameter. This is the bearing clearance.

## CRANKSHAFT & MAIN BEARINGS

\* PLEASE READ THIS FIRST \*

NOTE: Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

## REMOVAL

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Ensure all main bearing caps are marked for location on cylinder block. Some main bearing caps have an arrow stamped on it which must face front of engine. Remove main bearing cap bolts. Remove main bearing caps. Carefully remove crankshaft. Use care not to bind crankshaft in cylinder block during removal.

### CLEANING & INSPECTION

Thoroughly clean crankshaft using solvent. Dry with compressed air. Ensure all oil passages are clear and free of sludge, rust, dirt, and metal chips.

Inspect crankshaft for scoring and nicks. Inspect crankshaft for cracks using Magnaflux procedure. Inspect rear seal area for grooving or damage. Inspect bolt hole threads for damage. If pilot bearing or bushing is used, check pilot bearing or bushing fit in crankshaft. Inspect crankshaft gear for damaged or cracked teeth. Replace gear if damaged. Check that oil passage plugs are tight (if equipped).

Using micrometer, measure all journals in 4 areas to determine journal taper, out-of-round and undersize. See Fig. 20. Some crankshafts can be reground to the next largest undersize, depending on the amount of wear or damage. Crankshafts with rolled fillet cannot be reground and must be replaced.

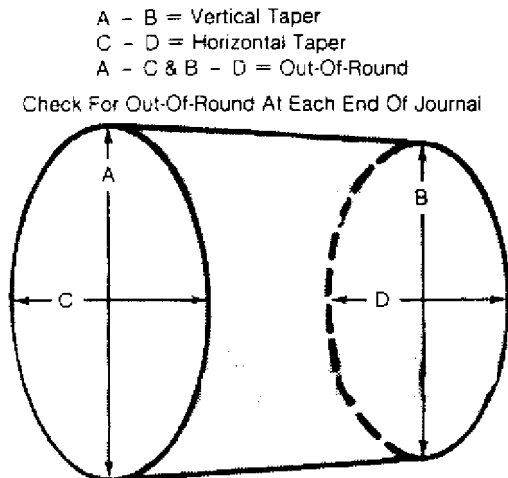


Fig. 20: Measuring Crankshaft Journal - Typical  
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Crankshaft journal runout should be checked. Install crankshaft in "V" blocks or bench center. Position dial indicator with tip resting on the main bearing journal area. See Fig. 21. Rotate crankshaft and note reading. Journal runout must not exceed specification. Repeat procedure on all main bearing journals. Crankshaft must be replaced if runout exceeds specification.

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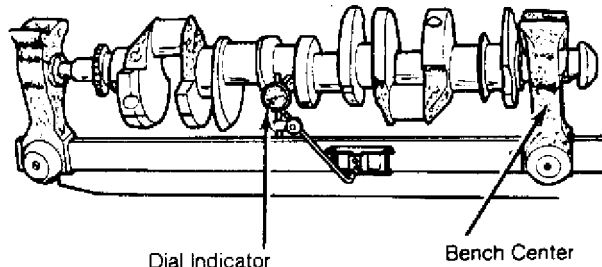


Fig. 21: Measuring Crankshaft Main Bearing Journal Runout - Typical  
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### INSTALLATION

Install upper main bearing in cylinder block. Ensure lock tab is properly located in cylinder block. Install bearings in main bearing caps. Ensure all oil passages are aligned. Install rear seal (if removed).

Ensure crankshaft journals are clean. Lubricate upper main bearings with clean engine oil. Carefully install crankshaft. Check each main bearing clearance using Plastigage method. See MAIN & CONNECTING ROD BEARING CLEARANCE in this article.

Once clearance is checked, lubricate lower main bearing and journals. Install main bearing caps in original location. Install rear seal in rear main bearing cap (if removed). Some rear main bearing caps require sealant to be applied in corners to prevent oil leakage.

Install and tighten all bolts except thrust bearing cap to specification. Tighten thrust bearing cap bolts finger tight only. Thrust bearing must be aligned. On most applications, crankshaft must be moved rearward then forward. Procedure may vary with manufacturer. Thrust bearing cap is then tighten to specification. Ensure crankshaft rotates freely. Crankshaft end play should be checked. See CRANKSHAFT END PLAY in this article.

### CRANKSHAFT END PLAY

#### Dial Indicator Method

Crankshaft end play can be checked using dial indicator. Mount dial indicator on rear of cylinder block. Position dial indicator tip against rear of crankshaft. Ensure tip is resting against flat surface.

Pry crankshaft rearward. Adjust dial indicator to zero. Pry crankshaft forward and note reading. Crankshaft end play must be within specification. If end play is not within specification, check for faulty thrust bearing installation or worn crankshaft. Some applications offer oversized thrust bearings.

#### Feeler Gauge Method

Crankshaft end play can be checked using feeler gauge. Pry crankshaft rearward. Pry crankshaft forward. Using feeler gauge, measure clearance between crankshaft and thrust bearing surface. See Fig. 22.

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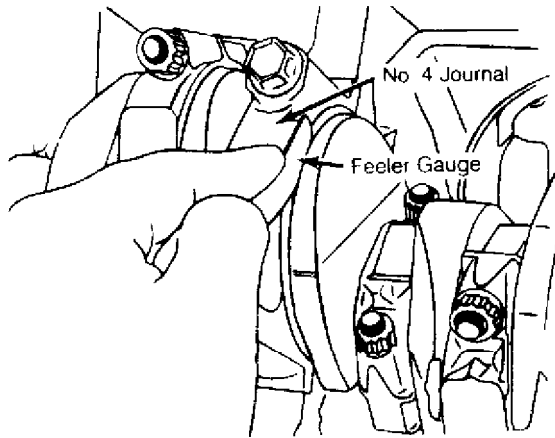


Fig. 22: Checking Crankshaft End Play - Typical  
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Crankshaft end play must be within specification. If end play is not within specification, check for faulty thrust bearing installation or worn crankshaft. Some applications offer oversized thrust bearings.

### CYLINDER BLOCK

\* PLEASE READ THIS FIRST \*

NOTE: Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

#### BLOCK CLEANING

Only cast cylinder blocks should be hot tank cleaned. Aluminum cylinder blocks should be cleaned using cold tank method. Cylinder block is cleaned in order to remove carbon deposits, gasket residue and water jacket scale. Remove oil galley plugs, freeze plugs and cam bearings prior to block cleaning.

#### BLOCK INSPECTION

Visually inspect the block. Check suspected areas for cracks using the Dye Penetrant inspection method. Block may be checked for cracks using the Magnaflux method.

Cracks are most commonly found at the bottom of the cylinders, the main bearing saddles, near expansion plugs and between the cylinders and water jackets. Inspect lifter bores for damage. Inspect all head bolt holes for damaged threads. Threads should be cleaned using tap to ensure proper head bolt torque. Consult machine shop concerning possible welding and machining (if required).

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### CYLINDER BORE INSPECTION

Inspect the bore for scuffing or roughness. Cylinder bore is dimensionally checked for out-of-round and taper using dial bore gauge. For determining out-of-round, measure cylinder parallel and perpendicular to the block centerline. Difference in the 2 readings is the bore out-of-round. Cylinder bore must be checked at top, middle and bottom of piston travel area.

Bore taper is obtained by measuring bore at the top and bottom. If wear has exceeded allowable limits, block must be honed or bored to next available oversize piston dimension.

### CYLINDER HONING

Cylinder must be properly honed to allow new piston rings to properly seat. Cross-hatching at correct angle and depth is critical to lubrication of cylinder walls and pistons.

A flexible drive hone and power drill are commonly used. Drive hone must be lubricated during operation. Mix equal parts of kerosene and SAE 20w engine oil for lubrication.

Apply lubrication to cylinder wall. Operate cylinder hone from top to bottom of cylinder using even strokes to produce 45 degree cross-hatch pattern on the cylinder wall. DO NOT allow cylinder hone to extend below cylinder during operation.

Recheck bore dimension after final honing. Wash cylinder wall with hot soapy water to remove abrasive particles. Blow dry with compressed air. Coat cleaned cylinder walls with lubricating oil.

### DECK WARPAGE

Check deck for damage or warped head sealing surface. Place a straightedge across gasket surface of the deck. Using feeler gauge, measure clearance at center of straightedge. Measure across width and length of cylinder block at several points.

If warpage exceeds specifications, deck must be resurfaced. If warpage exceeds manufacturer's maximum tolerance for material removal, replace block.

### DECK HEIGHT

Distance from the crankshaft centerline to the block deck is termed the deck height. Measure and record front and rear main journals of crankshaft. To compute this distance, install crankshaft and retain with center main bearing and cap only. Measure distance from the crankshaft journal to the block deck, parallel to the cylinder centerline.

Add one half of the main bearing journal diameter to distance from crankshaft journal to block deck. This dimension should be checked at front and rear of cylinder block. Both readings should be the same.

If difference exceeds specifications, cylinder block must be repaired or replaced. Deck height and warpage should be corrected at

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the same time.

### MAIN BEARING BORE & ALIGNMENT

For checking main bearing bore, remove all bearings from cylinder block and main bearing caps. Install main bearing caps in original location. Tighten bolts to specification. Using inside micrometer, measure main bearing bore in 2 areas 90 degrees apart. Determine bore size and out-of-round. If diameter is not within specification, block must be align-bored.

For checking alignment, place a straightedge along centerline of main bearing saddles. Check for clearance between straightedge and main bearing saddles. Block must be align-bored if clearance is present.

### EXPANSION PLUG REMOVAL & INSTALLATION

#### Removal

Drill a hole in the center of expansion plug. Remove with screwdriver or punch. Use care not to damage sealing surface.

#### Installation

Ensure sealing surface is free of burrs. Coat expansion plug with sealer. Use a wooden dowel or pipe of slightly smaller diameter, install expansion plug. Ensure expansion plug is evenly located.

### OIL GALLERY PLUG REMOVAL & INSTALLATION

#### Removal

Remove threaded oil gallery plugs using the appropriate wrench. Soft, press-in plugs are removed by drilling into plug and installing a sheet metal screw. Remove plug with slide hammer or pliers.

#### Installation

Ensure threads or sealing surface is clean. Coat threaded oil gallery plugs with sealer and install. Replacement soft press-in plugs are driven in place with a hammer and drift.

### CAMSHAFT

\* PLEASE READ THIS FIRST \*

NOTE: Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

### CLEANING & INSPECTION

Clean camshaft with solvent. Ensure all oil passages are clear. Inspect cam lobes and bearing journals for pitting, flaking or scoring. Using micrometer, measure bearing journal O.D.

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Support camshaft at each end with "V" blocks. Position dial indicator with tip resting on center bearing journal. Rotate camshaft and note reading. If reading exceeds specification, replace camshaft.

Check cam lobe lift by measuring base circle of camshaft using micrometer. Measure again at 90 degrees to tip of cam lobe. Cam lift can be determined by subtracting base circle diameter from tip of cam lobe measurement.

Different lift dimensions are given for intake and exhaust cam lobes. Reading must be within specifications. Replace camshaft if cam lobes or bearing journals are not within specifications.

Inspect camshaft gear for chipped, eroded or damaged teeth. Replace gear if damaged. On camshafts using thrust plate, measure distance between thrust plate and camshaft shoulder. Replace thrust plate if not within specification.

### CAMSHAFT BEARINGS

#### Removal & Installation

Remove the camshaft rear plug. The camshaft bearing remover is assembled with its shoulder resting on the bearing to be removed according to manufacturer's instructions. Tighten puller nut until bearing is removed. Remove remaining bearings, leaving front and rear bearings until last. These bearings act as guide for camshaft bearing remover.

To install new bearings, puller is rearranged to pull bearings toward the center of block. Ensure all lubrication passages of bearing are aligned with cylinder block. Coat new camshaft rear plug with sealant. Install camshaft rear plug. Ensure plug is even in cylinder block.

### CAMSHAFT INSTALLATION

Lubricate bearing surfaces and cam lobes with ample amount of Molykote or camshaft lubricant. Carefully install camshaft. Use care not to damage bearing journals during installation. Install thrust plate retaining bolts (if equipped). Tighten bolts to specification. On overhead camshafts, install bearing caps in original location. Tighten bolts to specification. Check end play.

### CAMSHAFT END PLAY

Using dial indicator, check end play. Position dial indicator on front of engine block. Position indicator tip against camshaft. Push camshaft toward rear of engine and adjust indicator to zero.

Move camshaft forward and note reading. Camshaft end play must be within specification. End play may be adjusted by relocating gear, shimming thrust plate or replacing thrust plate depending on manufacturer.

### TIMING CHAINS & BELTS

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**NOTE:** Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

### TIMING CHAINS

Timing chains will stretch during operation. Limits are placed upon amount of stretch before replacement is required. Timing chain stretch will alter ignition timing and valve timing.

To check timing chain stretch, rotate crankshaft to eliminate slack from one side of timing chain. Mark reference point on cylinder block. Rotate crankshaft in opposite direction to eliminate slack from remaining side of timing chain. Force other side of chain outward and measure distance between reference point and timing chain. See Fig. 23. Replace timing chain and gears if not within specification.

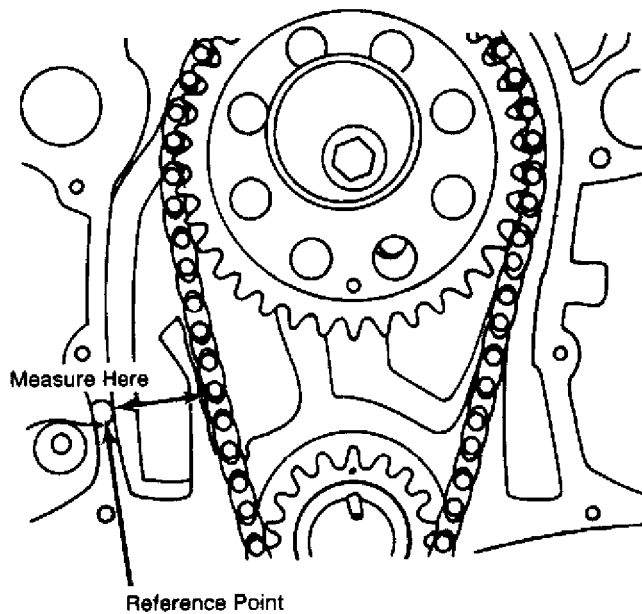


Fig. 23: Measuring Timing Chain Stretch - Typical  
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Timing chains must be installed so that timing marks on camshaft gear and crankshaft gear are aligned according to manufacturer. See Fig. 24.



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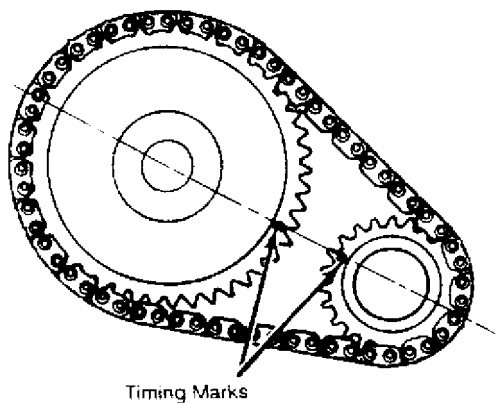


Fig. 24: Timing Gear Mark Alignment - Typical  
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### TIMING BELTS

Cogged tooth belts are commonly used on overhead cam engines. Inspect belt teeth for rounded corners or cracking. Replace belt if cracked, damaged, missing teeth or oil soaked.

Used timing belt must be installed in original direction of rotation. Inspect all sprocket teeth for wear. Replace all worn sprockets. Sprockets are marked for timing purposes. Engine is positioned so that crankshaft sprocket mark will be upward. Camshaft sprocket is aligned with reference mark on cylinder head and timing belt is installed. See Fig. 25.

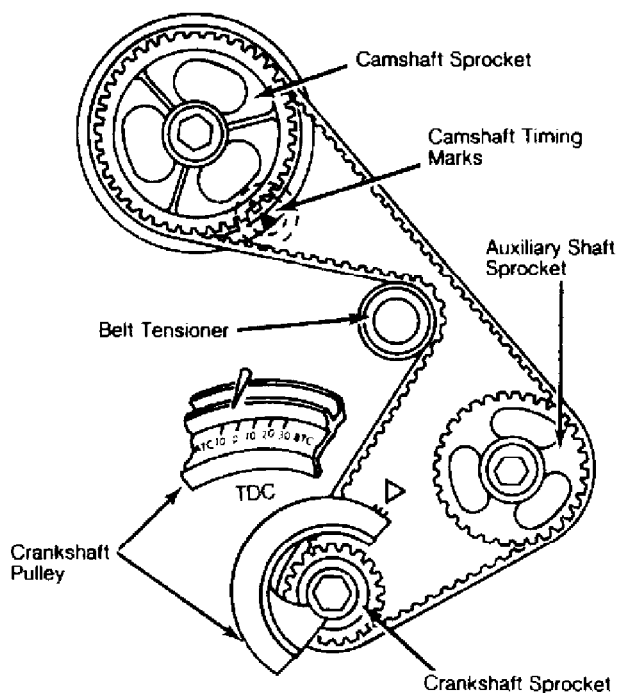


Fig. 25: Timing Belt Sprocket Alignment - Typical  
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#### TENSION ADJUSTMENTS

If guide rails are used with spring loaded tensioners, ensure at least half of original rail thickness remains. Spring loaded tensioner should be inspected for damage.

Ensure all timing marks are aligned. Adjust belt tension using manufacturer's recommendations. Belt tension may require checking using tension gauge. See Fig. 26.

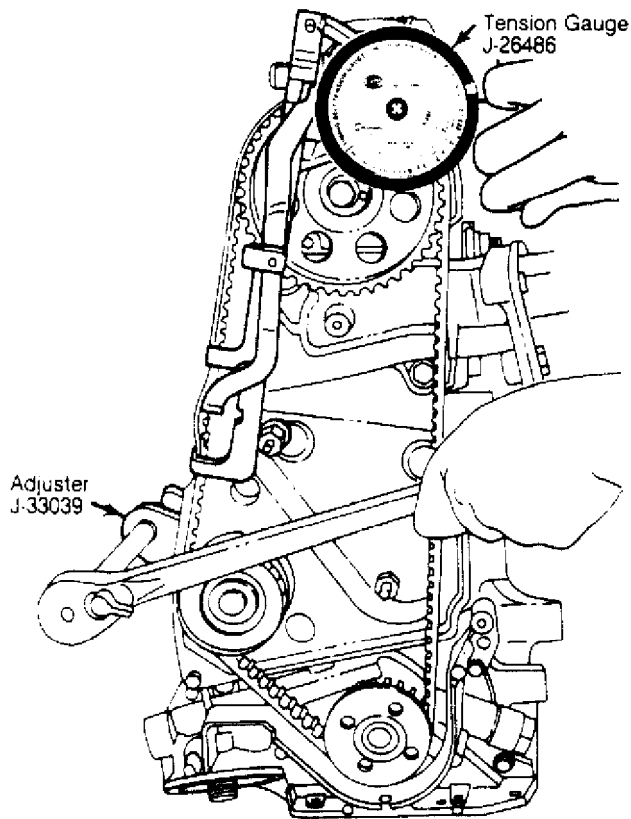


Fig. 26: Timing Belt Tension Adjustment - Typical  
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#### TIMING GEARS

\* PLEASE READ THIS FIRST \*

**NOTE:** Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

#### TIMING GEAR BACKLASH & RUNOUT

On engines where camshaft gear operates directly on crankshaft gear, gear backlash and runout must be checked. To check backlash, install dial indicator with tip resting on tooth of camshaft gear. Rotate camshaft gear as far as possible. Adjust indicator to

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zero. Rotate camshaft gear in opposite direction as far as possible and note reading.

To determine timing gear runout, mount dial indicator with tip resting on face edge of camshaft gear. Adjust indicator to zero. Rotate camshaft gear 360 degrees and note reading. If backlash or runout exceed specifications, replace camshaft and/or crankshaft gear.

### REAR MAIN OIL SEAL

\* PLEASE READ THIS FIRST \*

**NOTE:** Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

### INSTALLATION

#### One-Piece Type Seal

For one-piece type oil seal installation, coat block contact surface of seal with sealer if seal is not factory coated. Ensure seal surface is free of burrs. Lubricate seal lip with engine oil and press seal into place using proper oil seal installer. See Fig. 27.

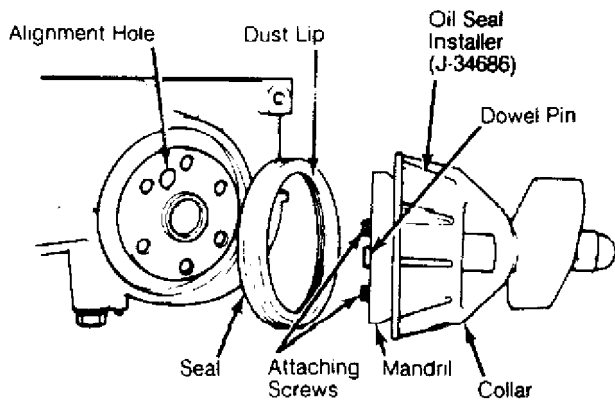


Fig. 27: Installing Typical One-Piece Oil Seal  
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#### Rope Type Seal

For rope type rear main oil seal installation, press seal lightly into its seat. Using seal installer, fully seat seal in bearing cap or cylinder block.

Trim seal ends even with block parting surface. Some applications require sealer to be applied on main bearing cap prior to installation. See Fig. 28.

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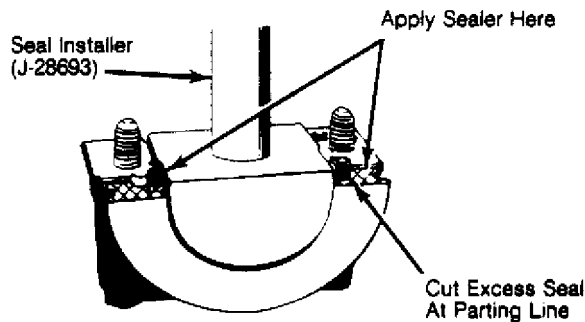


Fig. 28: Typical Rope Seal Installation  
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#### Split-Rubber Type Seal

Follow manufacturers procedures when installing split-rubber type rear main oil seals. Installation procedures vary with engine type. See appropriate ENGINE article in this section. See Fig. 29.

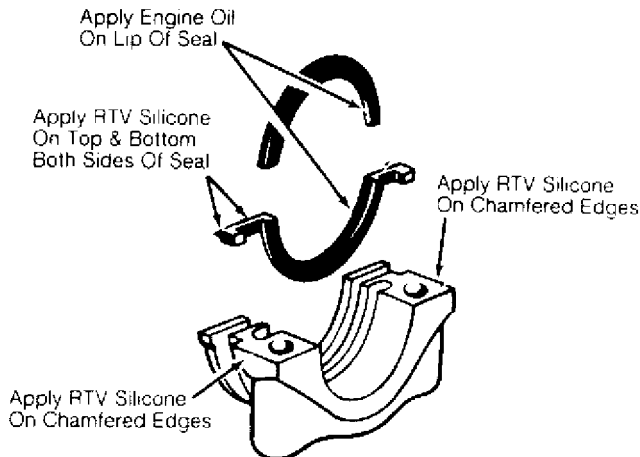


Fig. 29: Typical Split-Rubber Seal Installation  
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## OIL PUMP

\* PLEASE READ THIS FIRST \*

NOTE: Always refer to appropriate engine overhaul article in the ENGINES section for complete overhaul procedures and specifications for the vehicle being repaired.

### ROTOR-TYPE

Oil pump rotors must be marked for location prior to removal. See Fig. 30. Remove outer rotor and measure thickness and diameter. Measure inner rotor thickness. Inspect shaft for scoring or wear. Inspect rotors for pitting or damage. Inspect cover for grooving or wear. Replace components if worn or damaged.

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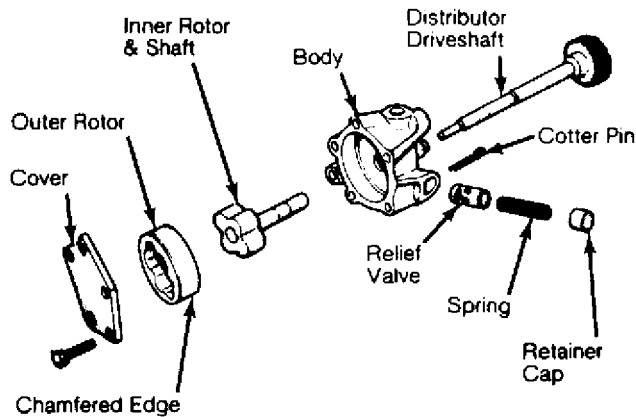


Fig. 30: Typical Rotor Type Oil Pump

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Measure outer rotor-to-body clearance. Replace pump assembly if clearance exceeds specification. Measure clearance between rotors. See Fig. 31. Replace shaft and both rotors if clearance exceeds specifications.

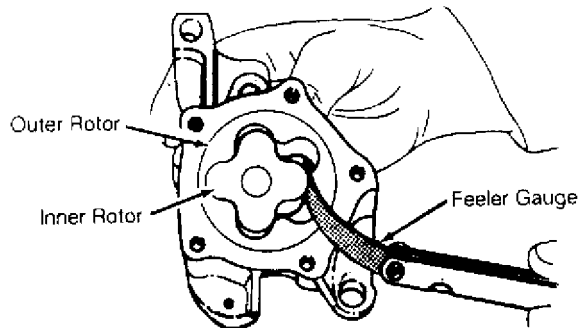


Fig. 31: Measuring Rotor Clearance - Typical

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Install rotors in pump body. Position straightedge across pump body. Using feeler gauge, measure clearance between rotors and straightedge. Pump cover wear is measured using a straightedge and feeler gauge. Replace pump if clearance exceeds specification.

### GEAR TYPE

Oil pump gears must be marked for location prior to removal. See Fig. 32. Remove gears from pump body. Inspect gears for pitting or damage. Inspect cover for grooving or wear.

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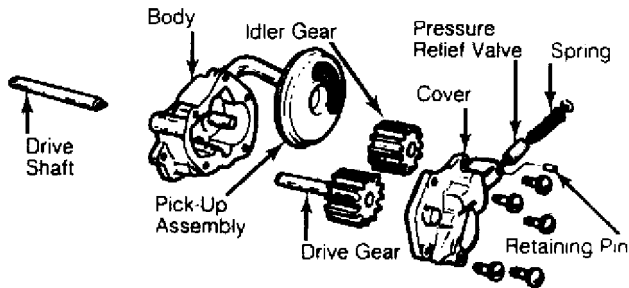


Fig. 32: Typical Gear Type Oil Pump

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Measure gear diameter and length. Measure gear housing cavity depth and diameter. See Fig. 33. Replace components if worn or damaged.

Pump cover wear is measured using a straightedge and feeler gauge. Pump is to be replaced if warpage or wear exceeds specifications or mating surface of pump cover is scratched or grooved.

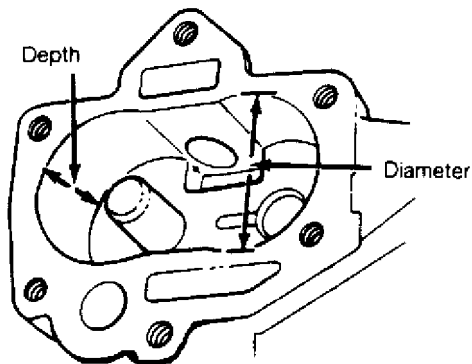


Fig. 33: Measuring Oil Pump Gear Cavity - Typical

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### BREAK-IN-PROCEDURE

\* PLEASE READ THIS FIRST \*

**NOTE:** Always refer to appropriate engine overhaul article in the **ENGINES** section for complete overhaul procedures and specifications for the vehicle being repaired.

### ENGINE PRE-OILING

Engine pre-oiling should be done prior to operation to prevent engine damage. A lightly oiled pump will cavitate unless oil pump cavities are filled with engine oil or petroleum jelly.

Engine pre-oiling can be done using pressure oiler (if available). Connect pressure oiler to cylinder block oil passage

# ENGINE OVERHAUL PROCEDURES - GENERAL INFORMATION

## Article Text (p. 36)

1996 Volkswagen Golf

For Volkswagen Technical Site

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such as oil pressure sending unit. Operate pressure oiler long enough to ensure correct amount of oil has filled crankcase. Check oil level while pre-oiling.

If pressure oiler is not available, disconnect ignition system. Remove oil pressure sending unit and replace with oil pressure test gauge. Using starter motor, rotate engine starter until gauge shows normal oil pressure for several seconds. DO NOT crank engine for more than 30 seconds to avoid starter motor damage.

Ensure oil pressure has reached the most distant point from the oil pump. Reinstall oil pressure sending unit. Reconnect ignition system.

### INITIAL START-UP

Start the engine and operate engine at low speed while checking for coolant, fuel and oil leaks. Stop engine. Recheck coolant and oil level. Adjust if necessary.

### CAMSHAFT

Break-in procedure is required when a new or reground camshaft has been installed. Operate and maintain engine speed between 1500-2500 RPM for approximately 30 minutes. Procedure may vary due to manufacturers recommendations.

### PISTON RINGS

Piston rings require a break-in procedure to ensure seating of rings to cylinder walls. Serious damage may occur to rings if correct procedures are not followed.

Extremely high piston ring temperatures are produced obtained during break-in process. If rings are exposed to excessively high RPM or high cylinder pressures, ring damage can occur. Follow piston ring manufacturer's recommended break-in procedure.

### FINAL ADJUSTMENTS

Check or adjust ignition timing and dwell (if applicable). Adjust valves (if necessary). Adjust carburetion or injection idle speed and mixture. Retighten cylinder heads (if required). If cylinder head or block is aluminum, retighten bolts when engine is cold. Follow the engine manufacturer's recommended break-in procedure and maintenance schedule for new engines.

NOTE: Some manufacturer's require that head bolts be retightened after specified amount of operation. This must be done to prevent head gasket failure.

**END OF ARTICLE**

# ELECTROSTATIC DISCHARGE WARNING - BASIC INFORMATION

## Article Text

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### ARTICLE BEGINNING

#### GENERAL INFORMATION

Electrostatic Discharge (ESD) Warning - Basic Information

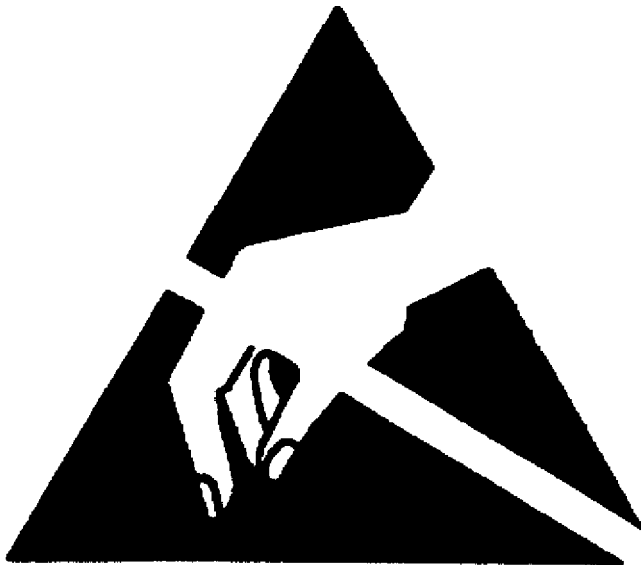
All Makes and Models

#### \* PLEASE READ THIS FIRST \*

NOTE: This article is intended for general information purposes only.

### INTRODUCTION

All Electrostatic Discharge (ESD) sensitive components contain solid state circuits (transistors, diodes, semiconductors) that may become damaged when contacted with an electrostatic charge. The following information applies to all ESD sensitive devices. The ESD symbol shown in Fig. 1 may be used on schematics to indicate which components are ESD sensitive. See Fig. 1. Although different manufactures may display different symbols to represent ESD sensitive devices, the handling and measuring precautions and procedures are the same.



**5012680**

Fig. 1: Sample ESD Symbol

### HANDLING STATIC-SENSITIVE CIRCUITS/DEVICES

When handling an electronic part that is ESD sensitive, the technician should follow these guidelines to reduce any possible electrostatic charge build-up on the technician's body and the electronic part.



# ELECTROSTATIC DISCHARGE WARNING - BASIC INFORMATION

## Article Text (p. 2)

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1) Always touch a known good ground source before handling the part. This should be repeated while handling the part and more frequently after sitting down from a standing position, sliding across the seat or walking a distance.

2) Avoid touching electrical terminals of the part, unless instructed by a diagnostic procedure.

3) DO NOT open the package of a new part until it is time to install the part.

4) Before removing the part from its package, ground the package to a known good ground source.

### CHECKING STATIC-SENSITIVE CIRCUITS/DEVICES

1) Solid State circuits in electronic devices are shown greatly simplified in schematics. See Fig. 2. Due to the simplification of the electronic devices on the schematic, resistance measurements could be misleading or could lead to an electrostatic discharge. Always follow the recommended diagnostic procedure.

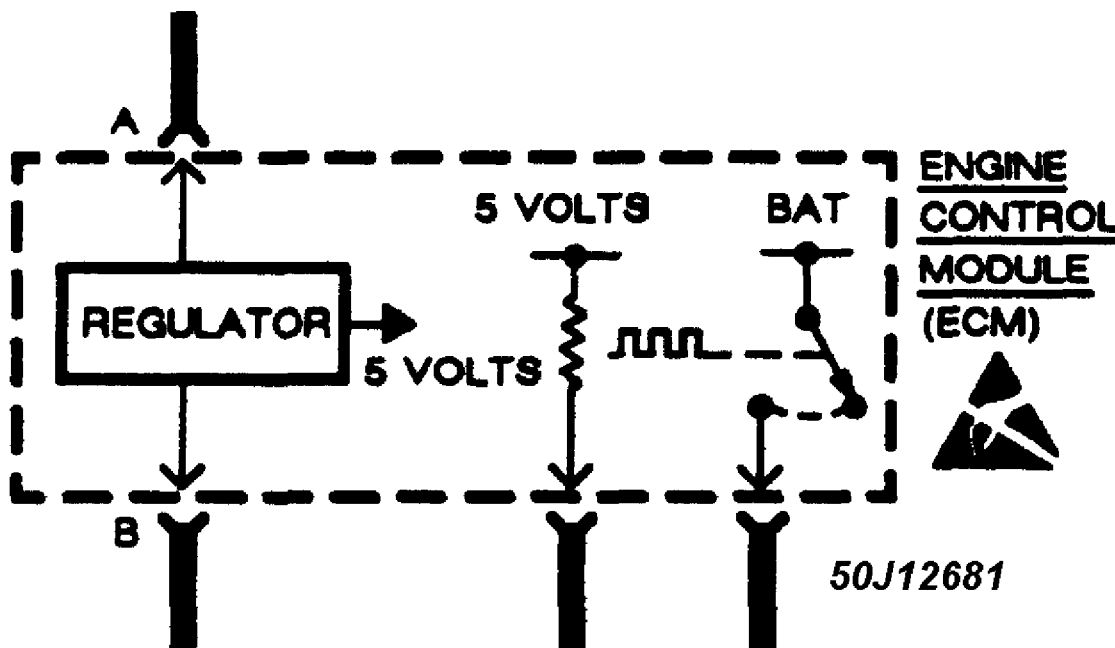


Fig. 2: Sample Schematic Showing Typical ESD Sensitive Device

2) Only measure resistance at the terminals of the devices when instructed by the recommended diagnostic procedure.

3) When using a voltmeter, be sure to connect the ground lead first.

END OF ARTICLE

# COMPUTER RELEARN PROCEDURES

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### ARTICLE BEGINNING

#### GENERAL INFORMATION

#### Computer Relearn Procedures

All Models

#### \* PLEASE READ THIS FIRST \*

The following general procedures are to be used if driveability problems are encountered after power loss or battery has been disconnected. These procedures may provide an aid in eliminating these problems.

To reduce the possibility of complaints, after any service which requires battery power to be disconnected, vehicle should be road tested.

### COMPUTER RELEARN PROCEDURES

Vehicles equipped with engine or transmission computers may require a relearn procedure after vehicle battery is disconnected. Many vehicle computers memorize and store vehicle operation patterns for optimum driveability and performance. When vehicle battery is disconnected, this memory is lost. The computer will use default data until new data from each key start is stored. As computer memorizes vehicle operation for each new key start, driveability is restored. Vehicle computers may memorize vehicles operation patterns for 40 of more key starts.

Customers often complain of driveability problems during relearn stage because vehicle acts differently then before being serviced. Depending on type and make of vehicle and how it is equipped, the following complaints (driveability problems) may exist:

- \* Harsh Or Poor Shift Quality
- \* Rough Or Unstable Idle
- \* Hesitation Or Stumble
- \* Rich Or Lean Running
- \* Poor Fuel Mileage

These symptoms and complaints should disappear after a number of drive cycles have been memorized. To reduce the possibility of complaints, after any service which requires battery power to be disconnected, vehicle should be road tested. If a specific relearn procedure is not available, the following procedure may be used:

#### Automatic Transmission

- \* Set parking brake, start engine in "P" or "N" position. Warm-up vehicle to normal operating temperature or until cooling fan cycles.
- \* Allow vehicle to idle for one minute in "N" position. Select

# COMPUTER RELEARN PROCEDURES

## Article Text (p. 2)

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"D" and allow engine to idle for one minute.

- \* Accelerate at normal throttle position (20-50%) until vehicle shifts into top gear.
- \* Cruise at light to medium throttle.
- \* Decelerate to a stop, allowing vehicle to downshift, and use brakes normally.
- \* Process may be repeated as necessary.

### Manual Transmission

- \* Place transmission in Neutral position.
- \* Ensure emergency brake has been set and all accessories are turned off.
- \* Start engine and bring to normal operating temperature.
- \* Allow vehicle to idle in Neutral for one minute.
- \* Initial relearn is complete: process will be completed during normal driving.

Some manufacturers identify a specific relearn procedure which will help establish suitable driveability during relearn stage. These procedures are especially important if vehicle is equipped with and electronically controlled automatic transmission or transaxle. Always complete procedure before returning vehicle to customer.

**END OF ARTICLE**

# ANTI-LOCK BRAKE SAFETY PRECAUTIONS

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### ARTICLE BEGINNING

#### GENERAL INFORMATION

#### Anti-Lock Brake Safety Precautions

#### \* PLEASE READ THIS FIRST \*

This article is intended for general information purposes only. This information may not apply to all makes and models. If vehicle is equipped with Anti-Lock Brake System (ABS), refer to appropriate ANTI-LOCK BRAKE SYSTEM article in the BRAKES section for description, operation, depressurizing, testing, system bleeding, trouble shooting and servicing of specific system.

WARNING: Failure to depressurize ABS could lead to physical injury.

### ANTI-LOCK BRAKE SAFETY PRECAUTIONS

WARNING: Failure to depressurize ABS could lead to physical injury.

- \* NEVER open a bleeder valve or loosen a hydraulic line while ABS is pressurized.
- \* NEVER disconnect or reconnect any electrical connectors while ignition is on. Damage to ABS control unit may result.
- \* DO NOT attempt to bleed hydraulic system without first referring to the appropriate ANTI-LOCK BRAKE SYSTEM article in the BRAKES section.
- \* Only use specially designed brake hoses/lines on ABS equipped vehicles.
- \* DO NOT tap on speed sensor components (sensor, sensor rings). Sensor rings must be pressed into hubs, NOT hammered into hubs. Striking these components can cause demagnetization or a loss of polarization, affecting the accuracy of the speed signal returning to the ABS control unit.
- \* DO NOT mix tire sizes. Increasing the width, as long as tires remain close to the original diameter, is acceptable. Rolling diameter must be identical for all 4 tires. Some manufacturers recommend tires of the same brand, style and type. Failure to follow this precaution may cause inaccurate wheel speed readings.
- \* DO NOT contaminate speed sensor components with grease. Only use recommended coating, when system calls for an anti-corrosion coating.
- \* When speed sensor components have been removed, ALWAYS check sensor-to-ring air gaps when applicable. These specifications can be found in each appropriate article.
- \* ONLY use recommended brake fluids. DO NOT use silicone brake fluids in an ABS equipped vehicle.
- \* When installing transmission devices (CB's, telephones, etc.) on ABS equipped vehicles, DO NOT locate the antenna near the ABS control unit (or any control unit).

## **ANTI-LOCK BRAKE SAFETY PRECAUTIONS**

### **Article Text (p. 2)**

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- \* Disconnect all on-board computers, when using electric welding equipment.
- \* DO NOT expose the ABS control unit to prolonged periods of high heat (185 °F/85°C for 2 hours is generally considered a maximum limit).

**END OF ARTICLE**

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| ABBREVIATION  | DEFINITION                        |
|---------------|-----------------------------------|
| A             | Amperes                           |
| A/C           | Air Conditioning                  |
| A/T           | Automatic Transmission/Transaxle  |
| AAP           | Auxiliary Accelerator Pump        |
| AB            | Air Bleed                         |
| ABCV          | Air Bleed Control Valve           |
| ABDC          | After Bottom Dead Center          |
| ABRS          | Air Bag Restraint System          |
| ABS           | Anti-Lock Brake System            |
| AC            | Alternating Current               |
| ACC           | A/C Clutch Compressor             |
| ACCS          | A/C Cycling Switch                |
| ACCUM         | Accumulator                       |
| ACCY          | Accessory                         |
| ACT           | Air Charge Temperature Sensor     |
| ACV           | Thermactor Air Control Valve      |
| ADJ           | Adjust or Adjustable              |
| ADV           | Advance                           |
| AFS           | Airflow Sensor                    |
| AI            | Air Injection                     |
| AIR or A.I.R. | Air Injection Reactor             |
| AIS           | Air Injection System              |
| ALCL          | Assembly Line Communications Link |
| ALDL          | Assembly Line Diagnostic Link     |
| ARC           | Automatic Ride Control            |
| ASCD          | Automatic Speed Control Device    |
| ASCS          | Air Suction Control Solenoid      |
| ASD           | Auto Shutdown                     |
| ASDM          | Air Bag System Diagnostic Module  |
| ASV           | Air Suction Valve                 |
| ATC           | Automatic Temperature Control     |
| ATDC          | After Top Dead Center             |
| ATF           | Automatic Transmission Fluid      |
| ATS           | Air Temperature Sensor            |
| AXOD          | Automatic Transaxle Overdrive     |
| Abs.          | Absolute                          |
| Accy.         | Accessory                         |
| Alt.          | Alternator or Altitude            |
| Amp.          | Ampere                            |

| ABBREVIATION | DEFINITION                              |
|--------------|-----------------------------------------|
| ° C          | Celsius (Degrees)                       |
| C(3) I       | Computer Controlled Coil Ignition       |
| C(4)         | Computer Controlled Catalytic Converter |
| CANP         | Canister Purge solenoid                 |
| CARB         | California Air Resources Board          |
| CAT          | Catalytic Converter                     |

|                  |                                |   |
|------------------|--------------------------------|---|
| <sup>3</sup> DBC | <sup>3</sup> Dual Bed Catalyst | 3 |
|------------------|--------------------------------|---|



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## "E" ABBREVIATION TABLE

## "E" ABBREVIATION TABLE

|                                                                                                                |                                                             |              |
|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|--------------|
| UAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                             |              |
| <sup>3</sup> ABBREVIATION                                                                                      | <sup>3</sup> DEFINITION                                     | <sup>3</sup> |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  |                                                             |              |
| <sup>3</sup> EAC                                                                                               | <sup>3</sup> Electric Assist Choke                          | <sup>3</sup> |
| <sup>3</sup> EACV                                                                                              | <sup>3</sup> Electric Air Control Valve                     | <sup>3</sup> |
| <sup>3</sup> EBCM                                                                                              | <sup>3</sup> Electronic Brake Control Module                | <sup>3</sup> |
| <sup>3</sup> ECA                                                                                               | <sup>3</sup> Electronic Control Assembly                    | <sup>3</sup> |
| <sup>3</sup> ECAT                                                                                              | <sup>3</sup> Electronically Controlled Automatic Transaxle  | <sup>3</sup> |
| <sup>3</sup> ECM                                                                                               | <sup>3</sup> Electronic Control Module                      | <sup>3</sup> |
| <sup>3</sup> ECT                                                                                               | <sup>3</sup> Engine Coolant Temperature Sensor              | <sup>3</sup> |
| <sup>3</sup> ECU                                                                                               | <sup>3</sup> Electronic Control Unit or Engine Control Unit | <sup>3</sup> |
| <sup>3</sup> EDF                                                                                               | <sup>3</sup> Electric Drive Fan relay assembly              | <sup>3</sup> |
| <sup>3</sup> EDIS                                                                                              | <sup>3</sup> Electronic Distributorless Ignition System     | <sup>3</sup> |
| <sup>3</sup> EEC                                                                                               | <sup>3</sup> Electronic Engine Control                      | <sup>3</sup> |
| <sup>3</sup> EECS                                                                                              | <sup>3</sup> Evaporative Emission Control System            | <sup>3</sup> |
| <sup>3</sup> EEPROM                                                                                            | <sup>3</sup> Electronically Erasable PROM                   | <sup>3</sup> |
| <sup>3</sup> EFE                                                                                               | <sup>3</sup> Early Fuel Evaporation                         | <sup>3</sup> |
| <sup>3</sup> EFI                                                                                               | <sup>3</sup> Electronic Fuel Injection                      | <sup>3</sup> |
| <sup>3</sup> EGO                                                                                               | <sup>3</sup> Exhaust Gas Oxygen sensor (see HEGO)           | <sup>3</sup> |
| <sup>3</sup> EGR                                                                                               | <sup>3</sup> Exhaust Gas Recirculation system               | <sup>3</sup> |
| <sup>3</sup> EGRC                                                                                              | <sup>3</sup> EGR Control solenoid or system                 | <sup>3</sup> |
| <sup>3</sup> EGRV                                                                                              | <sup>3</sup> EGR Vent solenoid or system                    | <sup>3</sup> |
| <sup>3</sup> EMR                                                                                               | <sup>3</sup> Emission Maintenance Reminder Module           | <sup>3</sup> |
| <sup>3</sup> ESA                                                                                               | <sup>3</sup> Electronic Spark Advance                       | <sup>3</sup> |



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| ABBREVIATION | DEFINITION                                    |
|--------------|-----------------------------------------------|
| H/D          | Heavy Duty                                    |
| HAC          | High Altitude Compensation                    |
| HC           | Hydrocarbons                                  |
| HEDF         | High Speed Electro Drive Fan relay or circuit |
| HEGO         | Heated Exhaust Gas Oxygen Sensor              |
| HEGOG        | HEGO Ground circuit                           |
| HEI          | High Energy Ignition                          |
| HLDT         | Headlight                                     |
| HO           | High Output                                   |
| HP           | High Performance                              |
| HSC          | High Swirl Combustion                         |
| HSO          | High Specific Output                          |
| HTR          | Heater                                        |
| HVAC         | Heating                                       |
| Headlt.      | Headlight                                     |
| Hg           | Mercury                                       |
| Hgt.         | Height                                        |
| Htr.         | Heater                                        |
| Hz           | Hertz (Cycles Per Second)                     |

| <sup>3</sup> ABBREVIATION | <sup>3</sup> DEFINITION                  | <sup>3</sup> |
|---------------------------|------------------------------------------|--------------|
| <sup>3</sup> I.D.         | <sup>3</sup> Inside Diameter             | <sup>3</sup> |
| <sup>3</sup> IAC          | <sup>3</sup> Idle Air Control            | <sup>3</sup> |
| <sup>3</sup> IACV         | <sup>3</sup> Idle Air Control Valve      | <sup>3</sup> |
| <sup>3</sup> IC           | <sup>3</sup> Integrated Circuit          | <sup>3</sup> |
| <sup>3</sup> ID           | <sup>3</sup> Identification              | <sup>3</sup> |
| <sup>3</sup> IDM          | <sup>3</sup> Ignition Diagnostic Monitor | <sup>3</sup> |
| <sup>3</sup> IGN          | <sup>3</sup> Ignition system or circuit  | <sup>3</sup> |
| <sup>3</sup> ILC          | <sup>3</sup> Idle Load Compensator       | <sup>3</sup> |
| <sup>3</sup> In. Hg       | <sup>3</sup> Inches of Mercury           | <sup>3</sup> |
| <sup>3</sup> INCH Lbs.    | <sup>3</sup> Inch Pounds                 | <sup>3</sup> |
| <sup>3</sup> INFL REST    | <sup>3</sup> Inflatable Restraint        | <sup>3</sup> |
| <sup>3</sup> INJ          | <sup>3</sup> Injector or Injection       | <sup>3</sup> |
| <sup>3</sup> IP           | <sup>3</sup> Instrument Panel            | <sup>3</sup> |
| <sup>3</sup> IPC          | <sup>3</sup> Instrument Panel Cluster    | <sup>3</sup> |
| <sup>3</sup> ISA          | <sup>3</sup> Idle Speed Actuator         | <sup>3</sup> |
| <sup>3</sup> ISC          | <sup>3</sup> Idle Speed Control          | <sup>3</sup> |
| <sup>3</sup> ISS          | <sup>3</sup> Idle Stop Solenoid          | <sup>3</sup> |
| <sup>3</sup> ITS          | <sup>3</sup> Idle Tracking Switch        | <sup>3</sup> |
| <sup>3</sup> IVSV         | <sup>3</sup> Idle Vacuum Switching Valve | <sup>3</sup> |
| <sup>3</sup> Ign.         | <sup>3</sup> Ignition                    | <sup>3</sup> |



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| 3ABBREVIATION | 3DEFINITION                                     | 3 |
|---------------|-------------------------------------------------|---|
| 3mA           | 3Milliamps                                      | 3 |
| 3mV           | 3Millivolts                                     | 3 |
| 3mfd.         | 3Microfarads                                    | 3 |
| 3mm           | 3Millimeters                                    | 3 |
| 3M/T          | 3Manual Transaxle or Transmission               | 3 |
| 3MA PFI       | 3Mass Air Sequential Port Fuel Injection system | 3 |
| 3MA or MAF    | 3Mass Airflow                                   | 3 |
| 3MAF          | 3Mass Air Flow sensor                           | 3 |
| 3MAFS         | 3Mass Airflow Sensor                            | 3 |
| 3MAP          | 3Manifold Absolute Pressure sensor              | 3 |
| 3MAT          | 3Manifold Air Temperature                       | 3 |
| 3MCU          | 3Microprocessor Control Unit                    | 3 |
| 3MCV          | 3Mixture Control Valve                          | 3 |
| 3MEM-CAL      | 3Memory Calibration Chip                        | 3 |
| 3MFI          | 3Multiport Fuel Injection                       | 3 |
| 3MIL          | 3Malfunction Indicator Light                    | 3 |
| 3MLP          | 3Manual Lever Position                          | 3 |
| 3MPFI         | 3Multi Point Fuel Injection                     | 3 |
| 3MPH          | 3Miles Per Hour                                 | 3 |
| 3MPI          | 3Multi-Point (Fuel) Injection                   | 3 |
| 3Man.         | 3Manual                                         | 3 |
| 3Mech.        | 3Mechanical                                     | 3 |
| 3Mem.         | 3Memory                                         | 3 |
| 3Mtr.         | 3Motor                                          | 3 |

| ABBREVIATION | DEFINITION              |
|--------------|-------------------------|
| N.m          | Newton-Meter            |
| NA           | Not Available           |
| NDS          | Neutral Drive Switch    |
| NGS          | Neutral Gear Switch     |
| NOx          | Oxides of Nitrogen      |
| NPS          | Neutral Pressure Switch |
| No.          | Number                  |
| Nos.         | Numbers                 |

[illegible]

| ABBREVIATION | DEFINITION                                     |
|--------------|------------------------------------------------|
| "p"          | Park                                           |
| P/C          | Printed Circuit                                |
| P/N          | Park/Neutral                                   |
| P/S          | Power Steering                                 |
| PAV          | Pulse Air Valve                                |
| PC-SOL       | Purge Control Solenoid                         |
| PCM          | Powertrain Control Module                      |
| PCS          | Purge Control Solenoid                         |
| PCSDM        | Passenger Compartment Sensor/Diagnostic Module |
| PCV          | Positive Crankcase Ventilation                 |
| PFE          | Pressure Feedback EGR sensor or circuit        |
| PFI          | Port Fuel Injection (see MA SEFI)              |
| PGM-CARB     | Programmed Carburetor                          |
| PGM-FI       | Programmed Fuel Injection                      |
| PIP          | Profile Ignition Pickup                        |
| PNK          | Pink                                           |
| PPL          | Purple                                         |
| PRNDL        | Park Reverse Neutral Drive Low                 |
| PROM         | Programmable Read-Only Memory                  |
| psi          | Pounds Per Square Inch                         |
| PSPS         | Power Steering Pressure Switch                 |
| PTC          | Positive Temperature Coefficient               |
| PTO          | Power Take-Off                                 |
| PWR GND      | Power Ground circuit                           |
| Pkg.         | Package                                        |
| Press.       | Pressure                                       |
| Prog.        | Programmed or Programmable                     |
| Pts.         | Pints                                          |

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## "Q" ABBREVIATION TABLE

## "Q" ABBREVIATION TABLE

[illegible]

## "R" ABBREVIATION TABLE

## "R" ABBREVIATION TABLE

| <sup>3</sup> ABBREVIATION | <sup>3</sup> DEFINITION                   | <sup>3</sup> |
|---------------------------|-------------------------------------------|--------------|
| <sup>3</sup> RABS         | <sup>3</sup> Rear Anti-Lock Brake System  | <sup>3</sup> |
| <sup>3</sup> RAC          | <sup>3</sup> Remote Accessory Control     | <sup>3</sup> |
| <sup>3</sup> RAM          | <sup>3</sup> Random Access Memory         | <sup>3</sup> |
| <sup>3</sup> RAP          | <sup>3</sup> Retained Accessory Power     | <sup>3</sup> |
| <sup>3</sup> RECIRC       | <sup>3</sup> Recirculation                | <sup>3</sup> |
| <sup>3</sup> RED          | <sup>3</sup> Red                          | <sup>3</sup> |
| <sup>3</sup> RH           | <sup>3</sup> Right Hand                   | <sup>3</sup> |
| <sup>3</sup> ROM          | <sup>3</sup> Read Only Memory             | <sup>3</sup> |
| <sup>3</sup> RPM          | <sup>3</sup> Revolutions Per Minute       | <sup>3</sup> |
| <sup>3</sup> RVB          | <sup>3</sup> Rear Vacuum Break            | <sup>3</sup> |
| <sup>3</sup> RWAL         | <sup>3</sup> Rear Wheel Anti-Lock Brake   | <sup>3</sup> |
| <sup>3</sup> RWD          | <sup>3</sup> Rear Wheel Drive             | <sup>3</sup> |
| <sup>3</sup> Recirc.      | <sup>3</sup> Recirculate or Recirculation | <sup>3</sup> |
| <sup>3</sup> Reg.         | <sup>3</sup> Regulator                    | <sup>3</sup> |
| <sup>3</sup> Rly.         | <sup>3</sup> Relay                        | <sup>3</sup> |

## "S" ABBREVIATION TABLE

## "S" ABBREVIATION TABLE

| UAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                              |              |
|---------------------------------------------------------------------------------|--------------------------------------------------------------|--------------|
| <sup>3</sup> ABBREVIATION                                                       | <sup>3</sup> DEFINITION                                      | <sup>3</sup> |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA   |                                                              |              |
| <sup>3</sup> SBC                                                                | <sup>3</sup> Single Bed Converter                            | <sup>3</sup> |
| <sup>3</sup> SBEC                                                               | <sup>3</sup> Single Board Engine Controller                  | <sup>3</sup> |
| <sup>3</sup> SC                                                                 | <sup>3</sup> Super Charged                                   | <sup>3</sup> |
| <sup>3</sup> SCC                                                                | <sup>3</sup> Spark Control Computer                          | <sup>3</sup> |
| <sup>3</sup> SCS                                                                | <sup>3</sup> Air Suction Control Solenoid                    | <sup>3</sup> |
| <sup>3</sup> SDM                                                                | <sup>3</sup> Supplemental Restraint System Diagnostic Module | <sup>3</sup> |
| <sup>3</sup> SDU                                                                | <sup>3</sup> SRS Diagnostic Unit                             | <sup>3</sup> |
| <sup>3</sup> SEN                                                                | <sup>3</sup> Sensor                                          | <sup>3</sup> |
| <sup>3</sup> SES                                                                | <sup>3</sup> Service Engine Soon                             | <sup>3</sup> |
| <sup>3</sup> SFI                                                                | <sup>3</sup> Sequential (Port) Fuel Injection                | <sup>3</sup> |

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## "T" ABBREVIATION TABLE

| "T" ABBREVIATION TABLE |                                           |  |
|------------------------|-------------------------------------------|--|
| ABBREVIATION           | DEFINITION                                |  |
| T.V.                   | Throttle Valve                            |  |
| TAB                    | Thermactor Air By-Pass                    |  |
| TAC                    | Thermostatic Air Cleaner                  |  |
| TAD                    | Thermactor Air Diverter                   |  |
| TAN                    | Tan                                       |  |
| TBI                    | Throttle Body Injection                   |  |
| TCC                    | Torque Converter Clutch                   |  |
| TCCS                   | Toyota Computer Control System            |  |
| TDC                    | Top Dead Center                           |  |
| TDCL                   | Total Diagnostic Communication Link       |  |
| TFI                    | Thick Film Ignition system                |  |
| TGS                    | Top Gear Switch (cancels SIL in top gear) |  |
| THERMAC                | Thermostatic Air Cleaner                  |  |
| THS                    | Transmission Hydraulic Switch             |  |
| TP/TPS                 | Throttle Position Sensor                  |  |
| TPI                    | Tuned Port Injection                      |  |
| TPS                    | Throttle Position Sensor/Switch           |  |
| TS                     | Temperature Sensor                        |  |
| TSB                    | Technical Service Bulletin                |  |
| TTS                    | Transmission Temperature Switch           |  |
| TV                     | Therموالve                                |  |



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## "V" ABBREVIATION TABLE

## "V" ABBREVIATION TABLE

ÀAAAAAAAAAAAAAAAAAAAAÁAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAÙ

## "W" ABBREVIATION TABLE

## "W" ABBREVIATION TABLE

ÀÁÂÃÄÅÆÇÈÉÊËÌÍÎÏÐÑÒÓÔÕÖ×ØÙÚÛÜÝÞßàáâãäåæçèéêëìíîïðñòóôõö÷øùúûüýþÿ

## **\* SYMPTOM CHECK LIST \***

### **Article Text**

1996 Volkswagen Golf  
For Volkswagen Technical Site  
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Thursday, August 19, 1999 11:43PM

## **ARTICLE BEGINNING**

### **SYMPTOM CHECK LIST WORKSHEETS**

#### **\* PLEASE READ THIS FIRST \***

NOTE: This article is intended for general information purposes only. It does not apply specifically to one make or model.

#### **PURPOSE**

Why Use the Symptom Check List Worksheets?

One of the most difficult and critical lines of communication is between the service customer and the technician. The clearer the technician understands the customer's concerns, the more likely the problem will be "fixed right the first time".

The Symptom Check List Worksheets in this article are designed to improve this communication. When used consistently, they can be helpful in reducing shop comebacks, increasing technician productivity, and producing satisfied customers. They also provide other benefits:

- \* Reduce "No Trouble Found" problems
- \* Increase customer involvement
- \* Customer perceive that "they really care and listen"
- \* Save time during peak write-up periods
- \* Reduce recontacting customers for additional information
- \* Improve night drop information
- \* Insure all the right questions are asked at write-up

Making the Worksheets a Part of Your Normal Routine

The following information contains ideas that may be helpful in forming habits that promote daily use of the Symptom Check Lists:

- \* HAVE THE SERVICE ADVISER FILL OUT THE FORM(S) WITH THE CUSTOMER WHENEVER POSSIBLE.
- \* Place them in your night drop for the customer to fill out, along with an instruction sheet to help them understand what to do.
- \* Hand out the worksheets to customers while they wait in line during the peak morning rush and ask them to fill it out. It will save time for all concerned and improve the quality of information received from the customer.
- \* Make sure it is attached to the hard copy when it goes to the technician.
- \* Place a copy with the final repair papers and review it with the customer at delivery.
- \* Put a new worksheet in the glovebox of all departing customers.
- \* Require that you personally see a copy of all worksheets filled out for shop comebacks.

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- \* Hold a shop meeting to get employee buy-in and their ideas on how to make it effective in your shop.

There are many other ways to utilize the concept, but as with every other idea, successful implementation depends on employee involvement and buy-in.

**SYMPTOM CHECK LIST WORKSHEETS**

CONDENSED VERSION - ALL ON ONE PAGE

NOTE: Have the service adviser fill out this form with the customer whenever possible.

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| <b>DRIVEABILITY WORKSHEET</b><br><small>( To Be Filled Out By Vehicle Owner )</small>                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Name:</b> _____ <b>Date:</b> _____ <b>Make:</b> _____<br><b>Model:</b> _____ <b>Year:</b> _____ <b>Engine:</b> _____ <b>Mileage:</b> _____ |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <small>FAULT CHARACTERISTICS - SYMPTOMS - DESCRIPTION OF PROBLEM ( Please Check All That Apply In All Categories )</small>                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Starting Problems</b>                                                                                                                      | <input type="checkbox"/> Will Not Crank <input type="checkbox"/> Cranks, But Won't Start <input type="checkbox"/> Starts, But Takes A Long Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Engine Quits/<br/>Running Problems</b>                                                                                                     | <b>Quits:</b> <input type="checkbox"/> Right After Starting <input type="checkbox"/> When Put Into Gear <input type="checkbox"/> Right After Vehicle Comes To A Stop<br><input type="checkbox"/> During Steady Speed Driving <input type="checkbox"/> While Idling <input type="checkbox"/> During Acceleration <input type="checkbox"/> When Parking                                                                                                                                                                                                                                                                                                                                                |
| <b>Poor Idling<br/>Conditions</b>                                                                                                             | <b>Idle Speed:</b> <input type="checkbox"/> Is Too Slow At All Times <input type="checkbox"/> Is Too Slow With A/C On <input type="checkbox"/> Is Too Fast<br><input type="checkbox"/> Is Rough Or Uneven <input type="checkbox"/> Fluctuates Up and Down                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Poor Running<br/>Conditions</b>                                                                                                            | <input type="checkbox"/> Runs Rough <input type="checkbox"/> Lacks Power <input type="checkbox"/> Hesitates Or Stumbles On Acceleration <input type="checkbox"/> Bucks and Jerks<br><input type="checkbox"/> Engine Knocks, Pings, Rattles <input type="checkbox"/> Backfires <input type="checkbox"/> Poor Fuel Economy <input type="checkbox"/> Misfires or Cuts Out<br><input type="checkbox"/> Surges and/or Chuggles <input type="checkbox"/> Dieseling or Run-On <input type="checkbox"/> Engine Light Always On<br><input type="checkbox"/> Engine Light On Sometimes <input type="checkbox"/> Fuel, Gas, or Sulfur Smell                                                                     |
| <b>Auto. Transmission<br/>Problems</b>                                                                                                        | <input type="checkbox"/> Improper Shifting ( early/late ) <input type="checkbox"/> Changes Gear Randomly On Its Own<br><input type="checkbox"/> Vehicle Does Not Move When In Gear                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Poor Handling</b>                                                                                                                          | <input type="checkbox"/> Pulls To One Side <input type="checkbox"/> Hard Steering <input type="checkbox"/> Vehicle Shakes and/or Vibrates While Moving                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Noise Problems</b>                                                                                                                         | <b>Explain:</b> _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Odor Problems</b>                                                                                                                          | <b>Explain:</b> _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Problem Frequency</b>                                                                                                                      | <input type="checkbox"/> Always <input type="checkbox"/> Often <input type="checkbox"/> Occasionally                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Usually Occurs</b>                                                                                                                         | <input type="checkbox"/> Morning <input type="checkbox"/> Afternoon <input type="checkbox"/> Anytime                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Engine Temp.</b>                                                                                                                           | <input type="checkbox"/> Cold <input type="checkbox"/> Warm <input type="checkbox"/> Hot                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Vehicle Speed</b>                                                                                                                          | <input type="checkbox"/> Low <input type="checkbox"/> Cruising <input type="checkbox"/> High                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Driving Conditions<br/>During Occurrence</b>                                                                                               | <input type="checkbox"/> Short - Less Than 2 Miles <input type="checkbox"/> 2-10 Miles <input type="checkbox"/> Long - More Than 10 Miles<br><input type="checkbox"/> Stop & Go <input type="checkbox"/> While Turning <input type="checkbox"/> While Braking<br><input type="checkbox"/> At Gear Engagement <input type="checkbox"/> With A/C Operating <input type="checkbox"/> With Headlights On<br><input type="checkbox"/> During Acceleration <input type="checkbox"/> During Deceleration <input type="checkbox"/> Mostly Downhill<br><input type="checkbox"/> Mostly Uphill <input type="checkbox"/> Mostly Level <input type="checkbox"/> Mostly Curvy <input type="checkbox"/> Rough Road |
| <b>Driving Habits</b>                                                                                                                         | <input type="checkbox"/> Drive Hard Before Engine Is Warmed <input type="checkbox"/> Allow Engine To Warm<br><input type="checkbox"/> Mostly City Driving <input type="checkbox"/> Highway <input type="checkbox"/> Park Vehicle Inside <input type="checkbox"/> Outside<br><b>Drive Per Day:</b> <input type="checkbox"/> Less Than 10 Miles <input type="checkbox"/> 10-50 <input type="checkbox"/> More Than 50<br><b>Fuel Octane:</b> <input type="checkbox"/> 87 <input type="checkbox"/> 89 <input type="checkbox"/> 91 <input type="checkbox"/> More Than 91<br><b>Brand:</b> _____<br><input type="checkbox"/> Gasohol <input type="checkbox"/> Propane Conversion                           |
| <b>Outside Weather</b>                                                                                                                        | <input type="checkbox"/> Cold <input type="checkbox"/> Warm <input type="checkbox"/> Hot <input type="checkbox"/> Wet/Rainy <input type="checkbox"/> Fog<br><input type="checkbox"/> Snow/Hail <input type="checkbox"/> Dust/Dirt <input type="checkbox"/> Dry <input type="checkbox"/> Humid                                                                                                                                                                                                                                                                                                                                                                                                        |

Fig. 1: Entire Vehicle - Symptom Check List For Customer

FULL VERSION - ALL ON FOUR PAGES

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NOTE: Have the service adviser fill out these forms with the customer whenever possible.

**Dear Valued Customer:**

Our goal is to fix your problem correctly and get you back on the road as soon as possible in the unlikely event you experience a problem with your vehicle. Help us identify the exact nature of the concern by taking a few moments to complete the appropriate section of this diagnostic worksheet. Thank you.

CUSTOMER NAME: \_\_\_\_\_ PHONE NO.: \_\_\_\_\_ REPAIR ORDER NO.: \_\_\_\_\_

## DIAGNOSTIC WORKSHEET

### DRIVEABILITY - ENGINE - AUTOMATIC TRANSMISSION

**SYMPTOM (CHECK ALL THAT APPLY)**  
**ENGINE**

- ☐ "Service Engine Soon"/"Malfunction Indicator Light" on
- ☐ Hard start/no start (cranks OK)
- ☐ Won't crank
- ☐ Engine stalls
- ☐ Engine miss
- ☐ Miss while driving
- ☐ Hesitates, stumbles or sags
- ☐ Rough idle
- ☐ Idle is too high ☐ Idle is too low
- ☐ Poor power/performance
- ☐ Surge or chuggle, buck - jerk - skip
- ☐ Poor gas mileage ☐ Highway ☐ City
- ☐ Pings, detonates
- ☐ Suphur, rotten egg odor
- ☐ Backfires (popping noise) - underhood/tailpipe
- ☐ Exhaust smoke ☐ Increased oil consumption
- ☐ Runs on after key is turned off
- ☐ Speed fluctuates without moving accelerator
- ☐ Engine noise (explain): \_\_\_\_\_

\_\_\_\_\_  
(whine, rattle, groan, clunk, etc.)

☐ Other: \_\_\_\_\_

### TRANSMISSION

- ☐ Does not shift properly ☐ Hard shift
- ☐ Will not shift ☐ Up ☐ Down
- ☐ Will not shift into overdrive
- ☐ Engine starts in other than "P" or "N"
- ☐ Noise (describe): \_\_\_\_\_

\_\_\_\_\_  
(whine, rattle, groan, clunk, buzz, etc.)

- ☐ Shifts into gear too early
- ☐ Overdrive doesn't work with speed control, but is otherwise OK
- ☐ Highway speed - shudder, surge, etc
- ☐ Other: \_\_\_\_\_

EXPLAIN: \_\_\_\_\_

**OPERATING CONDITIONS (CHECK ALL THAT APPLY)**  
**HOW OFTEN DOES IT OCCUR? (Engine and/or Transmission)**

- ☐ Always ☐ Few seconds ☐ Few minutes
- ☐ Few hours ☐ Few days ☐ Few weeks
- ☐ Few months ☐ Variable ☐ Only during event
- ☐ Every \_\_\_\_\_ to \_\_\_\_\_ miles ☐ Unknown
- ☐ Other (explain): \_\_\_\_\_
- ☐ Just started ☐ Getting better ☐ Getting worse
- ☐ Since new

**WHEN DOES IT OCCUR? (Engine and/or Transmission)**  
**When Engine Temperature is:**

- ☐ Cold ☐ Warm ☐ Hot
- ☐ All the time ☐ Only during warmup

**Weather Conditions:**

- ☐ Very cold - below 0 degrees F ☐ Cold - 0 to 32 degrees F
- ☐ Cool - 32 to 60 degrees F ☐ Warm - 60 to 80 degrees F
- ☐ Hot - Above 80 degrees F ☐ Any environment
- ☐ Raining ☐ Dry ☐ Humid
- ☐ Snow/ice ☐ Wet roads ☐ Other (explain below)

**Driving Conditions:**

- ☐ Light throttle ☐ Medium throttle ☐ Hard throttle
- ☐ Starting ☐ At idle ☐ Decelerating
- ☐ Over bumps ☐ When shifting ☐ While turning
- ☐ Cruising steady at \_\_\_\_\_ MPH ☐ While braking
- ☐ Anytime ☐ Uphill ☐ Downhill
- ☐ Highway ☐ City/town ☐ Stop and go
- ☐ Between \_\_\_\_\_ MPH and \_\_\_\_\_ MPH
- ☐ Only with A/C or Defrost on

**What Type of Fuel?**

- ☐ Regular UL ☐ Mid range UL ☐ Premium Unleaded
- ☐ Gasohol ☐ Ethanol ☐ Methanol
- ☐ Diesel #1 ☐ Diesel #2 ☐ Various brands

**What Brand? \_\_\_\_\_**

**When Gear Selector is in:**

- ☐ Park/Neutral ☐ Reverse ☐ Overdrive
- ☐ Drive/3 ☐ Drive/2 ☐ Drive/1

**Between Gears:**

- ☐ Park to R or D ☐ Rev/Drive ☐ First/Second
- ☐ Second/Third ☐ Third/Overdrive

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**BRAKES - STEERING - SUSPENSION**

**SYMPTOM**

- |                                                                     |                                                    |                                       |
|---------------------------------------------------------------------|----------------------------------------------------|---------------------------------------|
| <input type="checkbox"/> Vehicle pulls right - When _____           | <input type="checkbox"/> Suspension bottoms out    | <input type="checkbox"/> Sits uneven  |
| <input type="checkbox"/> Vehicle pulls left - When _____            | <input type="checkbox"/> Leans or sways in corners | <input type="checkbox"/> "Dog" tracks |
| <input type="checkbox"/> Steering wheel vibrates at _____ MPH       | <input type="checkbox"/> Brake light on            | <input type="checkbox"/> ABS light on |
| <input type="checkbox"/> Excessive play in steering                 | <input type="checkbox"/> Traction control light on | <input type="checkbox"/> Soft ride    |
| <input type="checkbox"/> Erratic steering when braking              | <input type="checkbox"/> Uneven tire wear          |                                       |
| <input type="checkbox"/> Poor steering wheel return after cornering |                                                    |                                       |

**Hard to steer**

- ☐ Effort                      ☐ Wanders  
☐ Steering wheel off center

**Shimmy/vibration (check box below for location)**

- |                                |                                |                                      |
|--------------------------------|--------------------------------|--------------------------------------|
| <input type="checkbox"/> Front | <input type="checkbox"/> Rear  | <input type="checkbox"/> Don't know  |
| <input type="checkbox"/> Seat  | <input type="checkbox"/> Floor | <input type="checkbox"/> Other _____ |

**Brake pedal**

- ☐ Noise                      ☐ Pulses                      ☐ Squeaks                      ☐ Hard                      ☐ Mushy                      ☐ Excessive travel

**WHEN DOES IT OCCUR?**

- |                                            |                                        |                                       |                                       |                                       |
|--------------------------------------------|----------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> Cold days         | <input type="checkbox"/> Hot days      | <input type="checkbox"/> Wet/rain     | <input type="checkbox"/> All the time | <input type="checkbox"/> Intermittent |
| <input type="checkbox"/> Parking maneuvers | <input type="checkbox"/> At road speed | <input type="checkbox"/> Accelerating | <input type="checkbox"/> Decelerating |                                       |

**EXPLAIN:** \_\_\_\_\_

**SQUEAK - RATTLE - NOISE CONDITIONS**

**AREA OF NOISE**

- |                                                |                                  |                                      |                                 |                                     |
|------------------------------------------------|----------------------------------|--------------------------------------|---------------------------------|-------------------------------------|
| <input type="checkbox"/> Engine Compartment    | <input type="checkbox"/> Left    | <input type="checkbox"/> Right       | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Front Suspension      | <input type="checkbox"/> Left    | <input type="checkbox"/> Right       | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Rear Suspension       | <input type="checkbox"/> Left    | <input type="checkbox"/> Right       | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Passenger Compartment | <input type="checkbox"/> Left    | <input type="checkbox"/> Right       | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Instrument Panel      | <input type="checkbox"/> Left    | <input type="checkbox"/> Right       | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Doors                 | <input type="checkbox"/> Left    | <input type="checkbox"/> Right       | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Rear seat area        | <input type="checkbox"/> Console | <input type="checkbox"/> Other _____ |                                 |                                     |

**NOISE SOUNDS LIKE**

- |                                  |                                     |                                      |                                      |                                  |                                |
|----------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|----------------------------------|--------------------------------|
| <input type="checkbox"/> Knocks  | <input type="checkbox"/> Hard metal | <input type="checkbox"/> Light metal | <input type="checkbox"/> Roars       | <input type="checkbox"/> Ticking | <input type="checkbox"/> Whine |
| <input type="checkbox"/> Squeaks | <input type="checkbox"/> Rattles    | <input type="checkbox"/> Scraping    | <input type="checkbox"/> Other _____ |                                  |                                |

**HOW OFTEN DOES IT OCCUR?**

- ☐ Continuous                      ☐ Often                      ☐ Intermittent                      ☐ Just started                      ☐ Since new

**WHEN DOES IT OCCUR?**

- |                                        |                                         |                                          |                                            |                                       |                                           |
|----------------------------------------|-----------------------------------------|------------------------------------------|--------------------------------------------|---------------------------------------|-------------------------------------------|
| <input type="checkbox"/> All the time  | <input type="checkbox"/> Speed          | <input type="checkbox"/> RPM             | <input type="checkbox"/> Only moving       | <input type="checkbox"/> On turns     | <input type="checkbox"/> Braking          |
| <input type="checkbox"/> Hard throttle | <input type="checkbox"/> Light throttle | <input type="checkbox"/> Decelerate      | <input type="checkbox"/> Steady speed      | <input type="checkbox"/> Idle in gear | <input type="checkbox"/> Idle out of gear |
| <input type="checkbox"/> Hot days      | <input type="checkbox"/> Cold days      | <input type="checkbox"/> Humid or rainy  | <input type="checkbox"/> Temperature _____ |                                       |                                           |
| <input type="checkbox"/> Heavy bumps   | <input type="checkbox"/> Light bumps    | <input type="checkbox"/> Smooth pavement |                                            |                                       |                                           |

**EXPLAIN:** \_\_\_\_\_

**CUSTOMER NAME:**

**PHONE NO.:**

**REPAIR ORDER NO:**

**SHOP USE ONLY:**

**VIN#:**

**MILES:**

**TECHNICIAN:**

**ADVISOR#:**

50H15062

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**AIR CONDITIONING - HEATER - VENTILATION**

**SYSTEM OR AREA AFFECTED**

- |                                          |                                                        |                                    |                                    |                                   |                                     |
|------------------------------------------|--------------------------------------------------------|------------------------------------|------------------------------------|-----------------------------------|-------------------------------------|
| <input type="checkbox"/> Air conditioner | <input type="checkbox"/> Heater                        | <input type="checkbox"/> Defroster | <input type="checkbox"/> Vent      | <input type="checkbox"/> Bi-Level | <input type="checkbox"/> Fan/blower |
| <input type="checkbox"/> Max A/C         | <input type="checkbox"/> Automatic Temperature Control |                                    | <input type="checkbox"/> Mix/blend | <input type="checkbox"/> Economy  | <input type="checkbox"/> All        |

**SYMPTOM**

- |                                          |                                                               |                                                       |                                        |
|------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------|----------------------------------------|
| <input type="checkbox"/> Does not work   | <input type="checkbox"/> Blows wrong temperature air          | <input type="checkbox"/> No air comes out of vents    | <input type="checkbox"/> Rapid cycling |
| <input type="checkbox"/> Noisy (explain) | <input type="checkbox"/> Broken <input type="checkbox"/> Odor | <input type="checkbox"/> Air comes from wrong outlets | <input type="checkbox"/> Blows fuse    |
| <input type="checkbox"/> Leaks           | <input type="checkbox"/> Insufficient heat or cool            | <input type="checkbox"/> Other (explain below)        |                                        |

**WHEN DOES IT OCCUR?**

- |                                                    |                              |                                                |                                       |                                                            |
|----------------------------------------------------|------------------------------|------------------------------------------------|---------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> All the time              | <input type="checkbox"/> Hot | <input type="checkbox"/> Cold                  | <input type="checkbox"/> Intermittent | <input type="checkbox"/> Right after startup               |
| <input type="checkbox"/> When change controls only |                              | <input type="checkbox"/> Other (explain below) |                                       | <input type="checkbox"/> Fan blower speed High / Med / Low |

**EXPLAIN:** \_\_\_\_\_

**ELECTRICAL - RADIO - TAPE/CD PLAYER**

**SYMPTOM - MUSIC SYSTEM**

- |                                               |                                |                                     |                                                |                                      |                                         |
|-----------------------------------------------|--------------------------------|-------------------------------------|------------------------------------------------|--------------------------------------|-----------------------------------------|
| <input type="checkbox"/> Does not work        | <input type="checkbox"/> Noisy | <input type="checkbox"/> Static     | <input type="checkbox"/> Won't load            | <input type="checkbox"/> Won't eject | <input type="checkbox"/> Poor reception |
| <input type="checkbox"/> Controls do not work |                                | <input type="checkbox"/> Blows fuse | <input type="checkbox"/> Other (explain below) |                                      |                                         |

**SYSTEM AFFECTED**

- |                                      |                                    |                                                   |                                                 |                                             |
|--------------------------------------|------------------------------------|---------------------------------------------------|-------------------------------------------------|---------------------------------------------|
| <input type="checkbox"/> Radio only  | <input type="checkbox"/> AM        | <input type="checkbox"/> FM                       | <input type="checkbox"/> FM stereo              | <input type="checkbox"/> Graphic equalizer  |
| <input type="checkbox"/> Tape player | <input type="checkbox"/> CD player | <input type="checkbox"/> Whole system             | <input type="checkbox"/> Steering wheel buttons | <input type="checkbox"/> Phone              |
| <input type="checkbox"/> Speakers    | <input type="checkbox"/> Front     | <input type="checkbox"/> Rear                     | <input type="checkbox"/> Left                   | <input type="checkbox"/> Right              |
| <input type="checkbox"/> Antenna     | <input type="checkbox"/> Clock     | <input type="checkbox"/> Radio or player controls |                                                 | <input type="checkbox"/> Rear seat controls |

**ALL OTHER ELECTRICAL ITEMS OR ACCESSORIES**

**Please list the complaint accessory or item and check any applicable symptom(s) from the list that follows:**

- |       |                                                     |                                       |                                                                  |                                  |
|-------|-----------------------------------------------------|---------------------------------------|------------------------------------------------------------------|----------------------------------|
| _____ | <input type="checkbox"/> Inoperable                 | <input type="checkbox"/> Noisy        | <input type="checkbox"/> No control                              | <input type="checkbox"/> Erratic |
|       | <input type="checkbox"/> Check light on or flashing |                                       | <input type="checkbox"/> Works improperly (explain below)        |                                  |
|       | <input type="checkbox"/> Blows fuse                 | <input type="checkbox"/> Intermittent | <input type="checkbox"/> Related system affected (explain below) |                                  |

- |       |                                                     |                                       |                                                                  |                                  |
|-------|-----------------------------------------------------|---------------------------------------|------------------------------------------------------------------|----------------------------------|
| _____ | <input type="checkbox"/> Inoperable                 | <input type="checkbox"/> Noisy        | <input type="checkbox"/> No control                              | <input type="checkbox"/> Erratic |
|       | <input type="checkbox"/> Check light on or flashing |                                       | <input type="checkbox"/> Works improperly (explain below)        |                                  |
|       | <input type="checkbox"/> Blows fuse                 | <input type="checkbox"/> Intermittent | <input type="checkbox"/> Related system affected (explain below) |                                  |

- |       |                                                     |                                       |                                                                  |                                  |
|-------|-----------------------------------------------------|---------------------------------------|------------------------------------------------------------------|----------------------------------|
| _____ | <input type="checkbox"/> Inoperable                 | <input type="checkbox"/> Noisy        | <input type="checkbox"/> No control                              | <input type="checkbox"/> Erratic |
|       | <input type="checkbox"/> Check light on or flashing |                                       | <input type="checkbox"/> Works improperly (explain below)        |                                  |
|       | <input type="checkbox"/> Blows fuse                 | <input type="checkbox"/> Intermittent | <input type="checkbox"/> Related system affected (explain below) |                                  |

**WHEN DOES IT OCCUR?**

- |                                                |                                                       |                               |                                                                         |
|------------------------------------------------|-------------------------------------------------------|-------------------------------|-------------------------------------------------------------------------|
| <input type="checkbox"/> All the time          | <input type="checkbox"/> Hot                          | <input type="checkbox"/> Cold | <input type="checkbox"/> Just after starting - malfunctions for a while |
| <input type="checkbox"/> Intermittent          | <input type="checkbox"/> After runs for _____ minutes |                               | <input type="checkbox"/> Rough roads or bumps only                      |
| <input type="checkbox"/> Other (explain below) |                                                       |                               |                                                                         |

**EXPLAIN:** \_\_\_\_\_

**CUSTOMER NAME:**

**PHONE NO.:**

**REPAIR ORDER NO.:**

**SHOP USE ONLY:**

**VIN#:**

**MILES:**

**TECHNICIAN:**

**ADVISOR#:**

50115063

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**WATER LEAK - WINDNOISE**

**WATER LEAK**

**Leak Occurs When?**

- |                                                                |                                            |                                                                  |                                        |
|----------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------|----------------------------------------|
| <input type="checkbox"/> Setting level                         | <input type="checkbox"/> Any time it rains | <input type="checkbox"/> While driving in the rain               | <input type="checkbox"/> Car wash only |
| <input type="checkbox"/> Back lower than front (facing uphill) |                                            | <input type="checkbox"/> Front lower than back (facing downhill) |                                        |

**Location of Leak (where water appears):**

- |                                                 |                                    |                                    |                                               |                                     |                                        |
|-------------------------------------------------|------------------------------------|------------------------------------|-----------------------------------------------|-------------------------------------|----------------------------------------|
| <input type="checkbox"/> LF Door                | <input type="checkbox"/> RF Door   | <input type="checkbox"/> LR Door   | <input type="checkbox"/> RR Door              | <input type="checkbox"/> Windshield | <input type="checkbox"/> Rear window   |
| <input type="checkbox"/> LF window              | <input type="checkbox"/> RF window | <input type="checkbox"/> LR window | <input type="checkbox"/> RR window            | <input type="checkbox"/> Side door  | <input type="checkbox"/> Sunroof/T-Top |
| <input type="checkbox"/> Under instrument panel |                                    |                                    | <input type="checkbox"/> Rear door/rear hatch |                                     |                                        |

**WINDNOISE:**

**Location:**

- |                                                 |                                    |                                    |                                               |                                     |                                        |
|-------------------------------------------------|------------------------------------|------------------------------------|-----------------------------------------------|-------------------------------------|----------------------------------------|
| <input type="checkbox"/> LF Door                | <input type="checkbox"/> RF Door   | <input type="checkbox"/> LR Door   | <input type="checkbox"/> RR Door              | <input type="checkbox"/> Windshield | <input type="checkbox"/> Rear window   |
| <input type="checkbox"/> LF window              | <input type="checkbox"/> RF window | <input type="checkbox"/> LR window | <input type="checkbox"/> RR window            | <input type="checkbox"/> Side door  | <input type="checkbox"/> Sunroof/T-Top |
| <input type="checkbox"/> Under instrument panel |                                    |                                    | <input type="checkbox"/> Rear door/rear hatch |                                     |                                        |

**EXPLAIN:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**MANUAL TRANSMISSION - CLUTCH**

**SYMPTOM - MANUAL GEAR SHIFT**

- |                                                                    |                                        |
|--------------------------------------------------------------------|----------------------------------------|
| <input type="checkbox"/> Hard to shift                             | <input type="checkbox"/> Doesn't shift |
| <input type="checkbox"/> Grinds going into _____ gear              |                                        |
| <input type="checkbox"/> Noisy when in _____ gear or neutral _____ |                                        |
| <input type="checkbox"/> Slips/pops out of gear                    |                                        |
| <input type="checkbox"/> Noise (describe): _____                   |                                        |

- |                                                      |
|------------------------------------------------------|
| <input type="checkbox"/> Upshift light stays on      |
| <input type="checkbox"/> Upshift light doesn't light |

**WHEN DOES IT OCCUR?**

- |                                       |                                     |
|---------------------------------------|-------------------------------------|
| <input type="checkbox"/> All the time | <input type="checkbox"/> Light load |
| <input type="checkbox"/> Heavy load   |                                     |

**EXPLAIN:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**SYMPTOM - CLUTCH**

- |                                                                           |                                          |
|---------------------------------------------------------------------------|------------------------------------------|
| <input type="checkbox"/> Hard to push                                     | <input type="checkbox"/> Fail to release |
| <input type="checkbox"/> Noise when pressing pedal down (describe): _____ |                                          |

- |                                          |                                                   |
|------------------------------------------|---------------------------------------------------|
| <input type="checkbox"/> Slips           | <input type="checkbox"/> Chattering (grabbing)    |
| <input type="checkbox"/> Odor present    | <input type="checkbox"/> Pedal stays on the floor |
| <input type="checkbox"/> Squealing sound |                                                   |

**WHEN DOES IT OCCUR?**

**When Engine Temperature is:**

- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> Cold         | <input type="checkbox"/> Hot          |
| <input type="checkbox"/> Accelerating | <input type="checkbox"/> Decelerating |

**COMMENTS:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**CUSTOMER NAME:**

**PHONE NO.:**

**REPAIR ORDER NO:**

**SHOP USE ONLY:**

**VIN#:**

**MILES:**

**TECHNICIAN:**

**ADVISOR#:**

50J15064

Fig. 5: Symptom Check List - Page 4



**\* SYMPTOM CHECK LIST \***

**Article Text (p. 8)**

1996 Volkswagen Golf

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NOTE: Have the service adviser fill out these forms with the customer whenever possible.

| DRIVEABILITY - ENGINE - AUTOMATIC TRANSMISSION                                                           |                                                                                                                         |
|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>SYMPTOM (CHECK ALL THAT APPLY)</b><br><b>ENGINE</b>                                                   | <b>OPERATING CONDITIONS (CHECK ALL THAT APPLY)</b><br><b>HOW OFTEN DOES IT OCCUR? (Engine &amp;/or Transmission)</b>    |
| <input type="checkbox"/> "Service Engine Soon"/Malfunction Indicator Light" on                           | <input type="checkbox"/> Always <input type="checkbox"/> Few Seconds <input type="checkbox"/> Few minutes               |
| <input type="checkbox"/> Hard start/no start (cranks OK)                                                 | <input type="checkbox"/> Few hours <input type="checkbox"/> Few days <input type="checkbox"/> Few weeks                 |
| <input type="checkbox"/> Won't crank                                                                     | <input type="checkbox"/> Few months <input type="checkbox"/> Variable <input type="checkbox"/> Only during event        |
| <input type="checkbox"/> Engine stalls                                                                   | <input type="checkbox"/> Every _____ to _____ miles <input type="checkbox"/> Unknown                                    |
| <input type="checkbox"/> Engine miss                                                                     | <input type="checkbox"/> Other (explain): _____                                                                         |
| <input type="checkbox"/> Miss while driving                                                              | <input type="checkbox"/> Just started <input type="checkbox"/> Getting better <input type="checkbox"/> Getting worse    |
| <input type="checkbox"/> Hesitates, stumbles or sags                                                     | <input type="checkbox"/> Since new                                                                                      |
| <input type="checkbox"/> Rough idle                                                                      |                                                                                                                         |
| <input type="checkbox"/> Idle is too high <input type="checkbox"/> Idle is too low                       | <b>WHEN DOES IT OCCUR? (Engine and/or Transmission)</b>                                                                 |
| <input type="checkbox"/> Poor power/performance                                                          | <b>When Engine Temperature is:</b>                                                                                      |
| <input type="checkbox"/> Surge or chuggle, buck - jerk - skip                                            | <input type="checkbox"/> Cold <input type="checkbox"/> Warm <input type="checkbox"/> Hot                                |
| <input type="checkbox"/> Poor gas mileage <input type="checkbox"/> Highway <input type="checkbox"/> City | <input type="checkbox"/> All the time <input type="checkbox"/> Only during warmup                                       |
| <input type="checkbox"/> Ping, detonates                                                                 | <b>Weather Conditions:</b>                                                                                              |
| <input type="checkbox"/> Sulphur/rotten egg odor                                                         | <input type="checkbox"/> Very cold - below 0°F <input type="checkbox"/> Cold - 0 to 32°F                                |
| <input type="checkbox"/> Backfires (popping noise) - underhood/tailpipe                                  | <input type="checkbox"/> Cool - 32 to 60°F <input type="checkbox"/> Warm - 60 to 80°F                                   |
| <input type="checkbox"/> Exhaust smoke <input type="checkbox"/> Increased oil consumption                | <input type="checkbox"/> Hot - above 80°F <input type="checkbox"/> Any environment                                      |
| <input type="checkbox"/> Runs on after key is turned off                                                 | <input type="checkbox"/> Raining <input type="checkbox"/> Dry <input type="checkbox"/> Humid                            |
| <input type="checkbox"/> Speed fluctuates without moving accelerator                                     | <input type="checkbox"/> Snow/Ice <input type="checkbox"/> Wet roads                                                    |
| <input type="checkbox"/> Engine noise (explain): _____                                                   | <input type="checkbox"/> Other (explain): _____                                                                         |
| _____                                                                                                    | _____                                                                                                                   |
| _____                                                                                                    | _____                                                                                                                   |
| (whine, rattle, groan, clunk, etc.)                                                                      |                                                                                                                         |
| <input type="checkbox"/> Other: _____                                                                    |                                                                                                                         |
| _____                                                                                                    |                                                                                                                         |
| _____                                                                                                    |                                                                                                                         |
| <b>TRANSMISSION</b>                                                                                      | <b>Driving Conditions:</b>                                                                                              |
| <input type="checkbox"/> Does not shift properly <input type="checkbox"/> Hard shift                     | <input type="checkbox"/> Light throttle <input type="checkbox"/> Medium throttle <input type="checkbox"/> Hard throttle |
| <input type="checkbox"/> Will not shift <input type="checkbox"/> Up <input type="checkbox"/> Down        | <input type="checkbox"/> Starting <input type="checkbox"/> At idle <input type="checkbox"/> Decelerating                |
| <input type="checkbox"/> Will not shift into overdrive                                                   | <input type="checkbox"/> Over bumps <input type="checkbox"/> When shifting <input type="checkbox"/> While turning       |
| <input type="checkbox"/> Engine starts in other than "P" or "N"                                          | <input type="checkbox"/> Cruising - steady at _____ MPH <input type="checkbox"/> While braking                          |
| <input type="checkbox"/> Noise (describe): _____                                                         | <input type="checkbox"/> Anytime <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill                      |
| _____                                                                                                    | <input type="checkbox"/> Highway <input type="checkbox"/> City/town <input type="checkbox"/> Stop and go                |
| _____                                                                                                    | <input type="checkbox"/> Between _____ MPH and _____ MPH                                                                |
| _____                                                                                                    | <input type="checkbox"/> Only with A/C or Defrost on                                                                    |
| (whine, rattle, groan, clunk, buzz, etc.)                                                                |                                                                                                                         |
| <input type="checkbox"/> Shifts into next gear too early                                                 | <b>What Type of Fuel?</b> <b>What Brand?</b>                                                                            |
| <input type="checkbox"/> Overdrive doesn't work with speed control, but is otherwise OK                  | <input type="checkbox"/> Regular UL <input type="checkbox"/> Midrange UL <input type="checkbox"/> Premium UL            |
| <input type="checkbox"/> Highway speed - shudder, surge, etc.                                            | <input type="checkbox"/> Gasohol <input type="checkbox"/> Ethanol <input type="checkbox"/> Methanol                     |
| <input type="checkbox"/> Other: _____                                                                    | <input type="checkbox"/> Diesel #1 <input type="checkbox"/> Diesel #2 <input type="checkbox"/> Various brands           |
| _____                                                                                                    |                                                                                                                         |
| <b>EXPLAIN:</b> _____                                                                                    | <b>When Gear Selector is in:</b>                                                                                        |
| _____                                                                                                    | <input type="checkbox"/> Park/Neutral <input type="checkbox"/> Reverse <input type="checkbox"/> Overdrive               |
| _____                                                                                                    | <input type="checkbox"/> Drive/3 <input type="checkbox"/> Drive/2 <input type="checkbox"/> Drive/1                      |
| _____                                                                                                    | <b>Between Gears:</b>                                                                                                   |
| _____                                                                                                    | <input type="checkbox"/> Park to R or D <input type="checkbox"/> Reverse/Drive <input type="checkbox"/> First/Second    |
| _____                                                                                                    | <input type="checkbox"/> Second/Third <input type="checkbox"/> Third/Overdrive                                          |
| <b>CUSTOMER NAME:</b> _____                                                                              | <b>PHONE NO.:</b> _____ <b>REPAIR ORDER NO.:</b> _____                                                                  |
| <b>SHOP USE ONLY:</b>                                                                                    |                                                                                                                         |
| <b>VIN#:</b> _____                                                                                       | <b>TECHNICIAN:</b> _____ <b>ADVISOR#:</b> _____                                                                         |
| <b>MILES:</b> _____                                                                                      |                                                                                                                         |

Fig. 6: Engine Driveability & Automatic Transmission

**\* SYMPTOM CHECK LIST \***  
**Article Text (p. 9)**  
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**BRAKES - STEERING - SUSPENSION**

**SYMPTOM**

- |                                                                     |                                                    |                                       |
|---------------------------------------------------------------------|----------------------------------------------------|---------------------------------------|
| <input type="checkbox"/> Vehicle pulls right - When _____           | <input type="checkbox"/> Suspension bottoms out    | <input type="checkbox"/> Sits uneven  |
| <input type="checkbox"/> Vehicle pulls left - When _____            | <input type="checkbox"/> Leans or sways in corners | <input type="checkbox"/> "Dog" tracks |
| <input type="checkbox"/> Steering wheel vibrates at _____ MPH       | <input type="checkbox"/> Brake light on            | <input type="checkbox"/> ABS light on |
| <input type="checkbox"/> Excessive play in steering                 | <input type="checkbox"/> Traction control light on | <input type="checkbox"/> Soft ride    |
| <input type="checkbox"/> Erratic steering when braking              | <input type="checkbox"/> Uneven tire wear          |                                       |
| <input type="checkbox"/> Poor steering wheel return after cornering |                                                    |                                       |

**Hard to steer**

- ☐ Effort                      ☐ Wanders  
☐ Steering wheel off center

**Shimmy/vibration (check box below for location)**

- |                                |                                |                                      |
|--------------------------------|--------------------------------|--------------------------------------|
| <input type="checkbox"/> Front | <input type="checkbox"/> Rear  | <input type="checkbox"/> Don't know  |
| <input type="checkbox"/> Seat  | <input type="checkbox"/> Floor | <input type="checkbox"/> Other _____ |

**Brake pedal**

- ☐ Noise                      ☐ Pulses                      ☐ Squeaks                      ☐ Hard                      ☐ Mushy                      ☐ Excessive travel

**WHEN DOES IT OCCUR?**

- |                                            |                                        |                                       |                                       |                                       |
|--------------------------------------------|----------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| <input type="checkbox"/> Cold days         | <input type="checkbox"/> Hot days      | <input type="checkbox"/> Wet/rain     | <input type="checkbox"/> All the time | <input type="checkbox"/> Intermittent |
| <input type="checkbox"/> Parking maneuvers | <input type="checkbox"/> At road speed | <input type="checkbox"/> Accelerating | <input type="checkbox"/> Decelerating |                                       |

**EXPLAIN:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**CUSTOMER NAME:**

**PHONE NO.:**

**REPAIR ORDER NO:**

**SHOP USE ONLY:**

**VIN#:**

**MILES:**

**TECHNICIAN:**

**ADVISOR#:**

*50C15059*

Fig. 7: Brakes, Steering, & Suspension

**\* SYMPTOM CHECK LIST \***  
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**AIR CONDITIONING - HEATER - VENTILATION**

**SYSTEM OR AREA AFFECTED**

- |                                          |                                                        |                                    |                                    |                                   |                                     |
|------------------------------------------|--------------------------------------------------------|------------------------------------|------------------------------------|-----------------------------------|-------------------------------------|
| <input type="checkbox"/> Air conditioner | <input type="checkbox"/> Heater                        | <input type="checkbox"/> Defroster | <input type="checkbox"/> Vent      | <input type="checkbox"/> Bi-Level | <input type="checkbox"/> Fan/blower |
| <input type="checkbox"/> Max A/C         | <input type="checkbox"/> Automatic Temperature Control |                                    | <input type="checkbox"/> Mix/blend | <input type="checkbox"/> Economy  | <input type="checkbox"/> All        |

**SYMPTOM**

- |                                          |                                                               |                                                       |                                        |
|------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------|----------------------------------------|
| <input type="checkbox"/> Does not work   | <input type="checkbox"/> Blows wrong temperature air          | <input type="checkbox"/> No air comes out of vents    | <input type="checkbox"/> Rapid cycling |
| <input type="checkbox"/> Noisy (explain) | <input type="checkbox"/> Broken <input type="checkbox"/> Odor | <input type="checkbox"/> Air comes from wrong outlets | <input type="checkbox"/> Blows fuse    |
| <input type="checkbox"/> Leaks           | <input type="checkbox"/> Insufficient heat or cool            | <input type="checkbox"/> Other (explain below)        |                                        |

**WHEN DOES IT OCCUR?**

- |                                                    |                              |                                                |                                       |                                                            |
|----------------------------------------------------|------------------------------|------------------------------------------------|---------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> All the time              | <input type="checkbox"/> Hot | <input type="checkbox"/> Cold                  | <input type="checkbox"/> Intermittent | <input type="checkbox"/> Right after startup               |
| <input type="checkbox"/> When change controls only |                              | <input type="checkbox"/> Other (explain below) |                                       | <input type="checkbox"/> Fan blower speed High / Med / Low |

**EXPLAIN:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**CUSTOMER NAME:**

**PHONE NO.:**

**REPAIR ORDER NO:**

**SHOP USE ONLY:**

**VIN#:**

**MILES:**

**TECHNICIAN:**

**ADVISOR#:**

*50A15057*  
Fig. 8: Air Conditioning, Heater & Ventilation

**\* SYMPTOM CHECK LIST \***  
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**ELECTRICAL - RADIO - TAPE/CD PLAYER**

**SYMPTOM - MUSIC SYSTEM**

- |                                               |                                |                                     |                                                |                                      |                                         |
|-----------------------------------------------|--------------------------------|-------------------------------------|------------------------------------------------|--------------------------------------|-----------------------------------------|
| <input type="checkbox"/> Does not work        | <input type="checkbox"/> Noisy | <input type="checkbox"/> Static     | <input type="checkbox"/> Won't load            | <input type="checkbox"/> Won't eject | <input type="checkbox"/> Poor reception |
| <input type="checkbox"/> Controls do not work |                                | <input type="checkbox"/> Blows fuse | <input type="checkbox"/> Other (explain below) |                                      |                                         |

**SYSTEM AFFECTED**

- |                                      |                                    |                                                   |                                                 |                                            |
|--------------------------------------|------------------------------------|---------------------------------------------------|-------------------------------------------------|--------------------------------------------|
| <input type="checkbox"/> Radio only  | <input type="checkbox"/> AM        | <input type="checkbox"/> FM                       | <input type="checkbox"/> FM stereo              | <input type="checkbox"/> Graphic equalizer |
| <input type="checkbox"/> Tape player | <input type="checkbox"/> CD player | <input type="checkbox"/> Whole system             | <input type="checkbox"/> Steering wheel buttons | <input type="checkbox"/> Phone             |
| <input type="checkbox"/> Speakers    | <input type="checkbox"/> Front     | <input type="checkbox"/> Rear                     | <input type="checkbox"/> Left                   | <input type="checkbox"/> Right             |
| <input type="checkbox"/> Antenna     | <input type="checkbox"/> Clock     | <input type="checkbox"/> Radio or player controls | <input type="checkbox"/> Rear seat controls     |                                            |

**ALL OTHER ELECTRICAL ITEMS OR ACCESSORIES**

**Please list the complaint accessory or item and check any applicable symptom(s) from the list that follows:**

- |       |                                                     |                                       |                                                                  |                                  |
|-------|-----------------------------------------------------|---------------------------------------|------------------------------------------------------------------|----------------------------------|
| _____ | <input type="checkbox"/> Inoperable                 | <input type="checkbox"/> Noisy        | <input type="checkbox"/> No control                              | <input type="checkbox"/> Erratic |
|       | <input type="checkbox"/> Check light on or flashing |                                       | <input type="checkbox"/> Works improperly (explain below)        |                                  |
|       | <input type="checkbox"/> Blows fuse                 | <input type="checkbox"/> Intermittent | <input type="checkbox"/> Related system affected (explain below) |                                  |
| _____ | <input type="checkbox"/> Inoperable                 | <input type="checkbox"/> Noisy        | <input type="checkbox"/> No control                              | <input type="checkbox"/> Erratic |
|       | <input type="checkbox"/> Check light on or flashing |                                       | <input type="checkbox"/> Works improperly (explain below)        |                                  |
|       | <input type="checkbox"/> Blows fuse                 | <input type="checkbox"/> Intermittent | <input type="checkbox"/> Related system affected (explain below) |                                  |
| _____ | <input type="checkbox"/> Inoperable                 | <input type="checkbox"/> Noisy        | <input type="checkbox"/> No control                              | <input type="checkbox"/> Erratic |
|       | <input type="checkbox"/> Check light on or flashing |                                       | <input type="checkbox"/> Works improperly (explain below)        |                                  |
|       | <input type="checkbox"/> Blows fuse                 | <input type="checkbox"/> Intermittent | <input type="checkbox"/> Related system affected (explain below) |                                  |

**WHEN DOES IT OCCUR?**

- |                                                |                                                       |                               |                                                                         |
|------------------------------------------------|-------------------------------------------------------|-------------------------------|-------------------------------------------------------------------------|
| <input type="checkbox"/> All the time          | <input type="checkbox"/> Hot                          | <input type="checkbox"/> Cold | <input type="checkbox"/> Just after starting - malfunctions for a while |
| <input type="checkbox"/> Intermittent          | <input type="checkbox"/> After runs for _____ minutes |                               | <input type="checkbox"/> Rough roads or bumps only                      |
| <input type="checkbox"/> Other (explain below) |                                                       |                               |                                                                         |

**EXPLAIN:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**CUSTOMER NAME:**

**PHONE NO.:**

**REPAIR ORDER NO:**

**SHOP USE ONLY:**

**VIN#:**

**MILES:**

**TECHNICIAN:**

**ADVISOR#:**

50B15058

Fig. 9: Electrical, Radio & Tape/CD Player

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**MANUAL TRANSMISSION - CLUTCH**

**SYMPTOM - MANUAL GEAR SHIFT**

- ☐ Hard to shift                      ☐ Doesn't shift  
☐ Grinds going into \_\_\_\_\_ gear  
☐ Noisy when in \_\_\_\_\_ gear or neutral \_\_\_\_\_  
☐ Slips/pops out of gear  
☐ Noise (describe): \_\_\_\_\_  
\_\_\_\_\_

- ☐ Upshift light stays on  
☐ Upshift light doesn't light

**WHEN DOES IT OCCUR?**

- ☐ All the time                      ☐ Light load  
☐ Heavy load

**EXPLAIN:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**SYMPTOM - CLUTCH**

- ☐ Hard to push                      ☐ Fail to release  
☐ Noise when pressing pedal down (describe): \_\_\_\_\_  
\_\_\_\_\_

- ☐ Slips                                      ☐ Chattering (grabbing)  
☐ Odor present                      ☐ Pedal stays on the floor  
☐ Squealing sound

**WHEN DOES IT OCCUR?**

**When Engine Temperature is:**

- ☐ Cold                                      ☐ Hot  
☐ Accelerating                      ☐ Decelerating

**CUSTOMER NAME:**

**PHONE NO.:**

**REPAIR ORDER NO:**

**SHOP USE ONLY:**

**VIN#:**

**MILES:**

**TECHNICIAN:**

**ADVISOR#:**

50.115056

Fig. 10: Manual Transmission & Clutch

**\* SYMPTOM CHECK LIST \***

**Article Text (p. 13)**

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**SQUEAK - RATTLE - NOISE CONDITIONS**

**AREA OF NOISE**

- |                                                |                                  |                                      |                                 |                                     |
|------------------------------------------------|----------------------------------|--------------------------------------|---------------------------------|-------------------------------------|
| <input type="checkbox"/> Engine Compartment    | <input type="checkbox"/> Left    | <input type="checkbox"/> Right       | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Front Suspension      | <input type="checkbox"/> Left    | <input type="checkbox"/> Right       | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Rear Suspension       | <input type="checkbox"/> Left    | <input type="checkbox"/> Right       | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Passenger Compartment | <input type="checkbox"/> Left    | <input type="checkbox"/> Right       | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Instrument Panel      | <input type="checkbox"/> Left    | <input type="checkbox"/> Right       | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Doors                 | <input type="checkbox"/> Left    | <input type="checkbox"/> Right       | <input type="checkbox"/> Center | <input type="checkbox"/> Don't know |
| <input type="checkbox"/> Rear seat area        | <input type="checkbox"/> Console | <input type="checkbox"/> Other _____ |                                 |                                     |

**NOISE SOUNDS LIKE**

- |                                  |                                     |                                      |                                      |                                  |                                |
|----------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|----------------------------------|--------------------------------|
| <input type="checkbox"/> Knocks  | <input type="checkbox"/> Hard metal | <input type="checkbox"/> Light metal | <input type="checkbox"/> Roars       | <input type="checkbox"/> Ticking | <input type="checkbox"/> Whine |
| <input type="checkbox"/> Squeaks | <input type="checkbox"/> Rattles    | <input type="checkbox"/> Scraping    | <input type="checkbox"/> Other _____ |                                  |                                |

**HOW OFTEN DOES IT OCCUR?**

- |                                     |                                |                                       |                                       |                                    |
|-------------------------------------|--------------------------------|---------------------------------------|---------------------------------------|------------------------------------|
| <input type="checkbox"/> Continuous | <input type="checkbox"/> Often | <input type="checkbox"/> Intermittent | <input type="checkbox"/> Just started | <input type="checkbox"/> Since new |
|-------------------------------------|--------------------------------|---------------------------------------|---------------------------------------|------------------------------------|

**WHEN DOES IT OCCUR?**

- |                                        |                                         |                                          |                                            |                                       |                                           |
|----------------------------------------|-----------------------------------------|------------------------------------------|--------------------------------------------|---------------------------------------|-------------------------------------------|
| <input type="checkbox"/> All the time  | <input type="checkbox"/> Speed          | <input type="checkbox"/> RPM             | <input type="checkbox"/> Only moving       | <input type="checkbox"/> On turns     | <input type="checkbox"/> Braking          |
| <input type="checkbox"/> Hard throttle | <input type="checkbox"/> Light throttle | <input type="checkbox"/> Decelerate      | <input type="checkbox"/> Steady speed      | <input type="checkbox"/> Idle in gear | <input type="checkbox"/> Idle out of gear |
| <input type="checkbox"/> Hot days      | <input type="checkbox"/> Cold days      | <input type="checkbox"/> Humid or rainy  | <input type="checkbox"/> Temperature _____ |                                       |                                           |
| <input type="checkbox"/> Heavy bumps   | <input type="checkbox"/> Light bumps    | <input type="checkbox"/> Smooth pavement |                                            |                                       |                                           |

**EXPLAIN:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**CUSTOMER NAME:**

**PHONE NO.:**

**REPAIR ORDER NO:**

**SHOP USE ONLY:**

**VIN#:**

**MILES:**

**TECHNICIAN:**

**ADVISOR#:**

*50F15060*

Fig. 11: Squeak, Rattle, & Noise Conditions

**\* SYMPTOM CHECK LIST \***  
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For Volkswagen Technical Site  
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**WATER LEAK - WINDNOISE**

**WATER LEAK**

**Leak Occurs When?**

- |                                                                |                                            |                                                                  |                                        |
|----------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------|----------------------------------------|
| <input type="checkbox"/> Setting level                         | <input type="checkbox"/> Any time it rains | <input type="checkbox"/> While driving in the rain               | <input type="checkbox"/> Car wash only |
| <input type="checkbox"/> Back lower than front (facing uphill) |                                            | <input type="checkbox"/> Front lower than back (facing downhill) |                                        |

**Location of Leak (where water appears):**

- |                                                 |                                    |                                    |                                               |                                     |                                        |
|-------------------------------------------------|------------------------------------|------------------------------------|-----------------------------------------------|-------------------------------------|----------------------------------------|
| <input type="checkbox"/> LF Door                | <input type="checkbox"/> RF Door   | <input type="checkbox"/> LR Door   | <input type="checkbox"/> RR Door              | <input type="checkbox"/> Windshield | <input type="checkbox"/> Rear window   |
| <input type="checkbox"/> LF window              | <input type="checkbox"/> RF window | <input type="checkbox"/> LR window | <input type="checkbox"/> RR window            | <input type="checkbox"/> Side door  | <input type="checkbox"/> Sunroof/T-Top |
| <input type="checkbox"/> Under instrument panel |                                    |                                    | <input type="checkbox"/> Rear door/rear hatch |                                     |                                        |

**WINDNOISE:**

**Location:**

- |                                                 |                                    |                                    |                                               |                                     |                                        |
|-------------------------------------------------|------------------------------------|------------------------------------|-----------------------------------------------|-------------------------------------|----------------------------------------|
| <input type="checkbox"/> LF Door                | <input type="checkbox"/> RF Door   | <input type="checkbox"/> LR Door   | <input type="checkbox"/> RR Door              | <input type="checkbox"/> Windshield | <input type="checkbox"/> Rear window   |
| <input type="checkbox"/> LF window              | <input type="checkbox"/> RF window | <input type="checkbox"/> LR window | <input type="checkbox"/> RR window            | <input type="checkbox"/> Side door  | <input type="checkbox"/> Sunroof/T-Top |
| <input type="checkbox"/> Under instrument panel |                                    |                                    | <input type="checkbox"/> Rear door/rear hatch |                                     |                                        |

**EXPLAIN:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**CUSTOMER NAME:**

**PHONE NO.:**

**REPAIR ORDER NO:**

**SHOP USE ONLY:**

**VIN#:**

**MILES:**

**TECHNICIAN:**

**ADVISOR#:**

*50115055*

Fig. 12: Water Leak & Wind Noise

**END OF ARTICLE**

# **\* EXHAUST SYSTEM UNIFORM INSPECTION GUIDELINES \***

## **Article Text**

1996 Volkswagen Golf  
For Volkswagen Technical Site  
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### **ARTICLE BEGINNING**

GENERAL INFORMATION  
Exhaust Systems

All Makes & Models

Updated: September, 1996

### **MAP UNIFORM INSPECTION GENERAL GUIDELINES**

#### **OVERVIEW OF MOTORIST ASSURANCE PROGRAM**

The Motorist Assurance Program (MAP) is the consumer outreach effort of the Automotive Maintenance and Repair Association, Inc. (AMRA). Participation in the Motorist Assurance Program is drawn from retailers, suppliers, independent repair facilities, vehicle manufacturers and industry associations.

The Motorist Assurance Program was established as an industry-wide effort to address concerns raised by regulators, the media and consumers questioning our ethics and methods of doing business. The automotive repair industry had been bombarded by months of negative stories in the media and scrutiny from state and federal regulators who focused on how the need for repairs is determined. MAP was formed as an industry response to this issue.

Our mission is to strengthen the relationship between the consumer and the auto repair industry. We produce materials that give motorists the information and encouragement to take responsibility for their vehicles - through proper, manufacturer-recommended, maintenance. We encourage participating service and repair shops (including franchisees and dealers) to adopt a Pledge to their Customers and the Motorist Assurance Program developed Standards of Service. All participating service providers have agreed to subscribe to this Pledge and to adhere to the promulgated Standards of Service which demonstrates to their customers that they are serious about customer satisfaction.

These Standards of Service require that an inspection of the vehicle's (problem) system be made according to industry guidelines. After learning that neither the car manufacturers nor any other source had complete guidelines, leading industry organizations, along with other industry participants banded together to address this challenging task. During the past two and a half years, they successfully developed industry inspection guidelines for the following systems: Exhaust, Brakes, ABS, Steering and Suspension, Engine Maintenance and Performance, HVAC, and Electrical systems. Guidelines for Drive Train and Transmission are currently being promulgated. Revisions to the inspection guidelines for Exhaust, Brakes/ABS and Steering and Suspension Systems, which were issued two years ago, are now being published for implementation beginning spring 1997. Participating shops utilize these Uniform Inspection Guidelines as part of the inspection process and for communicating their findings



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to their customers.

The Motorist Assurance Program continues to work cooperatively and proactively with government agencies and consumer groups toward solutions that both benefit the customer and are mutually acceptable to both regulators and industry. We maintain the belief that industry must retain control over how we conduct our business, and we must be viewed as part of the solution and not part of the problem. Meetings with state and other government officials concerned with auto repair and/or consumer protection are conducted. Feedback from these representatives are brought back to members, and the program adjusted as needed.

To assure auto repair customers recourse if they were not satisfied with a repair transaction, the Motorist Assurance Program offers arbitration through MAP/BBB-CARE in cooperation with the Council of Better Business Bureaus and individual participating Bureaus. MAP "piloted" in Indianapolis and Pittsburgh during spring, 1996 - and publicized "roll-outs" in New Jersey, Detroit (MI), Chicago (IL) and Richmond (VA) were conducted. To put some "teeth" in the program, and accreditation requirement for shops was initiated. The requirements are stringent and a self-policing method has been incorporated which includes the "mystery shopping" of outlets. In addition, a committee of service providers had been working diligently developing standards for newspaper, television and Internet advertising.

We welcome you to join us as we continue our outreach ... with your support, both the automotive repair industry and your customers will reap the benefits. Please visit MAP at our Internet site: [www.hunter.com/map.htm](http://www.hunter.com/map.htm) or contact us at:

808 17th Street, NW Suite 200  
Washington, D.C. 20006  
Ph. (202) 466-7050 Fax (202) 223-9569

## **OVERVIEW OF SERVICE REQUIREMENTS & SUGGESTIONS**

It is MAP policy that all exhaust, brake, ABS, steering and suspension, wheel alignment, tires and wheels, driveline, engine performance and maintenance and heating, ventilation and air conditioning services be offered and performed under the guidelines and procedures specified in these sections.

Before any service is performed on a vehicle, an inspection of the appropriate system must be performed. The results of this inspection must be explained to the customer and documented on an inspection form. The condition of the vehicle and its components will indicate what services/part replacements may be required or suggested. In addition, suggestions may be made to satisfy the needs expressed by the customer.

This section lists the various parts and conditions that indicate required or suggested service or part replacement. Although this list is extensive, it is not inclusive. In addition to this list, a technician may make a suggestion. This suggestion must be based on substantial and informed experience or the vehicle manufacturer's

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recommended service interval.

Some conditions indicate that service or part replacement is required because the part in question is no longer providing the function for which it is intended, does not meet a vehicle manufacturer's design specification or is missing.

- \* Example: An exhaust pipe has corroded severely and has a hole in it through which exhaust gases are leaking. Replacement of the exhaust pipe in this case is required due to functional failure.
- \* Example: A brake rotor has been worn to the point where it measures less than the vehicle manufacturer's specifications. Replacement of the rotor is required because it does not meet design specifications.

Some conditions indicate that a service or part replacement is suggested because the part is close to the end of its useful life or to address a customer's need, convenience or request. If a customer's vehicle has one of these conditions, the procedure may only be to suggest service.

- \* Example: An exhaust pipe is rusted, corroded or weak, but no leaks are present. In this case, the exhaust pipe has not failed. However, there is evidence that the pipe may need replacement in the near future. Replacement of the pipe may be suggested for the customer's convenience in avoiding a future problem.
- \* Example: The customer desires improved ride and/or handling, but the vehicle's shocks or struts have not failed. In this case, replacement may be suggested to satisfy the customer's wishes. In this case, replacement of the shocks or struts may not be sold as a requirement.

A customer, of course, has the choice of whether or not a shop will service his or her vehicle. He or she may decide not to follow some of your suggestions. When a customer declines to authorize a service or repair indicated in the MAP Uniform Inspection Guidelines as "required," a MAP shop may refuse service on that system, if proceeding with the work could create or continue an unsafe or unsatisfactory condition.

The following reasons may be used for required and suggested services. These codes are shown in the "Code" column of the Uniform Inspection Guidelines that follow.

### **PART REPLACEMENT CODE IDENTIFICATION**

**NOTE:** Refer to the following tables for definitions of the codes listed in the condition/procedure tables for the specific components that may need to be replaced.

Some exhaust systems are of a welded design. It is not required that the entire system be replaced. Determine the need to

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replace individual components based on conditions of component.

**CATALYTIC CONVERTERS**

**CAUTION:** Before working on an exhaust system, review EPA regulations on removing and replacing catalytic converters.

**NOTE:** Any time a converter has failed, further diagnosis is required to determine the reason(s) for converter failure. Advise customer of cause(s).

**CATALYTIC CONVERTERS**

|                                                                          |          |                                                                                        |
|--------------------------------------------------------------------------|----------|----------------------------------------------------------------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Condition                                                                | 3 Code 3 | Procedure                                                                              |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Air injection tube broken                                                | 3 A 3    |                                                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Air injection tube burnt                                                 | 3 A 3    |                                                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Air injection tube damaged                                               | 3 B 3    |                                                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Air injection tube leaking                                               | 3 A 3    |                                                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Air injection tube loose                                                 | 3 A 3    | Require repair or replacement of injection tube or replacement of catalytic converter. |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Air injection tube restricted                                            | 3 A 3    |                                                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Air injection tube threads damaged                                       | 3 B 3    |                                                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Air injection tube threads stripped (threads missing)                    | 3 A 3    |                                                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Body cracked                                                             | 3 B 3    |                                                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Converter empty                                                          | 3 A 3    | Require repair or replacement.                                                         |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Converter fill plug missing                                              | 3 C 3    |                                                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Converter missing                                                        | 3 C 3    | Require replacement.                                                                   |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Exhaust gases leaking                                                    | 3 A 3    | Require repair or replacement.                                                         |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Flanges leaking                                                          | 3 A 3    | Require repair or replacement of flanges.                                              |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Inlet pipes cracked                                                      | 3 B 3    | Require repair or replacement.                                                         |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
| Internal rattle (except pellet-type)                                     | 3 B,2 3  | Further inspection required.                                                           |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |
|                                                                          | 3        | See note (1) below.                                                                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |          |                                                                                        |

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Mounting brackets that are <sup>3</sup> A <sup>3</sup> Require repair or replacement.  
part of converter broken <sup>3</sup> <sup>3</sup>  
Obvious overheating <sup>3</sup> <sup>3</sup> Further inspection required.  
<sup>3</sup> <sup>3</sup> See note (2) below.  
Outlet pipes cracked <sup>3</sup> B <sup>3</sup> Require repair or replacement.  
Pieces of catalyst material <sup>3</sup> A,1 <sup>3</sup> Suggest replacement.  
found downstream <sup>3</sup> <sup>3</sup>  
Plugged <sup>3</sup> A <sup>3</sup> Require replacement. See note (3)  
Testing has determined that <sup>3</sup> A <sup>3</sup> Require repair or replacement.  
existing converter has been <sup>3</sup> <sup>3</sup>  
lead-poisoned, contaminated <sup>3</sup> <sup>3</sup>  
or failed testing <sup>3</sup> <sup>3</sup>

- NOTE: (1) If the converter is breaking up, suggest converter replacement. If an object has fallen into the converter, remove the object.
- (2) Further diagnosis is required to determine the cause of the overheating. Replacement of the converter may not be necessary.
- (3) Determine cause and correct to ensure that new converter will not become plugged.

**EXHAUST & TAIL PIPES**

NOTE: For pipes with resonators, also refer to the section on Mufflers and Resonators.

**EXHAUST & TAIL PIPES**

Condition <sup>3</sup> Code <sup>3</sup> Procedure  
Bracket broken <sup>3</sup> A <sup>3</sup>  
Pipe bent out of position <sup>3</sup> B <sup>3</sup>  
Require repair or replacement.  
Pipe broken <sup>3</sup> A <sup>3</sup>  
Pipe cracked <sup>3</sup> B <sup>3</sup>  
Pipe leaking <sup>3</sup> A <sup>3</sup>  
Pipe missing <sup>3</sup> C <sup>3</sup> Require replacement.  
Pipe plugged <sup>3</sup> A <sup>3</sup>  
Pipe weak due to corrosion, <sup>3</sup> A,1 <sup>3</sup> Suggest replacement.



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Broken 3 A 3 Require replacement of affected parts.

Diaphragm inoperative 3 A 3 Further inspection required. See note (1) below.

Leaking 3 A 3 Require repair or replacement.

Rattles 3 B,2 3 Suggest replacement of affected parts.

Seized 3 A 3 Require replacement of affected parts.

Spring(s) broken 3 B 3 Require replacement of spring(s).

Spring(s) inoperative 3 A 3 Require replacement of spring(s).

NOTE: (1) If the inoperative diaphragm is separate from the heat riser, then require replacement of the inoperative diaphragm. If the inoperative diaphragm is part of the heat riser, then replace the heat riser.

**HEAT SHIELDS**

**HEAT SHIELDS**

| Condition                                | Code | Procedure                      |
|------------------------------------------|------|--------------------------------|
| Bent                                     | B    | Require repair or replacement. |
| Broken                                   | A    | Require replacement.           |
| Corroded, affecting structural integrity | A,1  | Suggest replacement.           |
| Loose                                    | A    | Require repair.                |
| Missing                                  | C    | Require replacement.           |

**MANIFOLDS: CAST & TUBE TYPE**

**MANIFOLDS: CAST & TUBE TYPE**

| Condition                             | Code | Procedure                                                    |
|---------------------------------------|------|--------------------------------------------------------------|
| Air injection tube in manifold broken | A    | Require repair of injection tube or replacement of manifold. |

[illegible]



| Condition                                                           | 3 | Code | 3 | Procedure                                                    |
|---------------------------------------------------------------------|---|------|---|--------------------------------------------------------------|
| Body shell distorted, affecting performance or structural integrity | 3 | A    | 3 |                                                              |
| Corrosion hole                                                      | 3 | A    | 3 | Require replacement                                          |
| Missing                                                             | 3 | C    | 3 |                                                              |
| Mounting bracket(s) broken                                          | 3 | A    | 3 |                                                              |
| Mounting bracket(s) cracked                                         | 3 | B    | 3 | Require repair or replacement.                               |
| Nipple cracked                                                      | 3 | A    | 3 |                                                              |
| Nipple loose                                                        | 3 | B    | 3 | Require replacement.                                         |
| Outer wrap peeling (exhaust not leaking)                            | 3 | A,1  | 3 | Suggest replacement.                                         |
| Plugged                                                             | 3 | A    | 3 |                                                              |
| Puncture (other than a drain hole)                                  | 3 | A    | 3 | Require replacement.                                         |
| Rattling or knocking noise from muffler                             | 3 | B    | 3 |                                                              |
| Seam(s) open (exhaust leaking)                                      | 3 | A    | 3 |                                                              |
| Sound quality unsatisfactory                                        | 3 | B,2  | 3 | Suggest replacement to address customer need and/or request. |
| Split (exhaust leaking)                                             | 3 | A    | 3 | Require replacement.                                         |
| Weak due to corrosion, but no leaks present                         | 3 | A,1  | 3 | Suggest replacement.                                         |

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**END OF ARTICLE**

# TROUBLE SHOOTING - BASIC PROCEDURES

## Article Text

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### ARTICLE BEGINNING

#### GENERAL TROUBLE SHOOTING

#### AIR CONDITIONING TROUBLE SHOOTING

WARNING: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

#### BASIC AIR CONDITIONING TROUBLE SHOOTING CHART

| CONDITION                                         | POSSIBLE CAUSE                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Compressor Not Working                            | <ul style="list-style-type: none"><li>Compressor clutch circuit open.</li><li>Compressor clutch coil inoperative.</li><li>Poor clutch ground connection.</li><li>Fan belts loose.</li><li>Thermostatic switch inoperative.</li><li>Thermostatic switch not adjusted.</li><li>Ambient temperature switch open.</li><li>Superheat fuse blown.</li></ul>                                                                                                                 |
| Excessive Noise or Vibration                      | <ul style="list-style-type: none"><li>Missing or loose mounting bolts.</li><li>Bad idler pulley bearings.</li><li>Fan belts not tightened correctly.</li><li>Compressor clutch contacting body.</li><li>Excessive system pressure.</li><li>Compressor oil level low.</li><li>Damaged clutch bearings.</li><li>Damaged reed valves.</li><li>Damaged compressor.</li></ul>                                                                                              |
| Insufficient or No Cooling;<br>Compressor Working | <ul style="list-style-type: none"><li>Expansion valve inoperative.</li><li>Heater control valve stuck open.</li><li>Low system pressure.</li><li>Blocked condenser fins.</li><li>Blocked evaporator fins.</li><li>Vacuum system leak.</li><li>Vacuum motors inoperative.</li><li>Control cables improperly adjusted.</li><li>Restricted air inlet.</li><li>Mode doors binding.</li><li>Blower motor inoperative.</li><li>Temperature above system capacity.</li></ul> |

# TROUBLE SHOOTING - BASIC PROCEDURES

## Article Text (p. 2)

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### BRAKE SYSTEM TROUBLE SHOOTING

**WARNING:** This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

#### BRAKE SYSTEM TROUBLE SHOOTING CHART

| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                       |                                          |
|----------------------------------------------------------------------------------|---------------------------------------|------------------------------------------|
| CONDITION                                                                        | POSSIBLE CAUSE                        | CORRECTION                               |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                       |                                          |
| Brakes Pull Left<br>or Right                                                     | Incorrect tire pressure               | Inflate tires to proper pressure         |
|                                                                                  | Front end out of alignment            | See WHEEL ALIGNMENT                      |
|                                                                                  | Mismatched tires                      | Check tires sizes                        |
|                                                                                  | Restricted brake lines<br>or hoses    | Check hose routing                       |
|                                                                                  | Loose or malfunctioning<br>caliper    | See DISC BRAKES or<br>BRAKE SYSTEM       |
|                                                                                  | Bent shoe or oily linings             | See DRUM BRAKES or<br>BRAKE SYSTEM       |
|                                                                                  | Malfunctioning rear brakes            | See DRUM, DISC BRAKES<br>or BRAKE SYSTEM |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                       |                                          |
| Noises Without<br>Brakes Applied                                                 | Loose suspension parts                | See SUSPENSION                           |
|                                                                                  | Front linings worn out                | Replace linings                          |
|                                                                                  | Dust or oil on drums<br>or rotors     | See DRUM, DISC BRAKES<br>or BRAKE SYSTEM |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                       |                                          |
| Noises With<br>Brakes Applied                                                    | Insulator on outboard<br>shoe damaged | See DISC BRAKES or<br>BRAKE SYSTEM       |
|                                                                                  | Incorrect pads or linings             | Replace pads or linings                  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                       |                                          |
| Brake Rough, Chatters<br>or Pulsates                                             | Excessive lateral runout              | Check rotor runout                       |

## TROUBLE SHOOTING - BASIC PROCEDURES

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|                                        |                          |
|----------------------------------------|--------------------------|
| Parallelism not to specifications      | Reface or replace rotor  |
| Wheel bearings not adjusted            | See SUSPENSION           |
| Rear drums out-of-round                | Reface or replace drums  |
| Disc pad reversed, steel against rotor | Remove and reinstall pad |

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                        |                                              |                                      |
|------------------------|----------------------------------------------|--------------------------------------|
| Excessive Pedal Effort | Malfunctioning power unit                    | See POWER BRAKES or BRAKE SYSTEM     |
|                        | Partial system failure                       | Check fluid and pipes                |
|                        | Worn disc pad or lining                      | Replace pad or lining                |
|                        | Caliper piston stuck or sluggish             | See DISC BRAKES or BRAKE SYSTEM      |
|                        | Master cylinder piston stuck                 | See MASTER CYLINDERS or BRAKE SYSTEM |
|                        | Brake fade due to incorrect pads for linings | Replace pads or linings              |
|                        | Linings or pads glazed                       | Replace pads or linings              |
|                        | Worn drums                                   | Reface or replace drums              |

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                        |                                       |                                                |
|------------------------|---------------------------------------|------------------------------------------------|
| Excessive Pedal Travel | Partial brake system failure          | Check fluid and pipes                          |
|                        | Insufficient fluid in master cylinder | See MASTER CYLINDERS or BRAKE SYSTEM           |
|                        | Air trapped in system                 | See BRAKE BLEEDING or BRAKE SYSTEM             |
|                        | Rear brakes not adjusted              | See Adjustments in DRUM BRAKES or BRAKE SYSTEM |
|                        | Bent shoe or lining                   | See DRUM BRAKES or BRAKE SYSTEM                |
|                        | Plugged master cylinder cap           | See MASTER CYLINDERS                           |

# TROUBLE SHOOTING - BASIC PROCEDURES

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or BRAKE SYSTEM

Improper brake fluid

Replace brake fluid

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Pedal Travel

Decreasing

Compensating port plugged

See MASTER CYLINDERS  
or BRAKE SYSTEM

Swollen cup in master  
cylinder

See MASTER CYLINDERS  
or BRAKE SYSTEM

Master cylinder piston  
not returning

See MASTER CYLINDERS  
or BRAKE SYSTEM

Weak shoe retracting springs See DRUM BRAKES  
BRAKE SYSTEM

Wheel cylinder piston  
sticking

See DRUM BRAKES or  
BRAKE SYSTEM

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Dragging

Brakes

Master cylinder pistons  
not returning

See MASTER CYLINDERS  
BRAKE SYSTEM

Restricted brake lines  
or hoses  
Incorrect parking brake  
adjustment

Check line routing

See DRUM BRAKES  
BRAKE SYSTEM

Parking Brake cables frozen See DRUM BRAKES  
BRAKE SYSTEM

Incorrect installation of  
inboard disc pad Remove and replace  
correctly

Power booster output  
rod too long See POWER BRAKE UNITS  
BRAKE SYSTEM

Brake pedal not returning  
freely See DISC, DRUM BRAKES  
BRAKE SYSTEM

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Brakes Grab or  
Uneven Braking  
Action

Malfunction of combination  
valve

See CONTROL VALVE or  
BRAKE SYSTEM

Malfunction of power brake  
unit See POWER BRAKE UNITS  
or BRAKE SYSTEM

# TROUBLE SHOOTING - BASIC PROCEDURES

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Binding brake pedal

See DISC, DRUM BRAKES  
or BRAKE SYSTEM

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Pulsation or  
Roughness

Uneven pad wear caused by  
caliper

See DISC BRAKES or  
BRAKE SYSTEM

Uneven rotor wear

See DISC BRAKES or  
BRAKE SYSTEM

Drums out-of-round

Reface or replace drums

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

### CARBURETOR TROUBLE SHOOTING:

READ THIS FIRST:

WARNING: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

### COLD START SYMPTOMS

#### BASIC COLD START SYMPTOMS TROUBLE SHOOTING CHART

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

CONDITION

POSSIBLE CAUSE

CORRECTION

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Engine Won't  
Start

Choke not closing

Check choke  
operation, see  
FUEL SYSTEMS

Choke linkage bent

Check linkage, see  
FUEL SYSTEM

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Engine Starts,  
Then Dies

Choke vacuum kick setting  
too wide

Check setting and  
adjust see, FUEL  
SYSTEMS

Fast idle RPM too low

Reset RPM to specif-  
ication, see TUNE-UP

Fast idle cam index  
incorrect

Reset fast idle cam  
index, see FUEL  
SYSTEMS

Vacuum leak

Inspect vacuum  
system for leaks

# TROUBLE SHOOTING - BASIC PROCEDURES

## Article Text (p. 6)

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Low fuel pump outlet

Repair or replace  
pump, see FUEL  
SYSTEMS

Low carburetor fuel level

Check float setting  
see FUEL SYSTEM

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Engine Quits  
Under Load

Choke vacuum kick setting  
incorrect

Reset vacuum kick  
setting, see FUEL  
SYSTEMS

Fast idle cam index  
incorrect

Reset fast idle cam  
index, see FUEL  
SYSTEM

Incorrect hot fast idle  
speed RPM

Reset fast idle RPM,  
see TUNE-UP

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Engine Starts,  
Runs Up, Then  
Idles, Slowly  
With Black Smoke

Choke vacuum kick set too  
narrow

Reset vacuum kick,  
see FUEL SYSTEMS

Fast idle cam index  
incorrect

Reset fast idle cam  
index, see FUEL  
SYSTEMS

Hot fast idle RPM too low

Reset fast idle RPM,  
see TUNE-UP

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

### HOT STARTING SYMPTOMS

#### BASIC HOT START SYMPTOMS TROUBLE SHOOTING CHART

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

CONDITION

POSSIBLE CAUSE

CORRECTION

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Engine Won't  
Start

Engine flooded

Allow fuel to  
evaporate

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

### COLD ENGINE DRIVEABILITY SYMPTOMS

#### BASIC COLD ENGINE DRIVEABILITY SYMPTOMS TROUBLE SHOOTING CHART

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

CONDITION

POSSIBLE CAUSE

CORRECTION

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Engine Stalls in  
Gear

Choke vacuum kick setting  
incorrect

Reset choke vacuum  
kick, see FUEL  
SYSTEMS

Fast idle RPM incorrect

Reset fast idle RPM,  
see TUNE-UP



## TROUBLE SHOOTING - BASIC PROCEDURES

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|                           |                                     |                                                |
|---------------------------|-------------------------------------|------------------------------------------------|
|                           | Fast idle cam index incorrect       | Reset fast idle cam see FUEL SYSTEMS           |
| Acceleration Sag or Stall | Defective choke control switch      | Replace choke control switch                   |
|                           | Choke vacuum kick setting incorrect | Reset choke vacuum kick see, FUEL SYSTEMS      |
|                           | Float level incorrect (too low)     | Adjust float level, FUEL SYSTEMS               |
|                           | Accelerator pump defective          | Repair or replace pump see FUEL SYSTEMS        |
|                           | Secondary throttles not closed      | Inspect lockout adjustment, see FUEL SYSTEMS   |
| Sag or Stall After Warmup | Defective choke control switch      | Replace choke control switch, see FUEL SYSTEMS |
|                           | Defective accelerator pump          | Replace pump, see FUEL SYSTEMS                 |
|                           | Float level incorrect (too low)     | Adjust float level, see FUEL SYSTEMS           |
| Backfiring & Black Smoke  | Plugged heat crossover system       | Remove restriction                             |

## WARM ENGINE DRIVEABILITY SYMPTOM

### BASIC WARM ENGINE DRIVEABILITY SYMPTOMS TROUBLE SHOOTING CHART

| CONDITION                                          | POSSIBLE CAUSE                      | CORRECTION                           |
|----------------------------------------------------|-------------------------------------|--------------------------------------|
| Hesitation With Small Amount of Gas Pedal Movement | Vacuum leak                         | Inspect vacuum lines                 |
|                                                    | Accelerator pump weak or inoperable | Replace pump, see FUEL SYSTEMS       |
|                                                    | Float level setting too low         | Reset float level, see, FUEL SYSTEMS |
|                                                    | Metering rods sticking or           | Inspect and/or                       |

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|                                                |                                             |
|------------------------------------------------|---------------------------------------------|
| binding                                        | replace rods, see<br>FUEL SYSTEMS           |
| Carburetor idle or transfer<br>system plugged  | Inspect system and<br>remove restriction    |
| Frozen or binding heated air<br>inlet          | Inspect heated air<br>door for binding      |
| Hesitation With<br>Heavy Gas Pedal<br>Movement | Replace pump, see<br>FUEL SYSTEMS           |
| Metering rod carrier<br>sticking or binding    | Remove restriction                          |
| Large vacuum leak                              | Inspect vacuum<br>system and repair<br>leak |
| Float level setting too<br>low                 | Reset float level,<br>see FUEL SYSTEMS      |
| Defective fuel pump, lines<br>or filter        | Inspect pump, lines<br>and filter           |
| Air door setting incorrect                     | Adjust air door<br>setting, see FUEL        |

## CHARGING SYSTEM TROUBLE SHOOTING

**WARNING:** This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

### BASIC CHARGING SYSTEM TROUBLE SHOOTING CHART

| CONDITION                 | POSSIBLE CAUSE                           | CORRECTION                                                                  |
|---------------------------|------------------------------------------|-----------------------------------------------------------------------------|
| Vehicle Will Not<br>Start | Dead battery                             | Check battery cells,<br>alternator belt<br>tension and alternator<br>output |
|                           | Loose or corroded battery<br>connections | Check all charging<br>system connections                                    |

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|                                                                          |                                          |                                                                                                             |
|--------------------------------------------------------------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|                                                                          | Ignition circuit or switch malfunction   | Check and replace as necessary                                                                              |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                          |                                                                                                             |
| Alternator Light Stays On With Engine Running                            | Loose or worn alternator drive belt      | Check alternator drive tension and condition, See Belt Adjustment in TUNE-UP article in the TUNE-UP section |
|                                                                          | Loose alternator wiring connections      | Check all charging system connections                                                                       |
|                                                                          | Short in alternator light wiring         | See Indicator Warning Lights in STANDARD INSTRUMENTS in the ACCESSORIES & EQUIPMENT section                 |
|                                                                          | Defective alternator stator or diodes    | See Bench Tests in ALTERNATOR article                                                                       |
|                                                                          | Defective regulator                      | See Regulator Check in ALTERNATOR article                                                                   |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                          |                                                                                                             |
| Alternator Light Stays Off With Ignition Switch ON                       | Blown fuse                               | See WIRING DIAGRAMS                                                                                         |
|                                                                          | Defective alternator                     | See Testing in ALTERNATOR article                                                                           |
|                                                                          | Defective indicator light bulb or socket | See Indicator Warning Lights in STANDARD INSTRUMENTS in the ACCESSORIES & EQUIPMENT section                 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                          |                                                                                                             |
| Alternator Light Stays OFF With Ignition Switch ON                       | Short in alternator wiring               | See On-Vehicle Tests in ALTERNATOR article                                                                  |
|                                                                          | Defective rectifier bridge               | See Bench Tests in ALTERNATOR article                                                                       |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                          |                                                                                                             |
| Lights or Fuses Burn Out Frequently                                      | Defective alternator wiring              | See On-Vehicle Tests in ALTERNATOR article                                                                  |
|                                                                          | Defective regulator                      | See Regulator Check in                                                                                      |

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### ALTERNATOR article

Defective battery

Check and replace as necessary

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Ammeter Gauge      Loose or worn drive belt  
Shows Discharge

Check alternator drive belt tension and condition. See Belt Adjustment in TUNE-UP article in the TUNE-UP section

Defective wiring

Check all wires and wire connections

Defective alternator or regulator

See Bench Tests and On-Vehicle Tests in ALTERNATOR article

Defective ammeter, or improper ammeter wiring connection

See Testing in STANDARD INSTRUMENTS in the ACCESSORIES & EQUIPMENT section

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Noisy                      Loose drive pulley  
Alternator

Tighten drive pulley attaching nut

Loose mounting bolts

Tighten all alternator mounting bolts

Worn or dirty bearings

See Bearing Replacement  
ALTERNATOR article

Defective diodes or stator

See Bench Test in ALTERNATOR article

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Battery Does              Loose or worn drive belt  
Stay Charged

Check alternator drive belt tension and condition. See Belt Adjustment in appropriate TUNE-UP article in the TUNE-UP section

Loose or corroded battery connections

Check all charging system connections

Loose alternator connections

Check all charging system connections

Defective alternator or

See On-Vehicle Tests

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battery

and Bench Tests in  
ALTERNATOR article

Add-on electrical accessories    Install larger  
exceeding alternator capacity    alternator

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Battery  
Overcharged-  
Uses Too Much  
Water

Defective battery

Check alternator  
output and repair as  
necessary

Defective alternator

See On-Vehicle Test and  
Bench Tests in  
ALTERNATOR article

Excessive alternator voltage    Check alternator output  
and repair as necessary

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## CLUTCH TROUBLE SHOOTING

WARNING: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

### BASIC CLUTCH TROUBLE SHOOTING CHART

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|-----------|----------------|------------|
|-----------|----------------|------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                           |                                    |                                       |
|---------------------------|------------------------------------|---------------------------------------|
| Chattering or<br>Grabbing | Incorrect clutch adjustment        | Adjust clutch                         |
|                           | Oil, grease or glaze on<br>facings | Disassemble and clean<br>or replace   |
|                           | Loose "U" joint flange             | See DRIVE AXLES<br>article            |
|                           | Worn input shaft spline            | Replace input shaft                   |
|                           | Binding pressure plate             | Replace pressure plate                |
|                           | Binding release lever              | See CLUTCH article                    |
|                           | Binding clutch disc hub            | Replace clutch disc                   |
|                           | Unequal pressure plate<br>contact  | Replace worn/misaligned<br>components |

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|                                             |                                                 |
|---------------------------------------------|-------------------------------------------------|
| Loose/bent clutch disc                      | Replace clutch disc                             |
| Incorrect transmission alignment            | Realign transmission                            |
| Worn pressure plate, disc or flywheel       | Replace damaged components                      |
| Broken or weak pressure springs             | Replace pressure plate                          |
| Sticking clutch pedal                       | Lubricate clutch pedal & linkage                |
| Incorrect clutch disc facing                | Replace clutch disc                             |
| Engine loose in chassis                     | Tighten all mounting bolts                      |
| Failure to Release                          |                                                 |
| Oil or grease on clutch facings             | Clean or replace clutch clutch disc             |
| Incorrect release lever or pedal adjustment | See CLUTCH article                              |
| Worn or broken clutch facings               | Replace clutch disc                             |
| Bent clutch disc or pressure plate          | Replace damaged components                      |
| Clutch disc hub binding on input shaft      | Clean or replace clutch disc and/or input shaft |
| Binding pilot bearing                       | Replace pilot bearing                           |
| Sticking release bearing sleeve             | Replace release bearing and/or sleeve           |
| Binding clutch cable                        | See CLUTCH article                              |
| Defective clutch master                     | Replace master cylinder                         |
| Defective clutch slave                      | Replace slave cylinder                          |
| Air in hydraulic system                     | Bleed hydraulic system                          |
| Rattling                                    |                                                 |
| Weak or broken release lever spring         | Replace spring and check alignment              |
| Damaged pressure plate                      | Replace pressure plate                          |

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|                                            |                                                                                    |
|--------------------------------------------|------------------------------------------------------------------------------------|
| Broken clutch return spring                | Replace return spring                                                              |
| Worn splines on clutch disc or input shaft | Replace clutch disc and/or input shaft                                             |
| Worn clutch release bearing                | Replace release bearing                                                            |
| Dry or worn pilot bearing                  | Lubricate or replace pilot bearing                                                 |
| Unequal release lever contact              | Align or replace release lever                                                     |
| Incorrect pedal free play                  | Adjust free play                                                                   |
| Warped or damaged clutch disc              | Replace damaged components                                                         |
| Slipping                                   | Pressure springs worn or Release pressure plate                                    |
|                                            | Oily, greasy or worn facings Clean or replace clutch disc                          |
|                                            | Incorrect clutch alignment Realign clutch assembly                                 |
|                                            | Warped clutch disc or pressure plate Replace damaged components                    |
|                                            | Binding release levers or clutch pedal Lubricate and/or replace release components |
| Squeaking                                  | Worn or damaged release Replace release bearing                                    |
|                                            | Dry or worn pilot or release bearing Lubricate or replace assembly                 |
|                                            | Pilot bearing turning in crankshaft Replace pilot bearing and/or crankshaft        |
|                                            | Worn input shaft bearing Replace bearing and seal                                  |
|                                            | Incorrect transmission alignment Realign transmission                              |
|                                            | Dry release fork between pivot Lubricate release fork and pivot                    |
| Heavy and/or Stiff Pedal                   | Sticking release bearing sleeve Replace release bearing and/or sleeve              |

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Dry or binding clutch  
pedal hub

Lubricate and align  
components

Floor mat interference  
with pedal

Lay mat flat in proper  
area

Dry or binding ball/fork  
pivots

Lubricate and align  
components

Faulty clutch cable

Replace clutch cable

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Noisy Clutch  
Pedal

Faulty interlock switch

Replace interlock  
switch

Self-adjuster ratchet  
noise

Lubricate or replace  
self-adjuster

Speed control interlock  
switch

Lubricate or replace  
interlock switch

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Clutch Pedal  
Sticks Down

Binding clutch cable

See CLUTCH article

Springs weak in pressure  
plate

Replace pressure plate

Binding in clutch linkage

Lubricate and free  
linkage

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Noisy

Dry release bearing

Lubricate or replace  
release bearing

Dry or worn pilot bearing

Lubricate or replace  
bearing

Worn input shaft bearing

Replace bearing

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Transmission  
Click

Weak springs in pressure  
plate

Replace pressure plate

Release fork loose on ball  
stud

Replace release fork  
and/or ball stud

Oil on clutch disc damper

Replace clutch disc

Broken spring in slave  
cylinder

Replace slave cylinder

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## COOLING SYSTEM TROUBLE SHOOTING



## TROUBLE SHOOTING - BASIC PROCEDURES

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#### COOLING SYSTEM TROUBLE SHOOTING

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|-----------|----------------|------------|
|-----------|----------------|------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                 |                                 |                            |
|-----------------|---------------------------------|----------------------------|
| Overheating     | Coolant Leak                    | Fill/Pressure Test System  |
|                 | A/C Condenser Fins Clogged      | Remove/Clean Condenser     |
|                 | Radiator Fins Clogged           | Remove/Clean Radiator      |
|                 | Thermostat Stuck Closed         | Replace Thermostat         |
|                 | Clogged Cooling System Passages | Clean/Flush Cooling System |
|                 | Water Pump Malfunction          | Replace Water Pump         |
|                 | Fan Clutch Malfunction          | Replace Fan Clutch         |
|                 | Retarded Ignition Timing        | Reset Ignition Timing      |
|                 | Cooling Fan Malfunction         | Test Cooling Fan/Circuit   |
|                 | Cooling Fan Motor Malfunction   | Test Fan Motor             |
|                 | Cooling Fan Relay Malfunction   | Test Fan Relay             |
|                 | Faulty Radiator Cap             | Replace Radiator Cap       |
|                 | Broken/Slipping Fan Belt        | Replace Fan Belt           |
|                 | Restricted Exhaust              | Repair Exhaust System      |
| Corrosion       | Impurities In Coolant           | Clean/Flush System         |
| Coolant Leakage | Damaged hose                    | Replace Hose               |
|                 | Leaky Water Pump                | Replace Water Pump         |

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|                       |                         |
|-----------------------|-------------------------|
| Damaged Radiator Seam | Replace/Repair Radiator |
|-----------------------|-------------------------|

|                        |                          |
|------------------------|--------------------------|
| Leaky Thermostat Cover | Replace Thermostat Cover |
|------------------------|--------------------------|

|                       |                        |
|-----------------------|------------------------|
| Cylinder Head Problem | Check Head/Head Gasket |
|-----------------------|------------------------|

|                    |                      |
|--------------------|----------------------|
| Leaky Freeze Plugs | Replace Freeze Plugs |
|--------------------|----------------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Recovery System Inoperative

|                                     |                      |
|-------------------------------------|----------------------|
| Loose and/or Defective Radiator Cap | Replace Radiator Cap |
|-------------------------------------|----------------------|

|                                      |             |
|--------------------------------------|-------------|
| Overflow Tube Clogged and/or Leaking | Repair Tube |
|--------------------------------------|-------------|

|                                 |            |
|---------------------------------|------------|
| Recovery Bottle Vent Restricted | Clean Vent |
|---------------------------------|------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

No Heater Core Flow

|                       |                     |
|-----------------------|---------------------|
| Collapsed Heater Hose | Replace Heater Hose |
|-----------------------|---------------------|

|                     |                           |
|---------------------|---------------------------|
| Plugged Heater Core | Clean/Replace Heater Core |
|---------------------|---------------------------|

|                     |                      |
|---------------------|----------------------|
| Faulty Heater Valve | Replace Heater Valve |
|---------------------|----------------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## DIESEL ENGINE TROUBLE SHOOTING

**WARNING:** This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

**NOTE:** Diesel engines mechanical diagnosis is the same as gasoline engines for items such as noisy valves, bearings, pistons, etc. The following trouble shooting covers only items pertaining to diesel engines.

### BASIC DIESEL ENGINE TROUBLE SHOOTING CHART

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| CONDITION          | POSSIBLE CAUSE                            | CORRECTION                                 |
|--------------------|-------------------------------------------|--------------------------------------------|
| Engine Won't Crank | Bad battery connections or dead batteries | Check connections and/or replace batteries |
|                    | Bad starter connections or bad starter    | Check connections and/or replace           |

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|                                                                          |                                              |                                                  |
|--------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------|
|                                                                          |                                              | batteries                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                              |                                                  |
| Engine Cranks<br>Slowly, Won't<br>Start                                  | Bad battery connections<br>or dead batteries | Check connections<br>and/or replace<br>batteries |
|                                                                          | Engine oil too heavy                         | Replace engine oil                               |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                              |                                                  |
| Engine Cranks<br>Normally, But<br>Will Not Start                         | Glow plugs not functioning                   | Check glow plug system,<br>see FUEL SYSTEMS      |
|                                                                          | Glow plug control not<br>functioning         | Check controller, see<br>FUEL SYSTEMS            |
|                                                                          | Fuel not injected into<br>cylinders          | Check fuel injectors,<br>see FUEL SYSTEMS        |
|                                                                          | No fuel to injection pump                    | Check fuel delivery<br>system                    |
|                                                                          | Fuel filter blocked                          | Replace fuel filter                              |
|                                                                          | Fuel tank filter blocked                     | Replace fuel tank<br>filter                      |
|                                                                          | Fuel pump not operating                      | Check pump operation<br>and/or replace pump      |
|                                                                          | Fuel return system blocked                   | Inspect system and<br>remove restriction         |
|                                                                          | No voltage to fuel solenoid                  | Check solenoid and<br>connections                |
|                                                                          | Incorrect or contaminated<br>fuel            | Replace fuel                                     |
|                                                                          | Incorrect injection pump<br>timing           | Re-adjust pump timing,<br>see FUEL SYSTEMS       |
|                                                                          | Low compression                              | Check valves, pistons,<br>rings, see ENGINES     |
|                                                                          | Injection pump malfunction                   | Inspect and/or replace<br>injection pump         |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                              |                                                  |
| Engine Starts,<br>Won't Idle                                             | Incorrect slow idle<br>adjustment            | Reset idle adjustment,<br>see TUNE-UP            |
|                                                                          | Fast idle solenoid<br>malfunctioning         | Check solenoid and<br>connections                |
|                                                                          | Fuel return system blocked                   | Check system and remove<br>restrictions          |
|                                                                          | Glow plugs go off too soon                   | See glow plug diagnosis<br>in FUEL SYSTEMS       |
|                                                                          | Injection pump timing<br>incorrect           | Reset pump timing, see<br>FUEL SYSTEMS           |
|                                                                          | No fuel to injection pump                    | Check fuel delivery<br>system                    |
|                                                                          | Incorrect or contaminated<br>fuel            | Replace fuel                                     |
|                                                                          | Low compression                              | Check valves, piston,<br>rings, see ENGINES      |
|                                                                          | Injection pump malfunction                   | Replace injection pump,<br>see FUEL SYSTEMS      |
|                                                                          | Fuel solenoid closes in RUN                  | Check solenoid and                               |

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|                                                                                           | position                                                                                                                                                                               | connections                                                                                                                                                                        |
|-------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Engines Starts/<br>Idles Rough W/out<br>Smoke or Noise                                    | Incorrect slow idle<br>adjustment<br>Injection line fuel leaks<br>Fuel return system blocked<br>Air in fuel system<br>Incorrect or contaminated<br>fuel<br>Injector nozzle malfunction | Reset slow idle, see<br>TUNE-UP<br>Check lines and<br>connections<br>Check lines and<br>connections<br>Bleed air from system<br>Replace fuel<br>Check nozzles, see<br>FUEL SYSTEMS |
| Engines Starts<br>and Idles Rough<br>W/out Smoke or<br>Noise, But Clears<br>After Warm-Up | Injection pump timing<br>incorrect<br>Engine not fully broken in<br>Air in system<br>Injector nozzle malfunction                                                                       | Reset pump timing, see<br>FUEL SYSTEMS<br>Put more miles on<br>engine<br>Bleed air from system<br>Check nozzles, see<br>FUEL SYSTEMS                                               |
| Engine Idles<br>Correctly,<br>Misfires Above<br>Idle                                      | Blocked fuel filter<br>Injection pump timing<br>incorrect<br>Incorrect or contaminated<br>fuel                                                                                         | Replace fuel filter<br>Reset pump timing, see<br>FUEL SYSTEMS<br>Replace fuel                                                                                                      |
| Engine Won't<br>Return To Idle                                                            | Fast idle adjustment<br>incorrect<br>Internal injection pump<br>malfunction<br>External linkage binding                                                                                | Reset fast idle, see<br>TUNE-UP<br>Replace injection pump,<br>see FUEL SYSTEMS<br>Check linkage and<br>remove binding                                                              |
| Fuel Leaks On<br>Ground                                                                   | Loose or broken fuel line<br>Internal injection pump<br>seal leak                                                                                                                      | Check lines and<br>connections<br>Replace injection pump,<br>see FUEL SYSTEMS                                                                                                      |
| Cylinder<br>Knocking Noise                                                                | Injector nozzles sticking<br>open<br>Very low nozzle opening<br>pressure                                                                                                               | Test injectors, see<br>FUEL SYSTEMS<br>Test injectors and/or<br>replace                                                                                                            |
| Loss of Engine<br>Power                                                                   | Restricted air intake<br>EGR valve malfunction<br>Blocked or damaged exhaust<br>system<br>Blocked fuel tank filter<br>Restricted fuel filter                                           | Remove restriction<br>Replace EGR valve<br>Remove restriction<br>and/or replace<br>components<br>Replace filter<br>Remove restriction                                              |

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# **TROUBLE SHOOTING - BASIC PROCEDURES**

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### **DRIVE AXLE - NOISE DIAGNOSIS**

#### **UNRELATED NOISES**

Some driveline trouble symptoms are also common to the engine, transmission, wheel bearings, tires, and other parts of the vehicle. Ensure cause of trouble actually is in the drive axle before adjusting, repairing, or replacing any of its parts.

#### **NON-DRIVE AXLE NOISES**

A few conditions can sound just like drive axle noise and have to be considered in pre-diagnosis. The 4 most common noises are exhaust, tires, CV/universal joints and wheel trim rings.

In certain conditions, the pitch of the exhaust gases may sound like gear whine. At other times, it may be mistaken for a wheel bearing rumble.

Tires, especially radial and snow, can have a high-pitched tread whine or roar, similar to gear noise. Also, some non-standard tires with an unusual tread construction may emit a roar or whine.

Defective CV/universal joints may cause clicking noises or excessive driveline play that can be improperly diagnosed as drive axle problems.

Trim and moldings also can cause a whistling or whining noise. Ensure none of these components are causing the noise before disassembling the drive axle.

#### **GEAR NOISE**

A "howling" or "whining" noise from the ring and pinion gear can be caused by an improper gear pattern, gear damage, or improper bearing preload. It can occur at various speeds and driving conditions, or it can be continuous.

Before disassembling axle to diagnose and correct gear noise, make sure that tires, exhaust, and vehicle trim have been checked as possible causes.

#### **CHUCKLE**

This is a particular rattling noise that sounds like a stick against the spokes of a spinning bicycle wheel. It occurs while decelerating from 40 MPH and usually can be heard until vehicle comes to a complete stop. The frequency varies with the speed of the vehicle.

A chuckle that occurs on the driving phase is usually caused by excessive clearance due to differential gear wear, or by a damaged tooth on the coast side of the pinion or ring gear. Even a very small tooth nick or a ridge on the edge of a gear tooth is enough the cause the noise.

This condition can be corrected simply by cleaning the gear tooth nick or ridge with a small grinding wheel. If either gear is

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damaged or scored badly, the gear set must be replaced. If metal has broken loose, the carrier and housing must be cleaned to remove particles that could cause damage.

#### **KNOCK**

This is very similar to a chuckle, though it may be louder, and occur on acceleration or deceleration. Knock can be caused by a gear tooth that is damaged on the drive side of the ring and pinion gears. Ring gear bolts that are hitting the carrier casting can cause knock. Knock can also be due to excessive end play in the axle shafts.

#### **CLUNK**

Clunk is a metallic noise heard when an automatic transmission is engaged in Reverse or Drive, or when throttle is applied or released. It is caused by backlash somewhere in the driveline, but not necessarily in the axle. To determine whether driveline clunk is caused by the axle, check the total axle backlash as follows:

1) Raise vehicle on a frame or twinpost hoist so that drive wheels are free. Clamp a bar between axle companion flange and a part of the frame or body so that flange cannot move.

2) On conventional drive axles, lock the left wheel to keep it from turning. On all models, turn the right wheel slowly until it is felt to be in Drive condition. Hold a chalk marker on side of tire about 12" from center of wheel. Turn wheel in the opposite direction until it is again felt to be in Drive condition.

3) Measure the length of the chalk mark, which is the total axle backlash. If backlash is one inch or less, drive axle is not the source of clunk noise.

#### **BEARING WHINE**

Bearing whine is a high-pitched sound similar to a whistle. It is usually caused by malfunctioning pinion bearings. Pinion bearings operate at drive shaft speed. Roller wheel bearings may whine in a similar manner if they run completely dry of lubricant. Bearing noise will occur at all driving speeds. This distinguishes it from gear whine, which usually comes and goes as speed changes.

#### **BEARING RUMBLE**

Bearing rumble sounds like marbles being tumbled. It is usually caused by a malfunctioning wheel bearing. The lower pitch is because the wheel bearing turns at only about 1/3 of drive shaft speed.

#### **CHATTER ON TURNS**

This is a condition where the entire front or rear of vehicle

# TROUBLE SHOOTING - BASIC PROCEDURES

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vibrates when vehicle is moving. The vibration is plainly felt as well as heard. Extra differential thrust washers installed during axle repair can cause a condition of partial lock-up that creates this chatter.

### AXLE SHAFT NOISE

Axle shaft noise is similar to gear noise and pinion bearing whine. Axle shaft bearing noise will normally distinguish itself from gear noise by occurring in all driving modes (Drive, cruise, coast and float), and will persist with transmission in Neutral while vehicle is moving at problem speed.

If vehicle displays this noise condition, remove suspect axle shafts, replace wheel seals and install a new set of bearings. Re-evaluate vehicle for noise before removing any internal components.

### VIBRATION

Vibration is a high-frequency trembling, shaking or grinding condition (felt or heard) that may be constant or variable in level and can occur during the total operating speed range of the vehicle.

The types of vibrations that can be felt in the vehicle can be divided into 3 main groups:

- \* Vibrations of various unbalanced rotating parts of the vehicle.
- \* Resonance vibrations of the body and frame structures caused by rotating of unbalanced parts.
- \* Tip-in moans of resonance vibrations from stressed engine or exhaust system mounts or driveline flexing modes.

### DRIVE AXLE - RWD TROUBLE SHOOTING

**WARNING:** This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing. For definitions of listed noises or sounds, see DRIVE AXLE - NOISE DIAGNOSIS.

#### DRIVE AXLE (RWD) TROUBLE SHOOTING

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
CONDITION POSSIBLE CAUSE CORRECTION  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Knocking or Clunking

Differential Side Gear  
Clearance

Check Clearance

Worn Pinion Shaft

Replace Pinion Shaft



# TROUBLE SHOOTING - BASIC PROCEDURES

## Article Text (p. 23)

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|                     |                |
|---------------------|----------------|
| Axle Shaft End Play | Check End Play |
|---------------------|----------------|

|                    |                                     |
|--------------------|-------------------------------------|
| Missing Gear Teeth | Check Differential/<br>Replace Gear |
|--------------------|-------------------------------------|

|                     |                |
|---------------------|----------------|
| Wrong Axle Backlash | Check Backlash |
|---------------------|----------------|

|                      |                   |
|----------------------|-------------------|
| Misaligned Driveline | Realign Driveline |
|----------------------|-------------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Clinking During Engagement

|                     |                 |
|---------------------|-----------------|
| Side Gear Clearance | Check Clearance |
|---------------------|-----------------|

|                          |                |
|--------------------------|----------------|
| Ring and Pinion Backlash | Check Backlash |
|--------------------------|----------------|

|                         |                       |
|-------------------------|-----------------------|
| Worn/Loose Pinion Shaft | Replace Shaft/Bearing |
|-------------------------|-----------------------|

|               |                   |
|---------------|-------------------|
| Bad "U" Joint | Replace "U" Joint |
|---------------|-------------------|

|                    |                |
|--------------------|----------------|
| Sticking Slip Yoke | Lube Slip Yoke |
|--------------------|----------------|

|                        |               |
|------------------------|---------------|
| Broken Rear Axle Mount | Replace Mount |
|------------------------|---------------|

|                          |              |
|--------------------------|--------------|
| Loose Drive Shaft Flange | Check Flange |
|--------------------------|--------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Click/Chatter On Turns

|                                     |                 |
|-------------------------------------|-----------------|
| Differential Side Gear<br>Clearance | Check Clearance |
|-------------------------------------|-----------------|

|                          |                       |
|--------------------------|-----------------------|
| Wrong Turn On Plates (1) | Replace Clutch Plates |
|--------------------------|-----------------------|

|                                     |                  |
|-------------------------------------|------------------|
| Wrong Differential<br>Lubricant (1) | Change Lubricant |
|-------------------------------------|------------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Knock Or Click

|                                    |                       |
|------------------------------------|-----------------------|
| Flat Spot on Rear<br>Wheel Bearing | Replace Wheel Bearing |
|------------------------------------|-----------------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Low Vibration At All Speeds

|                      |                       |
|----------------------|-----------------------|
| Faulty Wheel Bearing | Replace Wheel Bearing |
|----------------------|-----------------------|

|                  |                   |
|------------------|-------------------|
| Faulty "U" Joint | Replace "U" Joint |
|------------------|-------------------|

|                    |                     |
|--------------------|---------------------|
| Faulty Drive Shaft | Balance Drive Shaft |
|--------------------|---------------------|

|                         |                |
|-------------------------|----------------|
| Faulty Companion Flange | Replace Flange |
|-------------------------|----------------|

|                         |                |
|-------------------------|----------------|
| Faulty Slip Yoke Flange | Replace Flange |
|-------------------------|----------------|

(1) - Limited slip differential only.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## FWD AXLE SHAFTS & CV JOINTS TROUBLE SHOOTING

| CONDITION                             | POSSIBLE CAUSE                       | CORRECTION                              |
|---------------------------------------|--------------------------------------|-----------------------------------------|
| Engine Won't Start (Crankes Normally) | Cold start valve inoperative         | Test valve and circuit                  |
|                                       | Poor connection;vacuum or wiring     | Check vacuum and electrical connections |
|                                       | Contaminated fuel                    | Test fuel for water or alcohol          |
|                                       | Defective fuel pump relay or circuit | Test relay and wiring                   |
|                                       | Battery too low                      | Charge and test battery                 |

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|                                                                                  |                                                                                   |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Low fuel pressure                                                                | Test pressure regulator and fuel pump, check for restricted lines and filters     |
| No distributor reference pulses                                                  | Repair ignition system as necessary                                               |
| Open coolant temperature sensor circuit                                          | Test sensor and wiring                                                            |
| Shorted W.O.T. switch in T.P.S.                                                  | Disconnect W.O.T. switch, engine should start                                     |
| Defective ECM                                                                    | Replace ECM                                                                       |
| Fuel tank residual pressure valve leaks                                          | Test for fuel pressure drop after shut down                                       |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                   |
| Hard Starting                                                                    | Disconnected hot air tube to air cleaner<br>Reconnect tube and test control valve |
| Defective Idle Air Control (IAC) valve                                           | Test valve operation and circuit                                                  |
| Shorted, open or misadjusted T.P.S.                                              | Test and adjust or replace T.P.S.                                                 |
| EGR valve open                                                                   | Test EGR valve and control circuit                                                |
| Poor Oxygen sensor signal                                                        | Test for shorted or circuit                                                       |
| Incorrect mixture from PCV system                                                | Test PCV for flow, check sealing of oil filter cap                                |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                   |
| Poor High Speed Operation                                                        | Low fuel pump volume<br>Faulty pump or restricted fuel lines or filters           |
| Poor MAP sensor signal                                                           | Test MAP sensor, vacuum hose and wiring                                           |
| Poor Oxygen sensor signal                                                        | Test for shorted or open sensor or circuit                                        |

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|                                         |                                                                                      |
|-----------------------------------------|--------------------------------------------------------------------------------------|
| Open coolant temperature sensor circuit | Test sensor and wiring                                                               |
| Faulty ignition operation               | Check wires for cracks or poor connections, test secondary voltage with oscilloscope |
| Contaminated fuel                       | Test fuel for water or alcohol                                                       |
| Intermittent ECM ground                 | Test ECM ground connection for resistance                                            |
| Restricted air cleaner                  | Replace air cleaner                                                                  |
| Restricted exhaust system               | Test for exhaust manifold back pressure                                              |
| Poor MAF sensor signal                  | Check leakage between sensor and manifold                                            |
| Poor VSS signal                         | If tester for ALCL hook-up is available check that VSS reading matches speedometer   |
| Ping or Knock on Acceleration           | Poor Knock sensor signal<br>Test for shorted or open sensor or circuit               |
| Poor Baro sensor signal                 | Test for shorted or open sensor or circuit                                           |
| Improper ignition timing                | See VEHICLE EMISSION CONTROL LABEL (where applicable)                                |
| Check for engine overheating problems   | Low coolant, loose belts or electric cooling fan inoperative                         |

NOTE: For additional electronic fuel injection trouble shooting information, see the appropriate article in the ENGINE

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## Article Text (p. 27)

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PERFORMANCE section (not all vehicles have Computer Engine Control articles). Information is provided there for diagnosing fuel system problems on vehicles with electronic fuel injection.

### GASOLINE ENGINE - MECHANICAL TROUBLE SHOOTING

WARNING: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

#### BASIC GASOLINE ENGINE - MECHANICAL TROUBLE SHOOTING CHART

| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                  |                                                     |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------|
| CONDITION                                                                        | POSSIBLE CAUSE                                                                   | CORRECTION                                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                  |                                                     |
| Engine Lops At<br>Idle                                                           | Intake manifold-to-head leaks                                                    | Replace manifold gasket, See ENGINES                |
|                                                                                  | Blown head gasket                                                                | Replace head gasket, See ENGINES                    |
|                                                                                  | Worn timing gears, chain or sprocket                                             | Replace gears, chain or sprocket                    |
|                                                                                  | Worn camshaft lobes                                                              | Replace camshaft, See ENGINES                       |
|                                                                                  | Overheated engine                                                                | Check cooling system, See COOLING                   |
|                                                                                  | Blocked crankcase vent valve                                                     | Remove restriction                                  |
|                                                                                  | Leaking EGR valve                                                                | Repair leak and/or replace valve                    |
|                                                                                  | Faulty fuel pump                                                                 | Replace fuel pump                                   |
|                                                                                  | AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                     |
|                                                                                  | Leaking fuel pump                                                                | Repair leak and/or replace fuel pump                |
| Engine Has Low<br>Power                                                          | Excessive piston-to-bore clearance                                               | Install larger pistons, See ENGINES                 |
|                                                                                  | Sticking valves or weak valve springs                                            | Check valve train components, See ENGINES           |
|                                                                                  | Incorrect valve timing                                                           | Reset valve timing, See ENGINES                     |
|                                                                                  | Worn camshaft lobes                                                              | Replace camshaft, See ENGINES                       |
|                                                                                  | Blown head gasket                                                                | Replace camshaft, See ENGINES                       |
|                                                                                  | Clutch slipping                                                                  | Adjust pedal and/or replace components, See ENGINES |
|                                                                                  | Engine overheating                                                               | Check cooling system, See COOLING                   |

[illegible]

## TROUBLE SHOOTING - BASIC PROCEDURES

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|                              |                                                                                  |                                                     |
|------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------|
| Engine<br>Detonation         | Ignition timing too far advanced                                                 | Reset ignition timing,<br>See TUNE-UP               |
|                              | Faulty ignition system                                                           | Check ignition timing,<br>See TUNE-UP               |
|                              | Spark plugs loose or faulty                                                      | Retighten or replace<br>plugs                       |
|                              | Fuel delivery system clogged                                                     | Inspect lines, pump and<br>filter for clog          |
|                              | EGR valve inoperative                                                            | Replace EGR valve                                   |
|                              | PCV system inoperative                                                           | Inspect and/or replace<br>hoses or valve            |
|                              | Vacuum leaks                                                                     | Check vacuum system and<br>repair leaks             |
|                              | Excessive combustion<br>chamber deposits                                         | Remove built-up<br>deposits                         |
|                              | Leaking, sticking or<br>broken valves                                            | Inspect and/or replace<br>valves                    |
|                              | AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                     |
| External Oil<br>Leakage      | Fuel pump improperly seated<br>or worn gasket                                    | Remove pump, replace<br>gasket and seat<br>properly |
|                              | Oil pan gasket broken or<br>pan bent                                             | Straighten pan and<br>replace gasket                |
|                              | Timing chain cover gasket<br>broken                                              | Replace timing chain<br>cover gasket                |
|                              | Rear main oil seal worn                                                          | Replace rear main oil<br>seal                       |
|                              | Oil pan drain plug not<br>seated properly                                        | Remove and reinstall<br>drain plug                  |
|                              | Camshaft bearing drain<br>hole blocked                                           | Remove restriction                                  |
|                              | Oil pressure sending<br>switch leaking                                           | Remove and reinstall<br>sending switch              |
| Excessive Oil<br>Consumption | AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                     |
|                              | Worn valve stems or guides                                                       | Replace stems or<br>guides, See ENGINES             |
|                              | Valve "O" ring seals<br>damaged                                                  | Replace "O" ring seals,<br>See ENGINES              |
|                              | Plugged oil drain back holes                                                     | Remove restrictions                                 |
|                              | Improper PCV valve<br>operation                                                  | Replace PCV valve                                   |
|                              | Engine oil level too high                                                        | Remove excess oil                                   |
|                              | Engine oil too thin                                                              | Replace thicker oil                                 |
|                              | Valve stem oil deflectors<br>damaged                                             | Replace oil deflectors                              |
|                              | Incorrect piston rings                                                           | Replace piston rings,<br>See ENGINES                |
|                              | Piston ring gaps not<br>staggered                                                | Reinstall piston rings,<br>See ENGINES              |
|                              | Insufficient piston ring<br>tension                                              | Replace rings, See<br>ENGINES                       |

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|                                                 |                                      |
|-------------------------------------------------|--------------------------------------|
| Piston ring grooves or oil return slots clogged | Replace piston rings,<br>See ENGINES |
|-------------------------------------------------|--------------------------------------|

|                                  |                                      |
|----------------------------------|--------------------------------------|
| Piston rings sticking in grooves | Replace piston rings,<br>See ENGINES |
|----------------------------------|--------------------------------------|

|                                         |                                          |
|-----------------------------------------|------------------------------------------|
| Piston ring grooves<br>excessively worn | Replace piston and<br>rings, See ENGINES |
|-----------------------------------------|------------------------------------------|

|                                         |                                                  |
|-----------------------------------------|--------------------------------------------------|
| Compression rings installed upside down | Replace compression rings correctly, See ENGINES |
|-----------------------------------------|--------------------------------------------------|

|                               |                                   |
|-------------------------------|-----------------------------------|
| Worn or scored cylinder walls | Rebore cylinders or replace block |
|-------------------------------|-----------------------------------|

|                                       |                                                 |
|---------------------------------------|-------------------------------------------------|
| Mismatched oil ring expander and rail | Replace oil ring expander and rail, See ENGINES |
|---------------------------------------|-------------------------------------------------|

|                               |                              |
|-------------------------------|------------------------------|
| Intake gasket dowels too long | Replace intake gasket dowels |
|-------------------------------|------------------------------|

|                                                    |                                                      |
|----------------------------------------------------|------------------------------------------------------|
| Excessive main or connecting rod bearing clearance | Replace main or connecting rod bearings, See ENGINES |
|----------------------------------------------------|------------------------------------------------------|

[illegible]

|                 |                                         |                                                    |
|-----------------|-----------------------------------------|----------------------------------------------------|
| No Oil Pressure | Low oil level<br>Oil pressure sender or | Add oil to proper level<br>Replace sender or gauge |
|-----------------|-----------------------------------------|----------------------------------------------------|

|                      |                                           |
|----------------------|-------------------------------------------|
| gauge broken         |                                           |
| Oil pump malfunction | Remove and overhaul oil pump, See ENGINES |

|                                    |                            |
|------------------------------------|----------------------------|
| Oil pressure relief valve sticking | Remove and reinstall valve |
|------------------------------------|----------------------------|

|                           |                                   |
|---------------------------|-----------------------------------|
| Oil pump passages blocked | Overhaul oil pump, See<br>ENGINES |
|---------------------------|-----------------------------------|

Oil pickup screen or tube blocked      remove restriction

|                         |                        |
|-------------------------|------------------------|
| Loose oil inlet tube    | Tighten oil inlet tube |
| Loose camshaft bearings | Replace camshaft       |

|                                  |                                                         |
|----------------------------------|---------------------------------------------------------|
| Internal leakage at oil passages | bearings, See ENGINES<br>Replace block or cylinder head |
|----------------------------------|---------------------------------------------------------|

[illegible]

|                  |                                             |                                                    |
|------------------|---------------------------------------------|----------------------------------------------------|
| Low Oil Pressure | Low engine oil level<br>Engine oil too thin | Add oil to proper level<br>Remove and replace with |
|------------------|---------------------------------------------|----------------------------------------------------|

|                    |                                |
|--------------------|--------------------------------|
| Excessive oil pump | thicker oil<br>Reduce oil pump |
|--------------------|--------------------------------|

|                           |                        |
|---------------------------|------------------------|
| clearance                 | clearance, See ENGINES |
| Oil pickup tube or screen | Remove restrictions    |

|                          |                    |
|--------------------------|--------------------|
| blocked                  |                    |
| Main, rod or cam bearing | Replace bearing to |

|                     |                                  |
|---------------------|----------------------------------|
| clearance excessive | reduce clearance, See<br>ENGINES |
|---------------------|----------------------------------|

[illegible]

|                   |                                                    |                                              |
|-------------------|----------------------------------------------------|----------------------------------------------|
| High Oil Pressure | Improper grade of oil<br>Oil pressure relief valve | Replace with proper oil<br>Eliminate binding |
|-------------------|----------------------------------------------------|----------------------------------------------|

Oil pressure sender or stuck closed      Replace sender or gauge



## TROUBLE SHOOTING - BASIC PROCEDURES

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gauge faulty

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|                     |                                    |                                     |
|---------------------|------------------------------------|-------------------------------------|
| Noisy Main Bearings | Inadequate oil supply              | Check oil delivery to main bearings |
|                     | Excessive main bearing clearance   | Replace main bearings, See ENGINES  |
|                     | Excessive crankshaft end play      | Replace crankshaft, See ENGINES     |
|                     | Loose flywheel or torque converter | Tighten attaching bolts             |
|                     | Loose or damaged vibration damper  | Tighten or replace vibration damper |
|                     | Crankshaft journals out-of-round   | Re-grind crankshaft journals        |
|                     | Excessive belt tension             | Loosen belt tension                 |

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                       |                                                |                                 |
|-----------------------|------------------------------------------------|---------------------------------|
| Noisy Connecting Rods | Excessive bearing clearance or missing bearing | Replace bearing, See ENGINES    |
|                       | Crankshaft rod journal out-of-round            | Re-grind crankshaft journal     |
|                       | Misaligned connecting rod or cap               | Remove rod or cap and realign   |
|                       | Incorrectly tightened rod bolts                | Remove and re-tighten rod bolts |

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                         |                                        |                                      |
|-------------------------|----------------------------------------|--------------------------------------|
| Noisy Pistons and Rings | Excessive piston-to-bore clearance     | Install larger pistons, See ENGINES  |
|                         | Bore tapered or out-of-round           | Rebore block                         |
|                         | Piston ring broken                     | Replace piston rings, See ENGINES    |
|                         | Piston pin loose or seized             | Replace piston pin, See ENGINES      |
|                         | Connecting rods misaligned             | Realign connecting rods              |
|                         | Ring side clearance too loose or tight | Replace with larger or smaller rings |
|                         | Carbon build-up on piston              | Remove carbon                        |

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                   |                                        |                                      |
|-------------------|----------------------------------------|--------------------------------------|
| Noisy Valve Train | Worn or bent push rods                 | Replace push rods, See ENGINES       |
|                   | Worn rocker arms or bridged pivots     | Replace push rods, See ENGINES       |
|                   | Dirt or chips in valve lifters         | Remove lifters and remove dirt/chips |
|                   | Excessive valve lifter leak-down       | Replace valve lifters, See ENGINES   |
|                   | Valve lifter face worn                 | Replace valve lifters, See ENGINES   |
|                   | Broken or cocked valve springs         | replace or reposition springs        |
|                   | Too much valve stem-to-guide clearance | Replace valve guides, See ENGINES    |
|                   | Valve bent                             | Replace valve, See                   |

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|                                                    |  |                                               |
|----------------------------------------------------|--|-----------------------------------------------|
|                                                    |  | ENGINES                                       |
| Loose rocker arms                                  |  | Retighten rocker arms,<br>See ENGINES         |
| Excessive valve seat<br>run-out                    |  | Reface valve seats, See<br>ENGINES            |
| Missing valve lock                                 |  | Install new valve lock                        |
| Excessively worn camshaft<br>lobes                 |  | Replace camshaft, See<br>ENGINES              |
| Plugged valve lifter oil<br>holes                  |  | Eliminate restriction<br>or replace lifter    |
| Faulty valve lifter check<br>ball                  |  | Replace lifter check<br>ball, See ENGINES     |
| Rocker arm nut installed<br>upside down            |  | Remove and reinstall<br>correctly             |
| Valve lifter incorrect for<br>engine               |  | Remove and replace<br>valve lifters           |
| Faulty push rod seat or<br>lifter plunger          |  | Replace plunger or push<br>rod                |
| Noisy Valves                                       |  |                                               |
| Improper valve lash                                |  | Re-adjust valve lash,<br>See ENGINES          |
| Worn or dirty valve lifters                        |  | Clean and/or replace<br>lifters               |
| Worn valve guides                                  |  | Replace valve guides,<br>See ENGINES          |
| Excessive valve seat or<br>face run-out            |  | Reface seats or valve<br>face                 |
| Worn camshaft lobes                                |  | Replace camshaft, See<br>ENGINES              |
| Loose rocker arm studs                             |  | Re-tighten rocker arm<br>studs, See ENGINES   |
| Bent push rods                                     |  | Replace push rods, See<br>ENGINES             |
| Broken valve springs                               |  | Replace valve springs,<br>See ENGINES         |
| Burned, Sticking<br>or Broken Valves               |  |                                               |
| Weak valve springs or<br>warped valves             |  | Replace valves and/or<br>springs, See ENGINES |
| Improper lifter clearance                          |  | Re-adjust clearance or<br>replace lifters     |
| Worn guides or improper<br>guide clearance         |  | Replace valve guides,<br>See ENGINES          |
| Out-of-round valve seats<br>or improper seat width |  | Re-grind valve seats                          |
| Gum deposits on valve<br>stems, seats or guides    |  | Remove deposits                               |
| Improper spark timing                              |  | Re-adjust spark timing                        |
| Broken<br>Pistons/Rings                            |  |                                               |
| Undersize pistons                                  |  | Replace with larger<br>pistons, See ENGINES   |
| Wrong piston rings                                 |  | Replace with correct<br>rings, See ENGINES    |

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|                                   |                                         |
|-----------------------------------|-----------------------------------------|
| Out-of-round cylinder bore        | Re-bore cylinder bore                   |
| Improper connecting rod alignment | Remove and realign connecting rods      |
| Excessively worn ring grooves     | Replace pistons, See ENGINES            |
| Improperly assembled piston pins  | Re-assemble pin-to -piston, See ENGINES |
| Insufficient ring gap clearance   | Install new rings, See ENGINES          |
| Engine overheating                | Check cooling system                    |
| Incorrect ignition timing         | Re-adjust ignition timing, See TUNE-UP  |

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                         |                                       |                                       |
|-------------------------|---------------------------------------|---------------------------------------|
| Excessive Exhaust Noise | Leaks at manifold to head, or to pipe | Replace manifold or pipe gasket       |
|                         | Exhaust manifold cracked or broken    | Replace exhaust manifold, See ENGINES |

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## HEATER SYSTEM TROUBLE SHOOTING

WARNING: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

### BASIC HEATER SYSTEM TROUBLE SHOOTING CHART

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| CONDITION | POSSIBLE CAUSE |
|-----------|----------------|
|-----------|----------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                                   |                                                |
|-----------------------------------|------------------------------------------------|
| Insufficient, Erratic, or No Heat | ù Low Coolant Level                            |
|                                   | ù Incorrect thermostat.                        |
|                                   | ù Restricted coolant flow through heater core. |
|                                   | ù Heater hoses plugged.                        |
|                                   | ù Misadjusted control cable.                   |
|                                   | ù Sticking heater control valve.               |
|                                   | ù Vacuum hose leaking.                         |
|                                   | ù Vacuum hose blocked.                         |
|                                   | ù Vacuum motors inoperative.                   |
|                                   | ù Blocked air inlet.                           |
|                                   | ù Inoperative heater blower motor.             |
|                                   | ù Oil residue on heater core fins.             |
|                                   | ù Dirt on heater core fins.                    |
|                                   |                                                |

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|               |                                      |
|---------------|--------------------------------------|
| Too Much Heat | ù Improperly adjusted cables.        |
|               | ù Sticking heater control valve.     |
|               | ù No vacuum to heater control valve. |

[illegible]

```

3  * Check for battery voltage      3
3  at the positive terminal of      3
3  the coil.                        3

```

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAA

3 OK 3

AAAAA

AAAAA

3 NOT OK 3

AAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

3 \* Check air Gap of the Pick-Up 3

3 coil in the distributor. 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

3 \* Check resistance of ballast 3

3 resistor (if used) for the 3

3 correct resistance value. 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAA

3 OK 3

AAAAA

AAAAA

3 NOT OK 3

AAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

3 \* Check Pick-Up coil for 3

3 correct resistance value. 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

3 \* Adjust or replace as 3

3 necessary. 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAA

3 NOT OK 3

AAAAA

AAAAA

3 OK 3

AAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

3 \* Replace Pick-Up coil if 3

3 not to specification. 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

3 \* Check control module for 3

3 good ground connections. 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAA

3 OK 3

AAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

3 \* If vehicle fails to run at this point, go to 3

3 the appropriate article in the ENGINE 3

3 PERFORMANCE section. 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAA

3 OK 3

AAAAA

AAAAA

3 NOT OK 3

AAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

3 \* Check wires from the battery/3

3 ignition switch to the coil. 3

3 Also check the coil primary 3

3 and secondary resistance. 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

3 \* Replace ballast resistor 3

3 if the measured resistance 3

3 value is not within 3

3 specification. 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## MANUAL STEERING GEAR TROUBLE SHOOTING

WARNING: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to

## TROUBLE SHOOTING - BASIC PROCEDURES

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problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

#### BASIC MANUAL STEERING GEAR TROUBLE SHOOTING CHART

|                                                                          |                                               |                                       |
|--------------------------------------------------------------------------|-----------------------------------------------|---------------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                               |                                       |
| CONDITION                                                                | POSSIBLE CAUSE                                | CORRECTION                            |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                               |                                       |
| Rattle or<br>Chucking Noise<br>in Rack and<br>Pinion                     | Rack and pinion mounting<br>bracket loose     | Tighten all mounting<br>bolts         |
|                                                                          | Lack of/or incorrect<br>lubricant             | Correct as necessary                  |
|                                                                          | Steering gear mounting<br>bolts loose         | Tighten all mounting<br>bolts         |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                               |                                       |
| Excessive Play                                                           | Front wheel bearing<br>improperly adjusted    | See FRONT SUSPENSION<br>article       |
|                                                                          | Loose or worn steering<br>linkage             | See STEERING LINKAGE<br>article       |
|                                                                          | Loose or worn steering<br>gear shift          | See MANUAL STEERING<br>GEAR article   |
|                                                                          | Steering arm loose on<br>gear shaft           | See MANUAL STEERING<br>GEAR article   |
|                                                                          | Steering gear housing<br>bolts loose          | Tighten all mounting<br>bolts         |
|                                                                          | Steering gear adjustment<br>too loose         | See MANUAL STEERING<br>GEAR article   |
|                                                                          | Steering arms loose on<br>knuckles            | Tighten and check<br>steering linkage |
|                                                                          | Rack and pinion mounting<br>loose             | Tighten all mounting<br>bolts         |
|                                                                          | Rack and pinion out of<br>adjustment          | See adjustment in<br>STEERING article |
|                                                                          | Tie rod end loose                             | Tighten and check<br>steering linkage |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                               |                                       |
| Poor<br>Returnability                                                    | Excessive Pitman shaft-to-<br>ball nut lash   | Repair as necessary                   |
|                                                                          | Lack of lubricant in ball<br>joint or linkage | Lubricate and service<br>systems      |

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|                                   |                                             |
|-----------------------------------|---------------------------------------------|
| Binding in linkage or ball joints | See STEERING LINKAGE and SUSPENSION article |
|-----------------------------------|---------------------------------------------|

|                              |                             |
|------------------------------|-----------------------------|
| Improper front end alignment | See WHEEL ALIGNMENT article |
|------------------------------|-----------------------------|

|                        |                            |
|------------------------|----------------------------|
| Improper tire pressure | Inflate to proper pressure |
|------------------------|----------------------------|

|                 |                            |
|-----------------|----------------------------|
| Tie rod binding | Inflate to proper pressure |
|-----------------|----------------------------|

|                          |                             |
|--------------------------|-----------------------------|
| Shaft seal rubbing shaft | See STEERING COLUMN article |
|--------------------------|-----------------------------|

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|                           |                        |                            |
|---------------------------|------------------------|----------------------------|
| Excessive Vertical Motion | Improper tire pressure | Inflate to proper pressure |
|---------------------------|------------------------|----------------------------|

|                                        |                                            |
|----------------------------------------|--------------------------------------------|
| Tires, wheels or rotors out of balance | Balance tires then check wheels and rotors |
|----------------------------------------|--------------------------------------------|

|                                |                                |
|--------------------------------|--------------------------------|
| Worn or faulty shock absorbers | Check and replace if necessary |
|--------------------------------|--------------------------------|

|                                |                                 |
|--------------------------------|---------------------------------|
| Loose tie rod ends or steering | Tighten or replace if necessary |
|--------------------------------|---------------------------------|

|                              |                        |
|------------------------------|------------------------|
| Loose or worn wheel bearings | See SUSPENSION article |
|------------------------------|------------------------|

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|                            |                        |                            |
|----------------------------|------------------------|----------------------------|
| Steering Pulls to One Side | Improper tire pressure | Inflate to proper pressure |
|----------------------------|------------------------|----------------------------|

|                                 |                                |
|---------------------------------|--------------------------------|
| Front tires are different sizes | Rotate or replace if necessary |
|---------------------------------|--------------------------------|

|                                      |                              |
|--------------------------------------|------------------------------|
| Wheel bearings not adjusted properly | See FRONT SUSPENSION article |
|--------------------------------------|------------------------------|

|                                      |                              |
|--------------------------------------|------------------------------|
| Bent or broken suspension components | See FRONT SUSPENSION article |
|--------------------------------------|------------------------------|

|                          |                             |
|--------------------------|-----------------------------|
| Improper wheel alignment | See WHEEL ALIGNMENT article |
|--------------------------|-----------------------------|

|                 |                    |
|-----------------|--------------------|
| Brakes dragging | See BRAKES article |
|-----------------|--------------------|

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|             |                             |                            |
|-------------|-----------------------------|----------------------------|
| Instability | Low or uneven tire pressure | Inflate to proper pressure |
|-------------|-----------------------------|----------------------------|



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|                                 |                                   |
|---------------------------------|-----------------------------------|
| Loose or worn wheel bearings    | See FRONT SUSPENSION article      |
| Loose or worn idler arm bushing | See FRONT SUSPENSION article      |
| Loose or worn strut bushings    | See FRONT SUSPENSION article      |
| Incorrect front wheel alignment | See WHEEL ALIGNMENT article       |
| Steering gear not centered      | See MANUAL STEERING GEARS article |
| Springs or shock                | Check and replace if necessary    |
| Improper cross shaft            | See MANUAL STEERING GEARS article |

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## POWER STEERING TROUBLE SHOOTING

WARNING: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

### BASIC POWER STEERING TROUBLE SHOOTING CHART

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| CONDITION                                                                    | POSSIBLE CAUSE                       | CORRECTION                      |
|------------------------------------------------------------------------------|--------------------------------------|---------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                      |                                 |
| Rattle or Chucking Noise                                                     | Pressure hoses touching engine parts | Adjust to proper clearance      |
|                                                                              | Loose Pitman shaft                   | Adjust or replace if necessary  |
|                                                                              | Tie rods ends or Pitman arm loose    | Tighten and check system        |
|                                                                              | Rack and pinion mounts loose         | Tighten all mounting bolts      |
|                                                                              | Free play in worm and                | See POWER STEERING GEAR article |

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|                                                 |                         |
|-------------------------------------------------|-------------------------|
| Loose sector shaft or thrust bearing adjustment | See POWER STEERING GEAR |
|-------------------------------------------------|-------------------------|

|                           |                             |
|---------------------------|-----------------------------|
| Free play in pot coupling | See STEERING COLUMN article |
|---------------------------|-----------------------------|

|                       |                             |
|-----------------------|-----------------------------|
| Worn shaft serrations | See STEERING COLUMN article |
|-----------------------|-----------------------------|

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|                        |                             |                                                   |
|------------------------|-----------------------------|---------------------------------------------------|
| Growl in Steering Pump | Excessive pressure in hoses | Restricted hoses, see POWER STEERING GEAR article |
|------------------------|-----------------------------|---------------------------------------------------|

|                        |                                 |
|------------------------|---------------------------------|
| Scored pressure plates | See POWER STEERING GEAR article |
|------------------------|---------------------------------|

|                               |                                 |
|-------------------------------|---------------------------------|
| Scored thrust plates or rotor | See POWER STEERING GEAR article |
|-------------------------------|---------------------------------|

|                          |                                 |
|--------------------------|---------------------------------|
| Extreme wear of cam ring | See POWER STEERING GEAR article |
|--------------------------|---------------------------------|

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|                         |                     |                                 |
|-------------------------|---------------------|---------------------------------|
| Rattle in Steering Pump | Vanes not installed | See POWER STEERING PUMP article |
|-------------------------|---------------------|---------------------------------|

|                         |                                 |
|-------------------------|---------------------------------|
| Vanes sticking in rotor | See POWER STEERING PUMP article |
|-------------------------|---------------------------------|

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|                     |                              |                                 |
|---------------------|------------------------------|---------------------------------|
| Swish noise in Pump | Defective flow control valve | See POWER STEERING PUMP article |
|---------------------|------------------------------|---------------------------------|

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|                        |              |                                 |
|------------------------|--------------|---------------------------------|
| Groan in Steering Pump | Air in fluid | See POWER STEERING PUMP article |
|------------------------|--------------|---------------------------------|

|                               |                                         |
|-------------------------------|-----------------------------------------|
| Poor pressure hose connection | Tighten and check, replace if necessary |
|-------------------------------|-----------------------------------------|

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|                     |                                    |                                 |
|---------------------|------------------------------------|---------------------------------|
| Squawk When Turning | Damper "O" ring on valve spool cut | See POWER STEERING PUMP article |
|---------------------|------------------------------------|---------------------------------|

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|                       |                           |                           |
|-----------------------|---------------------------|---------------------------|
| Moan or Whine in Pump | Pump shaft bearing scored | Replace bearing and fluid |
|-----------------------|---------------------------|---------------------------|

|                                 |                                 |
|---------------------------------|---------------------------------|
| Air in fluid or fluid level low | See POWER STEERING PUMP article |
|---------------------------------|---------------------------------|

|                         |                                |
|-------------------------|--------------------------------|
| Hose or column grounded | Check and replace if necessary |
|-------------------------|--------------------------------|

|                                   |                                 |
|-----------------------------------|---------------------------------|
| Cover "O" ring missing or damaged | See POWER STEERING PUMP article |
|-----------------------------------|---------------------------------|

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|                                          |                                    |
|------------------------------------------|------------------------------------|
| Valve cover baffle<br>missing or damaged | See POWER STEERING PUMP<br>article |
|------------------------------------------|------------------------------------|

|                                       |                                    |
|---------------------------------------|------------------------------------|
| Interference of<br>components in pump | See POWER STEERING PUMP<br>article |
|---------------------------------------|------------------------------------|

|                                    |                                    |
|------------------------------------|------------------------------------|
| Loose or poor bracket<br>alignment | Correct or replace if<br>necessary |
|------------------------------------|------------------------------------|

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|-------------------------|--------------------------------------|--------------------------------|
| Hissing When<br>Parking | Internal leakage in<br>steering gear | Check valved assembly<br>first |
|-------------------------|--------------------------------------|--------------------------------|

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|                           |                                      |                                   |
|---------------------------|--------------------------------------|-----------------------------------|
| Chirp in<br>Steering Pump | Loose or worn power<br>steering belt | Adjust or replace if<br>necessary |
|---------------------------|--------------------------------------|-----------------------------------|

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|------------------------------|------------|------------------------------------|
| Buzzing When<br>Not Steering | Noisy pump | See POWER STEERING PUMP<br>article |
|------------------------------|------------|------------------------------------|

|                                        |                                |
|----------------------------------------|--------------------------------|
| Free play in steering<br>shaft bearing | See STEERING COLUMN<br>article |
|----------------------------------------|--------------------------------|

|                                      |                                |
|--------------------------------------|--------------------------------|
| Bearing loose on shaft<br>serrations | See STEERING COLUMN<br>article |
|--------------------------------------|--------------------------------|

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|                           |                        |                                    |
|---------------------------|------------------------|------------------------------------|
| Clicking Noise<br>in Pump | Pump slippers too long | See POWER STEERING PUMP<br>article |
|---------------------------|------------------------|------------------------------------|

|                        |                                    |
|------------------------|------------------------------------|
| Broken slipper springs | See POWER STEERING PUMP<br>article |
|------------------------|------------------------------------|

|                                    |                                    |
|------------------------------------|------------------------------------|
| Excessive wear or nicked<br>rotors | See POWER STEERING PUMP<br>article |
|------------------------------------|------------------------------------|

|                     |                                    |
|---------------------|------------------------------------|
| Damaged cam contour | See POWER STEERING PUMP<br>article |
|---------------------|------------------------------------|

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|-------------------------|--------------------------------------|-----------------------------------------|
| Poor Return of<br>Wheel | Wheel rubbing against<br>turn signal | See STEERING COLUMN<br>SWITCHES article |
|-------------------------|--------------------------------------|-----------------------------------------|

|                                          |                                |
|------------------------------------------|--------------------------------|
| Flange rubbing steering<br>gear adjuster | See STEERING COLUMN<br>article |
|------------------------------------------|--------------------------------|

|                                           |                                |
|-------------------------------------------|--------------------------------|
| Tight or frozen steering<br>shaft bearing | See STEERING COLUMN<br>article |
|-------------------------------------------|--------------------------------|

|                                    |                                    |
|------------------------------------|------------------------------------|
| Steering gear out of<br>adjustment | See POWER STEERING GEAR<br>article |
|------------------------------------|------------------------------------|

|                                    |                                    |
|------------------------------------|------------------------------------|
| Sticking or plugged<br>spool valve | See POWER STEERING PUMP<br>article |
|------------------------------------|------------------------------------|

|                    |                     |
|--------------------|---------------------|
| Improper front end | See WHEEL ALIGNMENT |
|--------------------|---------------------|

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|                                                                      |                                                |
|----------------------------------------------------------------------|------------------------------------------------|
| alignment                                                            | article                                        |
| Wheel bearings worn or loose                                         | See FRONT SUSPENSION article                   |
| Ties rods or ball joints binding                                     | Check and replace if necessary                 |
| Intermediate shaft joints binding                                    | See STEERING COLUMN article                    |
| Kinked pressure hoses                                                | Correct or replace if necessary                |
| Loose housing head spanner nut                                       | See POWER STEERING GEAR article                |
| Damaged valve lever                                                  | See POWER STEERING GEAR article                |
| Sector shaft adjusted too tight                                      | See ADJUSTMENTS in POWER STEERING GEAR article |
| Worm thrust bearing adjusted too tight                               | See ADJUSTMENTS in POWER STEERING GEAR article |
| Reaction ring sticking in cylinder                                   | See POWER STEERING GEAR article                |
| Reaction ring sticking in housing head                               | See POWER STEERING GEAR article                |
| Steering pump internal leakage                                       | See POWER STEERING PUMP article                |
| Steering gear-to-column misalignment                                 | See STEERING COLUMN article                    |
| Lack of lubrication in linkage                                       | Service front suspension                       |
| Lack of lubrication in ball joints                                   | Service front suspension                       |
| Increased Effort When Turning                                        | High internal pump leakage                     |
| Wheel Fast                                                           | Power steering pump belt slipping              |
| Foaming, Milky Power Steering Fluid, Low Fluid Level or Low Pressure | Low fluid level                                |
|                                                                      | See POWER STEERING PUMP article                |
|                                                                      | Adjust or replace if necessary                 |
|                                                                      | Check and fill to proper level                 |

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|                          |                           |
|--------------------------|---------------------------|
| Engine idle speed to low | Adjust to correct setting |
|--------------------------|---------------------------|

|                          |                                 |
|--------------------------|---------------------------------|
| Air in pump fluid system | See POWER STEERING PUMP article |
|--------------------------|---------------------------------|

|                 |                                 |
|-----------------|---------------------------------|
| Pump output low | See POWER STEERING PUMP article |
|-----------------|---------------------------------|

|                              |                                 |
|------------------------------|---------------------------------|
| Steering gear malfunctioning | See POWER STEERING GEAR article |
|------------------------------|---------------------------------|

|                       |                 |                                |
|-----------------------|-----------------|--------------------------------|
| Wheel Surges or Jerks | Low fluid level | Check and fill to proper level |
|-----------------------|-----------------|--------------------------------|

|                |                                |
|----------------|--------------------------------|
| Loose fan belt | Adjust or replace if necessary |
|----------------|--------------------------------|

|                            |                                 |
|----------------------------|---------------------------------|
| Insufficient pump pressure | See POWER STEERING PUMP article |
|----------------------------|---------------------------------|

|                           |                                 |
|---------------------------|---------------------------------|
| Sticky flow control valve | See POWER STEERING PUMP article |
|---------------------------|---------------------------------|

|                                      |                         |
|--------------------------------------|-------------------------|
| Linkage hitting oil pan at full turn | Replace bent components |
|--------------------------------------|-------------------------|

|                        |                          |                                 |
|------------------------|--------------------------|---------------------------------|
| Kick Back or Free Play | Air in pump fluid system | See POWER STEERING PUMP article |
|------------------------|--------------------------|---------------------------------|

|                                    |                                 |
|------------------------------------|---------------------------------|
| Worn poppet valve in steering gear | See POWER STEERING PUMP article |
|------------------------------------|---------------------------------|

|                            |                                 |
|----------------------------|---------------------------------|
| Excessive over center lash | See POWER STEERING GEAR article |
|----------------------------|---------------------------------|

|                                  |                                 |
|----------------------------------|---------------------------------|
| Thrust bearing out of adjustment | See POWER STEERING GEAR article |
|----------------------------------|---------------------------------|

|                           |                                 |
|---------------------------|---------------------------------|
| Free play in pot coupling | See POWER STEERING PUMP article |
|---------------------------|---------------------------------|

|                                       |                                 |
|---------------------------------------|---------------------------------|
| Steering gear coupling loose on shaft | See POWER STEERING PUMP article |
|---------------------------------------|---------------------------------|

|                                    |                                 |
|------------------------------------|---------------------------------|
| Steering disc mounting bolts loose | Tighten or replace if necessary |
|------------------------------------|---------------------------------|

|                              |                                 |
|------------------------------|---------------------------------|
| Coupling loose on worm shaft | Tighten or replace if necessary |
|------------------------------|---------------------------------|

|                       |                         |
|-----------------------|-------------------------|
| Improper sector shaft | See POWER STEERING GEAR |
|-----------------------|-------------------------|

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|                                    |                                    |
|------------------------------------|------------------------------------|
| adjustment                         | article                            |
| Excessive worm piston<br>side play | See POWER STEERING GEAR<br>article |
| Damaged valve lever                | See POWER STEERING GEAR<br>article |
| Universal joint loose              | Tighten or replace if<br>necessary |
| Defective rotary valve             | See POWER STEERING GEAR<br>article |

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|                          |                                         |                                         |
|--------------------------|-----------------------------------------|-----------------------------------------|
| No Power When<br>Parking | Sticking flow control<br>valve          | See POWER STEERING PUMP<br>article      |
|                          | Insufficient pump<br>pressure output    | See POWER STEERING PUMP<br>article      |
|                          | Excessive internal pump<br>leakage      | See POWER STEERING PUMP<br>article      |
|                          | Excessive internal gear<br>leakage      | See POWER STEERING PUMP<br>article      |
|                          | Flange rubs against gear<br>adjust plug | See STEERING COLUMN<br>article          |
|                          | Loose pump belt                         | Adjust or replace if<br>necessary       |
|                          | Low fluid level                         | Check and add proper<br>amount of fluid |
|                          | Engine idle too low                     | Adjust to correct<br>setting            |

|                                       |                                |
|---------------------------------------|--------------------------------|
| Steering gear-to-column<br>misaligned | See STEERING COLUMN<br>article |
|---------------------------------------|--------------------------------|

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|                        |                                          |                                    |
|------------------------|------------------------------------------|------------------------------------|
| No Power,<br>Left Turn | Left turn reaction seal<br>"O" ring worn | See POWER STEERING GEAR<br>article |
|------------------------|------------------------------------------|------------------------------------|

|                                            |                                    |
|--------------------------------------------|------------------------------------|
| Left turn reaction seal<br>damaged/missing | See POWER STEERING GEAR<br>article |
|--------------------------------------------|------------------------------------|

|                                   |                                    |
|-----------------------------------|------------------------------------|
| Cylinder head "O" ring<br>damaged | See POWER STEERING PUMP<br>article |
|-----------------------------------|------------------------------------|

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|                          |                                 |                                |
|--------------------------|---------------------------------|--------------------------------|
| No Power,<br>Right Turns | Column pot coupling<br>bottomed | See STEERING COLUMN<br>article |
|--------------------------|---------------------------------|--------------------------------|

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|                                           |                                    |
|-------------------------------------------|------------------------------------|
| Right turn reaction seal<br>"O" ring worn | See POWER STEERING GEAR<br>article |
|-------------------------------------------|------------------------------------|

|                                     |                                    |
|-------------------------------------|------------------------------------|
| Right turn reaction seal<br>damaged | See POWER STEERING GEAR<br>article |
|-------------------------------------|------------------------------------|

|                                             |                                    |
|---------------------------------------------|------------------------------------|
| Internal leakage through<br>piston end plug | See POWER STEERING GEAR<br>article |
|---------------------------------------------|------------------------------------|

|                                        |                                    |
|----------------------------------------|------------------------------------|
| Internal leakage through<br>side plugs | See POWER STEERING GEAR<br>article |
|----------------------------------------|------------------------------------|

|                                                                              |                                                                 |                                             |
|------------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                 |                                             |
| Lack of Effort<br>in Turning                                                 | Left and/or right<br>reaction seal sticking<br>in cylinder head | Replace, see POWER<br>STEERING GEAR article |

|                                                                              |                                  |                                |
|------------------------------------------------------------------------------|----------------------------------|--------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                  |                                |
| Wanders to One<br>Side                                                       | Front end alignment<br>incorrect | See WHEEL ALIGNMENT<br>article |

|                                   |                                    |
|-----------------------------------|------------------------------------|
| Unbalanced steering<br>gear valve | See POWER STEERING GEAR<br>article |
|-----------------------------------|------------------------------------|

|                                                                              |                                            |                                    |
|------------------------------------------------------------------------------|--------------------------------------------|------------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                            |                                    |
| Low Pressure Due<br>to Steering Pump                                         | Flow control valve stuck<br>or inoperative | See POWER STEERING PUMP<br>article |

|                                             |                                    |
|---------------------------------------------|------------------------------------|
| Pressure plate not flat<br>against cam ring | See POWER STEERING PUMP<br>article |
|---------------------------------------------|------------------------------------|

|                          |                                  |
|--------------------------|----------------------------------|
| Extreme wear of cam ring | Replace and check<br>adjustments |
|--------------------------|----------------------------------|

|                                        |                                    |
|----------------------------------------|------------------------------------|
| Scored plate, thrust<br>plate or rotor | See POWER STEERING PUMP<br>article |
|----------------------------------------|------------------------------------|

|                                 |                                    |
|---------------------------------|------------------------------------|
| Vanes not installed<br>properly | See POWER STEERING PUMP<br>article |
|---------------------------------|------------------------------------|

|                                  |                                    |
|----------------------------------|------------------------------------|
| Vanes sticking in rotor<br>slots | See POWER STEERING PUMP<br>article |
|----------------------------------|------------------------------------|

|                                            |                                    |
|--------------------------------------------|------------------------------------|
| Cracked/broken thrust or<br>pressure plate | See POWER STEERING PUMP<br>article |
|--------------------------------------------|------------------------------------|

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## STARTER TROUBLE SHOOTING

WARNING: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting,

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refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

#### BASIC STARTER TROUBLE SHOOTING CHART

| CONDITION                                   | POSSIBLE CAUSE                                                         | CORRECTION                                                    |
|---------------------------------------------|------------------------------------------------------------------------|---------------------------------------------------------------|
| Starter Fails to Operate                    | Dead battery or bad connections between starter and battery            | Check battery charge and all wires and connections to starter |
|                                             | Ignition switch faulty or misadjusted                                  | Adjust or replace ignition switch                             |
|                                             | Open circuit between starter switch ignition terminal on starter relay | Check and repair wires and connections as necessary           |
|                                             | Starter relay or starter defective                                     | See Testing in STARTER article                                |
|                                             | Open solenoid pull-in wire                                             | See Testing in STARTER article                                |
| Starter Does Not Operate and Headlights Dim | Weak battery or dead cell                                              | Charge or replace battery as necessary                        |
|                                             | Loose or corroded battery connections                                  | Check that battery connections are clean and tight            |
|                                             | Internal ground in starter windings                                    | See Testing in STARTER article                                |
|                                             | Grounded starter fields                                                | See Testing in STARTERS                                       |
|                                             | Armature rubbing on pole shoes                                         | See STARTER article                                           |
| Starter Turns but Engine Does Not Rotate    | Starter clutch slipping                                                | See STARTER article                                           |
|                                             | Broken clutch housing                                                  | See STARTER article                                           |
|                                             | Pinion shaft rusted or dry                                             | See STARTER article                                           |
|                                             | Engine basic timing incorrect                                          | See Ignition Timing in TUNE-UP article                        |
|                                             | Broken teeth on engine flywheel                                        | Replace flywheel and check for starter pinion                 |



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gear damage

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Starter Will Not  
Crank Engine

Faulty overrunning  
clutch

See STARTER article

Broken clutch housing

See STARTER article

Broken flywheel teeth

Replace flywheel and  
check for starter pinion  
gear damage

Armature shaft sheared  
or reduction gear teeth  
stripped

See STARTER article

Weak battery

Charge or replace  
battery as necessary

Faulty solenoid

See On-Vehicle Tests in  
STARTER article

Poor grounds

Check all ground  
connections for  
tight and clean  
connections

Ignition switch faulty  
or misadjusted

Adjust or replace  
ignition switch as  
necessary

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Starter Cranks  
Engine Slowly

Battery weak or  
defective

Charge or replace  
battery as necessary

Engine overheated

See ENGINE COOLING  
SYSTEM article

Engine oil too heavy

Check that proper  
viscosity oil  
is used

Poor battery-to-starter  
connections

Check that all  
between  
battery and starter are  
clean and tight

Current draw too low or  
too high

See Bench Tests in  
STARTER article

Bent armature, loose pole  
shoes screws or worn  
bearings

See STARTER article

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Burned solenoid contacts      Replace solenoid

Faulty starter      Replace starter

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Starter Engages      Engine timing too far      See Ignition Timing in  
Engine Only      advanced      TUNE-UP article  
Momentarily

Overrunning clutch not      Replace overrunning  
engaging properly      clutch. See STARTER  
article

Broken starter clutch      See STARTER article

Broken teeth on engine      Replace flywheel and  
flywheel      check starter pinion  
gear for damage

Weak drive assembly      See STARTER article  
thrust spring

Weak hold-in coil      See Bench Tests in  
STARTER article

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Starter Drive      Defective point assembly      See Testing in STARTER  
Will Not Engage      article

Poor point assembly ground      See Testing in STARTER  
article

Defective pull-in coil      Replace starter  
solenoid

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Starter Relay      Dead battery      Charge or replace  
Does Not Close      battery as necessary

Faulty wiring      Check all wiring and  
connections leading to  
relay

Neutral safety switch      Replace neutral safety  
faulty      switch

Starter relay faulty      Replace starter relay

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Starter Drive      Starter motor loose on      Tighten starter  
Will Not      mountings      attach bolts  
Disengage

Worn drive end bushing      See STARTER article

Damaged engine flywheel      Replace flywheel and  
teeth      starter pinion gear for  
damage

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|                                               |                       |
|-----------------------------------------------|-----------------------|
| Drive yolk return spring<br>broken or missing | Replace return spring |
|-----------------------------------------------|-----------------------|

|                        |                         |
|------------------------|-------------------------|
| Faulty ignition switch | Replace ignition switch |
|------------------------|-------------------------|

|                                                                                                         |                             |
|---------------------------------------------------------------------------------------------------------|-----------------------------|
| Insufficient clearance<br>between winding leads to<br>solenoid terminal and main<br>contact in solenoid | Replace starter<br>solenoid |
|---------------------------------------------------------------------------------------------------------|-----------------------------|

|                                   |                        |
|-----------------------------------|------------------------|
| Starter clutch not<br>disengaging | Replace starter clutch |
|-----------------------------------|------------------------|

|                                              |                         |
|----------------------------------------------|-------------------------|
| Ignition starter switch<br>contacts sticking | Replace ignition switch |
|----------------------------------------------|-------------------------|

|                                                    |                                                  |                                                                                                   |
|----------------------------------------------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Starter Relay<br>Operates but<br>Solenoid Does Not | Faulty solenoid switch,<br>switch connections or | Check all wiring<br>between relay and<br>solenoid or replace<br>relay or solenoid as<br>necessary |
|----------------------------------------------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------|

|                                              |                                                    |
|----------------------------------------------|----------------------------------------------------|
| Broken lead or loose<br>soldered connections | Repair wire or wire<br>connections as<br>necessary |
|----------------------------------------------|----------------------------------------------------|

|                                                        |              |                                           |
|--------------------------------------------------------|--------------|-------------------------------------------|
| Solenoid Plunger<br>Vibrates When<br>Switch is Engaged | Weak battery | Charge or replace<br>battery as necessary |
|--------------------------------------------------------|--------------|-------------------------------------------|

|                               |                                       |
|-------------------------------|---------------------------------------|
| Solenoid contacts<br>corroded | Clean contacts or<br>replace solenoid |
|-------------------------------|---------------------------------------|

|               |                                         |
|---------------|-----------------------------------------|
| Faulty wiring | Check all wiring<br>leading to solenoid |
|---------------|-----------------------------------------|

|                                           |                                           |
|-------------------------------------------|-------------------------------------------|
| Broken connections inside<br>switch cover | Repair connections or<br>replace solenoid |
|-------------------------------------------|-------------------------------------------|

|                   |                  |
|-------------------|------------------|
| Open hold-in wire | Replace solenoid |
|-------------------|------------------|

|                  |                      |                                                     |
|------------------|----------------------|-----------------------------------------------------|
| Low Current Draw | Worn brushes or weak | Replace brushes or<br>brush springs as<br>necessary |
|------------------|----------------------|-----------------------------------------------------|

|                                                                                                            |                                                              |                                                                                  |
|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------|
| High Pitched Whine<br>During Cranking<br>Before Engine<br>Fires but Engine<br>Fires and Cranks<br>Normally | Distance too great<br>between starter<br>pinion and flywheel | Align starter or check<br>that correct starter<br>and flywheel are being<br>used |
|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------------------|

AAAAA

# TROUBLE SHOOTING - BASIC PROCEDURES

## Article Text (p. 50)

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High Pitched                      Distance too small between  
Whine After Engine starter pinion and flywheel  
Fires With Key                  Flywheel runout contributes  
released. Engine                to the intermittent nature  
Fires and Cranks  
Normally

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

### STEERING COLUMN TROUBLE SHOOTING

WARNING: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

#### BASIC STEERING COLUMN TROUBLE SHOOTING CHART

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| CONDITION                                                                | POSSIBLE CAUSE                         | CORRECTION                   |
|--------------------------------------------------------------------------|----------------------------------------|------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                        |                              |
| Noise in Steering                                                        | Coupling pulled apart                  | See STEERING COLUMNS article |
|                                                                          | Column not correctly aligned           | See STEERING COLUMNS article |
|                                                                          | Broken lower joint                     | Replace joint                |
|                                                                          | Horn contact ring not                  | See STEERING COLUMN article  |
|                                                                          | Bearing not lubricated                 | See STEERING COLUMN article  |
|                                                                          | Shaft snap ring not properly seated    | Reseat or replace snap ring  |
|                                                                          | Plastic spherical joint not lubricated | See STEERING COLUMN article  |
|                                                                          | Shroud or housing loose                | Tighten holding screws       |
|                                                                          | Lock plate retaining ring not seated   | See STEERING COLUMN article  |
|                                                                          | Loose sight shield                     | Tighten holding screws       |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                        |                              |
| High Steering                                                            | Column assembly                        | See STEERING COLUMN          |
| Shaft Effort                                                             | misaligned                             | article                      |

## TROUBLE SHOOTING - BASIC PROCEDURES

### Article Text (p. 51)

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Improperly installed dust shield Adjust or replace shield

Tight steering universal joint See STEERING COLUMN article

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

High Shift Column is out of alignment See STEERING COLUMN article

Effort

Improperly installed dust shield Adjust or replace shield

Seals or bearings not lubricated See STEERING COLUMNS article

Mounting bracket screws too long Replace with new shorter screws

Burrs on shift tube Remove burrs or replace tube

Lower bowl bearing assembled wrong See STEERING COLUMN article

Shift tube bent or broken Replace as necessary

Improper adjustment of shift levers See STEERING COLUMN article

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Improper Trans. Sheared shift tube joint Replace as necessary

Shifting

Sheared lower shaft lever Replace as necessary

Improper shift lever adjustment See STEERING COLUMN article

Improper gate plate adjustment See STEERING COLUMN article

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Excess Play in Instrument panel bracket Tighten bolts and check Column bolts loose bracket

Column

Broken weld nut on jacket See STEERING COLUMN article

Instrument bracket capsule sheared See STEERING COLUMN article

Column bracket/jacket bolts loose Tighten bolts and check bracket

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Steering Locks Release lever mechanism See STEERING COLUMN

# TROUBLE SHOOTING - BASIC PROCEDURES

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in Gear

article

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

### SUSPENSION TROUBLE SHOOTING

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#### BASIC SUSPENSION TROUBLE SHOOTING CHART

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|-----------|----------------|------------|
|-----------|----------------|------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                                         |                                    |                                                               |
|-----------------------------------------|------------------------------------|---------------------------------------------------------------|
| Front End Noise                         | Loose or worn wheel                | See Wheel Bearing Adjustment in SUSPENSION                    |
|                                         | Worn shocks or shock mountings     | Replace struts or strut mountings                             |
|                                         | Worn struts or strut mountings     | Replace struts or strut mountings                             |
|                                         | Loose or worn lower control arm    | See SUSPENSION                                                |
|                                         | Loose steering gear-to-frame bolts | See STEERING                                                  |
|                                         | Worn control arm bushings          | See SUSPENSION                                                |
| Front Wheel Shake, Shimmy, or Vibration | Ball joints not lubricated         | Lubricate ball joints & see Ball Joint Checking in SUSPENSION |
|                                         | Tires or wheels out of balance     | Check tire balance                                            |
|                                         | Incorrect wheel alignment          | See WHEEL ALIGNMENT                                           |
|                                         | Drive shaft unbalanced             | Check drive shaft balance                                     |
|                                         | Loose or worn wheel bearings       | See WHEEL ALIGNMENT                                           |
|                                         | Loose or worn tie rod ends         | See SUSPENSION                                                |

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|                                                                          |                                      |                             |
|--------------------------------------------------------------------------|--------------------------------------|-----------------------------|
| Shock Absorber Noise                                                     | Loose shock mountings                | Check & tighten mountings   |
|                                                                          | Worn bushings                        | Replace bushings            |
|                                                                          | Air in system                        | Bleed air from system       |
|                                                                          | Undercoating on shocks               | Remove undercoating         |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                      |                             |
| Car Leans or Sways on Corners                                            | Loose stabilizer bar                 | See SUSPENSION              |
|                                                                          | Faulty shocks or mountings           | Replace shocks or mountings |
|                                                                          | Broken or sagging springs            | See SUSPENSION              |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                      |                             |
| Shock Absorbers Leaking                                                  | Worn seals or reservoir tube crimped | See SUSPENSION              |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                      |                             |
| Broken Springs                                                           | Loose "U" bolts                      | See SUSPENSION              |
|                                                                          | Inoperative shock absorbers          | Replace shock absorbers     |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                      |                             |

## TUNE-UP TROUBLE SHOOTING - GAS ENGINE VEHICLES

PLEASE READ THIS FIRST:

WARNING: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

### SPARK PLUG DIAGNOSIS

#### BASIC SPARK PLUG TROUBLE SHOOTING CHARTS

|                                                                          |                                |                                     |
|--------------------------------------------------------------------------|--------------------------------|-------------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                |                                     |
| CONDITION                                                                | POSSIBLE CAUSE                 | CORRECTION                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                |                                     |
| Normal Spark Plug Condition                                              | Light Tan or Gray deposits     | No Action                           |
|                                                                          | Electrode not burned or fouled | No Action                           |
|                                                                          | Gap tolerance not changed      | No Action                           |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                |                                     |
| Cold Fouling or Carbon Deposits                                          | Overrich air/fuel mixture      | Adjust air/fuel mixture, see ENGINE |



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#### PERFORMANCE section

|              |                                                        |
|--------------|--------------------------------------------------------|
| Faulty choke | Replace choke assembly, see ENGINE PERFORMANCE section |
|--------------|--------------------------------------------------------|

|                    |                                 |
|--------------------|---------------------------------|
| Clogged air filter | Clean and/or replace air filter |
|--------------------|---------------------------------|

|                                          |                                          |
|------------------------------------------|------------------------------------------|
| Incorrect idle speed or dirty carburetor | Reset idle speed and/or clean carburetor |
|------------------------------------------|------------------------------------------|

|                       |                         |
|-----------------------|-------------------------|
| Faulty ignition wires | Replace ignition wiring |
|-----------------------|-------------------------|

|                             |                                  |
|-----------------------------|----------------------------------|
| Prolonged operation at idle | Shut engine off during long idle |
|-----------------------------|----------------------------------|

|                                           |                   |
|-------------------------------------------|-------------------|
| Sticking valves or worn valve guide seals | Check valve train |
|-------------------------------------------|-------------------|

|                             |                        |                               |
|-----------------------------|------------------------|-------------------------------|
| Wet Fouling or Oil Deposits | Worn rings and pistons | Install new rings and pistons |
|-----------------------------|------------------------|-------------------------------|

|                         |                         |
|-------------------------|-------------------------|
| Excessive cylinder wear | Rebore or replace block |
|-------------------------|-------------------------|

|                                 |                       |
|---------------------------------|-----------------------|
| Excessive valve guide clearance | Worn or loose bearing |
|---------------------------------|-----------------------|

|             |                                                            |                                      |
|-------------|------------------------------------------------------------|--------------------------------------|
| Gap Bridged | Deposits in combustion chamber becoming fused to electrode | Clean combustion chamber of deposits |
|-------------|------------------------------------------------------------|--------------------------------------|

|                     |                    |                      |
|---------------------|--------------------|----------------------|
| Blistered Electrode | Engine overheating | Check cooling system |
|---------------------|--------------------|----------------------|

|                    |                           |
|--------------------|---------------------------|
| Wrong type of fuel | Replace with correct fuel |
|--------------------|---------------------------|

|                   |                       |
|-------------------|-----------------------|
| Loose spark plugs | Retighten spark plugs |
|-------------------|-----------------------|

|                               |                                              |
|-------------------------------|----------------------------------------------|
| Over-advanced ignition timing | Reset ignition timing see ENGINE PERFORMANCE |
|-------------------------------|----------------------------------------------|

|                                   |                        |                           |
|-----------------------------------|------------------------|---------------------------|
| Pre-Ignition or Melted Electrodes | Incorrect type of fuel | Replace with correct fuel |
|-----------------------------------|------------------------|---------------------------|

|                           |                                              |
|---------------------------|----------------------------------------------|
| Incorrect ignition timing | Reset ignition timing see ENGINE PERFORMANCE |
|---------------------------|----------------------------------------------|

|               |                |
|---------------|----------------|
| Burned valves | Replace valves |
|---------------|----------------|

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|                    |                      |
|--------------------|----------------------|
| Engine Overheating | Check cooling system |
|--------------------|----------------------|

|                                      |                                                               |
|--------------------------------------|---------------------------------------------------------------|
| Wrong type of spark plug,<br>too hot | Replace with correct<br>spark plug, see<br>ENGINE PERFORMANCE |
|--------------------------------------|---------------------------------------------------------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                       |                   |                                                     |
|-----------------------|-------------------|-----------------------------------------------------|
| Chipped<br>Insulators | Severe detonation | Check for over-<br>advanced timing or<br>combustion |
|-----------------------|-------------------|-----------------------------------------------------|

|                               |                    |
|-------------------------------|--------------------|
| Improper gapping<br>procedure | Re-gap spark plugs |
|-------------------------------|--------------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                          |                               |                             |
|--------------------------|-------------------------------|-----------------------------|
| Rust Colored<br>Deposits | Additives in unleaded<br>fuel | Try different fuel<br>brand |
|--------------------------|-------------------------------|-----------------------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                             |                                      |                                          |
|-----------------------------|--------------------------------------|------------------------------------------|
| Water In Combustion Chamber | Blown head gasket or<br>cracked head | Repair or replace<br>head or head gasket |
|-----------------------------|--------------------------------------|------------------------------------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## ELECTRONIC IGNITION DIAGNOSIS

NOTE: Before diagnosing an electronic ignition system, ensure that all wiring is connected properly between distributor, wiring connector and spark plugs. Ignition problem will show up either as: Engine Will Not Start or Engine Runs Rough.

## BASIC ELECTRONIC IGNITION TROUBLE SHOOTING CHARTS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|-----------|----------------|------------|
|-----------|----------------|------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                       |                                                               |                |
|-----------------------|---------------------------------------------------------------|----------------|
| Engine Won't<br>Start | Open circuit between<br>distributor and bulkhead<br>connector | Repair circuit |
|-----------------------|---------------------------------------------------------------|----------------|

|                                                                   |                |
|-------------------------------------------------------------------|----------------|
| Open circuit between<br>bulkhead connector and<br>ignition switch | Repair circuit |
|-------------------------------------------------------------------|----------------|

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Open circuit between<br>ignition switch and<br>starter solenoid | Repair circuit |
|-----------------------------------------------------------------|----------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                      |                                  |                                        |
|----------------------|----------------------------------|----------------------------------------|
| Engine Runs<br>Rough | Fuel lines leaking or<br>clogged | Tighten fitting,<br>remove restriction |
|----------------------|----------------------------------|----------------------------------------|

|                          |                                                 |
|--------------------------|-------------------------------------------------|
| Initial timing incorrect | Reset ignition timing<br>see ENGINE PERFORMANCE |
|--------------------------|-------------------------------------------------|

|                                    |                               |
|------------------------------------|-------------------------------|
| Centrifugal advance<br>malfunction | Repair distributor<br>advance |
|------------------------------------|-------------------------------|

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|                   |                                      |                               |
|-------------------|--------------------------------------|-------------------------------|
|                   | Defective spark plugs or wiring      | Replace plugs or plug wiring  |
| Component Failure | Spark arc-over on cap, rotor or coil | Replace cap, rotor or or coil |
|                   | Defective pick-up coil               | Replace pick-up coil          |
|                   | Defective ignition coil              | Replace ignition coil         |
|                   | Defective vacuum unit                | Replace vacuum unit           |
|                   | Defective control module             | Replace control module        |

## ELECTRONIC IGNITION DIAGNOSIS BY OSCILLOSCOPE PATTERN

### BASIC ELECTRONIC IGNITION TROUBLE SHOOTING

#### CHARTS - USING OSCILLOSCOPE PATTERNS

| CONDITION                                                    | POSSIBLE CAUSE                         | CORRECTION                                            |
|--------------------------------------------------------------|----------------------------------------|-------------------------------------------------------|
| Firing Voltage<br>Lines are the Same,<br>but Abnormally High | Retarded ignition timing               | Reset ignition timing, see ENGINE PERFORMANCE section |
|                                                              | Fuel mixture too lean                  | Readjust carburetor, see ENGINE PERFORMANCE           |
|                                                              | High resistance in coil wire           | Replace coil wire                                     |
|                                                              | Corrosion in coil tower terminal       | Clean and/or replace coil                             |
|                                                              | Corrosion in distributor coil terminal | Clean and/or replace distributor cap                  |
| Firing Voltage<br>Lines are the Same<br>but Abnormally Low   | Fuel mixture too rich                  | Readjust carburetor, see ENGINE PERFORMANCE           |
|                                                              | Breaks in coil wire causing arcing     | Replace coil wire                                     |
|                                                              | Cracked coil tower causing arcing      | Replace coil                                          |
|                                                              | Low coil output                        | Replace coil                                          |
|                                                              | Low engine compression                 | Determine cause and repair                            |

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## BASIC DRIVEABILITY PROBLEMS TROUBLE SHOOTING TABLE

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| CONDITION | POSSIBLE CAUSE | CORRECTION |
|-----------|----------------|------------|
|-----------|----------------|------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|               |                                     |                                                              |
|---------------|-------------------------------------|--------------------------------------------------------------|
| Hard Starting | Binding carburetor linkage          | Eliminate binding                                            |
|               | Binding choke linkage               | Eliminate binding                                            |
|               | Binding choke piston                | Eliminate binding                                            |
|               | Restricted choke vacuum             | Check vacuum lines for blockage                              |
|               | Worn or dirty needle valve and seat | Clean carburetor, see ENGINE PERFORMANCE                     |
|               | Float sticking                      | Readjust or replace float see the ENGINE PERFORMANCE section |
|               | Incorrect choke adjustment          | Reset choke adjustment see ENGINE PERFORMANCE                |
|               | Defective coil                      | Replace coil                                                 |
|               | Improper spark plug gap             | Regap spark plugs                                            |
| Detonation    | Incorrect ignition timing           | Reset ignition timing see ENGINE PERFORMANCE                 |
|               | Over-advanced ignition timing       | Reset ignition timing see ENGINE PERFORMANCE                 |
|               | Defective spark plugs               | Replace spark plugs                                          |
|               | Fuel lines clogged                  | Clean fuel lines                                             |
|               | EGR system malfunction              | Check and repair EGR system                                  |
|               | PCV system malfunction              | Repair PCV system                                            |
|               | Vacuum leaks                        | Check and repair vacuum system                               |
|               | Loose fan belts                     | Tighten or replace fan belts, see ENGINE PERFORMANCE         |
|               | Restricted airflow                  | Remove restriction                                           |
|               | Vacuum advance malfunction          | Check distributor operation                                  |

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|                                                                          |                                           |                                                 |
|--------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                           |                                                 |
| Dieseling                                                                | Binding carburetor linkage                | Eliminate binding                               |
|                                                                          | Binding throttle linkage                  | Eliminate blinding                              |
|                                                                          | Binding choke linkage or fast idle cam    | Eliminate binding                               |
|                                                                          | Defective idle solenoid                   | Replace idle solenoid<br>see ENGINE PERFORMANCE |
|                                                                          | Improper base idle speed                  | Reset idle speed, see<br>see ENGINE PERFORMANCE |
|                                                                          | Incorrect ignition timing                 | Reset ignition timing<br>see ENGINE PERFORMANCE |
|                                                                          | Incorrect idle mixture setting            | Reset idle mixture,<br>see ENGINE PERFORMANCE   |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                           |                                                 |
| Faulty Acceleration                                                      | Incorrect ignition timing                 | Reset ignition timing<br>see ENGINE PERFORMANCE |
|                                                                          | Engine cold and choke too lean            | Adjust choke and<br>allow engine to warm-up     |
|                                                                          | Defective spark plugs                     | Replace spark plugs                             |
|                                                                          | Defective coil                            | Replace coil                                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                           |                                                 |
| Faulty Low Speed Operation                                               | Clogged idle transfer slots               | Clean idle transfer slots, see FUEL             |
|                                                                          | Restricted idle air bleeds and passages   | Disassemble and clean carburetor, see FUEL      |
|                                                                          | Clogged air cleaner                       | Replace air filter                              |
|                                                                          | Defective spark plugs                     | Replace spark plugs                             |
|                                                                          | Defective ignition wires                  | Replace ignition wire<br>see ENGINE PERFORMANCE |
|                                                                          | Defective distributor cap                 | Replace distributor cap                         |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                           |                                                 |
| Faulty High Speed Operation                                              | Incorrect ignition timing                 | Reset ignition timing<br>see ENGINE PERFORMANCE |
|                                                                          | Defective distributor centrifugal advance | Replace advance mechanism                       |

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|                                      |                      |
|--------------------------------------|----------------------|
| Defective distributor vacuum advance | Replace advance unit |
|--------------------------------------|----------------------|

|                                   |                                      |
|-----------------------------------|--------------------------------------|
| Incorrect spark plugs or plug gap | Check gap and/or replace spark plugs |
|-----------------------------------|--------------------------------------|

|                        |                                    |
|------------------------|------------------------------------|
| Faulty choke operation | Check choke and repair as required |
|------------------------|------------------------------------|

|                         |                     |
|-------------------------|---------------------|
| Clogged vacuum passages | Remove restrictions |
|-------------------------|---------------------|

|                                   |                                    |
|-----------------------------------|------------------------------------|
| Improper size or clogged main jet | Check jet size and clean, see FUEL |
|-----------------------------------|------------------------------------|

|                        |                                       |
|------------------------|---------------------------------------|
| Restricted air cleaner | Check filter and replace as necessary |
|------------------------|---------------------------------------|

|                                          |                            |
|------------------------------------------|----------------------------|
| Defective distributor cap, rotor or coil | Replace cap, rotor or coil |
|------------------------------------------|----------------------------|

|                                                                                                          |                       |                     |
|----------------------------------------------------------------------------------------------------------|-----------------------|---------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA<br>Misfire at All<br>Speeds | Defective spark plugs | Replace spark plugs |
|----------------------------------------------------------------------------------------------------------|-----------------------|---------------------|

|                            |                          |
|----------------------------|--------------------------|
| Defective spark plug wires | Replace spark plug wires |
|----------------------------|--------------------------|

|                                           |                             |
|-------------------------------------------|-----------------------------|
| Defective distributor cap, rotor, or coil | Replace cap, rotor, or coil |
|-------------------------------------------|-----------------------------|

|                                |                      |
|--------------------------------|----------------------|
| Cracked or broken vacuum hoses | Replace vacuum hoses |
|--------------------------------|----------------------|

|              |                     |
|--------------|---------------------|
| Vacuum leaks | Repair vacuum leaks |
|--------------|---------------------|

|                                                                                            |                                |                      |
|--------------------------------------------------------------------------------------------|--------------------------------|----------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA<br>Hesitation | Fuel lines clogged             | Remove restriction   |
|                                                                                            | Cracked or broken vacuum hoses | Replace vacuum hoses |

|              |                     |
|--------------|---------------------|
| Vacuum leaks | Repair Vacuum leaks |
|--------------|---------------------|

|                            |                   |
|----------------------------|-------------------|
| Binding carburetor linkage | Eliminate binding |
|----------------------------|-------------------|

|                          |                   |
|--------------------------|-------------------|
| Binding throttle linkage | Eliminate binding |
|--------------------------|-------------------|

|                                        |                   |
|----------------------------------------|-------------------|
| Binding choke linkage or fast idle cam | Eliminate binding |
|----------------------------------------|-------------------|

|                        |                                  |
|------------------------|----------------------------------|
| Improper float setting | Readjust float setting, see FUEL |
|------------------------|----------------------------------|

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|                                 |                                         |                                                                 |
|---------------------------------|-----------------------------------------|-----------------------------------------------------------------|
|                                 | Cracked or broken ignition wires        | Replace ignition wires                                          |
| AAAAA                           |                                         |                                                                 |
| Rough idle, Missing or Stalling | Incorrect curb idle or fast idle speed  | Reset idle speed, see see ENGINE PERFORMANCE                    |
|                                 | Incorrect basic timing                  | Reset ignition timing see ENGINE PERFORMANCE                    |
|                                 | Improper idle mixture adjustment        | Reset idle mixture, see ENGINE PERFORMANCE                      |
|                                 | Improper feedback system operation      | Check feedback system see ENGINE PERFORMANCE                    |
|                                 | Incorrect spark plug gap                | Reset spark plug gap, see ENGINE PERFORMANCE                    |
|                                 | Moisture in ignition components         | Dry components                                                  |
|                                 | Loose or broken ignition wires          | Replace ignition wires                                          |
|                                 | Damaged distributor cap or or rotor     | Replace distributor cap or rotor                                |
|                                 | Faulty ignition coil                    | Replace ignition coil                                           |
|                                 | Fuel filter clogged or worn             | Replace fuel filter                                             |
|                                 | Damaged idle mixture screw              | Replace idle mixture screw, see FUEL                            |
|                                 | Improper fast idle cam adjustment       | Reset fast idle cam adjustment, see TUNE-see ENGINE PERFORMANCE |
|                                 | Improper EGR valve operation            | Replace EGR valve                                               |
|                                 | Faulty PCV valve air flow               | Replace PCV valve                                               |
|                                 | Choke binding or improper choke setting | Reset choke or eliminate binding                                |
|                                 | Vacuum leak                             | Repair vacuum leak                                              |
|                                 | Improper float bowl fuel level          | Reset float adjustment, see FUEL                                |
|                                 | Clogged air bleed or idle passages      | Clean carburetor passages, see FUEL                             |



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|                                         |                                              |
|-----------------------------------------|----------------------------------------------|
| Clogged or worn air cleaner filter      | Replace air filter                           |
| Faulty choke vacuum diaphragm           | Replace diaphragm, see ENGINE PERFORMANCE    |
| Exhaust manifold heat valve inoperative | Replace heat valve                           |
| Improper distributor spark advance      | Check distributor operation                  |
| Leaking valves or valve components      | Check and repair valvetrain                  |
| Improper carburetor mounting            | Remove and remount carburetor                |
| Excessive play in distributor shaft     | Replace distributor                          |
| Loose or corroded wiring connections    | Repair or replace as required                |
| Engine Surges                           | Improper PCV valve airflow                   |
|                                         | Replace PCV valve                            |
|                                         | Vacuum leaks                                 |
|                                         | Repair vacuum leaks                          |
|                                         | Clogged air bleeds                           |
|                                         | Remove restriction                           |
|                                         | EGR valve malfunction                        |
|                                         | Replace EGR valve                            |
|                                         | Restricted air cleaner filter                |
|                                         | Replace air filter                           |
|                                         | Cracked or broken vacuum hoses               |
|                                         | Replace vacuum hoses                         |
|                                         | Cracked or broken ignition wires             |
|                                         | Replace ignition wires                       |
|                                         | Vacuum advance malfunction                   |
|                                         | Check unit and replace as necessary          |
|                                         | Defective or fouled spark plugs              |
|                                         | Replace spark plugs                          |
| Ping or Spark Knock                     | Incorrect ignition timing                    |
|                                         | Reset ignition timing see ENGINE PERFORMANCE |
|                                         | Distributor centrifugal or                   |
|                                         | Check operation and                          |

## TROUBLE SHOOTING - BASIC PROCEDURES

### Article Text (p. 64)

1996 Volkswagen Golf

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vacuum advance malfunction      replace as necessary

Carburetor setting too lean      Readjust mixture  
setting, see ENGINE  
PERFORMANCE

Vacuum leak      Eliminate vacuum leak

EGR valve malfunction      Replace EGR valve

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Poor Gasoline      Cracked or broken vacuum      Replace vacuum hoses  
Mileage      hoses

Vacuum leaks      Repair vacuum leaks

Defective ignition wires      Replace wires

Incorrect choke setting      Readjust setting, see  
ENGINE PERFORMANCE

Defective vacuum advance      Replace vacuum advance

Defective spark plugs      Replace spark plugs

Binding carburetor power      Eliminate binding  
piston

Dirt in carburetor jets      Clean and/or replace  
jets

Incorrect float adjustment      Readjust float  
setting, see FUEL

Defective power valve      Replace power valve,  
see ENGINE PERFORMANCE

Incorrect idle speed      Readjust idle speed

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Engine Stalls      Improper float level      Readjust float level

Leaking needle valve and      Replace needle valve  
seat      and seat

Vacuum leaks      Eliminate vacuum  
leaks

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## VACUUM PUMP - DIESEL TROUBLE SHOOTING

WARNING: This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting

## TROUBLE SHOOTING - BASIC PROCEDURES

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information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

**NOTE:** Diesel engines mechanical diagnosis is the same as gasoline engines for items such as noisy valves, bearings, pistons, etc. The following trouble shooting covers only items pertaining to diesel engines.

#### VACUUM PUMP (DIESEL) TROUBLE SHOOTING CHART

| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                     |                          |
|--------------------------------------------------------------------------|-------------------------------------|--------------------------|
| CONDITION                                                                | POSSIBLE CAUSE                      | CORRECTION               |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                     |                          |
| Excessive Noise                                                          | Loose pump-to-drive assembly screws | Tighten screws           |
|                                                                          | Loose tube on pump assembly         | Tighten tube             |
|                                                                          | Valves not functioning properly     | Replace valves           |
|                                                                          |                                     |                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                     |                          |
| Oil Leakage                                                              | Loose end plug                      | Tighten end plug         |
|                                                                          | Bad seal crimp                      | Remove and re-crimp seal |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                     |                          |

#### WHEEL ALIGNMENT TROUBLE SHOOTING

**WARNING:** This is GENERAL information. This article is not intended to be specific to any unique situation or individual vehicle configuration. The purpose of this Trouble Shooting information is to provide a list of common causes to problem symptoms. For model-specific Trouble Shooting, refer to SUBJECT, DIAGNOSTIC, or TESTING articles available in the section(s) you are accessing.

#### BASIC WHEEL ALIGNMENT TROUBLE SHOOTING CHART

| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                  |                                                |
|--------------------------------------------------------------------------|----------------------------------|------------------------------------------------|
| CONDITION                                                                | POSSIBLE CAUSE                   | CORRECTION                                     |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                  |                                                |
| Premature Tire Wear                                                      | Improper tire inflation          | Check tire pressure                            |
|                                                                          | Front alignment out of tolerance | See ALIGNMENT SPECS in WHEEL ALIGNMENT section |
|                                                                          | Suspension components worn       | See SUSPENSION section                         |
|                                                                          | Steering system components worn  | See STEERING section                           |
|                                                                          | Improper standing height         | See WHEEL ALIGNMENT                            |
|                                                                          | Uneven or sagging springs        | See SUSPENSION section                         |

## TROUBLE SHOOTING - BASIC PROCEDURES

### Article Text (p. 66)

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|                                   |                                              |
|-----------------------------------|----------------------------------------------|
| Bent wheel                        | See WHEEL ALIGNMENT                          |
| Improper torsion bar adjustment   | See SUSPENSION section                       |
| Loose or worn wheel bearings      | See WHEEL BEARING ADJ. in SUSPENSION section |
| Worn or defective shock           | Replace shock absorbers                      |
| Tires out of balance              | Check tire balance                           |
| Pulls to One Side                 | Improper tire inflation                      |
|                                   | Check tire pressure                          |
| Brake dragging                    | See BRAKE section                            |
| Mismatched tires                  | See WHEEL ALIGNMENT                          |
| Broken or sagging spring          | See SUSPENSION section                       |
| Broken torsion bar                | See SUSPENSION section                       |
| Power steering valve not centered | See STEERING section                         |
| Front alignment out of tolerance  | See WHEEL ALIGNMENT section                  |
| Defective wheel bearing           | See WHEEL BEARINGS in SUSPENSION section     |
| Uneven sway bar links             | See SUSPENSION section                       |
| Frame bent                        | Check for frame damage                       |
| Steering system bushing worn      | See STEERING section                         |
| Hard Steering                     | Idler arm bushing too tight                  |
|                                   | See STEERING LINKAGE in STEERING section     |
| Ball joint tight or seized        | See SUSPENSION section                       |
| Steering linkage too tight        | See STEERING LINKAGE in STEERING section     |
| Power steering fluid low          | Add proper amount of fluid                   |
| Power steering drive belt loose   | See STEERING section                         |

## TROUBLE SHOOTING - BASIC PROCEDURES

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|                               |                      |
|-------------------------------|----------------------|
| Power steering pump defective | See STEERING section |
|-------------------------------|----------------------|

|                                 |                      |
|---------------------------------|----------------------|
| Steering gear out of adjustment | See STEERING section |
|---------------------------------|----------------------|

|                           |                     |
|---------------------------|---------------------|
| Incorrect wheel alignment | See WHEEL ALIGNMENT |
|---------------------------|---------------------|

|                       |                      |
|-----------------------|----------------------|
| Damaged steering gear | See STEERING section |
|-----------------------|----------------------|

|                    |                        |
|--------------------|------------------------|
| Damaged suspension | See SUSPENSION section |
|--------------------|------------------------|

|                                   |                        |
|-----------------------------------|------------------------|
| Bent steering knuckle or supports | See SUSPENSION section |
|-----------------------------------|------------------------|

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|                   |                                       |                        |
|-------------------|---------------------------------------|------------------------|
| Vehicle "Wanders" | Strut rod or control arm bushing worn | See SUSPENSION section |
|-------------------|---------------------------------------|------------------------|

|                              |                                          |
|------------------------------|------------------------------------------|
| Loose or worn wheel bearings | See WHEEL BEARINGS in SUSPENSION section |
|------------------------------|------------------------------------------|

|                         |                     |
|-------------------------|---------------------|
| Improper tire inflation | Check tire pressure |
|-------------------------|---------------------|

|                                     |                        |
|-------------------------------------|------------------------|
| Stabilizer bar missing or defective | See SUSPENSION section |
|-------------------------------------|------------------------|

|                                  |                                           |
|----------------------------------|-------------------------------------------|
| Wheel alignment out of tolerance | See Adjustment in WHEEL ALIGNMENT section |
|----------------------------------|-------------------------------------------|

|               |                        |
|---------------|------------------------|
| Broken spring | See SUSPENSION section |
|---------------|------------------------|

|                           |                         |
|---------------------------|-------------------------|
| Defective shock absorbers | Replace shock absorbers |
|---------------------------|-------------------------|

|                                       |                        |
|---------------------------------------|------------------------|
| Worn steering & suspension components | See SUSPENSION section |
|---------------------------------------|------------------------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|                  |                           |                    |
|------------------|---------------------------|--------------------|
| Front End Shimmy | Tire out of balance/round | Check tire balance |
|------------------|---------------------------|--------------------|

|                        |                     |
|------------------------|---------------------|
| Excessive wheel runout | See WHEEL ALIGNMENT |
|------------------------|---------------------|

|                                 |                             |
|---------------------------------|-----------------------------|
| Insufficient or improper caster | See WHEEL ALIGNMENT section |
|---------------------------------|-----------------------------|

|                                        |                        |
|----------------------------------------|------------------------|
| Worn suspension or steering components | See SUSPENSION section |
|----------------------------------------|------------------------|

|                           |                        |
|---------------------------|------------------------|
| Defective shock absorbers | Replace shock absorber |
|---------------------------|------------------------|

|                              |                                              |
|------------------------------|----------------------------------------------|
| Wheel bearings worn or loose | See WHEEL BEARING ADJ. in SUSPENSION section |
|------------------------------|----------------------------------------------|

# TROUBLE SHOOTING - BASIC PROCEDURES

## Article Text (p. 68)

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Power steering reaction                      See STEERING section  
Bracket loose

Steering gear box (rack)                      See STEERING section  
mounting loose

Steering gear adjustment                      See STEERING section  
loose

Worn spherical joints                      See SUSPENSION section

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Toe-In Not                      Lower control arm bent                      See SUSPENSION section  
Adjustable

Frame bent                      Check frame for damage

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Camber Not                      Control arm bent                      See SUSPENSION section  
Adjustable

Frame bent                      Check frame for damage

Hub & bearing not seated                      See SUSPENSION section  
properly

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

END OF ARTICLE

# **N - REMOVE/INSTALL/OVERHAUL - GASOLINE**

## **Article Text**

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### **ARTICLE BEGINNING**

1996 ENGINE PERFORMANCE

Volkswagen Removal, Overhaul & Installation - Gasoline

Cabrio, Golf III, GTI, Jetta III, Passat

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle.

### **INTRODUCTION**

Removal, overhaul and installation procedures are covered in this article. If component removal and installation is primarily an unbolt and bolt-on procedure, only a torque specification may be furnished.

**CAUTION:** Before disconnecting battery, obtain radio anti-theft code. If wrong code is entered into radio after power is restored, radio will become inoperable.

### **IGNITION SYSTEM**

#### **CAMSHAFT POSITION (CMP) SENSOR**

Removal & Installation (2.8L)

1) CMP sensor removal procedure is not available from manufacturer. To install CMP sensor, ensure cylinder No. 1 is at TDC of compression stroke.

2) Align mark on camshaft sprocket with mark on rear toothed-belt guard. Turn rotor so that it points to cylinder No. 1 mark on CMP sensor housing. Insert CMP sensor into engine. Check ignition timing.

#### **DISTRIBUTOR**

Removal (2.0L)

1) Ensure cylinder No. 1 is at TDC of compression stroke. Ensure camshaft gear lines up with mark on toothed-belt cover. See Fig. 1.

2) Ensure distributor rotor lines up with mark on distributor housing or notch in rim of Camshaft Position (CMP) sensor dust boot. With both camshaft and crankshaft at TDC position, remove distributor.

## N - REMOVE/INSTALL/OVERHAUL - GASOLINE

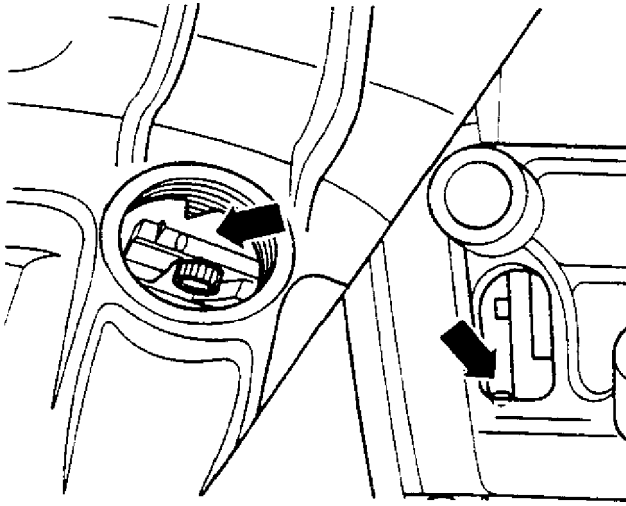
### Article Text (p. 2)

1996 Volkswagen Golf

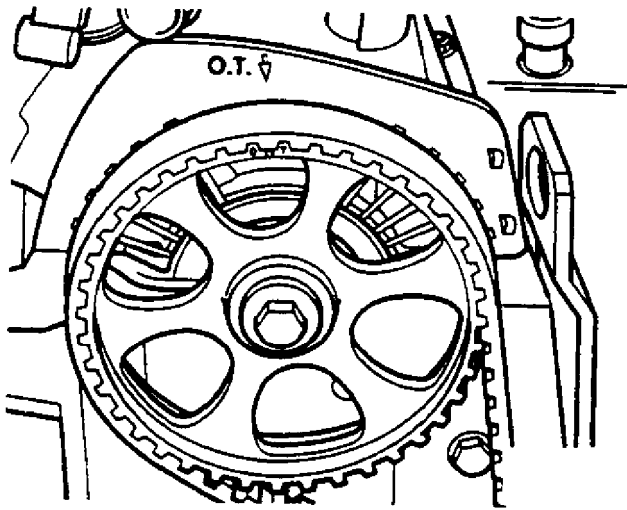
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FLYWHEEL AT TDC



TDC MARK ON  
TOOTHED BELT COVER

93D81169

Fig. 1: Removing Distributor (2.0L)

Courtesy of Volkswagen United States, Inc.

#### Installation

1) Ensure slot on oil pump shaft is parallel to crankshaft. Install distributor with pins toward hold-down bolt hole. Tighten distributor hold-down bolt. With distributor installed, distributor rotor should line up with mark on distributor housing or notch in rim of CMP sensor dust boot. See Fig. 2.

2) If marks do not align, remove upper timing belt guard. Loosen belt tensioner, and remove timing belt from camshaft sprocket. Turn intermediate shaft sprocket in direction of arrows, using timing belt, until distributor rotor aligns with mark on distributor housing.



## N - REMOVE/INSTALL/OVERHAUL - GASOLINE

### Article Text (p. 3)

1996 Volkswagen Golf

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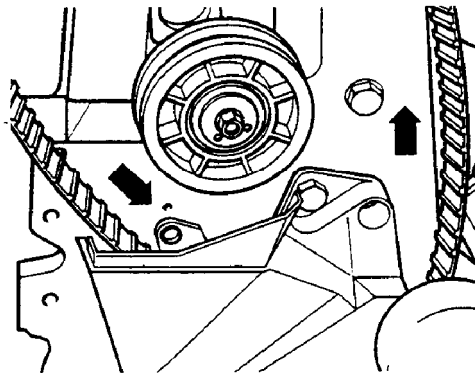
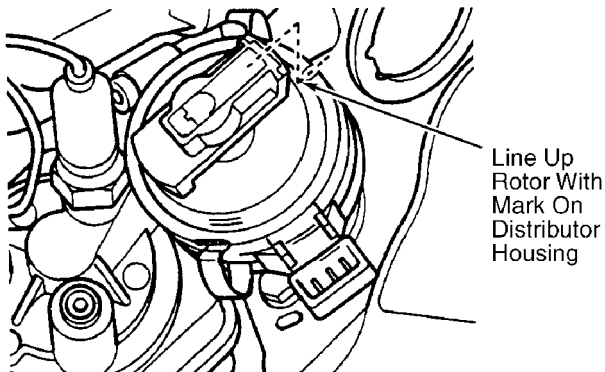
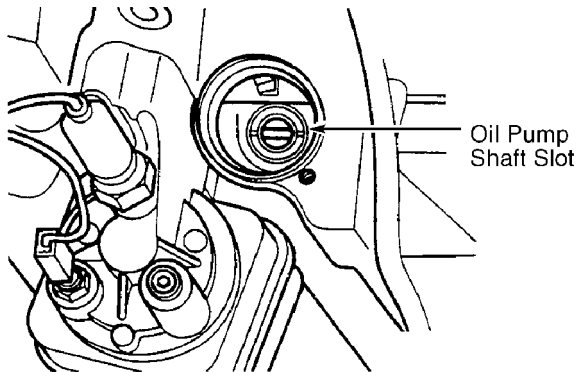
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See Fig. 2.

3) With distributor rotor properly aligned, install timing belt onto camshaft sprocket. For easier installation of drive belt, tighten belt tensioner nut one turn.

4) Using Spanner Wrench (V159), turn belt tensioner down and inward toward belt. Tighten belt tensioner nut to 33 ft. lbs. (45 N.m). Install upper timing belt guard. Check ignition timing.



NOTE: Turn Intermediate Shaft Sprocket With  
Timing Belt In Direction Of Arrows

93J81165

Fig. 2: Installing Distributor (2.0L)

Courtesy of Volkswagen United States, Inc.

## N - REMOVE/INSTALL/OVERHAUL - GASOLINE

### Article Text (p. 4)

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## FUEL SYSTEM

### FUEL SYSTEM PRESSURE RELEASE

Disconnect ignition coil output stage wiring harness to deactivate ignition. To relieve fuel system pressure, remove fuel pump fuse No. 18, or fuel pump relay, to deactivate fuel pump. Place a clean shop rag around fuel line fitting and slowly loosen fitting.

**WARNING:** Fuel will be discharged when disconnecting fuel system components. DO NOT smoke or work near heaters or other fire hazards. Keep fire extinguisher available.

### FUEL PUMP

**NOTE:** On 2.8L, an in-tank (transfer) fuel pump is also used. Disconnect fuel lines and remove plastic retaining collar. Remove fuel pump from fuel tank. To install, reverse removal procedure.

#### Removal & Installation

1) Obtain radio anti-theft code. Disconnect negative battery cable. Remove luggage compartment floor covering and fuel pump access cover. Disconnect wiring harness and fuel lines from fuel pump.

2) Using Wrench (3217), loosen fuel pump screw cap. Remove flange and sealing ring from fuel tank opening. Loosen fuel pump by twisting it to left. Remove fuel pump from fuel tank.

3) When installing fuel pump, ensure fuel gauge sending unit is not bent. Sending unit must be installed with a frontal angle of 5 degrees (70-75 degrees on Passat). Align mark on flange with fuel tank. To complete installation, reverse removal procedure.

### FUEL RAIL & INJECTORS

#### Removal & Installation (2.0L)

Remove upper intake manifold. See Fig. 3. Remove fuel rail and fuel injectors. To install, reverse removal procedure.

**NOTE:** Sealing gasket beneath lower insert should be replaced when servicing fuel injector. When installing upper insert, clean its threads and lightly apply thread locking compound.

## N - REMOVE/INSTALL/OVERHAUL - GASOLINE

### Article Text (p. 5)

1996 Volkswagen Golf

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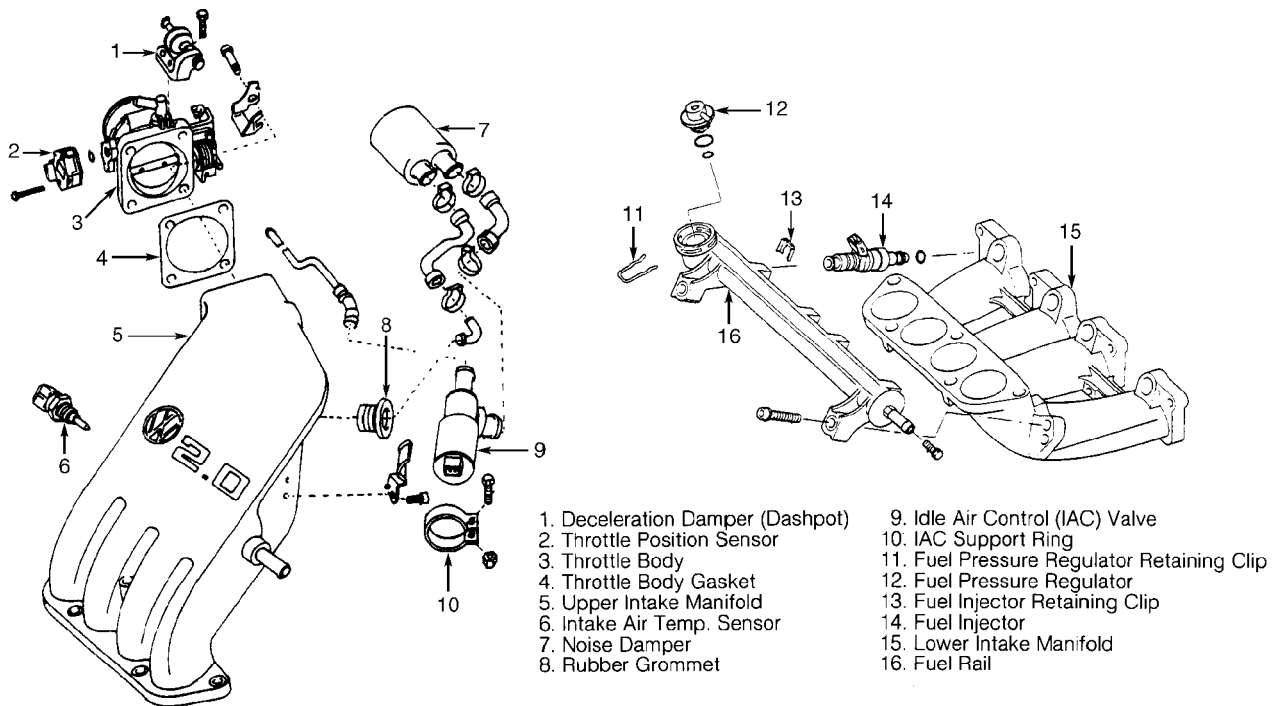


Fig. 3: Exploded View Of Upper & Lower Intake Manifolds (2.0L)  
Courtesy of Volkswagen United States, Inc.

#### Removal & Installation (2.8L)

1) Remove ignition wires. Remove hose from mass airflow sensor. Disconnect hose to fuel evaporative (frequency) solenoid valve at throttle body.

2) Disconnect throttle position sensor and idle air control valve. Disconnect accelerator cable from throttle body. Disconnect and plug coolant hoses at throttle body.

3) Disconnect hose from air intake heated tube. Detach fuel lines at cylinder head cover and remove from fuel rail. Disconnect vacuum hose from fuel pressure regulator. Remove upper intake manifold.

4) With upper intake manifold removed, disconnect wiring harness from fuel injector(s). Pry off retaining clip(s) from injector(s). Lubricate injector "O" rings with fuel, and install injectors. To complete installation, reverse removal procedure.

#### MASS AIRFLOW (MAF) SENSOR

MAF sensor removal and installation procedure is not available from manufacturer.

#### TORQUE SPECIFICATIONS

##### TORQUE SPECIFICATIONS TABLE (2.0L)

Application

|             |                |
|-------------|----------------|
| Application | Ft. Lbs. (N.m) |
|-------------|----------------|

## N - REMOVE/INSTALL/OVERHAUL - GASOLINE

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|                                   |         |
|-----------------------------------|---------|
| Distributor Hold-Down Bolts ..... | 18 (25) |
| Heated Oxygen Sensor .....        | 37 (50) |
| Knock Sensors .....               | 15 (20) |
| Upper Intake Manifold Bolts ..... | 15 (20) |

INCH Lbs. (N.m)

|                                 |         |
|---------------------------------|---------|
| Fuel Rail Bolts .....           | 84 (10) |
| Mass Airflow Sensor Bolts ..... | 84 (10) |
| Throttle Body Bolts .....       | 84 (10) |

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

#### TORQUE SPECIFICATIONS TABLE (2.8L)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Ft. Lbs. (N.m) |
|-------------|----------------|
|-------------|----------------|

|                                   |         |
|-----------------------------------|---------|
| EGR Temperature Sensor .....      | 15 (20) |
| Heated Oxygen Sensor .....        | 37 (50) |
| Knock Sensors .....               | 18 (25) |
| Throttle Body Bolts .....         | 18 (25) |
| Upper Intake Manifold Bolts ..... | 18 (25) |

INCH Lbs. (N.m)

|                                     |         |
|-------------------------------------|---------|
| Fuel Rail Bolts .....               | 84 (10) |
| Intake Air Temperature Sensor ..... | 84 (10) |

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END OF ARTICLE

## M - VACUUM DIAGRAMS - GASOLINE

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## ARTICLE BEGINNING

### 1996 ENGINE PERFORMANCE

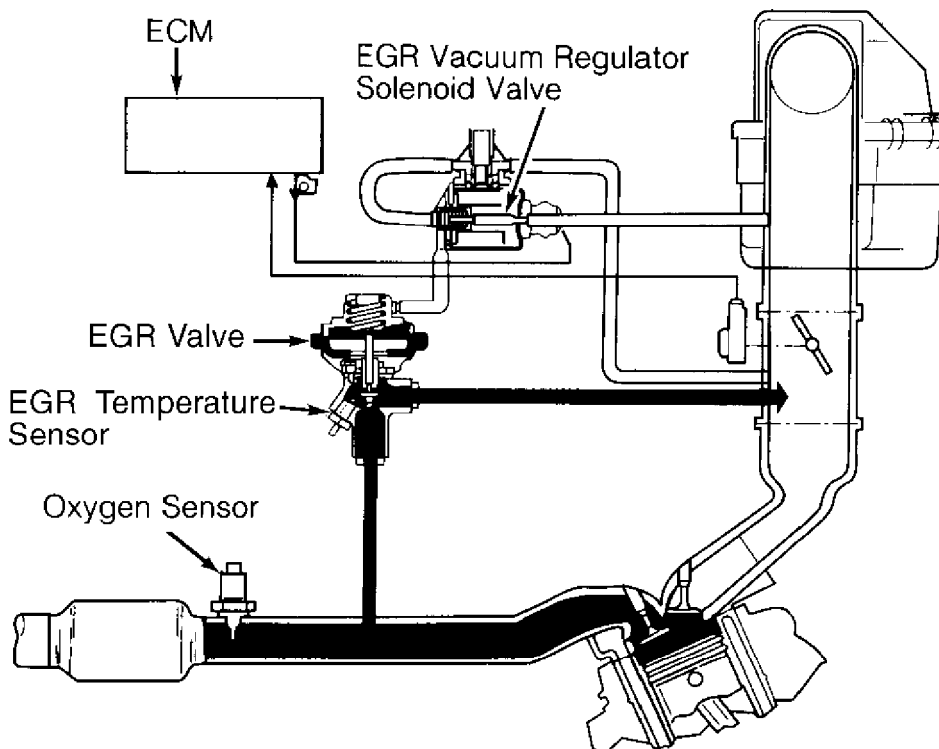
#### Volkswagen Vacuum Diagrams - Gasoline

Cabrio, Golf III, GTI, Jetta III, Passat

## INTRODUCTION

This article contains underhood views or schematics of vacuum hose routing. Use these vacuum diagrams during the visual inspection in the F - BASIC TESTING - GASOLINE article. This will assist in identifying improperly routed vacuum hoses which cause driveability and/or computer-indicated malfunctions.

**NOTE:** Vacuum diagrams for applications not shown were not available from manufacturer. Always refer to Emission Control label in engine compartment before attempting service. If manual and label differ, always use emission label specifications.



94D46048

Fig. 1: EGR & Motronic System Vacuum Diagram (2.0L)  
Courtesy of Volkswagen United States, Inc.

## M - VACUUM DIAGRAMS - GASOLINE

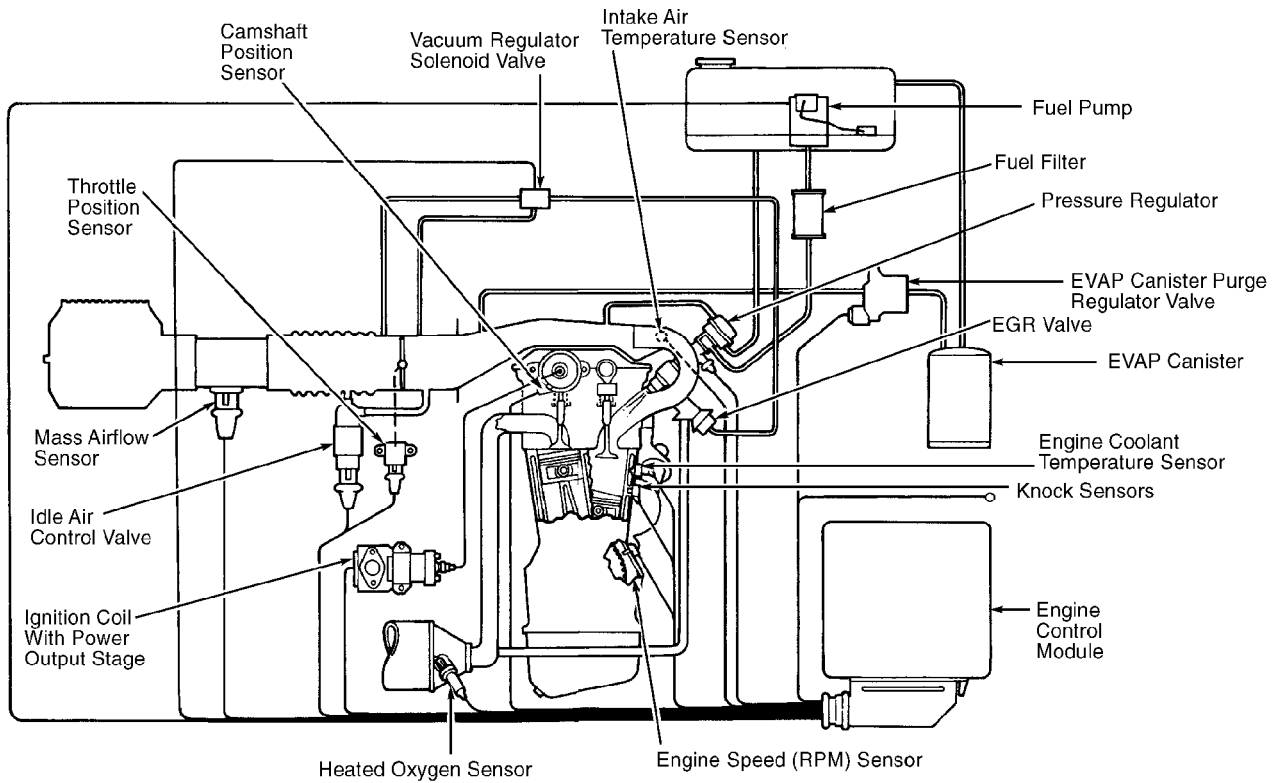
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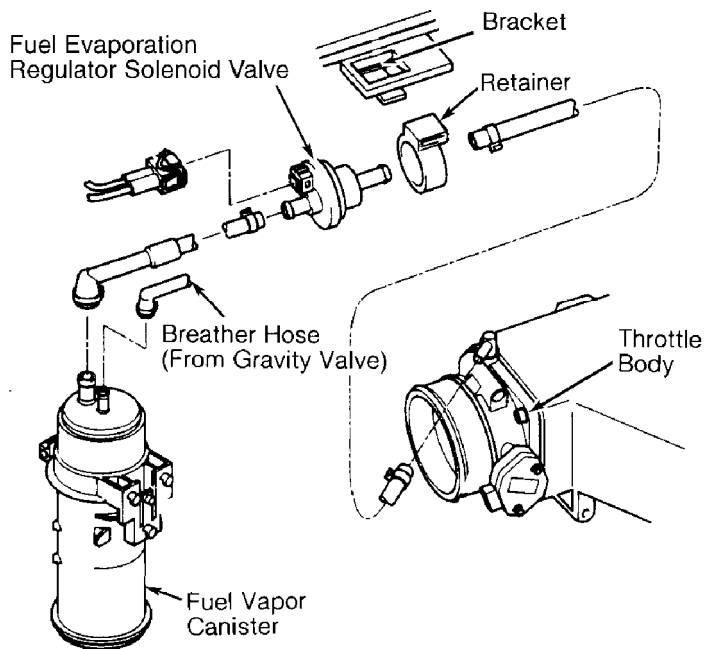
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96H11004

Fig. 2: EGR System Vacuum Diagram (2.8L)

Courtesy of Volkswagen United States, Inc.



96I11005

Fig. 3: Fuel Evaporation System Vacuum Diagram (2.0L)

Courtesy of Volkswagen United States, Inc.

## M - VACUUM DIAGRAMS - GASOLINE

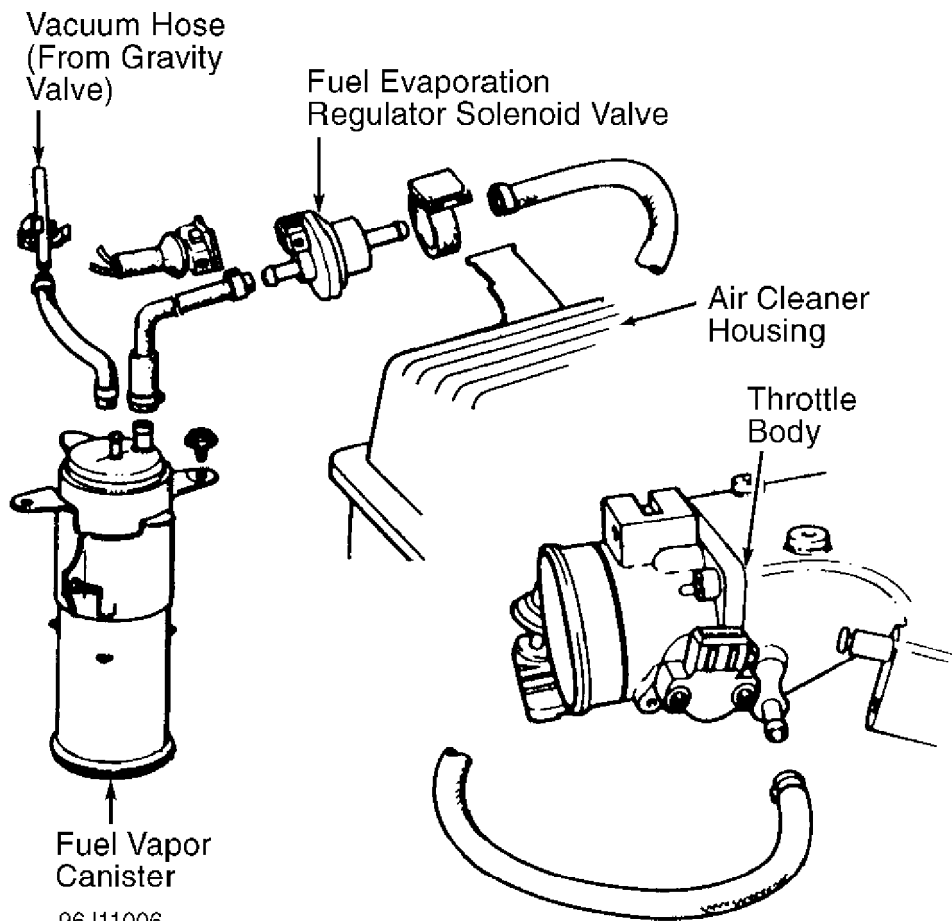
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96J11006

Fig. 4: Fuel Evaporation System Vacuum Diagram (2.8L)  
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END OF ARTICLE

# L - WIRING DIAGRAMS

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### ARTICLE BEGINNING

1996 ENGINE PERFORMANCE

Volkswagen Wiring Diagrams

Cabrio, Golf III, GTI, Jetta III, Passat

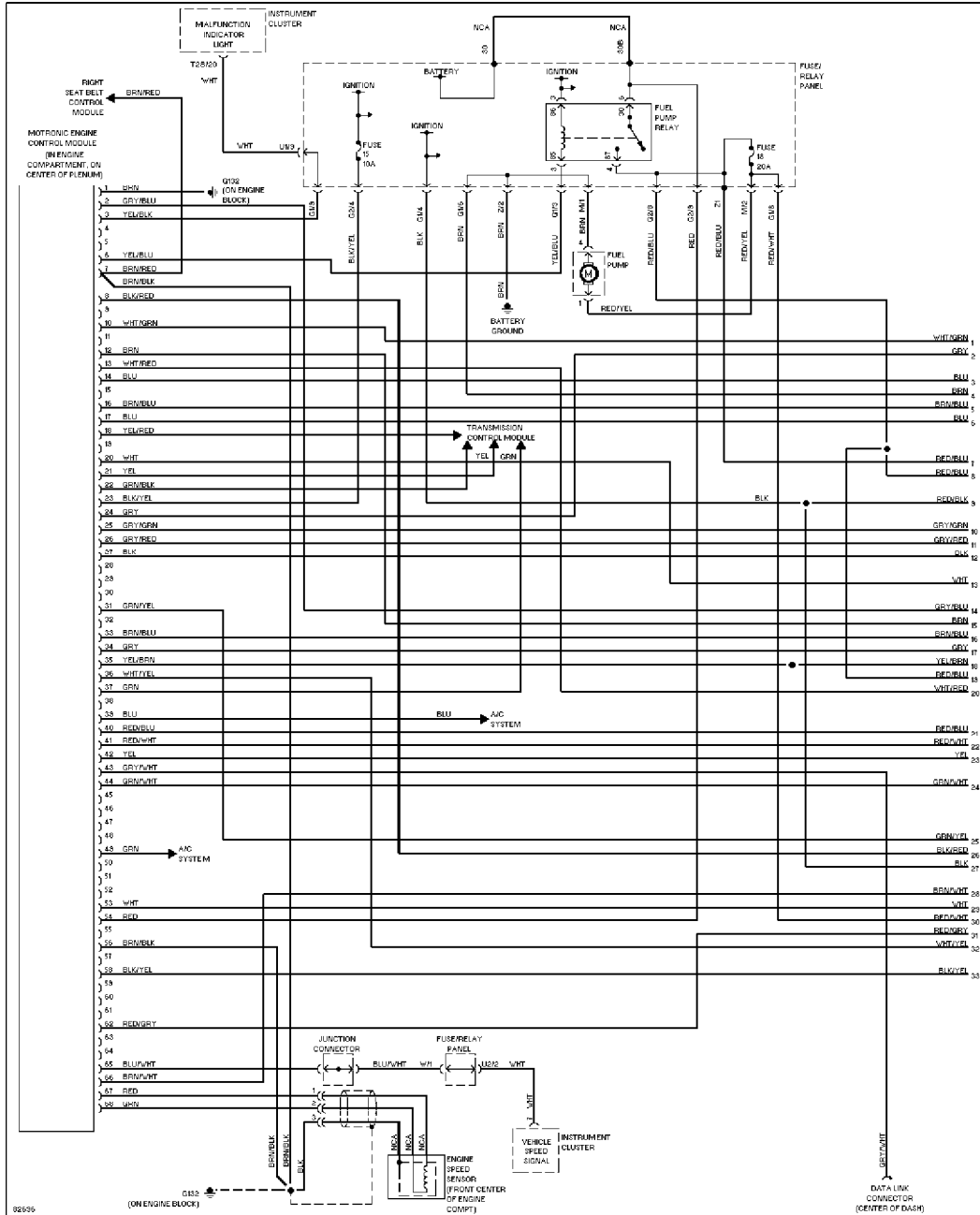


Fig. 1: Wiring Diagram (Cabrio 2.0L - 1 Of 2)



# L - WIRING DIAGRAMS

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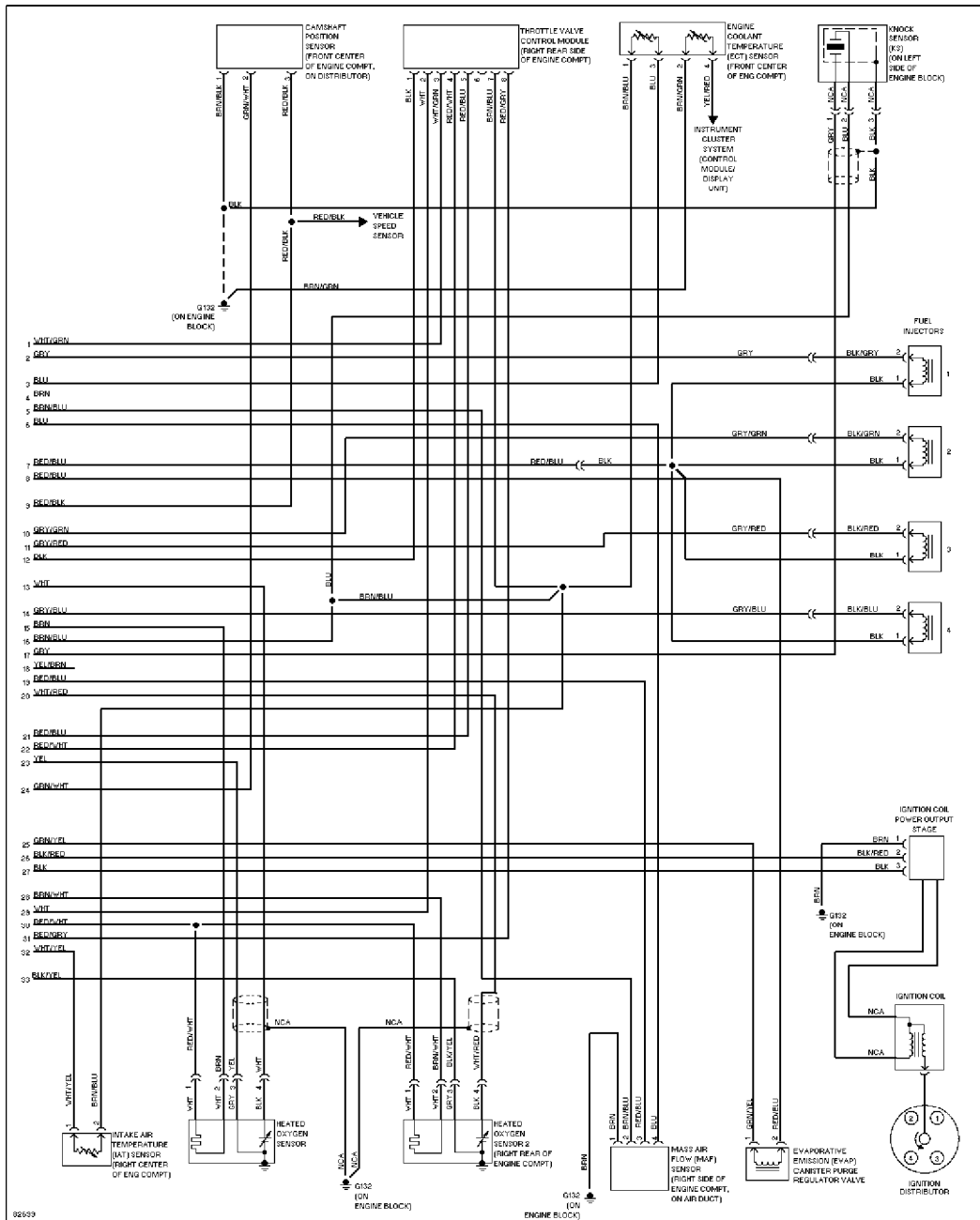


Fig. 2: Wiring Diagram (Cabrio 2.0L - 2 Of 2)

# L - WIRING DIAGRAMS

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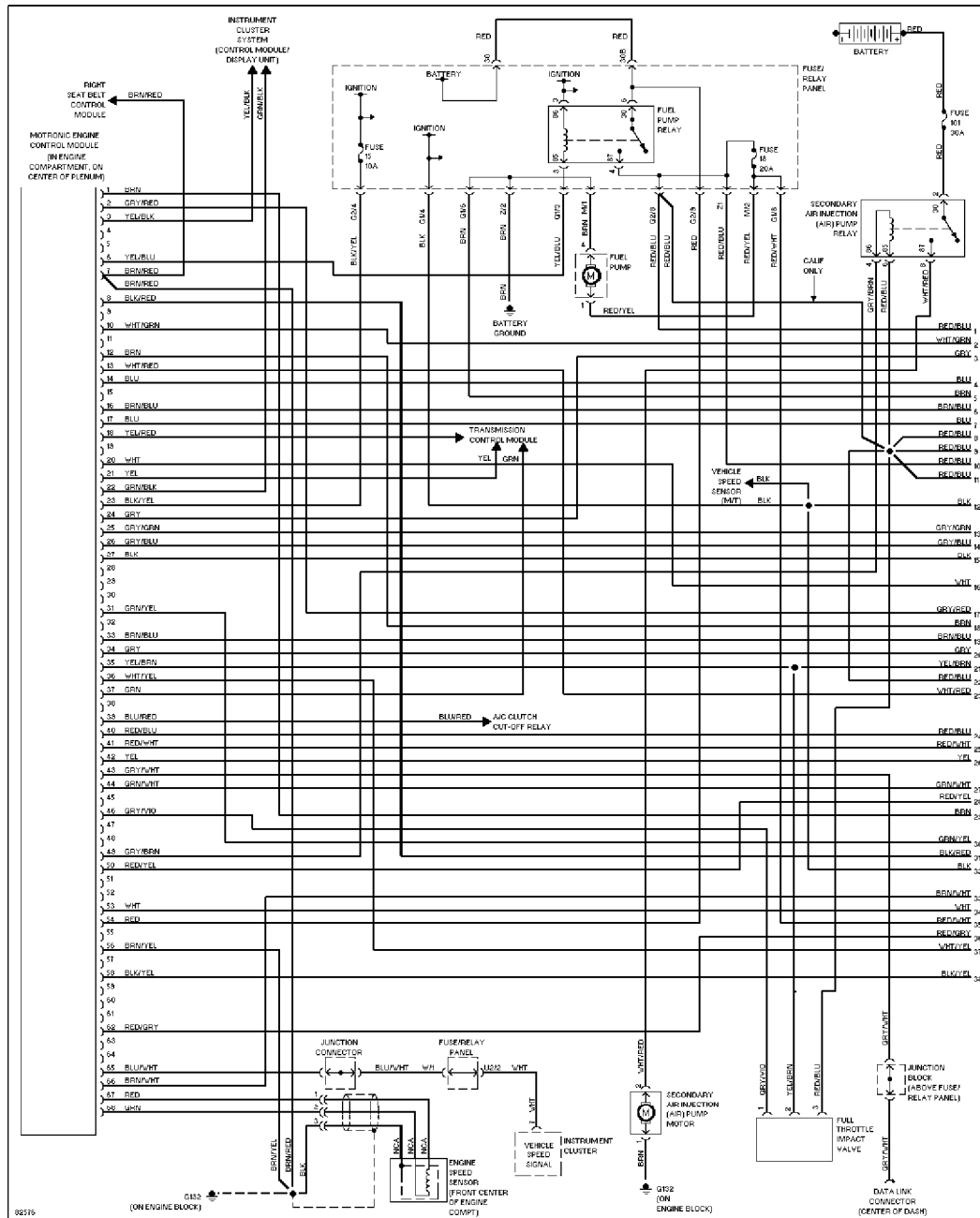


Fig. 3: Wiring Diagram (Golf III & Jetta III 2.0L - 1 Of 2)

# L - WIRING DIAGRAMS

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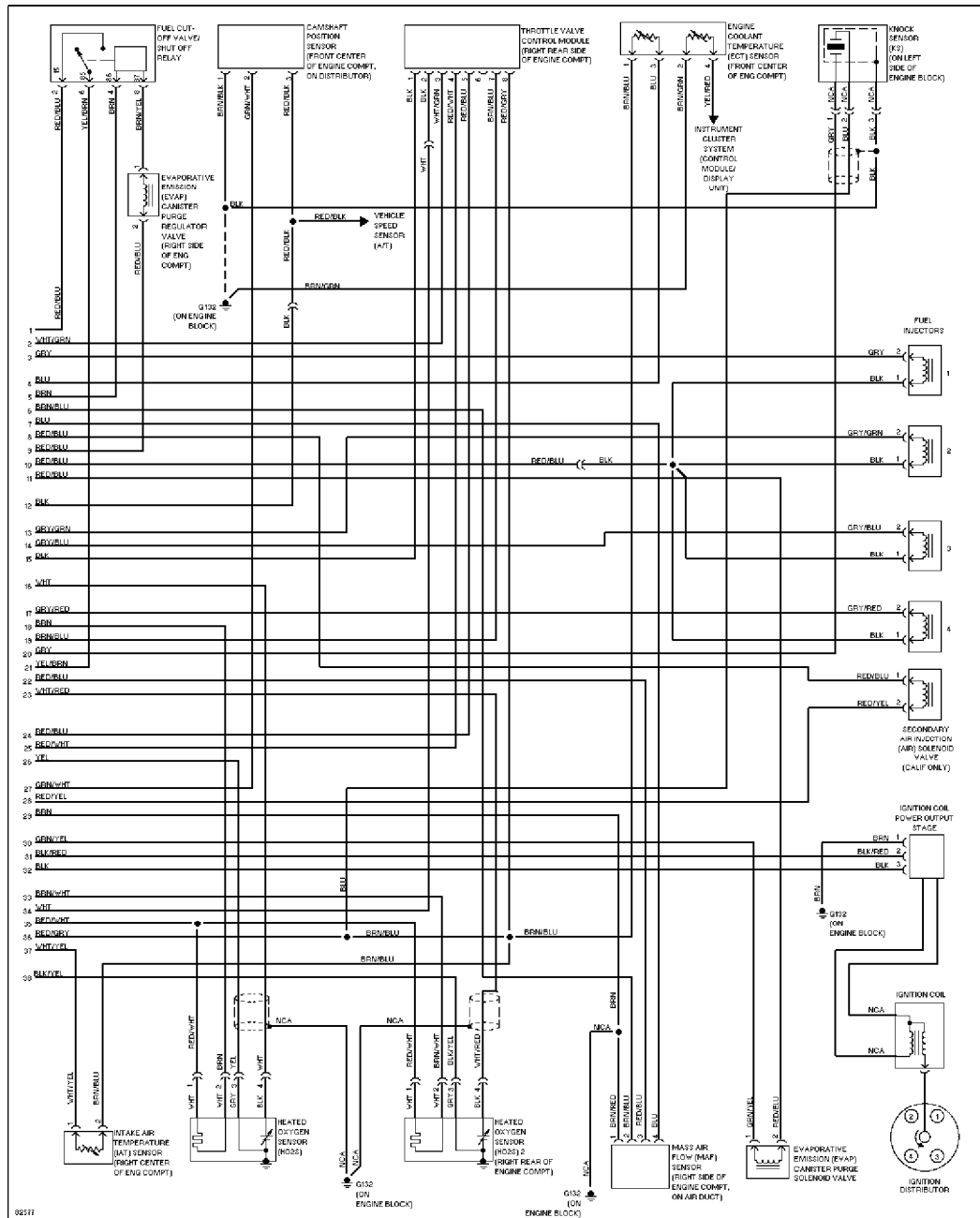


Fig. 4: Wiring Diagram (Golf III & Jetta III 2.0L - 2 Of 2)

# L - WIRING DIAGRAMS

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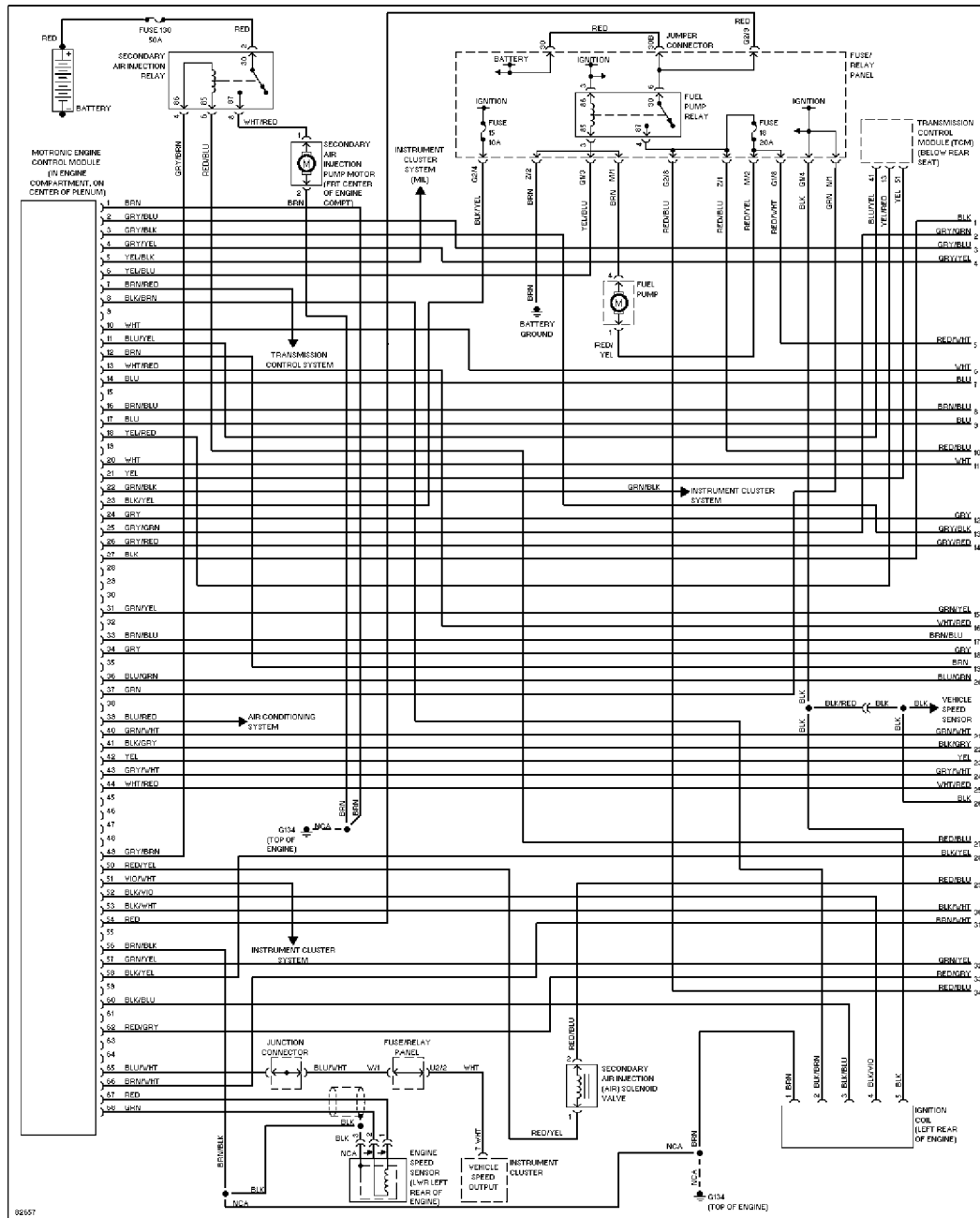


Fig. 5: Wiring Diagram (GTI & Jetta III 2.8L - 1 Of 2)

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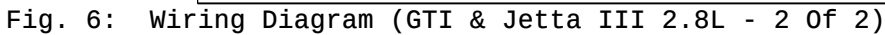


Fig. 6: Wiring Diagram (GTI & Jetta III 2.8L - 2 of 2)

# L - WIRING DIAGRAMS

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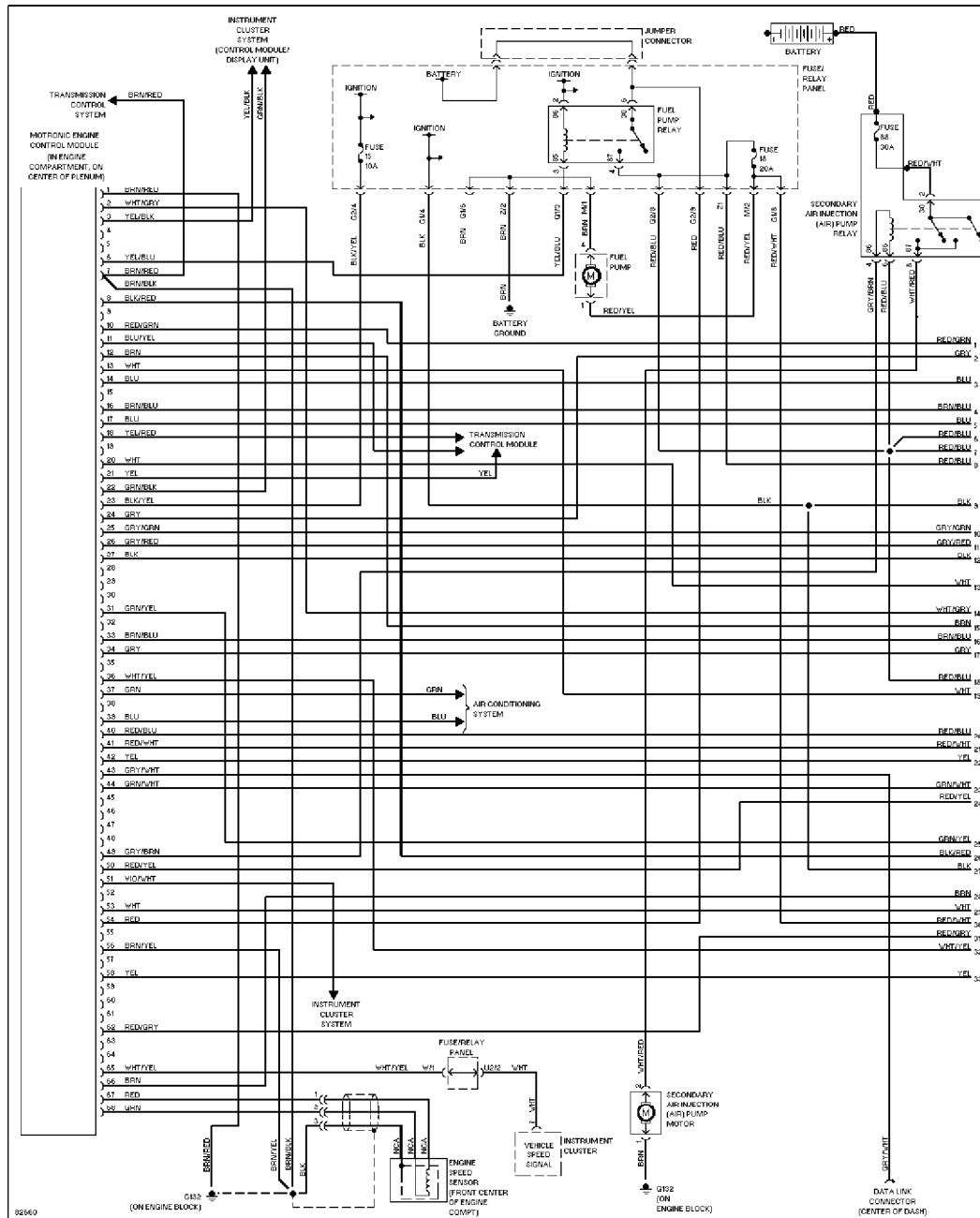


Fig. 7: Wiring Diagram (Passat 2.0L - 1 Of 2)

**L - WIRING DIAGRAMS**  
**Article Text (p. 8)**  
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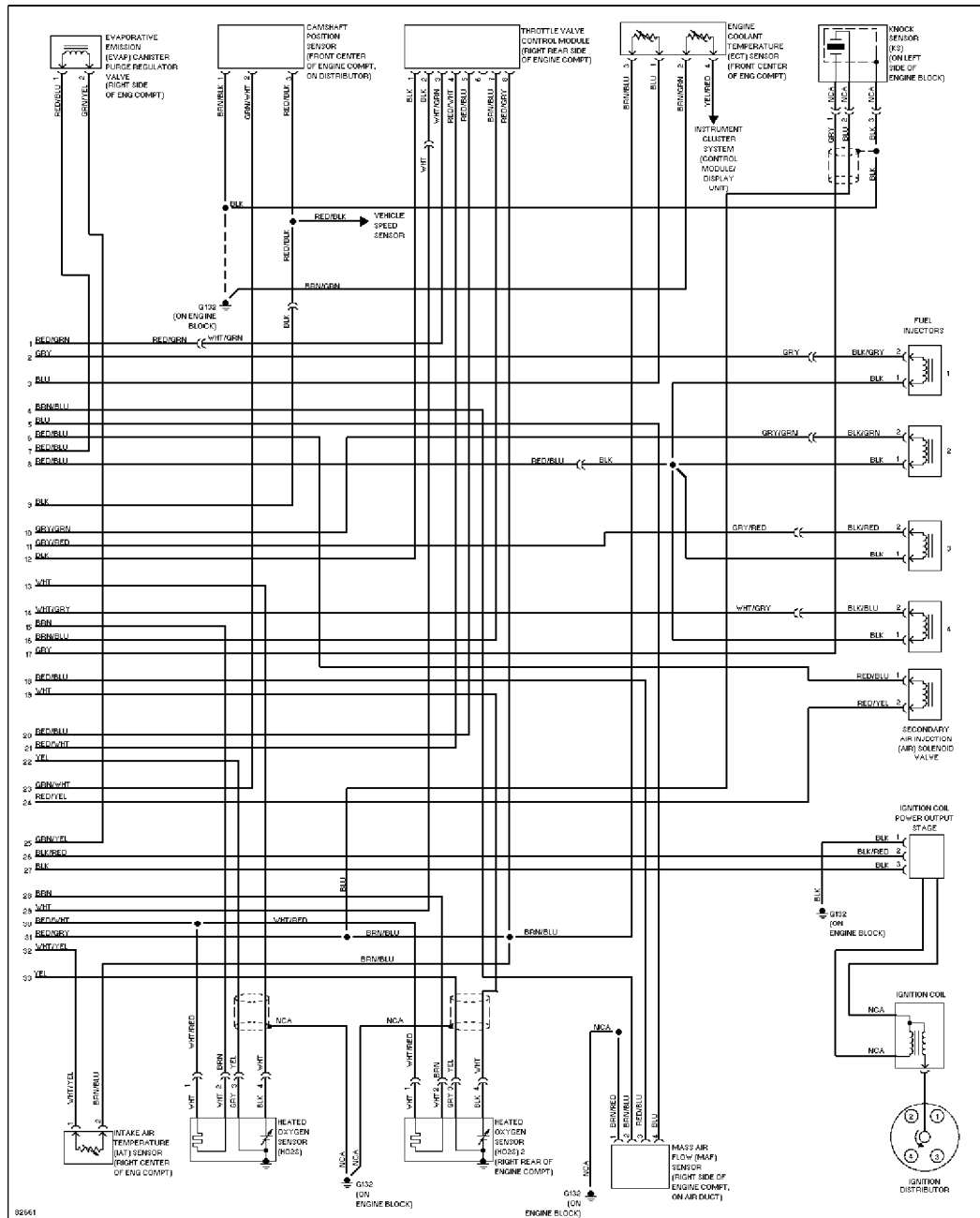


Fig. 8: Wiring Diagram (Passat 2.0L - 2 Of 2)

# L - WIRING DIAGRAMS

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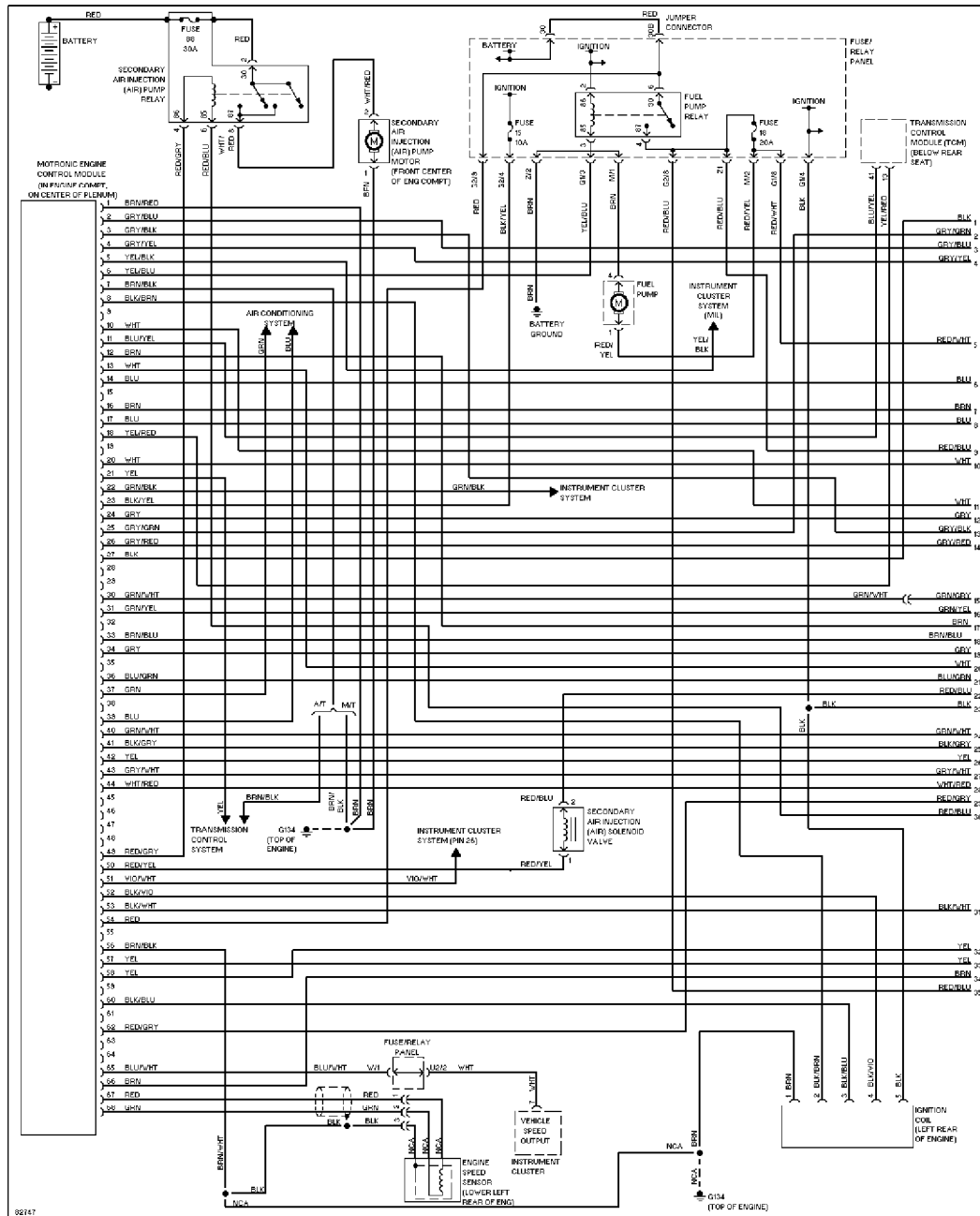


Fig. 9: Wiring Diagram (Passat 2.8L - 1 Of 2)



# L - WIRING DIAGRAMS

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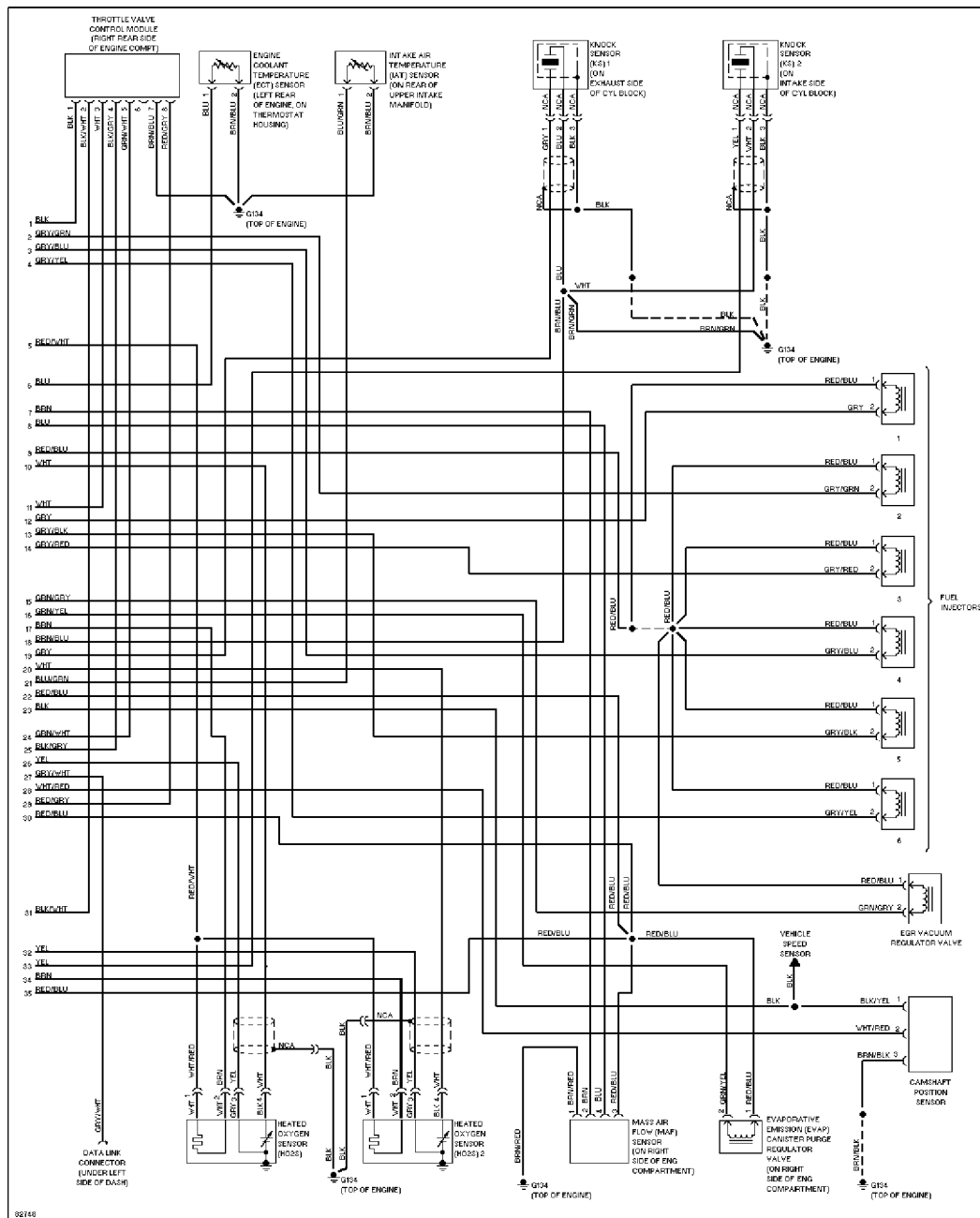


Fig. 10: Wiring Diagram (Passat 2.8L - 2 Of 2)

END OF ARTICLE

# K - SENSOR RANGE CHARTS

## Article Text

1996 Volkswagen Golf  
For Volkswagen Technical Site  
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Thursday, August 19, 1999 11:39PM

### ARTICLE BEGINNING

1996 ENGINE PERFORMANCE  
Volkswagen Sensor Operating Range Charts

Cabrio, Golf III, GTI, Jetta III, Passat

### INTRODUCTION

Sensor operating range information can help determine if a sensor is out of calibration. An out-of-calibration sensor may not set a diagnostic trouble code, but it may cause driveability problems.

NOTE: Unless stated otherwise in test procedure, perform all resistance and voltage tests using a Digital Volt-Ohmmeter (DVOM) with a minimum 10-megohm input impedance.

#### CLOSED THROTTLE POSITION (CTP) SWITCH RESISTANCE TABLE

|                                                                  |                 |                        |
|------------------------------------------------------------------|-----------------|------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                 |                        |
| Terminals                                                        | Ohms            | Ohms                   |
| No.                                                              | Closed Throttle | Slightly Open Throttle |
| 4 & 6                                                            | 0               | Infinite (Open)        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                 |                        |

#### CRANKSHAFT POSITION (CKP) SENSOR RESISTANCE TABLE

|                                                                  |  |                 |
|------------------------------------------------------------------|--|-----------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |  |                 |
| Terminals No.                                                    |  | Ohms            |
| 1 & 2                                                            |  | Approx. 1000    |
| 1 & 3                                                            |  | Infinite (Open) |
| 2 & 3                                                            |  | Infinite (Open) |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |  |                 |

#### EGR TEMPERATURE SENSOR RESISTANCE TEST TABLE

|                                                                  |  |                 |
|------------------------------------------------------------------|--|-----------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |  |                 |
| Temperature °F (°C)                                              |  | Ohms            |
| 122 (50)                                                         |  | 500,000-600,000 |
| 257 (125)                                                        |  | 35,000-40,000   |
| 392 (200)                                                        |  | 4500-6500       |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |  |                 |

#### ECT SENSOR RESISTANCE TABLE

|                                                                  |  |           |
|------------------------------------------------------------------|--|-----------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |  |           |
| Temperature °F (°C)                                              |  | Ohms      |
| 86 (30)                                                          |  | 1500-2000 |
| 104 (40)                                                         |  | 1000-1500 |
| 122 (50)                                                         |  | 800-1000  |
| 140 (60)                                                         |  | 500-700   |

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|                                                                  |       |         |
|------------------------------------------------------------------|-------|---------|
| 158 (70)                                                         | ..... | 375-500 |
| 176 (80)                                                         | ..... | 275-375 |
| 194 (90)                                                         | ..... | 225-275 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |       |         |

#### ENGINE SPEED (RPM) SENSOR RESISTANCE TABLE

|                                                                  |  |      |
|------------------------------------------------------------------|--|------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |  |      |
| Terminals No.                                                    |  | Ohms |

|                                                                  |       |                 |
|------------------------------------------------------------------|-------|-----------------|
| 1 & 2                                                            | ..... | Approx. 1       |
| 1 & 3                                                            | ..... | Infinite (Open) |
| 2 & 3                                                            | ..... | Infinite (Open) |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |       |                 |

#### HEATED OXYGEN SENSOR (HO2S) VOLTAGE TABLE

|                                                                  |  |           |
|------------------------------------------------------------------|--|-----------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |  |           |
| Condition                                                        |  | (1) Volts |

|      |       |             |
|------|-------|-------------|
| Lean | ..... | Approx. 0.2 |
| Rich | ..... | Approx. 0.7 |

(1) - Measured between connector terminal and ground.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

#### INTAKE AIR (IAT) SENSOR RESISTANCE TABLE

|                                                                  |  |      |
|------------------------------------------------------------------|--|------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |  |      |
| Temperature °F (°C)                                              |  | Ohms |

|                                                                  |       |           |
|------------------------------------------------------------------|-------|-----------|
| 86 (30)                                                          | ..... | 1500-2000 |
| 104 (40)                                                         | ..... | 1000-1500 |
| 122 (50)                                                         | ..... | 800-1000  |
| 140 (60)                                                         | ..... | 500-700   |
| 158 (70)                                                         | ..... | 375-500   |
| 176 (80)                                                         | ..... | 275-375   |
| 194 (90)                                                         | ..... | 225-275   |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |       |           |

#### MASS AIRFLOW (MAF) SENSOR TEST TABLE

|                                                                  |  |           |
|------------------------------------------------------------------|--|-----------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |  |           |
| Condition                                                        |  | (1) Volts |

|                   |       |                             |
|-------------------|-------|-----------------------------|
| Key On Engine Off | ..... | About 0.3-1.1               |
| Engine Running    | ..... | (2) 1.5 Minimum-3.4 Maximum |

(1) - Backprobe connector terminals No. 1 and 2.

(2) - Continuously vary engine speed between idle and  
4000 RPM.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

#### THROTTLE POSITION (TP) SENSOR RESISTANCE TABLE

|                                                                  |      |      |
|------------------------------------------------------------------|------|------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |      |      |
| Terminals                                                        | Ohms | Ohms |

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| No.         | At Idle         | Wide Open Throttle |
|-------------|-----------------|--------------------|
| 1 & 2 ..... | 1500-2600 ..... | N/A                |
| 2 & 3 ..... | 750-1300 .....  | (1) 3600 Maximum   |

(1) - Resistance should gradually increase as throttle is  
opened.

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END OF ARTICLE

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| Component/Circuit<br>(VAG 1598/18<br>Terminal No.)        | Test Conditions/<br>Additional Steps<br>(1)                               | Specified Value<br>Or Test Result               |
|-----------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------|
| Voltage Supply -<br>Control Module (1, 54)                | Ignition Off                                                              | Battery Voltage                                 |
| Voltage Supply -<br>Control Module Relay<br>(1, 23)       | (2) Ignition Off                                                          | Battery Voltage                                 |
| Wiring To Fuel Pump<br>Relay (6, 55 - Jumper)             | Ignition On                                                               | Fuel Pump Must Operate                          |
| Heated Oxygen Sensor<br>Relay (1, 28 -<br>Briefly Jumper) | (2) Ignition On                                                           | Relay Must Operate<br>(Click)                   |
| Malfunction Indicator<br>Light (5, 55 - Jumper)           | Ignition On                                                               | MIL Must Illuminate                             |
| Vehicle Speed Sensor<br>(1, 65)                           | Ignition On, Select<br>"D" or "N" & Raise &<br>Rotate Left<br>Front Wheel | Fluctuates Between<br>Zero & 4 Volts<br>Minimum |
| Ground Wire No. 58<br>Control Module - A/T<br>(54, 58)    | Ignition Off                                                              | Battery Voltage                                 |

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|                                                           |  |  |                                                                  |                              |
|-----------------------------------------------------------|--|--|------------------------------------------------------------------|------------------------------|
| Ground Wire No. 7 - A/T (7, 54)                           |  |  | Ignition On, Select "P" Or "N" Select "1", "2", "3", "D", Or "R" | Zero Or .5 Volt Max.         |
| Wire No. 39 From A/C (39, 55)                             |  |  | Ignition On, Fan Switch On & A/C Switch On                       | Battery Voltage              |
| Wire No. 37 From A/C Compressor (37, 38 - Briefly Jumper) |  |  | Ignition On                                                      | A/C Magnetic Clutch Operates |
| Fuel Injector No. 1 (23, 24)                              |  |  | Ignition Off                                                     | 14-21.5 Ohms                 |
| Fuel Injector No. 2 (2, 23)                               |  |  | Ignition Off                                                     | 14-21.5 Ohms                 |
| Fuel Injector No. 3 (23, 25)                              |  |  | Ignition Off                                                     | 14-21.5 Ohms                 |
| Fuel Injector No. 4 (23, 26)                              |  |  | Ignition Off                                                     | 14-21.5 Ohms                 |
| EVAP Regulator Valve (23, 31)                             |  |  | Ignition Off                                                     | 40-80 Ohms                   |
| Engine Coolant Temp. Sensor (14, 33)                      |  |  | (3) Ignition Off                                                 | (3)                          |
| Wiring To White Data Link Connector (1 (4), 21)           |  |  | Ignition Off                                                     | 1.5 Ohms Maximum             |
| Wiring To White Data Link Connector (1 (4), 43)           |  |  | Ignition Off                                                     | 1.5 Ohms Maximum             |
| Wiring To Heated Oxygen Sensor (20, 42)                   |  |  | Disconnect Sensor Connector & Jumper Terminals No. 3 & No. 4     | 1.5 Ohms Maximum             |
|                                                           |  |  | Reconnect Sensor Conn.                                           | Infinity (Open)              |
| Throttle Position Sensor (33, 41)                         |  |  | Ignition Off                                                     | 1600-2400 Ohms               |
| Throttle Position Sensor (33, 40)                         |  |  | Throttle Closed                                                  | 1000-2000 Ohms               |

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|                                                                |                                                                |                    |
|----------------------------------------------------------------|----------------------------------------------------------------|--------------------|
|                                                                | Throttle Slowly Opened                                         | Steady Increase In |
|                                                                | Resistance                                                     |                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                |                    |
| Throttle Position                                              | Throttle Closed                                                | 2500-4000 Ohms     |
| Sensor (40, 41)                                                | AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                    |
|                                                                | Throttle Slowly Opened                                         | Steady Decrease In |
|                                                                | Resistance                                                     |                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                |                    |
| Wiring To CMP                                                  | Disconnect Sensor                                              | 1.5 Ohms Maximum   |
| Sensor (44, 56)                                                | Connector & Jumper                                             |                    |
|                                                                | Terminals                                                      |                    |
|                                                                | No. 1 & No. 2                                                  |                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                |                    |
| Wiring To CMP                                                  | Jumper Terminals                                               | 1.5 Ohms Maximum   |
| Sensor (41, 56)                                                | No. 1 & No. 3                                                  |                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                |                    |
| Wiring To Ignition                                             | Disconnect Output                                              | Infinity           |
| Coil Power Output                                              | Stage Connector                                                | (Open)             |
| Stage (8, 55)                                                  |                                                                |                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                |                    |
| Wiring To Ignition                                             | Disconnect Output                                              | Infinity           |
| Coil Power Output                                              | Stage Connector                                                | (Open)             |
| Stage (8, 38)                                                  |                                                                |                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                |                    |
| Wiring To Ignition                                             | Jumper Terminals                                               | 1.5 Ohms Maximum   |
| Coil Power Output                                              | No. 1 & No. 2                                                  |                    |
| Stage (8, 55)                                                  |                                                                |                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                |                    |
| Wiring To Ignition                                             | Jumper Terminals                                               | 1.5 Ohms Maximum   |
| Coil Power Output                                              | No. 2 & No. 3                                                  |                    |
| Stage (8, 38)                                                  |                                                                |                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                |                    |
| Wiring To Knock Sensor                                         | Disconnect Sensor                                              | Infinity           |
| (33, 34)                                                       | Connector                                                      | (Open)             |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                |                    |
| Wiring To Knock Sensor                                         | Jumper Terminals                                               | 1.5 Ohms Maximum   |
| (34, 56)                                                       | No. 1 & No. 3                                                  |                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                |                    |
| Intake Air Temp.                                               | (3) Ignition Off                                               | (3)                |
| Sensor (33, 36)                                                |                                                                |                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                |                    |
| Wiring To Idle Air                                             | Ignition Off                                                   | 7-10 Ohms          |
| Control Valve                                                  | AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                    |
| (27, 53)                                                       | Disconnect Control                                             | Infinity           |
|                                                                | Valve Connector                                                | (Open)             |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                |                    |
| Wiring To Mass                                                 | Disconnect Sensor                                              | 1.5 Ohms Maximum   |
| Airflow Sensor                                                 | Connector                                                      |                    |
| (1, 16)                                                        |                                                                |                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                |                    |
| Wiring To Mass                                                 | Jumper Terminals                                               | 1.5 Ohms Maximum   |
| Airflow Sensor                                                 | No. 1 & No. 3                                                  |                    |

## J - PIN VOLTAGE CHARTS

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1996 Volkswagen Golf

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|   |                                                                      |   |                   |   |                    |
|---|----------------------------------------------------------------------|---|-------------------|---|--------------------|
| 3 | (1, 23)                                                              | 3 | 3                 | 3 | 3                  |
| 3 | Wiring To Mass                                                       | 3 | Jumper Terminals  | 3 | 1.5 Ohms Maximum   |
| 3 | Airflow Sensor                                                       | 3 | No. 1 & No. 4     | 3 | 3                  |
| 3 | (1, 17)                                                              | 3 | 3                 | 3 | 3                  |
| 3 | Wiring To Engine Speed                                               | 3 | Ignition Off      | 3 | 500-700 Ohms       |
| 3 | Sensor (67, 68)                                                      | 3 | 3                 | 3 | 3                  |
| 3 | Wiring To Engine Speed                                               | 3 | Ignition Off      | 3 | Infinity           |
| 3 | Sensor (56, 67)                                                      | 3 | 3                 | 3 | (Open)             |
| 3 | Wiring To Engine Speed                                               | 3 | Ignition Off      | 3 | Infinity           |
| 3 | Sensor (56, 68)                                                      | 3 | 3                 | 3 | (Open)             |
| 3 | Wiring To Engine Speed                                               | 3 | Disconnect Sensor | 3 | 1.5 Ohms Maximum   |
| 3 | Sensor (56, 67)                                                      | 3 | Connector         | 3 | 3                  |
| 3 | Wiring To Engine Speed                                               | 3 | Jumper Terminals  | 3 | 1.5 Ohms Maximum   |
| 3 | Sensor (56, 67)                                                      | 3 | No. 1 & No. 3     | 3 | 3                  |
| 3 | Wiring To Engine Speed                                               | 3 | Jumper Terminals  | 3 | 1.5 Ohms Maximum   |
| 3 | Sensor (56, 68)                                                      | 3 | No. 2 & No. 3     | 3 | 3                  |
| 3 | EGR Frequency Valve                                                  | 3 | (5) Ignition Off  | 3 | Valve Must Operate |
| 3 | (If Equipped) (9, 56                                                 | 3 | 3                 | 3 | (Click)            |
| 3 | Briefly Jumper)                                                      | 3 | 3                 | 3 | 3                  |
| 3 | Wiring To EGR                                                        | 3 | Ignition Off      | 3 | 27-31 Ohms         |
| 3 | Frequency Valve                                                      | 3 | 3                 | 3 | 3                  |
| 3 | (23, 30)                                                             | 3 | Disconnect Valve  | 3 | Infinity           |
| 3 | 3                                                                    | 3 | Connector         | 3 | (Open)             |
| 3 | 3                                                                    | 3 | 3                 | 3 | 3                  |
| 3 | 3                                                                    | 3 | Jumper Terminals  | 3 | 1.5 Ohms Maximum   |
| 3 | 3                                                                    | 3 | No. 1 & No. 2     | 3 | 3                  |
| 3 | EGR Temp. Sensor                                                     | 3 | Disconnect Sensor | 3 | Infinity           |
| 3 | (15, 33)                                                             | 3 | Connector         | 3 | (Open)             |
| 3 | 3                                                                    | 3 | 3                 | 3 | 3                  |
| 3 | 3                                                                    | 3 | Jumper Terminals  | 3 | 1.5 Ohms Maximum   |
| 3 | 3                                                                    | 3 | No. 1 & No. 2     | 3 | 3                  |
| 3 | (1) - TESTING CONDITIONS: Disconnect harness connector from ECM      | 3 | 3                 | 3 | 3                  |
| 3 | Connect Test Box (VAG 1598/18) to ECM harness connector,             | 3 | 3                 | 3 | 3                  |
| 3 | leaving ECM disconnected.                                            | 3 | 3                 | 3 | 3                  |
| 3 | (2) - With ignition off, jumper terminals No. 9 and 55 of test box.  | 3 | 3                 | 3 | 3                  |
| 3 | (3) - Refer to the I - SYSTEM/COMPONENT TESTS article or the         | 3 | 3                 | 3 | 3                  |
| 3 | K - SENSOR RANGE CHARTS article.                                     | 3 | 3                 | 3 | 3                  |
| 3 | (4) - These are terminal connectors at data link connector.          | 3 | 3                 | 3 | 3                  |
| 3 | (5) - With ignition off, jumper terminals No. 30 and 55 of test box. | 3 | 3                 | 3 | 3                  |
| 3 | 3                                                                    | 3 | 3                 | 3 | 3                  |



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### ECM PIN VOLTAGE CHART TABLE (2.8L)

| Component/Circuit<br>(VAG 1598/18<br>Terminal No.)        | Test Conditions/<br>Additional Steps<br>(1)                     | Specified Value<br>Or Test Result               |
|-----------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------|
| Voltage Supply -<br>Control Module (1, 54)                | Ignition Off                                                    | Battery Voltage                                 |
| Voltage Supply -<br>Control Module Relay<br>(1, 23)       | (2) Ignition Off                                                | Battery Voltage                                 |
| Wiring To Fuel Pump<br>Relay (6, 55 - Jumper)             | Ignition On                                                     | Fuel Pump Must<br>Operate                       |
| Heated Oxygen Sensor<br>Relay (1, 28 -<br>Briefly Jumper) | (2) Ignition On                                                 | Battery Voltage                                 |
| Malfunction Indicator<br>Light (5, 10 - Jumper)           | Ignition On                                                     | MIL Must Illuminate                             |
| Ground Wire No. 7 -<br>M/T (7, 54)                        | Ignition Off                                                    | Battery Voltage                                 |
| Wiring To Starter<br>Relay - A/T (1, 7)                   | Select "P", Disconnect<br>Ignition Coil<br>& Operate Starter    | Approximately 10 Volts                          |
| Vehicle Speed Sensor<br>(56, 65)                          | Ignition On, Select<br>"D" & Raise & Rotate<br>Left Front Wheel | Fluctuates Between<br>Zero & 4 Volts<br>Minimum |
| Wiring For A/C<br>(39, 55)                                | Ignition On,<br>A/C Switch On                                   | Battery Voltage                                 |
| Wiring To A/C<br>Compressor<br>(37, 38 - Jumper)          | Ignition On                                                     | A/C Magnetic Clutch<br>Operates                 |
| Fuel Injector No. 1<br>(23, 24)                           | Ignition Off                                                    | 15-21.5 Ohms                                    |
| Fuel Injector No. 2<br>(3, 23)                            | Ignition Off                                                    | 15-21.5 Ohms                                    |
| Fuel Injector No. 3<br>(23, 26)                           | Ignition Off                                                    | 15-21.5 Ohms                                    |
| Fuel Injector No. 4<br>(4, 23)                            | Ignition Off                                                    | 15-21.5 Ohms                                    |

## J - PIN VOLTAGE CHARTS

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|                                                  |                                                              |                          |  |
|--------------------------------------------------|--------------------------------------------------------------|--------------------------|--|
| ˆ                                                |                                                              |                          |  |
| Fuel Injector No. 5                              | Ignition Off                                                 | 15-21.5 Ohms             |  |
| (23, 25)                                         |                                                              |                          |  |
| ˆ                                                |                                                              |                          |  |
| Fuel Injector No. 6                              | Ignition Off                                                 | 15-21.5 Ohms             |  |
| (2, 23)                                          |                                                              |                          |  |
| ˆ                                                |                                                              |                          |  |
| EVAP Solenoid Valve I                            | Ignition Off                                                 | 40-80 Ohms               |  |
| (23, 31)                                         |                                                              |                          |  |
| ˆ                                                |                                                              |                          |  |
| Engine Coolant Temp. Sensor (14, 33)             | (3) Ignition Off                                             | (3)                      |  |
| ˆ                                                |                                                              |                          |  |
| Wiring To White Data Link Connector (15 (4), 21) | Ignition Off                                                 | 1.5 Ohms Maximum         |  |
| ˆ                                                |                                                              |                          |  |
| Wiring To White Data Link Connector (7 (4), 43)  | Ignition Off                                                 | 1.5 Ohms Maximum         |  |
| ˆ                                                |                                                              |                          |  |
| Wiring To Oxygen Sensor (20, 42)                 | Disconnect Sensor Connector & Jumper Terminals No. 3 & No. 4 | 1.5 Ohms Maximum         |  |
| ˆ                                                |                                                              |                          |  |
|                                                  | Reconnect Sensor Connector                                   | Infinity (Open)          |  |
| ˆ                                                |                                                              |                          |  |
| Throttle Position Sensor (33, 41)                | Ignition Off                                                 | 1500-2500 Ohms           |  |
| ˆ                                                |                                                              |                          |  |
| Throttle Position Sensor (33, 40)                | Throttle Valve Closed                                        | 700-1300 Ohms            |  |
| ˆ                                                |                                                              |                          |  |
|                                                  | Throttle Valve Opened                                        | Resistance Must Increase |  |
| ˆ                                                |                                                              |                          |  |
| Throttle Position Sensor (40, 41)                | Throttle Valve Closed                                        | 2500-3500 Ohms           |  |
| ˆ                                                |                                                              |                          |  |
|                                                  | Throttle Valve Opened                                        | Resistance Must Decrease |  |
| ˆ                                                |                                                              |                          |  |
| Wiring To CMP Sensor (23, 56)                    | Disconnect Sensor Connector & Jumper Terminals No. 1 & No. 3 | 1.5 Ohms Maximum         |  |
| ˆ                                                |                                                              |                          |  |
| Wiring To Hall Effect Sensor (44, 56)            | Jumper Terminals No. 2 & No. 3                               | 1.5 Ohms Maximum         |  |
| ˆ                                                |                                                              |                          |  |

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|                        |  |                    |                  |
|------------------------|--|--------------------|------------------|
| Wiring To Ignition     |  | Disconnect Output  | 1.5 Ohms Maximum |
| Power Output Stage     |  | Stage Connector &  |                  |
| (8, 55)                |  | Jumper Terminals   |                  |
|                        |  | No. 1 & No. 2      |                  |
| ~~~~~                  |  |                    |                  |
| Wiring To Ignition     |  | Disconnect Output  | 1.5 Ohms Maximum |
| Coil (55, 60)          |  | Stage Connector &  |                  |
|                        |  | Jumper Terminals   |                  |
|                        |  | No. 1 & No. 3      |                  |
| ~~~~~                  |  |                    |                  |
| Wiring To Ignition     |  | Disconnect Output  | 1.5 Ohms Maximum |
| Coil (52, 55)          |  | Stage Connector &  |                  |
|                        |  | Jumper Terminals   |                  |
|                        |  | No. 1 & No. 4      |                  |
| ~~~~~                  |  |                    |                  |
| Wiring To Ignition     |  | Disconnect Output  | 1.5 Ohms Maximum |
| Coil (38, 55)          |  | Stage Connector &  |                  |
|                        |  | Jumper Terminals   |                  |
|                        |  | No. 1 & No. 5      |                  |
| ~~~~~                  |  |                    |                  |
| Wiring To Knock        |  | Disconnect Sensor  | Infinity (Open)  |
| Sensor I (33, 34)      |  | Connector          |                  |
| (5)                    |  | ~~~~~              |                  |
|                        |  | Jumper Terminals   | 1.5 Ohms Maximum |
|                        |  | No. 1 & No. 2      |                  |
| ~~~~~                  |  |                    |                  |
| Wiring To Knock        |  | Jumper Terminals   | 1.5 Ohms Maximum |
| Sensor I (34, 56) (5)  |  | No. 1 & No. 3      |                  |
| ~~~~~                  |  |                    |                  |
| Intake Air Temp.       |  | (3) Ignition Off   | (3)              |
| Sensor (33, 36)        |  |                    |                  |
| ~~~~~                  |  |                    |                  |
| Idle Air Control Valve |  | Ignition Off       | 6-12 Ohms        |
| (27, 53)               |  |                    |                  |
| ~~~~~                  |  |                    |                  |
| Wiring To Knock        |  | Disconnect Sensor  | Infinity (Open)  |
| Sensor II (7, 33)      |  | Connector          |                  |
| (6)                    |  | ~~~~~              |                  |
|                        |  | Jumper Terminals   | 1.5 Ohms Maximum |
|                        |  | No. 2 & No. 3      |                  |
| ~~~~~                  |  |                    |                  |
| Wiring To Knock        |  | Jumper Terminals   | 1.5 Ohms Maximum |
| Sensor II (56, 57)     |  | No. 1 & No. 3      |                  |
| (6)                    |  |                    |                  |
| ~~~~~                  |  |                    |                  |
| Wiring To MAF Sensor   |  | Disconnect Sensor  | 1.5 Ohms Maximum |
| (16, 17)               |  | Connector & Jumper |                  |
|                        |  | Terminals          |                  |
|                        |  | No. 1 & No. 4      |                  |
| ~~~~~                  |  |                    |                  |
| Engine Speed Sensor    |  | Ignition Off       | 500-700 Ohms     |
| (67, 68) (7)           |  |                    |                  |

**END OF ARTICLE**

# I - SYSTEM/COMPONENT TESTS - GASOLINE

## Article Text

1996 Volkswagen Golf

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## ARTICLE BEGINNING

### 1996 ENGINE PERFORMANCE

### Volkswagen System & Component Testing - Gasoline

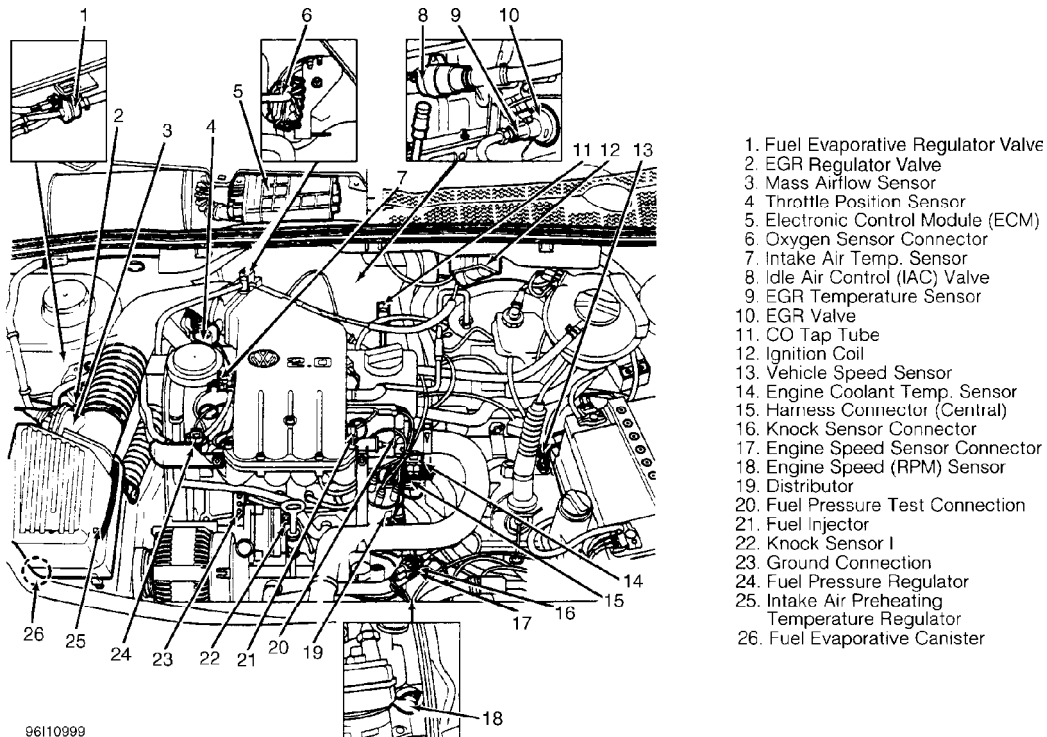
Cabrio, Golf III, GTI, Jetta III, Passat

## INTRODUCTION

Since many computer-controlled and monitored components set a Diagnostic Trouble Code (DTC) if they malfunction, also perform procedures in appropriate G - TESTS W/CODES - GASOLINE article. In most instances, a scan tool must be used to test systems and/or components. See ENTERING SELF DIAGNOSTICS in appropriate G - TESTS W/CODES - GASOLINE article for additional scan tool operating instructions.

**NOTE:** Testing individual components does not isolate short or open circuits. Perform all voltage tests with a Digital Volt-Ohmmeter (DVOM) with a minimum 10-megohm input impedance, unless stated otherwise in test procedure. Use ohmmeter to isolate shorted or open wiring harness.

## COMPONENT LOCATIONS



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Fig. 1: Component Locations (2.0L)  
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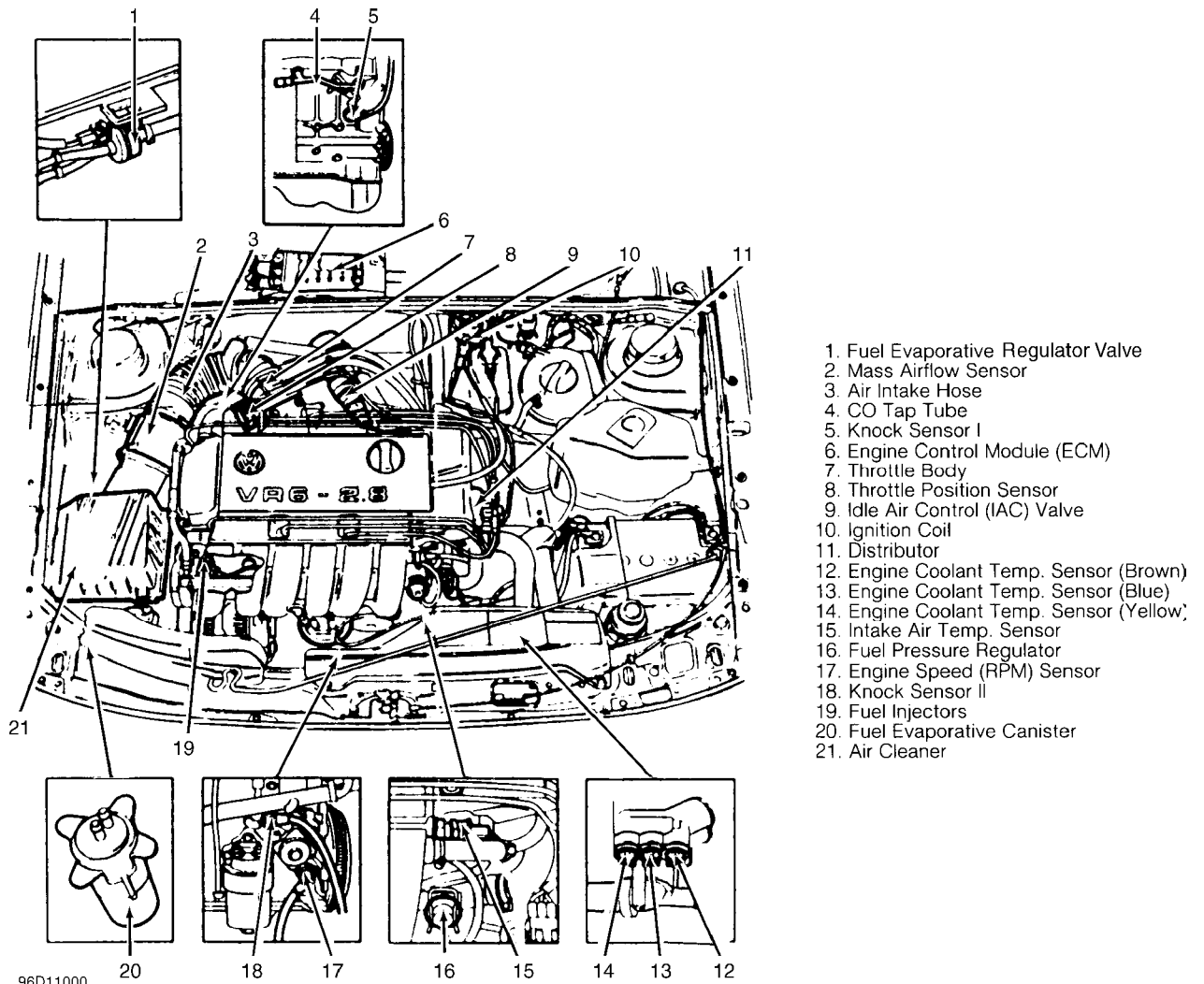


Fig. 2: Component Locations (2.8L)

Courtesy of Volkswagen United States, Inc.

## AIR INDUCTION SYSTEMS

### INTAKE AIR PREHEATING

#### Air Leak Checks (2.0L)

1) Ensure exhaust system has no leaks. Connect CO tester, using Adapter (VAG 1363/3), on CO tap tube. DO NOT remove oxygen sensor. Start engine and allow it to idle at closed throttle position.

2) Spray air intake system with Leak Detector Spray (G 001 800 A1). Air intake leaks will draw in leak detector spray. The spray reduces air/fuel mixture ignition and engine RPM, and decreases CO reading. Repair leaks as necessary.

#### Control Flap & Temperature Regulator (2.0L)

1) Ensure no air leaks exist in control flap vacuum reservoir. Loosen air cleaner upper section and remove air filter.

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2) Turn air cleaner upper part to access control flap in air cleaner lower section. Disconnect vacuum hose from temperature regulator. Connect hand-held vacuum pump to vacuum hose. Apply vacuum. Control flap will close cold air intake.

3) Reconnect vacuum hose to temperature regulator. Start engine and allow it to idle. Check position of control flap after 20 seconds. Replace temperature regulator if position of control flap is not as specified. See TEMPERATURE REGULATOR table.

### TEMPERATURE REGULATOR TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Temperature °F (°C) Control Flap Position

Less Than 68 (20) ..... Cold Air Intake Closed  
Between 68-86 (20-30) ... Open To Both Hot & Cold Air Intake  
More Than 86 (30) ..... Hot Air Intake Closed  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

### TURBOCHARGER

**WARNING:** Turbocharger and related components operate at a very high temperature. Always allow system to cool or use proper protective clothing to prevent severe burns. For safety during road test, it is advisable to have a helper read tester.

**CAUTION:** Test duration during measurement should be limited to a maximum of 10 seconds. Before disconnecting or reconnecting turbocharger, thoroughly clean all joints, pipes unions and connections. Prevent dust and dirt contamination. Cover all components with dust-free paper or plastic. DO NOT use cloth or rags. Avoid nearby use of compressed air. DO NOT move vehicle or work in dusty conditions while turbocharger is open or removed.

**NOTE:** Ensure any engine related problems are corrected before testing turbocharger. Ensure no intake or exhaust system leaks exist. Engine oil temperature must be at least 176°F (80°C).

### COMPUTERIZED ENGINE CONTROLS

#### ELECTRONIC CONTROL MODULE (ECM)

Ground & Power Circuits

Check ECM ground and power circuits using appropriate

J - PIN VOLTAGE CHARTS article.

### ENGINE SENSORS & SWITCHES

#### CAMSHAFT POSITION (CMP) SENSOR

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See CAMSHAFT POSITION (CMP) SENSOR in appropriate

F - BASIC TESTING - GASOLINE article.

### **ENGINE COOLANT TEMPERATURE (ECT) SENSOR**

2.0L

1) Ensure engine is cold. Connect scan tool to Data Link Connector (DLC) located below A/C-heater control panel. With scan tool in READ MEASURING VALUE BLOCK function, read coolant temperature value in field No. 2 of scan tool.

2) Temperature value must increase uniformly without interruption. If there is an interruption (open), 77.70C will be displayed. If coolant temperature value does not change, test circuit using Ground & Power Circuits

Check ECM ground and power circuits using appropriate

J - PIN VOLTAGE CHARTS article.

3) If necessary, replace ECT sensor. After repairs, erase DTC memory (if applicable) and select END OUTPUT function on scan tool.

2.8L

1) Ensure engine is cold. Connect scan tool to Data Link connector (DLC) located in center console, in front of shift lever. Start engine and allow it to idle.

2) With scan tool in READ TEST VALUE BLOCK function, select group "01" and read coolant temperature value in field No. 2 of scan tool. Temperature value must increase uniformly without interruption. If value increases as specified, select END OUTPUT function on scan tool.

3) If displayed value does not change or if engine malfunctions during certain temperature range, turn ignition off and disconnect ECT sensor connector. Measure ECT sensor resistance. See ECT SENSOR RESISTANCE table.

4) If resistance is not as specified, check circuit using appropriate Ground & Power Circuits

Check ECM ground and power circuits using appropriate

J - PIN VOLTAGE CHARTS article. If necessary, replace ECT sensor.

After repairs, erase DTC memory (if applicable) and select END OUTPUT function on scan tool.

### **INTAKE AIR TEMPERATURE (IAT) SENSOR**

2.0L

1) Ensure engine is cold. Connect scan tool to Data Link connector (DLC) located below A/C-heater control panel. With scan tool in READ MEASURING VALUE BLOCK function, read intake air temperature value in field No. 4 of scan tool.

2) Temperature value must increase uniformly without interruption. The value, 19.60C, will be displayed if there is an interruption (open) or if this temperature is reached. If air intake temperature value does not change, test circuit using appropriate Ground & Power Circuits



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Check ECM ground and power circuits using appropriate J - PIN VOLTAGE CHARTS article. If necessary, replace IAT sensor. After repairs, erase DTC memory (if applicable) and select END OUTPUT function.

2.8L

1) Turn ignition off. Disconnect IAT sensor. Remove IAT sensor from intake manifold and plug opening in manifold. Reconnect IAT sensor to wiring harness.

2) Connect scan tool to Data Link connector (DLC) located in center console, in front of shift lever. Start engine and allow it to idle. With scan tool in READ TEST VALUE BLOCK function, select group "03" and read IAT sensor value in field No. 4 of scan tool.

3) Spray IAT sensor with cooling spray and observe value on scan tool. Scan tester value must decrease. If temperature value does not change, repair IAT sensor circuit or replace IAT sensor as necessary. After repairs, erase DTC memory, if applicable, and select END OUTPUT function.

## **FUEL SYSTEM**

### **ACCELERATION/FULL THROTTLE ENRICHMENT & DECELERATION FUEL CUTOFF**

2.0L

1) Connect scan tool to Data Link Connectors (DLC) located below A/C-heater control panel. With scan tool in READ MEASURING VALUE BLOCK function, read closed throttle position value in field No. 4 of scan tool. Display value must be 00010.

2) Check part throttle load enrichment by gradually pressing down accelerator. Display value must be 00100. Check acceleration enrichment by accelerating quickly. Value must briefly be 10000.

3) Check full throttle enrichment by briefly flooring accelerator pedal. Value must briefly be 01000 at wide open throttle. Check deceleration fuel shutoff by briefly accelerating to 3000 RPM and then releasing throttle.

4) Value must briefly be 00001 with throttle closed and engine speed greater than 1200 RPM. If specified values are not obtained, erase DTC memory. Check THROTTLE POSITION (TP) SENSOR ADJUSTMENT in D - ADJUSTMENTS article.

2.8L

1) Ensure engine coolant temperature is at least 176°F (80°C). Connect scan tool to Data Link connector (DLC) located in center console, in front of shift lever.

2) Start engine and allow it to idle. With scan tool in READ TEST VALUE BLOCK function, select group "04" and read value in field No. 4 of scan tool. Display value must be 00010 at idle.

3) Using accelerator pedal, increase engine speed to 3000 RPM and observe scan tool. Display value in field No. 4 of scan tool must briefly be 10100. Release accelerator pedal and observe scan tool.

4) Display value in field No. 4 of scan tool must briefly be

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00011 then return to 00010 at idle. If values are not as specified, see THROTTLE POSITION (TP) SENSOR ADJUSTMENT in appropriate D - ADJUSTMENTS article. If values are as specified, select END OUTPUT function on scan tool.

### FUEL INJECTORS & CIRCUIT

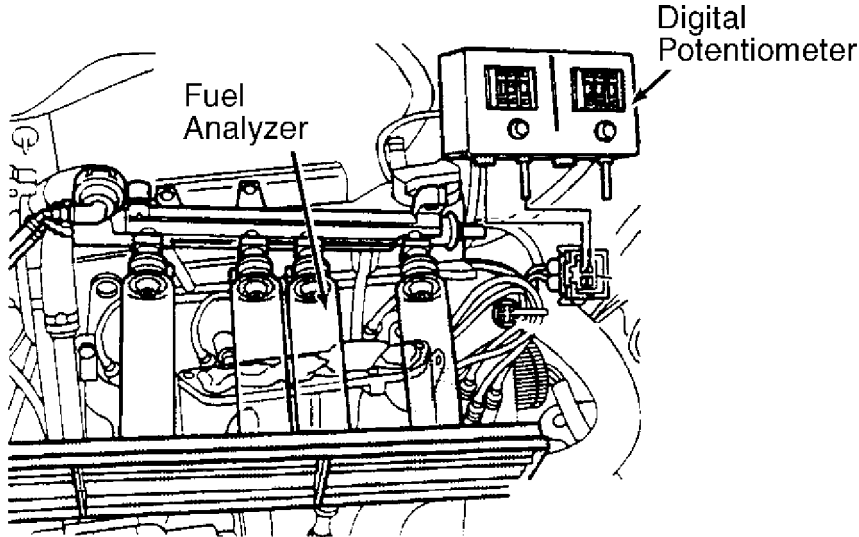
#### 2.0L

1) Ensure engine speed sensor and its circuit are okay. Check injector triggering using OUTPUT DIAGNOSTIC TEST MODE. See appropriate G - TESTS W/CODES - GASOLINE article.

2) If necessary, disconnect Engine Coolant Temperature (ECT) sensor. Adjust Digital Potentiometer side "A" of scan tool to 15 ohms. See Fig. 3. Connect potentiometer to ECT sensor using test leads from Adapter Kit (VW 1594).

3) Remove upper part of intake manifold. Remove fuel rail, leaving fuel lines and injectors attached. Place injectors in Fuel Analyzer (VAG 1602). Disconnect ignition coil.

4) Crank engine and observe injectors. Injectors must spray uniformly while pulsating. Turn ignition off and check fuel injectors for leaks. No more than 2 drops per minute are permissible. When reinstalling fuel rail, ensure "O" rings are not damaged.



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Fig. 3: Testing Fuel Injectors & Circuit (2.0L)  
Courtesy of Volkswagen United States, Inc.

#### 2.8L

1) To access fuel injectors, remove ignition wires. Remove hose from mass airflow sensor. Disconnect hose to fuel evaporative regulator solenoid valve at throttle body.

2) Disconnect throttle position sensor and idle air control valve. Disconnect accelerator cable from throttle body. Disconnect and plug coolant hoses at throttle body.

3) Disconnect hose from air intake heated tube. Detach fuel lines at cylinder head cover and remove from fuel rail. Disconnect

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vacuum hose from fuel pressure regulator. Remove intake manifold upper section. See Fig. 4.

4) With intake manifold upper section removed, disconnect wiring harness from fuel injectors. Using a Digital Volt-Ohmmeter (DVOM) and test leads from Adapter Kit (VW 1594), check fuel injector resistance. See Fig. 5.

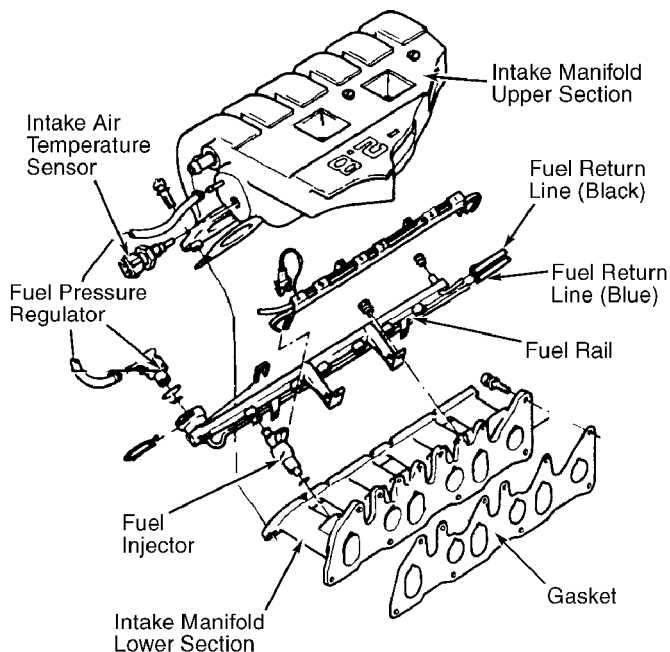
5) Fuel injector resistance should be 15.0-21.5 ohms. If resistance is zero ohms, check for short circuit in wiring harness. If wiring harness is okay, replace fuel injector(s).

6) With wiring harness and fuel injectors okay, disconnect ignition coil power output stage. Using test leads from adapter kit, check voltage supply to each injector by connecting LED tester between wiring harness connector terminals. See Fig. 5.

7) Crank engine and observe LED tester. LED tester must flicker. If LED tester does not flicker, reconnect wiring harness connector(s) to fuel injector(s). Check for open circuit in wiring harness between fuel injector(s) and Engine Control Module (ECM).

8) If LED tester flickers, remove fuel rail assembly (leaving fuel lines and injectors attached). Use test leads and fuel rail hose extensions if necessary. Disconnect Blue Engine Coolant Temperature (ECT) sensor. Connect the 15,000-ohm side of Adapter (VAG 1490) directly to ECT sensor wiring harness connector.

9) Place injectors in Fuel Analyzer (VAG 1602). Crank engine and observe injectors. Injector spray pattern must be the same on all injectors. Turn ignition on for 5 seconds, and check fuel injectors for leaks. No more than 2 drops per minute are permissible. When reinstalling fuel rail, ensure "O" rings are not damaged.



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Fig. 4: Accessing Fuel Injectors (2.8L)  
Courtesy of Volkswagen United States, Inc.

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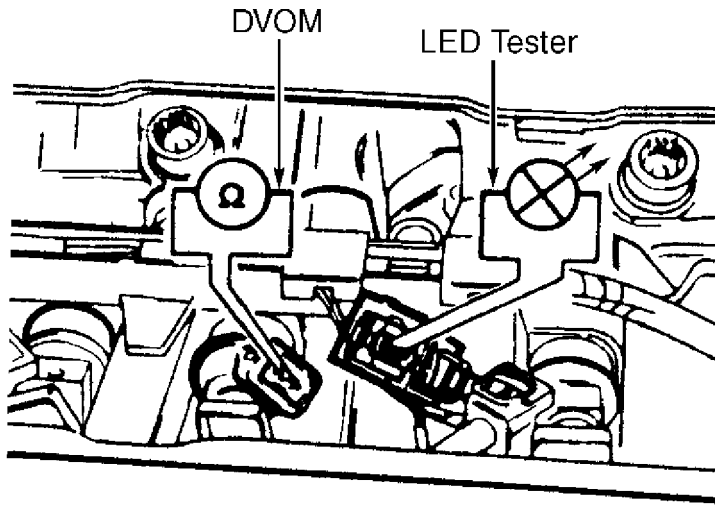
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93J81116

Fig. 5: Testing Fuel Injectors & Circuit (2.8L)

Courtesy of Volkswagen United States, Inc.

### OXYGEN SENSOR CONTROL

#### 2.0L & 2.8L

- 1) Ensure base settings for ignition and idle are okay.

Ensure exhaust system is not leaking between catalytic converter and cylinder head. Ensure voltage supply for oxygen sensor heater is okay.

- 2) Connect scan tool to Data Link connector (DLC) located below A/C-heater control panel. See G - TESTS W/CODES - GASOLINE article. With scan tool in READ MEASURING VALUE BLOCK function, ensure coolant temperature is greater than 176°F (80°C), as displayed in field No. 2 of scan tool.

- 3) Allow engine to run for 2 minutes at idle, then read oxygen sensor factor (signal) in field No. 3 of scan tool. Display value must fluctuate. If value in display field No. 3 does not fluctuate, briefly accelerate engine and repeat test.

- 4) If oxygen sensor value does not change even during acceleration, disconnect engine coolant temperature sensor. Erase DTC memory. Disconnect oxygen sensor wiring harness connector.

- 5) Ground oxygen sensor wiring harness connector terminal No. 4. See Fig. 6. Value in display field No. 3 must increase. If value increases, replace oxygen sensor. If value does not change, repair circuit or replace ECM as necessary. After repairs, erase DTC memory and select END OUTPUT function.

## I - SYSTEM/COMPONENT TESTS - GASOLINE

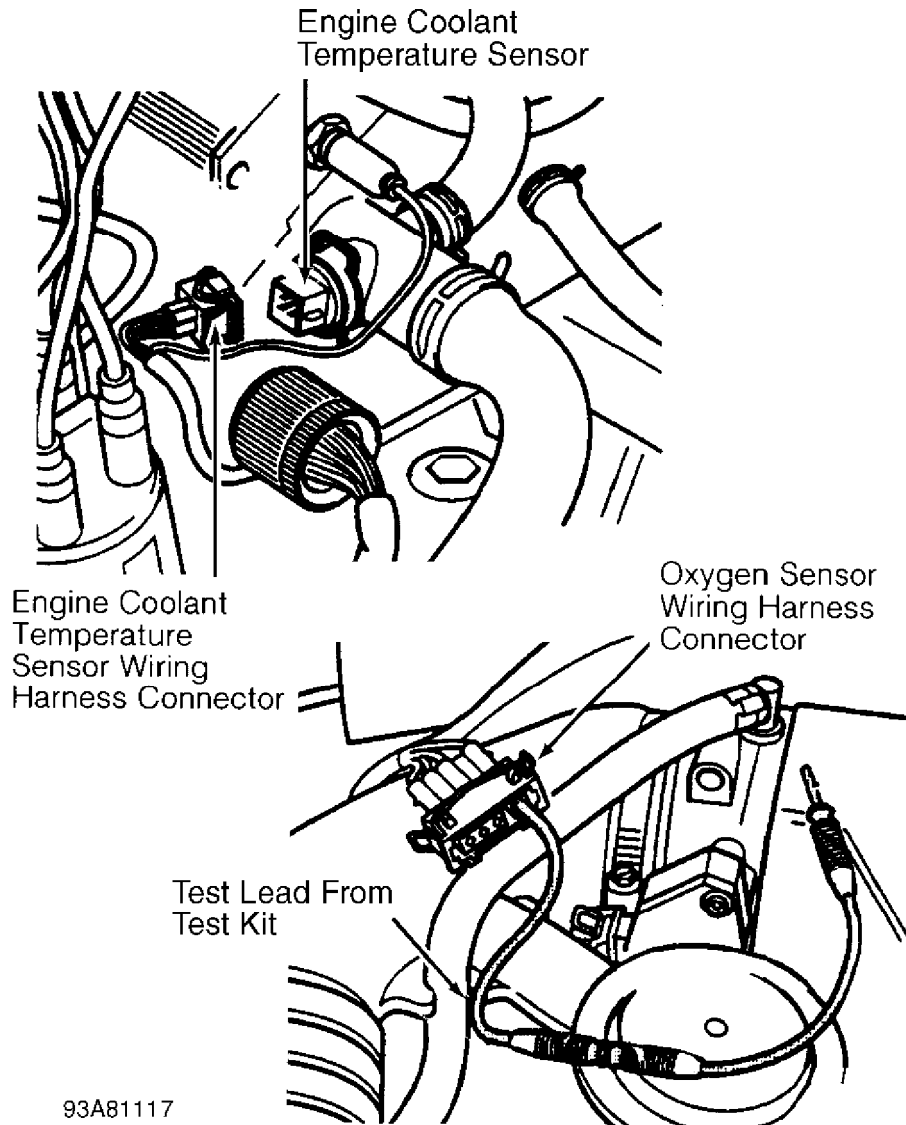
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Fig. 6: Testing Oxygen Sensor Control Circuit  
Courtesy of Volkswagen United States, Inc.

## IDLE CONTROL SYSTEM

### IDLE AIR CONTROL (IAC) VALVE

2.0L

1) Connect scan tool to Data Link connector (DLC) located below A/C-heater control panel. Ensure no Diagnostic Trouble Codes (DTCs) are stored in memory. See G - TESTS W/CODES - GASOLINE article.

2) With scan tool in READ MEASURING VALUE BLOCK function, ensure coolant temperature is more than 176°F (80°C), displayed in field No. 2 of scan tool. Allow engine to run for 2 minutes at idle, then press "C" button on scan tool. Press "0" and "5" buttons to display group "05". Press "Q" to enter input.

3) Read and record IAC valve duty cycle, displayed in field

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No. 3 of scan tool. Disconnect engine coolant temperature sensor. IAC valve duty cycle must increase and return to previous value. If duty cycle does not change as stated, repair circuit as necessary. After repairs, erase DTC memory (if applicable) and select END OUTPUT function.

### **2.8L**

1) Connect scan tool to Data Link connector (DLC) located in center console, in front of shift lever. With scan tool in OUTPUT DIAGNOSTIC TEST MODE, test IAC valve. See G - TESTS W/CODES - GASOLINE article.

2) To check IAC valve triggering circuit, turn ignition off. Disconnect wiring harness connector from IAC valve. Connect LED Tester (US 1115) to wiring harness connector terminals No. 1 and 2.

3) Turn ignition on. Perform OUTPUT DIAGNOSTIC TEST MODE until IAC valve is triggered. LED tester must flash. If LED tester does not flash, check IAC valve circuit.

4) If LED tester flashes, disconnect wiring harness connector from idle air control valve. Using Test Leads from Adapter Kit (VW 1594), connect DVOM to IAC valve terminals No. 1 and 2. IAC valve resistance must be 10-20 ohms. If resistance is incorrect, replace IAC valve.

## **IGNITION SYSTEM**

### **IGNITION COIL**

#### **Primary & Secondary Windings (2.0L & 2.8L)**

1) Connect Digital Volt-Ohmmeter (DVOM) between coil terminals No. 1 and 15. See Fig. 7. Primary coil resistance should be 0.5-0.7 ohm.

2) Connect DVOM between coil tower and terminal No. 15. Secondary coil resistance should be 3000-4000 ohms. If resistance values are incorrect, remove ignition coil. Remove ignition coil power output stage from coil and repeat test.

#### **Ignition Coil Power Output Stage (2.0L & 2.8L)**

1) Ensure camshaft position sensor and ignition coil are okay. Disconnect 3-pin connector from ignition coil power output stage wiring harness connector. Connect DVOM to ignition coil wiring harness terminals No. 1 and 3. See Fig. 7.

2) Turn ignition on. Battery (system) voltage should be indicated on DVOM. If battery voltage is not indicated, repair supply voltage circuit as necessary. If battery voltage is indicated, supply voltage circuit is okay.

3) Turn ignition off. Disconnect cold-start injector and fuel injector wiring harness at fuel rail. Connect LED Tester (US 1115) to ignition coil wiring harness terminals No. 2 and 3 using test leads from Adapter Kit (VW 1594).

4) Crank engine and check for ignition signal from Electronic Control Module (ECM). If LED tester does not flicker, repair ignition signal circuit or replace ECM as necessary. If LED tester flickers,

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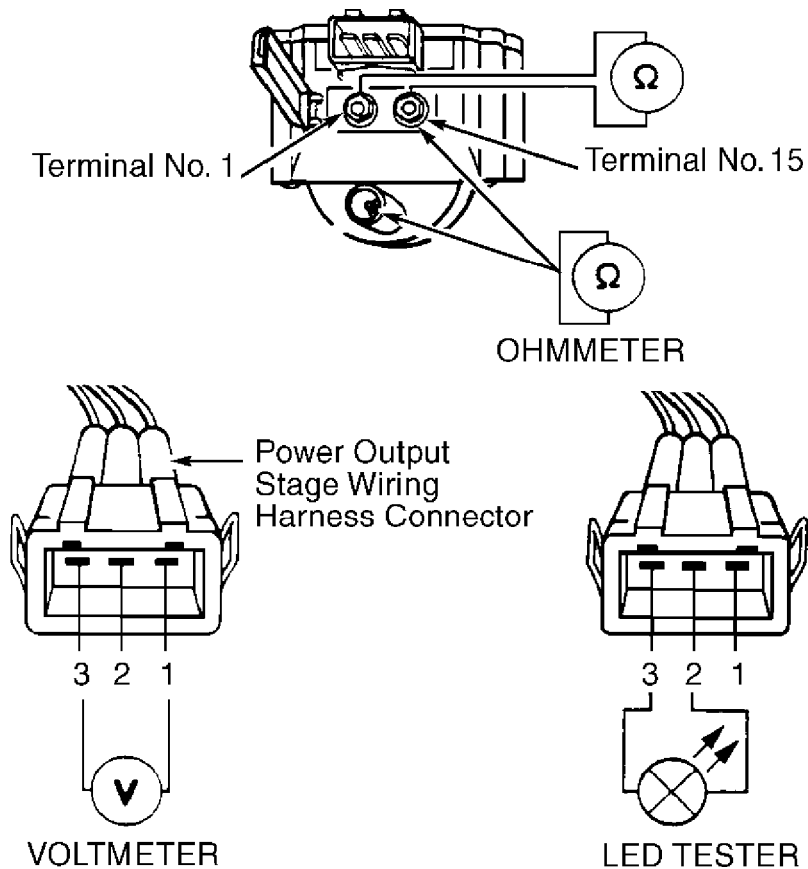
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ignition signal circuit is okay.

NOTE: A DVOM may be used in step 5). With ignition on, voltage must be 2 volts minimum and then drop to zero volts after 1-2 seconds.

5) Turn ignition off. Reconnect ignition wire and 3-pin connector to ignition coil. Connect LED tester between coil terminals No. 1 and 15. Turn ignition on. LED tester must light up for 1-2 seconds.

6) Crank engine and ensure LED tester flickers. If LED tester flickers, power output stage is okay. If LED tester does not flicker, replace power output stage.



93E81111

Fig. 7: Testing Ignition Coil & Power Output Stage  
Courtesy of Volkswagen United States, Inc.

## EMISSION SYSTEMS & SUB-SYSTEMS

NOTE: Other than EGR system, additional emission system and sub-system component testing information is not available from manufacturer.

### EXHAUST GAS RECIRCULATION (EGR)

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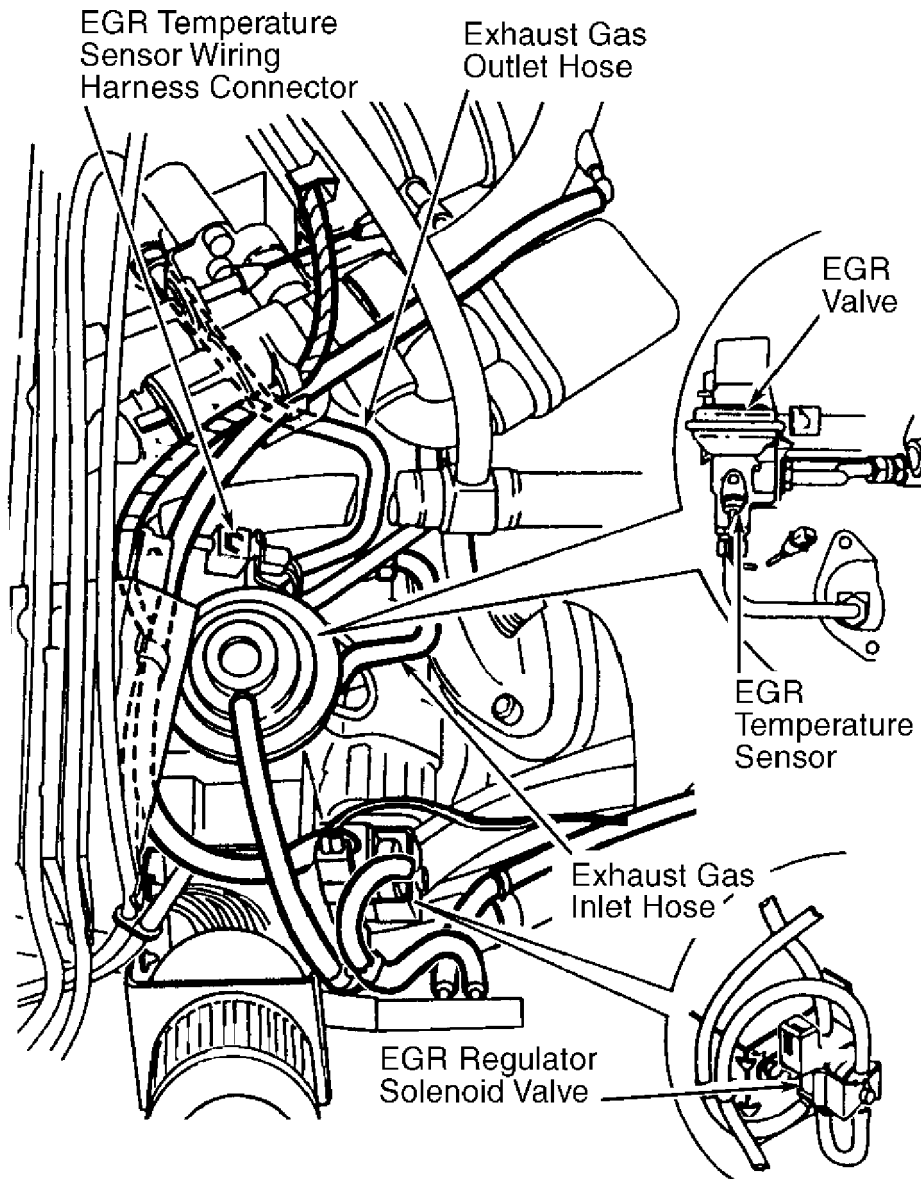
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#### 2.8L

1) Ensure engine coolant temperature is at least 122°F (50°C). Start engine and allow it to idle. Disconnect vacuum hose from EGR valve. See Fig. 8. Connect hand-held vacuum pump to EGR valve and apply vacuum.

2) Idle quality must deteriorate noticeably. If idle quality does not change, check EGR valve and exhaust manifold for plugging. Replace EGR valve if necessary. After repairs, erase DTC memory.



96G11003

Fig. 8: Testing Exhaust Gas Recirculation System (2.8L Is Shown)  
Courtesy of Volkswagen United States, Inc.

#### 2.0L

1) Connect scan tool to Data Link connector (DLC) located



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below A/C-heater control panel. See G - TESTS W/CODES - GASOLINE article. With scan tool in READ MEASURING VALUE BLOCK function, select group "02".

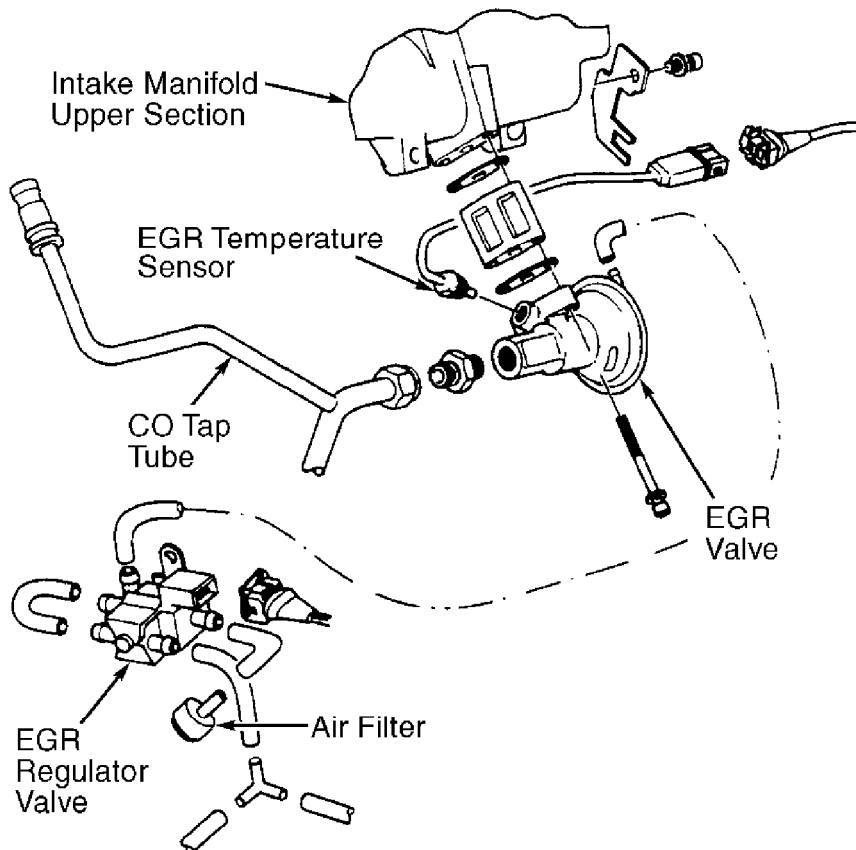
2) Ensure there are no leaks in vacuum hoses and connections. See Fig. 9. Ensure vacuum hoses are not plugged or kinked and engine oil temperature is at least 122°F (50°C). Start engine and allow it to idle.

3) Connect hand-held vacuum pump to EGR regulator solenoid, and apply vacuum. Idle quality must deteriorate noticeably. If idle quality does not change, check vacuum hoses for obstructions, and EGR valve and manifold for plugging.

4) If idle quality changes, read EGR temperature in display field No. 4 of scan tool. Temperature must rise steadily without interruption. If display is 127.4°C or less, there is an open circuit.

5) If temperature rises steadily, disconnect vacuum pump as soon as value reaches 200°C. Press right arrow button on scan tool. Press "0" and "6" buttons to select END DATA TRANSFER function. Press "Q" button to enter input.

6) If temperature value does not change, check EGR temperature sensor wiring harness for open circuit. If wiring harness is okay, replace EGR temperature sensor.



96E11001

Fig. 9: Testing EGR System (2.0L)

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#### **FUEL EVAPORATION**

2.0L & 2.8L

1) Ensure engine coolant temperature is at least 176°F (80°C). Ensure oxygen sensor and fuel/ignition system operating properly. Disconnect hose from fuel evaporative canister regulator solenoid valve (on left side of engine compartment firewall).

2) Start engine and allow to idle. No vacuum should be felt at valve connection. Increase engine speed. Vacuum must be felt at connection. If fuel evaporative canister regulator solenoid valve does not operate, perform OUTPUT DIAGNOSTIC TEST MODE. See appropriate G - TESTS W/CODES - GASOLINE article.

3) Turn ignition off. Disconnect fuel evaporative canister regulator solenoid valve wiring harness connector. Using test leads from adapter kit, connect LED tester between wiring harness connector terminals. Start engine and increase engine speed.

4) If LED tester flickers, replace fuel evaporative canister regulator solenoid valve. If LED tester does not flicker, check wiring harness for open circuit. If wiring harness is okay, replace Electronic Control Module (ECM).

**END OF ARTICLE**

## **H - TESTS W/O CODES - GASOLINE**

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## **ARTICLE BEGINNING**

1996 ENGINE PERFORMANCE

Volkswagen Trouble Shooting - No Codes - Gasoline

Cabrio, Golf III, GTI, Jetta III, Passat

## **INTRODUCTION**

Before diagnosing symptoms or intermittent faults, perform steps in appropriate articles;

F - BASIC TESTING - GASOLINE and

G - TESTS W/CODES - GASOLINE articles. Use this article to diagnose driveability problems existing when a hard Diagnostic Trouble Code (DTC) is not present.

**NOTE:** Some driveability problems may have been corrected by manufacturer with a revised computer calibration chip or computer control unit. Check with manufacturer for latest chip or computer application.

Symptom checks can direct technician to malfunctioning component(s) for further diagnosis. A symptom should lead to a specific component test, system test or an adjustment.

Use intermittent test procedures to locate driveability problems that do not occur when vehicle is being tested. These test procedures should also be used if a soft (intermittent) DTC was present, but no problem was found during self-diagnostic testing.

**NOTE:** For specific testing procedures, see appropriate  
I - SYSTEM/COMPONENT TESTS article. For specifications, see  
D - ADJUSTMENTS or  
C - SPECIFICATIONS article.

## **SYMPTOMS**

### **SYMPTOM DIAGNOSIS**

Symptom checks cannot be used properly unless problem is actually present while vehicle is being tested. To reduce diagnostic time, ensure battery voltage is okay and starter motor turns engine over before attempting to diagnose symptom.

Check engine mechanical condition (compression pressure, valve timing, etc.), wiring harness and connections (terminals not corroded or pushed back), and vacuum hose (not disconnected or leaking).

Also check for correct tire size, as recommended by manufacturer. Ensure wheels rotate freely (brake drag or bad wheel bearings). Symptoms available for diagnosis include the following.

\* Engine Does Not Start Or Is Difficult To Start When Cold

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- \* Engine Does Not Start Or Is Difficult To Start When Warm
- \* Uneven Idle Or No Idle With Cold Engine Or During Warm-Up
- \* Engine Starts But Stalls
- \* Idle Speed Exceeds Specification
- \* Poor Acceleration With Cold Engine Or During Warm-Up
- \* Engine Stalls While Driving
- \* Poor Performance
- \* Engine Run-On (Dieseling)
- \* High Fuel Consumption
- \* Engine Knock
- \* Engine Runs Unevenly Over Entire Speed Range

NOTE: When working on Motronic systems, use symptoms listed only as a diagnostic guide. Specific symptoms for Motronic systems are not available from manufacturer.

#### ENGINE DOES NOT START OR IS DIFFICULT TO START WHEN COLD

- \* Check fuel quality.
- \* Check fuel pump relay and fuel pump.
- \* Check auxiliary air intake system.
- \* Check fuel system acceleration enrichment circuits.
- \* Check MAF sensor.
- \* Check TP sensor plate rest position and idle circuit.
- \* Check fuel system pressures.
- \* Check fuel injection volume.
- \* Check engine coolant temperature sensor.
- \* Check ignition timing, spark plugs, distributor, secondary ignition wiring and coil.
- \* Check CMP sensor.
- \* Check ignition coil power output stage.

#### ENGINE DOES NOT START OR IS DIFFICULT TO START WHEN WARM

- \* Check radiator cooling fan after-run circuit.
- \* Check fuel pump check valve.
- \* Check fuel evaporative regulator solenoid(s).
- \* Check fuel system for leaks.
- \* Check auxiliary air intake system.
- \* Check idle speed.
- \* Check fuel system acceleration enrichment circuits.
- \* Check injector fuel pressure and volume.
- \* Check TP sensor plate rest position and idle circuit.
- \* Check sealing ring under control plunger.
- \* Check fuel system pressure.
- \* Check engine coolant temperature sensor.
- \* Check ignition timing, spark plugs, distributor, secondary ignition wiring and coil.

#### UNEVEN IDLE OR NO IDLE WITH COLD ENGINE OR DURING WARM-UP

- \* Check fuel evaporative regulator solenoid(s).

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- \* Check auxiliary air intake system.
- \* Check idle speed.
- \* Check H02S control circuit.
- \* Check cold-start valve.
- \* Check injector fuel pressure and volume.
- \* Check TP sensor.
- \* Check fuel system differential and residual pressures.
- \* Check engine coolant temperature sensor.
- \* Check exhaust system.
- \* Check ignition timing and spark plugs.

#### ENGINE STARTS BUT STALLS

- \* Check fuel pump relay and fuel pump.
- \* Check auxiliary air intake system.
- \* Check idle speed.
- \* Check MAF sensor.
- \* Check TP sensor plate rest position and idle circuit.
- \* Check fuel system pressure.
- \* Check idle switch.
- \* Check engine coolant temperature sensor.

#### IDLE SPEED EXCEEDS SPECIFICATION

- \* Check throttle cable adjustment.
- \* Check fuel evaporative regulator solenoid(s).
- \* Check auxiliary air intake system.
- \* Check idle speed.
- \* Check TP sensor.
- \* Check idle switch.
- \* Check engine coolant temperature sensor.
- \* Check throttle body basic adjustment.
- \* Check ignition timing.

#### POOR ACCELERATION WITH COLD ENGINE OR DURING WARM-UP

- \* Check fuel pump.
- \* Check auxiliary air intake system.
- \* Check H02S control circuit.
- \* Check fuel system acceleration enrichment circuits.
- \* Check MAF sensor.
- \* Check TP sensor.
- \* Check fuel system pressure.
- \* Check injector fuel pressure and volume.
- \* Check idle switch.
- \* Check engine coolant temperature sensor.
- \* Check throttle body basic adjustment.
- \* Check exhaust system.
- \* Check ignition timing, spark plugs, distributor, secondary ignition wiring and coil.

#### ENGINE STALLS WHILE DRIVING

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- \* Check fuel pump.
- \* Check auxiliary air intake system.
- \* Check injector fuel pressure and volume.
- \* Check idle and full throttle switches.
- \* Check intake air preheating system.
- \* Check ignition timing, spark plugs, distributor, secondary ignition wiring and coil.

#### POOR PERFORMANCE

- \* Check fuel pump.
- \* Check throttle cable adjustment.
- \* Check auxiliary air intake system.
- \* Check MAF sensor lever adjustment and control plunger.
- \* Check TP sensor.
- \* Check fuel system pressure.
- \* Check injector fuel pressure and volume.
- \* Check full throttle switch.
- \* Check intake air preheating system.
- \* Check catalytic converter.
- \* Check ignition timing.

#### ENGINE RUN-ON (DIESELING)

- \* Check fuel evaporative regulator solenoid(s).
- \* Check fuel system for leaks.
- \* Check cold-start valve.
- \* Check injector fuel pressure and volume.
- \* Check MAF sensor lever adjustment and control plunger.

#### HIGH FUEL CONSUMPTION

- \* Check fuel system for leaks.
- \* Check H02S control circuit.
- \* Check injector fuel pressure and volume.
- \* Check MAF sensor.
- \* Check TP sensor.
- \* Check injector fuel pressure and volume.
- \* Check full throttle switch.
- \* Check intake air preheating system.
- \* Check exhaust system for leaks (between cylinder and H02S).
- \* Check ignition timing.

#### ENGINE KNOCK

- \* Check knock sensor(s).
- \* Check full throttle switch.
- \* Check ignition timing.

#### ENGINE RUNS UNEVENLY OVER ENTIRE SPEED RANGE

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- \* Check auxiliary air intake system.
- \* Check injector fuel pressure and volume.
- \* Check ignition timing, spark plugs, distributor, secondary ignition wiring and coil.

## **INTERMITTENTS**

### **INTERMITTENT PROBLEM DIAGNOSIS**

Intermittent fault testing requires duplicating circuit or component failure to identify the problem. These procedures may lead to computer setting a Diagnostic Trouble Code (DTC) which may help in diagnosis.

If problem vehicle does not produce a DTC, monitor voltage or resistance values using a DVOM while attempting to reproduce conditions causing intermittent fault. A status change on DVOM indicates a fault has been located.

When monitoring voltage, ensure ignition switch is in ON position or engine is running. Ensure ignition switch is in OFF position or negative battery cable is disconnected when monitoring circuit resistance. Status changes on DVOM during test procedures indicate area of fault.

### **TEST PROCEDURES**

#### **Intermittent Simulation**

To reproduce conditions creating intermittent fault, use following methods.

- \* Lightly vibrate component.
- \* Heat component.
- \* Wiggle or bend wiring harness.
- \* Spray component with water.
- \* Remove/apply vacuum source.

Monitor circuit/component voltage or resistance while simulating intermittent. If engine is running, monitor for DTCs. Use test results to identify a faulty component or circuit.

## **END OF ARTICLE**

## **G - TESTS W/CODES - GASOLINE**

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#### **ARTICLE BEGINNING**

1996 ENGINE PERFORMANCE  
Volkswagen Self-Diagnostics - Gasoline

Cabrio, Golf III, GTI, Jetta III, Passat

#### **INTRODUCTION**

If no faults were found while performing preliminary inspection procedures, proceed with self-diagnostics. If no Diagnostic Trouble Codes (DTCs) or only pass DTCs are present after entering self-diagnostics, proceed to appropriate H - TESTS W/O CODES article for diagnosis by symptom (i.e., ROUGH IDLE, NO START, etc.).

NOTE: Scan Tool (VAG 1551) is recommended by manufacturer; however, generic scan tools may be used.

#### **SELF-DIAGNOSTIC SYSTEM**

##### **Hard Failures**

All vehicles are equipped with a permanent fault memory. If a failure occurs in monitored sensors and components, they store a hard failure in memory.

Hard failures of monitored sensors and/or components cause Malfunction Indicator Light (MIL) to come on and remain on until problem is repaired. If MIL comes on and remains on during vehicle operation, cause of failure must be determined.

If failures are present for more than 5 seconds, they are stored as Diagnostic Trouble Codes (DTCs) and will be displayed as a permanent failure even if failure is not present during DTCs display. Failures affecting oxygen sensor control can only be read accurately after a test drive of at least 10 minutes.

##### **Intermittent Failures**

If a failure occurs for no more than 5 seconds, they are stored and considered to be "sporadic" (intermittent failures). When displayed on scan tool, intermittent failures will have "SP" (sporadic) DTC.

#### **RETRIEVING DTCS**

NOTE: See ENTERING SELF-DIAGNOSTICS for additional scan tool operating instructions.

##### **Using VAG 1551 Scan Tool (All Models)**

1) Data Link Connector (DLC) is located below tachometer. See Fig. 1. On 2.0L and 2.8L, remove ashtray, and slide DLC cover to left. Ensure ignition is off. Connect scan tool to DLC. On all models, scan tool should alternately display 1-RAPID DATA TRANSFER and 2-BLINK CODE OUTPUT.



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2) Turn ignition on. Operate scan tool and observe display. Press "1" button to select RAPID DATA TRANSFER function. Press PRINT button to turn on printer. Indicator light on button should come on.

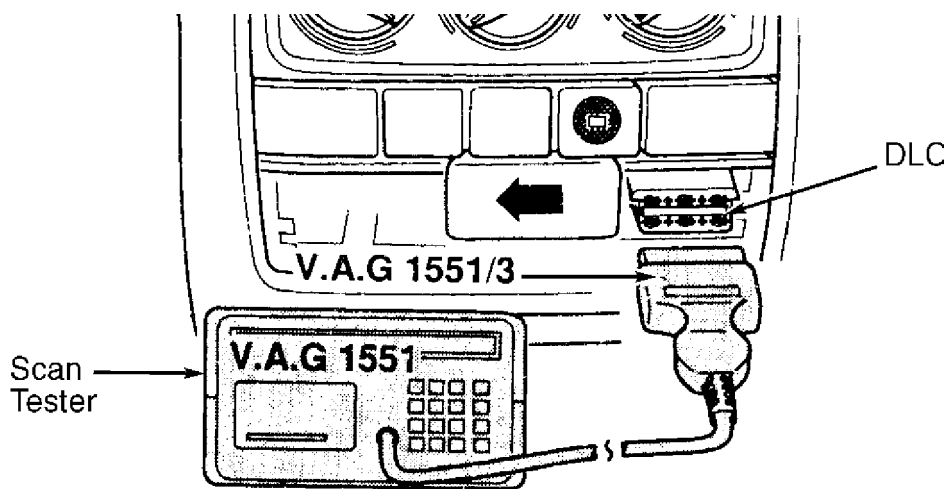
3) Press "0" and "1" buttons to select ENGINE ELECTRONICS function. Press "Q" button to enter input. Press right arrow button, then "0" and "2" buttons to select READ DTC MEMORY function. Press "Q" button to enter input.

4) Scan tool will display DTCs (if any). If NO FAULTS (DTCs) RECOGNIZED is displayed, press right arrow button to return to RAPID DATA TRANSFER function.

5) On 2.0L and 2.8L, if one or more DTCs are stored, proceed to 2.0L & 2.8L DTC IDENTIFICATION table under DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION to translate DTC to a system or affected circuit discription. To repair DTC, proceed to appropriate test number in appropriate G - TESTS W/CODES article.

6) After repairs on all models, press "0" and "5" buttons to select ERASE DTC MEMORY function. Press "Q" button to enter input. After DTCs are erased, press right arrow button.

7) Press "0" and "6" buttons to select END DATA TRANSFER function. Press "Q" button to enter input. Enter RAPID DATA TRANSFER function and test drive vehicle for at least 10 minutes.



94F51610

Fig. 1: Locating Data Link Connector  
Courtesy of Volkswagen United States, Inc.

### DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION

NOTE: For component location, see I - SYSTEM/COMPONENT TESTS article. For circuit, connector terminal No. and wire color identification, see appropriate WIRING DIAGRAM in L - WIRING DIAGRAMS article.

#### DTC IDENTIFICATION TABLE (2.0L & 2.8L)

|              |                                                                  |              |
|--------------|------------------------------------------------------------------|--------------|
| Ú            | AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA | ¿            |
| <sup>3</sup> | Generic Scan <sup>3</sup> VAG 1551                               | <sup>3</sup> |
| <sup>3</sup> | Tool DTC                                                         | <sup>3</sup> |
| <sup>3</sup> | DTC                                                              | <sup>3</sup> |
|              | Malfunction/Affected                                             | <sup>3</sup> |
|              | Sensor Or Circuit                                                | <sup>3</sup> |

|       |  |  |  |       |                                                               |
|-------|--|--|--|-------|---------------------------------------------------------------|
| P0102 |  |  |  | 16486 | MAF Circuit Low Input                                         |
| P0103 |  |  |  | 16487 | MAF Circuit High Input                                        |
| P0112 |  |  |  | 16501 | IAT Circuit Low Input                                         |
| P0113 |  |  |  | 16502 | IAT Circuit High Input                                        |
| P0117 |  |  |  | 16501 | ECT Circuit Low Input                                         |
| P0118 |  |  |  | 16502 | ECT Circuit High Input                                        |
| P0120 |  |  |  | 16504 | TP Sensor Circuit Malfunction                                 |
| P0121 |  |  |  | 16505 | TP Sensor Circuit Range/Performance Problem                   |
| P0122 |  |  |  | 16506 | TP Sensor Circuit Low Input                                   |
| P0125 |  |  |  | 16509 | Insufficient Coolant Temperature For Closed Loop Fuel Control |
| P0131 |  |  |  | 16515 | H02S Circuit Low Voltage (Bank 1, Sensor 1)                   |
| P0132 |  |  |  | 16516 | H02S Circuit High Voltage (Bank 1, Sensor 1)                  |
| P0133 |  |  |  | 16517 | H02S Circuit Slow Response (Bank 1, Sensor 1)                 |
| P0134 |  |  |  | 16518 | H02S Circuit No Activity Detected (Bank 1, Sensor 1)          |
| P0135 |  |  |  | 16519 | H02S Heater Circuit Malfunction (Bank 1, Sensor 1)            |
| P0137 |  |  |  | 16521 | H02S Circuit Low Voltage (Bank 1, Sensor 2)                   |
| P0138 |  |  |  | 16522 | H02S Circuit High Voltage (Bank 1, Sensor 2)                  |
| P0140 |  |  |  | 16524 | H02S Circuit No Activity Detected (Bank 1, Sensor 2)          |
| P0141 |  |  |  | 16525 | H02S Heater Circuit Malfunction (Bank 1, Sensor 2)            |
| P0171 |  |  |  | 16555 | System Too Lean (Bank 1)                                      |

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```
3   P0172   3   16556   3   System Too Rich (Bank 1)   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0300   3   16684   3   Random Misfire Detected   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0301   3   16685   3   Cylinder No. 1 Misfire Detected   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0302   3   16686   3   Cylinder No. 2 Misfire Detected   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0303   3   16687   3   Cylinder No. 3 Misfire Detected   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0304   3   16688   3   Cylinder No. 4 Misfire Detected   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0305 (1) 3 16689 (1) 3 Cylinder No. 5 Misfire Detected   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0306 (1) 3 16690 (1) 3 Cylinder No. 6 Misfire Detected   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0327   3   16711   3   Knock Sensor No. 1 Circuit Low   3
3                                     3
3                                     Input (Bank 1)   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0332 (1) 3 16176 (1) 3 Knock Sensor No. 2 Circuit Low   3
3                                     3
3                                     Input (Bank 2)   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0341   3   16725   3   Camshaft Position Sensor Circuit   3
3                                     3
3                                     Range/Performance   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0411   3   16795   3   Secondary Air Injection System   3
3                                     3
3                                     Incorrect Flow Detected   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0422   3   16806   3   Main Catalyst Efficiency Below   3
3                                     3
3                                     Threshold (Bank 1)   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0440   3   16824   3   EVAP System Malfunction   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0501   3   16885   3   Vehicle Speed Sensor   3
3                                     3
3                                     Range/Performance   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0510   3   16894   3   Closed Throttle Position Switch   3
3                                     3
3                                     Malfunction   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0605   3   16989   3   ECM Read Only Memory (ROM) Error   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0715 (2) 3 17099 (2) 3 Input/Turbine Speed Sensor Circuit   3
3                                     3
3                                     Malfunction   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0722 (2) 3 17106 (2) 3 Output Speed Sensor Circuit   3
3                                     3
3                                     No Signal   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0725 (2) 3 17109 (2) 3 Engine Speed Input Circuit   3
3                                     3
3                                     Malfunction   3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3   P0748 (2) 3 17132 (2) 3 Pressure Control Solenoid   3
3                                     3
3                                     Electrical   3
```

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```

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P0753 (2) 3 17137 (2)3 Shift Solenoid A Electrical 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P0758 (2) 3 17142 (2)3 Shift Solenoid B Electrical 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P0763 (2) 3 17147 (2)3 Shift Solenoid C Electrical 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P0768 (2) 3 17152 (2)3 Shift Solenoid D Electrical 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P0773 (2) 3 17157 (2)3 Shift Solenoid E Electrical 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1127 3 17535 3 Long Term Fuel Trim Too Rich 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1128 3 17536 3 Long Term Fuel Trim Too Lean 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1213 3 17621 3 Cylinder No. 1 Fuel Injector 3
3 3 Circuit Short To B + 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1214 3 17622 3 Cylinder No. 2 Fuel Injector 3
3 3 Circuit Short To B+ 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1215 3 17623 3 Cylinder No. 3 Fuel Injector 3
3 3 Circuit Short To B+ 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1216 3 17624 3 Cylinder No. 4 Fuel Injector 3
3 3 Circuit Short To B+ 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1217 (1) 3 17625 (1)3 Cylinder No. 5 Fuel Injector 3
3 3 Circuit Short To B+ 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1218 (1) 3 17626 (1)3 Cylinder No. 6 Fuel Injector 3
3 3 Circuit Short To B+ 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1225 3 17633 3 Cylinder No. 1 Injector Circuit 3
3 3 Short To Ground 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1226 3 17634 3 Cylinder No. 2 Injector Circuit 3
3 3 Short To Ground 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1227 3 17635 3 Cylinder No. 3 Injector Circuit 3
3 3 Short To Ground 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1228 3 17636 3 Cylinder No. 4 Injector Circuit 3
3 3 Short To Ground 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1229 (1) 3 17637 (1)3 Cylinder No. 5 Injector Circuit 3
3 3 Short To Ground 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1230 (1) 3 17638 (1)3 Cylinder No. 6 Injector Circuit 3
3 3 Short To Ground 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3 P1237 3 17645 3 Cylinder No. 1 Injector Circuit 3

```

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```
3          3          3          Open          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1238    3  17646  3  Cylinder No. 2 Injector Circuit  3
3          3          3          Open          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1239    3  17647  3  Cylinder No. 3 Injector Circuit  3
3          3          3          Open          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1240    3  17648  3  Cylinder No. 4 Injector Circuit  3
3          3          3          Open          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1241 (1) 3 17649 (1) 3 Cylinder No. 5 Injector Circuit  3
3          3          3          Open          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1242 (1) 3 17650 (1) 3 Cylinder No. 6 Injector Circuit  3
3          3          3          Open          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1340    3  17748  3 Camshaft/Crankshaft Position Sensor 3
3          3          3          Signals Out Of Sequence 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1410    3  17818  3 Fuel Tank Ventilation Valve      3
3          3          3          Short To B+          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1420    3  17828  3 Secondary Air Injection Control  3
3          3          3          Electrical Malfunction  3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1421    3  17829  3 Secondary Air Injection Solenoid  3
3          3          3          Valve Circuit Short To Ground 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1422    3  17830  3 Secondary Air Injection Solenoid  3
3          3          3          Valve Circuit Short To B+  3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1425    3  17833  3 Tank Ventilation Valve          3
3          3          3          Short To Ground          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1426    3  17833  3 Tank Ventilation Valve Circuit Open 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1450    3  17858  3 Secondary Air Injection System    3
3          3          3          Circuit Short To B+          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1451    3  17859  3 Secondary Air Injection System    3
3          3          3          Circuit Short To Ground          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1452    3  17860  3 Secondary Air Injection System    3
3          3          3          Circuit Open          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1500    3  17908  3 Fuel Pump Relay Circuit Electrical 3
3          3          3          Malfunction          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1502    3  17910  3 Fuel Pump Relay Circuit Short To B+ 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'
3  P1543    3  17951  3 Throttle Actuation Potentiometer  3
```

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```
3          3          3          Too Low          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3   P1544    3   17952  3   Throttle Actuation Potentiometer 3
3          3          3          Too High          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3   P1580    3   17988  3   Throttle Actuator Malfunction    3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3   P1611 (2) 3 18019 (2) 3 MIL Call-Up/TCM Short To Ground  3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3   P1613    3   18021  3   MIL Call-Up Circuit Open Or Short 3
3          3          3          To B+          3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3   P1778 (2) 3 18186 (2) 3 Solenoid EV7 Electrical Malfunction 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3   P1780 (2) 3 18188 (2) 3 Engine Intervention Readable    3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
3(1) - Applies to 2.8L only.                               3
3(2) - See appropriate MITCHELL(R) IMPORTED TRANSMISSION    3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAU
```

#### ENTERING SELF-DIAGNOSTICS

1) Ensure battery voltage and fuse No. 21 on 2.0L or No. 22 on 2.8L are okay. Ensure engine ground connections at cylinder head cover and manifold are okay.

2) Data Link Connector (DLC) is located below tachometer. See Fig. 1. On 2.0L and 2.8L, remove ashtray and slide DLC cover to left. Ensure ignition is off. Connect scan tool to DLC. On all models, scan tool should alternately display 1-RAPID DATA TRANSFER and 2-BLINK CODE OUTPUT.

3) Turn ignition on, or start engine, depending on function being selected. See SELECTABLE FUNCTIONS table. Press "1" button to select RAPID DATA TRANSFER function.

4) Press "0" and "1" buttons to select ENGINE ELECTRONICS function. Press "Q" button to enter input. ECM identification will be displayed on scan tool.

5) If CONTROL MODULE DOES NOT ANSWER message is displayed, press HELP button to print a list of possible causes. With scan tool in RAPID DATA TRANSFER function, press right arrow button. Press "02" to "08" buttons to select desired function. Press "Q" button to enter input.

#### SELECTABLE FUNCTIONS TABLE (1)

```
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Function                               Ignition On   Engine On
```

|                                        |   |           |
|----------------------------------------|---|-----------|
| 02 (Read DTC/Fault Memory) .....       | X | ..... X   |
| 03 (Output Diagnostic Test Mode) ..... | X | ..... (2) |
| 04 (Start Basic Setting) .....         | X | ..... X   |
| 05 (Erase DTC/Fault Memory) .....      | X | ..... X   |
| 06 (End Output) .....                  | X | ..... X   |
| 07 (Code Control Module) (3) .....     | X | ..... X   |

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08 (Read Measuring Value Block) ..... X ..... X  
11 (Log-In Procedure) (3) ..... X .....

(1) - Press HELP button at any time to obtain additional scan tool operating instructions.

(2) - With engine off on 2.0L and 2.8L.

(3) - Applies to 2.0L and 2.8L only.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

#### OUTPUT CHECK DIAGNOSIS (OUTPUT DIAGNOSTIC TEST MODE)

NOTE: See ENTERING SELF-DIAGNOSTICS for additional scan tool operating instructions.

##### 2.0L

1) Ensure battery voltage and fuse No. 21 are okay. Ensure engine ground connections at cylinder head cover and manifold are okay.

2) Data Link Connector (DLC) is located below tachometer. See Fig. 1. Remove ashtray and slide DLC cover to left. Ensure ignition is off. Connect scan tool to DLC. Scan tool should alternately display 1-RAPID DATA TRANSFER and 2-BLINK CODE OUTPUT.

3) Turn ignition on, or start engine, depending on function being selected. See SELECTABLE FUNCTIONS table under ENTERING SELF-DIAGNOSTICS. Press "1" button to select RAPID DATA TRANSFER function.

4) Press "0" and "3" buttons to select OUTPUT DIAGNOSTIC TEST MODE (DTM) function. Press "Q" button to enter input. OUTPUT DIAGNOSTIC TEST MODE will be displayed on scan tool.

5) Output DTM actuates following components in sequence:

- \* Cylinder No. 1 fuel injector.
- \* Cylinder No. 2 fuel injector.
- \* Cylinder No. 3 fuel injector.
- \* Cylinder No. 4 fuel injector.
- \* EVAP canister purge regulator valve.
- \* EVAP canister purge solenoid valve.

##### 2.8L

1) Ensure battery voltage and fuse No. 22 are okay. Ensure engine ground connections at cylinder head cover and manifold are okay.

2) Data Link Connector (DLC) is located below tachometer. See Fig. 1. Remove ashtray and slide DLC cover to left. Ensure ignition is off. Connect scan tool to DLC. Scan tool should alternately display 1-RAPID DATA TRANSFER and 2-BLINK CODE OUTPUT.

3) Turn ignition on, or start engine, depending on function being selected. See SELECTABLE FUNCTIONS table under ENTERING SELF-DIAGNOSTICS. Press "1" button to select RAPID DATA TRANSFER function.

4) Press "0" and "3" buttons to select OUTPUT DIAGNOSTIC TEST MODE (DTM) function. Press "Q" button to enter input. OUTPUT DIAGNOSTIC TEST MODE will be displayed on scan tool.

5) Output DTM actuates following components in sequence:

- \* Cylinder No. 1 fuel injector.

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- \* Cylinder No. 2 fuel injector.
- \* Cylinder No. 3 fuel injector.
- \* Cylinder No. 4 fuel injector.
- \* Cylinder No. 5 fuel injector.
- \* Cylinder No. 6 fuel injector.
- \* EVAP canister purge regulator valve.
- \* Secondary air injection solenoid valve.
- \* Secondary air injection pump relay.
- \* EVAP canister purge solenoid valve.

#### READ MEASUREMENT & READ MEASURING (TEST) VALUE BLOCK

NOTE: See ENTERING SELF-DIAGNOSTICS for additional scan tool operating instructions.

##### 2.0L

1) Ensure battery voltage and fuse No. 21 are okay. Ensure engine ground connections at cylinder head cover and manifold are okay.

2) Data Link Connector (DLC) is located below tachometer. See Fig. 1. Remove ashtray and slide DLC cover to left. Ensure ignition is off. Connect scan tool to DLC. Scan tool should alternately display 1-RAPID DATA TRANSFER and 2-BLINK CODE OUTPUT.

3) Turn ignition on, or start engine, depending on function being selected. See SELECTABLE FUNCTIONS table under ENTERING SELF-DIAGNOSTICS. Press "1" button to select RAPID DATA TRANSFER function.

4) Press "0" and "8" buttons to select READ MEASURING VALUE BLOCK MODE function. Press "Q" button to enter input. OUTPUT DIAGNOSTIC TEST MODE will be displayed on scan tool.

5) Press "3" button to select next higher group, "1" button to select next lower group or "C" button to skip a group. See DISPLAY GROUP (2.0L & 2.8L) table. When display group "000" is selected, only READ MEASUREMENT BLOCK is shown on display (the zeros do not appear on display). Scan tool displays a value (specification) which corresponds to operating parameters used by ECM. When READ MEASUREMENT BLOCK function is completed, select END DATA TRANSFER function on scan tool. Turn ignition off. Disconnect scan tool.

##### 2.8L

1) Ensure battery voltage and fuse No. 22 are okay. Ensure engine ground connections at cylinder head cover and manifold are okay.

2) Data Link Connector (DLC) is located below tachometer. See Fig. 1. Remove ashtray and slide DLC cover to left. Ensure ignition is off. Connect scan tool to DLC. Scan tool should alternately display 1-RAPID DATA TRANSFER and 2-BLINK CODE OUTPUT.

3) Turn ignition on, or start engine, depending on function being selected. See SELECTABLE FUNCTIONS table under ENTERING SELF-DIAGNOSTICS. Press "1" button to select RAPID DATA TRANSFER function.

4) Press "0" and "8" buttons to select READ MEASURING VALUE BLOCK MODE function. Press "Q" button to enter input. OUTPUT DIAGNOSTIC TEST MODE will be displayed on scan tool.



|   |                                                                      |   |
|---|----------------------------------------------------------------------|---|
| 3 | (1) - If connectors, wiring circuits and components are okay,        | 3 |
| 3 | substitute a known-good ECM and retest system.                       | 3 |
| 3 | (2) - If reading is less than specification, check thermostat        | 3 |
| 3 | operation. If thermostat is okay, check Engine Coolant               | 3 |
| 3 | Temperature (ECT) sensor, connectors and wiring circuit. If          | 3 |
| 3 | reading is more than specification, check ECT sensor,                | 3 |
| 3 | connectors and wiring circuit.                                       | 3 |
| 3 | (3) - If reading is less than specification, check intake air system | 3 |
| 3 | for leaks. If no leaks exist, check fuel pressure regulator.         | 3 |
| 3 | If reading is more than specification, turn off all                  | 3 |
| 3 | accessories, and check pre-catalyst Heated Oxygen Sensor             | 3 |
| 3 | (HO2S) heater operation. If HO2S heater is okay, check HO2S,         | 3 |

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- connectors and wiring circuit.
- (4) - 800-880 RPM (80-88) on 2.0L; 650-800 RPM (65-80) on 2.8L.
- (5) - If reading is less than specification, place gear selector in "P" or "N" position. Check Throttle Valve Control Module (TVCM) connectors and wiring circuit. If connectors and wiring circuit are okay, substitute a known-good TVCM and retest system. If reading is more than specification, check fuel pressure regulator. If fuel pressure regulator is okay, substitute a known-good TVCM and retest system.
- (6) - If reading is less than specification, check battery, generator and ECM voltage supply circuit. If reading is more than specification, check voltage regulator.
- (7) - If reading is more than specification, check throttle cable adjustment. If cable is adjusted properly, substitute a known-good throttle valve control module and retest system.
- (8) - If reading is less than specification, check intake air system for leaks. If reading is more than specification, turn off all accessories.
- (9) - If reading is less than specification, check pre-catalyst Heated Oxygen Sensor (HO2S) heater operation. If HO2S heater is okay, check HO2S, connectors and wiring circuit. If HO2S, connectors and wiring circuit are okay, check fuel pressure regulator. If reading is more than specification, check pre-catalyst Heated Oxygen Sensor (HO2S) heater operation. If HO2S heater is okay, check HO2S, connectors and wiring circuit. If HO2S, connectors and wiring circuit are okay, check intake air system for leaks. If no leaks exist, check fuel injectors. If reading is 128, check amount of fuel in tank. On 2.0L, check for secondary air injection system malfunctions. On all models, check pre-catalyst Heated Oxygen Sensor (HO2S) heater operation. If HO2S heater is okay, check HO2S, connectors and wiring circuit.
- (10) - If reading is -5 to -16.4 percent, change engine oil, check fuel pressure regulator, fuel injectors for leaks and Heated Oxygen Sensor (HO2S) heater. If reading is 5 to 16.4 percent, check intake air system for leaks, exhaust system, fuel pressure regulator, HO2S heater and fuel injectors. If reading is constant at zero, check wiring circuit between HO2S connector and ECM. See appropriate PIN VOLTAGE chart in PIN VOLTAGE CHARTS article. If wiring circuit is okay, check mass airflow sensor.

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#### CLEARING DTCS

See RETRIEVING DTCS.

#### ECM LOCATION

All Models

ECM is located underneath center of windshield cowl, directly behind engine compartment firewall.

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## **CIRCUIT TESTS**

**NOTE:** To properly diagnose vehicle, it is recommended to use Scan Tool (VAG 1551) and Test Box (VAG 1598/18).

**NOTE:** For component location, see I - SYSTEM/COMPONENT TESTS article. For circuit and wire color identification, see appropriate WIRING DIAGRAM in L - WIRING DIAGRAMS article.

### **DTC P0102/16486 - MAF CIRCUIT LOW INPUT**

**NOTE:** DTC is set when signal from Mass Airflow (MAF) sensor to Electronic Control Module (ECM) is too low.

1) Inspect MAF sensor connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Check MAF sensor fuse. Replace if necessary. Turn ignition off. Disconnect MAF sensor connector. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

3) Turn ignition on. Jumper test box sockets No. 1 and 6. Using a DVOM, check voltage between MAF sensor connector terminals No. 1 and 3. Voltage should be at least 11.5 volts. If voltage is as specified, go to step 5). If voltage is not as specified, go to next step.

4) Turn ignition off. Recheck MAF sensor fuse. Replace if necessary. Check resistance between MAF sensor connector terminal No. 1 and ground. Check resistance between MAF sensor connector terminal No. 1 and test box socket No. 1. Resistance should be less than 1.5 ohms. If resistance is not as specified, go to next step. If resistance is as specified, repair open circuit between fuel pump relay and MAF sensor. Erase DTC memory and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 7).

5) Jumper MAF sensor connector terminals No. 1 and 2, and check resistance between test box sockets No. 1 and 16. Jumper MAF sensor connector terminals No. 1 and 4, and check resistance between test box sockets No. 1 and 17. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, repair open circuit between MAF sensor and ECM connector. Erase DTC memory and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 7).

6) Remove jumper and check resistance between test box sockets No. 16 and 17. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, repair short circuit between MAF sensor connector and ECM connector. Erase DTC memory and perform test drive. See CLEARING

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DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

7) Replace MAP sensor. Erase DTC memory and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

8) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0103/16487 - MAF CIRCUIT HIGH INPUT**

**NOTE:** DTC is set when signal from Mass Airflow (MAF) sensor to Electronic Control Module (ECM) is too high.

1) Inspect MAF sensor connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Check MAF sensor fuse. Replace if necessary. Turn ignition off. Disconnect MAF sensor connector. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

3) Using a DVOM, check resistance between MAF sensor connector terminal No. 1 and test box socket No. 1. Jumper MAF sensor connector terminals No. 1 and 2, and check resistance between test box sockets No. 1 and 16. Jumper MAF sensor connector terminals No. 1 and 4, and check resistance between test box sockets No. 1 and 17. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, repair open circuit between MAF sensor connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Remove jumper and check resistance between test box sockets No. 16 and 17. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, repair short circuit between MAF sensor connector and ECM connector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

5) Replace MAF sensor. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

6) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0117/16501 - ECT SENSOR CIRCUIT LOW INPUT**

**NOTE:** DTC is set when Electronic Control Module (ECM) detects a short circuit in Engine Coolant Temperature (ECT) sensor or in ECT sensor circuit.





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**NOTE:** DTC is set when Throttle Position (TP) sensor supplies invalid signal to Electronic Control Module (ECM).

1) Inspect TP sensor connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Turn ignition off. Disconnect Throttle Valve Control Module (TVCM) connector. Turn ignition on. Using DVOM, check voltage between TVCM connector terminals No. 4 and 7. Voltage should be about 5 volts. Check voltage between TVCM connector terminals No. 3 and 7. Voltage should be about 10 volts. If voltage is as specified, go to step 6). If voltage is not as specified, go to next step.

3) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Check resistance between TVCM connector terminal No. 3 and test box socket No. 10, between TVCM connector terminal No. 4 and test box socket No. 41, and between TVCM connector terminal No. 7 and test box socket No. 33. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

5) Check for an open circuit between TVCM and ECM. Repair as necessary. Erase DTC memory and test drive vehicle. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If no open circuit is present, go to step 11).

6) Turn ignition off. Reconnect TVCM connector. With accelerator at Wide Open Throttle (WOT) and at closed throttle, check resistance between test box sockets No. 10 and 33. Resistance should be infinite (no continuity) at WOT and 10 ohms maximum at closed throttle. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

7) With accelerator pedal at closed throttle, check resistance between test box sockets No. 27 and 53. If resistance is 3-200 ohms, go to step 9). If resistance is not as specified, go to next step.

8) Disconnect TVCM connector. Check resistance between TVCM connector terminal No. 1 and test box socket No. 27, TVCM connector terminal No. 2 and test box socket No. 53, TVCM terminal connector No. 5 and test box socket No. 40, and TVCM connector terminal No. 8 and test box socket No. 62. Resistance should be less than 1.5 ohms. If resistance is not as specified, locate and repair open circuit between TVCM and ECM Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If resistance is as specified, go to next step.

9) Check resistance between test box sockets No. 10, 27, 33, 40, 41, 53, and 69. Resistance should be infinite (no continuity) between each circuit. If resistance is not as specified, repair

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circuits shorted to each other. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If no shorts are present, go to next step.

10) Substitute a known-good TVCM. Clear DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, see DTCs P0102/16486, P0103/16487, P0117/16501 and P0118/16502.

11) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0121/16505 - TP SENSOR CIRCUIT RANGE/PERFORMANCE PROBLEM**

**NOTE:** DTC is set when Throttle Position (TP) sensor supplies invalid signal to Electronic Control Module (ECM).

1) Inspect Throttle Position (TP) sensor connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Turn ignition off. Disconnect Throttle Valve Control Module (TVCM) connector. Turn ignition on. Using DVOM, check voltage between TVCM connector terminals No. 4 and 7. Voltage should be about 5 volts. Check voltage between TVCM connector terminals No. 3 and 7. Voltage should be about 10 volts. If voltage is as specified, go to step 6). If voltage is not as specified, go to next step.

3) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Check resistance between TVCM connector terminal No. 3 and test box socket No. 10, between TVCM connector terminal No. 4 and test box socket No. 41, and between TVCM connector terminal No. 7 and test box socket No. 33. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

5) Check for an open circuit between TVCM and ECM. Repair as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If no open circuit is present, go to next step.

6) Turn ignition off. Reconnect TVCM connector. With accelerator at Wide Open Throttle (WOT) and at closed throttle, check resistance between test box sockets No. 10 and 33. Resistance should be infinite (no continuity) at WOT and 10 ohms maximum at closed throttle. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

7) With accelerator pedal at closed throttle, check resistance between test box sockets No. 27 and 53. If resistance is 3-200 ohms, go to step 9). If resistance is not as specified, go to next step.



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8) Disconnect TVCM connector. Check resistance between TVCM connector terminal No. 1 and test box socket No. 27, TVCM connector terminal No. 2 and test box socket No. 53, TVCM terminal connector No. 5 and test box socket No. 40, and TVCM connector terminal No. 8 and test box socket No. 62. Resistance should be less than 1.5 ohms. If resistance is not as specified, locate and repair open circuit between TVCM and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If resistance is as specified, go to next step.

9) Check resistance between test box sockets No. 10, 27, 33, 40, 41, 53, and 69. Resistance should be infinite (no continuity) between each circuit. If resistance is not as specified, repair circuits shorted to each other. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If no shorts are present, go to next step.

10) Substitute a known-good TVCM. Clear DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, see DTCs P0102/16486, P0103/16487, P0117/16501 and P0118/16502.

11) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0122/16506 - TP SENSOR CIRCUIT LOW INPUT**

**NOTE:** DTC is set when Throttle Position (TP) sensor supplies invalid signal to Electronic Control Module (ECM).

1) Inspect Throttle Position (TP) sensor connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Turn ignition off. Disconnect Throttle Valve Control Module (TVCM) connector. Turn ignition on. Using DVOM, check voltage between TVCM connector terminals No. 4 and 7. Voltage should be about 5 volts. Check voltage between TVCM connector terminals No. 3 and 7. Voltage should be about 10 volts. If voltage is as specified, go to step 6). If voltage is not as specified, go to next step.

3) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Check resistance between TVCM connector terminal No. 3 and test box socket No. 10, between TVCM connector terminal No. 4 and test box socket No. 41, and between TVCM connector terminal No. 7 and test box socket No. 33. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

5) Check for an open circuit between TVCM and ECM. Repair as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS

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in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If no open circuit is present, go to step 11).

6) Turn ignition off. Reconnect TVCM connector. With accelerator at Wide Open Throttle (WOT) and at closed throttle, check resistance between test box sockets No. 10 and 33. Resistance should be infinite (no continuity) at WOT and 10 ohms maximum at closed throttle. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

7) With accelerator pedal at closed throttle, check resistance between test box sockets No. 27 and 53. If resistance is 3-200 ohms, go to step 9). If resistance is not as specified, go to next step.

8) Disconnect TVCM connector. Check resistance between TVCM connector terminal No. 1 and test box socket No. 27, TVCM connector terminal No. 2 and test box socket No. 53, TVCM terminal connector No. 5 and test box socket No. 40, and TVCM connector terminal No. 8 and test box socket No. 62. Resistance should be less than 1.5 ohms. If resistance is not as specified, locate and repair open circuit between TVCM and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If resistance is as specified, go to next step.

9) Check resistance between test box sockets No. 10, 27, 33, 40, 41, 53, and 69. Resistance should be infinite (no continuity) between each circuit. If resistance is not as specified, repair circuits shorted to each other. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If no shorts are present, go to next step.

10) Substitute a known-good TVCM. Clear DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, see DTCs P0102/16486, P0103/16487, P0117/16501 and P0118/16502.

11) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1025/16509 - INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL**

**NOTE:** DTC is set when Electronic Control Module (ECM) cannot use engine coolant temperature signal for Heated Oxygen Sensor (HO2S) control, or time taken for engine to reach normal operating temperature is too long.

1) Check Engine Coolant Temperature (ECT) sensor circuit. See DTCs P0117/16501 and P0118/16502. Repair ECT sensor circuit as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If ECT sensor circuit is okay, go to next step.

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2) Replace faulty thermostat. Clear DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

3) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0131/16515 - HO2S CIRCUIT LOW VOLTAGE (BANK 1, SENSOR 1)**

**NOTE:** DTC is set when pre-catalyst Heated Oxygen Sensor (HO2S) or wiring to HO2S is shorted to ground for more than 200 seconds.

1) Inspect pre-catalyst HO2S connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Turn engine on and allow it to reach operating temperature. Using a DVOM, check voltage between pre-catalyst HO2S connector terminals No. 3 and 4. Voltage should be .2-.8 volt. If voltage is as specified, circuit is okay. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. If voltage is not as specified, go to next step.

3) Increase engine speed several times. Voltage should change from .2 volt (lean mixture) to .9 volt (rich mixture). If voltage is as specified, go to next step. If voltage is not as specified, replace HO2S. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

5) Using DVOM, check resistance between pre-catalyst HO2S connector terminal No. 3 and test box socket No. 42, and pre-catalyst HO2S connector terminal No. 4 and test box socket No. 20. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between HO2S and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

6) Check resistance between pre-catalyst HO2S connector terminal No. 3 and test box socket No. 56, and pre-catalyst HO2S connector terminal No. 4 and test box socket No. 56. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between HO2S and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

7) Turn ignition on. Using a DVOM, check voltage between pre-catalyst HO2S connector terminals No. 3 and 4. Voltage should be .45 volt. If voltage is as specified, circuit is okay. Erase DTC memory

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and test drive vehicle. See CLEARING DTCS in this article. If voltage is not as specified, go to next step.

8) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0132/16516 - HO2S CIRCUIT HIGH VOLTAGE (BANK 1, SENSOR 1)**

**NOTE:** DTC is set when pre-catalyst Heated Oxygen Sensor (HO2S) or wiring to HO2S is shorted to battery voltage.

1) Inspect pre-catalyst HO2S connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Turn ignition on. Using a DVOM, check voltage between pre-catalyst HO2S connector terminals No. 3 and 4. Voltage should be .45 volt. If voltage is as specified, circuit is okay. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. If voltage is not as specified, go to next step.

3) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Remove fuse No. 18. Using DVOM, check resistance between fuse No. 18 connector upper terminal and test box socket No. 20. Check resistance between fuse No. 18 connector upper terminal No. 18 and test box socket No. 42. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short to battery voltage. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

5) Check resistance between pre-catalyst HO2S connector terminals No. 1 and 3, and No. 1 and 4. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, replace HO2S. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

6) If vehicle was repaired, clear DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If vehicle was not repaired, go to next step.

7) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0133/16517 - HO2S CIRCUIT SLOW RESPONSE (BANK 1, SENSOR 1)**

**NOTE:** DTC is set when pre-catalyst Heated Oxygen Sensor (HO2S) is

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dirty, aged or contaminated.

1) Inspect pre-catalyst H02S connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Run engine at 3500 RPM for at least 3 minutes. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC does not reset, H02S was dirty. If DTC resets, go to next step.

3) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Disconnect pre-catalyst H02S connector. Turn ignition on. Jumper test box sockets No. 1 and 6. Using DVOM, check voltage between pre-catalyst H02S connector terminal No. 1 and ground. Voltage must be at least 11.5 volts. If voltage is as specified, go to step 6). If voltage is not as specified, go to next step.

5) Remove fuse No. 18. Using DVOM, check resistance between fuse No. 18 connector upper terminal and pre-catalyst H02S connector terminal No. 1. Check resistance between pre-catalyst H02S connector terminal No. 2 and test box socket No. 12. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between pre-catalyst H02S connector and ECM, and go to step 7).

6) Check resistance between H02S terminals No. 1 and 2. Resistance should be 20 ohms at 68°F (20°C). If resistance is as specified, go to next step. If resistance is not as specified, replace H02S and go to next step.

7) If vehicle was repaired, clear DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If vehicle was not repaired, go to next step.

8) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

**DTC P0134/16518 - H02S CIRCUIT NO ACTIVITY DETECTED  
(BANK 1, SENSOR 1)**

**NOTE:** DTC is set when Engine Control Module (ECM) does not recognize pre-catalyst Heated Oxygen Sensor (H02S) signal.

1) Inspect pre-catalyst H02S connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Turn ignition off. Disconnect pre-catalyst H02S connector. Using a DVOM, check continuity between pre-catalyst H02S connector terminals No. 3 and 4 with engine idling at normal operating

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temperature. Voltage should be .2-.8 volt. Go to next step.

3) Increase engine speed several times. Voltage should change from .2 volt (lean mixture) to .9 volt (rich mixture). If voltage is as specified, go to next step. If voltage is not as specified, replace H02S. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

5) Using DVOM, check resistance between pre-catalyst H02S connector terminal No. 3 and test box socket No. 42, and pre-catalyst H02S connector terminal No. 4 and test box socket No. 20. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between H02S and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

6) Check resistance between pre-catalyst H02S connector terminal No. 3 and test box socket No. 56, and pre-catalyst H02S connector terminal No. 4 and test box socket No. 56. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between H02S and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

7) Replace H02S. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

8) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0135/16519 - H02S HEATER CIRCUIT MALFUNCTION (BANK 1, SENSOR 1)**

**NOTE:** DTC is set if pre-catalyst Heated Oxygen Sensor (H02S) heater is not functioning.

1) Inspect pre-catalyst H02S connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

3) Disconnect pre-catalyst H02S connector. Turn ignition on. Jumper test box sockets No. 1 and 6. Using DVOM, check voltage between pre-catalyst H02S connector terminal No. 1 and ground. Voltage should be at least 11.5 volts. If voltage is as specified, go to step 5). If voltage is not as specified, go to next step.

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4) Remove fuse No. 18. Check resistance between fuse No. 18 connector upper terminal and pre-catalyst H02S connector terminal No. 1. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between pre-catalyst H02S connector and ECM, Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 7).

5) Check resistance between pre-catalyst connector terminal No. 2 and test box socket No. 12. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is as specified, locate and repair open circuit between pre-catalyst H02S connector and ECM, and go to step 7).

6) Check resistance between pre-catalyst H02S terminals No. 1 and 2. Resistance should be 20 ohms at 68°F (20°C). If resistance is as specified, go to next step. If resistance is not as specified, replace pre-catalyst H02S and go to next step.

7) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0137/16521 - H02S CIRCUIT LOW VOLTAGE**

(BANK 1, SENSOR 2)

**NOTE:** DTC is set when post-catalyst Heated Oxygen Sensor (H02S) or wiring to H02S is shorted to ground for more than 200 seconds.

1) Inspect Pre-catalyst and post-catalyst H02S connectors for looseness and/or corrosion. Repair sensor connectors as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connectors are okay, go to next step.

2) Turn ignition on. Using a DVOM, check voltage between post-catalyst H02S connector terminals No. 3 and 4. Voltage should be .45 volt. If voltage is not as specified, go to next step. If voltage is as specified, circuit is okay. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

3) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Check resistance between post-catalyst H02S connector terminal No. 3 and test box socket No. 58, and post-catalyst H02S connector terminal No. 4 and test box socket No. 13. Resistance should be less than 1.5 ohms, If resistance is as specified, go next step 6). If resistance is not as specified, go to next step.

5) Check resistance between post-catalyst H02S connector terminal No. 3 and test box socket No. 56, and post-catalyst H02S connector terminal No. 4 and test box socket No. 56. Resistance should be infinite (no continuity). If resistance is as specified, go to next

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step. If resistance is not as specified, locate and repair short circuit to ground between post-catalyst H02S and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

6) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0138/16522 - H02S CIRCUIT HIGH VOLTAGE (BANK 1, SENSOR 2)**

**NOTE:** DTC is set when post-catalyst Heated Oxygen Sensor (H02S) or wiring to H02S is shorted to battery voltage.

1) Inspect post-catalyst H02S connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Turn ignition on. Using a DVOM, check voltage between post-catalyst H02S connector terminals No. 3 and 4. Voltage should be .45 volt. If voltage is not as specified, go to next step. If voltage is as specified, circuit is okay. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

3) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Remove fuse No. 18. Using DVOM, check resistance between fuse No. 18 connector upper terminal and test box socket No. 13. Check resistance between fuse No. 18 connector upper terminal No. 18 and test box socket No. 58. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short to battery voltage. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

5) Check resistance between post-catalyst H02S connector terminals No. 1 and 3, and No. 1 and 4. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, replace H02S. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

6) If vehicle was repaired, clear DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If vehicle was not repaired, go to next step.

7) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0140/16524 - H02S CIRCUIT NO ACTIVITY DETECTED**



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(BANK 1, SENSOR 2)

**NOTE:** DTC is set when post-catalyst Heated Oxygen Sensor (HO2S) is dirty, aged or contaminated.

1) Inspect pre-catalyst HO2S connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Run engine at 3500 RPM for at least 3 minutes. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC does not reset, HO2S was dirty. If DTC resets, go to next step.

3) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Disconnect post-catalyst HO2S connector. Using DVOM, check resistance between post-catalyst HO2S connector terminal No. 3 and test box socket No. 58, and post-catalyst HO2S connector terminal No. 4 and test box socket No. 13. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between HO2S and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

5) Turn ignition on. Jumper test box sockets No. 1 and 6. Using DVOM, check voltage between pre-catalyst HO2S connector terminal No. 1 and ground. Voltage must be at least 11.5 volts. If voltage is as specified, go to step 8). If voltage is not as specified, go to next step.

6) Remove fuse No. 18. Using DVOM, check resistance between fuse No. 18 connector upper terminal and post-catalyst HO2S connector terminal No. 1. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between pre-catalyst HO2S connector and ECM, and go to step 8).

7) Check resistance between HO2S terminals No. 1 and 2. Resistance should be 20 ohms at 68°F (20°C). If resistance is as specified, go to next step. If resistance is not as specified, replace HO2S and go to next step.

8) If vehicle was repaired, clear DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If vehicle was not repaired, go to next step.

9) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

DTC P0141/16525 - HO2S HEATER CIRCUIT MALFUNCTION  
(BANK 1, SENSOR 2)

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**NOTE:** DTC is set if post-catalyst Heated Oxygen Sensor (H02S) heater is not functioning.

1) Inspect post-catalyst H02S connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

3) Disconnect post-catalyst H02S connector. Turn ignition on. Jumper test box sockets No. 1 and 6. Using DVOM, check voltage between post-catalyst H02S connector terminal No. 1 and ground. Voltage should be at least 11.5 volts. If voltage is as specified, go to step 5). If voltage is not as specified, go to next step.

4) Remove fuse No. 18. Check resistance between fuse No. 18 connector upper terminal and post-catalyst H02S connector terminal No. 1. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between post-catalyst H02S connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 7). If sensor connector is okay, go to next step.

5) Check resistance between post-catalyst connector terminal No. 2 and test box socket No. 66. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is as specified, locate and repair open circuit between post-catalyst H02S connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 7).

6) Check resistance between post-catalyst H02S terminals No. 1 and 2. Resistance should be 20 ohms at 68°F (20°C). If resistance is as specified, go to next step. If resistance is not as specified, replace post-catalyst H02S. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

7) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0171/16555 - SYSTEM TOO LEAN (BANK 1)**

**NOTE:** DTC is set when mixture is so lean that Heated Oxygen Sensor (H02S) control cannot enrich mixture further.

1) Start engine and let it idle. Inspect intake system for leaks between Mass Airflow (MAF) sensor and cylinder head. Repair as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If an intake leak is not found, go to

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next step.

2) Inspect secondary air injection system operation. Repair as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If secondary air injection system is operating properly, go to next step.

3) Check MAF sensor circuit. See DTC P0102/16486 and P0103/16487. Repair MAF sensor circuit as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If MAF sensor circuit is operating properly, go to next step.

4) Disconnect test box. Test drive vehicle for performance problems. If problem occurs only at full acceleration, replace fuel filter. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets or if other performance problem(s) exist, go to next step.

5) If engine output is impaired at lower throttle openings or vehicle jerks at lower throttle openings, turn engine off. Check fuel injectors and circuit. See 2.0L or 2.8L under FUEL INJECTORS & CIRCUIT under FUEL SYSTEM in I - SYSTEM/COMPONENT TESTS article. Repair fuel injectors and circuit as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If fuel injectors and circuit are operating properly, go to next step.

6) Inspect fuel injectors for poor electronic connection or dirty/clogged injectors. Repair as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If electronic connection and injectors are okay, go to next step.

7) Replace pre-catalyst H02S. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

8) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0172/16556 - SYSTEM TOO RICH (BANK 1)**

NOTE: DTC is set when mixture is so rich that Heated Oxygen Sensor (H02S) control cannot lean mixture further.

1) Check whether crankcase dilution has caused engine to run rich. Change engine oil if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If engine oil is okay, go to next step.

2) Start engine and let it idle. Inspect exhaust system for leaks between 3-way catalyst and cylinder head. Repair as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If no exhaust leak is found, go to next step.

3) Turn ignition off. Disconnect Electronic Control Module

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(ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Using a DVOM, check resistance between test box sockets No. 20 and 42. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between pre-catalyst H02S connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

5) Check pre-catalyst H02S circuit. See DTC P0134/1658. Repair pre-catalyst H02S circuit as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If H02S circuit is okay, go to next step.

6) Turn ignition off. Check fuel delivery system. See FUEL PRESSURE and TRANSFER PUMP CHECK under FUEL SYSTEM in appropriate F - BASIC TESTING - GASOLINE article. Repair fuel delivery system as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If fuel delivery system is okay, go to next step.

7) Check fuel injectors. See 2.0L or 2.8L under FUEL INJECTORS & CIRCUIT under FUEL SYSTEM in I - SYSTEM/COMPONENT TESTS article. Repair fuel injectors and circuit as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If fuel injectors and circuit are okay, go to next step.

8) Check fuel injectors for poor electronic connection or dirty/clogged injectors. Repair as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If electronic connection and injectors are okay, go to next step.

9) Replace pre-catalyst H02S. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

10) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0300/16684 - RANDOM MISFIRE DETECTED**

NOTE: DTC is set when Electronic Control Module (ECM) detects rough engine running (misfiring).

1) Check fuel condition and tank level. Drain and/or fill if necessary. If fuel is okay, go to next step. If fuel level was low or contaminated, erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

2) Run engine at idle or slightly above idle. Check spark plug cables and connectors for arcing to ground. Replace spark plug cable(s) as necessary. If spark plug cables are okay, go to next step.

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Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

3) Remove and check condition of spark plugs. Check spark plugs for correct heat range. Replace spark plug(s) as necessary. If spark plugs are okay, go to next step. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Ensure engine speed sensor is properly installed. If speed sensor is properly installed, remove speed sensor and check for metal particle contamination. If speed sensor is okay, go to next step.

5) Check crankshaft wheel for damage or contamination. If crankshaft wheel is okay, check condition of speed sensor connector. Repair as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

6) Turn ignition off. Disconnect ignition coil connector. Turn ignition on. Using DVOM, check voltage between ignition coil connector terminals No. 1 and 3 on 2.0L or No. 1 and 5 on 2.8L. Voltage should be 11.5 volts. If voltage is as specified, go to step 10). If voltage is not as specified, go to next step.

7) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

8) Check resistance between ignition coil connector terminal No. 1 and test box socket No. 1. Resistance should be less than 1.5 ohms. If resistance is not as specified, go to next step. If resistance is as specified, locate and repair open circuit in positive wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

9) Locate and repair open circuit in ground wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

10) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

11) Check resistance between ignition coil connector terminal No. 2 and test box socket No. 8. Resistance should be less than 1.5 ohms. If resistance is as specified on 2.0L, go to step 13). If resistance is as specified on 2.8L, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

12) Check resistance between ignition coil connector terminal No. 3 and test box socket No. 60, and ignition coil connector terminal No. 4 and test box socket No. 52. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See

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CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

13) On all models, check resistance of ignition coil connector terminals to each other. On 2.0L, check between connector terminals No. 1 and 2, and No. 2 and 3. On 2.8L, check between connector terminals No. 2 and 3, and No. 3 and 4. On all models, resistance should be infinite (no continuity). If resistance is as specified, on 2.0L, go to next step. On 2.8L, go to step 16).

14) Check resistance between ignition coil terminals No. 1 and 15. Resistance should be 500-1200 ohms. If resistance is as specified, go to next step. If resistance is not as specified, go to step 16).

15) Check resistance between ignition coil terminals No. 4 and 15. Resistance should be 3000-4000 ohms. If resistance is as specified, go to next step. If resistance is not as specified, go to next step.

16) Replace ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

17) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0301/16685 - CYLINDER NO. 1 MISFIRE DETECTED**

NOTE: DTC is set when Electronic Control Module (ECM) detects rough engine running (misfiring)

1) Check fuel condition and tank level. Drain and/or fill if necessary. If fuel is okay, go to next step. If fuel level was low or contaminated, erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

2) Run engine at idle or slightly above idle. Check cylinder No. 1 spark plug cable and connector for arcing to ground. Replace spark plug cable if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If spark plug cable is okay, go to next step.

3) Remove and check condition of cylinder No. 1 spark plug. Check spark plug for correct heat range. Replace spark plug if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If spark plug is okay, go to next step.

4) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

5) Disconnect ignition coil connector. Check connector for looseness or contamination. Repair connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16). If connector is okay, go to next step.

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6) Turn ignition off. Disconnect ignition coil connector. Turn ignition on. Using DVOM, check voltage between ignition coil connector terminals No. 1 and 3 on 2.0L or No. 1 and 5 on 2.8L. Voltage should be 11.5 volts. If voltage is as specified, go to step 8). If voltage is not as specified, go to next step.

7) Check resistance between ignition coil connector terminal No. 1 and test box socket No. 1. Resistance should be less than 1.5 ohms. If resistance is not as specified, locate and repair open circuit in ground wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16). If resistance is as specified, locate and repair open circuit in positive wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

8) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

9) Check resistance between ignition coil connector terminal No. 2 and test box socket No. 8. Resistance should be less than 1.5 ohms. If resistance is as specified on 2.0L, go to step 11). If resistance is as specified on 2.8L, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

10) Check resistance between ignition coil connector terminal No. 3 and test box socket No. 60, and ignition coil connector terminal No. 4 and test box socket No. 52. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

11) On all models, check resistance of ignition coil connector terminals to each other. On 2.0L, check between connector terminals No. 1 and 2, and No. 3 and 4. On 2.8L, check between connector terminals No. 2 and 3, and No. 3 and 4. On all models, resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, repair connectors shorted to each other. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

12) Remove fuse No. 18. Check resistance between fuse No. 18 connector lower terminal and test box socket No. 24. Resistance should be 15-23 ohms. If resistance is not as specified, go to next step. If resistance is as specified, replace cylinder No. 1 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

13) Disconnect cylinder No. 1 fuel injector connector and Mass Airflow (MAF) sensor connector. Check resistance between cylinder

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No. 1 fuel injector connector terminal No. 1 and test box socket No. 1, and cylinder No. 1 fuel injector connector terminal No. 2 and test box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between cylinder No. 1 fuel injector connector and ECM, and go to next step.

14) Check resistance between cylinder No. 1 fuel injector connector terminal No. 1 and fuse No. 18 connector lower terminal, and cylinder No. 1 connector terminal No. 2 and test box socket No. 24. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between No. 1 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

15) Replace cylinder No. 1 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

16) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0302/16686 - CYLINDER NO. 2 MISFIRE DETECTED**

**NOTE:** DTC is set when Electronic Control Module (ECM) detects rough engine running (misfiring)

1) Check fuel condition and tank level. Drain and/or fill if necessary. If fuel is okay, go to next step. If fuel level was low or contaminated, erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

2) Run engine at idle or slightly above idle. Check cylinder No. 2 spark plug cable and connector for arcing to ground. Replace spark plug cable if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If spark plug cable is okay, go to next step.

3) Remove and check condition of cylinder No. 2 spark plug. Check spark plug for correct heat range. Replace spark plug if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If spark plug is okay, go to next step.

4) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

5) Disconnect ignition coil connector. Check connector for looseness or contamination. Repair connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16). If connector is okay, go to next step.

6) Turn ignition off. Disconnect ignition coil connector.



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Turn ignition on. Using DVOM, check voltage between ignition coil connector terminals No. 1 and 3 on 2.0L or No. 1 and 5 on 2.8L. Voltage should be 11.5 volts. If voltage is as specified, go to step 8). If voltage is not as specified, go to next step.

7) Check resistance between ignition coil connector terminal No. 1 and test box socket No. 1. Resistance should be less than 1.5 ohms. If resistance is not as specified, locate and repair open circuit in ground wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16). If resistance is as specified, locate and repair open circuit in positive wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

8) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

9) Check resistance between ignition coil connector terminal No. 2 and test box socket No. 8. Resistance should be less than 1.5 ohms. If resistance is as specified on 2.0L, go to step 11). If resistance is as specified on 2.8L, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

10) Check resistance between ignition coil connector terminal No. 3 and test box socket No. 60, and ignition coil connector terminal No. 4 and test box socket No. 52. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

11) On all models, check resistance of ignition coil connector terminals to each other. On 2.0L, check between connector terminals No. 1 and 2, and No. 3 and 4. On 2.8L, check between connector terminals No. 2 and 3, and No. 3 and 4. On all models, resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, repair connectors shorted to each other. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

12) Remove fuse No. 18. Check resistance between fuse No. 18 connector lower terminal and test box socket No. 25. Resistance should be 15-23 ohms. If resistance is not as specified, go to next step. If resistance is as specified, replace cylinder No. 2 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

13) Disconnect cylinder No. 2 fuel injector connector and Mass Airflow (MAF) sensor connector. Check resistance between cylinder No. 2 fuel injector connector terminal No. 1 and test box socket No.

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1, and cylinder No. 2 fuel injector connector terminal No. 2 and test box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between cylinder No. 2 fuel injector connector and ECM, and go to next step.

14) Check resistance between cylinder No. 2 fuel injector connector terminal No. 1 and fuse No. 18 connector lower terminal, and cylinder No. 2 connector terminal No. 2 and test box socket No. 25. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between No. 1 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

15) Replace cylinder No. 2 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

16) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0303/16687 - CYLINDER NO. 3 MISFIRE DETECTED**

**NOTE:** DTC is set when Electronic Control Module (ECM) detects rough engine running (misfiring)

1) Check fuel condition and tank level. Drain and/or fill if necessary. If fuel is okay, go to next step. If fuel level was low or contaminated, erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

2) Run engine at idle or slightly above idle. Check cylinder No. 3 spark plug cable and connector for arcing to ground. Replace spark plug cable if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If spark plug cable is okay, go to next step.

3) Remove and check condition of cylinder No. 3 spark plug. Check spark plug for correct heat range. Replace spark plug if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If spark plug is okay, go to next step.

4) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

5) Disconnect ignition coil connector. Check connector for looseness or contamination. Repair connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16). If connector is okay, go to next step.

6) Turn ignition off. Disconnect ignition coil connector. Turn ignition on. Using DVOM, check voltage between ignition coil

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connector terminals No. 1 and 3 on 2.0L or No. 1 and 5 on 2.8L. Voltage should be 11.5 volts. If voltage is as specified, go to step 8). If voltage is not as specified, go to next step.

7) Check resistance between ignition coil connector terminal No. 1 and test box socket No. 1. Resistance should be less than 1.5 ohms. If resistance is not as specified, locate and repair open circuit in ground wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16). If resistance is as specified, locate and repair open circuit in positive wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

8) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

9) Check resistance between ignition coil connector terminal No. 2 and test box socket No. 8. Resistance should be less than 1.5 ohms. If resistance is as specified on 2.0L, go to step 11). If resistance is as specified on 2.8L, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

10) Check resistance between ignition coil connector terminal No. 3 and test box socket No. 60, and ignition coil connector terminal No. 4 and test box socket No. 52. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

11) On all models, check resistance of ignition coil connector terminals to each other. On 2.0L, check between connector terminals No. 1 and 2, and No. 3 and 4. On 2.8L, check between connector terminals No. 2 and 3, and No. 3 and 4. On all models, resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, repair connectors shorted to each other. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

12) Remove fuse No. 18. Check resistance between fuse No. 18 connector lower terminal and test box socket No. 26. Resistance should be 15-23 ohms. If resistance is not as specified, go to next step. If resistance is as specified, replace cylinder No. 3 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

13) Disconnect cylinder No. 3 fuel injector connector and Mass Airflow (MAF) sensor connector. Check resistance between cylinder No. 3 fuel injector connector terminal No. 1 and test box socket No. 1, and cylinder No. 3 fuel injector connector terminal No. 2 and test

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box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between cylinder No. 3 fuel injector connector and ECM, and go to next step.

14) Check resistance between cylinder No. 3 fuel injector connector terminal No. 1 and fuse No. 18 connector lower terminal, and cylinder No. 3 connector terminal No. 2 and test box socket No. 26. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between No. 1 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

15) Replace cylinder No. 3 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

16) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0304/16688 - CYLINDER NO. 4 MISFIRE DETECTED**

**NOTE:** DTC is set when Electronic Control Module (ECM) detects rough engine running (misfiring)

1) Check fuel condition and tank level. Drain and/or fill if necessary. If fuel is okay, go to next step. If fuel level was low or contaminated, erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

2) Run engine at idle or slightly above idle. Check cylinder No. 4 spark plug cable and connector for arcing to ground. Replace spark plug cable if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If spark plug cable is okay, go to next step.

3) Remove and check condition of cylinder No. 4 spark plug. Check spark plug for correct heat range. Replace spark plug if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If spark plug is okay, go to next step.

4) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

5) Disconnect ignition coil connector. Check connector for looseness or contamination. Repair connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16). If connector is okay, go to next step.

6) Turn ignition off. Disconnect ignition coil connector. Turn ignition on. Using DVOM, check voltage between ignition coil connector terminals No. 1 and 3 on 2.0L or No. 1 and 5 on 2.8L.

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Voltage should be 11.5 volts. If voltage is as specified, go to step 8). If voltage is not as specified, go to next step.

7) Check resistance between ignition coil connector terminal No. 1 and test box socket No. 1. Resistance should be less than 1.5 ohms. If resistance is not as specified, locate and repair open circuit in ground wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16). If resistance is as specified, locate and repair open circuit in positive wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

8) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

9) Check resistance between ignition coil connector terminal No. 2 and test box socket No. 8. Resistance should be less than 1.5 ohms. If resistance is as specified on 2.0L, go to step 11). If resistance is as specified on 2.8L, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

10) Check resistance between ignition coil connector terminal No. 3 and test box socket No. 60, and ignition coil connector terminal No. 4 and test box socket No. 52. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

11) On all models, check resistance of ignition coil connector terminals to each other. On 2.0L, check between connector terminals No. 1 and 2, and No. 3 and 4. On 2.8L, check between connector terminals No. 2 and 3, and No. 3 and 4. On all models, resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, repair connectors shorted to each other. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

12) Remove fuse No. 18. Check resistance between fuse No. 18 connector lower terminal and test box socket No. 2. Resistance should be 15-23 ohms. If resistance is not as specified, go to next step. If resistance is as specified, replace cylinder No. 4 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

13) Disconnect cylinder No. 4 fuel injector connector and Mass Airflow (MAF) sensor connector. Check resistance between cylinder No. 4 fuel injector connector terminal No. 1 and test box socket No. 1, and cylinder No. 4 fuel injector connector terminal No. 2 and test box socket No. 1. Resistance should be infinite (no continuity). If

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resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between cylinder No. 4 fuel injector connector and ECM, and go to next step.

14) Check resistance between cylinder No. 4 fuel injector connector terminal No. 1 and fuse No. 18 connector lower terminal, and cylinder No. 4 connector terminal No. 2 and test box socket No. 2. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between No. 1 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

15) Replace cylinder No. 4 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

16) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0305/16689 - CYLINDER NO. 5 MISFIRE DETECTED**

**NOTE:** DTC is set when Electronic Control Module (ECM) detects rough engine running (misfiring)

1) Check fuel condition and tank level. Drain and/or fill if necessary. If fuel is okay, go to next step. If fuel level was low or contaminated, erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

2) Run engine at idle or slightly above idle. Check cylinder No. 5 spark plug cable and connector for arcing to ground. Replace spark plug cable if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If spark plug cable is okay, go to next step.

3) Remove and check condition of cylinder No. 5 spark plug. Check spark plug for correct heat range. Replace spark plug if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If spark plug is okay, go to next step.

4) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

5) Disconnect ignition coil connector. Check connector for looseness or contamination. Repair connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16). If connector is okay, go to next step.

6) Turn ignition off. Disconnect ignition coil connector. Turn ignition on. Using DVOM, check voltage between ignition coil connector terminals No. 1 and 3 on 2.0L or No. 1 and 5 on 2.8L. Voltage should be 11.5 volts. If voltage is as specified, go to step

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8). If voltage is not as specified, go to next step.

7) Check resistance between ignition coil connector terminal No. 1 and test box socket No. 1. Resistance should be less than 1.5 ohms. If resistance is not as specified, locate and repair open circuit in ground wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16). If resistance is as specified, locate and repair open circuit in positive wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

8) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

9) Check resistance between ignition coil connector terminal No. 2 and test box socket No. 8. Resistance should be less than 1.5 ohms. If resistance is as specified on 2.0L, go to step 11). If resistance is as specified on 2.8L, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

10) Check resistance between ignition coil connector terminal No. 3 and test box socket No. 60, and ignition coil connector terminal No. 4 and test box socket No. 52. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

11) On all models, check resistance of ignition coil connector terminals to each other. On 2.0L, check between connector terminals No. 1 and 2, and No. 3 and 4. On 2.8L, check between connector terminals No. 2 and 3, and No. 3 and 4. On all models, resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, repair connectors shorted to each other. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

12) Remove fuse No. 18. Check resistance between fuse No. 18 connector lower terminal and test box socket No. 3. Resistance should be 15-23 ohms. If resistance is not as specified, go to next step. If resistance is as specified, replace cylinder No. 5 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

13) Disconnect cylinder No. 5 fuel injector connector and Mass Airflow (MAF) sensor connector. Check resistance between cylinder No. 5 fuel injector connector terminal No. 1 and test box socket No. 1, and cylinder No. 5 fuel injector connector terminal No. 2 and test box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as

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specified, locate and repair short circuit to ground between cylinder No. 5 fuel injector connector and ECM, and go to next step.

14) Check resistance between cylinder No. 5 fuel injector connector terminal No. 1 and fuse No. 18 connector lower terminal, and cylinder No. 5 connector terminal No. 2 and test box socket No. 3. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between No. 1 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

15) Replace cylinder No. 5 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

16) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0306/16690 - CYLINDER NO. 6 MISFIRE DETECTED**

**NOTE:** DTC is set when Electronic Control Module (ECM) detects rough engine running (misfiring)

1) Check fuel condition and tank level. Drain and/or fill if necessary. If fuel is okay, go to next step. If fuel level was low or contaminated, erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

2) Run engine at idle or slightly above idle. Check cylinder No. 6 spark plug cable and connector for arcing to ground. Replace spark plug cable if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If spark plug cable is okay, go to next step.

3) Remove and check condition of cylinder No. 6 spark plug. Check spark plug for correct heat range. Replace spark plug if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If spark plug is okay, go to next step.

4) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

5) Disconnect ignition coil connector. Check connector for looseness or contamination. Repair connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16). If connector is okay, go to next step.

6) Turn ignition off. Disconnect ignition coil connector. Turn ignition on. Using DVOM, check voltage between ignition coil connector terminals No. 1 and 3 on 2.0L or No. 1 and 5 on 2.8L. Voltage should be 11.5 volts. If voltage is as specified, go to step 8). If voltage is not as specified, go to next step.



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7) Check resistance between ignition coil connector terminal No. 1 and test box socket No. 1. Resistance should be less than 1.5 ohms. If resistance is not as specified, locate and repair open circuit in ground wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16). If resistance is as specified, locate and repair open circuit in positive wire to ignition coil. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

8) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

9) Check resistance between ignition coil connector terminal No. 2 and test box socket No. 8. Resistance should be less than 1.5 ohms. If resistance is as specified on 2.0L, go to step 11). If resistance is as specified on 2.8L, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

10) Check resistance between ignition coil connector terminal No. 3 and test box socket No. 60, and ignition coil connector terminal No. 4 and test box socket No. 52. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between ignition coil connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

11) On all models, check resistance of ignition coil connector terminals to each other. On 2.0L, check between connector terminals No. 1 and 2, and No. 3 and 4. On 2.8L, check between connector terminals No. 2 and 3, and No. 3 and 4. On all models, resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, repair connectors shorted to each other. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

12) Remove fuse No. 18. Check resistance between fuse No. 18 connector lower terminal and test box socket No. 4. Resistance should be 15-23 ohms. If resistance is not as specified, go to next step. If resistance is as specified, replace cylinder No. 6 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

13) Disconnect cylinder No. 6 fuel injector connector and Mass Airflow (MAF) sensor connector. Check resistance between cylinder No. 6 fuel injector connector terminal No. 1 and test box socket No. 1, and cylinder No. 6 fuel injector connector terminal No. 2 and test box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between cylinder

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No. 6 fuel injector connector and ECM, and go to next step.

14) Check resistance between cylinder No. 6 fuel injector connector terminal No. 1 and fuse No. 18 connector lower terminal, and cylinder No. 6 connector terminal No. 2 and test box socket No. 4. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between No. 1 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 16).

15) Replace cylinder No. 6 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

16) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0327/16711 - KNOCK SENSOR NO. 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)**

**NOTE:** DTC is set if Knock Sensor No. 1 (KS1) test signal is too low or not recognized by Electronic Control Module (ECM).

1) Inspect KS1 connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Inspect KS1 for loose mounting to engine. Using Insert (3247), torque KS1 to 15 ft. lbs. (20 N.m) if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If KS1 mounting is okay, go to next step.

3) Turn ignition off. Disconnect KS1 connector. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Using DVOM, check resistance between KS1 connector terminal No. 1 and test box socket No. 56, and KS1 connector terminal No. 2 and test box socket No. 56. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between KS1 connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

5) Using DVOM, check resistance between KS1 connector terminal No. 1 and test box socket No. 34, KS1 connector terminal No. 2 and test box socket No. 33, and KS1 connector terminal No. 3 and test box socket No. 56. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between KS1 connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC

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resets, go to next step.

6) Replace KS1. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

7) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0332/16716 - KS2 CIRCUIT LOW INPUT (BANK 2)**

NOTE: DTC is set if Knock Sensor No. 2 (KS2) test signal is too low or not recognized by Electronic Control Module (ECM).

1) Inspect KS2 connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Inspect KS2 for loose mounting to engine. Using Insert (3247), torque KS2 to 15 ft. lbs. (20 N.m) if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If KS2 mounting is okay, go to next step.

3) Turn ignition off. Disconnect KS2 connector. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Using DVOM, check resistance between KS2 connector terminal No. 1 and test box socket No. 56, and KS2 connector terminal No. 2 and test box socket No. 56. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between KS2 connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

5) Using DVOM, check resistance between KS2 connector terminal No. 1 and test box socket No. 57, KS2 connector terminal No. 2 and test box socket No. 33, and KS2 connector terminal No. 3 and test box socket No. 56. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between KS2 connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

6) Replace KS2. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

7) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0341/16725 - CAMSHAFT POSITION SENSOR CIRCUIT RANGE/PERFORMANCE**

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**NOTE:** DTC is set when Camshaft Position (CMP) sensor sends and invalid signal to Electronic Control Module (ECM).

1) Inspect CMP sensor connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Disconnect sensor connector. Turn ignition on. Using DVOM, check voltage between sensor connector terminals No. 1 and 3. Voltage should be at least 11.5 volts. If voltage is as specified, go to step 6). If voltage is not as specified, go to next step.

3) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Check resistance between CMP sensor connector terminal No. 1 on 2.0L or No. 3 on 2.8L and test box socket No. 56. Resistance should be less than 1.5 ohms. If resistance is as specified, locate and repair open circuit between sensor connector positive terminal and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If resistance is not as specified, go to next step.

5) Locate and repair open circuit between sensor connector ground terminal and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 9).

6) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

7) Turn ignition off. Check resistance between CMP sensor connector terminal No. 2 on and test box socket No. 44. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between CMP sensor connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets on 2.0L, go to step 9). If DTC resets on 2.8L go to next step.

8) Inspect and repair sensor wheel on camshaft chain sprocket. Check ignition timing. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

9) Replace CMP sensor. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

10) Replace faulty ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

DTC P0411/16795 - SECONDARY AIR INJECTION SYSTEM INCORRECT  
FLOW DETECTED

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**NOTE:** DTC sets if Electronic Control Module (ECM) senses Secondary Air Injection (SAI) pump functioning, but quantity of air is recognized as insufficient by Heated Oxygen Sensor (HO2S).

1) Turn ignition off. Disconnect SAI solenoid valve connector. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Using DVOM, check resistance between solenoid valve connector terminal No. 1 and test box socket No. 50. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between solenoid valve connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 10).

3) Reconnect solenoid valve connector. Disconnect a vacuum hose from solenoid valve and connect an auxiliary hose. Turn ignition on. Jumper test box sockets No. 1 and 6. Briefly jumper test box socket No. 50 to ground while blowing into auxiliary hose. Go to next step.

4) Solenoid valve must open while activated and close when deactivated. If solenoid valve does not operate as specified, replace solenoid valve. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 10). If solenoid valve operates as specified, go to next step.

5) Remove SAI pump pressure hose at engine. Check pressure hose for damage, replace if necessary. If hose is replaced, erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 10). If hose is not replaced, go to next step.

6) Turn ignition on. Jumper test box sockets No. 1 and 6. Briefly jumper test box socket No. 49 to ground to activate SAI pump and go to next step.

7) While SAI pump is activated, check for air pressure at pump. If pump runs but no air pressure is present, replace pump. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 10). If air pressure is present, go to next step.

8) Check whether solenoid valve-to-combination valve vacuum hose is damaged or disconnected. If hose is okay, go to next step. Repair vacuum hose if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 10).

9) Connect hand-held vacuum pump to vacuum hose at combination valve. Start engine and let it idle. Operate hand-held vacuum pump several times. Combination valve must open and a noise change must be distinctly audible. If valve does not operate as specified, go to next step. If valve operates as specified, go to step 11).

10) Replace faulty combination valve. Erase DTC memory and

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test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

11) Replace faulty ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0422/16806 - MAIN CATALYST EFFICIENCY BELOW THRESHOLD (BANK 1)**

NOTE: ECM uses Heated Oxygen Sensor (H02S) in front of, and behind 3-way catalyst to determine deterioration of 3-way catalyst using oxygen storage capability of catalyst.

1) If any H02S DTCs are set in memory, perform testing for H02S DTCs first. If after repairing H02S DTCs and CLEARING DTCS, if this DTC returns, go to next step. If no H02S DTCs are set in memory, go to next step.

2) Possible cause for DTC may be catalyst is chemically or thermally aged or mechanically damaged. Replace 3-way catalyst. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0440/16824 - EVAP SYSTEM MALFUNCTION**

NOTE: ECM sets DTC if it senses an Evaporative (EVAP) canister purge regulator valve malfunction.

1) Turn ignition off. Disconnect EVAP canister purge regulator valve connector. Disconnect ECM connector. Using a DVOM, check resistance between EVAP canister purge regulator valve connector terminals No. 1 and 2. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between EVAP canister purge regulator valve connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

2) Replace EVAP canister purge valve. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

3) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0501/16885 - VEHICLE SPEED SENSOR RANGE/PERFORMANCE**

NOTE: DTC is set if Electronic Control Module (ECM) does not receive a usable Vehicle Speed Sensor (VSS) signal.

1) Inspect VSS and VSS connector for looseness and/or corrosion. Repair VSS or connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC

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memory and verify DTC does not reset. If DTC resets, go to next step. If VSS or connector is okay, go to next step.

2) Disconnect VSS connector. Turn ignition on. Using DVOM, check voltage between VSS connector terminals No. 1 and 3. Voltage should be at least 11.5 volts. If voltage is as specified, go to step 5). If voltage is not as specified, go to next step.

3) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Check resistance between VSS connector terminal No. 3 and test box socket No. 1. Resistance should be less than 1.5 ohms. If resistance is as specified, locate and repair open circuit between VSS connector positive terminal and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If resistance is not as specified, locate and repair open circuit between VSS connector ground terminal and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 8).

5) Turn ignition off. Connect VSS connector. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

6) Turn ignition on. Raise and support vehicle so left front wheel is free to rotate. Right front wheel must not rotate. Check voltage between test box sockets No. 56 and 65. Rotate left front wheel by hand. Voltage should fluctuate from zero to 10 volts. If voltage is as specified, go to step 8). If voltage is not as specified, go to next step.

7) Turn ignition off. Disconnect VSS connector. Check resistance between VSS connector terminal No. 3 and ground, VSS connector terminal No. 1 and fuse No. 15, and VSS connector terminal No. 2 and instrument cluster connector. Resistance should be less than 1.5 ohms. If resistance is not as specified, repair open circuit or circuit shorted to each other. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

8) Replace faulty VSS. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

9) Replace faulty ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0510/16894 - CLOSED THROTTLE POSITION SWITCH MALFUNCTION**

NOTE: DTC sets if Electronic Control Module (ECM) receives an unusable signal from Closed Throttle Position (CTP) switch.

1) Inspect TP sensor connector for looseness and/or corrosion. Repair sensor connector as necessary. If sensor connector is okay, go to next step. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does

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not reset. If DTC resets, go to next step.

2) Turn ignition off. Disconnect Throttle Valve Control Module (TVCM) connector. Turn ignition on. Using DVOM, check voltage between TVCM connector terminals No. 4 and 7. Voltage should be about 5 volts. Check voltage between TVCM connector terminals No. 3 and 7. Voltage should be about 10 volts. If voltage is as specified, go to step 6). If voltage is not as specified, go to next step.

3) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Check resistance between TVCM connector terminal No. 3 and test box socket No. 10, between TVCM connector terminal No. 4 and test box socket No. 41, and between TVCM connector terminal No. 7 and test box socket No. 33. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

5) Check for an open circuit in harness between TVCM and ECM. Repair as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. If no open circuit is present, replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

6) Turn ignition off. Reconnect TVCM connector. With accelerator at Wide Open Throttle (WOT) and at closed throttle, check resistance between test box sockets No. 10 and 33. Resistance should be infinite (no continuity) at WOT and 10 ohms maximum at closed throttle. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

7) With accelerator pedal at closed throttle, check resistance between test box sockets No. 27 and 53. If resistance is 3-200 ohms, go to step 9). If resistance is not as specified, go to next step.

8) Disconnect TVCM connector. Check resistance between TVCM connector terminal No. 1 and test box socket No. 27, TVCM connector terminal No. 2 and test box socket No. 53, TVCM terminal connector No. 5 and test box socket No. 40, and TVCM connector terminal No. 8 and test box socket No. 62. Resistance should be less than 1.5 ohms. If resistance is not as specified, locate and repair open circuit between TVCM and ECM. Erase DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If resistance is as specified, go to next step.

9) Check resistance between test box sockets No. 10, 27, 33, 40, 41, 53, and 69. Resistance should be infinite (no continuity) between each circuit. If resistance is not as specified, repair circuits shorted to each other. Erase DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If no shorts are present, go to next step.

10) Substitute a known-good TVCM. Erase DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

11) Replace faulty ECM. Test drive vehicle. Recheck DTC



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memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P0605/16989 - ECM READ ONLY MEMORY (ROM) ERROR**

**NOTE:** DTC is set when Electronic Control Module (ECM) recognizes internal failures.

- 1) Inspect ECM connector for looseness and/or corrosion. Repair ECM connector as necessary. Erase DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If ECM connector is okay, go to next step.
- 2) Start and run engine for about 3 minutes. Turn ignition off and on. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.
- 3) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1127/17535 - LONG TERM FUEL TRIM TOO RICH**

**NOTE:** DTC sets if fuel mixture is so rich that Heated Oxygen Sensor (HO2S) control is on lean limit.

- 1) If no HO2S DTCs are set in memory, go to next step. If any HO2S DTCs are set in memory, perform testing for HO2S DTCs first. If HO2S circuits are operating properly, go to next step.
- 2) Check Mass Airflow (MAF) sensor circuit for signal too high. See DTC P0103/16487. If MAF sensor circuit is operating properly, go to next step.
- 3) Check Secondary Air Injection (SAI) system. See DTC P0411/16795. If SAI system is operating properly, go to next step.
- 4) Check fuel delivery system. See FUEL PRESSURE and TRANSFER PUMP CHECK under FUEL SYSTEM in DTC P0172/16556 - SYSTEM TOO RICH (BANK 1)

**NOTE:** DTC is set when mixture is so rich that Heated Oxygen Sensor (HO2S) control cannot lean mixture further.

- 1) Check whether crankcase dilution has caused engine to run rich. Change engine oil if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If engine oil is okay, go to next step.
- 2) Start engine and let it idle. Inspect exhaust system for leaks between 3-way catalyst and cylinder head. Repair as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If no exhaust leak is found, go to next step.
- 3) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness.

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Terminal assignments of test box are identical to ECM connector's.

4) Using a DVOM, check resistance between test box sockets No. 20 and 42. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between pre-catalyst H02S connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

5) Check pre-catalyst H02S circuit. See DTC P0134/1658. Repair pre-catalyst H02S circuit as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If H02S circuit is okay, go to next step.

6) Turn ignition off. Check fuel delivery system. See FUEL PRESSURE and TRANSFER PUMP CHECK under FUEL SYSTEM in appropriate F - BASIC TESTING - GASOLINE article. If fuel delivery system is okay, go to next step.

5) Check fuel injectors. See 2.0L or 2.8L under FUEL INJECTORS & CIRCUIT under FUEL SYSTEM in I - SYSTEM/COMPONENT TESTS article. If fuel injectors and circuit are operating properly, go to next step.

6) Inspect fuel injectors for poor Electronic Connection or dirty/clogged injectors. If injectors and connections are okay, go to next step. If a malfunction was repaired, erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

7) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1128/17536 - LONG TERM FUEL TRIM TOO LEAN**

NOTE: DTC sets if fuel mixture is so lean than Heated Oxygen Sensor (H02S) control is on rich limit.

1) Test drive vehicle for performance problems. If problem occurs only at full acceleration, replace fuel filter. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If other performance problem(s) exist, go to next step.

2) If engine output is impaired at lower throttle openings or vehicle jerks at lower throttle openings, turn engine off. See 2.0L or 2.8L under FUEL INJECTORS & CIRCUIT under FUEL SYSTEM in appropriate I - SYSTEM/COMPONENT TESTS article. If fuel injectors and circuit are operating properly, go to next step.

3) Inspect fuel injectors for poor Electronic Connection or dirty/clogged injectors. If injectors and connections are okay, go to next step. If a malfunction was repaired, erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing

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procedure.

#### **DTC P1213/17621 - CYLINDER NO. 1 FUEL INJECTOR CIRCUIT SHORT TO B+**

**NOTE:** DTC is set when cylinder No. 1 fuel injector or wiring to fuel injector is shorted to battery voltage.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Disconnect fuel injector connector. Using a DVOM, check resistance between fuel injector connector terminal No. 2 and fuse No. 18 connector lower terminal. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between fuel injector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 4).

3) Check resistance between fuel injector connector terminals No. 1 and 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Replace faulty ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1214/17622 - CYLINDER NO. 2 FUEL INJECTOR CIRCUIT SHORT TO B+**

**NOTE:** DTC is set when cylinder No. 2 fuel injector or wiring to fuel injector is shorted to battery voltage.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Disconnect fuel injector connector. Using a DVOM, check resistance between fuel injector connector terminal No. 2 and fuse No. 18 connector lower terminal. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between fuel injector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 4).

3) Check resistance between fuel injector connector terminals No. 1 and 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

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4) Replace faulty ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1215/17623 - CYLINDER NO. 3 FUEL INJECTOR CIRCUIT SHORT TO B+**

NOTE: DTC is set when cylinder No. 3 fuel injector or wiring to fuel injector is shorted to battery voltage.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Disconnect fuel injector connector. Using a DVOM, check resistance between fuel injector connector terminal No. 2 and fuse No. 18 connector lower terminal. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between fuel injector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 4).

3) Check resistance between fuel injector connector terminals No. 1 and 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Replace faulty ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1216/17624 - CYLINDER NO. 4 FUEL INJECTOR CIRCUIT SHORT TO B+**

NOTE: DTC is set when cylinder No. 4 fuel injector or wiring to fuel injector is shorted to battery voltage.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Disconnect fuel injector connector. Using a DVOM, check resistance between fuel injector connector terminal No. 2 and fuse No. 18 connector lower terminal. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between fuel injector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 4).

3) Check resistance between fuel injector connector terminals No. 1 and 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace fuel injector. Erase DTC memory and test drive vehicle. See CLEARING

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DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Replace faulty ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1217/17625 - CYLINDER NO. 5 FUEL INJECTOR CIRCUIT SHORT TO B+**

NOTE: DTC is set when cylinder No. 5 fuel injector or wiring to fuel injector is shorted to battery voltage.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Disconnect fuel injector connector. Using a DVOM, check resistance between fuel injector connector terminal No. 2 and fuse No. 18 connector lower terminal. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between fuel injector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 4).

3) Check resistance between fuel injector connector terminals No. 1 and 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Replace faulty ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1218/17626 - CYLINDER NO. 6 FUEL INJECTOR CIRCUIT SHORT TO B+**

NOTE: DTC is set when cylinder No. 6 fuel injector or wiring to fuel injector is shorted to battery voltage.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Disconnect fuel injector connector. Using a DVOM, check resistance between fuel injector connector terminal No. 2 and fuse No. 18 connector lower terminal. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between fuel injector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 4).

3) Check resistance between fuel injector connector terminals No. 1 and 2. Resistance should be 15-23 ohms. If resistance is as

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specified, go to next step. If resistance is not as specified, replace fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Replace faulty ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1225/17633 - CYLINDER NO. 1 FUEL INJECTOR CIRCUIT SHORT TO GROUND**

NOTE: DTC is set when cylinder No. 1 fuel injector or wiring to fuel injector is shorted to ground.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Using a DVOM, check resistance between test box socket No. 24 and fuse No. 18 connector lower terminal. Resistance should be 15-23 ohms. If resistance is as specified, go to step 4). If resistance is not as specified, go to next step.

3) Disconnect cylinder No. 1 fuel injector connector and Mass Airflow (MAF) sensor connector. Check resistance between cylinder No. 1 fuel injector connector terminal No. 1 and test box socket No. 1, and cylinder No. 1 fuel injector connector terminal No. 2 and test box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between cylinder No. 1 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Disconnect cylinder No. 1 fuel injector connector. Check resistance between cylinder No. 1 fuel injector connector terminals No. 1 and No. 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace faulty cylinder No. 1 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step

5) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1226/17634 - CYLINDER NO. 2 FUEL INJECTOR CIRCUIT SHORT TO GROUND**

NOTE: DTC is set when cylinder No. 2 fuel injector or wiring to fuel injector is shorted to ground.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Using a DVOM, check resistance between

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test box socket No. 25 and fuse No. 18 connector lower terminal. Resistance should be 15-23 ohms. If resistance is as specified, go to step 4). If resistance is not as specified, go to next step.

3) Disconnect cylinder No. 2 fuel injector connector and Mass Airflow (MAF) sensor connector. Check resistance between cylinder No. 2 fuel injector connector terminal No. 1 and test box socket No. 1, and cylinder No. 2 fuel injector connector terminal No. 2 and test box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between cylinder No. 2 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Disconnect cylinder No. 2 fuel injector connector. Check resistance between cylinder No. 2 fuel injector connector terminals No. 1 and No. 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace faulty cylinder No. 2 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step

5) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1227/17635 - CYLINDER NO. 3 FUEL INJECTOR CIRCUIT SHORT TO GROUND**

NOTE: DTC is set when cylinder No. 3 fuel injector or wiring to fuel injector is shorted to ground.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Using a DVOM, check resistance between test box socket No. 26 and fuse No. 18 connector lower terminal. Resistance should be 15-23 ohms. If resistance is as specified, go to step 4). If resistance is not as specified, go to next step.

3) Disconnect cylinder No. 3 fuel injector connector and Mass Airflow (MAF) sensor connector. Check resistance between cylinder No. 3 fuel injector connector terminal No. 1 and test box socket No. 1, and cylinder No. 3 fuel injector connector terminal No. 2 and test box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between cylinder No. 3 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Disconnect cylinder No. 3 fuel injector connector. Check resistance between cylinder No. 3 fuel injector connector terminals No. 1 and No. 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace faulty cylinder No. 3 fuel injector. Erase DTC memory and test drive

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vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step

5) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1228/17636 - CYLINDER NO. 4 FUEL INJECTOR CIRCUIT SHORT TO GROUND**

NOTE: DTC is set when cylinder No. 4 fuel injector or wiring to fuel injector is shorted to ground.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Using a DVOM, check resistance between test box socket No. 2 and fuse No. 18 connector lower terminal. Resistance should be 15-23 ohms. If resistance is as specified, go to step 4). If resistance is not as specified, go to next step.

3) Disconnect cylinder No. 4 fuel injector connector and Mass Airflow (MAF) sensor connector. Check resistance between cylinder No. 4 fuel injector connector terminal No. 1 and test box socket No. 1, and cylinder No. 4 fuel injector connector terminal No. 2 and test box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between cylinder No. 4 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Disconnect cylinder No. 4 fuel injector connector. Check resistance between cylinder No. 4 fuel injector connector terminals No. 1 and No. 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace faulty cylinder No. 4 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step

5) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1229/17637 - CYLINDER NO. 5 FUEL INJECTOR CIRCUIT SHORT TO GROUND**

NOTE: DTC is set when cylinder No. 5 fuel injector or wiring to fuel injector is shorted to ground.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Using a DVOM, check resistance between test box socket No. 2 and fuse No. 18 connector lower terminal. Resistance should be 15-23 ohms. If resistance is as specified, go to



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step 4). If resistance is not as specified, go to next step.

3) Disconnect cylinder No. 5 fuel injector connector and Mass Airflow (MAF) sensor connector. Check resistance between cylinder No. 5 fuel injector connector terminal No. 1 and test box socket No. 1, and cylinder No. 5 fuel injector connector terminal No. 2 and test box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between cylinder No. 5 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Disconnect cylinder No. 5 fuel injector connector. Check resistance between cylinder No. 5 fuel injector connector terminals No. 1 and No. 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace faulty cylinder No. 5 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step

5) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1230/17638 - CYLINDER NO. 6 FUEL INJECTOR CIRCUIT SHORT TO GROUND**

NOTE: DTC is set when cylinder No. 6 fuel injector or wiring to fuel injector is shorted to ground.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Using a DVOM, check resistance between test box socket No. 2 and fuse No. 18 connector lower terminal. Resistance should be 15-23 ohms. If resistance is as specified, go to step 4). If resistance is not as specified, go to next step.

3) Disconnect cylinder No. 6 fuel injector connector and Mass Airflow (MAF) sensor connector. Check resistance between cylinder No. 6 fuel injector connector terminal No. 1 and test box socket No. 1, and cylinder No. 6 fuel injector connector terminal No. 2 and test box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between cylinder No. 6 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Disconnect cylinder No. 6 fuel injector connector. Check resistance between cylinder No. 6 fuel injector connector terminals No. 1 and No. 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace faulty cylinder No. 6 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step

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5) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1237/17645 - CYLINDER NO. 1 FUEL INJECTOR CIRCUIT OPEN CIRCUIT**

NOTE: DTC is set when cylinder No. 1 fuel injector or wiring to fuel injector has an open circuit.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Using a DVOM, check resistance between fuse No. 18 connector lower terminal and test box socket No. 24. Resistance should be 15-23 ohms. If resistance is not as specified, go to next step. If resistance is as specified, go to step 4).

3) Disconnect cylinder No. 1 fuel injector connector. Check resistance between cylinder No. 1 fuel injector connector terminal No. 1 and fuse No. 18 connector lower terminal. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between cylinder No. 1 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Check resistance between cylinder No. 1 fuel injector connector terminal No. 2 and test box socket No. 24. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit in activation wire between cylinder No. 1 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step. 6).

5) Check resistance between cylinder No. 1 fuel injector terminals No. 1 and No. 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace faulty cylinder No. 6 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step

6) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1238/17646 - CYLINDER NO. 2 FUEL INJECTOR CIRCUIT OPEN CIRCUIT**

NOTE: DTC is set when cylinder No. 2 fuel injector or wiring to fuel injector has an open circuit.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness.

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Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Using a DVOM, check resistance between fuse No. 18 connector lower terminal and test box socket No. 25. Resistance should be 15-23 ohms. If resistance is not as specified, go to next step. If resistance is as specified, go to step 4).

3) Disconnect cylinder No. 2 fuel injector connector. Check resistance between cylinder No. 2 fuel injector connector terminal No. 1 and fuse No. 18 connector lower terminal. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between cylinder No. 2 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Check resistance between cylinder No. 2 fuel injector connector terminal No. 2 and test box socket No. 25. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit in activation wire between cylinder No. 2 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 6).

5) Check resistance between cylinder No. 2 fuel injector terminals No. 1 and No. 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace faulty cylinder No. 6 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step

6) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1239/17647 - CYLINDER NO. 3 FUEL INJECTOR CIRCUIT OPEN CIRCUIT**

NOTE: DTC is set when cylinder No. 3 fuel injector or wiring to fuel injector has an open circuit.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Using a DVOM, check resistance between fuse No. 18 connector lower terminal and test box socket No. 26. Resistance should be 15-23 ohms. If resistance is not as specified, go to next step. If resistance is as specified, go to step 4).

3) Disconnect cylinder No. 3 fuel injector connector. Check resistance between cylinder No. 3 fuel injector connector terminal No. 1 and fuse No. 18 connector lower terminal. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between cylinder No. 3 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC

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memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Check resistance between cylinder No. 3 fuel injector connector terminal No. 2 and test box socket No. 26. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit in activation wire between cylinder No. 3 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step. 6).

5) Check resistance between cylinder No. 3 fuel injector terminals No. 1 and No. 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace faulty cylinder No. 6 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step

6) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1240/17648 - CYLINDER NO. 4 FUEL INJECTOR CIRCUIT OPEN CIRCUIT**

NOTE: DTC is set when cylinder No. 4 fuel injector or wiring to fuel injector has an open circuit.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Using a DVOM, check resistance between fuse No. 18 connector lower terminal and test box socket No. 2. Resistance should be 15-23 ohms. If resistance is not as specified, go to next step. If resistance is as specified, go to step 4).

3) Disconnect cylinder No. 4 fuel injector connector. Check resistance between cylinder No. 4 fuel injector connector terminal No. 1 and fuse No. 18 connector lower terminal. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between cylinder No. 4 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Check resistance between cylinder No. 4 fuel injector connector terminal No. 2 and test box socket No. 2. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit in activation wire between cylinder No. 4 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step. 6).

5) Check resistance between cylinder No. 4 fuel injector terminals No. 1 and No. 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as

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specified, replace faulty cylinder No. 6 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step

6) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1241/17649 - CYLINDER NO. 5 FUEL INJECTOR CIRCUIT OPEN CIRCUIT**

NOTE: DTC is set when cylinder No. 5 fuel injector or wiring to fuel injector has an open circuit.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Using a DVOM, check resistance between fuse No. 18 connector lower terminal and test box socket No. 3. Resistance should be 15-23 ohms. If resistance is not as specified, go to next step. If resistance is as specified, go to step 4).

3) Disconnect cylinder No. 5 fuel injector connector. Check resistance between cylinder No. 5 fuel injector connector terminal No. 1 and fuse No. 18 connector lower terminal. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between cylinder No. 5 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Check resistance between cylinder No. 5 fuel injector connector terminal No. 2 and test box socket No. 3. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit in activation wire between cylinder No. 5 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step. 6).

5) Check resistance between cylinder No. 5 fuel injector terminals No. 1 and No. 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace faulty cylinder No. 6 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step

6) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1242/17650 - CYLINDER NO. 6 FUEL INJECTOR CIRCUIT OPEN CIRCUIT**

NOTE: DTC is set when cylinder No. 6 fuel injector or wiring to

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fuel injector has an open circuit.

1) Turn ignition off. Disconnect Electronic Control Module (ECM) connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Remove fuse No. 18. Using a DVOM, check resistance between fuse No. 18 connector lower terminal and test box socket No. 4. Resistance should be 15-23 ohms. If resistance is not as specified, go to next step. If resistance is as specified, go to step 4).

3) Disconnect cylinder No. 6 fuel injector connector. Check resistance between cylinder No. 6 fuel injector connector terminal No. 1 and fuse No. 18 connector lower terminal. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between cylinder No. 6 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Check resistance between cylinder No. 6 fuel injector connector terminal No. 2 and test box socket No. 4. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit in activation wire between cylinder No. 6 fuel injector connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step. 6).

5) Check resistance between cylinder No. 6 fuel injector terminals No. 1 and No. 2. Resistance should be 15-23 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace faulty cylinder No. 6 fuel injector. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step

6) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1340/17748 - CAMSHAFT/CRANKSHAFT POSITION SENSOR SIGNALS OUT OF SEQUENCE**

NOTE: DTC is set when Engine Speed (RPM) sensor supplies invalid signals to Electronic Control Module (ECM).

1) Inspect RPM sensor connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Turn ignition off. Disconnect ECM connector. Connect Test Box VAG 1598/19 to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

3) Using DVOM, check resistance between test box sockets No. 67 and 68. Resistance should be 500-700 ohms. If resistance is as

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specified, go to next step. If resistance is not as specified, replace RPM sensor. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 7).

4) Disconnect RPM sensor connector. Check resistance between RPM sensor connector terminal No. 1 and test box socket No. 56, and RPM sensor connector terminal No. 2 and test box socket No. 56. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between RPM sensor connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 7).

5) Check resistance between RPM sensor connector terminal No. 1 and test box socket No. 67, and RPM sensor connector terminal No. 2 and test box socket No. 68. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, locate and repair open circuit between RPM sensor connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 7).

6) Remove speed sensor and check for metal particle contamination. If speed sensor is okay, check crankshaft wheel for damage or contamination. If crankshaft wheel is okay, check condition of speed sensor connector. Repair if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, next step.

7) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1410/17818 - FUEL TANK VENTILATION VALVE SHORT TO B+**

NOTE: DTC is set when Electronic Control Module (ECM) senses and Evaporative (EVAP) canister purge regulator valve malfunction.

1) Turn ignition off. Disconnect ECM connector. Disconnect EVAP canister purge regulator valve connector. Go to next step.

2) Using DVOM, check resistance between EVAP canister purge regulator valve connector terminals No. 1 and 2. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between EVAP canister purge regulator valve connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

3) Replace EVAP canister purge regulator valve Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Replace faulty ECM. Test drive vehicle. Recheck DTC memory

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and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1420/17828 - SECONDARY AIR INJECTION CONTROL ELECTRICAL MALFUNCTION**

**NOTE:** DTC is set when Electronic Control Module (ECM) activates secondary air injection solenoid but Heated Oxygen Sensor (HO2S) does not detect secondary air injection.

1) Inspect secondary air injection solenoid valve connector for looseness and/or corrosion. Repair solenoid valve connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If solenoid valve connector was not repaired, go to next step.

2) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

3) Using DVOM, check resistance between solenoid valve connector terminal No. 1 and test box socket No. 50. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 5). If resistance is not as specified, locate and repair open circuit between solenoid valve connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Turn ignition on. Jumper test box sockets No. 1 and 6. Jumper test box socket No. 50 to ground. Check voltage between solenoid valve connector terminals No. 1 and 2. Voltage should be at least 11.5 volts. If voltage is as specified, go to next step. If voltage is not as specified, locate and repair open circuit between solenoid valve connector terminal No. 2 and fuse No. 18 connector lower terminal. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 6).

5) Check resistance between solenoid valve terminals No. 1 and 2. Resistance should be 40-80 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace solenoid valve. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

6) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1421/17829 - SECONDARY AIR INJECTION SOLENOID VALVE CIRCUIT SHORT TO GROUND**

**NOTE:** DTC is set if Electronic Control Module (ECM) detects a short circuit to ground when it activates secondary air injection solenoid valve.



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1) Turn ignition off. Disconnect secondary air injection solenoid valve connector. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Using DVOM, check resistance between solenoid valve connector terminal No. 1 and test box socket No. 50. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 4). If resistance is not as specified, go to next step.

3) Check resistance between solenoid valve connector terminal No. 1 and test box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between solenoid valve connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Check resistance between solenoid valve terminals No. 1 and 2. Resistance should be 20-50 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace solenoid valve. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

5) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1422/17830 - SECONDARY AIR INJECTION SOLENOID VALVE CIRCUIT SHORT TO B+**

NOTE: DTC is set if Electronic Control Module (ECM) detects a short circuit to battery voltage when it activates secondary air injection solenoid valve.

1) Turn ignition off. Disconnect secondary air injection solenoid valve connector. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Using DVOM, check resistance between solenoid valve connector terminal No. 1 and test box socket No. 50. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 4). If resistance is not as specified, go to next step.

3) Remove fuse No. 18. Check resistance between fuse No. 18 connector lower terminal and test box socket No. 50. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to battery voltage between solenoid valve connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Check resistance between solenoid valve terminals No. 1 and 2. Resistance should be 20-50 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace solenoid valve. Erase DTC memory and test drive vehicle. See CLEARING DTCS in

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this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

5) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1425/17833 - TANK VENTILATION VALVE SHORT TO GROUND**

**NOTE:** ECM sets DTC if it senses an Evaporative (EVAP) canister purge regulator valve or circuit short to ground.

1) Turn ignition off. Disconnect EVAP canister purge regulator valve connector. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Using DVOM, check resistance between regulator valve connector terminal No. 1 and test box socket No. 1. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 5). If resistance is not as specified, go to next step.

3) Remove fuse No. 18. Check resistance between fuse No. 18 connector upper terminal and regulator valve connector terminal No. 2. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 5). If resistance is not as specified, locate and repair open circuit between regulator valve connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Check resistance between regulator valve connector terminal No. 1 and test box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit between regulator valve connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

5) Check resistance between regulator valve terminals No. 1 and 2. Resistance should be 20-50 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace regulator. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

6) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1426/17834 - TANK VENTILATION VALVE CIRCUIT OPEN**

**NOTE:** ECM sets DTC if it senses an Evaporative (EVAP) canister purge regulator valve or circuit open.

1) Turn ignition off. Disconnect EVAP canister purge regulator valve connector. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box

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are identical to ECM connector's.

2) Jumper test box sockets No. 1 and 6. Turn ignition on. Using DVOM, check voltage between regulator valve connector terminal No. 2 and ground. Voltage should be at least 11.5 volts. If voltage is as specified, go to step 6). If voltage is not as specified, go to next step.

3) Turn ignition off. Check resistance between regulator valve connector terminal No. 1 and test box socket No. 31. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 6). If resistance is not as specified, go to next step.

4) Remove fuse No. 18. Check resistance between regulator valve connector terminal No. 2 and fuse No. 18 connector upper terminal. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 6). If resistance is not as specified, locate and repair open circuit between regulator valve connector and ECM. Go to next step.

5) Check resistance between regulator valve connector terminal No. 1 and test box socket No. 1. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between regulator valve connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

6) Check resistance between regulator valve terminals No. 1 and 2. Resistance should be 20-50 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace regulator. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

7) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1450/17858 - SECONDARY AIR INJECTION SOLENOID VALVE CIRCUIT SHORT TO B+**

**NOTE:** DTC is set if Electronic Control Module (ECM) detects a short circuit to battery voltage when it activates Secondary Air Injection (SAI) pump relay.

1) Turn ignition off. Remove SAI pump relay. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Using DVOM, check resistance between test box socket No. 49 and relay connector terminal No. 6. Check resistance between test box socket No. 49 and positive battery terminal. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to battery voltage between relay connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to

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step 4).

3) Replace relay. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1451/17859 - SECONDARY AIR INJECTION SOLENOID VALVE CIRCUIT SHORT TO GROUND**

NOTE: DTC is set if Electronic Control Module (ECM) detects a short circuit to ground when it activates Secondary Air Injection (SAI) pump relay.

1) Turn ignition off. Remove SAI pump relay. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Using DVOM, check resistance between test box sockets No. 1 and 49. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between relay connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 4).

3) Replace relay. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1452/17860 - SECONDARY AIR INJECTION SOLENOID VALVE OPEN CIRCUIT**

NOTE: DTC is set if Electronic Control Module (ECM) activates Secondary Air Injection (SAI) pump relay and SAI pump motor does not run.

1) Turn ignition off. Remove SAI pump relay. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Using DVOM, check resistance between test box socket No. 49 and relay connector terminal No. 4. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 4). If resistance is not as specified, go to next step.

3) Remove fuse No. 18. Check resistance between relay connector terminal No. 6 and fuse No. 18 connector lower terminal. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next. If resistance is not as specified, locate and repair open circuit between relay connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC

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memory and verify DTC does not reset. If DTC resets, go to step 5).

4) Check 30-amp fuse in fuse box, next to SAI pump relay, and replace if necessary. If fuse is okay, locate and repair open circuit between fuse and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

5) Disconnect SAI pump motor connector. Check resistance between relay connector terminal No. 8 and motor connector terminal No. 2. Check resistance between motor connector terminal No. 1 and test box socket No. 1. Resistance should be less than 1.5 ohms. If resistance is as specified, go to next step. If resistance is not as specified, replace relay. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

6) Replace SAI pump motor. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

7) Replace faulty ECM. Test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1500/17908 - FUEL PUMP RELAY CIRCUIT ELECTRICAL MALFUNCTION**

**NOTE:** DTC is set when Electronic Control Module (ECM) detects an electrical malfunction in fuel pump relay.

1) Turn ignition off. Ensure fuel delivery unit is firmly attached. Remove and inspect fuse No. 18. If fuse is okay, go to next step. If fuse is open, locate and repair short circuit between ECM and transfer fuel pump, pre-catalyst or post-catalyst heated oxygen sensor heater. Replace fuse. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 6).

2) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

3) Jumper test box sockets No. 1 and 6. Transfer fuel pump must run audibly. If fuel pump runs, go to step 6). If fuel pump does not run, go to next step.

4) Remove fuel pump relay. Check resistance between test box socket No. 6 and fuel pump relay connector terminal No. 3. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 6). If resistance is not as specified, locate and repair open circuit between relay connector and ECM. Go to next step.

5) Check resistance between test box sockets No. 1 and 6. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between fuel pump relay connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

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6) Separate central connector, located near intake air temperature sensor. See Fig. 1 in I - SYSTEM/COMPONENT TESTS article. Remove secondary air injection pump relay. Disconnect Mass Airflow (MAF) sensor, Evaporative (EVAP) emission canister purge regulator valve and Secondary Air Injection (SAI) solenoid valve connectors. Remove fuse No. 18. Go to next step.

7) Check resistance between fuse No. 18 connector lower terminal and ground. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short to ground between fuse No. 18 and EVAP emission canister purge regulator and/or SAI solenoid valve. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 10).

8) Reconnect center connector. Check resistance between fuse No. 18 connector lower terminal and ground. Resistance should be infinite (no continuity). If resistance is as specified, go to step 10). If resistance is not as specified, locate and repair short to ground between fuse No. 18 and fuel injectors. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 10).

9) Replace fuel pump relay. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

10) Replace faulty ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1502/17910 - FUEL PUMP RELAY CIRCUIT SHORT TO B+**

**NOTE:** DTC is set when Electronic Control Module (ECM) detects a short circuit to battery voltage on activation wire from fuel pump relay.

1) Turn ignition off. Disconnect fuel pump relay connector. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Check resistance between test box socket No. 6 and fuel pump relay connector terminal No. 3. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 4). If resistance is not as specified, locate and repair open circuit between relay connector and ECM. Go to next step.

3) Check resistance between test box sockets No. 1 and 6. Resistance should be infinite (no continuity). If resistance is as specified, go to next step. If resistance is not as specified, locate and repair short circuit to ground between fuel pump relay connector and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Replace fuel pump relay. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and

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verify DTC does not reset. If DTC resets, go to next step.

5) Replace faulty ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1543/17951 - THROTTLE ACTUATION POTENTIOMETER SIGNAL TOO LOW**

**NOTE:** DTC sets if Throttle Position (TP) sensor supplies too low a signal to Electronic Control Module (ECM).

1) Inspect Throttle Position (TP) sensor connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Turn ignition off. Disconnect Throttle Valve Control Module (TVCM) connector. Turn ignition on. Using DVOM, check voltage between TVCM connector terminals No. 4 and 7. Voltage should be about 5 volts. Check voltage between TVCM connector terminals No. 3 and 7. Voltage should be about 10 volts. If voltage is as specified, go to step 6). If voltage is not as specified, go to next step.

3) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Check resistance between TVCM connector terminal No. 3 and test box socket No. 10, between TVCM connector terminal No. 4 and test box socket No. 41, and between TVCM connector terminal No. 7 and test box socket No. 33. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

5) Check for an open circuit between TVCM and ECM. Repair as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If no open circuit is present, go to next step.

6) Turn ignition off. Reconnect TVCM connector. With accelerator at Wide Open Throttle (WOT) and at closed throttle, check resistance between test box sockets No. 10 and 33. Resistance should be infinite (no continuity) at WOT and 10 ohms maximum at closed throttle. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

7) With accelerator pedal at closed throttle, check resistance between test box sockets No. 27 and 53. If resistance is 3-200 ohms, go to step 9). If resistance is not as specified, go to next step.

8) Disconnect TVCM connector. Check resistance between TVCM connector terminal No. 1 and test box socket No. 27, TVCM connector terminal No. 2 and test box socket No. 53, TVCM terminal connector No. 5 and test box socket No. 40, and TVCM connector terminal No. 8 and test box socket No. 62. Resistance should be less than 1.5 ohms. If resistance is not as specified, locate and repair open circuit between

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TVCM and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If resistance is as specified, go to next step.

9) Check resistance between test box sockets No. 10, 27, 33, 40, 41, 53, and 69. Resistance should be infinite (no continuity) between each circuit. If resistance is not as specified, repair circuits shorted to each other. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If no shorts are present, go to next step.

10) Substitute a known-good TVCM. Erase DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, see DTC P0102/16486, P0103/16487. P0117/16501 and P0118/16502.

11) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1544/17952 - THROTTLE ACTUATION POTENTIOMETER SIGNAL TOO HIGH**

**NOTE:** DTC sets if Throttle Position (TP) sensor supplies too high a signal to Electronic Control Module (ECM).

1) Inspect Throttle Position (TP) sensor connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Turn ignition off. Disconnect Throttle Valve Control Module (TVCM) connector. Turn ignition on. Using DVOM, check voltage between TVCM connector terminals No. 4 and 7. Voltage should be about 5 volts. Check voltage between TVCM connector terminals No. 3 and 7. Voltage should be about 10 volts. If voltage is as specified, go to step 6). If voltage is not as specified, go to next step.

3) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

4) Check resistance between TVCM connector terminal No. 3 and test box socket No. 10, between TVCM connector terminal No. 4 and test box socket No. 41, and between TVCM connector terminal No. 7 and test box socket No. 33. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

5) Check for an open circuit between TVCM and ECM. Repair as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If no open circuit is present, go to next step.

6) Turn ignition off. Reconnect TVCM connector. With accelerator at Wide Open Throttle (WOT) and at closed throttle, check



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resistance between test box sockets No. 10 and 33. Resistance should be infinite (no continuity) at WOT and 10 ohms maximum at closed throttle. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

7) With accelerator pedal at closed throttle, check resistance between test box sockets No. 27 and 53. If resistance is 3-200 ohms, go to step 9). If resistance is not as specified, go to next step.

8) Disconnect TVCM connector. Check resistance between TVCM connector terminal No. 1 and test box socket No. 27, TVCM connector terminal No. 2 and test box socket No. 53, TVCM terminal connector No. 5 and test box socket No. 40, and TVCM connector terminal No. 8 and test box socket No. 62. Resistance should be less than 1.5 ohms. If resistance is not as specified, locate and repair open circuit between TVCM and ECM. Erase DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If resistance is as specified, go to next step.

9) Check resistance between test box sockets No. 10, 27, 33, 40, 41, 53, and 69. Resistance should be infinite (no continuity) between each circuit. If resistance is not as specified, repair circuits shorted to each other. Erase DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If no shorts are present, go to next step.

10) Substitute a known-good TVCM. Erase DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, see DTC P0102/16486, P0103/16487. P0117/16501 and P0118/16502.

11) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

#### **DTC P1580/17988 - THROTTLE ACTUATOR MALFUNCTION**

**NOTE:** DTC sets if Electronic Control Module (ECM) detects a faulty throttle position in Throttle Valve Control Module (TVCM) output.

1) Inspect Throttle Position (TP) sensor connector for looseness and/or corrosion. Repair sensor connector as necessary. Erase DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If sensor connector is okay, go to next step.

2) Turn ignition off. Disconnect TVCM connector. Turn ignition on. Using DVOM, check voltage between TVCM connector terminals No. 4 and 7. Voltage should be about 5 volts. Check voltage between TVCM connector terminals No. 3 and 7. Voltage should be about 10 volts. If voltage is as specified, go to step 6). If voltage is not as specified, go to next step.

3) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test

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box are identical to ECM connector's.

4) Check resistance between TVCM connector terminal No. 3 and test box socket No. 10, between TVCM connector terminal No. 4 and test box socket No. 41, and between TVCM connector terminal No. 7 and test box socket No. 33. Resistance should be less than 1.5 ohms. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

5) Check for an open circuit between TVCM and ECM. Repair as necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If no open circuit is present, go to next step.

6) Turn ignition off. Reconnect TVCM connector. With accelerator at Wide Open Throttle (WOT) and at closed throttle, check resistance between test box sockets No. 10 and 33. Resistance should be infinite (no continuity) at WOT and 10 ohms maximum at closed throttle. If resistance is as specified, go to step 9). If resistance is not as specified, go to next step.

7) With accelerator pedal at closed throttle, check resistance between test box sockets No. 27 and 53. If resistance is 3-200 ohms, go to step 9). If resistance is not as specified, go to next step.

8) Disconnect TVCM connector. Check resistance between TVCM connector terminal No. 1 and test box socket No. 27, TVCM connector terminal No. 2 and test box socket No. 53, TVCM terminal connector No. 5 and test box socket No. 40, and TVCM connector terminal No. 8 and test box socket No. 62. Resistance should be less than 1.5 ohms. If resistance is not as specified, locate and repair open circuit between TVCM and ECM. Erase DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If resistance is as specified, go to next step.

9) Check resistance between test box sockets No. 10, 27, 33, 40, 41, 53, and 69. Resistance should be infinite (no continuity) between each circuit. If resistance is not as specified, repair circuits shorted to each other. Erase DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to step 11). If no shorts are present, go to next step.

10) Substitute a known-good TVCM. Erase DTCs and perform test drive. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, see DTC P0102/16486, P0103/16487. P0117/16501 and P0118/16502.

11) Replace faulty ECM. Test drive vehicle. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

**DTC P1613/18021 - MIL CALL-UP CIRCUIT OPEN OR SHORT TO B+**

**NOTE:** DTC sets when Electronic Control Module (ECM) Malfunction Indicator Light (MIL) does not come on due to short circuit to battery voltage.

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1) Turn ignition off. Disconnect ECM connector. Connect Test Box (VAG 1598/18) to ECM wiring harness. Terminal assignments of test box are identical to ECM connector's.

2) Jumper test box sockets No. 1 and 3 on 2.0L or No. 1 and 5 on 2.8L. Turn ignition on. If MIL comes on, go to step 4). If MIL does not come on, turn ignition off and go to next step.

3) Check MIL bulb. Replace bulb if necessary. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step. If bulb is okay, locate and repair open or short circuit between MIL and ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, go to next step.

4) Replace faulty ECM. Erase DTC memory and test drive vehicle. See CLEARING DTCS in this article. Recheck DTC memory and verify DTC does not reset. If DTC resets, repeat testing procedure.

### **SUMMARY**

If no hard DTCs (only "sporadic" DTCs) are present, driveability symptoms exist or intermittent DTCs exist, proceed to appropriate H - TESTS W/O CODES article for diagnosis by symptom (i.e. , ROUGH IDLE, NO START, etc.) or intermittent diagnostic procedures.

### **END OF ARTICLE**

## Article Text

## ARTICLE BEGINNING

[illegible]

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| Application | Specification |
|-------------|---------------|
|-------------|---------------|

#### Compression Ratio

|                  |        |
|------------------|--------|
| All Models ..... | 10.0:1 |
|------------------|--------|

#### Compression Pressure

|            |                                             |
|------------|---------------------------------------------|
| 2.0L ..... | 142-186 psi (10.0-13.0 kg/cm <sup>2</sup> ) |
|------------|---------------------------------------------|

|            |                                             |
|------------|---------------------------------------------|
| 2.8L ..... | 157-186 psi (11.0-13.0 kg/cm <sup>2</sup> ) |
|------------|---------------------------------------------|

|                                    |                                   |
|------------------------------------|-----------------------------------|
| Minimum Compression Pressure ..... | 106 psi (7.5 kg/cm <sup>2</sup> ) |
|------------------------------------|-----------------------------------|

|                                           |                                  |
|-------------------------------------------|----------------------------------|
| Maximum Variation Between Cylinders ..... | 43 psi (3.0 kg/cm <sup>2</sup> ) |
|-------------------------------------------|----------------------------------|

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#### Exhaust System Backpressure

A restricted exhaust system can be checked with a vacuum or pressure gauge. Remove heated oxygen sensor or air injection check valve (if equipped). Connect a 0-5 psi pressure gauge and operate engine at 2500 RPM. If exhaust system backpressure is greater than 2 psi, exhaust system or catalytic converter is plugged.

If a vacuum gauge is used, connect vacuum gauge hose to intake manifold vacuum port and start engine. Observe vacuum gauge. Open throttle part way and hold steady. If vacuum gauge reading slowly drops after stabilizing, check exhaust system for restriction.

## FUEL SYSTEM

All models use a Motronic Multiport Fuel Injection (MFI) system.

### FUEL PRESSURE

Basic diagnosis of fuel system should begin with determining fuel system pressure.

**WARNING:** ALWAYS relieve fuel pressure before disconnecting any fuel injection-related component. See FUEL SYSTEM PRESSURE RELEASE. DO NOT allow fuel to contact engine or electrical components.

#### Fuel System Pressure Release

Disconnect ignition coil output stage wiring harness to deactivate ignition. To relieve fuel system pressure, remove fuel pump fuse No. 18, or fuel pump relay, to deactivate fuel pump. Place a clean shop rag around fuel line fitting and slowly loosen fitting. Reconnect ignition coil output stage wiring harness and fuel pump fuse No. 18.

#### Fuel Pressure Test

1) Release fuel pressure. Ensure ignition is off. Connect fuel pressure gauge between fuel distributor port and end of fuel line to cold start valve. Disconnect differential pressure regulator harness connector.

2) Start engine and let it run. System fuel pressure should be 89-96 psi (6.3-6.7 kg/cm<sup>2</sup>). If fuel pressure is greater than

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specification, go to next step. If system fuel pressure is less than specification, perform fuel volume check. If fuel volume is okay, release fuel pressure and replace fuel pressure regulator.

3) Release fuel pressure. Remove return hose from pressure regulator and place in a container. Repeat test. If pressure is incorrect, release fuel pressure and replace fuel pressure regulator. If system pressure is okay, check for restricted fuel return line. Repair as necessary. Go to next step.

4) Turn ignition off. After 10 minutes, residual pressure should be 48 psi (3.4 kg/cm<sup>2</sup>). After 20 minutes, residual pressure should be 46 psi (3.2 kg/cm<sup>2</sup>). If system fuel pressure is low, check fuel pump check valve, sensor plate free play, fuel distributor "O" rings and seats. Release fuel pressure and replace if necessary. If these components are okay, release fuel pressure and replace fuel pressure regulator.

### TRANSFER PUMP CHECK

#### Transfer Pump Fuel Volume Check

1) Turn ignition off. To check transfer pump (in tank), remove rear seat. Remove fuel sending unit access cover. Disconnect ignition coil secondary wire and connect to ground.

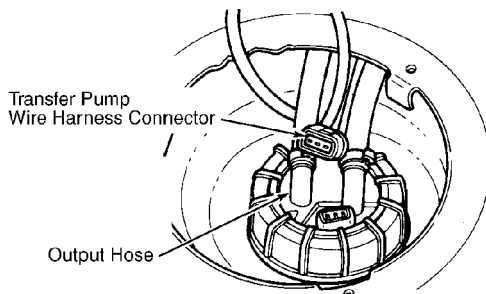
2) With transmission in Neutral, crank engine for 3-4 seconds. While starter is turning and for a few seconds afterward, an audible sound should be heard at the pump. If sound is not heard, go to next step. If sound is heard, go to step 5).

3) Remove fuel pump relay from relay panel. Using a remote control, activate fuel pump. If pump does not operate, remove transfer pump wire harness connector. See Fig. 1.

4) Using test light, check voltage between Brown wire and Red/Yellow wire. If voltage is present, replace transfer pump. If voltage is not present, repair open or short circuit in wiring.

5) Remove fuel pump relay jumper wire. Disconnect and plug transfer pump output hose. Attach a hose to pump outlet connector, and place other end of hose in a graduated container. Activate fuel pump for 10 seconds.

6) Minimum fuel flow should be 10 ounces (0.3 liter). If fuel flow is low, check fuel tank filter for restriction. If fuel tank filter is okay, replace transfer pump.



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Fig. 1: Checking Transfer Pump Fuel Volume (Typical)

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#### MAIN FUEL PUMP VOLUME CHECK

NOTE: Before testing main fuel pump, check transfer pump. See TRANSFER PUMP CHECK.

2.0L

Remove fuel pump relay from relay panel. Using a remote control, activate fuel pumps for 30 seconds. Compare fuel volume with values in FUEL PUMP PERFORMANCE table.

2.8L

1) Remove fuel pump relay from relay panel. Using a remote control, activate fuel pumps. Measure voltage being applied to fuel pump when activating with remote control. Record voltage.

2) Fuel volume is relative to voltage applied to fuel pumps. Activate fuel pumps for 30 seconds. Compare volume with values in FUEL PUMP PERFORMANCE table.

#### FUEL PUMP PERFORMANCE TABLE (1)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Pressure                  |       | Min. Vol. In 30 Sec. |           |
|-------------|---------------------------|-------|----------------------|-----------|
|             | psi (kg/cm <sup>2</sup> ) |       | Pts. (L)             |           |
| 2.0L .....  | 43 (3.0)                  | ..... | 1.0-1.4              | (0.5-0.7) |
| 2.8L .....  | 58 (4.0)                  | ..... | 1.0-1.4              | (0.5-0.7) |

(1) - Fuel pump energized, with 10-12 volts at fuel pump, and engine off.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

#### IGNITION CHECKS

##### SPARK TEST

1) Using an ohmmeter, check resistance of each spark plug wire. See HIGH TENSION WIRE RESISTANCE table. Check for strong Blue spark at coil wire and at each spark plug wire by holding wire terminal 5/16" from ground while cranking engine.

2) Disconnect and inspect all related ignition system connectors and harness. Clean or repair if necessary. If related connectors and harness are okay, remove negative battery cable. Disconnect secondary and primary leads from ignition coil.

3) Using ohmmeter, check primary resistance between primary terminals of coil. Check secondary resistance between coil secondary terminal and primary positive terminal. Replace coil if readings are not within specifications. See IGNITION COIL RESISTANCE table.

#### HIGH TENSION WIRE RESISTANCE TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Ohms |
|-------------|------|
|-------------|------|

2.0L

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Cap & Coil Suppressors ..... 600-1400  
Spark Plug Connector Suppressors ..... 4000-6000  
2.8L ..... (1)

(1) - Information is not available from manufacturer.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

#### IGNITION COIL

IGNITION COIL RESISTANCE TABLE - Ohms @ 68°F (20°C)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Primary | Secondary |
|-------------|---------|-----------|
|-------------|---------|-----------|

|            |               |           |
|------------|---------------|-----------|
| 2.0L ..... | 0.5-0.7 ..... | 3000-4000 |
|------------|---------------|-----------|

|            |           |     |
|------------|-----------|-----|
| 2.8L ..... | (1) ..... | (1) |
|------------|-----------|-----|

(1) - Information is not available from manufacturer.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

#### DISTRIBUTOR

NOTE: The Camshaft Position (CMP) portion of this article has been updated by TSB Group No. 28 - Ignition System, Bulletin No. 95-03, dated June 7, 1995. For TSB see 2.0L CAMSHAFT POSITION SENSOR (G40) CHECKING

Camshaft Position (CMP) Sensor/Hall Sensor

1) Remove coil secondary wire and attach to ground.

Disconnect CMP sensor harness connector at distributor. Using an LED Test Light (US 1115), check for voltage between outer terminals of connector. See Figs. 2 and 3. With ignition on, light should be on. If light is on, go to next step. If light is not on, check wiring for short or open circuit. If wiring is okay, replace ignition control unit.

2) Reconnect CMP sensor harness connector. Pull back CMP sensor boot to expose contact terminals. Connect LED test light probe to center contact and battery positive terminal. See Fig. 2. Observe test light while cranking engine. If test light blinks, CMP sensor is okay. If light does not blink, replace CMP sensor.

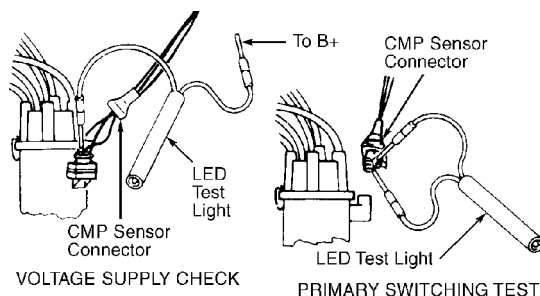


Fig. 2: Testing CMP Sensor (Typical)

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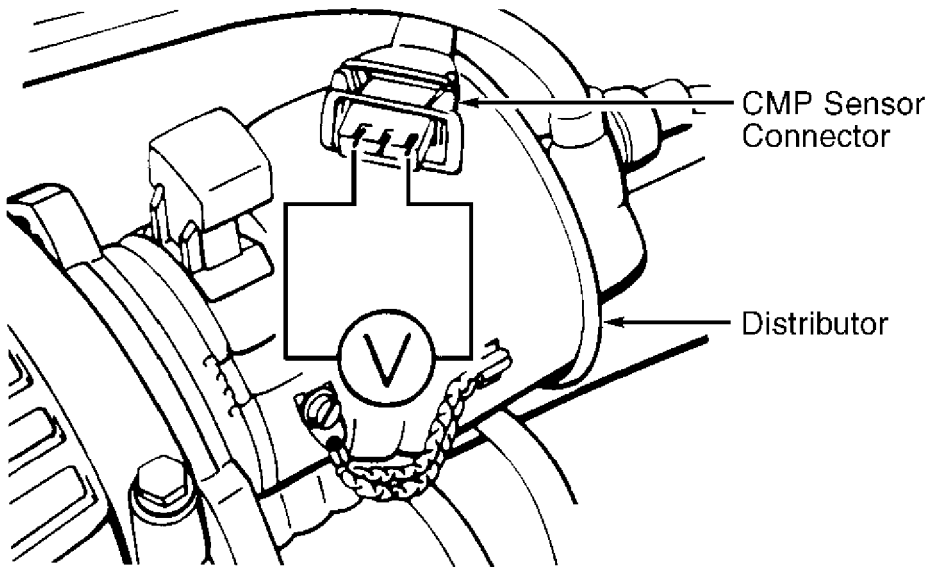
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#### Voltage Supply & Ground To CMP/Hall Sensor

1) With ignition off, disconnect CMP sensor harness connector. Using a voltmeter, check for voltage between outer terminals No. 1 and 3. See Fig. 3. Turn ignition on. There should be a minimum of 10.0 volts (4-cylinder) or 4.5 volts (VR6).

2) If there is no voltage, check for open wire between CMP sensor connector terminal No. 3 of and ECM. Also check for voltage between CMP sensor terminal No. 1 and ground. Repair open and recheck.



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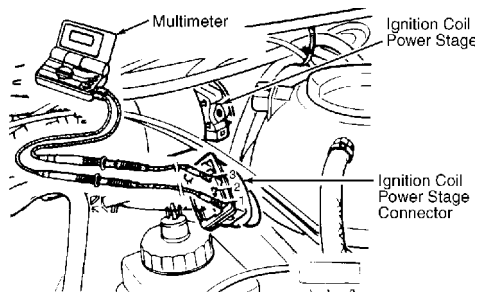
Fig. 3: Testing CMP Sensor Connector (Typical)  
Courtesy of Volkswagen United States, Inc.

#### POWER STAGE

##### Voltage Supply & Ground To Power Stage

1) Turn ignition off. Disconnect coil power stage harness connector. Connect a voltmeter to terminals No. 1 and 3. See Fig. 4.

2) Turn ignition on. Ensure battery voltage is present. Turn ignition off. If voltage is not present, check for open wire from fuse box to terminal No. 1, or from terminal No. 3 to ground. Repair open wire and recheck.



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Fig. 4: Testing Ignition Coil Power Stage (Typical)  
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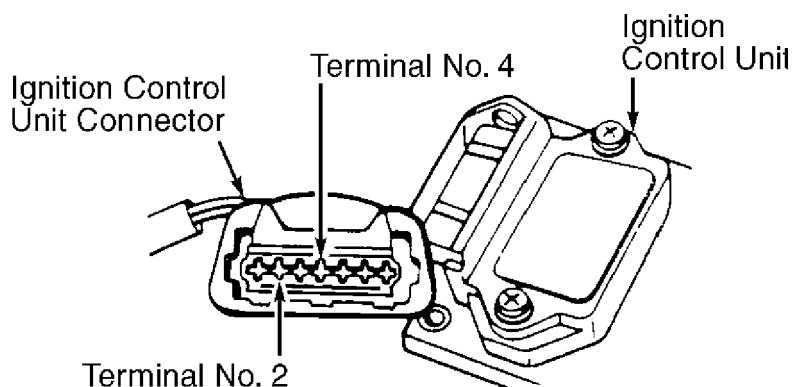
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#### IGNITION CONTROL UNIT

##### 2.0L

1) Perform spark test. See SPARK TEST. If secondary spark is present, ignition control unit is okay. If secondary spark is not present, turn ignition off. Disconnect ignition control unit wire harness connector. Turn ignition on. Using a voltmeter, measure voltage between terminals No. 2 (-) and No. 4 (+) of connector. See Fig. 5.

2) Battery voltage should be present. If battery voltage is not present, ensure continuity exists between terminal No. 2 and ground. Continuity must also exist between terminal No. 4 and ignition coil positive terminal. Repair wiring if necessary. If wiring is okay, replace ignition control unit.



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Fig. 5: Checking Ignition Control Unit Voltage (Typical)  
Courtesy of Volkswagen United States, Inc.

#### IDLE SPEED, CO LEVEL & IGNITION TIMING

Ensure idle speed, CO level and base ignition timing are set to specification. If necessary, see D - ADJUSTMENTS article.

##### IDLE SPEED & MIXTURE

###### IDLE SPEED & CO LEVEL TABLE

| Application |         |            |  |
|-------------|---------|------------|--|
| Idle RPM    |         | CO Level % |  |
| 2.0L        | 800-880 | 0.3-1.2    |  |
| 2.8L (1)    | 650-750 | 0.3-1.5    |  |

(1) - Idle speed and fuel mixture (CO level) are not adjustable.

###### IGNITION TIMING TABLE (Degrees BTDC @ RPM)

| Application |  |           |
|-------------|--|-----------|
| Checking    |  | Adjusting |

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2.0L ..... (1) 12 @ 800-880  
2.8L ..... 4-8 @ 2000-2500 ..... 5-7 @ 2000-2500

(1) - Scan Tool (VAG 1551) in START BASIC SETTING mode. Ignition timing is not adjustable.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

IGNITION TIMING ADVANCE TABLE (Degrees BTDC @ RPM)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Specification |
|-------------|---------------|
|-------------|---------------|

VR6 ..... (1) 27-33 @ 4500

(1) - Vehicle not in BASIC ADJUSTMENT mode, engine oil temperature at 176°F (80°C), and engine coolant temperature sensor connected.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

### SUMMARY

If no faults were found while performing BASIC DIAGNOSTIC PROCEDURES, go to H - TESTS W/O CODES article for diagnosis by symptom (i.e., ROUGH IDLE, NO START, etc.) or intermittent diagnostic procedures.

END OF ARTICLE

# E - THEORY/OPERATION - GASOLINE

## Article Text

1996 Volkswagen Golf

For Volkswagen Technical Site

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Thursday, August 19, 1999 11:37PM

### ARTICLE BEGINNING

#### 1996 ENGINE PERFORMANCE

#### Volkswagen Theory & Operation - Gasoline

Cabrio, Golf III, GTI, Jetta III, Passat

### INTRODUCTION

This article covers basic description and operation of engine performance-related systems and components. Read this article before diagnosing vehicles or systems with which you are not completely familiar.

### COMPUTERIZED ENGINE CONTROLS

#### ELECTRONIC CONTROL MODULE

The Motronic engine management system uses a single Electronic Control Module (ECM) for fuel injection, idle speed control, ignition, and emission controls. See Fig. 1.

The ECM continually corrects air/fuel mixture based on signals from various input devices. The ECM is located underneath center of windshield cowl, behind engine compartment firewall.

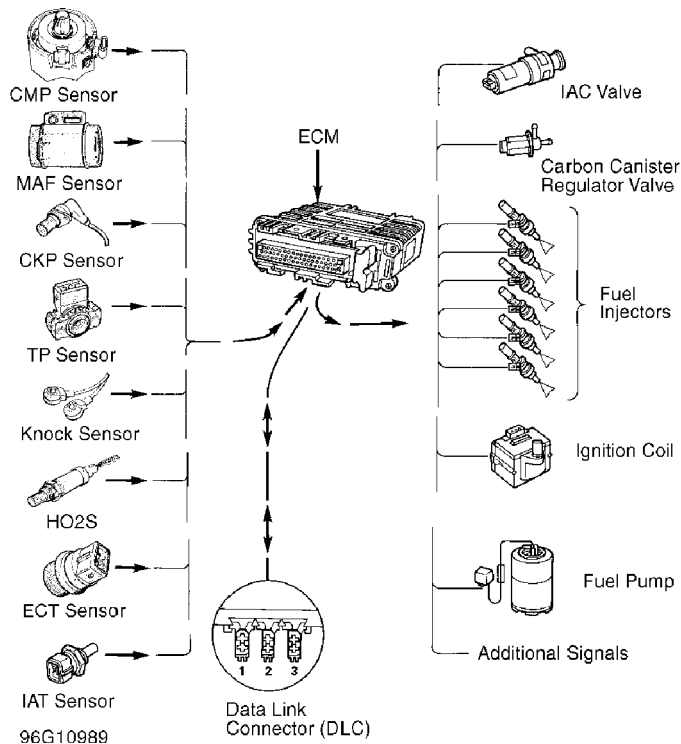


Fig. 1: Identifying Motronic System Components (VR6 Is Shown; 4-Cylinder Is Similar)  
Courtesy of Volkswagen United States, Inc.

## **E - THEORY/OPERATION - GASOLINE**

### **Article Text (p. 2)**

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**NOTE:** Components are grouped into 2 categories. The first category covers INPUT DEVICES, which control or produce voltage signals monitored by the control unit. The second category covers OUTPUT SIGNALS, which are components controlled by the control unit.

#### **INPUT DEVICES**

**NOTE:** Vehicles are equipped with different combinations of input devices. Not all devices listed below are used on every vehicle.

##### **Engine Coolant Temperature (ECT) Sensor**

ECT sensor is located on thermostat housing. As engine coolant temperature increases, resistance of sensor decreases. ECT sensor signals are used for control of ignition timing, injector pulse width, and idle speed stabilization. In addition, knock sensors, idle air control, heated oxygen sensor and fuel tank venting are activated based on coolant temperature.

##### **Camshaft Position (CMP) Sensor**

See ELECTRONIC IGNITION SYSTEM under IGNITION SYSTEM.

##### **Crankshaft Position (CKP) Sensor**

Crankshaft position is registered by CKP sensor located on side of engine block. CKP sensor reads toothed wheel mounted on crankshaft. Wheel has a 2-tooth gap which is used as reference point for crankshaft position. Engine speed/reference signal is used to monitor engine RPM and identify TDC position of cylinder No. 1.

**NOTE:** For illustration of component locations, see appropriate I - SYSTEM/COMPONENT TESTS article.

##### **Heated Oxygen Sensor (HO2S)**

HO2S is made from zirconium dioxide, while inner and outer surfaces are coated with platinum. If fuel mixture is lean (excess oxygen), HO2S will send a low voltage signal (about 100 millivolts) to ECM. If fuel mixture is rich (lack of oxygen), HO2S will send a high voltage signal (about 900 millivolts) to ECM.

##### **Intake Air Temperature (IAT) Sensor**

IAT sensor is located on side of intake manifold. Signal from IAT sensor is used for idle stabilization and correction factor for ignition timing. If IAT sensor fails, ECM uses substitute temperature value of 68°F (20°C). If this happens, cold start problems could occur at temperatures less than 32°F (0°C).

##### **Knock Sensor(s)**

See IGNITION TIMING CONTROL under IGNITION SYSTEM.

##### **Mass Airflow (MAF) Sensor**

## **E - THEORY/OPERATION - GASOLINE**

### **Article Text (p. 3)**

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A hot-wire air mass sensor is used to measure airflow into engine. MAF sensor is attached to air filter housing. The hot wire in MAF sensor is kept at 356°F (180°C) above air temperature.

As airflow increases, wire is cooled and resistance of MAF sensor changes. Resulting current change is converted to a voltage signal, and is used by ECM to calculate the volume of air intake.

If a fault develops with MAF sensor signal, signal from throttle position sensor will be substituted for driveability.

#### **Throttle Position (TP) Sensor**

TP sensor is connected to throttle valve shaft. It informs ECM of power requested by driver (throttle opening). Idle and full throttle switches are not used in potentiometer. Idle speed and full throttle applications are recognized by ECM from voltage output of potentiometer.

TP sensor signals are used for idle speed stabilization, idle air volume control, fuel after-run shutoff, and full throttle enrichment. ECM uses mass airflow sensor signal and engine RPM signals as substitute values if TP sensor fails.

#### **OUTPUT SIGNALS**

**NOTE:** Vehicles are equipped with different combinations of computer-controlled components. Not all components listed are used on every vehicle. For theory and operation on each output component, refer to system indicated after component.

#### **EGR Regulator Valve**

See EXHAUST GAS RECIRCULATION (EGR) SYSTEM under EMISSION SYSTEMS.

#### **Fuel Evaporative (Regulator) Valve**

See FUEL EVAPORATIVE EMISSIONS SYSTEM under EMISSION SYSTEMS.

#### **Fuel Injectors**

See FUEL CONTROL under FUEL SYSTEM.

#### **Fuel Pump**

See FUEL DELIVERY under FUEL SYSTEM.

#### **Idle Air Control/Stabilizer Valve**

See IDLE SPEED under FUEL SYSTEM.

#### **Malfunction Indicator Light (MIL)**

See MALFUNCTION INDICATOR LIGHT (MIL) under SELF-DIAGNOSTIC SYSTEM.

### **FUEL SYSTEM**

#### **FUEL DELIVERY**

##### **Fuel Pump**

## E - THEORY/OPERATION - GASOLINE

### Article Text (p. 4)

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A 2-stage fuel pump, located in fuel tank, is used (one motor drives 2 separate pumps). Stage one vane-type pump draws fuel, through a screen, from bottom of fuel tank and into an accumulator. Vane-type pump acts as a transfer pump. Stage two gear-type pump draws fuel from bottom of accumulator and out fuel lines.

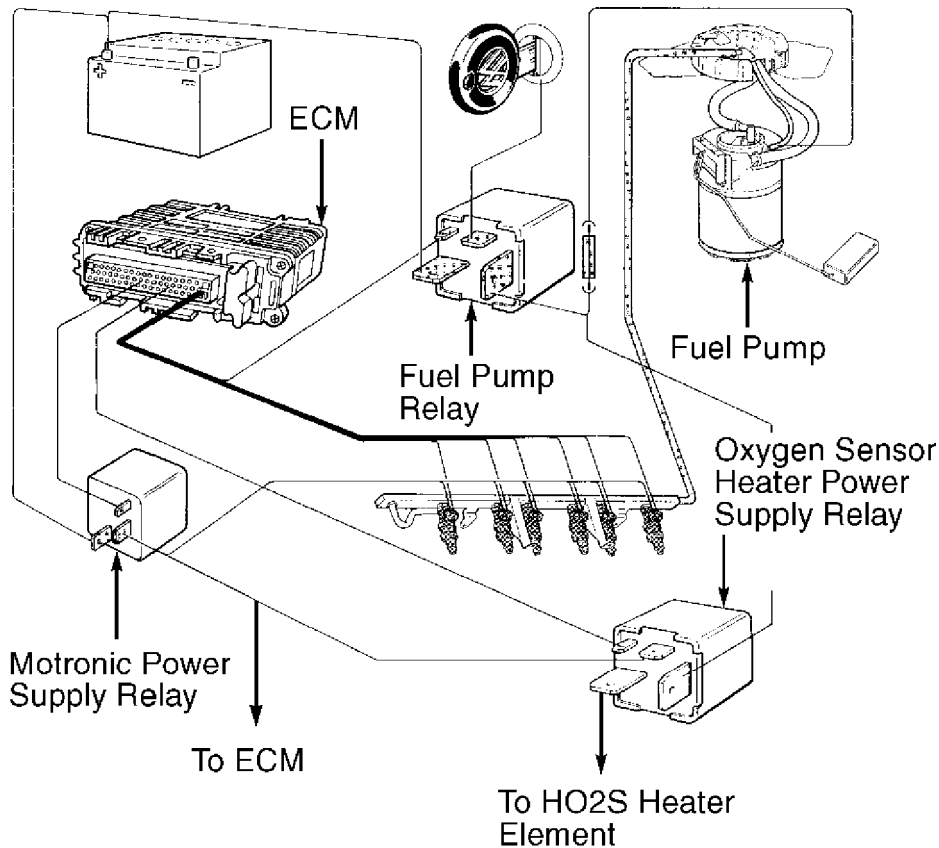
#### Fuel Pressure Regulator

A diaphragm-type fuel pressure regulator is attached to fuel return side of fuel rail. Fuel pressure is regulated depending on intake manifold pressure. As intake manifold pressure changes, pressure regulator will increase or decrease fuel system pressure.

### FUEL CONTROL

#### Fuel Injectors

Fuel injectors are supplied with battery (system) voltage through power supply relay, and are controlled (grounded) by the ECM. See Fig. 2. Injectors are opened sequentially in cylinder firing order. Fuel quantity is determined by injector on time (duty cycle).



96J10990

Fig. 2: Identifying Fuel Control System Components (VR6 Is Shown; 4-Cylinder Is Similar)

Courtesy of Volkswagen United States, Inc.

### IDLE SPEED

## E - THEORY/OPERATION - GASOLINE

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#### Idle Air Control (IAC) Valve

IAC valve is actuated by ECM through IAC valve ground control circuit. When a defect in circuit is recognized, both output stages are shut off and valve rotates to a fixed position. This permits engine to idle at a warm engine idle speed.

### IGNITION SYSTEM

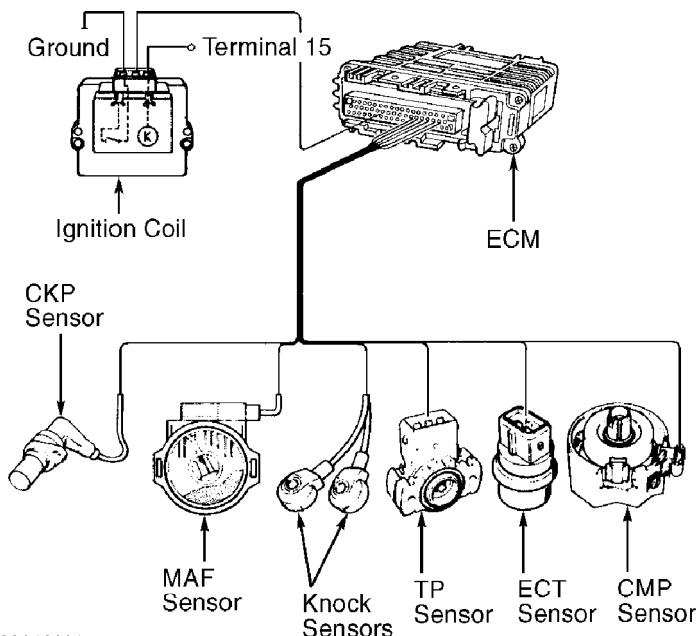
#### ELECTRONIC IGNITION SYSTEM

The electronic ignition system consists of ECM, CMP sensor, CKP sensor, ECT sensor, ignition coil, distributor, MAF sensor and TP sensor. See Fig. 3.

Ignition system uses engine speed, engine load and throttle valve position signals to calculate ignition timing. ECT sensor signal is used to correct ignition timing when engine is cold and to activate knock sensor circuit. See KNOCK SENSOR(S) under IGNITION TIMING CONTROL.

#### Camshaft Position (CMP) Sensor

CMP sensor is an integral part of distributor. CMP sensor consists of a magnetic enclosure and integrated semi-conductor circuit. A voltage signal is generated when trigger wheel, turning at camshaft speed, interrupts magnetic field created by semi-conductor. CMP sensor and engine speed/reference signals are used to identify TDC position of cylinder No. 1 for sequential fuel injection and spark knock regulation.



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Fig. 3: Identifying Ignition & Related System Components (VR6 Is Shown; 4-Cylinder Is Similar)  
Courtesy of Volkswagen United States, Inc.



## E - THEORY/OPERATION - GASOLINE

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## IGNITION TIMING CONTROL

### Knock Sensor(s)

Knock sensor (KS) works like a microphone to "listen" for spark knock (detonation). When detonation occurs, ignition timing is retarded until knock is eliminated.

One sensor is used on 2.0L engine. On 2.8L engine, 2 knock sensors are mounted on sides of engine block. Knock sensor I monitors cylinders No. 1, 3 and 5. Knock sensor II monitors cylinders No. 2, 4 and 6.

## EMISSION SYSTEMS

### EXHAUST GAS RECIRCULATION (EGR) SYSTEM

EGR system consists of EGR valve, EGR regulator valve, and EGR temperature sensor. See Fig. 4. EGR system is activated when engine coolant temperature reaches 122°F (50°C). System recirculates a small portion of exhaust gas into intake air/fuel mixture to reduce oxides of nitrogen (NOx) emissions.

#### EGR Regulator Valve

EGR regulator valve is mounted on back of intake manifold. Regulator valve controls amount of vacuum supplied to EGR valve. ECM controls ground circuit of regulator valve based on engine speed and load. In doing so, ECM controls amount of recirculated exhaust gas entering engine.

#### EGR Temperature Sensor (EGR-TS)

EGR-TS is located in EGR valve exhaust gas recirculation channel. EGR-TS measures exhaust gas temperature. Electrical resistance of EGR-TS decreases as temperature of exhaust gas increases. Signal generated by EGR-TS is used for diagnosis of EGR system only.

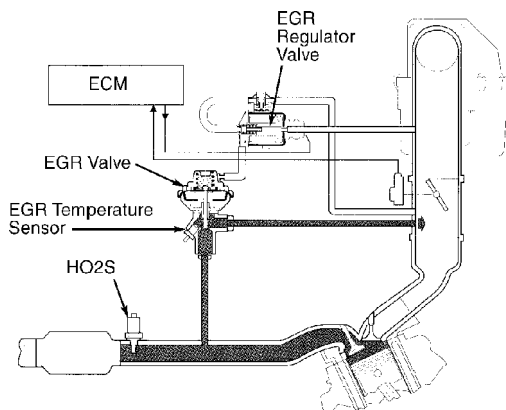


Fig. 4: Identifying EGR System Components (VR6 Is Shown; 4-Cylinder Is Similar)  
Courtesy of Volkswagen United States, Inc.

## **E - THEORY/OPERATION - GASOLINE**

### **Article Text (p. 7)**

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#### **FUEL EVAPORATIVE EMISSIONS SYSTEM**

##### **Fuel Evaporative (Regulator) Valve**

ECM determines duty cycle of regulator valve to regulate flow of fuel vapors from fuel evaporative (carbon) canister into engine. When no current is supplied to valve, it remains in open position. Valve is closed (100 percent duty cycle) when engine is started cold. A spring-operated check valve inside regulator valve closes when engine is off. This prevents fuel vapors from entering intake manifold, causing a rich mixture during engine restart.

##### **Fuel Tank Venting**

Engine speed, engine load, engine coolant temperature, and throttle valve potentiometer input signals are used by ECM to control fuel tank venting. Fuel vapors from fuel tank are vented to fuel evaporative (carbon) canister. When engine is warm and above idle speed, vapors will be drawn into intake manifold. Depending on engine load and heated oxygen sensor signal, fuel evaporative (regulator) valve will regulate amount of vapors entering intake manifold.

#### **SELF-DIAGNOSTIC SYSTEM**

Electronic Control Module (ECM) recognizes faults (open circuits, short circuits, missing signals, or a continuously applied signal voltage) in the following circuits/components.

- \* Camshaft Position (CMP) Sensor
- \* Crankshaft Position (CKP) Sensor
- \* EGR Regulator Valve
- \* EGR Temperature Sensor
- \* Engine Coolant Temperature (ECT) Sensor
- \* Fuel Evaporative (Regulator) Valve
- \* Heated Oxygen Sensor (HO2S)
- \* Idle Air Control (IAC) Valve
- \* Intake Air Temperature (IAT) Sensor
- \* Knock Sensor(s)
- \* Throttle Position (TP) Sensor

#### **MALFUNCTION INDICATOR LIGHT (MIL)**

All models are equipped with a MIL. If MIL comes on and remains on during vehicle operation, cause of malfunction must be determined. See G - TESTS W/CODES article.

#### **END OF ARTICLE**

## **D - ADJUSTMENTS**

### **Article Text**

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#### **ARTICLE BEGINNING**

1996 ENGINE PERFORMANCE  
Volkswagen On-Vehicle Adjustments

Cabrio, Golf III, GTI, Jetta III, Passat

#### **ENGINE MECHANICAL**

Before performing any on-vehicle adjustments to fuel or ignition systems, ensure engine mechanical condition is okay.

#### **VALVE CLEARANCE**

NOTE: All models use hydraulic lifters. No adjustments are required.

#### **IGNITION TIMING**

##### **4-CYLINDER (2.0L) IGNITION TIMING**

1) Start and warm engine to normal operating temperature. Ensure engine oil temperature is 176°F (80°C). Ensure A/C and electrical loads are off, including radiator cooling fan. Connect Engine Analyzer (VAG 1367) to engine.

2) Connect Scan Tester (VAG 1551) to Data Link Connectors (DLC), located under A/C-heater system control panel. Ensure no Diagnostic Trouble Codes (DTC) are stored. Ensure throttle cable is properly adjusted. Ensure exhaust system has no leaks.

3) Start engine and let it run for 2 minutes at closed throttle. Operate scan tester and observe display. Press "1" button to select RAPID DATA TRANSFER function. Press "0" and "1" buttons to select ENGINE ELECTRONICS function. Press "Q" button to enter input.

4) Press right arrow button, then "0" and "4" buttons to select BASIC SETTING function. The Engine Control Module (ECM) should control idle speed and close fuel evaporative frequency valve.

5) Press "0" and "1" buttons to select DISPLAY GROUP NUMBER 1 input. Press "Q" button to enter input. Scan tester displays idle speed in field one, oxygen sensor factor (fluctuating 0.75-1.25) in field three, and ignition timing in field four.

6) When radiator cooling fan stops running, end BASIC SETTING function by pressing right arrow button. Press "0" and "6" for END OUTPUT function. Press "Q" button to enter input.

7) If idle speed, CO level or ignition timing is incorrect, turn ignition off. Check accelerator pedal and throttle cable for ease of operation. Disconnect ECM and reconnect. Test drive vehicle and check for DTCs. Repeat engine basic setting function.

##### **VR6 (2.8L) IGNITION TIMING**

1) Start and warm engine to normal operating temperature.

## D - ADJUSTMENTS

### Article Text (p. 2)

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Ensure engine oil temperature is at least 176°F (80°C). Ensure A/C and electrical loads are off, including cooling fan.

2) Ensure no Diagnostic Trouble Codes (DTC) are stored.

Ensure throttle cable and closed throttle position switch are properly adjusted. Ensure idle air control valve is okay. Valve must vibrate or hum. Ensure exhaust system has no leaks.

3) Disconnect Blue Engine Coolant Temperature (ECT) sensor wiring harness connector. Start engine and allow to idle. With timing light connected, check ignition timing. Timing mark is on flywheel. Timing pointer is on timing hole on transaxle bellhousing.

4) If necessary, loosen distributor hold-down. Adjust ignition timing to 5-7 BTDC by rotating distributor. Ensure radiator cooling fan is not running during adjustment. Check and adjust idle speed if necessary. See IDLE SPEED & MIXTURE.

5) After adjustment, tighten distributor hold-down. To check ignition timing advance, ensure ignition timing is correctly set. Increase engine speed to about 4500 RPM. See VR6 (2.8L) IGNITION TIMING ADVANCE table.

VR6 (2.8L) IGNITION TIMING ADVANCE TABLE (Degrees BTDC @ RPM)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application Specification

All Models ..... (1) 27-33 @ 4500

(1) - Vehicle not in BASIC ADJUSTMENT mode, engine oil temperature at 176°F (80°C), and Blue engine coolant temperature sensor connected.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

### IDLE SPEED & MIXTURE

NOTE: Idle mixture is computer controlled and is not adjustable.

NOTE: Ensure fuel system pressure is correct before attempting idle speed adjustment.

#### 4-CYLINDER IDLE SPEED ADJUSTMENT

See 4-CYLINDER (2.0L) IGNITION TIMING under IGNITION TIMING.

#### VR6 IDLE SPEED ADJUSTMENT

Idle speed and mixture are not adjustable. If idle speed and/or air mixture is incorrect, check for vacuum leaks. If no vacuum leaks are present, check dashpot adjustment, ERG valve, IAC valve and TP sensor. Repair or replace if necessary.

### THROTTLE BODY

If stop screw for basic throttle adjustment has been moved,

## **D - ADJUSTMENTS**

### **Article Text (p. 3)**

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replace throttle body.

### **DASHPOT**

#### **2.8L**

Open and close throttle until dashpot piston contacts roller. With throttle in this position, check gap between limiter (stop) screw and throttle. Gap between limiter (stop) screw and throttle lever must be 0.10-0.14" (2.5-3.5 mm).

### **THROTTLE POSITION (TP) SENSOR**

#### **THROTTLE POSITION (TP) SENSOR ADJUSTMENT**

#### **1.9L**

1) Connect Scan Tester (VAG 1551) to Data Link Connector (DLC), located under tachometer. Turn ignition on. Operate scan tester and select RAPID DATA TRANSFER, ENGINE ELECTRONICS, then READ TEST VALUE BLOCK functions.

2) Press "0" and "8" buttons to select READ MEASURING VALUE BLOCK function. Press "Q" button to enter input. Press "0" and "2" buttons to select DISPLAY GROUP NUMBER 02 function. Press "Q" button to enter input.

3) DO NOT press accelerator pedal. Check TP display in 2 channel. Reading should be 0.0. Slowly open throttle, while observing display in channel 2, until throttle is wide open. Reading on display must increase uniformly from 0.0 at closed throttle to 100 at wide open throttle, without interruption.

4) If readings are correct, press right arrow button. Press "0" and "6" to select ENDING OUTPUT function. Press "Q" button to enter input. If readings are incorrect, adjust accelerator pedal by turning accelerator pedal adjustment screw. Retest TP sensor. If readings are not corrected by adjustment, check TP sensor circuit or replace TP sensor as necessary.

#### **2.0L**

1) Connect Scan Tester (VAG 1551) to Data Link Connector (DLC), located under A/C-heater system control panel. Using scan tester, enter READ BLOCK MEASUREMENT function mode. See appropriate articles;

For Diesel see G - TESTS W/CODES,  
For Gasoline see G - TESTS W/CODES.

2) Slowly open throttle, while observing display in field 3, until throttle is wide open. Numerical value must increase uniformly over entire throttle opening range and without interruption.

3) If reading is correct, press right arrow button. Press "0" and "6" to select END OUTPUT function. Press "Q" button to enter input. If reading is incorrect, repair TP sensor or circuit as necessary.

#### **2.8L**

## **D - ADJUSTMENTS**

### **Article Text (p. 4)**

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1) Connect Scan Tester (VAG 1551) to Data Link Connectors (DLC), located in center console, in front of shift lever. Turn ignition on. Operate scan tester and select RAPID DATA TRANSFER, ENGINE ELECTRONICS, then READ TEST VALUE BLOCK functions.

2) Press "0" and "3" buttons to select INSERT DISPLAY GROUP NUMBER 03 function. Press "Q" button to enter input. Slowly open throttle, while observing display in channel 3, until throttle is wide open. Numerical value must increase uniformly over entire throttle opening range, without interruption.

3) Reading should be 5-19 at idle. Reading should be 94-100 at full throttle stop. If readings are correct, press right arrow button. Press "0" and "6" to select ENDING OUTPUT function. Press "Q" button to enter input. If readings are incorrect, check TP sensor circuit or replace TP sensor as necessary.

**END OF ARTICLE**

## C - SPECIFICATIONS

### Article Text

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#### ARTICLE BEGINNING

1996 ENGINE PERFORMANCE  
Volkswagen Service & Adjustment Specifications

Cabrio, Golf III, GTI, Jetta III, Passat

#### INTRODUCTION

Use this article to quickly find specifications related to servicing and on-vehicle adjustments. This is a quick-reference article to use when you are familiar with an adjustment procedure and only need a specification.

#### CAPACITIES

##### BATTERY SPECIFICATIONS TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Amp Hr. Rating |
|-------------|----------------|
|-------------|----------------|

|                   |     |
|-------------------|-----|
| 1.9L & 2.0L ..... | (1) |
| 2.8L .....        | 63  |

(1) - Information is not available from manufacturer.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

##### FLUID CAPACITIES TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Quantity |
|-------------|----------|
|-------------|----------|

Auto. Trans.

A/T 01M (VW ATF Or Equivalent)

|                |                 |
|----------------|-----------------|
| Dry Fill ..... | 5.6 Qts. (5.3L) |
|----------------|-----------------|

|              |                 |
|--------------|-----------------|
| Refill ..... | 3.2 Qts. (3.0L) |
|--------------|-----------------|

A/T 096 (Dexron II)

|                |                 |
|----------------|-----------------|
| Dry Fill ..... | 5.9 Qts. (5.6L) |
|----------------|-----------------|

|              |                 |
|--------------|-----------------|
| Refill ..... | 3.2 Qts. (3.0L) |
|--------------|-----------------|

Auto Trans. Final Drive

|                                          |                 |
|------------------------------------------|-----------------|
| A/T 01M (VW ATF Or Equivalent) (1) ..... | 0.8 Qts (0.76L) |
|------------------------------------------|-----------------|

|                                                       |                  |
|-------------------------------------------------------|------------------|
| A/T 096 (SAE 75W-90,<br>Synthetic Gear Oil) (1) ..... | 0.8 Qts. (0.76L) |
|-------------------------------------------------------|------------------|

Cooling System (Includes Heater)

|                   |                 |
|-------------------|-----------------|
| 1.9L & 2.0L ..... | 6.9 Qts. (6.5L) |
|-------------------|-----------------|

|            |                 |
|------------|-----------------|
| 2.8L ..... | 9.1 Qts. (8.6L) |
|------------|-----------------|

Crankcase (Includes Filter)

|            |                 |
|------------|-----------------|
| 1.9L ..... | 4.5 Qts. (4.3L) |
|------------|-----------------|

|            |                 |
|------------|-----------------|
| 2.0L ..... | 4.3 Qts. (4.1L) |
|------------|-----------------|

|            |                 |
|------------|-----------------|
| 2.8L ..... | 6.3 Qts. (6.0L) |
|------------|-----------------|

|                                            |                 |
|--------------------------------------------|-----------------|
| Man. Transaxle (SAE 80W-90/API GL-4) ..... | 2.1 Qts. (2.0L) |
|--------------------------------------------|-----------------|

(1) - Dry fill capacity given. Use ONLY specified Oil.

## C - SPECIFICATIONS

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No oil change required.

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## QUICK-SERVICE

### SERVICE INTERVALS & SPECIFICATIONS

#### REPLACEMENT INTERVALS TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Component             | Miles  |
|-----------------------|--------|
| Air Filter .....      | 30,000 |
| Coolant .....         | 30,000 |
| Brake Fluid .....     | (1)    |
| Fuel Filter (2) ..... | 30,000 |
| Oil & Filter .....    | 7500   |
| Spark Plugs (3) ..... | 30,000 |
| Timing Belt .....     | 60,000 |

(1) - Every 2 years regardless of mileage.

(2) - On diesel engine only.

(3) - On gasoline engine only.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

#### BELT ADJUSTMENT TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application          | Specification            |
|----------------------|--------------------------|
| A/C Compressor ..... | (1)                      |
| Generator .....      | (1) (2)                  |
| Power Steering       |                          |
| New .....            | (3) 62 INCH Lbs. (7 N.m) |
| Used .....           | (3) 36 INCH Lbs. (4 N.m) |

(1) - Serpentine belt tension automatically adjusted by tensioner.

(2) - Tighten bolts. Start engine and let it idle for 5 minutes.  
Loosen and retighten bolts.

(3) - Turn tensioning nut on toothed rack with Torque Wrench (VAG1410) and Ring Insert (SW VAG 1410-2).

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## MECHANICAL CHECKS

### ENGINE COMPRESSION

#### COMPRESSION SPECIFICATIONS TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Specification |
|-------------|---------------|
|-------------|---------------|



[illegible]

## C - SPECIFICATIONS

### Article Text (p. 4)

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## SPARK PLUGS

### SPARK PLUG TYPE TABLE

Application Bosch

2.0L ..... FR8DS

2.8L ..... C9MCC

### SPARK PLUG SPECIFICATIONS

| Application | Gap<br>In. (mm) | Torque<br>Ft. Lbs. (N.m) |
|-------------|-----------------|--------------------------|
|-------------|-----------------|--------------------------|

|      |            |         |
|------|------------|---------|
| 2.0L | .024 (.60) | 22 (30) |
|------|------------|---------|

|      |                     |         |
|------|---------------------|---------|
| 2.8L | .028-.031 (.70-.80) | 18 (25) |
|------|---------------------|---------|

## FIRING ORDER & TIMING MARKS

NOTE: To identify firing order and/or distributor rotation, see Fig. 1.

1.9L

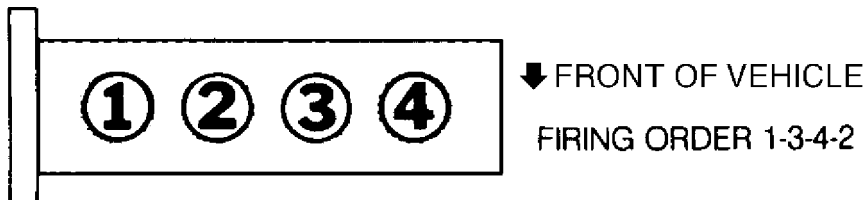
Information is not available from manufacturer.

2.0L

Timing mark location is on flywheel. Pointer is on timing hole on transaxle bellhousing.

2.8L

Ignition coil pack is located on left side of cylinder head. When ignition coil is triggered, spark is supplied to 2 spark plugs at one time. One spark plug fires during compression stroke and the other plug fires during exhaust stroke (waste spark).



96F10988

Fig. 1: Firing Order & Distributor Rotation - 1.9L  
Courtesy of Volkswagen United States, Inc.

## C - SPECIFICATIONS

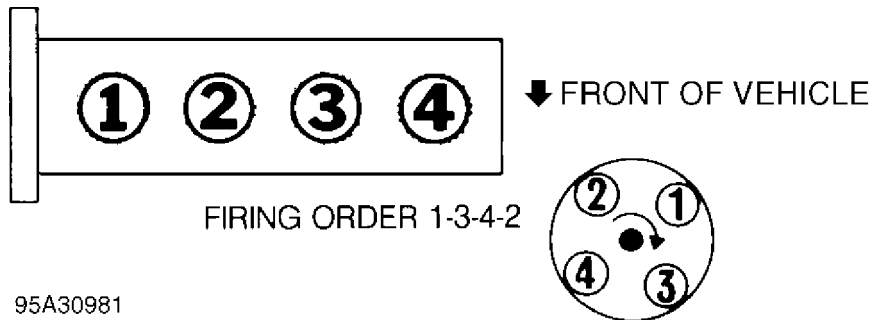
### Article Text (p. 5)

1996 Volkswagen Golf

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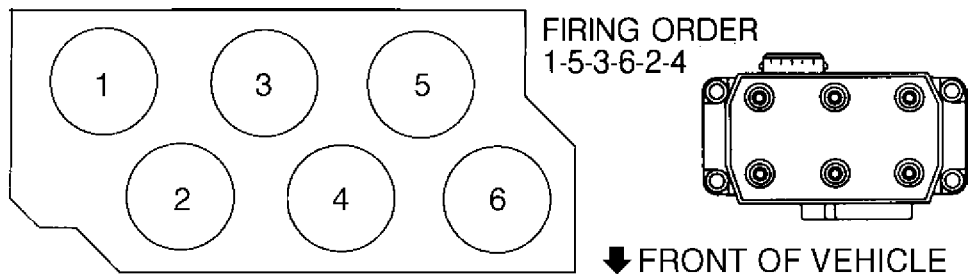
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95A30981

Fig. 2: Firing Order & Distributor Rotation - 2.0L  
Courtesy of Volkswagen United States, Inc.



93H79688

Fig. 3: Firing Order & Distributor Rotation - 2.8L  
Courtesy of Volkswagen United States, Inc.

### IGNITION TIMING

NOTE: Always refer to underhood label for latest specifications.

#### IGNITION TIMING TABLE (Degrees BTDC @ RPM)

| Application |                              |                 |  |
|-------------|------------------------------|-----------------|--|
| Checking    |                              | Adjusting       |  |
| 1.9L        | ..... (1) .....              | (1)             |  |
| 2.0L        | ..... (2) 12 @ 800-880 ..... | (3)             |  |
| 2.8L        | ..... 4-8 @ 2000-2500 ....   | 5-7 @ 2000-2500 |  |

(1) - Information is not available from manufacturer.

(2) - Scan Tester (VAG 1551) in START BASIC SETTING mode.

(3) - Ignition timing is not adjustable.

#### IGNITION TIMING ADVANCE TABLE (Degrees BTDC @ RPM)

| Application |                        | Specification |
|-------------|------------------------|---------------|
| 1.9L & 2.0L | .....                  | (1)           |
| 2.8L        | ..... (2) 27-33 @ 4500 |               |

(1) - Information is not available from manufacturer.

(2) - Vehicle not in BASIC ADJUSTMENT mode, engine oil temperature at 176°F (80°C), and Blue engine coolant

## C - SPECIFICATIONS

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temperature sensor connected.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## FUEL SYSTEM

### FUEL PUMP

NOTE: Fuel pump performance measures fuel pressure and volume availability, not regulated fuel pressure.

#### FUEL PUMP PERFORMANCE TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Pressure<br>psi (kg/cm <sup>2</sup> ) | Min. Vol. In 30 Sec.<br>Pts. (L) |
|-------------|---------------------------------------|----------------------------------|
|-------------|---------------------------------------|----------------------------------|

|                |                |                   |
|----------------|----------------|-------------------|
| 1.9L .....     | (1) .....      | (1)               |
| 2.0L (2) ..... | 43 (3.0) ..... | 1.0-1.4 (0.5-0.7) |
| 2.8L (2) ..... | 58 (4.0) ..... | 1.0-1.4 (0.5-0.7) |

- (1) - Information is not available from manufacturer.  
(2) - Using Adapter Cable (VAG 1348/3-2) between battery positive terminal and terminal No. 4 of fuel pump relay socket. Fuel pump energized, with 10-12 volts at fuel pump, and engine off.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

#### REGULATED FUEL PRESSURE TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | At Idle<br>w/ Vacuum<br>psi (kg/cm <sup>2</sup> ) | At Idle<br>w/o Vacuum<br>(1) psi (kg/cm <sup>2</sup> ) |
|-------------|---------------------------------------------------|--------------------------------------------------------|
|-------------|---------------------------------------------------|--------------------------------------------------------|

|            |                |          |
|------------|----------------|----------|
| 1.9L ..... | (2) .....      | (2)      |
| 2.0L ..... | 36 (2.5) ..... | 43 (3.0) |
| 2.8L ..... | 50 (3.5) ..... | 58 (4.0) |

- (1) - With vacuum hose disconnected from fuel pressure regulator.  
(2) - Information is not available from manufacturer.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## INJECTOR RESISTANCE

#### INJECTOR RESISTANCE SPECIFICATIONS TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Ohms |
|-------------|------|
|-------------|------|

|            |           |
|------------|-----------|
| 1.9L ..... | (1)       |
| 2.0L ..... | 14.0-21.5 |
| 2.8L ..... | 15.0-21.5 |

- (1) - Information is not available from manufacturer.



[illegible]

**B - EMISSION APPLICATION**  
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**ABBREVIATION DEFINITIONS**

ABBREVIATION DEFINITION TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Abbreviation Definition

|                                                                    |       |                                            |
|--------------------------------------------------------------------|-------|--------------------------------------------|
| CEC                                                                | ..... | Computerized Engine Controls               |
| DFI                                                                | ..... | Direct Fuel Injection                      |
| EGR                                                                | ..... | Exhaust Gas Recirculation                  |
| EGR-CS                                                             | ..... | EGR Control Solenoid                       |
| EGR-CV                                                             | ..... | EGR Control (Frequency) Valve              |
| EGR-TS                                                             | ..... | EGR Temperature Sensor                     |
| EVAP                                                               | ..... | Fuel Evaporative System                    |
| EVAP-PV                                                            | ..... | EVAP Purge (Frequency) Valve               |
| EVAP-VC                                                            | ..... | EVAP Vapor Canister                        |
| FR                                                                 | ..... | Fill Pipe Restrictor                       |
| HAI                                                                | ..... | Hot Air Intake                             |
| H02S                                                               | ..... | Heated Oxygen Sensor                       |
| MIL                                                                | ..... | Malfunction Indicator (CHECK ENGINE) Light |
| MFI                                                                | ..... | Multiport Fuel Injection                   |
| PCV                                                                | ..... | Positive Crankcase Ventilation             |
| SPK                                                                | ..... | Spark Control System                       |
| SPK-CC                                                             | ..... | SPK Computer Controlled                    |
| TWC                                                                | ..... | Three-Way Catalyst                         |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |       |                                            |

**END OF ARTICLE**

## AA - USING THIS SECTION (GENERAL HELP INFORMATION)

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## ARTICLE BEGINNING

ENGINE PERFORMANCE

How To Use This Section

## INTRODUCTION

NOTE: Because there are so many possible combinations of articles for the different manufacturers and models, the new hyper-text capabilities built into this product do not apply to this article.

It is the purpose of this repair information system to help professional automotive technicians maintain top vehicle performance and correct driveability problems related to today's high tech vehicles.

Because of the limited amount of space allowable, our titles have been condensed to fit into the menus. An alphabetical designation has been added to the front of each title to allow the titles to be displayed in a way that reflects their respective order of use. References to the titles in some of the diagnostic flow charts sometimes will not correlate with the titles in the menu. If not, refer to ELECTRONIC MENU CROSS-REFERENCE table.

### ELECTRONIC MENU CROSS-REFERENCE TABLE

Electronic Title Print Title

|                          |       |                                     |
|--------------------------|-------|-------------------------------------|
| A - ENGINE/VIN I D       | ..... | Introduction                        |
| B - EMISSION APPLICATION | ..... | Emission Applications               |
| C - TUNE-UP SPECS        | ..... | Service & Adjustment Specifications |
| C - SPECIFICATIONS       | ..... | Service & Adjustment Specifications |
| D - ADJUSTMENTS          | ..... | On-Vehicle Adjustments              |
| E - THEORY/OPERATION     | ..... | Theory & Operation                  |
| F - BASIC TESTING        | ..... | Basic Diagnostic Procedures         |
| G - TESTS W/CODES        | ..... | Self-Diagnostics                    |
| H - TESTS W/O CODES      | ..... | Trouble Shooting - No Codes         |
| I - SYS/COMP TESTS       | ..... | Systems & Component Testing         |
| J - PIN VOLTAGE CHARTS   | ..... | Pin Voltage Charts                  |
| K - SENSOR RANGE CHARTS  | ..... | Sensor Operating Range Charts       |
| L - WIRING DIAGRAMS      | ..... | Wiring Diagrams                     |
| M - VACUUM DIAGRAMS      | ..... | Vacuum Diagrams                     |
| N - REMOVE/INSTALL/OHAUL | ..... | Removal, Overhaul & Installation    |

Because of this we recommend that you read the rest of these INTRODUCTION paragraphs to better understand why the information is presented in this new format.

The A - ENGINE/VIN ID article will help you identify the vehicle and its systems. It will also explain the VIN code and in many cases, show its location.



## **AA - USING THIS SECTION (GENERAL HELP INFORMATION)**

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If you want "TUNE-UP" type information, see D - ADJUSTMENTS for the adjustment procedures. If you are familiar with the procedures, but need a quick way to find the specification, go to C - TUNE-UP SPECS or C - SPECIFICATIONS for the specifications pertaining to the vehicle.

When diagnosing driveability problems, first go to F - BASIC TESTING. This article is here to help eliminate wasted diagnostic time. If the basic systems are working properly, go to G - TESTS W/CODES.

If the vehicle still is having a driveability problem or if the vehicle has no self-diagnostic system, go to H - TESTS W/O CODES. This article will help you diagnose the problem by symptom, locate the symptom exhibited by the vehicle, and inspect or test the items which may be causing the problem.

After finding which specific system or component requires testing, use the I - SYS/COMP TESTS article to tests the systems and components. Also included (when available) are pin voltage charts and sensor range charts. These can be found in J - PIN VOLTAGE CHARTS and K - SENSOR RANGE CHARTS.

Also included in this section are wiring diagrams and vacuum diagrams. These can be found in L - WIRING DIAGRAMS and M - VACUUM DIAGRAMS.

When all diagnostic tests have been performed and the problem has been discovered, it may be necessary to replace or overhaul the defective part. This information can be found in N - REMOVE/INSTALL/OHAUL.

The content of each of these articles is outlined below. As a summary of the driveability diagnosis, see ROUTINE OUTLINE in this article.

### **A - ENGINE/VIN ID**

This article shows how to identify the model and engine by its Vehicle Identification Number (VIN). A model coverage chart shows each model and engine, the fuel system, ignition system and engine code. The engine serial number locations are also included in this article.

### **B - EMISSION APPLICATION**

These charts identify the emission systems and sub-systems applicable to each model and engine combination.

### **C - TUNE-UP SPECS**

This is a collection of quick-reference type specifications. This article is helpful when you are familiar with proper adjustment procedures and only need specifications. Included in this section are:

- \* Battery specifications.
- \* Fluid capacities.

## **AA - USING THIS SECTION (GENERAL HELP INFORMATION)**

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- \* Replacement intervals.
- \* Belt adjustment.
- \* Engine Compression.
- \* Valve clearance.
- \* Valve Arrangement.
- \* Ignition coil specifications.
  
- \* High tension wire resistance.
- \* Spark plug type and gap.
- \* Firing order.
- \* Ignition timing.
- \* Fuel pump performance and injector resistance specifications
- \* Slow and fast idle speed and mixture specifications.
- \* Carbon monoxide (CO) level specifications.
- \* Throttle position sensor/switch specifications.

## **C - SPECIFICATIONS**

This is a collection of quick-reference type specifications. This article is helpful when you are familiar with proper adjustment procedures and only need specifications. Included in this section are:

- \* Battery specifications.
- \* Fluid capacities.
- \* Replacement intervals.
- \* Belt adjustment.
- \* Engine Compression.
- \* Valve clearance.
- \* Valve Arrangement.
- \* Ignition coil specifications.
  
- \* High tension wire resistance.
- \* Spark plug type and gap.
- \* Firing order.
- \* Ignition timing.
- \* Fuel pump performance and injector resistance specifications
- \* Slow and fast idle speed and mixture specifications.
- \* Carbon monoxide (CO) level specifications.
- \* Throttle position sensor/switch specifications.

## **D - ADJUSTMENTS**

This article contains the information that use to be included in the TUNE-UP section. Checking and adjusting valves, spark plugs, spark plug wires, base ignition timing and idle speed are found in this section. Use this article for routine maintenance. Also, if you have a driveability problem, ensure all on-vehicle adjustments are correct before proceeding with any diagnosis.

## **E - THEORY/OPERATION**

## **AA - USING THIS SECTION (GENERAL HELP INFORMATION)**

### **Article Text (p. 4)**

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This article covers basic theory and operation of engine performance-related systems and components. Before diagnosing vehicles or systems with which you are not completely familiar, read this article.

### **F - BASIC TESTING**

When diagnosing driveability problems, there are certain "BASIC DIAGNOSTIC PROCEDURES" which must FIRST be performed. It is necessary to perform a careful, complete check of basic engine mechanical and electrical conditions, and verify spark availability and adequate fuel supply.

The procedures apply to both computerized and non-computerized systems. If all systems are okay, go to G - TESTS W/CODES for vehicles with self-diagnostic systems or H - TESTS W/O CODES for diagnosis by symptom.

### **G - TESTS W/CODES**

Use this article to retrieve and interpret trouble codes from the engine computer self-diagnostic system. Once information is retrieved, diagnostic procedures are given to help pinpoint and repair computer system/component faults. Necessary steps for clearing trouble codes are also given. If faults indicated by trouble codes are not present at time of testing, proceed to H - TESTS W/O CODES for intermittent testing procedures.

### **H - TESTS W/O CODES**

This article helps trouble shoot driveability problems based upon available "SYMPTOMS" and "INTERMITTENT TESTING" procedures. Procedures in this section should lead you to specific component or system tests which may or may not be computer monitored/controlled.

### **I - SYS/COMP TESTS**

In this article, you will find tests for systems and components related to air induction systems (turbochargers), fuel control, ignition control, and emissions control systems.

### **J - PIN VOLTAGE CHARTS**

PIN VOLTAGE CHARTS are supplied (where available) to speed up the diagnostic process. By checking pin voltages at the electronic control unit, it is possible to determine if the control unit is receiving and transmitting proper voltage signals.

### **K - SENSOR RANGE CHARTS**

Use the SENSOR OPERATING RANGE CHARTS to determine if a

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sensor is out of calibration. A sensor that is out of calibration may not set a trouble code, but it will cause driveability problems.

### **L - WIRING DIAGRAMS**

Use these WIRING DIAGRAMS to identify and trace component circuits, locate shorts and opens in circuits, and understand how individual circuits function as part of a system. The diagrams in this article are only for fuel, ignition and emission systems

### **M - VACUUM DIAGRAMS**

The VACUUM DIAGRAMS will assist you in finding incorrectly routed vacuum hoses which may cause driveability problems or computer indicated malfunctions.

### **N - REMOVE/INSTALL/OHAUL**

N - REMOVE/INSTALL/OHAUL contains information found in the sub-headings of REMOVAL, OVERHAUL & INSTALLATION. These are procedures and specifications required to remove, overhaul (if possible) and install components related to engine performance.

### **WHERE TO START**

#### **PERFORM BASIC INSPECTION**

- 1) Verify customer complaint.
- 2) Perform visual inspection. See F - BASIC TESTING.
- 3) Test engine sub-system to determine that the following systems are functioning properly. See F- BASIC TESTING.

- \* Mechanical conditions (compression)
- \* Ignition output
- \* Fuel Delivery

- 4) Check air induction system for leaks.
- 5) Check & adjust basic engine settings listed below to ensure they are to specification. See D - ADJUSTMENTS.

- \* Ignition timing
- \* Idle speed

#### **CHECK FOR TROUBLE CODES**

- 1) If equipped with self-diagnostics, check for trouble codes. Refer to G - TESTS W/CODES.
- 2) Repair causes of trouble code(s).
- 3) Clear control unit memory.

#### **SYMPTOM DIAGNOSIS**

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1) If no self-diagnostics available, or no trouble codes present, identify symptom.

2) See trouble shooting procedure to repair complaint. See H

- TESTS W/O CODES.

#### TEST SYSTEM

1) Perform necessary systems and component tests. See I - SYS/COMP TESTS.

2) Verify that complaint is repaired.

#### SAFETY PRECAUTIONS

- \* Always refer to Engine Tune-Up Decal in engine compartment before performing tune-up. If manual and decal differ, always use decal specifications.
- \* Do not allow or create a condition of misfire in more than one cylinder for an extended period of time. Damage to converter may occur due to loading converter with unburned air/fuel mixture.
- \* Always turn ignition off and disconnect negative battery cable BEFORE disconnecting or connecting computer or other electrical components.
- \* DO NOT drop or shock electrical components such as computer, airflow meter, etc.
- \* DO NOT use fuel system cleaning compounds that are not recommended by the manufacturer. Damage to gaskets, diaphragm materials and catalytic converter may result.
- \* Before performing a compression test or cranking engine using a remote starter switch, disconnect coil wire from distributor and secure it to a good engine ground, or disable ignition.
- \* Before disconnecting any fuel system component, ensure fuel system pressure is released.
- \* Use a shop towel to absorb any spilled fuel to prevent fire.
- \* DO NOT create sparks or have an open flame near battery.
- \* If any EFI components such as hoses or clamps are replaced, ensure they are replaced with components designed for EFI use.
- \* Always reassemble throttle body components with new gaskets, "O" rings and seals.
- \* If equipped with an inertia switch, DO NOT reset switch until fuel system has been inspected for leaks.
- \* Wear safety goggles when drilling or grinding.
- \* Wear proper clothing which protects against chemicals and other hazards.

END OF ARTICLE

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# 1996 ENGINE PERFORMANCE

## Volkswagen Introduction

| MODEL    | BODY | ENGINE CODE    | ENGINE | FUEL SYSTEM      | IGNITION SYSTEM |
|----------|------|----------------|--------|------------------|-----------------|
| CODE(1)  | (2)  | ID (3)         |        |                  |                 |
| Cabrio   | 1E   | ABA 2.0L 4-Cyl | B      | Motronic MFI (4) | Hall Effect (3) |
| Golf III | 1H   | ABA 2.0L 4-Cyl | B      | Motronic MFI (4) | Hall Effect (3) |
| GTI      | 1H   | AAA 2.8L VR6   | D      | Motronic MFI (4) | Hall Effect (3) |
|          |      | (5)            |        |                  |                 |
| Jetta    | 1H   | ABA 2.0L 4-Cyl | B      | Motronic MFI (4) | Hall Effect (3) |
| III      |      | AAA 2.8L VR6   | D      | Motronic MFI (4) | Hall Effect (3) |
|          |      | (5)            |        |                  |                 |
| Passat   | 3A   | 1Z 1.9L 4-Cyl  | F      | Diesel DFI (6)   | Diesel DIS (7)  |
|          |      | Turbo Diesel   |        |                  |                 |
|          |      | ABA 2.0L 4-Cyl | B      | Motronic MFI (4) | Hall Effect (3) |
|          |      | AAA 2.8L VR6   | D      | Motronic MFI (4) | Hall Effect (3) |
|          |      | (5)            |        |                  |                 |

(1) Body code is designated by 7th and 8th digit of Vehicle Identification Number (VIN). See VIN DEFINITION below.

(2) Engine code letters and engine serial number are located on engine block. See Fig. 1. An adhesive label on drive belt cover also identifies engine code and engine serial number. Engine code is additionally located on underhood vehicle data plate.

(3) - Engine is identified by 5th digit of Vehicle Identification Number (VIN).

(4) - Sequential multiport fuel injection.

(5) - VR6 is a combination of "Vee" and "Reihenmotor" (German). The combination roughly translates as "in-line vee". For practical purposes, engine has 6 in-line but slightly staggered cylinders.

(6) - Direct fuel injection.

(7) - Direct ignition system.

(VIN)      W   V   W   C   B   5   1   5   2   T   C   0   0   0   0   0   1

**A - ENGINE/VIN ID**  
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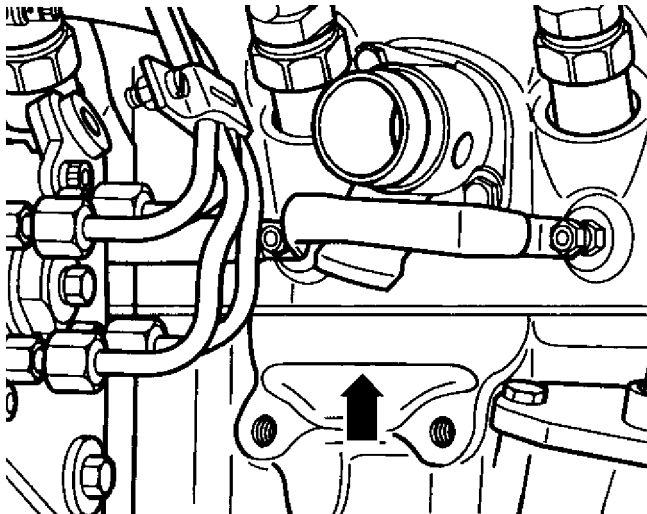
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

- 1-3 - Indicates Nation of Origin.
- 4 - Indicates Series.
- 5 - Indicates Engine Type.
- 6 - Indicates Restraint System.
- 7-8 - Indicates Body Code.
- 9 - Indicates Check Digit.
- 10 - Indicates Model Year.
- 11 - Indicates Assembly Plant.
- 12-17 - Indicates Production Sequence.

**MODEL YEAR VIN CODE APPLICATION TABLE**

|                                                              |       |       |       |       |       |       |       |       |       |            |       |       |       |       |       |      |
|--------------------------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------------|-------|-------|-------|-------|-------|------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |       |       |       |       |       |       |       |       |       |            |       |       |       |       |       |      |
| VIN Code                                                     |       |       |       |       |       |       |       |       |       | Model Year |       |       |       |       |       |      |
| R                                                            | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .....      | ..... | ..... | ..... | ..... | ..... | 1994 |
| S                                                            | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .....      | ..... | ..... | ..... | ..... | ..... | 1995 |
| T                                                            | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | .....      | ..... | ..... | ..... | ..... | ..... | 1996 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |       |       |       |       |       |       |       |       |       |            |       |       |       |       |       |      |

**ENGINE CODE LOCATION**



STAMPED ON ENGINE BLOCK,  
 BETWEEN DIESEL INJECTION  
 PUMP & EXHAUST PIPE

96D10986

Fig. 1: Locating Engine Identification Codes 1.9L 4-Cylinder Turbo Diesel  
 Courtesy of Volkswagen United States, Inc.

## A - ENGINE/VIN ID

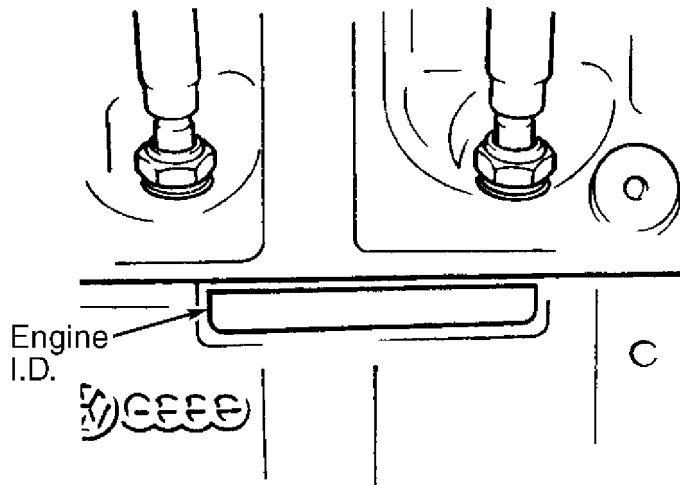
### Article Text (p. 3)

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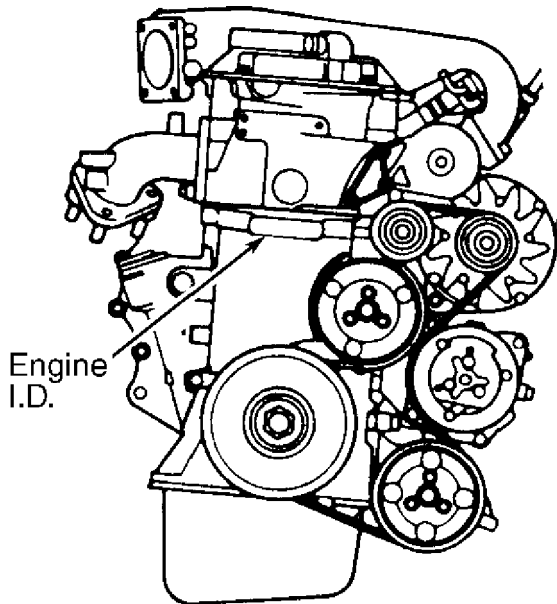
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STAMPED ON ENGINE BLOCK,  
ABOVE CRANKCASE BREATHER

96E10987

Fig. 2: Locating Engine Identification Codes 2.0L 4-Cylinder  
Courtesy of Volkswagen United States, Inc.



STAMPED ON ENGINE BLOCK,  
JUST BELOW CYLINDER HEAD

92D26719

Fig. 3: Locating Engine Identification Codes 2.8L VR6  
Courtesy of Volkswagen United States, Inc.

END OF ARTICLE



# **\* ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES \***

## **Article Text**

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### **ARTICLE BEGINNING**

#### **GENERAL INFORMATION**

Engine Maintenance & Performance  
Uniform Inspection Guidelines

All Makes & Models

Last Updated: December, 1994

### **MAP UNIFORM INSPECTION GENERAL GUIDELINES**

#### **OVERVIEW OF MOTORIST ASSURANCE PROGRAM**

The Motorist Assurance Program (MAP) is the consumer outreach effort of the Automotive Maintenance and Repair Association, Inc. (AMRA). Participation in the Motorist Assurance Program is drawn from retailers, suppliers, independent repair facilities, vehicle manufacturers and industry associations.

The Motorist Assurance Program was established as an industry-wide effort to address concerns raised by regulators, the media and consumers questioning our ethics and methods of doing business. The automotive repair industry had been bombarded by months of negative stories in the media and scrutiny from state and federal regulators who focused on how the need for repairs is determined. MAP was formed as an industry response to this issue.

Our mission is to strengthen the relationship between the consumer and the auto repair industry. We produce materials that give motorists the information and encouragement to take responsibility for their vehicles - through proper, manufacturer-recommended, maintenance. We encourage participating service and repair shops (including franchisees and dealers) to adopt a Pledge to their Customers and the Motorist Assurance Program developed Standards of Service. All participating service providers have agreed to subscribe to this Pledge and to adhere to the promulgated Standards of Service which demonstrates to their customers that they are serious about customer satisfaction.

These Standards of Service require that an inspection of the vehicle's (problem) system be made according to industry guidelines. After learning that neither the car manufacturers nor any other source had complete guidelines, leading industry organizations, along with other industry participants banded together to address this challenging task. During the past two and a half years, they successfully developed industry inspection guidelines for the following systems: Exhaust, Brakes, ABS, Steering and Suspension, Engine Maintenance and Performance, HVAC, and Electrical systems. Guidelines for Drive Train and Transmission are currently being promulgated. Revisions to the inspection guidelines for Exhaust, Brakes/ABS and Steering and Suspension Systems, which were issued two years ago, are now being published for implementation beginning spring 1997. Participating shops utilize these Uniform Inspection Guidelines

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as part of the inspection process and for communicating their findings to their customers.

The Motorist Assurance Program continues to work cooperatively and proactively with government agencies and consumer groups toward solutions that both benefit the customer and are mutually acceptable to both regulators and industry. We maintain the belief that industry must retain control over how we conduct our business, and we must be viewed as part of the solution and not part of the problem. Meetings with state and other government officials concerned with auto repair and/or consumer protection are conducted. Feedback from these representatives are brought back to members, and the program adjusted as needed.

To assure auto repair customers recourse if they were not satisfied with a repair transaction, the Motorist Assurance Program offers arbitration through MAP/BBB-CARE in cooperation with the Council of Better Business Bureaus and individual participating Bureaus. MAP "piloted" in Indianapolis and Pittsburgh during spring, 1996 - and publicized "roll-outs" in New Jersey, Detroit (MI), Chicago (IL) and Richmond (VA) were conducted. To put some "teeth" in the program, and accreditation requirement for shops was initiated. The requirements are stringent and a self-policing method has been incorporated which includes the "mystery shopping" of outlets. In addition, a committee of service providers had been working diligently developing standards for newspaper, television and Internet advertising.

We welcome you to join us as we continue our outreach ... with your support, both the automotive repair industry and your customers will reap the benefits. Please visit MAP at our Internet site: [www.hunter.com/map.htm](http://www.hunter.com/map.htm) or contact us at:

808 17th Street, NW Suite 200  
Washington, D.C. 20006  
Ph. (202) 466-7050 Fax (202) 223-9569

### **OVERVIEW OF SERVICE REQUIREMENTS & SUGGESTIONS**

It is MAP policy that all exhaust, brake, ABS, steering and suspension, wheel alignment, tires and wheels, driveline, engine performance and maintenance and heating, ventilation and air conditioning services be offered and performed under the guidelines and procedures specified in these sections.

Before any service is performed on a vehicle, an inspection of the appropriate system must be performed. The results of this inspection must be explained to the customer and documented on an inspection form. The condition of the vehicle and its components will indicate what services/part replacements may be required or suggested. In addition, suggestions may be made to satisfy the needs expressed by the customer.

This section lists the various parts and conditions that indicate required or suggested service or part replacement. Although this list is extensive, it is not inclusive. In addition to this list, a technician may make a suggestion. This suggestion must be based on

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substantial and informed experience or the vehicle manufacturer's recommended service interval.

Some conditions indicate that service or part replacement is required because the part in question is no longer providing the function for which it is intended, does not meet a vehicle manufacturer's design specification or is missing.

- \* Example: An exhaust pipe has corroded severely and has a hole in it through which exhaust gases are leaking. Replacement of the exhaust pipe in this case is required due to functional failure.
- \* Example: A brake rotor has been worn to the point where it measures less than the vehicle manufacturer's specifications. Replacement of the rotor is required because it does not meet design specifications.

Some conditions indicate that a service or part replacement is suggested because the part is close to the end of its useful life or to address a customer's need, convenience or request. If a customer's vehicle has one of these conditions, the procedure may only be to suggest service.

- \* Example: An exhaust pipe is rusted, corroded or weak, but no leaks are present. In this case, the exhaust pipe has not failed. However, there is evidence that the pipe may need replacement in the near future. Replacement of the pipe may be suggested for the customer's convenience in avoiding a future problem.
- \* Example: The customer desires improved ride and/or handling, but the vehicle's shocks or struts have not failed. In this case, replacement may be suggested to satisfy the customer's wishes. In this case, replacement of the shocks or struts may not be sold as a requirement.

A customer, of course, has the choice of whether or not a shop will service his or her vehicle. He or she may decide not to follow some of your suggestions. When a customer declines to authorize a service or repair indicated in the MAP Uniform Inspection Guidelines as "required," a MAP shop may refuse service on that system, if proceeding with the work could create or continue an unsafe or unsatisfactory condition.

The following reasons may be used for required and suggested services. These codes are shown in the "Code" column of the Uniform Inspection Guidelines that follow.

## **ENGINE PERFORMANCE & MAINTENANCE**

### **ENGINE: MISCELLANEOUS**

### **ENGINE OIL**



**\* ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES \***

**Article Text (p. 5)**

1996 Volkswagen Golf

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NOTE: Some OEMs require replacement of drain plug gasket. Inspect threads in oil pan for damage.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

**ENGINE OIL WARNING LIGHTS**

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|           |              |           |
|-----------|--------------|-----------|
| Condition | <sup>3</sup> | Procedure |
|-----------|--------------|-----------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Light not on during bulb check <sup>3</sup> Further inspection required. See

<sup>3</sup> NOTE: below.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Light stays on or intermittent <sup>3</sup> Further inspection required. See

while engine is running <sup>3</sup> NOTE: below.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

NOTE: Light may indicate problem with contaminated oil, level, pressure, temperature or problem with circuit.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

**ENGINE OIL PRESSURE GAUGE**

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|           |              |           |
|-----------|--------------|-----------|
| Condition | <sup>3</sup> | Procedure |
|-----------|--------------|-----------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Inoperative <sup>3</sup> Further inspection required. See note.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Indicates out of range <sup>3</sup> Further inspection required. See note.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

NOTE: Gauge may indicate problem with contaminated oil, level, pressure, temperature or problem with gauge.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

**OIL PRESSURE SENDING UNIT**

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|           |              |           |
|-----------|--------------|-----------|
| Condition | <sup>3</sup> | Procedure |
|-----------|--------------|-----------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking <sup>3</sup> Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Connector or terminal bent, broken, <sup>3</sup> Require repair or replacement.

or loose <sup>3</sup>

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Inoperative/inaccurate <sup>3</sup> Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

**POWER STEERING FLUID**

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|           |              |           |
|-----------|--------------|-----------|
| Condition | <sup>3</sup> | Procedure |
|-----------|--------------|-----------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

See Steering and Suspension Uniform Inspection Guidelines

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

**TIMING BELT**

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

|           |              |           |
|-----------|--------------|-----------|
| Condition | <sup>3</sup> | Procedure |
|-----------|--------------|-----------|

| Condition                    | 3 | Procedure                                        |
|------------------------------|---|--------------------------------------------------|
| Worn or damaged bushings     | 3 | Requirement replacement.                         |
| Damaged or missing fasteners | 3 | Require repair or replacement of<br>3 fasteners. |

## \* ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES \*

## Article Text (p. 7)

## 1996 Volkswagen Golf

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Leaking<sup>3</sup> Suggest replacement.

Missing<sup>3</sup> Require replacement

## INDICATOR LIGHTS & GUAGES (TEMPERATURE, BRAKE, ENGINE OIL, CHARGING)

Condition - Lights 3 Procedure

```
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Light doesn't come on during bulb check ^
```

```

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA`
Fail to function properly during test      3 Further inspection required.
mode                                       3 See note.

```

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA'  
On constantly or intermittently<sup>3</sup>

NOTE: See service manual for further information.

Condition - Guages 3 Procedure

[illegible]

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA' Further inspection required.  
Indicating out of manufacturer's <sup>3</sup> See note.

[illegible]

NOTE: See service manual for further information.  
 ~~~~~

DIP STICKS/TUBES

Condition		Procedure	
3			

Missing³ Require replacement.

Incorrect application ³ Require replacement.

Modified³ Suggest replacement.

Broken/damaged ³ Suggest replacement.

Leaking ³ Suggest repair or replacement.

[illegible]

COOLERS (TRANSMISSION) EXTERNAL; ENGINE OIL; POWER STEERING

[illegible]

Leaking ³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged fins, tubes or fittings ³ Suggest repair or replacement.

[illegible]

* ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES *

Article Text (p. 8)

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Internal restrictions	3	Require repair or replacement.
Missing/by-passed	3	Further inspection required.
Air flow restriction	3	Suggest repair.
Missing, damaged, deteriorated	3	Require repair or replacement of mounting hardware and bushings
	3	hardware and/or bushings.

ENGINE COOLING SYSTEM

RADIATOR & RADIATOR CAP

Condition - Radiator		3	Procedure
Leaking		3	Require repair or replacement.
Damaged fins, tubes or fittings		3	Suggest repair or replacement.
Internal restrictions		3	Require repair or replacement.
Air flow restriction		3	Suggest repair.
Missing, damaged, deteriorated mounting hardware and bushings		3	Require repair or replacement of hardware and/or bushings.
Leaking internal trans cooler		3	Require repair or replacement.
Corroded		3	Suggest repair or replacement.
Condition - Radiator Cap		3	Procedure
Missing		3	Require replacement.
Fails to maintain proper pressure		3	Require replacement.
Damaged/bent or corroded		3	Suggest replacement.
Missing gaskets/seals		3	Require replacement.
Coolant recovery check valve inoperative		3	Require replacement.
Improper application		3	Require replacement.

THERMOSTAT/HOUSING

Condition	Procedure
Improper installation	³ Require repair or replacement.

* ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES *

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Missing/damaged/corroded thermostat	3	Require replacement of
	3	thermostat

Improper application	³ Require replacement.
Inoperative	³ Require replacement.
Damaged/corroded housing	³ Suggest replacement of housing.

COOLANT HOSES/TUBES (RADIATOR, BY-PASS, HEATER, RECOVERY TANK)

Condition	3	Procedure
Leaking	3	Require repair or replacement.
Brittle, hard, cracked, corroded, spongy, soft, oil soaked, collapsed, swollen, non-automotive	3	Suggest repair or replacement.
Improper routing	3	Suggest repair or replacement.
Restricted	3	Suggest repair or replacement.
Missing/damaged protective sleeves	3	Suggest replacement of sleeves.
Maintenance intervals	3	Suggest replacement to comply with vehicle's OEM recommended service intervals.

CLAMPS

Condition	3	Procedure
Missing/damaged	3	Require replacement.
Loose	3	Require repair or replacement.
Corroded	3	Suggest replacement.

NOTE: Be sure to inspect hoses for deterioration.

COOLANT RECOVERY TANK/CAP

Condition	Procedure
Missing	³ Require replacement.
Leaking	³ Require repair or replacement.

*** ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES ***

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Damaged³ Suggest repair or replacement.
Missing, damaged mounting hardware³ Suggest repair or replacement of
³ hardware.

COOLANT

Condition ³	Procedure
Contaminated	³ Require replacement. Further inspection ³ required. See NOTE: (1).
Low level	³ Require filling to proper level. See ³ NOTE: (2).
Improper mixture/type	³ Require correction or replacement.
Improper acidity (pH)	³ Suggest correction or replacement.
Maintenance intervals	³ Suggest replacement. See NOTE: (3).

NOTE: (1) Determine source of contamination and suggest correction prior to coolant replacement.
(2) Determine source of incorrect level and suggest repair.
(3) The system should be drained and/or flushed and refilled with correct coolant according to OEM Recommended Service Interval and procedure.

WATER PUMP

Condition ³	Procedure
Leaking, damaged	³ Require replacement.
Noisy	³ Suggest replacement.
Inoperative	³ Require replacement.
Broken, missing fasteners	³ Require replacement of fasteners.

SHROUD/BAFFLES/DEFLECTORS

Condition ³	Procedure
Missing/damaged	³ Require replacement.
Missing/damaged mounting hardware	³ Require replacement of hardware.

*** ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES ***

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RADIATOR FAN BLADE & FAN CLUTCH

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition - Fan Blade ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Loose ³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition - Fan Clutch ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Seized ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Noisy/worn bearing ³ Suggest replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking ³ Suggest replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Slips (insufficient fan speed) ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged ³ Suggest replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Loose fasteners ³ Require repair or replacement of

³ fasteners.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

NOTE: Some lateral movement, measured at the fan blade tip, is normal.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

RADIATOR FAN MOTOR

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Vibration/noisy ³ Suggest replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Intermittent/inoperative ³ Require replacement. See note.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Missing ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Missing, damaged mounting hardware ³ Require replacement of hardware.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

NOTE: Check fan motor/controls.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

RADIATOR FAN MOTOR RELAY/MODULE & FAN MOTOR RESISTOR

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition - Fan Motor Relay/Module ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Missing ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged ³ Suggest replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Intermittent/inoperative ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Missing, damaged mounting hardware ³ Require replacement of hardware.

Condition		Procedure	
3			

Condition		Procedure	
Missing	3	Require replacement.	

Condition - Control ³		
Mechanism		Procedure
Inoperative	³	Require repair or replacement. Further inspection required. See NOTE: below.
Leaking	³	Require repair or replacement.

[illegible]

[illegible]

*** ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES ***

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POWERTRAIN CONTROL MODULE (PCM)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Condition	³ Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Inoperative	³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Damaged	³ Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	

SENSORS/ACTUATORS DEFINITIONS

NOTE: The conditions and procedures apply to, but are not limited to the following list of components (SAE J1930 Terminology).

SENSORS/ACTUATORS DEFINITIONS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Sensor	Abbreviation

02 Sensor	02S
Intake Air Temperature Sensor	IAT
Manifold Absolute Pressure Sensor	MAP
Engine Coolant Temperature Sensor	ECT
Barometric Pressure Sensor	BARO
Crankshaft Position Sensor	CKP
Throttle Positon Sensor	TPS
Camshaft Position Sensor	CMP
Park Neutral Position	PNP
Clutch Pedal Position Switch	CPP
Wide Open Throttle Switch	WOT Switch
Exhaust Gas Recirculation Valve Position Sensor	EGR Valve Position Sensor
Mass Air Flow Sensor	MAF
Volume Air Flow Sensor	VAF
Power Steering Pressure Sensor	PSP
Vehicle Speed Sensor	VSS
Fan Control Sensor	FS
Knock Sensor	KS
Air Conditioning Cycling Switch	AC
Exhaust Gas Recirculating Temperature Sensor	EGRT
Transmission Range Switch	TR Switch

Actuators	Abbreviation

Idle Speed Control Actuator	ISC
Idle Air Control	IAC
Exhaust Gas Recirculation Solenoid	EGR Solenoid
Vacuum Regulator Solenoid	...
Mix Control Solenoid	MC Solenoid
Torque Converter Clutch	TCC

[illegible]

*** ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES ***

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TUBES, HOSES, CLAMPS & GROMMETS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	³	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Missing	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Damaged	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Leaking	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Restricted	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

ORIFICE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	³	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Missing	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Restricted	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Maintenance intervals	³	Suggest replacement to comply with vehicle's
	³	OEM recommended service intervals.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

OIL SEPARATOR/FILTER

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	³	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Missing	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Restricted	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Damaged	³	Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Maintenance intervals	³	Suggest replacement to comply with vehicle's
	³	OEM recommended service intervals.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

IGNITION SYSTEM

BATTERY

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	³	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Refer to Starting/Charging System information.		
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

BATTERY CABLES/WIRES/CONNECTORS (SEE NOTE:)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	³	Procedure

*** ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES ***

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged³ Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Corroded³ Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
High resistance³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Loose³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing, damaged, deteriorated³ Require repair or replacement.
mounting hardware³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
NOTE: Cable/wires includes all wires and terminals connected to the
battery.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

BATTERY TRAY/HOLD DOWN HARDWARE
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition³ Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged/corroded³ Suggest repair or replacement. See NOTE:
³ below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
NOTE: If battery tray/hold down hardware no longer performs
intended purpose, require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

FUSIBLE LINK
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition³ Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged³ Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Open³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

IGNITION SWITCH
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition³ Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged³ Suggest replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Inoperable/intermittent³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

PARK NEUTRAL SWITCH (PNP)
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition³ Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Inoperable/intermittent³ Require replacement.

Condition		Procedure	
3			

Condition		Procedure
Missing	3	Require replacement.
Inoperative	3	Require repair or replacement. Further inspection required. See NOTE: below.
Damaged	3	Suggest replacement.
Missing/damaged mounting hardware	3	Require repair or replacement of hardware.

Damaged

*** ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES ***

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Corroded/eroded terminals ³ Suggest replacement.
AAAAAA
Burned/carbon tracked/arcing ³ Require replacement.
AAAAAA
Missing carbon button ³ Require replacement.
AAAAAA
Loose ³ Suggest repair or replacement.
AAAAAA

DISTRIBUTOR ROTOR

AAAAAA
Condition ³ Procedure
AAAAAA
Damaged ³ Suggest replacement.
AAAAAA
Corroded/eroded ³ Require replacement.
AAAAAA
Loose ³ Suggest repair or replacement.
AAAAAA
Missing, damaged hold down fastener ³ Require repair or replacement of fastener
fastener ³
AAAAAA
Burned/carbon tracked ³ Require replacement.
AAAAAA

IGNITION WIRES/BOOTS/TERMINAL (SECONDARY - SEE NOTE: (1))

AAAAAA
Condition ³ Procedure
AAAAAA
Damaged ³ Suggest repair or replacement.
AAAAAA
Oil soaked ³ Suggest replacement.
AAAAAA
Open/shorted ³ Require repair or replacement.
AAAAAA
Mis-routed ³ Suggest repair. See NOTE: (2).
AAAAAA
Missing/damaged mounting ³ Suggest repair or replacement of hardware.
 ³ See NOTE: (2).
AAAAAA
Loose terminal ³ Suggest repair or replacement.
AAAAAA
Corroded ³ Suggest repair or replacement.
AAAAAA
High/Low resistance ³ Require repair or replacement.
AAAAAA

- NOTE: (1) It is not required to replace ignition wires in sets.
 However, you may suggest replacement of the entire secondary
 wire set for preventive maintenance.
- (2) Proper routing, hardware, heat shields, etc. are intended to
 prevent premature failure of secondary ignition components.

[illegible]

*** ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES ***

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Condition	3	Procedure
Missing	3	Require replacement.
Leaking	3	Require replacement.
Damaged	3	Suggest replacement.

FUEL FILLER NECK/HOSES/CLAMPS/RESTRICTOR

Condition	3	Procedure
Missing	3	Require replacement.
Leaking	3	Require repair or replacement.
Damaged	3	Suggest repair or replacement.
Missing, damaged mounting hardware	3	Require repair or replacement of hardware.

FUEL TANK/CELL

Condition	3	Procedure
Leaking	3	Require repair or replacement.
Loose baffles	3	Require repair or replacement.
Damaged	3	Suggest repair or replacement.
Missing, damaged mounting hardware	3	Require repair or replacement of hardware.
Contaminated	3	Suggest repair. Further inspection required. See NOTE: below.

NOTE: Some components may be serviceable; check for accepted cleaning procedure.

FUEL LEVEL SENDER

Condition	3	Procedure
Inoperative	3	Suggest repair or replacement.
Leaking	3	Require repair or replacement.
Damaged	3	Suggest repair or replacement.

*** ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES ***

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

FUEL PUMP (IN TANK/EXTERNAL - ELECTRICAL OR MECHANICAL)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Inoperative ³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Noisy ³ Suggest replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking ³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged ³ Suggest repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Missing, damaged mounting ³ Requires repair or replacement of hardware
hardware ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

ELECTRIC FUEL PUMP CONTROL CIRCUIT

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

See Electrical Uniform Inspection Guidelines.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

LIQUID VAPOR SEPARATOR

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Missing ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged ³ Suggest repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Inoperative ³ Require repair or replacement

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

ROLL-OVER VALVE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Missing ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged ³ Suggest repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Inoperative ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

INERTIA FUEL SHUT OFF SWITCH

*** ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES ***

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Condition³ Procedure
Inoperative³ Require repair or replacement.
Missing³ Require replacement.
Damaged³ Suggest replacement.

FUEL LINES/CLAMPS/O-RINGS/CONNECTORS (SEE NOTE)

Condition³ Procedure
Missing³ Require replacement.
Leaking³ Require repair or replacement.
Restricted³ Require repair or replacement.
Routed incorrectly³ Suggest repair.
Damaged³ Suggest repair or replacement.

NOTE: When replacing fuel lines/hoses, replace with products that meet(s) or exceed(s) OEM design specifications.

FUEL FILTER & IN-TANK FUEL STRAINER

Condition - External Filter³ Procedure
Missing³ Require replacement.
Restricted/contaminated³ Require replacement.
Leaking³ Require repair or replacement.
Damaged³ Suggest replacement.
Maintenance interval³ Suggest replacement to comply with OEM recommended service interval.
Missing, damaged mounting hardware³ Suggest repair. Further inspection required.
Condition - In-Tank³ Procedure
Missing³ Require replacement.
Damaged³ Require replacement.

*** ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES ***

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Restricted³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

FUEL ACCUMULATOR/DAMPENER

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Inoperative³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged³ Suggest replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

FUEL PRESSURE REGULATOR

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Inoperative³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged³ Suggest replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Restricted/contaminated³ Suggest repair. Further inspection required.

³ See NOTE: below.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

NOTE: Some components may be serviceable; check for accepted
cleaning procedure.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

FUEL RAIL

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Restricted³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged³ Suggest replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

FUEL DISTRIBUTOR

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Inoperative³ Require repair or replacement. Further

³ inspection required. See NOTE: below.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Out of specification³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking³ Requires repair or replacement.

Improper air/fuel control ³ Require repair or replacement.

[illegible]

Inoperative ³ Require repair or replacement.

*** ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES ***

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Noisy³ Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AIR PUMP BELT

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition³ Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Improper tension³ Require adjustment or repair.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Improper alignment³ Further inspection required. See NOTE: below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Noisy³ Suggest replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AIR CONTROL VALVE (DIVERter/BY-PASS)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition³ Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged³ Suggest replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Inoperative³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing, damaged³ Require repair or replacement of hardware.
mounting hardware³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

ASPIRATOR, CHECK/DECEL VALVE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition³ Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged³ Suggest replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Inoperative³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing, damaged³ Require repair or replacement of hardware.
mounting hardware³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

AIR MAIFOLD/PIPE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition³ Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing³ Require replacement.

*** ENGINE SYSTEMS UNIFORM INSPECTION GUIDELINES ***

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```

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition          3                      Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing            3  Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged            3  Suggest replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Leaking            3  Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Restricted         3  Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

```

EVAPORATIVE EMISSION CANISTER PURGE VALVE (ELECTRICAL/VACUUM)

```

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition          3                      Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing            3  Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged            3  Suggest replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Inoperative        3  Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Leaking            3  Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

```

GAS CAP

```

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition          3                      Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing            3  Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Leaking            3  Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged            3  Suggest replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

```

LIQUID/VAPOR SEPARATOR

```

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition          3                      Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing            3  Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Leaking            3  Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged            3  Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Inoperative        3  Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

```

ROLL OVER VALVE

```

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition          3                      Procedure

```


BRAKE SYSTEM

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ARTICLE BEGINNING

1995-96 BRAKES

Volkswagen - Disc & Drum

Golf

DESCRIPTION

All models are equipped with front disc brakes. Rear brakes are either disc or drum. Parking brake acts on rear brakes and is cable-actuated. All models use a pressure regulator between front and rear brake circuits to avoid rear wheel lock-up during hard braking.

A vacuum-assisted brake booster is used to ease brake pedal application. A vacuum check valve, located in vacuum supply hose, prevents vacuum leakdown when engine is off.

SERVICING

Manufacturer recommends replacing brake fluid every 2 years. After replacing brake fluid, bleed brake system. See BLEEDING BRAKE SYSTEM.

BLEEDING BRAKE SYSTEM

CAUTION: Ensure fluid level in master cylinder is adequate at all times during bleeding procedure. Use only DOT 4 brake fluid. DO NOT use DOT 5 silicone brake fluid.

BLEEDING PROCEDURES

NOTE: Manufacturer recommends bleeding brake system using Pressure Bleeder (US 1116). If a pressure bleeder is not available, use standard bleeding procedure.

1) Exhaust vacuum reserve from power unit by depressing brake pedal several times. On ABS-equipped vehicles, depress brake pedal at least 20 times to relieve system pressure.

2) On all vehicles, fill master cylinder with clean brake fluid. If master cylinder was replaced, bleed master cylinder before bleeding wheel calipers. Connect bleeder hose to appropriate bleeder valve. See BRAKELINE BLEEDING SEQUENCE table.

BRAKELINE BLEEDING SEQUENCE TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Application (1) Sequence

Golf RR, LR, RF, LF

(1) - On all vehicles, push brake pressure regulator lever in direction of rear axle when bleeding rear brakes.

BRAKE SYSTEM

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Pressure regulator is mounted on a bracket near rear trailing arm. See Fig. 1.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

3) Submerge other end of hose in clean glass jar partially filled with clean brake fluid. Pump brake pedal several times, then hold down. Open bleeder valve. Holding pedal down, close bleeder valve. Release brake pedal.

4) Repeat procedure until brake fluid shows no signs of air bubbles. When bleeding rear brakes, push lever of pressure regulator in direction of rear axle.

5) After bleeding ABS-equipped vehicles, turn ignition on. Allow pump to run until it shuts off. If pump runs longer than 2 minutes, allow pump to cool for 10 minutes. On all vehicles, ensure master cylinder reservoir is full.

ADJUSTMENTS

BRAKE PRESSURE REGULATOR

NOTE: Brake pressure regulator is mounted on a bracket near rear trailing arm. See Fig. 1.

CAUTION: DO NOT adjust pressure regulator with brake pedal depressed.

1) Ensure fuel tank is full and spare tire is in trunk. Raise and support vehicle. Attach Pressure Gauges (VAG 1310) to left front brake caliper and right rear brake caliper/cylinder. Bleed pressure gauge and hoses through valve on gauges.

2) Lower vehicle and bounce rear of vehicle several times. Press on brake pedal until front brake pressure gauge reading equals pressure listed in 1st Reading column of BRAKE PRESSURES table. Hold brake pressure. Rear brake pressure gauge reading should be within specification in 1st Reading column of BRAKE PRESSURES table.

3) Release brake pedal. Press on brake pedal until front brake pressure gauge reading equals pressure listed in 2nd Reading column of BRAKE PRESSURES table. Hold brake pressure. Rear brake pressure gauge reading should be within specification in 2nd Reading column of BRAKE PRESSURES table.

4) Adjust spring tension on brake pressure regulator if rear brake pressure for 1st and/or 2nd reading is not within specification. Decreasing spring tension will reduce system pressure. Increasing spring tension will increase system pressure. Recheck regulator pressures and re-adjust regulator as needed.

BRAKE PRESSURES TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application	1st Reading	2nd Reading
	psi (Bar)	psi (Bar)
Front Gauge	725 (50)	1450 (100)
Rear Gauge		

BRAKE SYSTEM

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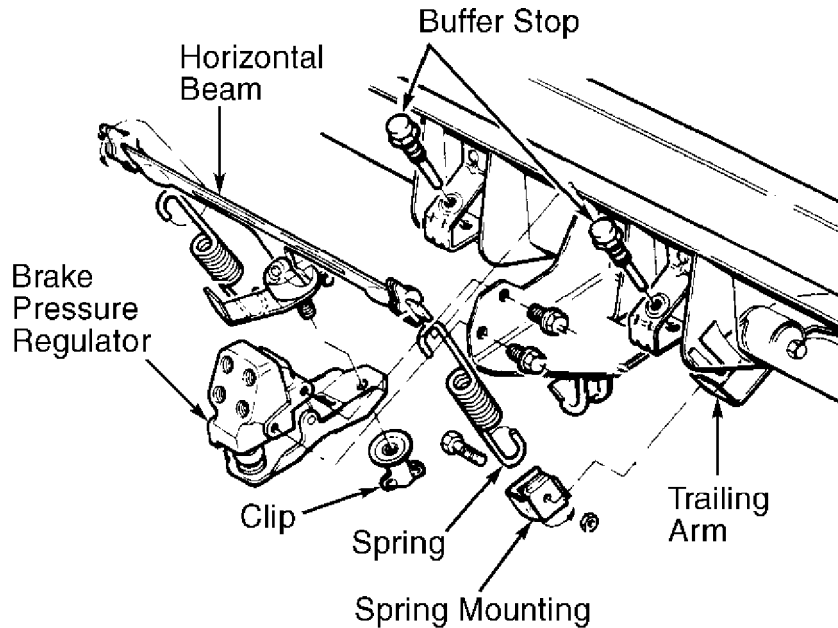
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Disc Brakes 406-493 (28-34) 711-798 (49-55)
Drum Brakes 435-508 (30-35) 740-812 (51-56)
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA



93D83405

Fig. 1: Identifying Brake Pressure Regulator Components (Typical)
Courtesy of Volkswagen United States, Inc.

MASTER CYLINDER PUSH ROD

NOTE: Master cylinder push rod is not adjustable.

STOPLIGHT SWITCH

NOTE: Some stoplight switches (Type 3) are mounted on master cylinder and are not adjustable.

Adjustable Stoplight Switch (Type 1)

Switch is located above brake pedal. To adjust, loosen lock nut. Turn switch until distance between brake pedal arm and first thread on switch body is .20-.24" (5-6 mm). See Fig. 2. Tighten lock nut.

BRAKE SYSTEM

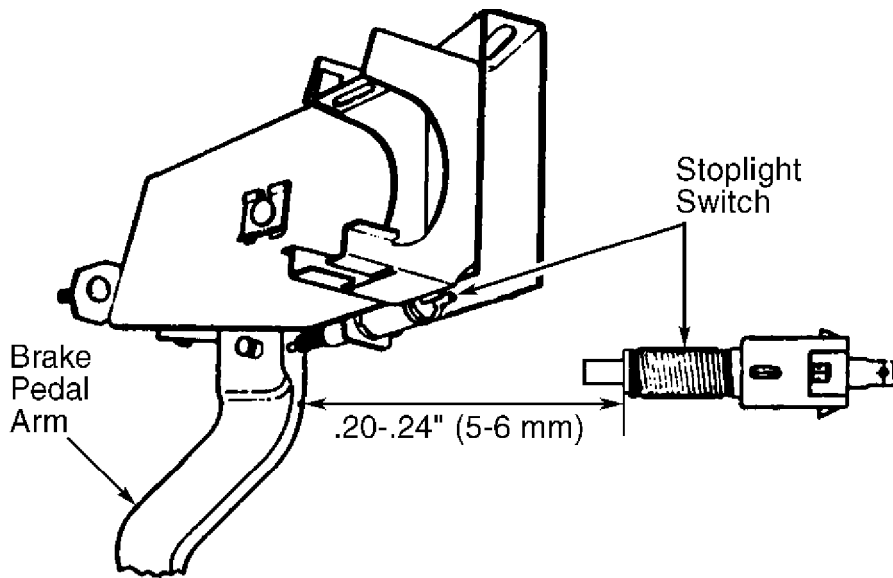
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Fig. 2: Adjusting Stoplight Switch (Type 1)
Courtesy of Volkswagen United States, Inc.

Adjustable Stoplight Switch (Type 2)

1) Switch must be removed to adjust. Switch is located above brake pedal. Remove trim under instrument panel.

2) Disconnect stoplight switch connector. Turn stoplight switch clockwise 90 degrees. Remove switch. Pull stoplight switch plunger fully out. Depress brake pedal as far as possible by hand.

3) Guide stoplight switch through locating hole and secure by turning counterclockwise 90 degrees. Pull brake pedal up to stop by hand. This sets stoplight switch back one notch. Connect stoplight switch connector.

4) Ensure stoplight switch operates properly. Repeat steps 2) and 3) if necessary. If stoplight switch operates okay, install trim under instrument panel.

PARKING BRAKE

Rear Disc

1) Raise and support vehicle. Disengage parking brake. Loosen locking nuts at parking brake lever. Tighten adjusting nuts until levers on calipers just move off stops. Measure gap between stop and lever. See Fig. 3.

2) Maximum clearance between parking brake lever (on caliper) and stop is .04-.12" (1-3 mm). Apply and release parking brake. Ensure rear wheels rotate freely. Tighten lock nuts.

BRAKE SYSTEM

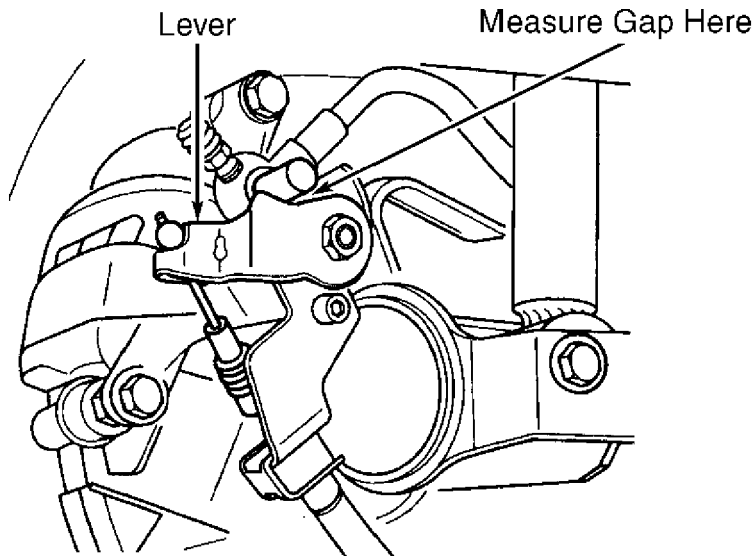
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Fig. 3: Adjusting Rear Disc Parking Brake
Courtesy of Volkswagen United States, Inc.

Rear Drum

Raise and support vehicle. Apply brake pedal once firmly. Pull parking brake handle up 4 notches. Loosen locking nuts at parking brake lever. Tighten adjusting nuts until respective rear wheel can just be rotated by hand. Release parking brake. Ensure rear wheels rotate freely. Tighten lock nuts.

WHEEL BEARINGS

NOTE: Front wheel bearings, also called hub or axle bearings, are sealed units with 1-piece outer race. Bearings are not adjustable.

Rear Wheel Bearings

Tighten adjusting nut snugly while turning drum or rotor. Back off and retighten nut just until axial movement is eliminated. Install locking cap and NEW cotter key. Install dust cap.

REMOVAL & INSTALLATION

FRONT DISC BRAKE PADS

BRAKE SYSTEM

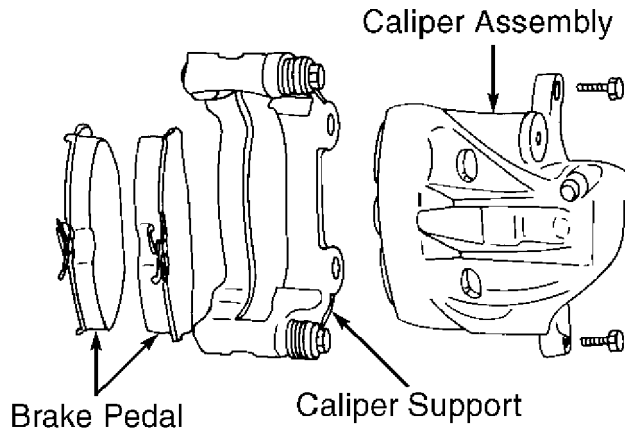
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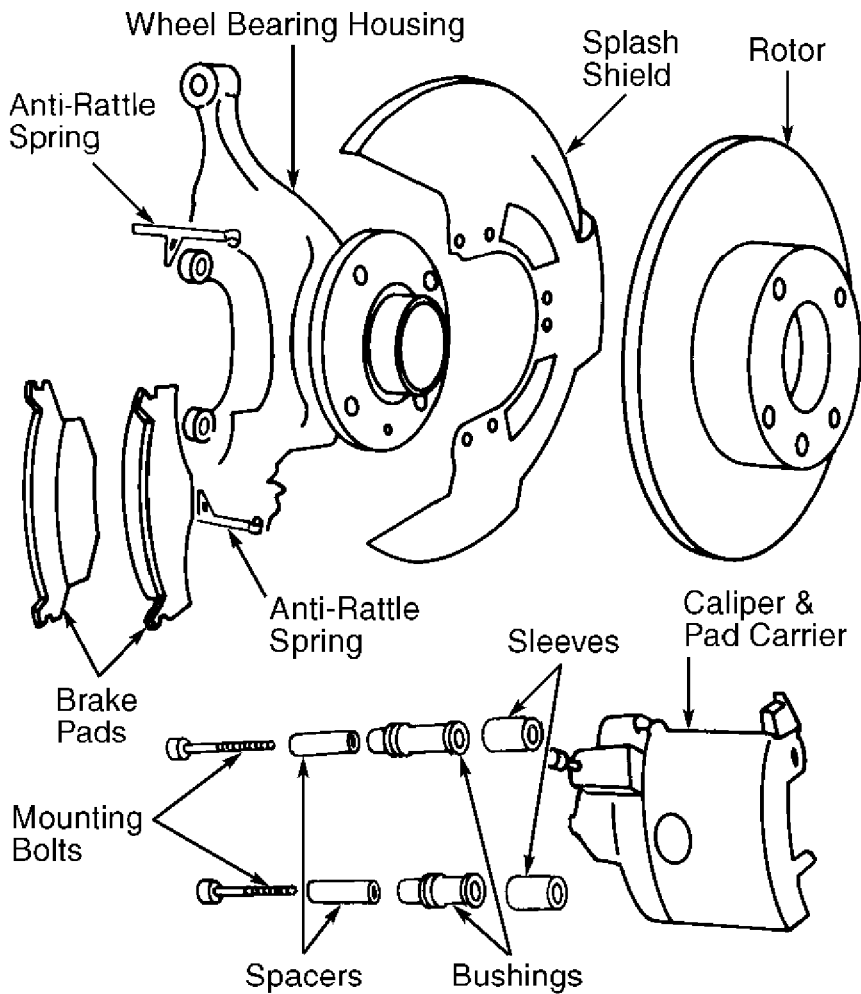
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96A20917
Fig. 4: Identifying Front Caliper Components (Typical)
Courtesy of Volkswagen United States, Inc.



96C20919
Fig. 5: Identifying Front Disc Brake Components (Typical)
Courtesy of Volkswagen United States, Inc.

Removal

BRAKE SYSTEM

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1) Raise and support vehicle. Remove front wheels. Hold lower guide pin using an open end wrench. Remove lower caliper mounting bolt. Push caliper assembly upward and swing out from bottom. See Figs. 4 and 5.

2) Siphon small amount of brake fluid from reservoir. Remove pads and retaining springs from caliper support. Replace pads exceeding wear limit. Wear limit of pads is .28" (7.0 mm), including backing plate.

Installation

1) Seat caliper piston fully into cylinder bore. Install inner pad and then outer pad. Swing caliper assembly down. Hold lower guide pin using an open end wrench.

2) Install lower caliper mounting bolt. Depress brake pedal several times to allow pads to move into operating position. Ensure master cylinder reservoir fluid level is full.

FRONT & REAR BRAKE CALIPER

Removal & Installation

1) Raise and support vehicle. Remove wheels. Disconnect brakeline from caliper, and plug openings. Bend back locking tabs (if equipped) on mounting bolts. If removing rear brake calipers, disconnect parking brake cables.

2) On all calipers, remove caliper mounting bolts. See Fig. 4 . Remove caliper assembly from wheel bearing housing. To install, reverse removal procedure. Use NEW lock plates (if equipped) and mounting bolts. Bleed hydraulic brake system. See BLEEDING PROCEDURES under BLEEDING BRAKE SYSTEM.

FRONT & REAR BRAKE ROTOR

Removal

Raise and support vehicle. Remove wheels. Remove caliper and suspend from frame with wire. Remove countersunk screw that holds rotor to hub. Pull rotor off hub.

Installation

To install, reverse removal procedure. Adjust wheel bearings (if necessary). See WHEEL BEARINGS under ADJUSTMENTS.

REAR DISC BRAKE PADS

Removal

Raise and support vehicle. Remove rear wheels. Disconnect parking brake cable from caliper. Remove caliper mounting bolts. Remove caliper, and wire aside. Siphon small amount of brake fluid from reservoir. Remove pads and retaining springs from caliper support. Replace pads that exceed wear limit. Wear limit of pads is .28" (7.0 mm), including backing plate.

Installation

BRAKE SYSTEM

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Seat caliper piston fully into cylinder bore. Install inner pad first and then install outer pad. Position caliper. Install caliper mounting bolts. With engine off, depress brake pedal several times to allow pads to move into operating position. Ensure master cylinder reservoir fluid level is full.

REAR BRAKE DRUM

Removal

Raise and support vehicle. Remove rear wheel. Remove grease cap, cotter pin, nut lock and nut. Remove thrust washer and outer bearing. Remove drum with inner bearing and grease seal.

Installation

To install, reverse removal procedure. Adjust wheel bearings. See WHEEL BEARINGS under ADJUSTMENTS. Apply brake pedal firmly several times to set self-adjusting mechanism.

REAR BRAKE SHOES

Removal

1) Remove brake drum. See REAR BRAKE DRUM under REMOVAL & INSTALLATION. After removing drum, remove retainer clips, hold-down springs and anchor pins. Remove lower return spring. Disconnect parking brake cable from lever. See Fig. 6.

2) Disconnect adjusting wedge spring and upper return spring. Remove brake shoes together with push rod and tensioning spring. Place push rod and shoes in vise. Remove tension spring. Separate shoes from push rod.

Installation

To install, reverse removal procedure. Ensure lug on adjusting wedge faces backing plate. Adjust wheel bearings (if necessary). See WHEEL BEARINGS under ADJUSTMENTS. Apply brake firmly to set self-adjusting mechanism.

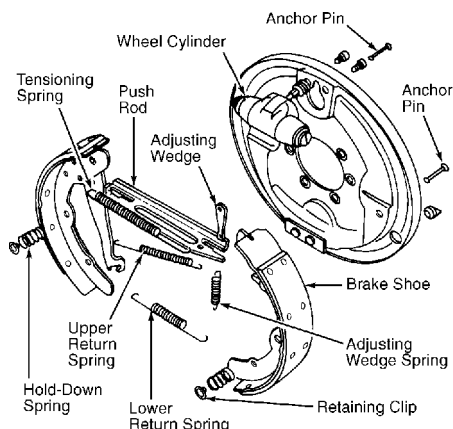


Fig. 6: Identifying Rear Drum Brake Components (Typical)
Courtesy of Volkswagen United States, Inc.

BRAKE SYSTEM

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MASTER CYLINDER R & I

Removal

- 1) Drain master cylinder reservoir. Remove cover plate (if equipped). Disconnect brakelines and wiring at master cylinder.
- 2) Remove master cylinder from brake booster. Be careful to keep any spacers used on attaching bolts for proper installation.

Installation

To install, reverse removal procedure. Always use NEW "O" ring between master cylinder and brake booster. Bleed hydraulic system. See BLEEDING BRAKE SYSTEM.

VACUUM-ASSISTED BRAKE BOOSTER

Removal

Remove master cylinder from brake booster. See MASTER CYLINDER R & I. Disconnect brake push rod from brake pedal. Disconnect vacuum hose from booster. Remove booster from vehicle.

NOTE: Not all vehicles have all components.

Installation

To install, reverse removal procedure. Always use NEW damping ring, washer, filter and "O" ring (as equipped). Slots in damping washer and filter must be offset 180 degrees (if equipped). Complete installation, and bleed hydraulic system. See BLEEDING BRAKE SYSTEM.

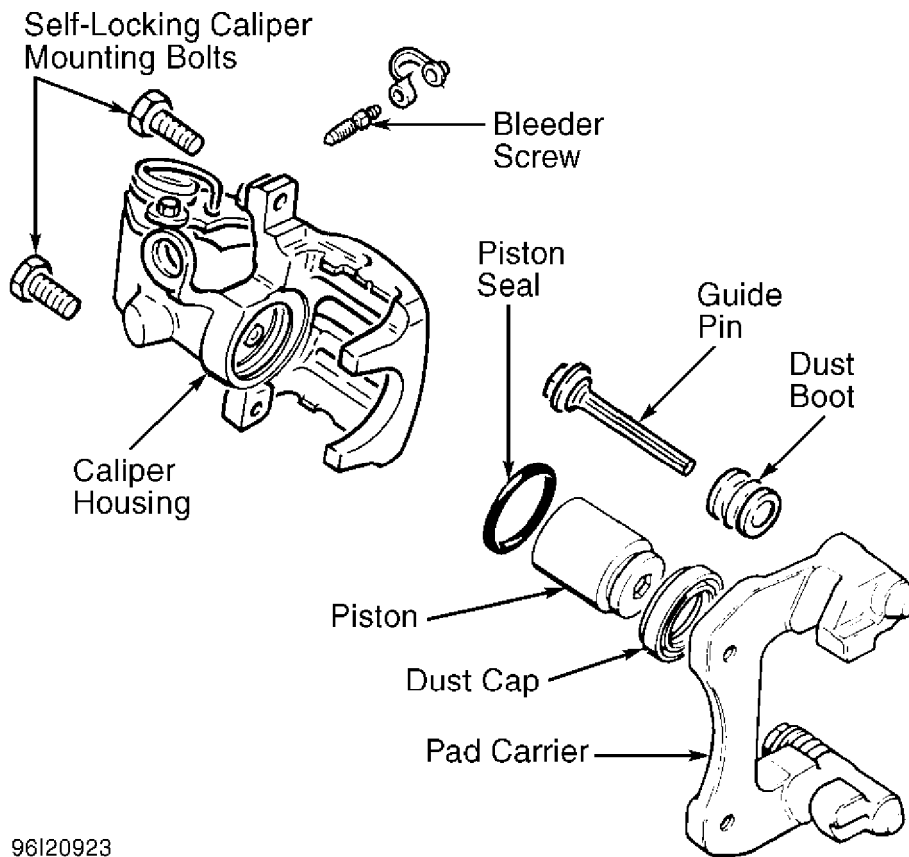
OVERHAUL

BRAKE CALIPER

NOTE: Black staining from piston seal wear may show on caliper bore walls and piston. This staining is normal.

Remove brake caliper. See FRONT & REAR BRAKE CALIPER under REMOVAL & INSTALLATION. Refer to illustration for overhaul. See Fig. 7

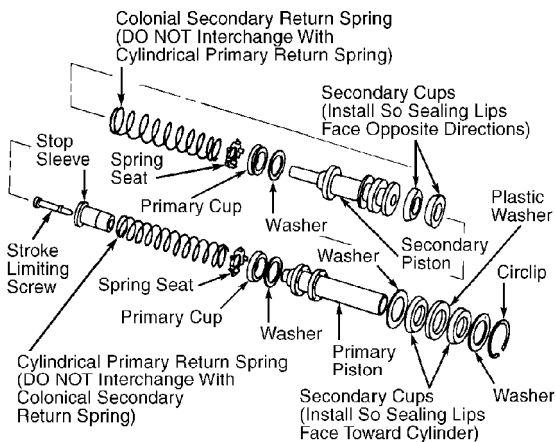
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96I20923
 Fig. 7: Identifying Caliper Components (Typical)
 Courtesy of Volkswagen United States, Inc.

MASTER CYLINDER

NOTE: Manufacturer does not recommend overhaul of master cylinder. Illustration is provided for information purposes only. See Fig. 8.



96A20925
 Fig. 8: Identifying Master Cylinder Components (Typical)
 Courtesy of Volkswagen United States, Inc.

BRAKE SYSTEM
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TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application Ft. Lbs. (N.m)

Caliper Mounting Bolts (1)	
Front	18 (25)
Rear	26 (35)
Pad Carrier Mounting Bolt	48 (65)
Rear Backing Plate-To-Flange Bolt	44 (60)
Wheel Lug Bolt	81 (110)

INCH Lbs. (N.m)

Wheel Cylinder Bolt	89 (10)

(1) - Always replace all self-locking bolts.

DISC BRAKE SPECIFICATIONS

DISC BRAKE SPECIFICATIONS TABLE (1)

Application In. (mm)

Front	
Solid Disc	
Disc Diameter	(2)
Original Thickness	.47 (12.0)
Wear Limit	.39 (10.0)
Vented disc	
4-Cylinder	
Disc Diameter	10.08 (256.0)
Original Thickness	.79 (20.0)
Wear Limit	.71 (18.0)
VR6	
Disc Diameter	11.02 (280.0)
Original Thickness	.87 (22.0)
Wear Limit	.79 (20.0)
Rear	
Disc Diameter	8.90 (226.0)
Original Thickness	.39 (10.0)

(1) - Lateral runout is .002" (.05 mm).

(2) - Information is not available at time of publication.

DRUM BRAKE SPECIFICATIONS

DRUM BRAKE SPECIFICATIONS TABLE

ANTI-LOCK BRAKE SYSTEM & TRACTION CONTROL

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ARTICLE BEGINNING

1995-96 BRAKES

Anti-Lock & Traction Control

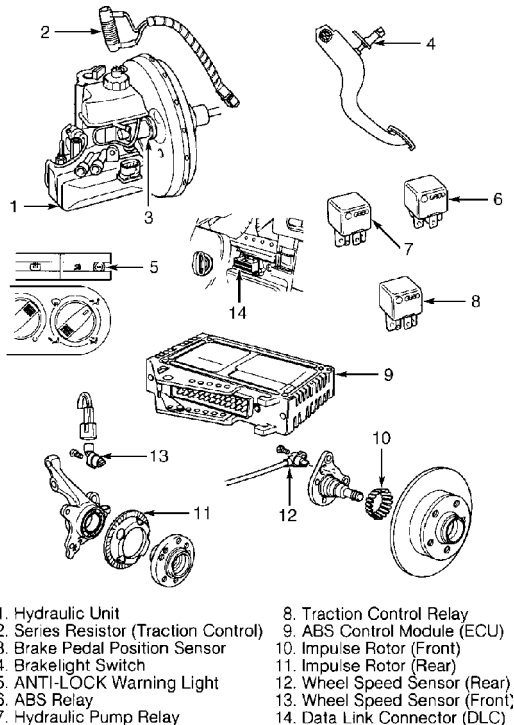
Golf III

DESCRIPTION

Vehicles may use Teves 04 or Teves 20 GI Anti-Lock Brake System (ABS). See Fig. 1 or 2. Both systems may include Electronic Differential Lock (traction control). Traction control operates at low speeds mainly during acceleration. This helps control excess wheel spin of the front wheels.

The anti-lock brake system reduces the chance of wheel lock-up during heavy braking. The anti-lock brake system consists of 4 wheel speed sensors, Electronic Control Unit (ECU), vacuum booster, master cylinder with split diagonal brakelines, brake pedal position sensor (mounted on brake booster), hydraulic pump and solenoid valves, ANTILOCK and BRAKE warning lights.

Teves 04, uses 3 relays (located at fuse/relay panel), to protect the hydraulic modulator, traction control solenoids and ECU. The ECU is located under right rear seat. On Teves 20 GI, the ECU is mounted on bottom of hydraulic unit.



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Fig. 1: Identifying ABS Components (Teves 04)
Courtesy of Volkswagen United States, Inc.

ANTI-LOCK BRAKE SYSTEM & TRACTION CONTROL

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LEGEND FOR FIGURE 1

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Item No.	Description

1.	 Hydraulic Unit
2.	 Series Resistor (Traction Control)
3.	 Brake Pedal Position Sensor
4.	 Brakelight Switch
5.	 ANTILOCK Warning Light
6.	 ABS Relay
7.	 Hydraulic Pump Relay
8.	 Traction Control Relay
9.	 ABS Control Module (ECU)
10.	 Impulse Rotor (Front)
11.	 Impulse Rotor (Rear)
12.	 Wheel Speed Sensor (Rear)
13.	 Wheel Speed Sensor (Front)
14.	 Data Link Connector (DLC)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

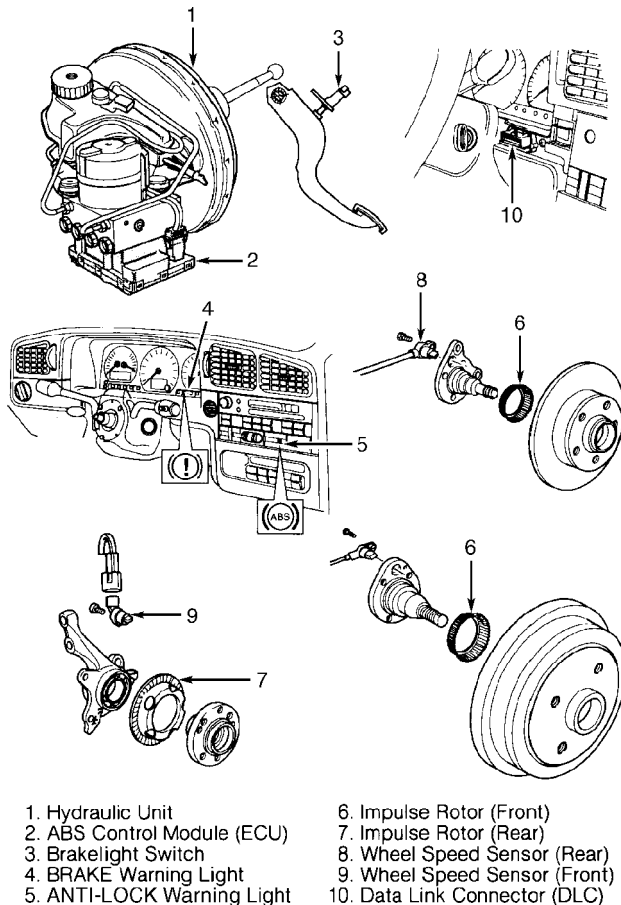


Fig. 2: Identifying ABS Components (Teves 20 GI)
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LEGEND FOR FIGURE 2

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Item No.	Description

1.	 Hydraulic Unit
2.	 ABS Control Module (ECU)
3.	 Brakelight Switch
4.	 BRAKE Warning Light
5.	 ANTILOCK Warning Light
6.	 Impulse Rotor (Front)
7.	 Impulse Rotor (Rear)
8.	 Wheel Speed Sensor (Rear)
9.	 Wheel Speed Sensor (Front)
10.	 Data Link Connector (DLC)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

NOTE: For more brake system information, see BRAKE SYSTEM DISC & DRUM article in BRAKES section.

OPERATION

When pressure is applied to brake pedal, ECU monitors input signals from each wheel speed sensor. If ECU measures a rate of reduction greater than what is programmed in ECU, the ECU will output a signal to appropriate solenoid valve.

Hydraulic line pressure is controlled by one pair of solenoids for each disc brake. Each solenoid valve allows hydraulic pressure to increase or decrease to the appropriate wheel cylinder. If wheel lock-up is detected by ECU, inlet valve closes. This prevents further pressure increase. If wheel lock-up continues, ECU opens outlet valve and fluid pressure returns to brake fluid reservoir. Each front brake is controlled separately by ECU. Rear brakes are controlled together based on first wheel which starts to lock.

A vacuum booster provides pressure assist for normal braking. During ABS operation, some hydraulic fluid is returned to the reservoir. A hydraulic pump runs whenever the brakes are being applied and ABS is in operation. This maintains pressure to the control solenoids and prevents internal loss of brake fluid (brake pedal goes to floor).

On models with traction control, 2 differential locking solenoids are included. If ECU detects wheel spin while vehicle is accelerating less than about 25 MPH, traction control prevents excess wheel spin. Under these conditions, ECU applies brake (on faster spinning wheel) to slow wheel down to the speed of slower spinning wheel.

If a system failure occurs, ANTILOCK warning light, located on instrument panel, will come on. System will be deactivated, but conventional brake system will still operate. If brake fluid level drops too low, BRAKE warning light, located on instrument panel, will come on.

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BLEEDING BRAKE SYSTEM

CAUTION: Ensure fluid level in master cylinder is adequate at all times during bleeding procedure. Use only DOT 4 brake fluid. DO NOT use DOT 5 silicone brake fluid. DO NOT open bleed screws on hydraulic unit at any time.

BLEEDING PROCEDURES

NOTE: Manufacturer recommends bleeding brake system using Pressure Bleeder (US 1116). If a pressure bleeder is not available, use standard bleeding procedure.

1) Exhaust vacuum reserve from power unit by depressing brake pedal several times. Fill master cylinder with clean brake fluid. If master cylinder was replaced, bleed master cylinder before bleeding wheel calipers. Connect bleeder hose to appropriate caliper bleeder valve. See BRAKELINE BLEEDING SEQUENCE table.

BRAKELINE BLEEDING SEQUENCE

Application	Sequence

All Models	RR, LR, RF & LF

2) Submerge other end of hose in clean glass jar partially filled with clean brake fluid. Pump brake pedal several times, then hold down. Open bleeder valve. Holding pedal down, close bleeder valve. Release brake pedal.

3) Repeat procedure until brake fluid shows no signs of air bubbles. When bleeding rear brakes, push lever of pressure regulator (if equipped) in direction of rear axle. Ensure master cylinder reservoir is full.

ADJUSTMENTS

BRAKELIGHT SWITCH

1) Remove trim panel from under driver's side instrument panel. Disconnect brakelight switch harness connector. Rotate brakelight switch 90 degrees clockwise (right) and remove switch.

2) Pull brakelight switch plunger fully out. Depress brake pedal as far as possible by hand. Guide brakelight switch through locating hole and secure switch by rotating 90 degrees counterclockwise (left). Pull brake pedal back up by hand to stop. Brakelight switch plunger should be pushed back one notch.

3) Reconnect brakelight switch harness connector. Check brakelight switch function by depressing brake pedal and observing brakelights. Install instrument panel trim panel.

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PARKING BRAKE

Disc Brake

Raise vehicle and support securely. Release parking brake lever. Apply brake pedal once. Loosen lock nuts. Tighten each adjusting nut until lever on respective caliper lifts off stop. Measure gap between stop and lever. DO NOT move lever off stop more than .040" (1 mm). Tighten lock nuts. Ensure wheels lock at 3 notches.

Drum Brake

Raise vehicle and support securely. Release parking brake lever. Apply brake pedal once. Pull parking brake lever up 4 notches. Tighten parking brake lever adjusting nuts until wheels are difficult to turn by hand. Release parking brake lever. Ensure both wheels turn freely.

NOTE: No other information on adjustments is available from manufacturer.

TROUBLE SHOOTING

ANTILOCK WARNING LIGHT

Start engine. ANTILOCK warning light should come on, then turn off after a few seconds. If light does not come on when engine is started, check electrical system. If light comes on and stays on, fault has been detected by ECU and testing will be needed.

DIAGNOSIS & TESTING

NOTE: Diagnostic information for Teves 04 and 20 GI can only be accessed using V.A.G. 1551 scan tool and V.A.G. 1551/3 adapter. Teves 04 circuit testing requires V.A.G. 1598 test box with V.A.G. 1598/10 adapter. Teves 20 GI circuit testing requires V.A.G. 1598/21 test box.

CIRCUIT TESTS (TEVES 04)

NOTE: Socket number designations on V.A.G. 1598 test box are identical to terminal designations on ABS ECU harness connector.

NOTE: Check battery condition, brake fluid level, electrical connections and wiring for damage. If fluid level is incorrect or battery and/or electrical connections are faulty, correct problem before preceding. Perform each step, in sequence, to test entire system, except for ECU. If faulty ECU is suspected, replace with a known good unit and retest system. Unplug ECU connector for all test steps. If test box is unavailable, use fine wire attached to test lead probe to avoid damaging ECU harness connector terminals.

ANTI-LOCK BRAKE SYSTEM & TRACTION CONTROL

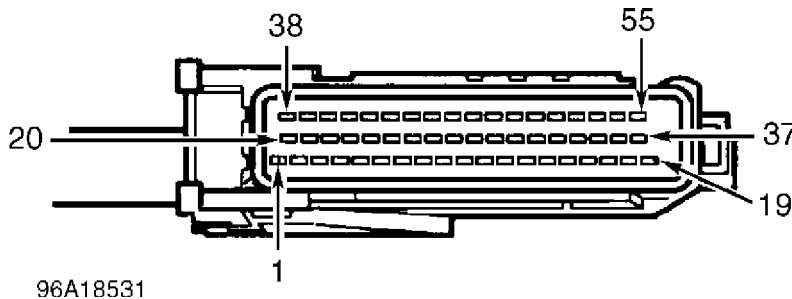
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96A18531
Fig. 3: Identifying ABS ECU Connector Terminals (Teves 04)
Courtesy of Volkswagen United States, Inc.

Voltage Supply Test (Traction Control)

Turn ignition off. Using voltmeter, check voltage between ECU harness connector terminals No. 1 and 35. See Fig. 3. Voltage should be 10.0-14.5 volts. If voltage is not as specified, check battery, ground, ABS fuse, relay and wiring. Repair as necessary. See WIRING DIAGRAMS.

Voltage Supply Test

Turn ignition off. Using voltmeter, check voltage between ECU harness connector terminals No. 1 and 53. See Fig. 3. Voltage should be 10.0-14.5 volts. If voltage is not as specified, check battery, ground, ABS fuse, relay and wiring. Repair as necessary. See WIRING DIAGRAMS.

ABS Relay Operation Test (ECU Voltage Supply)

Turn ignition off. Connect jumper wire between ECU harness connector terminals No. 19 and 34. Turn ignition on. Relay should operate (click) and ABS warning light should go out. Using voltmeter, check voltage between ECU harness connector terminals No. 1 and 33. See Fig. 3. Voltage should be 10.0-14.5 volts. If voltage is not as specified, check ground (terminal No. 1) and relay wiring (terminal No. 33). Repair as necessary. See WIRING DIAGRAMS. Remove jumper wire when test is complete.

ABS Relay Operation Test (Reference Voltage)

Turn ignition off. Connect jumper wire between ECU harness connector terminals No. 19 and 34. Turn ignition on. Relay should operate (click) and ABS warning light should go out. Using voltmeter, check voltage between ECU harness connector terminals No. 1 and 3. See Fig. 3. Voltage should be 10.0-14.5 volts. If voltage is not as specified, check wiring from ECU harness connector terminal No. 3 to battery positive. Repair as necessary. See WIRING DIAGRAMS. Remove jumper wire when test is complete.

Brakelight Switch Test

Turn ignition off. Depress and hold brake pedal. Using voltmeter, check voltage between ECU harness connector terminals No. 1 and 32. See Fig. 3. Voltage should be 10.0-14.5 volts. If voltage is not as specified, check wiring from ECU harness connector terminal No.

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1 to ground. Check wiring from ECU harness connector terminal No. 32 to relay panel. Also check brakelight switch and fuse. Repair as necessary. See WIRING DIAGRAMS.

Right Front Wheel Speed Sensor Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 29 and 47. See Fig. 3. Resistance should be 1.0-1.3 k/ohms. If resistance is not as specified, check related wiring from ECU harness connector to wheel speed sensor for opens, shorts or loose connections. Also disconnect wheel speed sensor connector and check sensor. Repair/replace as necessary. See WIRING DIAGRAMS.

Left Front Wheel Speed Sensor Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 30 and 48. See Fig. 3. Resistance should be 1.0-1.3 k/ohms. If resistance is not as specified, check related wiring from ECU harness connector to wheel speed sensor for opens, shorts or loose connections. Also disconnect wheel speed sensor connector and check sensor. Repair/replace as necessary. See WIRING DIAGRAMS.

Right Rear Wheel Speed Sensor Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 27 and 45. See Fig. 3. Resistance should be 1.0-1.3 k/ohms. If resistance is not as specified, check related wiring from ECU harness connector to wheel speed sensor for opens, shorts or loose connections. Also disconnect wheel speed sensor connector and check sensor. Repair/replace as necessary. See WIRING DIAGRAMS.

Left Rear Wheel Speed Sensor Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 28 and 46. See Fig. 3. Resistance should be 1.0-1.3 k/ohms. If resistance is not as specified, check related wiring from ECU harness connector to wheel speed sensor for opens, shorts or loose connections. Also disconnect wheel speed sensor connector and check sensor. Repair/replace as necessary. See WIRING DIAGRAMS.

Right Front Wheel Speed Sensor Shielding Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 1 and 29. See Fig. 3. Resistance should be at least 2 megohms. If resistance is not as specified, check related wiring from ECU harness connector to wheel speed sensor for chafing, loose connections or other damage. Repair/replace as necessary. See WIRING DIAGRAMS.

Left Front Wheel Speed Sensor Shielding Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 1 and 30. See Fig. 3. Resistance should be at least 2 megohms. If resistance is not as specified, check

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related wiring from ECU harness connector to wheel speed sensor for chafing, loose connections or other damage. Repair/replace as necessary. See WIRING DIAGRAMS.

Right Rear Wheel Speed Sensor Shielding Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 1 and 27. See Fig. 3. Resistance should be at least 2 megohms. If resistance is not as specified, check related wiring from ECU harness connector to wheel speed sensor for chafing, loose connections or other damage. Repair/replace as necessary. See WIRING DIAGRAMS.

Left Rear Wheel Speed Sensor Shielding Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 1 and 28. See Fig. 3. Resistance should be at least 2 megohms. If resistance is not as specified, check related wiring from ECU harness connector to wheel speed sensor for chafing, loose connections or other damage. Repair/replace as necessary. See WIRING DIAGRAMS.

ABS Relay Winding Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 34 and 53. See Fig. 3. Resistance should be 50-100 ohms. If resistance is not as specified, check related wiring from ECU harness connector to ABS relay. Also check relay. Repair/replace as necessary. See WIRING DIAGRAMS.

Hydraulic Pump Relay Winding Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 15 and 33. See Fig. 3. Resistance should be 50-100 ohms. If resistance is not as specified, check related wiring from ECU harness connector to hydraulic pump relay. Also check relay. Repair/replace as necessary. See WIRING DIAGRAMS.

Traction Control Relay Winding Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 7 and 33. See Fig. 3. Resistance should be 50-100 ohms. If resistance is not as specified, check related wiring from ECU harness connector to traction control relay. Also check relay. Repair/replace as necessary. See WIRING DIAGRAMS.

Left Front Inlet Valve Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 3 and 20. See Fig. 3. Resistance should be 6.5-10.0 ohms. If resistance is not as specified, check related wiring from ECU harness connector to left front inlet valve. Also check valve resistance at hydraulic unit. Repair/replace as necessary. See WIRING DIAGRAMS.

Right Front Inlet Valve Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 3 and 38. See Fig. 3. Resistance

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should be 6.5-10.0 ohms. If resistance is not as specified, check related wiring from ECU harness connector to right front inlet valve. Also check valve resistance at hydraulic unit. Repair/replace as necessary. See WIRING DIAGRAMS.

Left Rear Inlet Valve Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 3 and 54. See Fig. 3. Resistance should be 6.5-10.0 ohms. If resistance is not as specified, check related wiring from ECU harness connector to left rear inlet valve. Also check valve resistance at hydraulic unit. Repair/replace as necessary. See WIRING DIAGRAMS.

Right Rear Inlet Valve Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 3 and 55. See Fig. 3. Resistance should be 6.5-10.0 ohms. If resistance is not as specified, check related wiring from ECU harness connector to right rear inlet valve. Also check valve resistance at hydraulic unit. Repair/replace as necessary. See WIRING DIAGRAMS.

Left Front Outlet Valve Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 2 and 3. See Fig. 3. Resistance should be 3-7 ohms. If resistance is not as specified, check related wiring from ECU harness connector to left front outlet valve. Also check valve resistance at hydraulic unit. Repair/replace as necessary. See WIRING DIAGRAMS.

Right Front Outlet Valve Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 3 and 21. See Fig. 3. Resistance should be 3-7 ohms. If resistance is not as specified, check related wiring from ECU harness connector to right front outlet valve. Also check valve resistance at hydraulic unit. Repair/replace as necessary. See WIRING DIAGRAMS.

Left Rear Outlet Valve Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 3 and 36. See Fig. 3. Resistance should be 3-7 ohms. If resistance is not as specified, check related wiring from ECU harness connector to left rear outlet valve. Also check valve resistance at hydraulic unit. Repair/replace as necessary. See WIRING DIAGRAMS.

Right Rear Outlet Valve Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 3 and 18. See Fig. 3. Resistance should be 3-7 ohms. If resistance is not as specified, check related wiring from ECU harness connector to right rear outlet valve. Also check valve resistance at hydraulic unit. Repair/replace as necessary. See WIRING DIAGRAMS.

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Differential Lock Valve No. 1 Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 3 and 37. See Fig. 3. Resistance should be 6-10 ohms. If resistance is not as specified, check related wiring from ECU harness connector to differential lock valve No. 1. Also check valve resistance at hydraulic unit. Repair/replace as necessary. See WIRING DIAGRAMS.

Differential Lock Valve No. 2 Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 3 and 40. See Fig. 3. Resistance should be 6-10 ohms. If resistance is not as specified, check related wiring from ECU harness connector to differential lock valve No. 2. Also check valve resistance at hydraulic unit. Repair/replace as necessary. See WIRING DIAGRAMS.

Hydraulic Pump Sensor Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 31 and 49. See Fig. 3. Resistance should be 29-40 ohms. If resistance is not as specified, check related wiring from ECU harness connector to hydraulic pump sensor. Also check valve resistance at hydraulic unit. Repair/replace as necessary. See WIRING DIAGRAMS.

Pressure Control Switch Resistance Test (Traction Control)

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 13 and 26. See Fig. 3. Resistance should be 1.5 ohms minimum with brake pedal not depressed. Resistance should be 2 megohms minimum with brake pedal depressed. If resistance is not as specified, check related wiring from ECU harness connector to hydraulic unit connector. If wiring is okay, replace hydraulic unit. See WIRING DIAGRAMS.

ABS Relay Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 1 and 3, 1 and 33, and 1 and 19. See Fig. 3. Resistance in each test should be 1.5 ohms or less. If resistance is not as specified, check wire from terminals No. 3 and 33 (without relay) to ground. Repair/replace as necessary. See WIRING DIAGRAMS.

Right Rear Wheel Speed Sensor Voltage Test

Turn ignition off. Raise and support vehicle. Using voltmeter, check voltage between ECU harness connector terminals No. 27 and 45. See Fig. 3. Rotate right rear wheel at one revolution per minute. Voltage should be at least 65 millivolts AC. If voltage is not as specified, check related wiring and connectors from ECU harness connector to wheel speed sensor. Repair/replace as necessary. See WIRING DIAGRAMS.

Left Rear Wheel Speed Sensor Voltage Test

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Turn ignition off. Raise and support vehicle. Using voltmeter, check voltage between ECU harness connector terminals No. 28 and 46. See Fig. 3. Rotate left rear wheel at one revolution per minute. Voltage should be at least 65 millivolts AC. If voltage is not as specified, check related wiring and connectors from ECU harness connector to wheel speed sensor. Repair/replace as necessary. See WIRING DIAGRAMS.

Right Front Wheel Speed Sensor Voltage Test

Turn ignition off. Raise and support vehicle. Using voltmeter, check voltage between ECU harness connector terminals No. 29 and 47. See Fig. 3. Rotate right front wheel at one revolution per minute. Voltage should be at least 65 millivolts AC. If voltage is not as specified, check related wiring and connectors from ECU harness connector to wheel speed sensor. Repair/replace as necessary. See WIRING DIAGRAMS.

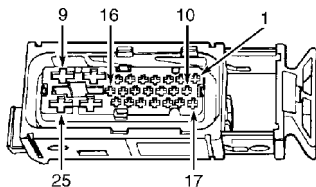
Left Front Wheel Speed Sensor Voltage Test

Turn ignition off. Raise and support vehicle. Using voltmeter, check voltage between ECU harness connector terminals No. 30 and 48. See Fig. 3. Rotate left front wheel at one revolution per minute. Voltage should be at least 65 millivolts AC. If voltage is not as specified, check related wiring and connectors from ECU harness connector to wheel speed sensor. Repair/replace as necessary. See WIRING DIAGRAMS.

CIRCUIT TESTS (TEVES 20 GI)

NOTE: Socket number designations on V.A.G. 1598/21 test box are identical to terminal designations on ABS ECU harness connector.

NOTE: Check battery condition, brake fluid level, electrical connections and wiring for damage. If fluid level is incorrect or battery and/or electrical connections are faulty, correct problem before preceding. Perform each step, in sequence, to test entire system, except for ECU. If faulty ECU is suspected, replace with a known good unit and retest system. Unplug ECU connector for all test steps. If test box is unavailable and to avoid damaging ECU harness connector terminals, use fine wire attached to test lead probe.



96B18532

Fig. 4: Identifying ABS ECU Connector Terminals (Teves 20 GI)
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Hydraulic Pump Supply Voltage Test

Turn ignition off. Using voltmeter, check voltage between ECU harness connector terminals No. 8 and 25. See Fig. 4. Voltage should be 10.0-14.5 volts. If voltage is not as specified, check related wiring and connectors from ECU harness connector terminal No. 8 and ground. Check related wiring and connectors from ECU harness connector terminal No. 25 and ABS fuse No. 1 and battery positive. Repair/replace as necessary. See WIRING DIAGRAMS.

Solenoid Valves Supply Voltage Test

Turn ignition off. Using voltmeter, check voltage between ECU harness connector terminals No. 9 and 24. See Fig. 4. Voltage should be 10.0-14.5 volts. If voltage is not as specified, check related wiring and connectors from ECU harness connector terminal No. 24 and ground. Check related wiring and connectors from ECU harness connector terminal No. 9 and ABS fuse No. 2 and battery positive. Repair/replace as necessary. See WIRING DIAGRAMS.

Electronic Control Unit Supply Voltage Test

Turn ignition off. Using voltmeter, check voltage between ECU harness connector terminals No. 8 and 23. See Fig. 4. Voltage should be 10.0-14.5 volts. If voltage is not as specified, check related wiring and connectors from ECU harness connector terminal No. 8 and ground. Check related wiring and connectors from ECU harness connector terminal No. 23 and ABS relay. Repair/replace as necessary. See WIRING DIAGRAMS.

Brakelight Switch Voltage Test

Turn ignition off. Using voltmeter, check voltage between ECU harness connector terminals No. 8 and 12. See Fig. 4. Voltage should be 0.0-0.5 volt with brake pedal not depressed. Voltage should be 10.0-14.5 volts with brake pedal depressed. If voltage is not as specified, check related wiring and connectors from ECU harness connector terminal No. 8 and ground. Check related wiring and connectors from ECU harness connector terminal No. 12 and relay panel. Check brakelight fuse. Repair/replace as necessary. See WIRING DIAGRAMS.

Right Front Wheel Speed Sensor Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 3 and 18. See Fig. 4. Resistance should be 1.0-1.3 k/ohms. If resistance is not as specified, check related wiring and connectors from ECU harness connector and wheel speed sensor for loose connectors or damaged wires. Disconnect wheel speed sensor connector and check sensor resistance. Repair/replace as necessary. See WIRING DIAGRAMS.

Left Front Wheel Speed Sensor Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 4 and 11. See Fig. 4. Resistance should be 1.0-1.3 k/ohms. If resistance is not as specified, check related wiring and connectors from ECU harness connector and wheel

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speed sensor for loose connectors or damaged wires. Disconnect wheel speed sensor connector and check sensor resistance. Repair/replace as necessary. See WIRING DIAGRAMS.

Right Rear Wheel Speed Sensor Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 1 and 17. See Fig. 4. Resistance should be 1.0-1.3 k/ohms. If resistance is not as specified, check related wiring and connectors from ECU harness connector and wheel speed sensor for loose connectors or damaged wires. Disconnect wheel speed sensor connector and check sensor resistance. Repair/replace as necessary. See WIRING DIAGRAMS.

Left Rear Wheel Speed Sensor Resistance Test

Turn ignition off. Using ohmmeter, check resistance between ECU harness connector terminals No. 2 and 10. See Fig. 4. Resistance should be 1.0-1.3 k/ohms. If resistance is not as specified, check related wiring and connectors from ECU harness connector and wheel speed sensor for loose connectors or damaged wires. Disconnect wheel speed sensor connector and check sensor resistance. Repair/replace as necessary. See WIRING DIAGRAMS.

Right Front Wheel Speed Sensor Voltage Test

Turn ignition off. Raise and support vehicle. Using voltmeter, check voltage between ECU harness connector terminals No. 3 and 18. See Fig. 4. Rotate right front wheel at one revolution per minute. Voltage should be at least 65 millivolts AC. If voltage is not as specified, check related wiring and connectors from ECU harness connector to wheel speed sensor. Ensure sensor has not been interchanged. Use V.A.G. 1551/3 scan tool to read measuring value block. Repair/replace as necessary. See WIRING DIAGRAMS.

Left Front Wheel Speed Sensor Voltage Test

Turn ignition off. Raise and support vehicle. Using voltmeter, check voltage between ECU harness connector terminals No. 4 and 11. See Fig. 4. Rotate left front wheel at one revolution per minute. Voltage should be at least 65 millivolts AC. If voltage is not as specified, check related wiring and connectors from ECU harness connector to wheel speed sensor. Ensure sensor has not been interchanged. Use V.A.G. 1551/3 scan tool to read measuring value block. Repair/replace as necessary. See WIRING DIAGRAMS.

Right Rear Wheel Speed Sensor Voltage Test

Turn ignition off. Raise and support vehicle. Using voltmeter, check voltage between ECU harness connector terminals No. 1 and 17. See Fig. 4. Rotate right rear wheel at one revolution per minute. Voltage should be 190-1140 millivolts AC. If voltage is not as specified, check related wiring and connectors from ECU harness connector to wheel speed sensor. Ensure sensor has not been interchanged. Use V.A.G. 1551/3 scan tool to read measuring value block. Repair/replace as necessary. See WIRING DIAGRAMS.

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Left Rear Wheel Speed Sensor Voltage Test

Turn ignition off. Raise and support vehicle. Using voltmeter, check voltage between ECU harness connector terminals No. 2 and 10. See Fig. 4. Rotate left rear wheel at one revolution per minute. Voltage should be 1190-1140 millivolts AC. If voltage is not as specified, check related wiring and connectors from ECU harness connector to wheel speed sensor. Ensure sensor has not been interchanged. Use V.A.G. 1551/3 scan tool to read measuring value block. Repair/replace as necessary. See WIRING DIAGRAMS.

REMOVAL & INSTALLATION

ABS ELECTRONIC CONTROL UNIT (ECU)

Removal & Installation (Teves 04)

ABS ECU is located under right rear seat. Ensure ignition is off. Press ECU securing clip together and pull out. Fold down retaining clip releasing connector latch and remove connector. Remove ECU mounting bolts and remove ECU. To install, reverse removal procedure.

Removal & Installation (Teves 20 GI)

ABS ECU is attached to bottom of ABS hydraulic unit, See HYDRAULIC UNIT.

HYDRAULIC UNIT

Removal & Installation (Teves 04)

1) Hydraulic unit and booster is removed as an assembly. Disconnect negative battery cable. Disconnect electrical connectors from hydraulic unit. Remove brake fluid reservoir. Disconnect brakelines from hydraulic unit and seal brakelines and threaded holes.

2) From inside vehicle, remove shelf below left side of instrument panel. Disconnect brake pedal from brake booster. Remove brake booster-to-firewall nuts. Remove hydraulic unit, master cylinder and brake booster as an assembly.

3) To install, reverse removal procedure. Tighten fittings to specifications. See TORQUE SPECIFICATIONS. Bleed brake system. See BLEEDING BRAKE SYSTEM.

Removal & Installation (Teves 20 GI)

1) ABS ECU is bolted to bottom of ABS hydraulic unit, left side of engine compartment. Disconnect negative battery cable. Remove engine coolant expansion tank and swing to one side. Connect bleeder bottle with bleeder hose to left front caliper bleeder screw and open bleeder screw. Depress brake pedal 2 3/8" (60 mm). Install Pedal Loading Device (V.A.G. 1238 B) to hold pedal in place. Close bleeder screw.

2) Remove brake master cylinder heat shield. Disconnect brakelines from brake master cylinder and hydraulic unit. Using plugs from Repair Kit (1H0 698 311 A), seal brakelines and threaded holes. Remove hydraulic unit-to-bracket bolts and remove hydraulic unit.

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Disconnect hydraulic pump motor harness from ECU.

3) Remove ECU-to-hydraulic unit screws and remove ECU. DO NOT tilt ECU when removing. Cover ECU solenoids with lint-free cloth. After separating ECU from hydraulic unit, protect valve dome. To install, reverse removal procedure. Tighten fittings to specifications. See TORQUE SPECIFICATIONS. Bleed brake system. See BLEEDING BRAKE SYSTEM.

WHEEL SPEED SENSORS

NOTE: To protect magnetic part of sensor, always leave new wheel speed sensor in special packaging until ready for installation.

Removal & Installation

Remove bolt retaining wheel speed sensor. Unplug connector. Remove wheel speed sensor. To install, apply Lubricant (G-000-650) to sensor. Install sensor and tighten retaining bolt to 89 INCH lbs. (10 N.m).

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Applications Ft. Lbs. (N.m)

Brake Booster-To-Firewall Nut	18 (25)
Brakeline Fitting	11 (15)
Master Cylinder-To-Booster Nut	18 (25)

	INCH Lbs. (N.m)
ECU-To-Hydraulic Unit Screw	35 (4)
Hydraulic Unit-To-Bracket	71 (8)
Wheel Speed Sensor Bolt	89 (10)

WIRING DIAGRAMS

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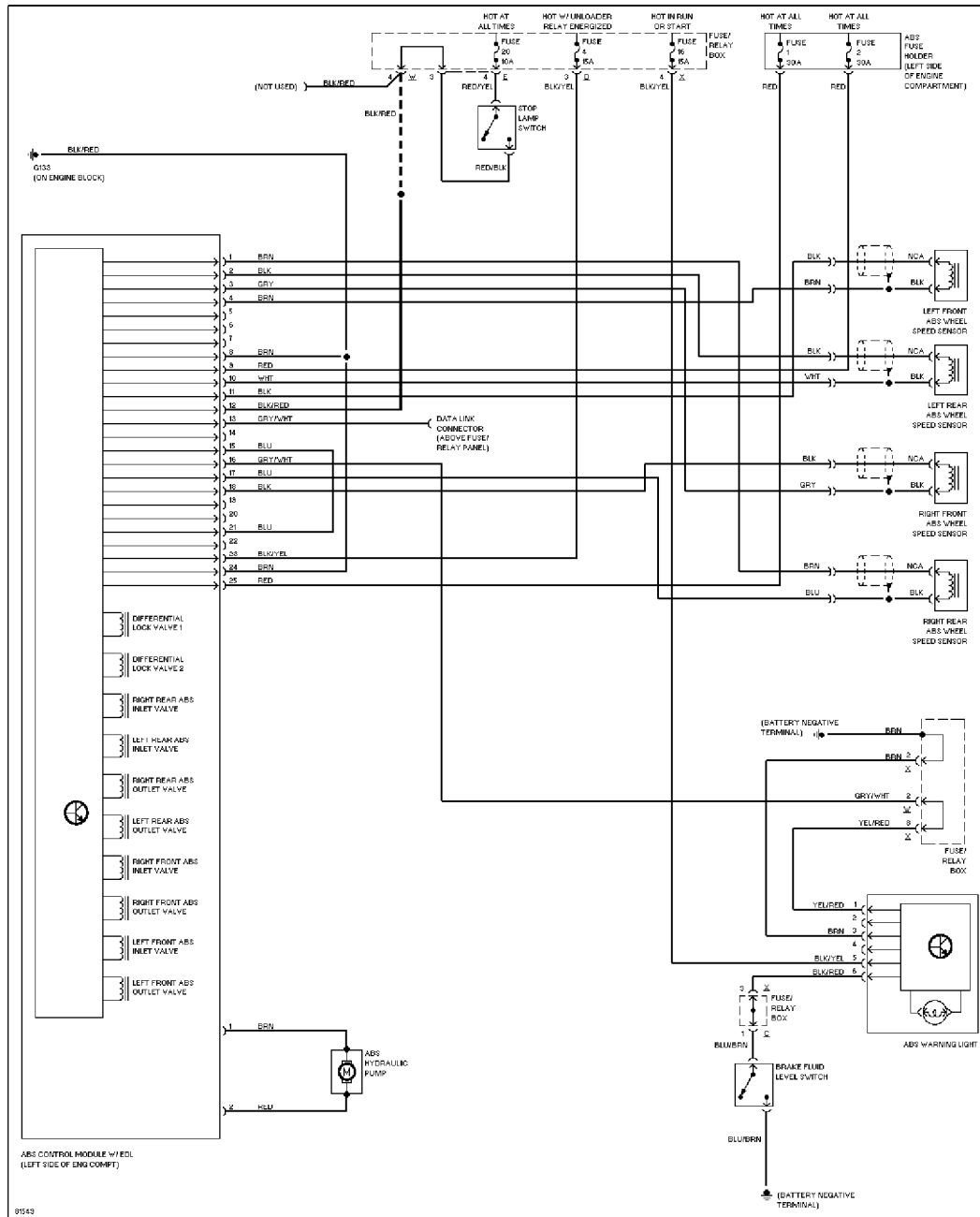


Fig. 5: Anti-Lock Brake System Wiring Diagram (1995 Golf III)

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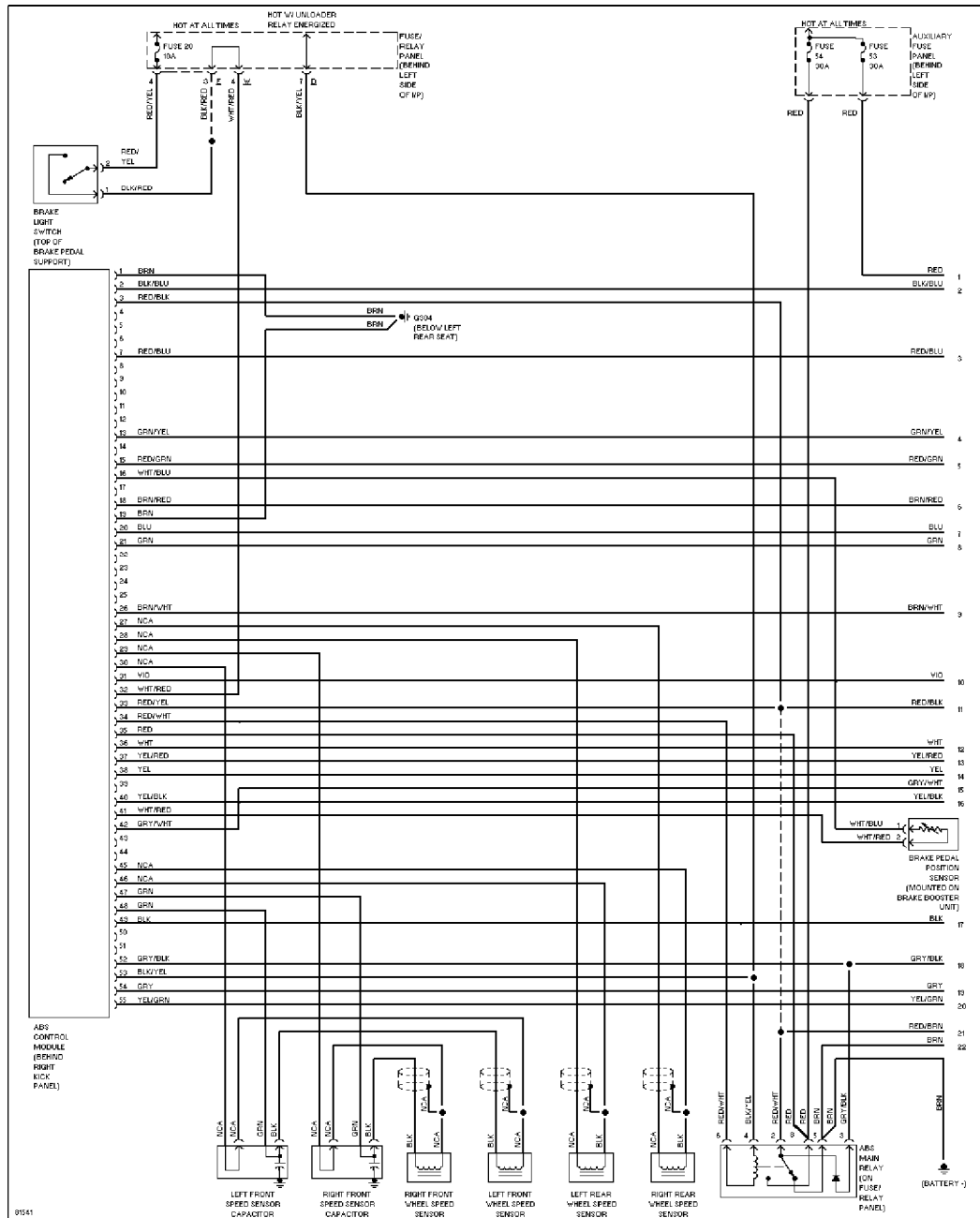


Fig. 6: Anti-Lock Brake System Wiring Diagram (1996 Golf III - 1
of 2)

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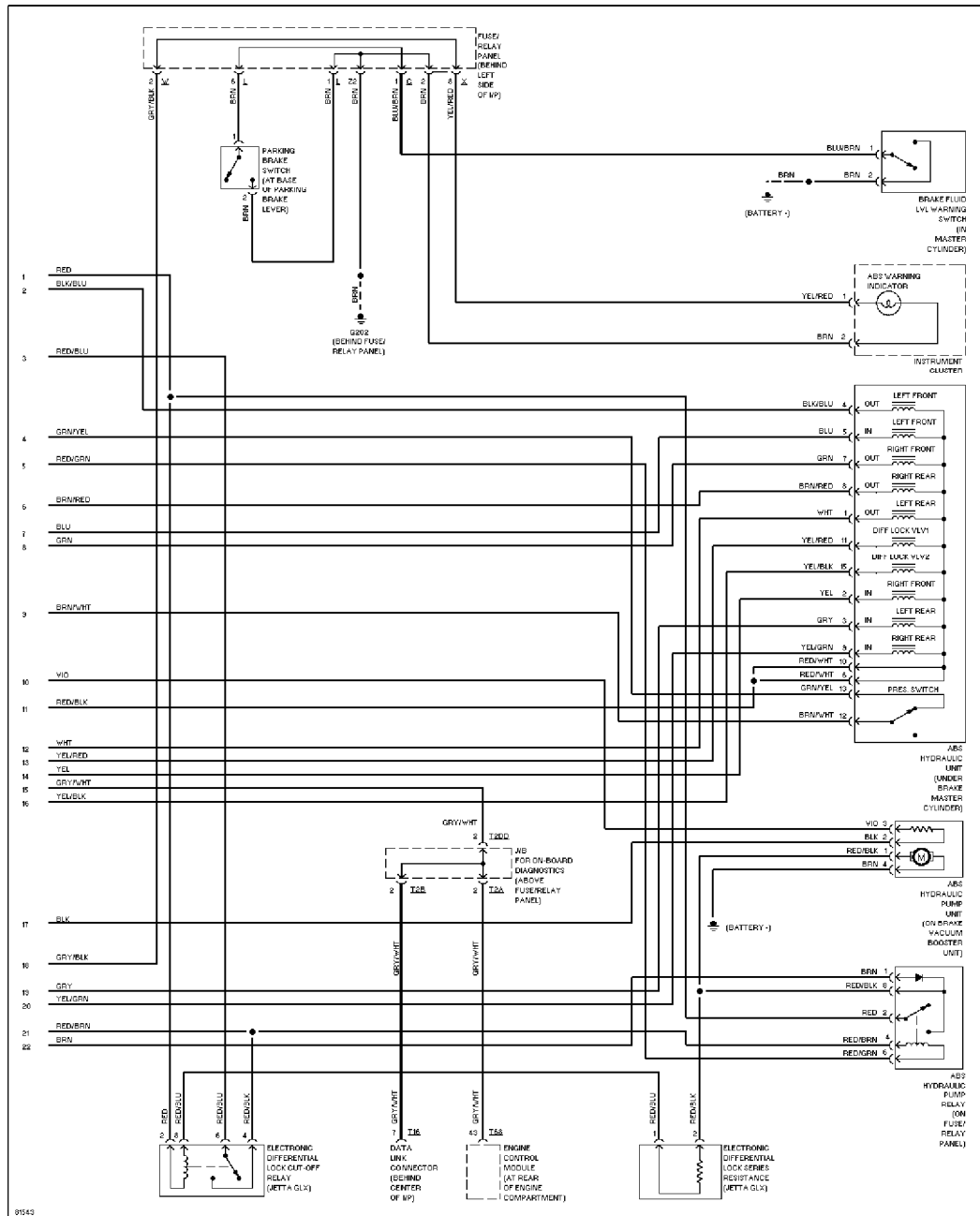


Fig. 7: Anti-Lock Brake System Wiring Diagram (1996 Golf III - 2 of 2)

END OF ARTICLE

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ARTICLE BEGINNING

GENERAL INFORMATION

Brake Systems - Motorist Assurance Program
Standards For Automotive Repair

All Makes & Models

INTRODUCTION TO MOTORIST ASSURANCE PROGRAM (MAP)

OVERVIEW OF MOTORIST ASSURANCE PROGRAM

The Motorist Assurance Program (MAP) is the consumer outreach effort of the Automotive Maintenance and Repair Association, Inc. (AMRA). Participation in the Motorist Assurance Program is drawn from retailers, suppliers, independent repair facilities, vehicle manufacturers and industry associations.

The Motorist Assurance Program was established as an industry-wide effort to address concerns raised by regulators, the media and consumers questioning our ethics and methods of doing business. The automotive repair industry had been bombarded by months of negative stories in the media and scrutiny from state and federal regulators who focused on how the need for repairs is determined. MAP was formed as an industry response to this issue.

Our mission is to strengthen the relationship between the consumer and the auto repair industry. We produce materials that give motorists the information and encouragement to take responsibility for their vehicles - through proper, manufacturer-recommended, maintenance. We encourage participating service and repair shops (including franchisees and dealers) to adopt a Pledge to their Customers and the Motorist Assurance Program developed Standards of Service. All participating service providers have agreed to subscribe to this Pledge and to adhere to the promulgated Standards of Service which demonstrates to their customers that they are serious about customer satisfaction.

These Standards of Service require that an inspection of the vehicle's (problem) system be made according to industry guidelines. After learning that neither the car manufacturers nor any other source had complete guidelines, leading industry organizations, along with other industry participants banded together to address this challenging task. During the past two and a half years, they successfully developed industry inspection guidelines for the following systems: Exhaust, Brakes, ABS, Steering and Suspension, Engine Maintenance and Performance, HVAC, and Electrical systems. Guidelines for Drive Train and Transmission are currently being promulgated. Revisions to the inspection guidelines for Exhaust, Brakes/ABS and Steering and Suspension Systems, which were issued two years ago, are now being published for implementation beginning spring 1997. Participating shops utilize these Uniform Inspection Guidelines as part of the inspection process and for communicating their findings to their customers.

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The Motorist Assurance Program continues to work cooperatively and proactively with government agencies and consumer groups toward solutions that both benefit the customer and are mutually acceptable to both regulators and industry. We maintain the belief that industry must retain control over how we conduct our business, and we must be viewed as part of the solution and not part of the problem. Meetings with state and other government officials concerned with auto repair and/or consumer protection are conducted. Feedback from these representatives are brought back to members, and the program adjusted as needed.

To assure auto repair customers recourse if they were not satisfied with a repair transaction, the Motorist Assurance Program offers arbitration through MAP/BBB-CARE in cooperation with the Council of Better Business Bureaus and individual participating Bureaus. MAP "piloted" in Indianapolis and Pittsburgh during spring, 1996 - and publicized "roll-outs" in New Jersey, Detroit (MI), Chicago (IL) and Richmond (VA) were conducted. To put some "teeth" in the program, and accreditation requirement for shops was initiated. The requirements are stringent and a self-policing method has been incorporated which includes the "mystery shopping" of outlets. In addition, a committee of service providers had been working diligently developing standards for newspaper, television and Internet advertising.

We welcome you to join us as we continue our outreach ... with your support, both the automotive repair industry and your customers will reap the benefits. Please visit MAP at our Internet site: www.hunter.com/map.htm or contact us at:

808 17th Street, NW Suite 200
Washington, D.C. 20006
Ph. (202) 466-7050 Fax (202) 223-9569

The Motorist Assurance Program was formed in 1992 by forty (40) companies who were concerned about the image of automotive service establishments. Today, MAP is an industry-wide association dedicated to strengthening consumer satisfaction with the automotive repair industry. MAP's participants represent the majority of the nation's multi-bay retail automotive outlets, their parts and equipment suppliers, independent repair shops, industry associations, car companies, manufacturers representatives, and the trade press. MAP is developing standards of service, uniform inspection procedures and other programs to assure consumers of the industry's professionalism and the commitment to excellence shared by MAP's sponsoring companies.

MAP's achievements to date include production and distribution (over 280,000) of the consumer brochure "How to Find Your Way Under the Hood and Around Your Car", development of a Pledge of Satisfaction to Consumers and Standards of Service and establishment of relationships with regulatory agencies.

As auto repair becomes an issue for federal and state regulators, MAP is working to educate government leaders on the dynamics of automotive service and the self-monitoring efforts MAP has undertaken on the industry's behalf. MAP's sponsoring companies

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are becoming well-known to government representatives as exemplary businesses working to improve the industry. Media sources also look to MAP to provide information and advice to consumers and on working with automotive technicians and repair establishments.

In the next few months, MAP plans to assist member repair facilities in implementing the MAP Pledge to Customers, establishing an alternate dispute resolution system to help resolve customer complaints within the industry, and developing a shop accreditation program to encourage policies in concert with the MAP Standards of Service and Inspection Guidelines.

MAP has united the aftermarket behind its consumer-oriented goals and has established itself both within and outside of the industry. We welcome you to join us as MAP continues its outreach. With your support, both the automotive repair industry and your customers will reap the benefits. Please contact MAP at:

808 17th Street, NW Suite 200
Washington, D.C. 20006
Ph. (202) 466-7050 Fax (202) 223-9569

MAP UNIFORM INSPECTION GENERAL GUIDELINES

OVERVIEW OF SERVICE REQUIREMENTS & SUGGESTIONS

It is MAP policy that all exhaust, brake, ABS, steering and suspension, wheel alignment, tires and wheels, driveline, engine performance and maintenance and heating, ventilation and air conditioning services be offered and performed under the guidelines and procedures specified in these sections.

Before any service is performed on a vehicle, an inspection of the appropriate system must be performed. The results of this inspection must be explained to the customer and documented on an inspection form. The condition of the vehicle and its components will indicate what services/part replacements may be required or suggested. In addition, suggestions may be made to satisfy the needs expressed by the customer.

This section lists the various parts and conditions that indicate required or suggested service or part replacement. Although this list is extensive, it is not inclusive. In addition to this list, a technician may make a suggestion. This suggestion must be based on substantial and informed experience or the vehicle manufacturer's recommended service interval.

Some conditions indicate that service or part replacement is required because the part in question is no longer providing the function for which it is intended, does not meet a vehicle manufacturer's design specification or is missing.

- * Example: An exhaust pipe has corroded severely and has a hole in it through which exhaust gases are leaking. Replacement of the exhaust pipe in this case is required due to functional failure.

Reasons to Require Repair or Replacement		Reasons to Suggest Repair or Replacement	
A - Part no longer performs intended purpose		1 - Part is close to the end of its useful life (just above discard specifications, or weak; failure likely to occur soon, etc.)	

Anti-lock brake systems are commonly referred to as "ABS" and will be referred to as "ABS" throughout these guidelines. Some ABS components also function as part of a traction control system (TCS). Inspection, diagnostic, and service procedures vary. Refer to appropriate service manuals for vehicle's specific requirements.

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WARNING: When diagnosing and servicing high pressure components, observe safety procedures and equipment requirements established by the vehicle manufacturer to reduce the possibility of serious personal injury.

CAUTION: Most manufacturers prohibit the use of DOT 5 brake fluid in a system equipped with ABS.

NOTE: Intermittent electrical conditions are often caused by a loss of ground, poor connection, or water intrusion into the wiring harness.

Electro-magnetic interference (EMI) may be caused by incorrect installation of accessories or components. EMI can result in improper system operation.

ACCELEROMETERS (G SENSOR OR LATERAL)

Condition	3	Code	3	Procedure
Broken	3	A	3	Require replacement.
Connector loose	3	A	3	Require repair or replacement.
Loose	3	A	3	Require repair or replacement.
Missing	3	A	3	Require replacement.
Out of position	3	A	3	Require re-positioning to vehicle manufacturer's specifications.
Output signal incorrect	3	A	3	Require replacement.

ACCUMULATORS - BRAKE

Condition	3	Code	3	Procedure
Leaking	3	A	3	Require replacement.
Missing	3	A	3	Require replacement.
Pre-charge incorrect	3	A	3	Require replacement.

BACKING PLATES OR ANCHOR PINS

Condition	3	Code	3	Procedure
Anchor pin bent	3	A	3	Require repair or replacement.
Anchor pin broken	3	A	3	Require replacement.

*** BRAKE SYSTEM UNIFORM INSPECTION GUIDELINES ***

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Anchor pin worn, 3 A 3 Require replacement.
affecting structural 3 3
integrity 3 3

Backing plate bent 3 A 3 Require repair or replacement.

Backing plate cracked 3 A 3 Require repair or replacement.

Backing plate broken 3 A 3 Require replacement.

Corroded, affecting 3 A 3 Require repair or replacement.
structural integrity 3 3

Loose 3 A 3 Require repair or replacement.

Missing 3 A 3 Require replacement.

Shoe lands worn 3 A 3 Require repair or replacement.

BRAKE FLUID

DOT 3 and DOT 4 brake fluids are clear or light amber in color. DOT 5 brake fluid is violet in color. Correct fluid required for the brake system is stamped on the master cylinder cover.

It is suggested that the system should be flushed and refilled with correct brake fluid when performing hydraulic brake service.

BRAKE FLUID

Condition 3 Code 3 Procedure

Beyond service interval 3 C,3 3 Suggest replacement.

Brake fluid incorrect 3 A 3 Require service. See note (1) below.

Contaminated, e.g. fluid 3 A 3 Require service. See note (2) below.
other than brake fluid 3 or 3
present 3 A 3

Rubber master cylinder 3 A 3 Require service. See note (2) below.
cover gasket distorted 3 3
and gummy 3 3

- NOTE: (1) If a fluid other than specification brake fluid is present in the brake system, the required service is to flush and fill with the correct brake fluid.
- (2) If a fluid other than brake fluid is present in the brake system which DOES affect the rubber parts, the required service is to: a) remove all components having rubber parts

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Separating from backing 3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Shoe table or web bent 3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Shoe table or web cracked 3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Shoe table or web worn 3 A 3 Require replacement.
affecting performance 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Surface cracking 3 3 No service suggested or required.
 3 3 Further inspection may be
 3 3 necessary.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Tapered wear 3 A 3 Further inspection required.
 3 3 See note (2) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Thickness of one pad is 3 B,2 3 Suggested minimum service is to
greater than opposite pad 3 3 lubricate caliper anchor and
in the same caliper 3 3 hardware. However, caliper may
(uneven wear) 3 3 need to be rebuilt or replaced.
 3 3 See note (3) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Wear indicator device 3 A 3 Require replacement of
(electronic) contacts rotor 3 3 appropriate parts. See caution
 3 3 below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
CAUTION: The pad wear indicator light may come on due to other
electrical problems.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Wear indicator device 3 B,2 3 Further inspection required.
(mechanical) bent 3 3 See note (4) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Wear indicator device 3 B,2 3 Further inspection required.
(mechanical) broken 3 3 See note (4) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Wear indicator device 3 B,2 3 Further inspection required.
(mechanical) contacts 3 3 See note (4) below.
rotor 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Worn to minimum 3 A 3 Suggest replacement.
specification 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Worn below minimum 3 A 3 Require replacement.
specification 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Worn close to, but above, 3 A 3 Suggest repair or replacement.
minimum specification 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
NOTE: (1) When reconditioning or replacing drums or rotors,
replacement of friction material may be suggested depending
on the severity of the grooves or ridges.
(2) This type of wear is normal on some vehicles. Refer to

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Broken 3 A 3 Require repair or replacement.
Corroded, affecting 3 A 3 Require repair or replacement.
performance 3 3
Dust boots on slider pin 3 B,2 3 Suggest replacement of boots.
(bolt) are missing 3 3
Dust boots on slider pin 3 B,2 3 Suggest replacement of boots.
(bolt) are torn 3 3
Missing 3 A 3 Require replacement.
Shims bent 3 A 3 Require removal or replacement.
Shims (OE standard) missing 3 A 3 Require replacement.
3 3 See note (1) below.
Shims out of position 3 A 3 Require removal or replacement.
Shims worn 3 A 3 Require removal or replacement.
Slider pin (bolt) bent 3 A 3 Require repair or replacement of
3 3 slider pin or bolt & lubricants.
3 3 slider pin or bolt & lubricants.
Slider pin (bolt) 3 A 3 Require repair or replacement of
rust-pitted 3 3 slider pin or bolt & lubricants.
Slider pin (bolt) worn 3 A 3 Require repair or replacement of
3 3 slider pin or bolt & lubricants.
Threads damaged 3 A 3 Require repair or replacement.
Threads stripped 3 A 3 Require replacement.
(threads missing) 3 3
Worn, affecting performance 3 A 3 Require replacement.
NOTE: (1) Aftermarket shims may be suggested to reduce noise.

CALIPERS

You are not required to replace or rebuild calipers in axle sets. However, when replacing or rebuilding a caliper due to the conditions that follow, you may suggest servicing, rebuilding, or replacement of the other caliper (on the same axle) for improved performance and preventive maintenance (for example, the part is close to the end of its useful life, replacing the caliper may extend pad life, or contribute to more balanced braking).

*** BRAKE SYSTEM UNIFORM INSPECTION GUIDELINES ***

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CAUTION: When installing calipers (loaded or unloaded), it is required that friction material be matched in axle sets for consistent braking characteristics.

Determine the need to replace or rebuild based upon the individual caliper conditions that follow.

CALIPERS

Condition	3	Code	3	Procedure
Bleeder port damaged (if non-repairable)	3	A	3	Require replacement of caliper.
Bleeder screw plugged	3	A	3	Require repair or replacement of bleeder screw. See note (1) below.
Bleeder screw broken off in caliper (if non-repairable)	3	A	3	Require replacement of caliper. See note (1) below.
Bleeder screw seized	3	A	3	Require replacement of caliper. See note (2) below.
Casting damaged - heavy corrosion affecting structural integrity	3	A	3	Require replacement of caliper.
Casting damaged - worn by rotor or wheel, affecting structural integrity	3	A	3	Require replacement of caliper.
Dust boot around caliper is torn	3	B,2	3	Suggest rebuilding or replacement of caliper.
Leaking	3	A	3	Require rebuilding or replacement of caliper.
Mounting pin threads damaged	3	A	3	Require repair or replacement of component with damaged threads.
Mounting pin threads stripped (threads missing)	3	A	3	Require repair or replacement of component with stripped threads.
Mounting pin threads stripped in caliper bracket (threads missing)	3	A	3	Require repair or replacement of caliper bracket.
Mounting pin threads stripped in steering knuckle (threads missing)	3	A	3	Require repair or replacement of steering knuckle.

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Pad thickness is greater	3	A	3	Require lubrication of caliper
than opposite pad in the	3		3	anchor and hardware. However,
same caliper (uneven wear)	3		3	caliper and/or hardware may need
	3		3	to be rebuilt or replaced.
	3		3	See note (3) below.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Pads in one caliper are	3	A	3	Further inspection required.
thinner than pads in the	3		3	See note (4) below.
other caliper on the same	3		3	
axle	3		3	

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Parking brake cable	3	A	3	Require replacement of parts.
support, lever, or return	3		3	
spring bent	3		3	

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Parking brake cable	3	A	3	Require replacement of parts.
support, lever, or return	3		3	
spring broken	3		3	

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Parking brake mechanism in	3	A	3	Require repair or replacement.
caliper inoperative	3		3	

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Piston anodized finish	3	A	3	Require replacement of piston and
worn off	3		3	rebuilding or replacement of
	3		3	caliper.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Piston corroded (pitted or	3	A	3	Require replacement of piston and
peeling chrome plating)	3		3	rebuilding or replacement of
	3		3	caliper.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Piston face damaged	3	A	3	Require replacement of piston and
(small scratches,	3		3	rebuilding or replacement of
chips acceptable)	3		3	caliper.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Piston face scored by rotor	3	A	3	Require replacement of piston and
(small scratches,	3		3	rebuilding or replacement of
chips acceptable)	3		3	caliper.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Piston sealing surface	3	A	3	Require replacement of piston and
damaged	3		3	rebuilding or replacement of
	3		3	caliper.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Piston sticking	3	A	3	Require rebuilding or replacement
	3		3	of caliper.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

NOTE: (1) Only required if the hydraulic system must be opened.

(2) Seized is defined as a bleeder screw that cannot be removed after a practical attempt at removing. Only required if the hydraulic system must be opened.

(3) Some vehicles are designed with inner and outer pads of different thicknesses. Refer to specific vehicle

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applications.

- (4) If all other causes have been eliminated, suggest repair or replacement of the caliper(s).

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DIGITAL RATIO AXLE CONTROLLERS & BUFFERS (DRAC & DRAB)

DIGITAL RATIO AXLE CONTROLLERS & BUFFERS (DRAC & DRAB)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	³ Code	³ Procedure
Missing	³ A	³ Require replacement.
Output signal incorrect	³ A	³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

DRUMS

Determine the need to recondition based upon individual drum conditions that follow. Friction material replacement does not require drum reconditioning unless other justifications exist. DO NOT recondition new drums unless they are being pressed or bolted onto an existing hub. It is not necessary to replace drums in axle sets. However, when replacing or reconditioning a drum due to the conditions that follow, you may suggest reconditioning of the other drum on the same axle to eliminate uneven braking behavior. Determine the need to replace based upon the individual drum conditions that follow. Always wash drums after servicing or before installing.

DRUMS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	³ Code	³ Procedure
Balance weight missing	³	³ No service suggested or required.
Bell-mouthed	³ B,2	³ Suggest reconditioning or replacement.
Cooling fin broken	³	³ No service suggested or required.
Cracked	³ A	³ Require replacement.
Drum diameter will exceed OEM "machine to" specs after required reconditioning	³ A	³ Require replacement. ³ See note (1) below. ³
Hard-spotted	³ A	³ Suggest reconditioning or replacement.
Measured diameter is greater than OEM discard	³ A	³ Require replacement. ³

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specifications 3 3
Out-of-round (wobbles) 3 B,2 3 Suggest reconditioning or
3 replacement.
Scored 3 A 3 Require reconditioning or
3 replacement.
Surface is threaded due to 3 A 3 Require reconditioning or
improper machining 3 replacement.
Tapered 3 B,2 3 Suggest reconditioning or
3 replacement.
NOTE: (1) If OEM does not supply "machine to" specifications, you may
machine to the discard specifications.

ELECTRICAL PUMPS & MOTORS - BRAKE

ELECTRICAL PUMPS & MOTORS - BRAKE
Condition 3 Code 3 Procedure
Does not build pressure 3 A 3 Further inspection required.
3 See note (1) below.
Excessive run time 3 A 3 Further inspection required.
3 See note (2) below.
Inoperative 3 A 3 Require replacement.
Leaking 3 A 3 Require repair or replacement.
Missing 3 A 3 Require replacement.
NOTE: (1) If failure to build pressure is traced to the pump or motor,
require replacement.
(2) If excessive run time is traced to the pump or motor,
require replacement.

ELECTRONIC CONTROLLERS BRAKE

ELECTRONIC CONTROLLERS BRAKE
Condition 3 Code 3 Procedure
Housing cracked 3 B,2 3 Suggest repair or replacement.
3 See note (1) below.
Inoperative 3 A 3 Require replacement.

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Missing 3 A 3 Require replacement.

NOTE: (1) If moisture enters the controller, it can reduce life expectancy or impair function.

FLUID LEVEL SENSOR SWITCHES BRAKE

FLUID LEVEL SENSOR SWITCHES BRAKE

Condition	3	Code	3	Procedure
Connector loose	3	A	3	Require repair or replacement.
Float saturated	3	A	3	Require replacement.
Missing	3	A	3	Require replacement.
Output signal incorrect	3	A	3	Require replacement.

FOUR WHEEL DRIVE SWITCHES

FOUR WHEEL DRIVE SWITCHES

Condition	3	Code	3	Procedure
Broken	3	A	3	Require replacement.
Connector loose	3	A	3	Require repair or replacement.
Leaking	3	A	3	Require repair or replacement.
Loose	3	A	3	Require repair or replacement.
Missing	3	A	3	Require replacement.
Output signal incorrect	3	A	3	Require replacement.

HOSES

HOSES

Condition	3	Code	3	Procedure
Blistered	3	A	3	Require replacement.
Fitting threads damaged	3	A	3	Require repair or replacement.
Fitting threads stripped	3	A	3	Require replacement.

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(threads missing) 3 3
Incorrectly secured 3 A 3 Require repair.
Inner fabric (webbing) cut 3 A 3 Require replacement.
Leaking 3 A 3 Require replacement.
Mounting hardware damaged 3 A 3 Require repair or replacement.
Mounting hardware missing 3 A 3 Require replacement.
Outer covering is cracked 3 A 3 Require replacement.
to the extent that inner 3 3
fabric of hose is visible 3 3
Restricted 3 A 3 Require replacement.
Routed incorrectly 3 A 3 Require routing correction.

HYDRAULIC MODULATORS BRAKE

Many modulators can only be replaced as complete assemblies. Whenever possible, replace the failed component part. If replacement of the failed part is not possible, then replace the modulator assembly.

HYDRAULIC MODULATORS BRAKE

Condition 3 Code 3 Procedure
Disabled 3 A 3 Require repair or replacement.
Electrical failure 3 A 3 Require repair or replacement.
External leak 3 A 3 Require repair or replacement.
Housing cracked 3 A 3 Require repair or replacement.
Internal leak 3 A 3 Require repair or replacement.
Missing 3 A 3 Require replacement.
Valve stuck 3 A 3 Require repair or replacement.

HYDRO-BOOSTERS

Conditions listed assume that the problem has been isolated to the specific component by proper testing procedures.

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HYDRO-BOOSTERS

Condition	3	Code	3	Procedure
Does not apply assist, or inadequate assist	3	A	3	Require repair or replacement.
Leaks fluid at fitting	3	A	3	Require tightening or replacement.
Leaks fluid at unit	3	A	3	Require repair or replacement. See note (1) below.
Leaks fluid from pressure hose(s)	3	A	3	Require replacement of hose(s).
Leaks fluid into passenger compartment	3	A	3	Require repair or replacement.
Wires corroded	3	A	3	Require repair or replacement.
Wires have exposed conductors	3	A	3	Require repair or replacement.
Wires burned	3	A	3	Require repair or replacement.
NOTE: (1) Follow diagnostic procedures as outlined in service manual to determine cause of leak and if unit can be repaired.				

HYDRO-ELECTRIC BOOSTERS (POWERMASTER)

Conditions listed assume that the problem has been isolated to the specific component by proper testing procedures.

HYDRO-ELECTRIC BOOSTERS (POWERMASTER)

Condition	3	Code	3	Procedure
Connector bent	3	A	3	Require repair or replacement.
Connector broken	3	A	3	Require repair or replacement.
Connector loose	3	A	3	Require repair or replacement.
Does not apply assist, or inadequate assist	3	A	3	Require repair or replacement.
Leaks fluid at fitting	3	A	3	Require tightening or replacement.
Leaks fluid at unit	3	A	3	Require repair or replacement. See note (1) below.

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Leak fluid from pressure hose(s) 3 A 3 Require replacement of hose(s).

Leak fluid into passenger compartment 3 A 3 Require repair or replacement.

NOTE: (1) Follow diagnostic procedures as outlined in service manual to determine cause of leak and if unit can be repaired.

IGNITION DISABLE SWITCHES

IGNITION DISABLE SWITCHES

Condition	Code	Procedure

Bent	A	Require replacement.

Broken	A	Require replacement.

Corroded	B,2	Suggest repair or replacement.

Missing	A	Require replacement.

Out of adjustment	A	Require adjustment or replacement.

Output signal incorrect	A	Require replacement.

LIGHTS - BRAKE

LIGHTS - BRAKE

Condition	Code	Procedure

Brake stoplights inoperable	A	Further inspection required to determine cause. See note (1).

Bulb burned out	A	Require replacement.

Warning light does not come on during bulb check		Further inspection required to determine cause. See note (1).

Warning light flashes		Further inspection required to determine cause. See note (1).

Warning light is intermittent		Further inspection required to determine cause. See note (1).

Warning light stays on after initial bulb check		Further inspection required to determine cause. See note (1).

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NOTE: (1) Follow appropriate procedure for determined cause.

MASTER CYLINDERS - BRAKE

MASTER CYLINDERS - BRAKE

Condition	³	Code	³	Procedure
Brake fluid leaking from rear of master cylinder bore	³	A	³	Further inspection required. See note (1) below.
Brake pedal drops intermittently	³	A	³	Further inspection required. See note (2) below.
Fluid level low	³		³	Further inspection required. See caution below.

CAUTION: DO NOT TOP OFF. Look for disc pad wear or fluid leak.

Refer to OEM procedures for adjusting low fluid level.

Internal valve failure	³	A	³	Require repair or replacement. See note (3) below.
Master cylinder has residue in reservoir	³	B,2	³	Further inspection required. See note (4) below.
Master cylinder leaking brake fluid internally	³	A	³	Require repair or replacement. See note (5) below.
Piston does not return	³	A	³	Require repair or replacement.
Ports plugged	³	A	³	Require repair or replacement.
Rubber master cylinder cover gasket distorted and gummy	³	A	³	Require replacement of the gasket. See note (6) below.

- NOTE: (1) Check for possible vacuum leak at booster input seal and/or push rod misalignment as possible causes. If neither is the cause, require repair or replacement of master cylinder.
- (2) This condition may be normal on some vehicles equipped with anti-lock brakes. If all other possible causes have been eliminated, require repair or replacement of master cylinder.
- (3) Require repair or replacement of valve if possible. If not possible, require replacement of the master cylinder.
- (4) DO NOT replace master cylinder unless it exhibits conditions listed for replacement. You may suggest fluid change according to OEM service intervals.

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(5) Use hose clamp test to determine this condition. Use an approved brake hose clamp to avoid damage to the hose.

(6) This condition may indicate contaminated brake fluid. See Brake Fluid section of the Uniform Inspection Guidelines.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

PARKING BRAKE SWITCHES

PARKING BRAKE SWITCHES

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	³	Code	³	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Bent	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Broken	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Corroded	³	B,2	³	Suggest repair or replacement as necessary.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Missing	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Out of adjustment	³	A	³	Require adjustment or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Output signal incorrect	³	A	³	Require replacement.
	³		³	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				

PARKING BRAKE SYSTEMS

The parking brake is an integral part of the brake system. It is important that the parking brake function properly when brake service is performed.

PARKING BRAKE SYSTEMS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	³	Code	³	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Cable improperly adjusted	³	A	³	Require cable adjustment.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Cable sticking	³	A	³	Require cable lubrication.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Cable stuck inside conduit and cannot be lubricated so that parking brake functions properly	³	A	³	Require replacement of cable assembly.
	³		³	
	³		³	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Cable or individual wires in the cable are broken	³	A	³	Require replacement of cable assembly.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Parking brake parts are inoperative	³	A	³	Require replacement of inoperative parts.
	³		³	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Parking brake parts are	³	A	³	Require replacement of missing

Condition	Code	Procedure

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Connector loose	³	A	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Housing damaged	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Leaking	³	A	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Loose	³	A	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Missing	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Output signal incorrect	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				

RELAYS - BRAKE

RELAYS - BRAKE				
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Condition	³	Code	³	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Housing cracked	³	B,2	³	Suggest replacement. See note (1) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Intermittent	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Missing	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Output signal incorrect	³	A	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
NOTE: (1) If moisture enters the relay, it can reduce life expectancy or impair function.				
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				

ROTORS

Determine the need to recondition based upon individual rotor conditions that follow. Friction material replacement does not require rotor reconditioning unless other justifications exist. DO NOT recondition new rotors unless they are being pressed or bolted onto an existing hub. It is not necessary to replace rotors in axle sets. However, when replacing or reconditioning a rotor due to the conditions that follow, you may suggest reconditioning of the other rotor on the same axle to eliminate uneven braking behavior.

Determine the need to replace based upon the individual rotor conditions that follow. Reconditioning is defined as machining and block sanding, or block sanding only. Block sanding is defined as using 120-150 grit sandpaper with moderate to heavy force for 60 seconds per side. Always wash rotors after servicing or before installing.

ROTORS				
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Condition	³	Code	³	Procedure

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*** BRAKE SYSTEM UNIFORM INSPECTION GUIDELINES ***

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Missing 3 A 3 Require replacement.
Star wheel does not turn 3 A 3 Require repair or replacement.
freely 3 3

STEEL BRAKE LINES

CAUTION: When replacing steel brake lines, replacement product must meet or exceed OEM design specifications.

STEEL BRAKE LINES

Condition 3 Code 3 Procedure
Fitting incorrect (e.g. 3 A 3 Require replacement.
compression fitting) 3 3
Flare type incorrect 3 A 3 Require replacement.
Leaking 3 A 3 Require tightening or replacement.
Line material incorrect 3 A 3 Require replacement.
(copper, etc.) 3 3
Mounting hardware damaged 3 A 3 Require repair or replacement.
Mounting hardware missing 3 A 3 Require replacement.
Restricted 3 A 3 Require replacement.
Routed incorrectly 3 A 3 Require routing correction.
Rust-pitted 3 A 3 Suggest replacement.

TIRES & WHEELS

Incorrect tire size, diameter, or pressure may affect the operation of ABS, traction control, and braking systems.

Consult the vehicle owner's manual or vehicle placard for correct size, speed ratings, and inflation pressure of the original tires.

TOOTHED RINGS (TONE WHEEL)

If the toothed ring requires replacement and cannot be replaced as a separate component, replace the assembly of which the ring is a part.

TOOTHED RINGS (TONE WHEEL)

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Condition	³ Code	³ Procedure
Alignment incorrect	³ A	³ Require repair or replacement.
Bent	³ A	³ Require replacement.
Contaminated	³ B,2	³ Suggest cleaning; identify and ³ correct cause.
Cracked	³ A	³ Require replacement.
Incorrect number of teeth	³ A	³ Require replacement.
Loose	³ A	³ Require replacement of worn parts.
Missing	³ A	³ Require replacement.
Teeth broken	³ A	³ Require replacement.
Teeth distorted	³ A	³ Further inspection required. ³ See note (1) below.
Teeth missing	³ A	³ Require replacement.
NOTE: (1) No action required unless ABS system performance is affected. If performance is affected, require replacement.		

VACUUM BOOSTERS

VACUUM BOOSTERS		
Condition	³ Code	³ Procedure
Auxiliary vacuum pump inoperative	³ A	³ Require repair or replacement.
Vacuum booster applies too much assist (oversensitive)	³ A	³ Require replacement.
Vacuum booster check valve grommet deteriorated	³ A	³ Suggest replacement of grommet.
Vacuum booster check valve leaking	³ A	³ Require replacement of check ³ valve.
Vacuum booster check valve missing	³ A	³ Require replacement of check ³ valve.
Vacuum booster check valve stuck closed	³ A	³ Require replacement of check ³ valve.
Vacuum booster check valve stuck open	³ A	³ Require replacement of check ³ valve.

*** BRAKE SYSTEM UNIFORM INSPECTION GUIDELINES ***

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Vacuum booster does not 3 A 3 Require replacement.
 apply enough assist 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Vacuum booster does not 3 A 3 Require replacement.
 release 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Vacuum booster fails to 3 A 3 Require replacement.
 store or maintain vacuum 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Vacuum hose filter 3 A 3 Require replacement of filter.
 restricted 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Vacuum hose filter leaking 3 A 3 Require replacement of filter.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Vacuum hoses collapsed 3 A 3 Require repair or replacement of
 3 3 hose.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Vacuum hoses leaking 3 A 3 Require repair or replacement of
 3 3 hose.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Vacuum hoses missing 3 A 3 Require replacement of hose.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Vacuum hoses restricted 3 A 3 Require repair or replacement of
 3 3 hose.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

VALVES - BRAKE

VALVES - BRAKE
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition 3 Code 3 Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Leaking 3 A 3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Linkage bent (rear load valves) 3 A 3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Linkage broken (rear load 3 A 3 Require repair or replacement.
 valves) 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Linkage disconnected (rear 3 A 3 Require repair or replacement.
 load valves) 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Pressure incorrect 3 A 3 Require adjustment. If not
 3 3 possible, require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Seized 3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Sticking 3 A 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

WHEEL ATTACHING HARDWARE

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For conditions noted below, also check conditions of wheel stud holes.

CAUTION: Proper lug nut torque is essential. Follow manufacturer's torque specifications and tightening sequence.
DO NOT lubricate threads unless specified by the vehicle manufacturer.

WHEEL ATTACHING HARDWARE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	³ Code ³	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Bent	³ A ³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Broken	³ A ³	Require replacement. See note (1) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Loose	³ A ³	Require repair or replacement of
	³	affected component.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Lug nut installed backward	³ A ³	Require repair.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Lug nut mating type incorrect	³ A ³	Require replacement of nut.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Lug nut mating surface dished	³ A ³	Require replacement of nut.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Lug nut flats rounded	³ A ³	Require replacement of nut. See note (2)
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Lug nut seized	³ A ³	Require replacement of nut and/or stud.
	³	See note (2) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Stud incorrect	³ A ³	Require replacement of stud.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Threads damaged	³ A ³	Require repair or replacement of
	³	component with damaged threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Threads stripped (threads missing)	³ A ³	Require replacement of component with
	³	stripped threads.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
NOTE: (1) Some manufacturers require replacement of all studs on that wheel if two or more studs or nuts on the same wheel are broken or missing.		
(2) Only required if removing wheel.		
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

WHEEL BEARINGS, RACES, & SEALS

NOTE: When repacking or replacing wheel bearings, grease seal replacement is required. You are not required to replace these

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components in axle sets. Determine the need to replace based upon the individual component conditions that follow.

WHEEL BEARINGS, RACES, AND SEALS

Condition			3	Code	3	Procedure
Rear axle seal on rear-wheel drive leaking			3	A	3	Require replacement of seal and inspection of axle, bearing, housing, and vent tube.
Seal leaking			3	A	3	Require replacement of seal and inspection of bearings.
Spindle worn			3	A	3	Require replacement of spindle and bearings.
Wheel bearing assembly feels rough when rotated			3	A	3	Require replacement of bearing assembly.
Wheel bearing balls are pitted			3	A	3	Require replacement of bearing assembly.
Wheel bearing balls are worn			3	A	3	Require replacement of bearing assembly.
Wheel bearing end-play exceeds manufacturer's specifications			3	A	3	Require adjustment of bearing, if possible. If proper adjustment cannot be obtained, require repair or replacement of worn component.
Wheel bearing race is loose in the hub bore			3	A	3	Require replacement of hub assembly and wheel bearings.
Wheel bearing races are pitted			3	A	3	Require replacement of bearing assembly.
Wheel bearing races are worn			3	A	3	Require replacement of bearing assembly.
Wheel bearing rollers are pitted			3	A	3	Require replacement of bearing assembly.
Wheel bearing rollers are worn			3	A	3	Require replacement of bearing assembly.

WHEEL CYLINDERS

You are not required to replace or rebuild wheel cylinders in axle sets. However, when rebuilding or replacing a wheel cylinder due to the conditions that follow, you may suggest rebuilding or

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replacement of the other wheel cylinder (on the same axle) for preventive maintenance, for example, the part is close to the end of its useful life.

Determine the need to rebuild or replace based upon the individual wheel cylinder conditions that follow.

WHEEL CYLINDERS

Condition			3	Code	3	Procedure
Attaching hardware bent			3	A	3	Require replacement of bent parts.
Attaching hardware broken			3	A	3	Require replacement of broken parts.
Attaching hardware corroded affecting structural integrity			3	A	3	Require replacement of corroded parts.
Attaching hardware loose			3	A	3	Require repair or replacement.
Attaching hardware missing			3	A	3	Require replacement of missing parts.
Bleeder port damaged (if non-repairable)			3	A	3	Require replacement.
Bleeder screw plugged			3	A	3	Require repair or replacement of bleeder screw. See note (1) below.
Bleeder screw broken off in wheel cylinder (if non-repairable)			3	A	3	Require replacement. See note (1) below.
Bleeder screw seized			3	A	3	Require replacement. See note (2) below.
Bore corroded (pitted)			3	A	3	Require replacement.
Bore grooved			3	A	3	Require replacement.
Bore oversized			3	A	3	Require replacement.
Casting mounting threads damaged			3	A	3	Require repair or replacement.
Casting mounting threads stripped (threads missing)			3	A	3	Require replacement.
Dust boot damaged			3	A	3	Require replacement of dust boot. See note (3) below.

*** BRAKE SYSTEM UNIFORM INSPECTION GUIDELINES ***

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Dust boot missing	³ A	³ Require replacement of dust boot.
	³	³ See note (3) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Leaking	³ A	³ Require rebuilding or replacement.
	³	³ See note (4) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Piston anodized finish worn off	³ A	³ Require replacement of piston and rebuilding or replacement of wheel cylinder.
	³	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Piston corroded (pitted)	³ A	³ Require replacement of piston and rebuilding or replacement of wheel cylinder.
	³	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Piston stuck in bore	³ A	³ Require replacement of wheel cylinder.
	³	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Wheel cylinder loose	³ A	³ Require repair. See note (5) below
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
NOTE: (1) Only required if the hydraulic system must be opened.		
(2) Seized is defined as bleeder screw that cannot be removed after a practical attempt at removing. Only required if the hydraulic system must be opened.		
(3) Inspect for related conditions to wheel cylinder.		
(4) Leaking is defined as a drop or almost a drop. Dampness is normal.		
(5) Further inspection is required to determine whether the attaching hardware may be reused or replaced. This may include screws, clips, rings, or backing plate, depending upon the design.		
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

WHEEL SPEED & VEHICLE SPEED SENSORS

WHEEL SPEED & VEHICLE SPEED SENSORS		
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	³ Code	³ Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Air gap incorrect	³ A	³ Require adjustment to vehicle manufacturer's specifications.
	³	³ See note (1) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Broken	³ A	³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Housing cracked	³ A	³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Internal resistance does not meet specifications	³ A	³ Require replacement.
	³	³ See note (2) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Lead routing incorrect	³ A	³ Require re-routing according to vehicle manufacturer's specs.
	³	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

*** BRAKE SYSTEM UNIFORM INSPECTION GUIDELINES ***

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Loose	³	A	³	Require adjustment to vehicle
	³		³	manufacturer's specifications.
	³		³	See note (3) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Missing	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Output signal incorrect	³	A	³	Require repair or replacement.
	³		³	See note (2) below.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Surface contaminated	³	B,2	³	Suggest cleaning; identify and
	³		³	correct source.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Tip bent	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Tip broken	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Tip missing	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Wire lead burned	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
exposed	³		³	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Wire lead corroded	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Wire lead open	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Wire lead shorted	³	A	³	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
NOTE: (1) If a sensor is not adjustable, further inspection is				
required to identify and correct cause.				
(2) Component failure may be caused by water intrusion into the				
wiring harness. Always check insulation for damage and				
wiring for excessive resistance.				
(3) Some integral bearing assemblies with sensors may require				
replacement.				
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				

WIRING HARNESSSES - BRAKE

NOTE: Component failure may be caused by water intrusion into the wiring harness. Always check insulation for damage and wiring for excessive resistance.

WIRING HARNESSSES - BRAKE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Condition	³	Code	³	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Burned	³	A	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Connector bent	³	A	³	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA				
Connector broken	³	A	³	Require repair or replacement.

*** BRAKE SYSTEM UNIFORM INSPECTION GUIDELINES ***

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Connector burned 3 A 3 Require repair or replacement.

Connector loose 3 A 3 Require repair or replacement.

Connector melted 3 A 3 Require repair or replacement.

Conductors exposed 3 A 3 Require repair or replacement.

Diode open 3 A 3 Require replacement.

Diode shorted 3 A 3 Require replacement.

Excessive resistance 3 A 3 Require repair or replacement.

Fuse blown 3 A 3 Require replacement.

Fusible link blown 3 A 3 Require replacement.

Mis-routed 3 A 3 Require re-routing to vehicle
 3 3 manufacturer's specifications.

Open 3 A 3 Require repair or replacement.

Poor ground 3 A 3 Require repair or replacement.

Shorted 3 A 3 Require repair or replacement.

Socket bent 3 A 3 Require repair or replacement.

Socket broken 3 A 3 Require repair or replacement.

Socket burned 3 A 3 Require repair or replacement.

Socket corroded 3 A 3 Require repair or replacement.

Socket loose 3 A 3 Require repair or replacement.

Socket melted 3 A 3 Require repair or replacement.

Terminal bent 3 A 3 Require repair or replacement.

Terminal broken 3 A 3 Require repair or replacement.

Terminal corroded 3 A 3 Require repair or replacement.

Terminal loose 3 A 3 Require repair or replacement.

END OF ARTICLE

*** ANTI-LOCK BRAKES UNIFORM INSPECTION GUIDELINE ***

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ARTICLE BEGINNING

GENERAL INFORMATION

Anti-Lock Brake System (ABS) Motorist Assurance Program
Standards For Automotive Repair

All Makes and Models

INTRODUCTION TO MOTORIST ASSURANCE PROGRAM (MAP)

The Motorist Assurance Program was formed in 1992 by forty (40) companies who were concerned about the image of automotive service establishments. Today, MAP is an industry-wide association dedicated to strengthening consumer satisfaction with the automotive repair industry. MAP's participants represent the majority of the nation's multi-bay retail automotive outlets, their parts and equipment suppliers, independent repair shops, industry associations, car companies, manufacturers representatives, and the trade press. MAP is developing standards of service, uniform inspection procedures and other programs to assure consumers of the industry's professionalism and the commitment to excellence shared by MAP's sponsoring companies.

MAP's achievements to date include production and distribution (over 280,000) of the consumer brochure "How to Find Your Way Under the Hood and Around Your Car", development of a Pledge of Satisfaction to Consumers and Standards of Service and establishment of relationships with regulatory agencies.

As auto repair becomes an issue for federal and state regulators, MAP is working to educate government leaders on the dynamics of automotive service and the self-monitoring efforts MAP has undertaken on the industry's behalf. MAP's sponsoring companies are becoming well-known to government representatives as exemplary businesses working to improve the industry. Media sources also look to MAP to provide information and advice to consumers and on working with automotive technicians and repair establishments.

In the next few months, MAP plans to assist member repair facilities in implementing the MAP Pledge to Customers, establishing an alternate dispute resolution system to help resolve customer complaints within the industry, and developing a shop accreditation program to encourage policies in concert with the MAP Standards of Service and Inspection Guidelines.

MAP has united the aftermarket behind its consumer-oriented goals and has established itself both within and outside of the industry. We welcome you to join us as MAP continues its outreach. With your support, both the automotive repair industry and your customers will reap the benefits. Please contact MAP at:

808 17th Street, NW
Suite 200
Washington, D.C. 20006

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MAP UNIFORM INSPECTION GENERAL GUIDELINES

OVERVIEW OF SERVICE REQUIREMENTS & SUGGESTIONS

It is MAP policy that all exhaust, brake, ABS, steering and suspension, wheel alignment, tires and wheels, driveline, engine performance and maintenance and heating, ventilation and air conditioning services be offered and performed under the guidelines and procedures specified in these sections.

Before any service is performed on a vehicle, an inspection of the appropriate system must be performed. The results of this inspection must be explained to the customer and documented on an inspection form. The condition of the vehicle and its components will indicate what services/part replacements may be required or suggested. In addition, suggestions may be made to satisfy the needs expressed by the customer.

This section lists the various parts and conditions that indicate required or suggested service or part replacement. Although this list is extensive, it is not inclusive. In addition to this list, a technician may make a suggestion. This suggestion must be based on substantial and informed experience or the vehicle manufacturer's recommended service interval.

Some conditions indicate that service or part replacement is required because the part in question is no longer providing the function for which it is intended, does not meet a vehicle manufacturer's design specification or is missing.

- * Example: An exhaust pipe has corroded severely and has a hole in it through which exhaust gases are leaking. Replacement of the exhaust pipe in this case is required due to functional failure.
- * Example: A brake rotor has been worn to the point where it measures less than the vehicle manufacturer's specifications. Replacement of the rotor is required because it does not meet design specifications.

Some conditions indicate that a service or part replacement is suggested because the part is close to the end of its useful life or to address a customer's need, convenience or request. If a customer's vehicle has one of these conditions, the procedure may only be to suggest service.

- * Example: An exhaust pipe is rusted, corroded or weak, but no leaks are present. In this case, the exhaust pipe has not failed. However, there is evidence that the pipe may need replacement in the near future. Replacement of the pipe may be suggested for the customer's convenience in avoiding a future problem.

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- * Example: The customer desires improved ride and/or handling, but the vehicle's shocks or struts have not failed. In this case, replacement may be suggested to satisfy the customer's wishes. In this case, replacement of the shocks or struts may not be sold as a requirement.

A customer, of course, has the choice of whether or not a Shop will service his or her vehicle. He or she may decide not to follow some of your suggestions. The following reasons may be used for required and suggested services:

Reasons to Require Repair or Replacement:

- * component no longer performs intended purpose
- * component does not meet a design specification (regardless of performance)
- * component is missing.

Reasons to Suggest Repair or Replacement

- * component is close to the end of its useful life (just above discard specifications or weak; failure likely to occur soon, etc.)
- * address a customer need, convenience or request (stiffen ride, enhance performance, eliminate noise, etc.)
- * comply with maintenance recommended by the vehicle's Original Equipment Manufacturer (OEM)
- * technician's recommendation based on substantial and informed experience.

BRAKE SERVICE PROCEDURES REQUIRED AND SUGGESTED FOR PROPER VEHICLE OPERATION

ANTI-LOCK BRAKE SYSTEMS: GENERAL

Anti-lock brake systems are considered an essential part of brake systems on which they are found .

Anti-lock brake systems are commonly referred to as "ABS" and will be referred to as "ABS" throughout these guidelines. Some ABS components also function as part of a traction control system (TCS). Inspection, diagnostic and service procedures vary. Refer to appropriate service manuals for vehicle's specific requirements.

WARNING: When diagnosing and servicing high pressure components, observe safety procedures and equipment requirements established by the vehicle manufacturer to reduce the possibility of serious personal injury.

CAUTION: Most manufacturers prohibit the use of DOT 5 brake fluid in a system equipped with ABS.

NOTE: Intermittent electrical conditions are often caused by a

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Condition	3	Procedure	3	Note
Teeth damaged	3	Further inspection required.	3	No action required unless ABS system performance is affected. If performance is affected, require replacement.
Cracked	3	Require replacement.	3	
Teeth missing or broken	3	Require replacement.	3	
Loose	3	Require replacement of worn parts.	3	
Contaminated	3	Suggest cleaning, identify and correct cause.	3	
Missing	3	Require replacement.	3	
Improper alignment	3	Require repair or replacement.	3	
Bent	3	Require replacement.	3	
Incorrect	3	Require replacement.	3	If the toothed ring requires replacement and cannot be replaced as a separate component, replace the assembly of which the ring is a part.

ABS: FLUID LEVEL SENSOR SWITCH

ABS: FLUID LEVEL SENSOR SWITCH

Condition	3	Procedure
Saturated float	3	Require replacement.
Improper output	3	Require replacement.

ABS: PRESSURE SWITCHES

ABS: PRESSURE SWITCHES

Condition	3	Procedure

[illegible]

Condition			Procedure			Note		
3			3					

Condition	3	Procedure	3	Note
Inoperative	3	Require replacement.	3	
Leaking	3	Require repair or replacement.	3	
Excessive run time	3	Further inspection	3	If excessive run time or

Condition	Procedure
Incorrect size, diameter or pressure may affect the operation of ABS and traction control systems.	Consult the vehicle owner's manual or vehicle placard for correct size, speed ratings and inflation pressure of the original tires. Do not exceed the maximum load or inflation capacity of the tire specified by OE.

*** ANTI-LOCK BRAKES UNIFORM INSPECTION GUIDELINE ***

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REQUEST FOR MAP MEMBERSHIP INFORMATION

NOTE: To print membership information request form, print portion
of article between dashed lines.

MAP

Request for Membership Information

I want to be a part of the automotive maintenance and repair
industry's move to improve the level of Customer satisfaction.

Please send me information on how I can become a member of MAP.

Name _____

Company/Organization _____

Address _____

Phone _____ FAX _____

MAP

808 17th STREET, NW
Suite 200
Washington, D.C 20006

Phone 202 466 7050
Fax 202 223 9569

END OF ARTICLE

AUTO TRANS DIAGNOSIS - 01M

Article Text

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ARTICLE BEGINNING

AUTOMATIC TRANSMISSIONS
Volkswagen Type 01M

Cabrio, Golf, Golf III, GTI Jetta, Jetta III, Passat

APPLICATION & LABOR TIMES

APPLICATION & LABOR TIMES

Vehicle Labor Times Trans.
Application (1) R & I (2) Overhaul Model

1995-96					
Cabrio	4.4	6.3	....	01M (CLK)	
Golf, GTI & Jetta					
4-Cylinder					
Gas	4.4	6.3	....	01M (CLK)	
Turbo Diesel	4.4	6.3	....	01M (CKZ)	
V6	4.4	6.3	....	01M (CLB)	
Passat					
4-Cylinder					
Gas	4.9	6.3	....	01M (CLK)	
Turbo Diesel	4.9	6.3	....	01M (CKZ)	
V6	4.9	6.3	....	01M (CLB)	

- (1) - Removal and installation of transmission from vehicle chassis.
(2) - On bench overhaul for transmission and differential.
DOES NOT include removal and installation.

IDENTIFICATION

Volkswagen Audi Group (VAG) transaxle type is cast into top of transaxle case, next to ATF cooler. Transaxle code and build date are located on top of transaxle case, next to starter.

DESCRIPTION & OPERATION

Transaxle includes a 4-speed automatic transmission, lock-up torque converter, final drive and solenoid-operated valve body. See Fig. 1. Under normal conditions, all shifts are controlled by a Transaxle Control Module (TCM). See Fig. 2. Fourth gear is an overdrive gear.

AUTO TRANS DIAGNOSIS - 01M

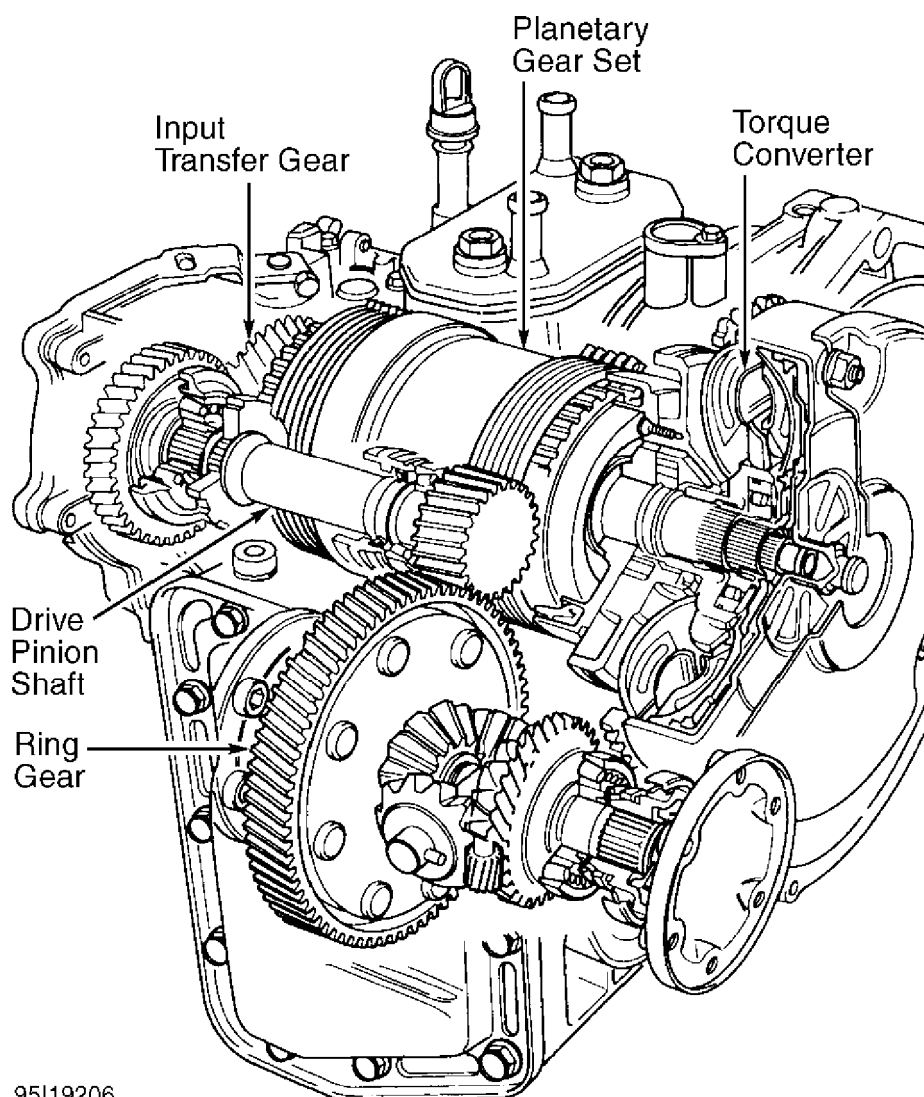
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Fig. 1: Cross-Sectional View Of Transaxle Components
Courtesy of Volkswagen United States, Inc.

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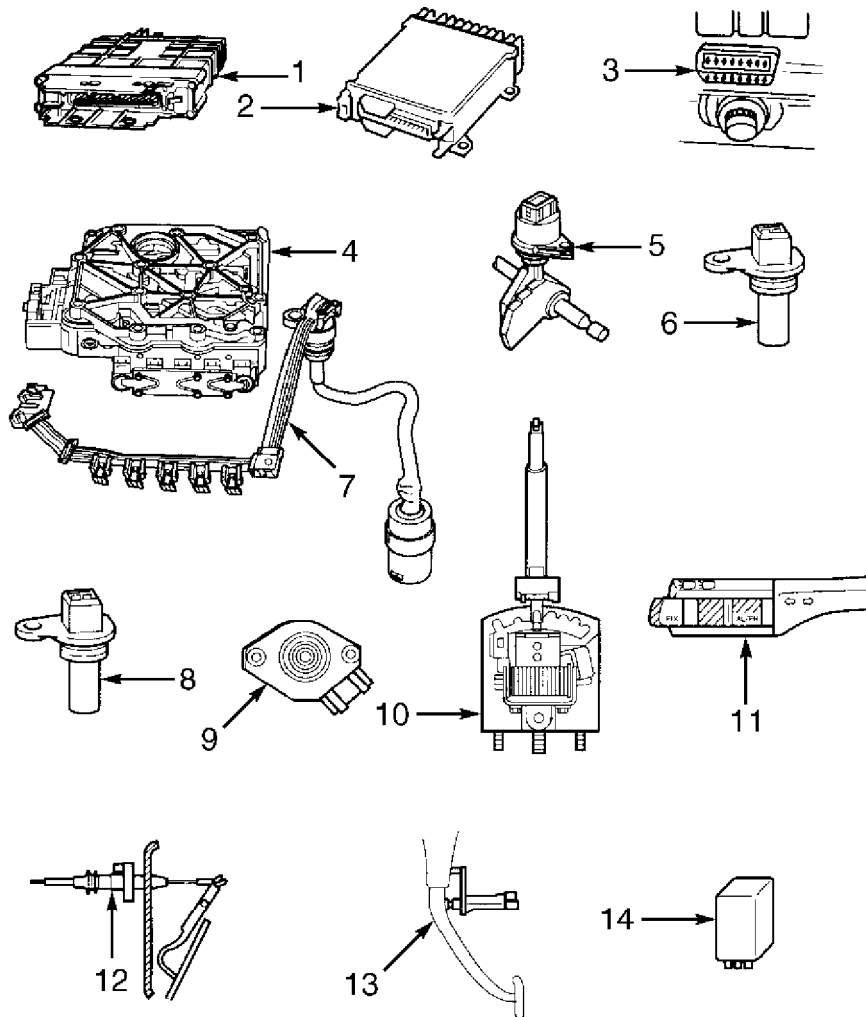
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1. Transmission Control Module (TCM)	7. Conductor Strip (With Integrated Transmission Fluid Temperature Sensor)
2. Powertrain Control Module (PCM)	8. Vehicle Speed Sensor (VSS)
3. Data Link Connector (DLC)	9. Throttle Position (TP) Sensor
4. Valve Body	10. Shift Lock Solenoid
5. Transmission Range (TR) Switch	11. Cruise Control Solenoid
6. Transmission Vehicle Speed Sensor (VSS)	12. Kickdown Switch
	13. Brake/Neutral Position Switch
	14. Park/Neutral Position Relay

96C04631

Fig. 2: Identifying TCM & Shift Lock Electrical Components
Courtesy of Volkswagen United States, Inc.

The transmission elements consist of a planetary gear set, one-way roller clutch, 3 apply clutches, 2 brake clutches and a torque converter lock-up clutch. See Figs. 1 and 3.

All 4 forward gears are hydraulically activated. When the lock-up clutch is engaged, the forward gears become mechanically driven by eliminating torque converter slip. The lock-up clutch is

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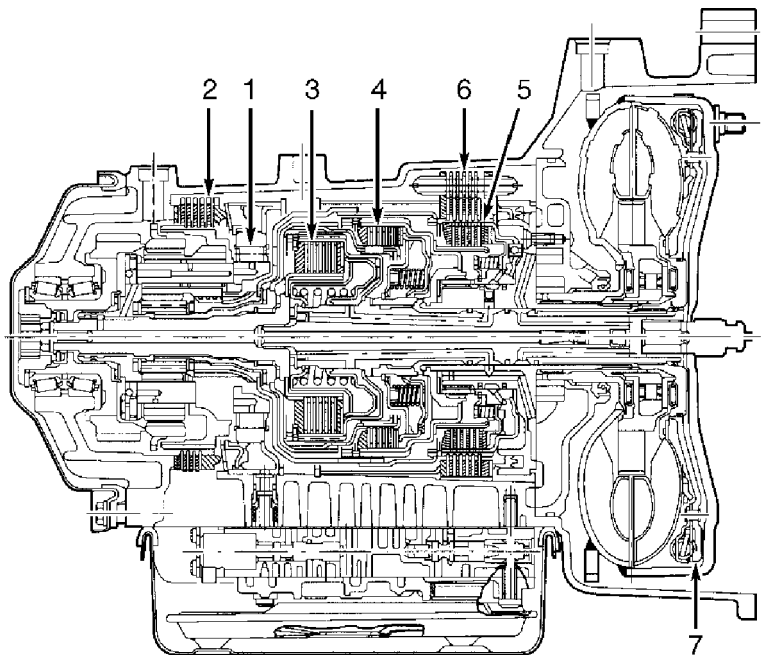
engaged depending on engine load and vehicle speed.

Power from the transmission is connected to the drive pinion through transfer gears. A ring gear and differential assembly are connected to flanges which spin the drive axles.

The electronic control consists of a TCM (located under rear seat), control solenoids, various sensors and switches. The control solenoids direct oil pressure inside the valve body. Solenoid valves No. 1-4 control the apply and brake clutches. Solenoid valves No. 5 and 7 control shift smoothness. Solenoid valve No. 6 is a frequency valve and controls the main hydraulic pressure. The TCM controls the main hydraulic pressure by varying the duty cycle.

The TCM monitors input and output signals. If electrical problems occur, TCM will record faults in TCM memory and may go into fail-safe mode (also known as emergency running mode). If TCM enters fail-safe mode, the transaxle will operate manually in reverse, 1st or 3rd gear. In fail-safe mode, 3rd gear operates with gear selector in 2nd, 3rd or "D". If engine is started with TCM in fail-safe mode, TCM activates 3rd gear hydraulically. The TCM memory can only be read using Scan Tool (VAG 1551) and Adapter (VAG 1551/3).

The TCM also controls shift lock system. This system locks the gear selector in Park or Neutral position unless the brake pedal is pressed. The TCM uses a shift lock control relay to release a gear-selector mounted solenoid. See Fig. 2.



1. One-Way Roller Clutch	5. Reverse Gear Apply Clutch
2. Reverse Gear Brake Clutch	6. 2nd-4th Gear Brake Clutch
3. 4th Gear Apply Clutch	7. Torque Converter
4. 1st-3rd Gear Apply Clutch	Lock-Up Clutch

96A04630

Fig. 3: View Of Transaxle Clutch Elements

Courtesy of Volkswagen United States, Inc.

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LUBRICATION & ADJUSTMENTS

NOTE: See appropriate AUTOMATIC TRANSMISSION SERVICING article in TRANSMISSION SERVICING section.

TROUBLE SHOOTING

SYMPTOM DIAGNOSIS

Leak At Torque Converter

Check drive plate clearance, torque converter bushing, oil seal or oil pump assembly. Repair as necessary.

Transaxle Fluid In Coolant

Faulty transaxle oil cooler. Replace transaxle oil cooler and friction plates in transaxle. Clean transaxle.

Transaxle & Differential Oils Mixed

Replace "O" ring and drive pinion seal on inner bearing support.

Gear Selector Hard To Move

Check gear selector between shifter and transaxle. Repair as necessary. Check parking lock assembly inside transaxle. Repair as necessary.

No Drive In 1st Gear

Check for faulty 1st-3rd apply clutch or reverse brake clutch.

No Drive In "D", "2" Or "3"

Check for faulty 1st-3rd apply clutch or one-way clutch.

No 2nd Gear In "D", "2" Or "3"

Check for faulty 2nd-4th brake clutch.

No 3rd Gear In "D" Or "3"

Check for faulty reverse apply clutch.

No 4th Gear In "D"

Check for faulty 2nd-4th brake clutch.

No Reverse

Check for faulty reverse apply clutch or reverse brake clutch.

No Drive In All Forward Gear Positions

Check for faulty 1st-3rd apply clutch, reverse brake clutch or one-way clutch.

Missing Shifts Up Or Down

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Check valve body for sticking valve(s) or faulty shift solenoid(s).

Erratic Or Harsh Shifts

Short in wiring to shift solenoid(s) or faulty shift solenoid(s). Check for proper throttle angle adjustment. See TECHNICAL SERVICE BULLETINS.

Harsh Shift In One Gear Only

Determine elements involved. Air check elements. Check for faulty shift solenoid or shift valve.

Stuck In Emergency Running Mode

Check for incorrect TCM installed, faulty wiring, bad solenoid electrical strip (inside oil pan) or stuck valve.

Park Lock Will Not Engage

Check for misadjusted selector lever cable. Check for faulty locking mechanism.

Bucking Or Poor Idling

Check throttle housing and air ducts for leaks. Check for possible air entering oil pump pickup.

Excess Engine RPM Drop When Shifting Into 1st Gear

Faulty Powertrain Control Module (PCM).

Engine Starts In Gear Or No Start In Park/Neutral

Check for faulty Park/Neutral safety switch.

Shift Lock Not Holding Selector In Park/Neutral

Check for faulty shift lock solenoid, shift lock mechanism or bad TCM.

MECHANICAL, HYDRAULIC & ELECTRICAL COMPONENTS

1) If gear selector is stuck in Park or Neutral position, go to SHIFT LOCK SYSTEM under TROUBLE SHOOTING. If gear positions are missing, shift quality is poor or no shifts are possible, ensure all electrical connections are okay and fluid level is correct.

2) If problems are still present, disconnect electrical connector at transaxle. Test drive vehicle. Check if transaxle will operate manually in reverse and 1st gear. Move gear selector to 2nd, 3rd or "D" position. Transaxle should operate in 3rd gear (2nd, 3rd or "D").

3) If transaxle operates as described, problem may be electrical. See ELECTRONIC SELF-DIAGNOSTICS. If transaxle does not operate as described, problem may be mechanical or hydraulic. See ROAD TEST.

NOTE: If transaxle does not operate in manual 1st gear, check 1st-3rd apply clutch and reverse brake clutch for damage or

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wear. If transaxle does not operate in manual reverse gear, check reverse apply clutch and reverse brake clutch for damage or wear.

ROAD TEST

WARNING: DO NOT exceed safe or legal speed limits during road test.

1) Road test vehicle with transaxle in "D" range. With vehicle at a speed above kickdown speed, press throttle pedal down and note kickdown shift speeds. Compare kickdown shift speeds to kickdown shift speed specifications. See KICKDOWN SHIFT SPEED SPECIFICATIONS table.

NOTE: In the following table, letter suffix following gear application refers to Hydraulic ("H") or Mechanical ("M") gear operation. Hydraulic or manual gear operation depends on operating mode of torque converter lock-up clutch.

KICKDOWN SHIFT SPEED SPECIFICATIONS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application Kickdown (MPH)

4-Cylinder (CLK)

1H-1M	.....	30-34
1M-2H	.....	30-34
2H-2M	.....	61-65
2M-3H	.....	61-65
3H-3M	.....	85-89
3M-4H	.....	85-89
4H-4M	.....	85-89
4M-4H	.....	86-83
4H-3M	.....	86-83
3M-3H	.....	61-57
3H-2M	.....	61-57
2M-2H	.....	61-57
2H-1M	.....	26-22
1M-1H	.....	26-22

Turbo Diesel (CKZ) (1)

V6 (CLB)

1H-1M	.....	37-41
1M-2H	.....	37-41
2H-2M	.....	76-80
2M-3H	.....	76-80
3H-3M	.....	111-115
3M-4H		111-115
4H-4M		111-115
4M-4H		112-108
4H-3M		112-108
3M-3H		75-71
3H-2M		75-71
2M-2H		75-71

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2H-1M 32-28
1M-1H 32-28

(1) - Information not available from manufacturer.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

2) Connect scan tool and appropriate adapter to diagnostic connector. Select function 08 "READ MEASURING VALUE BLOCK". Test solenoid valves and upshift speeds following scan tool manufacturers instructions.

3) If transaxle does not shift within specified MPH range, and scan tool values are within specification, determine affected elements. See APPLY & BRAKE CLUTCH APPLICATION.

4) If all apply and brake clutch elements are affected, check oil pump, oil filter, cooler lines, solenoid valve No. 6, and condition of torque converter and/or engine. Repair as necessary.

5) If one or more apply and brake clutch elements are affected, remove valve body. Locate appropriate fluid circuit in transaxle case and valve body. Check for leaks and/or blockage. Repair as necessary.

6) If hydraulic circuits are okay, or problems with apply and brake clutch elements are mechanical, repair transaxle.

NOTE: If transaxle does not operate in manual 1st gear, check 1st-3rd apply clutch and reverse brake clutch for damage or wear. If transaxle does not operate in manual reverse gear, check reverse apply clutch and reverse brake clutch for damage or wear.

APPLY & BRAKE CLUTCH APPLICATION

APPLY & BRAKE CLUTCH APPLICATION (1)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Gear Application	Elements In Use
1st Gear	1st-3rd Apply & One-Way Clutch Holding
2nd Gear	1st-3rd Apply & 2nd-4th Brake
3rd Gear	1st-3rd & 4th Apply Clutches
4th Gear	4th Apply & 2nd-4th Brake
Reverse	Reverse Apply & Reverse Brake
Park & Neutral	All Apply & Brake Clutches Released Or Ineffective

(1) - All forward gear elements shown are in "hydraulic-state". Forward gear elements switch to a "mechanical-state" with the addition of torque converter lock-up clutch apply.

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SHIFT LOCK SYSTEM

Operation

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All models are equipped with an electronic shift lock system. TCM controls shift lock system. See Fig. 2. This system locks gear selector in Park or Neutral position unless brake pedal is pressed. TCM uses shift lock control relay to release a solenoid mounted on gear selector assembly.

NOTE: Shift lock relay will not lock gear selector when vehicle speed is greater than 3 MPH.

A mechanical control cable prevents ignition key from being removed unless gear selector is in Park position. With ignition key removed, gear selector locks in Park position.

NOTE: If battery is disconnected or discharged, gear selector can be moved out of Park position by turning ignition key to START position.

Functional Check

1) With ignition key removed, ensure gear selector cannot be moved from "P" position. Insert key in ignition switch.

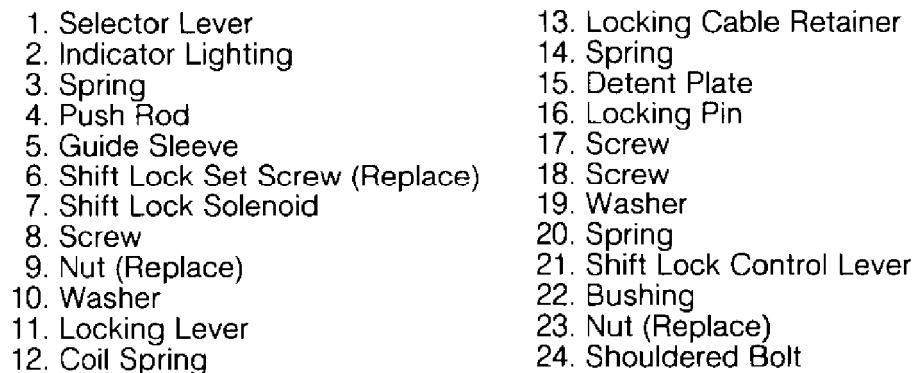
2) Turn ignition on. Ensure gear selector can only be moved with brake pedal pressed. Move gear selector to "N" position.

3) Without pressing brake pedal, ensure gear selector cannot move out of "N" position. Press brake pedal down. Ensure it is now possible to move gear selector.

4) If shift lock system does not operate as described, adjust gear selector, solenoid and control cable. If shift lock system does not operate after adjustments are made, check shift lock electrical system with Scan Tool (VAG 1551).

5) See testing information under ELECTRONIC SELF-DIAGNOSTICS. See Figs. 10-13. If any problems are found, service harness or components. If no problems are found, TCM may be defective. If shift lock system still does not operate correctly, check for worn or damaged parts and replace as necessary. See Figs. 2 and 4.

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95A19208
Fig. 4: Exploded View Of Shift Lock & Gear Selector Assembly
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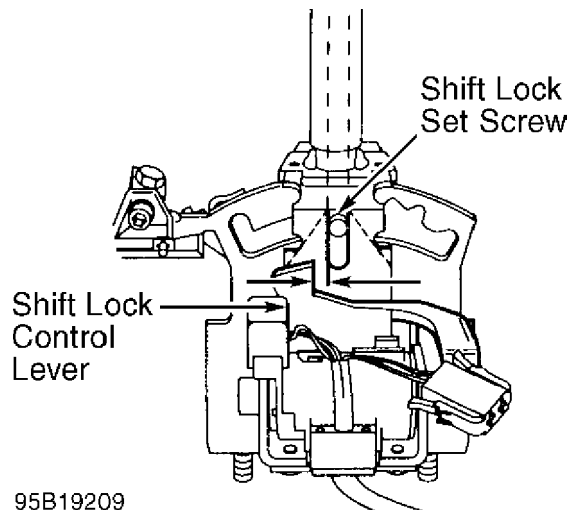
NOTE: Perform the following adjustments in order given.

Control Cable Adjustment

Loosen lock screw at gear selector lever on transaxle. Move gear selector in center console to Park position. Ensure front wheels are locked. Tighten cable housing to gear selector lever lock screw.

Shift Lock Solenoid Adjustment

Place gear selector in "N" or "P" position. Loosen shift lock solenoid mounting screws. Insert a .019" (.30 mm) feeler gauge between shift lock solenoid push rod and shift lever. See Fig. 5. If necessary, move shift lock solenoid and tighten screws.



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Fig. 5: Adjusting Shift Lock Solenoid
Courtesy of Volkswagen United States, Inc.

Shift Lock Cable Adjustment

1) Move gear selector to "1" position. Remove steering column covers. Turn ignition key to START position and release. Check clearance between shift lock cable lever and ignition switch locking pin.

2) Clearance should be .028" (.70 mm). If clearance is not correct, loosen lock nut on shift lock cable sheath. Position shift lock cable lever to obtain correct clearance. Tighten lock nut. See Fig. 6. Tighten gear selector housing screws and install steering column covers.

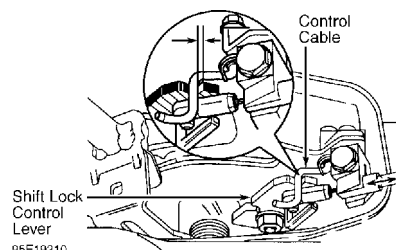


Fig. 6: Adjusting Shift Lock Cable
Courtesy of Volkswagen United States, Inc.

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Removal & Installation (Control Cable)

Remove lower cover from center console. Remove circlip from control cable end. Remove exhaust covers. On models equipped with V6 engines, remove catalytic converter. On all models, loosen lock nut and remove control cable from shift lever on transaxle. To install, reverse removal procedure. Adjust control cable. See CONTROL CABLE ADJUSTMENT under SHIFT LOCK SYSTEM.

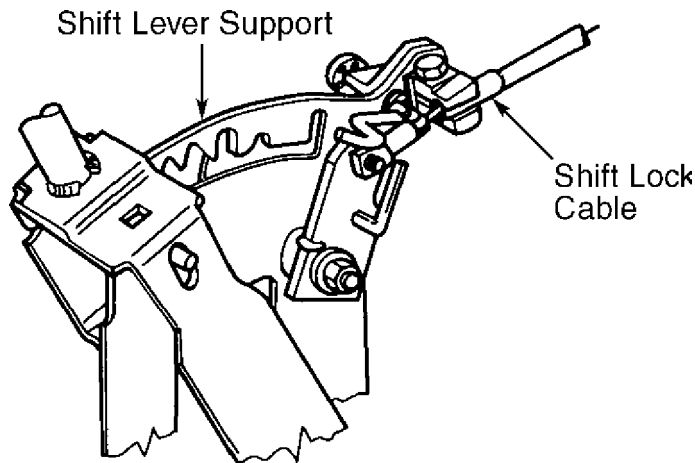
Removal & Installation (Shift Lock Cable)

1) Remove shift lever handle. Remove center console cover. Disconnect negative battery cable and wait 30 seconds.

2) Using Torx wrench, remove air bag retaining screws from rear side of steering wheel. Lift off air bag unit from steering wheel, and tilt air bag unit downward. Disconnect wiring connector from air bag unit. Remove steering wheel. Remove dash panel.

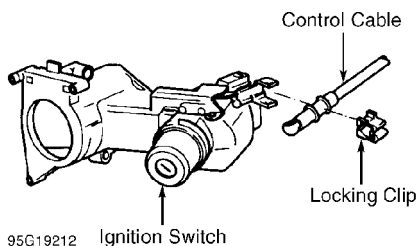
3) Place gear selector in rear position. Loosen screw holding cable sheath to gear selector support. Remove cable from lever. See Fig. 7.

4) Remove cover from ignition switch. Remove spring clip holding cable housing to ignition assembly. Lift and tilt shift lock cable housing upward. Pull up shift lock cable until shift lock cable unhooks from ignition switch. See Fig. 8.



95F19211

Fig. 7: Removing Shift Lock Cable From Shift Lever Support
Courtesy of Volkswagen United States, Inc.



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Fig. 8: Removing Shift Lock Cable From Ignition Switch
Courtesy of Volkswagen United States, Inc.

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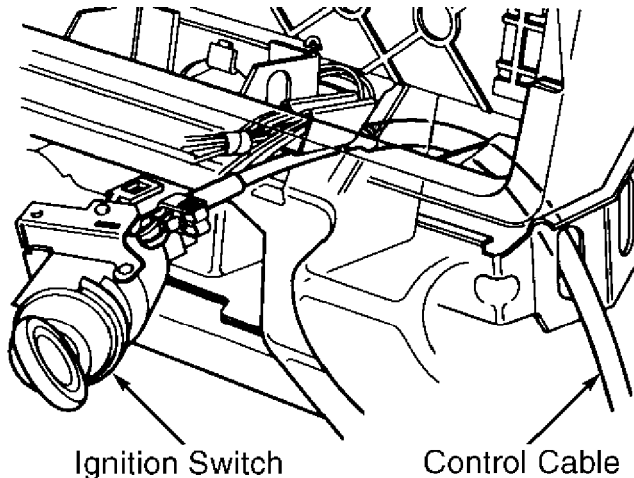
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5) Remove shift lock cable from under dash near A/C-heater housing and remove from vehicle. To install, position shift lock cable through under-dash panels. See Fig. 9. To complete installation, reverse removal procedure. Adjust shift lock control cable. See SHIFT LOCK CABLE ADJUSTMENT under SHIFT LOCK SYSTEM.



95H19213

Fig. 9: Routing Shift Lock Cable To Ignition Switch
Courtesy of Volkswagen United States, Inc.

ELECTRONIC SELF-DIAGNOSTICS

RETRIEVING TROUBLE CODES

1) Electronic control consists of a TCM (located under rear seat), control solenoids, and various sensors and switches. TCM monitors input and output signals. See Fig. 2.

2) If TCM detects problems in transaxle-related circuits or devices, TCM may record a trouble code in memory. To retrieve obtain trouble codes, use Scan Tool (VAG 1551) and Adapter (VAG 1551/3). All trouble code and related testing information is contained in scan tool.

TESTING

ELECTRICAL

NOTE: Manufacturer does not provide electrical component tests or specifications. All testing information is contained in Scan Tool (VAG 1551).

1) To isolate TCM circuit problems without a scan tool, circuit resistance and voltage can be checked by using Test Box (VAG 1598/18).

2) When checking circuit voltage, leave battery connected with test box connected to TCM and TCM vehicle harness. When checking circuit resistance, disconnect negative battery cable and connect test

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box to TCM vehicle harness. Leave TCM disconnected.

3) Measure voltage and resistance between specified sockets on test box. See Figs. 10-13. If a problem is found, service harness or components as necessary. If no problem is found, TCM may be defective.

RESISTANCE & VOLTAGE TESTS

Sockets On VAG 1598/18	Area To Be Tested	• Testing Requirements & Additional Steps	Test Result Specifications	If Test Results NOT Within Specs
23 + 1	Transaxle TCM Voltage Supply	• Switch Ignition ON	About Battery Voltage	Check Wire From Terminal No. 1 Check Wire From Terminal No. 23 For Continuity With C/15A In Relay Panel
5 + 28	Throttle Position (TP) Sensor	• Switch Ignition OFF No Throttle Full Throttle	700-1800 Ohms 2100-3900 Ohms	Check Wiring Calibrate Throttle Position (TP) Sensor
5 + 50	Throttle Position (TP) Sensor	• Switch Ignition OFF No Throttle Full Throttle	2100-3900 Ohms 700-1800 Ohms	Check Wiring Calibrate Throttle Position (TP) Sensor
29 + 15	Solenoid Switch For Shift Interlock	• Switch Ignition ON • Selector Lever In P Or N Brakes Applied	About Battery Voltage	Check Wiring Replace Shiftlock Solenoid
			About 0.2 Volt	
15 + 1	Signal From Brake Light Switch	• Switch Ignition ON DO NOT Apply Brakes Brakes Applied	0 Volt	Check Wiring Replace Brake Light Switch
			About Battery Voltage	

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Fig. 10: Testing TCM Harness & Components (1 Of 4)
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RESISTANCE TESTS

VAG 1598/18 Terminals	Component To Be Tested	• Test Conditions & Additional Steps	Specified Value Or Results	If Test Results NOT Within Specs
63 + 1	Multifunction Switch	• Switch Ignition OFF Move Selector Lever To Positions R, N, D, 2 & 3	Open	Check Wire Routing Replace Multifunction Switch
		Move Selector Lever To Position P & 1	.8 – 1.0 Ohms	
40 + 1		Move Selector Lever To Position P, R, 2 & 1	Open	
		Move Selector Lever To Position N, D & 3	.8 – 1.0 Ohms	
62 + 1		• Switch Ignition OFF Move Selector Lever To Position P, R, N & D	Open	
		Move Selector Lever To Position 3, 2 & 1	.8 – 1.0 Ohms	
18 + 1		• Switch Ignition ON Move Selector Lever To Position P, R & N	About Battery Voltage	
		Move Selector Lever To Position D, 3, 2 & 1	0 Volt	
55 + 67	Solenoid Valve No. 1	• Switch Ignition OFF	55 – 65 Ohms	Check Harness
55 + 1		Control Unit Removed	Open	Replace Valve Body
54 + 67	Solenoid Valve No. 2	• Switch Ignition OFF	55 – 65 Ohms	Check Harness
54 + 1		Control Unit Removed	Open	Replace Valve Body

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Fig. 11: Testing TCM Harness & Components (2 Of 4)

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RESISTANCE TESTS

Sockets On VAG 1598/18	Area To Be Tested	• Testing Requirements & Additional Steps	Test Result Specifications	If Test Results NOT Within Specs
9 + 67	Solenoid Valve No. 3	• Switch Ignition OFF	55 – 65 Ohms	Check Harness Routing
9 + 1		TCM Disconnected	Open	Replace Valve Body
47 + 67	Solenoid Valve No. 4	• Switch Ignition OFF	4.5 – 6.5 Ohms	Check Harness Routing
47 + 1		TCM Disconnected	Ohms	Replace Valve Body
56 + 67	Solenoid Valve No. 5	• Switch Ignition OFF	55 – 65 Ohms	Check Harness Routing
56 + 1		TCM Disconnected	Open	Replace Valve Body
58 + 22	Solenoid Valve No. 6	• Switch Ignition OFF	4.5 – 6.5 Ohms	Check Harness Routing
58 + 1/22 + 1		TCM Disconnected	Open	Replace Valve Body
10 + 67	Solenoid Valve No. 7	• Switch Ignition OFF	55 – 65 Ohms	Check Harness Routing
10 + 1		TCM Disconnected	Open	Replace Valve Body
23 + 29	Solenoid Switch for Shift Interlock	• Switch Ignition OFF TCM Disconnected	14 – 25 Ohms	Check Harness Routing Replace Shiftlock Solenoid Assembly
1 + 16	Kickdown Switch	• Switch Ignition OFF • TCM Disconnected	Open	Check Harness Routing Adjust Or Replace Accelerator Cable
		DO NOT Press Accelerator Pedal Depress Accelerator Fully	Less Than 1.5 Ohms	

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Fig. 12: Testing TCM Harness & Components (3 Of 4)
Courtesy of Volkswagen United States, Inc.

RESISTANCE TESTS

VAG 1598/18 Terminals	Component To Be Tested	• Test Conditions & Additional Steps	Specified Value Or Results	If Test Results NOT Within Specs
20 + 65	Vehicle Speed Sensor	• Switch Ignition OFF • TCM Disconnected • Set Ohmmeter To 2 k/ohm Scale	800 – 900 Ohms	Check Harness Routing Replace Vehicle Speed Sensor
6 + 67	ATF Temperature Sensor	• Switch Ignition OFF • TCM Disconnected • Set Ohmmeter To 200 k/ohm Scale ATF Temperature 68°F (20°C)	24,700 Ohms	Check Harness Routing Replace Valve Body
		• Set Ohmmeter to 200 k/ohm scale ATF Temperature 140°F (60°C)	About 48,800 Ohms	
		ATF Temperature 248°F (120°C)	About 7400 Ohms	
21 + 66	Transmission Vehicle Speed Sensor	• Switch Ignition OFF • TCM Disconnected • Set Ohmmeter To 2 k/ohm Scale	800 – 900 Ohms	Check Harness Routing Replace Vehicle Speed Sensor

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Fig. 13: Testing TCM Harness & Components (4 Of 4)
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ON-VEHICLE SERVICE

DRIVE AXLE SHAFTS

See appropriate AXLE SHAFTS article in AXLE SHAFTS & TRANSFER CASES section.

OIL COOLER FLUSHING

1) Remove external oil filter. Remove oil lines and allow fluid to drain. Using pressurized solvent, flush remaining fluid and debris from oil lines and cooler. Repeat flushing if necessary.

2) Use pressurized shop air to remove solvent from oil lines and oil cooler. Install a new external oil filter.

TRANSAXLE COMPONENTS

Following components may be serviced with transaxle in vehicle. For removal and installation procedures, see TRANSAXLE DISASSEMBLY.

- * Drive Flanges
- * External Oil Filter
- * Gear Selector Lever
- * Multifunction Switch, Speedometer Drive Shaft & Speed Sensor
- * Oil Pan & Valve Body Assembly
- * Planetary Gear Cover

REMOVAL & INSTALLATION

See appropriate AUTOMATIC TRANSMISSION REMOVAL article in TRANSMISSION SERVICING section.

TORQUE CONVERTER

1) Remove torque converter. Check torque converter for any wear or damage, and replace if necessary. If torque converter is being reused, drain old fluid.

2) Extract ATF from torque converter using Torque Converter Service Station (VAG 1358 A) and Probe (VAG 1358 A/1).

TRANSAXLE DISASSEMBLY

TRANSAXLE UNIT

1) Remove torque converter. Remove oil pan and valve body assembly. Remove sealing plug from transaxle case. See Fig. 14.

2) Measure and record turbine shaft end play. See Fig. 15. Remove oil pump bolts. Using two M8 bolts, remove oil pump from front of transaxle. See Fig. 16.

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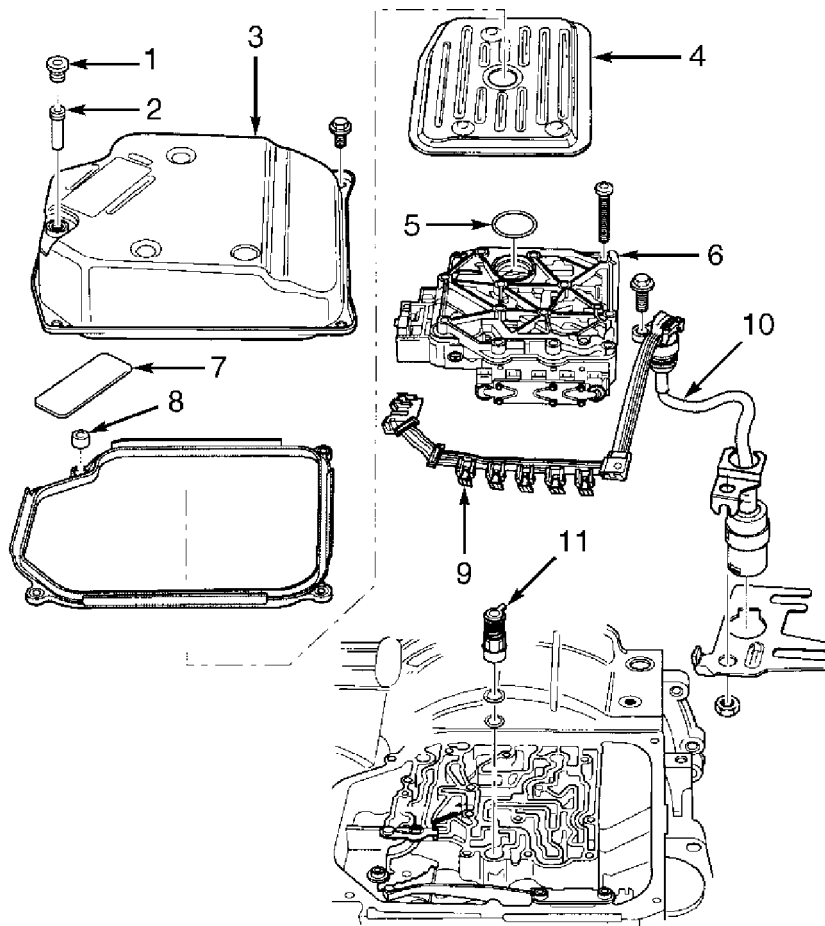
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3) Remove all clutches with support tube, 2nd-4th gear clutch plates, springs and spring caps together. See Figs. 17 and 18.

4) Lock drive shell in place by inserting a screwdriver through hole of large sun gear into side of transaxle case. See Fig. 19. Loosen and remove small planetary drive shaft bolt, washer and shim. See Fig. 20. Remove small planetary drive shaft.

5) Remove large drive shaft and sun gear. Remove Vehicle Speed Sensor (VSS) from transaxle case. Remove supporting tube and one-way clutch circlips. Remove one-way clutch assembly.

6) Remove planetary carrier with dished spring. Remove reverse brake clutch assembly. See Figs. 17, 20 and 21. DO NOT remove input gear assembly, unless bearing or gear damage is present.



1. Drain Plug
2. Overflow Tube
3. Oil Pan
4. ATF Screen
5. "O" Ring
6. Valve Body

7. Magnet
8. Spacer Bushing
9. Solenoid Valve Connector
10. Conductor Strip
11. Sealing Plug

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Fig. 14: Exploded View Of Oil Pan & Valve Body
Courtesy of Volkswagen United States, Inc.

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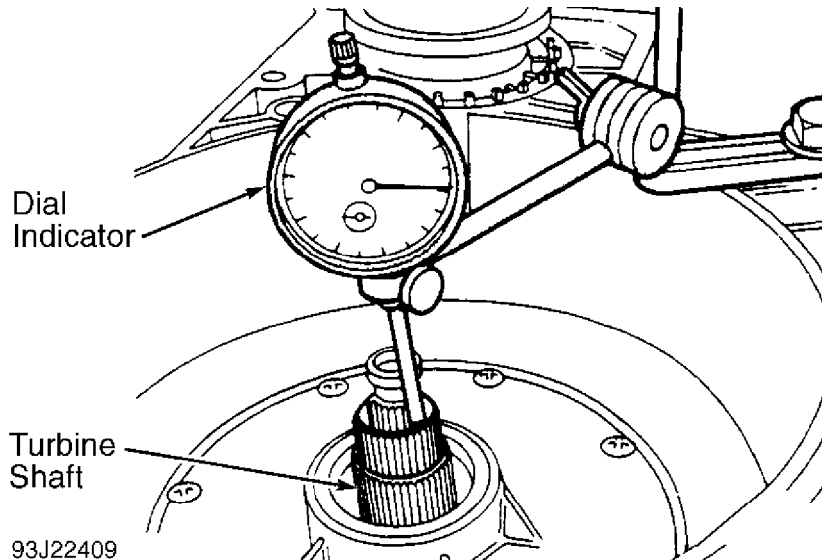


Fig. 15: Checking Turbine Shaft End Play
Courtesy of Volkswagen United States, Inc.

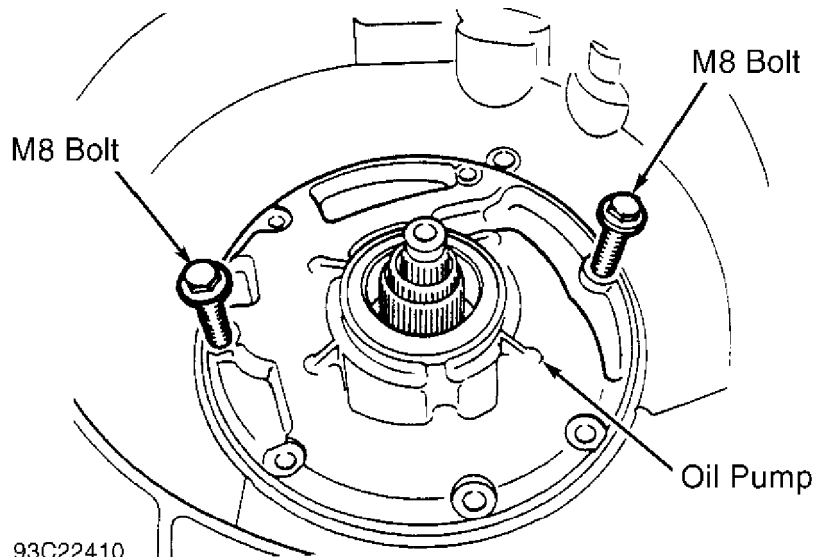


Fig. 16: Removing Oil Pump
Courtesy of Volkswagen United States, Inc.

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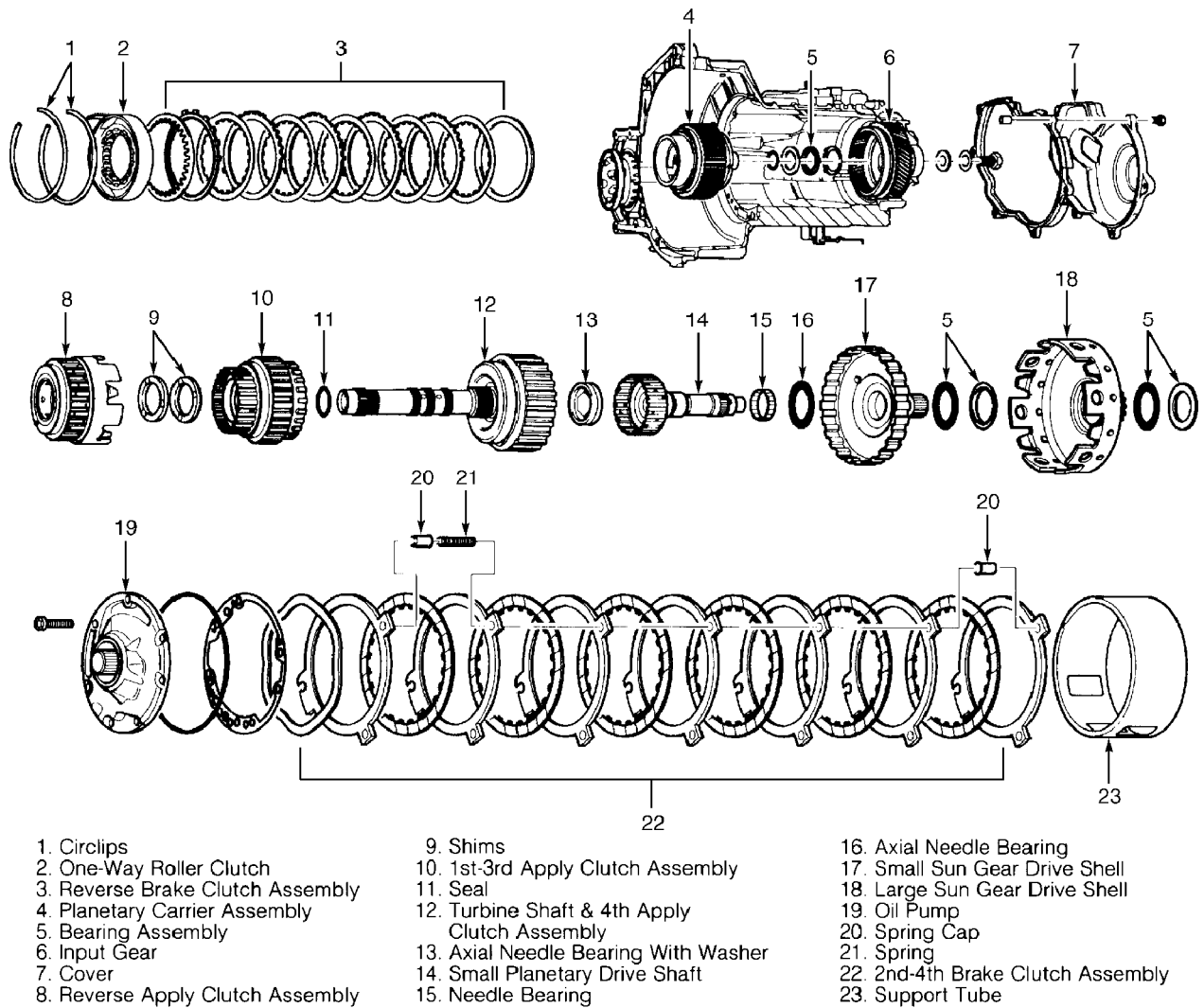
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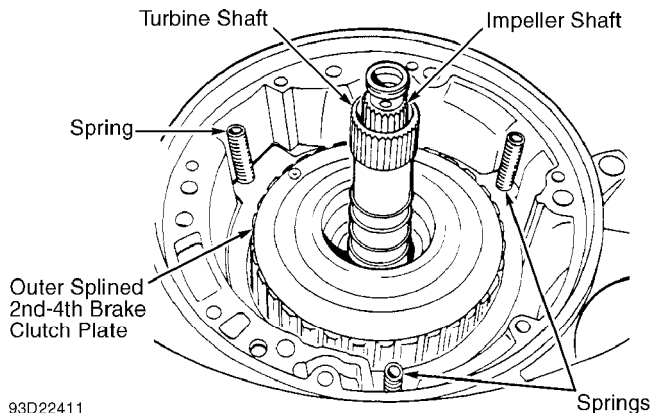
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Fig. 17: Exploded View Of Transaxle Components
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Fig. 18: Removing Turbine Shaft With 2nd-4th Brake Clutch & 1st-3rd Apply Clutch
Courtesy of Volkswagen United States, Inc.

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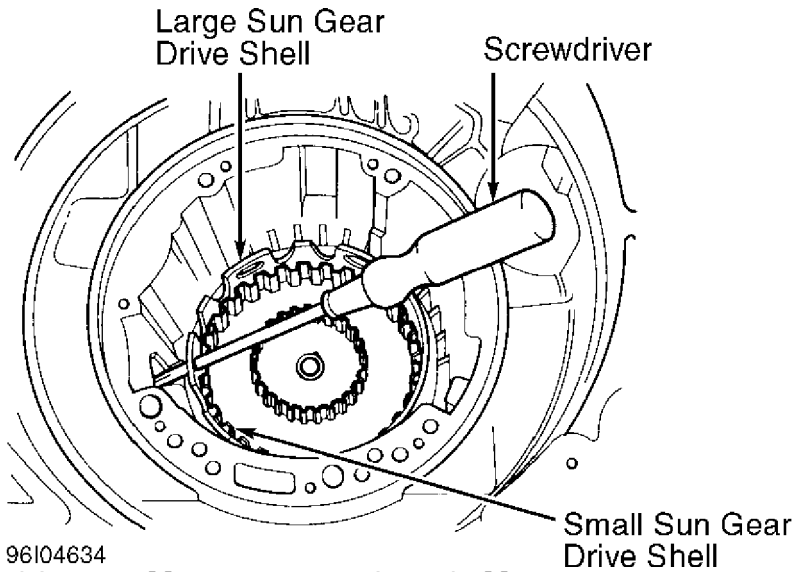
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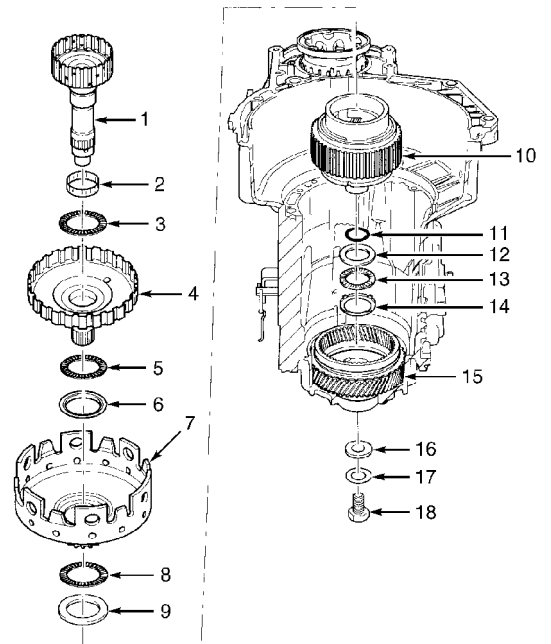
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Fig. 19: Locking Small Sun Gear Drive Shell
Courtesy of Volkswagen United States, Inc.



1. Small Planetary Drive Shaft	9. Washer
2. Needle Bearing	10. Planetary Carrier Assembly
3. Axial Needle Bearing	11. Seal
4. Small Sun Gear Drive Shell	12. Washer
5. Axial Needle Bearing	13. Axial Needle Bearing
6. Washer	14. Washer
7. Large Sun Gear Drive Shell	15. Input Gear
8. Axial Needle Bearing	16. Planetary Carrier Shim
	17. Washer
	18. Bolt

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Fig. 20: Removing Small Planetary Drive Shaft
Courtesy of Volkswagen United States, Inc.

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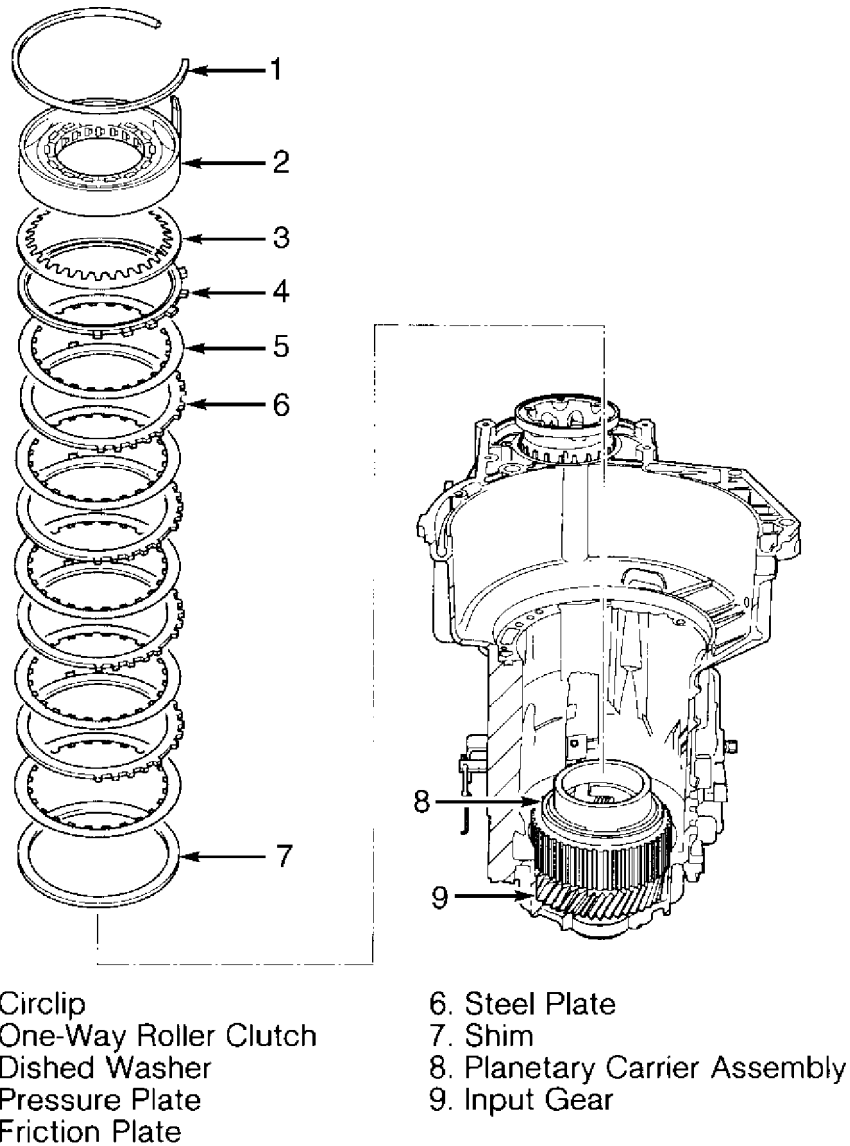
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Fig. 21: Removing Planetary Carrier & Reverse Brake Clutch Assembly
Courtesy of Volkswagen United States, Inc.

FINAL DRIVE & TRANSFER GEARS

1) Drain gear oil. Attach INCH-lb. torque wrench to a 1 5/8" (41 mm) socket wrench. See Fig. 22. Measure and record total roller bearing turning torque of drive pinion gear. This measurement is required for reassembly reference if roller bearings are reused.

2) Engage parking pawl. Using a 7/8" (22 mm) Allen wrench socket, remove fastener nut. See Fig. 22. Remove dished washer, shim and bearing.

3) Install fastener nut. Using Pressing Adapter (VW771), thread tool until 1/8" clearance is present between bearing race and fastener nut.

4) Pull input gear out until it bottoms in pressing adapter.

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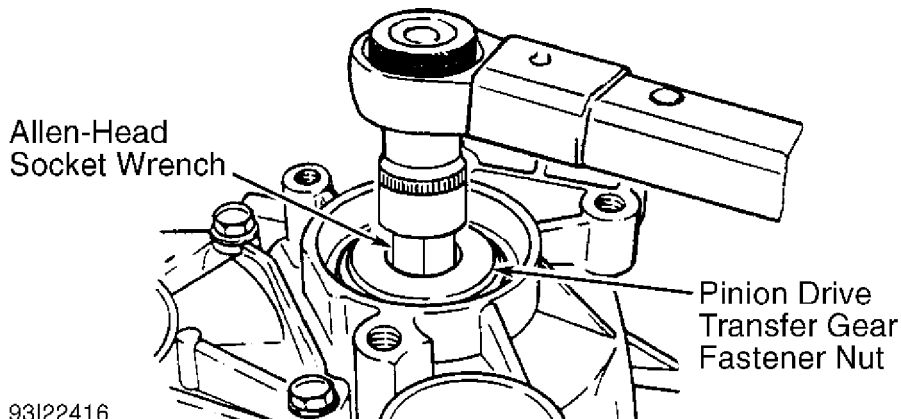
Remove pressing adapter. Remove input transfer gear assembly from transaxle case.

5) Remove speedometer drive shaft. See Fig. 23. On left axle flange, remove bolt and remove axle flange. On right axle flange, remove circlip. Using puller, remove right axle flange.

6) Remove differential ring gear cover. If bearings are being reused, mark differential adjuster ring (torque converter side) bearing carrier to transaxle case. Using Bearing Adjuster Ring Socket (3155), remove both differential bearing carriers. See Fig. 24. Remove differential assembly from transaxle case. See Fig. 23.

7) Remove drive pinion and input transfer gear cover (if not already removed). See Fig. 25. Using INCH-lb. torque wrench, measure turning force of drive pinion and transfer gear bearings. Record measurement for reassembly.

8) Engage parking pawl. Remove nut from pinion. See Fig. 26. Using puller, remove output gear. See Fig. 27. Remove selector shaft and parking pawl assembly. See Fig. 36. Remove outer bearing support. Remove parking gear from pinion. Remove pinion and bearing from transaxle. Using pin socket, remove inner bearing support with drive pinion seal.



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Fig. 22: Removing Input Transfer Gear Fastener Nut
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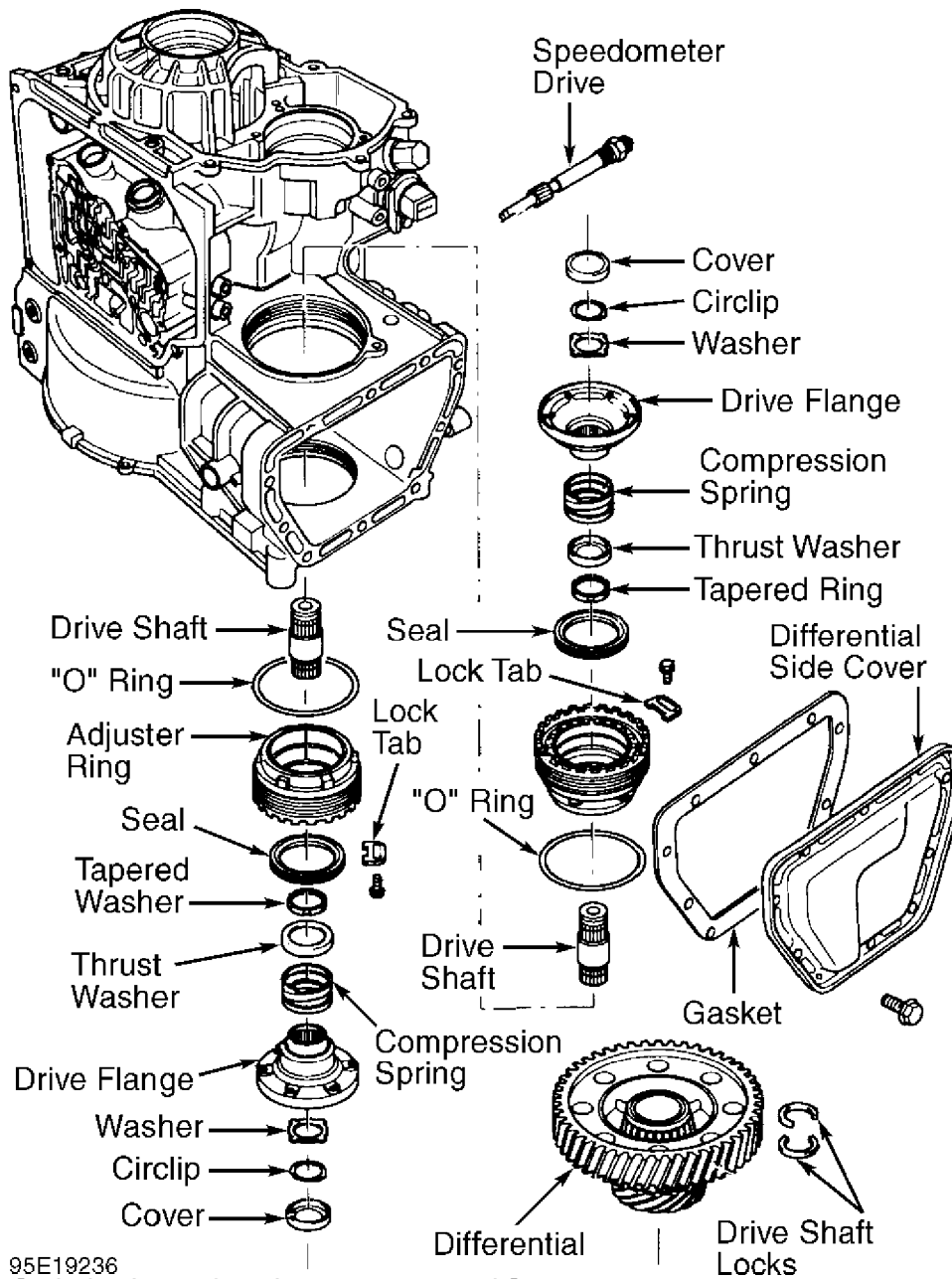


Fig. 23: Exploded View Of Drive Gear Assembly
Courtesy of Volkswagen United States, Inc.

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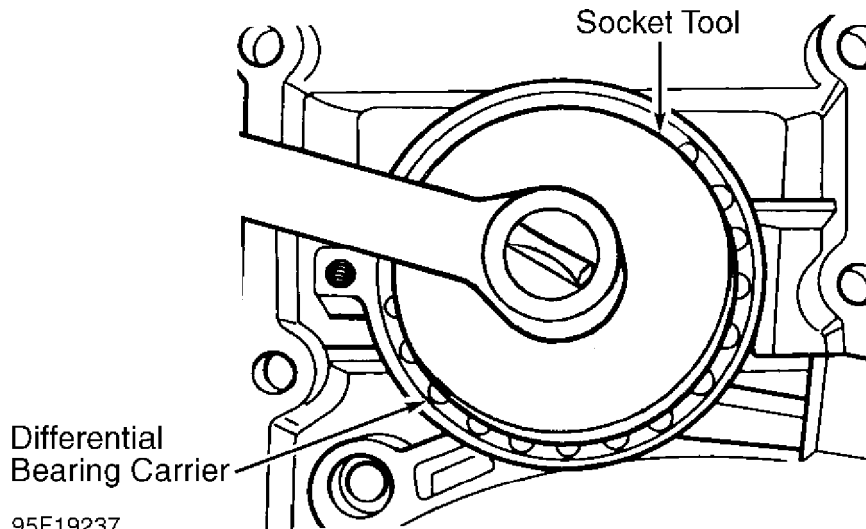
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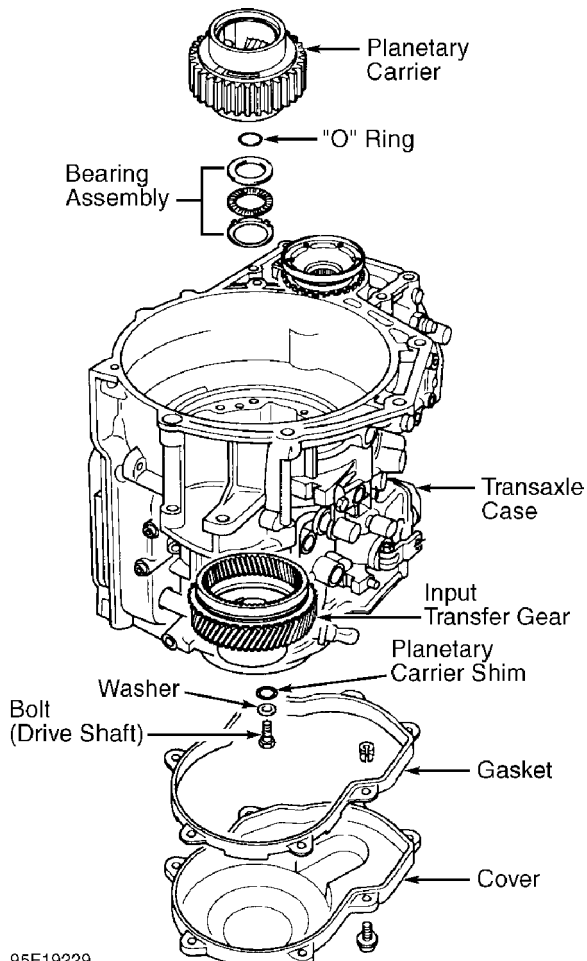
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Fig. 24: Removing Bearing Adjuster Ring Bearing Carrier
Courtesy of Volkswagen United States, Inc.



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Fig. 25: Locating Planetary & Input Gear Assembly
Courtesy of Volkswagen United States, Inc.

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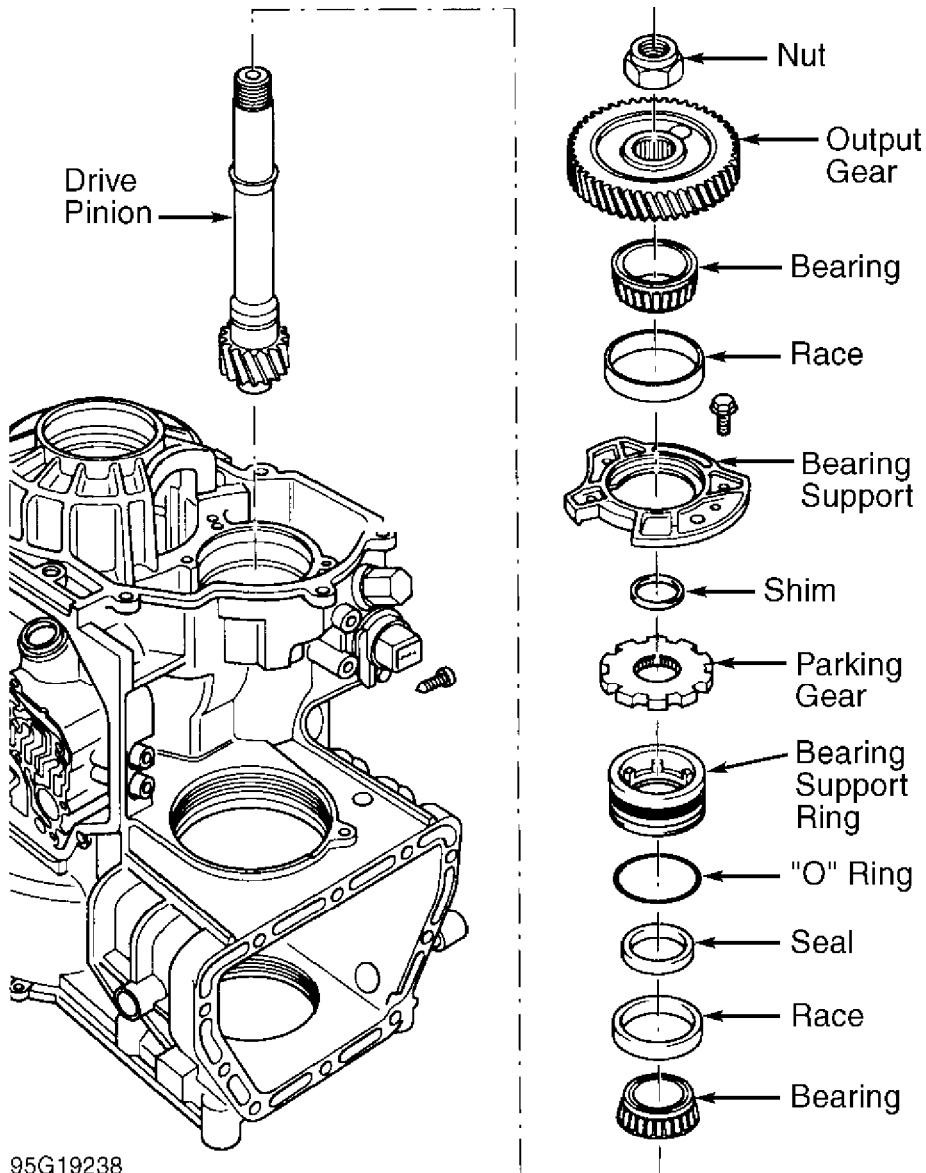


Fig. 26: Exploded View Of Drive Pinion & Output Gear Assembly
Courtesy of Volkswagen United States, Inc.

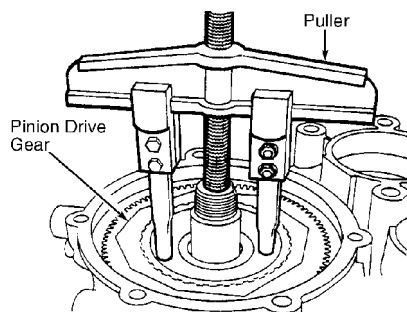


Fig. 27: Removing Pinion Drive Gear
Courtesy of Volkswagen United States, Inc.

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COMPONENT DISASSEMBLY & REASSEMBLY

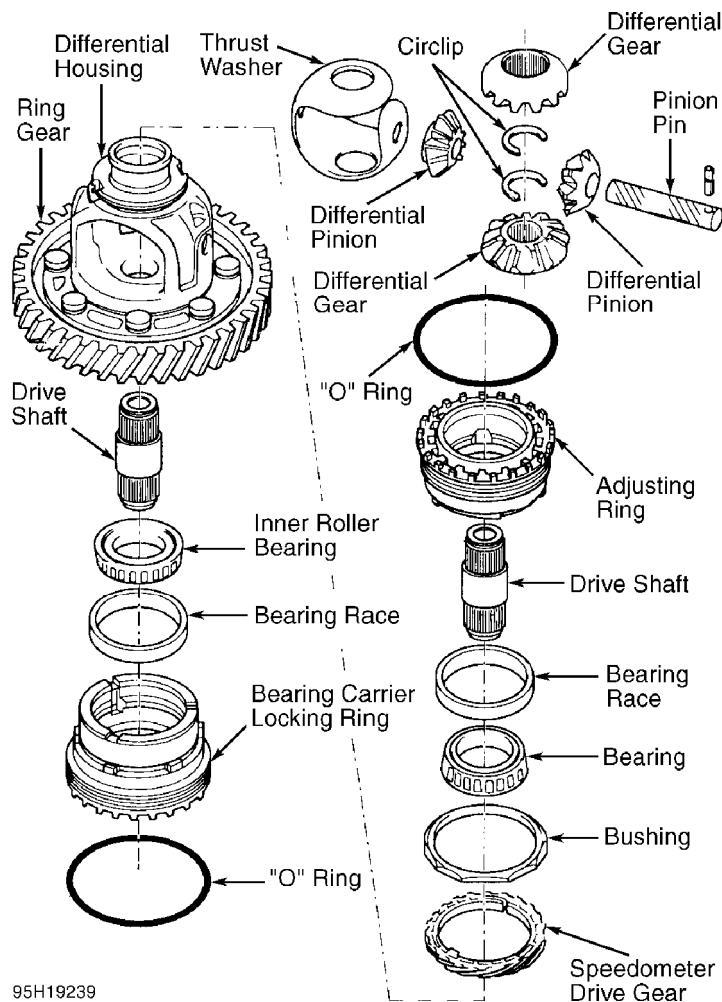
FINAL DRIVE

1) Disassemble differential. See Fig. 28. If ring gear or differential housing is damaged, replace differential housing. To reassemble differential, reverse disassembly.

NOTE: If differential bearings are replaced, check differential side bearing preload and ring gear position. See FINAL DRIVE & TRANSFER GEARS under TRANSAXLE REASSEMBLY.

2) Using puller, remove roller bearing from differential housing. Remove speedometer drive gear and bushing.

3) Check all bearing races in adjuster rings and replace if necessary. Using hydraulic press, replace bearing race(s). Replace each roller bearing and race as a set.



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Fig. 28: Exploded View Of Differential
Courtesy of Volkswagen United States, Inc.

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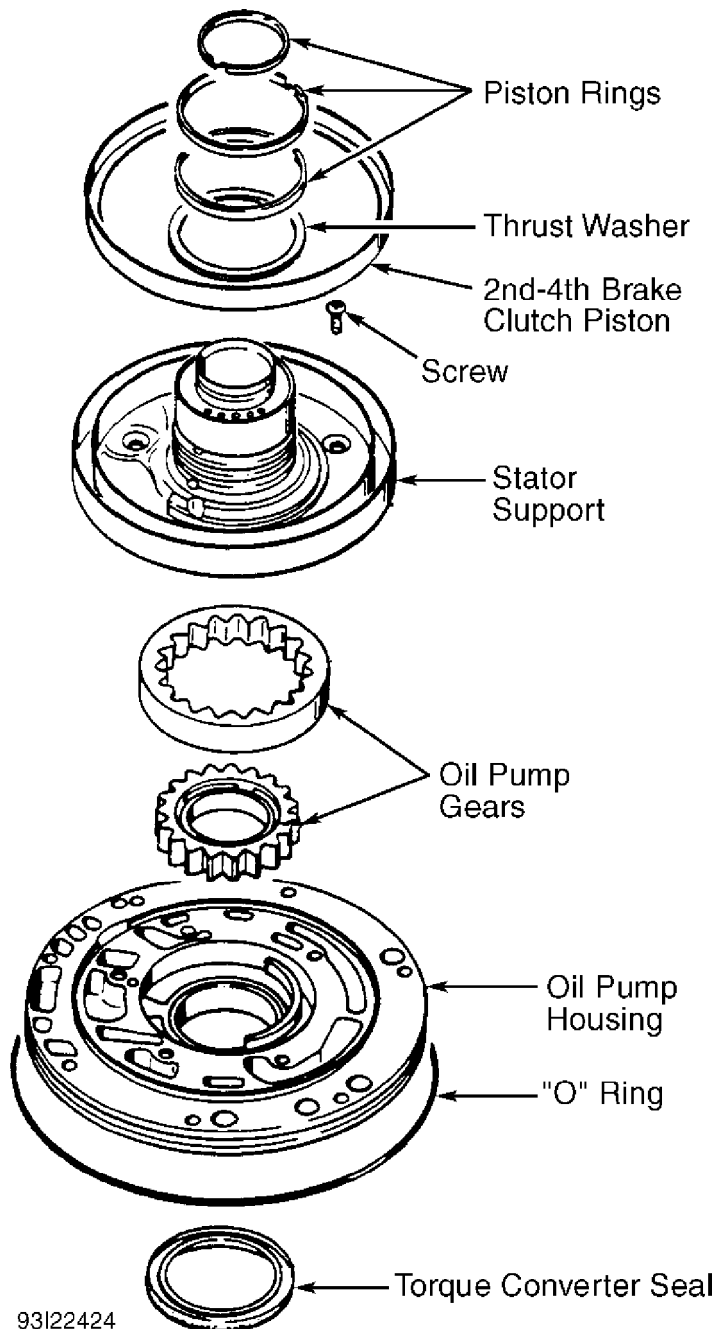
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OIL PUMP & 2ND-4TH BRAKE CLUTCH PISTON

Disassemble oil pump and 2nd-4th brake clutch piston. Check for worn or damaged parts and replace as necessary. Replace all seals and reassemble. See Fig. 29.

NOTE: Specifications are not available from manufacturer.



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Fig. 29: Exploded View Of Oil Pump & 2nd-4th Brake Clutch Piston
Courtesy of Volkswagen United States, Inc.

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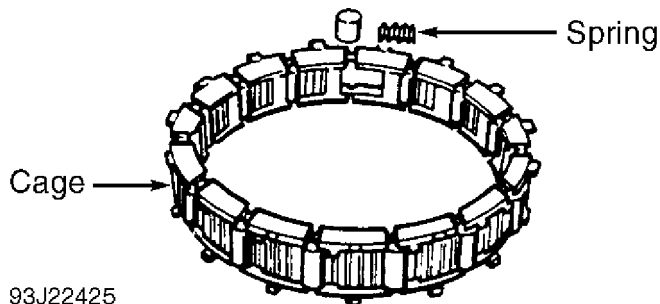
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ONE-WAY CLUTCH

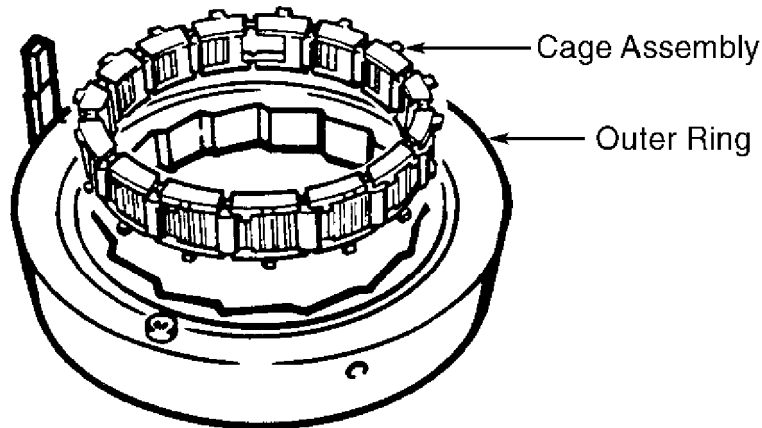
1) Disassemble one-way clutch. Check for worn or damaged parts and replace as necessary. Compress each spring and install into cage. See Fig. 30.

2) Hold cage assembly with large lugs up. Install cage assembly into outer ring. See Figs. 31-33. Rotate cage clockwise until lugs touch stop. Install piston into outer ring.



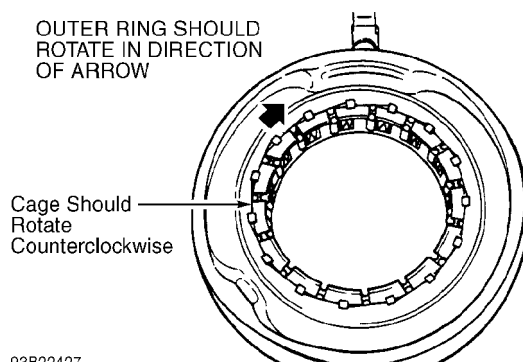
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Fig. 30: Installing Springs Into Cage
Courtesy of Volkswagen United States, Inc.



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Fig. 31: Installing Cage Assembly Into Outer Ring
Courtesy of Volkswagen United States, Inc.



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Fig. 32: Checking One-Way Clutch Rotation
Courtesy of Volkswagen United States, Inc.

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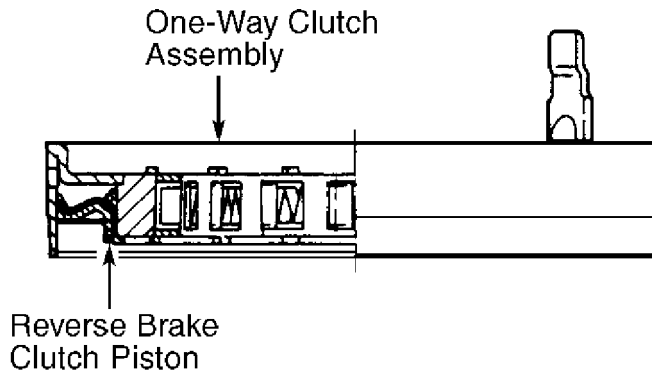
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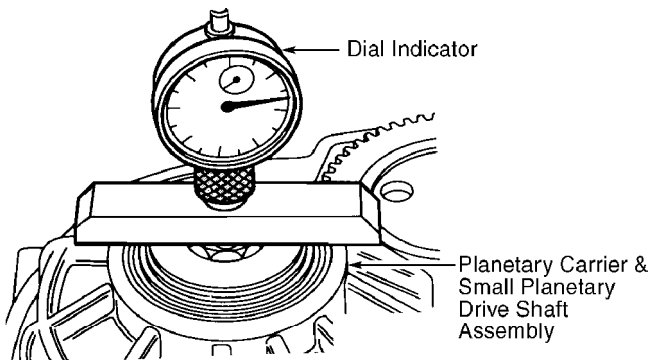
Fig. 33: Installing Piston Into One-Way Clutch
Courtesy of Volkswagen United States, Inc.

PLANETARY CARRIER

NOTE: Disassembly and reassembly procedures are not available from manufacturer.

Inspection & Adjustment

- 1) Inspect planetary carrier, pinion gears, sun gears and related parts for wear or damage. Replace parts as necessary.
- 2) Assemble sun gear drive shells, planetary carrier, small sun gear, pinion drive transfer gear and all related bearings and washers onto small planetary drive shaft. See Figs. 17 and 20.
- 3) Place assembly into transaxle case. Install adjustment shim, washer and bolt to pinion drive transfer gear end of small planetary drive shaft. Using a screwdriver, lock large sun gear drive shell to transaxle case. See Fig. 19. Tighten bolt to 22 ft. lbs. (30 N.m).
- 4) Place Dial Indicator Support (VW 382/7) on top of assembly. See Fig. 34. Measure end play of small sun gear drive shaft.
- 5) If end play is not .009-.014 (.23-.37 mm), replace adjustment shim. Adjustment shims range in thickness from .040" (1.00 mm) to .114" (2.90 mm) in .004" (.10 mm) increments.



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Fig. 34: Adjusting Planetary Carrier End Play
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APPLY CLUTCH PLATE APPLICATIONS

APPLY CLUTCH PLATE APPLICATIONS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application Number Of Plates

Reverse Clutch

Inner 5

Outer 5

1st-3rd Clutch

Inner 5

Outer

CLB & CLK 5

CKZ 4

4th Clutch

Inner

CLB & CKZ 6

CLK 5

Outer

CLB & CKZ 5

CLK 4

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

REVERSE APPLY CLUTCH

NOTE: Soak all friction-faced clutch plates in ATF for at least 15 minutes before installation.

1) Mark circlip for installation reference and remove.

Disassemble clutch plates. See Fig. 35. Compress spring support, and remove circlip. Remove clutch piston.

2) Check for worn or damaged parts and replace as necessary.

Ensure check ball in clutch housing is not damaged. Piston seal is part of piston. If damaged, replace reverse apply clutch piston. Reassemble reverse apply clutch. See APPLY CLUTCH PLATE APPLICATIONS table.

NOTE: Assembled clutch clearance specification is not available from manufacturer. Ensure thrust plate is installed with shouldered side facing circlip.

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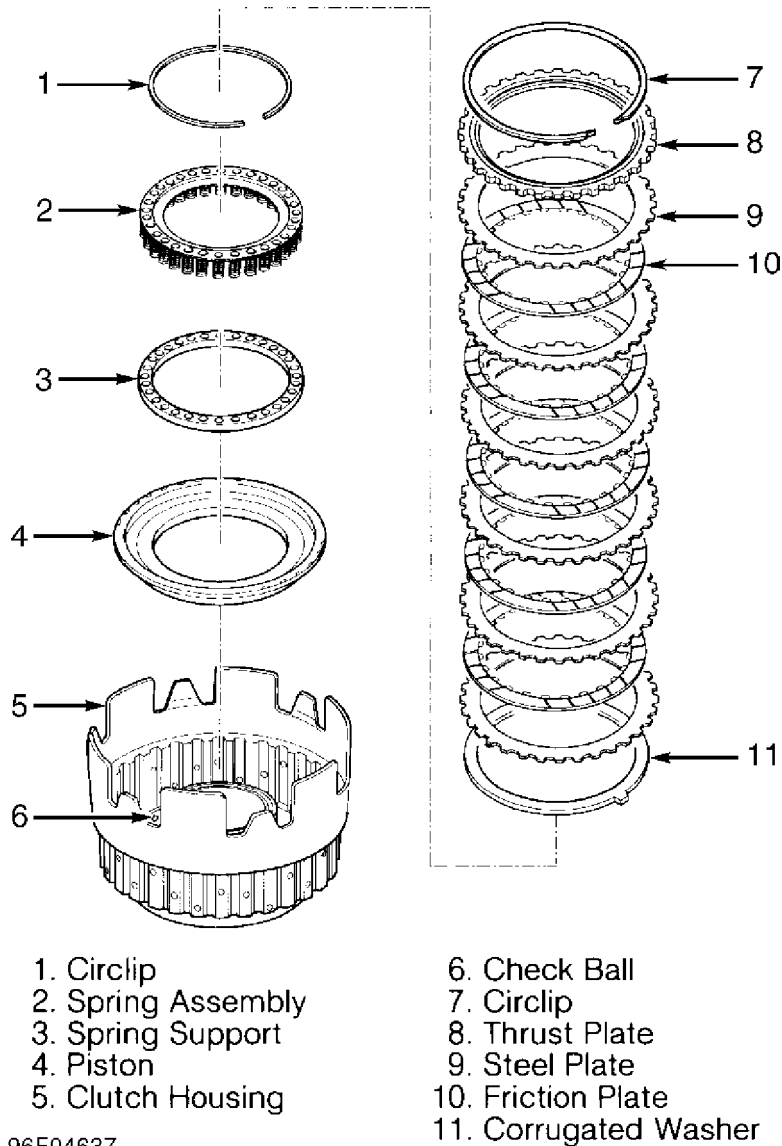
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Fig. 35: Exploded View Of Reverse Apply Clutch Assembly
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REVERSE & 2ND-4TH BRAKE CLUTCHES

Reverse and 2nd-4th brake clutches are disassembled and reassembled during transaxle disassembly and reassembly. See TRANSAXLE DISASSEMBLY and TRANSAXLE REASSEMBLY.

TRANSAXLE CASE

1) Remove multifunction switch, all seals, manual valve assembly, parking pawl and sensors. If necessary, remove parking pawl pin, detent spring screws and selector rod for manual valve from case. See Fig. 36. Inspect bushings and bearing races, and replace if necessary.

2) Install new "O" ring to gear change shaft. Install gear

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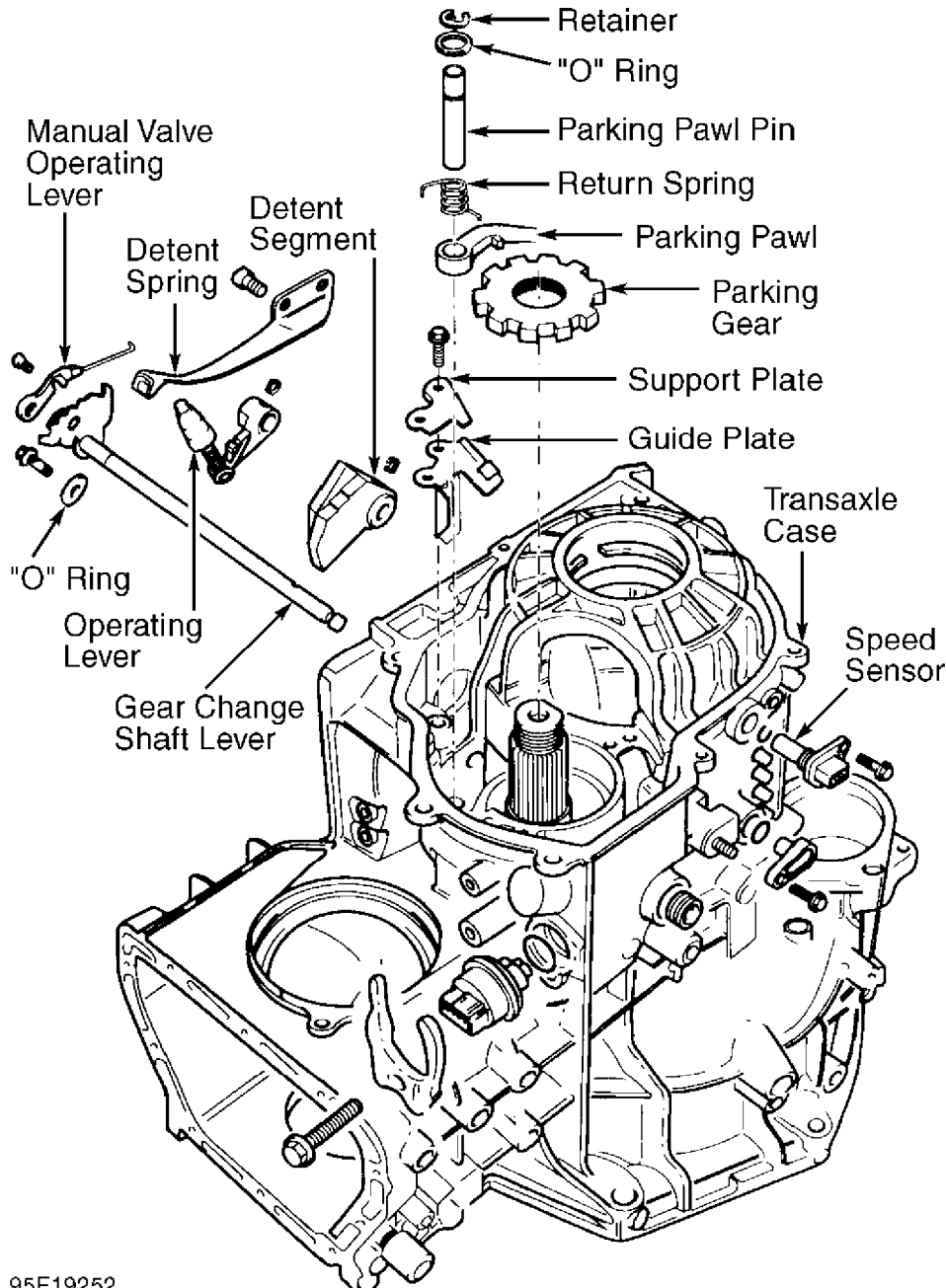
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change shaft. Install parking pawl pin (if removed). Using a center punch, peen parking pawl pin. Install operating rod for manual valve, detent spring screws, multifunction switch and new seals.



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Fig. 36: Exploded View Of Transaxle Case Components
Courtesy of Volkswagen United States, Inc.

TRANSFER GEARS

Using puller and adapter, remove tapered bearing from output gear. See Fig. 37. Using hydraulic press, install bearing to drive pinion transfer gear. Set transfer and drive pinion gears aside.

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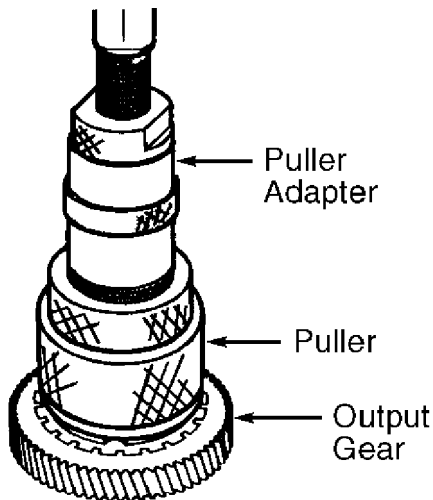
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Fig. 37: Removing Output Gear Roller Bearing
Courtesy of Volkswagen United States, Inc.

VALVE BODY

NOTE: Disassembly and reassembly procedures are not available from manufacturer.

1ST & 3RD APPLY CLUTCH

1) Remove support ring. Mark circlip for installation reference, and remove circlip. Disassemble clutch plates. See Fig. 38. Remove diaphragm spring circlip. Compress spring support, and remove circlip. See Fig. 39. Remove spring plates and clutch piston.

2) Remove piston rings from piston. Piston seal is part of piston. If damaged, replace 1st-3rd apply clutch piston. Remove seal rings from turbine shaft. Check for worn or damaged parts and replace as necessary. Ensure check ball in clutch housing is not damaged.

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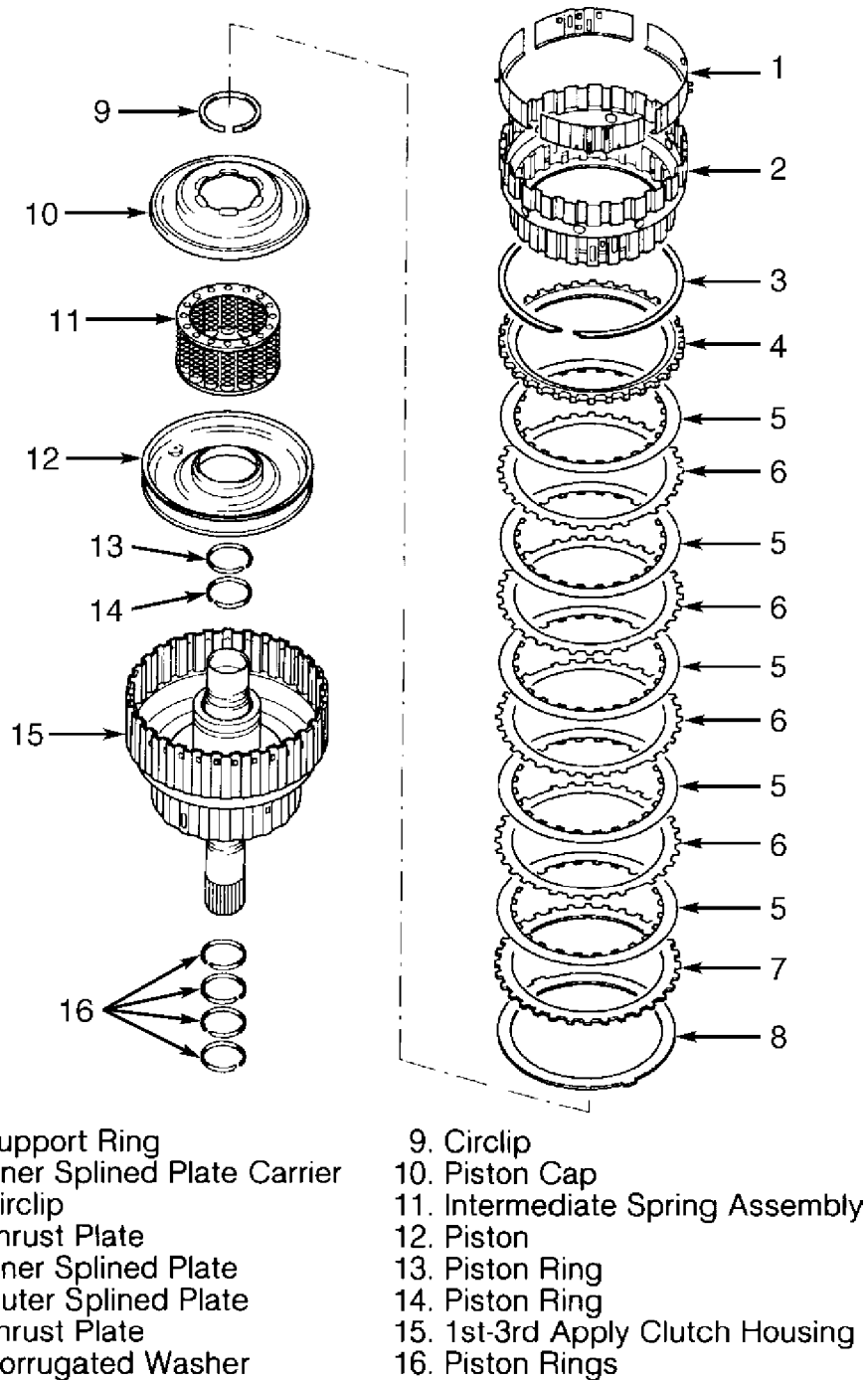
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Fig. 38: Exploded View Of 1st-3rd Apply Clutch
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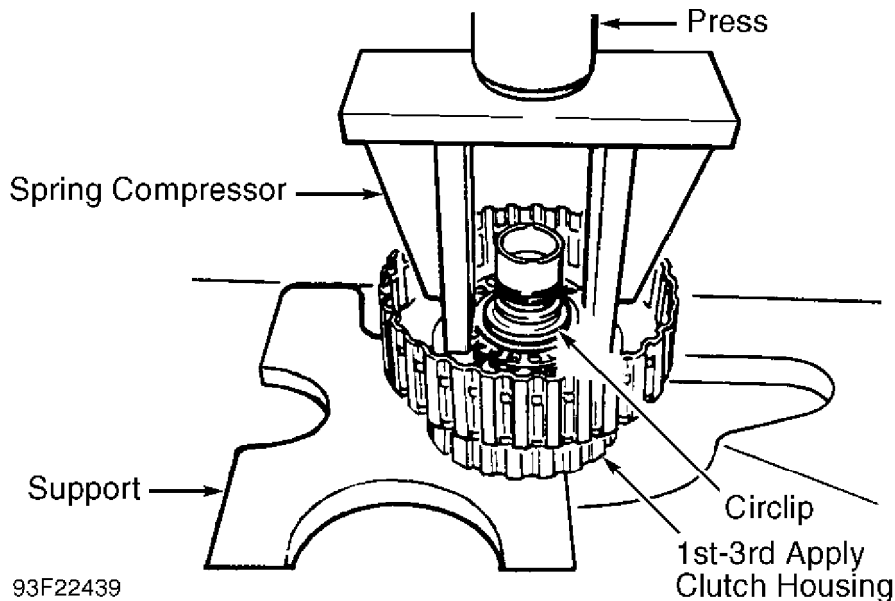
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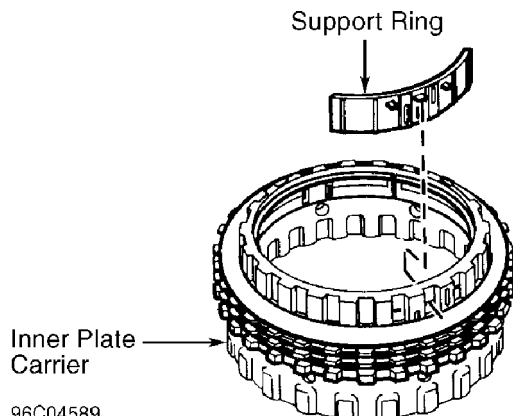
Fig. 39: Removing & Installing Spring Circlip
Courtesy of Volkswagen United States, Inc.

3) Install new seal rings to clutch piston, and install piston in clutch housing. Install plate springs. Compress spring support and install circlip. See Fig. 39.

4) Install bottom thrust plate with smooth side facing clutch plate. Install one inner splined and one outer splined clutch plate into clutch housing. See Fig. 38.

5) Place inner plate carrier on bench. Install remaining clutch plates to inner plate carrier. See APPLY CLUTCH PLATE APPLICATIONS. Insert top thrust plate with smooth side facing clutch plate. Install support ring with step tabs up after installing thrust plate, friction plates and steel plates. See Fig. 40.

6) Install inner plate carrier into clutch housing. Install circlip in clutch housing. See Fig. 41.



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Fig. 40: Installing Support Ring
Courtesy of Volkswagen United States, Inc.

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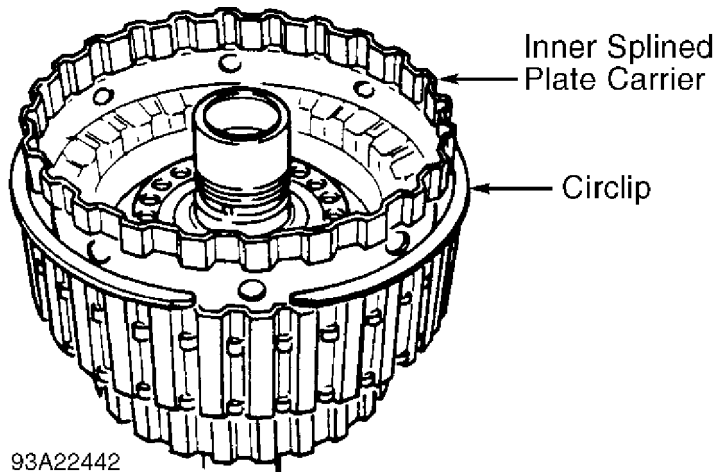
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Fig. 41: Installing Clutch Housing Circlip
Courtesy of Volkswagen United States, Inc.

4TH APPLY CLUTCH

NOTE: Soak all friction-faced clutch plates in ATF for at least 15 minutes before installation.

1) Mark circlip for installation reference and remove. Disassemble clutch plates. See Fig. 42. Compress spring support ring, and remove circlip. Remove spring support ring and spring. Remove clutch piston.

2) Remove front impeller seal rings. DO NOT remove inner impeller seal rings unless damaged. Check for worn or damaged parts and replace as necessary.

3) Piston seal is part of piston. If damaged, replace 3rd-4th apply clutch piston. Reassemble 3rd-4th apply clutch. See APPLY CLUTCH PLATE APPLICATIONS table.

NOTE: Assembled clutch clearance specification is not available from manufacturer. Ensure top thrust plate is installed with shouldered side facing circlip.

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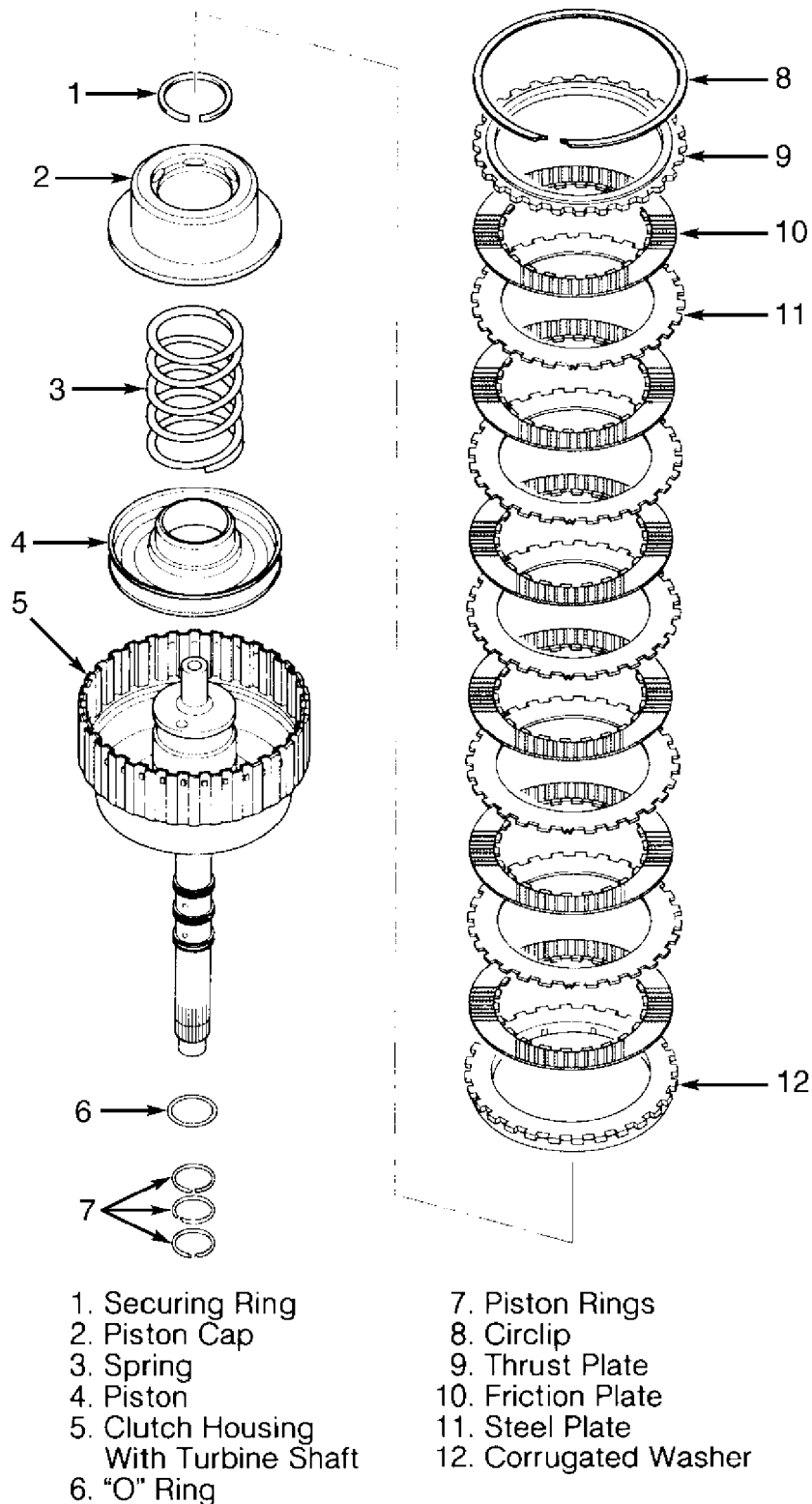
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Fig. 42: Exploded View Of 4th Apply Clutch
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TRANSAXLE REASSEMBLY

FINAL DRIVE & TRANSFER GEARS

NOTE: Reassembly procedures include bearing and shim adjustments. Perform all steps in the order given. If no parts were replaced, skip adjustment steps and reassemble final drive and transfer gear assembly using new seals. Ensure turning torque of complete assembly is within specifications. See INPUT TRANSFER GEAR ADJUSTMENT & REASSEMBLY procedure. If turning torque is not within specifications, check all adjustments.

Drive Pinion Roller Bearing Adjustment

1) Install drive pinion assembly with smaller bearing and inner bearing support (with pinion seal and "O" ring). Install parking gear (rounded side facing drive pinion gear), park lock lug and large pinion bearing race support. Go to next step.

NOTE: Install drive pinion seal with lip opening facing closest roller bearing.

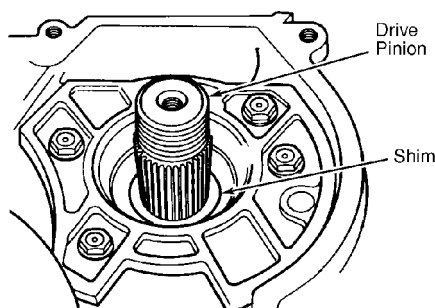
2) If reusing drive pinion and large pinion bearing, DO NOT remove existing shims from drive pinion shaft. See Fig. 43. Go to step 4). If replacing drive pinion and/or pinion bearings, install large pinion roller bearing to drive pinion. Go to next step.

3) Remove large roller bearing race support. Place two .06" (1.5 mm) thick shims onto drive pinion shaft. See Fig. 43. Install large roller bearing race support. Go to next step.

4) Install output drive pinion gear and nut. See Figs. 36 and 44. Engage parking lug to lock drive pinion shaft. Tighten nut to 184 ft. lbs. (250 N.m). Go to next step.

5) If reusing drive pinion and large pinion bearing, go to step 9). If replacing drive pinion and/or pinion bearings, go to next step.

6) DO NOT rotate drive pinion. Mount a dial indicator on transaxle case. See Fig. 45. Move drive pinion up and down (DO NOT rotate). Measure and record end play. Go to next step.



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Fig. 43: Installing Drive Pinion Shim
Courtesy of Volkswagen United States, Inc.

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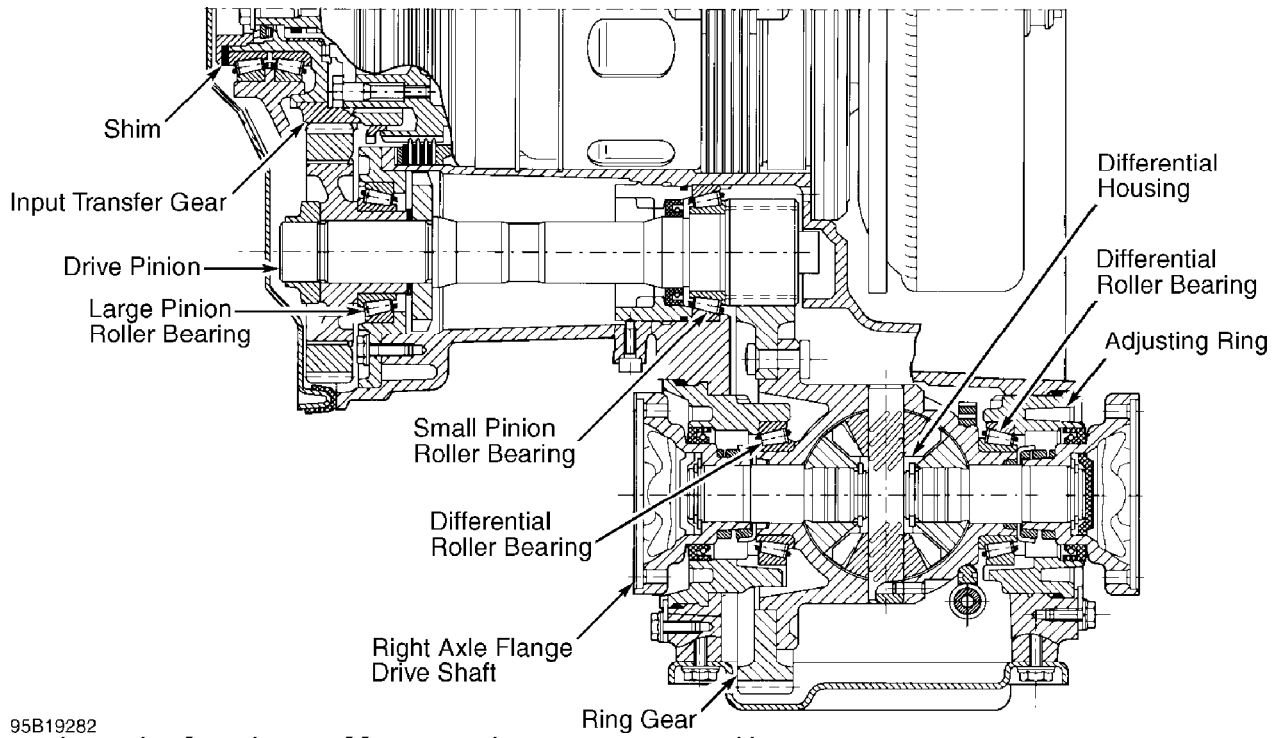
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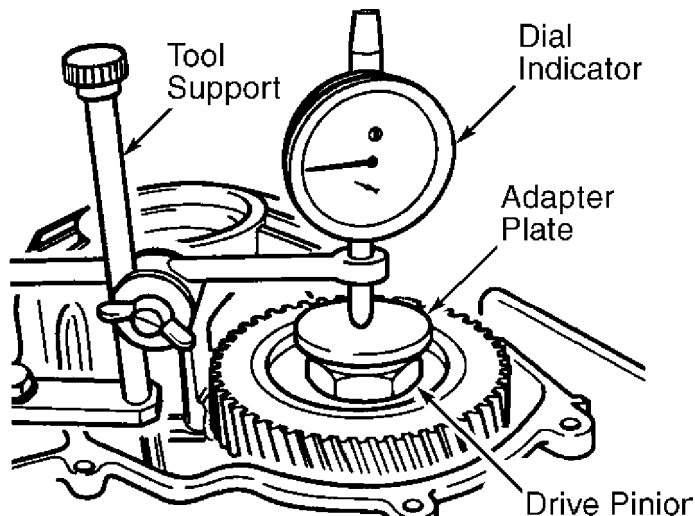
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Fig. 44: Locating Final Drive Roller Bearings, Races & Adjustment Shims

Courtesy of Volkswagen United States, Inc.



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Fig. 45: Checking Drive Pinion Roller Bearing End Play

Courtesy of Volkswagen United States, Inc.

7) Drive pinion requires .008" (.220 mm) preload. To determine correct shim thickness, perform the following procedure. Dimensions are given as an EXAMPLE ONLY:

- * Subtract end play reading .037" (0.93 mm) recorded in step 6) from .118" (3.00 mm) shim pack added in step 3). This will

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result in zero end play.

- * Next, subtract .008" (.220 mm) to achieve required preload.
- * Total shim thickness required to achieve correct preload would be .073" (1.85 mm).
- * Shims are available in thickness ranging from .040-.106" (1.00-2.70 mm), in .001" (.025 mm) increments.

8) Remove nut, drive pinion gear and bearing. Install shim calculated in step 7). Apply gear oil to bearings. Install drive pinion gear and nut. Tighten nut to 184 ft. lbs. (250 N.m) to seat bearings.

9) Using INCH-lb. torque wrench, rotate torque wrench at least 8 turns to determine turning torque. Measure turning torque of drive pinion roller bearings. See Fig. 46. See DRIVE PINION ROLLER BEARING SPECIFICATIONS table. After turning torque is correct, bend locking plate on nut.

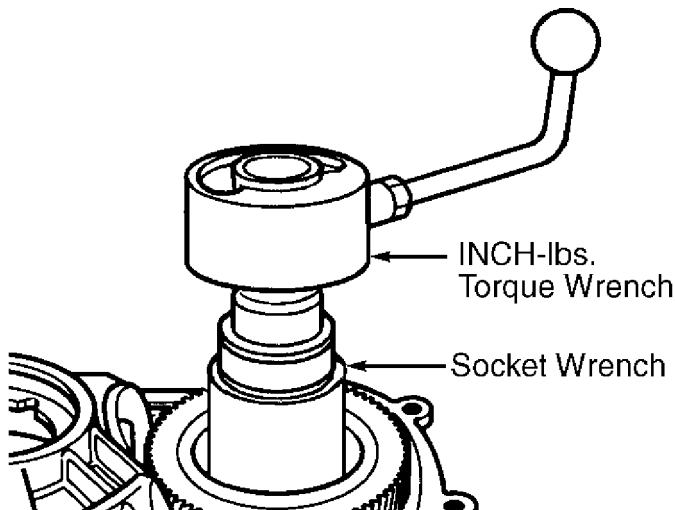
DRIVE PINION ROLLER BEARING SPECIFICATIONS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Application Turning Torque

New Bearings 7-11 INCH Lbs. (.73-1.20 N.m)
Used Bearings (1) Same As Before Disassembly

(1) - Recorded during disassembly. See FINAL DRIVE & TRANSFER GEARS under TRANSAXLE DISASSEMBLY.

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Fig. 46: Checking Pinion Roller Bearing Preload
Courtesy of Volkswagen United States, Inc.

Input Transfer Gear Adjustment & Reassembly

- 1) Ensure inner race for roller bearing is installed in transaxle case.
- 2) Install input transfer gear with roller bearing and axial

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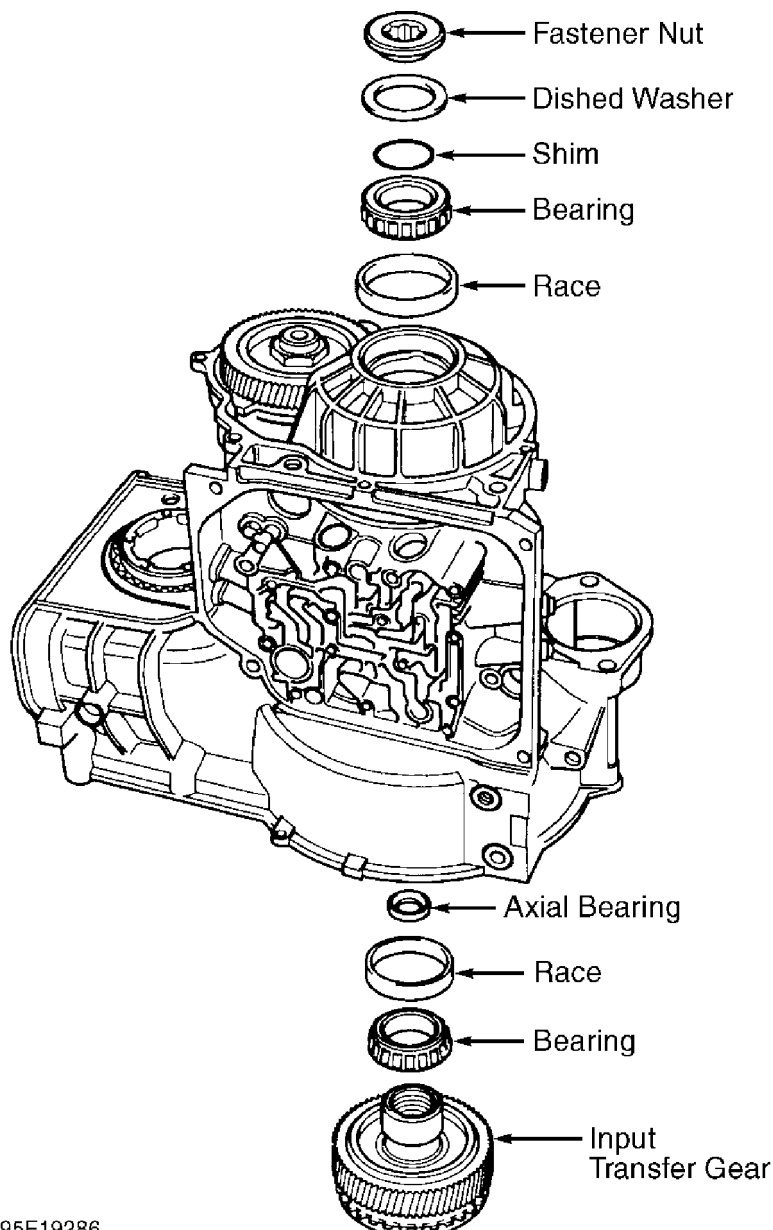
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needle bearing (flat side facing input gear) into transaxle case. See Figs. 1, 44 and 47. Align lugs on outer roller bearing to fit between lugs on inner roller bearing. See Fig. 48.

3) Install outer roller bearing (without dished washer or shim) on input transfer gear. See Figs. 44 and 47. Engage parking gear. Using an Allen-head socket, tighten fastener nut to 74 ft. lbs. (100 N.m). See Fig. 49.

4) Remove fastener nut. Using a dial indicator, measure distance between input transfer gear and inner race of roller bearing. See Fig. 50. Measure thickness of dished washer.



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Fig. 47: Locating Input Transfer Gear Assembly
Courtesy of Volkswagen United States, Inc.

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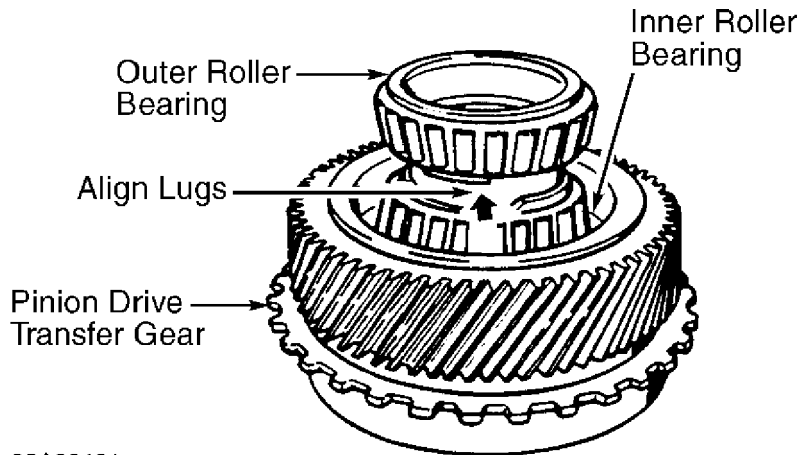
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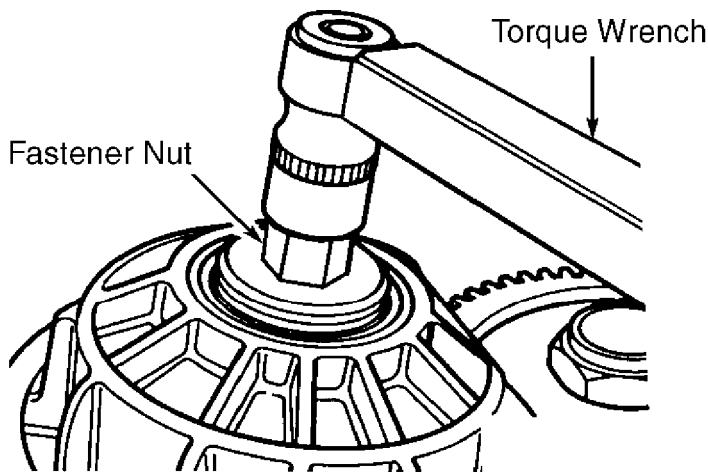
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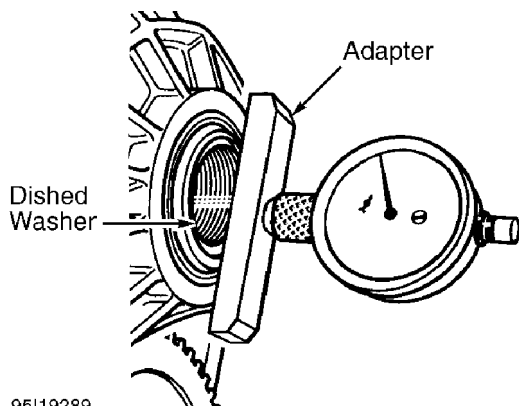
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Fig. 48: Aligning Lugs On Input Transfer Gear Roller Bearings
Courtesy of Volkswagen United States, Inc.



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Fig. 49: Tightening Fastener Nut On Input Transfer Gear Roller Bearings
Courtesy of Volkswagen United States, Inc.



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Fig. 50: Checking Distance Between Input Transfer Gear & Inner Race Of Roller Bearings
Courtesy of Volkswagen United States, Inc.

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5) Add dished washer thickness to distance measured in step 3). Subtract .007" (.180 mm) to obtain shim thickness for desired roller bearing preload. Shims are available in thickness ranging from .040-.106" (1.00-2.70 mm), in .001" (.025 mm) increments.

6) Install selected shim. Install dished washer with curved side facing fastener nut. Apply ATF to bearings. Install and tighten fastener nut to 184 ft. lbs. (250 N.m) to seat bearings.

7) Using INCH-lb. torque wrench, rotate torque wrench at least 8 turns to determine turning torque. Measure combined turning torque of pinion and input transfer gear roller bearings. See Fig. 46. See INPUT TRANSFER GEAR ROLLER BEARING SPECIFICATIONS table.

INPUT TRANSFER GEAR ROLLER BEARING SPECIFICATIONS

Application Turning Torque

New Bearings

Without Drive Pinion Bearings ... 18 INCH Lbs. (2.0 N.m)

With Drive Pinion Bearings .. (1) 27 INCH Lbs. (3.0 N.m)

Used Bearings (2) Same As Before Disassembly

(1) - Based on a drive pinion torque of 9 INCH Lbs. (1.0 N.m).

(2) - Recorded during disassembly. See FINAL DRIVE & TRANSFER GEARS under TRANSAXLE DISASSEMBLY.

8) Remove fastener nut. If necessary, select a shim and recheck roller bearing preload. If roller bearing preload is okay, apply Locking Compound (AMV 100 01) to shaft side of roller bearing.

9) Align lugs with notches of opposite roller bearing. See Fig. 48. Install axial needle bearing with flat side facing drive shaft. Engage parking gear lug. Install fastener nut and tighten to 184 ft. lbs. (250 N.m).

Final Drive Assembly

1) Oil bearings and place differential assembly inside transaxle. Install seals, "O" rings and new bearing races (if required) to bearing carrier and bearing adjuster ring.

2) Install and tighten bearing carrier to 111 ft. lbs. (150 N.m). Install locking tab.

3) Install bearing adjuster ring. Tighten adjuster ring. See Fig. 51. If using original bearings, tighten bearing adjuster ring to marks made during disassembly.

4) If using new bearings, differential or bearing carrier, tighten bearing adjuster ring to 37 ft. lbs. (50 N.m). Turn bearing adjuster ring 5 locking lugs tighter. Install locking tab. See Fig. 51.

5) Using INCH-lb. torque wrench, rotate torque wrench at least 8 turns to determine turning torque. Measure combined turning torque of pinion, input transfer gear and differential side roller bearings. See Fig. 46. See DIFFERENTIAL ROLLER BEARING SPECIFICATIONS

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table.

DIFFERENTIAL ROLLER BEARING SPECIFICATIONS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application	Turning Torque

Including Transfer & Pinion Bearings

New Bearings		33 INCH Lbs. (3.7 N.m)

Used Bearings		Same As Before Disassembly

Differential Side Bearings Only

New Bearings		5-7 INCH Lbs. (.6-.8 N.m)

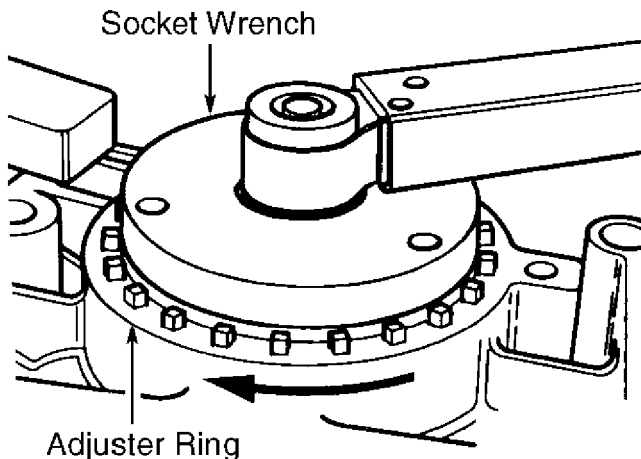
Used Bearings		Same As Before Disassembly

(1) - Recorded during disassembly. See FINAL DRIVE & TRANSFER GEARS under TRANSAXLE DISASSEMBLY.

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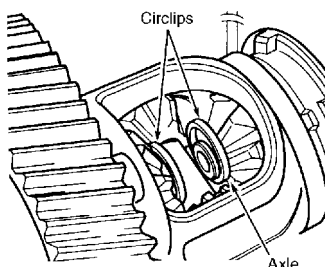
6) Install circlips to end of each axle. See Fig. 52. Install "O" rings and new seals to drive axle flange. Fill space between seal and dust lip with multi-purpose grease.

7) Install drive axle flanges to transaxle. Install and tighten differential cover bolts to 21 ft. lbs. (28 N.m). Install speedometer drive.



95B19290

Fig. 51: Preloading Differential Side Bearings
Courtesy of Volkswagen United States, Inc.



95C19291

Fig. 52: Installing Circlips To Axles
Courtesy of Volkswagen United States, Inc.

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TRANSMISSION

NOTE: Soak all friction-faced clutch plates in ATF for at least 15 minutes before installation. Apply assembly lubrication to all bushings, washers, shims and bearings before installation. See Fig. 17.

1) Input transfer gear, drive pinion and differential assemblies should be adjusted and installed at this time. Install axial needle bearing to input transfer gear. See Fig. 53. Install "O" ring and planetary carrier. Install washer and axial needle bearing into planetary carrier. See Figs. 25 and 54. Install end plate shim for reverse brake clutch plates. See Fig. 55.

2) Install reverse brake clutch plates. See Fig. 56. See BRAKE CLUTCH PLATE APPLICATIONS table. Using Assembly Ring(VW 3267), install one-way clutch and secure using circlip. See Figs. 57 and 58.

3) Using a feeler gauge, check installed reverse brake clutch clearance. See Fig. 59. Clearance should be .047-.071" (1.2-1.8 mm). If clearance is not as specified, replace end plate shim. End plate shims are available in thicknesses ranging from .040" (1.0 mm) to .070" (1.9 mm) in .004" (.10 mm) increments.

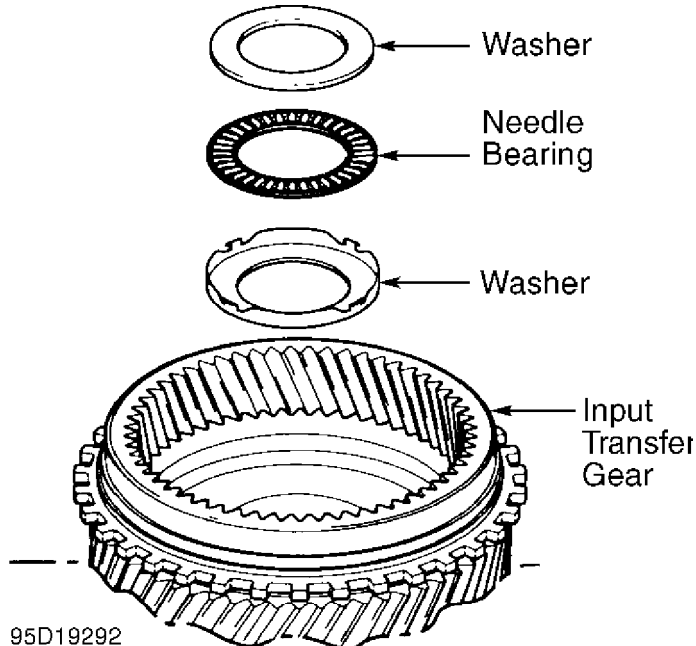


Fig. 53: Installing Axial Needle Bearing To Input Transfer Gear
Courtesy of Volkswagen United States, Inc.

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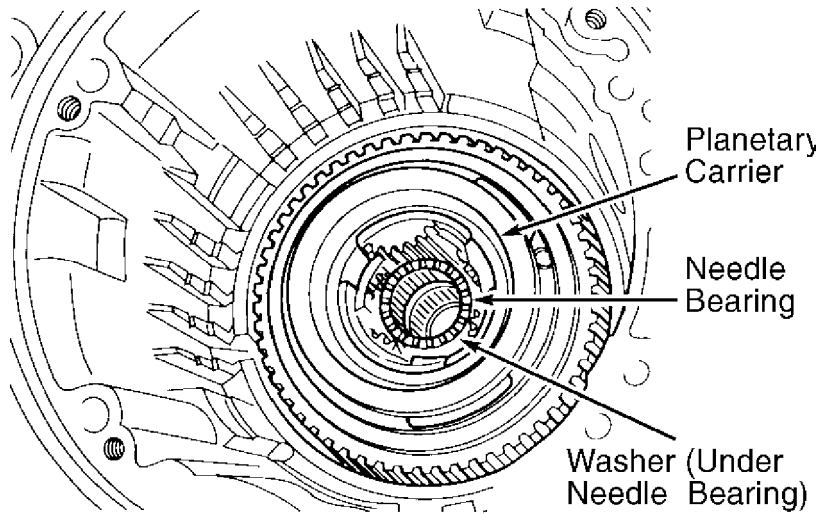
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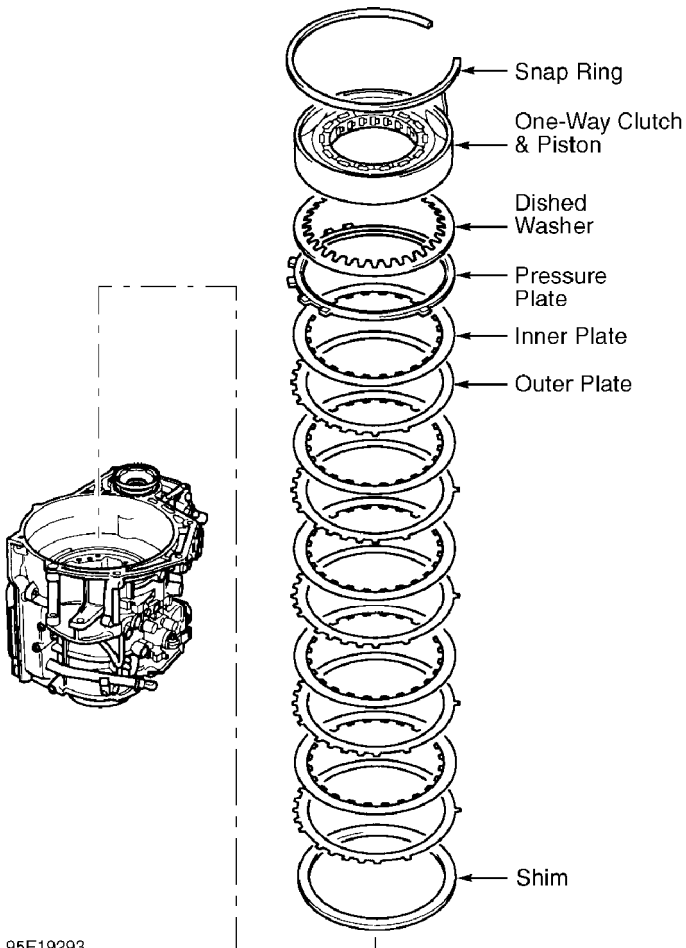
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96E04590

Fig. 54: Installing Planetary Carrier & Axial Needle Bearing
Courtesy of Volkswagen United States, Inc.



95E19293

Fig. 55: Exploded View Reverse Brake Clutch Assembly
Courtesy of Volkswagen United States, Inc.

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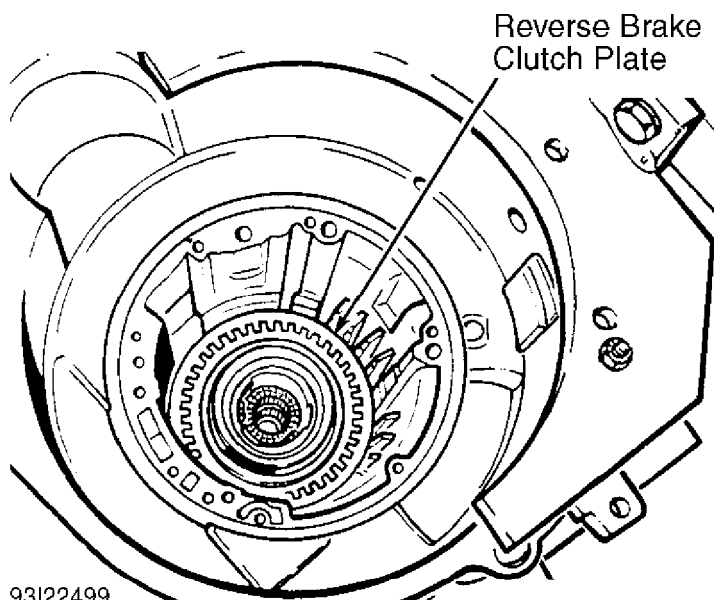
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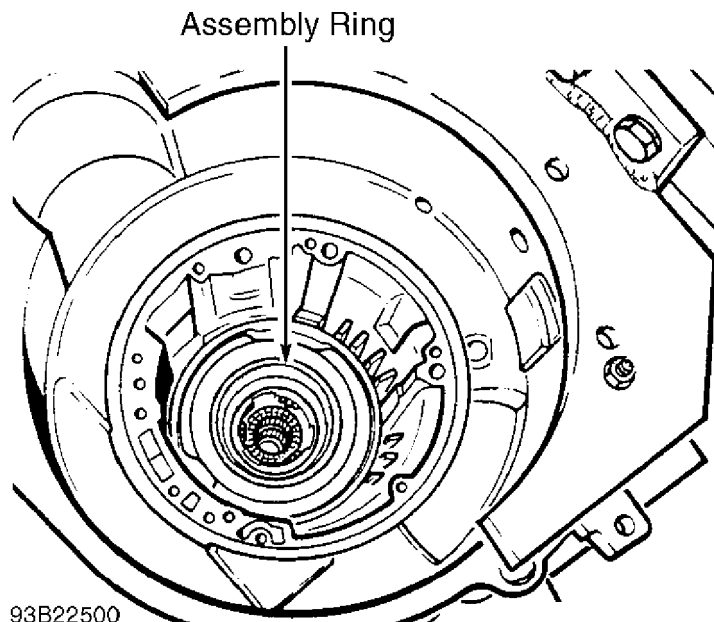
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93I22499

Fig. 56: Installing Reverse Brake Clutch Plates
Courtesy of Volkswagen United States, Inc.



93B22500

Fig. 57: Installing One-Way Clutch
Courtesy of Volkswagen United States, Inc.

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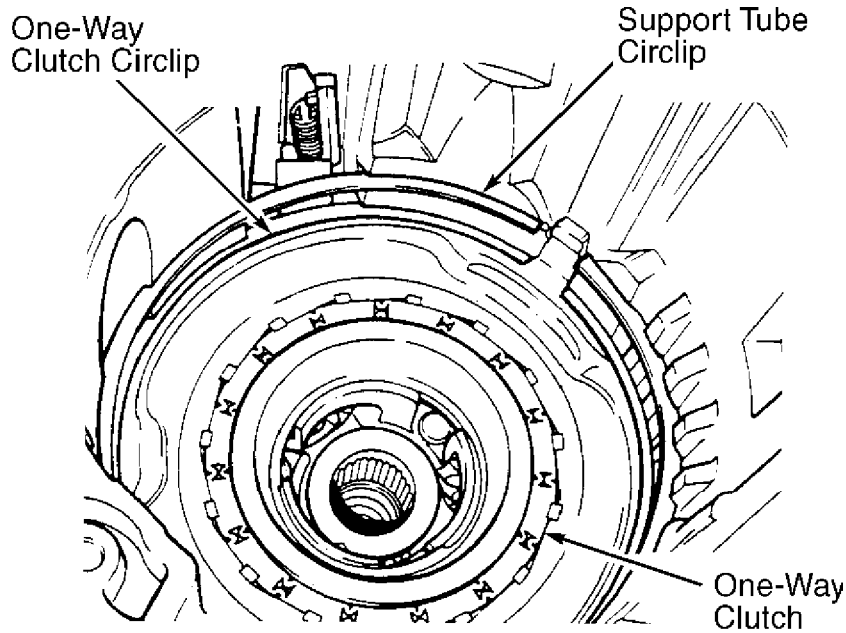
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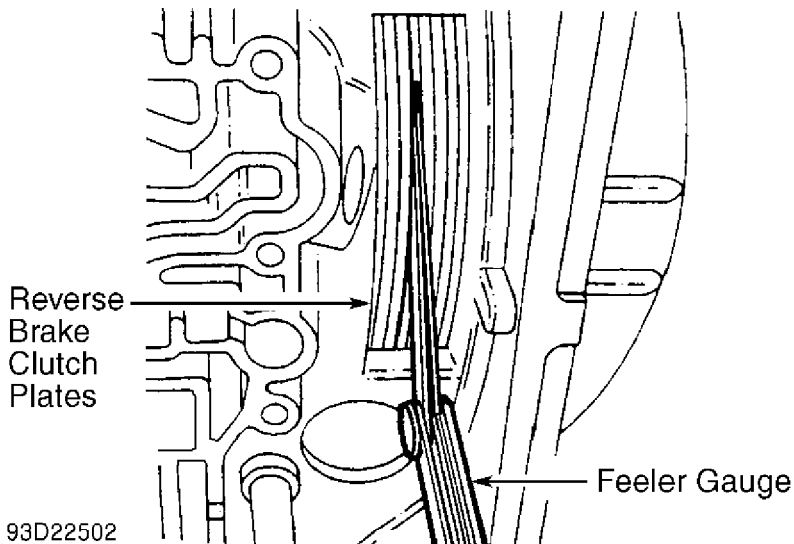
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93C22501

Fig. 58: Installing Circlips

Courtesy of Volkswagen United States, Inc.



93D22502

Fig. 59: Checking Reverse Brake Clutch Clearance

Courtesy of Volkswagen United States, Inc.

BRAKE CLUTCH PLATE APPLICATIONS

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Application Number Of Plates

Reverse Clutch

Inner	5
Outer	5

2nd-4th Clutch

Inner	6

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Outer 7
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4) Install upper circlip for support tube. See Fig. 58.
Install washer and needle bearing into large sun gear drive shell. See Fig. 17. Install large sun gear drive shell. See Fig. 60.

5) Install small sun gear drive shell. Install small planetary drive shaft with needle bearings. See Figs. 17, 61 and 62.
Using a screwdriver, lock small sun gear drive shell to large sun gear drive shell. See Fig. 19. Install adjustment shim, washer and bolt on end of small planetary drive shaft. Tighten bolt to 22 ft. lbs. (30 N. m).

6) Ensure end play is .009-.014" (.23-.37 mm). If end play is not as specified, recheck assembly or adjustment. See PLANETARY CARRIER under COMPONENT DISASSEMBLY & REASSEMBLY.

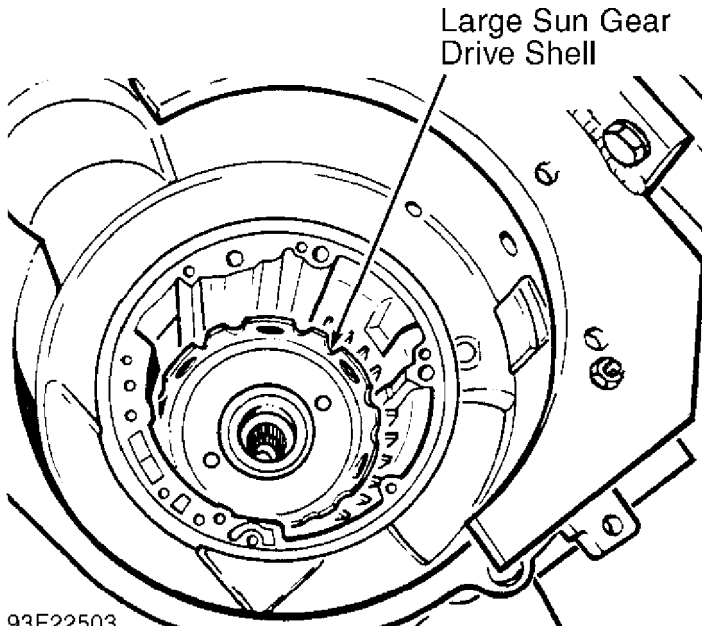


Fig. 60: Installing Large Sun Gear Drive Shell
Courtesy of Volkswagen United States, Inc.

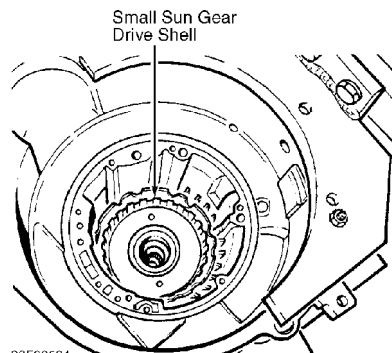


Fig. 61: Installing Small Sun Gear Drive Shell
Courtesy of Volkswagen United States, Inc.

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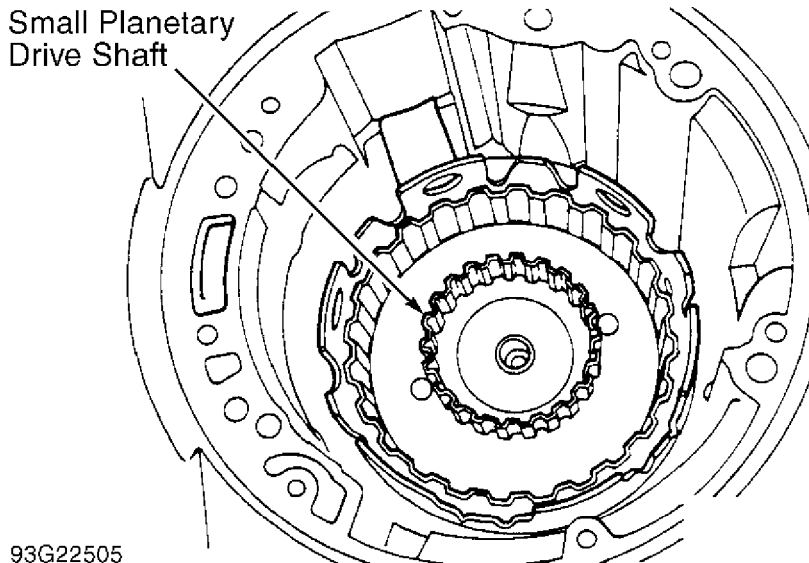
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93G22505
Fig. 62: Installing Small Planetary Drive Shaft
Courtesy of Volkswagen United States, Inc.

7) Install bearing, washer, and impeller shaft and 4th apply clutch. See Fig. 63. Install bearing, washer and 1st-3rd apply clutch with turbine shaft assembly. See Fig. 64. Install thrust shims on 1st-3rd apply clutch housing. Install reverse apply clutch and support tube. See Fig. 65.

NOTE: Turbine shaft end play was measured before disassembly. If end play is okay, use original thrust shims. If end play is not okay or new parts are installed, calculate end play and install required thrust shims.

8) For checking purposes, install oil pump gasket and oil pump. See Fig. 17. Position dial indicator and Support (VW 387) on transaxle case. See Fig. 66.

9) Press dial indicator on turbine shaft, and apply .040" (1.0 mm) preload. Move turbine shaft up and down. Turbine shaft end play should be .019-.047" (.50-1.20 mm).

10) If end play is okay, go to next step. If end play is not okay, install required thrust shims. Thrust shims are available in thicknesses ranging from .04" (1.0 mm) to .07" (1.8 mm) in .008" (.20 mm) increments. Recheck turbine shaft end play.

11) Remove oil pump and oil pump gasket. Install support tube and .118" (3.0 mm) thick outer splined plate for reverse apply clutch. Ensure groove on support tube engages wedge of one-way clutch. See Figs. 17 and 65.

12) Install friction plates and outer splined plates for reverse apply clutch into transaxle case. See Fig. 67. Install 3 caps and springs. Install 2nd-4th brake clutch plates. See Fig. 68. See BRAKE CLUTCH PLATE APPLICATIONS table. Install 3 spring caps to springs.

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Article Text (p. 53)

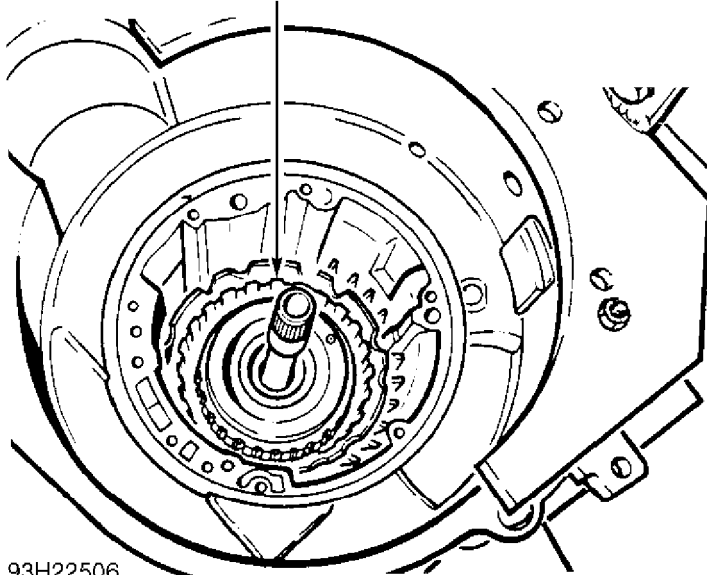
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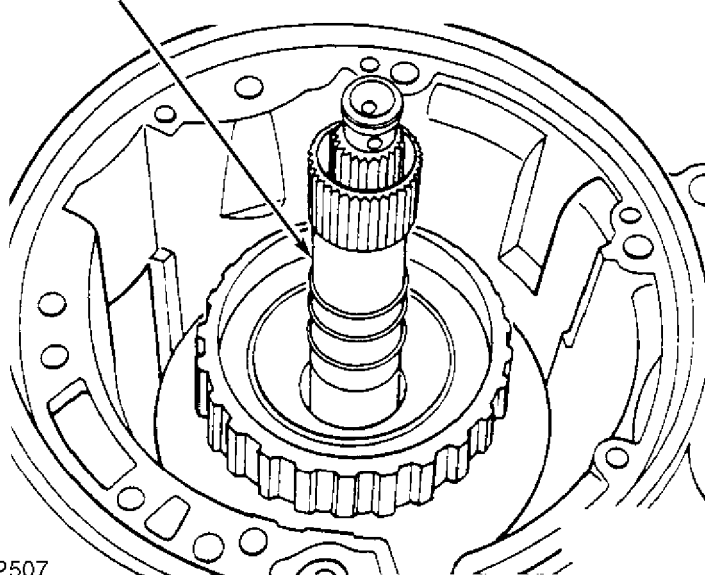
3rd-4th Apply Clutch
& Impeller Shaft Assembly



93H22506

Fig. 63: Installing 4th Apply Clutch & Impeller Shaft
Courtesy of Volkswagen United States, Inc.

1st-2nd Apply Clutch
& Turbine Shaft Assembly



93I22507

Fig. 64: Installing 1st-3rd Apply Clutch & Turbine Shaft
Courtesy of Volkswagen United States, Inc.

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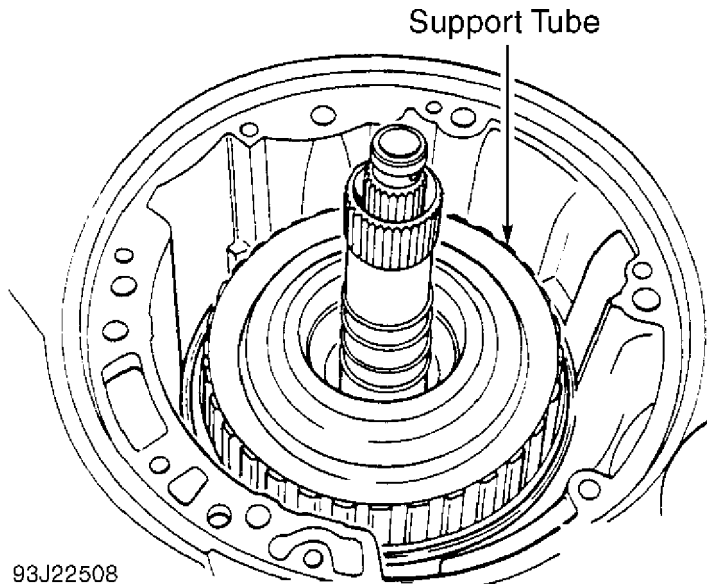
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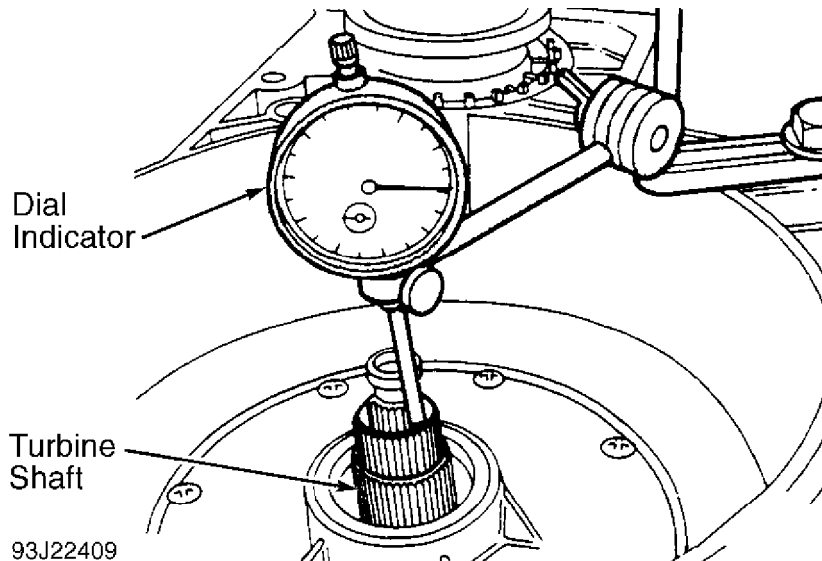
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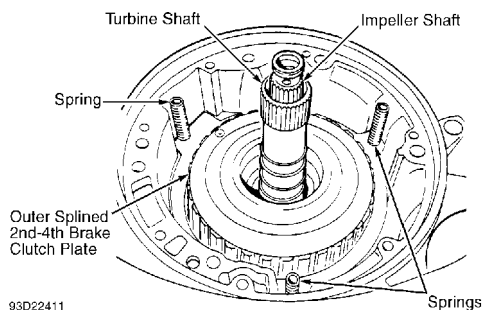
93J22508

Fig. 65: Installing Support Tube
Courtesy of Volkswagen United States, Inc.



93J22409

Fig. 66: Checking Turbine Shaft End Play
Courtesy of Volkswagen United States, Inc.



93D22411

Springs

Fig. 67: Installing 2nd-4th Brake Clutch Plate & Springs
Courtesy of Volkswagen United States, Inc.

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13) DO NOT install top outer splined clutch plate or waved spring washer. Determine clearance of 2nd-4th brake clutch. Press 2nd-4th brake clutch assembly down. Using a depth gauge, measure distance from top of oil pump flange to 2nd-4th brake clutch (inner splined). See Fig. 69.

14) Place a straightedge across top of piston. Place gasket on oil pump flange. Using depth gauge, measure distance from straightedge to oil pump flange gasket. See Fig. 70. Subtract thickness of straightedge.

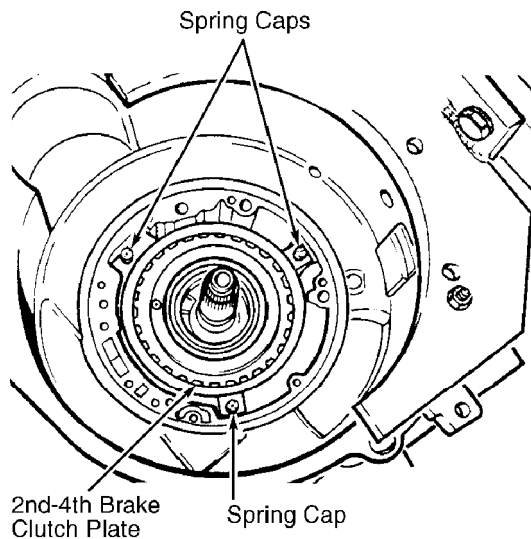
15) Subtract distance measured in step 13) from distance calculated in step 14). This gives 2nd-4th brake clutch-to-piston distance.

16) Subtract .140" (3.6 mm) from value calculated in step 15). This determines thickness of last outer splined 2nd-4th brake clutch plate. Outer splined 2nd-4th brake clutch plates are available in thickness ranging from .080-.148" (2.00-3.75 mm), in .010" (.25 mm) increments.

NOTE: Manufacturer uses .140" (3.6 mm) value to allow for waved spring washer thickness installed with 2nd-4th brake clutch plates.

17) Install last outer 2nd-4th brake clutch plate. Install waved spring washer. Install oil pump gasket. Install "O" ring to oil pump, and install oil pump. Install cover for transfer gears.

18) Move gear change shaft to "P" position. Push manual valve operating lever with manual valve into valve body. Tighten set screw. Install sealing plug. See Figs. 14 and 36. Install valve body. Install oil filter screen and oil pan. See Figs. 14, 71 and 72. Install torque converter.



93A22509

Fig. 68: Installing 2nd-4th Clutch Plates
Courtesy of Volkswagen United States, Inc.

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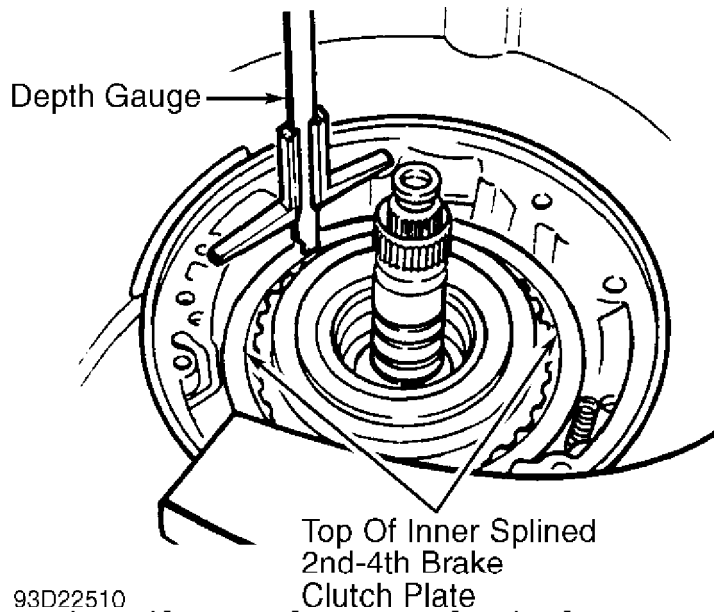
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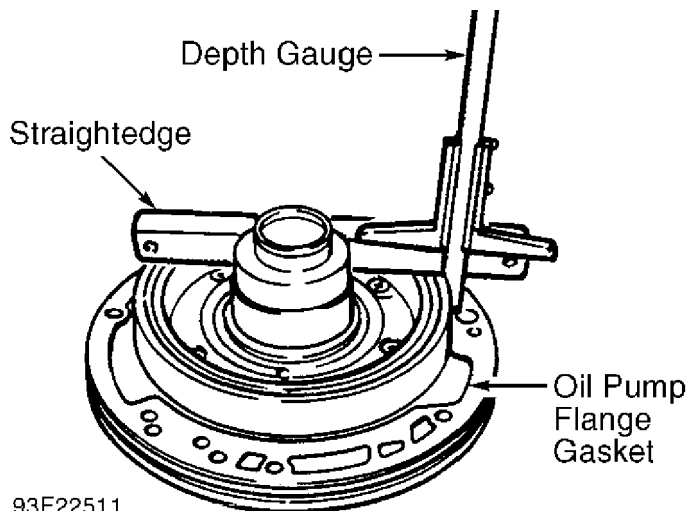
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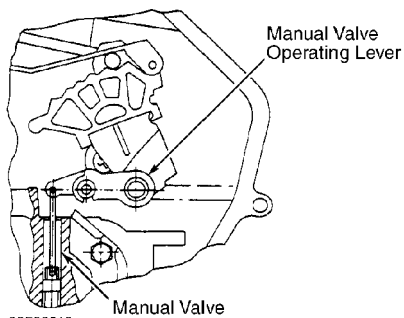
93D22510

Fig. 69: Measuring Oil Pump Flange-To-Clutch Plate
Courtesy of Volkswagen United States, Inc.



93E22511

Fig. 70: Measuring Height Of Piston



93F22512

Fig. 71: Installing Manual Valve Operating Lever
Courtesy of Volkswagen United States, Inc.

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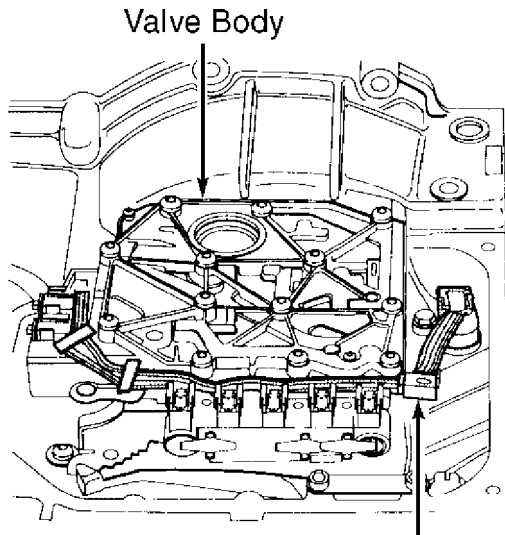
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96F30424

Wire Harness

Fig. 72: Installing Valve Body

Courtesy of Volkswagen United States, Inc.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

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Application Ft. Lbs. (N.m)

Differential Bearing Carrier	111 (150)
Differential Housing Cover Bolts	21 (28)
Drive Axle Flange Bolts	33 (45)
Drive Pinion Bearing & "O" Ring Support	148 (200)
Drive Pinion Nut	184 (250)
Input Transfer Gear Nut	184 (250)
Oil Cooler Banjo Bolts	26 (35)
Small Planetary Drive Shaft Bolt	22 (30)
Starter-To-Transaxle Bolts	44 (60)
Subframe-To-Transaxle Support Nut	44 (60)
Torque Converter Nuts	44 (60)
Transaxle-To-Engine Bolts	
10-mm Diameter	44 (60)
12-mm Diameter	59 (80)
Transaxle-To-Transaxle Support Bolts	44 (60)

INCH Lbs. (N.m)

Detent Spring Screws	84 (10)
Differential Bearing Carrier/Adjuster	
Locking Tab Bolt	108 (12)
Oil Pan Bolts	108 (12)
Oil Pump-To-Transaxle Bolts	
Step 1	71 (8)
Step 2	Additional 90 Degrees
Transfer Gear Cover Bolts	71 (8)

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Valve Body Bolts 44 (5)
Valve Body Conductor Strip Bolt 89 (10)
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TRANSMISSION SPECIFICATIONS

TRANSMISSION SPECIFICATIONS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Application In. (mm)

Clutch Clearance
Apply Clutches (1)
Brake Clutches
2nd-4th (2) .060-.068 (1.50-1.74)
Reverse 047-.071 (1.2-1.8)
Gear & Shaft End Play
Planetary Carrier 009-.014 (.23-.37)
1st-3rd To Reverse Apply Clutch 019-.047 (.50-1.20)
Turbine Shaft 019-.047 (.50-1.20)

(1) - Assembled clutch clearance is not available.

(2) - See TRANSMISSION under TRANSAXLE REASSEMBLY.

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TECHNICAL SERVICE BULLETINS

SHIFTING ERRATIC, HARSH OR DELAYED

1993-On Cabrio, Golf, GTI, Jetta & Passat (Group 01, TSB No. 97-01, 1-8-97)

Transaxle may shift erratic, harsh or hold shifts too long (delayed upshifts) with no trouble codes stored in memory. This condition is normally caused by improper throttle angle setting. If shifting quality is a concern, perform THROTTLE ANGLE SETTING procedure.

NOTE: On a newly installed TCM, basic settings must be set prior to performing the following procedure. Basic settings can be set with Scan Tool (VAG 1551) using Function "04", Display "000".

Throttle Angle Setting

1) Connect scan tool. Turn ignition on. Press "1" to select RAPID DATA TRANSFER. Enter address word 02 "TRANSMISSION ELECTRONICS" and advance until "SELECT FUNCTION XX" appears in scan tool display.

2) Press buttons "0", then "8" to select function 08 "READ MEASURING VALUE BLOCK". Press "Q" button to confirm input. Press "Q" button once more, then enter group No. 001. Press "Q" button to confirm input.

3) Print screen. While observing scan tool display, slowly press accelerator pedal until display reads 25 percent. DO NOT release

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pedal. Print screen.

4) While observing scan tool display, slowly press accelerator pedal until display reads 50 percent. DO NOT release pedal. Print screen.

5) While observing scan tool display, slowly press accelerator pedal until display reads 75 percent. DO NOT release pedal. Print screen.

6) While observing scan tool display, slowly press accelerator pedal until display reads 99 percent. DO NOT release pedal (resistance of kickdown switch should be felt). Print screen.

7) Continue pressing accelerator pedal to its stop while observing fourth digit on right-side 8 digit display. Fourth digit must change from 0 to 1, indicating kickdown. Hold for 5 seconds to set throttle angle.

8) Release accelerator pedal, then press right arrow button on scan tool. Select function 06 "END OUTPUT". Repeat procedure from beginning.

9) Compare voltage readings and throttle angle percentages on printout from first test with that of second test. If readings do not match, throttle angle was set incorrectly.

10) If readings do match, road test vehicle and activate kickdown switch several times to ensure proper operation.

WIRING DIAGRAMS

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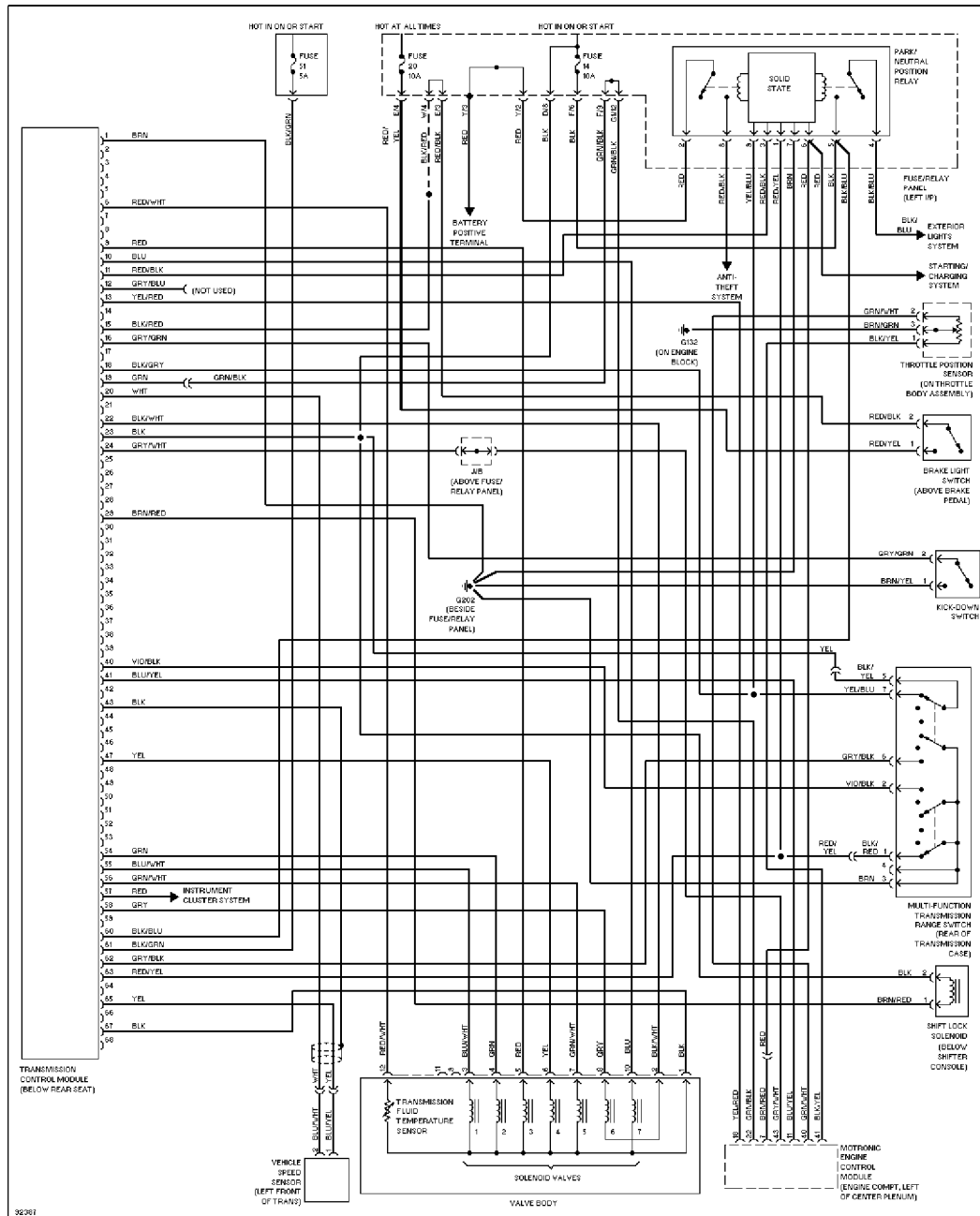


Fig. 73: 1995 Transaxle Wiring Diagram (Cabrio, Golf & Jetta 2.0L - Early Production)

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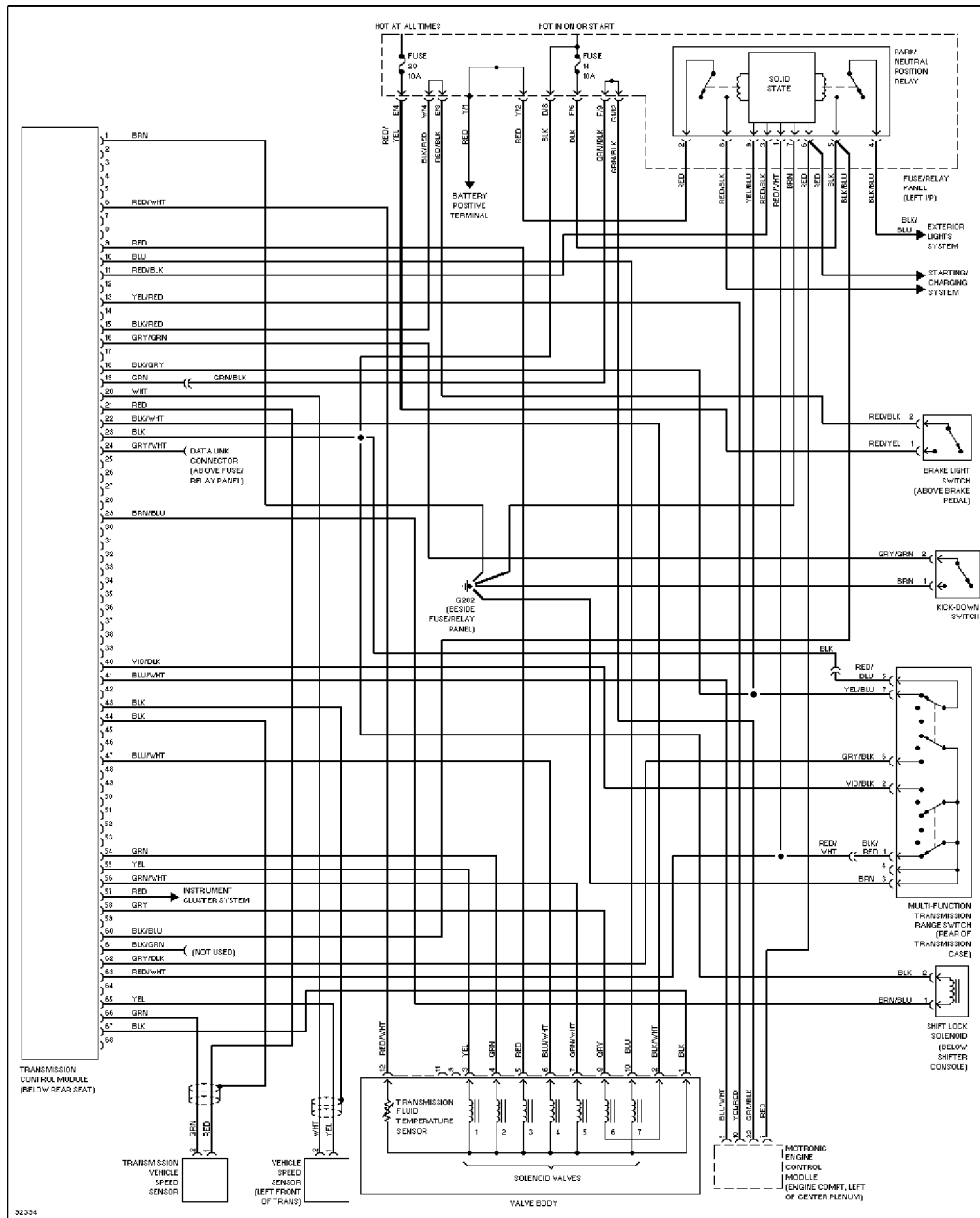


Fig. 75: 1995 Transaxle Wiring Diagram (Golf & Jetta 2.0L - Late Production)

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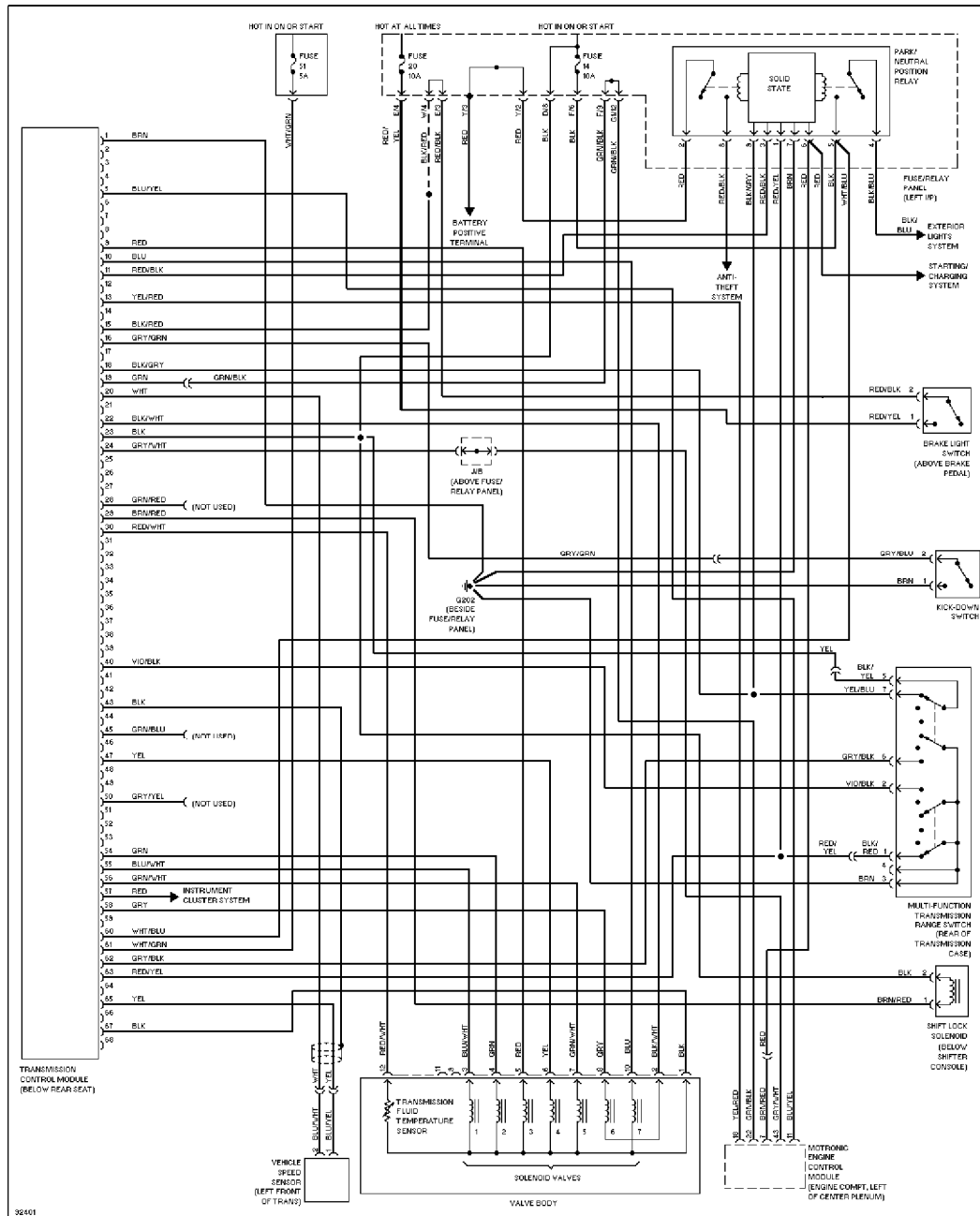


Fig. 76: 1995 Transaxle Wiring Diagram (Jetta 2.8L)

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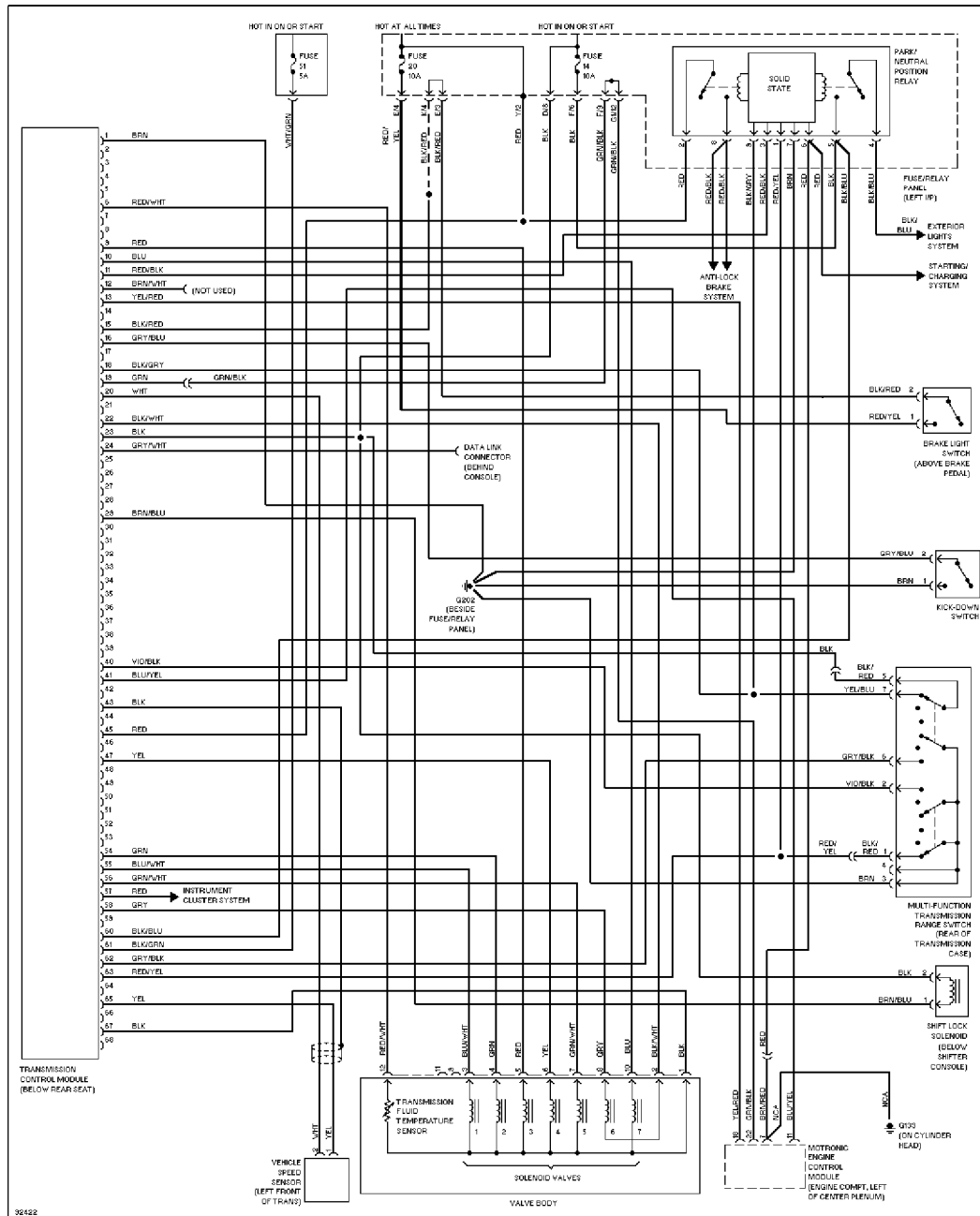


Fig. 77: 1995 Transaxle Wiring Diagram (Passat)

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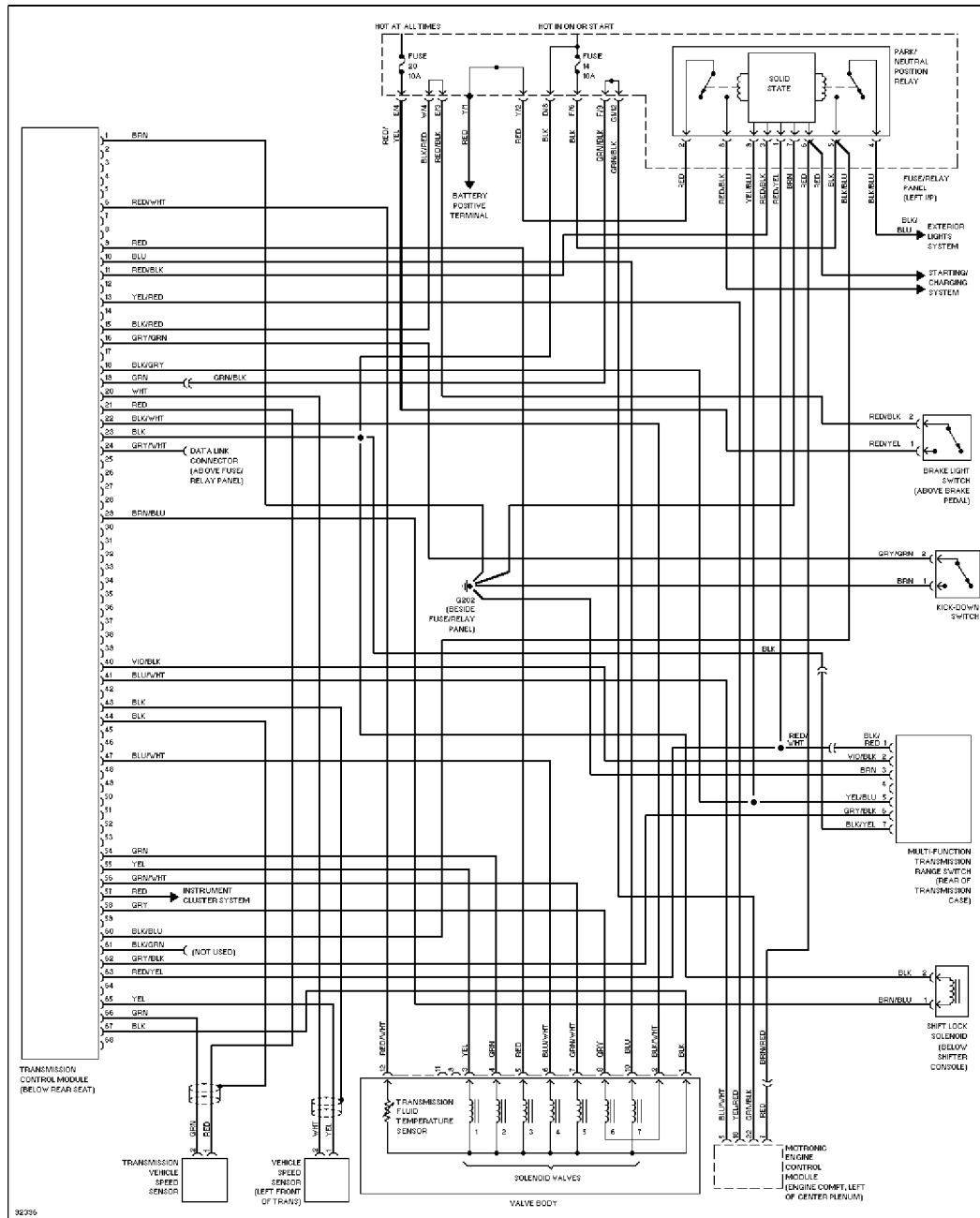


Fig. 78: 1996 Transaxle Wiring Diagram (Cabrio)

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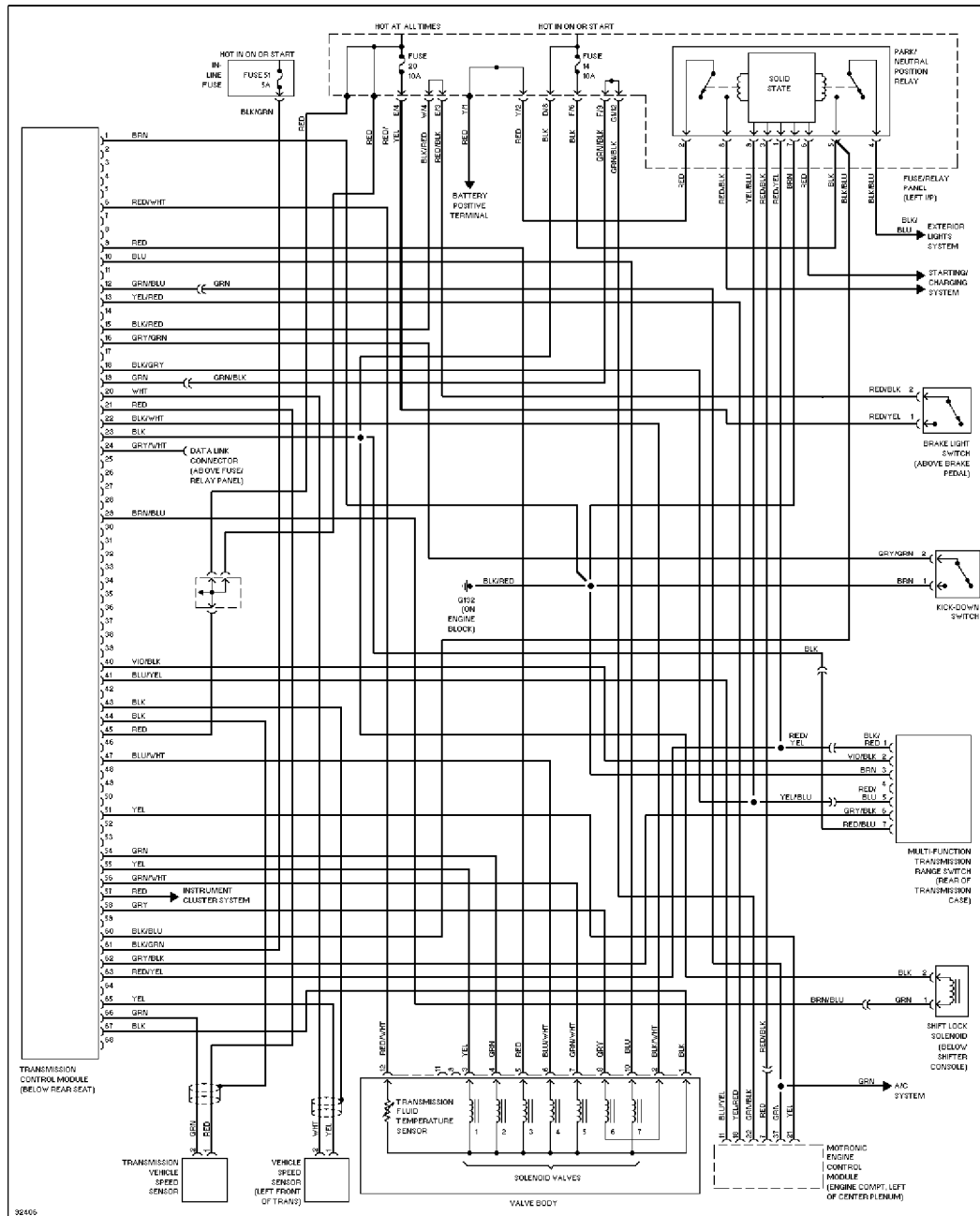


Fig. 79: 1996 Transaxle Wiring Diagram (Golf 2.0L & Jetta 2.0L & 2.8L)

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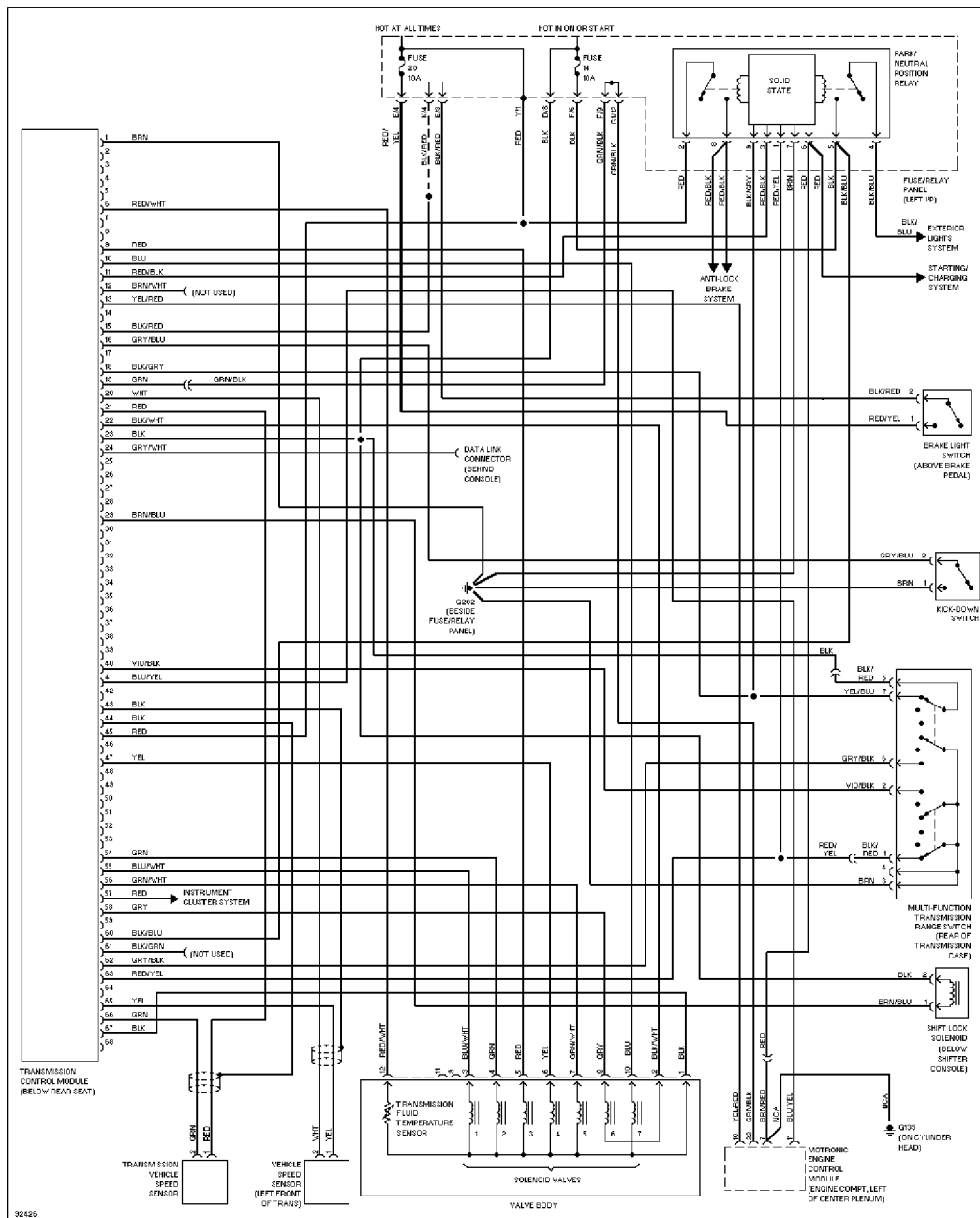


Fig. 80: 1996 Transaxle Wiring Diagram (Passat)

END OF ARTICLE

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ARTICLE BEGINNING

AUTOMATIC TRANSMISSION SERVICING
Volkswagen

Cabrio, Golf, Golf III, GTI VR6
Jetta, Jetta III, Passat

IDENTIFICATION

AUTOMATIC TRANSAXLE APPLICATIONS

Vehicle Year & Model Transaxle Model

1995

Cabrio, Golf III, GTI VR6

Jetta III & Passat 096

1996

Cabrio, Golf, Jetta & Passat 01M

LUBRICATION

SERVICE INTERVALS

Check fluid level at each oil change. Change fluid every 30,000 miles under severe driving conditions. Replace filter if needed during fluid change.

CHECKING FLUID LEVEL

CAUTION: Fill 01M transaxle with VW ATF (G 052 162 A2) only. DO NOT use Dexron or Dexron-II type fluids.

096 Transaxle

1) Park vehicle on level surface, with transaxle at normal operating temperature. Set selector lever to Park. Apply parking brake. Allow engine to idle. Remove dipstick, wipe clean, and reinsert. Shift through all selector lever positions once.

2) Remove dipstick. Fluid level should be between marks on dipstick. If additional fluid is required, use Dexron or Dexron-II type fluid only and add as needed. DO NOT use any lubricant additives.

096 Final Drive

Park vehicle on level surface. Remove speedometer drive. Wipe clean and reinstall. Remove speedometer drive and check oil level. Oil must be between MIN and MAX markings. If addition fluid is required, add Synthetic G 50, SAE 75W-90 (G 052 145 A2).

01M Transaxle

1) Set selector lever to Park. Start engine and allow it to

TRANSMISSION SERVICING - A/T

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idle. Raise and support vehicle. With transaxle at normal operating temperature, remove ATF level plug from oil pan. Any ATF present in overflow tube (inside plug hole) will run out.

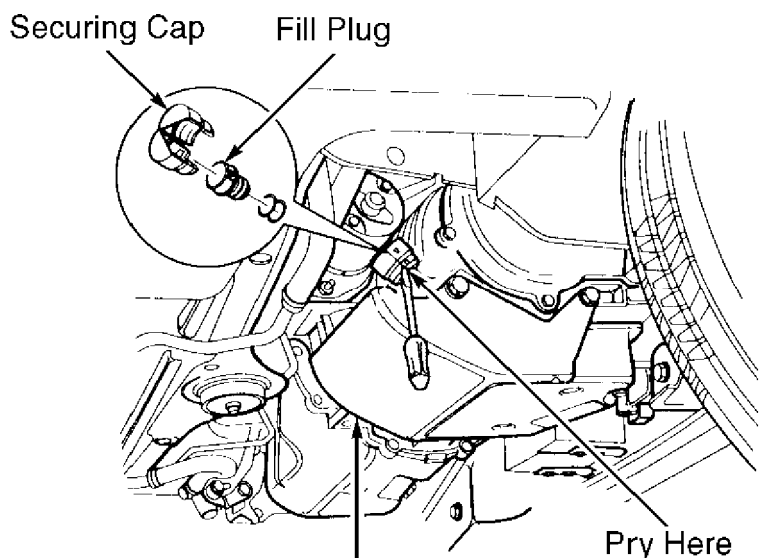
2) If only a small amount, or no ATF flows from overflow tube, filling is required. Go to next step. If ATF continues to run out, fluid level is okay. Install ATF level plug with a NEW seal and tighten to 11 ft. lbs. (15 N.m).

3) Pry off fill plug securing cap and discard. See Fig. 1. Spring retainer type caps may be reused. Pull plug from filler pipe. Fill with VW ATF (G 052 162 A2) using Filler (VAG 1924) until ATF runs out of level plug hole.

4) Install ATF level plug with a NEW seal and tighten to 11 ft. lbs. (15 N.m). Install filler plug with a NEW securing cap if needed. Shift through all selector lever positions once. Recheck fluid level.

01M Final Drive

Park vehicle on level surface. Remove speedometer drive. Wipe clean and reinstall. Remove speedometer drive and check oil level. Oil must be between MIN and MAX markings. If addition fluid is required, add VW ATF (G 052 162 A2).



96D04599

Transaxle Oil Pan

Fig. 1: Removing Filler Plug Securing Cap (01M Transaxle)

Courtesy of Volkswagen United States, Inc.

RECOMMENDED FLUID

RECOMMENDED FLUID

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application

Fluid Type

Transaxle

096 Dexron Or Dexron-II ATF

01M VW ATF (G 052 162 A2)

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Final Drive

096 (1) G 50, SAE 75W-90 (G 052 145 A2)

01M VW ATF (G 052 162 A2)

(1) - Synthetic oil.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

FLUID CAPACITIES

TRANSAXLE REFILL CAPACITIES

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application	Refill Qts. (L)	Dry Fill Qts. (L)

096	3.2 (3.0)	5.9 (5.6)

01M	3.2 (3.0)	5.6 (5.3)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

FINAL DRIVE REFILL CAPACITIES

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Model	Qts. (L)

All Models	.8 (.75)

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

DRAINING & REFILLING

096 Transaxle

1) Remove rear pan bolts. Loosen front pan bolts. Carefully lower pan to drain as much fluid as possible. Remove oil pan. Pour out remaining fluid.

2) Remove filter. Clean oil pan. Install NEW filter. Tighten filter retaining screws to 71 INCH lbs. (8 N.m). Install oil pan with NEW gasket. Tighten oil pan bolts to 108 INCH lbs. (12 N.m). Add 3.2 qts. (3.0L) ATF.

3) With engine running at normal operating temperature, shift through all selector lever positions once. Check fluid level. Add if necessary.

01M Transaxle

1) Remove ATF level plug from oil pan. Remove overflow tube through plug hole. Drain ATF. Install overflow tube. Screw level plug in hand-tight.

2) Add 3.2 qts. (3.0L) ATF through filler pipe. See 01M TRANSAXLE under CHECKING FLUID LEVEL. With engine running at normal operating temperature, shift through all selector lever positions once. Check fluid level. Add if necessary. Tighten ATF level plug to 11 ft. lbs. (15 N.m).

ADJUSTMENTS

CONTROL CABLE

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Loosen lock screw at gear selector lever on transaxle. Move gear selector in center console to "P" position. Ensure front wheels are locked. Tighten cable housing-to-gear selector lever lock screw.

SHIFT LOCK CABLE

1) Move gear selector to "1" position. Remove steering column covers. Turn ignition key to Start position and release. Check clearance between shift lock cable lever and ignition switch locking pin.

2) Clearance should be .028" (.70 mm). If clearance is not correct, loosen lock nut on shift lock cable sheath. Position shift lock cable lever to obtain correct clearance. Tighten lock nut. See Fig. 2. Tighten gear selector housing screws and install steering column covers.

SHIFT LOCK SOLENOID

Place gear selector in Neutral or Park. Loosen shift lock solenoid mounting screws. Insert a .019" (.30 mm) feeler gauge between shift lock solenoid push rod and shift lever. See Fig. 3. If necessary, move shift lock solenoid and tighten screws.

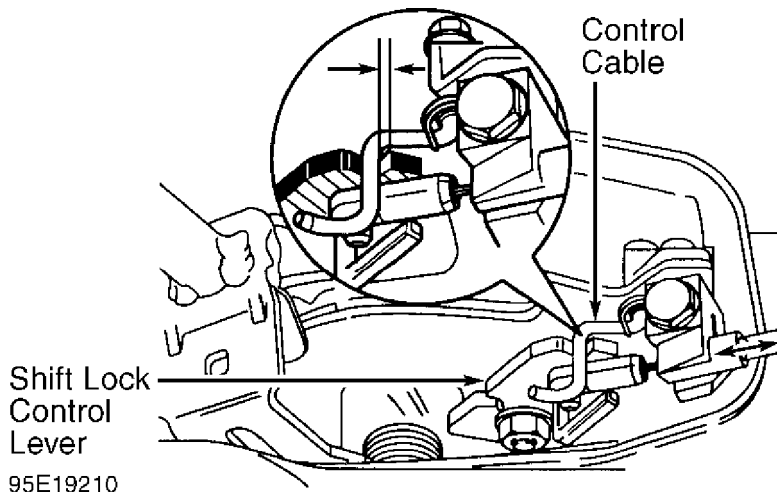


Fig. 2: Adjusting Shift Lock Cable
Courtesy of Volkswagen United States, Inc.

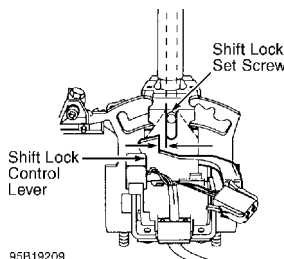


Fig. 3: Adjusting Shift Lock Solenoid
Courtesy of Volkswagen United States, Inc.

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END OF ARTICLE

TRANSMISSION REMOVAL & INSTALLATION - A/T

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ARTICLE BEGINNING

AUTOMATIC TRANSMISSION REMOVAL
Volkswagen

Cabrio, Golf, Golf III, GTI VR6, Jetta, Jetta III, Passat

MODEL IDENTIFICATION

AUTOMATIC TRANSAXLE APPLICATIONS

Vehicle Year & Model Transaxle Model

1995

Cabrio, Golf III, GTI VR6

Jetta III & Passat 096

1996

Cabrio, Golf, Jetta & Passat 01M

REMOVAL & INSTALLATION

CABRIO, GOLF, GTI & JETTA

Removal & Installation

1) Obtain radio code. Disconnect negative battery cable. On models equipped with V6 engine, remove battery. On all models, disconnect speedometer cable from transaxle. Disconnect all harness connections at transaxle. Position harnesses aside.

2) On models equipped with V6 engine, remove multi-function Transaxle Range (TR) switch. On all models, move selector lever to Park position. Disconnect selector lever cable from lever/selector shaft. Remove selector lever cable anchor circlip and remove selector lever cable.

3) Using appropriate tool, clamp-off ATF cooler hoses. Disconnect hoses at ATF cooler. Support engine and transaxle assembly from top of vehicle with appropriate support fixture.

4) Remove starter. Remove power steering pressure hose bracket. On models equipped with V6 engine, disconnect cooling fan harness connector. On all models, remove front engine mount bolt and remove mount bracket.

5) Remove engine coolant recovery tank and set aside. Remove left engine mount assembly. Remove upper engine-to-transaxle bolts. Remove transaxle oil pan protective plate.

6) On models equipped with V6 engine, remove right-side drive belt cover and vibration dampening weight. On all models, remove torque converter cover plate and nuts from torque converter. Disconnect axle shafts at transaxle flanges.

7) Raise right-side axle shaft and secure. Remove left front wheel. Turn steering full-right to its lock. Mark position of ball joint bolts on left-side control arm for installation reference. On

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vehicles equipped with Plus Suspension option, remove both outer-most bolts. Loosen, but do not remove inner bolt. On models equipped with 4-cylinder engine, remove all bolts.

8) On all models, swing ball joint outward and secure left-side axle shaft aside (remove axle shaft if triple-roller type joint). Support transaxle with transmission jack.

9) Remove lower engine-to-transmission bolts. Tilt engine and transaxle forward. Separate transaxle from engine. Push torque converter up against pump. Lower engine, then transaxle slightly and guide power steering pressure line past transaxle.

10) Remove transaxle from vehicle. To install, reverse removal procedure. Adjust control cable. See ADJUSTMENTS in appropriate AUTOMATIC TRANSMISSION SERVICING article. Tighten bolts to specification. See TORQUE SPECIFICATIONS.

PASSAT

Removal & Installation

1) Obtain radio code. Disconnect negative battery cable. On models equipped with V6 engine, remove battery. On all models, disconnect speedometer cable from transaxle. Disconnect all harness connections at transaxle. Position harnesses aside.

2) Remove multi-function Transaxle Range (TR) switch. Move selector lever to Park position. Disconnect selector lever cable from lever/selector shaft. Remove selector lever cable anchor circlip and remove selector lever cable.

3) Using appropriate tool, clamp-off ATF cooler hoses. Disconnect hoses at ATF cooler. Disconnect cooling fan harness connector. Remove upper engine-to-transaxle bolts.

4) Remove starter. Support engine and transaxle assembly from top of vehicle with appropriate support fixture. Remove front engine mount bolt and remove mount bracket.

5) Remove engine coolant recovery tank and set aside. Remove left engine mount assembly. On models equipped with V6 engine, remove drive belt cover. Disconnect axle shafts at transaxle flanges.

6) Remove left front wheel. Turn steering full-right to its lock. Raise right-side axle shaft and secure. Mark position of ball joint bolts on left-side control arm for installation reference.

7) On vehicles equipped with Plus Suspension option, remove both outer-most bolts. Loosen, but do not remove inner bolt. On models equipped with 4-cylinder engine, remove all bolts. On all models, swing ball joint outward and secure left-side axle shaft aside (remove axle shaft if triple-roller type joint).

8) Remove transaxle oil pan protective plate and vibration dampening weight. Remove power steering pressure hose bracket. Remove torque converter cover plate and nuts from torque converter.

9) Support transaxle with transmission jack. Remove lower engine-to-transmission bolts. Tilt engine and transaxle forward. Separate transaxle from engine. Push torque converter up against pump. Lower engine, then transaxle slightly and guide past wheelhousing.

10) Rotate transaxle and remove from vehicle. To install, reverse removal procedure. Adjust control cable. See ADJUSTMENTS in

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appropriate AUTOMATIC TRANSMISSION SERVICING article. Tighten bolts to specification. See TORQUE SPECIFICATIONS.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Application	Ft. Lbs. (N.m)

Axle Shaft-To-Flange Bolts	33 (45)

Axle-To-Hub Lock Nut	

Without Plus Suspension	195 (265)

With Plus Suspension	

Except Passat	(1)

Passat	(2)

Ball Joint-To-Control Arm Bolt	26 (35)

Cover Plate-To-Transaxle Bolt	11 (15)

Front Mount-To-Bracket Bolt	44 (60)

Left Mount-To-Bracket Bolt	44 (60)

Left Mount-To-Transaxle Bolt	18 (25)

Starter-To-Transaxle Bolt	44 (60)

Torque Converter-To-Drive Plate Bolts	44 (60)

Transaxle-To-Engine	

M10 Bolts	44 (60)

M12 Bolts	59 (80)

(1) - Tighten to 148 ft. lbs. (200 N.m), then back off one turn. Torque to 37 ft. lbs. (50 N.m) plus an additional 30 degrees.

(2) - Tighten to 66 ft. lbs. (90 N.m) plus an additional 45 degrees.

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END OF ARTICLE

HEATER SYSTEM

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ARTICLE BEGINNING

1995-96 HEATER SYSTEMS

Volkswagen

Cabrio, GTI, Golf, Golf III, Jetta & Jetta III

* PLEASE READ THIS FIRST *

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in the AIR BAG RESTRAINT SYSTEM article in the ACCESSORIES/SAFETY EQUIPMENT section.

CAUTION: When battery is disconnected, radio will go into anti-theft protection mode. Obtain radio anti-theft protection code from owner prior to servicing vehicle.

DESCRIPTION & OPERATION

Heating and ventilation system is a blend type system. A heater control valve is not used. Coolant flows unrestricted through heater core. Interior temperature is regulated by a blend door which controls amount of air flowing through heater core. Blend door is operated by a cable connected to temperature control knob.

Three knobs are used to control blower speed, air temperature, and air distribution. Fresh air blower has 4 speeds. Blower motor resistor is located on blower motor housing.

ADJUSTMENTS

MAIN SHUTOFF FLAP CABLE

Install heater control panel. Adjust blower control knob to stop at position "0". Connect main shutoff flap cable (Black sleeve) to main shutoff flap lever. Push lever in direction of arrow until it stops. See Fig. 1. Hold lever in this position, and install cable retaining clip.

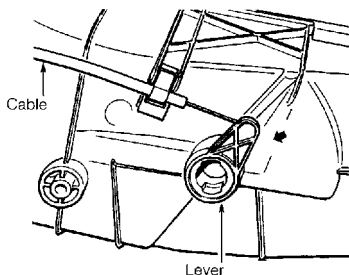


Fig. 1: Adjusting Main Shutoff Flap Cable
Courtesy of Volkswagen United States, Inc.

HEATER SYSTEM

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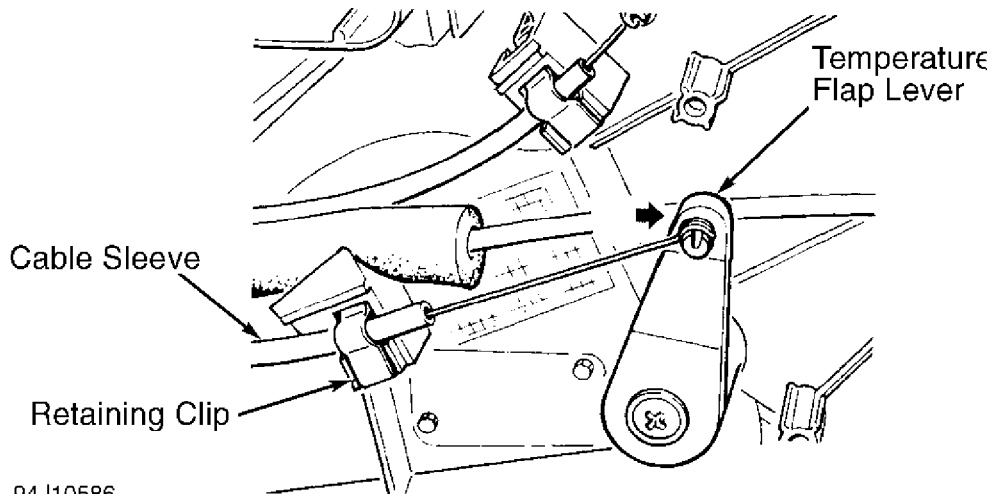
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TEMPERATURE FLAP CABLE

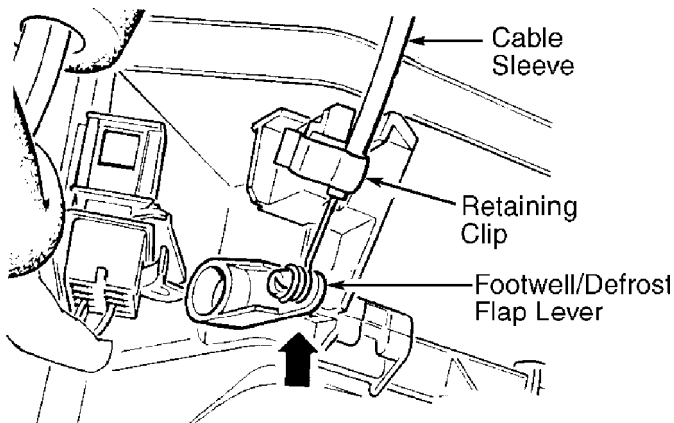
Install heater control panel. Adjust temperature control knob to full cold. Connect temperature flap cable (Blue sleeve) to temperature flap lever. Push lever in direction of arrow until it stops. See Fig. 2. Hold lever in this position, and install cable retaining clip.



94J10586
Fig. 2: Adjusting Temperature Flap Cable
Courtesy of Volkswagen United States, Inc.

FOOTWELL/DEFROST FLAP CABLE

Install heater control panel. Adjust airflow distribution knob to defrost position (against stop). Connect footwell/defrost flap cable (Black sleeve) to footwell/defrost flap lever. Push lever in direction of arrow until it stops. See Fig. 3. Hold lever in this position, and install cable retaining clip.



94B10588
Fig. 3: Adjusting Footwell/Defrost Flap Cable
Courtesy of Volkswagen United States, Inc.

HEATER SYSTEM

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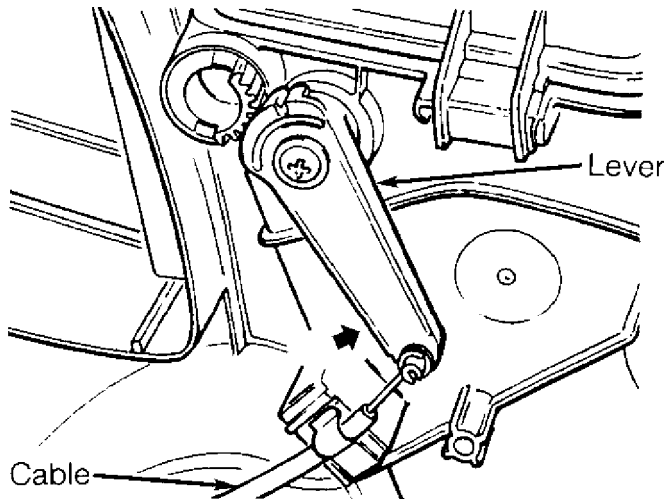
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CENTRAL FLAP CABLE

Install heater control panel. Adjust airflow distribution knob to vent position (against stop). Connect central flap cable (Black sleeve) to central flap lever. Push lever in direction of arrow until it stops. See Fig. 4. Hold lever in this position, and install cable retaining clip.



94B10448

Fig. 4: Adjusting Central Flap Cable
Courtesy of Volkswagen United States, Inc.

TESTING

Testing information is not available from manufacturer. Use wiring diagram as a guide. See WIRING DIAGRAM.

REMOVAL & INSTALLATION

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in the AIR BAG RESTRAINT SYSTEM article in the ACCESSORIES/SAFETY EQUIPMENT section.

BLOWER MOTOR

Removal & Installation

Disconnect wiring harness from blower motor resistor. Remove clip, and rotate blower motor clockwise. Remove blower motor. To install, reverse removal procedure.

BLOWER MOTOR RESISTOR

Removal & Installation

Disconnect wiring harness from blower motor resistor.

HEATER SYSTEM

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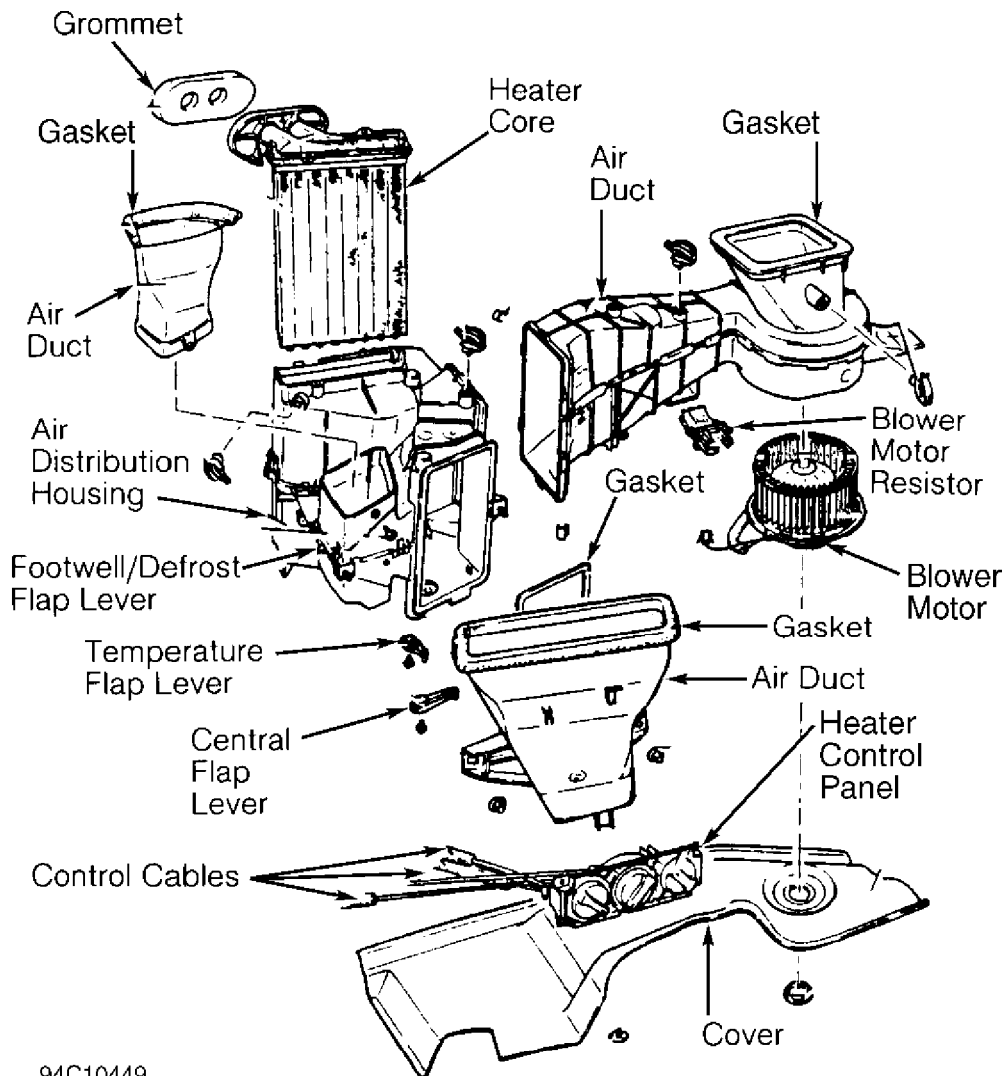
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Disengage locking tabs, and remove blower motor resistor. To install, reverse removal procedure. When installing, if locking tabs do not line up, secure blower motor resistor with self-tapping screw through mounting hole.

HEATER ASSEMBLY

Removal & Installation

Remove instrument panel and heater assembly support bracket. Disconnect heater core hoses, and plug outlets. Remove heater assembly. Exploded view of heater assembly is provided as a guide. See Fig. 5. Manufacturer recommends that air distribution housing not be disassembled. To install, reverse removal procedure.



94C10449

Fig. 5: Exploded Of Heater Assembly
Courtesy of Volkswagen United States, Inc.

WIRING DIAGRAM

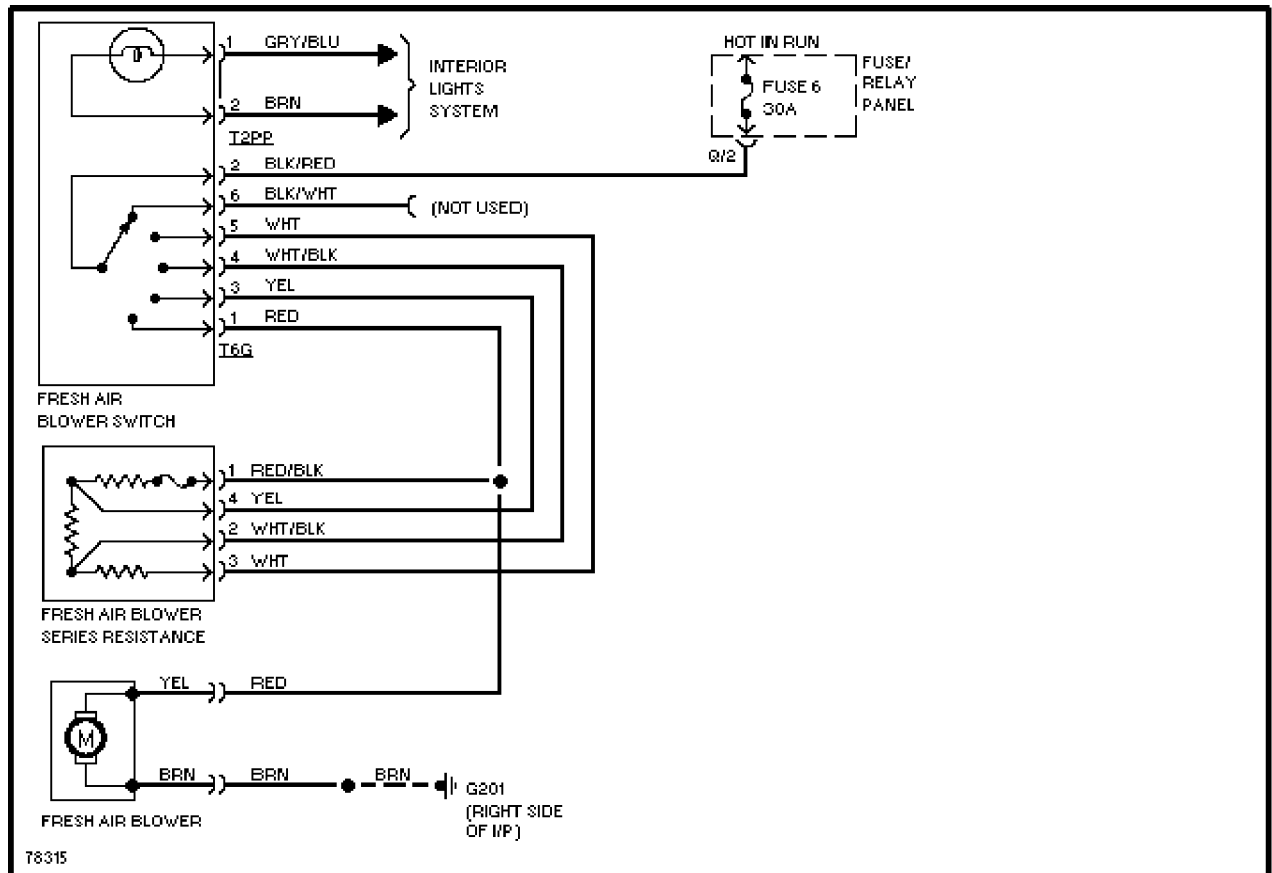


Fig. 6: Heater System Wiring Diagram

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A/C-HEATER SYSTEM - MANUAL

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ARTICLE BEGINNING

1995-96 MANUAL A/C-HEATER SYSTEMS
Volkswagen

Cabrio, Golf, Golf III, GTI, Jetta & Jetta III

* PLEASE READ THIS FIRST *

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in the AIR BAG RESTRAINT SYSTEM article in the ACCESSORIES/SAFETY EQUIPMENT section.

CAUTION: When battery is disconnected, radio will go into anti-theft protection mode. Obtain radio anti-theft protection code from owner prior to servicing vehicle.

A/C SYSTEM SPECIFICATIONS

SPECIFICATIONS

Application Specification

Compressor Type	 Sanden SD7-V16/SD7-V16L 7-Cyl.
Compressor Belt Tension (1)	
System Oil Capacity	 3.9 ozs.
Refrigerant (R-134a) Capacity (2)	 28.0-29.8 ozs.
System Operating Pressures (3)	
High Side	 203 psi (14.27 kg/cm ²)
Low Side	 17.4 psi (1.22 kg/cm ²)

(1) - Serpentine belt tension is automatically adjusted by tensioner pulley.

(2) - Use SP-10 PAG Compressor Oil (Part No. G 052 154 A2).

(3) - Measured at 68-86°F (20-30°C) ambient temperature.

Application Specification

DESCRIPTION & OPERATION

REFRIGERANT SYSTEM

System uses R-134a refrigerant. Variable displacement compressor increases or decreases pressure as necessary to maintain evaporator temperature near 32°F (0°C). Expansion valve restricts refrigerant flow, causing pressure differential. See Fig. 1.

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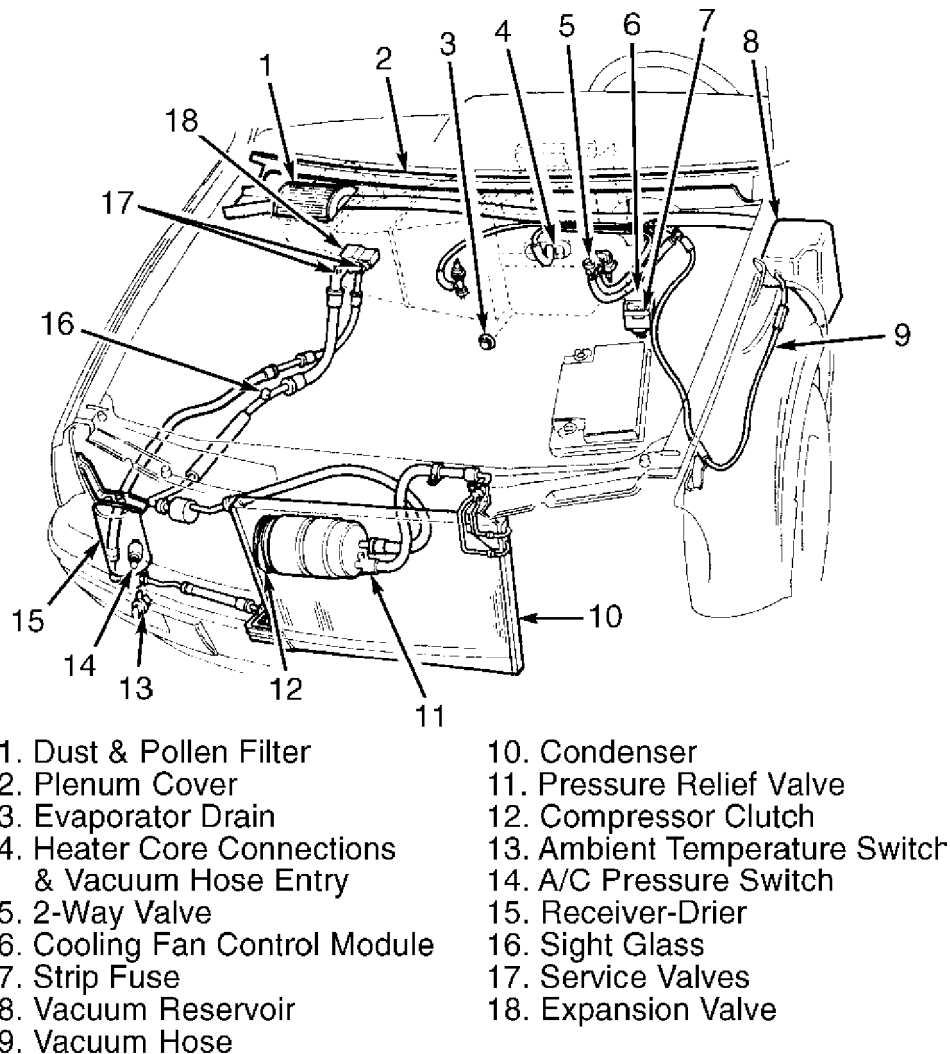
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Fig. 1: A/C-Heater System Component ID (Engine Compartment)

Courtesy of Volkswagen United States, Inc.

COMPRESSOR CLUTCH CONTROL

Evaporator Temperature Switch

Although compressor clutch does not normally cycle on and off, an evaporator temperature switch turns off the compressor clutch if evaporator temperature decreases to 32°F (0°C). This prevents evaporator icing. See Fig. 6.

A/C Pressure Switch

A/C pressure switch is a triple-pressure switch, which monitors high side pressure. See Fig. 1. If pressure decreases to less than 17.4 psi (1.2 kg/cm²), A/C pressure switch interrupts power to compressor clutch (low-pressure cutout). Switch closes when pressure increases to more than 34.8 psi (2.4 kg/cm²).

If pressure increases to more than 464 psi (32.6 kg/cm²), A/C pressure switch interrupts power to compressor clutch (high-

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pressure cutout). Switch closes when pressure decreases to less than 348 psi (24.5 kg/cm²).

A/C pressure switch also controls cooling fan high speed operation. If pressure increases to more than 232 psi (16.3 kg/cm²), switch contacts close, causing cooling fan to operate at high speed. When pressure decreases to less than 181 psi (12.7 kg/cm²), switch contacts open.

Ambient Temperature Switch

If ambient temperature decreases to less than 36°F (2°C), ambient temperature switch interrupts power to compressor clutch. When ambient temperature increases to more than 45°F (7°C), ambient temperature switch restores power to compressor clutch. See Fig. 1.

AIRFLOW CONTROL

Fresh/Recirculated Air Flap

Fresh/recirculated air flap (door) above blower motor controls air entering ducting system. Flap is controlled by a vacuum servo. See Fig. 6. Vacuum supply to servo is controlled by a 2-way valve (electric solenoid), located between vacuum reservoir and vacuum servo. When voltage signal from A/C-heater control panel is applied to the 2-way valve, the valve opens, allowing vacuum supply to vacuum servo.

Temperature Flap

Temperature flap (door) diverts air through or around heater core. Flap is controlled by a cable connected to the A/C-heater control panel.

Central Flap

Central flap (door) diverts air to face vents or to footwell and defrost vents (or a combination of all 3). Flap is controlled by a cable connected to the A/C-heater control panel.

Footwell/Defrost Flap

Footwell/defrost flap (door) diverts air to footwell or defrost vents (or a combination of both). Flap is controlled by a cable connected to the A/C-heater control panel.

ADJUSTMENTS

TEMPERATURE FLAP CABLE

Ensure cable is connected to A/C-heater control panel and panel is installed. Remove cable sleeve retaining clip (cable sleeve is Blue). See Fig. 2. Disconnect cable from temperature flap lever. Adjust temperature control knob to maximum cold position. Connect cable to temperature flap lever. Push lever in direction of arrow until it stops. Hold lever in position, and install cable retaining clip.

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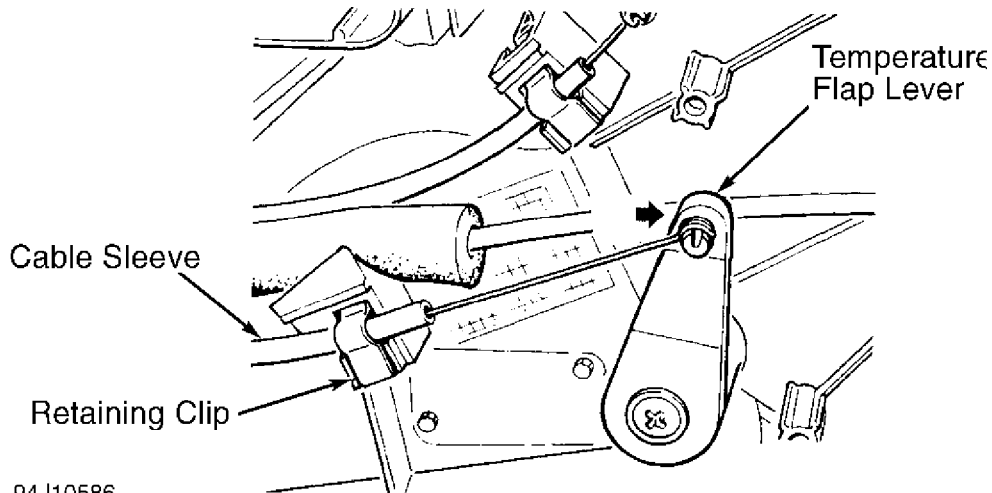
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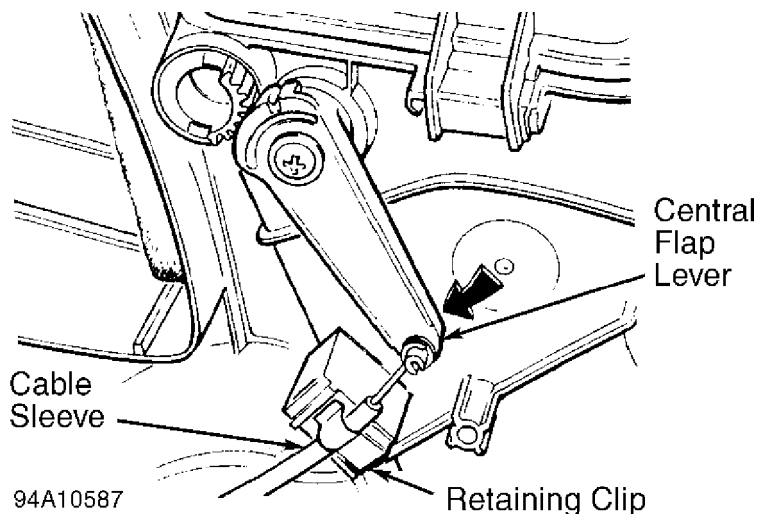


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Fig. 2: Adjusting Temperature Flap Cable
Courtesy of Volkswagen United States, Inc.

CENTRAL FLAP CABLE

Ensure cable is connected to A/C-heater control panel and panel is installed. Remove cable sleeve retaining clip (cable sleeve is Black). See Fig. 3. Disconnect cable from central flap lever. Adjust airflow distribution knob to defrost position. Connect cable to central flap lever. Push lever in direction of arrow until it stops. Hold lever in position, and install cable retaining clip.



94A10587

Fig. 3: Adjusting Central Flap Cable
Courtesy of Volkswagen United States, Inc.

FOOTWELL/DEFROST FLAP CABLE

Ensure cable is connected to A/C-heater control panel and panel is installed. Remove cable sleeve retaining clip (cable sleeve is Black). See Fig. 4. Disconnect cable from footwell/defrost flap lever. Adjust airflow distribution knob to defrost position. Connect

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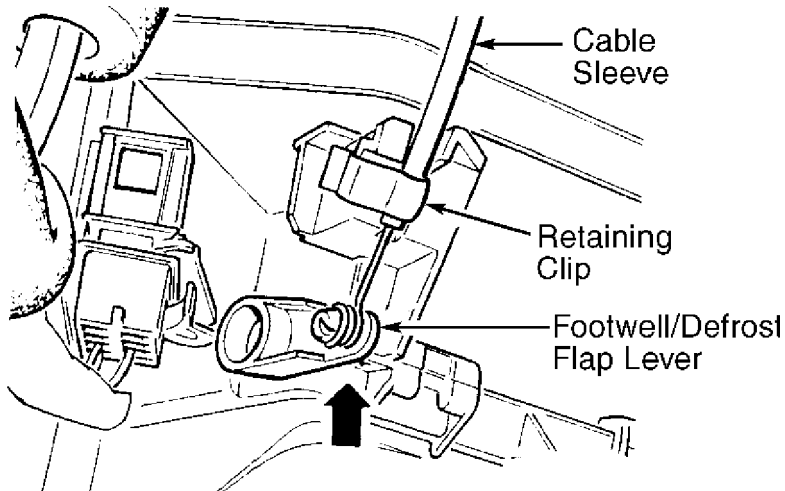
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cable to footwell/defrost flap lever. Push lever in direction of arrow until it stops. Hold lever in position and install cable retaining clip.



94B10588

Fig. 4: Adjusting Footwell/Defrost Flap Cable
Courtesy of Volkswagen United States, Inc.

TESTING

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in the AIR BAG RESTRAINT SYSTEM article in the ACCESSORIES/SAFETY EQUIPMENT section.

A/C SYSTEM PERFORMANCE

1) Ensure no bubbles are present in sight glass. See Fig. 1. Connect manifold gauge set to service valves. Run engine at 1500 RPM. Set air distribution knob to face vent position. Set temperature control knob to full cold position.

2) Press A/C NORM button. Set blower motor on 2nd speed. System is okay if air temperature at center vent is less than 50°F (10°C) after one minute and system operating pressures are within specification. See SPECIFICATIONS table at beginning of article.

A/C PRESSURE SWITCH

NOTE: A/C pressure switch may be removed without discharging A/C system.

Connect manifold gauge set to service valves. Disconnect A/C pressure switch connector. Check continuity between specified A/C pressure switch terminals. See A/C PRESSURE SWITCH CONTINUITY table. See Fig. 5. Replace A/C pressure switch if continuity is not as specified.

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A/C PRESSURE SWITCH CONTINUITY

Terminal No. & Pressure Continuity

1 & 2

Low-Pressure Cutout

Decreasing To 17.4 psi (1.2 kg/cm²) No

Increasing To 34.8 psi (2.4 kg/cm²) Yes

High-Pressure Cutout

Increasing To 464 psi (32.6 kg/cm²) No

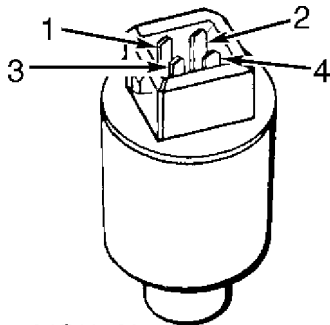
Decreasing To 348 psi (24.5 kg/cm²) Yes

3 & 4

Cooling Fan High Speed

Increasing To 232 psi (16.3 kg/cm²) Yes

Decreasing To 181 psi (12.7 kg/cm²) No



94C10589

Fig. 5: Identifying A/C Pressure Switch Terminals
Courtesy of Volkswagen United States, Inc.

NOTE: Additional testing information is not available from manufacturer. Use wiring diagrams as guide. See WIRING DIAGRAMS.

REMOVAL & INSTALLATION

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in the AIR BAG RESTRAINT SYSTEM article in the ACCESSORIES/SAFETY EQUIPMENT section.

NOTE: For removal and installation procedures not covered in this article, see HEATER SYSTEM article in this section.

A/C COMPRESSOR

Removal & Installation

1) Mark direction of serpentine belt rotation for installation reference. Loosen serpentine belt tensioner pulley.

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Remove serpentine belt.

2) Discharge A/C system using approved refrigerant recovery/recycling equipment. Disconnect refrigerant lines from A/C compressor. Remove A/C compressor bracket and/or A/C compressor, if necessary. To install, reverse removal procedure.

CONDENSER

Removal & Installation

Discharge A/C system using approved refrigerant recovery/recycling equipment. Remove front bumper. Remove bumper cross support. Disconnect refrigerant lines from condenser. Remove condenser. To install, reverse removal procedure.

EVAPORATOR HOUSING & EVAPORATOR

Removal & Installation

Discharge A/C system using approved refrigerant recovery/recycling equipment. Drain coolant. Remove instrument panel and support bracket. See INSTRUMENT PANEL. Remove evaporator housing. See Fig. 6.

Disassemble evaporator housing. See Fig. 7.

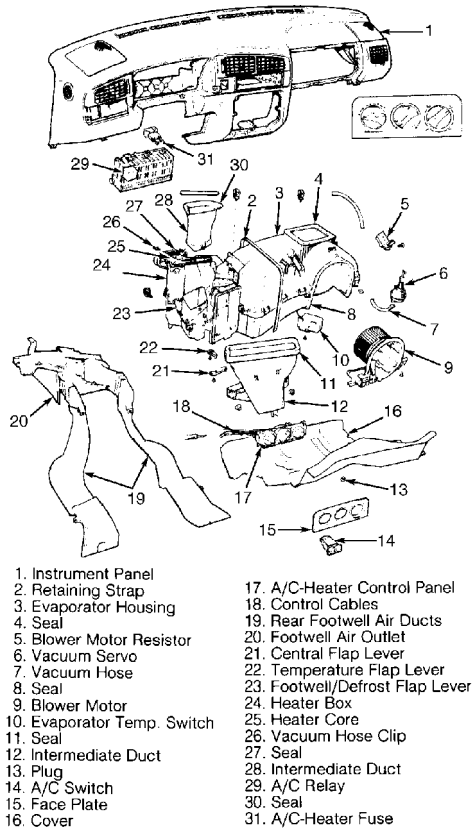


Fig. 6: Exploded View Of A/C-Heater System Components
Courtesy of Volkswagen United States, Inc.

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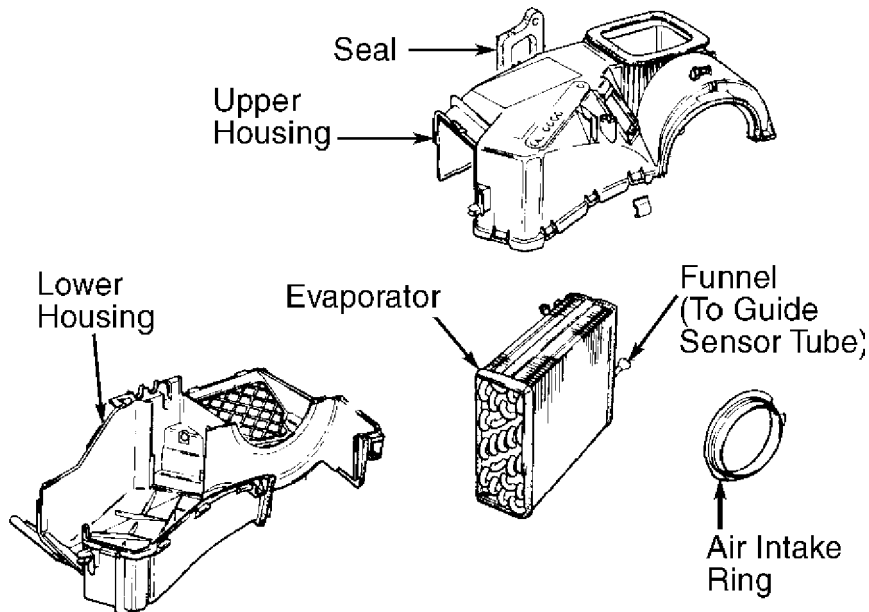


Fig. 7: Exploded View Of Evaporator Housing
Courtesy of Volkswagen United States, Inc.

EVAPORATOR TEMPERATURE SWITCH

Removal & Installation

Remove screw(s) and evaporator temperature switch from bottom of evaporator housing. See Fig. 6. To install, apply tape 13" (330 mm) from end of sensor tube. Install sensor tube into evaporator until tape reaches grommet. DO NOT bend sensor tube.

INSTRUMENT PANEL

Removal

1) Obtain radio anti-theft protection code from vehicle owner. Disconnect negative battery cable. Remove center console and radio. Remove steering wheel and combination switch on steering column. On left side of instrument panel, remove lower cover and lower trim pieces.

2) Remove lower trim piece from right side of instrument panel. Remove face plate from A/C-heater control panel, and remove screws. Push A/C-heater control panel back into cavity. Remove instrument cluster cover and instrument cluster.

3) Remove nuts and screws securing instrument panel (nuts are accessible through plenum with plenum cover removed). See Fig. 1. Pull instrument panel off carrier, and disconnect necessary electrical connectors for removal. Remove instrument panel.

Installation

To install, reverse removal procedure. Ensure wiring harnesses are not pinched during installation.

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VACUUM DIAGRAM

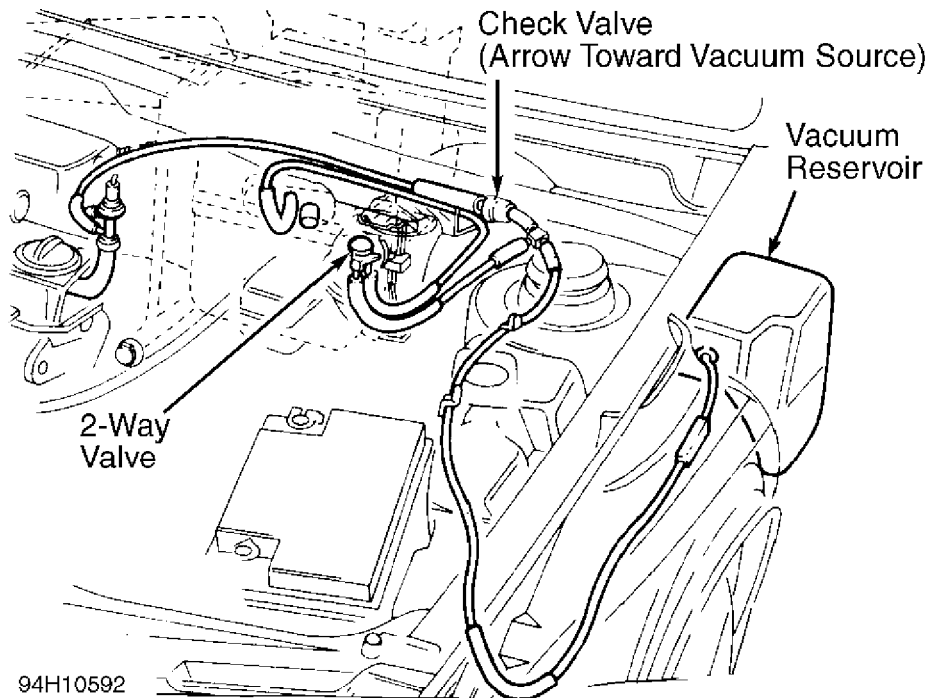


Fig. 8: Vacuum Diagram (Cabrio, Golf, Golf III & Jetta)
Courtesy of Volkswagen United States, Inc.

WIRING DIAGRAMS

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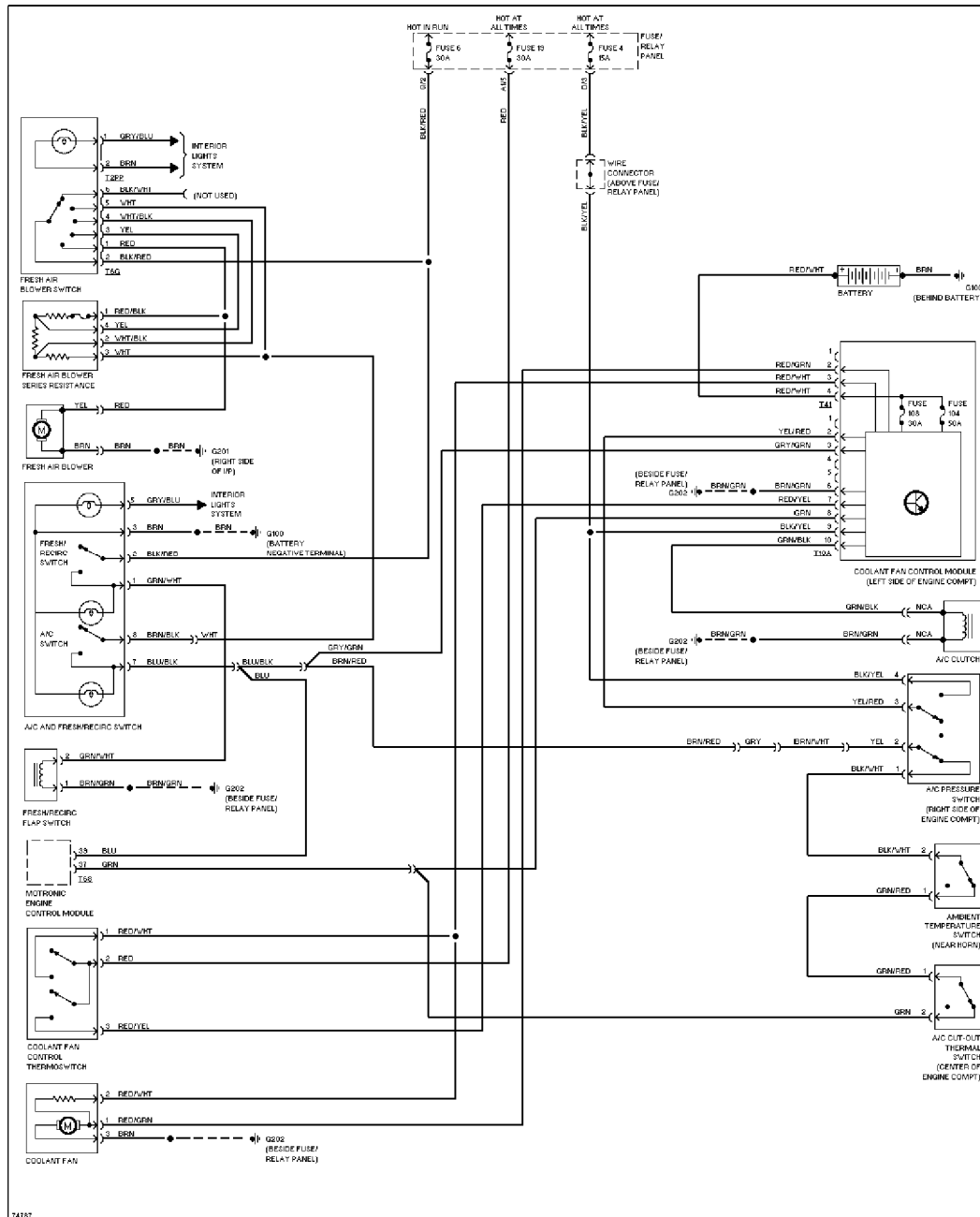


Fig. 9: Wiring Diagram (1995-96 Cabrio)

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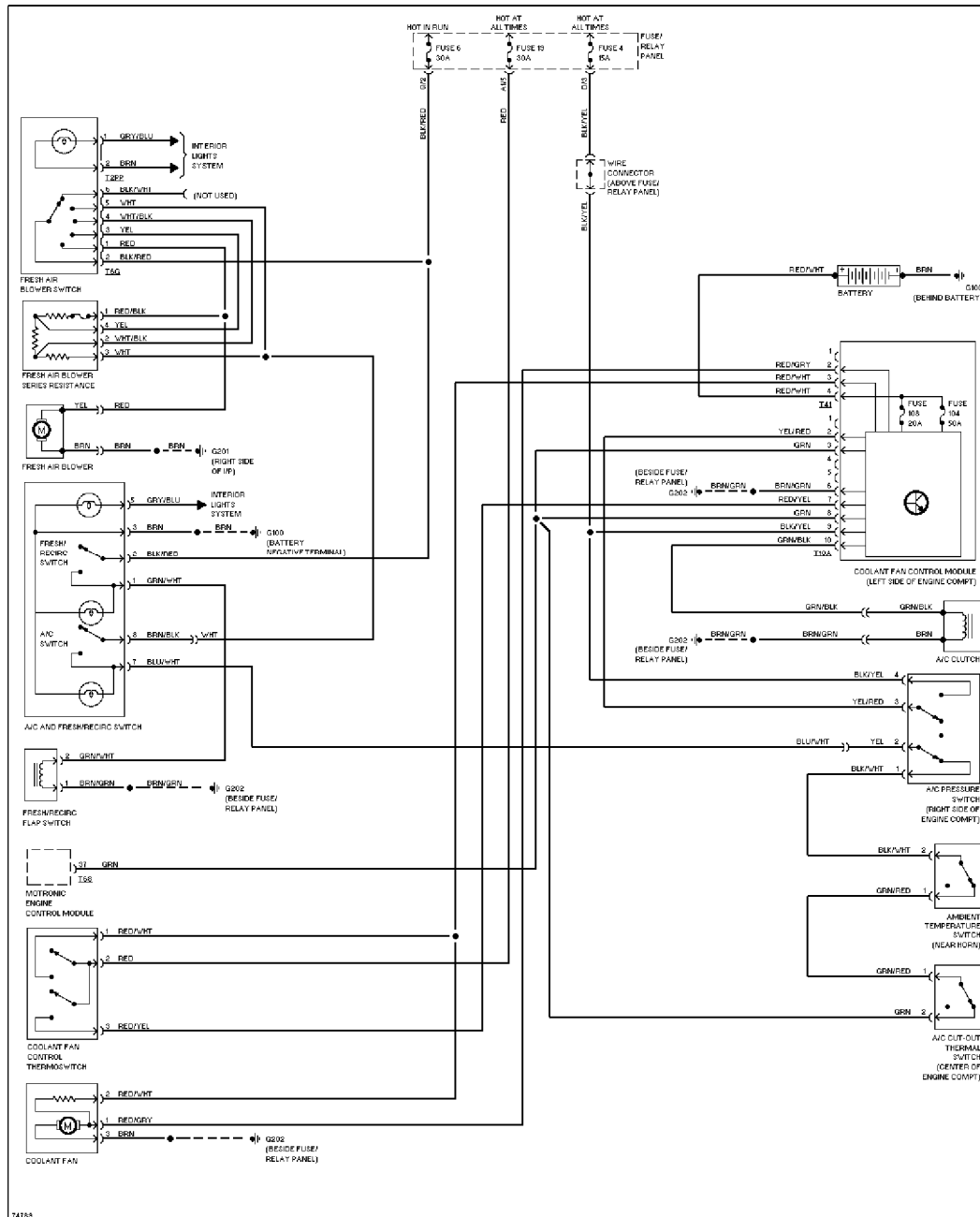
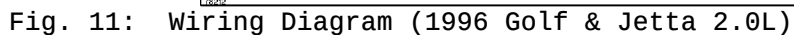


Fig. 10: Wiring Diagram (1995 Golf III & Jetta III 2.0L)

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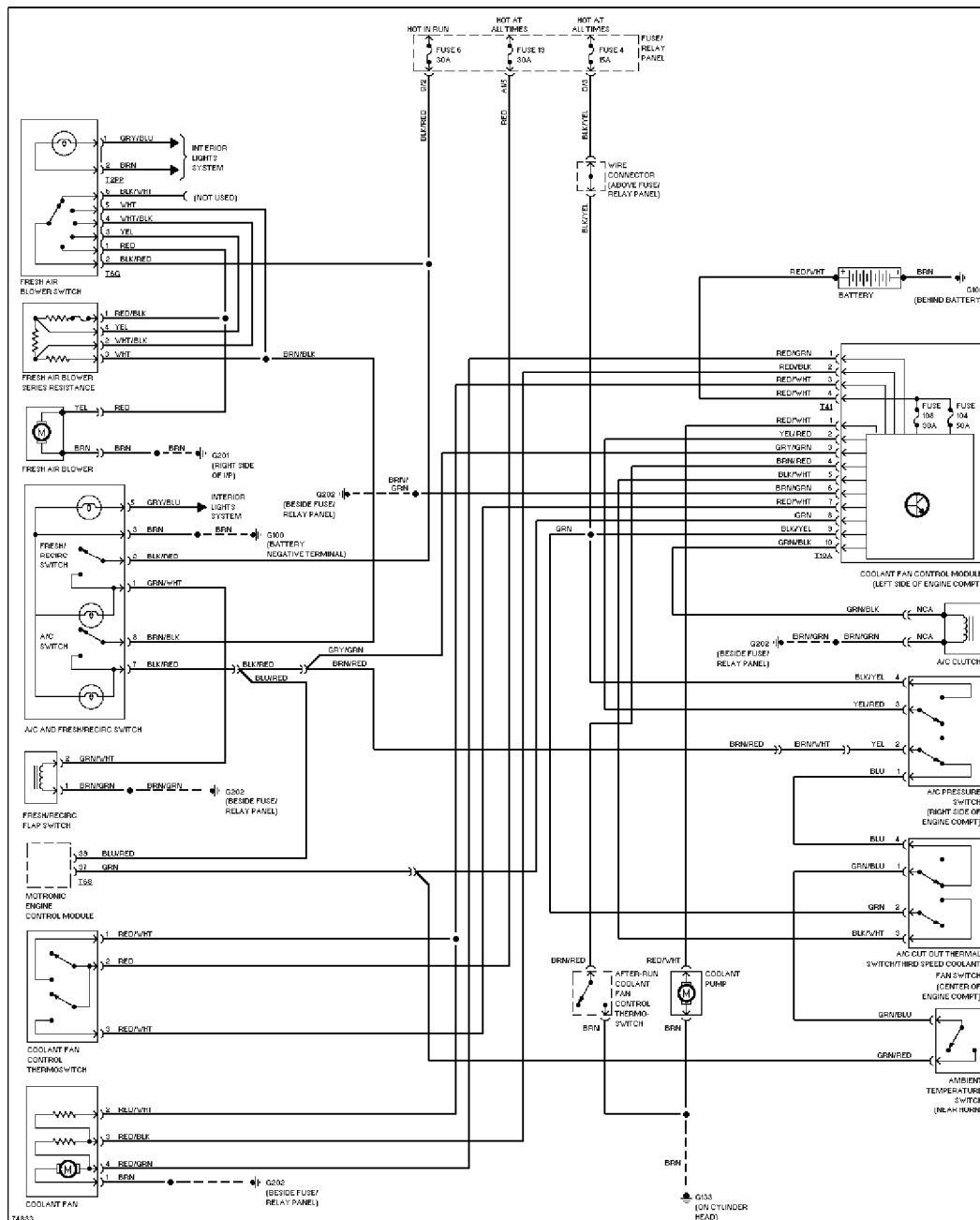


Fig. 12: Wiring Diagram (1995 -96 GTI & Jetta, Jetta III 2.8L)

END OF ARTICLE

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ARTICLE BEGINNING

GENERAL INFORMATION

A/C-Heater System Motorist Assurance Program
Standards For Automotive Repair

All Makes and Models

INTRODUCTION TO MOTORIST ASSURANCE PROGRAM (MAP)

The Motorist Assurance Program was formed in 1992 by forty (40) companies who were concerned about the image of automotive service establishments. Today, MAP is an industry-wide association dedicated to strengthening consumer satisfaction with the automotive repair industry. MAP's participants represent the majority of the nation's multi-bay retail automotive outlets, their parts and equipment suppliers, independent repair shops, industry associations, car companies, manufacturers representatives, and the trade press. MAP is developing standards of service, uniform inspection procedures and other programs to assure consumers of the industry's professionalism and the commitment to excellence shared by MAP's sponsoring companies.

MAP's achievements to date include production and distribution (over 280,000) of the consumer brochure "How to Find Your Way Under the Hood and Around Your Car", development of a Pledge of Satisfaction to Consumers and Standards of Service and establishment of relationships with regulatory agencies.

As auto repair becomes an issue for federal and state regulators, MAP is working to educate government leaders on the dynamics of automotive service and the self-monitoring efforts MAP has undertaken on the industry's behalf. MAP's sponsoring companies are becoming well-known to government representatives as exemplary businesses working to improve the industry. Media sources also look to MAP to provide information and advice to consumers and on working with automotive technicians and repair establishments.

In the next few months, MAP plans to assist member repair facilities in implementing the MAP Pledge to Customers, establishing an alternate dispute resolution system to help resolve customer complaints within the industry, and developing a shop accreditation program to encourage policies in concert with the MAP Standards of Service and Inspection Guidelines.

MAP has united the aftermarket behind its consumer-oriented goals and has established itself both within and outside of the industry. We welcome you to join us as MAP continues its outreach. With your support, both the automotive repair industry and your customers will reap the benefits. Please contact MAP at:

808 17th Street, NW
Suite 200
Washington, D.C. 20006
202 466 7050

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MAP UNIFORM INSPECTION GENERAL GUIDELINES

OVERVIEW OF SERVICE REQUIREMENTS & SUGGESTIONS

It is MAP policy that all exhaust, brake, ABS, steering and suspension, wheel alignment, tires and wheels, driveline, engine performance and maintenance and heating, ventilation and air conditioning services be offered and performed under the guidelines and procedures specified in these sections.

Before any service is performed on a vehicle, an inspection of the appropriate system must be performed. The results of this inspection must be explained to the customer and documented on an inspection form. The condition of the vehicle and its components will indicate what services/part replacements may be required or suggested. In addition, suggestions may be made to satisfy the needs expressed by the customer.

This section lists the various parts and conditions that indicate required or suggested service or part replacement. Although this list is extensive, it is not inclusive. In addition to this list, a technician may make a suggestion. This suggestion must be based on substantial and informed experience or the vehicle manufacturer's recommended service interval.

Some conditions indicate that service or part replacement is required because the part in question is no longer providing the function for which it is intended, does not meet a vehicle manufacturer's design specification or is missing.

- * Example: An exhaust pipe has corroded severely and has a hole in it through which exhaust gases are leaking. Replacement of the exhaust pipe in this case is required due to functional failure.
- * Example: A brake rotor has been worn to the point where it measures less than the vehicle manufacturer's specifications. Replacement of the rotor is required because it does not meet design specifications.

Some conditions indicate that a service or part replacement is suggested because the part is close to the end of its useful life or to address a customer's need, convenience or request. If a customer's vehicle has one of these conditions, the procedure may only be to suggest service.

- * Example: An exhaust pipe is rusted, corroded or weak, but no leaks are present. In this case, the exhaust pipe has not failed. However, there is evidence that the pipe may need replacement in the near future. Replacement of the pipe may be suggested for the customer's convenience in avoiding a future problem.
- * Example: The customer desires improved ride and/or handling, but the vehicle's shocks or struts have not failed. In this case, replacement may be suggested to satisfy the customer's

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wishes. In this case, replacement of the shocks or struts may not be sold as a requirement.

A customer, of course, has the choice of whether or not a Shop will service his or her vehicle. He or she may decide not to follow some of your suggestions. The following reasons may be used for required and suggested services:

Reasons to Require Repair or Replacement:

- * component no longer performs intended purpose
- * component does not meet a design specification (regardless of performance)
- * component is missing.

Reasons to Suggest Repair or Replacement

- * component is close to the end of its useful life (just above discard specifications or weak; failure likely to occur soon, etc.)
- * address a customer need, convenience or request (stiffen ride, enhance performance, eliminate noise, etc.)
- * comply with maintenance recommended by the vehicle's Original Equipment Manufacturer (OEM)
- * technician's recommendation based on substantial and informed experience.

HEATING, VENTILATION & AIR CONDITIONING GUIDELINES

* PLEASE READ THIS FIRST *

NOTE: When servicing R-12 Systems it is suggested to use "O" rings, seals and hose materials which are also compatible with R-134a in case the vehicle requires retrofitting later in its life.

COMPRESSOR & CLUTCH ASSEMBLY

COMPRESSOR

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Condition	3	Procedure	3 Note
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Seized	3	Requires replacement 3	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Inoperative	3	Further inspection	3 Check/service state of
	3	required.	3 charge following the
	3		3 manufacturer's recommended
	3		3 service procedures. If the
	3		3 compressor is still
	3		3 inoperative, require
	3		3 repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			

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EVAPORATOR

EVAPORATOR

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Condition	3	Procedure	3 Note
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Leaking	3	Require repair or	3
	3	replacement.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Internal	3	Require replacement.	3
restriction	3		3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Air flow	3	Further inspection	3 If fins cannot be cleaned
obstruction	3	required.	3 or straightened, require
	3		3 replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Damaged	3	Require replacement.	3
connections or	3		3
fittings	3		3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			

ACCUMULATOR/DRIER

ACCUMULATOR/DRIER

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Condition	3	Procedure	3 Note
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Leaking	3	Require replacement.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Restricted	3	Require replacement.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Desiccant bag	3	Require replacement.	3
deterioration	3		3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Moisture in system	3	Require replacement.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
System has been	3	Suggest replacement.	3
exposed to air	3		3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Missing, damaged	3	Require repair or	3
mounting hardware	3	replacement of	3
or brackets	3	hardware or brackets	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			

HOSES/LINES/FITTINGS

HOSES/LINES/FITTINGS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Condition	3	Procedure	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Blistered hose	3	Suggest repair or replacement.	

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PRESSURE CONTROL VALVES

NOTE: Includes Evaporator Pressure Regulator (EPR), Pilot Operated Absolute (POA), Suction Throttling Valve (STV), Valves In Receiver (VIR).

PRESSURE CONTROL VALVES

Condition	³	Procedure
Leaking	³	Require repair or replacement.
Restriction	³	Require repair or replacement.
Stuck open or closed	³	Require repair or replacement.
Damaged connections or fittings	³	Require repair or replacement.

SERVICE PORTS

SERVICE PORTS

Condition	³	Procedure
Leaking	³	Require repair or replacement.
Sticking valve core	³	Require repair or replacement
Missing valve cap	³	Require replacement of valve cap.
Damaged threads	³	Require repair or replacement.

DRIVE BELTS

DRIVE BELTS

Condition	³	Procedure	³	Note
Missing	³	Require replacement.	³	
Improper tension	³	Require adjustment.	³	
Improper alignment	³	Further inspection	³	Check alignment of pulleys
	³	required.	³	and proper belt
	³		³	installation. Suggest
	³		³	repair or replacement.
Damaged	³	Require replacement.	³	Damaged conditions may
	³		³	include but are not

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3	3	limited to: teeth missing,
3	3	chunking or excessive
3	3	cracking, missing rib,
3	3	broken or cut, ply
3	3	separation.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Noisy 3 Suggest replacement. 3

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Worn 3 Suggest replacement. 3 Worn conditions may

3	3	include: belt worn
3	3	narrower than original
3	3	width, bottom and side-
3	3	wall cracks, protruding
3	3	edge cords.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

DRIVE PULLEYS

DRIVE PULLEYS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	3	Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged 3 Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Improper alignment 3 Require repair.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Missing, damaged mounting hardware 3 Require repair or replacement of

3 bracket of hardware or bracket.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

TENSIONERS

TENSIONERS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	3	Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Missing 3 Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Noisy 3 Suggest replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged 3 Suggest replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Improper adjustment 3 Require adjustment or repair.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

CONDENSER

CONDENSER

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition	3	Procedure	3	Note

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking 3 Require repair or 3

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³ replacement. ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged connections ³ Require replacement. ³
or fittings ³ ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Internal restriction ³ Require replacement. ³

Air flow obstruction ³ Further inspection ³ If fins cannot be cleaned
³ required. ³ or straightened, require
³ ³ replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Missing/damaged ³ Require repair or ³
mounting hardware/ ³ replacement of ³
brackets ³ hardware or ³
³ brackets. ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

"O" RINGS/GASKETS/SEALS/SPRING LOCKS

"O" RINGS/GASKETS/SEALS/SPRING LOCKS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking ³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

IN-LINE FILTER

IN-LINE FILTER

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Leaking ³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Restricted ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Damaged connections or fittings ³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

REFRIGERANT OIL

REFRIGERANT OIL

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition ³ Procedure ³ Note

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Overcharge/ ³ Require service to ³
undercharge ³ manufacturer's ³
³ specifications. ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Contaminated ³ Suggest replacement. ³ Particulate material
³ ³ (contaminants) may indicate a
³ ³ need for additional service.
³ ³ Determine cause of contamination

[illegible]

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ELECTRICAL/VACUUM ACTUATORS (MOTORS)

ELECTRICAL/VACUUM ACTUATORS (MOTORS)

Condition	³	Procedure
Leaking vacuum	³	Require replacement.
Inoperative	³	Require replacement
Damaged	³	Suggest replacement.
Missing	³	Require replacement.
Missing, damaged mounting hardware	³	Require repair of mounting hardware or bracket.
Corroded, loose terminals	³	Require repair or replacement.

LINKAGE

LINKAGE

Condition	³	Procedure
Broken/damaged or binding	³	Require repair or replacement.
Missing or disconnected	³	Require repair or replacement.
Out of adjustment	³	Require adjustment.

CABLES

CABLES

Condition	³	Procedure
Binding	³	Suggest repair or replacement.
Out of adjustment	³	Require adjustment.
Broken or seized	³	Require replacement.
Disconnected	³	Require repair.

VACUUM HOSES/TUBES

VACUUM HOSES/TUBES

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Condition	3	Procedure
Missing	3	Require replacement.
Damaged	3	Suggest repair or replacement.
Leaking/restricted	3	Require repair or replacement.
Routed incorrectly	3	Suggest re-routing.

EVAPORATOR DRAIN TUBE

EVAPORATOR DRAIN TUBE

Condition	3	Procedure
Disconnected	3	Require repair.
Missing	3	Require replacement.
Damaged/leaking	3	Require replacement.
Restricted	3	Require repair or replacement.

CONTROLS

FUNCTION SELECTORS

Condition	3	Procedure
Inoperative	3	Require repair or replacement.
Malfunctioning	3	Suggest repair or replacement.
Damaged	3	Suggest replacement.
Missing	3	Require replacement.
Missing, damaged mounting hardware	3	Require repair of mounting hardware or bracket.
Corroded, loose terminals	3	Require repair or replacement.

BLOWER SWITCH

Condition	3	Procedure
Inoperative	3	Require replacement.

Condition		Procedure
Inoperative	³	Require replacement.

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Malfunctioning	³ Suggest replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Damaged	³ Suggest replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Missing	³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Missing, damaged mounting hardware	³ Require repair of mounting
	³ hardware or bracket.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Corroded, loose terminals	³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	

SWITCHES

NOTE: Includes, but not limited to: High Pressure Cut-Off,
Low Pressure Cut-Off, Thermostatic Fan Control, Ambient,
Pressure Cycling, etc.

SWITCHES	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Condition	³ Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Inoperative/intermittent	³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Malfunctioning	³ Suggest replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Leaking	³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Damaged	³ Suggest replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Missing	³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Missing, damaged mounting hardware	³ Require repair of mounting
	³ hardware or bracket.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Corroded, loose terminals	³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	

THERMISTOR/SENSORS

NOTE: Includes, but not limited to: In-car Temperature, Ambient Air
Temperature, Sun Load Sensor, etc.

THERMISTOR/SENSORS	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Condition	³ Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Inoperative	³ Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Malfunctioning	³ Suggest replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	
Damaged	³ Suggest replacement.

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Missing³ Require replacement.

Missing, damaged mounting hardware³ Require repair of mounting hardware or bracket.

Corroded, loose terminals³ Require repair or replacement.

RELAYS

RELAYS

Condition ³	Procedure
Inoperative ³	Require replacement.
Malfunctioning ³	Suggest replacement.
Damaged ³	Suggest replacement.
Missing ³	Require replacement.
Missing, damaged mounting hardware ³	Require repair or replacement of hardware.
Corroded, loose terminals ³	Require repair or replacement.

FUSE/FUSIBLE LINK/CIRCUIT BREAKER

FUSE/FUSIBLE LINK/CIRCUIT BREAKER

Condition ³	Procedure ³	Note
Inoperative/intermittent ³	Require replacement. ³	Determine cause of condition & correct prior to replacement.
Damaged ³	Suggest repair or replacement. ³	
Open ³	Require replacement. ³	
Missing ³	Require replacement. ³	Refer to OEM owner's manual for proper amperage & location.

WIRING HARNESS/CONNECTORS

WIRING HARNESS/CONNECTORS

Condition ³	Procedure ³	Note

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Damaged	³ Suggest repair or	³
	³ replacement.	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Routed incorrectly	³ Suggest rerouting of	³
	³ of wiring.	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Open fusible link	³ Require replacement	³ Determine cause of
	³ of fusible link.	³ condition and repair
	³ prior to replacement.	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Shorted/open	³ Require repair or	³
	³ replacement.	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Connector terminal bent,	³ Require repair or	³
broken, corroded or	³ replacement	³
loose	³	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Excessive resistance	³ Require repair or	³
	³ replacement	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Poor ground	³ Require repair.	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

CONTROL MODULE

NOTE: Includes, but not limited to: BOM (Body), ECM (Electronic), PCM (Power), etc.

CONTROL MODULE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	³ Procedure	³ Note
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Inoperative	³ Require replacement.	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Malfunctioning	³ Suggest replacement.	³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Code set	³ Further inspection	³ Refer to manufacturer's
	³ required.	³ diagnostic trouble code
	³	³ procedure and repair or
	³	³ replace affected
	³	³ component(s) as necessary.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Damaged/cracked	³ Suggest replacement.	³ If moisture enters the
housing	³	³ module it can reduce life
	³	³ expectancy or impair
	³	³ function.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Damaged	³ Suggest replacement.	³
Missing	³ Require replacement.	³
Missing, damaged	³ Require repair of	³
mounting hardware	³ mounting hardware or	³
	³ bracket.	³

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Corroded, loose terminals 3 Require repair or replacement. 3

CONTROLLERS

NOTE: Includes, but not limited to: IRCM, Coolant Fan Control Module (CFCM), AC Controller, Amplifier, Programmers, Control Heads, Power Modules, etc.

CONTROLLERS

Condition	3	Procedure	3	Note
Inoperative	3	Require replacement.	3	
Malfunctioning	3	Suggest replacement.	3	
Damaged/cracked housing	3	Suggest replacement.	3	If moisture enters the controller it can reduce life expectancy or impair function.
Damaged	3	Suggest replacement.	3	
Missing	3	Require replacement.	3	
Missing, damaged mounting hardware	3	Require repair of mounting hardware or bracket.	3	
Corroded, loose terminals	3	Require repair or replacement.	3	

HEATER CORE

HEATER CORE

Condition	3	Procedure	3	Note
Leaking	3	Require repair or replacement.	3	
Damaged fins, tubes, fittings	3	Suggest repair or replacement.	3	
Internal restrictions	3	Require repair or replacement	3	
Missing/by-passed	3	Suggest repair or	3	

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³ replacement ³

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Air flow ³ Further inspection ³ If fins cannot be cleaned
obstruction ³ required. ³ or straightened, require
³ replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

HEATER CONTROL VALVE

HEATER CONTROL VALVE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Coolant leak ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Vacuum leak ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Inoperative ³ Require replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Malfunctioning ³ Suggest replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Restricted ³ Suggest repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

MIX/AIR CONTROL DOORS

MIX/AIR CONTROL DOORS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Condition ³ Procedure

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Broken/damaged/binding ³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

Disconnected ³ Require repair or replacement.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

REQUEST FOR MAP MEMBERSHIP INFORMATION

NOTE: To print membership information request form, print portion
of article between dashed lines.

MAP

Request for Membership Information

I want to be a part of the automotive maintenance and repair
industry's move to improve the level of Customer satisfaction.

Please send me information on how I can become a member of MAP.

Name _____

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Company/Organization _____

Address _____

Phone _____ FAX _____

MAP

808 17th STREET, NW
Suite 200
Washington, D.C 20006

Phone 202 466 7050
Fax 202 223 9569

END OF ARTICLE

STARTER

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ARTICLE BEGINNING

1995-96 STARTING & CHARGING SYSTEMS

Volkswagen Starters

Cabrio, Golf III, GTI, Jetta III

DESCRIPTION

Starter is a brush type, series-wound electric motor with an overrunning clutch. Field frame is enclosed by commutator end frame and drive bushing, and carries pole shoes and field coils. A splined armature shaft drive end carries drive assembly.

TROUBLE SHOOTING

NOTE: See TROUBLE SHOOTING article in GENERAL INFORMATION.

ON-VEHICLE TESTING

STARTER DOES NOT CRANK ENGINE

1) Ensure battery is fully charged. Ensure electrical and ground connections are clean and tight. With ignition switch in START position, measure voltage at spade terminal of starter solenoid. Reading should be at least 8 volts. If voltage is as specified, go to step 3). If voltage is not as specified, go to next step.

2) Measure voltage at ignition switch. If reading is at least 8 volts, check wiring between ignition switch and starter solenoid. If voltage is not as specified, replace ignition switch.

3) While operating starter, measure voltage at field (starter) terminal of starter solenoid. If reading is at least 8 volts, repair or replace starter. If reading is less than 8 volts, replace starter solenoid.

NOTE: On vehicles with automatic transmission, also check park/neutral switch.

STARTER CRANKS TOO SLOWLY TO START ENGINE

Ensure battery is fully charged. Ensure electrical and ground connections are clean and tight. If necessary, clean and tighten ground strap between transmission and body. DO NOT loosen ground strap on body. If starter still turns slowly, repair or replace starter.

REMOVAL & INSTALLATION

Removal & Installation

1) Disconnect negative battery cable. Support engine/transmission assembly with Support Beam (VW 10-222A) and Leg

STARTER

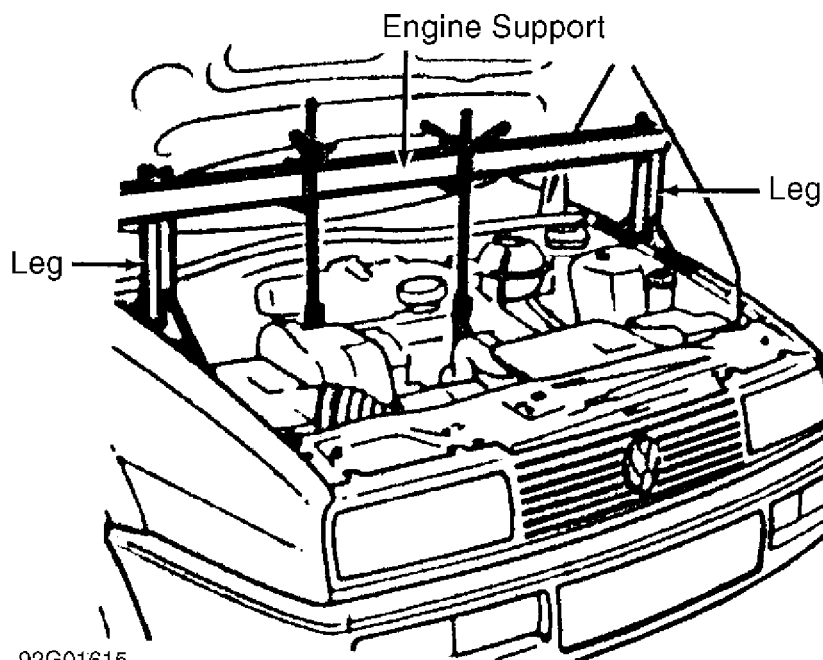
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Set (VW 10-222A/1). See Fig. 1.

2) Remove Black plastic cap and connector from solenoid. Disconnect connector from spade terminal on solenoid. Remove nuts and wiring from solenoid. Remove M8 nut from stud. On 2.0L engine, remove M12 x 60 bolt securing starter to front console.

3) On all models, remove M10 nuts securing starter. To install, reverse removal procedure. Tighten starter mounting bolt/nuts to specification. See TORQUE SPECIFICATIONS.



92G01615

Fig. 1: Removing Starter (Typical)

OVERHAUL

Manufacturer recommends replacing starter as an assembly. Exploded view/overhaul procedures not available from manufacturer.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application			Ft. Lbs. (N.m)
M8 Nut	.....	(1)	84 (10)
M10 Nuts	.....		44 (60)
M12 x 60 Bolt	.....		33 (45)

(1) - INCH lbs.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

WIRING DIAGRAMS

1996 Volkswagen Golf

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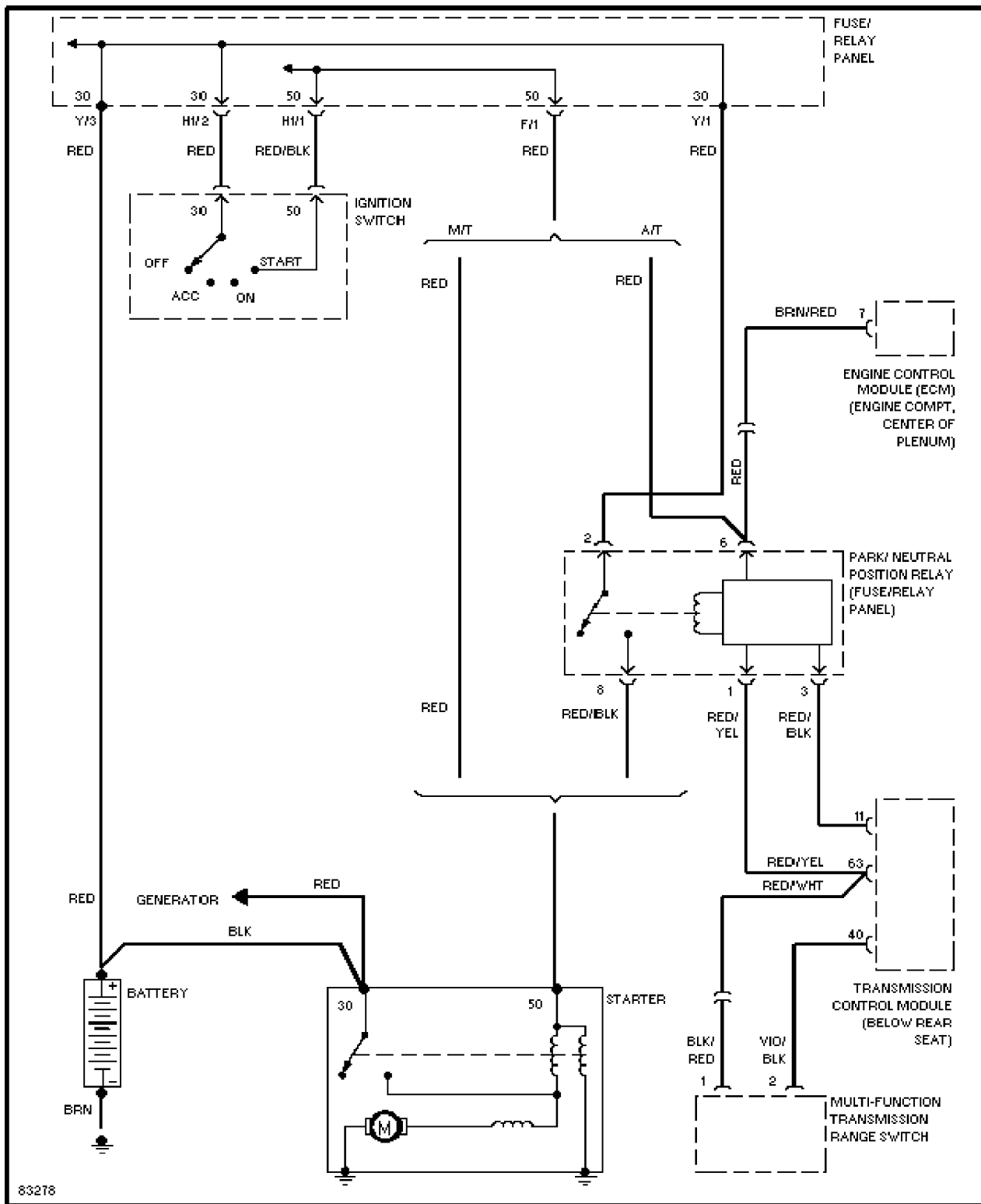


Fig. 2: Starting System Wiring Diagram (1995-96 Cabrio)

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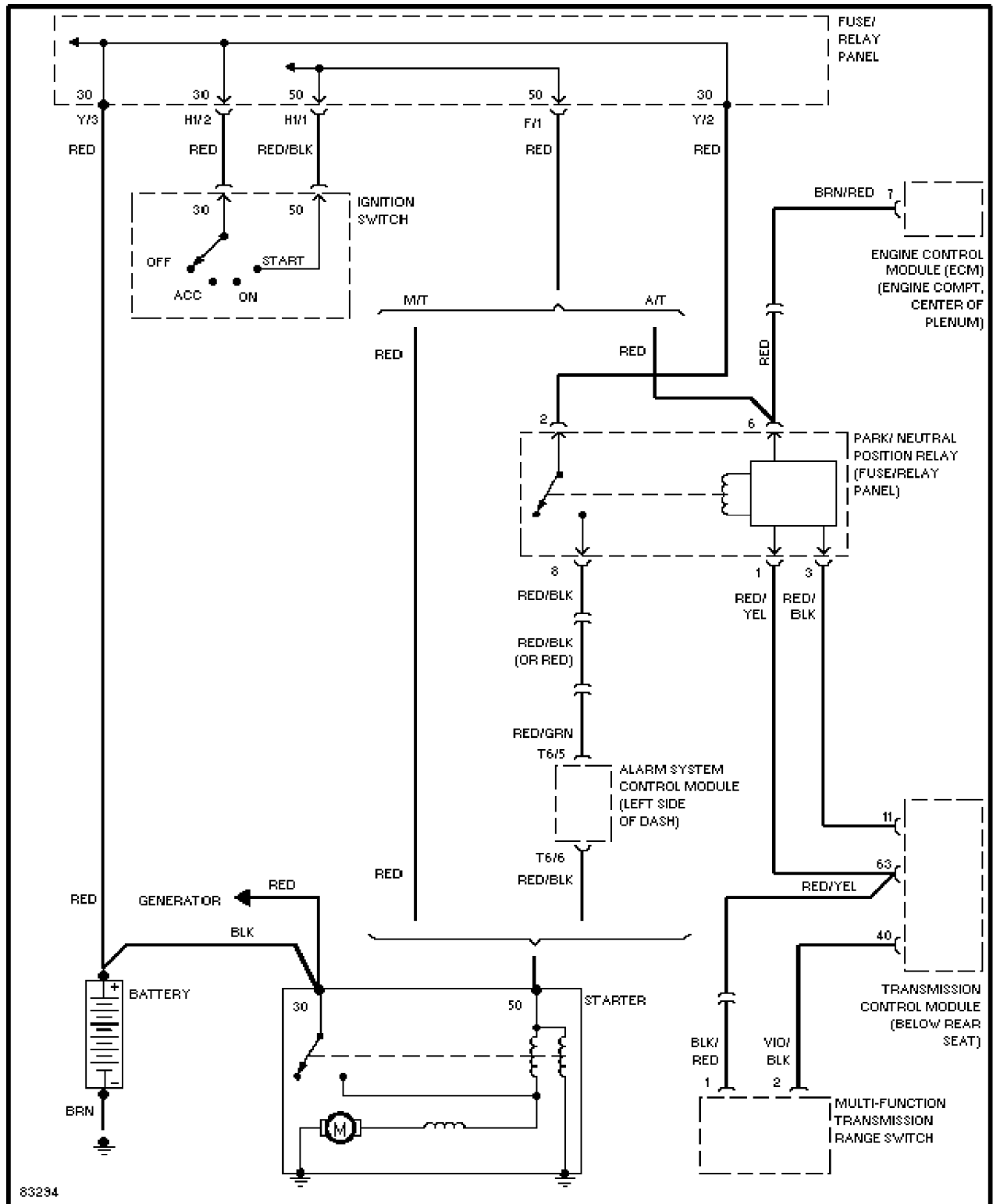


Fig. 3: Starting System Wiring Diagram (1995 Golf III, GTI & Jetta III - Early Production)

STARTER

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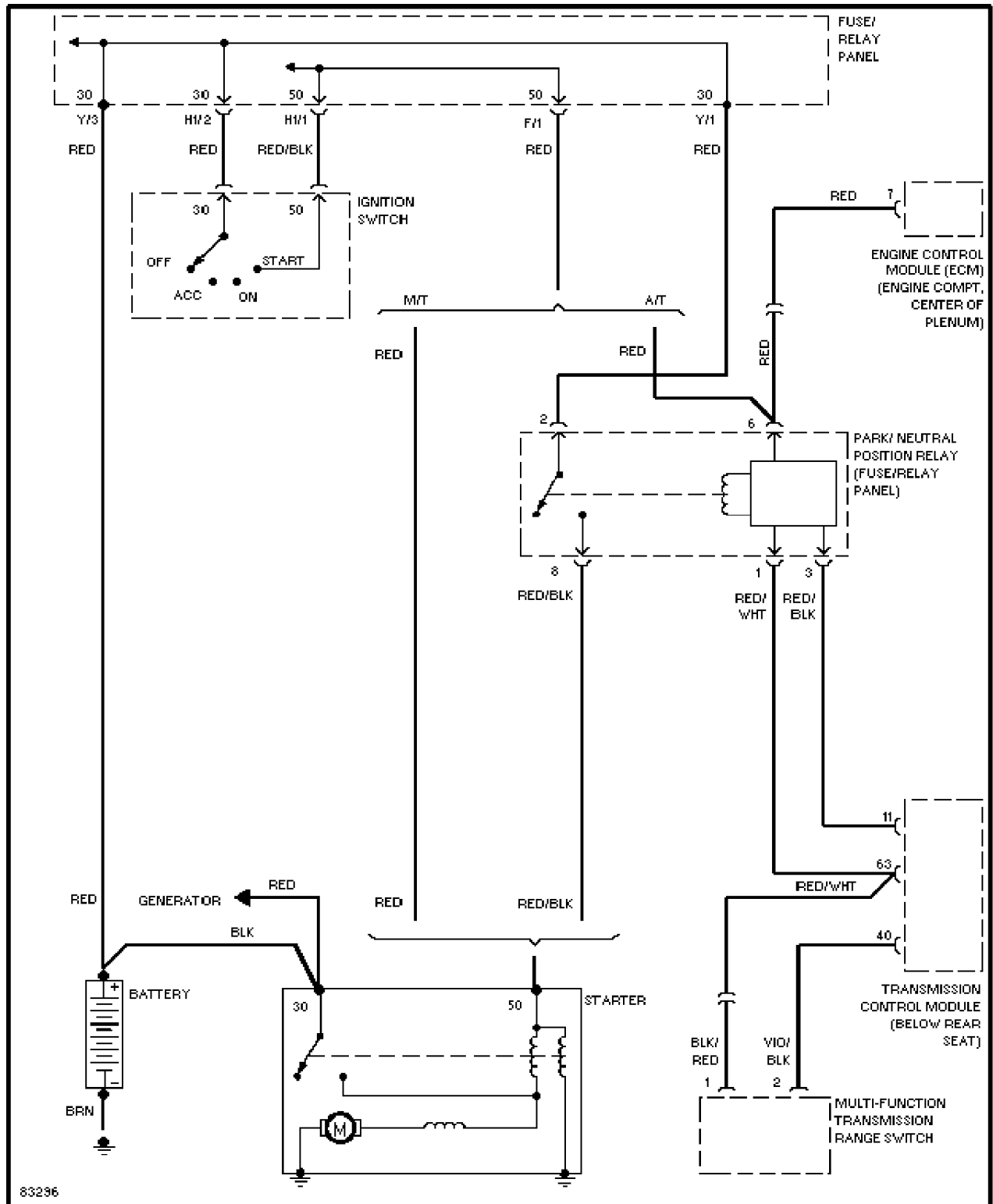


Fig. 4: Starting System Wiring Diagram (1995 Golf III, GTI & Jetta III - Late Production)

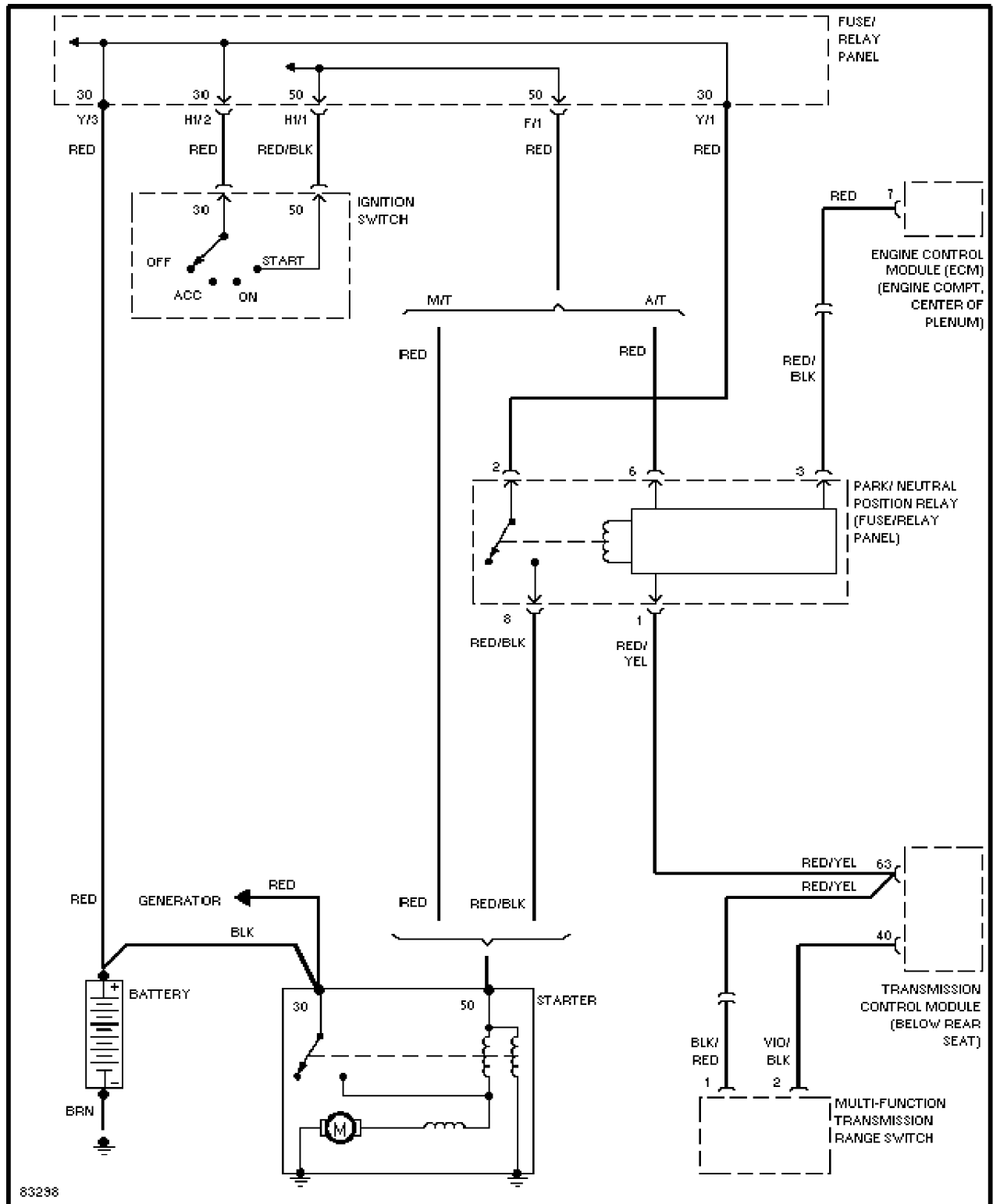


Fig. 5: Starting System Wiring Diagram (1996 Golf, GTI & Jetta III)

FUSES & CIRCUIT BREAKERS

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ARTICLE BEGINNING

Fuses & Circuit Breakers
1987-96 Volkswagen ELECTRICAL

FUSES & CIRCUIT BREAKERS

* PLEASE READ FIRST *

The fuse panel is located under the left side of the dash board by the driver's knee on the Cabriolet, Fox, Jetta, Rabbit and Pickup. On the Golf and GTI models the panel is located by the driver's right knee, under the dash panel.

NOTE: On all models, fuse specifications are listed on inside of panel cover.

WARNING: Always disconnect battery ground cable before servicing "high-current fuses. It is recommended that "high-current" fuses be replaced by a qualified technician.

ALL BUT JETTA (1990-92)

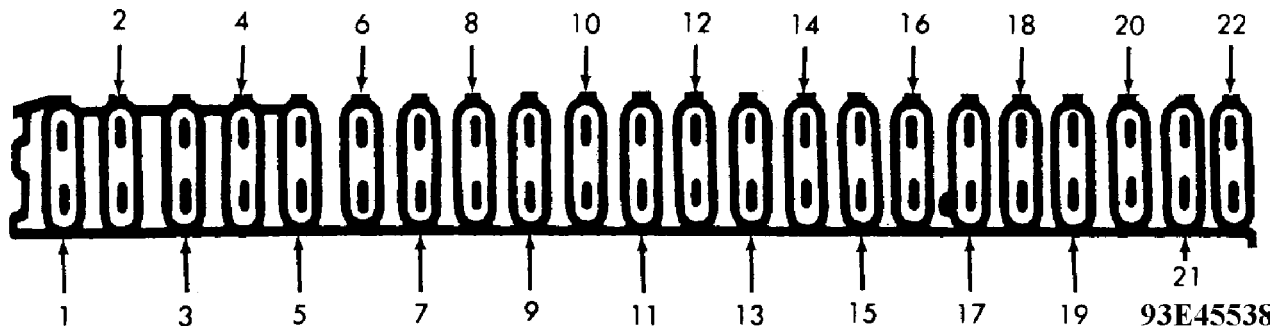


Fig. 1: Fuse Panel Identification (All But Jetta 1990-92)
Courtesy of Volkswagen United States, Inc.

Fuse & Circuit Breaker Identification

- 1 - 10 Amp
Left Headlight Low Beam
- 2 - 10 Amp
Right Headlight Low Beam
- 3 - 10 Amp
Instrument & License Lights
- 4 - 15 Amp
Rear Window Wiper, Glove Box Light
- 5 - 15 Amp
Windshield Wiper/Washer
- 6 - 30 Amp
A/C, Fresh Air Fan
- 7 - 10 Amp
Right Taillight & Side Marker Light

FUSES & CIRCUIT BREAKERS

Article Text (p. 2)

1996 Volkswagen Golf

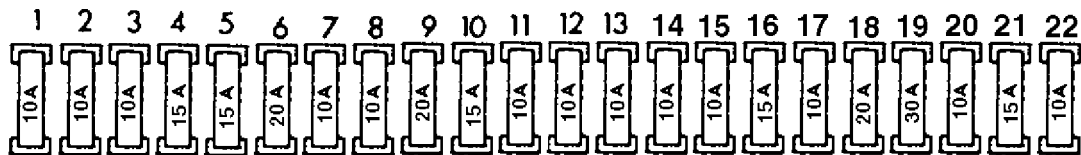
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- 8 - 10 Amp
Left Taillight & Side Marker Light
- 9 - 20 Amp
Rear Window Defogger, Mirror Heater
- 10 - 15 Amp
Fog Lights
- 11 - 10 Amp
Left Headlight High Beam & High Beam Indicator
- 12 - 10 Amp
Right Headlight High Beam
- 13 - 10 Amp
Horn, Radiator Cooling Fan
- 14 - 15 Amp
Backup Lights, Electric Mirrors, Heated Front Seats,
Windshield Washer Jets
- 15 - 10 Amp
Engine Electronics
- 16 - 15 Amp
Power Sunroof
- 17 - 10 Amp
Emergency Flasher
- 18 - 20 Amp
Fuel Pump, Oxygen Sensor
- 19 - 30 Amp
A/C, Radiator Cooling Fan
- 20 - 10 Amp
Brakelights, Cruise Control
- 21 - 15 Amp
Dome/Luggage/Vanity Mirror Lights, Clock, Radio, Central
Locking System, Multi-Function Indicator, Alarm System
- 22 - 10 Amp
Radio, Cigarette Lighter, Remote Luggage Compartment Release

JETTA - 1990-92



50E12447

Fig. 2: Fuse Panel Identification (Jetta 1990-92)
Courtesy of Volkswagen United States, Inc.

Fuse & Circuit Breaker Identification

- 1 - 10 Amp
Left Headlight Low Beam
- 2 - 10 Amp
Right Headlight Low Beam
- 3 - 10 Amp
Instrument & License Lights

FUSES & CIRCUIT BREAKERS

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- 4 - 15 Amp
Rear Window Wiper, Glove Box Light
- 5 - 15 Amp
Windshield Wiper/Washer
- 6 - 20 Amp
A/C, Fresh Air Fan (16-Valve)
- 7 - 10 Amp
Right Taillight & Side Marker Light
- 8 - 10 Amp
Left Taillight & Side Marker Light
- 9 - 20 Amp
Rear Window Defogger
- 10 - 15 Amp
Fog Lights (2.0 16-Valve Only)
- 11 - 10 Amp
Left Headlight High Beam & High Beam Indicator Light
- 12 - 10 Amp
Right Headlight High Beam
- 13 - 10 Amp
Horn, Radiator Cooling Fan (16-Valve)
- 14 - 10 Amp
Backup Lights, Washer Nozzle Heaters
- 15 - 10 Amp
2.0 16-Valve Only: Engine Electronics, Stabilizer Valve, Cold Start Valve
- 16 - 15 Amp
Instrument Panel Warning Lights, Multi Function Indicator (16-Valve)
- 17 - 10 Amp
Emergency Flasher, Turn Signals
- 18 - 20 Amp
Fuel Pump, Oxygen Sensor
- 19 - 30 Amp
A/C, Radiator Cooling Fan
- 20 - 10 Amp
Brakelights, Cruise Control
- 21 - 15 Amp
Interior Lights, Digital Clock, 16 Valve: Luggage Compartment Light, Central Locking System, Multi-Function Indicator
- 22 - 10 Amp
Radio, Cigarette Lighter

CAUTIONS & WARNINGS

ELECTRICAL SHOCK

WARNING: Contact with live components of ignition system while engine is running could lead to a fatal electric shock.

RADIATOR FAN

Keep hands away from radiator fan. Fan is controlled by a

FUSES & CIRCUIT BREAKERS

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thermostatic switch which may come on or run for up to 15 minutes even after engine is turned off.

RADIATOR CAP

CAUTION: Always disconnect the fan motor when working near the radiator fan. The fan is temperature controlled and could start at any time even when the ignition key is in the OFF position. DO NOT loosen or remove radiator cap when cooling system is hot.

REPLACING BLOWN FUSES

Before replacing a blown fuse, remove ignition key, turn off all lights and accessories to avoid damaging the electrical system. Be sure to use fuse with the correct indicated amperage rating. The use of an incorrect amperage rating fuse may result in a dangerous electrical system overload.

BATTERY WARNING

CAUTION: When battery is disconnected, vehicles equipped with computers may lose memory data. When battery power is restored, driveability problems may exist on some vehicles. These vehicles may require a relearn procedure. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION section.

BRAKE PAD WEAR INDICATOR

Indicator will cause a squealing or scraping noise, warning that brake pads need replacement.

HALOGEN BULBS

Halogen bulbs contain pressurized gas which may explode if overheated. DO NOT touch glass portion of bulb with bare hands. Eye protection should be worn when handling or working around halogen bulbs.

SUPPLEMENTAL RESTRAINT SYSTEM (AIR BAG)

NOTE: See the AIR BAGS article in the ACCESSORIES/SAFETY EQUIPMENT Section.

Modifications or improper maintenance, including incorrect removal and installation of the Supplemental Restraint System (SRS), can adversely affect system performance. DO NOT cover, obstruct or change the steering wheel horn pad in any way, as such action could cause improper function of the system. Use only plain water when cleaning the horn pad. Solvents or cleaners could adversely affect the air bag cover and cause improper deployment of the system.

FUSES & CIRCUIT BREAKERS

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WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all warnings and service precautions. See appropriate AIR BAGS article in ACCESSORIES/SAFETY EQUIPMENT.

CAUTION: Disconnect negative battery cable before servicing any air bag system, steering column or passenger side dash component. After any repair, turn ignition key to the ON position from passenger's side of vehicle in case of accidental air bag inflation

ANTI-LOCK BRAKE SYSTEM

The anti-lock brake system contains electronic equipment that can be susceptible to interference caused by improperly installed or high output radio transmitting equipment. Since this interference could cause the possible loss of the anti-lock braking capability, such equipment should be installed by qualified professionals.

CATALYTIC CONVERTER

To prevent catalytic converter overheating, DO NOT allow engine to idle for more than 20 minutes.

END OF ARTICLE

ALTERNATOR & REGULATOR

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ARTICLE BEGINNING

1995-96 STARTING & CHARGING SYSTEMS
Volkswagen Alternators & Regulators

Cabrio, Golf III, GTI, Jetta III

DESCRIPTION

Bosch alternators are conventional 3-phase, self-rectifying type alternators. Bosch regulators are transistorized and integral with alternator. Additional information not available from manufacturer.

TROUBLE SHOOTING

NOTE: See TROUBLE SHOOTING article in GENERAL INFORMATION.

ADJUSTMENTS

BELT TENSION

Serpentine belt tension is automatically adjusted by tensioner.

ON-VEHICLE TESTING

GENERATOR WARNING LIGHT DOES NOT LIGHT UP WITH IGNITION ON

1) Ensure ignition is off. Disconnect battery ground strap. Remove instrument cluster. See INSTRUMENT PANELS article. Disconnect instrument cluster 28-pin connector.

2) Using Adapter (VAG 1598/8), connect Text Box (VAG 1598) to instrument cluster and wiring harness. Disconnect Blue wire from generator D+ terminal. Using a jumper wire, connect socket No. 16 to socket No. 3 (ground) on test box.

3) Connect battery ground strap. Turn ignition on. If warning light comes on, turn ignition off. Remove jumper wire from test box sockets. Using ohmmeter, check continuity of Blue wire between instrument cluster and generator. If continuity exists, replace faulty generator. If continuity does not exist, repair open circuit in Blue wire.

4) If warning light does not come on, check for burned out warning bulb. If bulb is okay, check for open circuit in instrument cluster. If necessary, replace instrument cluster.

GENERATOR WARNING LIGHT DOES NOT GO OUT

1) Disconnect Blue wire from generator D+ terminal and leave it disconnected. Turn ignition on. If warning light does not come on,

ALTERNATOR & REGULATOR

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perform OUTPUT TEST.

2) If warning light stays on, turn ignition off. Disconnect multi-pin connector "F" from fuse/relay panel. Turn ignition on. If warning light does not come on, repair short to ground in Blue wire between generator and fuse/relay panel.

3) If warning light stays on with multi-pin connector disconnected, turn ignition off. Disconnect multi-pin connector "U2" from fuse/relay panel. Turn ignition on.

4) If warning light does not come on, repair short to ground in fuse/relay panel. If warning light stays on, repair short to ground in White wire from fuse/relay panel to instrument cluster. If wire is okay, check for faulty instrument cluster and cluster printed circuit board.

BENCH TESTING

BRUSHES

Remove voltage regulator from back of generator. Ensure brushes are longer than .20" (5 mm). If necessary, unsolder brushes from voltage regulator. Solder new brushes. DO NOT allow solder to run into strands of brush leads.

OVERHAUL

Other than replacing voltage regulator, manufacturer recommends replacing generator as an assembly. Exploded view/overhaul procedures not available from manufacturer.

WIRING DIAGRAMS

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ARTICLE BEGINNING

GENERAL INFORMATION

Electrical System Motorist Assurance Program
Standards For Automotive Repair

All Makes and Models

INTRODUCTION TO MOTORIST ASSURANCE PROGRAM (MAP)

The Motorist Assurance Program was formed in 1992 by forty (40) companies who were concerned about the image of automotive service establishments. Today, MAP is an industry-wide association dedicated to strengthening consumer satisfaction with the automotive repair industry. MAP's participants represent the majority of the nation's multi-bay retail automotive outlets, their parts and equipment suppliers, independent repair shops, industry associations, car companies, manufacturers representatives, and the trade press. MAP is developing standards of service, uniform inspection procedures and other programs to assure consumers of the industry's professionalism and the commitment to excellence shared by MAP's sponsoring companies.

MAP's achievements to date include production and distribution (over 280,000) of the consumer brochure "How to Find Your Way Under the Hood and Around Your Car", development of a Pledge of Satisfaction to Consumers and Standards of Service and establishment of relationships with regulatory agencies.

As auto repair becomes an issue for federal and state regulators, MAP is working to educate government leaders on the dynamics of automotive service and the self-monitoring efforts MAP has undertaken on the industry's behalf. MAP's sponsoring companies are becoming well-known to government representatives as exemplary businesses working to improve the industry. Media sources also look to MAP to provide information and advice to consumers and on working with automotive technicians and repair establishments.

In the next few months, MAP plans to assist member repair facilities in implementing the MAP Pledge to Customers, establishing an alternate dispute resolution system to help resolve customer complaints within the industry, and developing a shop accreditation program to encourage policies in concert with the MAP Standards of Service and Inspection Guidelines.

MAP has united the aftermarket behind its consumer-oriented goals and has established itself both within and outside of the industry. We welcome you to join us as MAP continues its outreach. With your support, both the automotive repair industry and your customers will reap the benefits. Please contact MAP at:

808 17th Street, NW
Suite 200
Washington, D.C. 20006

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202 466 7050

PLEDGE TO CUSTOMERS

1. That recommendations will be clearly explained and based on system failure, improved system performance or preventive maintenance according to accepted industry standards.

2. That personnel will be properly trained and qualified to identify and perform an accurate and complete inspection and service of vehicle systems.

3. That a written estimate will be provided and no work will be performed without a prior authorization.

4. That a written limited warranty will be included at no additional cost.

STANDARDS OF SERVICE

I. Our recommendations are based upon the following definitions.

A. System Failure - Parts/system indicated are out of manufacturers' specifications, have failed, or are unable to perform their normal function as intended or designed by the manufacturers. Service/replacement is needed now.

B. Preventive/Schedule Maintenance - Parts/system are scheduled for service/replacement per industry standards or are near the end of their useful life and repair/replacement is recommended in advance of parts/system failure. Service/replacement is optional.

C. Improved System Performance (Performance Improvement) - Parts/system indicated are recommended for repair/replacement to enhance/improve the vehicle's ability to perform as intended or designed by the manufacturer, or as requested by the customer. Service/replacement is optional.

II. Training/Criteria

A. Our personnel have acquired auto repair expertise through formal education or work experience.

B. Where appropriate, personnel are moving toward certification (e.g. vehicle manufacturers, ASE, etc.) for the services performed.

C. Continuing education will be supported by all MAP participants.

III. Appropriate Company Approved Inspection - We will perform an appropriate inspection based on MAP Uniform Inspection Guidelines.

IV. Written Estimates - Written estimates based on our inspection, in compliance with state and local regulations, will

*** ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES ***

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include parts (dollar amount), labor (dollar amount), and the total estimate.

V. Work Authorization - No work will be performed without the customer's prior approval.

VI. Limited Warranty - A minimum limited warranty will be offered of 90 days or 4,000 miles, whichever comes first, covering parts and labor.

VII. Returned Parts - All customers will be entitled to the return of old parts, or if they choose, they may examine the parts prior to leaving the store. Where failed parts are required to be returned to the manufacturer in order to honor the warranty, the customer will be allowed to examine the parts.

VIII. Classification of Parts - Replaced parts will be identified as new, remanufactured, rebuilt or used. MAP participants will inform the customer and indicate on the estimate and invoice whether a part is new, remanufactured, rebuilt or used.

MAP UNIFORM INSPECTION GENERAL GUIDELINES

OVERVIEW OF SERVICE REQUIREMENTS & SUGGESTIONS

It is MAP policy that all exhaust, brake, ABS, steering and suspension, wheel alignment, tires and wheels, driveline, engine performance and maintenance and heating, ventilation and air conditioning services be offered and performed under the guidelines and procedures specified in these sections.

Before any service is performed on a vehicle, an inspection of the appropriate system must be performed. The results of this inspection must be explained to the customer and documented on an inspection form. The condition of the vehicle and its components will indicate what services/part replacements may be required or suggested. In addition, suggestions may be made to satisfy the needs expressed by the customer.

This section lists the various parts and conditions that indicate required or suggested service or part replacement. Although this list is extensive, it is not inclusive. In addition to this list, a technician may make a suggestion. This suggestion must be based on substantial and informed experience or the vehicle manufacturer's recommended service interval.

Some conditions indicate that service or part replacement is required because the part in question is no longer providing the function for which it is intended, does not meet a vehicle manufacturer's design specification or is missing.

- * Example: An exhaust pipe has corroded severely and has a hole in it through which exhaust gases are leaking. Replacement of the exhaust pipe in this case is required due to functional failure.

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- * Example: A brake rotor has been worn to the point where it measures less than the vehicle manufacturer's specifications. Replacement of the rotor is required because it does not meet design specifications.

Some conditions indicate that a service or part replacement is suggested because the part is close to the end of its useful life or to address a customer's need, convenience or request. If a customer's vehicle has one of these conditions, the procedure may only be to suggest service.

- * Example: An exhaust pipe is rusted, corroded or weak, but no leaks are present. In this case, the exhaust pipe has not failed. However, there is evidence that the pipe may need replacement in the near future. Replacement of the pipe may be suggested for the customer's convenience in avoiding a future problem.
- * Example: The customer desires improved ride and/or handling, but the vehicle's shocks or struts have not failed. In this case, replacement may be suggested to satisfy the customer's wishes. In this case, replacement of the shocks or struts may not be sold as a requirement.

A customer, of course, has the choice of whether or not a Shop will service his or her vehicle. He or she may decide not to follow some of your suggestions. The following reasons may be used for required and suggested services:

Reasons to Require Repair or Replacement:

- * component no longer performs intended purpose
- * component does not meet a design specification (regardless of performance)
- * component is missing.

Reasons to Suggest Repair or Replacement

- * component is close to the end of its useful life (just above discard specifications or weak; failure likely to occur soon, etc.)
- * address a customer need, convenience or request (stiffen ride, enhance performance, eliminate noise, etc.)
- * comply with maintenance recommended by the vehicle's Original Equipment Manufacturer (OEM)
- * technician's recommendation based on substantial and informed experience.

ELECTRICAL SYSTEMS

NOTE: When working on electrical systems, if a potentially

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hazardous condition is observed, require repair or replacement of affected components.

BATTERY PREFACE COVER PAGE

Proper operation of any electrical system component can be affected by battery condition. The battery(ies) must meet or exceed minimum specification for vehicle as equipped and test to that specific battery's CCA. Before condemning any component, test vehicle following OEM test and diagnostic procedures.

A battery should meet or exceed the intended vehicle's OEM (Original Equipment Manufacturer) specifications with regard to Cold Cranking Amps for that specific vehicle. A battery should be tested using the test procedures outlined by Battery Council International (BCI) - an association of battery industry companies whose members establish policy and standards for the industry and/or the manufacturer of the battery,

DEFINITION OF TERMS

Cold Cranking Amp (CCA) Rating - The number of amperes a new, fully charged battery at 00°F (-17.80°C) can deliver for 30 seconds and maintain at least a voltage of 1.2 volts per cell (7.2 volts for a 12 volt battery).

Cranking Amps (CA) - The number of amps a new, fully charged battery, typically at 32°F (00°C), can deliver for 30 seconds and maintain at least a voltage of 1.2 volts per cell (7.2 volts for a 12 volt battery).

Hot Cranking Amps - A rating (non-recognized by BCI) used by some battery manufacturers for testing purposes based on 80°F (26.70°C).

OEM Cranking Amps - A number indicating the amount of amps (current) at 00 recommended by the vehicle manufacturer intended to meet the starting requirements for a specific vehicle.

Fails to Accept and Hold a Charge - This term refers a battery that fails to either accept and/or retain a charge using appropriate times listed in the Battery Charging Guide section of the BCI Technical Service Manual or battery manufacturer's specifications.

BATTERY LOAD TESTING

- * Battery Load Testing requirements should be tested at vehicle OEM specifications or battery CCA specifications for pass/fail criteria using the highest rating.
- * Battery Load Testing and OEM specifications are based on testing at the CCA level only. When a battery is rated at any other given temperature (32°F or 80°C), the battery rating

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should be converted to a corresponding CCA for testing purposes.

BATTERY

NOTE: Must meet or exceed OE specs for intended vehicle and component manufacturer's specifications for specific battery.

BATTERY

Condition	3	Procedure	3	Note
Fails to accept and hold charge	3	Require replacement.	3	
Discharged battery/ open circuit voltage low/ low specific gravity	3	Further inspection required.	3	Recharge and retest to manufacturer's specifications if battery fails load test or fails to accept or hold a charge - replacement required.
Corroded posts/ terminals	3	Require repair.	3	
Burned, melted posts/terminals	3	Require repair or replacement.	3	
Loose posts/ terminals	3	Require replacement.	3	
Loose or missing vent caps	3	Require repair or replacement of vent caps.	3	
Case leaking	3	Require replacement.	3	
Low fluid level	3	Further inspection required.	3	Determine cause of low fluid level, refill to proper level with water (distilled water preferred). If level was below top of plates, recharge and retest to manufacturer's specifications to verify condition. If battery does not meet specifications, require replacement. If battery is sealed type (non-removable filler

[illegible]

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Condition	3	Procedure
AAAAA		
Inoperative/intermittent	3	Require repair or replacement.
AAAAA		
Missing, damaged mounting hardware	3	Require repair or replacement of
	3	mounting hardware.
AAAAA		
Corroded, loose terminals	3	Suggest repair or replacement.
AAAAA		
Noisy	3	Suggest repair or replacement.
AAAAA		
Cracked/broken housing	3	Suggest repair or replacement.
AAAAA		
Defective diodes	3	Require repair or replacement.
AAAAA		

BELTS

BELTS			
AA			

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PULLEYS

PULLEYS

Condition	3	Procedure
Improper alignment	3	Require repair or replacement.
Missing, damaged mounting hardware	3	Require repair or replacement of mounting hardware.
Damaged	3	Require replacement.

TENSIONERS

TENSIONERS

Condition	3	Procedure	3	Note
Missing	3	Require replacement.	3	
Noisy	3	Suggest replacement.	3	
Damaged	3	Suggest replacement.	3	
Improper tension	3	Further inspection required.	3	Follow manufacturer's recommended adjustment procedures. Suggest replacement if unable to meet OE specifications.

VOLTAGE REGULATOR

VOLTAGE REGULATOR

Condition	3	Procedure
Inoperative/Intermittent	3	Require replacement.
Output outside of OEM specifications	3	Require repair or replacement.
Corroded, loose terminal ends	3	Suggest repair or replacement.
Noisy	3	Suggest repair or replacement.
Missing, damaged mounting hardware	3	Require repair or replacement of mounting hardware.
Damaged	3	Suggest replacement.

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WIRING HARNESS/CONNECTORS

VOLTAGE REGULATOR

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	3	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Routed incorrectly	3	Suggest repair.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Shorted/open	3	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Connector terminal problem (e.g., bent, corroded, loose)	3	Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Excessive resistance	3	Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Poor ground	3	Require repair.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Damaged	3	Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

FUSE BOX/BLOCK

FUSE BOX/BLOCK

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	3	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Burned/melted	3	Further inspection
	3	required.
	3	
	3	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Connector, terminal problem (e.g., bent, corroded, loose)	3	Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Missing, damaged mounting hardware	3	Require replacement of mounting hardware.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

SYSTEM INDICATOR LIGHTS

SYSTEM INDICATOR LIGHTS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	3	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Light does not come on during bulb check	3	Further inspection required.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Fail to function properly during test mode	3	
	3	
	3	
	3	

*** ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES ***

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AAAAAAAAAAAAAAAAAAAAAAAAA' 3
On constantly or 3 3
intermittently 3 3
below. 3 3
AAAAAAAAAAAAAAAAAAAAAAAAA

SYSTEM GAUGE

SYSTEM GAUGE
AAAAAAAAAAAAAAAAAAAAAAAAA
Condition 3 Procedure 3 Note
AAAAAAAAAAAAAAAAAAAAAAAAA
Inoperative/ 3 Further inspection 3 See service manual for
intermittent 3 required. 3 further information
AAAAAAAAAAAAAAAAAAAAAAAAA' 3
Indicating out of 3 3
OEM's specification 3 3
AAAAAAAAAAAAAAAAAAAAAAAAA
Missing, damaged 3 Require replacement 3
mounting hardware 3 of mounting hardware. 3
AAAAAAAAAAAAAAAAAAAAAAAAA

GROUND STRAP

GROUND STRAP
AAAAAAAAAAAAAAAAAAAAAAAAA
Condition 3 Procedure
AAAAAAAAAAAAAAAAAAAAAAAAA
High resistance/open 3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAA
Missing 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAA
Corroded 3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAA
Loose 3 Require repair.
AAAAAAAAAAAAAAAAAAAAAAAAA
Missing, damaged mounting hardware 3 Require replacement of mounting
3 hardware.
AAAAAAAAAAAAAAAAAAAAAAAAA
Damaged 3 Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAA

STARTER SYSTEMS

To prevent misdiagnosis, care should be taken to eliminate the possibilities of mechanical problems or high resistance in power and/or ground circuits.

STARTER SYSTEMS
AAAAAAAAAAAAAAAAAAAAAAAAA
Condition 3 Procedure 3 Note
AAAAAAAAAAAAAAAAAAAAAAAAA

*** ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES ***

Article Text (p. 12)

1996 Volkswagen Golf

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Inoperative/ intermittent	³ Require repair or ³ replacement.	³ ³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Excessive resistance/ open	³ Require repair or ³ replacement.	³ ³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Amperage does not meet OEM specifications	³ Require repair or ³ replacement.	³ ³ ³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Missing, damaged mounting hardware/ brackets	³ Require repair or ³ replacement of ³ mounting hardware.	³ ³ ³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Noisy	³ Further inspection ³ required. ³	³ Identify source of ³ noise, suggest repair ³ or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Damaged drive gear	³ Require repair or ³ replacement.	³ Inspect ring gear and ³ service as needed.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Corroded, loose terminals	³ Require repair or ³ replacement.	³ ³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Cracked/broken housing	³ Suggest repair or ³ replacement.	³ ³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

SOLENOID

SOLENOID			
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Condition	³	Procedure	³ Note
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Inoperative/ intermittent	³ Require repair or ³ replacement.	³ ³	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Excessive resistance/ open	³ Require repair or ³ replacement.	³ ³	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Noisy	³ Further inspection ³ required. ³	³ Identify source of ³ noise, suggest repair ³ or replacement.	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Missing, damaged mounting hardware/ brackets	³ Require repair or ³ replacement of ³ mounting hardware.	³ ³ ³	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Fails to disengage	³ Further inspection ³ required.	³ See service manual for ³ further information.	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Damaged	³ Suggest replacement.	³	

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Suggested Replacements:

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Article Text (p. 14)

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Malfunctioning (e.g.,³ Suggest repair or³
binding, worn, won't³ replacement³
return, etc.)³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing³ Require replacement³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing, damaged³ Require repair or³
mounting hardware³ replacement of³
³ mounting hardware.³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Corroded, loose³ Suggest repair or³
terminals³ replacement.³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Out of adjustment³ Further inspection³ Follow OEM recommended
³ required.³ adjustment procedures.
³ Repair or replace if out
³ of specification.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged³ Suggest replacement.³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

STARTER WIRING HARNESS/CONNECTORS

BATTERY CABLES/WIRES/CONNECTORS

NOTE: Cable/wires includes all wires and terminals connected to the battery.

STARTER WIRING HARNESS/CONNECTORS

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition³ Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Routed incorrectly³ Suggest repair.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Shorted/open³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Connector terminal problem (e.g.,³ Suggest repair or replacement.
bent, corroded, loose)³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Excessive resistance³ Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Poor ground³ Require repair.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing, damaged mounting hardware³ Require repair or replacement
or brackets³ mounting hardware or brackets.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged (e.g., melted, burned,³ Suggest repair or replacement.
cracked, etc.)³
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

LIGHTS (BULBS/SEALED BEAM/LED's)

LIGHTS (BULBS/SEALED BEAM/LED's)

*** ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES ***

Article Text (p. 15)

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Condition	3	Procedure	3	Note
Out of adjustment	3	Further inspection	3	Follow OEM recommended
	3	required.	3	adjustment procedures.
	3		3	Repair or replace if out
	3		3	of specification.
Inoperative	3	Require replacement.	3	
Intermittent	3	Require replacement.	3	
Corroded, loose	3	Suggest repair or	3	
terminals	3	replacement.	3	
Missing, damaged	3	Require repair or	3	
mounting hardware	3	replacement of	3	
	3	mounting hardware.	3	
Damaged	3	Suggest replacement.	3	

BULB SOCKETS

Condition	3	Procedure	3	Note
Missing, damaged	3	Require repair or	3	
mounting hardware	3	replacement of	3	
	3	mounting hardware.	3	
Burned/melted	3	Further inspection	3	Determine cause and
	3	required.	3	correct prior to repair
	3		3	or replacement of
	3		3	socket(s).
Corroded, loose	3	Suggest repair or	3	
terminals	3	replacement.	3	
Inoperative/ intermittent	3	Require repair or	3	
	3	replacement.	3	
Damaged	3	Suggest repair or	3	
	3	replacement.	3	

WIRING HARNESS/CONNECTORS

Condition	3	Procedure

*** ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES ***

Article Text (p. 16)

1996 Volkswagen Golf

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Routed incorrectly 3 Suggest repair.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Shorted/open 3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Connector terminal problem (e.g., bent, corroded, loose) 3 Suggest repair or replacement.
3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Excessive resistance 3 Require repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Poor ground 3 Require repair.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged 3 Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

FUSE/FUSIBLE LINK/CIRCUIT BREAKER

FUSE/FUSIBLE LINK/CIRCUIT BREAKER
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition 3 Procedure 3 Note
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Inoperative/intermittent 3 Require replacement. 3 Determine cause of
3 Further inspection 3 condition and correct
3 required. 3 prior to replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Corroded, loose terminals 3 Suggest repair or 3
3 replacement. 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing 3 Require replacement. 3 Refer to OEM owner's
3 3 manual for proper
3 3 amperage and location.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Damaged (e.g., melted, burned, cracked, etc.) 3 Suggest repair or 3
3 replacement. 3
3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

SWITCHES/DIMMERS/TIMERS/DELAYS

SWITCHES/DIMMERS/TIMERS/DELAYS
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Condition 3 Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Inoperative/intermittent 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing 3 Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Malfunctioning (e.g., binding, worn, won't return, etc.) 3 Suggest repair or replacement.
3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Missing, damaged mounting hardware/adjusters 3 Require repair or replacement
3 of mounting hardware/adjusters.

Condition	3	Procedure	3	Note
Inoperative/ intermittent	3	Require replacement.	3	
Malfunctioning (e.g. binding, worn, won't return, etc.)	3	Suggest repair or replacement.	3	
Missing	3	Require replacement.	3	
Out of adjustment	3	Further inspection required.	3	Follow OEM recommended adjustment procedures. Repair or replace if out of specification.
Leaking (vacuum)	3	Suggest repair or replacement.	3	
Noisy	3		3	
Missing, damaged mounting hardware	3	Require repair or replacement of mounting hardware.	3	

*** ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES ***

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Corroded, loose terminals	3	Suggest replacement.	3
AAAAAA	3		3
Damaged	3		3
AAAAAA			

VEHICLE ACCESSORIES

Vehicle accessories refers to OEM installed equipment, including but not limited to power windows, locks, seats, roof/top, antennas, heated seats, mirrors, windshield/window defrosters, trunk pull down/release, keyless entry, tire pressure monitors, electric mirrors, etc.

POWER LOCKS, WINDOWS, SEATS, MIRRORS, ROOF/TOPS, ANTENNAS, SLIDING DOORS

SWITCHES

Condition	3	Procedure
Inoperable	3	Require replacement.
Intermittent	3	Suggest replacement.
Malfunctioning (e.g., binding, worn, won't return, etc.)	3	Suggest repair or replacement.
Missing	3	Require replacement.
Missing, damaged mounting hardware	3	Require repair or replacement of mounting hardware.
Corroded, loose terminals	3	Suggest repair or replacement.
Damaged (e.g., melted, burned, cracked, etc.)	3	Suggest replacement.

ACTUATORS/MOTORS/SOLENOIDS/TRANSDUCERS

ACTUATORS/MOTORS/SOLENOIDS/TRANSDUCERS

Condition	3	Procedure	3	Note
Inoperative/intermittent	3	Require replacement.	3	
Malfunctioning (e.g., binding, worn, won't return, etc.)	3	Suggest repair or replacement.	3	

*** ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES ***

Article Text (p. 19)

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Missing	3	Require replacement.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Out of adjustment	3	Further inspection	3
	3	required.	3
	3		3
	3		3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Leaking (vacuum/ fluid/air)	3	Suggest repair or	3
	3	replacement.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Noisy	3		3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Corroded, loose terminals	3		3
	3		3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Missing, damaged	3	Require repair or	3
mounting hardware	3	replacement of	3
	3	mounting hardware.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Damaged	3	Suggest repair or	3
	3	replacement.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			

WIRING HARNESS/CONNECTORS

WIRING HARNESS/CONNECTORS			
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Condition	3	Procedure	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Routed incorrectly	3	Suggest repair.	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Shorted/open	3	Require repair or replacement.	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Connector terminal problem (e.g., bent, corroded, loose)	3	Suggest repair or replacement.	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Excessive resistance	3		
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Poor ground	3	Suggest repair.	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Damaged	3	Suggest repair or replacement.	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			

FUSE BOX/BLOCK

FUSE BOX/BLOCK			
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Condition	3	Procedure	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Burned/melted	3	Require replacement.	3
	3	Further inspection	3
	3	required.	3

*** ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES ***

Article Text (p. 20)

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	3		3	box.
Connector, terminal	3	Suggest repair or	3	
problem (e.g., bent,	3	replacement.	3	
corroded, loose)	3		3	
Loose terminals/	3		3	
connectors	3		3	
Missing, damaged	3	Require replacement	3	
mounting hardware	3	of mounting hardware.	3	

FUSE/FUSIBLE LINK/CIRCUIT BREAKER

FUSE/FUSIBLE LINK/CIRCUIT BREAKER				
Condition	3	Procedure	3	Note
Inoperative,	3	Require replacement.	3	Determine cause of
intermittent	3	Further inspection	3	condition and correct
	3	required.	3	prior to replacement.
Corroded, loose	3	Suggest repair or	3	
terminals	3	replacement.	3	
Missing	3	Require replacement.	3	Refer to OEM owner's
	3		3	manual for proper
	3		3	amperage and location.
Damaged (e.g.,	3	Suggest repair or	3	
melted, burned,	3	replacement.	3	
cracked, etc.)	3		3	

RELAYS

RELAYS				
Condition	3	Procedure		
Inoperative, intermittent	3	Require replacement.		
Missing	3	Require replacement.		
Missing, damaged mounting hardware	3	Require repair or replacement		
		of mounting hardware.		
Corroded, loose terminals	3	Suggest repair or replacement.		
Damaged	3	Suggest replacement.		

*** ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES ***

Article Text (p. 21)

1996 Volkswagen Golf

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CONTROL MODULE

CONTROL MODULE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Condition	3	Procedure	3 Note
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Inoperative/ intermittent	3 3	Require replacement.	3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Malfunctioning (i.e., consistent with expected operations)	3 3 3	Suggest replacement.	3 3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Code set (if applicable)	3 3 3 3	Further inspection required.	3 3 3 3
			Refer to manufacturer's diagnostic trouble code procedure and repair or replacement of affected component(s).
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Damaged	3	Suggest replacement.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Corroded, loose terminals	3 3		3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Missing, damaged mounting hardware	3 3	Require replacement of mounting hardware.	3 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			

ELECTROCHROMATIC MIRROR

ELECTROCHROMATIC MIRROR

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Condition	3	Procedure	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Inoperative, intermittent	3	Require replacement.	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Corroded, loose terminals	3	Suggest repair or replacement.	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Malfunctioning	3	Suggest replacement.	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Missing, damaged mounting hardware	3 3	Require repair or replacement of mounting hardware.	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Missing	3	Require replacement.	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Damaged	3	Suggest replacement.	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			

HEATING ELEMENTS (DEFROSTER/DEFOGGER - ELECTRIC HEATERS,
MIRRORS, SEATS. ETC.)

*** ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES ***

Article Text (p. 22)

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HEATING ELEMENTS (DEFROSTER/DEFOGGER - ELECTRIC HEATERS, ETC.)

Condition	³	Procedure
Inoperative, intermittent	³	Require repair or replacement.
Corroded, loose terminals	³	Suggest repair or replacement.
Damaged	³	Suggest repair or replacement.

CLOCK

CLOCK

Condition	³	Procedure
Inoperative, intermittent	³	Require repair or replacement.
Missing, damaged mounting hardware	³	Require repair or replacement of mounting hardware.
Corroded, loose terminals	³	Suggest repair or replacement.
Damaged (e.g., melted, burned, cracked, etc.)	³	Suggest repair or replacement.

CIGARETTE LIGHTER/SOCKET/ELEMENT

CIGARETTE LIGHTER/SOCKET/ELEMENT

Condition	³	Procedure
Inoperative, intermittent	³	Require repair or replacement.
Corroded, loose terminals	³	Suggest repair or replacement.
Missing	³	Suggest replacement.
Missing, damaged mounting hardware	³	Require repair or replacement of mounting hardware.
Damaged	³	Suggest repair or replacement.

CRUISE CONTROL/LINKAGE/CABLES

CRUISE CONTROL/LINKAGE/CABLES

Condition	³	Procedure	³	Note

[illegible]

*** ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES ***

Article Text (p. 24)

1996 Volkswagen Golf

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Condition	3	Procedure	3	Note
Improper output signal	3	Further inspection required.	3	Follow OEM recommended service procedures.
Internal resistance does not meet specifications	3		3	Component failure may be caused by water intrusion into the wiring harness. Always check insulation for damage and wiring for excessive resistance. Require repair or replacement of affected component(s).
Cracked sensor housing	3	Require replacement.	3	
Lead routed incorrectly	3	Require re-routing according to vehicle manufacturer's specifications.	3	
Damaged wire lead	3	Require repair or replacement.	3	
Contamination of surface	3	Further inspection required.	3	Identify and correct source of contamination. Suggest repair (cleaning).
Missing sensor/tip	3	Require replacement.	3	
Loose	3	Require repair or replacement.	3	
Damaged	3	Suggest replacement.	3	
Missing, damaged mounting hardware or brackets	3	Require repair or replacement of mounting hardware or brackets.	3	

BRAKE/CLUTCH SWITCH

BRAKE/CLUTCH SWITCH				
Condition	3	Procedure	3	Note
Inoperative	3	Require replacement.	3	

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Article Text (p. 25)

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Intermittent	3	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Malfunctioning (e.g., binding, worn, won't return, etc.)	3 Suggest repair or replacement.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Out of adjustment	3 Further inspection required.	3 Follow OEM recommended adjustment procedure.
	3	3 Require repair or replacement if out of specification.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Leaking	3 Suggest replacement.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Missing	3 Require replacement.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Missing, damaged mounting hardware	3 Require repair or replacement of mounting hardware.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Corroded, loose terminals	3 Suggest repair or replacement.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Damaged	3 Suggest replacement.	3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

VACUUM DUMP RELEASE VALVE

VACUUM DUMP RELEASE VALVE			
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Condition	3	Procedure	3 Note
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Inoperative	3	3	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Intermittent	3	3	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Out of adjustment	3	3 Further inspection required.	3 Follow OEM recommended adjustment procedure.
	3	3	3 Require repair or replacement if out of specification.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Leaking	3	3	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Missing, damaged mounting hardware	3	3	
	3	3	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			
Damaged	3	3	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA			

CELLULAR PHONES/ANTENNA

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CELLULAR PHONES/ANTENNA

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	3	Procedure
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Inoperative/intermittent	3	Require replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Broken	3	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Missing	3	
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Corroded, loose terminals	3	Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Missing, damaged mounting hardware	3	Require repair or replacement
	3	of mounting hardware.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Damaged	3	Suggest repair or replacement.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

TRANSCEIVER/EXTERNAL SPEAKER/MICROPHONE

TRANSCEIVER/EXTERNAL SPEAKER/MICROPHONE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Condition	3	Procedure 3 Note
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Inoperative/intermittent	3	Require repair or replacement 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Malfunctioning	3	Suggest repair or replacement. 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Missing	3	Require replacement. 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Missing, damaged mounting hardware	3	Require replacement 3 of mounting hardware. 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Corroded, loose terminals	3	Suggest repair or replacement. 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Poor sound quality	3	Further inspection 3 Make sure poor sound is
	3	required. 3 not caused by ignition/
	3	charging system or other
	3	forms of electrical
	3	interference.
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		
Damaged	3	Suggest repair or replacement. 3
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA		

HORNS/SIRENS

HORNS/SIRENS

*** ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES ***

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Condition	3	Procedure
Inoperative	3	Require repair or replacement.
Intermittent	3	
Malfunctioning	3	Suggest repair or replacement.
Missing	3	Require replacement.
Missing, damaged mounting hardware	3	Require repair or replacement of mounting hardware.
Corroded, loose terminals	3	
Damaged	3	Suggest repair or replacement.

SECURITY/ALARM SYSTEM/SENSORS

Condition	3	Procedure
Inoperative	3	Require repair or replacement.
Intermittent	3	
Malfunctioning	3	Suggest repair or replacement.
Missing	3	Require replacement.
Missing, damaged mounting hardware	3	Require repair or replacement of mounting hardware.
Corroded, loose terminals	3	
Damaged	3	Suggest repair or replacement.

KEYLESS ENTRY/KEY PAD/TRANSMITTER

Condition	3	Procedure
Inoperative/intermittent	3	Require repair or replacement.
Malfunctioning	3	Suggest repair or replacement.
Missing	3	Require replacement.

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[illegible]

Damaged 3 Suggest repair or replacement.
 ~~~~~

3 3 forms of electrical

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3 3 interference.

Corroded, loose 3 Suggest repair or 3  
terminals 3 replacement. 3  
Damaged 3 Suggest replacement. 3

**TAPE/CD PLAYER**

**TAPE/CD PLAYER**

| Condition                          | Procedure                                 | Note                                                                                                      |
|------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Inoperative                        | Require repair or replacement             |                                                                                                           |
| Intermittent                       | Suggest repair or replacement.            |                                                                                                           |
| Malfunctioning                     |                                           |                                                                                                           |
| Missing                            | Require replacement.                      |                                                                                                           |
| Missing, damaged mounting hardware | Require replacement of mounting hardware. |                                                                                                           |
| Poor sound quality                 | Further inspection required.              | Make sure poor sound is not caused by ignition/charging system or other forms of electrical interference. |
| Corroded, loose terminals          | Suggest repair or replacement.            |                                                                                                           |
| Skips                              |                                           |                                                                                                           |
| Incorrect speed                    |                                           |                                                                                                           |
| Damaged                            | Suggest replacement.                      |                                                                                                           |

**WIPER SYSTEMS/MOTOR**

**WIPER SYSTEMS/MOTOR**

| Condition                | Procedure                      | Note |
|--------------------------|--------------------------------|------|
| Inoperative/intermittent | Require repair or replacement. |      |
| Malfunctioning (e.g.     | Suggest repair or              |      |

[illegible]

# **\* ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES \***

## **Article Text (p. 31)**

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| Condition                          | 3 | Procedure                                              |
|------------------------------------|---|--------------------------------------------------------|
| Leaks                              | 3 | Require repair or replacement.                         |
| Missing                            | 3 | Require replacement.                                   |
| Missing, damaged mounting hardware | 3 | Require repair or replacement<br>of mounting hardware. |
| Damaged                            | 3 | Suggest repair or replacement.                         |

### **HOSES/NOZZLES**

| Condition                          | 3 | Procedure                                              |
|------------------------------------|---|--------------------------------------------------------|
| Leaks                              | 3 | Require repair or replacement.                         |
| Missing                            | 3 | Require replacement.                                   |
| Missing, damaged mounting hardware | 3 | Require repair or replacement<br>of mounting hardware. |
| Incorrect spray pattern            | 3 | Suggest repair or replacement.                         |
| Blocked                            | 3 | Require repair or replacement.                         |
| Damaged                            | 3 | Suggest repair or replacement.                         |

### **PASSIVE RESTRAINT SYSTEMS**

FOR ALL SIR COMPONENTS AND CONDITIONS, CUSTOMER MUST BE REFERRED TO DIAGNOSIS AND PART REPLACEMENT.

### **FACILITY ACCREDITATION PROGRAM**

The mission of the Motorist Assurance Program (MAP) is ... To promote trust and the assurance of customer satisfaction in the vehicle repair industry through education and the creation of industry guidelines. In continuing to fulfill its mission, MAP will be establishing a facility accreditation procedure to provide customers with some assurance that standards of service are being followed throughout the industry, and that when those standards are not met, there is a method for the customer to achieve satisfaction.

A repair facility which commits to participate in the program will be permitted to display the MAP Facility Accreditation Program sign. Display of the sign will notify the consuming public that they can have confidence in the inspection performed at the facility, and

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that any dispute over repairs or service will be resolved fairly.

Facilities participating in the MAP Accreditation Program must adopt and diligently adhere to MAP's Pledge to Customers and MAP's Standards of Service.

If you are interested in obtaining more information about the Accreditation Program when it is issued, please complete the form below and then FAX it to MAP headquarters at (202) 223 9569.

Please send me information about MAP's accreditation program as soon as it is available.

NOTE: To print information request for Facilities Accreditation Program, print portion of article between dashed lines.

-----  
**MAP FACILITIES ACCREDITATION PROGRAM**

Please send me information about MAP's accreditation program as soon as possible.

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone \_\_\_\_\_ FAX \_\_\_\_\_

-----  
**END OF ARTICLE**

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## ARTICLE BEGINNING

## 1996 ELECTRICAL COMPONENT LOCATION

## Volkswagen Electrical Components - 2.0L 4-Cyl.

Cabrio, Golf III, Jetta III

## SAFETY PRECAUTION

**WARNING:** When working on vehicles equipped with Supplemental Restraint System (SRS), never apply electrical voltage to the system. This could cause the SRS (air bag) to be deployed.

## BUZZERS, RELAYS & TIMERS

Component Location

1. A/C Relay  
 2. Rear Window Wiper/Washer Relay  
 3. ECM Power Supply Relay  
 4. Load Reduction Relay  
 5. Not Used  
 6. Emergency Flasher Relay  
 7. Not Used  
 8. Wiper/Washer Intermittent Relay  
 9. Seat Belt Warning System Relay  
 10. Fog Lamp Relay  
 11. Dual-Horn Relay or Bridge For Horn  
 12. Fuel Pump Relay  
 13. Heated Oxygen Sensor Control Module  
 14. Park/Neutral Position Relay  
 15. ABS Hydraulic Pump Relay  
 16. ABS Relay

## ABS Relay

96D03793

On fuse/relay panel.

# ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

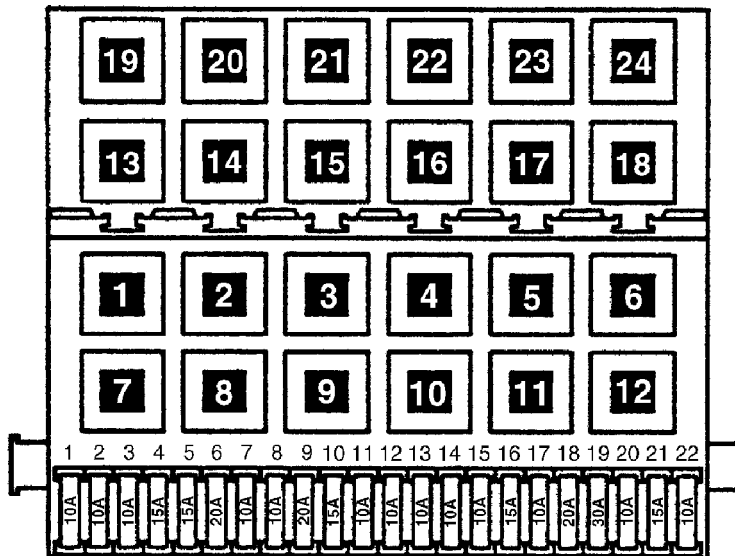
## Article Text (p. 2)

1996 Volkswagen Golf

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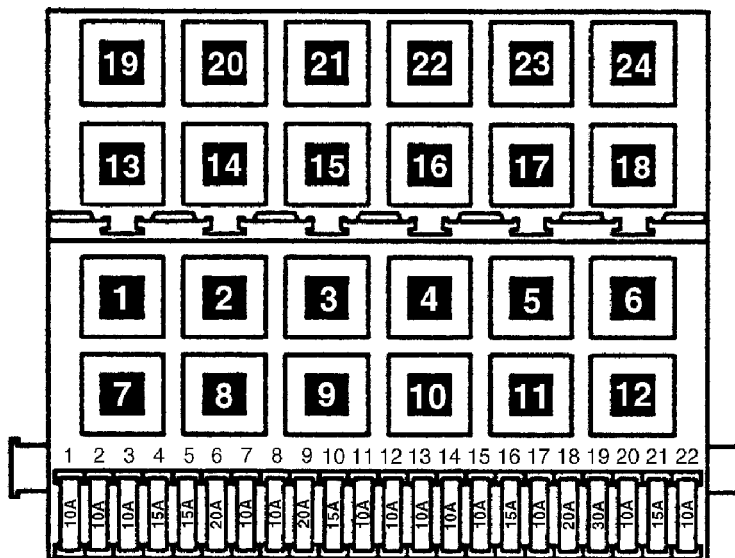


1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

Fuse/Relay Panel

96D03793  
ABS Hydraulic Pump Relay

On fuse/relay panel.



1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

Fuse/Relay Panel

A/C Relay

96D03793

On fuse/relay panel.

# ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

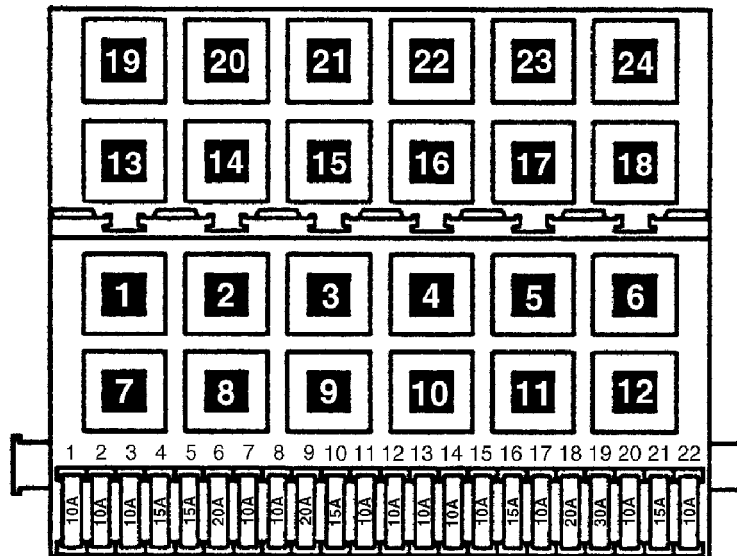
## Article Text (p. 3)

1996 Volkswagen Golf

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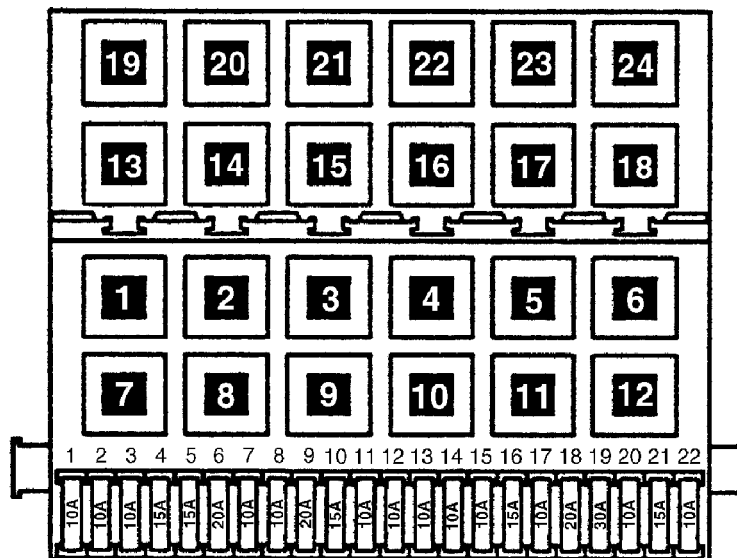


1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

Fuse/Relay Panel

96D03793  
Dual-Horn Relay

On fuse/relay panel.



1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

Fuse/Relay Panel

96D03793  
ECM Power Supply Relay

On fuse/relay panel.



# ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

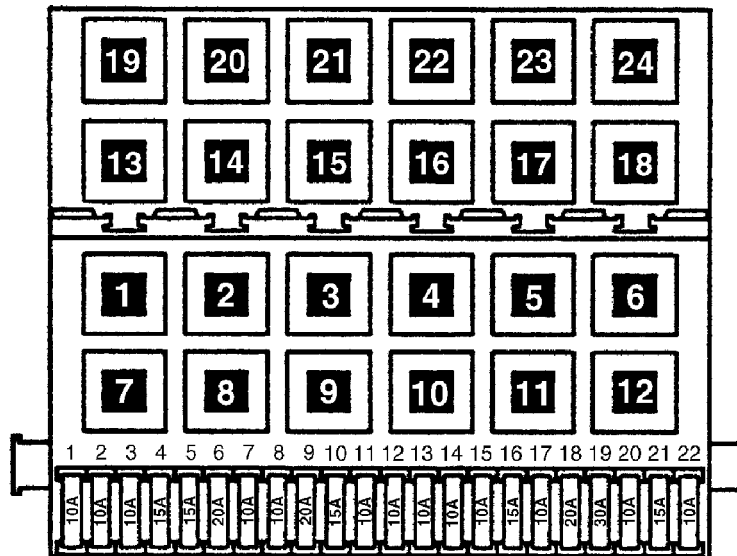
## Article Text (p. 4)

1996 Volkswagen Golf

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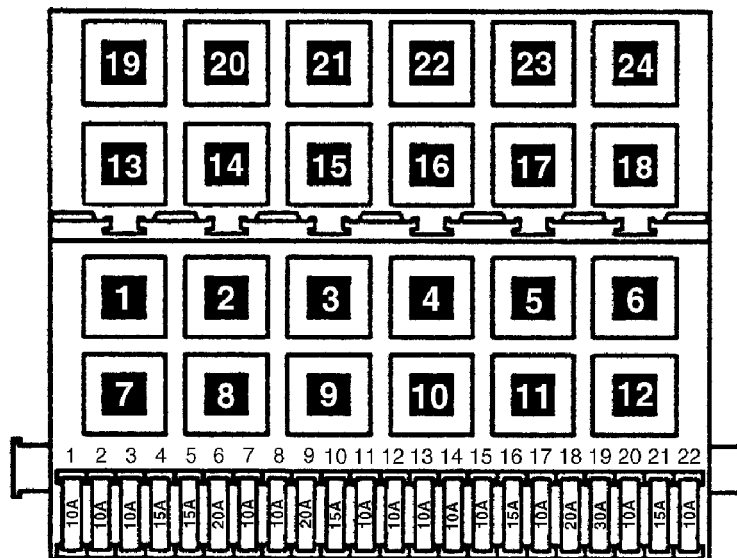


1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

Fuse/Relay Panel

96D03793  
Emergency Flasher Relay

On fuse/relay panel.



1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

Fuse/Relay Panel

96D03793  
Fog Lamp Relay

On fuse/relay panel.

# ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

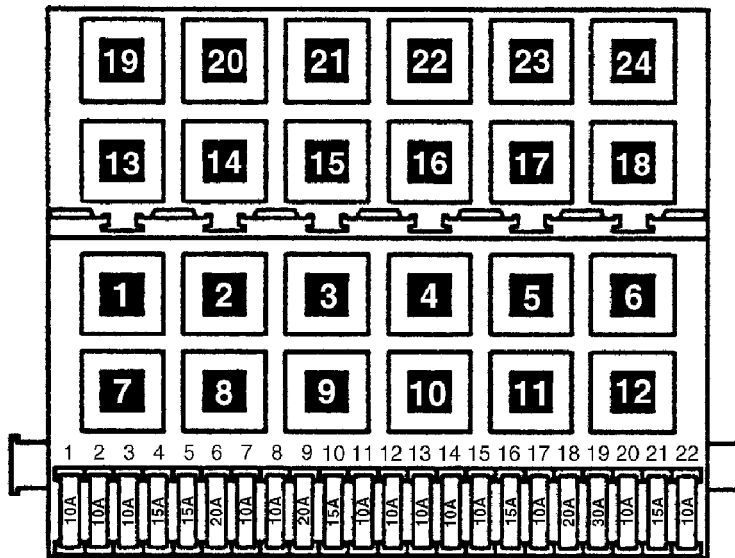
## Article Text (p. 5)

1996 Volkswagen Golf

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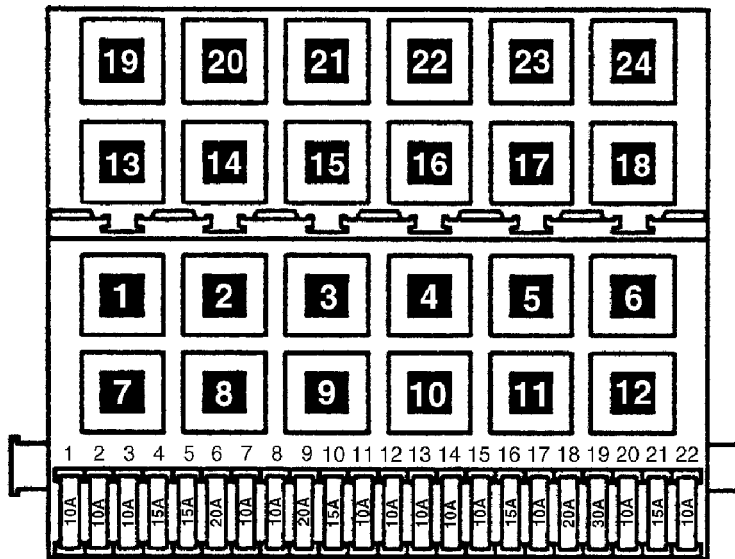


1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

Fuse/Relay Panel

96D03793  
Fuel Pump Relay

On fuse/relay panel.



1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

Fuse/Relay Panel

96D03793  
Load Reduction Relay

On fuse/relay panel.

# ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

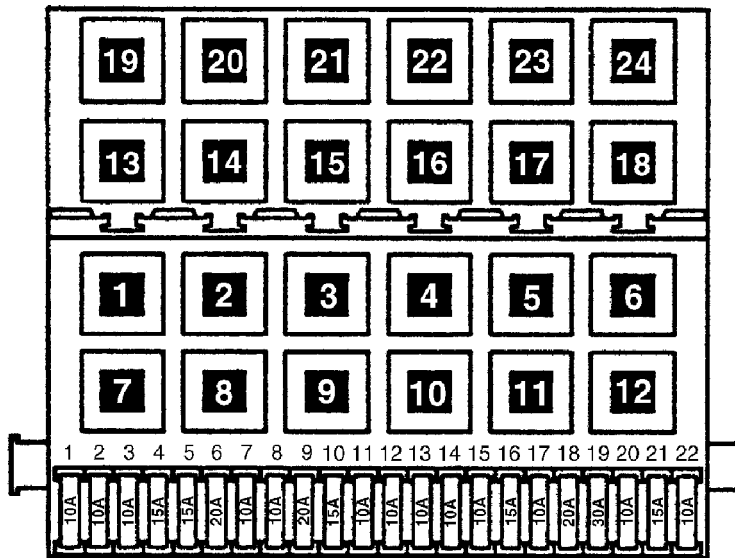
## Article Text (p. 6)

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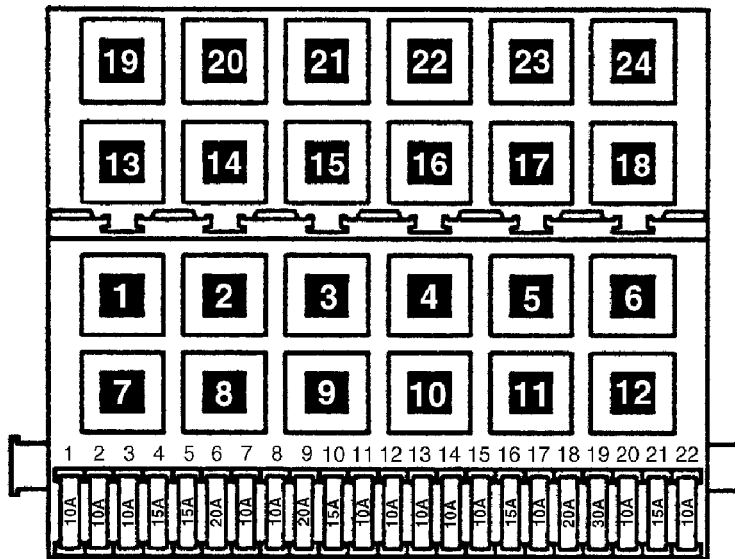


1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

Fuse/Relay Panel

96D03793  
Park/Neutral Position Relay

On fuse/relay panel.



1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

Fuse/Relay Panel

96D03793  
Rear Window Wiper/Washer  
Relay

On fuse/relay panel.

# ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

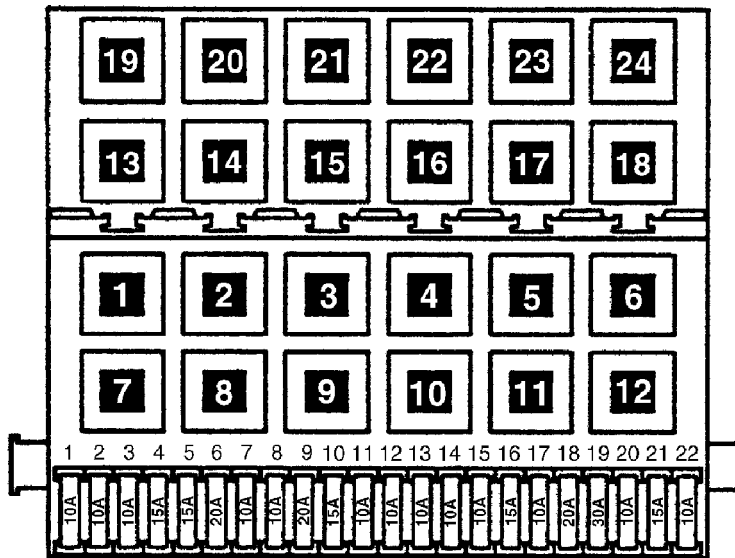
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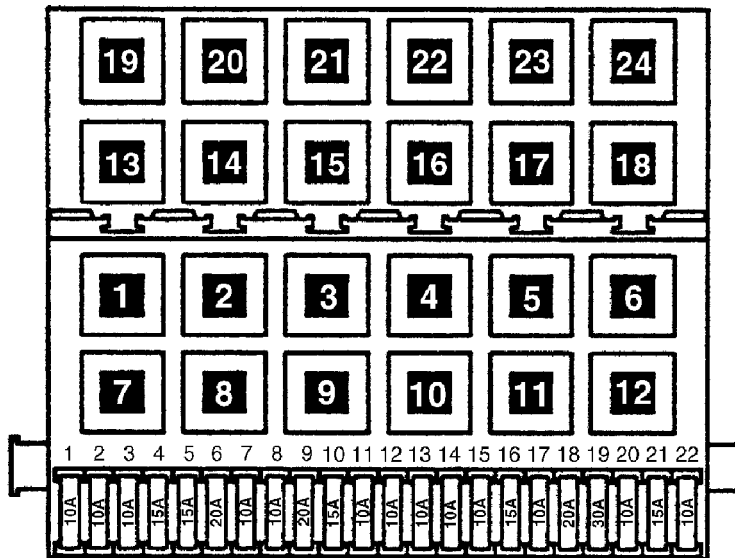


1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

Fuse/Relay Panel

96D03793  
Seat Belt Warning System  
Relay

On fuse/relay panel.



1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

Fuse/Relay Panel

96D03793  
Wiper/Washer Intermittent  
Relay

On fuse/relay panel.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

## CIRCUIT PROTECTION DEVICES

# ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

## Article Text (p. 8)

1996 Volkswagen Golf

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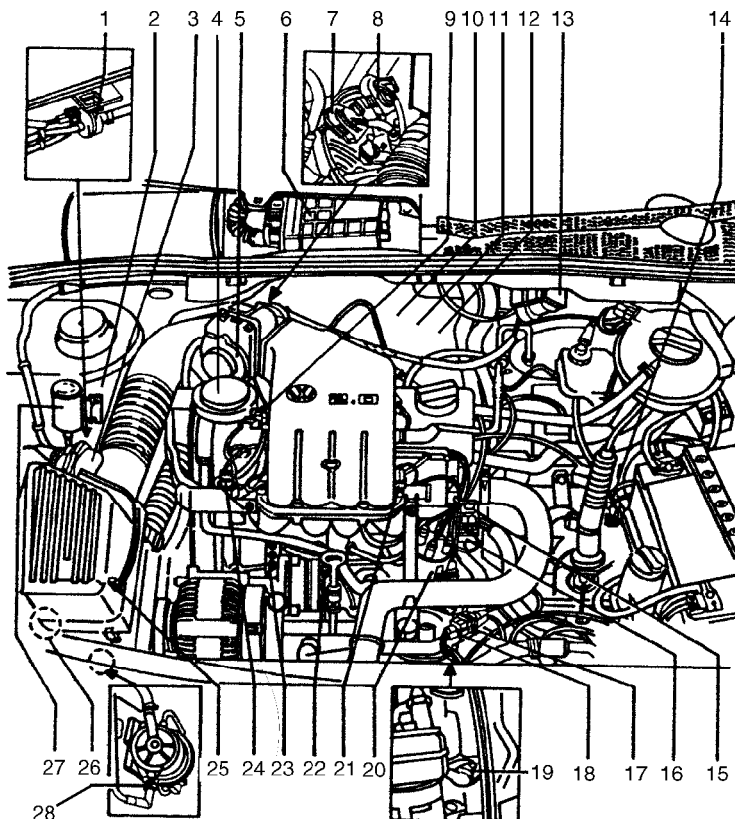
|                  |                          |
|------------------|--------------------------|
| Component        | Component Location       |
| Fuse/Relay Panel | Under left side of dash. |

### CONTROL UNITS

|                    |                                  |
|--------------------|----------------------------------|
| Component          | Component Location               |
| ABS Control Module | Left side of engine compartment. |

|                             |                                                      |
|-----------------------------|------------------------------------------------------|
| Alarm System Control Module | Behind left side of dash,<br>above fuse/relay panel. |
|-----------------------------|------------------------------------------------------|

|                          |                                  |
|--------------------------|----------------------------------|
| Coolant Fan Control Unit | Left side of engine compartment. |
|--------------------------|----------------------------------|



1. EVAP Canister Purge Regulator Valve
2. EGR Vacuum Regulator Valve (1995)
3. Mass Air Flow Sensor
4. Throttle Position Sensor (1995)
5. Throttle Valve Control Module (1996)
6. Engine Control Module
7. Heated Oxygen Sensor Connector (1996)
8. Heated Oxygen Sensor Connector (1996)
9. Intake Air Temperature Sensor
10. Idle Air Control Valve (1995)
11. EGR Temperature Sensor (1995)
12. EGR Valve (1995)
13. Ignition Coil
14. Vehicle Speed Sensor
15. Engine Coolant Temperature Sensor
16. Central Connector
17. Knock Sensor Connector (3-Pin)
18. Engine Speed Sensor Connector (3-Pin)
19. Engine Speed Sensor
20. Distributor (Camshaft Position Sensor)
21. Fuel Injectors
22. Knock Sensor 1
23. Ground
24. Fuel Pressure Regulator
25. Temperature Regulator Thermal Vacuum Valve
26. EVAP Canister
27. Leak Diagnosis Pump Filter (1996)
28. Leak Diagnosis Pump (1996)

96F03794  
Engine Control Module

In engine compartment, on  
center of plenum.

## ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

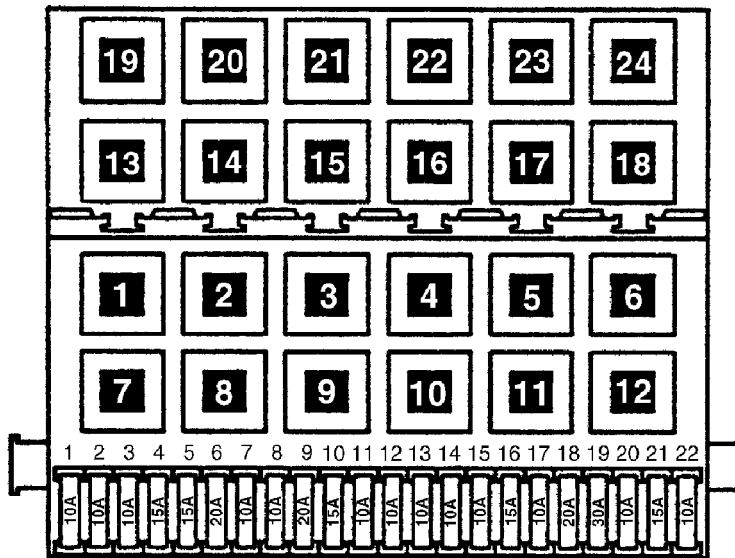
### Article Text (p. 9)

1996 Volkswagen Golf

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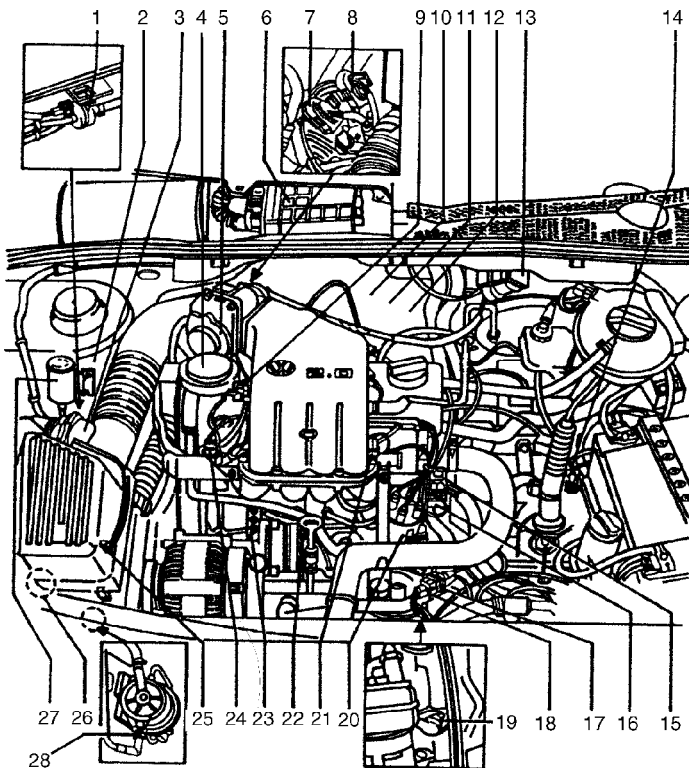


1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

Fuse/Relay Panel

96D03793  
Heated Oxygen Sensor Control  
Module

On fuse/relay panel.



1. EVAP Canister Purge Regulator Valve
2. EGR Vacuum Regulator Valve (1995)
3. Mass Air Flow Sensor
4. Throttle Position Sensor (1995)
5. Throttle Valve Control Module (1996)
6. Engine Control Module
7. Heated Oxygen Sensor Connector (1996)
8. Heated Oxygen Sensor Connector (1996)
9. Intake Air Temperature Sensor
10. Idle Air Control Valve (1995)
11. EGR Temperature Sensor (1995)
12. EGR Valve (1995)
13. Ignition Coil
14. Vehicle Speed Sensor
15. Engine Coolant Temperature Sensor
16. Central Connector
17. Knock Sensor Connector (3-Pin)
18. Engine Speed Sensor Connector (3-Pin)
19. Engine Speed Sensor
20. Distributor (Camshaft Position Sensor)
21. Fuel Injectors
22. Knock Sensor 1
23. Ground
24. Fuel Pressure Regulator
25. Temperature Regulator Thermal Vacuum Valve
26. EVAP Canister
27. Leak Diagnosis Pump Filter (1996)
28. Leak Diagnosis Pump (1996)

96F03794  
Throttle Valve Control Module

Right rear side of engine  
compartment.

[illegible]

# ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

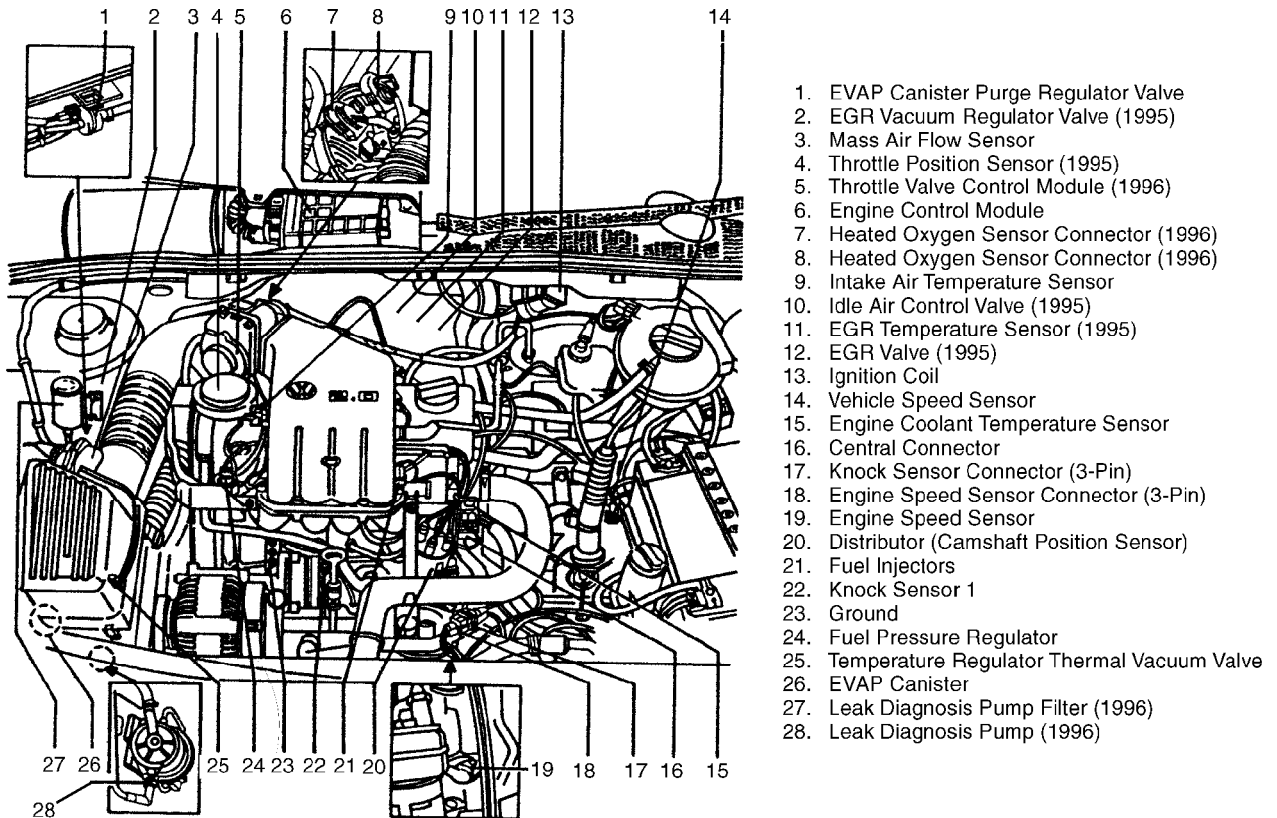
## Article Text (p. 11)

1996 Volkswagen Golf

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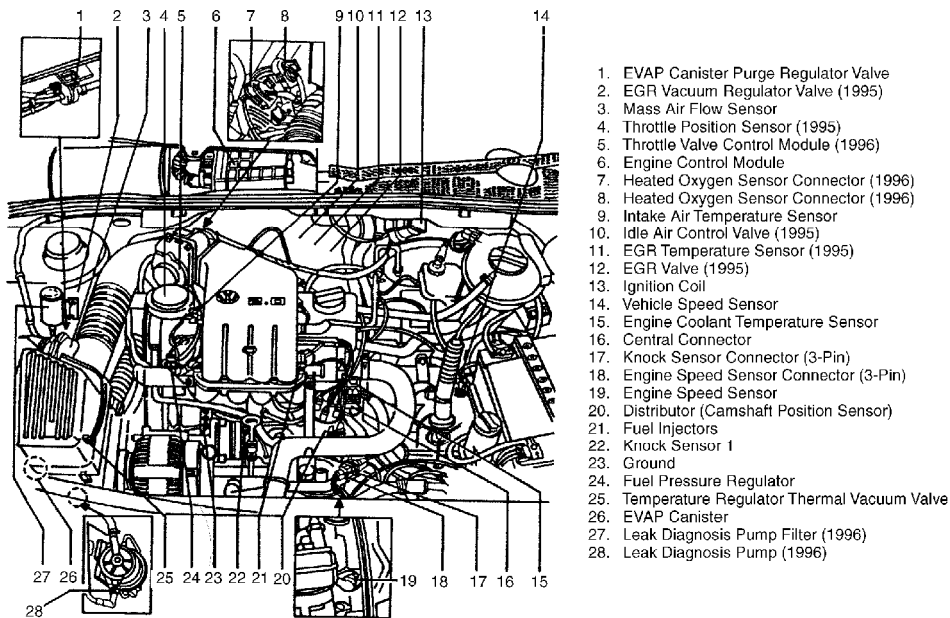
Thursday, August 19, 1999 11:19PM



96F03794

Camshaft Position Sensor

Front center of engine compartment, in distributor.



96F03794

Engine Coolant Temperature Sensor

Front center of engine compartment, near distributor.



# ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

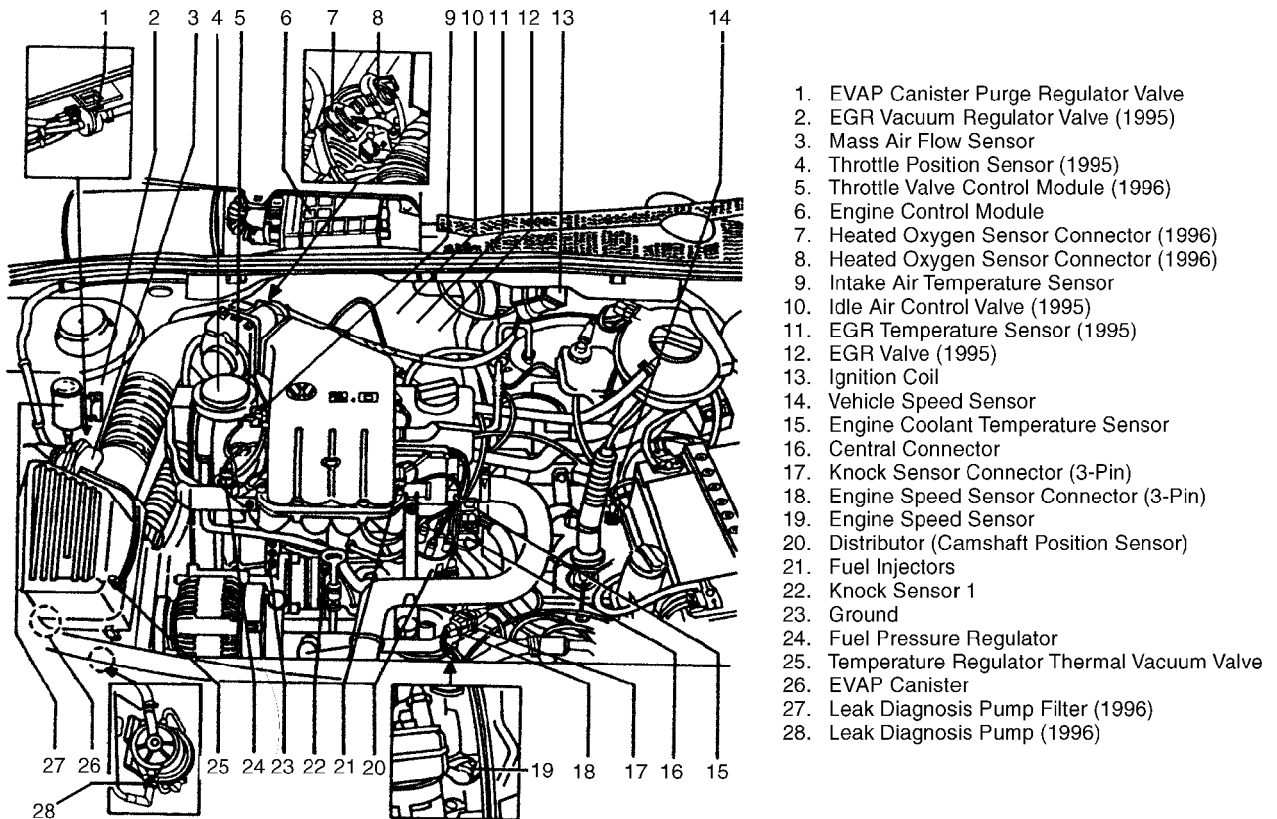
## Article Text (p. 12)

1996 Volkswagen Golf

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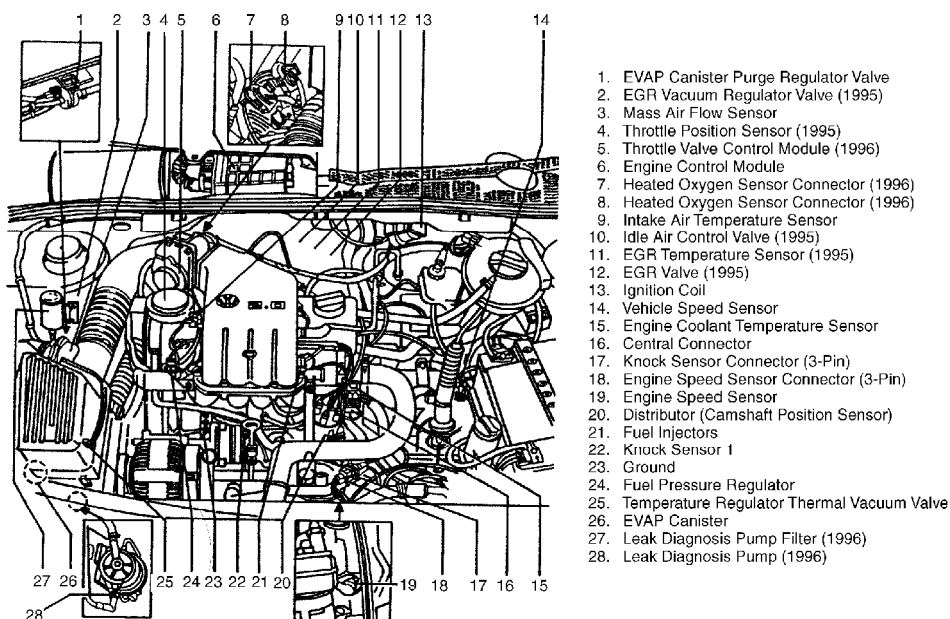
Thursday, August 19, 1999 11:19PM



96F03794

Engine Speed Sensor

Front center of engine compartment.



96F03794

Heated Oxygen Sensor Connector (2)

Right rear of engine

# ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

## Article Text (p. 13)

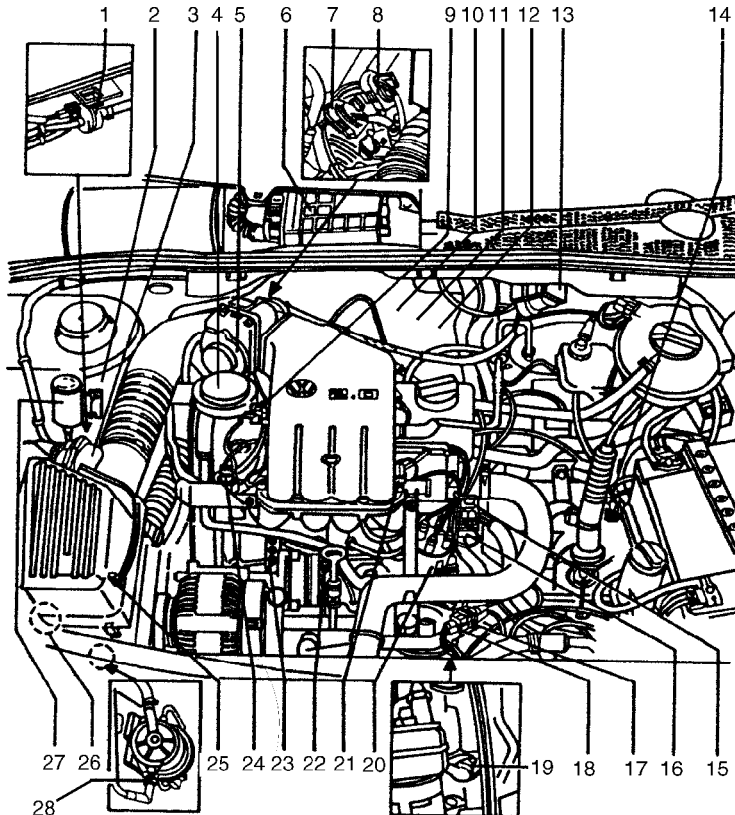
1996 Volkswagen Golf

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Thursday, August 19, 1999 11:19PM

compartment.



1. EVAP Canister Purge Regulator Valve
2. EGR Vacuum Regulator Valve (1995)
3. Mass Air Flow Sensor
4. Throttle Position Sensor (1995)
5. Throttle Valve Control Module (1996)
6. Engine Control Module
7. Heated Oxygen Sensor Connector (1996)
8. Heated Oxygen Sensor Connector (1996)
9. Intake Air Temperature Sensor
10. Idle Air Control Valve (1995)
11. EGR Temperature Sensor (1995)
12. EGR Valve (1995)
13. Ignition Coil
14. Vehicle Speed Sensor
15. Engine Coolant Temperature Sensor
16. Central Connector
17. Knock Sensor Connector (3-Pin)
18. Engine Speed Sensor Connector (3-Pin)
19. Engine Speed Sensor
20. Distributor (Camshaft Position Sensor)
21. Fuel Injectors
22. Knock Sensor 1
23. Ground
24. Fuel Pressure Regulator
25. Temperature Regulator Thermal Vacuum Valve
26. EVAP Canister
27. Leak Diagnosis Pump Filter (1996)
28. Leak Diagnosis Pump (1996)

96F03794  
Intake Air Temperature Sensor

Right center of engine  
compartment.

# ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

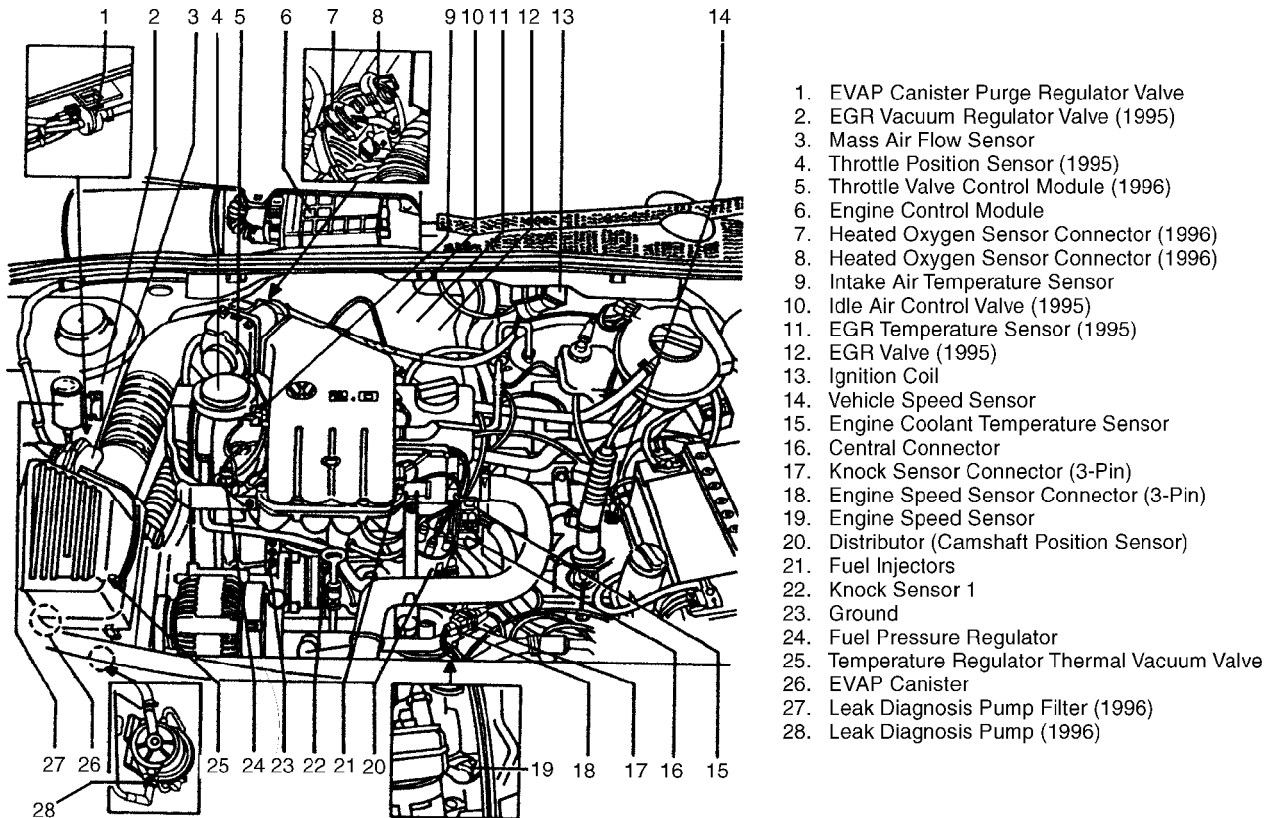
## Article Text (p. 14)

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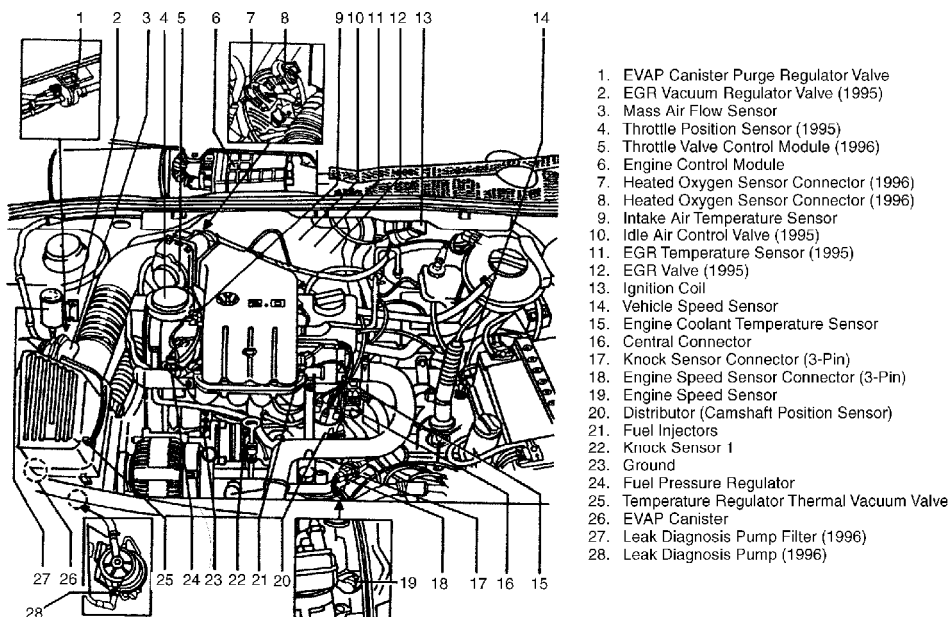
Thursday, August 19, 1999 11:19PM



96F03794

Knock Sensor 1

On left side of engine block,  
front center of engine  
compartment.



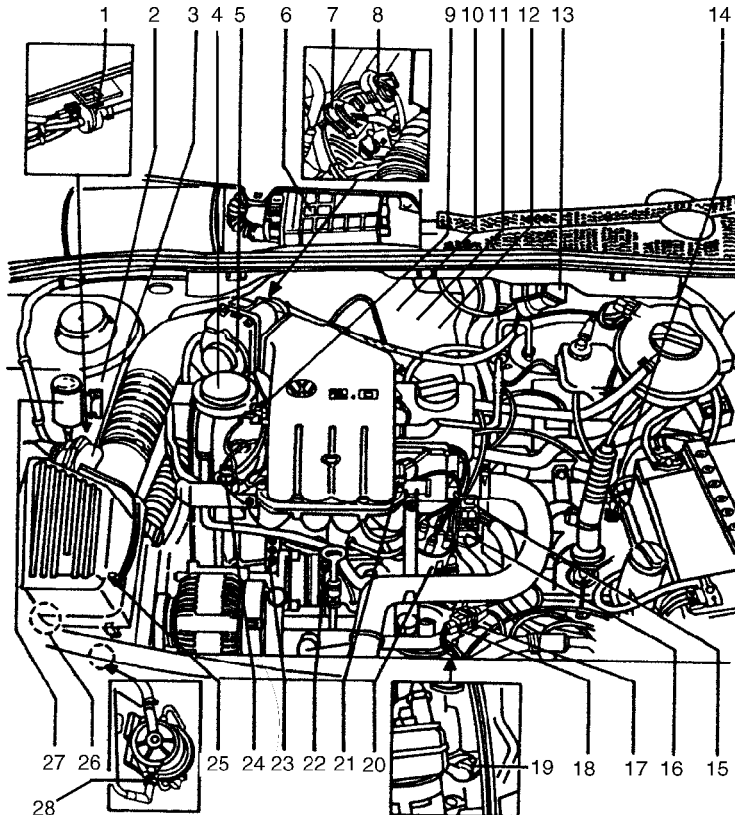
96F03794

Mass Air Flow Sensor

On right side of engine  
compartment, on intake air

Thursday, August 19, 1999 11:19PM

duct.



1. EVAP Canister Purge Regulator Valve
2. EGR Vacuum Regulator Valve (1995)
3. Mass Air Flow Sensor
4. Throttle Position Sensor (1995)
5. Throttle Valve Control Module (1996)
6. Engine Control Module
7. Heated Oxygen Sensor Connector (1996)
8. Heated Oxygen Sensor Connector (1996)
9. Intake Air Temperature Sensor
10. Idle Air Control Valve (1995)
11. EGR Temperature Sensor (1995)
12. EGR Valve (1995)
13. Ignition Coil
14. Vehicle Speed Sensor
15. Engine Coolant Temperature Sensor
16. Central Connector
17. Knock Sensor Connector (3-Pin)
18. Engine Speed Sensor Connector (3-Pin)
19. Engine Speed Sensor
20. Distributor (Camshaft Position Sensor)
21. Fuel Injectors
22. Knock Sensor 1
23. Ground
24. Fuel Pressure Regulator
25. Temperature Regulator Thermal Vacuum Valve
26. EVAP Canister
27. Leak Diagnosis Pump Filter (1996)
28. Leak Diagnosis Pump (1996)

96F03794

Vehicle Speed Sensor

Left side of engine  
compartment, below battery.

[illegible]

## SOLENOID & SOLENOID VALVES

[illegible]

| Component | Component Location |
|-----------|--------------------|
|-----------|--------------------|

[illegible]

## ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

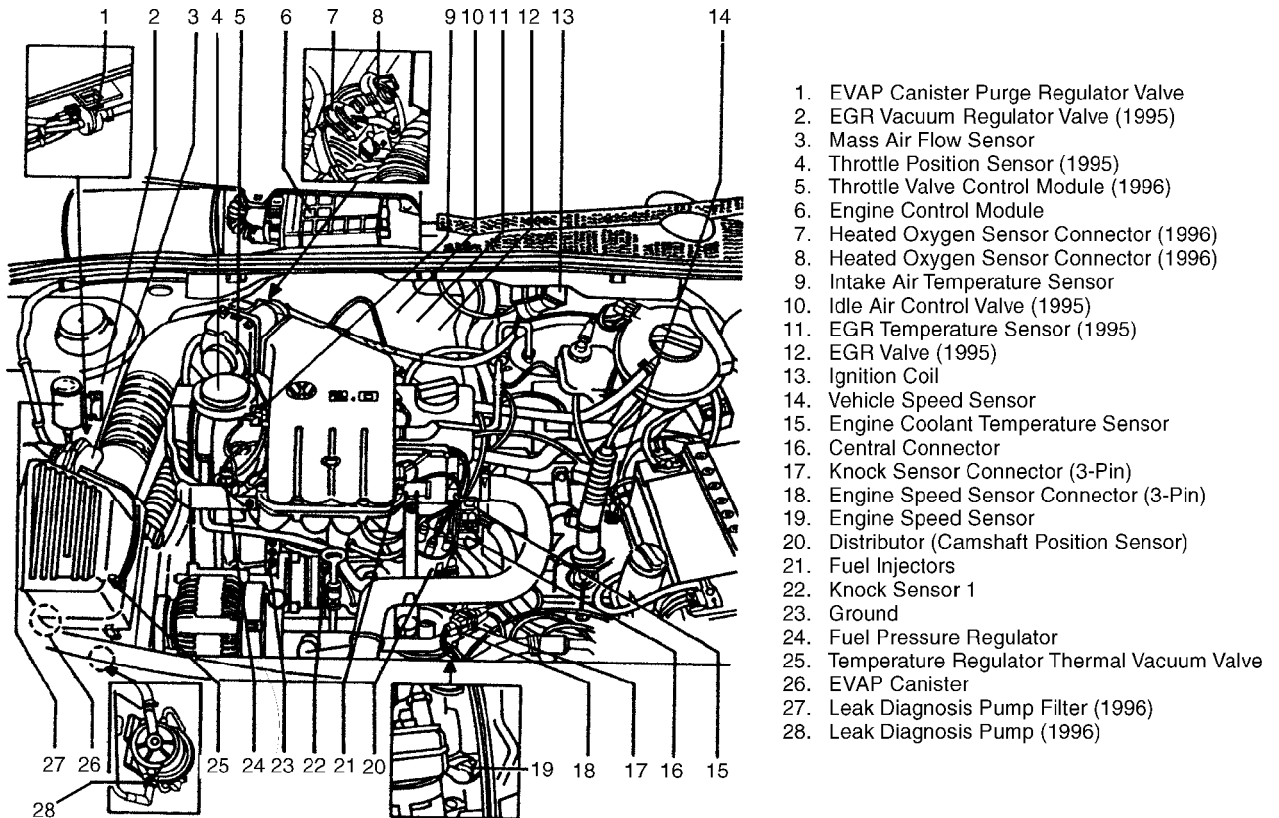
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96F03794

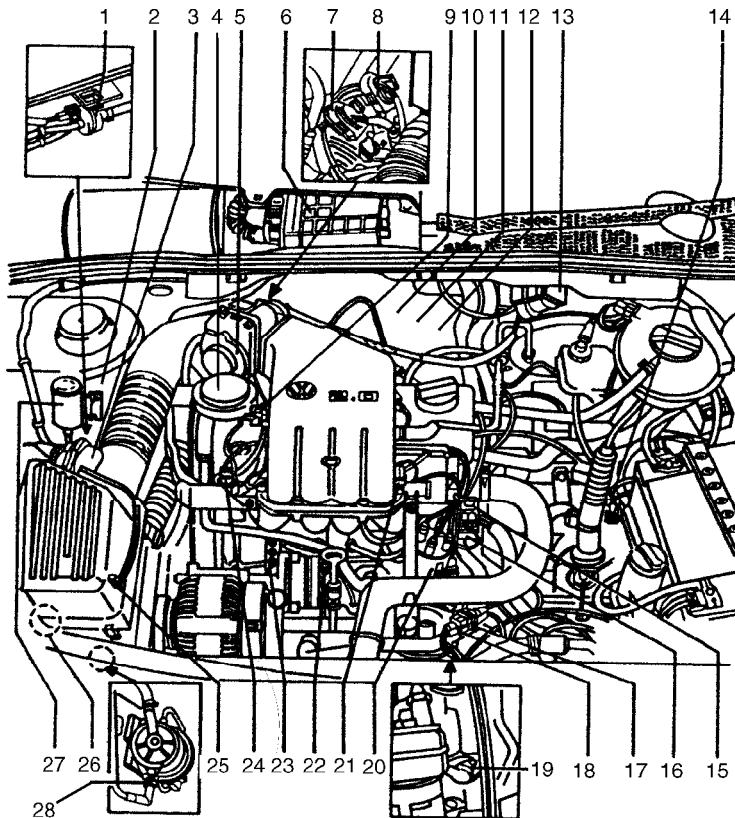
EVAP Canister Purge Regulator  
Valve

On right side of engine  
compartment.

Fresh Air & Recirculating Flap  
Two-Way Valve

Rear of engine compartment.

Thursday, August 19, 1999 11:19PM



1. EVAP Canister Purge Regulator Valve
2. EGR Vacuum Regulator Valve (1995)
3. Mass Air Flow Sensor
4. Throttle Position Sensor (1995)
5. Throttle Valve Control Module (1996)
6. Engine Control Module
7. Heated Oxygen Sensor Connector (1996)
8. Heated Oxygen Sensor Connector (1996)
9. Intake Air Temperature Sensor
10. Idle Air Control Valve (1995)
11. EGR Temperature Sensor (1995)
12. EGR Valve (1995)
13. Ignition Coil
14. Vehicle Speed Sensor
15. Engine Coolant Temperature Sensor
16. Central Connector
17. Knock Sensor Connector (3-Pin)
18. Engine Speed Sensor Connector (3-Pin)
19. Engine Speed Sensor
20. Distributor (Camshaft Position Sensor)
21. Fuel Injectors
22. Knock Sensor 1
23. Ground
24. Fuel Pressure Regulator
25. Temperature Regulator Thermal Vacuum Valve
26. EVAP Canister
27. Leak Diagnosis Pump Filter (1996)
28. Leak Diagnosis Pump (1996)

96F03794

Temperature Regulator  
Thermal Vacuum Valve

Right front corner of engine compartment.

[illegible]

## SWITCHES

[illegible]

| Component | Component Location |
|-----------|--------------------|
|-----------|--------------------|

[illegible]

|                     |                                      |
|---------------------|--------------------------------------|
| A/C Pressure Switch | On right side of engine compartment. |
|---------------------|--------------------------------------|

Ambient Temperature Switch                      Near horn.

[illegible]

## MISCELLANEOUS

[illegible]

| Component | Component Location |
|-----------|--------------------|
|-----------|--------------------|

[illegible]

## ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

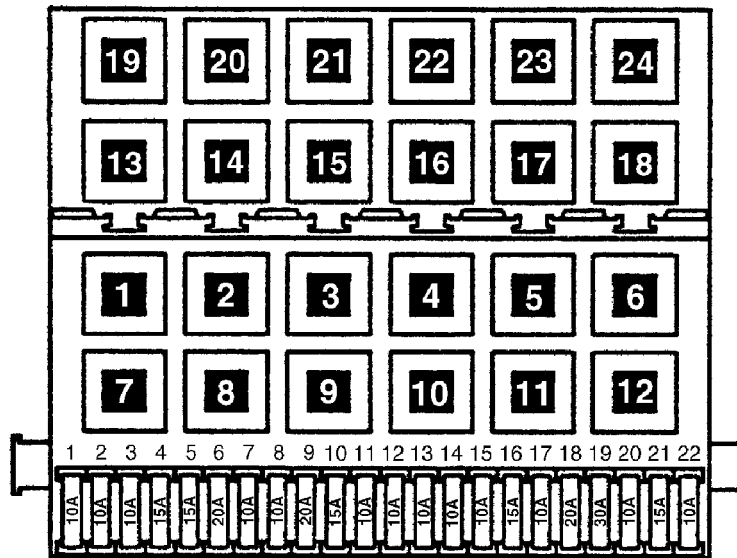
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1. A/C Relay
2. Rear Window Wiper/Washer Relay
3. ECM Power Supply Relay
4. Load Reduction Relay
5. Not Used
6. Emergency Flasher Relay
7. Not Used
8. Wiper/Washer Intermittent Relay
9. Seat Belt Warning System Relay
10. Fog Lamp Relay
11. Dual-Horn Relay or Bridge For Horn
12. Fuel Pump Relay
13. Heated Oxygen Sensor Control Module
14. Park/Neutral Position Relay
15. ABS Hydraulic Pump Relay
16. ABS Relay

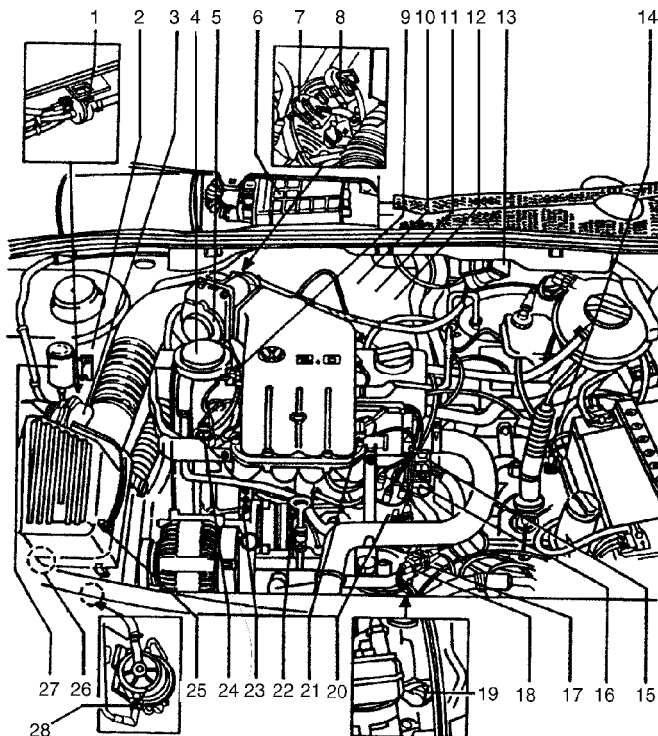
Fuse/Relay Panel

96D03793  
Bridge For Horn

On fuse/relay panel.

Data Link Connector (DLC)

Behind center of dash.



1. EVAP Canister Purge Regulator Valve
2. EGR Vacuum Regulator Valve (1995)
3. Mass Air Flow Sensor
4. Throttle Position Sensor (1995)
5. Throttle Valve Control Module (1996)
6. Engine Control Module
7. Heated Oxygen Sensor Connector (1996)
8. Heated Oxygen Sensor Connector (1996)
9. Intake Air Temperature Sensor
10. Idle Air Control Valve (1995)
11. EGR Temperature Sensor (1995)
12. EGR Valve (1995)
13. Ignition Coil
14. Vehicle Speed Sensor
15. Engine Coolant Temperature Sensor
16. Central Connector
17. Knock Sensor Connector (3-Pin)
18. Engine Speed Sensor Connector (3-Pin)
19. Engine Speed Sensor
20. Distributor (Camshaft Position Sensor)
21. Fuel Injectors
22. Knock Sensor 1
23. Ground
24. Fuel Pressure Regulator
25. Temperature Regulator Thermal Vacuum Valve
26. EVAP Canister
27. Leak Diagnosis Pump Filter (1996)
28. Leak Diagnosis Pump (1996)

96F03794  
Fuel Pressure Regulator

Right center of engine compartment.

# ELECTRICAL COMPONENT LOCATOR - 2.0L 4-CYL

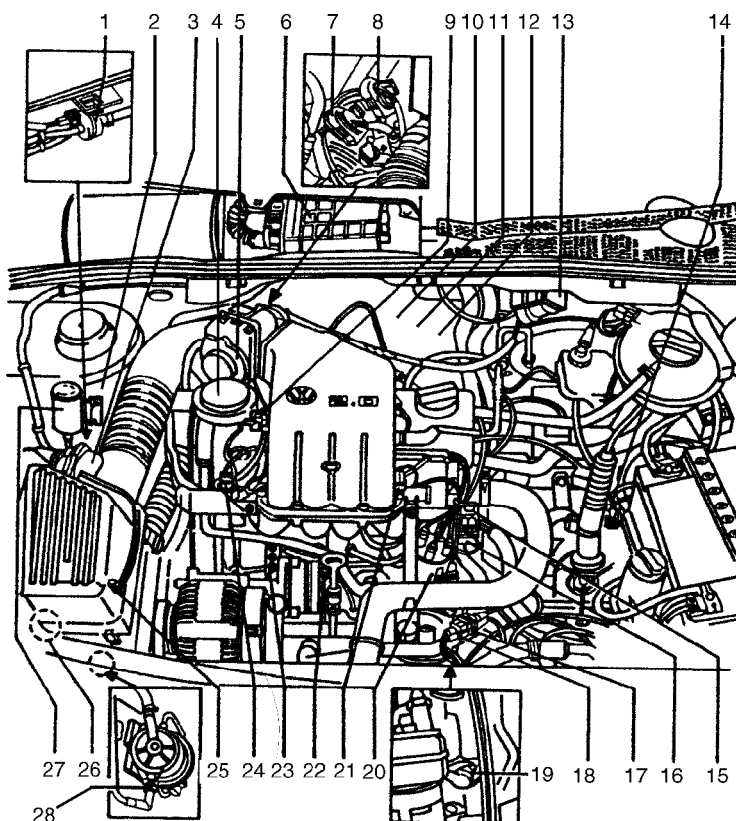
## Article Text (p. 19)

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1. EVAP Canister Purge Regulator Valve
2. EGR Vacuum Regulator Valve (1995)
3. Mass Air Flow Sensor
4. Throttle Position Sensor (1995)
5. Throttle Valve Control Module (1996)
6. Engine Control Module
7. Heated Oxygen Sensor Connector (1996)
8. Heated Oxygen Sensor Connector (1996)
9. Intake Air Temperature Sensor
10. Idle Air Control Valve (1995)
11. EGR Temperature Sensor (1995)
12. EGR Valve (1995)
13. Ignition Coil
14. Vehicle Speed Sensor
15. Engine Coolant Temperature Sensor
16. Central Connector
17. Knock Sensor Connector (3-Pin)
18. Engine Speed Sensor Connector (3-Pin)
19. Engine Speed Sensor
20. Distributor (Camshaft Position Sensor)
21. Fuel Injectors
22. Knock Sensor 1
23. Ground
24. Fuel Pressure Regulator
25. Temperature Regulator Thermal Vacuum Valve
26. EVAP Canister
27. Leak Diagnosis Pump Filter (1996)
28. Leak Diagnosis Pump (1996)

Ignition Coil

96F03794

Left rear of engine  
compartment, on firewall.

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

END OF ARTICLE



# AIR BAG RESTRAINT SYSTEM

## Article Text

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### ARTICLE BEGINNING

1996 ACCESSORIES/SAFETY EQUIPMENT  
Volkswagen Air Bag Restraint System

Volkswagon; Cabrio, Golf III, GTI & Jetta III

#### \* PLEASE READ THIS FIRST \*

**WARNING:** To avoid injury from accidental air bag deployment, read and carefully follow all WARNINGS and SERVICE PRECAUTIONS.

**NOTE:** Before disconnecting vehicle battery for any service procedure, be sure to obtain radio activation code if vehicle is equipped with anti-theft radio. If wrong code is entered into radio after power restoration, radio may lock and be rendered inoperable, even after subsequent entry of correct code.

### DESCRIPTION & OPERATION

The Supplementary Restraint System (SRS) is designed to operate together with the seat belts. Air bags will activate if the vehicle is in a frontal collision at approximately 9-12 MPH.

Main components of the air bag system include air bag control unit, located behind center console at end of tunnel; driver-side air bag unit, located in steering wheel; passenger-side air bag unit, located in right side of instrument panel; data link connector (DLC), located behind cover in instrument panel just below heating and ventilation controls; air bag malfunction indicator lamp (MIL), in instrument cluster; and spiral spring assembly under steering wheel, in steering column. See Fig. 1.

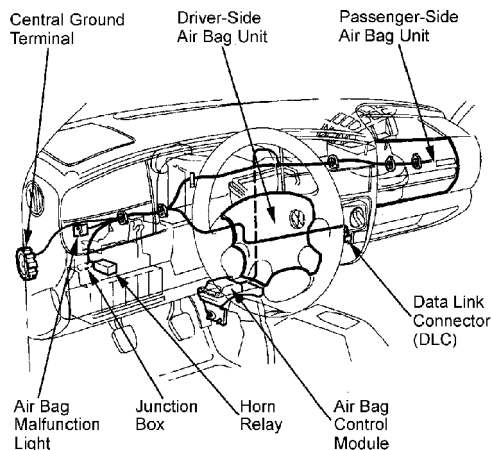


Fig. 1: Exploded View of SRS Components  
Courtesy of Volkswagen of America

## AIR BAG RESTRAINT SYSTEM

### Article Text (p. 2)

1996 Volkswagen Golf

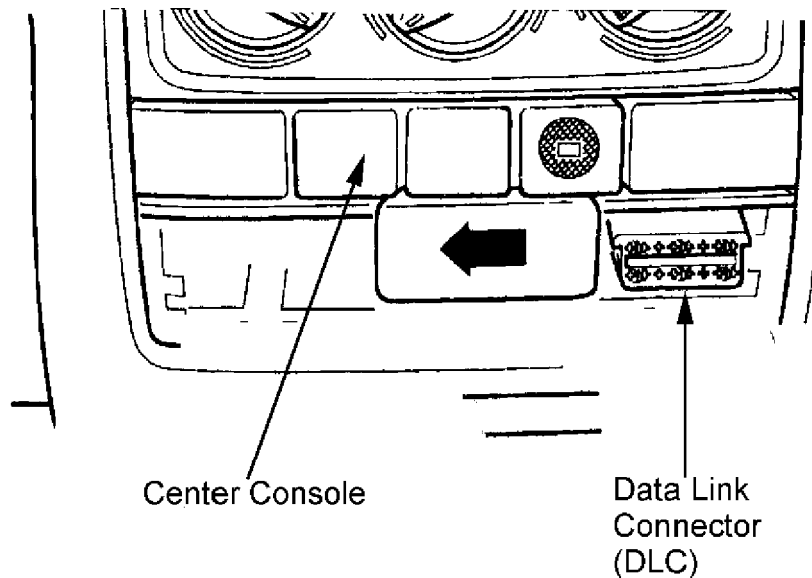
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Air bag control unit is capable of system self-diagnosis. Air bag system components are monitored electrically. Any interferences in operation can be detected. These interferences (faults) are then stored in air bag control unit memory.

Self-diagnosis can only be performed when Diagnostic Tester (VAG 1551) is connected to vehicle's Data Link Connector (DLC), located behind cover in instrument panel, just below heating and ventilation controls. See Fig. 2.



96F14071

Fig. 2: Locating Data Link Connector (DLC)  
Courtesy of Volkswagen of America

### SYSTEM OPERATION CHECK

An air bag malfunction indicator lamp (MIL) is located on left side of instrument cluster. MIL is used to indicate readiness of system. This light comes on for approximately 3 seconds when ignition is switched on, then goes out.

If MIL does not glow when ignition is on or does not go out after 3 seconds, a fault probably exists in system. If a fault occurs while ignition is on, it is stored in fault memory. MIL will then glow and air bag system will be switched off. If MIL glows or flickers while driving, air bag system should be tested. See DIAGNOSIS & TESTING.

### SERVICE PRECAUTIONS

Observe these precautions when working with air bag systems:

- \* DO NOT use computer memory saver tool. Using computer memory saver tool will keep air bag system active and may cause accidental deployment of air bag unit.

# AIR BAG RESTRAINT SYSTEM

## Article Text (p. 3)

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- \* Disable air bag system before servicing any air bag system or steering column component. See DISABLING & ACTIVATING AIR BAG SYSTEM.
- \* Because of critical operating requirements of system, DO NOT attempt to service any air bag system component.
- \* Air bag parts should not be left unattended. They should be installed in vehicle immediately after obtaining them.
- \* Air bag components which have been dropped more than 18 inches should not be used.
- \* Chemical cleaners, oil and grease should not contact vinyl covering on air bag unit.
- \* DO NOT place stickers or covers on steering wheel.
- \* Always disable air bag system before performing electric welding on vehicle.
- \* Air bag system can only be tested using Diagnostic Tester (VAG 1551). Never use test light on air bag system.

### SPECIAL TOOLS

To avoid SRS deployment and personal injury or damage to SRS system, use recommended tools for servicing. See SRS RECOMMENDED TOOLS table.

#### SRS RECOMMENDED TOOLS TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Tool Name Tool Number

Air Bag Igniter Unit ..... VAG 1821  
Air Bag Igniter Unit Adapter Cable ..... 357 971 419  
Air Bag Igniter Adapter Kit ..... VAG 1594A  
Diagnostic Tester ..... VAG 1551  
Scan Tool Adapter Harness ..... VAG 1551/3  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

### DISABLING & ACTIVATING AIR BAG SYSTEM

**WARNING:** Wait about 10 minutes after deactivating air bag system before servicing. Air bag system voltage is maintained for several minutes after system is deactivated. Servicing system before 10 minutes may cause accidental air bag deployment and possible personal injury.

To disable air bag system, disconnect negative battery cable and wait 10 minutes before working on vehicle. To activate system, reconnect negative battery cable. Perform a system operational check to ensure proper system operation. See SYSTEM OPERATION CHECK.

### DISPOSAL PROCEDURES

#### DEPLOYED AIR BAG

# AIR BAG RESTRAINT SYSTEM

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Dispose of deployed air bag modules as you would any other part. Handle air bag modules wearing gloves and safety glasses.

### UNDEPLOYED AIR BAG

An undeployed air bag must be deployed before disposal. See SCRAPPED VEHICLE.

### SCRAPPED VEHICLE

NOTE: Some vehicles to be scrapped may have an undeployed air bag. Ensure following procedure is performed.

1) Before proceeding, follow service precautions. See SERVICE PRECAUTIONS. Ensure vehicle is outside, away from other vehicles and people. Disconnect negative battery cable.

2) Remove driver-side air bag module and unplug Red connector. Connect Adapter Cable (357 971 419) to rear of air bag and reinstall. Position wiring between air bag module and steering wheel. Connect Air Bag Igniter (VAG 1821) to adapter cable and run cable through window gap.

3) Stretch cables to 30 feet and connect to an external car battery. Stand away from vehicle and depress igniter switch. An explosion should be heard, and smoke may be visible inside vehicle. Air bag unit will be hot after deployment, so wait 30 minutes and then remove air bag module and dispose.

4) On passenger-side, remove knee bolster from under dash. Cut off air bag unit connector and attach to Air Bag Igniter (VAG 1821). Run cables through window gap and extend cables to 30 feet. Connect igniter to an external car battery and depress igniter switch. An explosion should be heard, and smoke may be visible inside vehicle. Air bag unit will be hot after deployment, so wait 30 minutes and then remove air bag unit and dispose.

### REMOVAL & INSTALLATION

WARNING: Failure to follow air bag service precautions may result in air bag deployment and personal injury. See SERVICE PRECAUTIONS. After component replacement, perform a system operational check to ensure proper system operation. See SYSTEM OPERATION CHECK.

NOTE: Before disconnecting vehicle battery for any service procedure, be sure to obtain radio activation code if vehicle is equipped with anti-theft radio. If wrong code is entered into radio after power restoration, radio may lock and be rendered inoperable, even after subsequent entry of correct code.

### AIR BAG CONTROL UNIT

Removal

# AIR BAG RESTRAINT SYSTEM

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1996 Volkswagen Golf

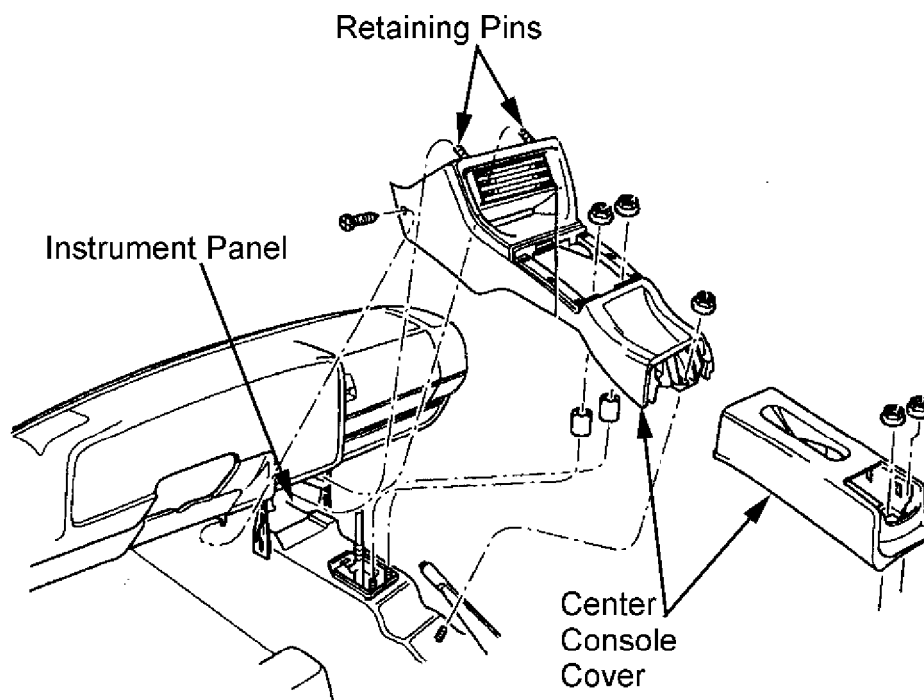
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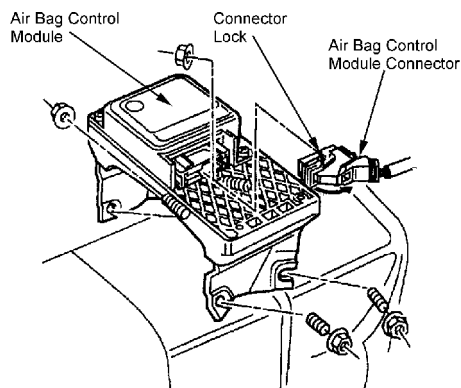
1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Air bag control unit is located under center of instrument panel. See Fig. 3. Remove plastic screw covers on sides of console and remove screws. Pull out and disconnect electric rear lid release switch, then pull back on rear section of console to remove. Remove hex nuts and then Phillips head screws (one on driver-side, two on passenger-side). Lift rear of console slightly and pull back to remove. See Fig. 4.



96G14072

Fig. 3: Removing Center Console & Air Bag Control Unit  
Courtesy of Volkswagen of America.



96H14073

Fig. 4: Removing Air Bag Control Unit  
Courtesy of Volkswagen of America.

# AIR BAG RESTRAINT SYSTEM

## Article Text (p. 6)

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3) Remove footwell air vent and move safety catch on SRS control module to unlock position. Remove electrical connector. If a Temic control unit is used, unscrew Torx bolts with Snap-On Tools FXTR 30 socket and remove control unit. If Siemens control unit is used, remove 3 nuts and remove control unit with bracket from mounting studs. Remove 7 nuts and remove control unit from bracket.

4) Air bag ECM safety catch is fragile. Use care when connecting and removing. If catch is damaged, it can be replaced using part number 1 H0 972 516. If connector plug housing on airbag harness is damaged, entire assembly is available as part number 701 972 515.

5) To replace connector plug housing, cut tie-strap on housing and slide off plastic end cap. Slide connector plug housing off pin retainer assembly. Install new housing over pin retainer assembly, install end cap and new tie-strap.

6) If Siemens control unit is to be installed in a vehicle previously equipped with the Temic control unit, the wiring harness must also be replaced. Only the Siemens control unit and harness will be supplied as replacement parts.

### Installation

1) To install, reverse removal procedure. On Temic control units, install Torx bolts and torque to 84 INCH Lbs. (10 N.m.). On Siemens control units, tighten bracket mounting nuts to 15 Ft. Lbs. (20 N.m) and control unit-to-bracket nuts to 80 INCH Lbs. (9 N.m). See TORQUE SPECIFICATIONS.

2) If new control module is being installed in Golf III, GTI, Jetta III with VR6 engine or Cabrio, control module will need to be coded. See CODING AIR BAG CONTROL UNIT. If not, go to next step.

3) Reactivate air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Check air bag malfunction indicator light to ensure system is functioning properly. See SERVICE PRECAUTIONS.

### CODING AIR BAG CONTROL UNIT

1) If it is determined that air bag control unit is not coded, first check if VAG 1551 will communicate. See CONNECTING DIAGNOSTIC TESTER. If VAG 1551 will communicate, proceed to coding procedure. If not, see CHECKING DEALER NUMBER first.

2) Depress PRINT button for a complete printout of functions. Depress button "1" to access RAPID DATA TRANSMISSION operating mode. Turn ignition switch to ON position. Depress buttons "1" and "5" to insert address word AIR BAG. Depress "Q" button to enter data.

3) Display should show 701 909 603 D AIRBAG ZAE and CODING 000000 WSC 000000. A "D" must follow air bag identification number.

4) If "A" or "C" appears, an incorrect control unit has been installed and must be replaced. If correct, press right arrow button to step to next function. Display should show RAPID DATA TRANSFER HELP and SELECT FUNCTION XX. Enter "0" and "7" to select code control module. Depress "Q" to confirm. Display should show CODE CONTROL MODULE Q and ENTER CODE NUMBER XXXXX. Enter code 00068. This code only

# AIR BAG RESTRAINT SYSTEM

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applies to Golf III, GTI, Jetta III with VR6 engine and Cabrio. Depress "Q" to confirm. Air bag malfunction indicator light should go out.

5) Display should show 701 909 603 D AIRBAG ZAE and CODING 00068 WSC XXXXX. "X"s in second row, right side of screen represent five digit dealer identification number. If message is not displayed as described and an error is not displayed, repeat coding procedure. If an error such as FUNCTION IS UNKNOWN OR CANNOT BE CARRIED OUT AT THE MOMENT is displayed and air bag malfunction indicator light does not go out, repeat coding procedure. If an error is still displayed, replace air bag control unit. If display is normal, depress right arrow button, and then depress "0" and "6" to select end output function. Depress "Q" to confirm. Coding is complete. Disconnect VAG 1551 and verify that system is operating correctly. See SYSTEM OPERATION CHECK.

### CHECKING DEALER NUMBER

1) Depress PRINT button for a complete printout of functions. Depress button "1" to access RAPID DATA TRANSMISSION operating mode. Turn ignition switch to ON position. Depress buttons "1" and "5" to insert address word AIR BAG. Depress "Q" button to enter data. Air bag control unit serial number should appear on display.

2) If message AIRBAG CONTROL UNIT DOES NOT ANSWER appears on screen, depress HELP button for printout of possible causes. Correct any problems before proceeding. Repeat address word 15 (AIRBAG). Depress "Q" button again to enter data.

3) Depress right arrow button. RAPID DATA TRANSMISSION and SELECT FUNCTION should display on screen. Depress buttons "0" and "4" to access dealer coding. Depress "Q" button to enter data. Display should show DEALERSHIP CODE HELP on first line and 1 - DISPLAY 2 - DELETE 3 - ENTER on second line. Enter 3 to input dealer identification code, enter code and depress "Q" then return to CODING AIR BAG CONTROL UNIT procedure.

### AIR BAG UNIT (DRIVER-SIDE)

#### Removal

1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Air bag unit is located on steering wheel hub. Turn steering wheel to straight ahead position. Remove socket head retaining bolts on rear of steering wheel. Lift off air bag unit from steering wheel, and tilt air bag unit downward. Disconnect wiring connector from air bag unit. See Fig. 5.

## AIR BAG RESTRAINT SYSTEM

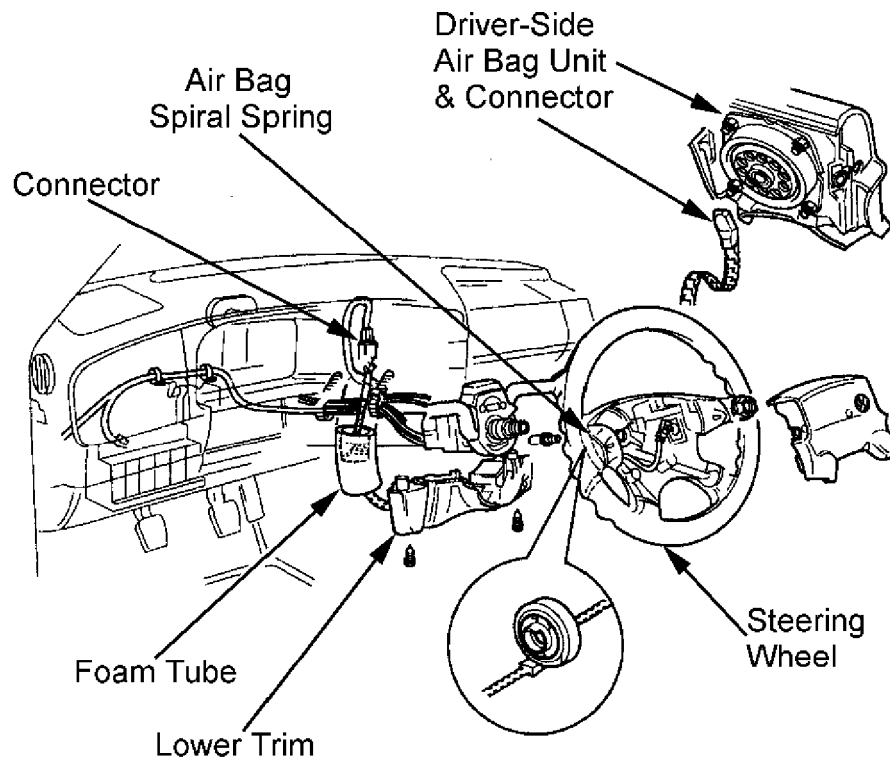
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96114074

Fig. 5: Removing Driver-Side Air Bag  
Courtesy of Volkswagen of America

#### Installation

To install, reverse removal procedure. Use new air bag retaining screws. Tighten air bag unit retaining screws to specification. See TORQUE SPECIFICATIONS. Reactivate air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Check air bag malfunction indicator light to ensure system is functioning properly. See SYSTEM OPERATION CHECK.

#### AIR BAG UNIT (PASSENGER-SIDE)

##### Removal

1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Air bag unit is located on right side of instrument panel. Remove passenger-side knee bar. Pull out right air vent. Remove 2 air vent housing screws. Remove air vent housing. Unplug air vent housing connector (vehicles with VR6 engine).

3) Remove 3 air bag unit cover bolts. Slide air bag unit cover to right and remove. Remove retaining frame around outside of air bag recess in instrument panel. Replace retaining frame if air bag has deployed. Remove 4 air bag bolts. Remove passenger-side air bag unit. Disconnect electrical connector. See Fig. 6.



## AIR BAG RESTRAINT SYSTEM

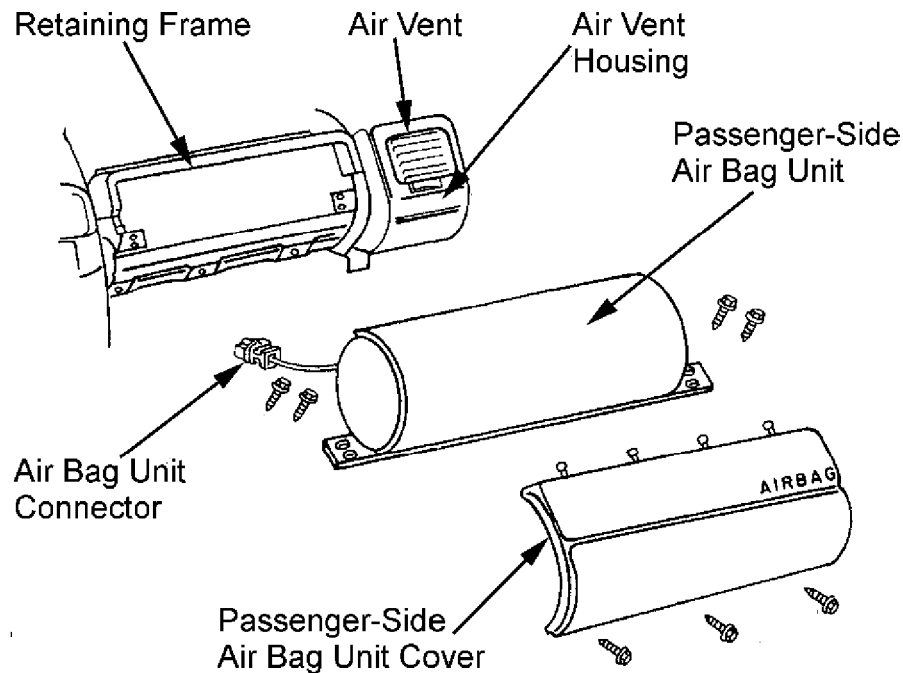
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96J14075

Fig. 6: Removing Passenger-Side Air Bag  
Courtesy of Volkswagen of America

#### Installation

To install, reverse removal procedure. Tighten air bag unit retaining bolts to specification. See TORQUE SPECIFICATIONS. Reactivate air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Check air bag malfunction indicator light to ensure system is functioning properly. See SYSTEM OPERATION CHECK.

#### SPIRAL SPRING

##### Removal

1) Before proceeding, follow air bag service precautions. See SERVICE PRECAUTIONS. Disable air bag system. See DISABLING & ACTIVATING AIR BAG SYSTEM.

2) Remove driver-side air bag unit. See AIR BAG UNIT (DRIVER-SIDE). Set front wheels straight-ahead. Remove knee bolster panel and steering column lower trim. Pull foam tube back and disconnect 2-pin wiring connector at base of steering column. Remove steering wheel. See STEERING WHEEL. Disconnect single connectors from spiral spring and remove Phillips screws. Remove spiral spring. See Fig. 7.

## AIR BAG RESTRAINT SYSTEM

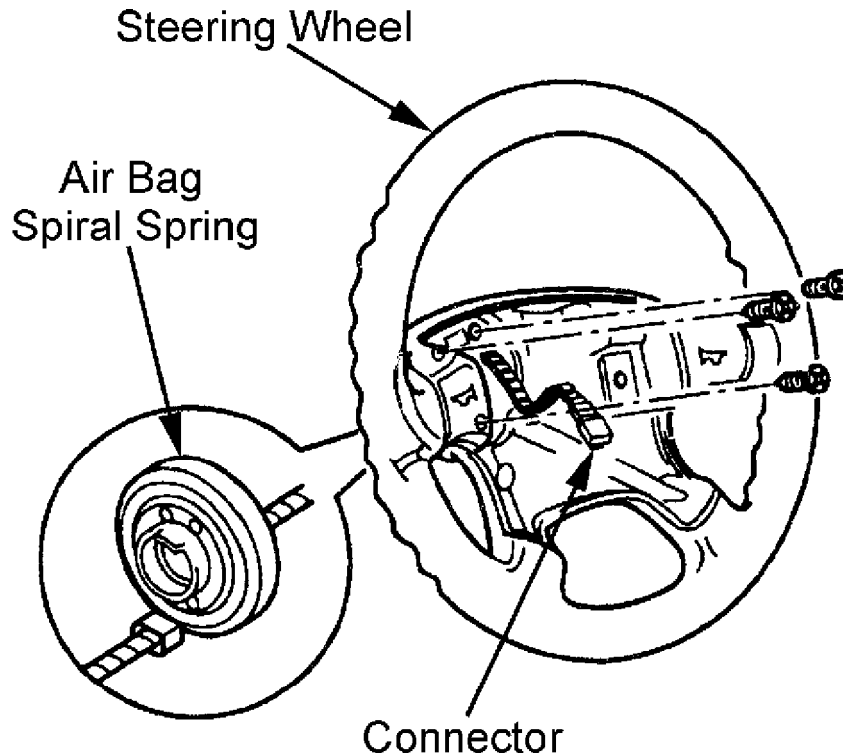
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96A14076

Fig. 7: Installing Spiral Spring Assembly  
Courtesy of Volkswagen of America

#### Installation

1) New spiral spring assemblies have a cable tie which locks assembly in its centered position. Cable tie must be removed before installing new spring assembly.

2) To install spiral spring assembly, reverse removal procedure. Reactivate air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM**. Check air bag malfunction indicator light to ensure system is functioning properly. See **SYSTEM OPERATION CHECK**.

#### STEERING WHEEL

##### Removal

1) Before proceeding, follow air bag service precautions. See **SERVICE PRECAUTIONS**. Disable air bag system. See **DISABLING & ACTIVATING AIR BAG SYSTEM**.

2) Turn front wheels to straight-ahead position. Remove air bag unit. See **AIR BAG UNIT**. Remove steering wheel hex nut. Mark steering wheel and shaft for installation reference. Remove steering wheel.

##### Installation

To install, reverse removal procedure. Tighten steering wheel nut to specification. See **TORQUE SPECIFICATIONS**. Reactivate air bag

# AIR BAG RESTRAINT SYSTEM

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system. See DISABLING & ACTIVATING AIR BAG SYSTEM. Check air bag malfunction indicator light to ensure system is functioning properly. See SYSTEM OPERATION CHECK.

### WIRE REPAIR

Manufacturer does not recommend repair on air bag system wiring or component pigtail wiring. Wiring harness must be replaced if found to be faulty.

### TORQUE SPECIFICATIONS

#### TORQUE SPECIFICATIONS TABLE

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

| Application | Ft. Lbs. (N.m) |
|-------------|----------------|
|-------------|----------------|

|                            |         |
|----------------------------|---------|
| SRS Mounting Bracket ..... | 15 (20) |
|----------------------------|---------|

|                          |         |
|--------------------------|---------|
| Steering Wheel Nut ..... | 37 (50) |
|--------------------------|---------|

INCH Lbs. (N.m)

Driver-Side Air Bag Unit-To-Steering

|                    |        |
|--------------------|--------|
| Wheel Screws ..... | 58 (7) |
|--------------------|--------|

|                                              |          |
|----------------------------------------------|----------|
| Knee Bolster-To-Instrument Panel Bolts ..... | 14 (1.5) |
|----------------------------------------------|----------|

Passenger-Side Air Bag Unit-To-Instrument

|                   |        |
|-------------------|--------|
| Panel Bolts ..... | 58 (7) |
|-------------------|--------|

SRS Control Module-To-Mounting Bracket

|               |        |
|---------------|--------|
| Siemens ..... | 80 (9) |
|---------------|--------|

|             |         |
|-------------|---------|
| Temic ..... | 84 (10) |
|-------------|---------|

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

### DIAGNOSIS & TESTING

**WARNING:** Failure to follow air bag service precautions may result in air bag deployment and personal injury. See SERVICE PRECAUTIONS. After component replacement, perform a system operational check to ensure proper system operation. See SYSTEM OPERATION CHECK.

**NOTE:** Before disconnecting vehicle battery for any service procedure, be sure to obtain radio activation code if vehicle is equipped with anti-theft radio. If wrong code is entered into radio after power restoration, radio may lock and be rendered inoperable, even after subsequent entry of correct code.

### SELF-DIAGNOSTIC SYSTEM

#### Preliminary Steps

Control unit for air bag constantly monitors air bag system and stores faults in its permanent fault memory. Memory will remain

## AIR BAG RESTRAINT SYSTEM

### Article Text (p. 12)

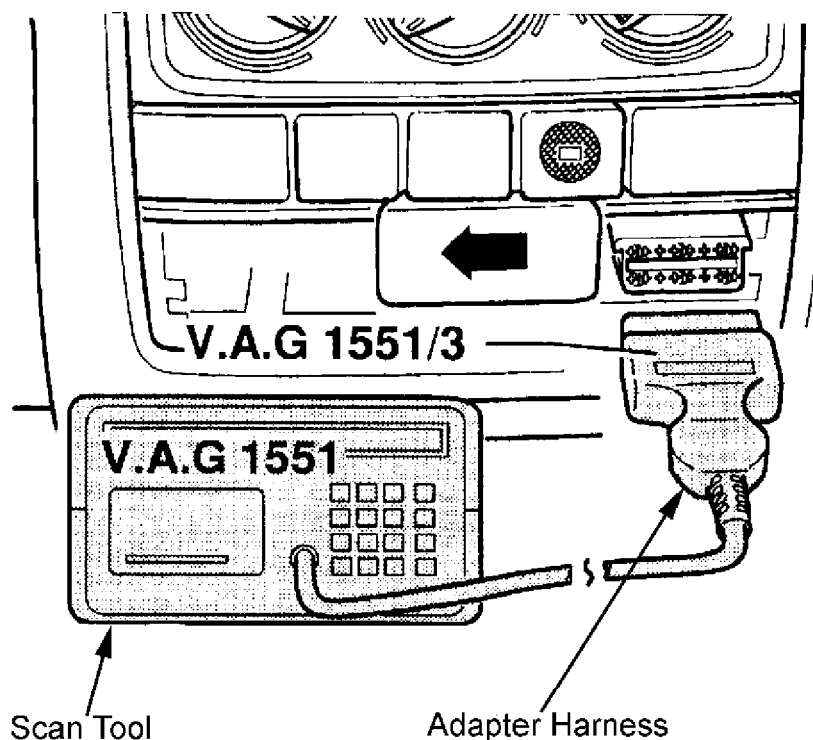
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even if battery is disconnected. Memory can be read and system tested only with Diagnostic Tester (VAG 1551). See Fig. 8.



96B14077

Fig. 8: Installing VAG (1551) & VAG (1551/3)

Courtesy of Volkswagen of America

Data Link Connector (DLC) for diagnostic tester is located above cigarette lighter. To access connector, remove ashtray, and slide small panel above cigarette lighter to left. The ADDRESS WORD for testing air bag system is 15. For malfunctions that can be detected, see VAG 1551 PRINT-OUT table.

#### VAG 1551 PRINT-OUT TABLE

|                                                                  |      |       |                                   |
|------------------------------------------------------------------|------|-------|-----------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |      |       |                                   |
| Code                                                             |      |       | Function                          |
| 00532                                                            | 2234 | ..... | Supply (B+)Voltage                |
| 00588                                                            |      | ..... | Driver-Side Air Bag Igniter       |
| 00589                                                            |      | ..... | Passenger-Side Air Bag Igniter    |
| 00594                                                            |      | ..... | Air Bag Ignition Circuit          |
| 00595                                                            |      | ..... | Crash Data Stored                 |
| 01025                                                            |      | ..... | Malfunction Indicator Lamp Faulty |
| 65535                                                            | 1111 | ..... | Control Module Malfunction        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |      |       |                                   |

Ensure vehicle electrical system is operating within normal voltage range. To ensure all faults are stored, allow vehicle to idle

# AIR BAG RESTRAINT SYSTEM

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in Neutral with parking brake fully applied. Remove cover located under cigarette lighter to access diagnostic connectors. See Fig. 2.

### Connecting Diagnostic Tester (VAG 1551)

Turn ignition switch to OFF position. Connect Adapter Harness (VAG 1551/3) to DLC. Watch for display readout. Operating modes "1" (rapid data transfer) and "2" (blink code output) should appear alternately. If no display appears, check voltage supply to VAG 1551. A minimum battery voltage of 10 volts is needed. Recharge battery as necessary.

### Accessing Fault Memory

1) Depress PRINT button for a printout of functions. Depress button "1" to access RAPID DATA TRANSMISSION operating mode. Turn ignition switch to ON. Depress buttons "1" and "5" to insert address word AIR BAG. Depress "Q" button to enter data. Air bag control unit serial number should appear on display.

2) If message AIRBAG CONTROL UNIT DOES NOT ANSWER appears on screen, depress HELP button for printout of possible causes. Correct any problems before proceeding. Repeat address word 15 (AIRBAG). Depress "Q" button again to enter data.

3) Depress right arrow button. RAPID DATA TRANSMISSION and SELECT FUNCTION should display on screen. Depress buttons "0" and "2" to access fault memory. Depress "Q" button to enter data. Number of faults stored (if any) will appear on screen.

4) Depress right arrow button. Stored faults will be displayed and printed out. After last fault is displayed, depress right arrow button again. Message RAPID DATA TRANSMISSION and SELECT FUNCTION should appear on screen. Diagnose and correct air bag system faults as necessary. See DIAGNOSTIC TESTS.

## DIAGNOSTIC TESTS

### CODE 00532 - LOW VOLTAGE SUPPLY SIGNAL

#### Printer Display

Supply voltage too high. Signal too low.

#### Symptom

Air bag does not deploy.

#### Possible Cause

Alternator/voltage regulator defective. Weak or defective battery. Air bag control unit faulty. Short in wiring.

#### Corrective Action

Repair or replace alternator/voltage regulator. Charge or replace battery. Replace air bag control unit. Locate and repair short in wiring.

### CODE 00588 - DRIVER-SIDE AIR BAG IGNITER MALFUNCTION

## AIR BAG RESTRAINT SYSTEM

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#### Printer Display

Resistance value too large. Resistance value too small. Short circuit to B+, Short circuit to ground.

#### Symptom

Driver-side air bag does not ignite.

#### Possible Cause

Igniter disconnected. Spiral spring defective. Driver-side air bag defective. Control unit defective.

#### Corrective Action

Check and reconnect igniter. Check spiral spring. Replace driver-side air bag unit. Replace control unit.

### CODE 00589 - PASSENGER-SIDE AIR BAG IGNITER MALFUNCTION

#### Printer Display

Resistance value too large. Resistance value too small. Short circuit to B+, Short circuit to ground.

#### Symptom

No. 1 igniter for passenger-side air bag does not ignite.

#### Possible Cause

Igniter disconnected. Passenger-side air bag defective. Control unit defective.

#### Corrective Action

Reconnect igniter. Replace passenger-side air bag. Replace control unit.

### CODE 00594 - SHORT TO VOLTAGE

#### Printer Display

Short circuit.

#### Symptom

Igniter for air bag does not ignite.

#### Possible Cause

Air bag circuit wiring damaged. Control unit defective.

#### Corrective Action

Locate and repair damaged wiring. Replace control unit.

### CODE 00595 - CRASH DATA STORED

#### Printer Display

None.

#### Symptom

|                                                                            |  |     |                               |   |  |
|----------------------------------------------------------------------------|--|-----|-------------------------------|---|--|
| UAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |  |     |                               |   |  |
| ³Replace After Deployment                                                  |  | 3 * | Air Bag Module(s)             | 3 |  |
| 3                                                                          |  | 3 * | Control Unit                  | 3 |  |
| 3                                                                          |  | 3 * | Control Unit Mounting Bracket | 3 |  |
| 3                                                                          |  | 3 * | Seat Belts In Use At Time Of  | 3 |  |
| 3                                                                          |  | 3   | Collision                     | 3 |  |
| 3                                                                          |  | 3 * | Spiral Spring                 | 3 |  |
| ~AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA~   |  |     |                               |   |  |
| ³Inspect & If Damaged,                                                     |  | 3 * | Wiring Harness                | 3 |  |

## WIRING DIAGRAM



# AIR BAG RESTRAINT SYSTEM

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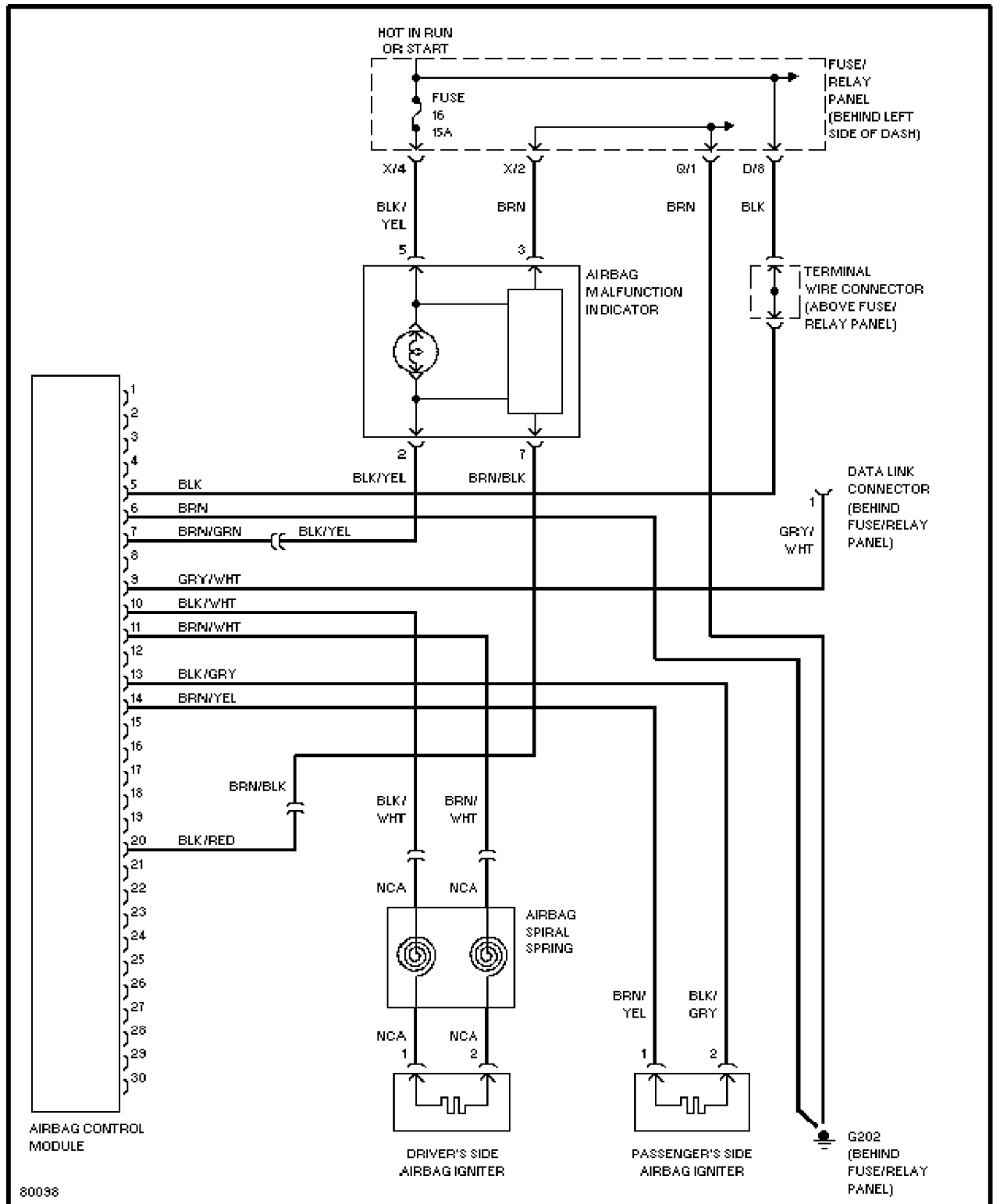


Fig. 9: SRS Wiring Diagram (Cabrio)

# AIR BAG RESTRAINT SYSTEM

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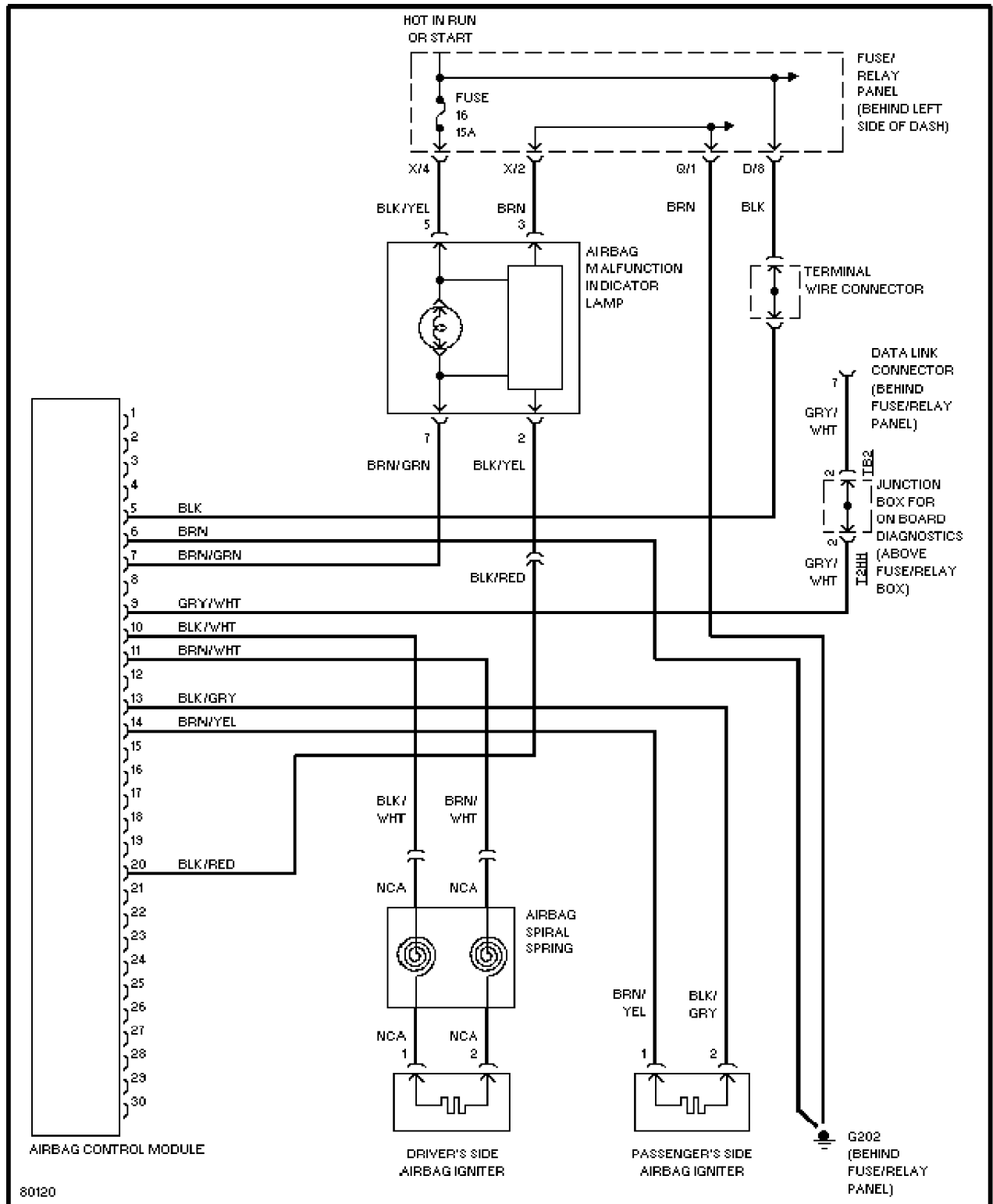


Fig. 10: SRS Wiring Diagram (Golf III, GTI & Jetta - Early Production)

# AIR BAG RESTRAINT SYSTEM

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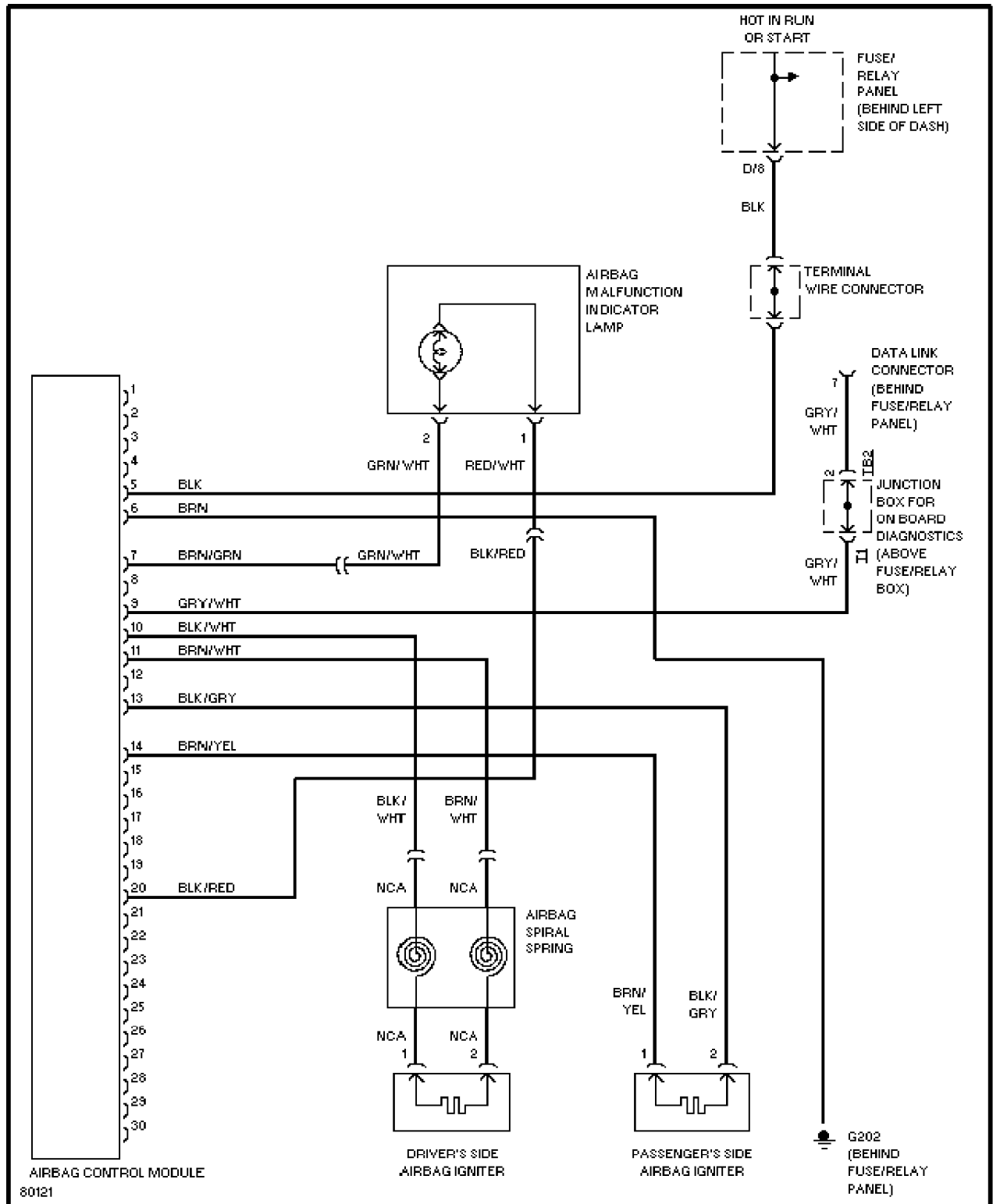


Fig. 11: 1996 Golf & Jetta (Late Production) Supplemental Restraints

END OF ARTICLE

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### **ARTICLE BEGINNING**

#### **GENERAL INFORMATION**

Electrical System Motorist Assurance Program  
Standards For Automotive Repair

All Makes and Models

### **INTRODUCTION TO MOTORIST ASSURANCE PROGRAM (MAP)**

The Motorist Assurance Program was formed in 1992 by forty (40) companies who were concerned about the image of automotive service establishments. Today, MAP is an industry-wide association dedicated to strengthening consumer satisfaction with the automotive repair industry. MAP's participants represent the majority of the nation's multi-bay retail automotive outlets, their parts and equipment suppliers, independent repair shops, industry associations, car companies, manufacturers representatives, and the trade press. MAP is developing standards of service, uniform inspection procedures and other programs to assure consumers of the industry's professionalism and the commitment to excellence shared by MAP's sponsoring companies.

MAP's achievements to date include production and distribution (over 280,000) of the consumer brochure "How to Find Your Way Under the Hood and Around Your Car", development of a Pledge of Satisfaction to Consumers and Standards of Service and establishment of relationships with regulatory agencies.

As auto repair becomes an issue for federal and state regulators, MAP is working to educate government leaders on the dynamics of automotive service and the self-monitoring efforts MAP has undertaken on the industry's behalf. MAP's sponsoring companies are becoming well-known to government representatives as exemplary businesses working to improve the industry. Media sources also look to MAP to provide information and advice to consumers and on working with automotive technicians and repair establishments.

In the next few months, MAP plans to assist member repair facilities in implementing the MAP Pledge to Customers, establishing an alternate dispute resolution system to help resolve customer complaints within the industry, and developing a shop accreditation program to encourage policies in concert with the MAP Standards of Service and Inspection Guidelines.

MAP has united the aftermarket behind its consumer-oriented goals and has established itself both within and outside of the industry. We welcome you to join us as MAP continues its outreach. With your support, both the automotive repair industry and your customers will reap the benefits. Please contact MAP at:

808 17th Street, NW  
Suite 200  
Washington, D.C. 20006

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**PLEDGE TO CUSTOMERS**

1. That recommendations will be clearly explained and based on system failure, improved system performance or preventive maintenance according to accepted industry standards.

2. That personnel will be properly trained and qualified to identify and perform an accurate and complete inspection and service of vehicle systems.

3. That a written estimate will be provided and no work will be performed without a prior authorization.

4. That a written limited warranty will be included at no additional cost.

**STANDARDS OF SERVICE**

I. Our recommendations are based upon the following definitions.

A. System Failure - Parts/system indicated are out of manufacturers' specifications, have failed, or are unable to perform their normal function as intended or designed by the manufacturers. Service/replacement is needed now.

B. Preventive/Schedule Maintenance - Parts/system are scheduled for service/replacement per industry standards or are near the end of their useful life and repair/replacement is recommended in advance of parts/system failure. Service/replacement is optional.

C. Improved System Performance (Performance Improvement) - Parts/system indicated are recommended for repair/replacement to enhance/improve the vehicle's ability to perform as intended or designed by the manufacturer, or as requested by the customer. Service/replacement is optional.

**II. Training/Criteria**

A. Our personnel have acquired auto repair expertise through formal education or work experience.

B. Where appropriate, personnel are moving toward certification (e.g. vehicle manufacturers, ASE, etc.) for the services performed.

C. Continuing education will be supported by all MAP participants.

III. Appropriate Company Approved Inspection - We will perform an appropriate inspection based on MAP Uniform Inspection Guidelines.

IV. Written Estimates - Written estimates based on our inspection, in compliance with state and local regulations, will

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## **Article Text (p. 3)**

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include parts (dollar amount), labor (dollar amount), and the total estimate.

V. Work Authorization - No work will be performed without the customer's prior approval.

VI. Limited Warranty - A minimum limited warranty will be offered of 90 days or 4,000 miles, whichever comes first, covering parts and labor.

VII. Returned Parts - All customers will be entitled to the return of old parts, or if they choose, they may examine the parts prior to leaving the store. Where failed parts are required to be returned to the manufacturer in order to honor the warranty, the customer will be allowed to examine the parts.

VIII. Classification of Parts - Replaced parts will be identified as new, remanufactured, rebuilt or used. MAP participants will inform the customer and indicate on the estimate and invoice whether a part is new, remanufactured, rebuilt or used.

## **MAP UNIFORM INSPECTION GENERAL GUIDELINES**

### **OVERVIEW OF SERVICE REQUIREMENTS & SUGGESTIONS**

It is MAP policy that all exhaust, brake, ABS, steering and suspension, wheel alignment, tires and wheels, driveline, engine performance and maintenance and heating, ventilation and air conditioning services be offered and performed under the guidelines and procedures specified in these sections.

Before any service is performed on a vehicle, an inspection of the appropriate system must be performed. The results of this inspection must be explained to the customer and documented on an inspection form. The condition of the vehicle and its components will indicate what services/part replacements may be required or suggested. In addition, suggestions may be made to satisfy the needs expressed by the customer.

This section lists the various parts and conditions that indicate required or suggested service or part replacement. Although this list is extensive, it is not inclusive. In addition to this list, a technician may make a suggestion. This suggestion must be based on substantial and informed experience or the vehicle manufacturer's recommended service interval.

Some conditions indicate that service or part replacement is required because the part in question is no longer providing the function for which it is intended, does not meet a vehicle manufacturer's design specification or is missing.

- \* Example: An exhaust pipe has corroded severely and has a hole in it through which exhaust gases are leaking. Replacement of the exhaust pipe in this case is required due to functional failure.

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- \* Example: A brake rotor has been worn to the point where it measures less than the vehicle manufacturer's specifications. Replacement of the rotor is required because it does not meet design specifications.

Some conditions indicate that a service or part replacement is suggested because the part is close to the end of its useful life or to address a customer's need, convenience or request. If a customer's vehicle has one of these conditions, the procedure may only be to suggest service.

- \* Example: An exhaust pipe is rusted, corroded or weak, but no leaks are present. In this case, the exhaust pipe has not failed. However, there is evidence that the pipe may need replacement in the near future. Replacement of the pipe may be suggested for the customer's convenience in avoiding a future problem.
- \* Example: The customer desires improved ride and/or handling, but the vehicle's shocks or struts have not failed. In this case, replacement may be suggested to satisfy the customer's wishes. In this case, replacement of the shocks or struts may not be sold as a requirement.

A customer, of course, has the choice of whether or not a Shop will service his or her vehicle. He or she may decide not to follow some of your suggestions. The following reasons may be used for required and suggested services:

### Reasons to Require Repair or Replacement:

- \* component no longer performs intended purpose
- \* component does not meet a design specification (regardless of performance)
- \* component is missing.

### Reasons to Suggest Repair or Replacement

- \* component is close to the end of its useful life (just above discard specifications or weak; failure likely to occur soon, etc.)
- \* address a customer need, convenience or request (stiffen ride, enhance performance, eliminate noise, etc.)
- \* comply with maintenance recommended by the vehicle's Original Equipment Manufacturer (OEM)
- \* technician's recommendation based on substantial and informed experience.

## **ELECTRICAL SYSTEMS**

NOTE: When working on electrical systems, if a potentially

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hazardous condition is observed, require repair or replacement of affected components.

### **BATTERY PREFACE COVER PAGE**

Proper operation of any electrical system component can be affected by battery condition. The battery(ies) must meet or exceed minimum specification for vehicle as equipped and test to that specific battery's CCA. Before condemning any component, test vehicle following OEM test and diagnostic procedures.

A battery should meet or exceed the intended vehicle's OEM (Original Equipment Manufacturer) specifications with regard to Cold Cranking Amps for that specific vehicle. A battery should be tested using the test procedures outlined by Battery Council International (BCI) - an association of battery industry companies whose members establish policy and standards for the industry and/or the manufacturer of the battery,

### **DEFINITION OF TERMS**

Cold Cranking Amp (CCA) Rating - The number of amperes a new, fully charged battery at 00°F (-17.80°C) can deliver for 30 seconds and maintain at least a voltage of 1.2 volts per cell (7.2 volts for a 12 volt battery).

Cranking Amps (CA) - The number of amps a new, fully charged battery, typically at 32°F (00°C), can deliver for 30 seconds and maintain at least a voltage of 1.2 volts per cell (7.2 volts for a 12 volt battery).

Hot Cranking Amps - A rating (non-recognized by BCI) used by some battery manufacturers for testing purposes based on 80°F (26.70°C).

OEM Cranking Amps - A number indicating the amount of amps (current) at 00 recommended by the vehicle manufacturer intended to meet the starting requirements for a specific vehicle.

Fails to Accept and Hold a Charge - This term refers a battery that fails to either accept and/or retain a charge using appropriate times listed in the Battery Charging Guide section of the BCI Technical Service Manual or battery manufacturer's specifications.

### **BATTERY LOAD TESTING**

- \* Battery Load Testing requirements should be tested at vehicle OEM specifications or battery CCA specifications for pass/fail criteria using the highest rating.
- \* Battery Load Testing and OEM specifications are based on testing at the CCA level only. When a battery is rated at any other given temperature (32°F or 80°C), the battery rating



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should be converted to a corresponding CCA for testing purposes.

**BATTERY**

NOTE: Must meet or exceed OE specs for intended vehicle and component manufacturer's specifications for specific battery.

**BATTERY**

|                                                                    |   |                                             |   |                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------|---|---------------------------------------------|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Condition                                                          | 3 | Procedure                                   | 3 | Note                                                                                                                                                                                                                                                                                                                         |
| Fails to accept and hold charge                                    | 3 | Require replacement.                        | 3 |                                                                                                                                                                                                                                                                                                                              |
| Discharged battery/ open circuit voltage low/ low specific gravity | 3 | Further inspection required.                | 3 | Recharge and retest to manufacturer's specifications if battery fails load test or fails to accept or hold a charge - replacement required.                                                                                                                                                                                  |
| Corroded posts/ terminals                                          | 3 | Require repair.                             | 3 |                                                                                                                                                                                                                                                                                                                              |
| Burned, melted posts/terminals                                     | 3 | Require repair or replacement.              | 3 |                                                                                                                                                                                                                                                                                                                              |
| Loose posts/ terminals                                             | 3 | Require replacement.                        | 3 |                                                                                                                                                                                                                                                                                                                              |
| Loose or missing vent caps                                         | 3 | Require repair or replacement of vent caps. | 3 |                                                                                                                                                                                                                                                                                                                              |
| Case leaking                                                       | 3 | Require replacement.                        | 3 |                                                                                                                                                                                                                                                                                                                              |
| Low fluid level                                                    | 3 | Further inspection required.                | 3 | Determine cause of low fluid level, refill to proper level with water (distilled water preferred). If level was below top of plates, recharge and retest to manufacturer's specifications to verify condition. If battery does not meet specifications, require replacement. If battery is sealed type (non-removable filler |

[illegible]

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| Condition                          | 3 | Procedure                        |
|------------------------------------|---|----------------------------------|
| AAAAA                              |   |                                  |
| Inoperative/intermittent           | 3 | Require repair or replacement.   |
| AAAAA                              |   |                                  |
| Missing, damaged mounting hardware | 3 | Require repair or replacement of |
|                                    | 3 | mounting hardware.               |
| AAAAA                              |   |                                  |
| Corroded, loose terminals          | 3 | Suggest repair or replacement.   |
| AAAAA                              |   |                                  |
| Noisy                              | 3 | Suggest repair or replacement.   |
| AAAAA                              |   |                                  |
| Cracked/broken housing             | 3 | Suggest repair or replacement.   |
| AAAAA                              |   |                                  |
| Defective diodes                   | 3 | Require repair or replacement.   |
| AAAAA                              |   |                                  |

**BELTS**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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**Article Text (p. 9)**

1996 Volkswagen Golf

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**PULLEYS**

**PULLEYS**

| Condition                          | 3 | Procedure                                           |
|------------------------------------|---|-----------------------------------------------------|
| Improper alignment                 | 3 | Require repair or replacement.                      |
| Missing, damaged mounting hardware | 3 | Require repair or replacement of mounting hardware. |
| Damaged                            | 3 | Require replacement.                                |

**TENSIONERS**

**TENSIONERS**

| Condition        | 3 | Procedure                    | 3 | Note                                                                                                              |
|------------------|---|------------------------------|---|-------------------------------------------------------------------------------------------------------------------|
| Missing          | 3 | Require replacement.         | 3 |                                                                                                                   |
| Noisy            | 3 | Suggest replacement.         | 3 |                                                                                                                   |
| Damaged          | 3 | Suggest replacement.         | 3 |                                                                                                                   |
| Improper tension | 3 | Further inspection required. | 3 | Follow manufacturer's recommended adjustment procedures. Suggest replacement if unable to meet OE specifications. |

**VOLTAGE REGULATOR**

**VOLTAGE REGULATOR**

| Condition                            | 3 | Procedure                                           |
|--------------------------------------|---|-----------------------------------------------------|
| Inoperative/Intermittent             | 3 | Require replacement.                                |
| Output outside of OEM specifications | 3 | Require repair or replacement.                      |
| Corroded, loose terminal ends        | 3 | Suggest repair or replacement.                      |
| Noisy                                | 3 | Suggest repair or replacement.                      |
| Missing, damaged mounting hardware   | 3 | Require repair or replacement of mounting hardware. |
| Damaged                              | 3 | Suggest replacement.                                |

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**WIRING HARNESS/CONNECTORS**

**VOLTAGE REGULATOR**

|                                                                          |   |                                |
|--------------------------------------------------------------------------|---|--------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Condition                                                                | 3 | Procedure                      |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Routed incorrectly                                                       | 3 | Suggest repair.                |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Shorted/open                                                             | 3 | Require repair or replacement. |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Connector terminal problem (e.g., bent, corroded, loose)                 | 3 | Suggest repair or replacement. |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Excessive resistance                                                     | 3 | Require repair or replacement. |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Poor ground                                                              | 3 | Require repair.                |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Damaged                                                                  | 3 | Suggest repair or replacement. |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |

**FUSE BOX/BLOCK**

**FUSE BOX/BLOCK**

|                                                                          |   |                           |
|--------------------------------------------------------------------------|---|---------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                           |
| Condition                                                                | 3 | Procedure                 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                           |
| Burned/melted                                                            | 3 | Further inspection        |
|                                                                          |   | 3 required.               |
|                                                                          |   | 3 Determine cause and     |
|                                                                          |   | 3 correct prior to repair |
|                                                                          |   | 3 or replacement of fuse  |
|                                                                          |   | 3 box.                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                           |
| Connector, terminal                                                      | 3 | Suggest repair or         |
| problem (e.g., bent,                                                     | 3 | replacement.              |
| corroded, loose)                                                         | 3 |                           |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                           |
| Missing, damaged                                                         | 3 | Require replacement       |
| mounting hardware                                                        | 3 | of mounting hardware.     |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                           |

**SYSTEM INDICATOR LIGHTS**

**SYSTEM INDICATOR LIGHTS**

|                                                                          |   |                          |
|--------------------------------------------------------------------------|---|--------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                          |
| Condition                                                                | 3 | Procedure                |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                          |
| Light does not come                                                      | 3 | Further inspection       |
| on during bulb check                                                     | 3 | required.                |
|                                                                          |   | 3 See service manual for |
|                                                                          |   | 3 further information    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                          |
| Fail to function                                                         | 3 |                          |
| properly during test                                                     | 3 |                          |
| mode                                                                     | 3 |                          |

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AAAAAAAAAAAAAAAAAAAAAAAAA' 3  
On constantly or 3 3  
intermittently 3 3  
below. 3 3  
AAAAAAAAAAAAAAAAAAAAAAAAA

**SYSTEM GAUGE**

SYSTEM GAUGE  
AAAAAAAAAAAAAAAAAAAAAAAAA  
Condition 3 Procedure 3 Note  
AAAAAAAAAAAAAAAAAAAAAAAAA  
Inoperative/ 3 Further inspection 3 See service manual for  
intermittent 3 required. 3 further information  
AAAAAAAAAAAAAAAAAAAAAAAAA' 3  
Indicating out of 3 3  
OEM's specification 3 3  
AAAAAAAAAAAAAAAAAAAAAAAAA  
Missing, damaged 3 Require replacement 3  
mounting hardware 3 of mounting hardware. 3  
AAAAAAAAAAAAAAAAAAAAAAAAA

**GROUND STRAP**

GROUND STRAP  
AAAAAAAAAAAAAAAAAAAAAAAAA  
Condition 3 Procedure  
AAAAAAAAAAAAAAAAAAAAAAAAA  
High resistance/open 3 Require repair or replacement.  
AAAAAAAAAAAAAAAAAAAAAAAAA  
Missing 3 Require replacement.  
AAAAAAAAAAAAAAAAAAAAAAAAA  
Corroded 3 Require repair or replacement.  
AAAAAAAAAAAAAAAAAAAAAAAAA  
Loose 3 Require repair.  
AAAAAAAAAAAAAAAAAAAAAAAAA  
Missing, damaged mounting hardware 3 Require replacement of mounting  
3 hardware.  
AAAAAAAAAAAAAAAAAAAAAAAAA  
Damaged 3 Suggest repair or replacement.  
AAAAAAAAAAAAAAAAAAAAAAAAA

**STARTER SYSTEMS**

To prevent misdiagnosis, care should be taken to eliminate the possibilities of mechanical problems or high resistance in power and/or ground circuits.

STARTER SYSTEMS  
AAAAAAAAAAAAAAAAAAAAAAAAA  
Condition 3 Procedure 3 Note  
AAAAAAAAAAAAAAAAAAAAAAAAA

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|                                                                          |                                                                                                  |                                                                                                       |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Inoperative/<br>intermittent                                             | <sup>3</sup> Require repair or<br><sup>3</sup> replacement.                                      | <sup>3</sup><br><sup>3</sup>                                                                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |
| Excessive resistance/<br>open                                            | <sup>3</sup> Require repair or<br><sup>3</sup> replacement.                                      | <sup>3</sup><br><sup>3</sup>                                                                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |
| Amperage does not<br>meet OEM<br>specifications                          | <sup>3</sup> Require repair or<br><sup>3</sup> replacement.                                      | <sup>3</sup><br><sup>3</sup><br><sup>3</sup>                                                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |
| Missing, damaged<br>mounting hardware/<br>brackets                       | <sup>3</sup> Require repair or<br><sup>3</sup> replacement of<br><sup>3</sup> mounting hardware. | <sup>3</sup><br><sup>3</sup><br><sup>3</sup>                                                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |
| Noisy                                                                    | <sup>3</sup> Further inspection<br><sup>3</sup> required.<br><sup>3</sup>                        | <sup>3</sup> Identify source of<br><sup>3</sup> noise, suggest repair<br><sup>3</sup> or replacement. |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |
| Damaged drive gear                                                       | <sup>3</sup> Require repair or<br><sup>3</sup> replacement.                                      | <sup>3</sup> Inspect ring gear and<br><sup>3</sup> service as needed.                                 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |
| Corroded, loose<br>terminals                                             | <sup>3</sup> Require repair or<br><sup>3</sup> replacement.                                      | <sup>3</sup><br><sup>3</sup>                                                                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |
| Cracked/broken<br>housing                                                | <sup>3</sup> Suggest repair or<br><sup>3</sup> replacement.                                      | <sup>3</sup><br><sup>3</sup>                                                                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |

**SOLENOID**

|                                                                          |                                                                                                  |                                                                                                       |                   |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------|
| SOLENOID                                                                 |                                                                                                  |                                                                                                       |                   |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |                   |
| Condition                                                                | <sup>3</sup>                                                                                     | Procedure                                                                                             | <sup>3</sup> Note |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |                   |
| Inoperative/<br>intermittent                                             | <sup>3</sup> Require repair or<br><sup>3</sup> replacement.                                      | <sup>3</sup><br><sup>3</sup>                                                                          |                   |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |                   |
| Excessive resistance/<br>open                                            | <sup>3</sup> Require repair or<br><sup>3</sup> replacement.                                      | <sup>3</sup><br><sup>3</sup>                                                                          |                   |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |                   |
| Noisy                                                                    | <sup>3</sup> Further inspection<br><sup>3</sup> required.<br><sup>3</sup>                        | <sup>3</sup> Identify source of<br><sup>3</sup> noise, suggest repair<br><sup>3</sup> or replacement. |                   |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |                   |
| Missing, damaged<br>mounting hardware/<br>brackets                       | <sup>3</sup> Require repair or<br><sup>3</sup> replacement of<br><sup>3</sup> mounting hardware. | <sup>3</sup><br><sup>3</sup><br><sup>3</sup>                                                          |                   |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |                   |
| Fails to disengage                                                       | <sup>3</sup> Further inspection<br><sup>3</sup> required.                                        | <sup>3</sup> See service manual for<br><sup>3</sup> further information.                              |                   |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                                                                  |                                                                                                       |                   |
| Damaged                                                                  | <sup>3</sup> Suggest replacement.                                                                | <sup>3</sup>                                                                                          |                   |

[illegible]





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|                                                                          |   |                      |                            |
|--------------------------------------------------------------------------|---|----------------------|----------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |                            |
| Condition                                                                | 3 | Procedure            | 3 Note                     |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |                            |
| Out of adjustment                                                        | 3 | Further inspection   | 3 Follow OEM recommended   |
|                                                                          | 3 | required.            | 3 adjustment procedures.   |
|                                                                          | 3 |                      | 3 Repair or replace if out |
|                                                                          | 3 |                      | 3 of specification.        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |                            |
| Inoperative                                                              | 3 | Require replacement. | 3                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |                            |
| Intermittent                                                             | 3 | Require replacement. | 3                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |                            |
| Corroded, loose                                                          | 3 | Suggest repair or    | 3                          |
| terminals                                                                | 3 | replacement.         | 3                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |                            |
| Missing, damaged                                                         | 3 | Require repair or    | 3                          |
| mounting hardware                                                        | 3 | replacement of       | 3                          |
|                                                                          | 3 | mounting hardware.   | 3                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |                            |
| Damaged                                                                  | 3 | Suggest replacement. | 3                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |                            |

**BULB SOCKETS**

|                                                                          |   |                    |                           |
|--------------------------------------------------------------------------|---|--------------------|---------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                    |                           |
| Condition                                                                | 3 | Procedure          | 3 Note                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                    |                           |
| Missing, damaged                                                         | 3 | Require repair or  | 3                         |
| mounting hardware                                                        | 3 | replacement of     | 3                         |
|                                                                          | 3 | mounting hardware. | 3                         |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                    |                           |
| Burned/melted                                                            | 3 | Further inspection | 3 Determine cause and     |
|                                                                          | 3 | required.          | 3 correct prior to repair |
|                                                                          | 3 |                    | 3 or replacement of       |
|                                                                          | 3 |                    | 3 socket(s).              |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                    |                           |
| Corroded, loose                                                          | 3 | Suggest repair or  | 3                         |
| terminals                                                                | 3 | replacement.       | 3                         |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                    |                           |
| Inoperative/<br>intermittent                                             | 3 | Require repair or  | 3                         |
|                                                                          | 3 | replacement.       | 3                         |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                    |                           |
| Damaged                                                                  | 3 | Suggest repair or  | 3                         |
|                                                                          | 3 | replacement.       | 3                         |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                    |                           |

**WIRING HARNESS/CONNECTORS**

|                                                                          |   |           |  |
|--------------------------------------------------------------------------|---|-----------|--|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |           |  |
| Condition                                                                | 3 | Procedure |  |

**\* ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES \***

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AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Routed incorrectly 3 Suggest repair.  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Shorted/open 3 Require repair or replacement.  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Connector terminal problem (e.g., bent, corroded, loose) 3 Suggest repair or replacement.  
3  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Excessive resistance 3 Require repair or replacement.  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Poor ground 3 Require repair.  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Damaged 3 Suggest repair or replacement.  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

**FUSE/FUSIBLE LINK/CIRCUIT BREAKER**

**FUSE/FUSIBLE LINK/CIRCUIT BREAKER**

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Condition 3 Procedure 3 Note  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Inoperative/intermittent 3 Require replacement. 3 Determine cause of  
3 Further inspection 3 condition and correct  
3 required. 3 prior to replacement.  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Corroded, loose terminals 3 Suggest repair or 3  
3 replacement. 3  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Missing 3 Require replacement. 3 Refer to OEM owner's  
3 3 manual for proper  
3 3 amperage and location.  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Damaged (e.g., melted, burned, cracked, etc.) 3 Suggest repair or 3  
3 replacement. 3  
3 3  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

**SWITCHES/DIMMERS/TIMERS/DELAYS**

**SWITCHES/DIMMERS/TIMERS/DELAYS**

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Condition 3 Procedure  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Inoperative/intermittent 3 Require replacement.  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Missing 3 Require replacement.  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Malfunctioning (e.g., binding, worn, won't return, etc.) 3 Suggest repair or replacement.  
3  
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  
Missing, damaged mounting hardware/adjusters 3 Require repair or replacement  
3 of mounting hardware/adjusters.

| Condition                                                     | 3 | Procedure                                                 | 3 | Note                                             |
|---------------------------------------------------------------|---|-----------------------------------------------------------|---|--------------------------------------------------|
| Inoperative/<br>intermittent                                  | 3 | Require replacement.                                      | 3 |                                                  |
| Malfunctioning (e.g.<br>binding, worn, won't<br>return, etc.) | 3 | Suggest repair or<br>replacement.                         | 3 |                                                  |
| Missing                                                       | 3 | Require replacement.                                      | 3 |                                                  |
| Out of adjustment                                             | 3 | Further inspection<br>required.                           | 3 | Follow OEM recommended<br>adjustment procedures. |
|                                                               | 3 |                                                           | 3 | Repair or replace if out<br>of specification.    |
| Leaking (vacuum)                                              | 3 | Suggest repair or<br>replacement.                         | 3 |                                                  |
| Noisy                                                         | 3 |                                                           | 3 |                                                  |
| Missing, damaged<br>mounting hardware                         | 3 | Require repair or<br>replacement of<br>mounting hardware. | 3 |                                                  |

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|                           |   |                      |   |
|---------------------------|---|----------------------|---|
| Corroded, loose terminals | 3 | Suggest replacement. | 3 |
| AAAAA                     | 3 |                      | 3 |
| Damaged                   | 3 |                      | 3 |
| AAAAA                     |   |                      |   |

**VEHICLE ACCESSORIES**

Vehicle accessories refers to OEM installed equipment, including but not limited to power windows, locks, seats, roof/top, antennas, heated seats, mirrors, windshield/window defrosters, trunk pull down/release, keyless entry, tire pressure monitors, electric mirrors, etc.

**POWER LOCKS, WINDOWS, SEATS, MIRRORS, ROOF/TOPS, ANTENNAS, SLIDING DOORS**

**SWITCHES**

|                                                          |   |                                                     |
|----------------------------------------------------------|---|-----------------------------------------------------|
| Condition                                                | 3 | Procedure                                           |
| Inoperable                                               | 3 | Require replacement.                                |
| Intermittent                                             | 3 | Suggest replacement.                                |
| Malfunctioning (e.g., binding, worn, won't return, etc.) | 3 | Suggest repair or replacement.                      |
| Missing                                                  | 3 | Require replacement.                                |
| Missing, damaged mounting hardware                       | 3 | Require repair or replacement of mounting hardware. |
| Corroded, loose terminals                                | 3 | Suggest repair or replacement.                      |
| Damaged (e.g., melted, burned, cracked, etc.)            | 3 | Suggest replacement.                                |

**ACTUATORS/MOTORS/SOLENOIDS/TRANSDUCERS**

**ACTUATORS/MOTORS/SOLENOIDS/TRANSDUCERS**

|                                                          |   |                                |   |      |
|----------------------------------------------------------|---|--------------------------------|---|------|
| Condition                                                | 3 | Procedure                      | 3 | Note |
| Inoperative/intermittent                                 | 3 | Require replacement.           | 3 |      |
| Malfunctioning (e.g., binding, worn, won't return, etc.) | 3 | Suggest repair or replacement. | 3 |      |

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|                                                                          |   |                      |   |
|--------------------------------------------------------------------------|---|----------------------|---|
| Missing                                                                  | 3 | Require replacement. | 3 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |   |
| Out of adjustment                                                        | 3 | Further inspection   | 3 |
|                                                                          | 3 | required.            | 3 |
|                                                                          | 3 |                      | 3 |
|                                                                          | 3 |                      | 3 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |   |
| Leaking (vacuum/<br>fluid/air)                                           | 3 | Suggest repair or    | 3 |
|                                                                          | 3 | replacement.         | 3 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |   |
| Noisy                                                                    | 3 |                      | 3 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |   |
| Corroded, loose<br>terminals                                             | 3 |                      | 3 |
|                                                                          | 3 |                      | 3 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |   |
| Missing, damaged                                                         | 3 | Require repair or    | 3 |
| mounting hardware                                                        | 3 | replacement of       | 3 |
|                                                                          | 3 | mounting hardware.   | 3 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |   |
| Damaged                                                                  | 3 | Suggest repair or    | 3 |
|                                                                          | 3 | replacement.         | 3 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |   |

**WIRING HARNESS/CONNECTORS**

|                                                                          |   |                                |  |
|--------------------------------------------------------------------------|---|--------------------------------|--|
| WIRING HARNESS/CONNECTORS                                                |   |                                |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |  |
| Condition                                                                | 3 | Procedure                      |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |  |
| Routed incorrectly                                                       | 3 | Suggest repair.                |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |  |
| Shorted/open                                                             | 3 | Require repair or replacement. |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |  |
| Connector terminal problem (e.g.,<br>bent, corroded, loose)              | 3 | Suggest repair or replacement. |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |  |
| Excessive resistance                                                     | 3 |                                |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |  |
| Poor ground                                                              | 3 | Suggest repair.                |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |  |
| Damaged                                                                  | 3 | Suggest repair or replacement. |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |  |

**FUSE BOX/BLOCK**

|                                                                          |   |                      |   |
|--------------------------------------------------------------------------|---|----------------------|---|
| FUSE BOX/BLOCK                                                           |   |                      |   |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |   |
| Condition                                                                | 3 | Procedure            | 3 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                      |   |
| Burned/melted                                                            | 3 | Require replacement. | 3 |
|                                                                          | 3 | Further inspection   | 3 |
|                                                                          | 3 | required.            | 3 |

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|                      |   |                       |   |      |
|----------------------|---|-----------------------|---|------|
|                      | 3 |                       | 3 | box. |
| Connector, terminal  | 3 | Suggest repair or     | 3 |      |
| problem (e.g., bent, | 3 | replacement.          | 3 |      |
| corroded, loose)     | 3 |                       | 3 |      |
| Loose terminals/     | 3 |                       | 3 |      |
| connectors           | 3 |                       | 3 |      |
| Missing, damaged     | 3 | Require replacement   | 3 |      |
| mounting hardware    | 3 | of mounting hardware. | 3 |      |

**FUSE/FUSIBLE LINK/CIRCUIT BREAKER**

|                                   |   |                      |   |                        |
|-----------------------------------|---|----------------------|---|------------------------|
| FUSE/FUSIBLE LINK/CIRCUIT BREAKER |   |                      |   |                        |
| Condition                         | 3 | Procedure            | 3 | Note                   |
| Inoperative,                      | 3 | Require replacement. | 3 | Determine cause of     |
| intermittent                      | 3 | Further inspection   | 3 | condition and correct  |
|                                   | 3 | required.            | 3 | prior to replacement.  |
| Corroded, loose                   | 3 | Suggest repair or    | 3 |                        |
| terminals                         | 3 | replacement.         | 3 |                        |
| Missing                           | 3 | Require replacement. | 3 | Refer to OEM owner's   |
|                                   | 3 |                      | 3 | manual for proper      |
|                                   | 3 |                      | 3 | amperage and location. |
| Damaged (e.g.,                    | 3 | Suggest repair or    | 3 |                        |
| melted, burned,                   | 3 | replacement.         | 3 |                        |
| cracked, etc.)                    | 3 |                      | 3 |                        |

**RELAYS**

|                                    |   |                                |   |  |
|------------------------------------|---|--------------------------------|---|--|
| RELAYS                             |   |                                |   |  |
| Condition                          | 3 | Procedure                      | 3 |  |
| Inoperative, intermittent          | 3 | Require replacement.           | 3 |  |
| Missing                            | 3 | Require replacement.           | 3 |  |
| Missing, damaged mounting hardware | 3 | Require repair or replacement  | 3 |  |
|                                    | 3 | of mounting hardware.          | 3 |  |
| Corroded, loose terminals          | 3 | Suggest repair or replacement. | 3 |  |
| Damaged                            | 3 | Suggest replacement.           | 3 |  |

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**CONTROL MODULE**

**CONTROL MODULE**

|                                                                          |                  |                                              |                                                                                                                           |
|--------------------------------------------------------------------------|------------------|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                  |                                              |                                                                                                                           |
| Condition                                                                | 3                | Procedure                                    | 3 Note                                                                                                                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                  |                                              |                                                                                                                           |
| Inoperative/<br>intermittent                                             | 3<br>3           | Require replacement.                         | 3<br>3                                                                                                                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                  |                                              |                                                                                                                           |
| Malfunctioning (i.e.,<br>consistent with<br>expected operations)         | 3<br>3<br>3      | Suggest replacement.                         | 3<br>3<br>3                                                                                                               |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                  |                                              |                                                                                                                           |
| Code set<br>(if applicable)                                              | 3<br>3<br>3<br>3 | Further inspection<br>required.              | 3<br>3<br>3<br>3                                                                                                          |
|                                                                          |                  |                                              | Refer to manufacturer's<br>diagnostic trouble code<br>procedure and repair or<br>replacement of affected<br>component(s). |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                  |                                              |                                                                                                                           |
| Damaged                                                                  | 3                | Suggest replacement.                         | 3                                                                                                                         |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                  |                                              |                                                                                                                           |
| Corroded, loose<br>terminals                                             | 3<br>3           |                                              | 3<br>3                                                                                                                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                  |                                              |                                                                                                                           |
| Missing, damaged<br>mounting hardware                                    | 3<br>3           | Require replacement<br>of mounting hardware. | 3<br>3                                                                                                                    |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                  |                                              |                                                                                                                           |

**ELECTROCHROMATIC MIRROR**

**ELECTROCHROMATIC MIRROR**

|                                                                          |        |                                                        |  |
|--------------------------------------------------------------------------|--------|--------------------------------------------------------|--|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |        |                                                        |  |
| Condition                                                                | 3      | Procedure                                              |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |        |                                                        |  |
| Inoperative, intermittent                                                | 3      | Require replacement.                                   |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |        |                                                        |  |
| Corroded, loose terminals                                                | 3      | Suggest repair or replacement.                         |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |        |                                                        |  |
| Malfunctioning                                                           | 3      | Suggest replacement.                                   |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |        |                                                        |  |
| Missing, damaged mounting hardware                                       | 3<br>3 | Require repair or replacement<br>of mounting hardware. |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |        |                                                        |  |
| Missing                                                                  | 3      | Require replacement.                                   |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |        |                                                        |  |
| Damaged                                                                  | 3      | Suggest replacement.                                   |  |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |        |                                                        |  |

HEATING ELEMENTS (DEFROSTER/DEFOGGER - ELECTRIC HEATERS,  
MIRRORS, SEATS. ETC.)



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**HEATING ELEMENTS (DEFROSTER/DEFOGGER - ELECTRIC HEATERS, ETC.)**

|                           |   |                                |
|---------------------------|---|--------------------------------|
| Condition                 | 3 | Procedure                      |
| Inoperative, intermittent | 3 | Require repair or replacement. |
| Corroded, loose terminals | 3 | Suggest repair or replacement. |
| Damaged                   | 3 | Suggest repair or replacement. |

**CLOCK**

**CLOCK**

|                                                  |   |                                                          |
|--------------------------------------------------|---|----------------------------------------------------------|
| Condition                                        | 3 | Procedure                                                |
| Inoperative, intermittent                        | 3 | Require repair or replacement.                           |
| Missing, damaged mounting hardware               | 3 | Require repair or replacement<br>3 of mounting hardware. |
| Corroded, loose terminals                        | 3 | Suggest repair or replacement.                           |
| Damaged (e.g., melted, burned,<br>cracked, etc.) | 3 | Suggest repair or replacement.                           |

**CIGARETTE LIGHTER/SOCKET/ELEMENT**

**CIGARETTE LIGHTER/SOCKET/ELEMENT**

|                                    |   |                                                          |
|------------------------------------|---|----------------------------------------------------------|
| Condition                          | 3 | Procedure                                                |
| Inoperative, intermittent          | 3 | Require repair or replacement.                           |
| Corroded, loose terminals          | 3 | Suggest repair or replacement.                           |
| Missing                            | 3 | Suggest replacement.                                     |
| Missing, damaged mounting hardware | 3 | Require repair or replacement<br>3 of mounting hardware. |
| Damaged                            | 3 | Suggest repair or replacement.                           |

**CRUISE CONTROL/LINKAGE/CABLES**

**CRUISE CONTROL/LINKAGE/CABLES**

|           |   |           |   |      |
|-----------|---|-----------|---|------|
| Condition | 3 | Procedure | 3 | Note |
|-----------|---|-----------|---|------|

[illegible]

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| Condition                                        | 3 | Procedure                                                              | 3 | Note                                                                                                                                                                                                        |
|--------------------------------------------------|---|------------------------------------------------------------------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Improper output signal                           | 3 | Further inspection required.                                           | 3 | Follow OEM recommended service procedures.                                                                                                                                                                  |
| Internal resistance does not meet specifications | 3 |                                                                        | 3 | Component failure may be caused by water intrusion into the wiring harness. Always check insulation for damage and wiring for excessive resistance. Require repair or replacement of affected component(s). |
| Cracked sensor housing                           | 3 | Require replacement.                                                   | 3 |                                                                                                                                                                                                             |
| Lead routed incorrectly                          | 3 | Require re-routing according to vehicle manufacturer's specifications. | 3 |                                                                                                                                                                                                             |
| Damaged wire lead                                | 3 | Require repair or replacement.                                         | 3 |                                                                                                                                                                                                             |
| Contamination of surface                         | 3 | Further inspection required.                                           | 3 | Identify and correct source of contamination. Suggest repair (cleaning).                                                                                                                                    |
| Missing sensor/tip                               | 3 | Require replacement.                                                   | 3 |                                                                                                                                                                                                             |
| Loose                                            | 3 | Require repair or replacement.                                         | 3 |                                                                                                                                                                                                             |
| Damaged                                          | 3 | Suggest replacement.                                                   | 3 |                                                                                                                                                                                                             |
| Missing, damaged mounting hardware or brackets   | 3 | Require repair or replacement of mounting hardware or brackets.        | 3 |                                                                                                                                                                                                             |

**BRAKE/CLUTCH SWITCH**

| BRAKE/CLUTCH SWITCH |   |                      |   |      |
|---------------------|---|----------------------|---|------|
| Condition           | 3 | Procedure            | 3 | Note |
| Inoperative         | 3 | Require replacement. | 3 |      |

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|                                                                          |                                                       |                                                          |
|--------------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------|
| Intermittent                                                             | 3                                                     | 3                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                       |                                                          |
| Malfunctioning (e.g., binding, worn, won't return, etc.)                 | 3 Suggest repair or replacement.                      | 3                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                       |                                                          |
| Out of adjustment                                                        | 3 Further inspection required.                        | 3 Follow OEM recommended adjustment procedure.           |
|                                                                          | 3                                                     | 3 Require repair or replacement if out of specification. |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                       |                                                          |
| Leaking                                                                  | 3 Suggest replacement.                                | 3                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                       |                                                          |
| Missing                                                                  | 3 Require replacement.                                | 3                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                       |                                                          |
| Missing, damaged mounting hardware                                       | 3 Require repair or replacement of mounting hardware. | 3                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                       |                                                          |
| Corroded, loose terminals                                                | 3 Suggest repair or replacement.                      | 3                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                       |                                                          |
| Damaged                                                                  | 3 Suggest replacement.                                | 3                                                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |                                                       |                                                          |

**VACUUM DUMP RELEASE VALVE**

|                                                                          |   |                                |                                                          |
|--------------------------------------------------------------------------|---|--------------------------------|----------------------------------------------------------|
| VACUUM DUMP RELEASE VALVE                                                |   |                                |                                                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |                                                          |
| Condition                                                                | 3 | Procedure                      | 3 Note                                                   |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |                                                          |
| Inoperative                                                              | 3 | 3                              |                                                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |                                                          |
| Intermittent                                                             | 3 | 3                              |                                                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |                                                          |
| Out of adjustment                                                        | 3 | 3 Further inspection required. | 3 Follow OEM recommended adjustment procedure.           |
|                                                                          | 3 | 3                              | 3 Require repair or replacement if out of specification. |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |                                                          |
| Leaking                                                                  | 3 | 3                              |                                                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |                                                          |
| Missing, damaged mounting hardware                                       | 3 | 3                              |                                                          |
|                                                                          | 3 | 3                              |                                                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |                                                          |
| Damaged                                                                  | 3 | 3                              |                                                          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |                                                          |

**CELLULAR PHONES/ANTENNA**

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**CELLULAR PHONES/ANTENNA**

|                                                                          |   |                                |
|--------------------------------------------------------------------------|---|--------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Condition                                                                | 3 | Procedure                      |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Inoperative/intermittent                                                 | 3 | Require replacement.           |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Broken                                                                   | 3 |                                |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Missing                                                                  | 3 |                                |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Corroded, loose terminals                                                | 3 | Suggest repair or replacement. |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Missing, damaged mounting hardware                                       | 3 | Require repair or replacement  |
|                                                                          | 3 | of mounting hardware.          |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |
| Damaged                                                                  | 3 | Suggest repair or replacement. |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                |

**TRANSCEIVER/EXTERNAL SPEAKER/MICROPHONE**

**TRANSCEIVER/EXTERNAL SPEAKER/MICROPHONE**

|                                                                          |   |                                               |
|--------------------------------------------------------------------------|---|-----------------------------------------------|
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                               |
| Condition                                                                | 3 | Procedure 3 Note                              |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                               |
| Inoperative/intermittent                                                 | 3 | Require repair or replacement 3               |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                               |
| Malfunctioning                                                           | 3 | Suggest repair or replacement. 3              |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                               |
| Missing                                                                  | 3 | Require replacement. 3                        |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                               |
| Missing, damaged mounting hardware                                       | 3 | Require replacement 3 of mounting hardware. 3 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                               |
| Corroded, loose terminals                                                | 3 | Suggest repair or replacement. 3              |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                               |
| Poor sound quality                                                       | 3 | Further inspection 3 Make sure poor sound is  |
|                                                                          | 3 | required. 3 not caused by ignition/           |
|                                                                          | 3 | charging system or other                      |
|                                                                          | 3 | forms of electrical                           |
|                                                                          | 3 | interference.                                 |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                               |
| Damaged                                                                  | 3 | Suggest repair or replacement. 3              |
| AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA |   |                                               |

**HORNS/SIRENS**

**HORNS/SIRENS**

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|                                    |   |                                                        |
|------------------------------------|---|--------------------------------------------------------|
| Condition                          | 3 | Procedure                                              |
| Inoperative                        | 3 | Require repair or replacement.                         |
| Intermittent                       | 3 |                                                        |
| Malfunctioning                     | 3 | Suggest repair or replacement.                         |
| Missing                            | 3 | Require replacement.                                   |
| Missing, damaged mounting hardware | 3 | Require repair or replacement<br>of mounting hardware. |
| Corroded, loose terminals          | 3 |                                                        |
| Damaged                            | 3 | Suggest repair or replacement.                         |

**SECURITY/ALARM SYSTEM/SENSORS**

|                                    |   |                                                        |
|------------------------------------|---|--------------------------------------------------------|
| Condition                          | 3 | Procedure                                              |
| Inoperative                        | 3 | Require repair or replacement.                         |
| Intermittent                       | 3 |                                                        |
| Malfunctioning                     | 3 | Suggest repair or replacement.                         |
| Missing                            | 3 | Require replacement.                                   |
| Missing, damaged mounting hardware | 3 | Require repair or replacement<br>of mounting hardware. |
| Corroded, loose terminals          | 3 |                                                        |
| Damaged                            | 3 | Suggest repair or replacement.                         |

**KEYLESS ENTRY/KEY PAD/TRANSMITTER**

|                          |   |                                |
|--------------------------|---|--------------------------------|
| Condition                | 3 | Procedure                      |
| Inoperative/intermittent | 3 | Require repair or replacement. |
| Malfunctioning           | 3 | Suggest repair or replacement. |
| Missing                  | 3 | Require replacement.           |

3 forms of electrical

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3 interference.  
Corroded, loose 3 Suggest repair or 3  
terminals 3 replacement. 3  
Damaged 3 Suggest replacement. 3

**TAPE/CD PLAYER**

**TAPE/CD PLAYER**

| Condition                          | Procedure                                 | Note                                                                                                      |
|------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Inoperative                        | Require repair or replacement             |                                                                                                           |
| Intermittent                       | Suggest repair or replacement.            |                                                                                                           |
| Malfunctioning                     |                                           |                                                                                                           |
| Missing                            | Require replacement.                      |                                                                                                           |
| Missing, damaged mounting hardware | Require replacement of mounting hardware. |                                                                                                           |
| Poor sound quality                 | Further inspection required.              | Make sure poor sound is not caused by ignition/charging system or other forms of electrical interference. |
| Corroded, loose terminals          | Suggest repair or replacement.            |                                                                                                           |
| Skips                              |                                           |                                                                                                           |
| Incorrect speed                    |                                           |                                                                                                           |
| Damaged                            | Suggest replacement.                      |                                                                                                           |

**WIPER SYSTEMS/MOTOR**

**WIPER SYSTEMS/MOTOR**

| Condition                | Procedure                      | Note |
|--------------------------|--------------------------------|------|
| Inoperative/intermittent | Require repair or replacement. |      |
| Malfunctioning (e.g.     | Suggest repair or              |      |



[illegible]

# **\* ELECTRICAL SYSTEM UNIFORM INSPECTION GUIDELINES \***

## **Article Text (p. 31)**

1996 Volkswagen Golf

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| Condition                          | 3 | Procedure                                              |
|------------------------------------|---|--------------------------------------------------------|
| Leaks                              | 3 | Require repair or replacement.                         |
| Missing                            | 3 | Require replacement.                                   |
| Missing, damaged mounting hardware | 3 | Require repair or replacement<br>of mounting hardware. |
| Damaged                            | 3 | Suggest repair or replacement.                         |

### **HOSES/NOZZLES**

| Condition                          | 3 | Procedure                                              |
|------------------------------------|---|--------------------------------------------------------|
| Leaks                              | 3 | Require repair or replacement.                         |
| Missing                            | 3 | Require replacement.                                   |
| Missing, damaged mounting hardware | 3 | Require repair or replacement<br>of mounting hardware. |
| Incorrect spray pattern            | 3 | Suggest repair or replacement.                         |
| Blocked                            | 3 | Require repair or replacement.                         |
| Damaged                            | 3 | Suggest repair or replacement.                         |

### **PASSIVE RESTRAINT SYSTEMS**

FOR ALL SIR COMPONENTS AND CONDITIONS, CUSTOMER MUST BE REFERRED TO DIAGNOSIS AND PART REPLACEMENT.

### **FACILITY ACCREDITATION PROGRAM**

The mission of the Motorist Assurance Program (MAP) is ... To promote trust and the assurance of customer satisfaction in the vehicle repair industry through education and the creation of industry guidelines. In continuing to fulfill its mission, MAP will be establishing a facility accreditation procedure to provide customers with some assurance that standards of service are being followed throughout the industry, and that when those standards are not met, there is a method for the customer to achieve satisfaction.

A repair facility which commits to participate in the program will be permitted to display the MAP Facility Accreditation Program sign. Display of the sign will notify the consuming public that they can have confidence in the inspection performed at the facility, and

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that any dispute over repairs or service will be resolved fairly.

Facilities participating in the MAP Accreditation Program must adopt and diligently adhere to MAP's Pledge to Customers and MAP's Standards of Service.

If you are interested in obtaining more information about the Accreditation Program when it is issued, please complete the form below and then FAX it to MAP headquarters at (202) 223 9569.

Please send me information about MAP's accreditation program as soon as it is available.

NOTE: To print information request for Facilities Accreditation Program, print portion of article between dashed lines.

-----  
**MAP FACILITIES ACCREDITATION PROGRAM**

Please send me information about MAP's accreditation program as soon as possible.

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone \_\_\_\_\_ FAX \_\_\_\_\_

-----  
**END OF ARTICLE**

# **TURBOCHARGER, ENGINE STARTING PRECAUTIONS**

## **Article Text**

1996 Volkswagen Golf  
For Volkswagen Technical Site  
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Friday, August 20, 1999 12:08AM

### **ARTICLE BEGINNING**

TECHNICAL SERVICE BULLETIN

TURBOCHARGER, ENGINE STARTING PRECAUTIONS

Model(s): 1995-on Volkswagen Passat  
1996-on Volkswagen Golf, Jetta  
All with Turbocharged Diesel Engine code (AAZ, 1Z)  
Group: 21 - Turbo, Charger/Supercharger  
Bulletin No.: 96-01  
Date: January 12, 1996

### **CONDITION**

Damage to the turbocharger (after replacing the oil filter or starting the engine after long term storage) can be caused by raising the engine RPM before full oil pressure is reached.

### **SERVICE**

After replacing the engine oil filter or if a vehicle has been in long term storage: ALWAYS allow the engine to idle at least 10 seconds after the oil pressure light extinguishes before raising engine RPM's (this allows full oil pressure to reach the turbocharger).

CAUTION: Failure to allow oil pressure to build prior to raising the engine RPM can lead to premature turbocharger damage or internal engine damage.

For additional starting information, see the vehicle owners manual.

### **END OF ARTICLE**