

CLIC



1998-1999
Service Manual
GX Supplement

INTRODUCTION

How to Use This Manual

This supplement contains information for the 1998 – 1999 CIVIC GX. Refer to the 1996 – 1999 CIVIC Service Manual, P/N 61S0305, for service procedures and data not included in this supplement.

The first page of each section is marked with a black tab that lines up with one of the thumb index tabs on this page. You can quickly find the first page of each section without looking through a full table of contents. The symbols printed at the top corner of each page can also be used as a quick reference system.

Special Information

▲WARNING Indicates a strong possibility of severe personal injury or loss of life if instructions are not followed.

CAUTION: Indicates a possibility of personal injury or equipment damage if instructions are not followed.

NOTICE

The purpose of these messages is to help prevent damage to the vehicle, other property, or the environment.

NOTE: Gives helpful information.

CAUTION: Detailed descriptions of *standard workshop* procedures, safety principles and service operations are not included. Please note that this manual contains warnings and cautions against some specific service methods which could cause **PERSONAL INJURY**, damage a vehicle or make it unsafe. Please understand that these warnings cannot cover all conceivable ways in which service, whether or not recommended by HONDA, might be done, or of the possible hazardous consequences of every conceivable way, nor could HONDA investigate all such ways. Anyone using service procedures or tools, whether or not recommended by HONDA, *must satisfy himself thoroughly* that neither personal safety nor vehicle safety will be jeopardized.

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■ marked sections are not included in this manual.

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Service Publication Office

As sections with * include SRS components;
special precautions are required when servicing.

General Info



Special Tools



Specifications

specs

Maintenance



Engine



Cooling



Fuel and Emissions



*Transaxle



*Steering



Suspension



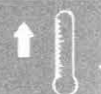
*Brakes (Including ABS)



*Body



*Heater and Air Conditioning



*Electrical



*SRS



SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

The Civic SRS includes a driver's airbag located in the steering wheel hub and a passenger's airbag located in the dashboard above the glove box.

Information necessary to safely service the SRS is included in the 1996 – 1999 CIVIC Service Manual, P/N 61S0305. Items marked with an asterisk (*) on the contents page include, or are located near, SRS components. Servicing, disassembling or replacing these items will require special precautions and tools, and should therefore be done by an authorized Honda dealer.

▲ WARNING

- To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all SRS service work must be performed by an authorized Honda dealer.
- Improper service procedures, including incorrect removal and installation of the SRS, could lead to personal injury caused by unintentional deployment of the airbags.
- Do not bump the SRS unit. Otherwise, the system may fail in case of a collision, or the airbags may deploy when the ignition switch is ON (II).
- SRS electrical wiring harnesses are indicated by yellow color coding. Related components are located in the steering column, front console, dashboard, dashboard lower panel, and in the dashboard above the glove box. Do not use electrical test equipment on these circuits.



General Information

Chassis and Paint Codes	1-2
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Chassis and Paint Codes

U.S. 1998 Model (4-door Sedan)

Vehicle Identification Number

1HGEN164*WL000001

Manufacturer, Make and Type of Vehicle

1HG: HONDA OF AMERICA
MFG., INC.
HONDA Passenger
vehicle

Line, Body and Engine Type

EN1: CIVIC 4-door/D16B5

Body Type and Transmission Type

6: Sedan/4-speed
Automatic

Vehicle Grade

4: GX

Check Digit

Model Year

W: 1998

Factory Code

L: East Liberty, Ohio Plant, U.S.A.

Serial Number

Engine Number

D16B5 - 1000001

Engine Type

D16B5: 1600 SOHC VTEC 16-valves Sequential
Multiport Fuel-injected Engine

Serial Number

Transmission Number

BDRA - 2000001

Transmission Type

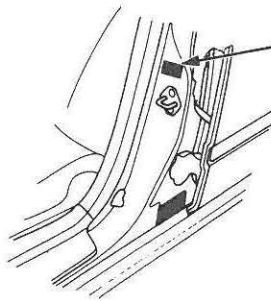
BDRA: 4-speed Automatic Transmission

Serial Number

Paint Code

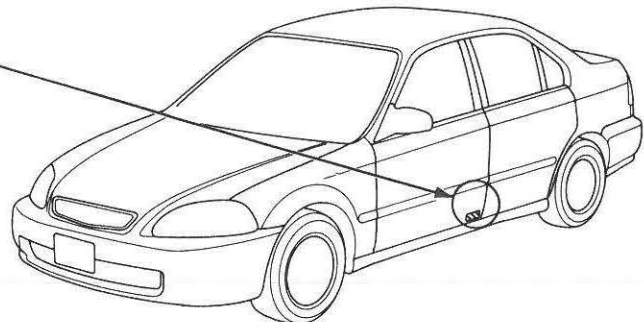
Paint Code	Color
B-73M	Cyclone Blue Metallic
NH-578	Taffeta White
NH-583M	New Vogue Silver Metallic

Vehicle Identification Number and Federal Motor Vehicle Safety Standard Certification



Paint Code

COLOR
B-73M





U.S. 1999 Model (4-door Sedan)

Vehicle Identification Number

1HGEN164 * X L 000001

Manufacturer, Make and Type of Vehicle

1HG: HONDA OF AMERICA
MFG., INC.
HONDA Passenger
vehicle

Line, Body and Engine Type

EN1: CIVIC 4-door/D16B5

Body Type and Transmission Type

6: Sedan/4-speed
Automatic

Vehicle Grade

4: GX

Check Digit

Model Year

X: 1999

Factory Code

L: East Liberty, Ohio Plant, U.S.A.

Serial Number

Engine Number

D16B5 - 1100001

Engine Type

D16B5: 1600 SOHC VTEC 16-valves Sequential
Multiport Fuel-injected Engine

Serial Number

Transmission Number

BDRA - 3000001

Transmission Type

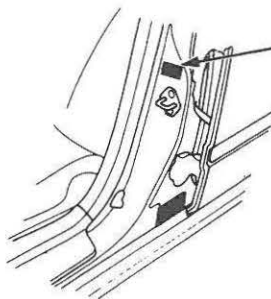
BDRA: 4-speed Automatic Transmission

Serial Number

Paint Code

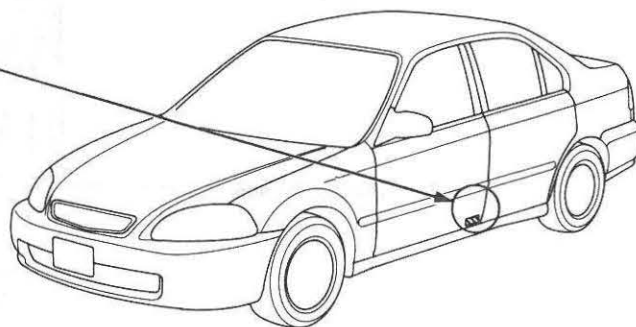
Paint Code	Color
B-73M	Cyclone Blue Metallic
NH-578	Taffeta White
NH-583M	New Vogue Silver Metallic

Vehicle Identification Number and Federal Motor Vehicle Safety Standard Certification

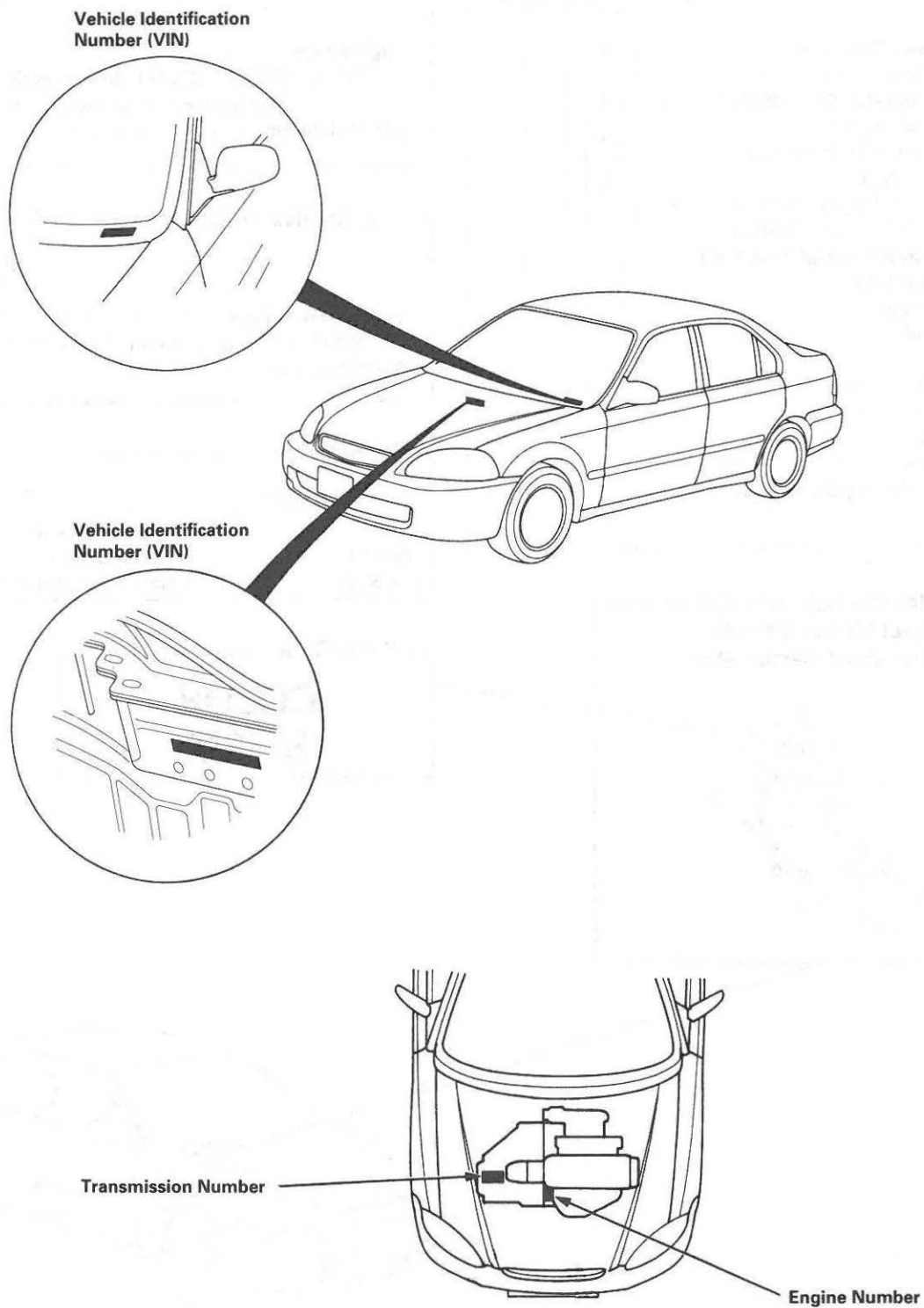


Paint Code

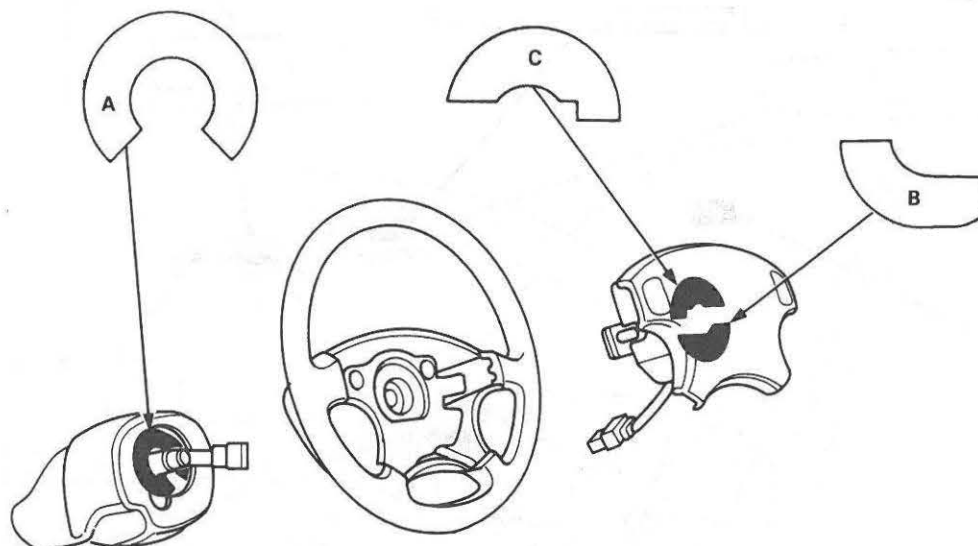
COLOR
B-73M



Identification Number Locations



Warning/Caution Label Locations



A: CABLE REEL CAUTION

SRS

INSTALLATION OF THE SRS CABLE REEL IS CRITICAL TO THE PROPER OPERATION OF THE SRS SYSTEM. REFER TO THE SERVICE MANUAL FOR DETAILED INSTALLATION INSTRUCTIONS.

B: DRIVER MODULE WARNING

WARNING

THE AIRBAG INFLATOR IS EXPLOSIVE AND, IF ACCIDENTALLY DEPLOYED, CAN SERIOUSLY HURT OR KILL YOU.

- DO NOT USE ELECTRICAL TEST EQUIPMENT OR PROBING DEVICES. THEY CAN CAUSE ACCIDENTAL DEPLOYMENT.
- NO SERVICEABLE PARTS INSIDE. DO NOT DISASSEMBLE.
- PLACE AIRBAG UPRIGHT WHEN REMOVED.
- FOLLOW SERVICE MANUAL INSTRUCTIONS CAREFULLY.

C: DRIVER MODULE DANGER

DANGER

EXPLOSIVE/FLAMMABLE

CONTACT WITH ACID, WATER OR HEAVY METALS SUCH AS COPPER, LEAD OR MERCURY MAY PRODUCE HARMFUL AND IRRITATING GASES OR EXPLOSIVE COMPOUNDS. STORAGE TEMPERATURES MUST NOT EXCEED 200°F (100°C). FOR PROPER HANDLING, STORAGE AND DISPOSAL PROCEDURES REFER TO SERVICE MANUAL, SRS SUPPLEMENT.

POISON

CONTAINS POISONOUS SODIUM AZIDE AND POTASSIUM NITRATE.

FIRST AID:

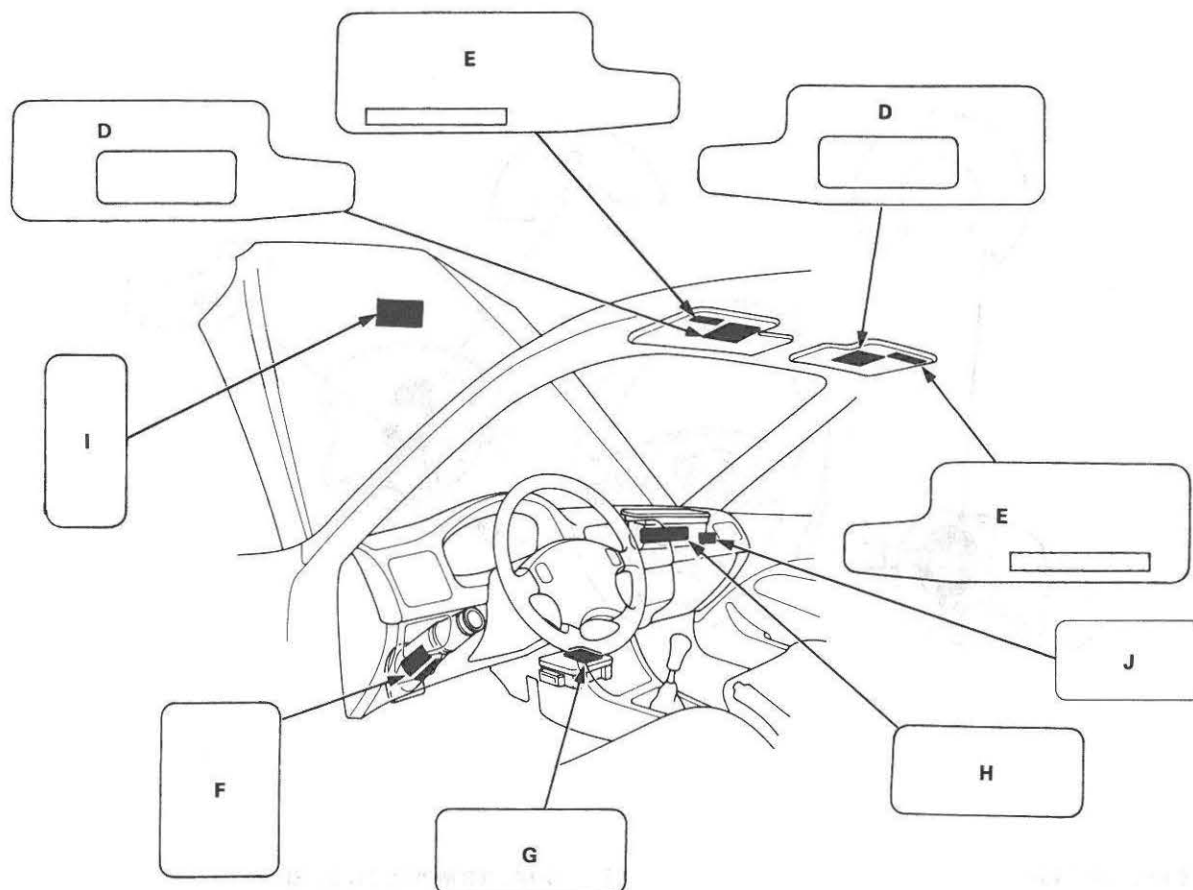
IF CONTENTS ARE SWALLOWED, INDUCE VOMITING. FOR EYE CONTACT, FLUSH EYES WITH WATER FOR 15 MINUTES. IF GASES (FROM ACID OR WATER CONTACT) ARE INHALED, SEEK FRESH AIR. IN EVERY CASE, GET PROMPT MEDICAL ATTENTION.

KEEP OUT OF REACH OF CHILDREN.

(cont'd)

Warning/Caution Label Locations

(cont'd)



H, I, J: see page 1-6

D: SRS INFORMATION

- WARNING**
DEATH OR SERIOUS INJURY CAN OCCUR.
- CHILDREN 12 AND UNDER CAN BE KILLED BY THE AIRBAG.
 - THE BACK SEAT IS THE SAFEST PLACE FOR CHILDREN.
 - NEVER PUT A REAR-FACING CHILD SEAT IN THE FRONT.
 - SIT AS FAR BACK AS POSSIBLE FROM THE AIRBAG.
 - ALWAYS USE SEAT BELTS AND CHILD RESTRAINTS.

E: SRS INFORMATION

AIRBAG WARNING
FLIP VISOR OVER

F: STEERING COLUMN NOTICE

- NOTICE**
TO PREVENT SRS DAMAGE, REMOVE STEERING WHEEL BEFORE REMOVING STEERING SHAFT CONNECTING BOLT.

G: MONITOR CAUTION

- NOTICE** **SRS**
- NO SERVICEABLE PARTS INSIDE.
 - REFER TO SERVICE MANUAL FOR DETAILED INSTRUCTIONS.



H: FRONT SEAT PASSENGER MODULE DANGER

DANGER

EXPLOSIVE/FLAMMABLE

CONTACT WITH ACID, WATER OR HEAVY METALS SUCH AS COPPER, LEAD OR MERCURY MAY PRODUCE HARMFUL AND IRRITATING GASES OR EXPLOSIVE COMPOUNDS. STORAGE TEMPERATURES MUST NOT EXCEED 200°F (100°C). FOR PROPER HANDLING, STORAGE, AND DISPOSAL PROCEDURES REFER TO SERVICE MANUAL, SRS SUPPLEMENT.

POISON

CONTAINS POISONOUS SODIUM AZIDE AND POTASSIUM NITRATE.

FIRST AID

IF CONTENTS ARE SWALLOWED, INDUCE VOMITING. FOR EYE CONTACT, FLUSH EYES WITH WATER FOR 15 MINUTES. IF GASES (FROM ACID OR WATER CONTACT) ARE INHALED, SEEK FRESH AIR IN EVERY CASE, GET PROMPT MEDICAL ATTENTION.

KEEP OUT OF REACH OF CHILDREN.

WARNING

THE AIRBAG INFLATOR IS EXPLOSIVE AND, IF ACCIDENTALLY DEPLOYED, CAN SERIOUSLY HURT OR KILL YOU.

- DO NOT USE ELECTRICAL TEST EQUIPMENT OR PROBING DEVICES.
THEY CAN CAUSE ACCIDENTAL DEPLOYMENT.
- NO SERVICEABLE PARTS INSIDE. DO NOT DISASSEMBLE.
- PLACE AIRBAG UPRIGHT WHEN REMOVED.
- FOLLOW SERVICE MANUAL INSTRUCTIONS CAREFULLY.

I: SRS WARNING (HOOD)

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

THIS VEHICLE IS EQUIPPED WITH DRIVER AND FRONT SEAT PASSENGER AIRBAGS.

ALL SRS ELECTRICAL WIRING AND CONNECTORS ARE COLORED YELLOW.

TAMPERING WITH, DISCONNECTING OR USING ELECTRICAL TEST EQUIPMENT ON THE SRS WIRING CAN MAKE THE SYSTEM INOPERATIVE OR CAUSE ACCIDENTAL FIRING OF THE INFLATOR.

WARNING

THE AIRBAG INFLATOR IS EXPLOSIVE AND, IF ACCIDENTALLY DEPLOYED, CAN SERIOUSLY HURT YOU. FOLLOW SERVICE MANUAL INSTRUCTIONS CAREFULLY.

J: PASSENGER AIRBAG CAUTION

WARNING

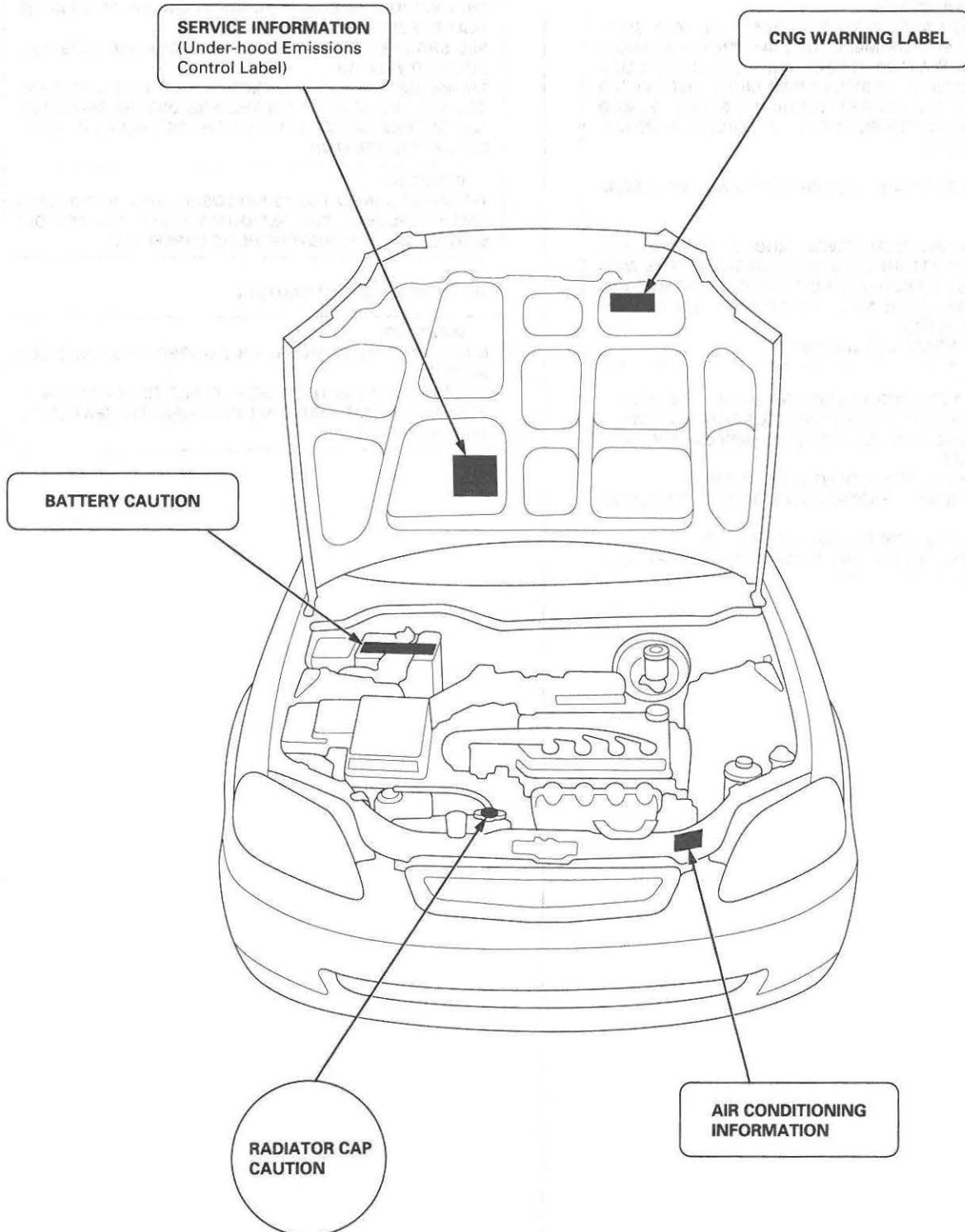
CHILDREN CAN BE KILLED OR INJURED BY PASSENGER AIRBAG.

THE BACK SEAT IS THE SAFEST PLACE FOR CHILDREN 12 AND UNDER. MAKE SURE ALL CHILDREN USE SEAT BELTS OR CHILD SEATS.

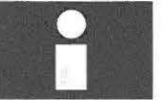
(cont'd)

Warning/Caution Label Locations

(cont'd)



Under-hood Emissions Control Label (1998 Model)



Emission Group Identification

Example:

VEHICLE EMISSION CONTROL INFORMATION	
THIS VEHICLE CONFORMS TO U.S. EPA REGULATIONS APPLICABLE TO NATURAL GAS FUELED 1998 MODEL YEAR NEW ILEV CLEAN FUEL FLEET PROGRAM MOTOR VEHICLES AND TO CALIFORNIA AND U.S. EPA REGULATIONS APPLICABLE TO 1998 NEW ILEV PASSENGER CARS. THIS PASSENGER CAR IS CERTIFIED TO OPERATE ON COMPRESSED NATURAL GAS.	
CATALYST	
WU-TWC/TWC/HO2S(2)/EGR/SFI OBD II CERTIFIED	
VALVE LASH (COLD)	IN: 0.20±0.02 mm EX: 0.25±0.02 mm
SPARK PLUG GAP	0.7-0.8 mm
NO OTHER ADJUSTMENTS NEEDED.	
WHNXV01.6KA4 WHNXR0000CNG (\$86.130-96 PROCEDURES) 1.6L	
16VHCPPG	
HONDA MOTOR CO., LTD	PDN-A00

Engine and Evaporative Families

Engine Family: W HNX V 01.6 KA4

Model Year _____
W: 1998
Manufacturer _____
HNX: Honda
Type _____
V: Light Duty Vehicle/Passenger Car
Displacement _____
Sequence Characters _____

Evaporative Family: W HNX R 0000 CNG

Model Year _____
W: 1998
Manufacturer _____
HNX: Honda
Type _____
R: Refueling
Canister Work Capacity (grams) _____
Sequence Characters _____

Under-hood Emissions Control Label (1999 Model)

Emission Group Identification

Example:

VEHICLE EMISSION CONTROL INFORMATION

THIS VEHICLE CONFORMS TO U.S. EPA REGULATIONS APPLICABLE TO NATURAL GAS FUELED 1999 MODEL YEAR ILEV CLEAN FUEL FLEET PROGRAM MOTOR VEHICLES AND TO CALIFORNIA AND U.S. EPA NLEV REGULATIONS APPLICABLE TO 1999 MODEL YEAR NEW ULEV PASSENGER CARS. THIS PASSENGER CAR IS CERTIFIED TO OPERATE ON COMPRESSED NATURAL GAS.

CATALYST

WU-TWC/TWC/HO2S(2)/EGR/SFI

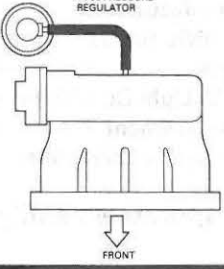
VALVE LASH
(COLD)
SPARK PLUG GAP
NO OTHER ADJUSTMENTS NEEDED.

IN: 0.20±0.02 mm
EX: 0.25±0.02 mm
0.7-0.8 mm


X-HNXV01 6KA4
X-HNXR0000CNG
OBD II CERTIFIED


1.6L

FUEL PRESSURE
REGULATOR



16VHCPPG

HONDA MOTOR CO., LTD

U-E
PDN-A01

Engine and Evaporative Families

Engine Family:

X HNX V 01.6 KA4

Model Year

X: 1999

Manufacturer

HNX: Honda

Type

V: Light Duty Vehicle/Passenger Car

Displacement

Sequence Characters

Evaporative Family:

X HNX R 0000 CNG

Model Year

X: 1999

Manufacturer

HNX: Honda

Type

R: Refueling

Canister Work Capacity (grams)

Sequence Characters



Special Tools

Individual tool lists are located at the front of each section.



Special Topics

Special Topics in the History of the United States

Specifications

Standards and Service Limits	3-2
Design Specifications	3-11
Body Specifications	3-13

Standards and Service Limits

Cylinder Head/Valve Train — Section 6

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Compression	250 rpm and wide open throttle kPa (kgf/cm ² , psi)	Nominal Minimum Maximum variation	1,670 (17.0, 242) 930 (9.5, 135) 200 (2.0, 28)	
Cylinder head	Warpage Height		92.95 – 93.05 (3.659 – 3.663)	0.05 (0.002)
Camshaft	End play		0.05 – 0.15 (0.002 – 0.006)	0.5 (0.02)
	Camshaft-to-holder oil clearance		0.050 – 0.089 (0.002 – 0.004)	0.15 (0.006)
	Total runout		0.03 (0.001) max.	0.04 (0.002)
	Cam lobe height	IN Primary EX Secondary	38.427 (1.5129) 32.292 (1.2713) 38.784 (1.5269)	
Valve	Valve clearance (Cold)	IN	0.18 – 0.22 (0.007 – 0.009)	
		EX	0.23 – 0.27 (0.009 – 0.011)	
	Valve stem O.D.	IN	5.48 – 5.49 (0.2157 – 0.2161)	5.45 (0.2146)
		EX	5.45 – 5.46 (0.2146 – 0.2150)	5.42 (0.2134)
	Stem-to-guide clearance	IN	0.02 – 0.05 (0.001 – 0.002)	0.08 (0.003)
		EX	0.05 – 0.08 (0.002 – 0.003)	0.11 (0.004)
Valve seat	Width	IN	0.85 – 1.15 (0.033 – 0.045)	1.6 (0.063)
		EX	1.25 – 1.55 (0.049 – 0.061)	2.0 (0.079)
	Stem installed height	IN	53.17 – 53.64 (2.093 – 2.112)	53.89 (2.122)
		EX	53.17 – 53.64 (2.093 – 2.112)	53.89 (2.122)
Valve spring	Free length	IN	56.5 (2.22)	
		EX	57.9 (2.28)	
Valve guide	I.D.	IN	5.51 – 5.53 (0.217 – 0.218)	5.55 (0.219)
		EX	5.51 – 5.53 (0.217 – 0.218)	5.55 (0.219)
	Installed height	IN	17.85 – 18.35 (0.703 – 0.722)	
		EX	18.65 – 19.15 (0.734 – 0.754)	
Rocker arm	Arm-to-shaft clearance	IN	0.017 – 0.050 (0.0007 – 0.0020)	0.08 (0.003)
		EX	0.018 – 0.054 (0.0007 – 0.0021)	0.08 (0.003)

Unit of length: mm (in)

Engine Block — Section 7

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Cylinder block	Warpage of deck surface Bore diameter Bore taper Reboring limit	0.07 (0.003) max. 75.00 – 75.02 (2.953 – 2.954) _____ _____	0.10 (0.004) 75.07 (2.956) 0.05 (0.002) 0.5 (0.02)
Piston	Skirt O.D. at 14 mm (0.6 in) from bottom of skirt Clearance in cylinder Groove width (for ring) Top Second Oil	74.980 – 74.990 (2.9520 – 2.9524) 0.010 – 0.040 (0.0004 – 0.0016) 1.020 – 1.030 (0.0402 – 0.0406) 1.220 – 1.230 (0.0480 – 0.0484) 2.805 – 2.820 (0.1104 – 0.1110)	74.970 (2.9516) 0.05 (0.002) 1.05 (0.041) 1.25 (0.049) 2.85 (0.112)
Piston ring	Ring-to-groove clearance Top Second Ring end gap Top Second Oil	0.035 – 0.060 (0.0014 – 0.0024) 0.030 – 0.055 (0.0012 – 0.0022) 0.15 – 0.30 (0.006 – 0.012) 0.30 – 0.45 (0.012 – 0.018) 0.20 – 0.70 (0.008 – 0.028)	0.13 (0.005) 0.13 (0.005) 0.60 (0.024) 0.70 (0.028) 0.80 (0.031)
Piston pin	O.D. Pin-to-piston clearance	20.996 – 21.000 (0.8266 – 0.8268) 0.010 – 0.020 (0.0004 – 0.0008)	_____ _____
Connecting rod	Pin-to-rod interference Small end bore diameter Large end bore diameter Nominal End play installed on crankshaft	0.015 – 0.032 (0.0006 – 0.0013) 20.968 – 20.981 (0.8255 – 0.8260) 48.0 (1.89) 0.15 – 0.30 (0.006 – 0.012)	_____ _____ _____ 0.40 (0.016)
Crankshaft	Main journal diameter Rod journal diameter Taper Out-of-round End play Total runout	54.976 – 55.000 (2.1644 – 2.1654) 44.976 – 45.000 (1.7707 – 1.7717) 0.0025 (0.0001) max. 0.0025 (0.0001) max. 0.10 – 0.35 (0.004 – 0.014) 0.03 (0.001) max.	_____ _____ 0.005 (0.0002) 0.005 (0.0002) 0.45 (0.018) 0.04 (0.002)
Bearings	Main bearing-to-journal oil clearance No. 1 and 5 journals No. 2, 3 and 4 journals Rod bearing-to-journal oil clearance	0.018 – 0.036 (0.0007 – 0.0014) 0.024 – 0.042 (0.0009 – 0.0017) 0.020 – 0.038 (0.0008 – 0.0015)	0.05 (0.002) 0.05 (0.002) 0.05 (0.002)

Engine Lubrication — Section 8

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Engine oil	Capacity ℓ (US qt, Imp qt)	3.7 (3.9, 3.3) for engine overhaul 3.3 (3.5, 2.9) for oil change, including filter 3.0 (3.2, 2.6) for oil change, without filter	
Oil pump	Inner-to-outer rotor radial clearance Pump housing-to-outer rotor radial clearance Pump housing-to rotor axial clearance	0.02 – 0.14 (0.001 – 0.006) 0.10 – 0.18 (0.004 – 0.007) 0.03 – 0.08 (0.001 – 0.003)	0.20 (0.008) 0.20 (0.008) 0.15 (0.006)
Relief valve	Pressure setting with oil temperature 176°F (80°C) kPa (kgf/cm ² , psi) at idle at 3,000 rpm	70 (0.7, 10) min. 340 (3.5, 50) min.	

Standards and Service Limits

Cooling — Section 10

	MEASUREMENT	STANDARD (NEW)
Radiator	Engine coolant capacity ℓ (US qt, Imp qt) including engine, heater, cooling line and reservoir Reservoir capacity: 0.4 ℓ (0.42 US qt, 0.35 Imp qt)	4.3 (4.5, 3.8) for overhaul 3.9 (4.1, 3.4) for coolant change
Radiator cap	Opening pressure kPa (kgf/cm ² , psi)	93 – 123 (0.95 – 1.25, 13.5 – 17.8)
Thermostat	Start to opening °F (°C) Fully open °F (°C) Valve lift at fully open	169 – 176 (76 – 80) 194 (90) 8.0 (0.31) min.
Cooling fan	Thermoswitch “ON” temperature °F (°C) Thermoswitch “OFF” temperature °F (°C)	196 – 203 (91 – 95) Subtract 5 – 15 (3 – 8) from actual “ON” temperature

Fuel and Emission — Section 11

	MEASUREMENT	
Engine	Idle speed rpm	700 ± 50 (N or P position)
	Idle CO %	0.1 max.

Automatic Transmission — Section 14

Automatic Transmission — Section 14				
	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Transmission fluid	Capacity ℓ (US qt, Imp qt)		5.9 (6.2, 5.2) for overhaul 2.7 (2.9, 2.4) for fluid change	
Hydraulic pressure kPa (kgf/cm ² , psi)	Line pressure at 2,000 rpm in N or P position		830 – 880 (8.5 – 9.0, 120 – 130)	780 (8.0, 110)
	1st clutch pressure at 2,000 rpm in D₄ position			
	2nd clutch pressure at 2,000 rpm in 2 position		800 – 850 (8.2 – 8.7, 120 – 124)	760 (7.7, 110)
	3rd clutch pressure at 2,000 rpm in D₃ position		810 – 860 (8.3 – 8.8, 118 – 125)	760 (7.8, 110)
	4th clutch pressure at 2,000 rpm in D₄ position			
Stall speed rpm (Check with vehicle on level ground)			2,700	2,550 – 2,850
Clutch	Clutch initial clearance	1st, 2nd	0.65 – 0.85 (0.026 – 0.033)	—
		3rd, 4th	0.40 – 0.60 (0.016 – 0.024)	—
	Clutch return spring free length	1st	32.0 (1.26)	30.0 (1.18)
		2nd, 3rd, 4th	30.5 (1.20)	28.5 (1.12)
	Clutch disc thickness		1.88 – 2.00 (0.074 – 0.079)	Until grooves worn out
	Clutch plate thickness	1st	1.55 – 1.65 (0.061 – 0.065)	Discoloration
		2nd, 3rd, 4th	1.95 – 2.05 (0.077 – 0.081)	Discoloration
	Clutch end plate thickness	Mark 1	2.05 – 2.10 (0.081 – 0.083)	Discoloration ↑ ↓ Discoloration
		Mark 2	2.15 – 2.20 (0.085 – 0.087)	
		Mark 3	2.25 – 2.30 (0.089 – 0.091)	
		Mark 4	2.35 – 2.40 (0.093 – 0.094)	
		Mark 5	2.45 – 2.50 (0.096 – 0.098)	
		Mark 6	2.55 – 2.60 (0.100 – 0.102)	
		Mark 7	2.65 – 2.70 (0.104 – 0.106)	
		Mark 8	2.75 – 2.80 (0.108 – 0.110)	
		Mark 9	2.85 – 2.90 (0.112 – 0.114)	

(cont'd)

Standards and Service Limits

Automatic Transmission (cont'd) — Section 14

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission	Diameter of needle bearing contact area		
	On mainshaft stator shaft bearing	22.980 – 22.993 (0.9047 – 0.9052)	Wear or damage ↑
	On mainshaft 2nd gear	35.975 – 35.991 (1.4163 – 1.4169)	
	On mainshaft 4th gear collar	31.975 – 31.991 (1.2589 – 1.2595)	↓ Wear or damage
	On mainshaft 1st gear collar	30.975 – 30.991 (1.2195 – 1.2201)	
	On countershaft (left side)	36.004 – 36.017 (1.4175 – 1.4180)	Wear or damage
	On countershaft 3rd gear collar	35.980 – 35.996 (1.4165 – 1.4172)	
	On countershaft 4th gear	27.980 – 27.993 (1.1016 – 1.1021)	↑ Wear or damage
	On countershaft reverse gear collar	31.975 – 31.991 (1.2589 – 1.2595)	
	On countershaft 1st gear collar	31.975 – 31.991 (1.2589 – 1.2595)	↓ Wear or damage
	On reverse idler gear shaft	13.990 – 14.000 (0.5508 – 0.5512)	
	Inside diameter of needle bearing contact area		
	On mainshaft 1st gear	35.000 – 35.016 (1.3780 – 1.3786)	↑ Wear or damage
	On mainshaft 2nd gear	41.000 – 41.016 (1.6142 – 1.6148)	
	On mainshaft 4th gear	38.000 – 38.016 (1.4961 – 1.4967)	↓ Wear or damage
	On countershaft 1st gear	38.000 – 38.016 (1.4961 – 1.4967)	
	On countershaft 3rd gear	41.000 – 41.016 (1.6142 – 1.6148)	↑ Wear or damage
	On countershaft 4th gear	33.000 – 33.016 (1.2992 – 1.2998)	
	On countershaft reverse gear	38.000 – 38.016 (1.4961 – 1.4967)	↓ Wear or damage
	On reverse idler gear	18.007 – 18.020 (0.7089 – 0.7094)	
	On stator shaft (ATF pump side)	29.000 – 29.013 (1.1417 – 1.1422)	↑ Wear or damage
	On stator shaft (stator side)	27.000 – 27.021 (1.0630 – 1.0638)	
	Reverse idler gear shaft holder I.D.	14.416 – 14.434 (0.5676 – 0.5683)	Wear or damage
	End play		
	Mainshaft 1st gear	0.08 – 0.19 (0.003 – 0.007)	—
	Mainshaft 2nd gear	0.05 – 0.13 (0.002 – 0.005)	—
	Mainshaft 4th gear	0.075 – 0.185 (0.003 – 0.007)	—
	Countershaft 1st gear	0.1 – 0.5 (0.004 – 0.020)	—
	Countershaft 3rd gear	0.05 – 0.17 (0.002 – 0.007)	—
	Countershaft 4th gear	0.10 – 0.18 (0.004 – 0.007)	—
	Reverse idler gear	0.05 – 0.18 (0.002 – 0.007)	—
	Countershaft reverse gear	0.10 – 0.25 (0.004 – 0.010)	—
	Selector hub O.D.	51.87 – 51.90 (2.042 – 2.043)	Wear or damage
	Mainshaft 4th gear collar length	45.00 – 45.03 (1.771 – 1.773)	—
	Mainshaft 4th gear collar flange thickness	4.435 – 4.525 (0.1746 – 0.1781)	—
	Mainshaft 1st gear collar length	27.00 – 27.15 (1.063 – 1.069)	—
	Countershaft distance collar length		
		38.87 – 38.90 (1.530 – 1.531)	—
		38.92 – 38.95 (1.532 – 1.533)	—
		38.97 – 39.00 (1.534 – 1.535)	—
		39.02 – 39.05 (1.536 – 1.537)	—
		39.07 – 39.10 (1.538 – 1.539)	—
		39.12 – 39.15 (1.540 – 1.541)	—
		39.17 – 39.20 (1.542 – 1.543)	—
		39.22 – 39.25 (1.544 – 1.545)	—
		39.27 – 39.30 (1.546 – 1.547)	—
	Countershaft 3rd gear collar length	20.65 – 20.70 (0.813 – 0.825)	—
	Countershaft reverse gear collar length	14.5 – 14.6 (0.571 – 0.575)	—
	Countershaft reverse gear collar flange thickness	2.4 – 2.6 (0.094 – 0.102)	Wear or damage
	Countershaft 1st gear collar length	14.5 – 14.6 (0.571 – 0.575)	—
	Countershaft 1st gear collar flange thickness	2.4 – 2.6 (0.094 – 0.102)	Wear or damage

Automatic Transmission — Section 14

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission	Mainshaft 2nd gear thrust washer thickness	3.97 – 4.00 (0.156 – 0.157) 4.02 – 4.05 (0.158 – 0.159) 4.07 – 4.10 (0.160 – 0.161) 4.12 – 4.15 (0.162 – 0.163) 4.17 – 4.20 (0.164 – 0.165) 4.22 – 4.25 (0.166 – 0.167) 4.27 – 4.30 (0.168 – 0.169) 4.32 – 4.35 (0.170 – 0.171) 4.37 – 4.40 (0.172 – 0.173) 4.42 – 4.45 (0.174 – 0.175)	Wear or damage ↑ ↓ Wear or damage
	Thrust washer thickness		
	Mainshaft ball bearing left side	2.95 – 3.05 (0.116 – 0.120)	Wear or damage
	Mainshaft 1st gear	2.43 – 2.50 (0.096 – 0.098)	↑ Wear or damage
	Countershaft 3rd gear splined washer	4.95 – 5.00 (0.195 – 0.197)	↓ Wear or damage
	One-way clutch contact area I.D.		
	Countershaft 1st gear	83.339 – 83.365 (3.2810 – 3.2821)	Wear or damage
	Parking gear	66.685 – 66.698 (2.6254 – 2.6259)	Wear or damage
	Mainshaft feed pipe A, O.D. (at 15 mm from end)	8.97 – 8.98 (0.353 – 0.354)	8.95 (0.352)
	Mainshaft feed pipe B, O.D. (at 30 mm from end)	5.97 – 5.98 (0.2350 – 0.2354)	5.95 (0.234)
Transmission	Countershaft feed pipe O.D. (at 15 mm from end)	7.97 – 7.98 (0.3138 – 0.3142)	7.95 (0.313)
	Mainshaft sealing ring thickness (29 mm and 35 mm)	1.87 – 1.97 (0.074 – 0.078)	1.80 (0.071)
	Mainshaft bushing I.D.	6.018 – 6.030 (0.2369 – 0.2374)	6.045 (0.2380)
	Mainshaft bushing I.D.	9.000 – 9.015 (0.3543 – 0.3549)	9.03 (0.356)
	Countershaft bushing I.D.	8.000 – 8.022 (0.3150 – 0.3158)	8.03 (0.316)
	Mainshaft sealing ring groove width	2.025 – 2.075 (0.0797 – 0.0817)	2.08 (0.082)
	Regulator valve body	Sealing ring contact area I.D.	35.000 – 35.025 (1.3780 – 1.3782) 35.050 (1.3799)
	Shifting device and parking brake control	Reverse shift fork finger thickness Parking brake pawl Parking gear	5.90 – 6.00 (0.232 – 0.236) _____ _____ 5.40 (0.213) Wear or other defect
	Servo body	Shift fork shaft bore I.D. Shift fork shaft valve bore I.D.	14.000 – 14.010 (0.5512 – 0.5516) 37.000 – 37.039 (1.4567 – 1.4582) 37.045 (1.4585)
	ATF pump	ATF pump gear side clearance ATF pump gear-to-body clearance ATF pump driven gear I.D. ATF pump driven gear shaft O.D.	0.03 – 0.05 (0.001 – 0.002) 0.1050 – 0.1325 (0.0041 – 0.0052) 0.0350 – 0.0625 (0.0014 – 0.0025) 14.016 – 14.034 (0.5518 – 0.5525) 13.980 – 13.990 (0.5504 – 0.5508) 0.07 (0.003) _____ _____ Wear or damage Wear or damage
Differential carrier	Pinion shaft contact area I.D.	18.010 – 18.028 (0.7091 – 0.7098)	_____ 0.1 (0.004)
	Carrier-to-pinion clearance	0.023 – 0.057 (0.0009 – 0.0022)	_____ 0.12 (0.005)
	Driveshaft contact area I.D.	26.025 – 26.045 (1.0246 – 1.0254)	_____ 0.12 (0.005)
	Carrier-to-driveshaft clearance	0.045 – 0.086 (0.0018 – 0.0034)	_____ 0.15 (0.006)
Differential pinion gear	Backlash	0.05 – 0.15 (0.002 – 0.006)	_____ 0.15 (0.006)
	I.D.	18.042 – 18.066 (0.7103 – 0.7113)	_____ 0.15 (0.006)
	Pinion gear-to-pinion shaft clearance	0.055 – 0.095 (0.0022 – 0.0037)	_____ Adjust
Set ring-to-bearing outer race clearance		0 – 0.15 (0 – 0.006)	Adjust

(cont'd)

Standards and Service Limits

Automatic Transmission (cont'd) — Section 14

	MEASUREMENT	STANDARD (NEW)			
		Wire Dia.	O.D.	Free Length	No. of Coils
Springs	Regulator valve spring A	1.8 (0.071)	14.7 (0.584)	87.8 (3.457)	16.5
	Regulator valve spring B	1.8 (0.071)	*6.0 (0.236)	44.0 (1.732)	11.0
	Stator reaction spring	4.5 (0.177)	35.4 (1.407)	30.3 (1.193)	1.9
	Modulator valve spring	1.4 (0.055)	9.4 (0.374)	35.0 (1.378)	10.9
	Torque converter check valve spring	1.0 (0.039)	8.4 (0.334)	33.8 (1.331)	8.2
	Cooler relief valve spring	1.0 (0.039)	8.4 (0.334)	33.8 (1.331)	8.2
	Relief valve spring	1.1 (0.043)	8.6 (0.342)	37.1 (1.461)	13.4
	2nd orifice control valve spring	0.7 (0.028)	6.6 (0.262)	34.8 (1.370)	22.0
	1-2 shift valve spring	0.9 (0.035)	7.6 (0.302)	41.3 (1.626)	16.3
	2-3 shift valve spring	0.9 (0.035)	7.6 (0.302)	57.0 (2.244)	26.8
	3-4 shift valve spring	0.9 (0.035)	7.6 (0.302)	57.0 (2.244)	26.8
	1st accumulator spring	2.1 (0.083)	16.0 (0.636)	89.1 (3.508)	16.2
	4th accumulator spring B	2.3 (0.091)	*5.6 (0.220)	51.6 (2.031)	13.8
	4th accumulator spring A	2.6 (0.102)	17.0 (0.676)	87.0 (3.425)	14.2
	2nd accumulator spring A	2.4 (0.094)	29.0 (1.152)	39.0 (1.535)	2.9
	3rd accumulator spring A	2.8 (0.110)	17.5 (0.695)	89.3 (3.516)	15.6
	2nd accumulator spring B	1.6 (0.063)	9.0 (0.358)	20.7 (0.815)	6.1
	3rd accumulator spring B	2.2 (0.087)	31.0 (1.220)	35.1 (1.382)	2.4
	2nd accumulator spring C	2.2 (0.087)	14.5 (0.576)	68.0 (2.677)	13.9
	Lock-up shift valve spring	0.9 (0.035)	7.6 (0.302)	73.7 (2.902)	32.0
	Lock-up timing valve spring	0.9 (0.035)	8.1 (0.319)	80.7 (3.177)	45.8
	Lock-up control valve spring	0.7 (0.028)	6.6 (0.262)	38.0 (1.496)	14.1
	3-4 orifice control valve spring	0.7 (0.028)	6.6 (0.262)	37.5 (1.476)	24.6
	Servo control valve spring	1.0 (0.039)	8.1 (0.319)	52.1 (2.051)	20.8
	CPC valve spring	0.6 (0.024)	5.6 (0.223)	12.2 (0.480)	5.5
	CPB valve spring	0.9 (0.035)	8.1 (0.319)	47.2 (1.858)	18.3
	4th exhaust valve spring	0.9 (0.035)	6.1 (0.242)	36.4 (1.433)	19.5

*: Inside Diameter

Steering — Section 17

	MEASUREMENT	STANDARD (NEW)
Steering wheel	Play at steering wheel circumference	0 – 10 (0 – 0.4)
	Starting load at steering wheel circumference N (kgf, lbf) Engine running	29 (3.0, 6.6)
Gearbox	Angle of rack guide screw loosened from locked position	20° Max
	Preload at pinion gear shaft N·m (kgf·cm, lbf·in)	0.7 – 1.2 (7 – 12, 6.08 – 10.42)
Pump	Pump pressure with valve closed (oil temp./speed: 40°C (105°F) min./idle. Do not run for more than 5 seconds). kPa (kgf/cm², psi)	6,400 – 7,400 (65 – 75, 920 – 1,070)
Power steering fluid	Recommended power steering fluid	HONDA Power Steering Fluid
	Fluid capacity ℓ (US qt, Imp qt) Reservoir	0.85 (0.90, 0.75) at disassembly 0.4 (0.42, 0.35)
Power steering belt*	Deflection with 98 N (10 kgf, 22 lbf) between pulleys	10.5 – 14.0 (0.41 – 0.55) with used belt 7.5 – 10.0 (0.30 – 0.39) with new belt
	Tension measured with belt tension gauge N (kgf, lbf)	340 – 490 (35 – 50, 77 – 110) with used belt 640 – 780 (65 – 80, 143 – 176) with new belt

*: When using a new belt, adjust deflection or tension to new values. Run the engine for 5 minutes then turn it off.
Readjust the deflection or tension to used belt values.

Unit of length: mm (in)

Suspension — Section 18

Suspension — Section 18					
	MEASUREMENT			STANDARD (NEW)	SERVICE LIMIT
Wheel alignment	Camber	Front		0°00' ± 1°	_____
		Rear		-1° ± 1°	_____
	Caster	Front		1°40' ± 1°	_____
		Front		In 1.0 ± 2.0 (1/16 ± 1/16)	_____
	Total toe	Front		In 2.0 ± 2.0 (1/16 ± 1/16)	_____
		Rear			_____
Front wheel turning angle	Inward wheel		39°50'	_____	
	Outward wheel		33°10' (Reference)	_____	
Wheel	Rim runout	Aluminum wheel	Axial	0 - 0.7 (0 - 0.03)	2.0 (0.08)
			Radial	0 - 0.7 (0 - 0.03)	1.5 (0.06)
		Steel wheel	Axial	0 - 1.0 (0 - 0.04)	2.0 (0.08)
			Radial	0 - 1.0 (0 - 0.04)	1.5 (0.06)
Wheel bearing	End play	Front		0 - 0.05 (0 - 0.002)	_____
		Rear		0 - 0.05 (0 - 0.002)	_____

Brakes — Section 19

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Parking brake lever	Play in stroke at 196 N (20 kgf, 44 lbf) lever force		To be locked when pulled 6 - 9 notches	_____
Foot brake pedal	Pedal height (with floor mat removed)		161 (6 5/16)	_____
	Free play		1 - 5 (1/16 - 3/16)	_____
Master cylinder	Piston-to-pushrod clearance		0 - 0.4 (0 - 0.02)	_____
Disc brake	Disc thickness	Front	20.9 - 21.8 (0.82 - 0.86)	19.0 (0.75)
	Disc runout	Front	_____	0.10 (0.004)
		Rear	_____	0.10 (0.004)
	Disc parallelism	Front	_____	0.015 (0.0006)
	Pad thickness	Front	8.5 - 9.5	1.6 (0.06)
Rear brake drum	I.D.		200 (7.87)	201 (7.91)
	Lining thickness		4.0 (0.16)	2.0 (0.08)

Air Conditioning — Section 22

	MEASUREMENT		STANDARD (NEW)
Air Conditioning system	Lubricant type: SP-10 (P/N 38897 - P13 - A01AH or 38899 - P13 - A01) (For refrigerant: HFC-134a (R-134a))		
	Lubricant capacity ml (fl oz, Imp oz)	Condenser	20 (2/3 0.7)
		Evaporator	45 (1 2/3, 1.6)
		Line or hose	10 (1/3, 0.4)
		Receiver	10 (1/3, 0.4)
Compressor	Lubricant type: SP-10		
	Lubricant capacity ml (fl oz, Imp oz)		130 - 150 (4 1/3 - 4.6, 5.0 - 5.3)
	Field coil resistance at 68°F (20°C) Ω		3.05 - 3.35
Compressor belt*	Pulley-to-pressure plate clearance		0.5 ± 0.15 (0.020 ± 0.006)
	Deflection with 98 N (10 kgf, 22 lbf) between pulleys		7.5 - 9.5 (0.30 - 0.37) with used belt 5.0 - 6.5 (0.20 - 0.26) with new belt
	Belt tension N (kgf, lbf)		340 - 490 (35 - 50, 77 - 110) with used belt 690 - 830 (70 - 85, 150 - 190) with new belt

*: When using a new belt, adjust deflection or tension to new values. Run the engine for 5 minutes then turn it off. Readjust deflection or tension to used belt values.

Standards and Service Limits

Electrical — Section 23

	MEASUREMENT	STANDARD (NEW)	
Ignition coil	Rated voltage V Primary winding resistance at 68°F (20°C) Ω Secondary winding resistance at 68°F (20°C) kΩ	12 0.63 – 0.77 12.8 – 19.2	
Ignition wire	Resistance at 68°F (20°C) kΩ Firing order	25 max. 1 – 3 – 4 – 2	
Spark plug	Type Gap	PFR 7N-D 0.7 – 0.8 (0.028 – 0.031)	0.9 (0.035)*1
Ignition timing	At idle ° BTDC (Red)	12 ± 2	
Alternator belt*2	Deflection with 98 N (10 kgf, 22 lbf) between pulleys	7.0 – 10.5 (0.28 – 0.41) with used belt 5.0 – 7.0 (0.20 – 0.28) with new belt	
	Belt tension N (kgf, lbf) Measured with belt tension gauge	340 – 490 (35 – 50, 77 – 110) with used belt 690 – 880 (70 – 90, 154 – 198) with new belt	
Alternator (MITSUBISHI)	Output 13.5 V at hot A Coil resistance (rotor) at 68°F (20°C) kΩ Slip ring O.D. Brush length Brush spring tension g (oz)	STANDARD (NEW)	SERVICE LIMIT
		75 3.4 – 3.8 22.7 (0.89) 19.0 (0.75) 300 – 450 (10.6 – 15.9)	— — 22.2 (0.87) 5.0 (0.20) —
Starter motor (MITSUBA 1.2 kW)	Type Commutator mica depth Commutator runout Commutator O.D. Brush length Brush spring tension (new) N (kgf, lbf)	Gear reduction 0.4 – 0.5 (0.016 – 0.020) 0 – 0.02 (0 – 0.0008) 28.0 – 28.1 (1.102 – 1.106) 15.8 – 16.2 (0.62 – 0.64) 15.7 – 17.7 (1.60 – 1.80, 3.5 – 4.0)	0.15 (0.006) 0.05 (0.002) 27.5 (1.083) 11.0 (0.43) —

*1: Do not adjust the gap, replace the spark plug if it is out of service limit.

*2: When using a new belt, adjust deflection or tension to new values. Run the engine for 5 minutes then turn it off.
Readjust deflection or tension to used belt values.

Design Specifications

specs

Unit of length: mm (in)

	ITEM	METRIC	ENGLISH	NOTES	
DIMENSIONS	Overall Length	4,445 mm	175.0 in		
	Overall Width	1,705 mm	67.1 in		
	Overall Height	1,390 mm	54.7 in		
	Wheelbase	2,620 mm	103.1 in		
	Track Front/Rear	1,475/1,475 mm	58.1/58.1 in		
	Ground Clearance	150 mm	5.9 in		
	Seating Capacity	Four			
WEIGHT (USA)	Gross Vehicle Weight Rating (GVWR)	—	3,310 lbs		
ENGINE	Type	Water-cooled, 4-stroke SOHC VTEC, compressed natural gas engine			
	Cylinder Arrangement	Inline 4-cylinder, transverse			
	Bore and Stroke	75.0 x 90.0 mm	2.95 x 3.54 in		
	Displacement	1,590 cm ³ (mℓ)	97.0 cu-in		
	Compression Ratio	12.5			
	Valve Train	Belt driven, SOHC 4 valve per cylinder			
	Lubrication System	Forced and wet sump, trochoid pump			
	Oil Pump Displacement at 6,800 engine rpm	33.4 ℓ (35.3 US qt, 29.4 Imp qt)/minute			
	Water Pump Displacement at 6,000 engine rpm	125 ℓ (132 US qt, 110 Imp qt)/minute			
	Fuel Required	Compressed Natural Gas (NFPA-52 and SAE J1616 standards)			
STARTER	Type/Make	Gear reduction/MITSUBA			
	Normal Output	1.2 kW			
	Nominal Voltage	12 V			
	Hour Rating	30 seconds			
	Direction of Rotation	Clockwise as viewed from gear end			
	Weight MITSUBA 1.2 kW	3.4 kg	7.5 lbf		
CLUTCH	Clutch Type	Torque converter			
TRANSMISSION	Transmission Type	4-speed automatic, 1 reverse			
	Primary Reduction	Direct 1 : 1			
TRANSMISSION	Automatic transmission				
	Gear Ratio				
	1st	2.722			
	2nd	1.516			
	3rd	1.079			
	4th	0.711			
	Reverse	1.955			
	Final Reduction	4.357			
	Gear ratio	Single helical gear			
	Gear type				
AIR CONDITIONING	Cooling Capacity	3,530 Kcal/h	14,000 BTU/h	SP-10	
	Compressor	Type/Make	Scroll/SANDEN		
	No. of Cylinder				
	Capacity	85.7 mℓ/rev	5.22 cu-in/rev		
	Max. Speed	10,000 rpm			
	Lubricant Capacity	130 mℓ	4 1/3 fl oz, 4.6 Imp oz		
	Condenser	Type	Corrugated fin		
	Evaporator	Type	Corrugated fin		
	Blower	Type	Sirocco fan		
	Motor Input	200 W/12 V			
	Speed Control	4-speed variable			
	Max. Capacity	460 m ³ /h	16,200 cu-ft/h		
Temperature Control	Air-mix type				
Compressor Clutch	Type	Dry, single plate, poly-V-belt drive			
Power Consumption	40 W max./12 V at 68°F (20°C)				
Refrigerant	Type	HFC-134a (R-134a)			
Quantity	650 ⁰ / ₋₅₀ g	22.9 ⁰ / _{-1.8} oz			

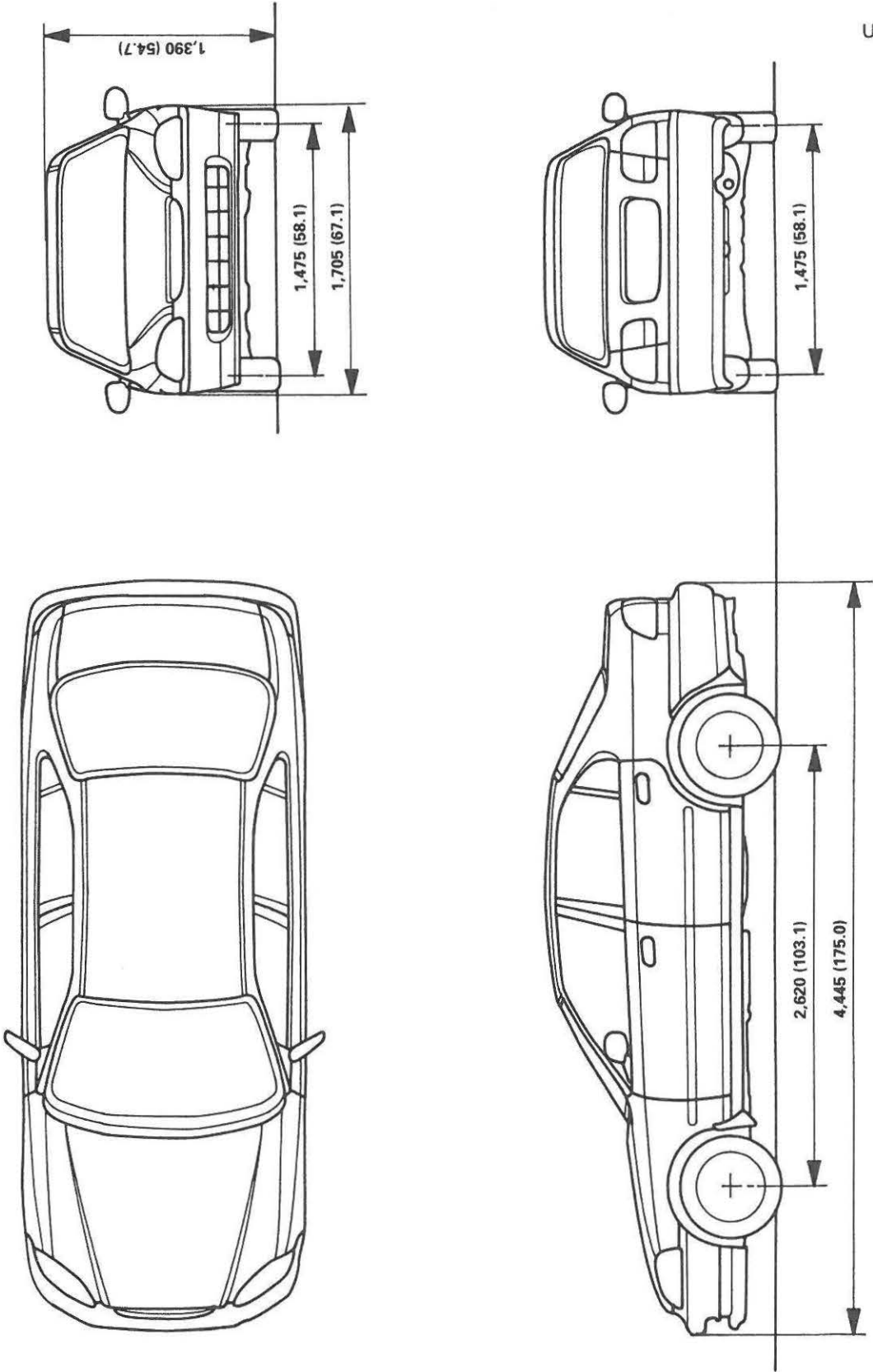
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Design Specifications

(cont'd)

	ITEM		METRIC	ENGLISH	NOTES
STEERING SYSTEM	Type Overall Ratio Turns, Lock-to-Lock Steering Wheel Dia.		Power assisted, rack and pinion 17.7 3.6 380 mm	15 in	
SUSPENSION	Type Shock Absorber	Front and Rear Front and Rear	Independent double wishbone, coil spring Telescopic, hydraulic nitrogen gas-filled		
WHEEL ALIGNMENT	Camber Caster Total Toe	Front Rear Front Front Rear	0°00' -1° 1°40' In 1.0 mm In 2.0 mm	In 1/16 in In 1/16 in	
BRAKE SYSTEM	Type Pad Surface Area Parking Brake	Front Rear Front Rear Type	Power-assisted self-adjusting ventilated disc Power-assisted self-adjusting solid disc 44.1 cm ² x 2 6.84 sq-in x 2 67.2 cm ² x 2 10.4 sq-in x 2 Mechanical actuating, rear two wheel brakes		
TIRE	Size Front and Rear Spare Tire		P185/65R14 85S T105/80D13 Cars without ABS T125/70D14 Cars with ABS		
WASHER RESERVOIR	Capacity ℓ (US qt, Imp qt)		2.5 (2.6, 2.2)		
ELECTRICAL	Battery Starter Alternator Fuses In Under-dash Fuse/Relay Box In Under-hood Fuse/Relay Box In Under-hood ABS Fuse/Relay Box Headlights Front Turn Signal/Parking Lights Rear Turn Signal Lights Brake/Taillights High Mount Brake Light Back-up Lights License Plate Lights Ceiling Light Gauge Lights Indicator Lights Illumination and Pilot Lights Heater Control Panel Lights		12 V - 38AH/5HR 12 V - 1.2 kW 12 V - 75 A 7.5 A, 10 A, 15 A, 20 A 7.5 A, 10 A, 15 A, 20 A, 30 A, 40 A, 80 A 7.5 A, 20 A, 40 A 12 V - 60/55 W 12 V - 21/5 W 12 V - 21 W 12 V - 21/5 W 12 V - 45 cp 12 V - 21 W 12 V - 5 W 12 V - 5 W 12 V - 1.4 W, 3 W, 3.4 W 12 V - 1.12 W, 1.4 W 12 V - 0.84 W, 1.4 W 12 V - 1.4 W		

Unit: mm (in)



Maintenance

Lubrication Points 4-2

Maintenance Schedule

Normal Conditions 4-4

Severe Conditions 4-6

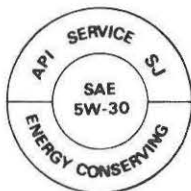


Lubrication Points

For the details of lubrication points and types of lubricants to be applied, refer to the Illustrated Index and various work procedures (such as Assembly/Reassembly, Replacement, Overhaul, Installation, etc.) contained in each section.

No.	LUBRICATION POINTS	LUBRICANT
1	Engine	API Service Grade: Use SJ "Energy Conserving" grade oil. The oil container may also display the API Certification mark shown below. Make sure it says "For Gasoline Engines." SAE Viscosity: See chart below.
2	Transmission	Genuine Honda Premium Formula Automatic Transmission Fluid (ATF)* ¹
3	Brake Line	Genuine Honda DOT3 Brake Fluid* ²
4	Power steering gearbox	Steering grease P/N 08733 – B070E
5	Steering boots	Multi-purpose grease
6	Steering ball joints	
7	Shift lever (automatic transmission)	
8	Pedal linkage	
9	Brake master cylinder pushrod	Honda White Lithim Grease
10	Trunk hinges and latch	
11	Door hinges upper and lower	
12	Door opening detents	
13	Hood hinge and hood latch	Multi-purpose grease
14	Fuel filler lid	
15	Throttle cable end and throttle linkage	
16	Rear brake shoe linkages	
17	Caliper piston seal, dust seal, caliper pin, piston	Silicone grease
18	Throttle cable end (dashboard lower panel)	
19	Power steering system	Genuine Honda Power Steering Fluid* ³
20	Air conditioning compressor	Compressor oil: SANDEN: SP-10 P/N 38897 – P13 – A01AH or 38899 – P13 – A01 (For Refrigerant: HFC-134a (R-134a))

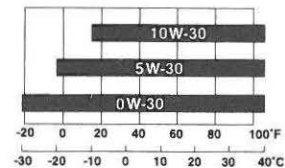
API SERVICE LABEL



API CERTIFICATION SEAL

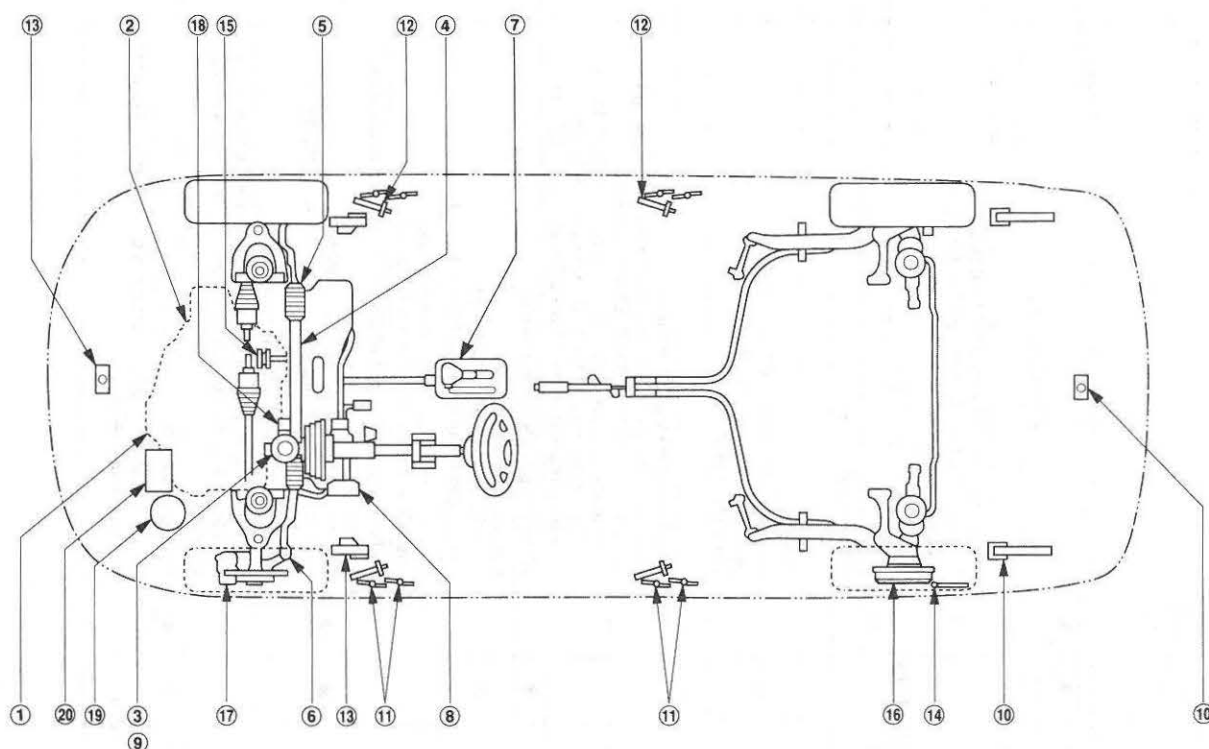


Recommended Engine Oil



Engine oil viscosity for ambient temperature ranges

- *1: Always use Genuine Honda Premium Formula Automatic Transmission Fluid (ATF). Using a non-Honda ATF can affect shift quality.
- *2: Always use Genuine Honda DOT3 Brake Fluid. Using a non-Honda brake fluid can cause corrosion and decrease the life of the system.
- *3: Always use Genuine Honda Power Steering Fluid. Using any other type of power steering fluid or automatic transmission fluid can cause increase wear and poor steering in cold weather.



NOTE: Lubricate all hinges, latches and locks once a year.
In corrosive areas, more frequent lubrication is necessary.
We recommend Honda White Lithium Grease.

Maintenance Schedule (1998, 1999 Models)

Normal Conditions

Follow the Normal Conditions Maintenance Schedule for 1998 Model if the severe driving conditions specified in the Severe Conditions Maintenance Schedule on pages 4-6 and 4-7 do not apply.

Service at the indicated distance or time whichever comes first.	miles x 1,000	15	30	45	60	75	90	105	120	NOTE	SECTION and PAGE
	km x 1,000	24	48	72	96	120	144	168	192		
	months	12	24	36	48	60	72	84	96		
Replace engine oil		Every 7,500 miles (12,000 km) or 12 months								Capacity for change with filter: 3.3 l (3.5 US qt, 2.9 Imp qt)	8-4
Replace engine oil filter		●	●	●	●	●	●	●	●		8-6
Check engine oil and coolant		Check oil and coolant at each fuel stop								Check levels and check for leaks.	8-4, 10-5
Replace air cleaner element		●		●		●		●			11-244*2
Inspect valve clearance		●		●		●		●		Intake: 0.18 – 0.22 mm (0.007 – 0.009 in) Exhaust: 0.23 – 0.27 mm (0.009 – 0.011 in) Measured when cold	6-10
Inspect fuel filter		Every 7,500 miles (12,000 km) or 12 months								Drain the water and oil	11-129
Replace fuel filter element		●		●		●		●			11-129
Inspect fuel tank		Every 36 months								Check for damage	11-138
Replace fuel tank		15 years after production									11-138
Inspect (○) and replace (●) spark plugs		○		○		○	●	○		PFR 7N-D Gap: 0.7 – 0.8 mm (0.028 – 0.031 in) Service limit: 0.9 mm (0.035 in)*1 Check for corrosion	23-23
Replace timing belt and inspect water pump							●				6-17, 10-11
Inspect and adjust drive belts		●		●		●		●		Check for cracks and damage. Check deflection and tension at center of following belts pressing with 98 N (10 kgf, 22 lbf) tension: Alternator drive belt: 7.0 – 10.5 mm (0.28 – 0.41 in) P/S pump belt: 10.5 – 14.0 mm (0.41 – 0.55 in) A/C compressor belt: 7.5 – 9.5 mm (0.30 – 0.37 in)	17-32*2 22-43*2 23-125*2
Inspect idle speed							●			700 ± 50 rpm (N or P position)	11-116
Replace engine coolant			●		●		●			Capacity for change: 3.9 l (4.1 US qt, 3.4 Imp qt) Check specific gravity for freezing point.	10-5
Replace transmission fluid							●			2.7 l (2.9 US qt, 2.4 Imp qt) for change with Genuine Honda Premium Formula ATF	14-118*2
Inspect front and rear brakes		●	●	●	●	●	●	●	●	<ul style="list-style-type: none"> Check the brake pad and disc thickness and free movement. Check the wheel cylinder for leaks. Check the brake linings for cracking, glazing, wear, or contamination. Check the calipers for leakage. 	19*2-4, 8, 10, 12, 16, 18, 25, 28
Replace brake fluid			●		●		●			Use Genuine Honda DOT3 brake fluid. Check that brake fluid level is between the upper and lower marks on the reservoir.	19-7*2
Check parking brake adjustment		●	●	●	●	●	●	●	●	Fully engaged 6 to 9 notches.	19-6*2
Rotate tires (Check tire inflation and condition at least once per month)		Rotate tires every 7,500 miles (12,000 km)								The suggested rotation method is shown in the diagram in the Owner's Manual.	—

*1: Do not adjust the gap, replace the spark plug if it is out of service limit.

*2: Refer to Base Service Manual (96-99 CIVIC, P/N 61S0305)

Service at the indicated distance or time whichever comes first.	miles x 1,000	15	30	45	60	75	90	105	120	NOTE	SECTION and PAGE
	km x 1,000	24	48	72	96	120	144	168	192		
	months	12	24	36	48	60	72	84	96		
Visually inspect the following items:											
Tie-rod ends, steering gear box, and boots	●	●	●	●	●	●	●	●	●	Check steering linkage for looseness. Check condition of boots. Check for fluid leaks.	17-31* ¹
Suspension components										Check the bolts for tightness. Check the condition of ball joint boots.	18* ¹ -8, 9, 21 18-2
Driveshaft boots										Check condition of boots.	16-3* ¹
Brake hoses and lines (including ABS)										Check for damage or leakage.	19-39* ¹
All fluid levels and condition of fluid										Check levels, condition of fluids, and check for leaks. If brake fluid is low, check brake pad thickness.	10-5, 14-118* ¹ 19-7* ¹
Cooling system hoses and connections										Check all hoses for damage, leaks, and deterioration. Check for proper fan operation.	10-2
Exhaust system*										Check the catalytic converter heat shield, exhaust pipe, and muffler for damage, leaks, and lightness.	9-4
Fuel lines and connections*										Check for leaks. Retighten loose connections and replace any damaged parts.	11-117

*1: Refer to Base Service Manual (96-99 CIVIC, P/N 61S0305)

According to state and federal regulations, failure to perform maintenance on the items marked with an asterisk (*) will not void customer's emission warranties. However, Honda recommends that all maintenance services be performed at the recommended time or mileage period to ensure long-term reliability.



Maintenance Schedule (1998, 1999 Models)

Severe Conditions

Follow the Severe Conditions Maintenance Schedule if the vehicle is driven MAINLY under one or more of the Severe Driving Conditions (page 4-7):

Service at the indicated distance or time whichever comes first.	miles x 1,000	15	30	45	60	75	90	105	120	NOTE	SECTION and PAGE
	km x 1,000	24	48	72	96	120	144	168	192		
	months	12	24	36	48	60	72	84	96		
Replace engine oil and oil filter	Every 3,750 miles (6,000 km) or 6 months									Capacity for change with filter: 3.3 l (3.5 US qt, 2.9 Imp qt)	8-4, 6
Check engine oil and coolant	Check oil and coolant at each fuel stop									Check levels and check for leaks.	8-4, 10-5
Replace air cleaner element Use normal schedule except in dusty conditions		●	●	●	●	●	●	●	●		11-244*2
Inspect valve clearance			●		●		●		●	Intake: 0.18 – 0.22 mm (0.007 – 0.009 in) Exhaust: 0.23 – 0.27 mm (0.009 – 0.011 in) Measured when cold	6-10
Inspect fuel filter	Every 7,500 miles (12,000 km) or 12 months									Drain the water and oil	11-129
Replace fuel filter element		●		●		●		●			11-129
Inspect fuel tank	Every 36 months									Check for damage	11-138
Replace fuel tank	15 years after production										11-138
Inspect (○) and replace (●) spark plugs		○		○		○	●	○		PFR 7N-D Gap: 0.7 – 0.8 mm (0.028 – 0.031 in) Service limit: 0.9 mm (0.035 in)*1 Check for corrosion	23-23
Replace timing belt*3 and inspect water pump							●				6-17, 10-11
Inspect and adjust drive belts		●		●		●		●		Check for cracks and damage. Check deflection and tension at center of following belts pressing with 98 N (10 kgf, 22 lbf) tension: Alternator drive belt: 7.0 – 10.5 mm (0.28 – 0.41 in) P/S pump belt: 10.5 – 14.0 mm (0.41 – 0.55 in) A/C compressor belt: 7.5 – 9.5 mm (0.30 – 0.37 in)	17-23*2 22-43*2 23-125*2
Inspect idle speed							●			700 ± 50 rpm (N or P position)	11-116
Replace engine coolant			●		●		●			Capacity for change: 3.9 l (4.1 US qt, 3.4 Imp qt) Check specific gravity for freezing point.	10-5
Replace transmission fluid		●		●		●		●		2.7 l (2.9 US qt, 2.4 Imp qt) for change with Genuine Honda Premium Formula ATF	14-118*2
Inspect front and rear brakes	Every 7,500 miles (12,000 km) or 6 months									<ul style="list-style-type: none"> • Check the brake pad and disc thickness and free movement. • Check the wheel cylinder for leaks. • Check the brake linings for cracking, glazing, wear, or contamination. • Check the calipers for leak. 	19*2-4, 8, 10, 12, 16, 18, 25, 28
Replace brake fluid			●			●				Use Genuine Honda DOT3 brake fluid. Check that brake fluid level is between the upper and lower marks on the reservoir.	19-7*2
Check parking brake adjustment	●	●	●	●	●	●	●	●	●	Fully engaged 6 to 9 clicks.	19-6*2

*1: Do not adjust the gap, replace the spark plug if it is out of service limit.

*2: Refer to Base Service Manual (96-99 CIVIC, P/N 61S0305)

*3: Replace the timing belt at 60,000 miles (USA) 100,000 km (Canada) if the vehicle regularly is driven in one or more of these conditions:

- In very high temperatures (over 110°F, 43°C).
- In very low temperatures (under -20°F, -29°C).

Service at the indicated distance or time whichever comes first.	miles x 1,000	15	30	45	60	75	90	105	120	NOTE	SECTION and PAGE
	km x 1,000	24	48	72	96	120	144	168	196		
	months	12	24	36	48	60	72	84	96		
Lubricate locks and hinges		●	●	●	●	●	●	●	●	Lubricate all hinges, latches and locks.	4-2, 3
Clean antenna mast		●	●	●	●	●	●	●	●		23-170* ¹
Rotate tires (check tire inflation and condition at least once per month)		Rotate tires every 7,500 miles (12,000 km)								The suggested rotation method is shown in the diagram in the Owner's Manual.	————
Visually inspect the following items:											
Tie-rod ends, steering gear box, and boots	Every 7,500 miles (12,000 km) or 6 months								Check steering linkage for looseness. Check condition of boots. Check for fluid leaks.	17-31* ¹	
Suspension components									Check the bolts for tightness. Check the condition of ball joint boots.	18* ¹ -8, 9, 21 18-2	
Driveshaft boots									Check condition of boots.	16-3* ¹	
Brake hoses and lines (including ABS)	●	●	●	●	●	●	●	●	Check for damage or leakage.	19-39* ¹	
All fluid levels and condition of fluid									Check levels, condition of fluids, and check for leaks. If brake fluid is low, check brake pad thickness.	10-5, 14-118* ¹ , 19-7* ¹	
Cooling system hoses and connections									Check all hoses for damage, leaks, and deterioration. Check for proper fan operation.	10-2	
Exhaust system*									Check the catalytic converter heat shield, exhaust pipe, and muffler for damage, leaks, and tightness.	9-4	
Fuel lines and connections*									Check for leaks.	11-117	
Lights and controls									Check all lighting functions.	23-152	
Vehicle underbody									Check for damage and fluid leaks.	————	

*1: Refer to Base Service Manual (96-99 CIVIC, P/N 61S0305)

According to state and federal regulations, failure to perform maintenance on the items marked with an asterisk (*) will not void customer's emission warranties. However, Honda recommends that all maintenance services be performed at the recommended time or mileage period to ensure long-term reliability.

Severe Driving Conditions:

- Driving less than 5 miles (8 km) per trip or, in freezing temperatures, driving less than 10 miles (16 km) per trip.
- Driving in extremely hot [over 90°F (32°C)] conditions.
- Extensive idling or long periods of stop-and-go driving.
- Driving with a roof top carrier, or driving in mountainous conditions.
- Driving on muddy, dusty, or de-iced roads.

NOTE: If the car is driven OCCASIONALLY under a "severe" condition, you should follow the Normal Conditions Maintenance Schedule on pages 4-4 and 4-5.



Engine

Engine Removal/Installation	5-1
Cylinder Head/Valve Train	6-1
Engine Block	7-1
Engine Lubrication	8-1
Intake Manifold/Exhaust System	9-1
Cooling	10-1



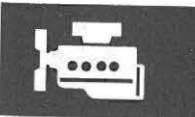
Figure

Figure 1: A schematic diagram of the experimental setup.	1-2
Figure 2: A schematic diagram of the experimental setup.	2-3
Figure 3: A schematic diagram of the experimental setup.	3-4
Figure 4: A schematic diagram of the experimental setup.	4-5
Figure 5: A schematic diagram of the experimental setup.	5-6
Figure 6: A schematic diagram of the experimental setup.	6-7
Figure 7: A schematic diagram of the experimental setup.	7-8
Figure 8: A schematic diagram of the experimental setup.	8-9
Figure 9: A schematic diagram of the experimental setup.	9-10
Figure 10: A schematic diagram of the experimental setup.	10-11



Engine Removal/Installation

Removal	5-2
Installation	5-10



Engine Removal/Installation

Removal

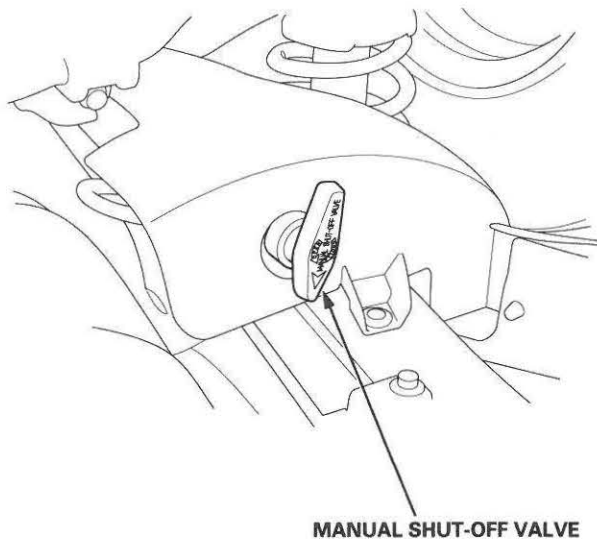
⚠ WARNING

- Make sure jacks and safety stands are placed properly and hoist brackets are attached to the correct positions on the engine.
- Make sure the vehicle will not roll off stands and fall while you are working under it.

CAUTION:

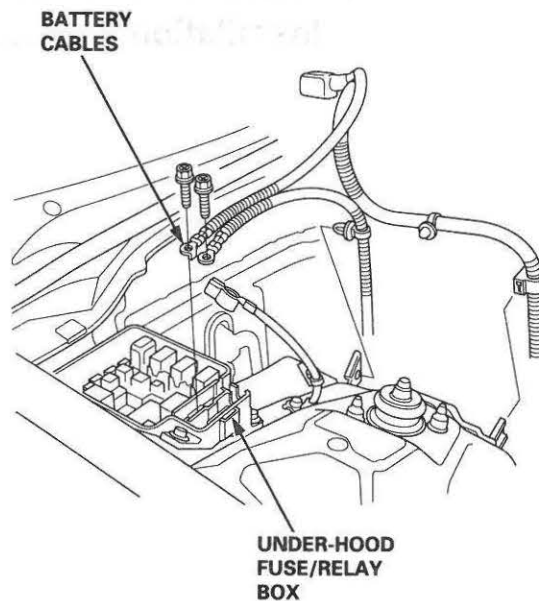
- Use fender covers to avoid damaging painted surfaces.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.

1. Turn off the manual shut-off valve.

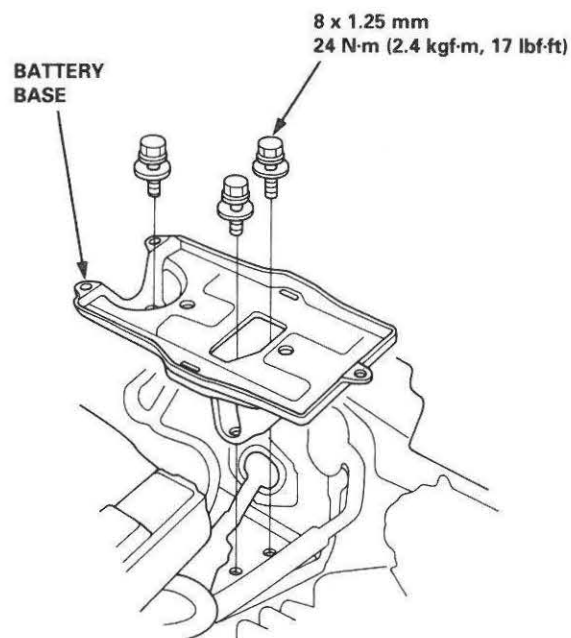


2. To reduce fuel pressure in the lines, start the engine and run it until it stalls.
3. Secure the hood as far open as possible.

4. Disconnect the battery negative terminal first, then the positive terminal.
5. Disconnect the battery cables from the under-hood fuse/relay box and remove the harness clamps.

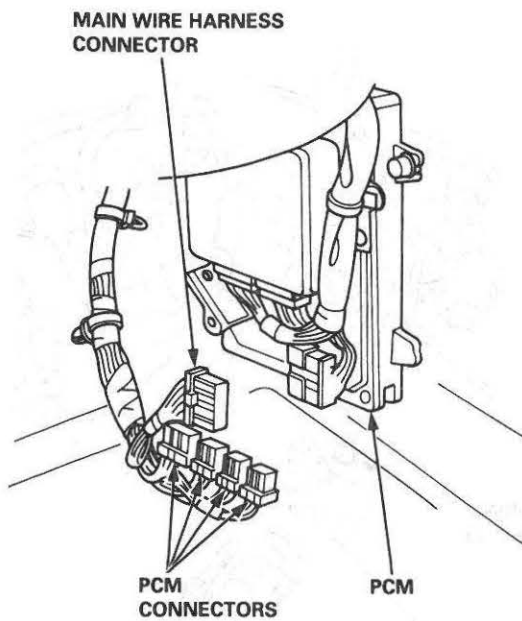


6. Remove the battery and battery base.

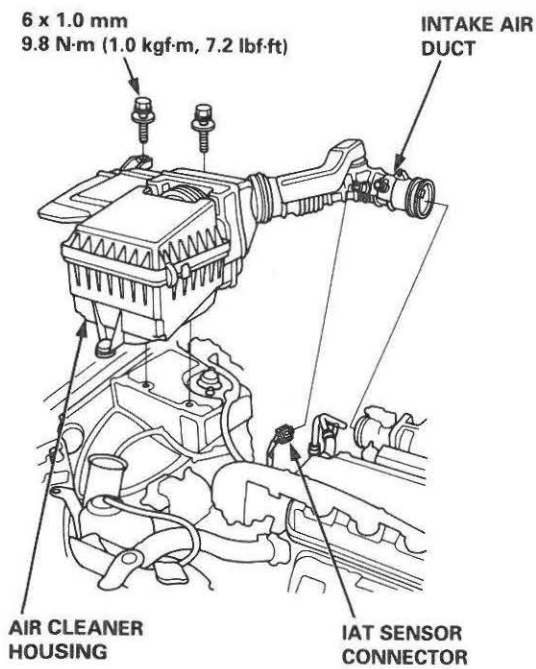




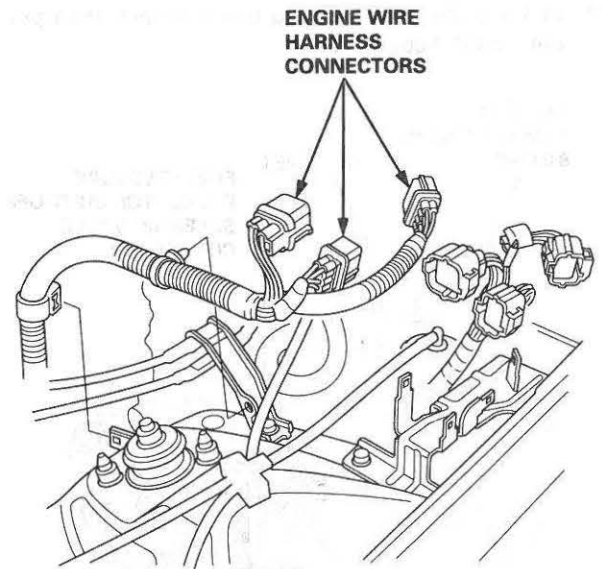
7. Disconnect the connectors from the PCM.
8. Disconnect the main wire harness connector.



9. Disconnect the intake air temperature (IAT) sensor connector, then remove the intake air duct and air cleaner assembly.



10. Disconnect the engine wire harness connectors on the left side of the engine compartment.

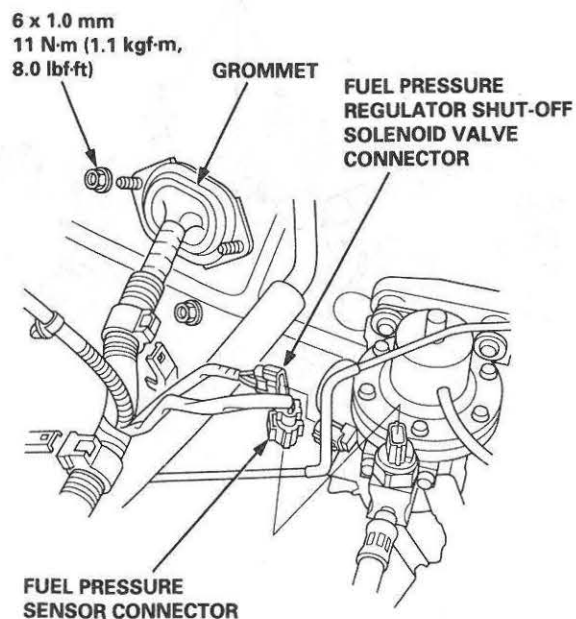


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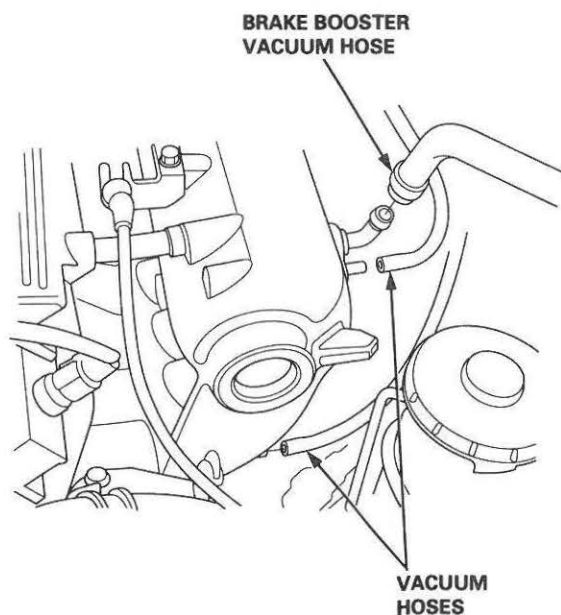
Engine Removal/Installation

Removal (cont'd)

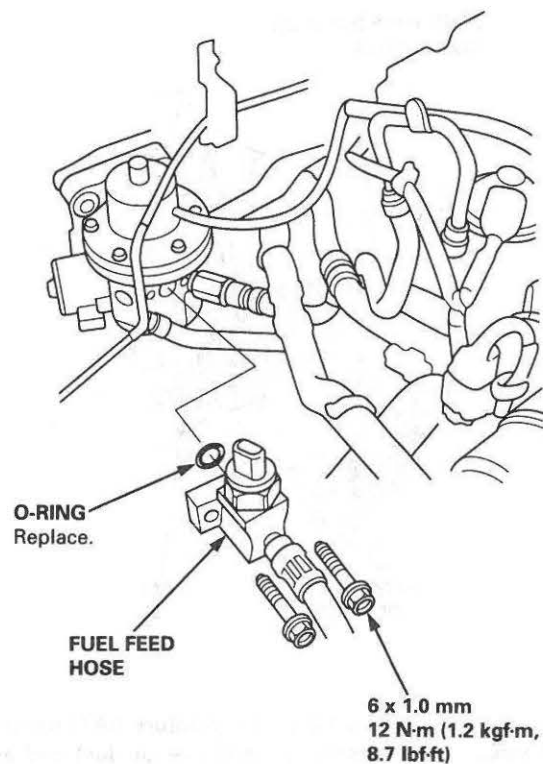
11. Disconnect the fuel pressure regulator shut-off solenoid valve connector and fuel pressure sensor connector, then remove the wire harness clamps.
12. Remove the nuts securing the grommet, then pull out the PCM connectors.

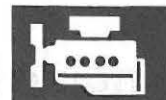


13. Remove the brake booster vacuum hose and vacuum hoses.



14. Remove the fuel feed hose.

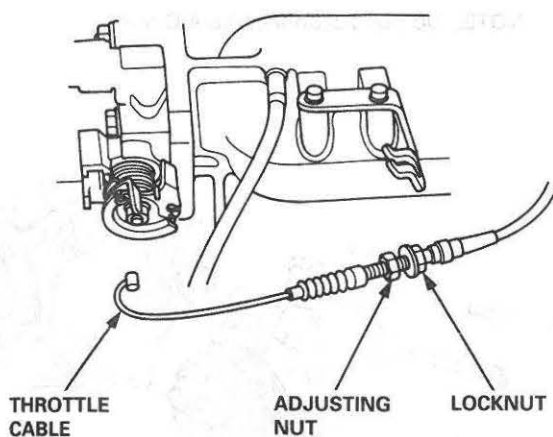




15. Remove the throttle cable by loosening the locknut, then slip the cable end out of the accelerator linkage.

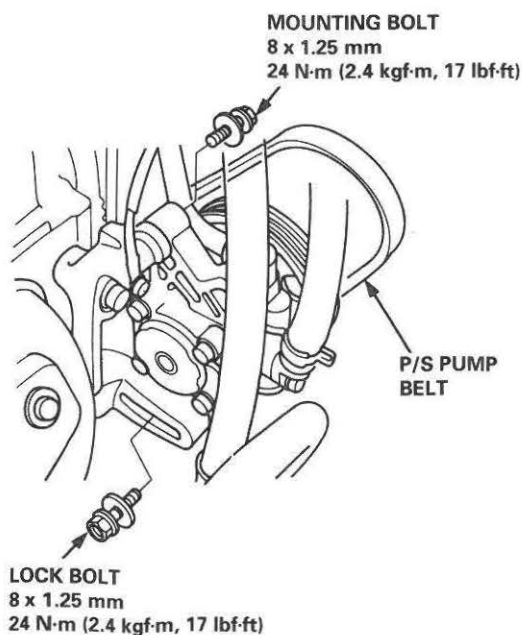
NOTE:

- Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.
- Adjust the throttle cable when installing (see section 11).

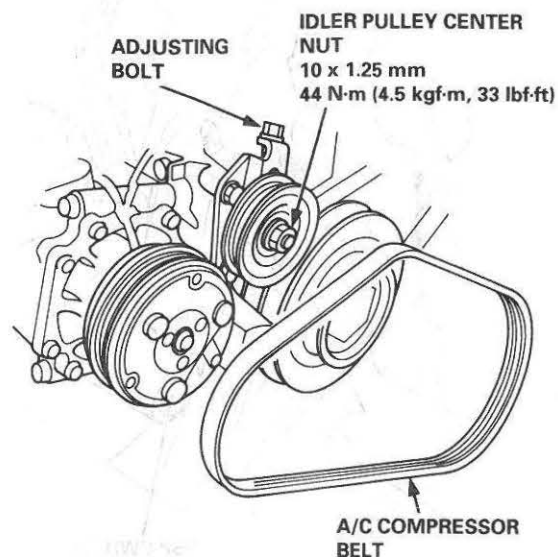


16. Remove the mounting bolt and lock bolt, then remove the power steering (P/S) pump belt and pump.

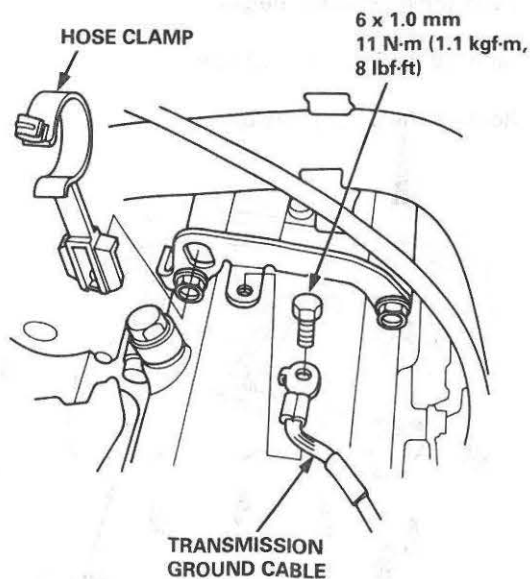
NOTE: Do not disconnect the P/S hoses.



17. Loosen the idler pulley center nut and adjusting bolt, then remove the air conditioning (A/C) compressor belt.



18. Remove the transmission ground cable and the hose clamp.



(cont'd)

Engine Removal/Installation

Removal (cont'd)

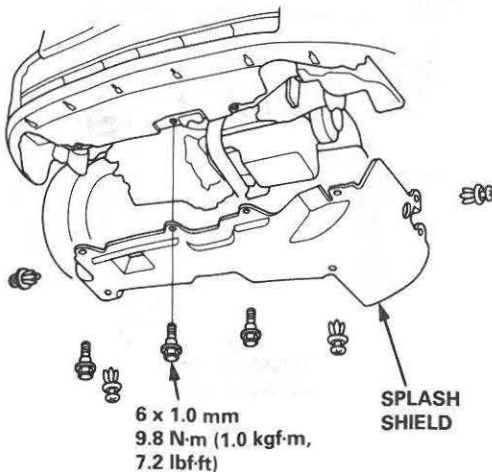
19. Disconnect the power steering pressure (PSP) switch connector, and remove the wire harness clamp.



20. Remove the radiator cap.

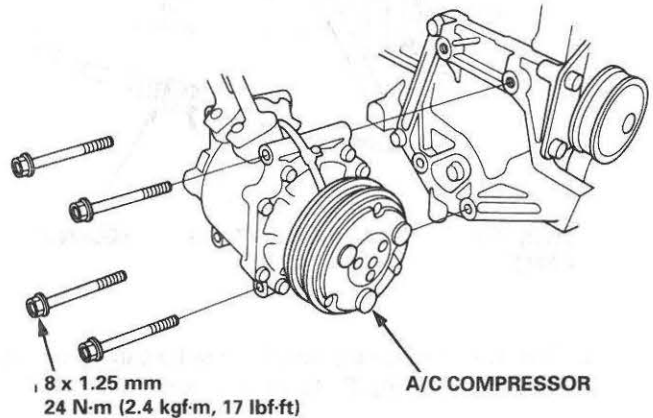
⚠ WARNING Use care when removing the radiator cap to avoid scalding by hot coolant or steam.

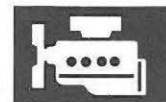
21. Raise the hoist to full height.
22. Remove the front tires/wheels.
23. Remove the splash shield.



24. Loosen the drain plug in the radiator and, drain the engine coolant (see page 10-5).
25. Drain the automatic transmission fluid (ATF). Reinstall the drain plug using a new washer (see section 14).
26. Drain the engine oil. Reinstall the drain bolt using a new washer (see page 8-4).
27. Remove the A/C compressor.

NOTE: Do not disconnect the A/C hoses.

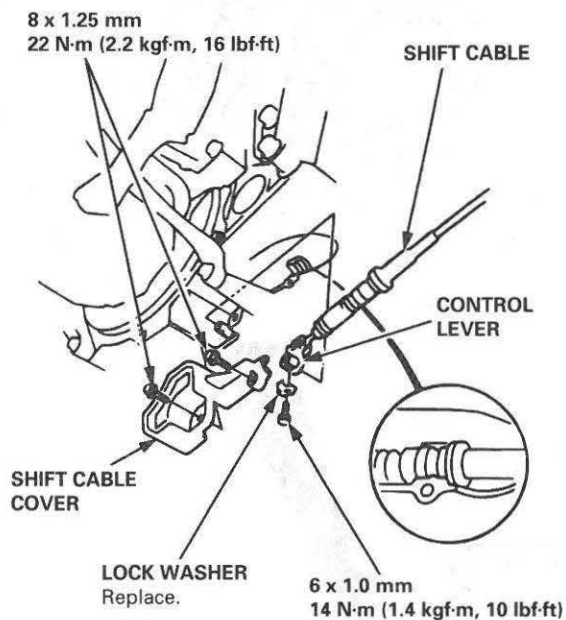




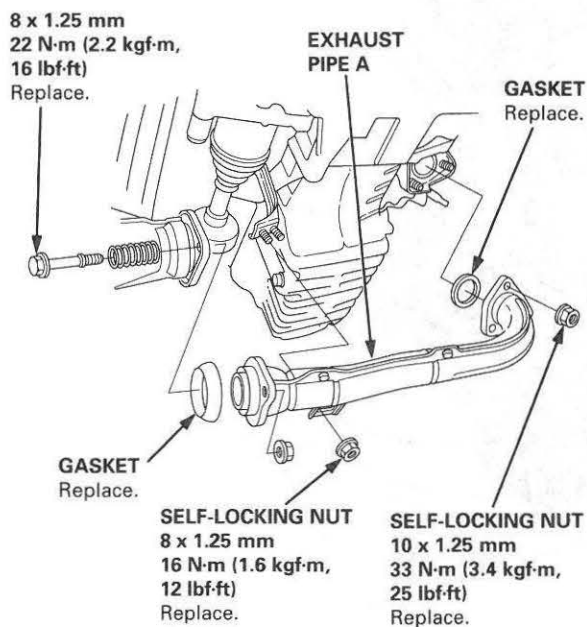
28. Remove the shift cable.

NOTE:

- Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.
- Adjust the shift cable when installing (see section 14).



29. Remove exhaust pipe A.



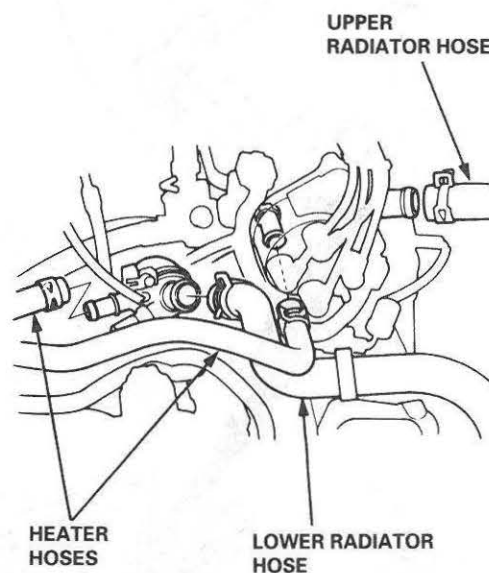
30. Remove the damper forks (see section 18).

31. Disconnect the suspension lower arm ball joints (see section 18).

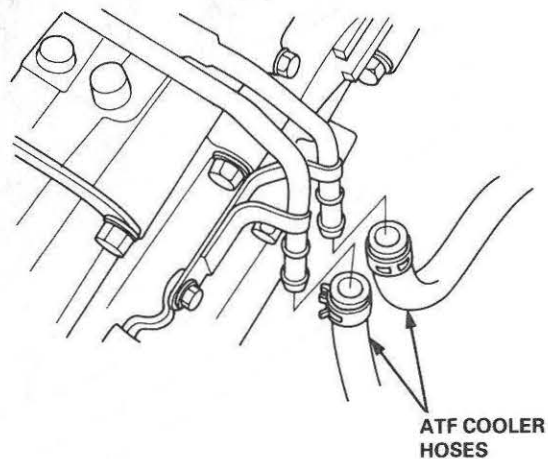
32. Remove the driveshafts (see section 16).

33. Lower the hoist.

34. Remove the upper and lower radiator hoses and the heater hoses.



35. Remove the ATF cooler hoses.



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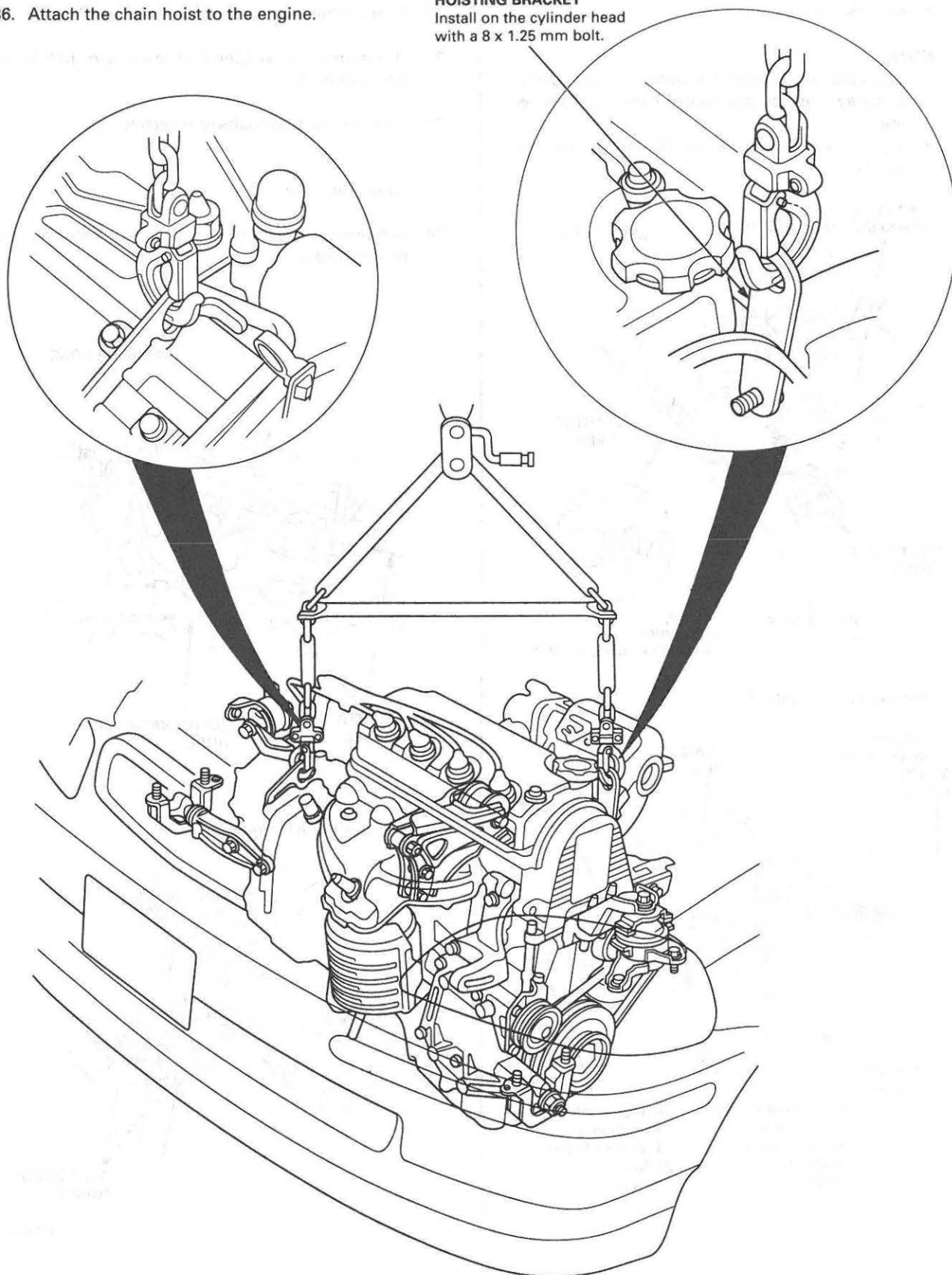
Engine Removal/Installation

Removal (cont'd)

36. Attach the chain hoist to the engine.

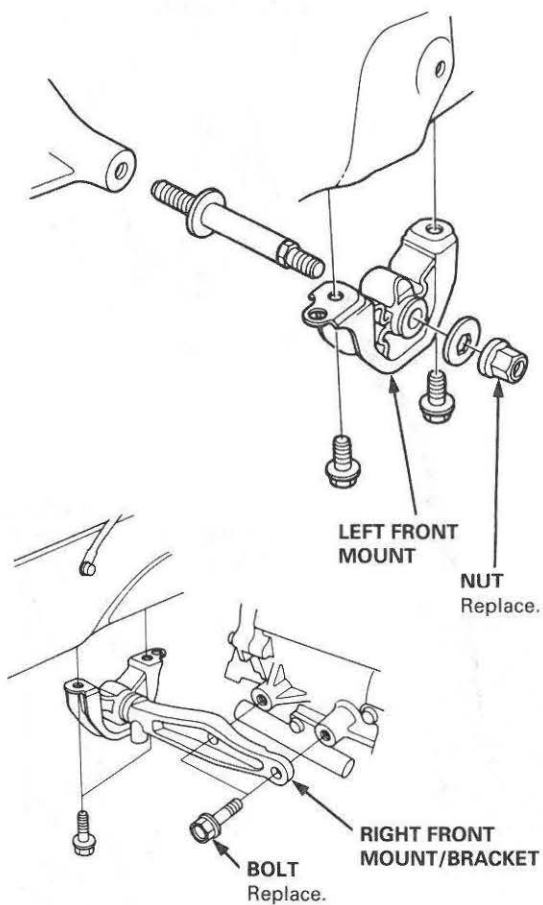
HOISTING BRACKET

Install on the cylinder head with a 8 x 1.25 mm bolt.

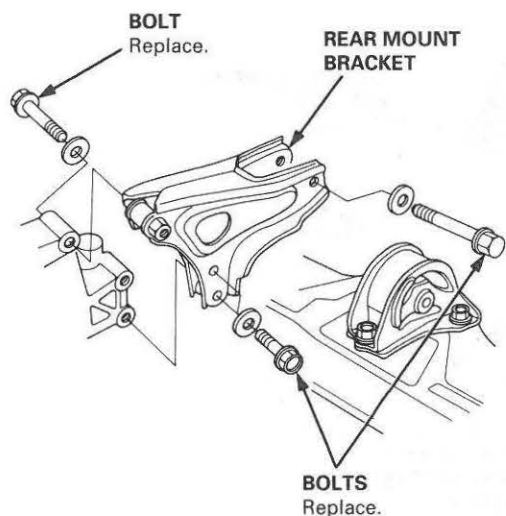




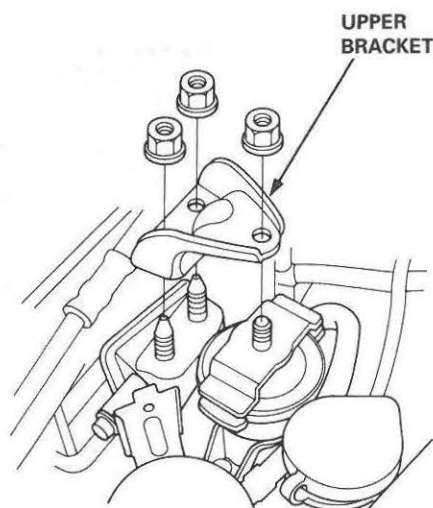
37. Remove the left and right front mounts and brackets.



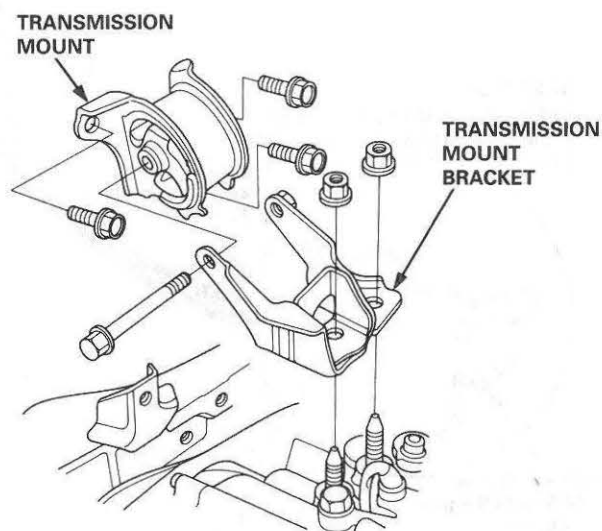
38. Remove the rear mount bracket.



39. Remove the upper bracket.



40. Remove the transmission mount bracket, then remove the transmission mount.

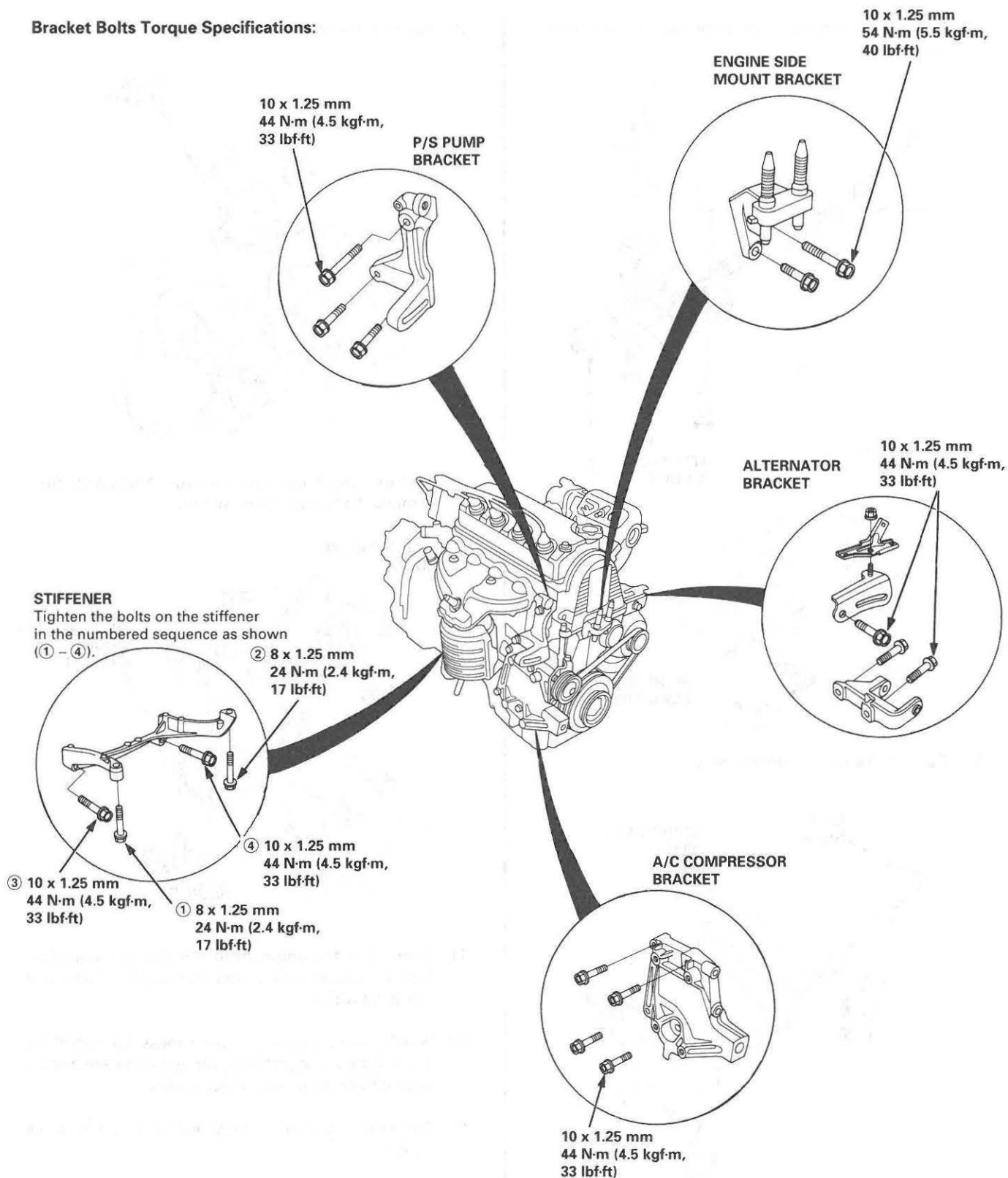


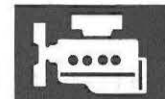
41. Check that the engine/transmission is completely free of vacuum hoses, fuel and coolant hoses and electrical wiring.
42. Slowly raise the engine approximately 150 mm (6 in). Check once again that all hoses and wires are disconnected from the engine/transmission.
43. Raise the engine all the way, and remove it from the vehicle.

Engine Removal/Installation

Installation

Bracket Bolts Torque Specifications:

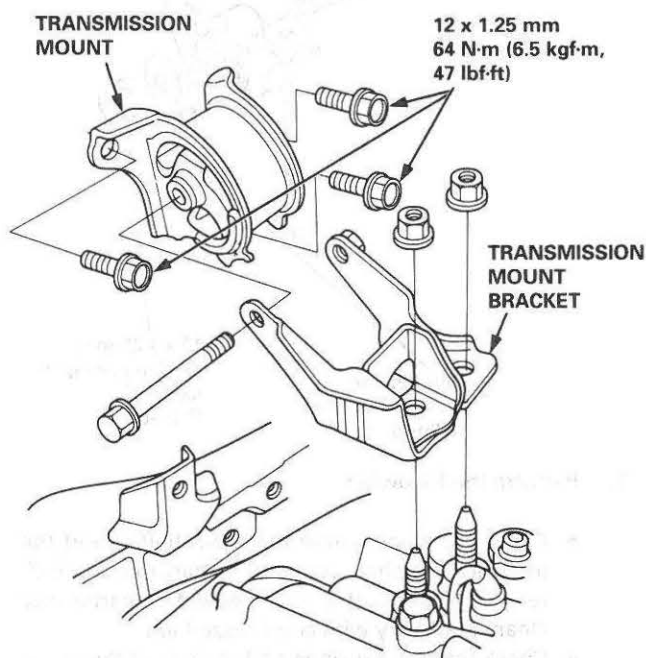




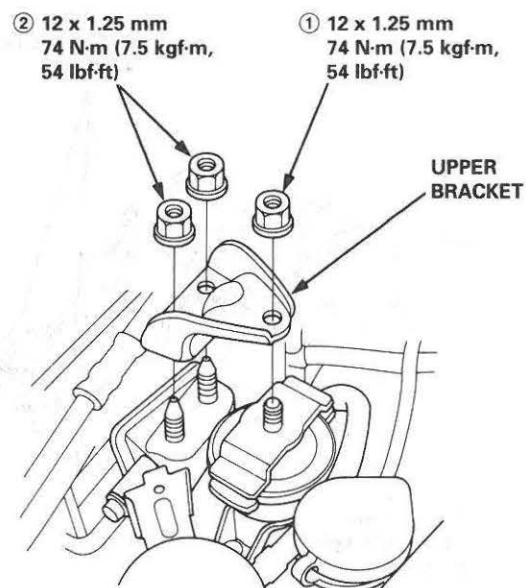
Engine Installation:

Install the engine in the reverse order of removal. Reinstall the mount bolts/nuts in the following sequence. Failure to follow these procedures may cause excessive noise and vibration, and reduce bushing life.

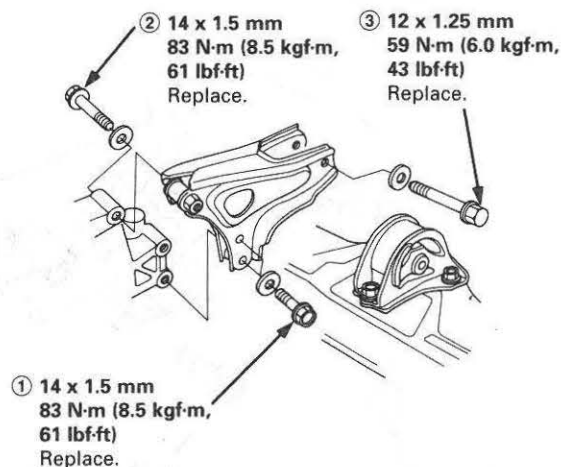
1. Install the transmission mount and bracket, then tighten the transmission mount bolts. Do not tighten the nuts on the transmission mount bracket.



2. Install the upper bracket, then tighten the nuts in the numbered sequence as shown (① - ②).



3. Install the rear mount bracket, then tighten the bolts in the numbered sequence shown (① - ③).

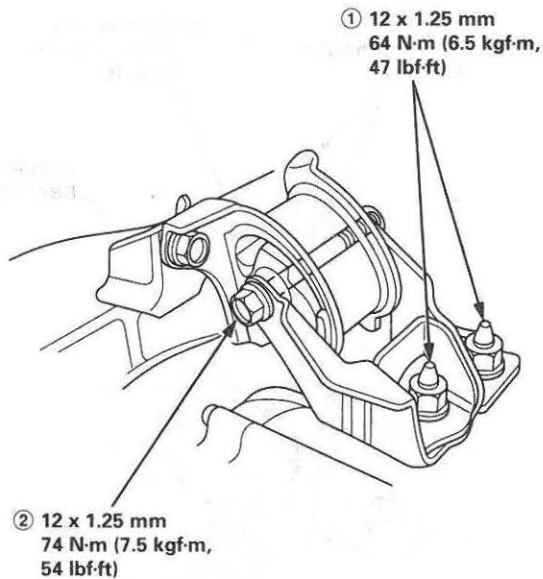


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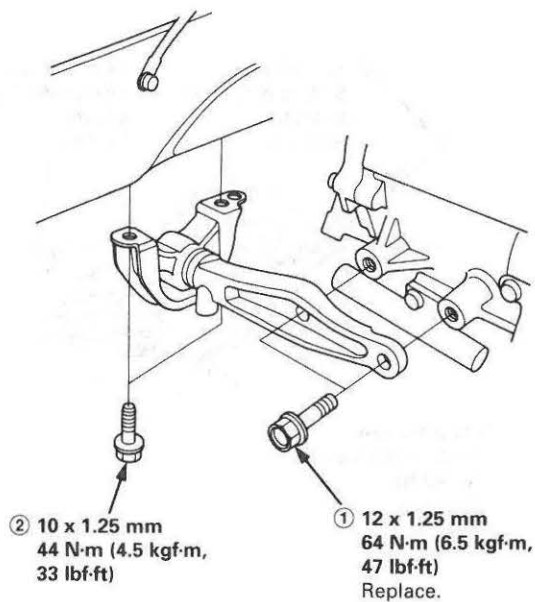
Engine Removal/Installation

Installation (cont'd)

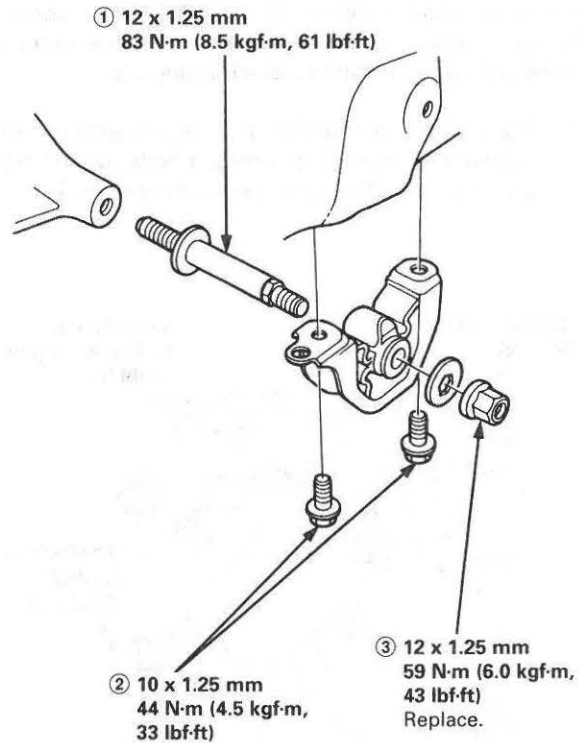
4. Tighten the bolt/nuts on the transmission mount bracket in the numbered sequence shown (① – ②).



5. Tighten the bolts on the right front mount/bracket in the numbered sequence shown (① – ②).

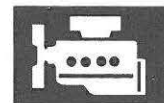


6. Tighten the bolts/nut on the left front mount in the numbered sequence shown (① – ③).



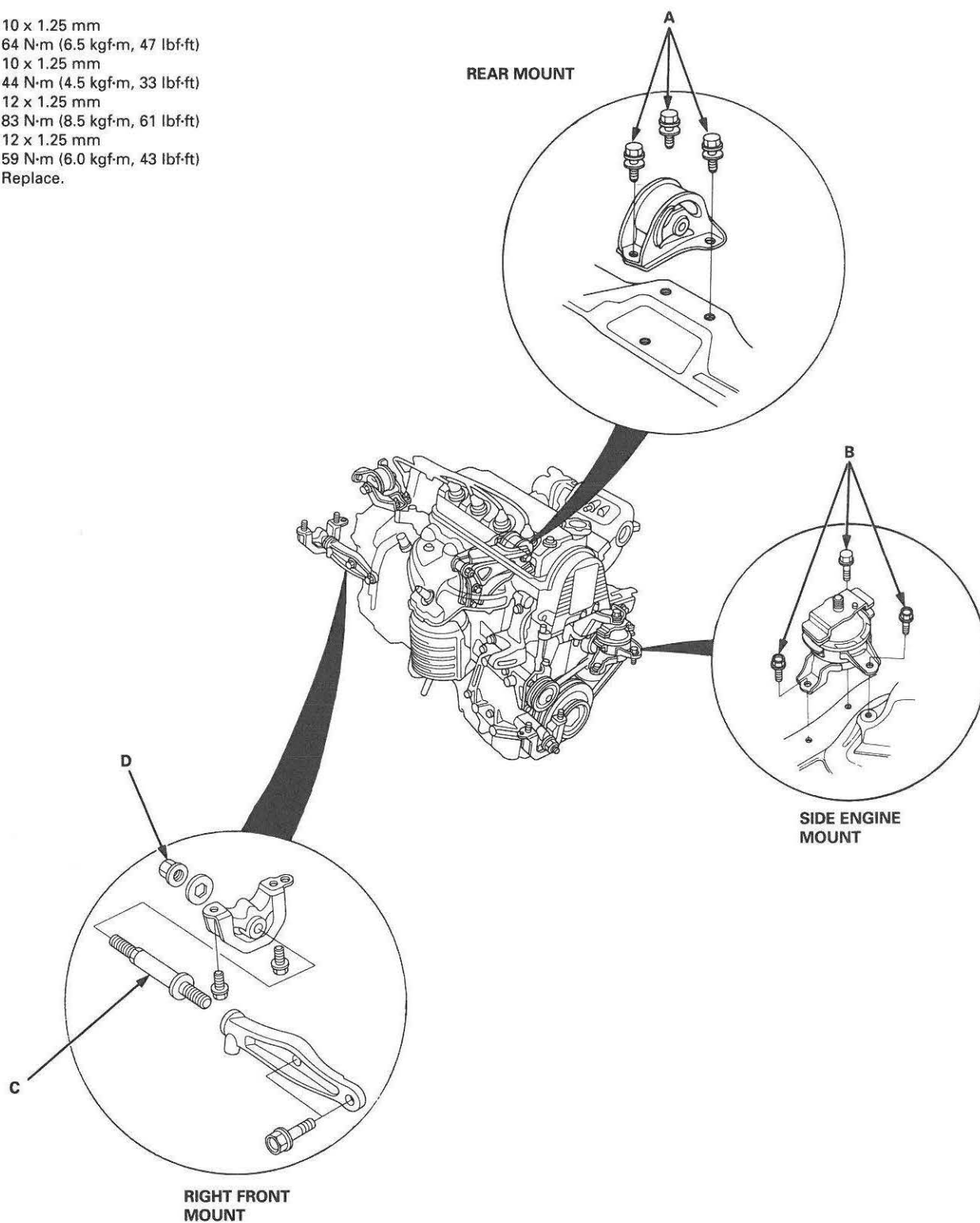
7. Perform the following:

- Clean the areas where the driveshaft(s) and the intermediate shaft contact the transmission (differential) thoroughly with solvent or carburetor cleaner, and dry with compressed air.
- Check that the set rings on the ends of the driveshaft and intermediate shaft click into place.
CAUTION: Use new set rings.
- Adjust the shift cable (see section 14).
- Adjust the throttle cable (see section 11).
- Adjust the cruise control cable (see section 23).
- Refill the engine with engine oil (see page 8-4).
- Refill the transmission with fluid (see section 14).
- Refill the radiator with engine coolant (see page 10-5).
- Bleed air from the cooling system with the heater valve open (see page 10-5).
- Clean the battery posts and cable terminals with sandpaper, assemble them, then apply grease to prevent corrosion.



Mount and Bracket Bolts/Nuts Torque Value Specifications:

- A: 10 x 1.25 mm
64 N·m (6.5 kgf-m, 47 lbf-ft)
B: 10 x 1.25 mm
44 N·m (4.5 kgf-m, 33 lbf-ft)
C: 12 x 1.25 mm
83 N·m (8.5 kgf-m, 61 lbf-ft)
D: 12 x 1.25 mm
59 N·m (6.0 kgf-m, 43 lbf-ft)
Replace.



Cylinder Head/Valve Train

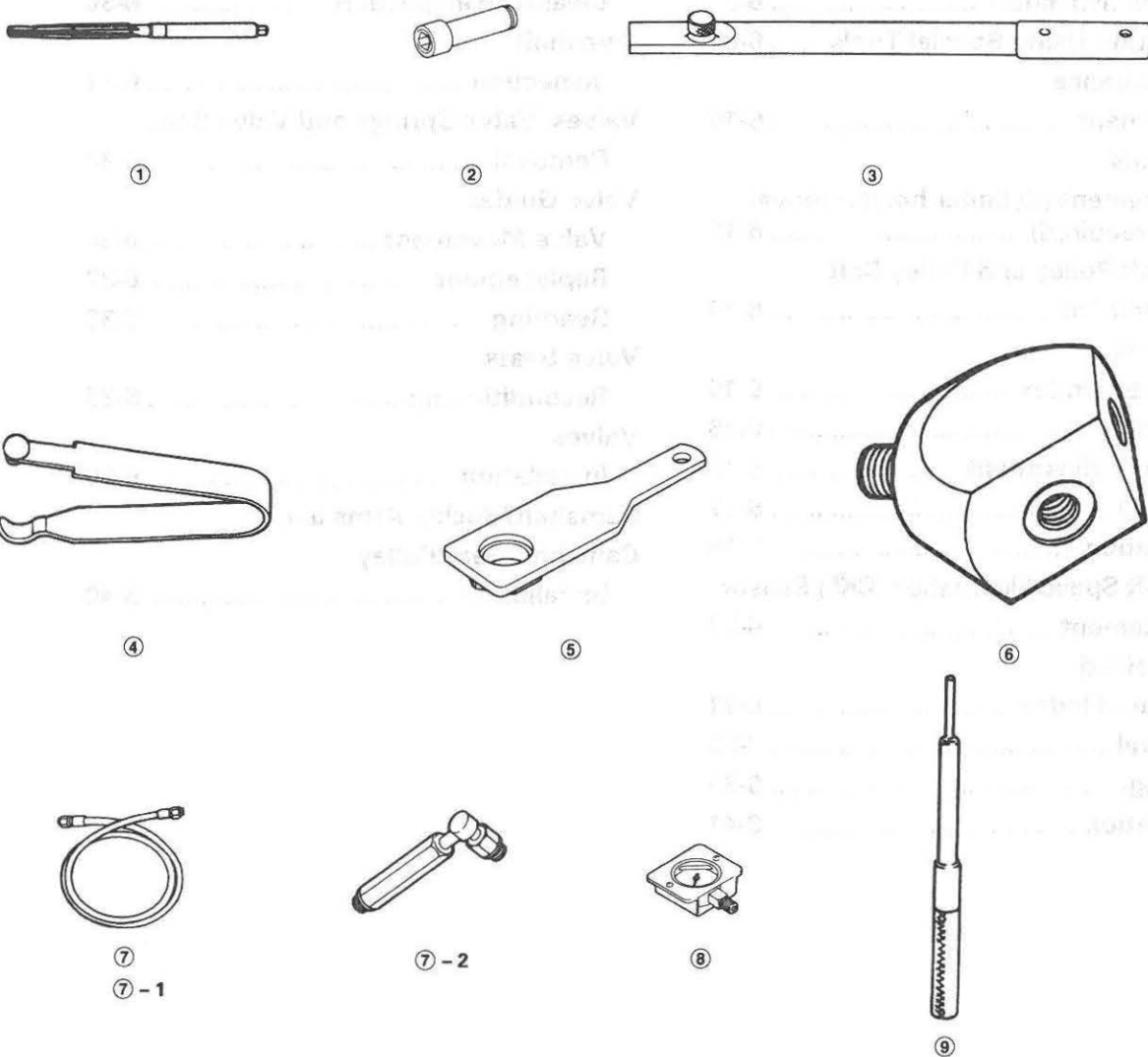
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Installation	6-40



Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07HAH - PJ7010B	Valve Guide Reamer, 5.5 mm	1	6-38
②	07JAA - 001010A	Socket, 17 mm	1	6-14
③	07JAB - 001020A	Holder Handle	1	6-14
④	07LAJ - PR3020B	Air Stopper	1	6-8
⑤	07NAB - 001040A	Holder Attachment, 50 mm	1	6-14
⑥	07NAJ - P07010A	Pressure Gauge Adapter	1	6-4
⑦	07406 - 0020201	A/T Pressure Hose	1	6-4
or ⑦ - 1	07MAJ - PY4011A	A/T Pressure Hose, 2,210 mm	1	6-4
and ⑦ - 2	07MAJ - PY40120	A/T Pressure Adapter	1	6-4
⑧	07406 - 0070300	A/T Low Pressure Gauge W/Panel	1	6-4
⑨	07742 - 0010100	Valve Guide Driver, 5.5 mm	1	6-37, 38



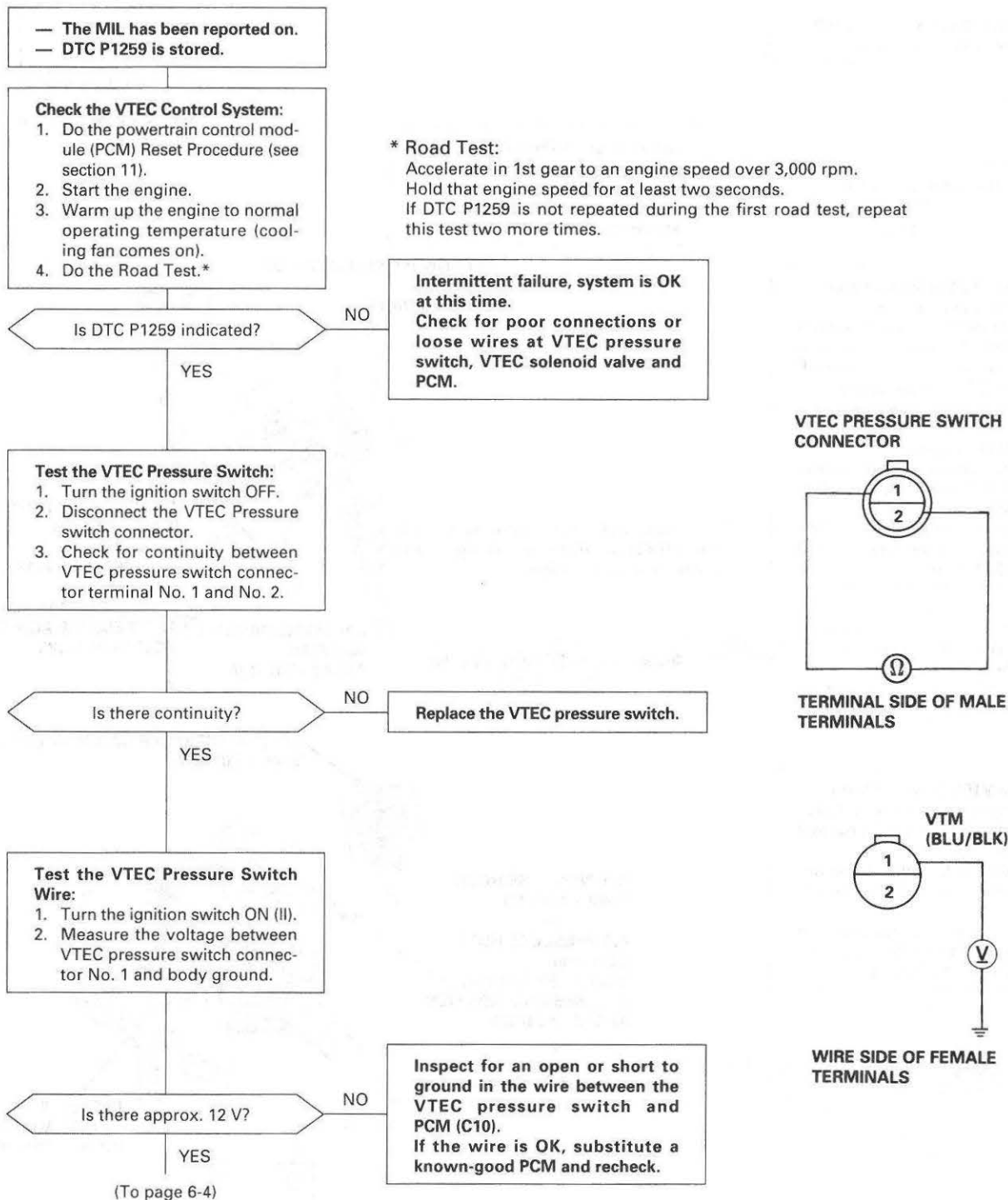
VTEC Control System



Troubleshooting Flowchart

P1259 The scan tool indicates Diagnostic Trouble Code (DTC) P1259: A problem in the VTEC Pressure Switch circuit or VTEC Solenoid Valve circuit.

Refer to page 11-28 through 11-44 before troubleshooting.



(cont'd)

VTEC Control System

Troubleshooting Flowchart (cont'd)

(From page 6-3)

Test the VTEC Pressure Switch Wire:
Measure voltage across the VTEC pressure switch connector.

Is there approx. 12 V?

NO

Repair open in the wire between VTEC pressure switch and B2 or B10 of the PCM.
If the wire is OK, substitute a known-good PCM and recheck.

YES

Test the VTEC Solenoid Valve:

1. Turn the ignition switch OFF.
2. Remove the VTEC pressure switch and install the special tool as shown, then reinstall the VTEC pressure switch.
3. Connect a tachometer (see section 11).
4. Start the engine.
5. Warm up engine to normal operating temperature (cooling fan comes on).
6. Check oil pressure at the following engine speeds 1000 and 3000 rpm.

Is pressure below 49 kPa (0.5 kgf/cm², 7 psi)?

NO

Inspect the VTEC solenoid valve.

YES

Test the VTEC Solenoid Valve:

1. Turn the ignition switch OFF.
2. Disconnect the VTEC solenoid valve connector.
3. Attach the battery positive terminal to the GRN/YEL terminal.
4. Start the engine and check the oil pressure at the following engine speed 3000 rpm.

Is the pressure above 250 kPa (2.5 kgf/cm², 36 psi)?

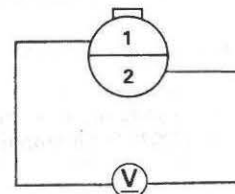
NO

Inspect the VTEC solenoid valve.

YES

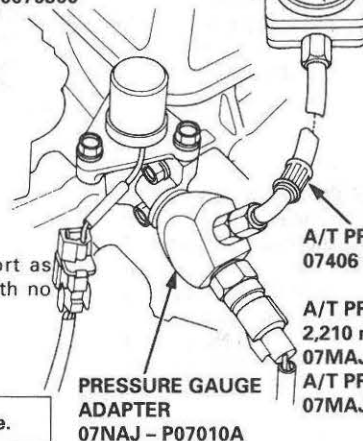
(To page 6-5)

VTEC PRESSURE SWITCH CONNECTOR



WIRE SIDE OF FEMALE TERMINAL

A/T LOW PRESSURE GAUGE W/PANEL
07406 - 0070300

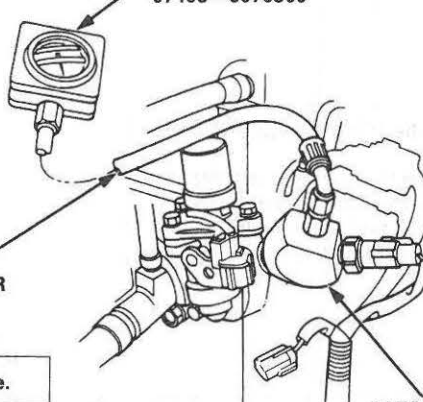


A/T PRESSURE HOSE
07406 - 0020201
or
A/T PRESSURE HOSE,
2,210 mm
07MAJ - PY4011A and
A/T PRESSURE ADAPTER
07MAJ - PY40120

PRESSURE GAUGE
ADAPTER
07NAJ - P07010A

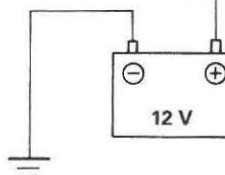
NOTE: Keep measuring time as short as possible because engine is running with no load (less than one minute).

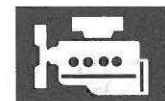
A/T LOW PRESSURE GAUGE W/PANEL
07406 - 0070300



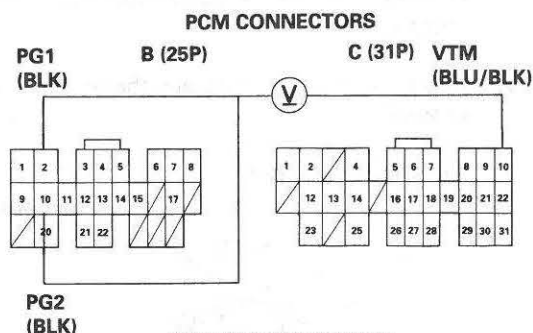
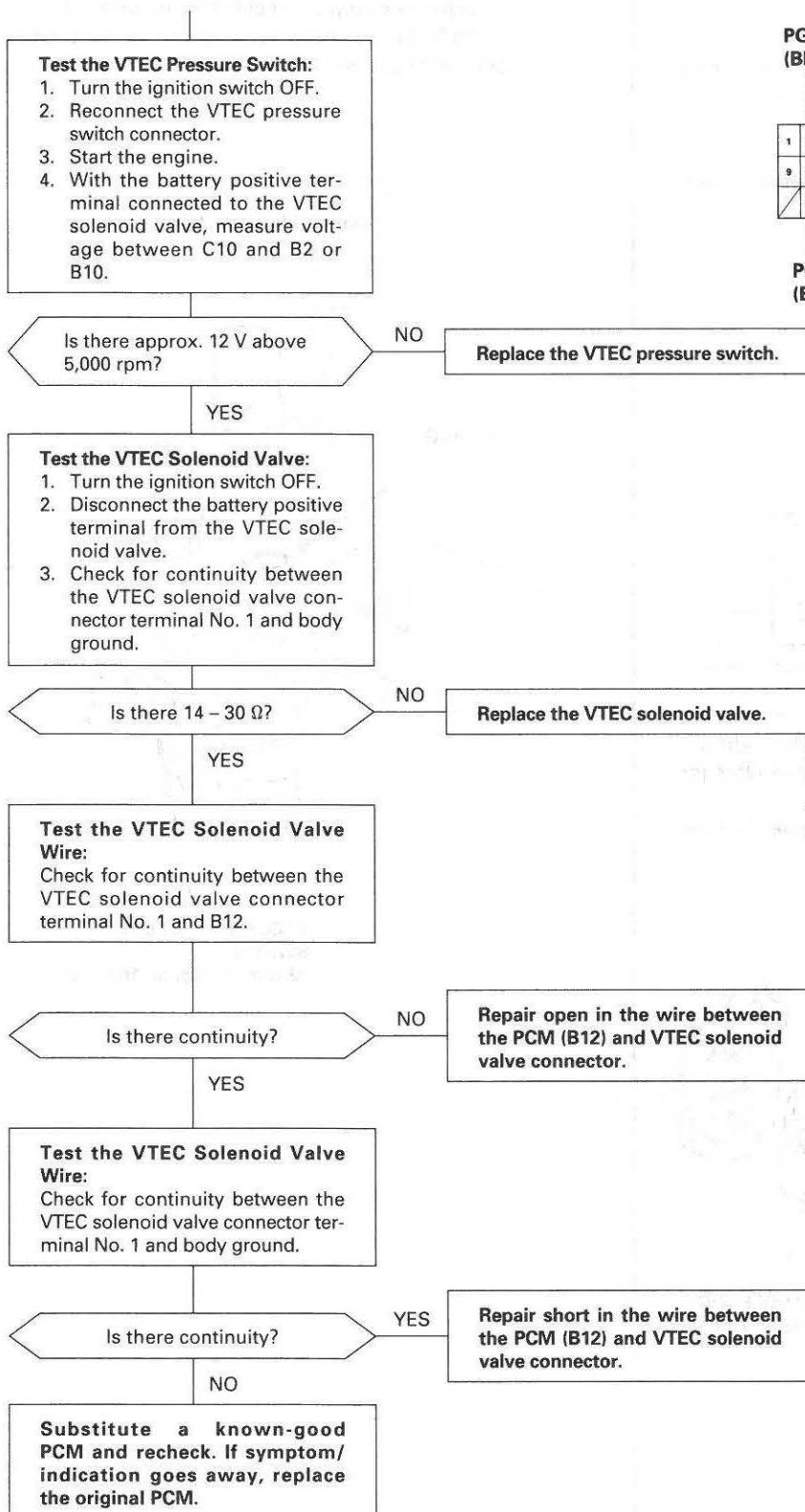
A/T PRESSURE HOSE
07406 - 0020201
or
A/T PRESSURE HOSE,
2,210 mm
07MAJ - PY4011A and
A/T PRESSURE ADAPTER
07MAJ - PY40120

PRESSURE
GAUGE ADAPTER
07NAJ - P07010A



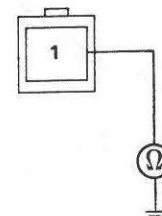


(From page 6-4)

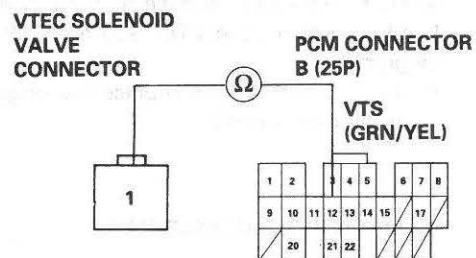


WIRE SIDE OF FEMALE TERMINALS

VTEC SOLENOID VALVE CONNECTOR

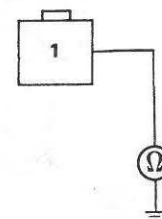


TERMINAL SIDE OF MALE TERMINAL



WIRE SIDE OF FEMALE TERMINALS

VTEC SOLENOID VALVE CONNECTOR



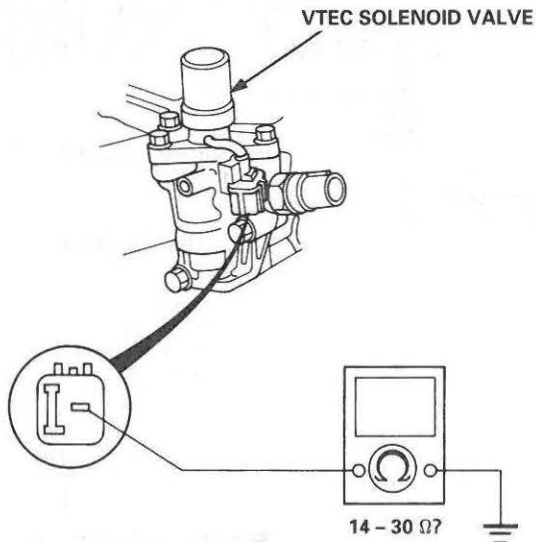
WIRE SIDE OF FEMALE TERMINAL

VTEC Solenoid Valve

Inspection

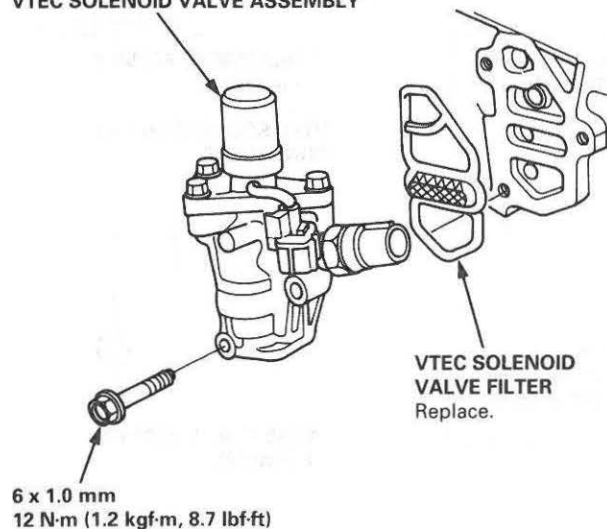
1. Disconnect the 1P connector from the VTEC solenoid valve.
2. Measure resistance between the terminal and body ground.

Resistance: 14 – 30 Ω

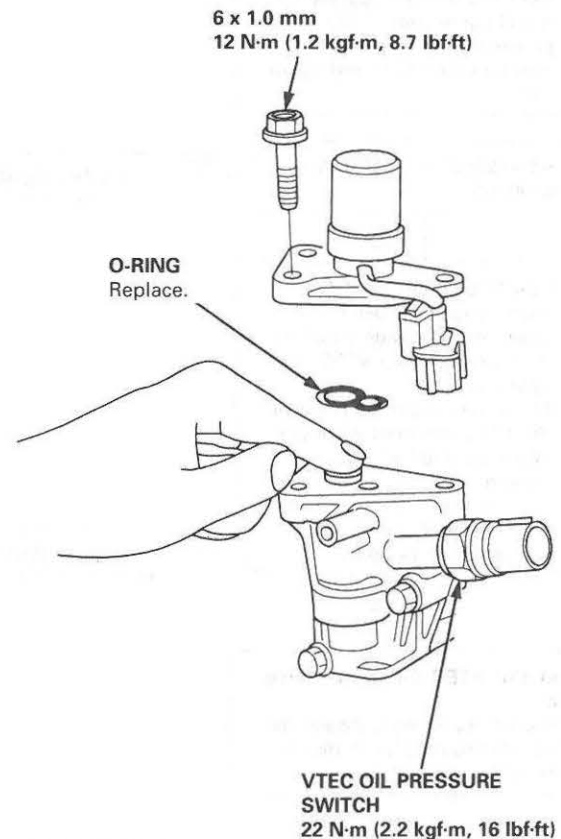


3. If the resistance is within specifications, remove the VTEC solenoid valve assembly from the cylinder head, and check the VTEC solenoid valve filter for clogging.
 - If there is clogging, replace the engine oil filter and the engine oil.

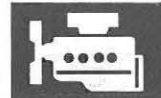
VTEC SOLENOID VALVE ASSEMBLY



4. If the filter is not clogged, push the VTEC solenoid valve with your finger and check its movement.
 - If the VTEC solenoid valve is normal, check the engine oil pressure.



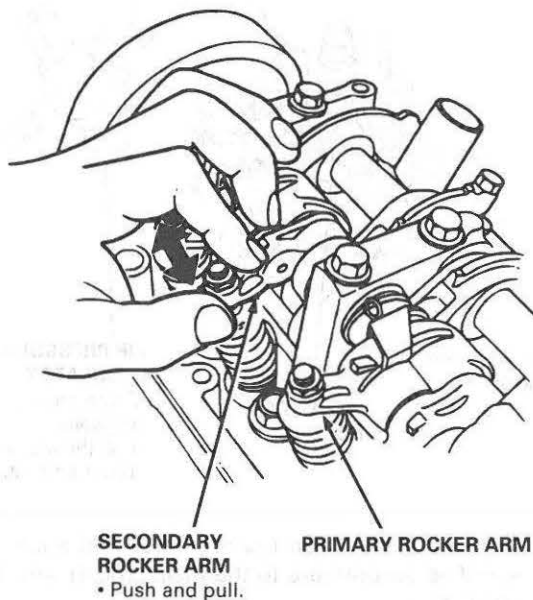
VTEC Rocker Arms



Manual Inspection

1. Set the No. 1 piston at TDC.
2. Remove the cylinder head cover.

NOTE: Refer to page 6-42 when installing the cylinder head cover.
3. Move the intake secondary rocker arm on the No. 1 cylinder manually.
4. Check that the intake secondary rocker arm moves independently of the primary intake rocker arm.



5. Check the intake secondary rocker arm of each cylinder at TDC.
 - If the intake secondary rocker arm does not move, remove the primary and secondary intake rocker arms as an assembly and check that the pistons in the secondary and primary rocker arms move smoothly.
 - If any rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly.

VTEC Rocker Arms

Inspection Using Special Tools

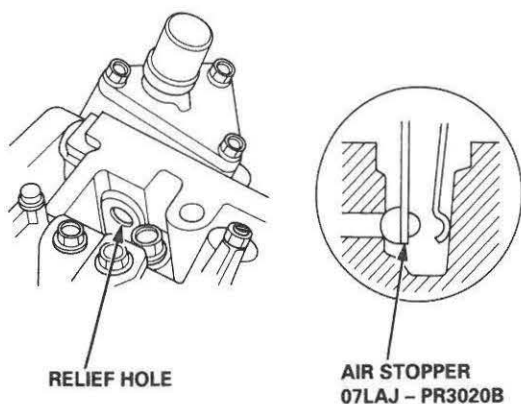
CAUTION:

- Before using the Valve Inspection Tool, make sure that the air pressure gauge on the air compressor indicates over 400 kPa (4 kgf/cm², 57 psi).
- Inspect the valve clearance before rocker arm inspection.
- Cover the timing belt with a shop towel to protect the belt.
- Check the intake primary rocker arm of each cylinder at TDC.

1. Remove the cylinder head cover.

NOTE: Refer to page 6-42 when installing the cylinder head cover.

2. Plug the relief hole with the special tool.



3. Remove the sealing bolt from the inspection hole and connect an air pressure regulator with a 0 – 100 psi gauge.

10 x 1.0 mm
SEALING BOLT
20 N·m (2.0 kgf·m, 14 lbf·ft)

AIR STOPPER
07LAJ - PR3020B

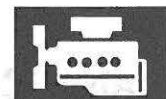
10 x 1.0 mm
ADAPTER

INSPECTION
HOLE

AIR PRESSURE
REGULATOR
(Commercially
available)
• Pull the dial and
turn to adjust.

4. Loosen the valve on the regulator and apply the specified air pressure to the intake rocker arm timing piston.

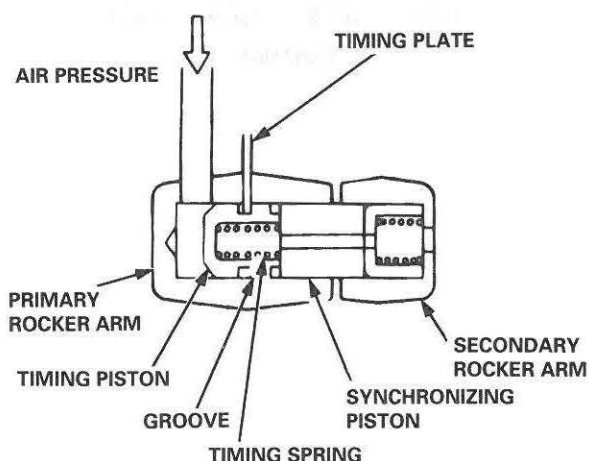
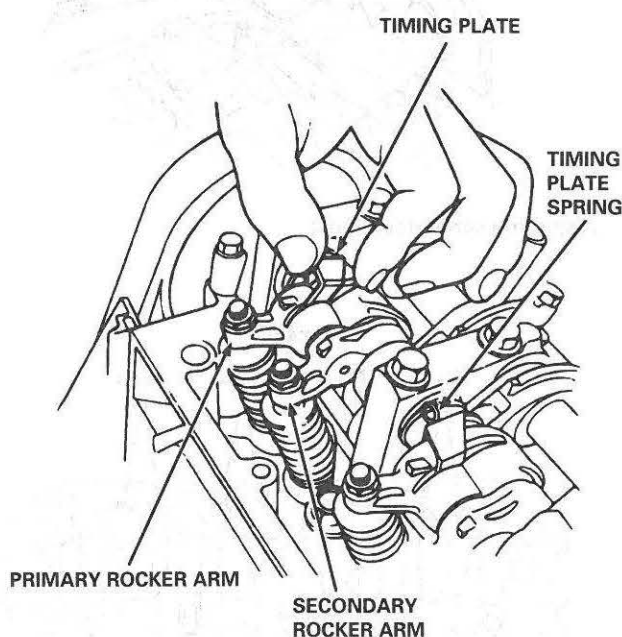
Specified Air Pressure:
250 kPa (2.5 kgf/cm², 36 psi)



5. With the specified air pressure applied, push up the timing plate; the synchronizing piston will pop out and engage the intake secondary rocker arm. Visually check the engagement of the synchronizing piston.

NOTE:

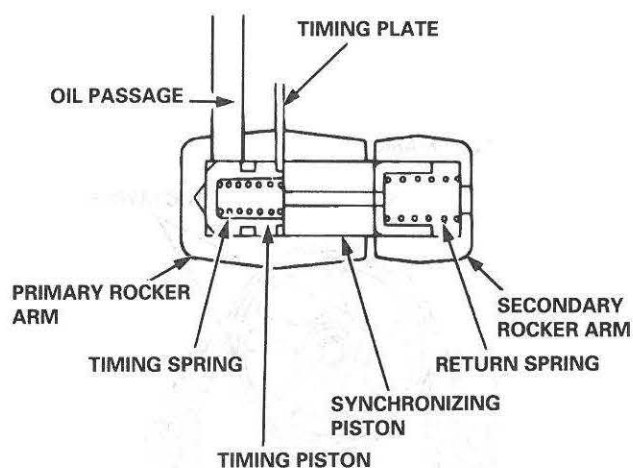
- The synchronizing piston can be seen in the gap between the secondary and primary rocker arms.
- With the timing plate engaged in the groove on the timing piston, the piston is locked in the pushed out position.



6. Stop applying air pressure and push up the timing plate; the synchronizing piston will snap back to its original position. Visually check the disengagement of the synchronizing piston.

NOTE:

- When the timing plate is pushed up, it releases the timing piston, letting the return spring move the synchronizing piston to its original position.
- Replace the intake rocker arms as an assembly if either does not work correctly.



7. Remove the special tools.
8. After inspection, check that the malfunction indicator lamp (MIL) does not come on.

Valve Clearance

Adjustment

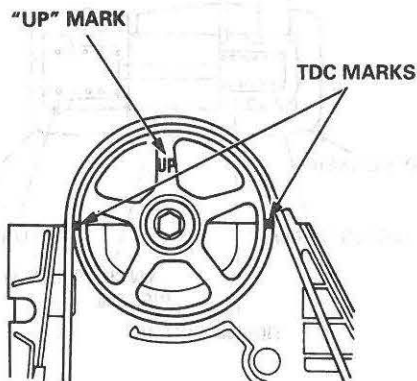
NOTE:

- Valves should be adjusted only when the cylinder head temperature is less than 100°F (38°C).
- After adjusting, retorque the crankshaft pulley bolt (see page 6-14).

1. Remove the cylinder head cover.

NOTE: Refer to page 6-42 when installing the cylinder head cover.

2. Remove the upper cover (see page 6-17).
3. Set the No. 1 piston at TDC. The "UP" mark on the camshaft pulley should be at the top, and the TDC marks should align with the cylinder head surface.



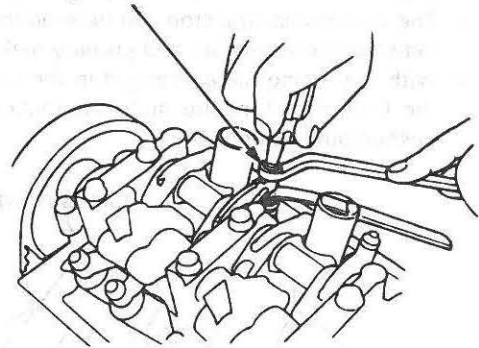
4. Adjust valves on No. 1 cylinder.

Intake: 0.18 – 0.22 mm (0.007 – 0.009 in)

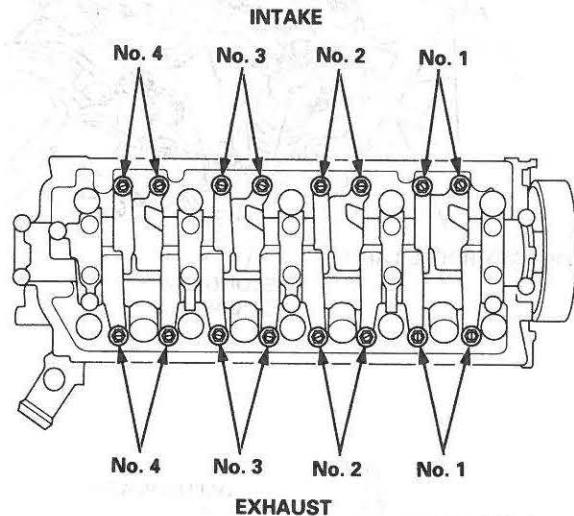
Exhaust: 0.23 – 0.27 mm (0.009 – 0.011 in)

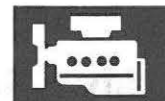
5. Loosen the locknut, and turn the adjustment screw until the feeler gauge slides back and forth with a slight amount of drag.

INTAKE and EXHAUST VALVE LOCKNUTS 20 N·m (2.0 kgf·m, 14 lbf·ft)

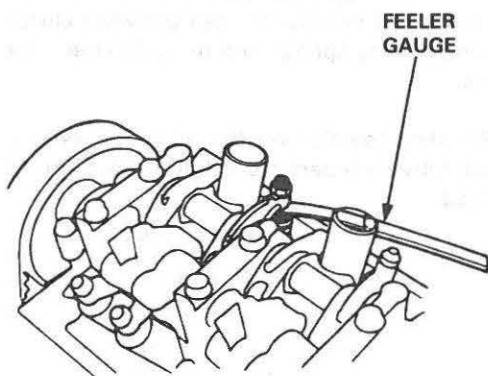


Adjusting screw locations:

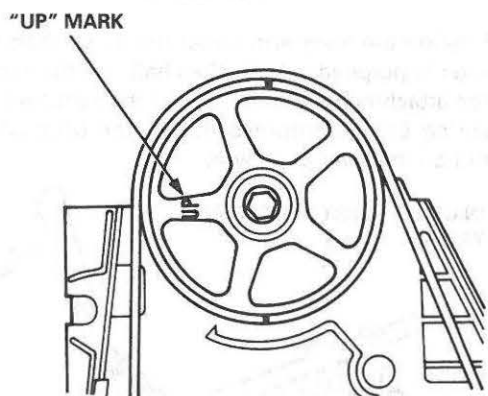




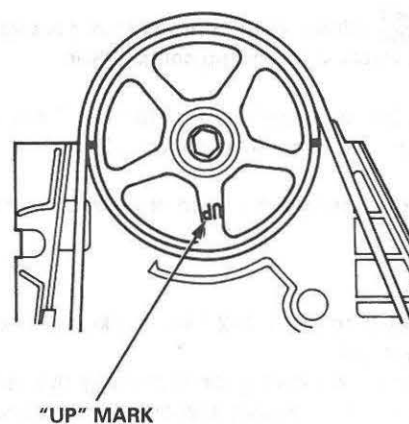
6. Tighten the locknut, and check the clearance again. Repeat the adjustment if necessary.



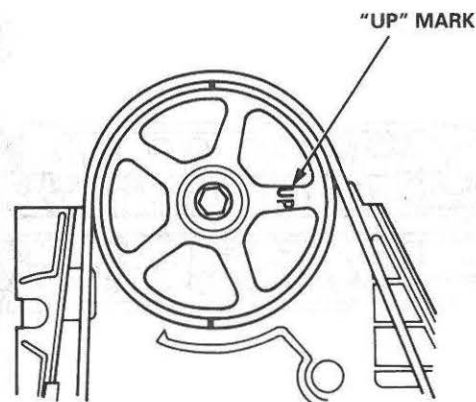
7. Rotate the crankshaft 180° counterclockwise (camshaft pulley turns 90°). The "UP" mark should be on the exhaust side. Adjust valves on No. 3 cylinder.



8. Rotate the crankshaft 180° counterclockwise to bring No. 4 piston to TDC. Both TDC grooves are once again visible. Adjust valves on No. 4 cylinder.



9. Rotate the crankshaft 180° counterclockwise to bring No. 2 piston to TDC. The "UP" mark should be on the intake side. Adjust valves on No. 2 cylinder.



Valve Seals

Replacement (Cylinder head removal not required)

NOTE: Cylinder head removal is not required in this procedure.

The procedure shown below applies when using the in-car valve spring compressor (Snap-on YA8845 with YA8845 - 2 A 7/8" attachment).

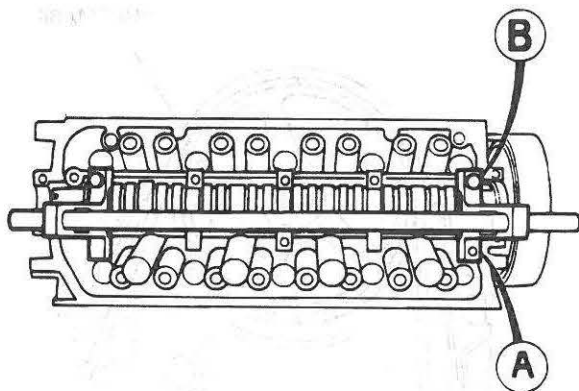
⚠ WARNING Always wear approved eye protection when using the in-car valve spring compressor.

1. Turn the crankshaft so that the No. 1 and the No. 4 pistons are at top dead center (TDC).
2. Remove the cylinder head cover and the rocker arm assembly.

NOTE:

- Refer to page 6-27 for rocker arm assembly removal.
- When removing or installing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the holders, springs and rocker arms on the shaft.
- Refer to page 6-42 when installing the cylinder head cover.

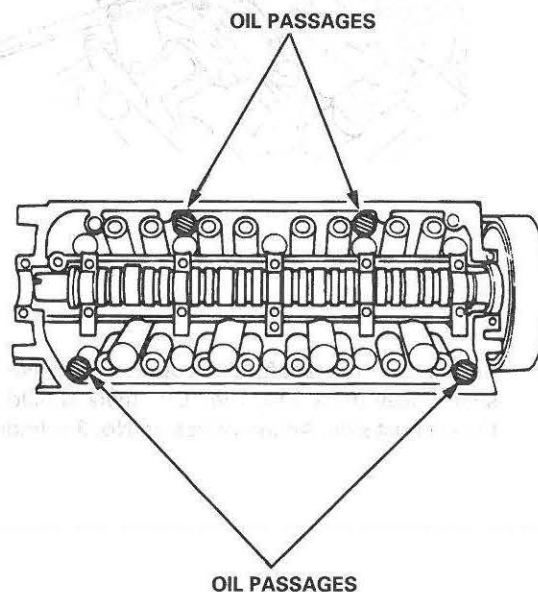
3. Remove the fuel injectors and the wire harness.
4. Using the 8 mm bolts supplied with the tool, mount the two uprights to the cylinder head at the end camshaft holders. The uprights fit over the camshaft as shown.



5. Insert the cross shaft through the top hole of the two uprights.

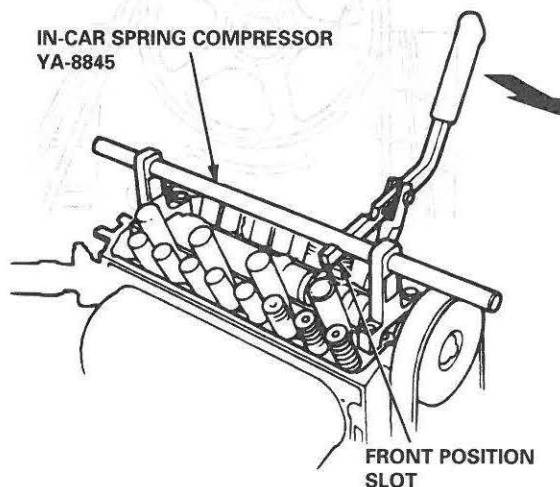
Intake Valve Seals:

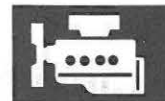
6. Select the 7/8 in diameter short compressor attachment, and fasten the attachment to the No. 4 hole of the lever arm with the speed pin supplied.
7. Insert an air adaptor into the spark plug hole. Pump air into the cylinder to keep the valve closed while compressing springs and removing the valve keepers.
8. Put shop towels over the oil passages to prevent the valve keepers from falling into the cylinder head.



9. Position the lever arm under the cross shaft so the lever is perpendicular to the shaft and the compressor attachment rests on top of the retainer for the spring being compressed. Use the front position slot on the lever as shown.

IN-CAR SPRING COMPRESSOR
YA-8845

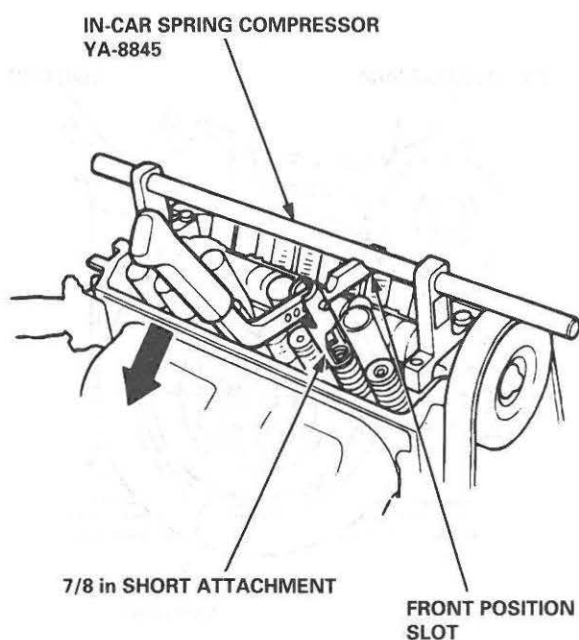




10. Using a downward motion on the lever arm, compress the valve spring and remove the keepers from the valve stem. Slowly release pressure on the spring.
11. Remove the valve seals (see page 6-33).
12. Install the valve seals (see page 6-39).
13. Install the springs, the retainers and the keepers in reverse order of removal.

Exhaust Valve Seals:

14. Select the 7/8 in. diameter short compressor attachment, and fasten the attachment to the No. 2 hole of the lever arm with the speed pin supplied.
15. Put shop towels over the oil passages to prevent the valve keepers from falling into the cylinder head.
16. Position the lever arm under the cross shaft so the lever is perpendicular to the shaft and the compressor attachment rests on top of the retainer for the spring being compressed. Use the front position slot on the lever as shown.



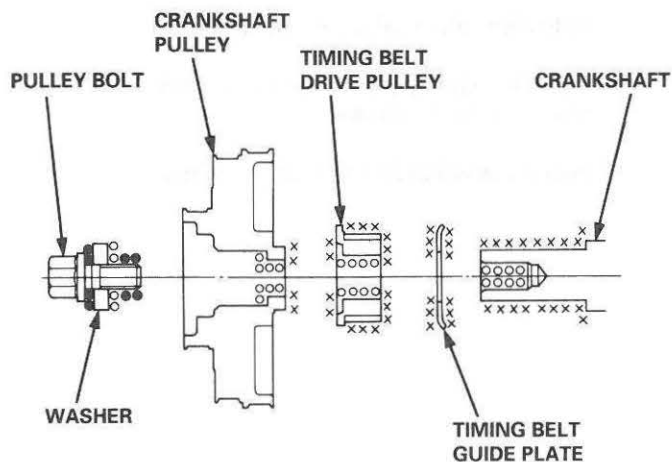
17. Using a downward motion on the lever arm, compress the valve spring and remove the keepers from the valve stem. Slowly release pressure on the spring.
18. Remove the valve seals (see page 6-33).
19. Install the valve seals (see page 6-39).
20. Install the springs, the retainers and the keepers in reverse order of removal.
21. Repeat steps 6 to 20 on the other cylinders.

Crankshaft Pulley and Pulley Bolt

Replacement

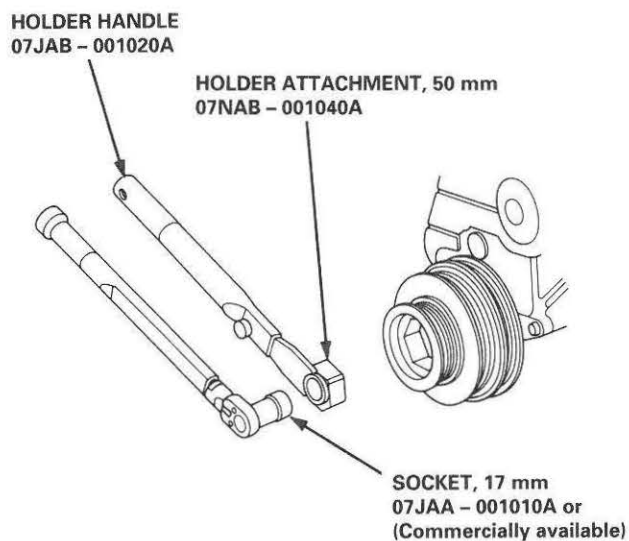
1. Remove any oil from the pulleys, crankshaft, bolt and washer. Clean and lubricate as shown below.

○: Clean
 ×: Remove any oil
 ●: Lubricate

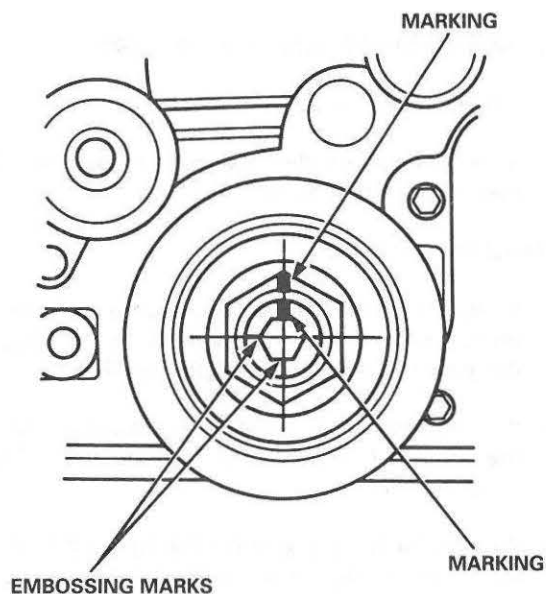


2. Tighten the pulley bolt to the specified torque.

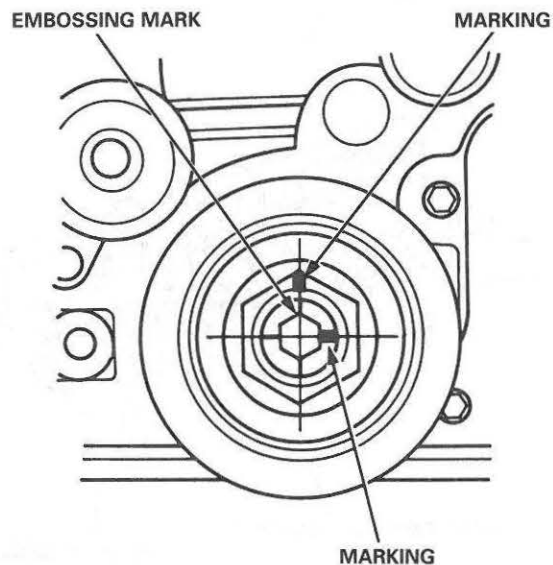
Torque: 20 N·m (2.0 kgf-m, 14 lbf-ft)



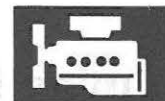
3. Use a felt tip pen to mark the pulley bolt head and washer.



4. Tighten the pulley bolt an additional 90°.



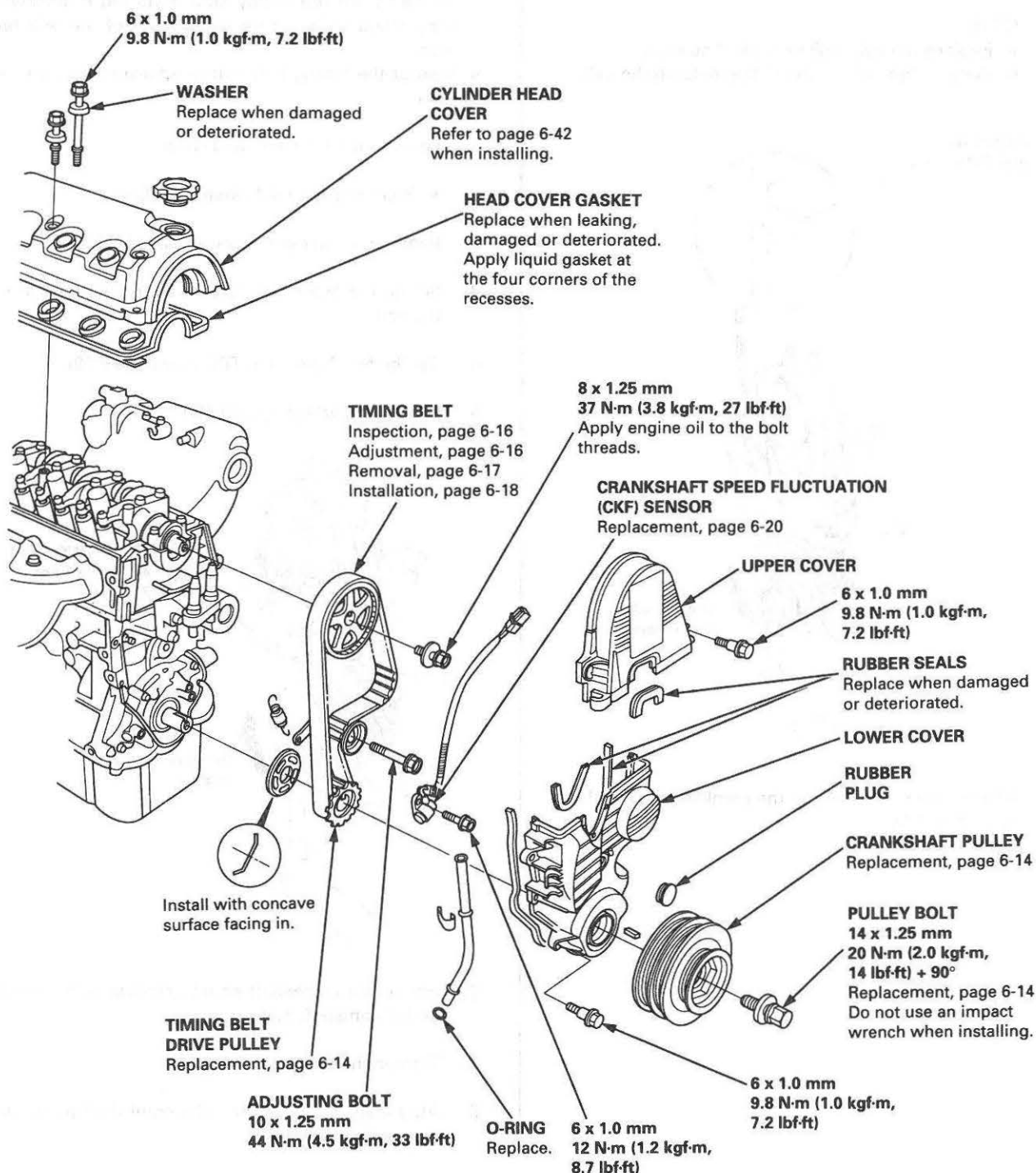
Timing Belt



Illustrated Index

NOTE:

- Refer to page 6-18 for how to position the crankshaft and pulley before installing the belt.
- Mark the direction of rotation on the belt before removing.
- Do not use the upper cover and lower cover for storing removed items.
- Clean the upper cover and lower cover before installing.
- Replace the camshaft seals and crankshaft seals if there is oil leakage.
- Refer to page 6-14 before installing the timing belt.



Timing Belt

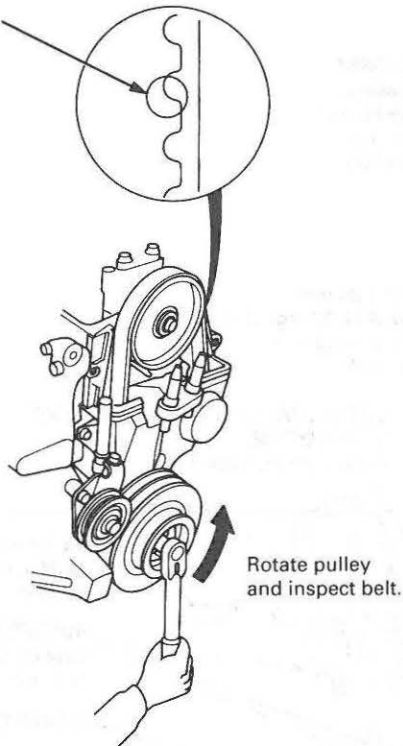
Inspection

1. Remove the cylinder head cover.
 - Refer to page 6-42 when installing.
2. Remove the upper cover (see page 6-17).
3. Inspect the timing belt for cracks and oil or coolant soaking.

NOTE:

- Replace the belt if oil or coolant soaked.
- Remove any oil or solvent that gets on the belt.

Inspect this area for wear.



4. After inspecting, retorque the crankshaft pulley bolt (see page 6-14).

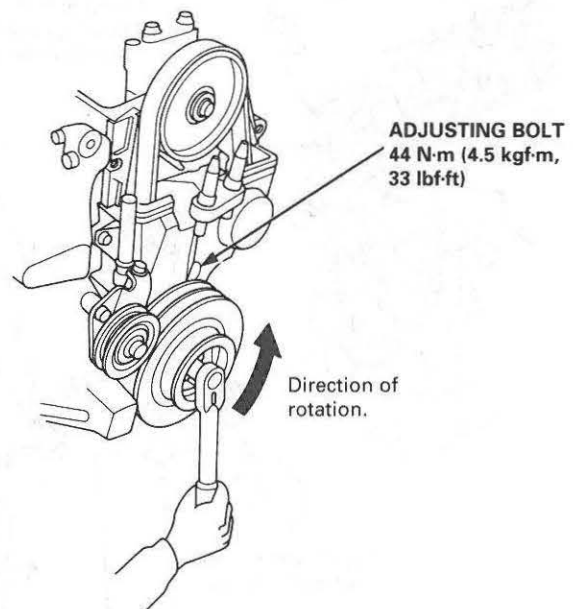
Tension Adjustment

CAUTION: Always adjust the timing belt tension with the engine cold.

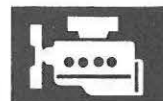
NOTE:

- The tensioner is spring-loaded to apply tension to the belt automatically after making the following adjustment.
- Always rotate the crankshaft counterclockwise when viewed from the pulley side. Rotating it clockwise may result in improper adjustment of the belt tension.
- Inspect the timing belt before adjusting the belt tension.

1. Remove the cylinder head cover.
 - Refer to page 6-42 when installing.
2. Remove the upper cover (see page 6-17).
3. Rotate the crankshaft five or six revolutions to set the belt.
4. Set the No. 1 piston at TDC (see page 6-19).
5. Loosen the adjusting bolt 180°.



6. Rotate the crankshaft counterclockwise three teeth on the camshaft pulley.
7. Tighten the adjusting bolt.
8. After inspecting, retorque the crankshaft pulley bolt (see page 6-14).

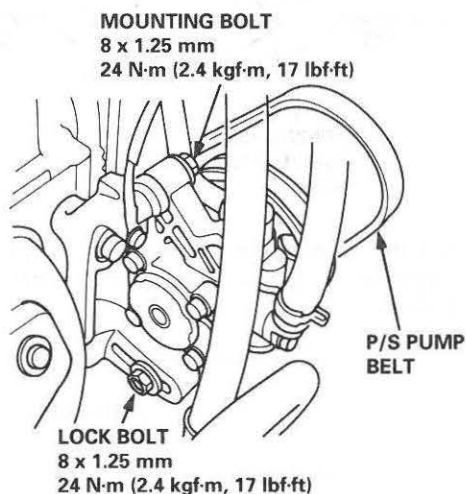


Removal

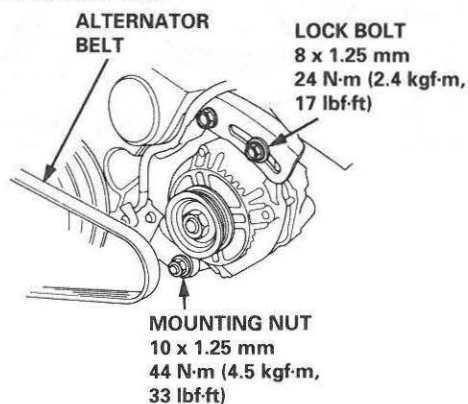
NOTE:

- Replace the timing belt at 105,000 miles (168,000 km) according to the maintenance schedule (normal conditions/severe condition).
If the vehicle is regularly driven in one or more of the following conditions, replace the timing belt at 60,000 miles (U.S.A.) 100,000 km (Canada).
 - In very high temperatures (over 110°F, 43°C).
 - In very low temperatures (under -20°F, -29°C).
- Turn the crankshaft pulley so the No. 1 piston is at top dead center (TDC) before removing the belt (see page 6-19).
- Inspect the water pump before installing the timing belt (see page 10-11).

1. Remove the splash shield (see page 5-6).
2. Loosen the mounting bolt and lock bolt, then remove the power steering (P/S) pump belt and pump.

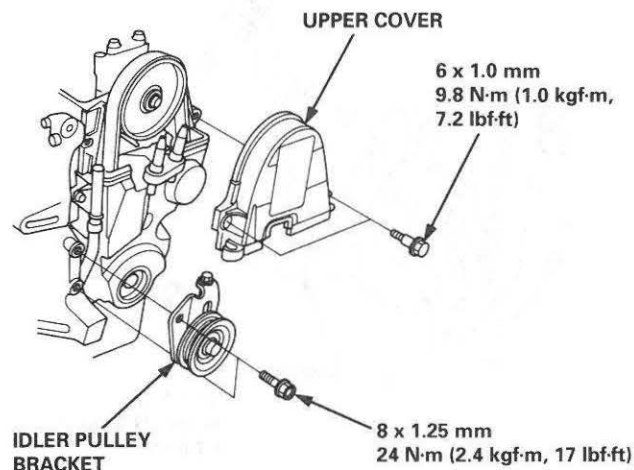


3. Loosen the idler pulley center nut and adjusting bolt, then remove the air conditioning (A/C) compressor belt (see page 5-5).
4. Loosen the mounting nut and lock bolt, then remove the alternator belt.



5. Remove the dipstick, then remove the upper cover and idler pulley bracket.

NOTE: Do not use the upper cover to store removed items.



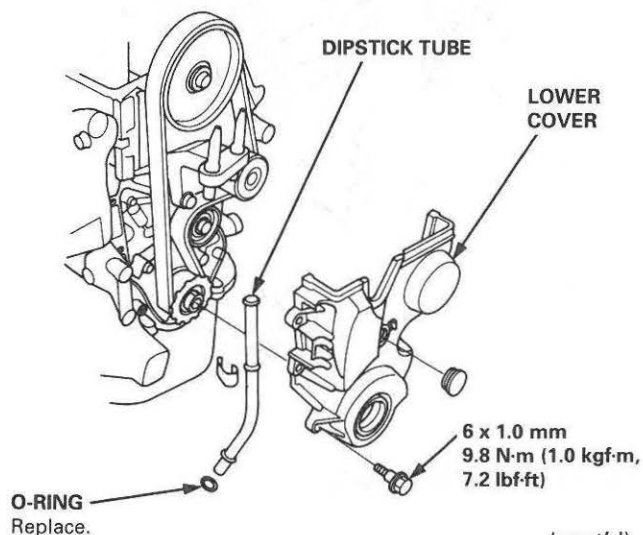
6. Remove the upper bracket (see page 6-26).

NOTE:

- Use a jack to support the engine before the upper bracket is removed.
- Make sure to place a cushion between the oil pan and the jack.

7. Remove the crankshaft pulley (see page 6-14).
8. Remove the lower cover and dipstick tube.

NOTE: Do not use the lower cover to store removed items.

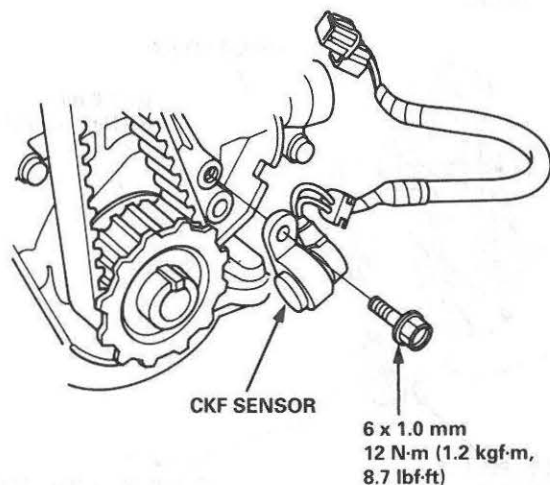


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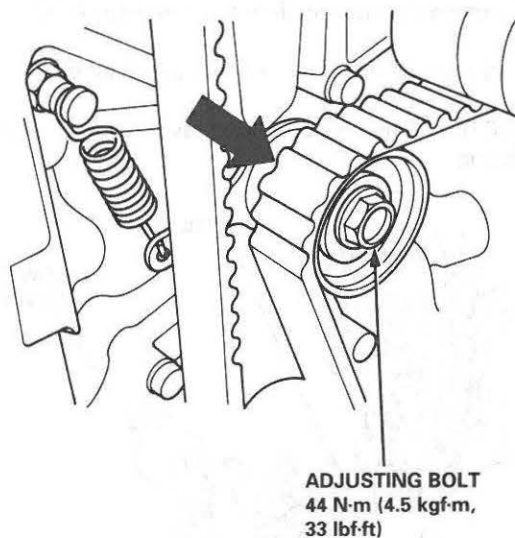
Timing Belt

Removal (cont'd)

9. Remove the CKF sensor from the oil pump.



10. Loosen the adjusting bolt 180°. Push the tensioner to remove tension from the timing belt, then retighten the adjusting bolt.

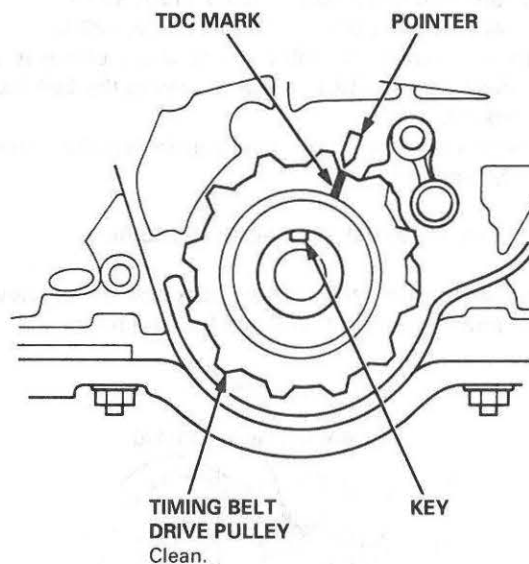


11. Remove the timing belt.

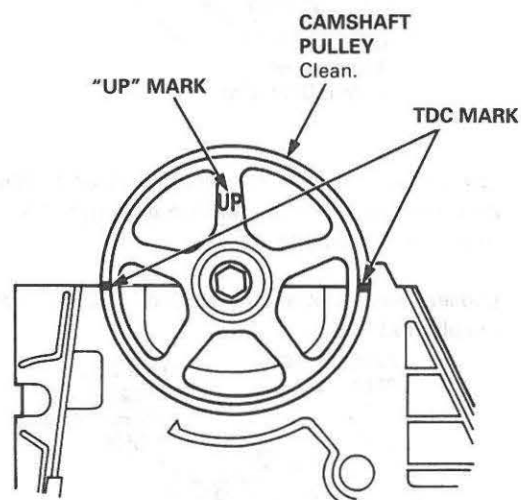
Installation

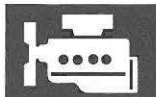
Install the timing belt in the reverse order of removal; Only key points are described here.

1. Set the timing belt drive pulley so that the No. 1 piston is at top dead center (TDC). Align the groove on the timing belt drive pulley to the pointer on the oil pump.



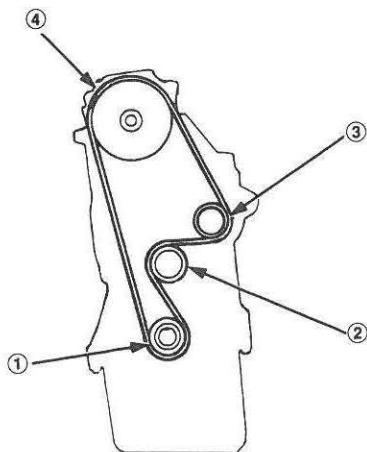
2. Set the camshaft pulley to TDC. Align the TDC marks on the camshaft pulley to the cylinder head surface.





3. Install the timing belt tightly in the sequence shown.
①Timing belt drive pulley (crankshaft) →②Adjusting pulley →③Water pump pulley →④Camshaft pulley.

NOTE: Make sure the timing belt drive pulley and camshaft pulley are at TDC.



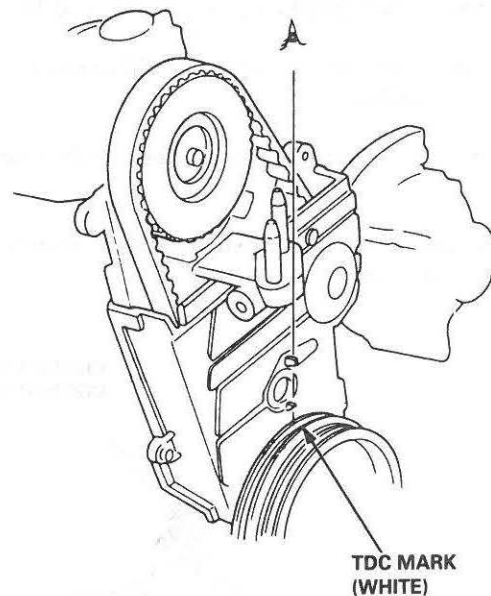
4. Loosen and retighten the adjusting bolt to tension the timing belt.
5. Install the lower cover and upper cover.

NOTE: Clean the upper and lower covers before installation.

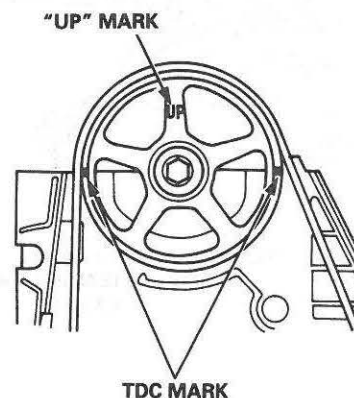
6. Install the crankshaft pulley, then tighten the pulley bolt (see page 6-14).
7. Rotate the crankshaft pulley about five or six turns counterclockwise so that the timing belt positions on the pulleys.
8. Adjust the timing belt tension (see page 6-16).

9. Check that the crankshaft pulley and camshaft pulley are both at TDC.

CRANKSHAFT PULLEY:



CAMSHAFT PULLEY:



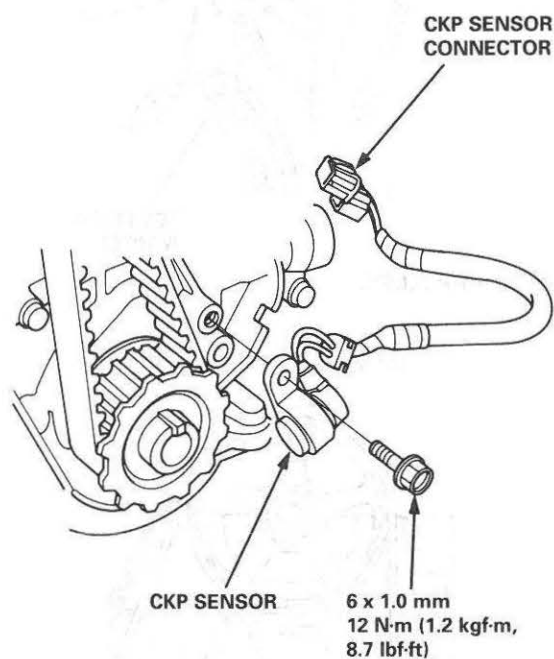
10. If the camshaft or crankshaft pulley is not positioned at TDC, remove the timing belt and adjust the position following the procedure on page 6-18. Then reinstall the timing belt.
11. After installation, adjust the tension of each belt.
- See section 23 for alternator belt tension adjustment.
 - See section 22 for A/C compressor belt tension adjustment.
 - See section 17 for P/S pump belt tension adjustment.

Crankshaft Speed Fluctuation (CKF) Sensor

Replacement

1. Remove the cylinder head cover.

NOTE: Refer to page 6-42 when installing.
2. Remove the crankshaft pulley (see page 6-14).
3. Remove the upper cover and idler pulley bracket (see page 6-17).
4. Remove the lower cover and dipstick/tube (see page 6-17).
5. Disconnect the CKF sensor connector, then remove the CKF sensor.



6. Install the CKF sensor in reverse order of removal.

Cylinder Head

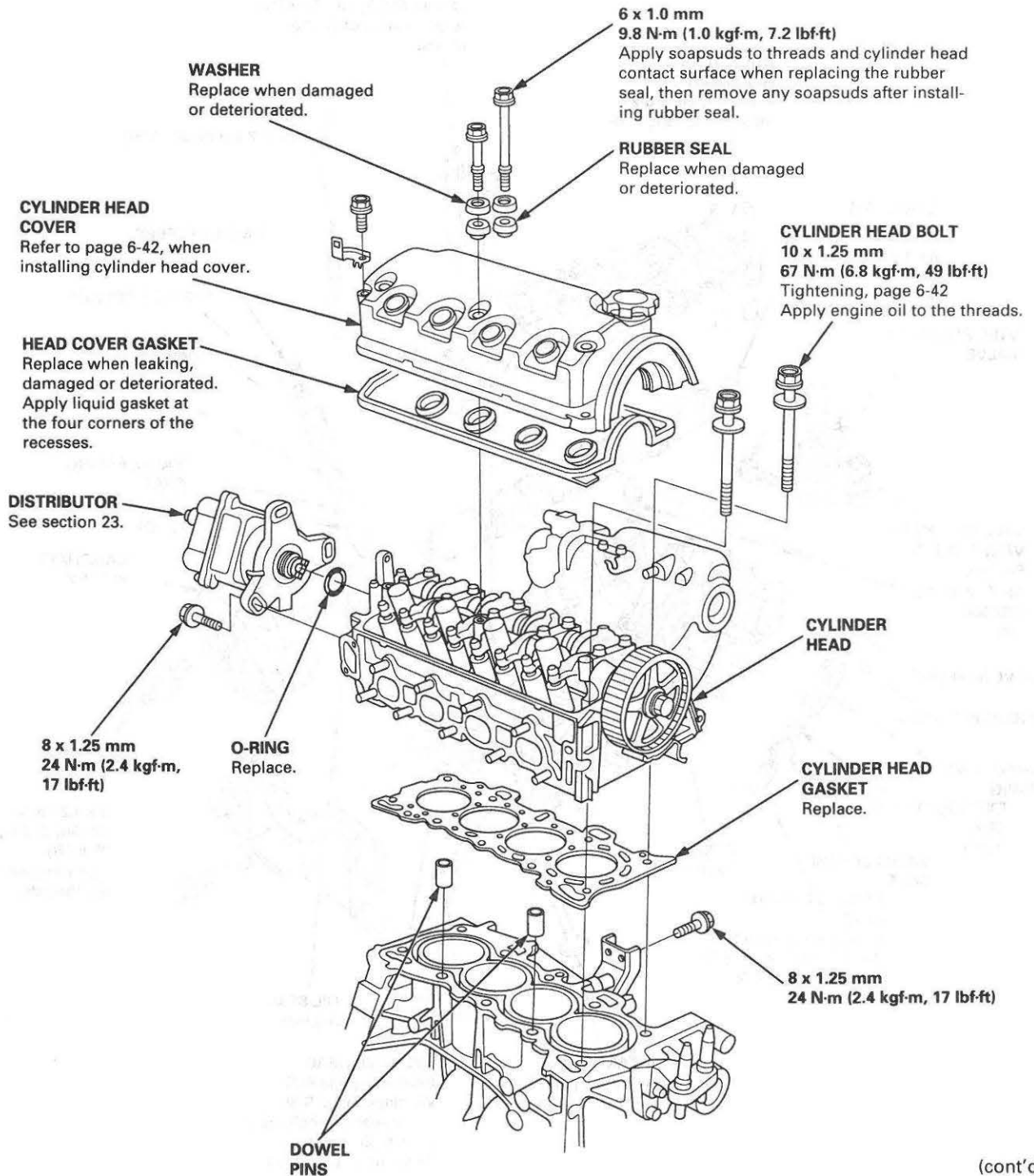


Illustrated Index

CAUTION:

- To avoid damage, wait until the engine coolant temperature drops below 100°F (38°C) before removing the cylinder head.
- When handling a metal gasket, take care not to fold it or damage the contact surface.

NOTE: Use new O-rings and gaskets when reassembling.



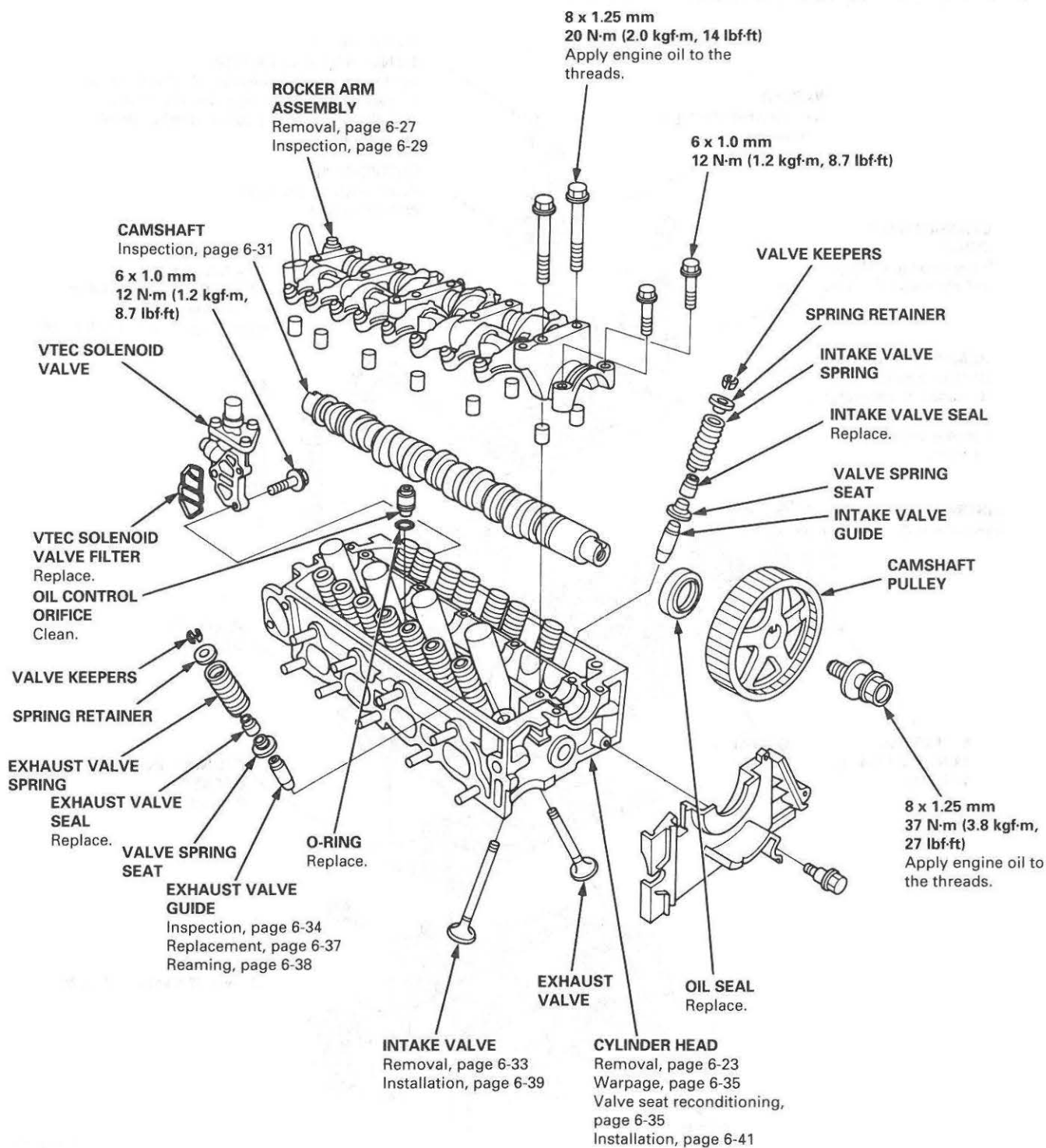
(cont'd)

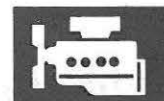
Cylinder Head

Illustrated Index (cont'd)



Prior to reassembling, clean all the parts in solvent, dry them and apply lubricant to any contact parts.





Removal

Engine Removal is not required for this procedure.

⚠ WARNING Make sure jacks and safety stands are placed properly and hoist brackets are attached to the correct positions on the engine.

CAUTION:

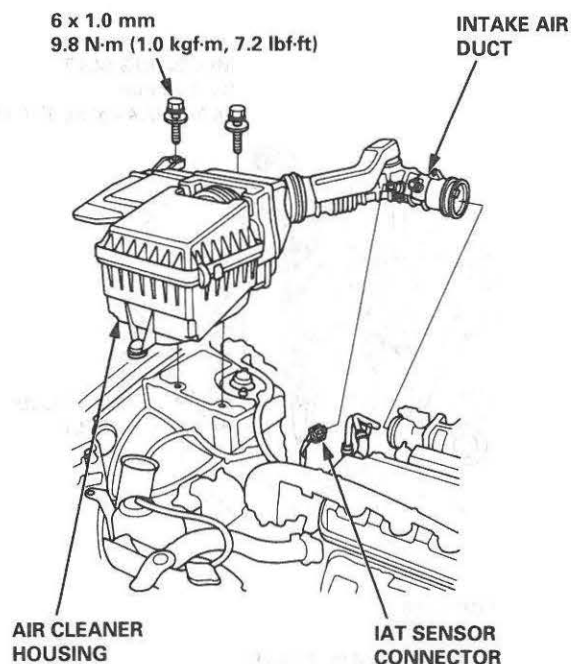
- Use fender covers to avoid damaging painted surfaces.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.
- To avoid damaging the cylinder head, wait until the engine coolant temperature drops below 100°F (38°C) before loosening the retaining bolts.

NOTE:

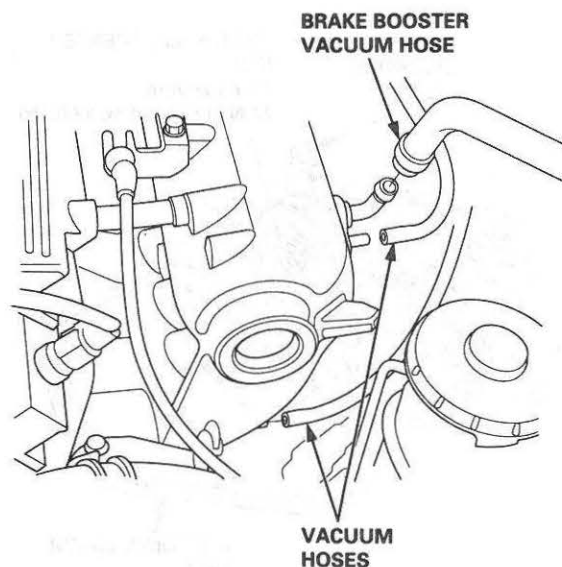
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.
- Inspect the timing belt before removing the cylinder head.
- Turn the crankshaft pulley so that the No. 1 piston is at top dead center (see page 6-19).

1. Turn off the manual shut-off valve.
2. To reduce fuel pressure in the lines, start the engine and run it until it stalls.
3. Disconnect the negative terminal from the battery.
4. Drain the engine coolant (see page 10-5).
 - Remove the radiator cap to speed draining.

5. Disconnect the intake air temperature (IAT) sensor connector, then remove the intake air duct and air cleaner assembly.



6. Remove the brake booster vacuum hose and vacuum hoses.



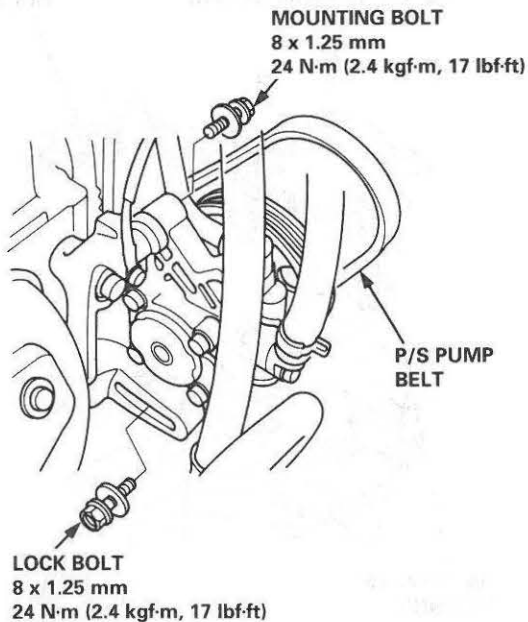
(cont'd)

Cylinder Head

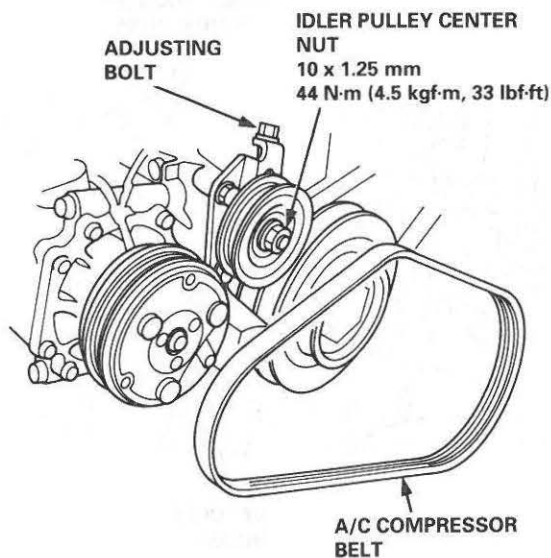
Removal (cont'd)

7. Remove the mounting bolt and lock bolt, then remove the power steering (P/S) pump belt and pump.

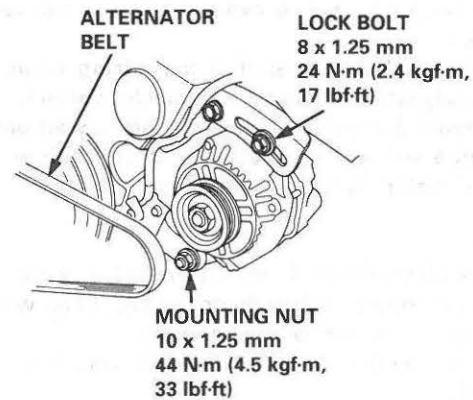
NOTE: Do not disconnect the P/S hoses.



8. Loosen the idler pulley center nut and adjusting bolt, then remove the air conditioning (A/C) compressor belt.



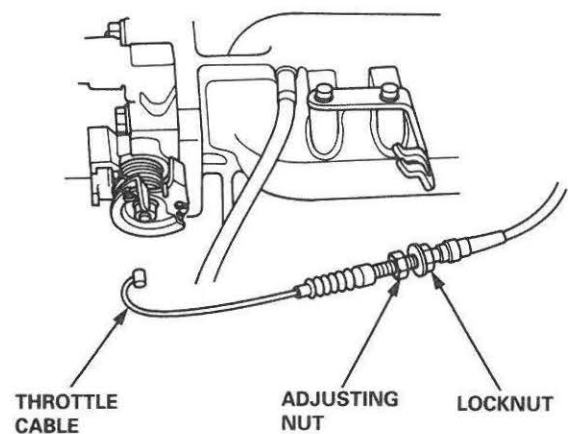
9. Loosen the mounting nut and lock bolt, then remove the alternator belt.



10. Remove the P/S pump bracket (see page 5-10).
11. Remove the throttle cable by loosening the locknut, then slip the cable end out of the accelerator linkage.

NOTE:

- Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.
- Adjust the throttle cable when installing (see section 11).

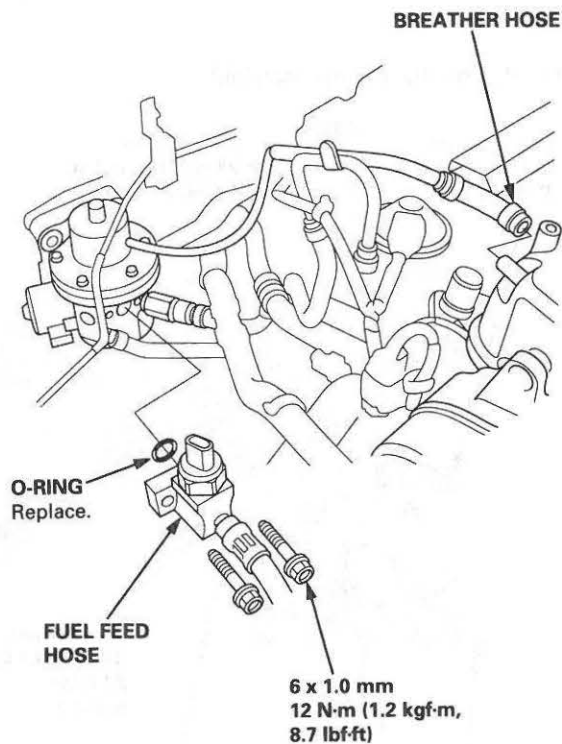




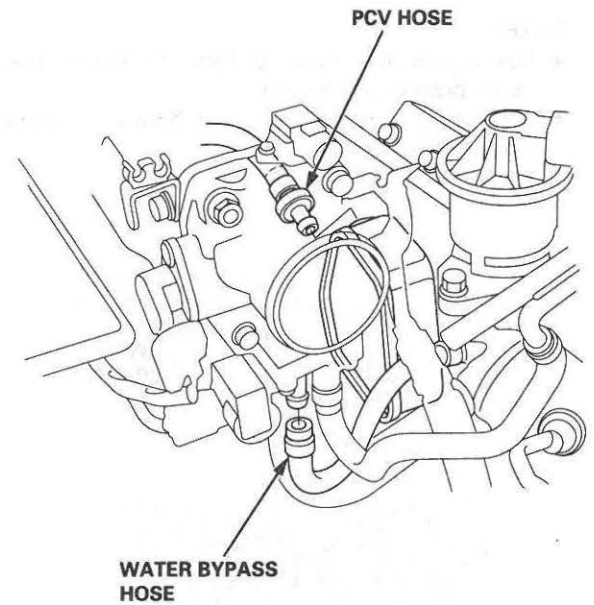
12. Remove the engine wire harness connectors and wire harness clamps from the cylinder head and the intake manifold.

- Four fuel injector connectors
- Engine coolant temperature (ECT) sensor connector
- Radiator fan switch connector
- Coolant temperature gauge sending unit connector
- Throttle position sensor connector
- Manifold absolute pressure (MAP) sensor connector
- Primary heated oxygen sensor (primary HO2S) connector
- Secondary heated oxygen sensor (secondary HO2S) connector
- Exhaust gas recirculation (EGR) connector
- VTEC solenoid valve connector
- VTEC pressure sensor connector
- Idle air control (IAC) valve connector
- Fuel pressure sensor connector
- Fuel temperature sensor connector

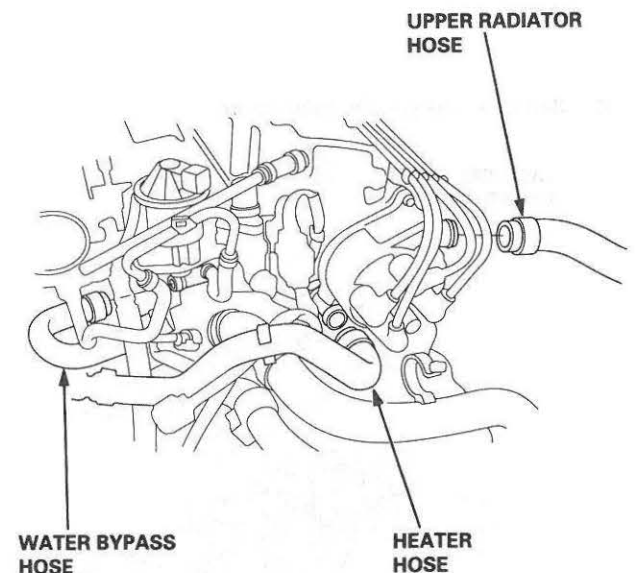
13. Remove the fuel feed hose and breather hose.



14. Remove the water bypass hose and positive crankcase ventilation (PCV) hose.



15. Remove the upper radiator hose, heater hose and water bypass hose.



(cont'd)

Cylinder Head

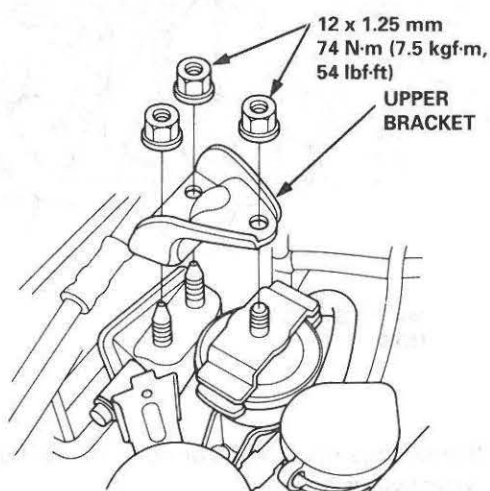
Removal (cont'd)

16. Remove the spark plug caps and distributor from the cylinder head.

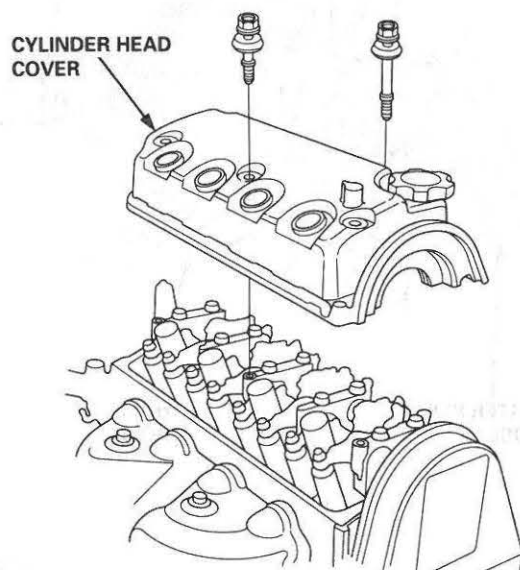
17. Remove the upper bracket.

NOTE:

- Use a jack to support the engine before the upper bracket is removed.
- Make sure to place a cushion between the oil pan and the jack.

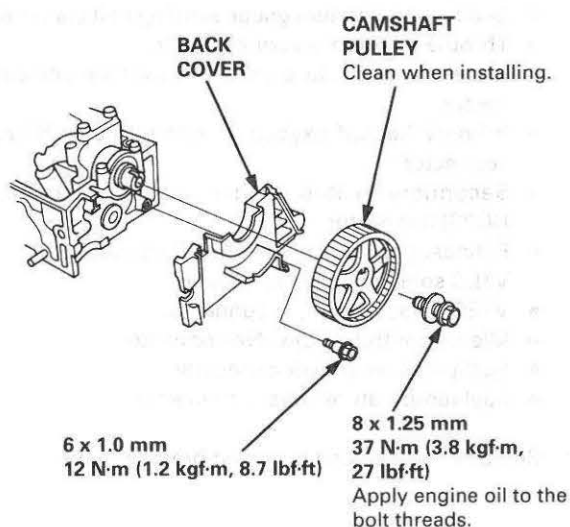


18. Remove the cylinder head cover.

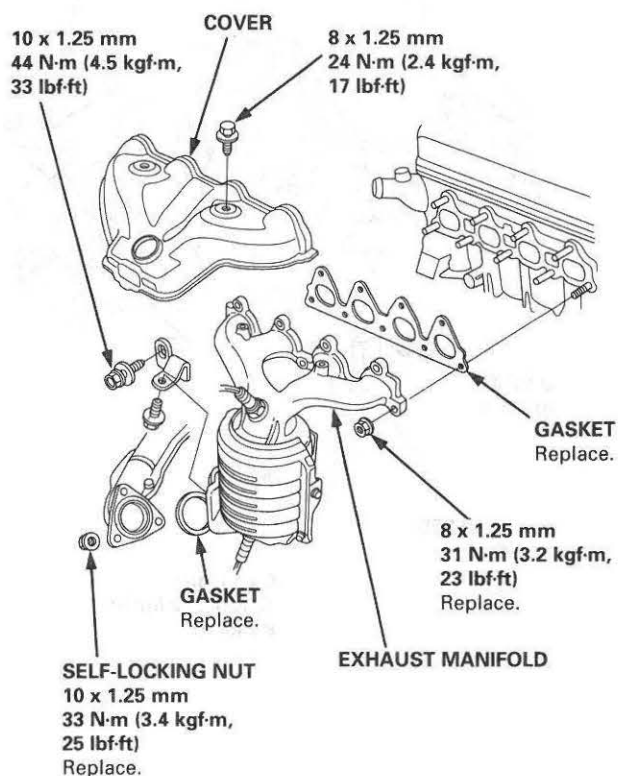


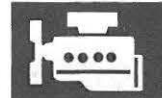
19. Remove the timing belt (see page 6-17).

20. Remove the camshaft pulley and the back cover.

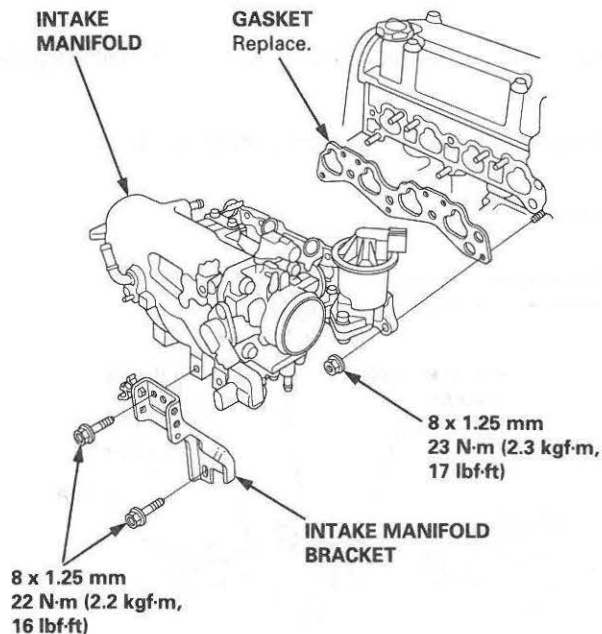


21. Remove the exhaust manifold.





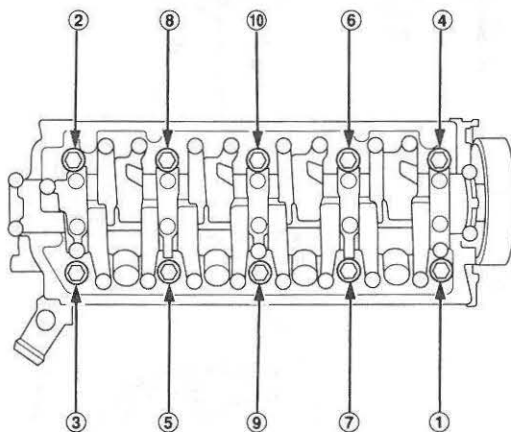
22. Remove the intake manifold.



23. Remove the cylinder head bolts, then remove the cylinder head.

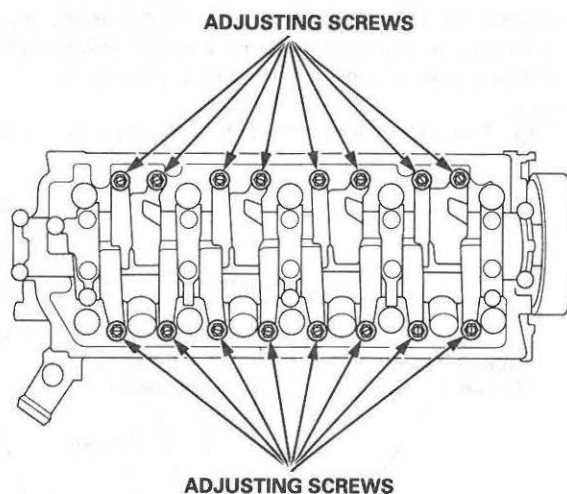
CAUTION: To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

CYLINDER HEAD BOLTS LOOSENING SEQUENCE:



Removal

1. Loosen the adjusting screws.

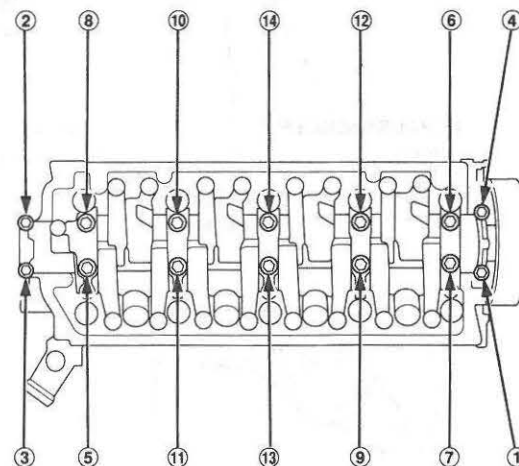


2. Unscrew the camshaft holder bolts, then remove the rocker arm assembly.

NOTE:

- Unscrew the camshaft holder bolts two turns at a time, in a crisscross pattern, to prevent damaging the valves or rocker arm assembly.
- When removing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the camshaft holders, the springs and the rocker arms on the shaft.

CAMSHAFT HOLDER BOLTS LOOSENING SEQUENCE:



Rocker Arms

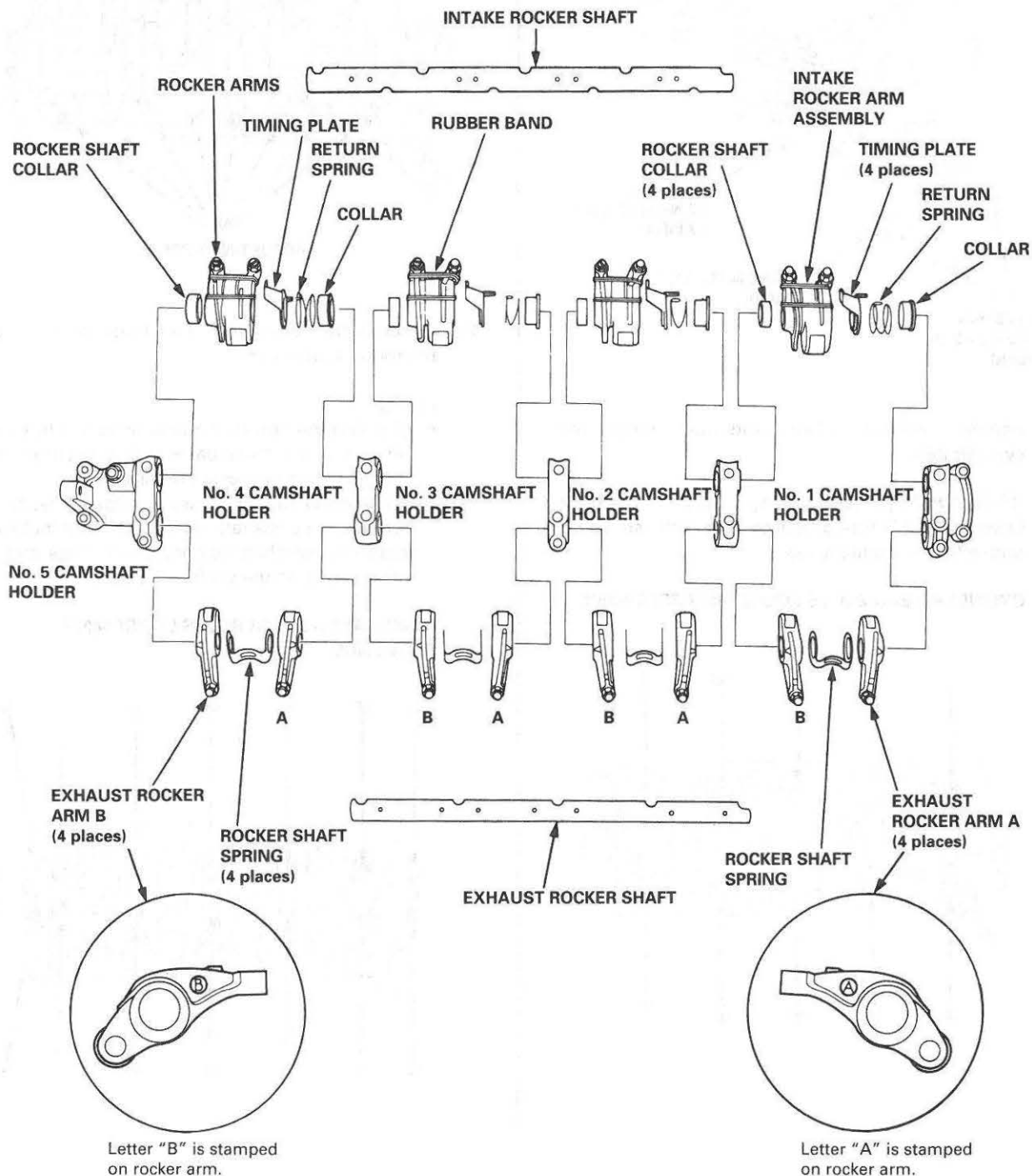
Disassembly/Reassembly

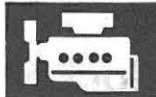
NOTE:

- Identify parts as they are removed to ensure reinstallation in original locations.
- Inspect rocker shafts and rocker arms (see page 6-29).
- Rocker arms must be installed in the same position if reused.
- When removing or installing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the holders, springs and rocker arms on the shaft.



Prior to reassembling, clean all the parts in solvent, dry them and apply lubricant to any contact points.

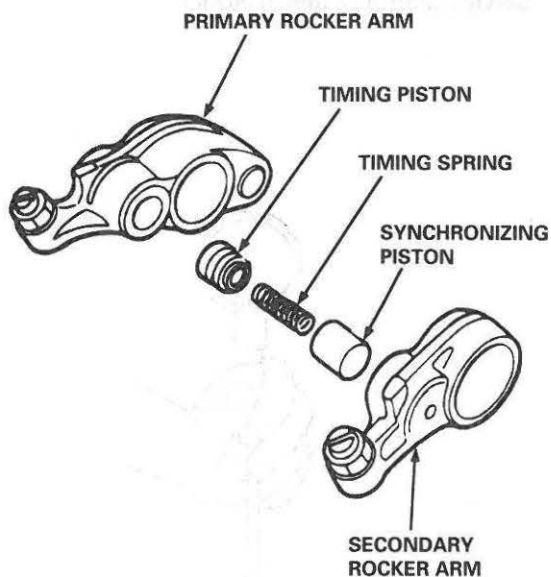




Inspection

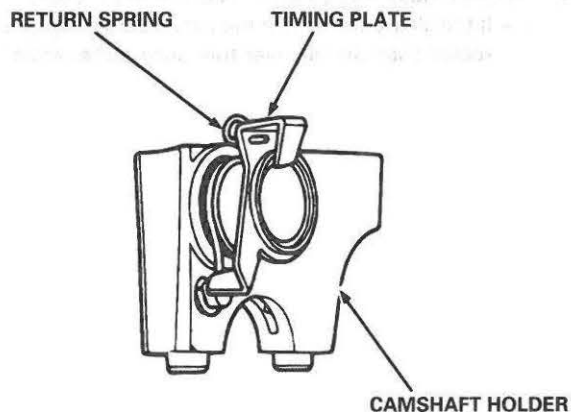
NOTE: When reassembling the primary rocker arm, carefully apply air pressure to the oil passage of the rocker arm.

1. Inspect the rocker arm piston. Push it manually.
— If it does not move smoothly, replace the rocker arm assembly.



NOTE:

- Apply oil to the pistons when reassembling.
 - Bundle the rocker arms with a rubber band to prevent them from separating.
2. Set the timing plate and return spring as shown below.

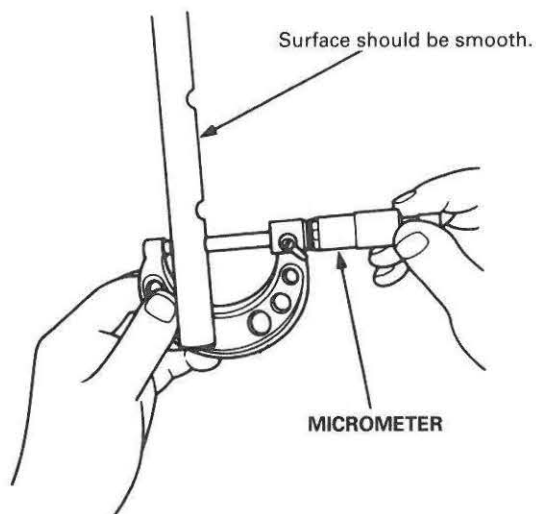


Rocker Arms and Shafts

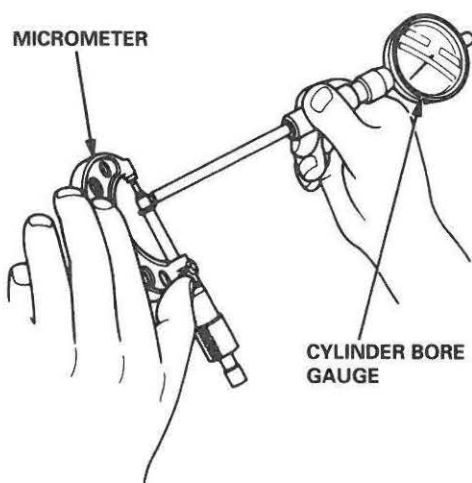
Clearance Inspection

Measure both the intake rocker shaft and exhaust rocker shaft.

1. Measure the diameter of the shaft at the first rocker location.



2. Zero the gauge to the shaft diameter.



3. Measure the inside diameter of the rocker arm and check for an out-of-round condition.

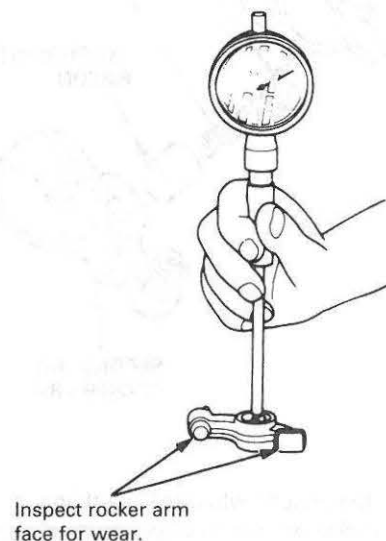
Rocker Arm-to-Shaft Clearance:

Standard (New):

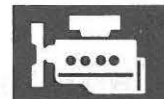
Intake: 0.017 – 0.050 mm
(0.0007 – 0.0020 in)

Exhaust: 0.018 – 0.054 mm
(0.0007 – 0.0021 in)

Service Limit: 0.08 mm (0.003 in)



4. Repeat these measurements on all the rockers.
— If the clearance is over the service limit, replace the rocker shaft and all over-tolerance rocker arms.



Inspection

NOTE:

- Do not rotate the camshaft during inspection.
- Remove the rocker arms and rocker shafts.

1. Put the camshaft and the camshaft holders on the cylinder head, then tighten the bolts to the specified torque.

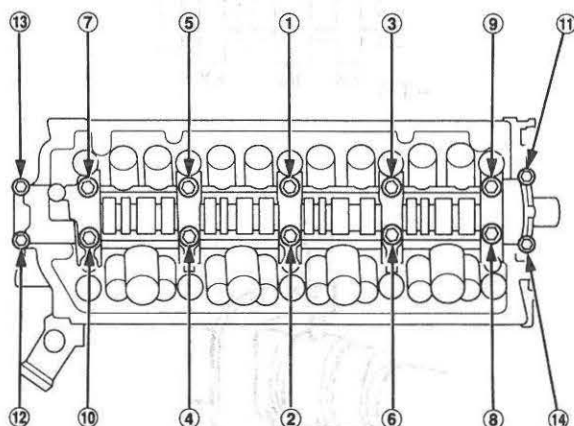
Specified torque:

8 mm bolts: 20 N·m (2.0 kgf·m, 14 lbf·ft)

Apply engine oil to the threads.

6 mm bolts: 12 N·m (1.2 kgf·m, 8.7 lbf·ft)

6 mm bolts: ⑪, ⑫, ⑬, ⑭

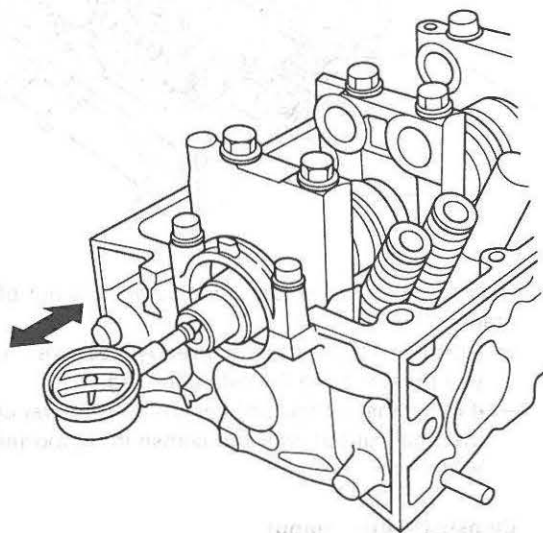


2. Seat the camshaft by pushing it toward the rear of the cylinder head.
3. Zero the dial indicator against the end of the camshaft. Push the camshaft back and forth, and read the end play.

Camshaft End Play:

Standard (New): 0.05 – 0.15 mm
(0.002 – 0.006 in)

Service Limit: 0.5 mm (0.02 in)



4. Remove the bolts, then remove the camshaft holders from the cylinder head.
 - Lift the camshaft out of the cylinder head, wipe it clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.
 - Clean the camshaft bearing surfaces in the cylinder head, then set the camshaft back in place.
 - Place a plastigage strip across each journal.
5. Install the camshaft holders, and tighten the bolts to the specified torque.

(cont'd)

Camshaft

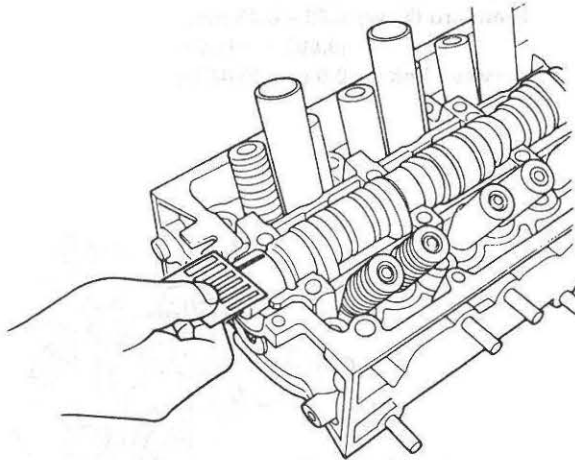
Inspection (cont'd)

6. Remove the camshaft holders, then measure the widest portion of the plastigage on each journal.

Camshaft-to-Holder Oil Clearance:

Standard (New): 0.050 – 0.089 mm
(0.002 – 0.004 in)

Service Limit : 0.15 mm (0.006 in)

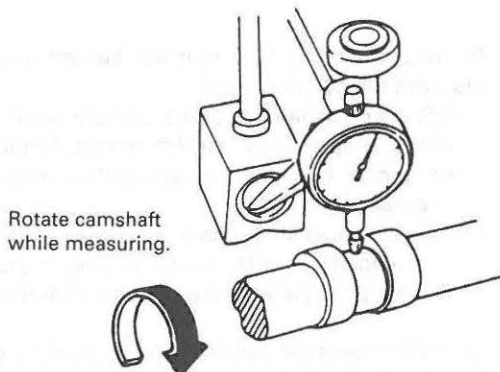


7. If the camshaft-to-holder oil clearance is out of tolerance:
- And the camshaft has already been replaced, you must replace the cylinder head.
 - If the camshaft has not been replaced, first check the total runout with the camshaft supported on V-blocks.

Camshaft Total Runout:

Standard (New): 0.03 mm (0.001 in) max.

Service Limit: 0.04 mm (0.002 in)



Rotate camshaft while measuring.

- If the total runout of the camshaft is within tolerance, replace the cylinder head.
- If the total runout is out of tolerance, replace the camshaft and recheck the camshaft-to-holder oil clearance. If the clearance is still out of tolerance, replace the cylinder head.

8. Check the cam lobe height wear.

Cam lobe height standard (New)

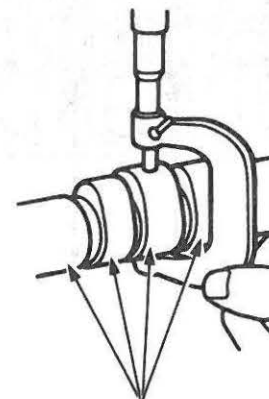
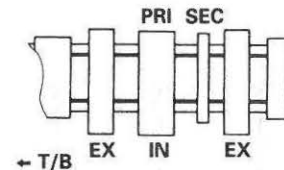
Unit: mm (in)

	INTAKE	EXHAUST
PRI	38.427 (1.5129)	38.784 (1.5269)
SEC	32.292 (1.2713)	

PRI: Primary cam lobe, SEC: Secondary cam lobe

T/B: Timing belt

IN: Intake, EX: Exhaust



Check this area for wear.

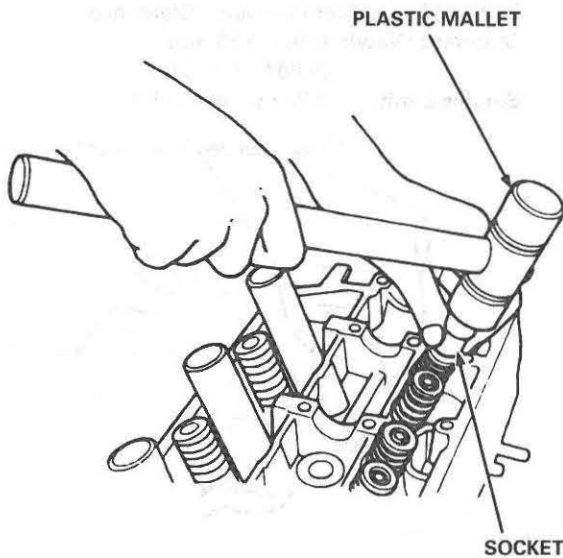
Valves, Valve Springs and Valve Seals



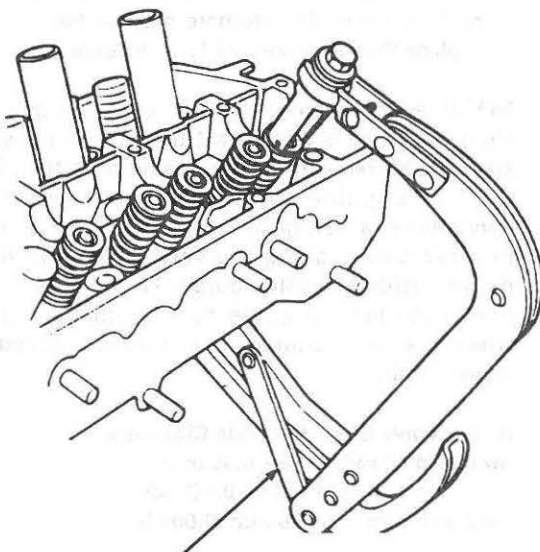
Removal

NOTE: Identify valves and valve springs as they are removed so that each item can be reinstalled in its original position.

1. Using an appropriate-sized socket and plastic mallet, lightly tap the valve retainer to loosen the valve keepers before installing the valve spring compressor.

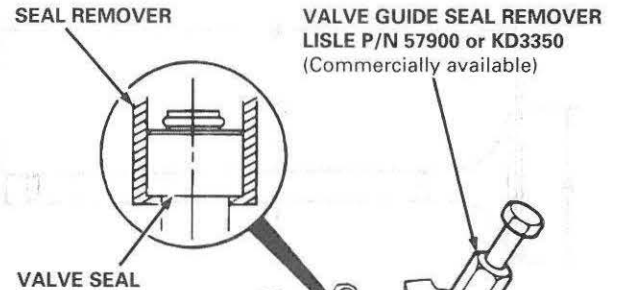


2. Install the spring compressor. Compress the spring and remove the valve keepers.

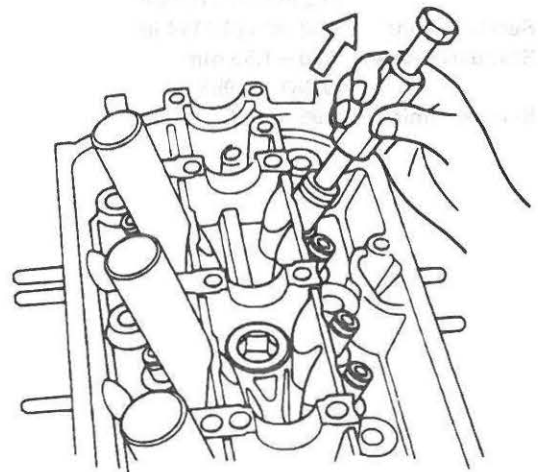


VALVE SPRING COMPRESSOR
Snap-on CF711 or KD - 383
with #32 JAWS

3. Install the valve guide seal remover.

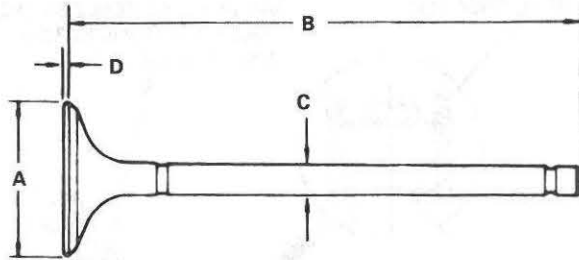


4. Remove the valve seal.



(cont'd)

Removal (cont'd)



Intake Valve Dimensions

- A Standard (New): 29.9 – 30.1 mm
(1.18 – 1.19 in)
- B Standard (New): 117.42 – 117.72 mm
(4.623 – 4.635 in)
- C Standard (New): 5.48 – 5.49 mm
(0.2157 – 0.2161 in)
- C Service Limit: 5.45 mm (0.2146 in)
- D Standard (New): 0.85 – 1.15 mm
(0.033 – 0.045 in)
- D Service Limit: 0.65 mm (0.026 in)

Exhaust Valve Dimensions

- A Standard (New): 25.9 – 26.1 mm
(1.02 – 1.03 in)
- B Standard (New): 114.60 – 114.90 mm
(4.512 – 4.524 in)
- C Standard (New): 5.45 – 5.46 mm
(0.2146 – 0.2150 in)
- C Service Limit: 5.42 mm (0.2134 in)
- D Standard (New): 1.05 – 1.35 mm
(0.041 – 0.053 in)
- D Service Limit: 0.95 mm (0.037 in)

Valve Movement

Measure the guide-to-stem clearance with a dial indicator while rocking the stem in the direction of normal thrust (wobble method).

Intake Valve Stem-to-Guide Clearance:

Standard (New): 0.04 – 0.10 mm
(0.002 – 0.004 in)

Service Limit: 0.16 mm (0.006 in)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.10 – 0.16 mm
(0.004 – 0.006 in)

Service Limit: 0.22 mm (0.009 in)

Valve extended 10 mm out from seat.



- If the measurement exceeds the service limit, recheck using a new valve.
- If the measurement is now within the service limit, reassemble using a new valve.
- If the measurement still exceeds the limit, recheck using the alternate method below, then replace the valve and guide, if necessary.

NOTE: An alternate method of checking guide to stem clearance is to subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or ball gauge. Take the measurements in three places along the valve stem and three places inside the valve guide. The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit.

Intake Valve Stem-to-Guide Clearance:

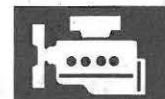
Standard (New): 0.02 – 0.05 mm
(0.001 – 0.002 in)

Service Limit: 0.08 mm (0.003 in)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.05 – 0.08 mm
(0.002 – 0.003 in)

Service Limit: 0.11 mm (0.004 in)



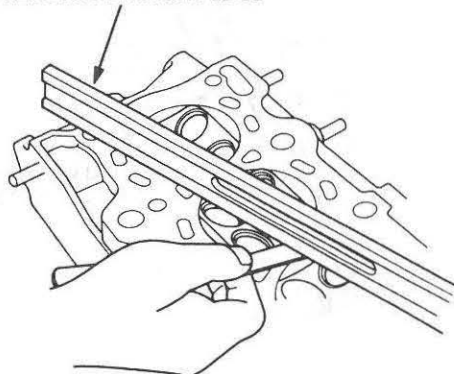
Warpage

NOTE: If the camshaft-to-holder oil clearances (see page 6-31) are not within specification, the cylinder head cannot be resurfaced.

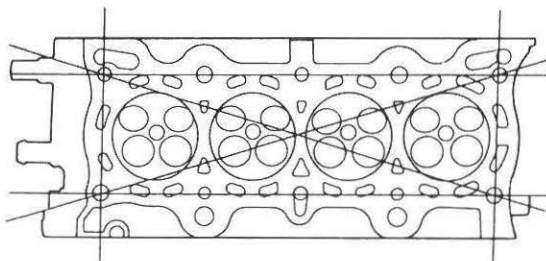
If the camshaft-to-holder oil clearances are within specifications, check the cylinder head for warpage.

- If warpage is less than 0.05 mm (0.002 in), cylinder head resurfacing is not required.
- If warpage is between 0.05 mm (0.002 in) and 0.2 mm (0.008 in), resurface the cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in) based on a height of 93 mm (3.66 in).

PRECISION STRAIGHT EDGE



Measure along edges, and three ways across center.



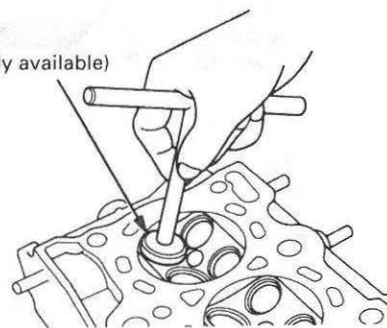
Cylinder Head Height:
Standard (New): 92.95 – 93.05 mm
 (3.659 – 3.663 in)

Reconditioning

1. Renew the valve seats in the cylinder head using a valve seat cutter.

NOTE: If the guides are worn (see page 6-34), replace them (see page 6-37) before cutting the valve seats.

VALVE SEAT CUTTER
 (Commercially available)



2. Carefully cut a 45° seat, removing only enough material to ensure a smooth and concentric seat.
3. Bevel the upper edge of the seat with the 30° cutter and the lower edge of the seat with the 60° cutter. Check the width of the seat and adjust accordingly.
4. Make one more very light pass with the 45° cutter to remove any possible burrs caused by the other cutters.

Valve Seat Width:

Standard (New):

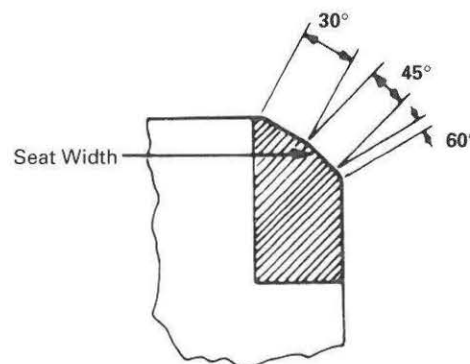
Intake: 0.85 – 1.15 mm (0.033 – 0.045 in)

Exhaust: 1.25 – 1.55 mm (0.049 – 0.061 in)

Service Limit:

Intake: 1.6 mm (0.063 in)

Exhaust: 2.0 mm (0.079 in)

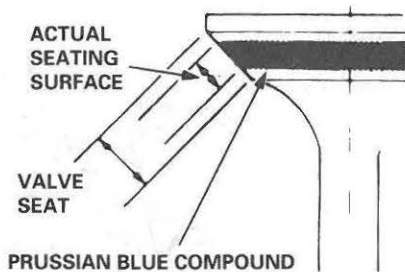


(cont'd)

Valve Seats

Reconditioning (cont'd)

5. After resurfacing the seat, inspect for even valve seating: Apply Prussian Blue compound to the valve face, and insert the valve in its original location in the head, then lift and snap it closed against the seat several times.



6. The actual valve seating surface, as shown by the blue compound, should be centered on the seat.
 - If it is too high (closer to the valve stem), you must make a second cut with the 60° cutter to move it down, then one more cut with the 45° cutter to restore seat width.
 - If it is too low (closer to the valve edge), you must make a second cut with the 30° cutter to move it up, then one more cut with the 45° cutter to restore seat width.

NOTE: The final cut should always be made with the 45° cutter.

7. Insert the intake and exhaust valves in the head and measure the valve stem installed height.

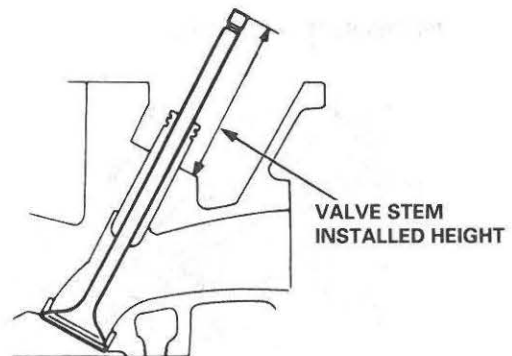
Intake, Exhaust Stem Installed Height:

Standard (New): 53.17 – 53.64 mm

(2.093 – 2.112 in)

Service Limit: 53.89 mm (2.122 in)

8. If the valve stem installed height is over the service limit, replace the valve and recheck. If its still over the service limit, replace the cylinder head; the valve seat in the head is too deep.

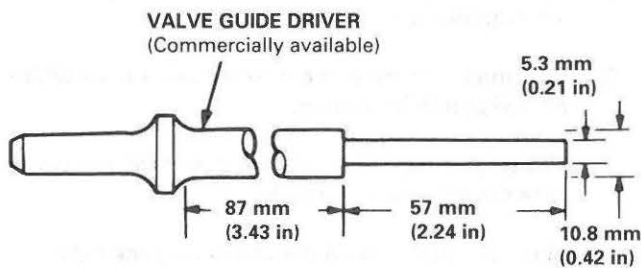


Valve Guides



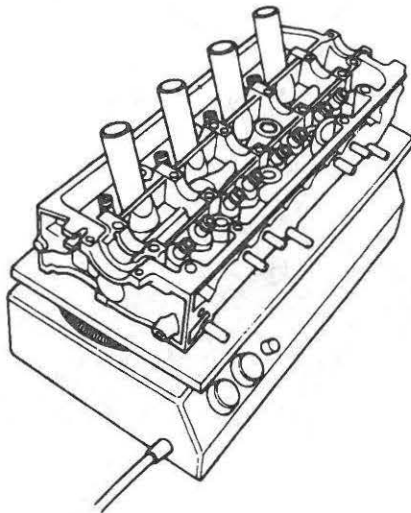
Replacement

1. As illustrated below, use a commercially-available air-impact valve guide driver attachment modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the special tool and a conventional hammer.



or
VALVE GUIDE DRIVER, 5.5 mm
07742 - 0010100

2. Select the proper replacement guides, and chill them in the freezer section of a refrigerator for about an hour.
3. Use a hot plate or oven to evenly heat the cylinder head to 300°F (150°C). Monitor the temperature with a cooking thermometer.



CAUTION:

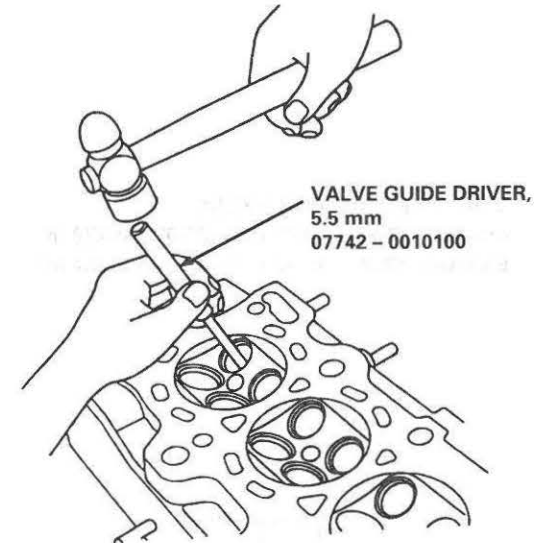
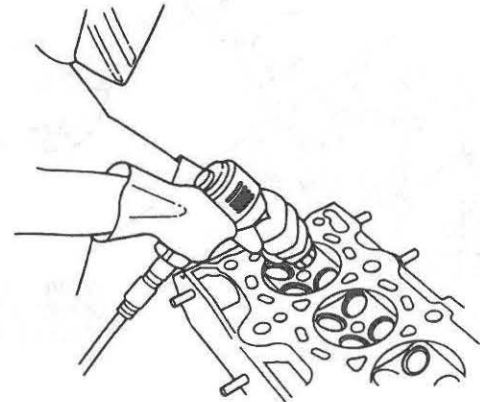
- Do not use a torch; it may warp the head.
- Do not get the head hotter than 300°F (150°C); excessive heat may loosen the valve seats.
- To avoid burns, use heavy gloves when handling the heated cylinder head.

4. Working from the camshaft side, use the driver and an air hammer to drive the guide about 2 mm (0.1 in) towards the combustion chamber. This will knock off some of the carbon and make removal easier.

CAUTION:

- Always wear safety goggles or a face shield when driving valve guides.
- Hold the air hammer directly in line with the valve guide to prevent damaging the driver.

5. Turn the head over, and drive the guide out toward the camshaft side of the head.



If a valve guide still won't move, drill it out with a 8 mm (5/16 in) bit, then try again.

CAUTION: Drill guides only in extreme cases; you could damage the cylinder head if the guide breaks.

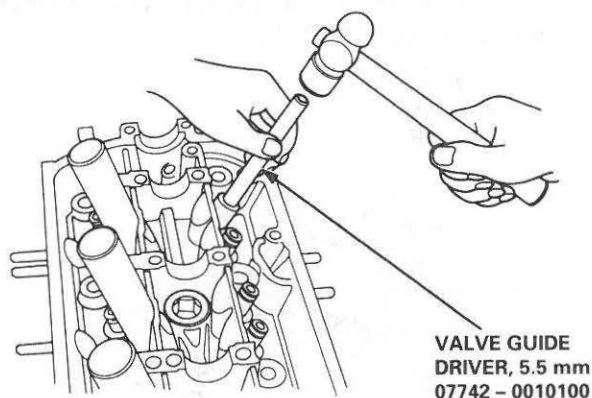
6. Remove the new guides from the freezer, one at a time, as you need them.

(cont'd)

Valve Guides

Replacement (cont'd)

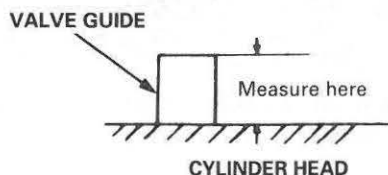
7. Apply a thin coat of clean engine oil to the outside of the new valve guide. Install the guide from the camshaft side of the head; use the special tool to drive the guide in to the specified installed height. If you have all 16 guides to do, you may have to reheat the head.



Valve Guide Installed Height:

Intake: 17.85 - 18.35 mm (0.703 - 0.722 in)

Exhaust: 18.65 - 19.15 mm (0.734 - 0.754 in)

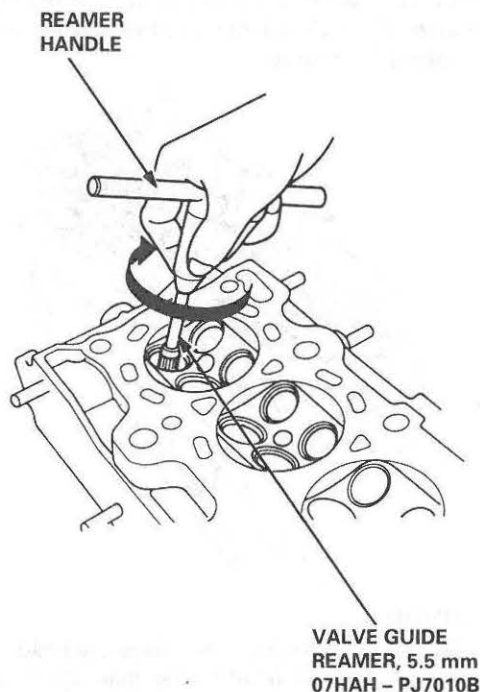


Reaming

NOTE: For new valve guides only.

1. Coat both the reamer and valve guide with cutting oil.
2. Rotate the reamer clockwise the full length of the valve guide bore.
3. Continue to rotate the reamer clockwise while removing it from the bore.
4. Thoroughly wash the guide in detergent and water to remove any cutting residue.
5. Check the clearance with a valve (see page 6-34). Verify that the valve slides in the valve guide without exerting pressure.

Turn reamer in
clockwise direction
only.





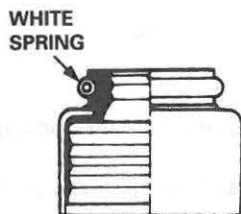
Installation

1. Coat valve stems with engine oil. Insert the valves in the valve guides.

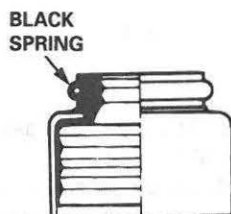
NOTE: Make sure the valves move up and down smoothly.

2. Install the spring seats on the cylinder head.
3. Install the valve seals using the valve guide seal installer.

NOTE: Exhaust and intake valve seals are not interchangeable.

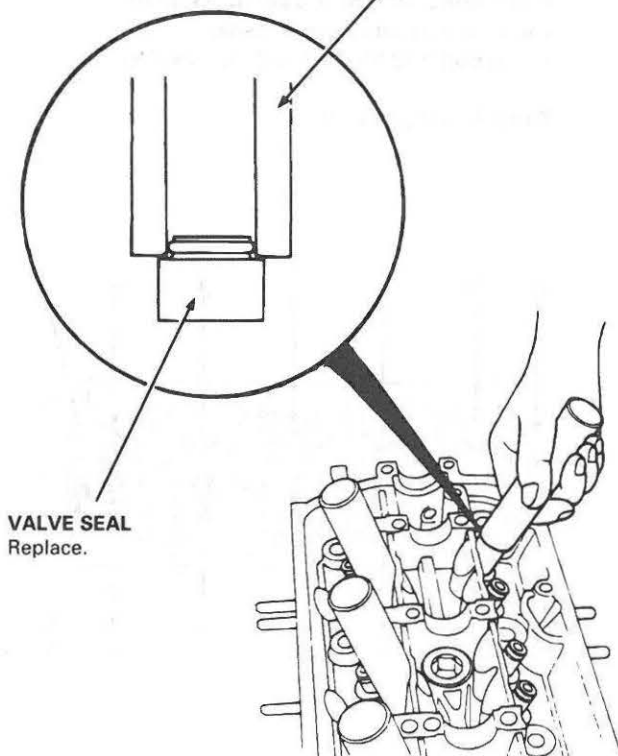


INTAKE VALVE SEAL



EXHAUST VALVE SEAL

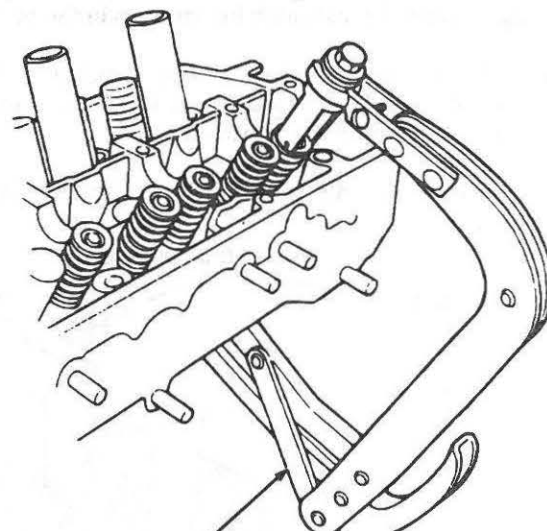
**VALVE GUIDE SEAL
INSTALLER
KD2899** (Commercially available)
NOTE: Use small ID end of tool.



VALVE SEAL
Replace.

4. Install the valve spring and valve retainer, then install the valve spring compressor. Compress the spring and install the valve keepers.

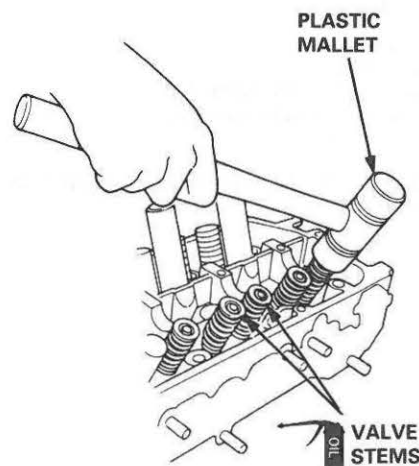
NOTE: Place the end of the valve spring with closely wound coils toward the cylinder head.



VALVE SPRING COMPRESSOR
(Commercially available)
Snap-on CF711 or KD - 383
with #32 JAWS

5. Lightly tap the end of each valve stem two or three times with a plastic mallet to ensure proper seating of the valve and valve keepers.

NOTE: Tap the valve stem only along its axis so you do not bend the stem.



PLASTIC
Mallet

VALVE
STEMS

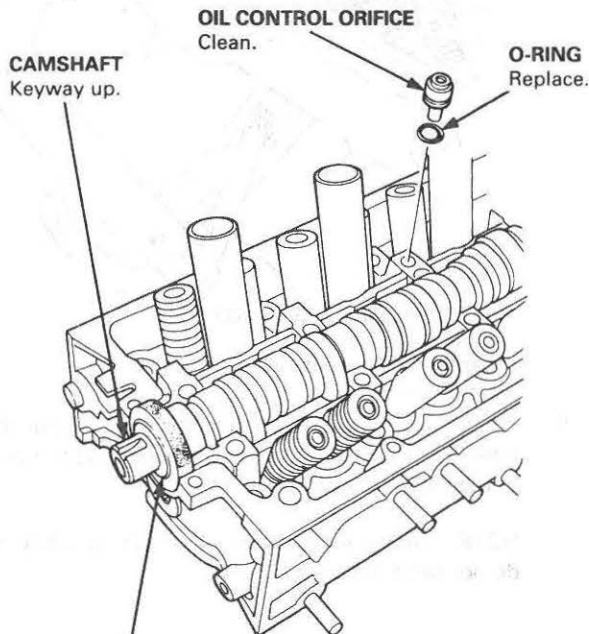
Camshaft/Rocker Arms and Camshaft Seal/Pulley

Installation

CAUTION:

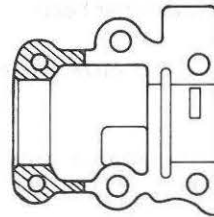
- Make sure that all rockers are in alignment with their valves when torquing the rocker assembly bolts.
- Valve locknuts should be loosened and adjusting screws backed off before installation.
- To prevent the rocker arm assembly from coming apart, leave the camshaft holder bolts in the holders.

1. After wiping down the camshaft, camshaft seal and journals in the cylinder head, lubricate both surfaces and install the camshaft.
2. Clean and install the oil control orifice with a new O-ring.

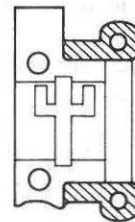


3. Turn the camshaft until its keyway is facing up (No. 1 piston TDC).

4. Apply liquid gasket (Part No. 08718 - 0001 or 08718 - 0003) to the head mating surfaces of the No. 1 and No. 5 camshaft holders.
— Apply liquid gasket to the shaded areas.



No. 5



No. 1

5. Set the rocker arm assembly in place and loosely install the bolts.
— Make sure that the rocker arms are properly positioned on the valve stems.
6. Tighten each bolt two turns at a time in the sequence shown below to ensure that the rockers do not bind on the valves.

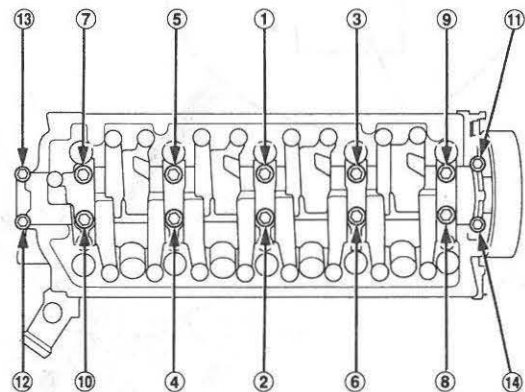
Specified torque:

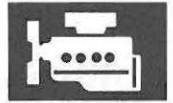
8 mm bolts: 20 N·m (2.0 kgf·m, 14 lbf·ft)

Apply engine oil to the threads.

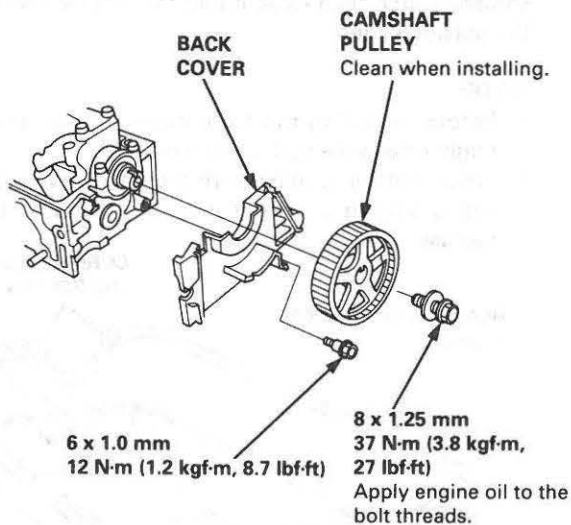
6 mm bolts: 12 N·m (1.2 kgf·m, 8.7 lbf·ft)

6 mm bolts: ⑪, ⑫, ⑬, ⑭





7. Install the back cover, then install the camshaft pulley.



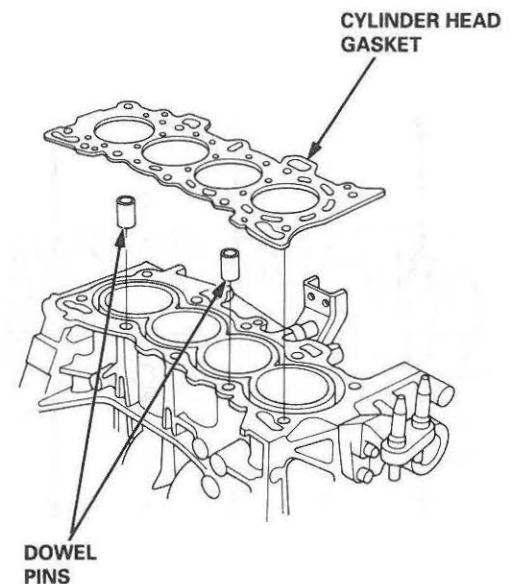
Installation

Install the cylinder head in the reverse order of removal:

NOTE:

- Always use a new head gasket.
- Cylinder head and cylinder block surface must be clean.
- "UP" mark on the camshaft pulley should be at the top.
- Turn the crankshaft so the No. 1 piston is at TDC (see page 6-18).
- Clean the oil control orifice before installing.
- Do not use the upper cover and lower cover to store removed items.
- Clean the upper cover and lower cover before installation.

1. Cylinder head dowel pins must be aligned.



(cont'd)

Cylinder Head

Installation (cont'd)

2. Position the camshaft correctly (see page 6-18).
3. Tighten the cylinder head bolts sequentially in four steps.

1st step: ① – ⑩ 20 N·m (2.0 kgf-m, 14 lbf-ft)

2nd step: ① – ⑩ 49 N·m (5.0 kgf-m, 36 lbf-ft)

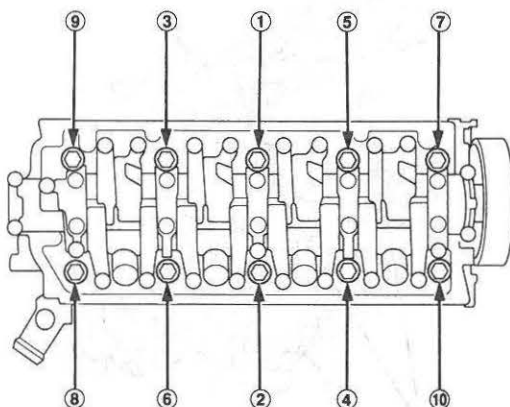
3rd step: ① – ⑩ 67 N·m (6.8 kgf-m, 49 lbf-ft)

4th step: ①, ② 67 N·m (6.8 kgf-m, 49 lbf-ft)

NOTE:

- We recommend using a beam-type torque wrench. When using a preset-type torque wrench, be sure to tighten slowly and not to overtighten.
- If a bolt makes any noise while you are torquing it, loosen the bolt, and retighten it from the 1st step.

CYLINDER HEAD BOLTS TORQUE SEQUENCE:



4. Install the intake manifold and tighten the nuts in a crisscross pattern in two or three steps, beginning with the inner nuts (see page 6-27).

- Always use a new intake manifold gasket.

5. Install the exhaust manifold and tighten the nuts in a crisscross pattern in two or three steps, beginning with the inner nut (see page 6-26).

- Always use a new exhaust manifold gasket.

6. Install the exhaust manifold bracket. Install the exhaust pipe A and the bracket, then install the cover.

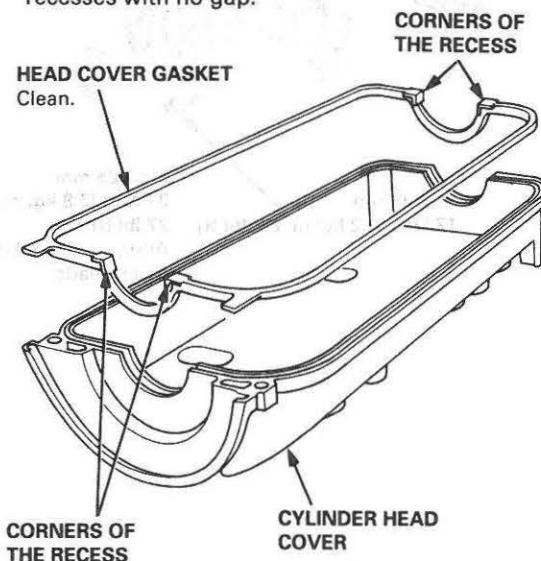
7. Install the timing belt (see page 6-18).

8. Adjust the valve clearance (see page 6-10).

9. Install the head cover gasket in the groove of the cylinder head cover. Seat the recesses for the camshaft first, then work it into the groove around the outside edges.

NOTE:

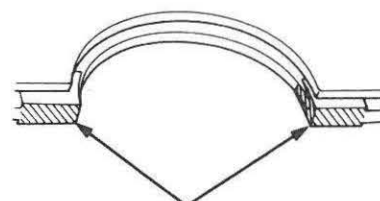
- Before installing the head cover gasket, thoroughly clean the seal and the groove.
- When installing, make sure the head cover gasket is seated securely in the corners of the recesses with no gap.



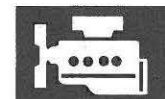
10. Apply liquid gasket to the head cover gasket at the four corners of the recesses.

NOTE:

- Use liquid gasket, Part No. 08718 – 0001 or 08718 – 0003.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Do not install the parts if five minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.



Apply liquid gasket to the shaded areas.

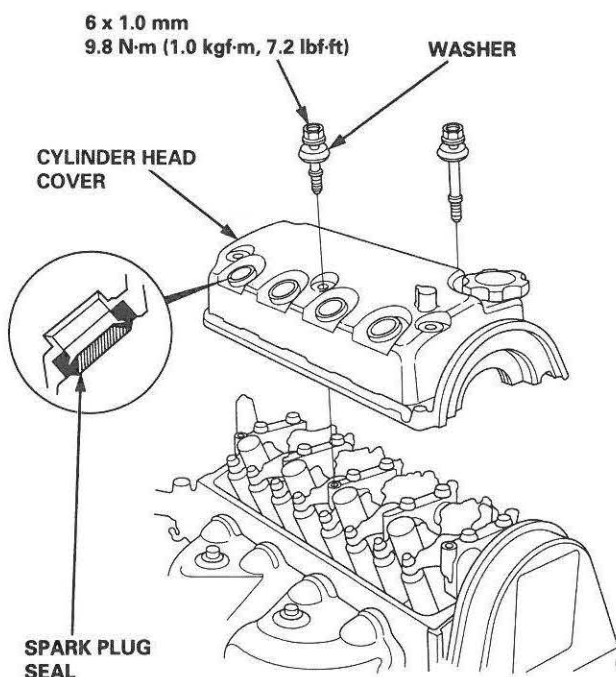


11. When installing the cylinder head cover, hold the head cover gasket in the groove by placing your fingers on the camshaft holder contacting surfaces (top of the semicircles).

Set the spark plug seal on the spark plug pipe. Once the cylinder head cover is on the cylinder head, slide the cover slightly back and forth to seat the head cover gasket.

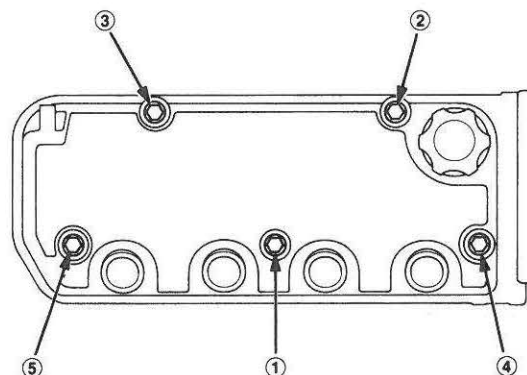
NOTE:

- Before installing the cylinder head cover, clean the cylinder head contacting surfaces with a shop towel.
- Do not touch the parts where liquid gasket was applied.
- Take care not to damage the spark plug seals when installing the cylinder head cover.
- Visually check the spark plug seals for damage.
- Replace the washer when damaged or deteriorated.



12. Tighten the nuts in two or three steps. In the final step, tighten all bolts, in sequence, to 9.8 N-m (1.0 kgf-m, 7.2 lbf-ft).

NOTE: After assembly, wait at least 30 minutes before filling the engine with oil.

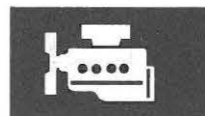


13. After installation, check that all tubes, hoses and connectors are installed correctly.

Engine Block

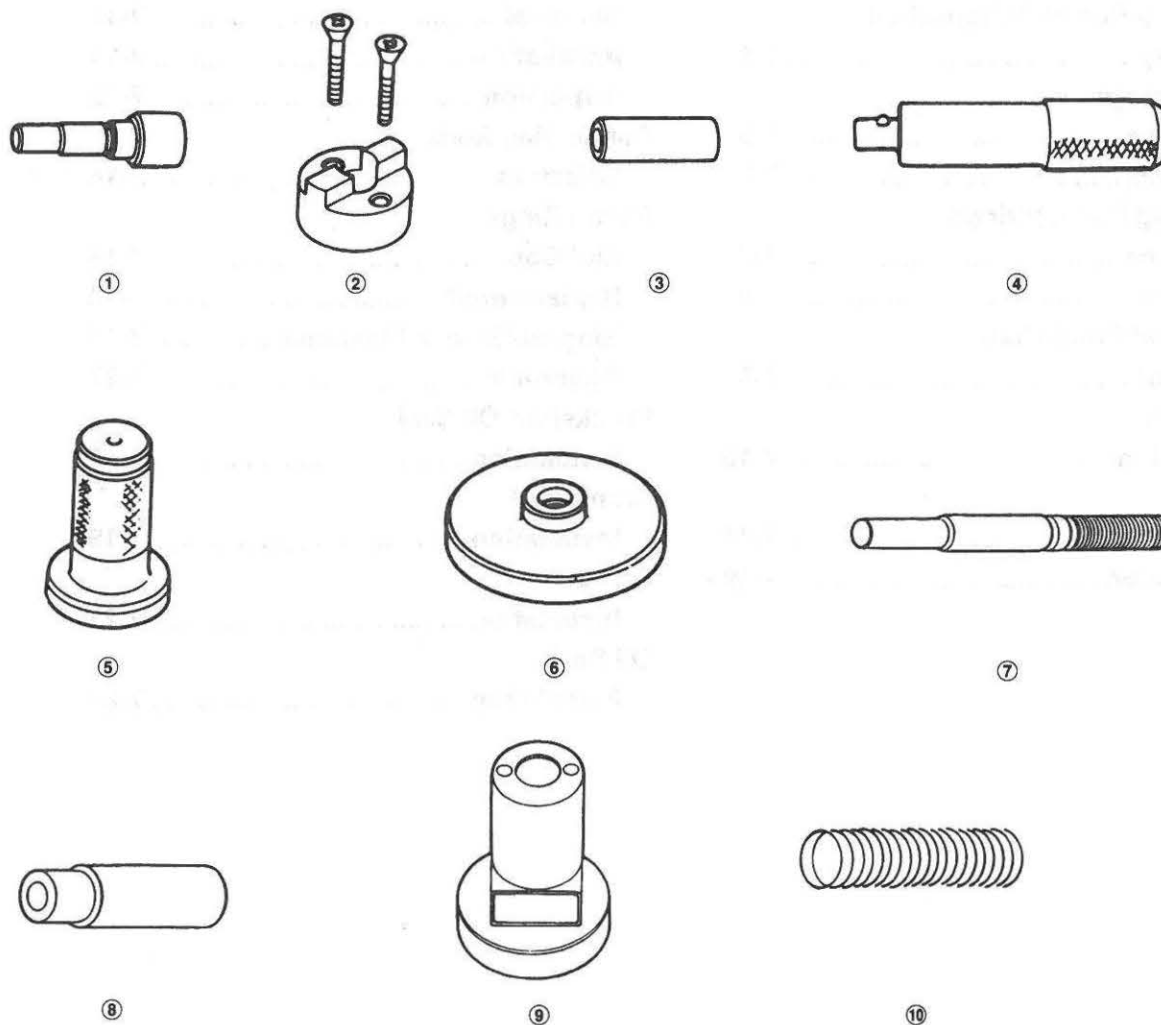
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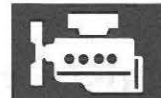


Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAF - PH60300	Piston Pin Base Insert	1	7-13, 14
②	07HAF - PL20102	Piston Base Head	1	7-13, 14
③	07LAF - PR30100	Pilot Collar	1	7-13, 14
④	07749 - 0010000	Driver	1	7-18, 23
⑤	07947 - SB00200	Seal Driver	1	7-22
⑥	07948 - SB00101	Seal Driver Attachment	1	7-18, 23
⑦	07973 - PE00310	Piston Pin Driver Shaft	1	7-13, 14
⑧	07973 - PE00320	Piston Pin Driver Head	1	7-13, 14
⑨	07973 - 6570500	Piston Base	1	7-13, 14
⑩	07973 - 6570600	Piston Base Spring	1	7-13, 14



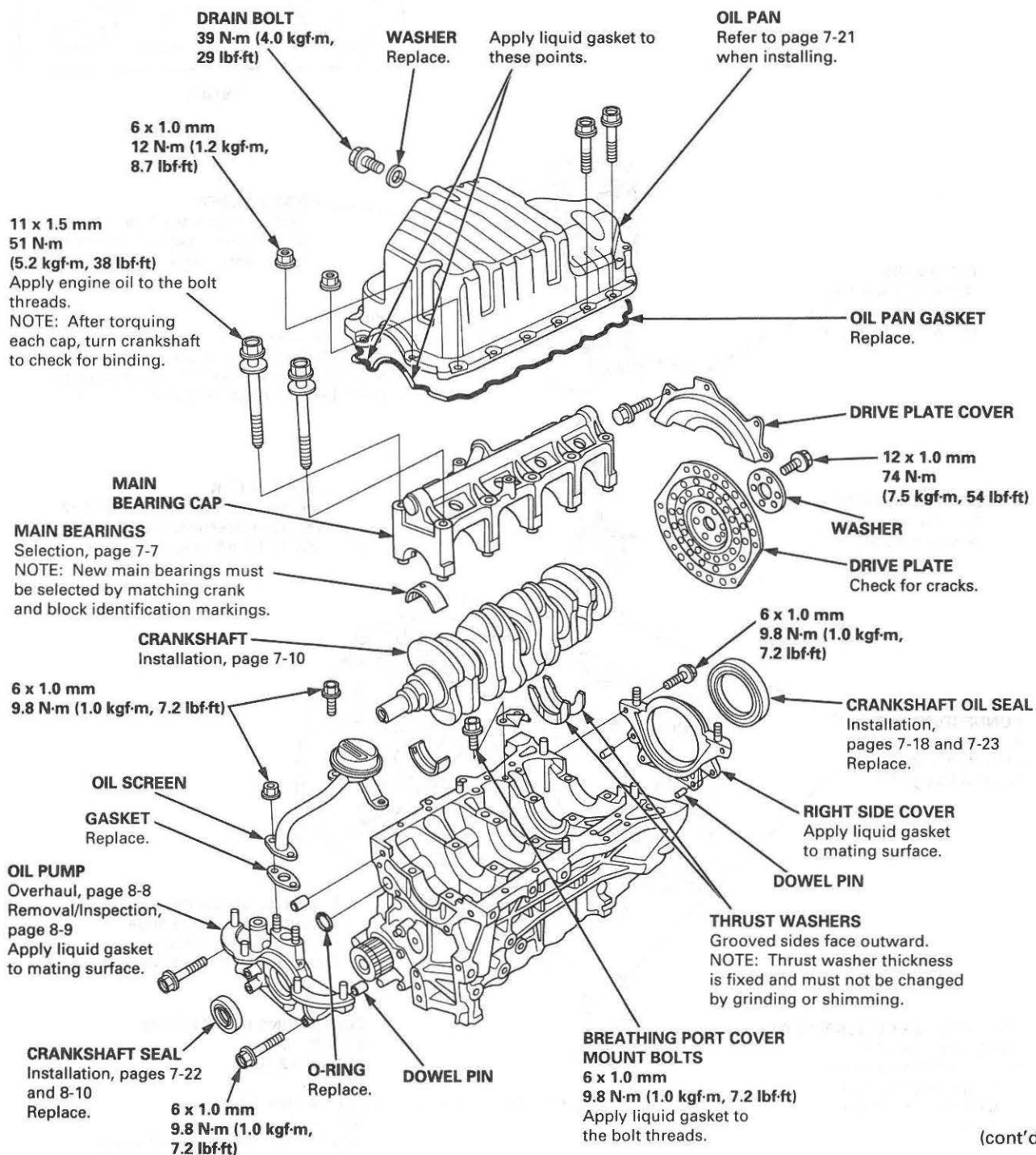
Illustrated Index



Lubricate all internal parts with engine oil during reassembly.

NOTE:

- Apply liquid gasket to the mating surfaces of the right side cover and oil pump case before installing them.
- Use liquid gasket, part No. 08718 – 0001 or 08718 – 0003.
- Clean the oil pan gasket mating surfaces before installing it.




(cont'd)

Illustrated Index

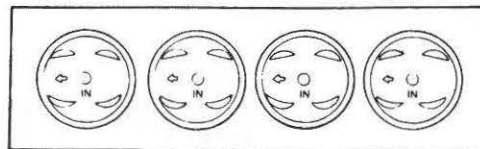
(cont'd)

NOTE: New rod bearings must be selected by matching connecting rod assembly and crankshaft identification markings (see page 7-8).

 Lubricate all internal parts with engine oil during reassembly.

PISTON INSTALLATION DIRECTION:

EXHAUST



INTAKE

PISTON PIN

Removal, page 7-13
Installation, page 7-14
Inspection, page 7-15

PISTON RINGS

Replacement, page 7-16
Measurement, pages 7-16 and 7-17
Alignment, page 7-17

PISTON

Inspection, page 7-11
NOTE: Before removing piston, inspect the top of the cylinder bore for carbon build-up or ridge. Remove ridge if necessary, page 7-9

CONNECTING ROD

End play, page 7-5
Selection, page 7-14

ENGINE BLOCK

Cylinder bore inspection, page 7-12
Warpage inspection, page 7-12
Cylinder bore honing, page 7-13

CONNECTING ROD BEARINGS

Clearance, page 7-7
Selection, page 7-8

Inspect top of each cylinder bore for carbon build-up or ridge before removing piston.
Remove ridge if necessary, page 7-9

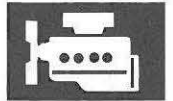
CONNECTING ROD BEARING CAP

Installation, page 7-19
NOTE: Install caps so the bearing recess is on the same side as the recess in the rod.

CONNECTING ROD CAP NUT

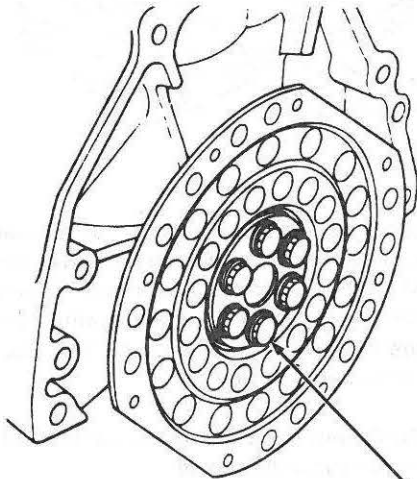
8 x 0.75 mm
31 N·m (3.2 kgf-m,
23 lbf-ft)

Apply engine oil to the bolt threads.
NOTE: After torquing each bearing cap, rotate crankshaft to check for binding.



Replacement

Remove the six drive plate bolts, then separate the drive plate from the crankshaft flange. After installation, tighten the bolts in a crisscross pattern.



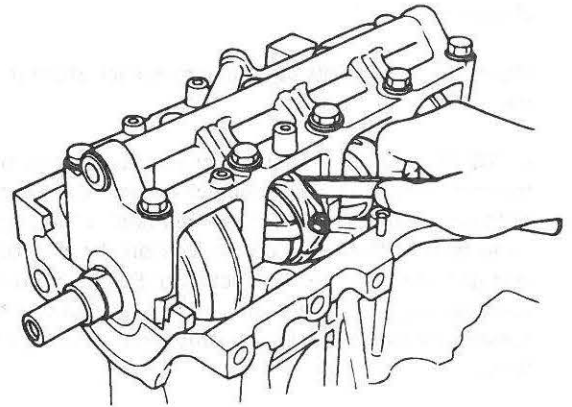
12 x 1.0 mm
74 N·m (7.5 kgf-m, 54 lbf-ft)

End Play

Connecting Rod End Play:

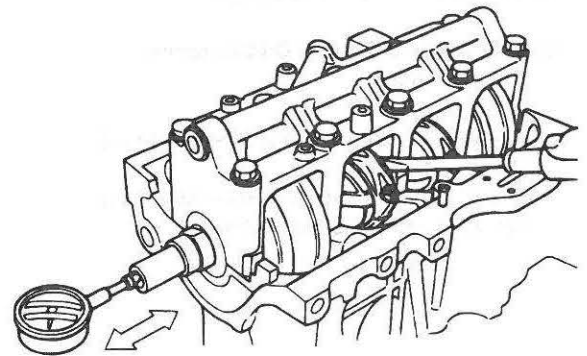
Standard (New): 0.15 – 0.30 mm (0.006 – 0.012 in)

Service Limit: 0.40 mm (0.016 in)



- If out-of-tolerance, install a new connecting rod.
- If still out-of-tolerance, replace the crankshaft (see pages 7-8 and 7-19).

Push the crankshaft firmly away from the dial indicator, and zero the dial against the end of the crankshaft. Then pull the crankshaft firmly back toward the indicator; dial reading should not exceed service limit.



Crankshaft End Play:

Standard (New): 0.10 – 0.35 mm (0.004 – 0.014 in)

Service Limit: 0.45 mm (0.018 in)

- If end play is excessive, inspect the thrust washers and thrust surface on the crankshaft. Replace parts as necessary.

NOTE: Thrust washer thickness is fixed and must not be changed either by grinding or shimming. Thrust washers are installed with grooved sides facing outward.

Main Bearings

Clearance

1. To check main bearing-to-journal oil clearance, remove the main caps and bearing halves.
2. Clean each main journal and bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.

NOTE: If the engine is still in the car when you bolt the main cap down to check clearance, the weight of the crankshaft and flywheel will flatten the plastigage further than just the torque on the cap bolt, and give you an incorrect reading. For an accurate reading, support the crank with a jack under the counterweights and check only one bearing at a time.

4. Reinstall the bearings and caps, then torque the bolts.

1st step: 25 N·m (2.5 kgf-m, 18 lbf-ft)

Final step: 51 N·m (5.2 kgf-m, 38 lbf-ft)

NOTE: Do not rotate the crankshaft during inspection.

5. Remove the cap and bearing again, and measure the widest part of the plastigage.

Main Bearing-to-Journal Oil Clearance:

Standard (New):

No. 1, 5 Journals:

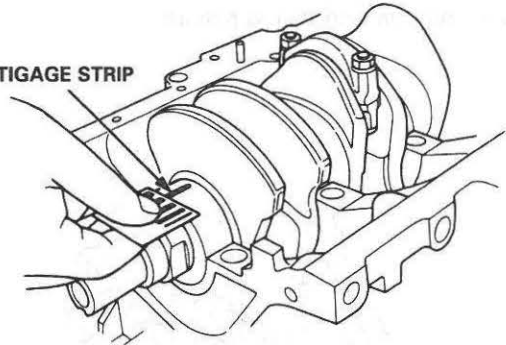
0.018 – 0.036 mm (0.0007 – 0.0014 in)

No. 2, 3, 4 Journals:

0.024 – 0.042 mm (0.0009 – 0.0017 in)

Service Limit: 0.05 mm (0.002 in)

PLASTIGAGE STRIP

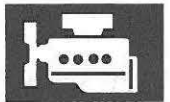


6. If the plastigage measures too wide or too narrow, (remove the engine if it's still in the car), remove the crankshaft, and remove the upper half of the bearing. Install a new, complete bearing with the same color code (select the color as shown on the next page), and recheck the clearance.

CAUTION: Do not file, shim, or scrape the bearings or the caps to adjust clearance.

7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check again.

NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

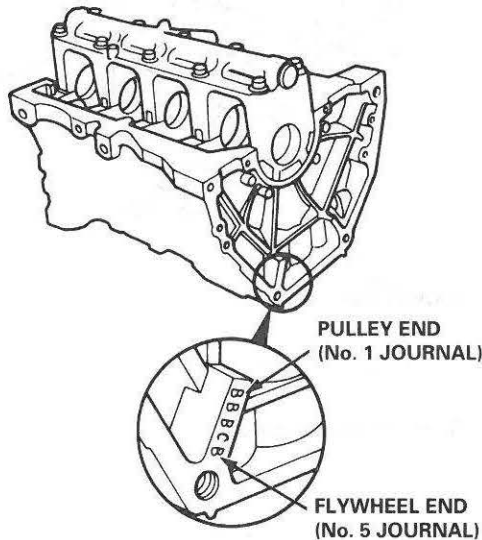


Selection

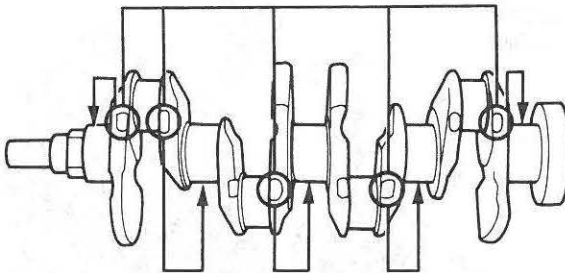
CAUTION: If the codes are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

Crankshaft Bore Code Location

Letters have been stamped on the end of the block as a code for the size of each of the 5 main journal bores. Use them, and the numbers stamped on the crankshaft (codes for main journal size), to choose the correct bearings.



Main Journal Code Location (Numbers)



Bearing Identification

Color code is on the edge of the bearing. → Larger crank bore

A	B	C	D
---	---	---	---

→ Smaller bearing (thicker)

1	Red	Pink	Yellow	Green
2	Pink	Yellow	Green	Brown
3	Yellow	Green	Brown	Black
4	Green	Brown	Black	Blue

Smaller main journal Smaller bearing (thicker)

Clearance

1. Remove the connecting rod cap and bearing half.
2. Clean the crankshaft rod journal and bearing half with a clean shop towel.
3. Place a strip of plastigage across the rod journal.
4. Reinstall the bearing half and cap, and torque the nuts.

Torque

31 N·m (3.2 kgf·m, 23 lbf·ft)

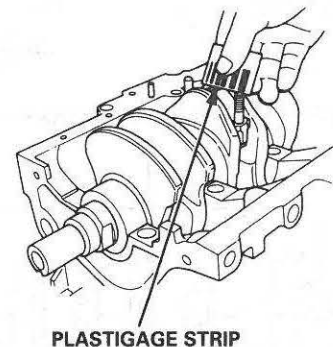
NOTE: Do not rotate the crankshaft during inspection.

5. Remove the rod cap and bearing half, and measure the widest part of the plastigage.

Connecting Rod Bearing-to-Journal Oil Clearance:

Standard (New): 0.020 – 0.038 mm
(0.0008 – 0.0015 in)

Service Limit: 0.05 mm (0.002 in)



6. If the plastigage measures too wide or too narrow, remove the upper half of the bearing, install a new, complete bearing with the same color code (select the color as shown on the next page), and recheck the clearance.

CAUTION: Do not file, shim, or scrape the bearings or the caps to adjust clearance.

7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check clearance again.

NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

Connecting Rod Bearings

Pistons and Crankshaft

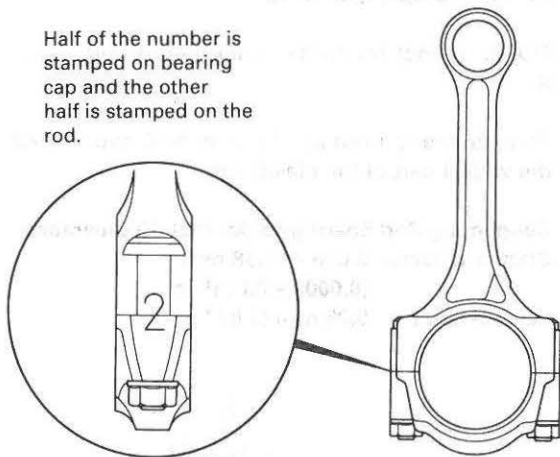
Selection

CAUTION: If the codes are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

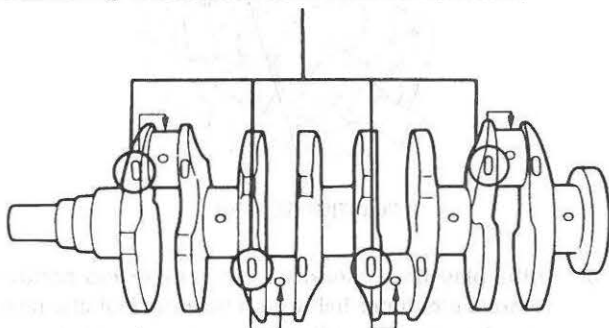
Connecting Rod Code Location

Numbers have been stamped on the side of each connecting rod as a code for the size of the big end. Use them, and the letters stamped on the crankshaft (codes for rod journal size), to choose the correct bearings.

Half of the number is stamped on bearing cap and the other half is stamped on the rod.



Connecting Rod Journal Code Locations (Letters)



Bearing Identification

Color code is on the edge of the bearing. → Larger big end bore edge of the bearing.

1	2	3	4
---	---	---	---

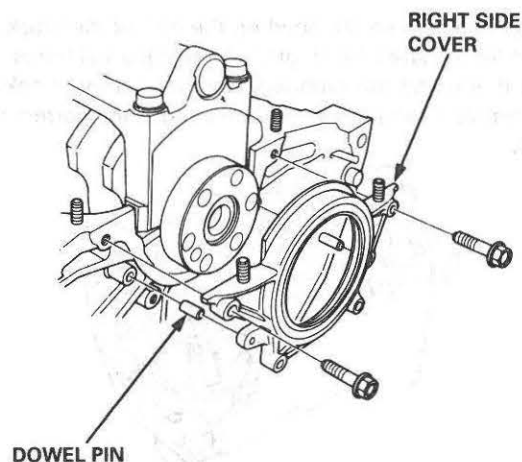
→ Smaller bearing (thicker)

A or I	Smaller rod journal
B or II	
C or III	
D or IIII	Smaller bearing (thicker)

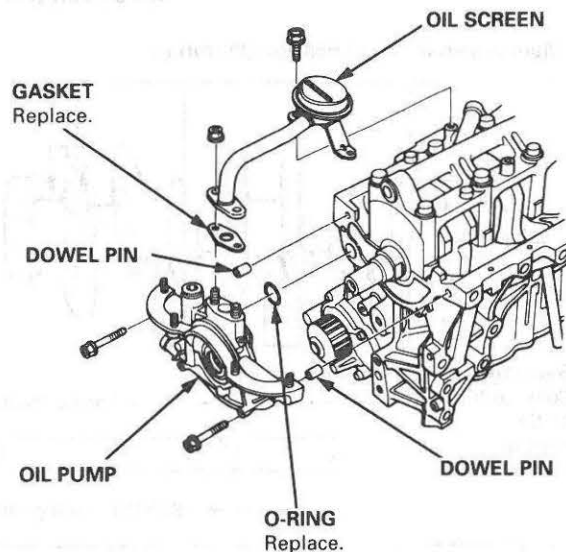
Red	Pink	Yellow	Green
Pink	Yellow	Green	Brown
Yellow	Green	Brown	Black
Green	Brown	Black	Blue

Removal

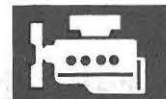
1. Remove the oil pan assembly.
2. Remove the right side cover.



3. Remove the oil screen.



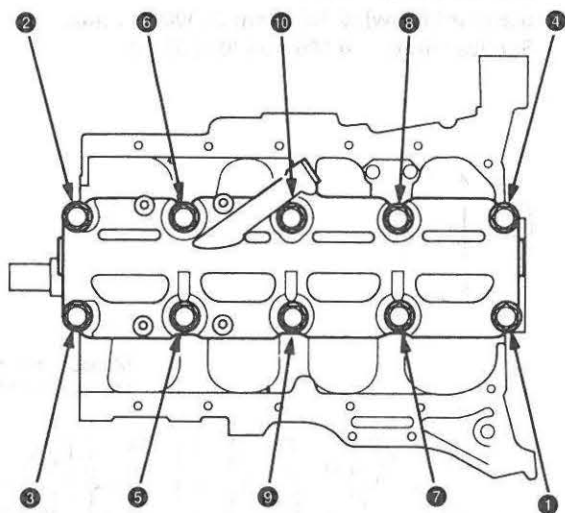
4. Remove the oil pump.



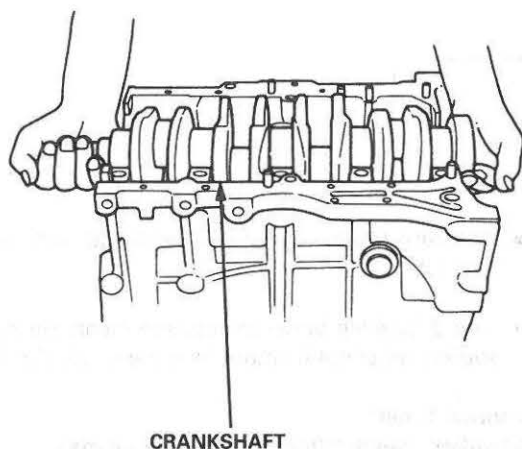
5. Remove the bolts and the bearing cap.

CAUTION: To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

MAIN BEARING CAP BOLTS LOOSENING SEQUENCE

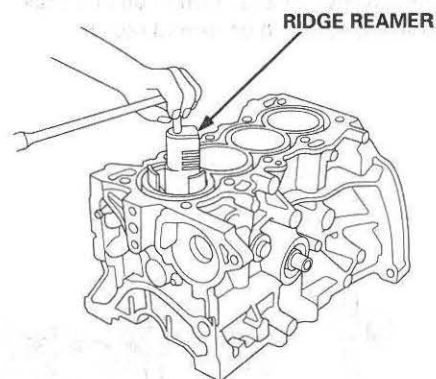


6. Remove the rod caps/bearings and main caps/bearings. Keep all caps/bearings in order.
7. Lift the crankshaft out of the engine, being careful not to damage journals.

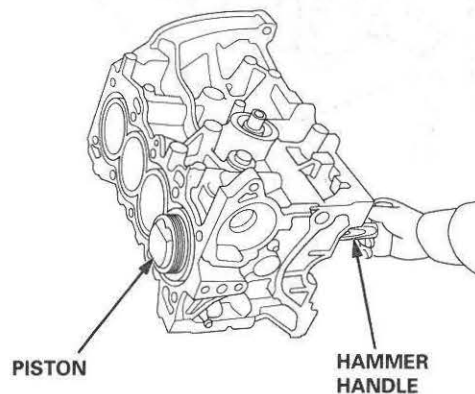


8. Remove the upper bearing halves from the connecting rods and set them aside with their respective caps.
9. Reinstall the main caps and bearings on the engine in proper order.
10. If you can feel a ridge of metal or hard carbon around the top of each cylinder, remove it with a ridge reamer. Follow the reamer manufacturer's instructions.

CAUTION: If the ridge is not removed, it may damage the pistons as they are pushed out.



11. Use the wooden handle of a hammer to drive the pistons out.



12. Reinstall the connecting rod bearings and caps after removing each piston/connecting rod assembly.
13. Mark each piston/connecting rod assembly with its cylinder number to avoid mixup on reassembly.

NOTE: The existing number on the connecting rod does not indicate its position in the engine, it indicates the rod bore size.

Crankshaft

Inspection

- Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
- Check the keyway and threads.

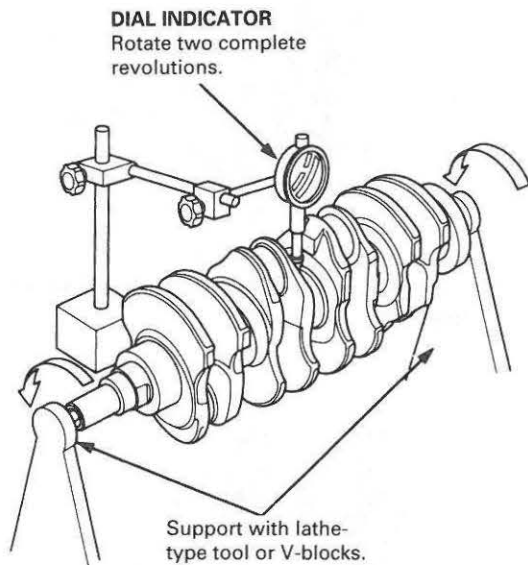
Alignment

- Measure runout on all main journals to make sure the crank is not bent.
- The difference between measurements on each journal must not be more than the service limit.

Crankshaft Total Indicated Runout:

Standard (New): 0.03 mm (0.001 in) max.

Service Limit: 0.04 mm (0.002 in)



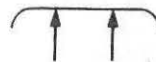
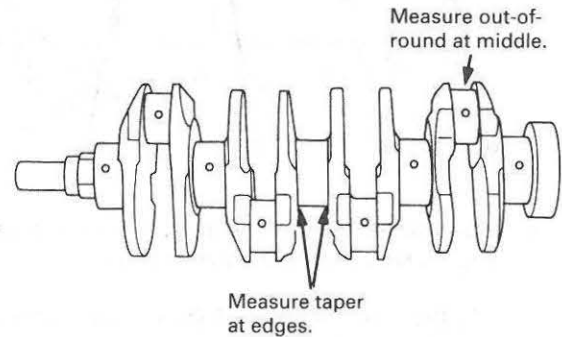
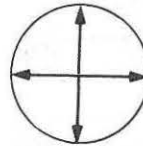
Out-of-Round and Taper

- Measure out-of-round at the middle of each rod and main journal in two places.
- The difference between measurements on each journal must not be more than the service limit.

Journal Out-of-Round:

Standard (New): 0.0025 mm (0.0001 in) max.

Service Limit: 0.005 mm (0.0002 in)

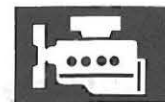


- Measure taper at edges of each rod and main journal.
- The difference between measurements on each journal must not be more than the service limit.

Journal Taper:

Standard (New): 0.0025 mm (0.0001 in) max.

Service Limit: 0.005 mm (0.0002 in)



Pistons

Inspection

1. Check the piston for distortion or cracks.

NOTE: If cylinder is bored, an oversized piston must be used.

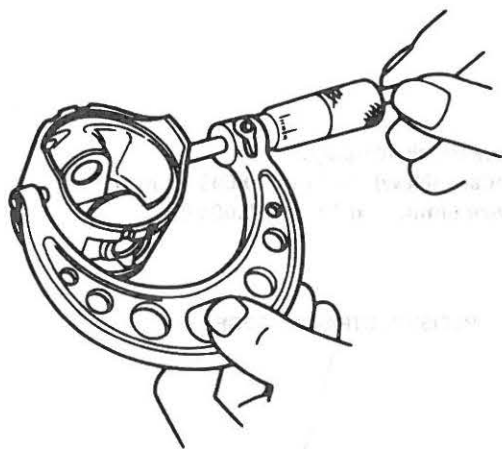
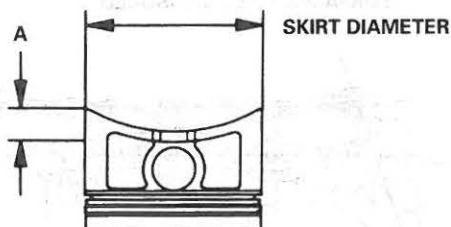
2. Measure piston diameter at distance A from the bottom of the skirt.

A: 14 mm (0.6 in)

Piston Diameter:

Standard (New): 74.980 – 74.990 mm
(2.9520 – 2.9524 in)

Service Limit: 74.970 mm (2.9516 in)

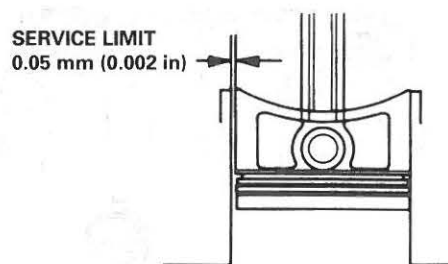


3. Calculate the difference between the cylinder bore diameter (see page 7-12) and piston diameter.

Piston-to-Cylinder Clearance

Standard (New): 0.010 – 0.040 mm
(0.0004 – 0.0016 in)

Service Limit: 0.05 mm (0.002 in)



If the clearance is near or exceeds the service limit, inspect the piston and cylinder block for excessive wear.

Oversize Piston Diameter

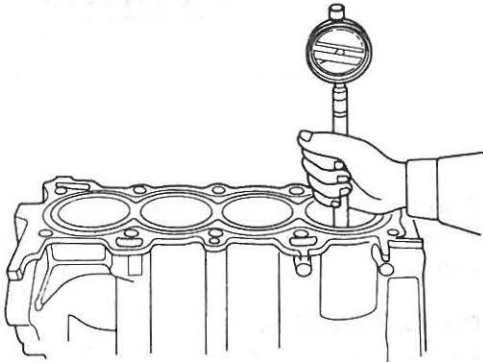
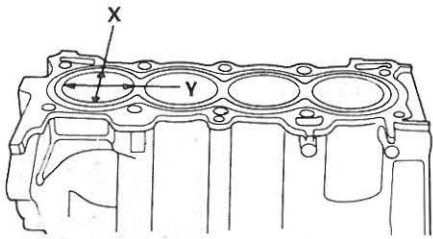
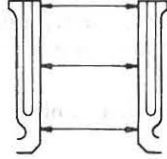
0.25: 75.23 – 75.24 mm (2.9618 – 2.9622 in)

0.50: 75.48 – 75.49 mm (2.9716 – 2.9720 in)

Cylinder Block

Inspection

1. Measure wear and taper in directions X and Y at three levels in each cylinder as shown.



Cylinder Bore Size

Standard (New): 75.00 – 75.02 mm
(2.953 – 2.954 in)

Service Limit: 75.07 mm (2.956 in)

Oversize

0.25: 75.25 – 75.27 mm (2.9626 – 2.9634 in)

0.50: 75.50 – 75.52 mm (2.9724 – 2.9732 in)

Bore Taper

Limit: (Difference between first and third measurement) 0.05 mm (0.002 in)

- If measurements in any cylinder are beyond the Oversize Bore Service Limit, replace the block.

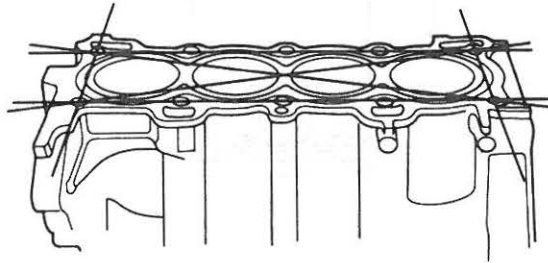
- If the block is to be rebored, refer to Piston Clearance Inspection (see page 7-11) after reboring.

NOTE: Scored or scratched cylinder bores must be honed.

Reboring Limit: 0.50 mm (0.020 in)

2. Check the top of the block for warpage. Measure along the edges and across the center as shown.

SURFACES TO BE MEASURED

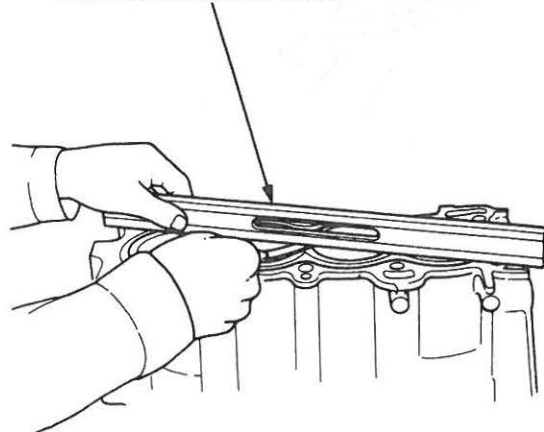


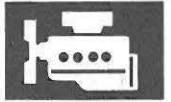
Engine Block Warpage:

Standard (New): 0.07 mm (0.003 in) max.

Service Limit: 0.10 mm (0.004 in)

PRECISION STRAIGHT EDGE



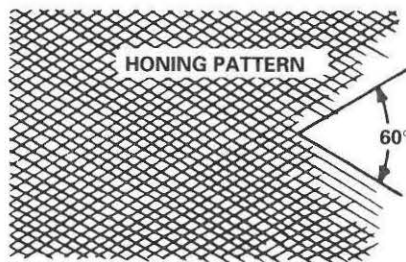


Bore Honing

1. Measure cylinder bores as shown on page 7-12. If the block is to be reused, hone the cylinders and remeasure the bores.
2. Hone cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree cross-hatch pattern.

NOTE:

- Use only a rigid hone with 400 grit or finer stone such as Sunnen, Ammco, or equivalent.
- Do not use stones that are worn or broken.

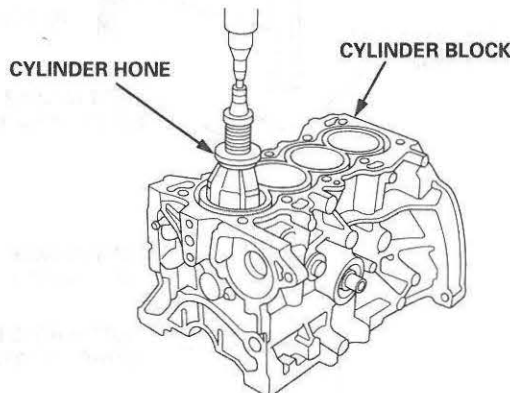


3. When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil immediately to prevent rusting.

NOTE: Never use solvent, it will only redistribute the grit on the cylinder walls.

4. If scoring or scratches are still present in cylinder bores after honing to the service limit, rebore the cylinder block.

NOTE: Some light vertical scoring and scratching is acceptable if it is not deep enough to catch your fingernail and does not run the full length of the bore.

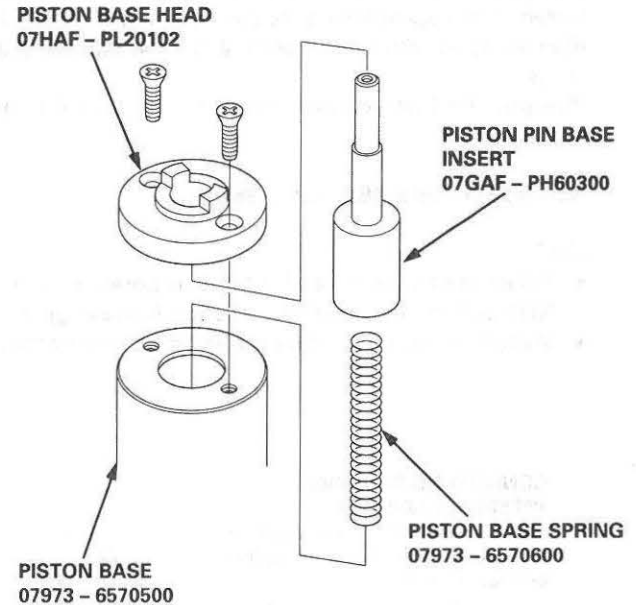


NOTE:

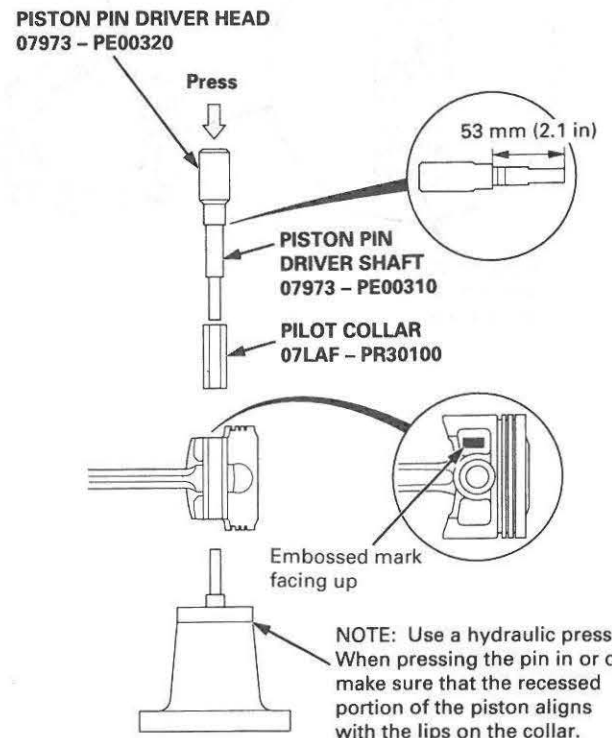
- After honing, clean the cylinder thoroughly with soapy water.
- Only a scored or scratched cylinder bore must be honed.

Removal

1. Assemble the special tool as shown.



2. Assemble and adjust the length of the piston pin driver and shaft to 53 mm (2.1 in) as shown.



3. Place the piston on the special tool and press the pin out with the special tools and a hydraulic press.

Connecting Rods

Piston Pins

Selection

Each rod falls into one of four tolerance ranges (from 0 to + 0.024 mm (0 to + 0.0009 in), in 0.006 mm (0.0002 in) increments) depending on the size of its big end bore. It's then stamped with a number (1, 2, 3, or 4) indicating the range.

You may find any combination of 1, 2, 3, or 4 in any engine.

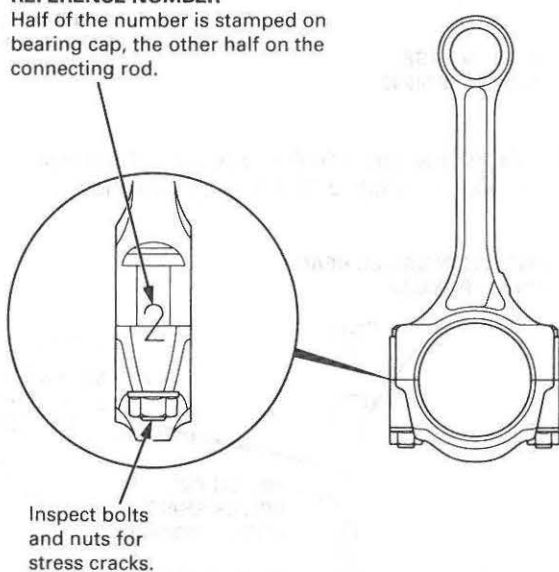
Normal Bore Size: 48.0 mm (1.89 in)

NOTE:

- Reference numbers are for big end bore size and do NOT indicate the position of the rod in the engine.
- Inspect connecting rod for cracks and heat damage.

CONNECTING ROD BORE REFERENCE NUMBER

Half of the number is stamped on bearing cap, the other half on the connecting rod.

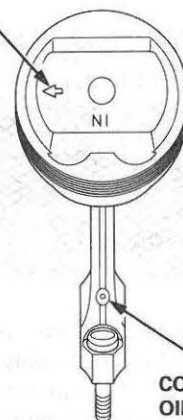


Installation

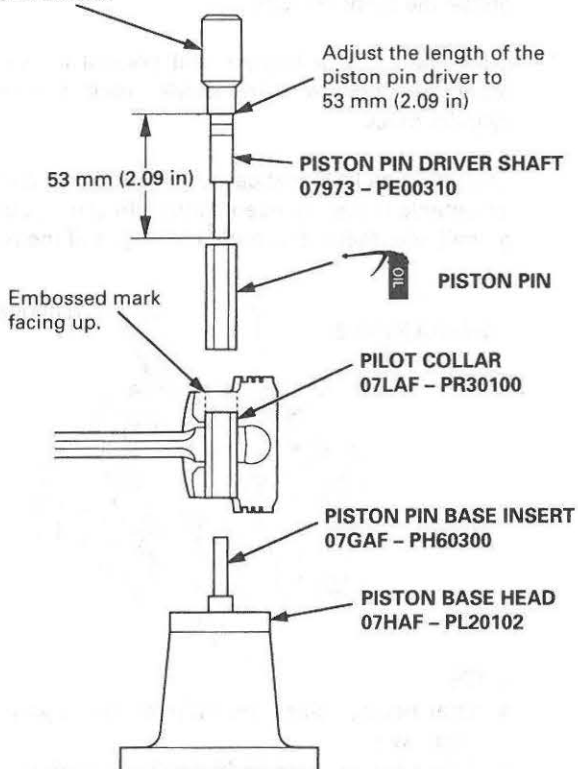
1. Use a hydraulic press for installation.

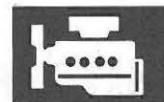
- When pressing the pin in or out, be sure you position the recessed flat on the piston against the lugs on the base attachment.

The arrow must face the timing belt side of the engine and the connecting rod oil hole must face the rear of the engine.



PISTON PIN DRIVER HEAD 07973 - PE00320





Inspection

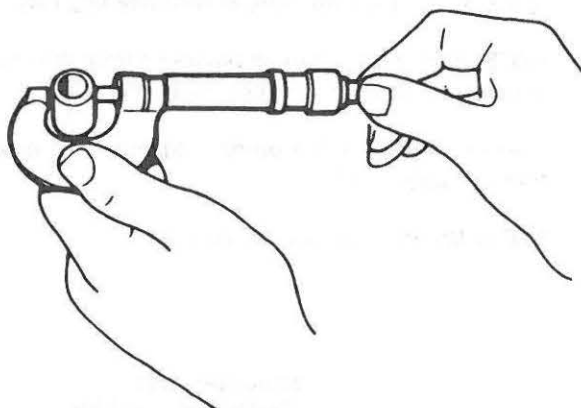
1. Measure the diameter of the piston pin.

Piston Pin Diameter:

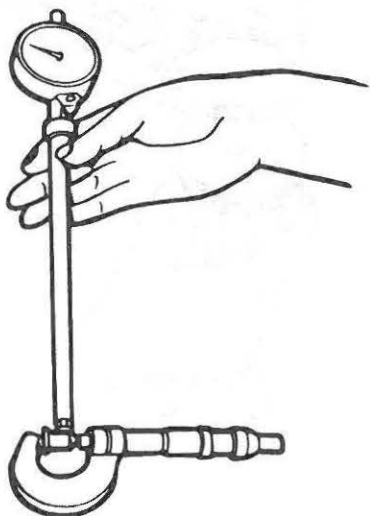
Standard (New): 20.996 – 21.000 mm
(0.8266 – 0.8268 in)

Overize: 20.998 – 21.002
(0.8267 – 0.8268 in)

NOTE: All replacement piston pins are oversize.



2. Zero the dial indicator to the piston pin diameter.



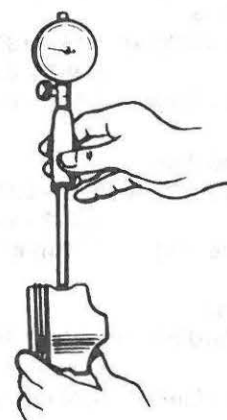
3. Measure the piston pin-to-piston clearance.

NOTE: Check the piston for distortion or cracks.

If the piston pin clearance is greater than 0.024 mm (0.0009 in), remeasure using an oversized piston pin.

Piston Pin-to-Piston Clearance:

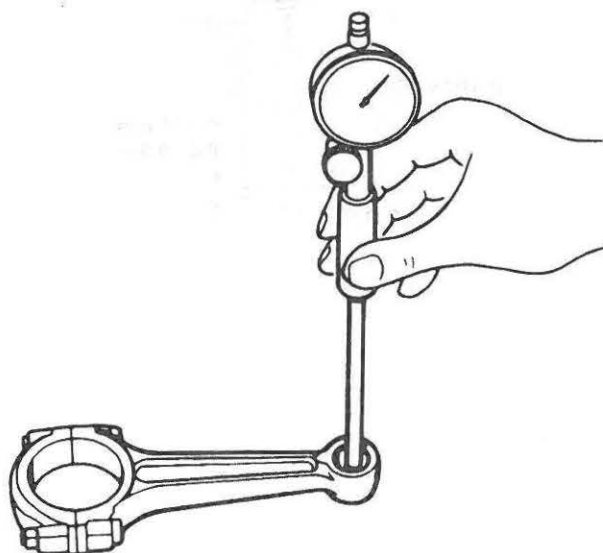
Standard (New): 0.010 – 0.020 mm
(0.0004 – 0.0008 in)



4. Check the difference between the piston pin diameter and the connecting rod small end diameter.

Piston Pin-to-Connecting Rod Interference:

Standard (New): 0.015 – 0.032 mm
(0.0006 – 0.0013 in)



Piston Rings

End Gap

1. Using a piston, push a new ring into the cylinder bore 15 – 20 mm (0.6 – 0.8 in) from the bottom.
2. Measure the piston ring end-gap with a feeler gauge:
 - If the gap is too small, check to see if you have the proper rings for your engine.
 - If the gap is too large, recheck the cylinder bore diameter against the wear limits on page 7-12. If the bore is over the service limit, the cylinder block must be rebored.

Piston Ring End-Gap:

Top Ring

Standard (New): 0.15 – 0.30 mm
(0.006 – 0.012 in)

Service Limit: 0.60 mm (0.024 in)

Second Ring

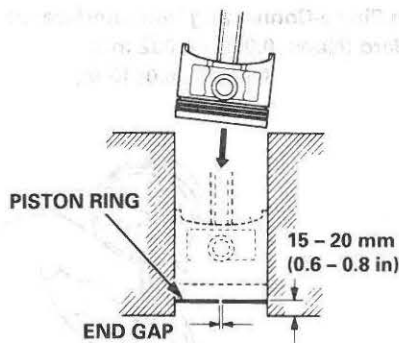
Standard (New): 0.30 – 0.45 mm
(0.012 – 0.018 in)

Service Limit: 0.70 mm (0.028 in)

Oil Ring

Standard (New): 0.20 – 0.70 mm
(0.008 – 0.028 in)

Service Limit: 0.80 mm (0.031 in)



Replacement

1. Using a ring expander, remove the old piston rings.
2. Clean all ring grooves thoroughly.

NOTE:

- Use a squared-off broken ring or ring groove cleaner with blade to fit piston grooves.
- Top ring groove is 1.0 mm (0.039 in) wide.
- Second ring groove is 1.2 mm (0.047 in) wide.
- Oil ring groove is 2.8 mm (0.11 in) wide.
- File down the blade if necessary.

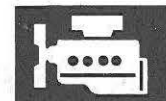
CAUTION: Do not use a wire brush to clean ring lands, or cut ring lands deeper with cleaning tool.

NOTE: If the piston is to be separated from the connecting rod, do not install new rings yet.

3. Install new rings in the proper sequence and position (see page 7-17).

NOTE: Do not reuse old piston rings.





Ring-to-Groove Clearance

After installing a new set of rings, measure the ring-to-groove clearances:

Top Ring Clearance

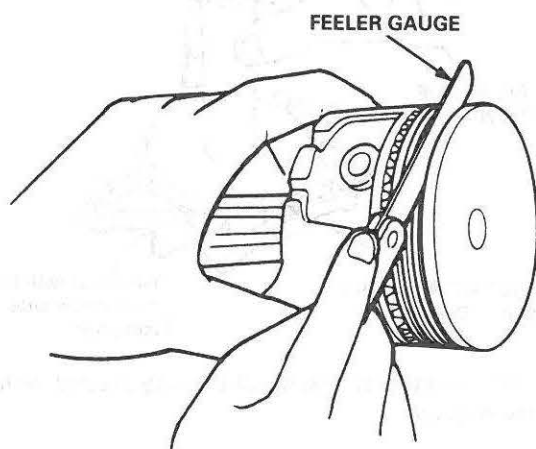
Standard (New): 0.035 – 0.060 mm
(0.0014 – 0.0024 in)

Service Limit: 0.13 mm (0.005 in)

Second Ring Clearance

Standard (New): 0.030 – 0.055 mm
(0.0012 – 0.0022 in)

Service Limit: 0.13 mm (0.005 in)

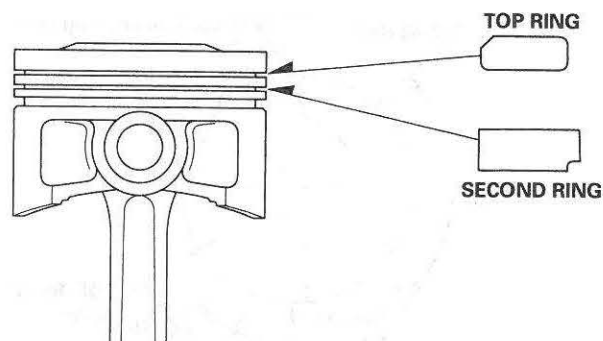


Alignment

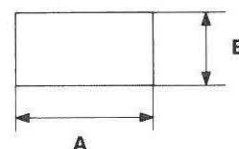
1. Install the rings as shown.

NOTE:

- The top ring has an "A" mark.
- The second ring has an "R" mark.



Piston Ring Dimensions:



Top Ring (Standard):

A: 2.6 mm (0.10 in)

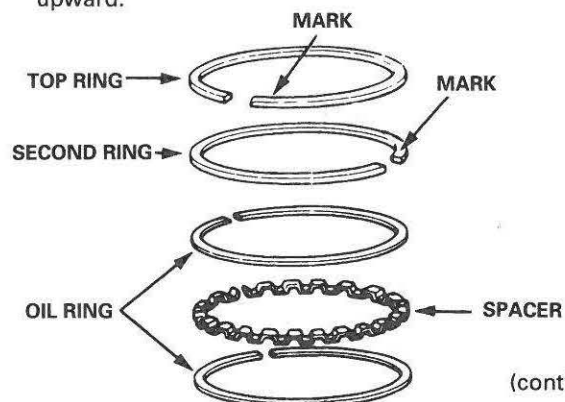
B: 1.0 mm (0.04 in)

Second Ring (Standard):

A: 3.0 mm (0.12 in)

B: 1.2 mm (0.05 in)

NOTE: The manufacturing marks must be facing upward.



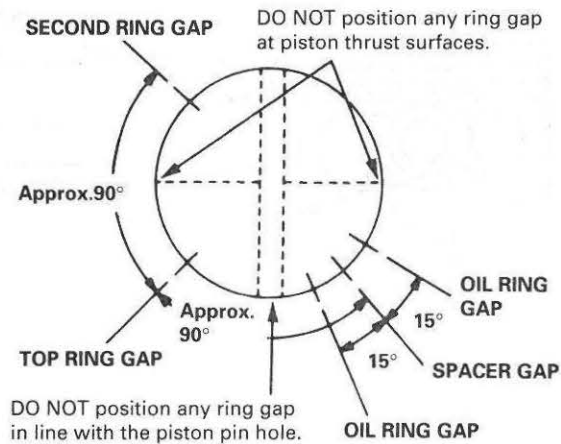
(cont'd)

Piston Rings

Crankshaft Oil Seal

Alignment (cont'd)

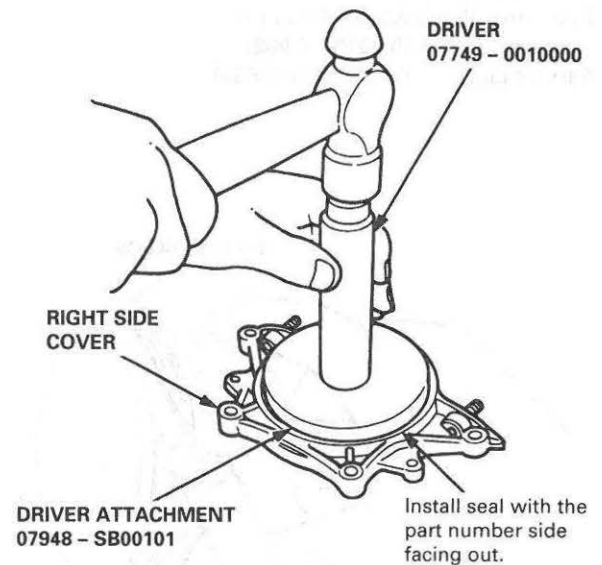
2. Rotate the rings in their grooves to make sure they do not bind.
3. Position the ring end gaps as shown:



Installation

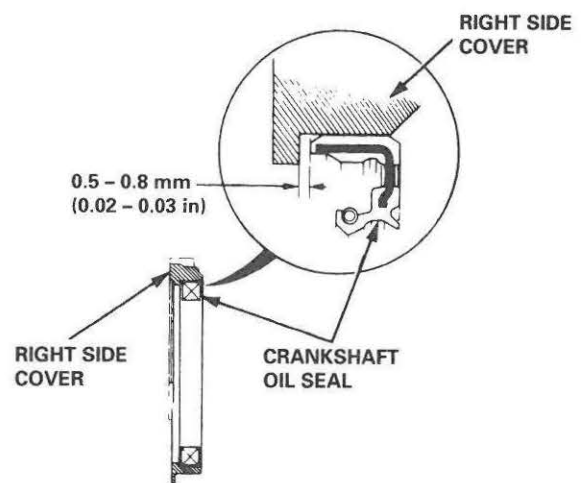
1. The seal surface on the block should be dry. Apply a light coat of oil to the crankshaft and to the lip of the seal.
1. Drive the crankshaft oil seal into the right side cover using the special tools.

NOTE: Drive the crankshaft oil seal in squarely.

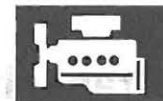


2. Confirm equal clearance all the way around with a feeler gauge.


Clearance: 0.5 - 0.8 mm (0.02 - 0.03 in)



NOTE: Refer to pages 7-22 and 8-10 for installation of the oil pump side crankshaft oil seal.



Installation

 Before installing the pistons, apply a coat of engine oil to the ring grooves and cylinder bores.

1. If the crankshaft is already installed:
 - Set the crankshaft to BDC for each cylinder.
 - Remove the connecting rod caps, and slip short sections of rubber hose over the threaded ends of the connecting rod bolts.
 - Install the ring compressor, check that the bearing is securely in place, then position the piston in the cylinder, and tap it in using the wooden handle of a hammer.
 - Stop after the ring compressor pops free, and check the connecting rod-to-crank journal alignment before pushing the piston into place.
 - Install the rod caps with bearings, and torque the nuts to:
31 N·m (3.2 kgf·m, 23 lbf·ft)
Apply engine oil to the bolt threads.

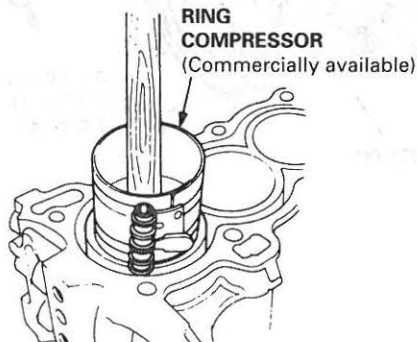
2. If the crankshaft is not installed:
 - Remove the rod caps and bearings, install the ring compressor, then position the piston in the cylinder and tap it in using the wooden handle of a hammer.
 - Position all pistons at top dead center.

The arrow must face the timing belt side of the engine.


CONNECTING ROD OIL HOLE

RUBBER HOSES

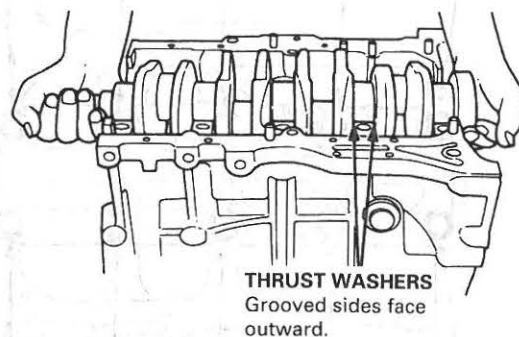
NOTE: Maintain downward force on the ring compressor to prevent rings from expanding before entering the cylinder bore.



Installation

 Before installing the crankshaft, apply a coat of engine oil to the main bearings and rod bearings.

1. Install the thrust washers in the No. 4 journal of the cylinder block.
2. Insert bearing halves in the cylinder block and connecting rods.
3. Hold the crankshaft so the rod journals for cylinders No. 2 and No. 3 are straight down.
4. Lower the crankshaft into the block, seating the rod journals into connecting rods No. 2, No. 3. Install the rod caps and nuts finger-tight.



5. Rotate the crankshaft clockwise, seat journals into connecting rods No. 1 and No. 4. Install the rod caps and nuts finger-tight.

NOTE: Install the caps so the bearing recess is on the same side as the recess in the rod.

6. Check rod bearing clearance with plastigage (see page 7-7), then torque the capnuts.

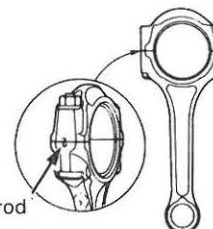
Torque:

31 N·m (3.2 kgf·m, 23 lbf·ft)

Apply engine oil to the bolt threads.

NOTE: Reference numbers on the connecting rod are for big-end bore tolerance and do not indicate the position of the piston in the engine.

Line up the marks when installing the connecting rod cap.



(cont'd)

Crankshaft

Installation (cont'd)

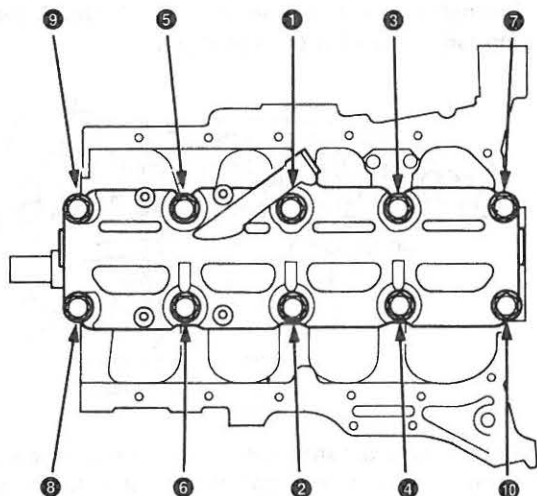
7. Install the main bearing caps. Check clearances with plastigage (see page 7-6), then tighten the bearing cap bolts in 2 steps.

First step: 25 N·m (2.5 kgf·m, 18 lbf·ft)

Second step: 51 N·m (5.2 kgf·m, 38 lbf·ft)

NOTE: Coat the thrust washer surfaces and bolt threads with oil.

MAIN BEARING CAP BOLTS TIGHTENING SEQUENCE

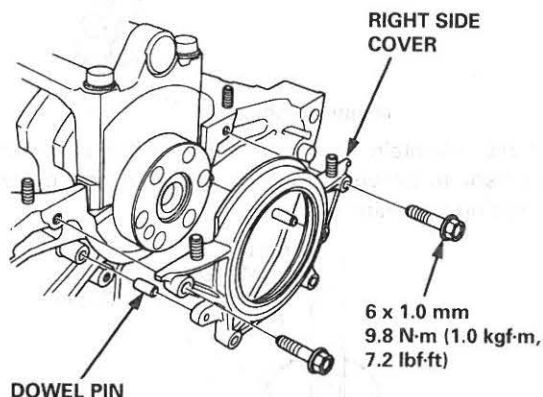
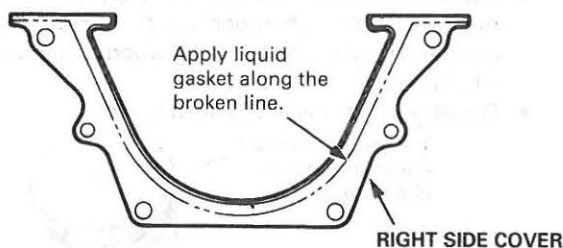


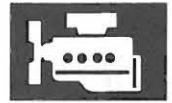
CAUTION: Whenever any crankshaft bearing or connecting rod bearing is replaced, it is necessary after reassembly to run the engine at idling speed until it reaches normal operating temperature, then continue to run it for approximately 15 minutes.

8. Apply liquid gasket to the block mating surface of the right side cover, then install it on the cylinder block.

NOTE:

- Use liquid gasket, part No. 08718 – 0001 or 08718 – 0003.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket evenly, being careful to cover all the mating surface.
- To prevent oil leakage, apply liquid gasket to the inner threads of the bolt holes.
- Do not install the parts if five minutes or more have elapsed since applying the liquid gasket. Instead reapply liquid gasket after removing the old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.

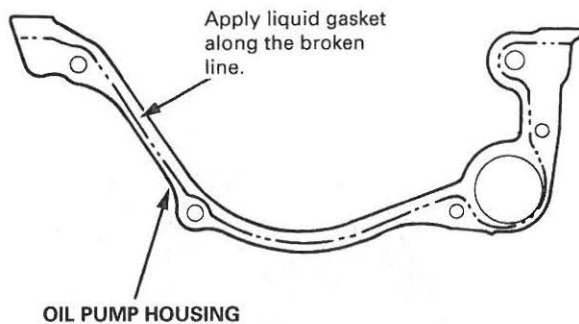




Installation

9. Apply liquid gasket to the oil pump mating surface of the block, then install the oil pump on the cylinder block.

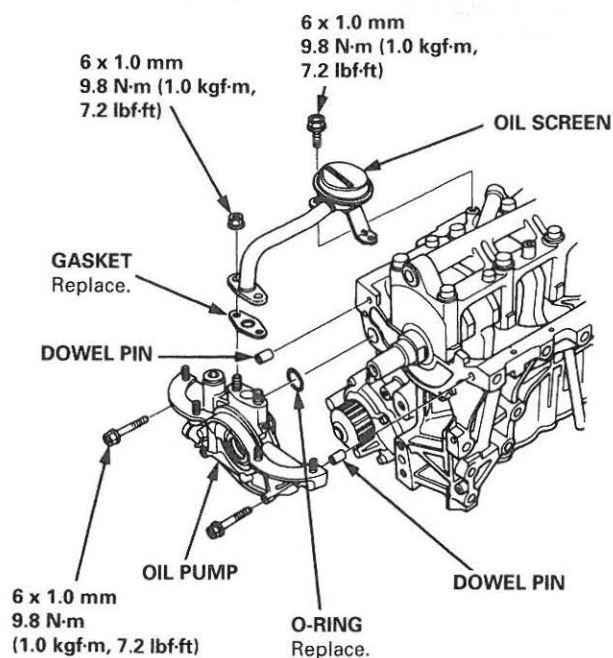
Apply grease to the lips of the oil seals. Then, install the oil pump while aligning the inner rotor with the crankshaft. When the pump is in place, clean any excess grease off the crankshaft, then check that the oil seal lips are not distorted.



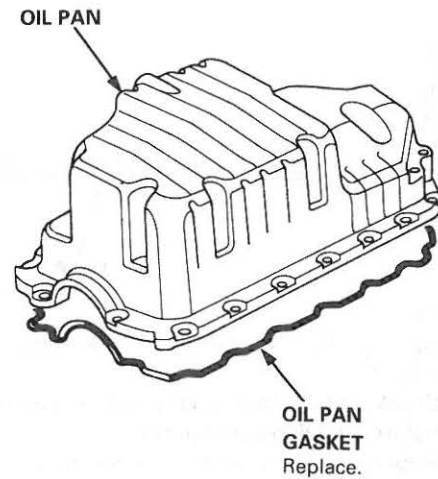
NOTE:

- Apply a light coat of oil to the crankshaft and to the lip of the seal.
- Use new O-rings and apply oil when installing them.

10. Install the oil pump and oil screen.



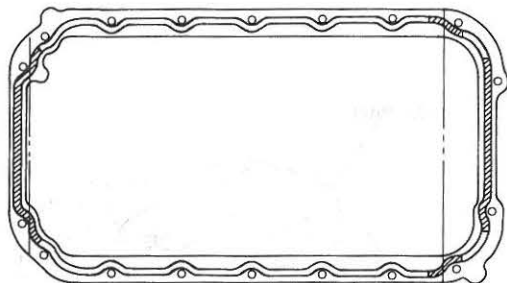
1. Install the oil pan gasket on the oil pan.



(cont'd)

Installation (cont'd)

2. Apply liquid gasket to the block mating surfaces in the shaded areas shown, then install the oil pan.

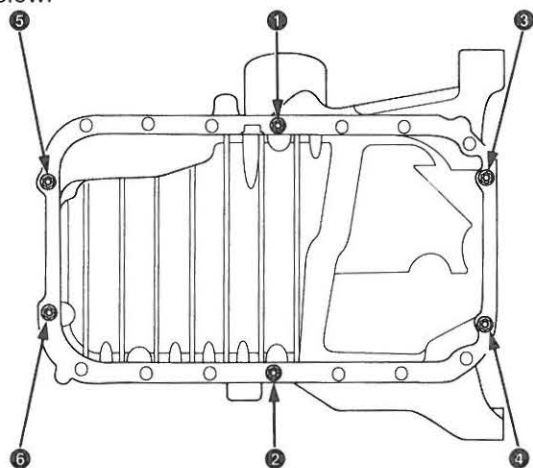


OIL PAN

NOTE:

- Use liquid gasket, part No. 08718 – 0001 or 08718 – 0003.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket as an even bead, centered between the edges of the mating surface.
- To prevent oil leakage, apply liquid gasket to the inner threads of the bolt holes.
- Do not install the parts if five minutes or more have elapsed since applying the liquid gasket. Instead reapply liquid gasket after removing the old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.

3. Tighten the nuts finger-tight at six points as shown below.



4. Tighten all bolts and nuts, starting from nut ①, clockwise in three steps.

NOTE: Excessive tightening can cause distortion of oil pan gasket and oil leakage.

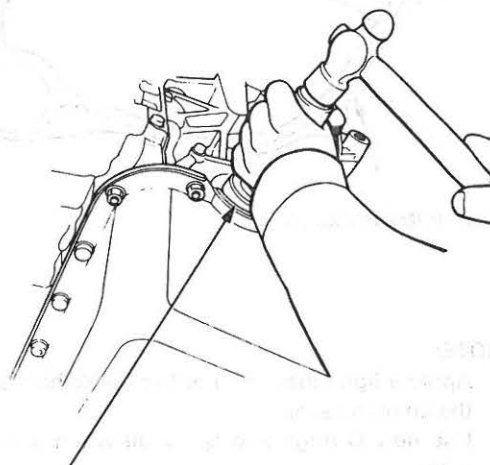
Torque: 12 N·m (1.2 kgf·m, 8.7 lbf·ft)

Installation

NOTE:

- Engine removal is not required.
 - The crankshaft oil seal housing should be dry.
- Apply a light coat of grease to the crankshaft and to the lips of the seals.

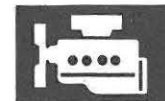
1. Using the special tool, drive in the timing pulley-end seal until the driver bottoms against the oil pump. When the seal is in place, clean any excess grease off the crankshaft and check that the oil seal lip is not distorted.



SEAL DRIVER

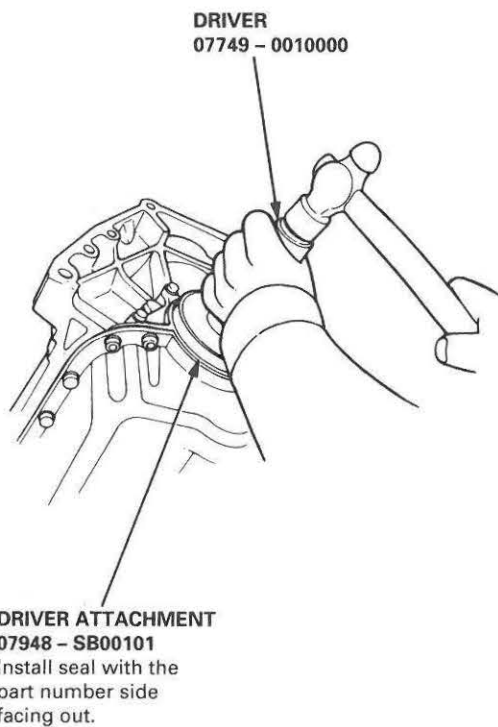
07947 – SB00200

Install seal with the part number side facing out.



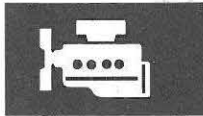
2. Measure the flywheel-end seal thickness and the oil seal housing depth. Using the special tool, drive the flywheel-end seal into the rear cover to the point where the clearance between the bottom of the oil seal and the right side cover is 0.5 – 0.8 mm (0.02 – 0.03 in) (see page 7-19).

NOTE: Align the hole in the driver attachment with the pin on the crankshaft.



Engine Lubrication

Special Tools	8-2
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Oil Filter	
Replacement	8-6
Oil Pressure	
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Oil Pump	
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Special Tools

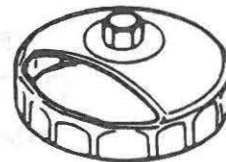
Ref. No.	Tool Number	Description	Qty	Page Reference
①	07746 - 0010400	Attachment, 52 x 55 mm	1	8-10
②	07749 - 0010000	Driver	1	8-10
③	07912 - 6110001	Oil Filter Wrench	1	8-6



①



②



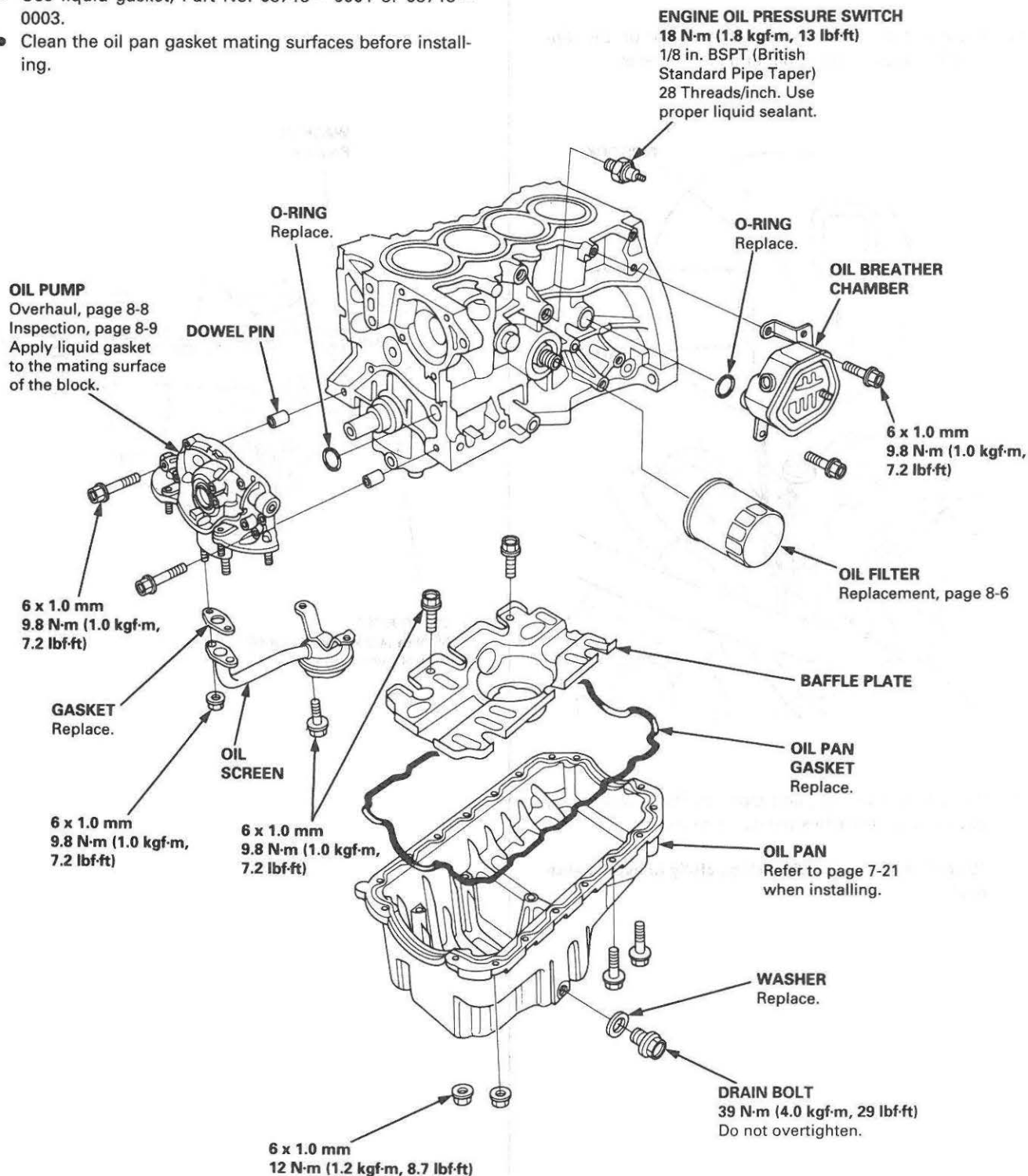
③



NOTE:

- Use new O-rings when reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 08718 - 0001 or 08718 - 0003.
- Clean the oil pan gasket mating surfaces before installing.

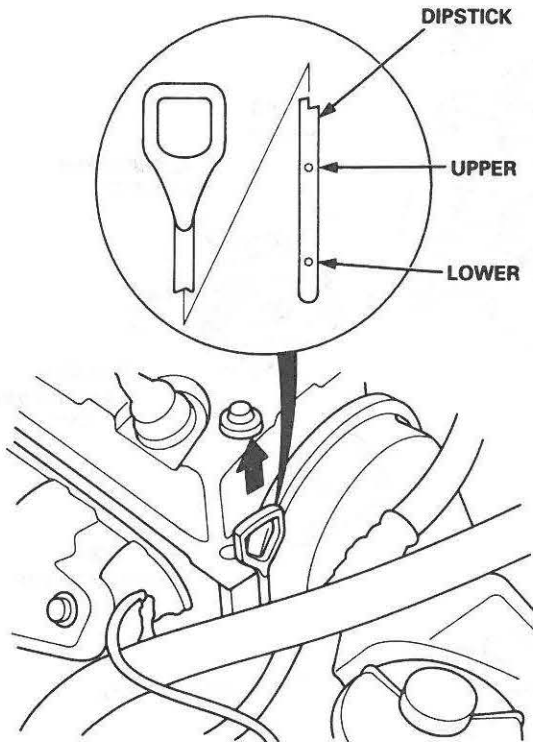
CAUTION: Do not overtighten the drain bolt.



Engine Oil

Inspection

1. Park the vehicle on level ground, and turn off the engine. Allow the oil a few minutes to drain back into the oil pan so the dipstick will show the actual level.
2. Make certain that the oil level indicated on the dipstick is between the upper and lower marks.



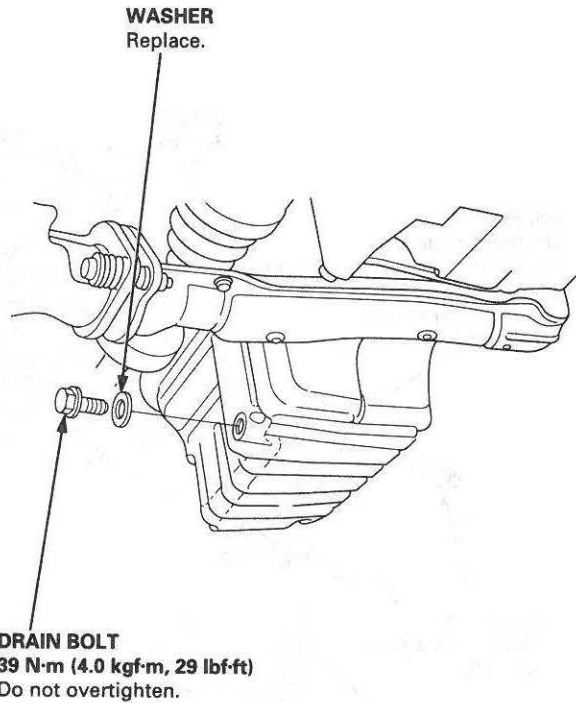
3. If the level has dropped close to the lower mark, add oil until it reaches the upper mark.

CAUTION: Insert the dipstick carefully to avoid bending it.

Replacement

CAUTION: Remove the drain bolt carefully while the engine is hot; the hot oil may cause scalding.

1. Warm up the engine.
2. Drain the engine oil.





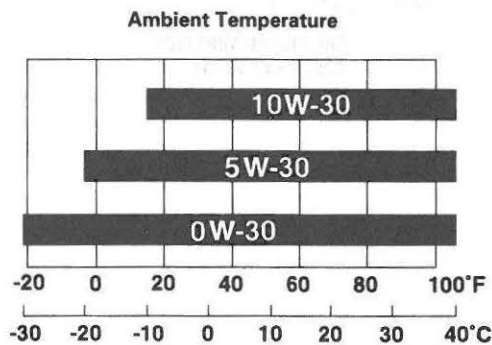
3. Reinstall the drain bolt with a new washer, and refill the engine with the recommended oil.

Requirement	API Service Grade: Use an "Energy Conserving" SJ grade oil, SAE 5W – 30 preferred. You can also use an oil that bears the API CERTIFICATION mark.
Capacity	3.3 ℓ (3.5 US qt, 2.9 Imp qt) at change, including filter. 3.0 ℓ (3.2 US qt, 2.6 Imp qt) at change, without filter. 3.7 ℓ (3.9 US qt, 3.3 Imp qt) after engine overhaul.
Change	Every 7,500 miles (12,000 km) or 12 months (Normal Conditions). Every 3,750 miles (6,000 km) or 6 months (Severe Conditions).

NOTE: Under normal conditions, the oil filter should be replaced at every other oil change.

Under severe conditions, the oil filter should be replaced at each oil change.

The numbers in the middle of the API Service label tell you the oil's SAE viscosity or weight. Select the oil for your vehicle according to this chart:



An oil with a viscosity of 5W – 30 is preferred for improved fuel economy and year-round protection in the vehicle. You may use a 0W – 30 oil if the temperature in your area regularly goes below –4°F (–20°C).



API CERTIFICATION MARK



API SERVICE LABEL

4. Run the engine for more than three minutes, then check for oil leakage.

Oil Filter

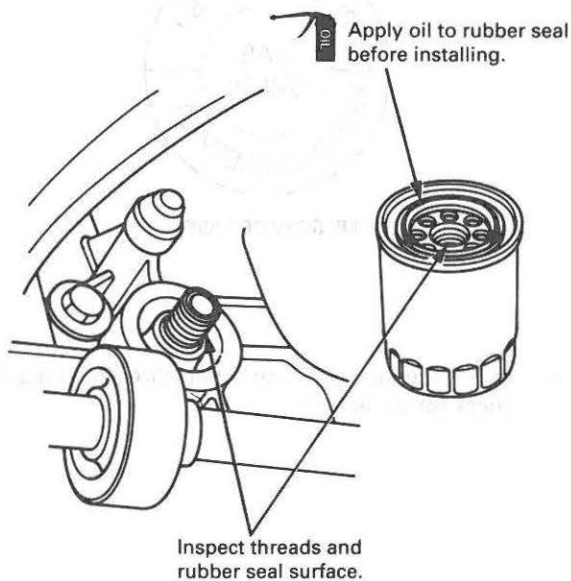
Replacement

⚠ WARNING

- After the engine has been run, the exhaust pipe will be hot; be careful when working around the exhaust pipe.
- Be careful when loosening the drain bolt while the engine is hot. Burns can result because the oil temperature is very high.

1. Remove the oil filter with the oil filter wrench.
2. Inspect the threads and rubber seal on the new filter. Wipe off the seat on the engine block, then apply a light coat of oil to the new filter's rubber seal.

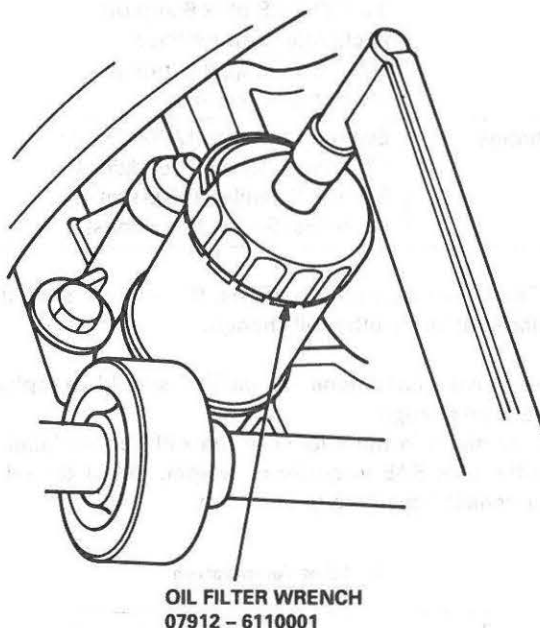
NOTE: Use only filters with a built-in bypass system.

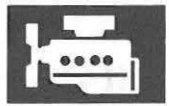


3. Install the oil filter by hand.
4. After the rubber seal seats, tighten the oil filter clockwise with the oil filter wrench.

Tighten: 7/8 turn clockwise.

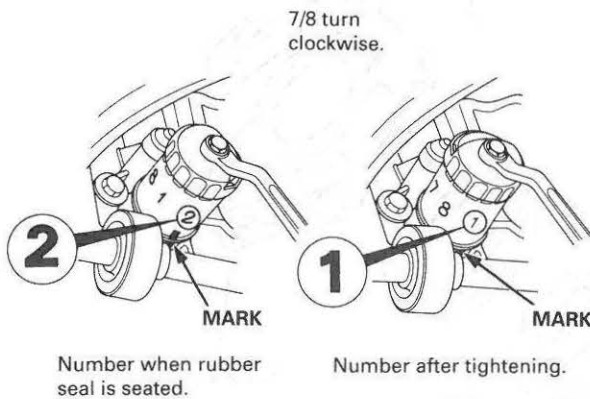
Tightening torque: 22 N·m (2.2 kgf·m, 16 lbf·ft)





Use this procedure to tighten the filter if eight numbers (1 to 8) are printed on the surface of the filter.

- 1) Make a mark on the oil filter base under the number that shows at the bottom of the filter when the rubber seal is seated.
- 2) Tighten the filter by turning it clockwise seven numbers from the marked point. For example, if a mark is made under the number 2 when the rubber seal is seated, the filter should be tightened until the number 1 comes up to the marked point.



Number when rubber seal is seated	1	2	3	4	5	6	7	8
Number after tightening	8	1	2	3	4	5	6	7

CAUTION: Using any procedure other than those shown could result in serious engine damage due to oil leakage.

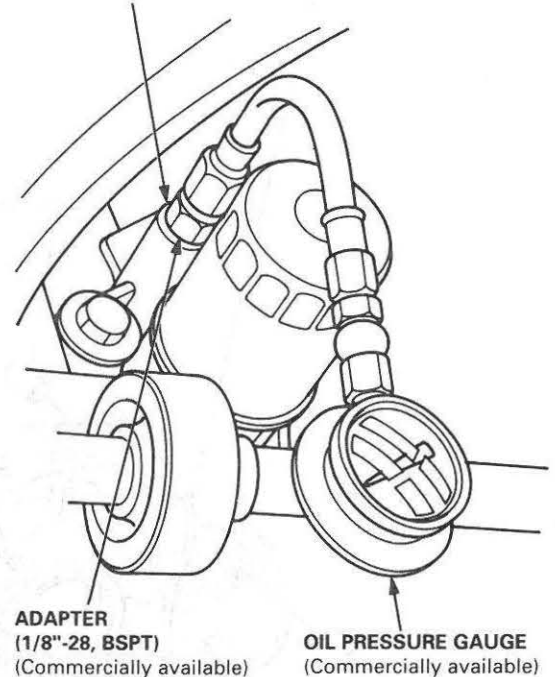
5. After installation, fill the engine with oil up to the specified level, run the engine for more than three minutes, then check for oil leakage.

Testing

If the oil pressure warning light stays on with the engine running, check the engine oil level. If the oil level is correct:

1. Connect a tachometer.
2. Remove the engine oil pressure switch, and install an oil pressure gauge.

ENGINE OIL PRESSURE SWITCH MOUNTING HOLE



3. Start the engine. Shut it off immediately if the gauge registers no oil pressure. Repair the problem before continuing.
4. Allow the engine to reach operating temperature (fan comes on at least twice). The pressure should be:

Engine Oil Temperature: 176°F (80°C)

Engine Oil Pressure:

At Idle: 70 kPa (0.7 kgf/cm², 10 psi) minimum

At 3,000 rpm: 340 kPa (3.5 kgf/cm², 50 psi) minimum

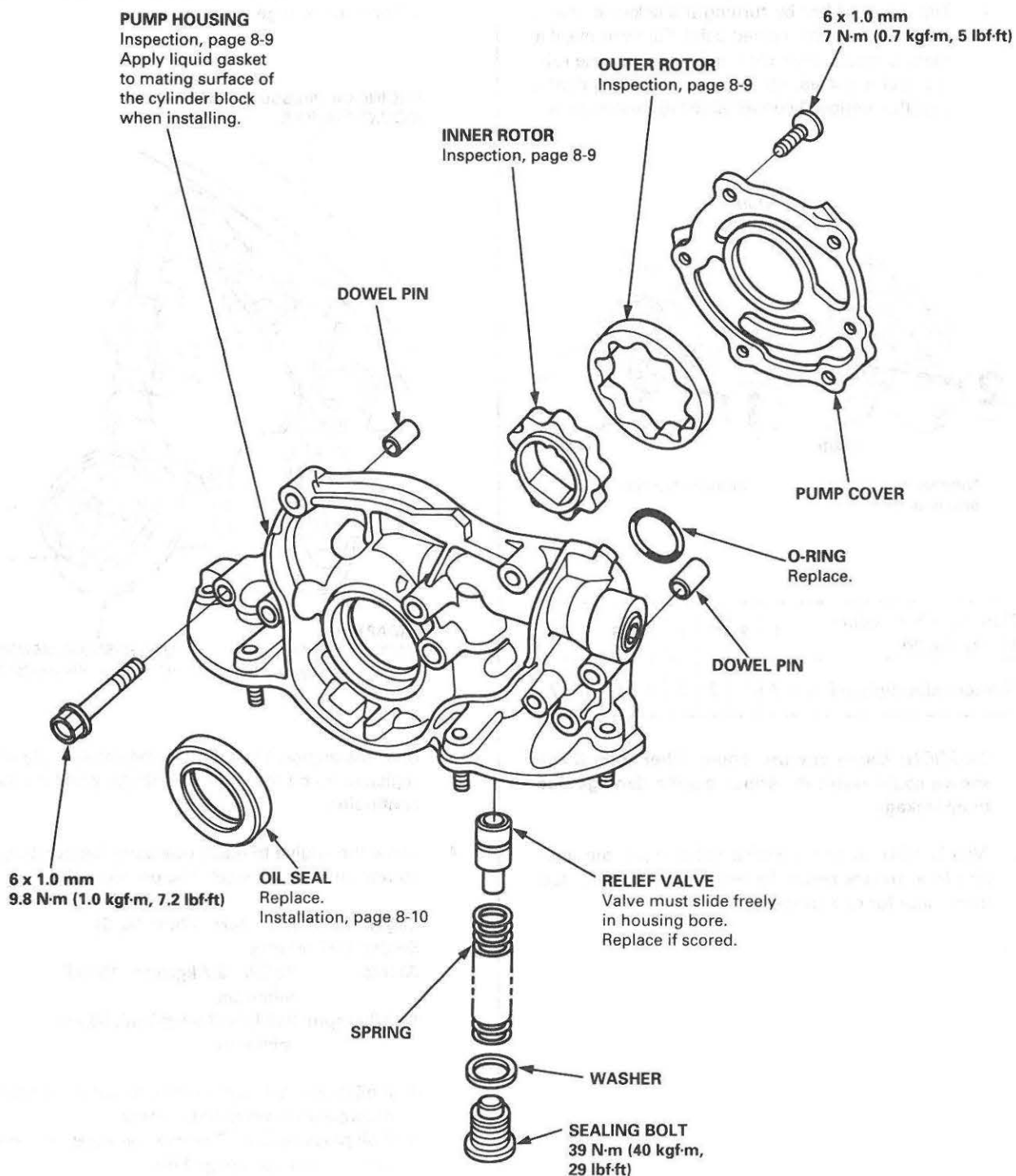
- If oil pressure is within specifications, replace the oil pressure switch and recheck.
- If oil pressure is NOT within specifications, inspect the oil pump (see page 8-9).

Oil Pump

Overhaul

NOTE:

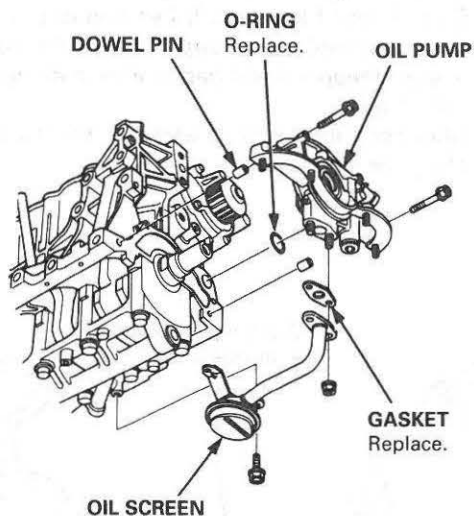
- Use new O-rings when reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 08718 – 0001 or 08718 – 0003.
- The rotors must be installed in the same direction.
- After reassembly, check that the rotors move without binding.





Removal/Inspection/Installation

1. Drain the engine oil.
2. Turn the crankshaft and align the white groove on the crankshaft pulley with the pointer on the lower cover.
3. Remove the cylinder head cover and upper cover.
4. Remove the power steering pump belt, air conditioner belt and the alternator belt.
5. Remove the crankshaft pulley and remove the lower cover.
6. Remove the timing belt.
7. Remove the drive pulley.
8. Remove the oil pan and oil screen.



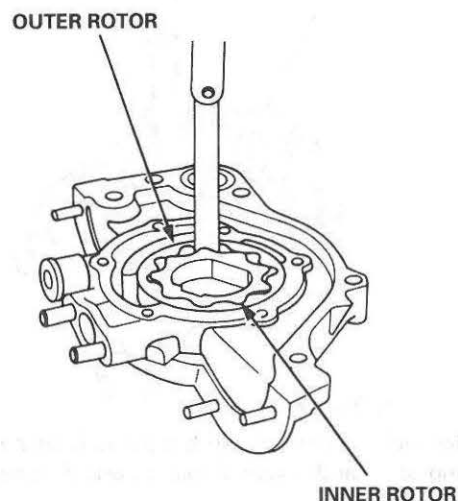
9. Remove the oil pump.

10. Remove the screws from the pump housing, then separate the housing and cover.
11. Check the inner-to-outer rotor radial clearance on the pump rotor. If the inner-to-outer rotor clearance exceeds the service limit, replace the inner and outer rotors.

Inner Rotor-to-Outer Rotor Radial Clearance

Standard (New): 0.02 – 0.14 mm
(0.001 – 0.006 in)

Service Limit: 0.20 mm (0.008 in)

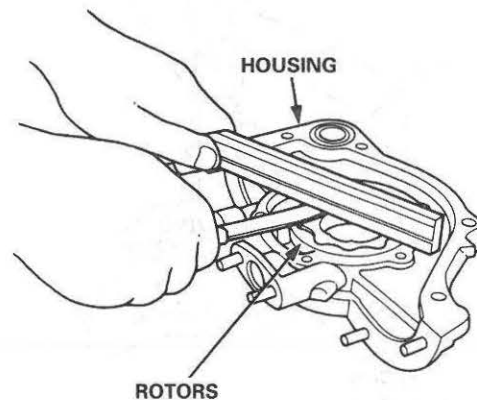


12. Check the housing-to-rotor axial clearance on the pump rotor. If the housing-to-rotor axial clearance exceeds the service limit, replace the set of inner and outer rotors and/or the pump housing.

Housing-to-Rotor Axial Clearance

Standard (New): 0.03 – 0.08 mm
(0.001 – 0.003 in)

Service Limit: 0.15 mm (0.006 in)



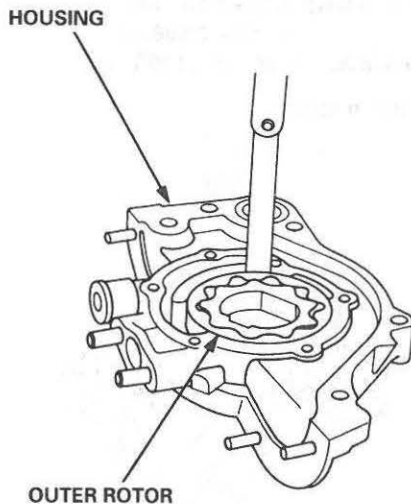
(cont'd)

Oil Pump

Removal/Inspection/Installation (cont'd)

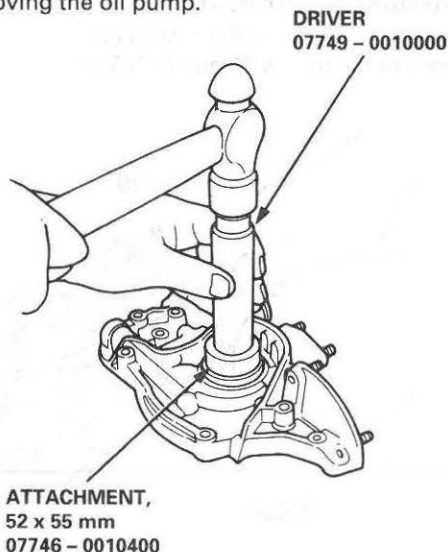
13. Check the housing-to-outer rotor radial clearance. If the housing-to-outer rotor radial clearance exceeds the service limit, replace the set of inner and outer rotors and/or the pump housing.

Housing-to-Outer Rotor Radial Clearance:
Standard (New): 0.10 – 0.18 mm
(0.004 – 0.007 in)
Service Limit: 0.20 mm (0.008 in)



14. Inspect both rotors and the pump housing for scoring or other damage. Replace parts if necessary.
15. Remove the old oil seal from the oil pump.
16. Using the special tool, gently tap in the new oil seal until the driver bottoms against the pump.

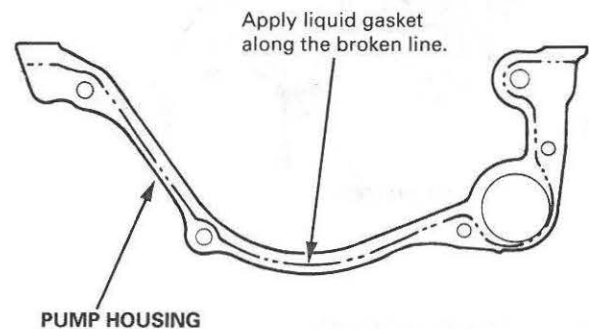
NOTE: The oil seal alone can be replaced without removing the oil pump.

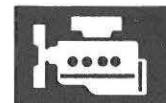


17. Reassemble the oil pump, applying thread lock to the pump housing screws.
18. Check that the oil pump turns freely.
19. Apply a light coat of oil to the seal lip.
20. Install the two dowel pins and new O-ring on the oil pump.
21. Apply liquid gasket to the cylinder block mating surface of the oil pump.

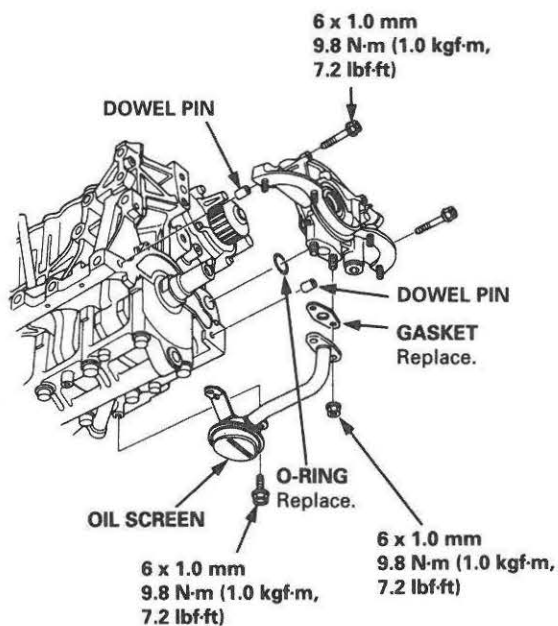
NOTE:

- Use liquid gasket, Part No. 08718 – 0001 or 08718 – 0003
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket evenly, in a narrow bead centered on the mating surface.
- To prevent oil leakage, apply liquid gasket to the inner threads of the bolt holes.
- Do not install the parts if five minutes or more have elapsed since applying liquid gasket. Instead reapply liquid gasket after removing the old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.





22. Install the oil pump on the cylinder block. Apply grease to the lip of the oil pump seal. Then, install the oil pump onto the crankshaft. When the pump is in place, clean any excess grease off the crankshaft and check that the oil seal lip is not distorted.



23. Install the oil screen.
24. Install the oil pan (see page 7-21).

NOTE: Clean the oil pan gasket mating surfaces.

Intake Manifold/Exhaust System

Intake Manifold

Replacement 9-2

Exhaust Manifold

Replacement 9-3

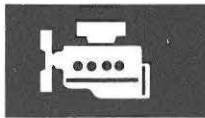
Exhaust Pipe and Muffler

Replacement 9-4

**Warm-up Three Way Catalytic Converter
(WU-TWC)/Three Way Catalytic Converter
(TWC) Inspection 9-5**

Heated Oxygen Sensor (HO2S)

Replacement 9-5



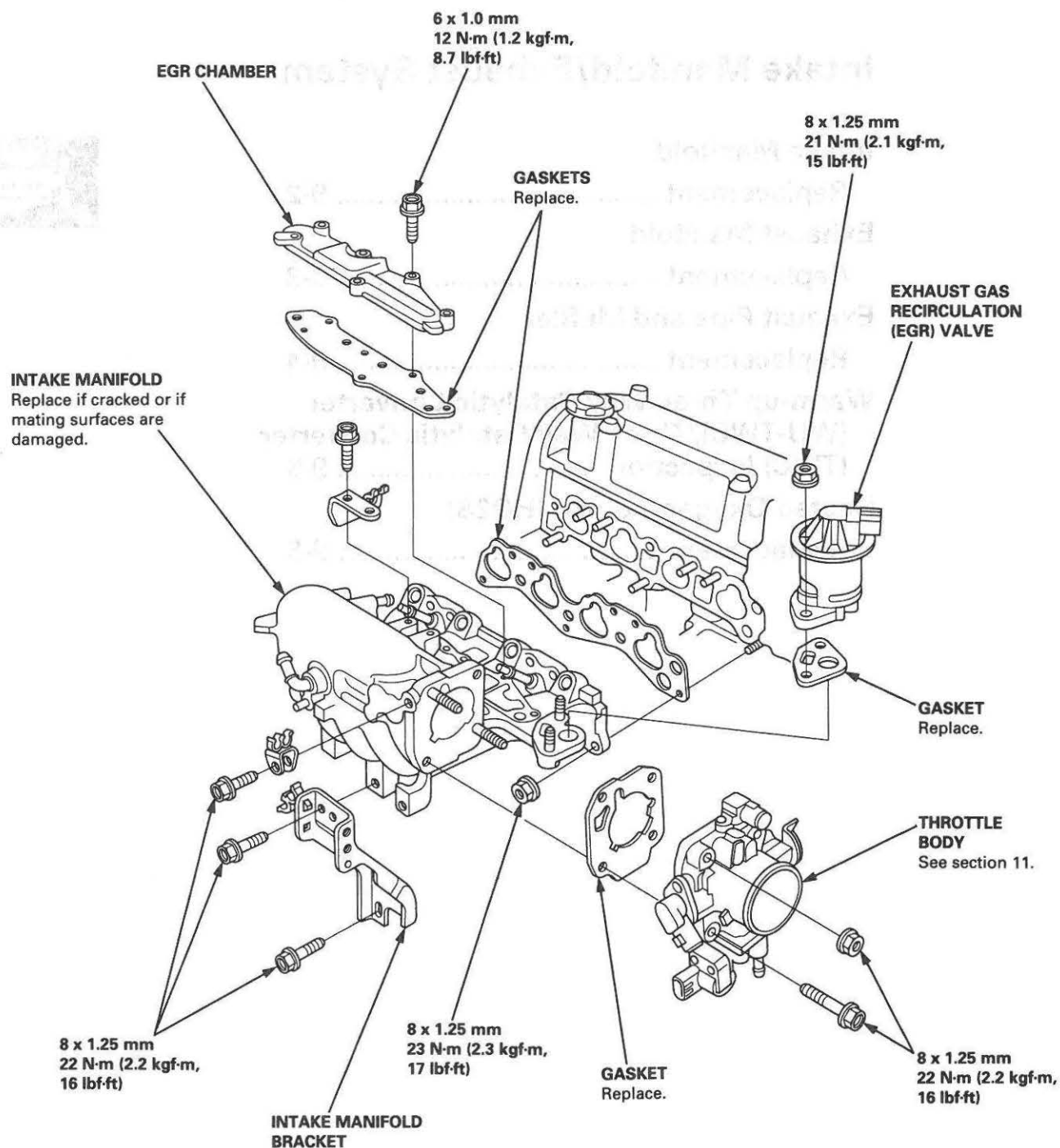
Intake Manifold

Replacement

NOTE: Use new O-rings and gaskets when reassembling.

CAUTION:

- Check for folds or scratches on the surface of the gasket.
- Replace with a new gasket if damaged.



Exhaust Manifold

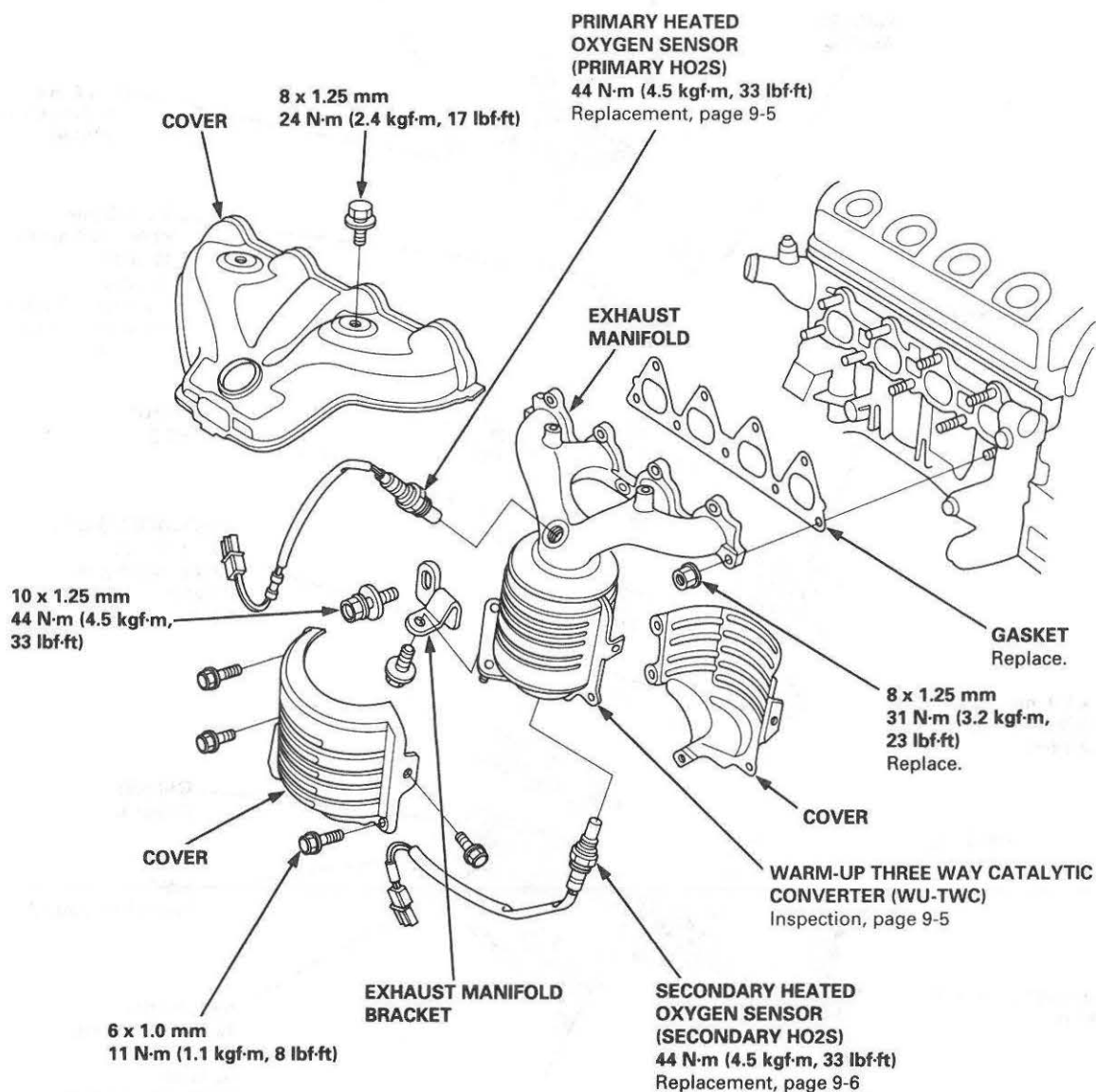


Replacement

NOTE: Use new gaskets and self-locking nuts when reassembling.

CAUTION:

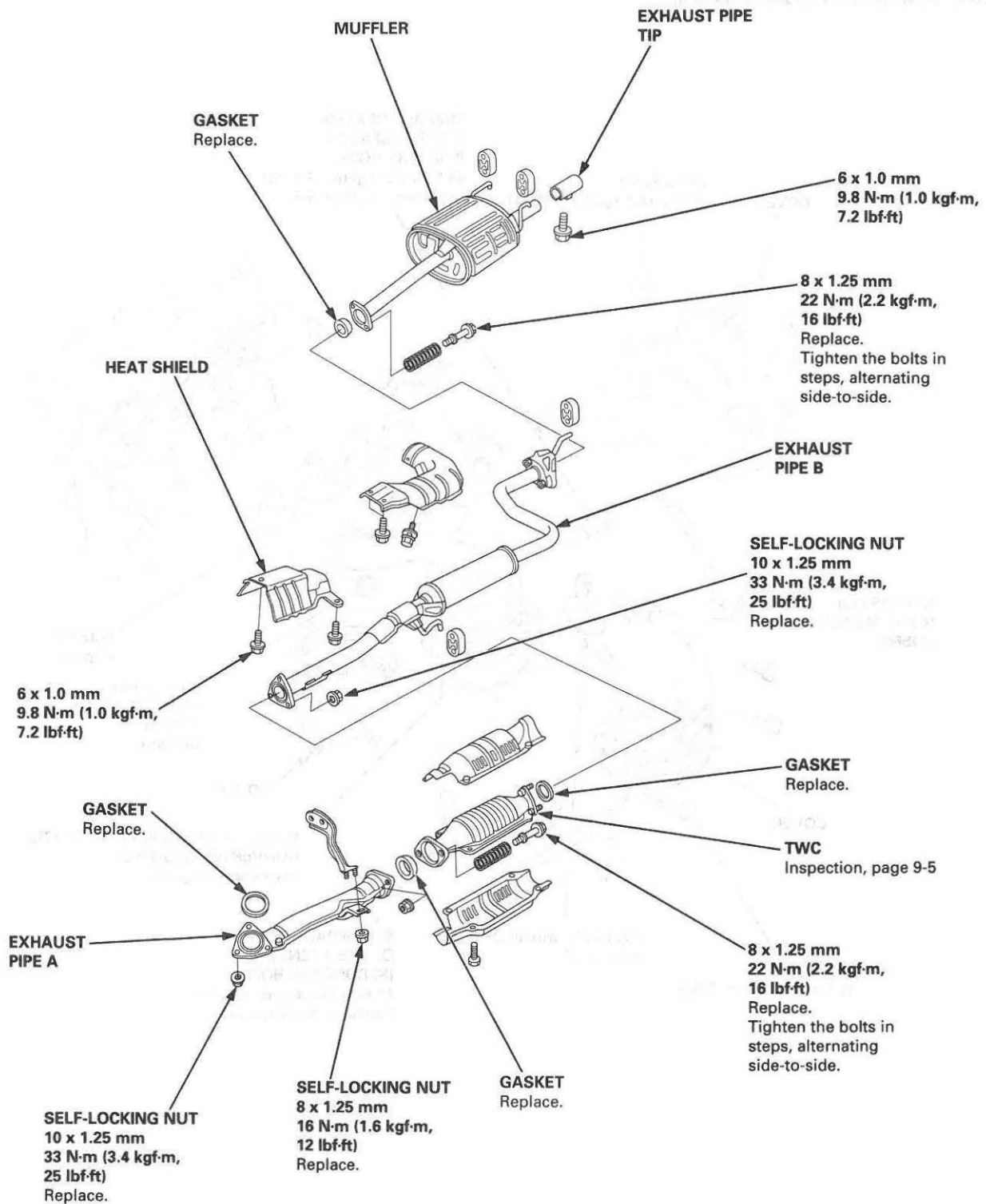
- Check for folds or scratches on the surface of the gasket.
- Replace with a new gasket if damaged.



Exhaust Pipe and Muffler

Replacement

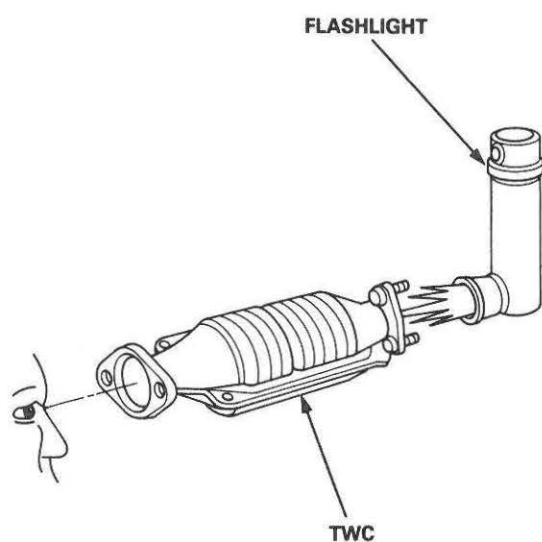
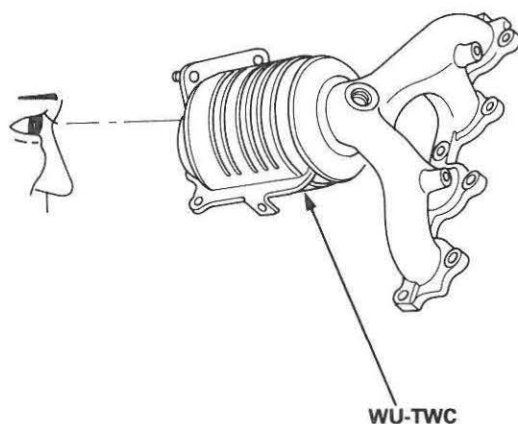
NOTE: Use new gaskets and self-locking nuts when reassembling.





Inspection

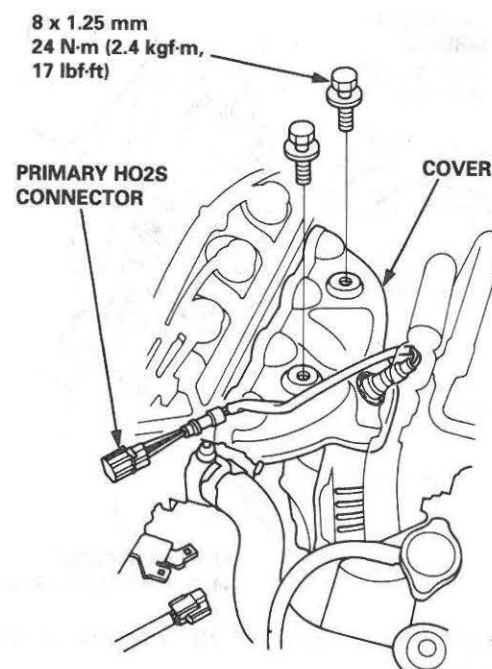
1. Using a flashlight, make a visual check for plugging, melting and cracking of the catalyst.



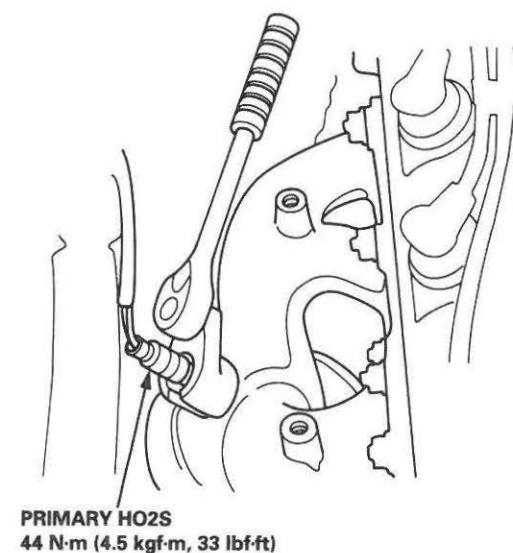
Replacement

Primary HO2S:

1. Disconnect the primary HO2S connector, then remove the cover.



2. Remove the primary HO2S.



3. Install the primary HO2S in reverse order of removal.

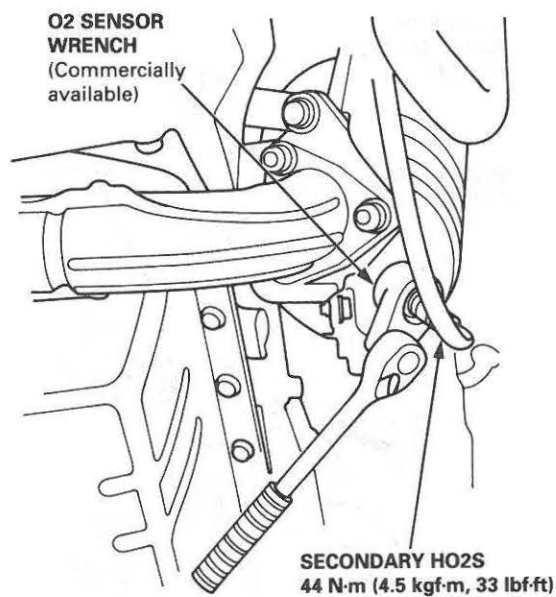
(cont'd)

HO2S

Replacement (cont'd)

Secondary HO2S:

1. Disconnect the secondary HO2S connector, then remove the secondary HO2S.



2. Install the secondary HO2S in reverse order of removal.

Cooling

Illustrated Index 10-2

Radiator

Replacement 10-4

**Engine Coolant Refilling and
Bleeding 10-5**

Cap Testing 10-7

Testing 10-7

Thermostat

Replacement 10-8

Testing 10-9

Radiator Fan Switch

Testing 10-9

Water Pump

Illustrated Index 10-10

Inspection 10-11

Replacement 10-11



Illustrated Index

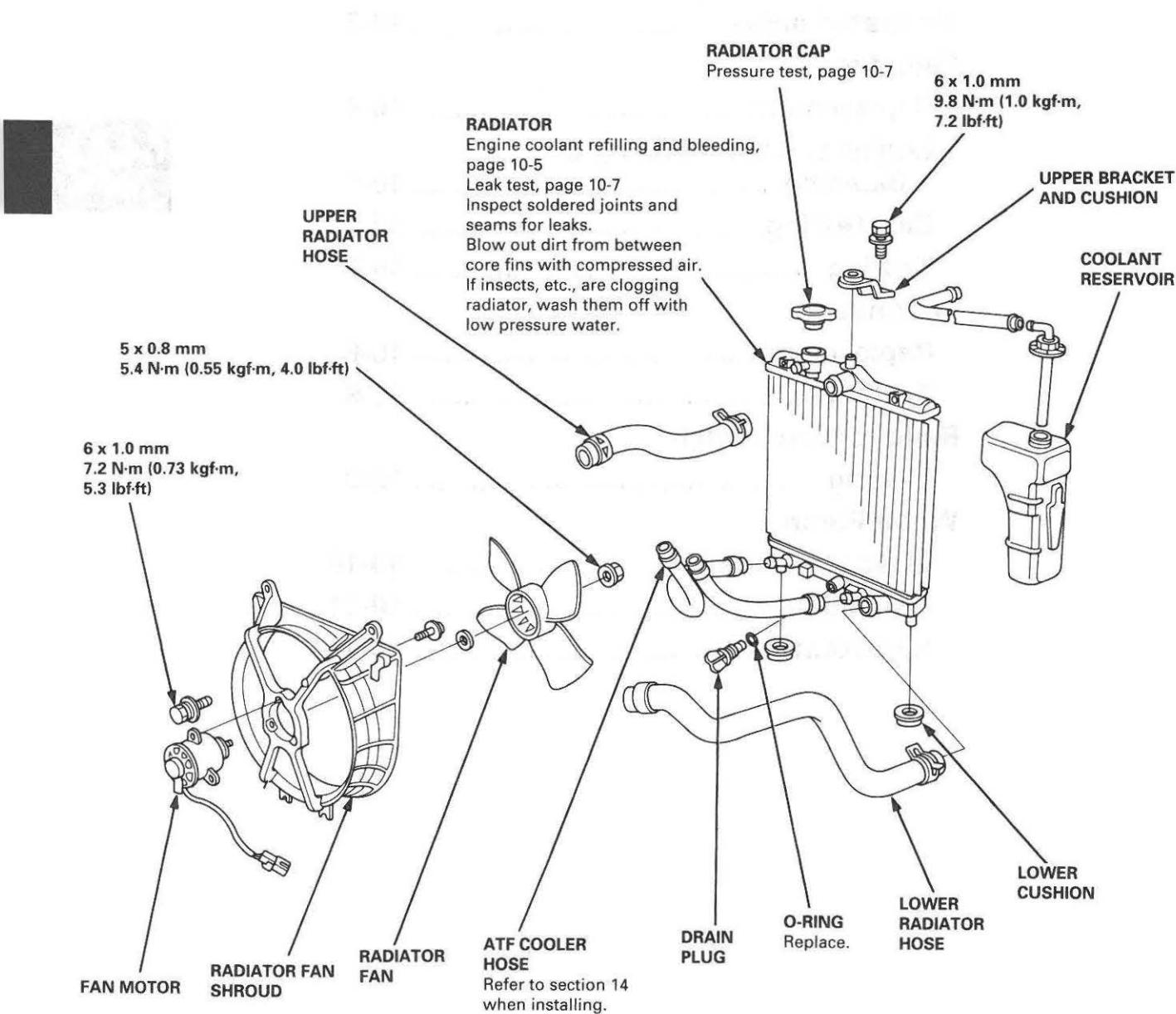
⚠ WARNING System is under high pressure when the engine is hot. To avoid danger of releasing scalding engine coolant, remove the cap only when the engine is cool.

Total Cooling System Capacity [Including heater and reservoir (0.4 ℓ (0.42 US qt, 0.35 Imp qt))]:
4.3 ℓ (4.5 US qt, 3.8 Imp qt)

CAUTION: If any engine coolant spills on painted portions of the body, rinse it off immediately.

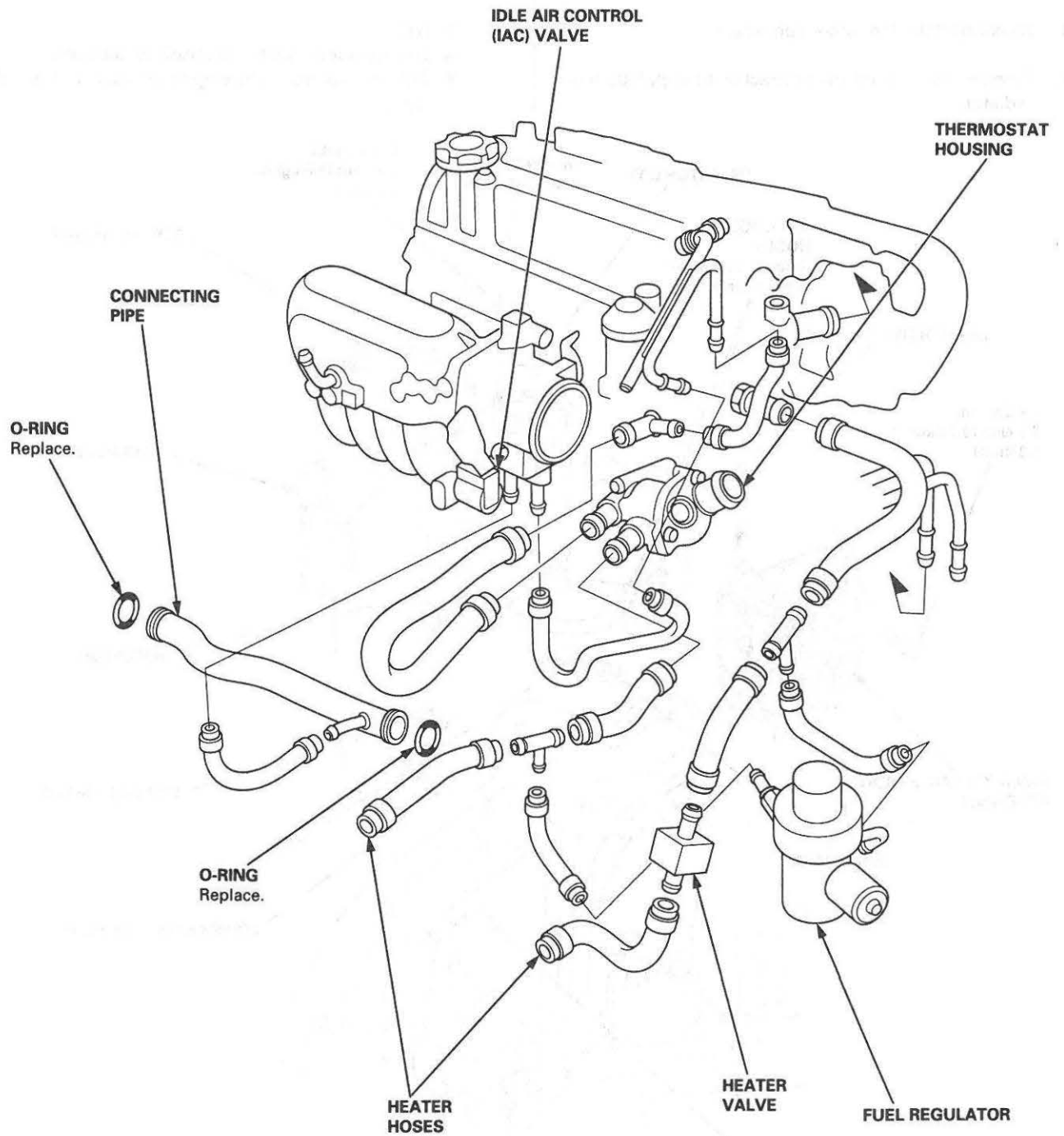
NOTE:

- Check all cooling system hoses for damage, leaks or deterioration and replace if necessary.
- Check all hose clamps and retighten if necessary.
- Use new O-rings when reassembling.





Engine Hose Connections:



Radiator

Replacement

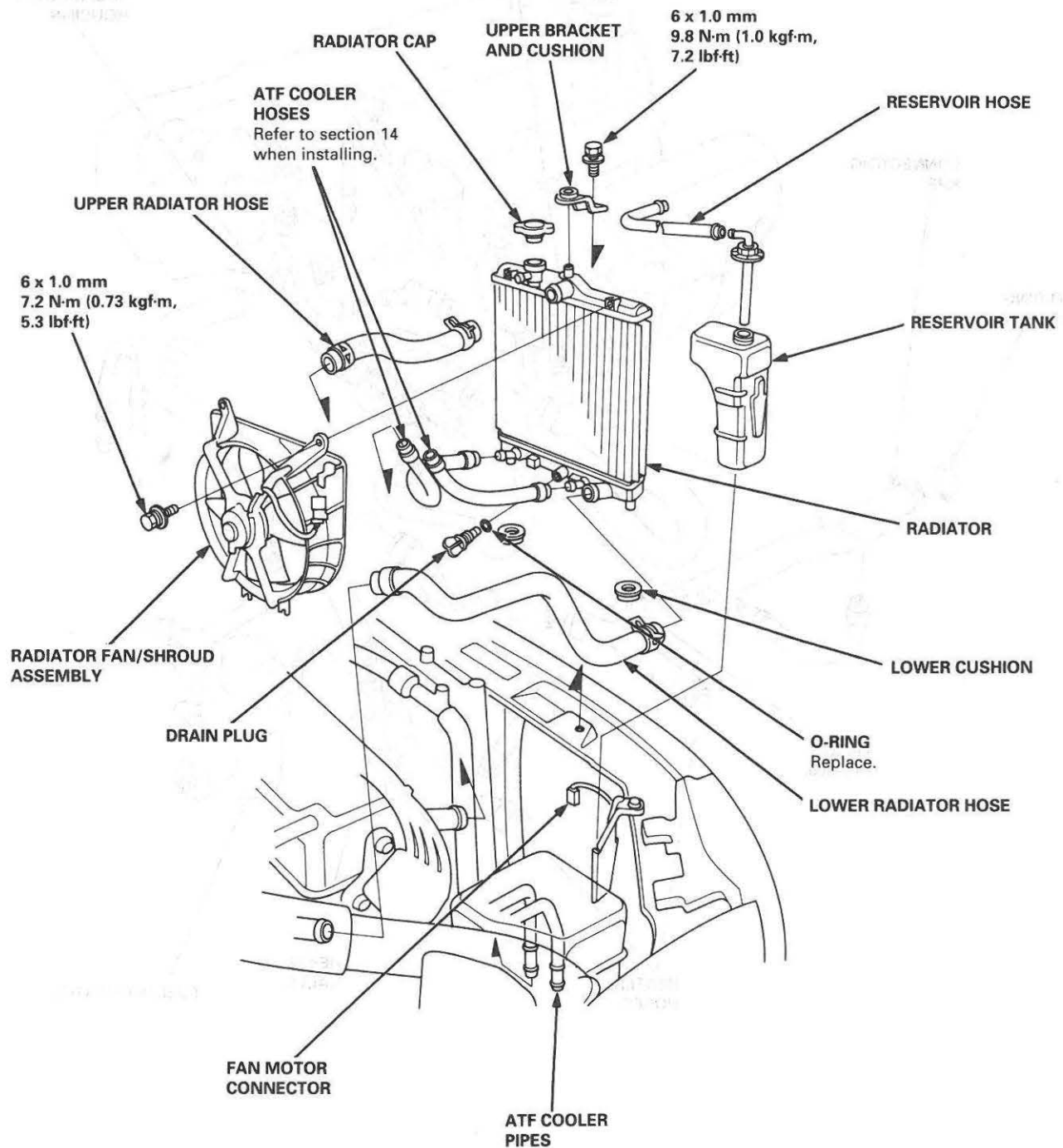
1. Drain the engine coolant.
2. Remove the upper and lower radiator hoses, and ATF cooler hoses.
3. Disconnect the fan motor connector.
4. Remove the radiator upper bracket, then pull up the radiator.

5. Remove the fan shroud assemblies and other parts from the radiator.

Install the radiator in the reverse order of removal:

NOTE:

- Set the upper and lower cushions securely.
- Fill the radiator with engine coolant and bleed the air.

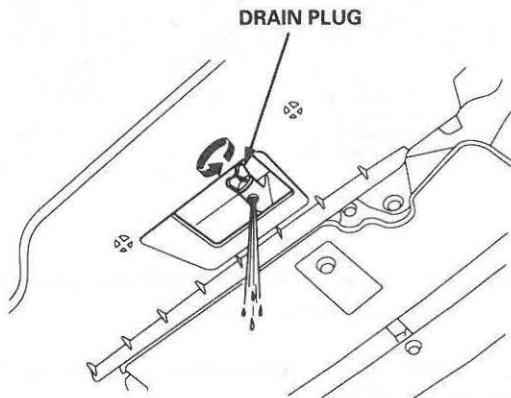




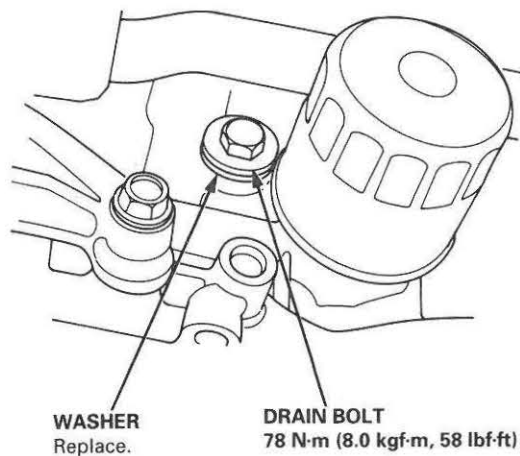
Engine Coolant Refilling and Bleeding

CAUTION: When pouring engine coolant, be sure to shut the relay box lid and not to let coolant spill on the electrical parts or the paint. If any coolant spills, rinse it off immediately.

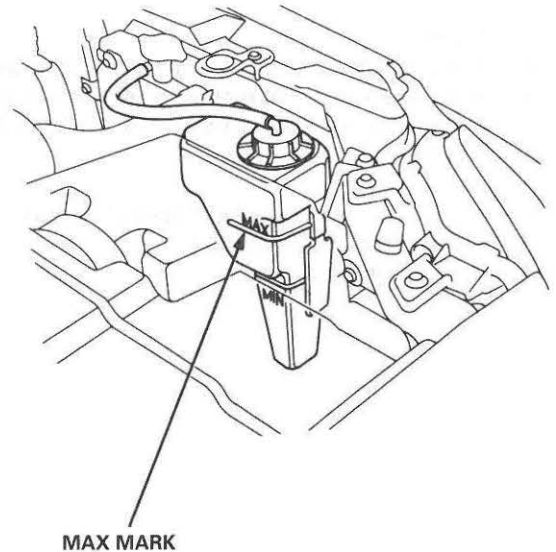
1. Slide the heater temperature control lever to maximum heat. Make sure the engine and radiator are cool to the touch.
2. Remove the radiator cap.
3. Loosen the drain plug, and drain the coolant.



4. Remove the drain bolt from the cylinder block.



5. Apply liquid gasket to the drain bolt threads, then reinstall the bolt with a new washer and tighten it securely.
6. Tighten the radiator drain plug securely.
7. Remove, drain and reinstall the reservoir. Fill the tank halfway to the MAX mark with water, then up to the MAX mark with antifreeze.



(cont'd)

Radiator

Engine Coolant Refilling and Bleeding (cont'd)

8. Mix the recommended antifreeze with an equal amount of water in a clean container.

NOTE:

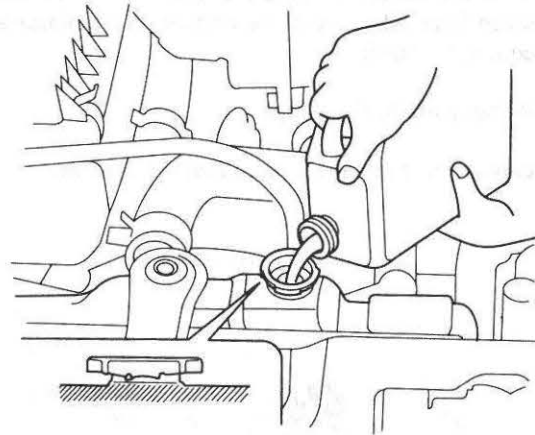
- Use only genuine Honda antifreeze/coolant.
- For best corrosion protection, the coolant concentration must be maintained year-round at 50% minimum. Coolant concentrations less than 50% may not provide sufficient protection against corrosion or freezing.
- Coolant concentrations greater than 60% will impair cooling efficiency and are not recommended.

CAUTION:

- Do not mix different brands of antifreeze/coolants.
- Do not use additional rust inhibitors or anti-rust products; they may not be compatible with the coolant.

Engine Coolant Refill Capacity [including reservoir (0.4 ℓ (0.42 US qt, 0.35 Imp qt))]:
3.9 ℓ (4.1 US qt, 3.4 Imp qt)

9. Pour coolant into the radiator up to the base of the filler neck, and install the radiator cap loosely.

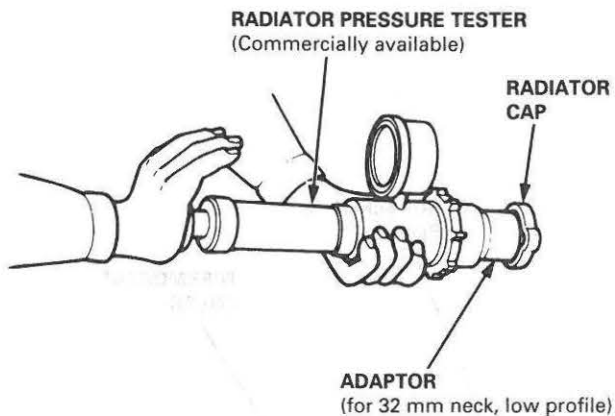


10. Start the engine and let it run until it warms up (the radiator fan comes on at least twice).
11. Turn off the engine. Check the level in the radiator, add coolant if needed.
12. Put the radiator cap on tightly, then run the engine again and check for leaks.



Cap Testing

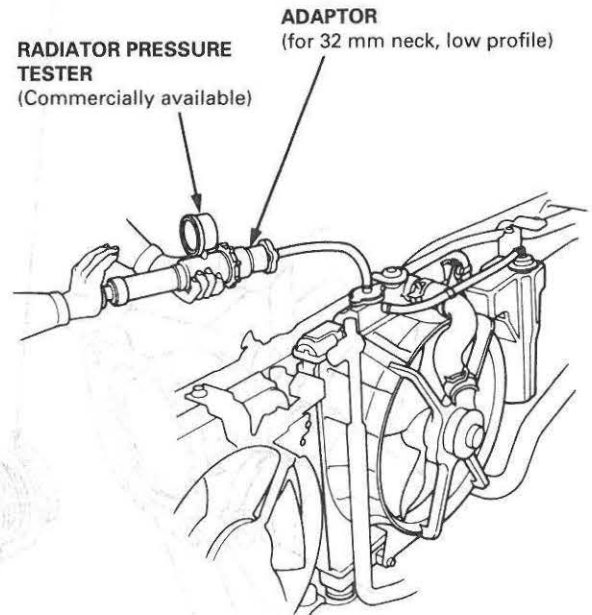
1. Remove the radiator cap, wet its seal with engine coolant, then install it on the pressure tester.



2. Apply a pressure of 93 – 123 kPa (0.95 – 1.25 kgf/cm², 14 – 18 psi).
3. Check for a drop in pressure.
4. If the pressure drops, replace the cap.

Testing

1. Wait until the engine is cool, then carefully remove the radiator cap and fill the radiator with engine coolant to the top of the filler neck.
2. Attach the pressure tester to the radiator and apply a pressure of 93 – 123 kPa (0.95 – 1.25 kgf/cm², 14 – 18 psi).



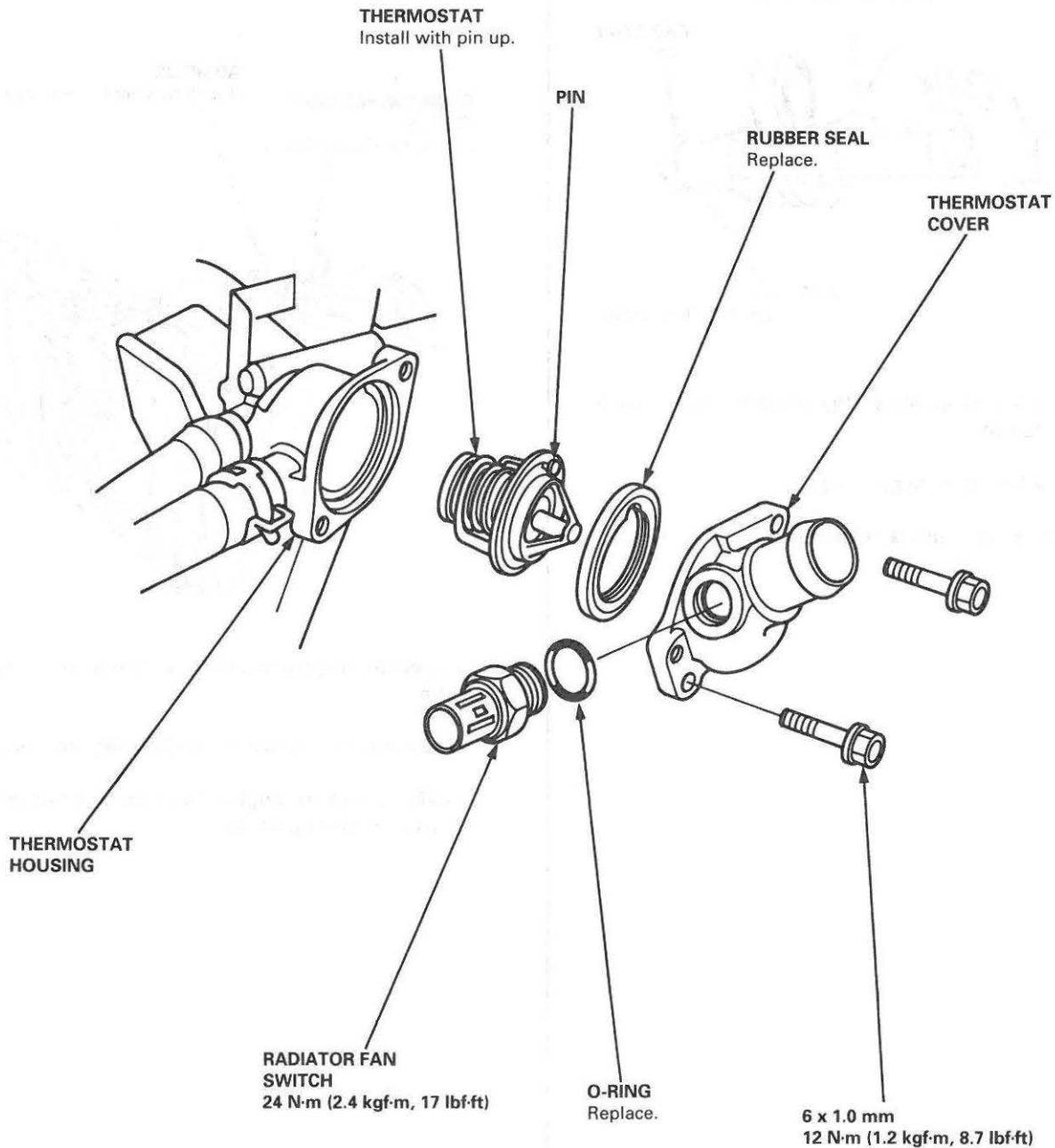
3. Inspect for engine coolant leaks and a drop in pressure.
4. Remove the tester and reinstall the radiator cap.

NOTE: Check for engine oil in the coolant and/or coolant in the engine oil.

Thermostat

Replacement

NOTE: Use a new O-ring when reassembling.



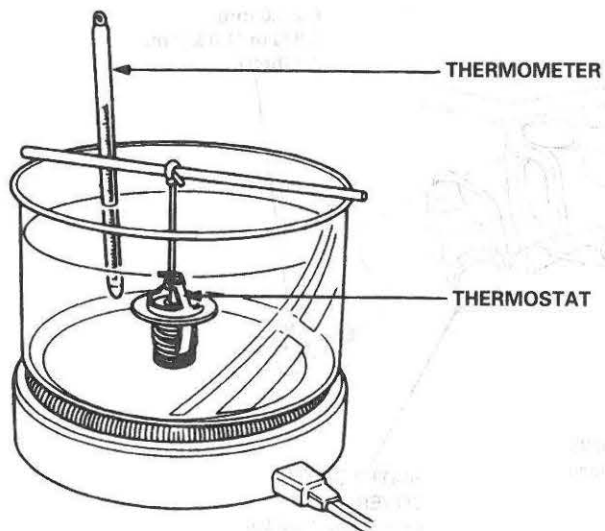


Testing

Replace the thermostat if it is open at room temperature.

To test a closed thermostat:

1. Suspend the thermostat in a container of water as shown.



2. Heat the water, and check the temperature with a thermometer. Check the temperature at which the thermostat first opens, and at which it is fully open.

CAUTION: Do not let the thermometer touch the bottom of the hot container.

3. Measure lift height of the thermostat when fully open.

STANDARD THERMOSTAT

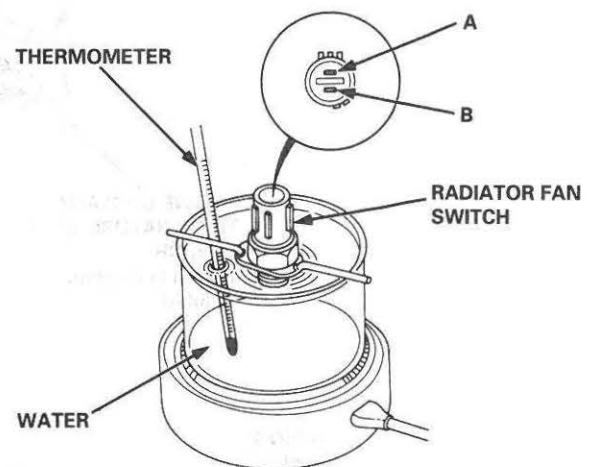
Lift height: above 8.0 mm (0.31 in)
 Starts opening: 169° – 176°F (76° – 80°C)
 Fully open: 194°F (90°C)

Testing

WARNING Removing the radiator fan switch while the engine is hot can cause the coolant to spray out, seriously scalding you. Always let the engine and radiator cool down before removing the radiator fan switch.

NOTE: Bleed air from the cooling system after installing the radiator fan switch (see page 10-5).

1. Remove the radiator fan switch from the thermostat housing (see page 10-8).
2. Suspend the radiator fan switch in a container of water as shown.



3. Heat the water, and check the temperature with a thermometer.

CAUTION: Do not let the thermometer touch the bottom of the hot container.

4. Measure the resistance between the A and B terminals according to the table.

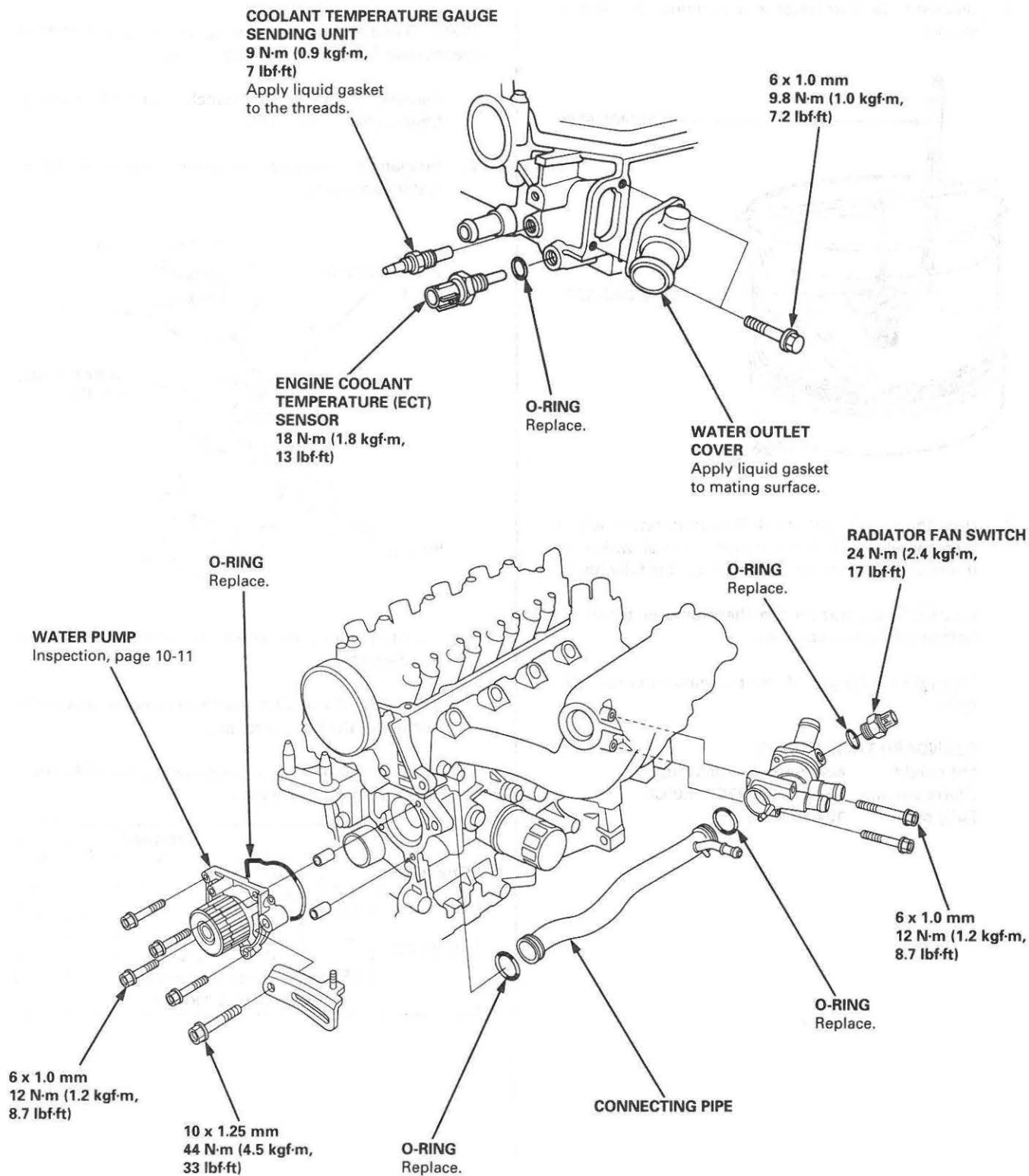
		Terminal	
Operation	Temperature	A	B
SWITCH	ON 196° – 203°F (91° – 95°C)	○	○
	OFF 5° – 15°F (3° – 8°C) lower than the temperature when it goes on		

Water Pump

Illustrated Index

NOTE:

- Use new O-rings when reassembling.
- Use liquid gasket, Part No. 08718 - 0001 or 08718 - 0003.

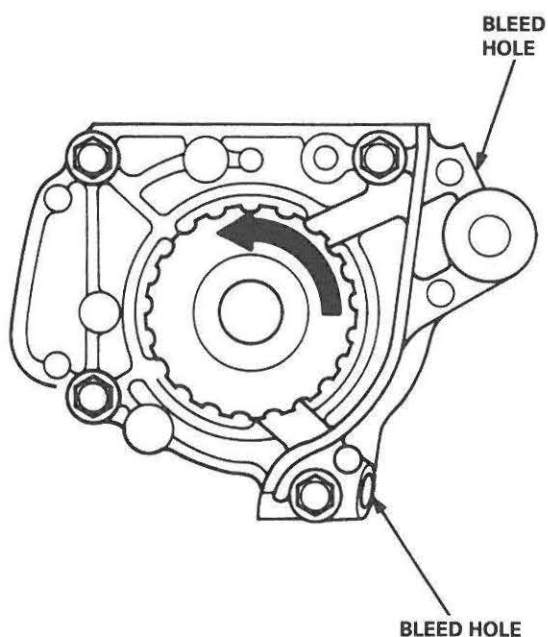




Inspection

1. Remove the timing belt (see page 6-17).
2. Turn the water pump pulley counterclockwise. Check that it turns freely.
3. Check for signs of seal leakage.

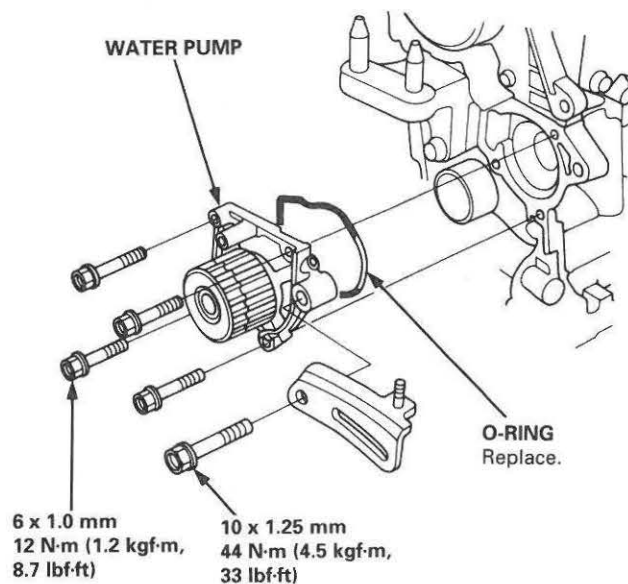
NOTE: A small amount of "weeping" from the bleed hole is normal.



Replacement

1. Remove the timing belt (see page 6-17).
2. Remove the water pump by removing five bolts.

NOTE: Inspect, repair and clean the O-ring groove and mating surface with the cylinder block.



3. Install the water pump in the reverse order of removal.

NOTE:

- Keep the O-ring in position when installing.
- Clean the spilled engine coolant.

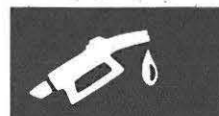
Fuel and Emissions

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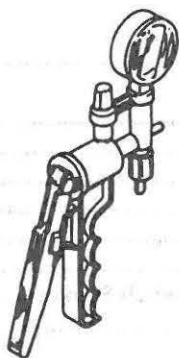
Outline of Civic CNG Model Change

- D16B5 engine has been added.

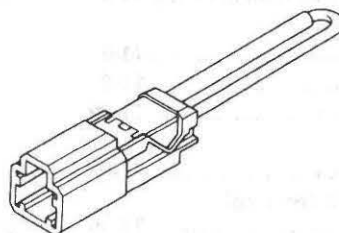
Special Tools

Special Tools

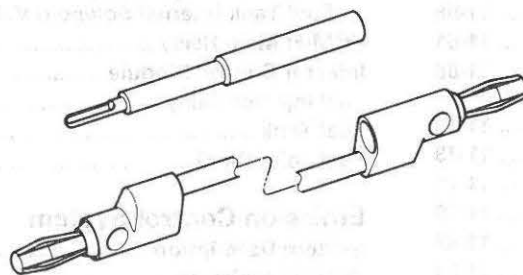
Ref. No.	Tool Number	Description	Qty	Page Reference
①	A973X - 041 - XXXXX	Vacuum Pump/Gauge, 0 - 30 in.Hg	1	11-124
②	07PAZ - 0010100	SCS Service Connector	1	11-28
③	07SAZ - 001000A	Backprobe Set	2	11-30



①



②

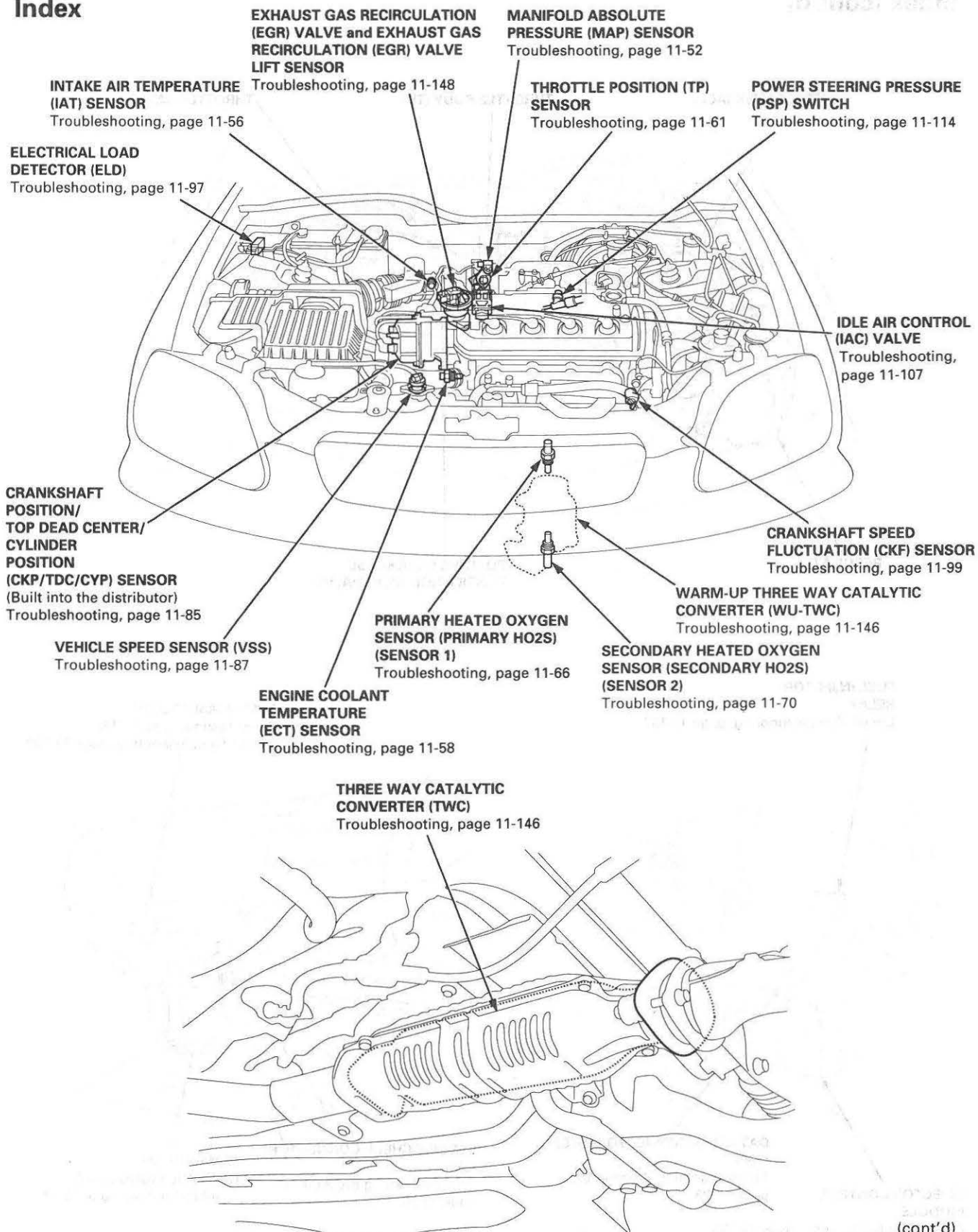


③

Component Locations



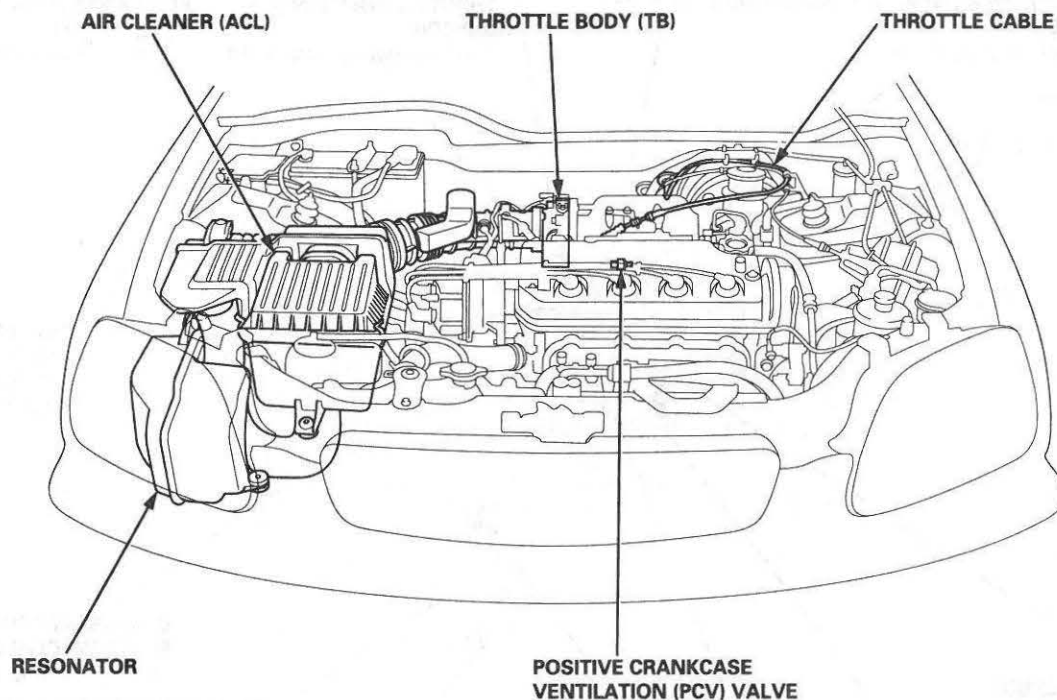
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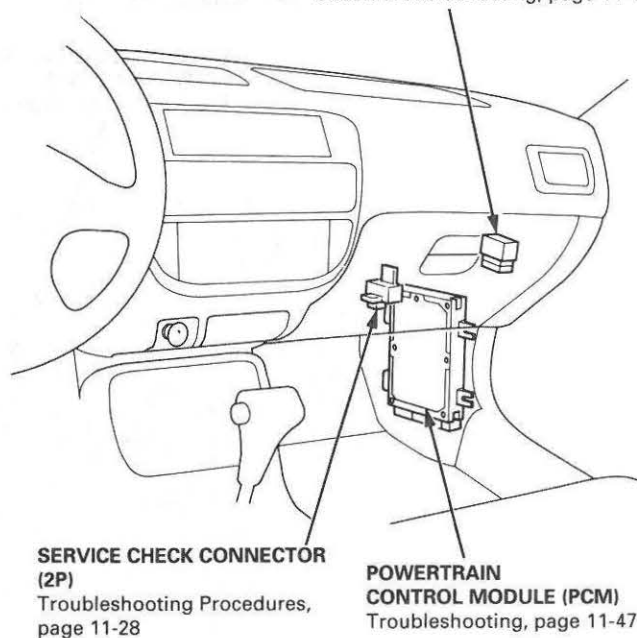
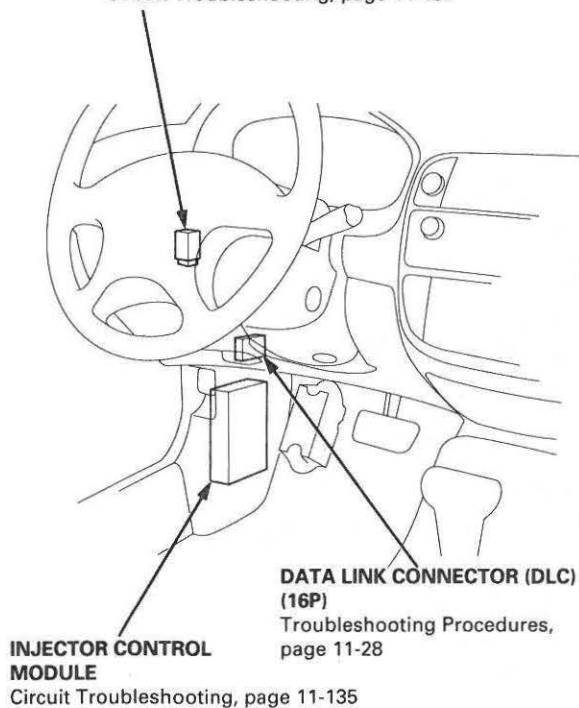
Component Locations

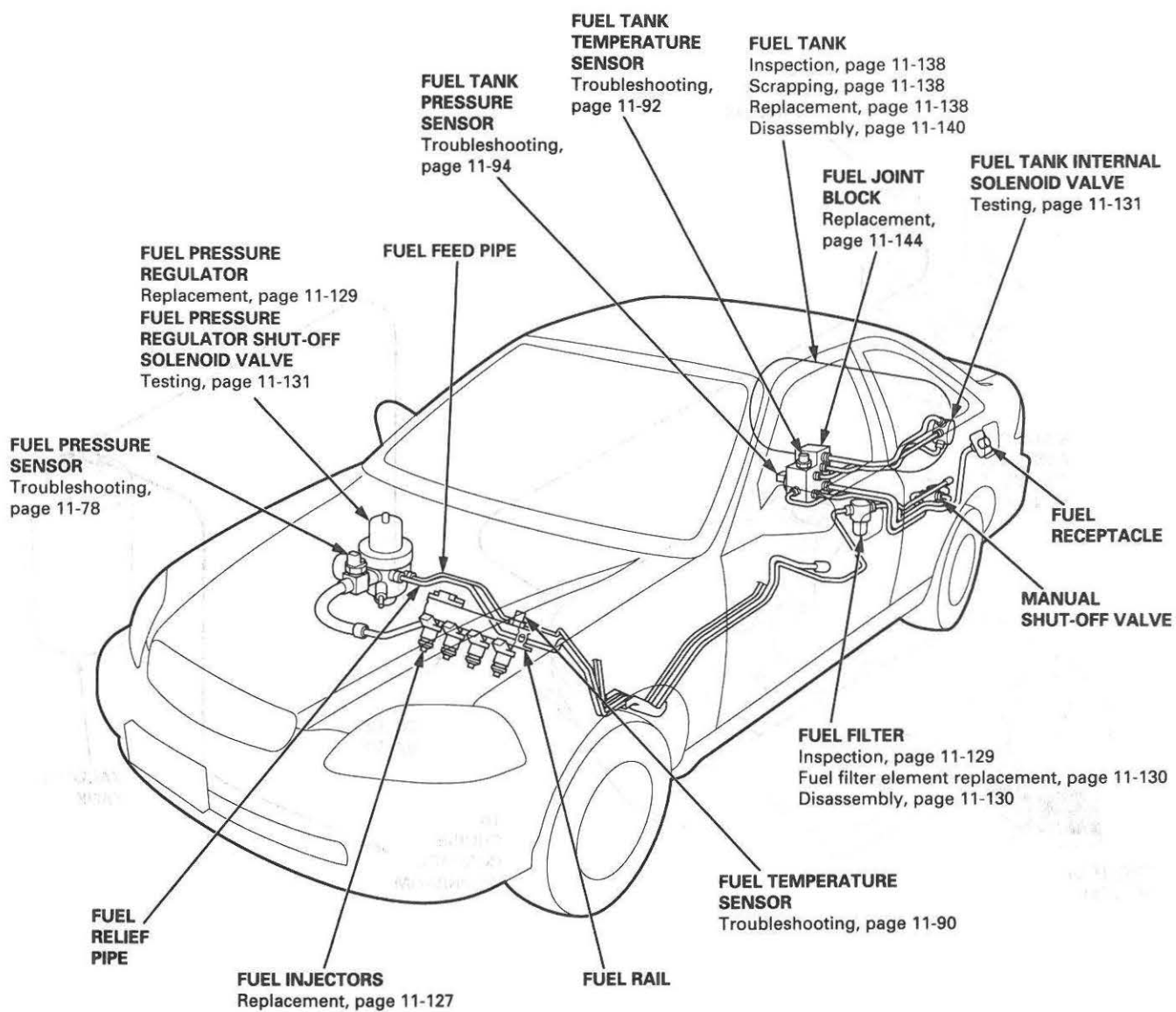
Index (cont'd)



FUEL INJECTOR RELAY
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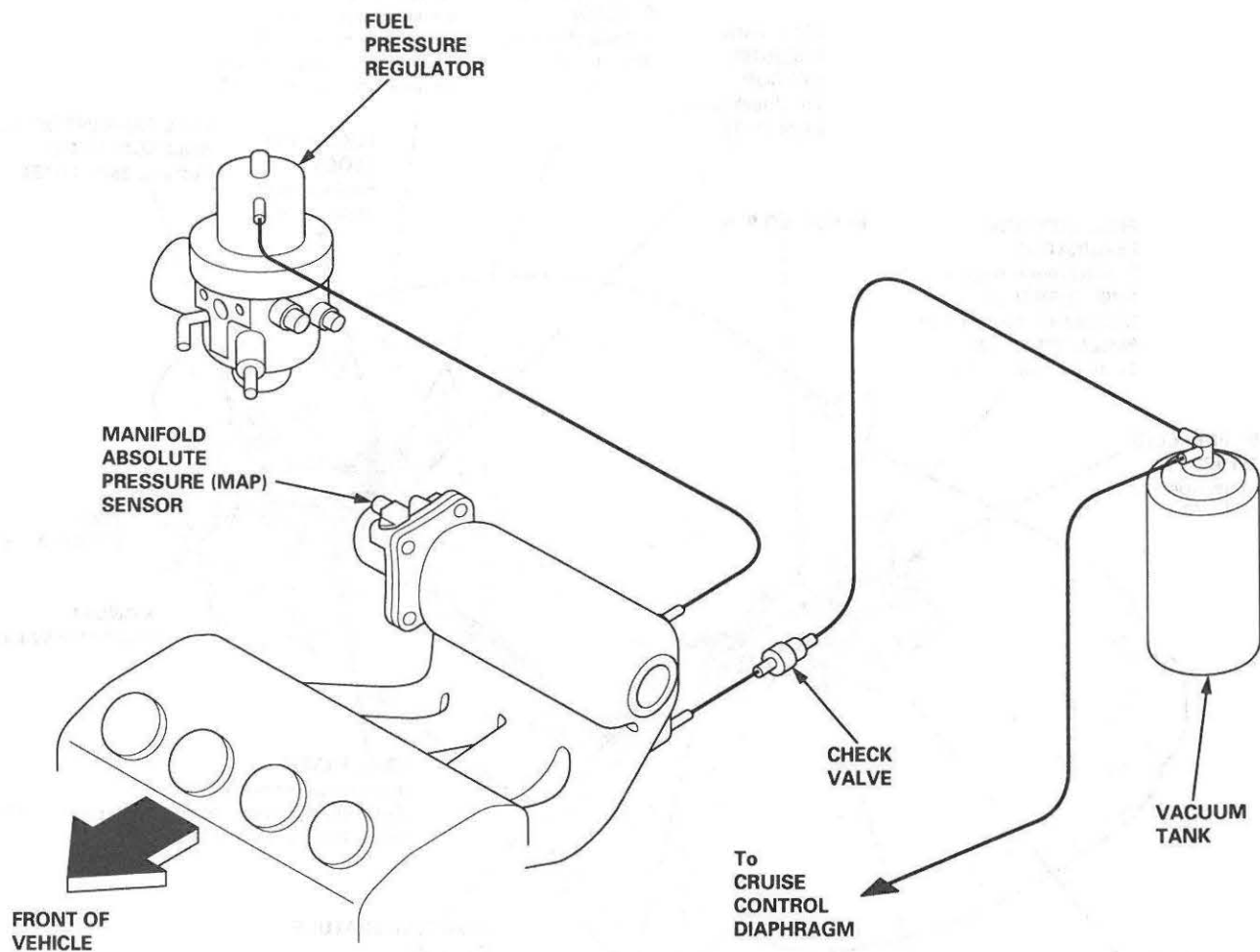
PGM-FI MAIN RELAY
Relay Testing, page 11-132
Circuit Troubleshooting, page 11-133

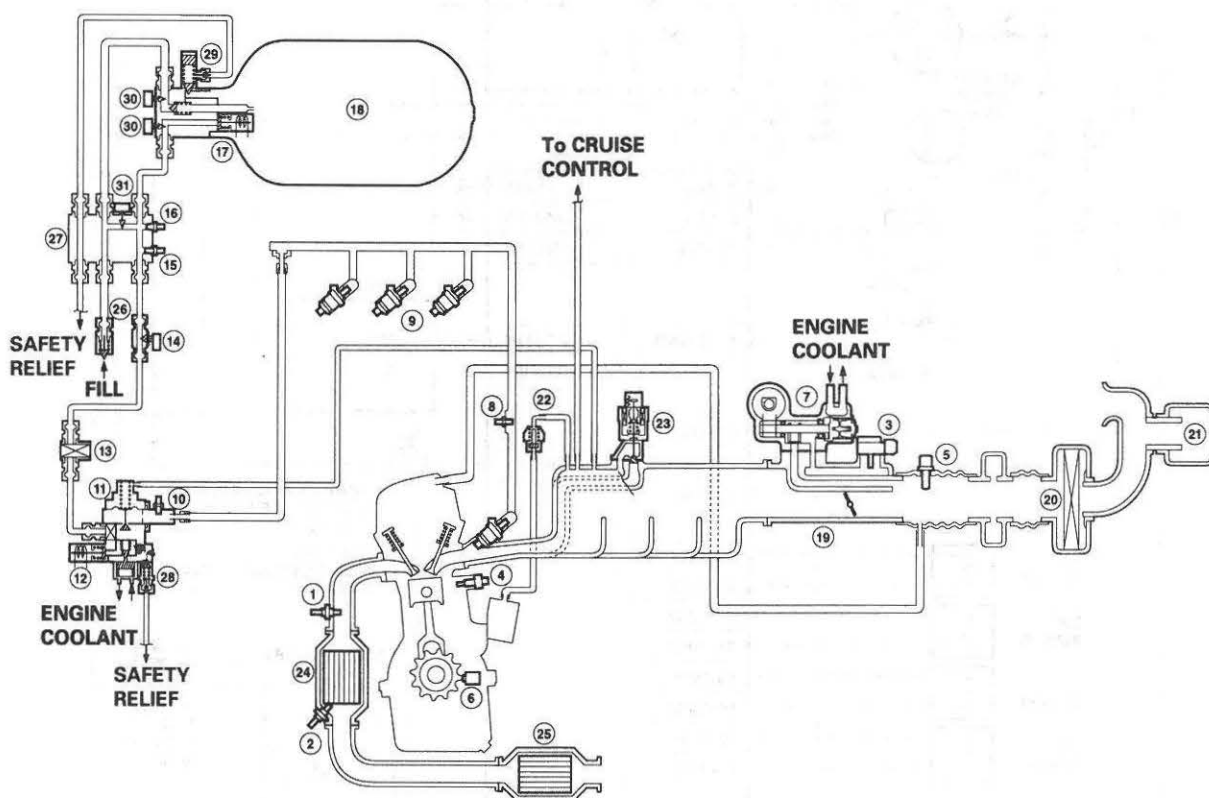




System Description

Vacuum Connections

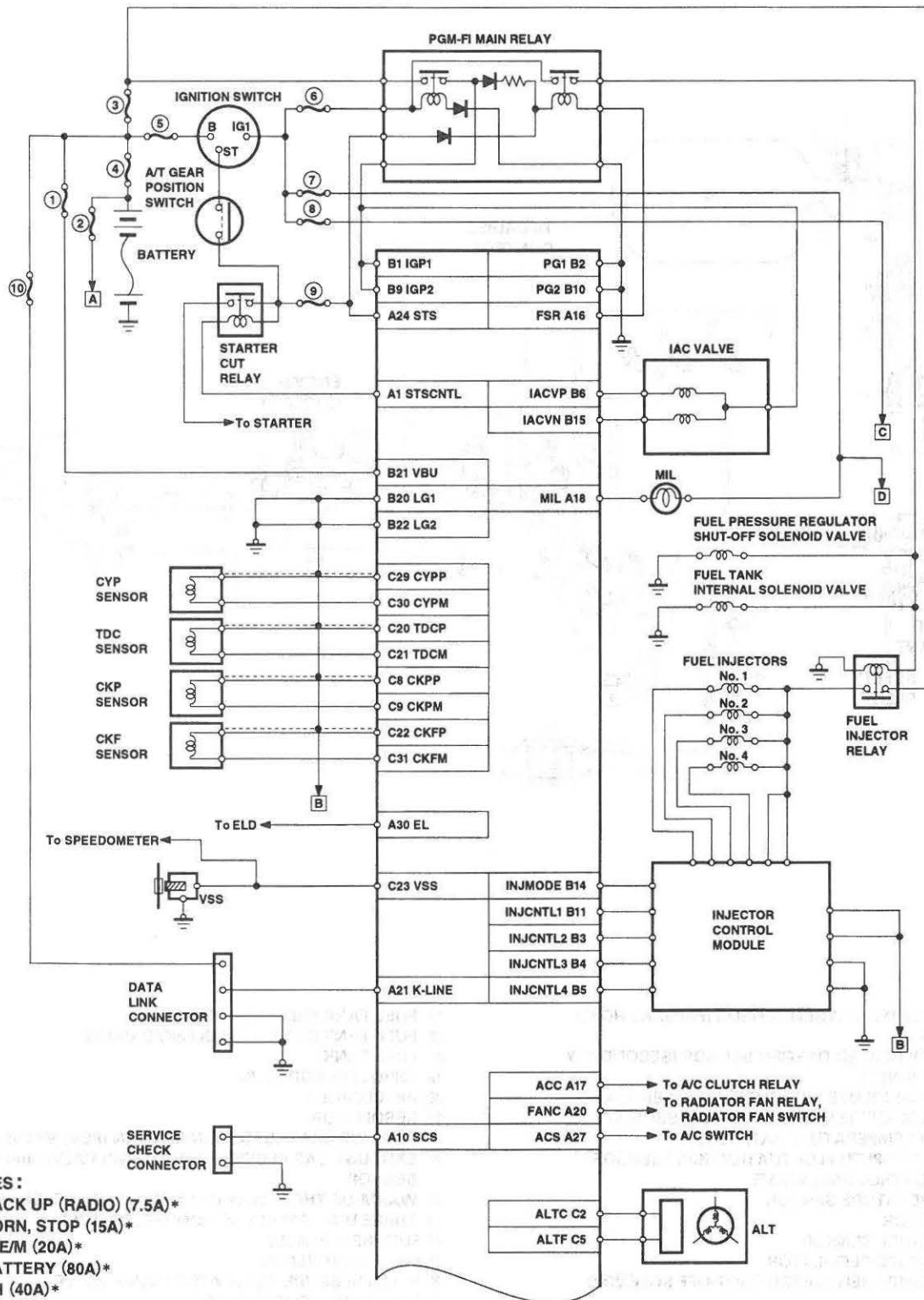


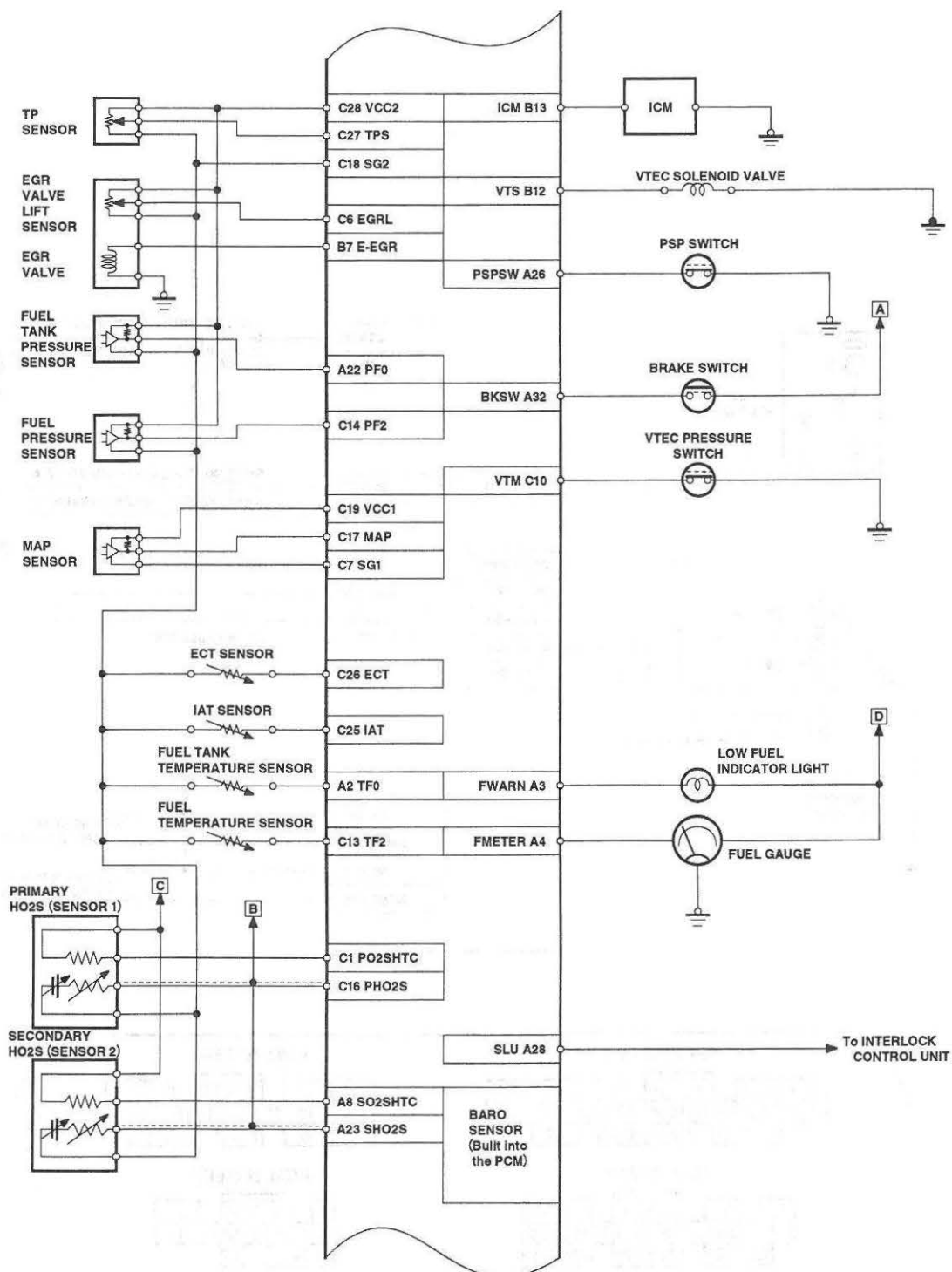


- | | |
|--|---|
| ① PRIMARY HEATED OXYGEN SENSOR (PRIMARY HO2S) (SENSOR 1) | ⑩ FUEL PRESSURE SENSOR |
| ② SECONDARY HEATED OXYGEN SENSOR (SECONDARY HO2S) (SENSOR 2) | ⑪ FUEL PRESSURE REGULATOR |
| ③ MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR | ⑫ FUEL PRESSURE REGULATOR SHUT-OFF SOLENOID VALVE |
| ④ ENGINE COOLANT TEMPERATURE (ECT) SENSOR | ⑬ FUEL FILTER |
| ⑤ INTAKE AIR TEMPERATURE (IAT) SENSOR | ⑭ MANUAL SHUT-OFF VALVE |
| ⑥ CRANKSHAFT SPEED FLUCTUATION (CKF) SENSOR | ⑮ FUEL TANK TEMPERATURE SENSOR |
| ⑦ IDLE AIR CONTROL (IAC) VALVE | ⑯ FUEL TANK PRESSURE SENSOR |
| ⑧ FUEL TEMPERATURE SENSOR | ⑰ FUEL TANK INTERNAL SOLENOID VALVE |
| ⑨ FUEL INJECTOR | ⑱ FUEL TANK |
| | ⑲ THROTTLE BODY (TB) |
| | ⑳ AIR CLEANER |
| | ㉑ RESONATOR |
| | ㉒ POSITIVE CRANKCASE VENTILATION (PCV) VALVE |
| | ㉓ EXHAUST GAS RECIRCULATION (EGR) VALVE and LIFT SENSOR |
| | ㉔ WARM-UP THREE WAY CATALYTIC CONVERTER (WU-TWC) |
| | ㉕ THREE WAY CATALYTIC CONVERTER (TWC) |
| | ㉖ FUEL RECEPTACLE |
| | ㉗ FUEL JOINT BLOCK |
| | ㉘ FUEL PRESSURE REGULATOR RELIEF VALVE |
| | ㉙ FUEL TANK RELIEF VALVE |
| | ㉚ MANUAL LOCK-DOWN VALVE |
| | ㉛ FUEL STEM ASSEMBLY |

System Description

Electrical Connections

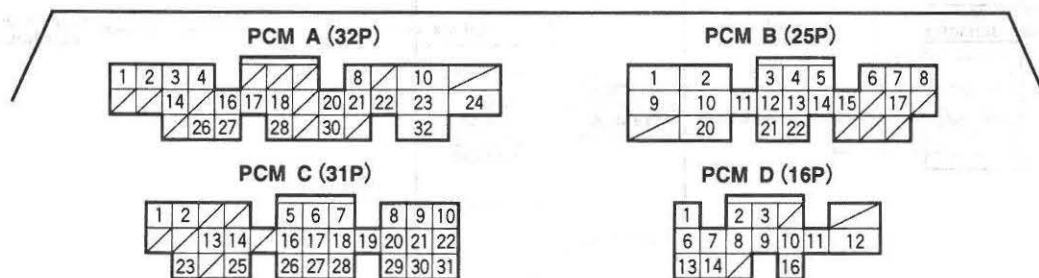
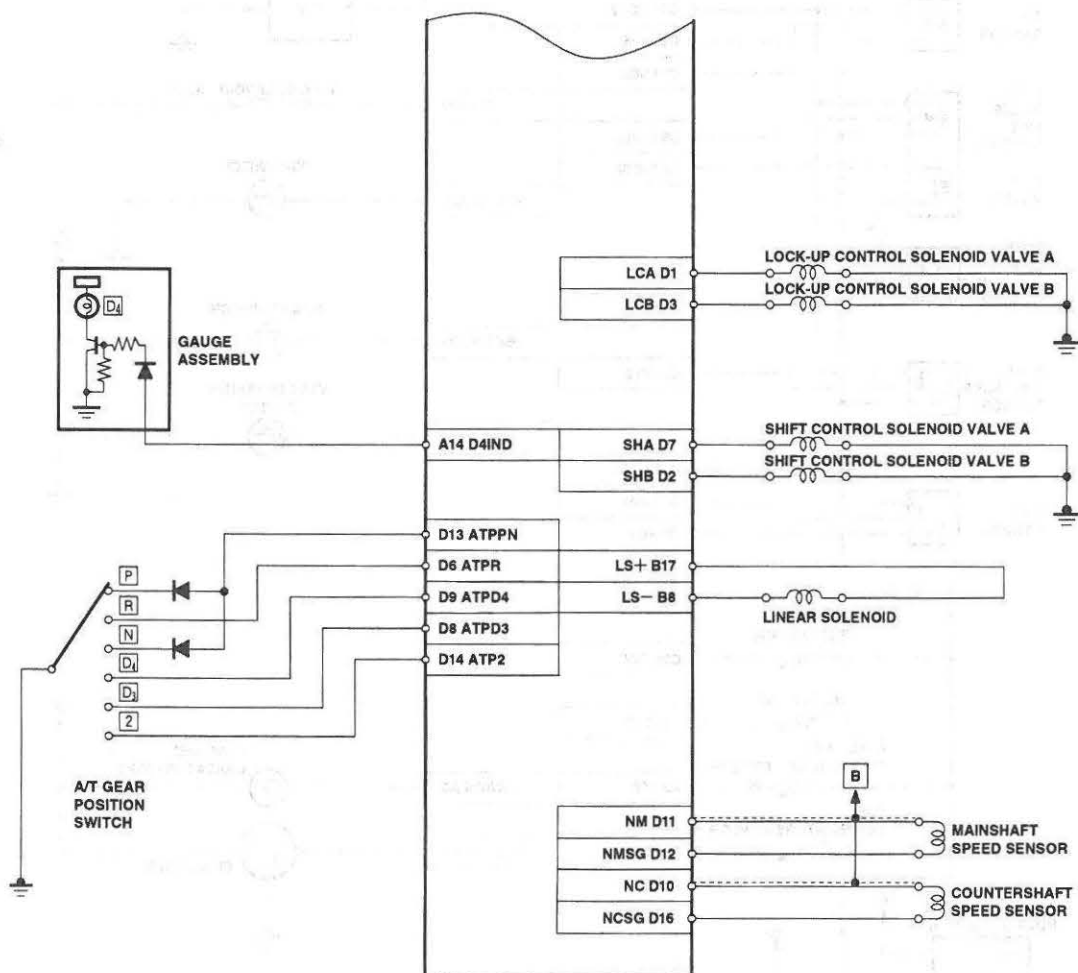




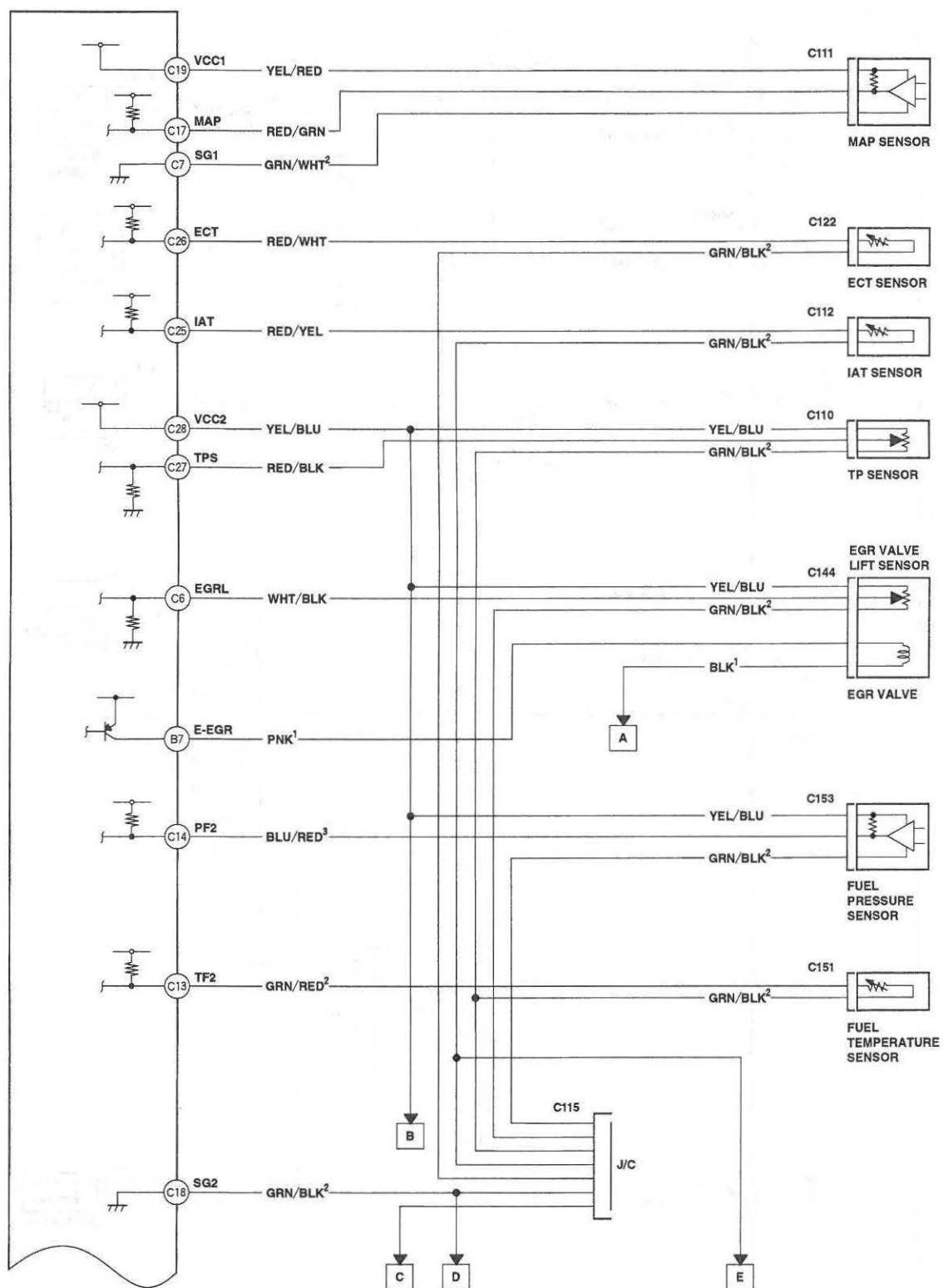
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System Description

Electrical Connections (cont'd)



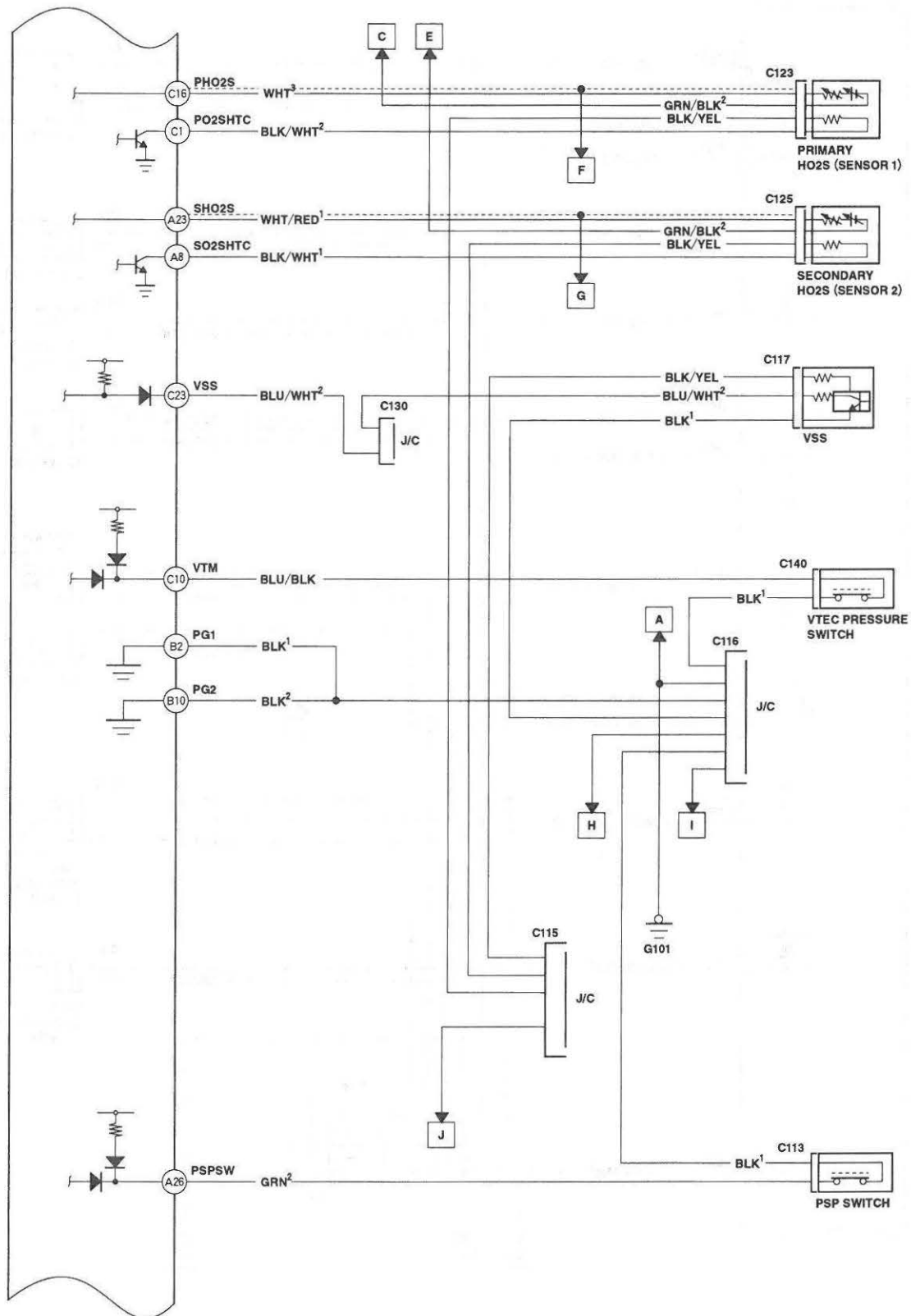
TERMINAL LOCATIONS



(cont'd)

System Description

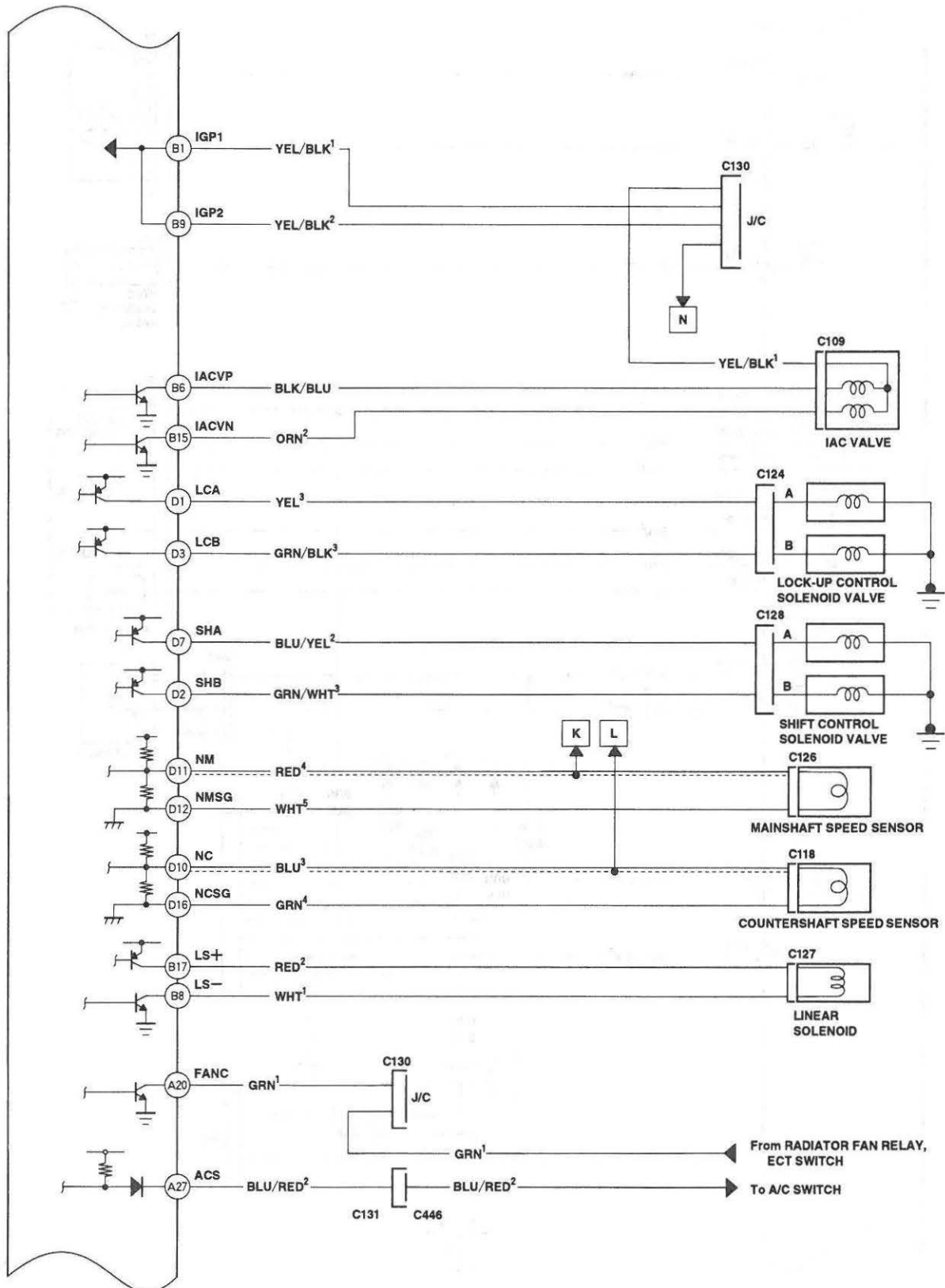
Electrical Connections (cont'd)

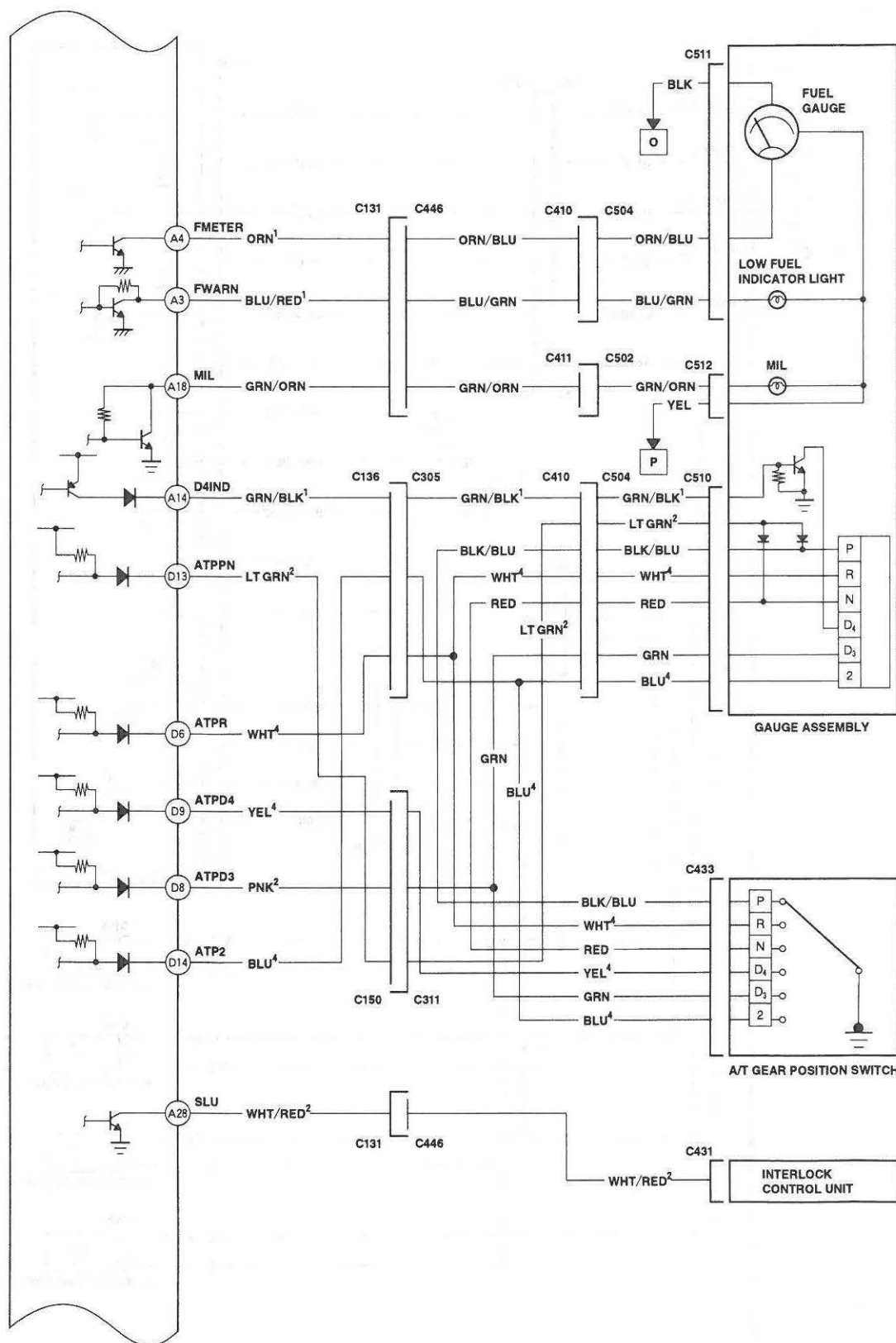


11-13

System Description

Electrical Connections (cont'd)

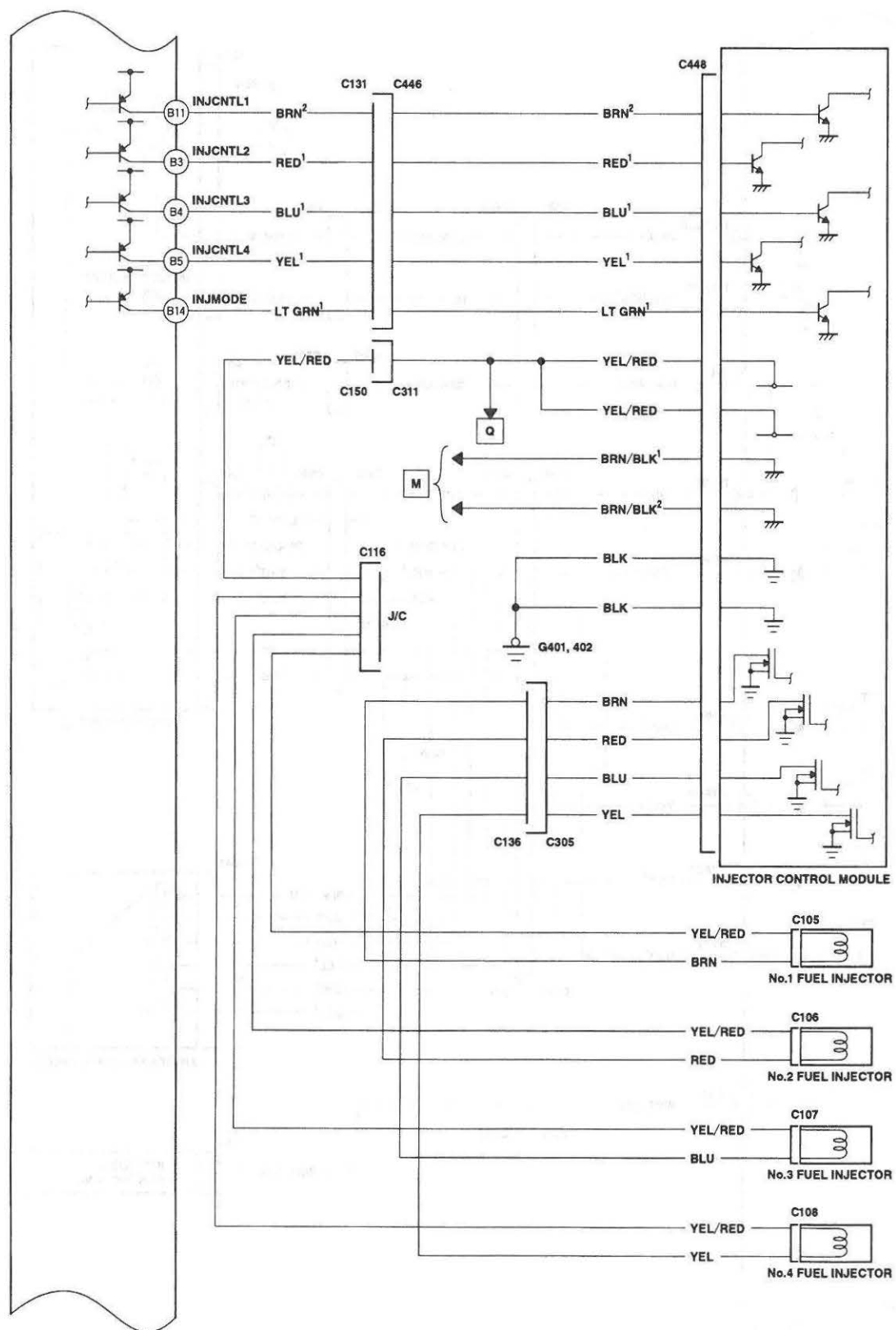


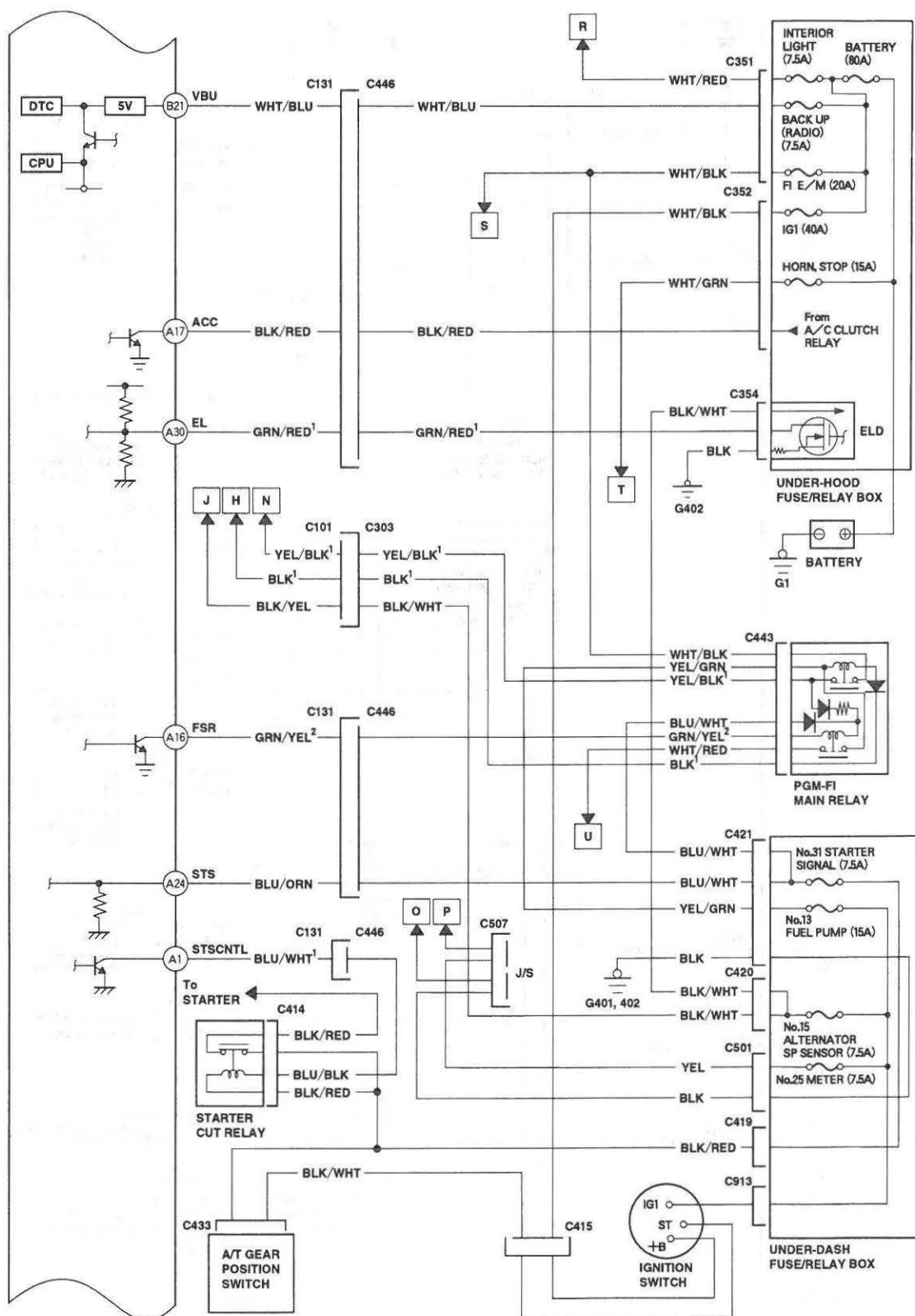


(cont'd)

System Description

Electrical Connections (cont'd)

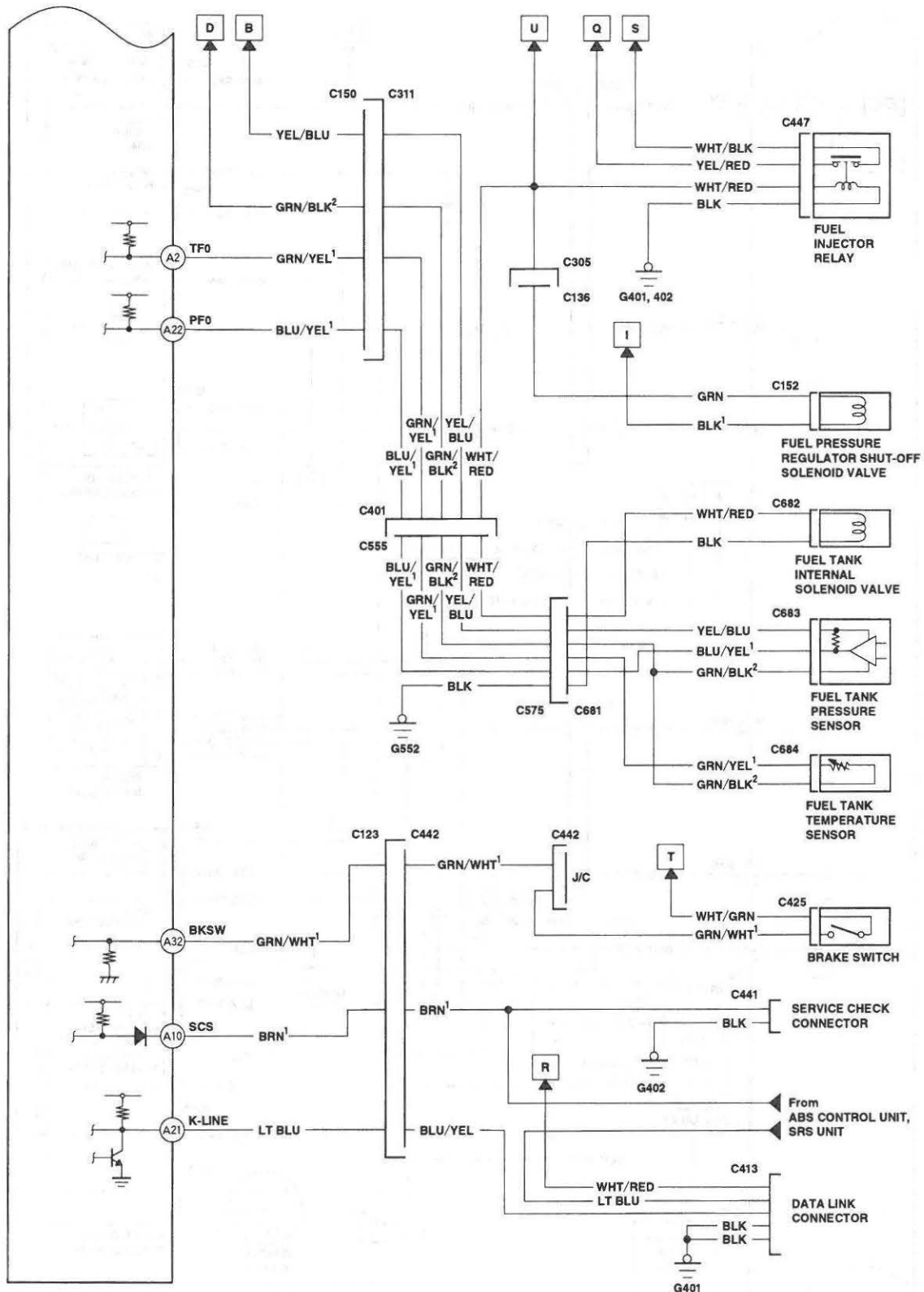




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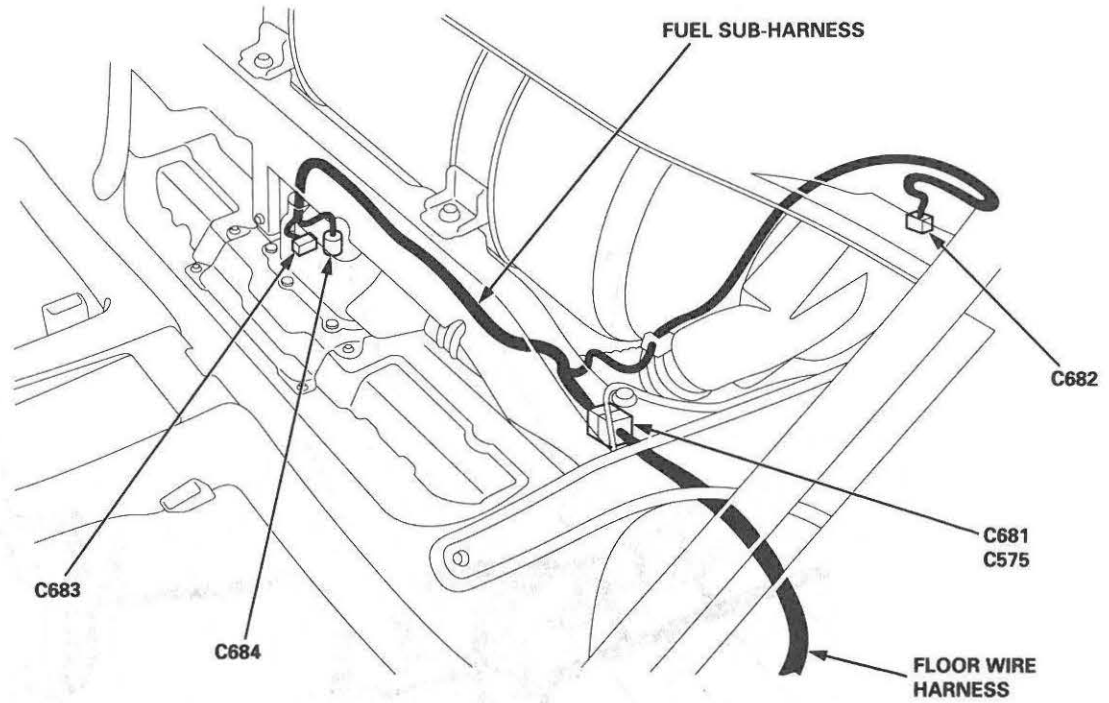
System Description

Electrical Connections (cont'd)

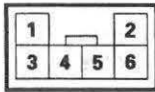




System Connectors [Trunk]



C681



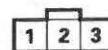
① BLK	④ GRN/BLK ²
② WHT/RED	⑤ BLU/YEL ¹
③ GRN/YEL ¹	⑥ YEL/BLU

C682



① BLK
② WHT/RED

C683



① YEL/BLU
② BLU/YEL ¹
③ GRN/BLK ²

C684

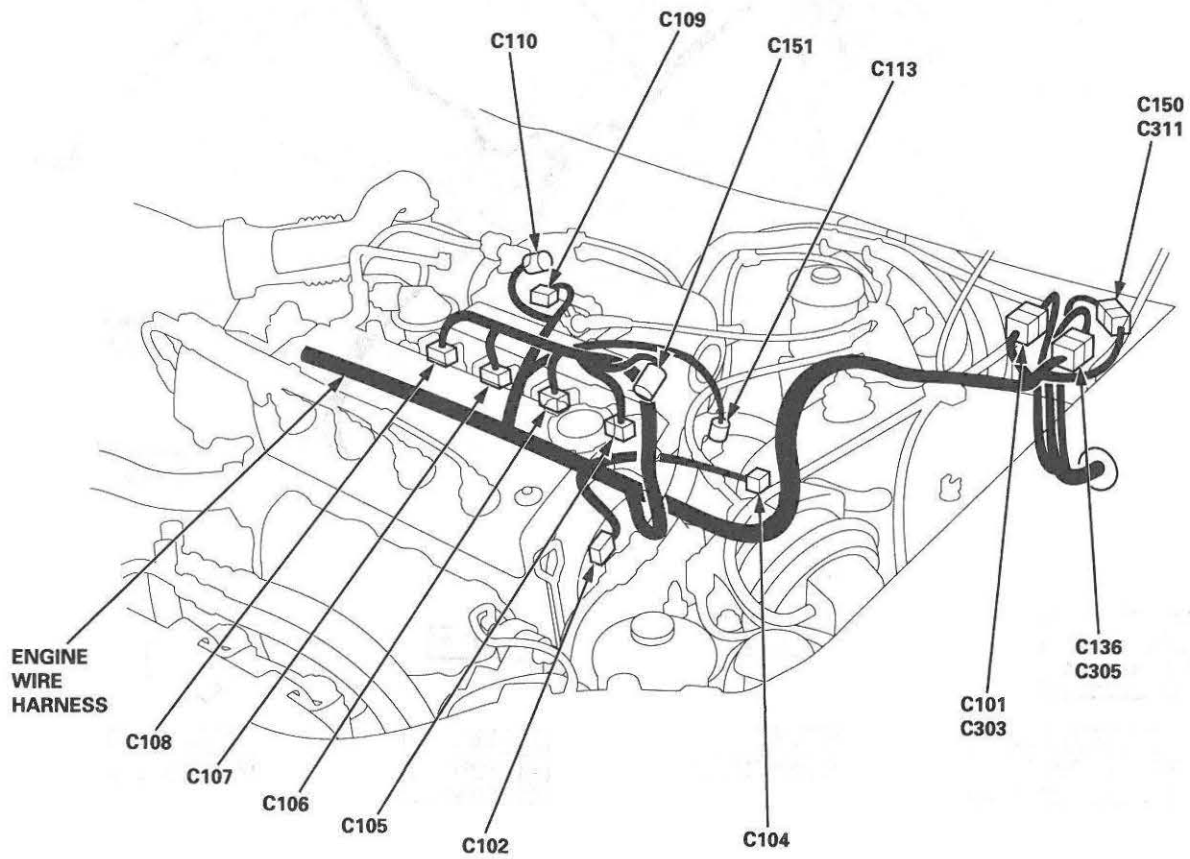


① GRN/BLK ²
② GRN/YEL ¹

- NOTE: ● Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK¹ and YEL/BLK² are not the same).
- : Related to Fuel and Emissions System.
- Connector with male terminals (double outline): View from terminal side
 - Connector with female terminals (single outline): View from wire side

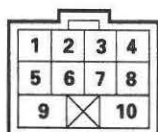
System Description

System Connectors [Engine Compartment]





C101



① BLK/YEL	6 WHT/BLU
② BLK ¹	7 YEL/GRN
3 YEL/RED	8 BLU
④ BRN/BLK ¹	9 BLK/WHT
⑤ YEL/BLK ¹	10 BLK/YEL

C102



① WHT/RED ⁴
② BRN/BLK ¹
③ BLU/RED ⁴

C104



1 BLK/YEL
② WHT/GRN
3 WHT/BLU
④ WHT/RED ³

C105



① BRN
② YEL/RED

C106



① RED
② YEL/RED

C107



① BLU
② YEL/RED

C108



① YEL
② YEL/RED

C109



① ORN ²
② YEL/BLK ¹
③ BLK/BLU

C110



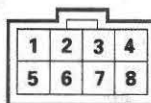
① GRN/BLK ²
② RED/BLK
③ YEL/BLU

C113



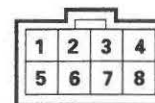
① GRN ²
② BLK ¹

C136



① BRN	⑤ GRN
② RED	⑥ GRN/BLK ¹
③ BLU	⑦ BLU ⁴
④ YEL	⑧ WHT ⁴

C150



① YEL/BLU	⑤ GRN/YEL ¹
② GRN/BLK ²	⑥ BLU/YEL ¹
③ LT GRN ²	⑦ PNK ²
④ YEL/RED	⑧ YEL ⁴

C151



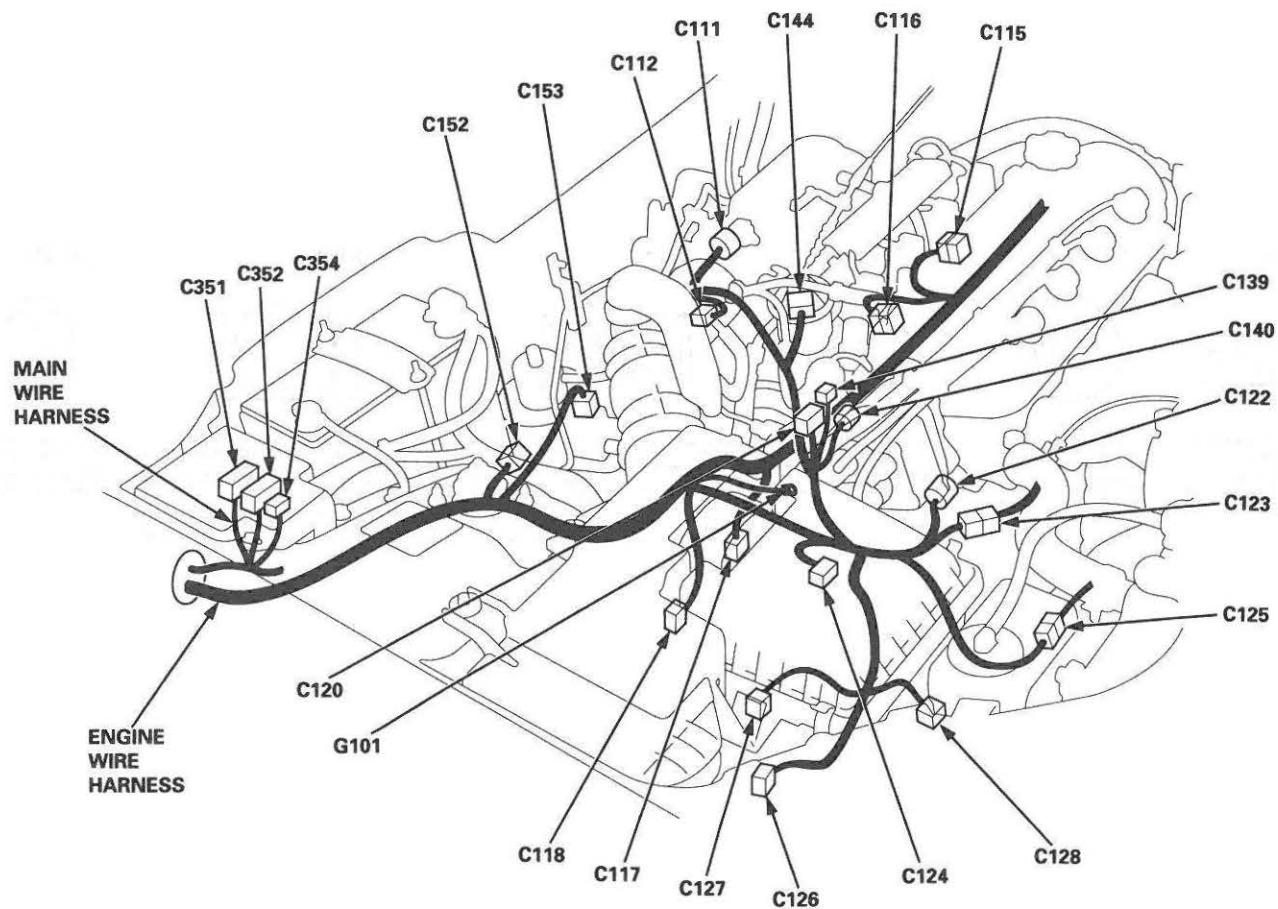
① GRN/BLK ²
② GRN/RED ²

- NOTE: • Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK¹ and YEL/BLK² are not the same).
 ○: Related to Fuel and Emissions System.
 — Connector with male terminals (double outline): View from terminal side
 — Connector with female terminals (single outline): View from wire side

(cont'd)

System Description

System Connectors [Engine Compartment] (cont'd)





C111



① YEL/RED
② GRN/WHT ²
③ RED/GRN

C112



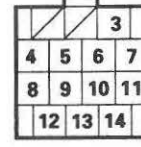
① GRN/BLK ²
② RED/YEL

C115



1 —	⑧ GRN/BLK ²
2 —	⑨ GRN/BLK ²
③ BLK/YEL	⑩ GRN/BLK ²
④ BLK/YEL	⑪ GRN/BLK ²
⑤ BLK/YEL	⑫ GRN/BLK ²
⑥ BLK/YEL	⑬ GRN/BLK ²
7 BLK/YEL	⑭ GRN/BLK ²

C116



1 —	⑧ BLK ¹
2 —	⑨ BLK ¹
③ YEL/RED	⑩ BLK ¹
④ YEL/RED	⑪ BLK ¹
⑤ YEL/RED	⑫ BLK ¹
⑥ YEL/RED	⑬ BLK ¹
⑦ YEL/RED	⑭ BLK ¹

C117



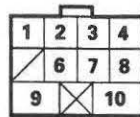
① BLK ¹
② BLK/YEL
③ BLU/WHT ²

C118



① GRN ⁴
② BLU ³

C120



① YEL/GRN	⑥ WHT ²
② BLU ²	⑦ RED ³
③ GRN ³	⑧ BLK ³
④ YEL ²	9 BLU
5 —	10 BLK/YEL

C122



① RED/WHT
② GRN/BLK ²

C123



① WHT ³
② GRN/BLK ²
③ BLK/YEL
④ BLK/WHT ²

C124



① GRN/BLK ³
② YEL ³

C125



① WHT/RED ¹
② GRN/BLK ²
③ BLK/YEL
④ BLK/WHT ¹

C126



① WHT ³
② RED ⁴

C127



① RED ²
② WHT ¹

C128



① BLU/YEL ²
② GRN/WHT ³

C139



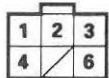
① GRN/YEL ³

C140



① BLU/BLK
② BLK ¹

C144



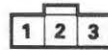
① WHT/BLK
② GRN/BLK ²
③ YEL/BLU
④ BLK ¹
5 —
⑥ PNK ¹

C152



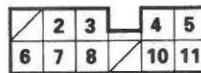
① BLK ¹
② GRN

C153



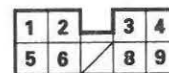
① YEL/BLU
② BLU/RED ³
③ GRN/BLK ²

C351



1 —	⑦ WHT/BLK
2 WHT/BLU	⑧ WHT/BLU
3 WHT/GRN	9 WHT/GRN
4 BLK	10 —
5 WHT/RED	11 BLU/WHT
⑥ WHT/RED	

C352



1 GRN	6 BLK/YEL
2 BLU/WHT	7 —
3 WHT/BLK	⑧ WHT/GRN
④ WHT/BLK	9 WHT
⑤ BLK/RED	

C354



① BLK/WHT
② BLK
③ GRN/RED ¹

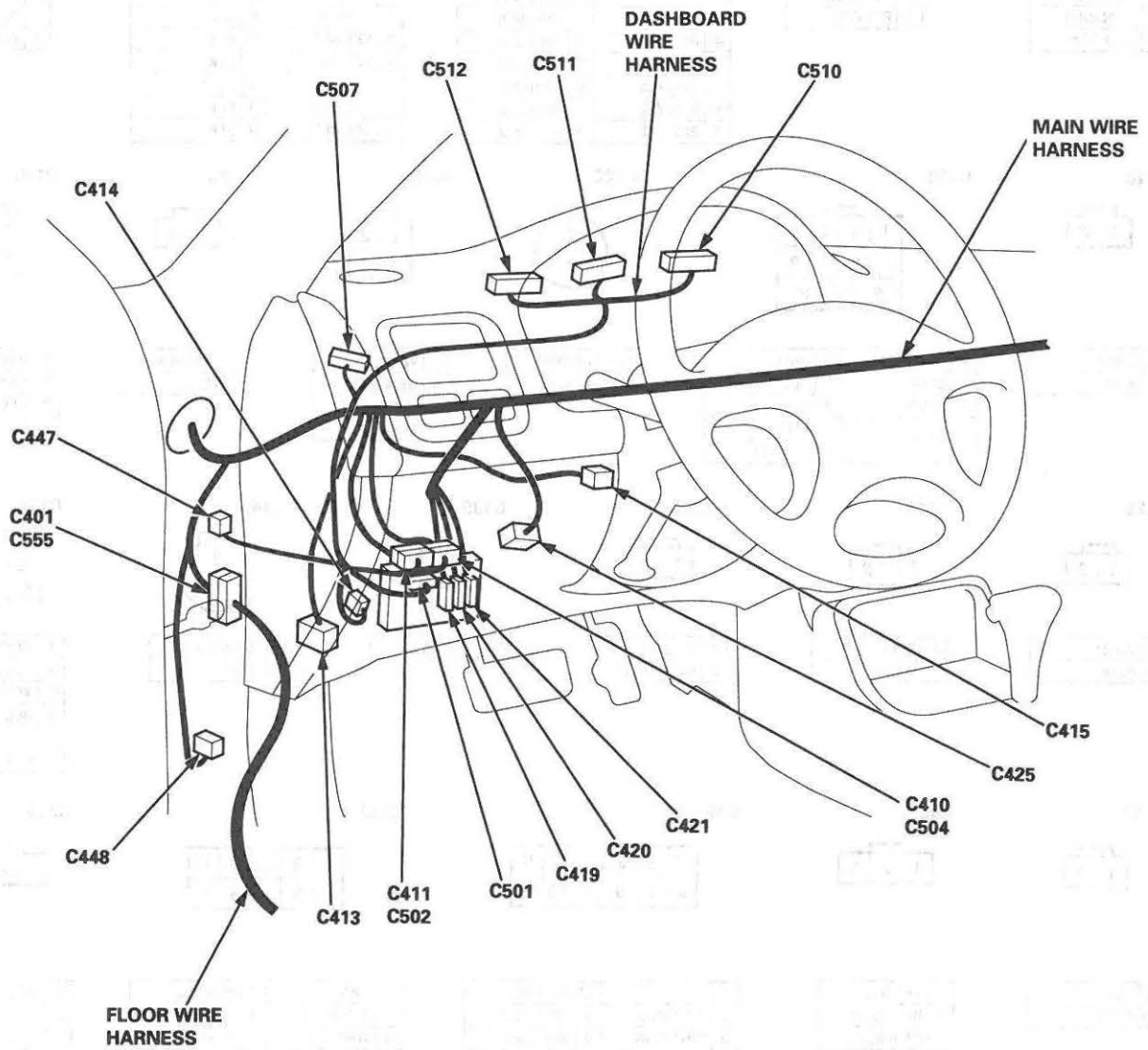
NOTE: • Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK¹ and YEL/BLK² are not the same).

○: Related to Fuel and Emissions System.

- Connector with male terminals (double outline): View from terminal side
- Connector with female terminals (single outline): View from wire side

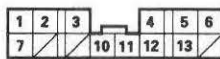
System Description

System Connectors [Dash and Floor]



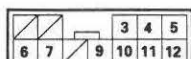


C401



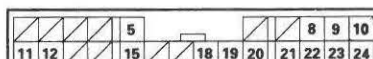
① YEL/BLU	8	
② BLU/YEL¹	9	
③ GRN/BLK²	10	GRN
④ GRN/YEL¹	11	LT GRN/RED
⑤ WHT/RED	12	GRN/BLK
⑥ RED/BLU	13	GRN/WHT
⑦ WHT/GRN	14	

C410



1		⑦ BLK/BLU
2		8
③ BLU/GRN	⑥ BLU²	
④ ORN/BLU	⑨ GRN	
⑤ WHT¹	⑩ GRN/BLK¹	
⑥ RED	⑫ LT GRN²	

C411



1		13	
2		14	
3		15	WHT/BLK
4		16	
5	BLU	17	
6		18	WHT/BLU
7		19	BLU
8	RED/BLU	20	RED/BLU
9	LT GRN	⑫ GRN/ORN	
10	BLU/YEL*	22	BLU/WHT
11	YEL/GRN	23	YEL/RED
12	RED	24	BLU/RED

*: '99 model

C413



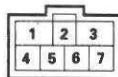
1		9	
2		10	
3		11	
4		⑫ BLK	
5		⑬ BLK	
⑥ LT BLU	14		
7		⑮ BLU/YEL	
⑧ WHT/RED	16		

C414



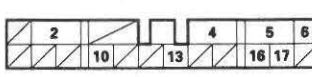
① BLK/RED
② BLK/RED
③ BLK/RED
④ BLU/BLK¹

C415



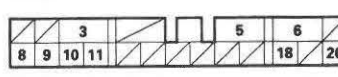
① BLK/WHT
2 BLU/RED
③ WHT/BLK
4 BLK
5 WHT
6 WHT/BLU
7 WHT/GRN

C419



1		10	YEL/RED
2	WHT/RED	11	
3		12	
④ BLK/RED	13	WHT/GRN	
5	WHT	14	
6	WHT/RED	15	
7		16	YEL
8		17	RED/BLK
9		18	

C420



1	_____	⑪	BLU/WHT
2	_____	12	_____
③	BLK	13	_____
4	_____	14	_____
5	WHT/GRN	15	_____
6	WHT/BLU	16	_____
7	_____	17	_____
⑧	YEL/GRN	18	WHT/GRN
9	BLK/YEL	19	_____
⑩	BLU/WHT	20	WHT/RED

C421



1	RED/YEL	10	GRN/YEL
2	BLK/BLU	11	
3	RED/GRN	⑫ BLK/WHT	
4	GRN/BLK	⑬ BLK/WHT	
5	RED/BLU	14	GRN/RED
6	WHT/BLU	15	
7		16	GRN/RED
8		17	RED/BLK
9	RED/WHT	18	RED/BLK

C425



1	LT GRN
2	GRY
③	GRN/WHT¹
④	WHT/GRN

C447



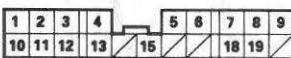
①	WHT/BLK
②	WHT/RED
③	YEL/RED
④	BLK

C448



①	RED	⑮ YEL
②	BRN	⑯ BLU
③	BLK	⑰ BLK
4		17
5		18
6		19
7		20
⑧ YEL¹	21	
⑨ BLU¹	22	
⑩ RED¹	23	
⑪ BRN²	⑳ LT GRN¹	
⑫ BRN/BLK¹	㉑ BRN/BLK¹	
⑬ YEL/RED	㉒ YEL/RED	

C501



1	RED/GRN	11	YEL/BLK
2	BLK/BLU	12	BLK/YEL
3		13	YEL/GRN
4	WHT/BLU	14	
④	BLK	15	RED/BLK
5	GRN/WHT	16	
6	GRN/RED	17	
7	GRN/ORN	18	BLK/WHT
8	BLU/YEL	19	YEL/RED
9	GRN/YEL	20	
⑩	YEL		

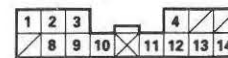
*: '99 model

C507



①	YEL	11	RED
②	YEL	12	RED
3	YEL	13	RED
4	YEL	14	RED
5	RED/BLK	15	BLK
6	RED/BLK	16	BLK
7	RED/BLK	⑮ BLK	
8	RED/BLK	18	BLK
9	RED/BLK	19	BLK
10	RED/BLK	⑳ BLK	

C510



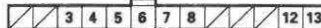
1	YEL	8	BLK
2	RED/BLK	⑨	GRN/BLK¹
3	RED	⑩	GRN
④	BLU¹	⑪	RED
5		⑫ WHT¹	
6		⑬ BLK/BLU	
7		⑭ LT GRN²	

C511



1		9	
②	BLK	⑩	ORN/BLU
3	BLU/BLK	11	BLU/WHT
4	GRN/YEL	12	YEL/GRN
5	GRN/RED	13	
6	RED/BLU	14	
7		15	BLK/WHT
⑧	BLU/GRN	16	WHT/BLU

C512



1		8	BLU
2		9	
3	YEL/RED	10	
④	YEL	11	
⑤	GRN/ORN	12	RED
6	RED/GRN	13	RED/BLK
7	GRN/RED		

NOTE: • Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK¹ and YEL/BLK² are not the same).

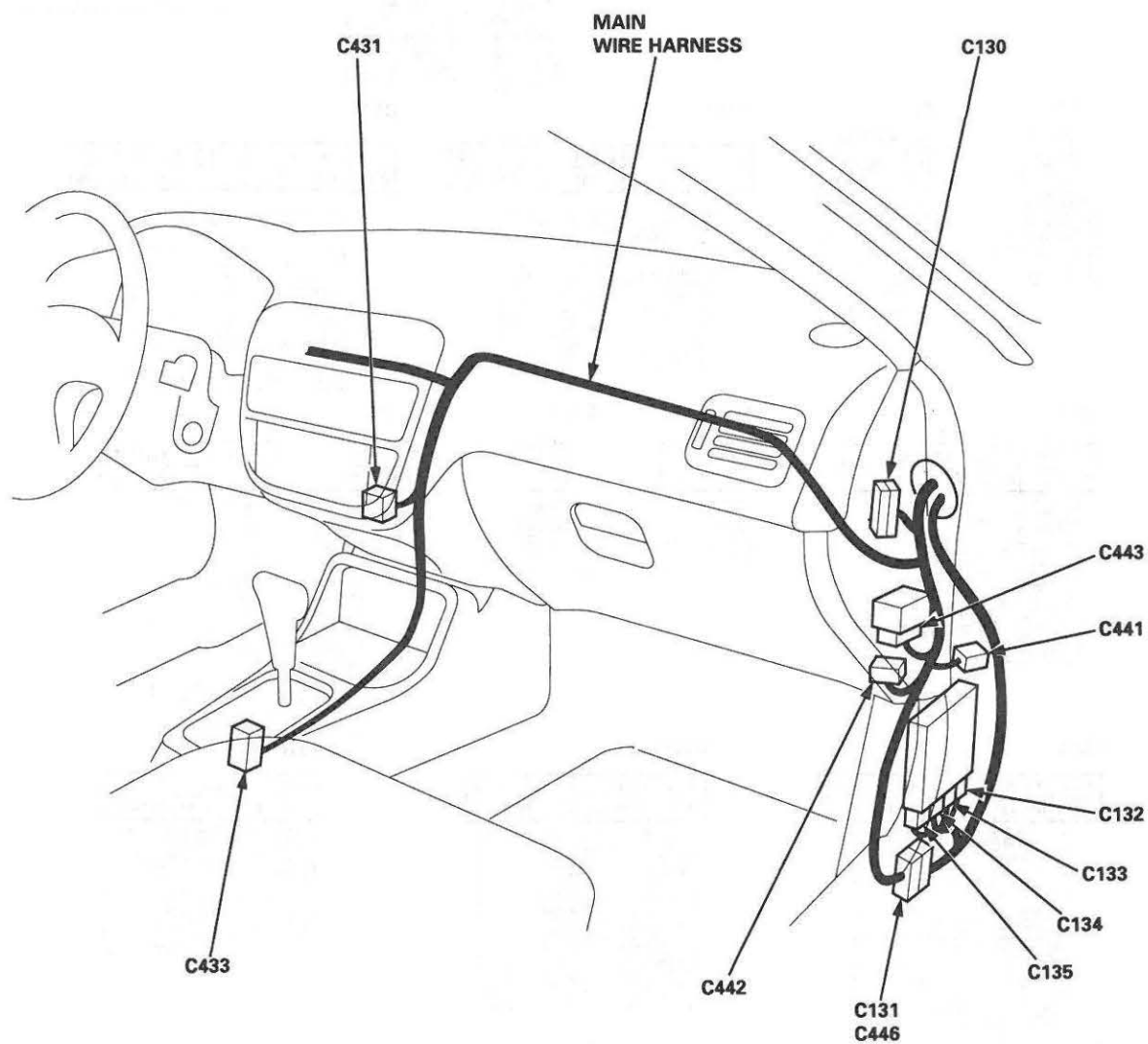
○: Related to Fuel and Emissions System.

- Connector with male terminals (double outline): View from terminal side
- Connector with female terminals (single outline): View from wire side

(cont'd)

System Description

System Connectors [Dash and Floor] (cont'd)





C130

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

1 GRN	11 BRN/BLK ¹
2 GRN	12 BRN/BLK ¹
3 GRN	13 BRN/BLK ¹
4 YEL/BLK ¹	14 BRN/BLK ¹
5 YEL/BLK ¹	15
6 YEL/BLK ¹	16 BRN/BLK ¹
7 YEL/BLK ¹	17 BRN/BLK ¹
8 BLU/WHT ¹	18 BRN/BLK ¹
9 BLU/WHT ¹	19 BRN/BLK ¹
10 BLU/WHT	20 BRN/BLK ¹

C131

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22								

1 RED ¹	12 YEL ¹
2 BRN ²	13 WHT/RED ²
3 BLU/WHT ¹	14
4 ORN ¹	15 BLU/RED ¹
5 LT GRN ¹	16 GRN/RED ¹
6 GRN	17 GRN/WHT ¹
7 BLU/RED ²	18 BLU/WHT
8 GRN/ORN	19 BLK/RED
9 BRN ¹	20 GRN/YEL ²
10 WHT/BLU	21 LT BLU
11 BLU ¹	22 BLU/ORN

C132 (PCM-A)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32								

1 BLU/WHT ¹	13	25
2 GRN/YEL ¹	14 GRN/BLK ¹	26 GRN ²
3 BLU/RED ¹	15	27 BLU/RED ²
4 ORN ¹	16 GRN/YEL ²	28 WHT/RED ²
5	17 BLK/RED	29
6	18 GRN/ORN	30 GRN/RED ¹
7	19	31
8 BLK/WHT ¹	20 GRN ¹	32 GRN/WHT ¹
9	21 LT BLU	
10 BRN ¹	22 BLU/YEL ¹	
11	23 WHT/RED ¹	
12	24 BLU/ORN	

C133 (PCM-B)

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24

1 YEL/BLK ¹	11 BRN ²	21 WHT/BLU
2 BLK ¹	12 GRN/YEL ¹	22 BRN/BLK ²
3 RED ¹	13 YEL/GRN	23
4 BLU ¹	14 LT GRN ¹	24
5 YEL ¹	15 ORN ²	25
6 BLK/BLU	16	
7 PNK ¹	17 RED ²	
8 WHT ¹	18	
9 YEL/BLK ¹	19	
10 BLK ²	20 BRN/BLK ¹	

C134 (PCM-C)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32								

1 BLK/WHT ²	13 GRN/RED ²	25 RED/YEL
2 WHT/GRN	14 BLU/RED ³	26 RED/WHT
3	15	27 RED/BLK
4	16 WHT ³	28 YEL/BLU
5 WHT/RED ³	17 RED/GRN	29 YEL ²
6 WHT/BLK	18 GRN/BLK ²	30 BLK ³
7 GRN/WHT ²	19 YEL/RED	31 WHT/RED ⁴
8 BLU ²	20 GRN ³	
9 WHT ²	21 RED ³	
10 BLU/BLK	22 BLU/RED ⁴	
11	23 BLU/WHT ²	
12	24	

C135 (PCM-D)

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

1 YEL ³	9 YEL ⁴
2 GRN/WHT ³	10 BLU ³
3 GRN/BLK ³	11 RED ⁴
4	12 WHT ⁵
5	13 LT GRN ²
6 WHT ⁴	14 BLU ⁴
7 BLU/YEL ²	15
8 PNK ²	16 GRN ⁴

C431

1	2	3
4	5	6
7	8	9

1 WHT/BLU
2 YEL
3 YEL/BLK
4 BLK
5 WHT
6 BLK/BLU
7 WHT/RED ²
8 WHT/BLK

C433

1	2	3	4	5	6	7
8	9	10	11	12	13	14

1 BLK	8
2	9 PNK
3 YEL/RED	10 BLK/WHT
4 GRN/BLK	11 BLK/RED
5 BLU ⁴	12 BLK/BLU
6 GRN ²	13 WHT ⁴
7 YEL ⁴	14 RED

C441

1	2
---	---

1 BRN ¹
2 BLK

C442

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

1 BRN/BLK ¹	11 GRN/RED
2 BRN/BLK ¹	12
3 BRN/BLK ¹	13 GRN/RED
4 BLU/WHT	14
5 BLU/WHT	15
6 BLU/WHT	16
7	17 BLU
8 GRN/WHT	18 BLU
9 GRN/WHT ¹	19 BLU
10 GRN/WHT ¹	20 BLU

C443

1	2	3
4	5	6
7	8	9

1 GRN/YEL ²	5 YEL/GRN
2 BLU/WHT	6 YEL/BLK ¹
3 BLK ¹	7 WHT/BLK
4 WHT/RED	

NOTE: • Different wires with the same color have been given a number suffix to distinguish them (for example, YEL/BLK¹ and YEL/BLK² are not the same).

○: Related to Fuel and Emissions System.

- Connector with male terminals (double outline): View from terminal side
- Connector with female terminals (single outline): View from wire side

Troubleshooting

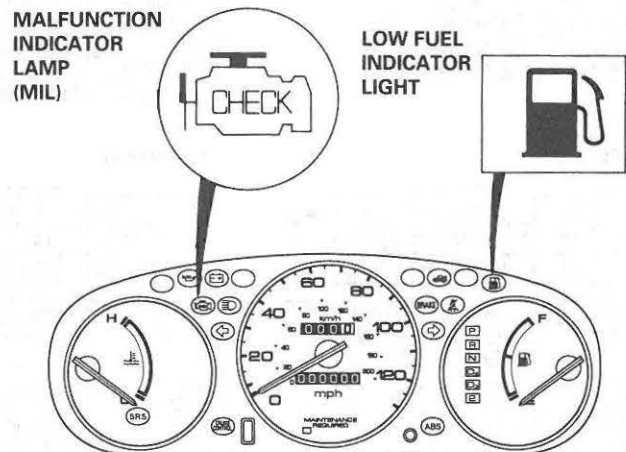
Troubleshooting Procedures

I. How To Begin Troubleshooting

When the Malfunction Indicator Lamp (MIL) has been reported on, the low fuel indicator light has been blinking, or there is a driveability problem, use the appropriate procedure below to diagnose and repair the problem.

A. When the MIL has come on, or if the low fuel indicator light has been blinking:

1. Connect the Honda PGM Tester or an OBD II scan tool to the 16P Data Link Connector (DLC) located near the left kick panel.
2. Turn the ignition switch ON (II).
3. Check the DTC and note it. Also check and note the freeze frame data.
4. Referring to the Diagnostic Trouble Code Chart, begin troubleshooting.



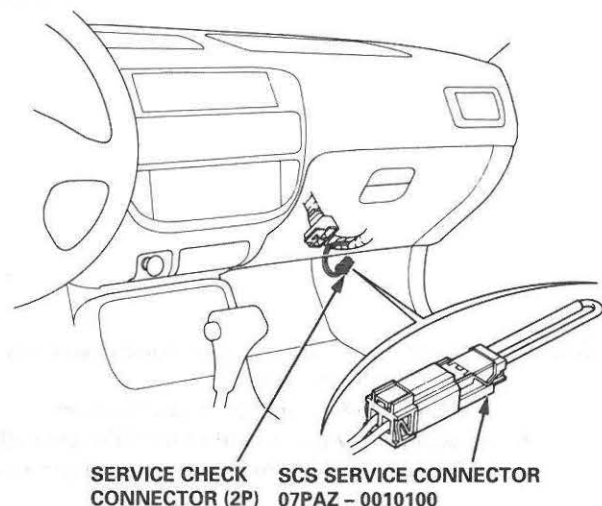
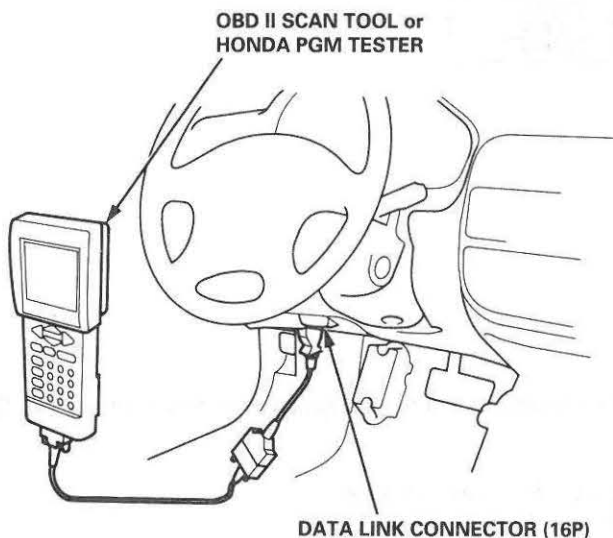
NOTE:

- See the OBD II scan tool or Honda PGM Tester user's manuals for specific operating instructions.
- The OBD II scan tool or Honda PGM Tester can read the Diagnostic Trouble Codes (DTC), freeze frame data, current data, and other Powertrain Control Module (PCM) data.
- Freeze frame data indicates the engine conditions when the first malfunction, misfire or fuel trim malfunction was detected. It can be useful information when troubleshooting.

B. When the MIL has not come on, but there is a driveability problem, refer to the Symptom Chart on page 11-32.

C. DTCs will be indicated by the blinking of the Malfunction Indicator Lamp (MIL) with the SCS service connector connected.

Connect the SCS service connector to Service Check Connector as shown. (The 2P Service Check Connector is located under the dash on the passenger's side of the vehicle.) Turn the ignition switch ON (II).





II. Powertrain Control Module (PCM) Reset Procedure

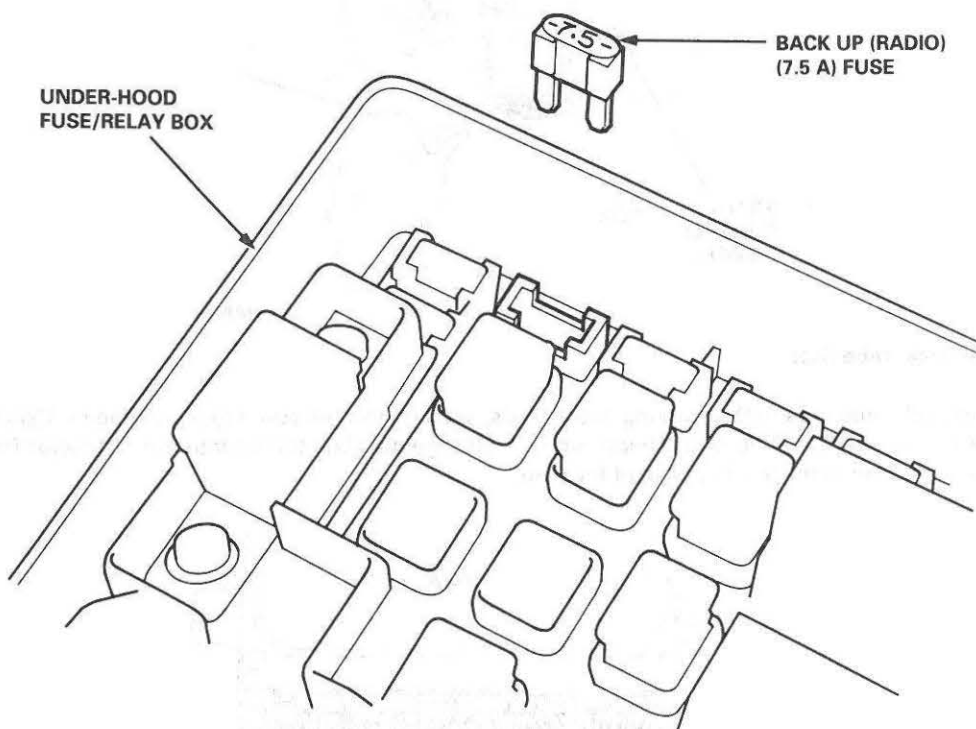
Either of the following actions will reset the PCM.

- Use the OBD II scan tool or Honda PGM Tester to clear the PCM's memory.

NOTE: See the OBD II scan tool or Honda PGM Tester user's manuals for specific operating instructions.

- Turn the ignition switch OFF. Remove the BACK UP (RADIO) (7.5 A) fuse from the under-hood fuse/relay box for 10 seconds.

NOTE: Removing the BACK UP (RADIO) (7.5 A) fuse cancels the clock and the radio presets. Make note of the customer's presets so you can reset them.



III. Final Procedure (this procedure must be done after any troubleshooting)

1. Remove the SCS Service Connector if it is connected.

NOTE: If the SCS service connector is connected and there are no DTCs stored in the PCM, the MIL will stay on when the ignition switch is turned ON (II).

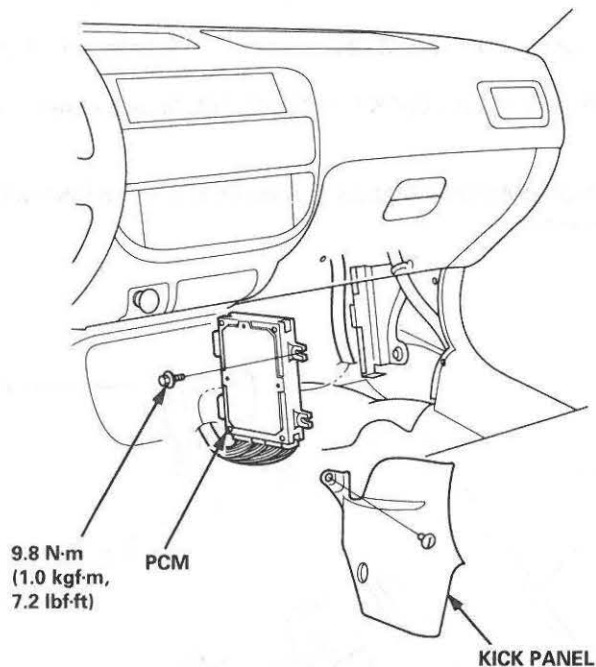
2. Do the PCM Reset Procedure.
3. Turn the ignition switch OFF.

(cont'd)

Troubleshooting

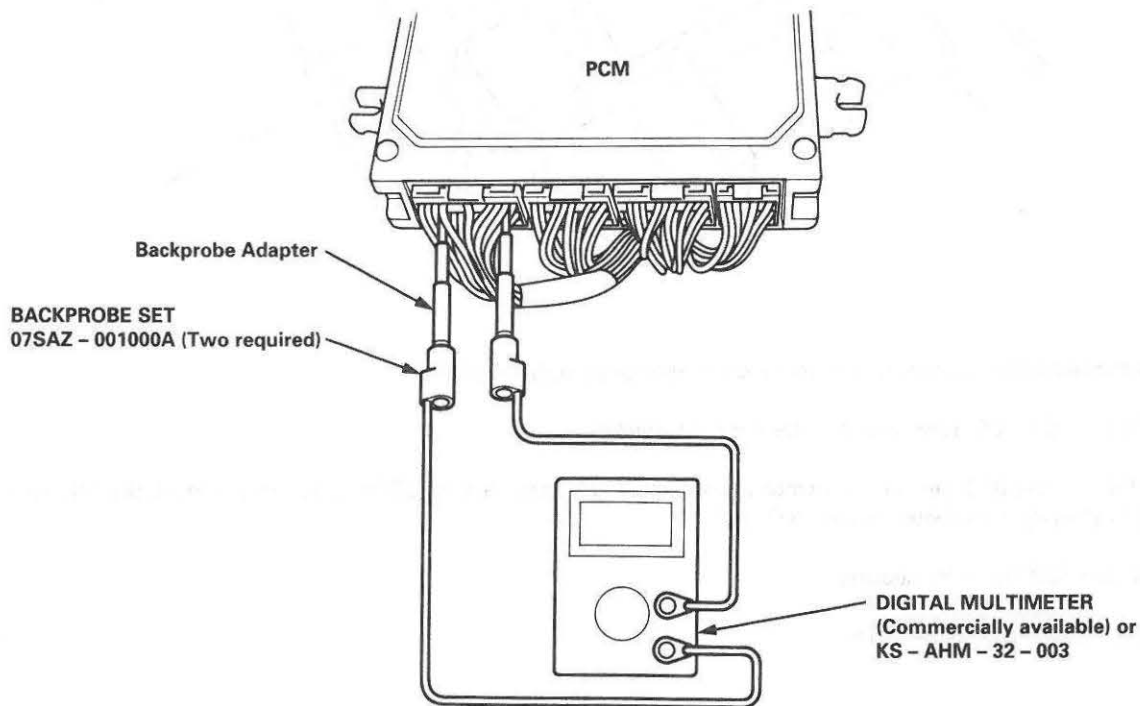
Troubleshooting Procedures (cont'd)

If the inspection for a particular code requires voltage or resistance checks at the PCM connectors, remove the right kick panel. Pull the carpet back to expose the PCM. Remove the ABS control unit if so equipped. Unbolt the PCM bolt. Turn the ignition switch OFF, and connect the backprobe sets and a digital multimeter as described below. Check the system according to the procedure described for the appropriate code(s) listed on the following pages.



How to Use the Backprobe Sets

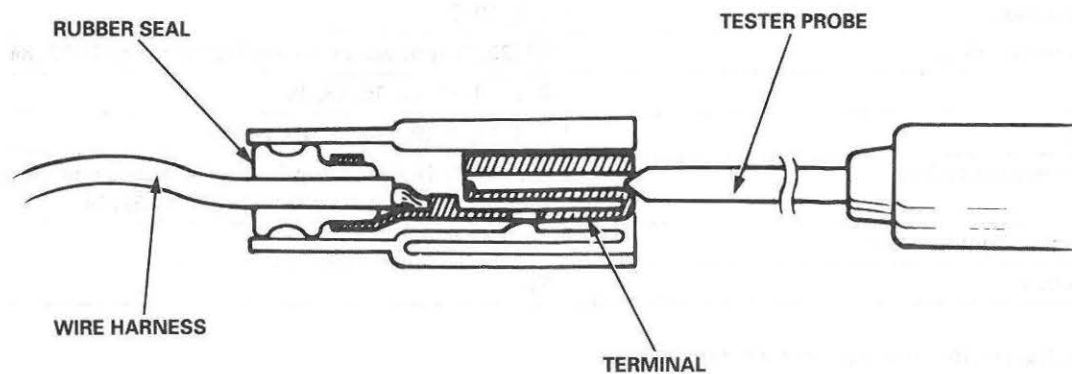
Connect the backprobe adapters to the stacking patch cords, and connect the cords to a multimeter. Using the wire insulation as a guide for the contoured tip of the backprobe adapter, gently slide the tip into the connector from the wire side until it comes in contact with the terminal end of the wire.





CAUTION:

- Puncturing the insulation on a wire can cause poor or intermittent electrical connections.
- Bring the tester probe into contact with the terminal from the terminal side of wire harness connectors in the engine compartment. For female connectors, just touch lightly with the tester probe and do not insert the probe.



(cont'd)

Troubleshooting

Troubleshooting Procedures (cont'd)

Symptom Chart

Listed below are symptoms and probable causes for problems that DO NOT cause the Malfunction indicator Lamp (MIL) to come on. If the MIL was reported on, go to page 11-28. Troubleshoot each probable cause in the order listed (from left to right) until the symptom is eliminated. The probable cause and troubleshooting page reference can be found below.

SYMPTOM	PROBABLE CAUSE
Engine will not start	20, 21, 22, 4, 2, 3, 5, 19, 14, 1
Hard starting	2, 4, 11, 16, 13
Cold fast idle too low	7, 8, 6, 16
Cold fast idle too high	7, 8, 10, 9
Idle speed fluctuates	7, 8, 10, 9
Misfire or rough running	24, 25, Troubleshoot for misfire on pages 11-82, 84
Low power	2, 9, 10, 12, 17, 16, 18, 19
Engine stalls	2, 4, 11, 7, 19, 8, 5, 15, 23, 24, 25
Low fuel indicator light blinks	23, 24, 25, Troubleshoot for fuel tank pressure sensor/fuel tank temperature sensor on pages 11-92, 94
Low fuel indicator light turns on	23, 24, 25
Poor acceleration	25

Other Probable Causes for an engine that will not start:

- Compression
- Starting system
- Intake air leakage
- Overheating
- Engine locked up
- Battery
- Timing belt

Probable Cause List (For the DTC Chart, see page 11-39)

Probable Cause	Page	System
1	11-47	Powertrain Control Module (PCM)
2	—	Fuel pressure
3	11-132	PGM-FI main relay
4	Section 23	Ignition system
5	11-85, 99	Crankshaft Position/Top Dead Center/Cylinder Position sensor circuit, CKF sensor circuit
6	11-56	Intake Air Temperature (IAT) sensor circuit
7	11-107	Idle Air Control Valve (IACV)
8	11-116	Idle speed adjustment
9	—	Throttle body
10	—	Throttle cable
11	11-52	Manifold Absolute Pressure (MAP) sensor
12	11-61	Throttle Position (TP) sensor
13	11-88	Barometric pressure (BARO) sensor
14	Section 14	A/T gear position signal (see section 14)



Probable Cause	Page	System
15	11-113	Brake switch signal
16	—	Air cleaner
17	—	Intake air pipe
18	11-146	Warm-up Three Way Catalytic Converter (WU-TWC), Three Way Catalytic Converter (TWC)
19	—	Contaminated fuel
20	11-124	Leak inspection (the engine does not start until the PCM is reset when the engine is stopped once when the low fuel indicator light blinks).
21	11-135	Injector control module
22	11-137	Fuel injector relay
23	—	Lack of fuel
24	—	Manual shut-off valve
25	11-130	Fuel pressure regulator shut-off solenoid valve/Fuel tank internal solenoid valve

PCM Data

By connecting the OBD II scan tool or the Honda PGM Tester to the 16P data link connector (DLC), various data can be retrieved from the PCM. The items listed in the table below conform to the SAE recommended practice.

The Honda PGM Tester also reads data beyond that recommended by SAE.

Understanding this data will help to find the causes of intermittent failures or engine problems.

NOTE:

- The "operating values" given below are approximate values and may be different depending on the environment and the individual vehicle.
- Unless noted otherwise, "at idle speed" means idling with the engine completely warmed up, transmission in Park or neutral, and the A/C and all accessories turned off.

Data	Description	Operating Value	Freeze Data
Diagnostic Trouble Code (DTC)	If the PCM detects a problem, it will store it as a code consisting of one letter and four numbers. Depending on the problem, an SAE-defined code (P0xxx) or a Honda-defined code (P1xxx) will be output to the tester.	If no problem is detected, there is no output.	YES
Engine Speed	The PCM computes engine speed from the signals sent from the Crankshaft Position sensor. This data is used for determining the time and amount of fuel injection.	Nearly the same as tachometer indication.	YES
Vehicle Speed	The PCM converts pulse signals from the Vehicle Speed Sensor (VSS) into speed data.	Nearly the same as speedometer indication	YES
Manifold Absolute Pressure (MAP)	The absolute pressure in the intake manifold caused by engine load and speed.	With engine stopped: Nearly the same as atmospheric pressure At idle speed: 24 – 37 kPa (180 – 280 mmHg, 7.1 – 11.0 inHg)	YES
Engine Coolant Temperature (ECT)	The ECT sensor converts coolant temperature into voltage and signals the PCM. The sensor is a thermistor whose internal resistance changes with coolant temperature. The PCM uses the voltage signals from the ECT sensor to determine the amount of injected fuel.	With cold engine: Same as ambient temperature and IAT With engine warmed up: 176 – 194°F (80 – 90°C)	YES

(cont'd)

Troubleshooting

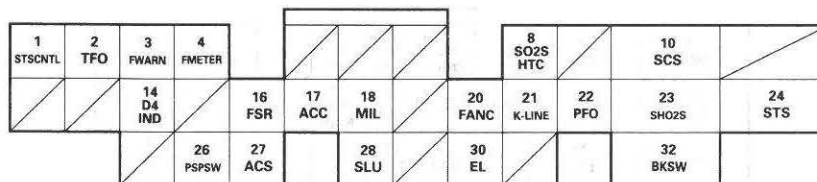
Troubleshooting Procedures (cont'd)

Data	Description	Operating Value	Freeze Data
Heated Oxygen Sensor (HO2S) (Primary, Sensor 1) (Secondary, Sensor 2)	The Heated Oxygen Sensor detects the oxygen content in the exhaust gas and sends voltage signals to the PCM. Based on these signals, the PCM controls the air/fuel ratio. When the oxygen content is high (that is, when the ratio is leaner than the stoichiometric ratio), the voltage signal is lower. When the oxygen content is low (that is, when the ratio is richer than the stoichiometric ratio), the voltage signal is higher.	0.0 – 1.25 V At idle speed: about 0.1 – 0.9 V	NO (Sensor 1)
HO2S Feedback Loop Status	Loop status is indicated as "open" or "closed". Closed: Based on the HO2S output, the PCM determines the air/fuel ratio and controls the amount of injected fuel. Open: Ignoring HO2S output, the PCM refers to signals from the TP, MAP, and ECT sensors to control the amount of injected fuel.	At idle speed: closed	YES
Short Term Fuel Trim	The air/fuel ratio correction coefficient for correcting the amount of injected fuel when HO2S feedback is in the closed loop status. When the signal from the HO2S is weak, short term fuel trim gets higher, and the PCM increases the amount of injected fuel. The air/fuel ratio gradually gets richer, causing a higher HO2S output. Consequently, the short term fuel trim is lowered, and the PCM reduces the amount of injected fuel. This cycle keeps the air/fuel ratio close to the stoichiometric ratio when in closed loop status.	+56.3% to –30.5%	YES
Long Term Fuel Trim	Long term fuel trim is computed from short term fuel trim and indicates changes occurring in the fuel supply system over a long period. If long term fuel trim is higher than 1.00, the amount of injected fuel must be increased. If it is lower than 1.00, the amount of injected fuel must be reduced.	+45.3% to –30.5%	YES
Intake Air Temperature (IAT)	The IAT sensor converts intake air temperature into voltage and signals the PCM. When intake air temperature is low, the internal resistance of the sensor increases, and the voltage signal is higher.	With cold engine: Same as ambient temperature and ECT	YES
Throttle Position	Based on the accelerator pedal position, the opening angle of the throttle valve is indicated.	At idle speed: approx. 10 %	YES
Ignition Timing	Ignition timing is the ignition advance angle set by the PCM. The PCM matches ignition timing to the driving conditions.	At idle speed: $12^{\circ} \pm 2^{\circ}$ BTDC with the SCS service connector connected.	NO
Calculated Load Value (CLV)	CLV is the engine load calculated from the MAP data.	At idle speed: 24 – 41 % At 2,500 rpm with no load: 22 – 39%	YES
Fuel Injector Pressure	Fuel pressure signal is used to correct the fuel injection period by fuel injector pressure.	At idle speed: 177 – 269 kPa (1.8 – 2.7 kgf/cm ² , 26 – 38 psi)	YES



Powertrain Control Module Terminal Arrangement

PCM CONNECTOR A (32P)



Wire side of female terminals

NOTE: Standard battery voltage is 12 V.

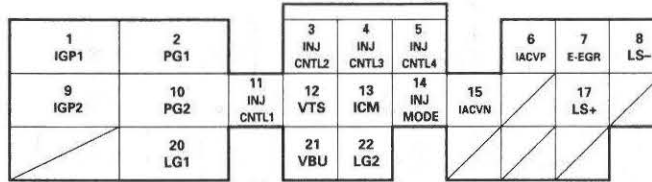
Terminal number	Wire color	Terminal name	Description	Signal
1	BLU/WHT	STSCNTL (STARTER SWITCH SIGNAL CONTROL)	Drives starter cut relay.	0 V for two seconds after turning ignition switch ON (II), then battery voltage (intake air and/or fuel temperature below 0°C)
2	GRN/YEL	TFO (FUEL TANK TEMPERATURE SENSOR)	Detects fuel tank temperature sensor signal.	With ignition switch ON (II): about 0.1 – 4.8 V (depending on fuel temperature)
3	BLU/RED	FWARN (LOW FUEL INDICATOR LIGHT)	Drives low fuel indicator light.	With low fuel indicator light turned ON: 0 V With low fuel indicator light turned OFF: battery voltage
4	ORN	FMETER (FUEL GAUGE)	Drives fuel gauge.	With ignition switch ON (II): pulses
8	BLK/WHT	SO2SHTC (SECONDARY HEATED OXYGEN SENSOR HEATER CONTROL)	Drives secondary heated oxygen sensor heater.	With ignition switch ON (II): battery voltage With fully warmed up engine running: duty controlled
10	BRN	SCS (SERVICE CHECK SIGNAL)	Detects service check connector signal (the signal causing a DTC indication)	With the terminal connected: 0 V With the terminal disconnected: 5 V
14	GRN/BLK	D4IND (D4 INDICATOR)	Drives D4 indicator light.	With D4 indicator light turned ON: voltage With D4 indicator light turned OFF: 0 V
16	GRN/YEL	FSR (FUEL SHUT-OFF SOLENOID VALVE RELAY)	Drives PGM-FI main relay.	0 V for two seconds after turning ignition switch ON (II), then battery voltage
17	BLK/RED	ACC (A/C CLUTCH RELAY)	Drives A/C clutch relay.	With compressor ON: 0 V With compressor OFF: battery voltage
18	GRN/ORN	MIL (MALFUNCTION INDICATOR LIGHT)	Drives MIL.	With MIL turned ON: 0 V With MIL turned OFF: battery voltage
20	GRN	FANC (RADIATOR FAN CONTROL)	Drives radiator fan relay.	With radiator fan running: 0 V With radiator fan stopped: battery voltage
21	LT BLU	K-LINE	Sends and receives scan tool signal.	With ignition switch ON (II): pulses
22	BLU/YEL	PFO (FUEL TANK PRESSURE SENSOR)	Detects fuel tank pressure sensor signal.	With ignition switch ON (II): about 0.5 – 4.5 V (depending on the amount of the fuel)
23	WHT/RED	SHO2S (SECONDARY HEATED OXYGEN SENSOR, SENSOR 2)	Detects secondary heated oxygen sensor (sensor 2) signal.	With throttle fully opened from idle with fully warmed up engine: above 0.6 V With throttle quickly closed: below 0.4 V
24	BLU/ORN	STS (STARTER SWITCH SIGNAL)	Detects starter switch signal.	With starter switch ON (III): battery voltage With starter switch OFF: 0 V
26	GRN	PPSW (P/S PRESSURE SWITCH SIGNAL)	Detects PSP switch signal.	At idle with steering wheel in straight ahead position: 0 V At idle with steering wheel at full lock: battery voltage
27	BLU/RED	ACS (A/C SWITCH SIGNAL)	Detects A/C switch signal.	With A/C switch ON: 0 V With A/C switch OFF: battery voltage
28	WHT/RED	SLU (INTERLOCK CONTROL UNIT)	Drives interlock control unit.	With ignition switch ON (II) and brake pedal depressed: 0 V
30	GRN/RED	EL (ELD)	Detects ELD signal.	With parking lights turned on at idle: about 2.5 – 3.5 V With low beam headlights turned on at idle: about 1.5 – 2.5 V
32	GRN/WHT	BKSW (BRAKE SWITCH)	Detects brake switch signal.	With brake pedal released: 0 V With brake pedal depressed: battery voltage

(cont'd)

Troubleshooting

Powertrain Control Module Terminal Arrangement (cont'd)

PCM CONNECTOR B (25P)



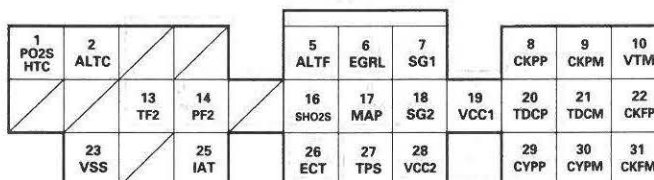
Wire side of female terminals

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1	YEL/BLK	IGP1 (POWER SOURCE)	Power source for the PCM control circuit.	With ignition switch ON (III): battery voltage With ignition switch OFF: 0 V
2	BLK	PG1 (POWER GROUND)	Ground for the PCM control circuit.	Less than 1.0 V at all times
3	RED	INJ CNTL2 (No. 2 FUEL INJECTOR CONTROL)	Drives No. 2 fuel injector.	With engine running: duty controlled
4	BLU	INJ CNTL3 (No. 3 FUEL INJECTOR CONTROL)	Drives No. 3 fuel injector.	
5	YEL	INJ CNTL4 (No. 4 FUEL INJECTOR CONTROL)	Drives No. 4 fuel injector.	
6	BLK/BLU	IACVP (IDLE AIR CONTROL VALVE POSITIVE SIDE)	Drives IAC valve (positive side).	With engine running: duty controlled
7	PNK	E-EGR	Drives EGR valve.	With EGR operation during driving with fully warmed up engine: duty controlled With EGR not operating: 0 V
8	WHT	LS- (LINEAR SOLENOID NEGATIVE SIDE)	Ground for linear solenoid.	With ignition switch ON (II): duty controlled
9	YEL/BLK	IGP2 (POWER SOURCE)	Power source for the PCM control circuit.	With ignition switch ON (II): battery voltage With ignition switch OFF: 0 V
10	BLK	PG2 (POWER GROUND)	Ground for the PCM control circuit.	Less than 1.0 V at all times
11	BRN	INJ CNTL1 (No. 1 FUEL INJECTOR CONTROL)	Drives No. 1 fuel injector.	With engine running: duty controlled
12	GRN/YEL	VTS (VTEC SOLENOID VALVE)	Drives VTEC solenoid valve.	With engine at low rpm: 0 V With engine at high rpm: battery voltage
13	YEL/GRN	ICM (IGNITION CONTROL MODULE)	Sends ignition pulse.	With ignition switch ON (II): battery voltage With engine running: about 10 V (depending on engine speed)
14	LT GRN	INJ MODE (FUEL INJECTOR CURRENT CONTROL)	Changes injector driver mode.	5 V for 100 ms after turning ignition switch ON (II), then 0 V (intake air and/or fuel temperature below 0°C)
15	ORN	IACVN (IDLE AIR CONTROL VALVE NEGATIVE SIDE)	Drives IAC valve (negative side).	With engine running: duty controlled
17	RED	LS+ (LINEAR SOLENOID POSITIVE SIDE)	Drives linear solenoid.	With ignition switch ON (II): duty controlled
20	BRN/BLK	LG1 (LOGIC GROUND)	Ground for the PCM control circuit.	Less than 1.0 V at all times
21	WHT/BLU	VBU (VOLTAGE BACK UP)	Power source for the PCM control circuit. Power source for the DTC memory.	Battery voltage at all times
22	BRN/BLK	LG2 (LOGIC GROUND)	Ground for the PCM control circuit.	Less than 1.0 V at all times



PCM CONNECTOR C (31P)



Wire side of female terminals

NOTE: Standard battery voltage is 12 V.

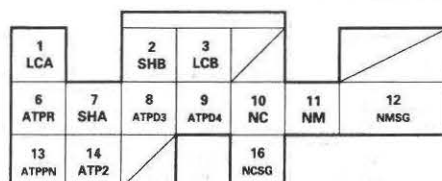
Terminal number	Wire color	Terminal name	Description	Signal
1	BLK/WHT	PO2SHTC (PRIMARY HEATED OXYGEN SENSOR HEATER CONTROL)	Drives primary heated oxygen sensor heater.	With ignition switch ON (II): battery voltage With fully warmed up engine running: duty controlled
2	WHT/GRN	ALTC (ALTERNATOR CONTROL)	Sends alternator control signal.	With fully warmed – up engine running: battery voltage During driving with small electrical load: 0 V
5	WHT/RED	ALTF (ALTERNATOR FR SIGNAL)	Detects alternator FR signal.	With fully warmed up engine running: 0 V – 5 V voltage (depending on electrical load)
6	WHT/BLK	EGRL (EGR VALVE LIFT SENSOR)	Detects EGR valve lift sensor signal.	At idle: about 1.2 V
7	GRN/WHT	SG1 (SENSOR GROUND)	Ground for MAP sensor.	Less than 1.0 V at all times
8	BLU	CKPP (CKP SENSOR P SIDE)	Detects CKP sensor.	With engine running: pulses
9	WHT	CKPM (CKP SENSOR M SIDE)	Ground for CKP sensor.	
10	BLU/BLK	VTM (VTEC PRESSURE SWITCH SIGNAL)	Detects VTEC pressure switch signal.	With engine at low engine speed: 0 V With engine at high engine speed : battery voltage
13	GRN/RED	TF2 (FUEL TEMPERATURE SENSOR)	Detects fuel temperature sensor signal.	With ignition switch ON (II): about 0.1 – 4.8 V (depending on fuel temperature)
14	BLU/RED	PF2 (FUEL PRESSURE SENSOR)	Detects fuel pressure sensor signal.	At idle: 2.3 – 3.0 V (depending on engine speed)
16	WHT	PHO2S (PRIMARY HEATED OXYGEN SENSOR, SENSOR 1)	Detects primary heated oxygen sensor (sensor 1) signal.	With throttle fully opened from idle with fully warmed up engine: above 0.6 V With throttle quickly closed: below 0.4 V
17	RED/GRN	MAP (MANIFOLD ABSOLUTE PRESSURE SENSOR)	Detects MAP sensor signal.	With ignition switch ON (II): about 3 V At idle: about 1.0 V (depending on engine speed)
18	GRN/BLK	SG2 (SENSOR GROUND)	Sensor ground.	Less than 1.0 V at all times
19	YEL/RED	VCC1 (SENSOR VOLTAGE)	Power source to MAP sensor.	With ignition switch ON (II): about 5 V With ignition switch OFF: 0 V
20	GRN	TDCP (TDC SENSOR P SIDE)	Detects TDC sensor.	With engine running: pulses
21	RED	TDCM (TDC SENSOR M SIDE)	Ground for TDC sensor.	
22	BLU/RED	CKFP (CKF SENSOR P SIDE)	Detects CKF sensor.	With engine running: pulses
23	BLU/WHT	VSS (VEHICLE SPEED SENSOR)	Detects VSS signal.	With ignition switch ON (II) and front wheel rotating: cycles 0 V – about 5 V or battery voltage
25	RED/YEL	IAT (INTAKE AIR TEMPERATURE SENSOR)	Detects IAT sensor signal.	With ignition switch ON (II): about 0.1 – 4.8 V (depending on intake air temperature)
26	RED/WHT	ECT (ENGINE COOLANT TEMPERATURE SENSOR)	Detects ECT sensor signal.	With ignition switch ON (II): about 0.1 – 4.8 V (depending on engine coolant temperature)
27	RED/BLK	TPS (THROTTLE POSITION SENSOR)	Detects TP sensor signal.	With throttle fully open: about 4.8 V With throttle fully closed: about 0.5 V
28	YEL/BLU	VCC2 (SENSOR VOLTAGE)	Provides sensor voltage.	With ignition switch ON (II): about 5 V With ignition switch OFF: 0 V
29	YEL	CYPP (CYP SENSOR P SIDE)	Detects CYP sensor.	With engine running: pluses
30	BLK	CYPM (CYP SENSOR M SIDE)	Ground for CYP sensor.	
31	WHT/RED	CKFM (CKF SENSOR M SIDE)	Ground for CKF sensor.	

(cont'd)

Troubleshooting

Powertrain Control Module Terminal Arrangement (cont'd)

PCM CONNECTOR D (16P)



Wire side of female terminals

NOTE: Standard battery voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal
1	YEL	LCA (LOCK-UP CONTROL SOLENOID VALVE A)	Drives lock-up control solenoid valve A.	With lock-up ON: battery voltage With lock-up OFF: 0 V
2	GRN/WHT	SHB (SHIFT CONTROL SOLENOID VALVE B)	Drives shift control solenoid valve B.	With engine running in 1st, 2nd gears: battery voltage With engine running in 3rd, 4th gears: about 0 V
3	GRN/BLK	LCB (LOCK-UP CONTROL SOLENOID VALVE B)	Drives lock-up control solenoid valve B.	With full lock-up ON: battery voltage With lock-up OFF: 0 V
6	WHT	ATPR (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In R position: 0 V In any other position: battery voltage
7	BLU/YEL	SHA (SHIFT CONTROL SOLENOID VALVE A)	Drives shift control solenoid valve A.	With engine running in 2nd, 3rd gears: battery voltage With engine running in 1st, 4th gears: about 0 V
8	PNK	ATPD3 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In D3 position: 0 V In any other position: about 5 V
9	YEL	ATPD4 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In D4 position: 0 V In any other position: battery voltage
10	BLU	NC (COUNTERSHAFT SPEED SENSOR)	Detects countershaft speed sensor signals.	With ignition switch ON (II), and front wheels rotating: pulses
11	RED	NM (MAINSHAFT SPEED SENSOR)	Detects mainshaft speed sensor signals.	With engine running: pulses
12	WHT	NMSG (MAINSHAFT SPEED SENSOR GROUND)	Ground for mainshaft speed sensor.	
13	LT GRN	ATPPN (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In park or neutral: 0 V In any other position: about 5 V
14	BLU	ATP2 (AT GEAR POSITION SWITCH)	Detects A/T gear position switch signal.	In 2nd position: 0 V In any other position: battery voltage
16	GRN	NCSG (COUNTERSHAFT SPEED SENSOR GROUND)	Ground for countershaft speed sensor.	



Diagnostic Trouble Code (DTC) Chart

DTC (MIL indication*)	Detection Item	Probable Cause	Page
P0107 (3)	Manifold Absolute Pressure Circuit Low Input	<ul style="list-style-type: none"> • Open or short in MAP sensor circuit • MAP sensor • PCM 	11-52
P0108 (3)	Manifold Absolute Pressure Circuit High Input	<ul style="list-style-type: none"> • Open in MAP sensor circuit • MAP sensor • PCM 	11-54
P0112 (10)	Intake Air Temperature Circuit Low Input	<ul style="list-style-type: none"> • Short in IAT sensor circuit • IAT sensor • PCM 	11-56
P0113 (10)	Intake Air Temperature Circuit High Input	<ul style="list-style-type: none"> • Open in IAT sensor circuit • IAT sensor • PCM 	11-57
P0116 (86)	Engine Coolant Temperature Circuit Range/Performance Problem	<ul style="list-style-type: none"> • ECT sensor • Cooling system 	11-58
P0117 (6)	Engine Coolant Temperature Circuit Low Input	<ul style="list-style-type: none"> • Short in ECT sensor circuit • ECT sensor • PCM 	11-59
P0118 (6)	Engine Coolant Temperature Circuit High Input	<ul style="list-style-type: none"> • Open in ECT sensor circuit • ECT sensor • PCM 	11-60
P0122 (7)	Throttle Position Circuit Low Input	<ul style="list-style-type: none"> • Open or short in TP sensor circuit • TP sensor • PCM 	11-61
P0123 (7)	Throttle Position Circuit High Input	<ul style="list-style-type: none"> • Open in TP sensor circuit • TP sensor • PCM 	11-63
P0131 (1)	Primary Heated Oxygen Sensor Circuit Low Voltage (Sensor 1)	<ul style="list-style-type: none"> • Short in Primary HO2S (Sensor1) circuit • Primary HO2S (Sensor 1) • Fuel supply system • PCM 	11-66
P0132 (1)	Primary Heated Oxygen Sensor Circuit High Voltage (Sensor 1)	<ul style="list-style-type: none"> • Open in Primary HO2S (Sensor 1) circuit • Primary HO2S (Sensor 1) • PCM 	11-68
P0133 (61)	Primary Heated Oxygen Sensor Slow Response (Sensor 1)	<ul style="list-style-type: none"> • Primary HO2S (Sensor1) • Exhaust system 	11-69
P0135 (41)	Primary Heated Oxygen Sensor Heater Circuit Malfunction (Sensor 1)	<ul style="list-style-type: none"> • Open or short in Primary HO2S (Sensor 1) heater circuit • PCM 	11-73
P0137 (63)	Secondary Heated Oxygen Sensor Circuit Low Voltage (Sensor 2)	<ul style="list-style-type: none"> • Short in Secondary HO2S (Sensor 2) circuit • Secondary HO2S (Sensor 2) • PCM 	11-70
P0138 (63)	Secondary Heated Oxygen Sensor Circuit High Voltage (Sensor 2)	<ul style="list-style-type: none"> • Open in Secondary HO2S (Sensor 2) circuit • Secondary HO2S (Sensor 2) • PCM 	11-71

*: These DTCs will be indicated by the blinking of the Malfunction Indicator Lamp (MIL) with the SCS service connector connected

(cont'd)

Troubleshooting

Diagnostic Trouble Code (DTC) Chart (cont'd)

DTC (MIL indication)	Detection Item	Probable Cause	Page
P0139 (63)	Secondary Heated Oxygen Sensor Slow Response (Sensor 2)	<ul style="list-style-type: none"> • Secondary HO2S (Sensor 2) 	11-72
P0141 (65)	Secondary Heated Oxygen Sensor Heater Circuit Malfunction (Sensor 2)	<ul style="list-style-type: none"> • Open or short in Secondary HO2S (Sensor 2) heater circuit • PCM 	11-73
P0171 (45)	System Too Lean	<ul style="list-style-type: none"> • Fuel supply system • Primary HO2S (Sensor 1) • MAP sensor • Contaminated fuel • Valve clearance • Exhaust leakage 	11-75
P0172 (45)	System Too Rich	<ul style="list-style-type: none"> • Fuel supply system • Primary HO2S (sensor 1) • MAP sensor • Contaminated fuel • Valve clearance 	11-75
P0191 (95)	Fuel Pressure Circuit Range/Performance Problem	<ul style="list-style-type: none"> • Fuel connection • Fuel pressure sensor • Vacuum connection (fuel pressure regulator) 	11-78
P0192 (95)	Fuel Pressure Circuit Low Input	<ul style="list-style-type: none"> • Open or short in fuel injector pressure sensor circuit • Fuel pressure sensor • PCM 	11-80
P0193 (95)	Fuel Pressure Circuit High Input	<ul style="list-style-type: none"> • Open in fuel injector pressure sensor circuit • Fuel pressure sensor • PCM • Fuel pressure regulator 	11-81
P0300 and some of P0301 P0302 P0303 P0304 (71 72 73 74)	Random Misfire	<ul style="list-style-type: none"> • Ignition system • Fuel supply system • MAP sensor • EGR system • IAC valve • Contaminated fuel • Lack of fuel • Injector control module • Primary HO2S (sensor 1) 	11-84
P0301 P0302 P0303 P0304 (71 72 73 74)	<ul style="list-style-type: none"> — Cylinder 1 — Cylinder 2 — Cylinder 3 — Cylinder 4 Misfire Detected	<ul style="list-style-type: none"> • Fuel Injector • Fuel Injector circuit • Ignition system • Low compression • Valve clearance • Injector control module 	11-82
P0335 (4)	Crankshaft Position Sensor Circuit Malfunction	<ul style="list-style-type: none"> • Crankshaft Position Sensor • Crankshaft Position Sensor circuit • PCM 	11-85
P0336 (4)	Crankshaft Position Sensor Range/Performance	<ul style="list-style-type: none"> • Crankshaft Position Sensor • Timing belt skipped teeth 	11-85
P0401 (80)	Exhaust Gas Recirculation Insufficient Flow Detected	<ul style="list-style-type: none"> • EGR valve • EGR line 	11-148
P0420 (67)	Catalyst System Efficiency Below Threshold	<ul style="list-style-type: none"> • Three Way Catalytic converter • Secondary HO2S 	11-146



DTC (MIL indication)	Detection Item	Probable Cause	Page
P0501 (17)	Vehicle Speed Sensor Circuit Range/Performance	<ul style="list-style-type: none"> • Vehicle Speed Sensor • Vehicle Speed Sensor circuit • PCM 	11-87
P0505 (14)	Idle Control System Malfunction	<ul style="list-style-type: none"> • IAC valve • Throttle Body 	11-105
P0700 and some of P0715 P0720 P0730 P0740 P0753 P0758 (70)*	Automatic Transaxle	—	Section 14
P1106 (13)	Barometric Pressure Circuit Range/Performance Problem	<ul style="list-style-type: none"> • PCM (Baro sensor) 	11-88
P1107 (13)	Barometric Pressure Circuit Low Input	<ul style="list-style-type: none"> • PCM (Baro sensor) 	11-89
P1108 (13)	Barometric Pressure Circuit High Input	<ul style="list-style-type: none"> • PCM (Baro sensor) 	11-89
P1121 (7)	Throttle Position Lower Than Expected	<ul style="list-style-type: none"> • TP sensor 	11-64
P1122 (7)	Throttle Position Higher Than Expected	<ul style="list-style-type: none"> • TP sensor 	11-65
P1128 (5)	Manifold Absolute Pressure Lower Than Expected	<ul style="list-style-type: none"> • MAP sensor 	11-55
P1129 (5)	Manifold Absolute Pressure Higher Than Expected	<ul style="list-style-type: none"> • MAP sensor 	11-55
P1182 (96)	Fuel Temperature Circuit Low Input	<ul style="list-style-type: none"> • Short in fuel temperature sensor circuit • Fuel injector temperature sensor • PCM 	11-90
P1183 (96)	Fuel Temperature Circuit High Input	<ul style="list-style-type: none"> • Open in fuel temperature sensor circuit • Fuel temperature sensor • PCM 	11-91
P1187 (98)**	Fuel Tank Temperature Circuit Low Input	<ul style="list-style-type: none"> • Short in fuel tank temperature sensor circuit • Fuel tank temperature sensor • PCM 	11-92
P1188 (98)**	Fuel Tank Temperature Circuit High Input	<ul style="list-style-type: none"> • Open in fuel tank temperature sensor circuit • Fuel tank temperature sensor • PCM 	11-93
P1192 (97)**	Fuel Tank Pressure Circuit Low Input	<ul style="list-style-type: none"> • Open or short in fuel tank pressure sensor circuit • Fuel tank pressure sensor • PCM 	11-94
P1193 (97)**	Fuel Tank Pressure Circuit High Input	<ul style="list-style-type: none"> • Open in fuel tank pressure sensor circuit • Fuel tank pressure sensor • PCM 	11-96

*: The  indicator light and the Malfunction Indicator Lamp (MIL) may come on simultaneously.

** : Low fuel indicator light blinks

(cont'd)

Troubleshooting

Diagnostic Trouble Code (DTC) Chart (cont'd)

DTC (MIL indication)	Detection Item	Probable Cause	Page
P1259 (22)	VTEC System Malfunction	<ul style="list-style-type: none"> • VTEC Solenoid Valve • Open or short in VTEC Solenoid Valve circuit • VTEC Pressure Switch • Open or short in VTEC Pressure Switch circuit • PCM 	Section 6
P1297 (20)	Electrical Load Detector Circuit Low Input	<ul style="list-style-type: none"> • Electrical Load Detector • Electrical Load Detector circuit • PCM 	11-97
P1298 (20)	Electrical Load Detector Circuit High Input	<ul style="list-style-type: none"> • Electrical Load Detector • Electrical Load Detector circuit • PCM 	11-98
P1336 (54)	Crankshaft Speed Fluctuation Sensor Intermittent Interruption	<ul style="list-style-type: none"> • CKF sensor 	11-99
P1337 (54)	Crankshaft Speed Fluctuation Sensor No Signal	<ul style="list-style-type: none"> • CKF sensor • CKF sensor circuit • PCM 	11-99
P1359 (8)	Crankshaft Position/Top Dead Center Sensor Disconnected	<ul style="list-style-type: none"> • CKP/TDC sensor circuit 	11-101
P1361 (8)	Top Dead Center Sensor Intermittent Interruption	<ul style="list-style-type: none"> • TDC sensor 	11-85
P1362 (8)	Top Dead Center Sensor No Signal	<ul style="list-style-type: none"> • TDC sensor • TDC sensor circuit • PCM 	11-85
P1381 (9)	Cylinder Position Sensor Intermittent Interruption	<ul style="list-style-type: none"> • CYP sensor 	11-85
P1382 (9)	Cylinder Position Sensor No Signal	<ul style="list-style-type: none"> • CYP sensor • CYP sensor circuit • PCM 	11-85
P1491 (12)	EGR Valve Lift Insufficient Detected	<ul style="list-style-type: none"> • EGR valve (with lift sensor) • EGR valve lift sensor circuit • EGR line • EGR valve circuit • PCM 	11-149
P1498 (12)	EGR Valve Lift Sensor High Voltage	<ul style="list-style-type: none"> • EGR valve (with lift sensor) • EGR valve lift sensor circuit • PCM 	11-152
P1509 (14)	Idle Air Control Valve Circuit Failure	<ul style="list-style-type: none"> • Open or short in IAC valve circuit • IAC valve • PCM 	11-107
P1607 (-)	Powertrain Control Module Internal Circuit Failure A	<ul style="list-style-type: none"> • PCM 	11-102
P1705 P1706 P1753 P1758 P1768 (70)*	Automatic Transaxle	—	Section 14

*: The  indicator light and the Malfunction Indicator Lamp (MIL) may come on simultaneously.



2019-2020

1. The first part of the report is a general introduction to the project, which includes the objectives, the scope of the work, and the organization of the report.

2. The second part of the report is a detailed description of the methodology used in the study, including the data collection methods, the statistical analysis, and the results of the study.

3. The third part of the report is a discussion of the results of the study, which includes a comparison of the findings with the existing literature and a conclusion about the significance of the study.

4. The fourth part of the report is a conclusion, which summarizes the main findings of the study and provides recommendations for future research.

5. The fifth part of the report is a list of references, which includes all the sources used in the study.

6. The sixth part of the report is an appendix, which contains additional information that is not included in the main text of the report.

7. The seventh part of the report is a glossary, which defines the key terms used in the study.

8. The eighth part of the report is a list of figures and tables, which provides a summary of the visual elements of the report.

9. The ninth part of the report is a list of abbreviations, which provides a summary of the abbreviations used in the report.

10. The tenth part of the report is a list of acronyms, which provides a summary of the acronyms used in the report.

11. The eleventh part of the report is a list of symbols, which provides a summary of the symbols used in the report.

12. The twelfth part of the report is a list of units, which provides a summary of the units used in the report.

13. The thirteenth part of the report is a list of variables, which provides a summary of the variables used in the report.

14. The fourteenth part of the report is a list of parameters, which provides a summary of the parameters used in the report.

15. The fifteenth part of the report is a list of constants, which provides a summary of the constants used in the report.

16. The sixteenth part of the report is a list of functions, which provides a summary of the functions used in the report.

17. The seventeenth part of the report is a list of operators, which provides a summary of the operators used in the report.

18. The eighteenth part of the report is a list of keywords, which provides a summary of the keywords used in the report.

Troubleshooting

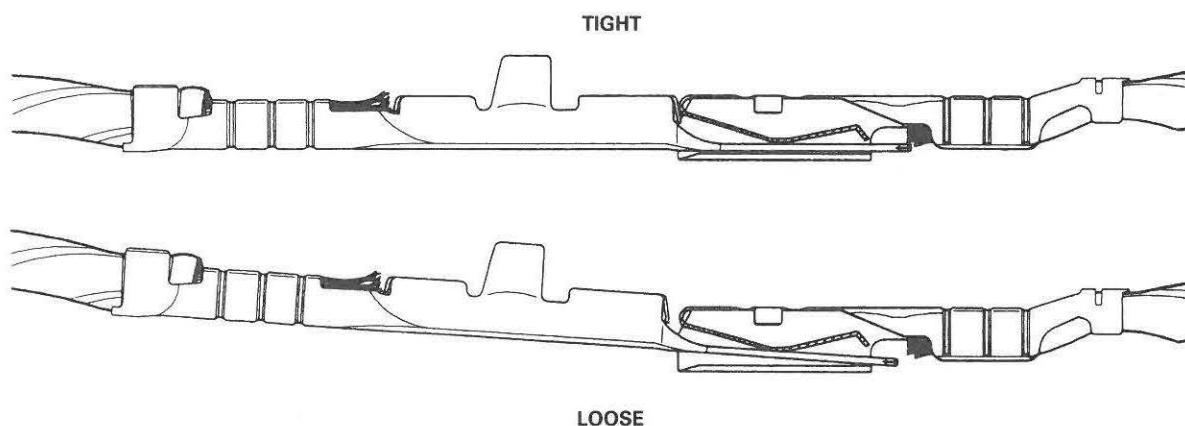
How to Read Flowcharts

A flowchart is designed to be used from start to final repair. It's like a map showing you the shortest distance. Do not go off the "map" anywhere except after a "stop" symbol, or you can easily get lost.

START (bold type)	Describes the conditions or situation to start a troubleshooting flowchart.
ACTION	Asks you to do something; perform a test, set up a condition etc.
DECISION	Asks you about the result of an action, then sends you in the appropriate troubleshooting direction.
STOP (bold type)	The end of a series of actions and decisions, describes a final repair action and sometimes directs you to an earlier part of the flowchart to confirm your repair.

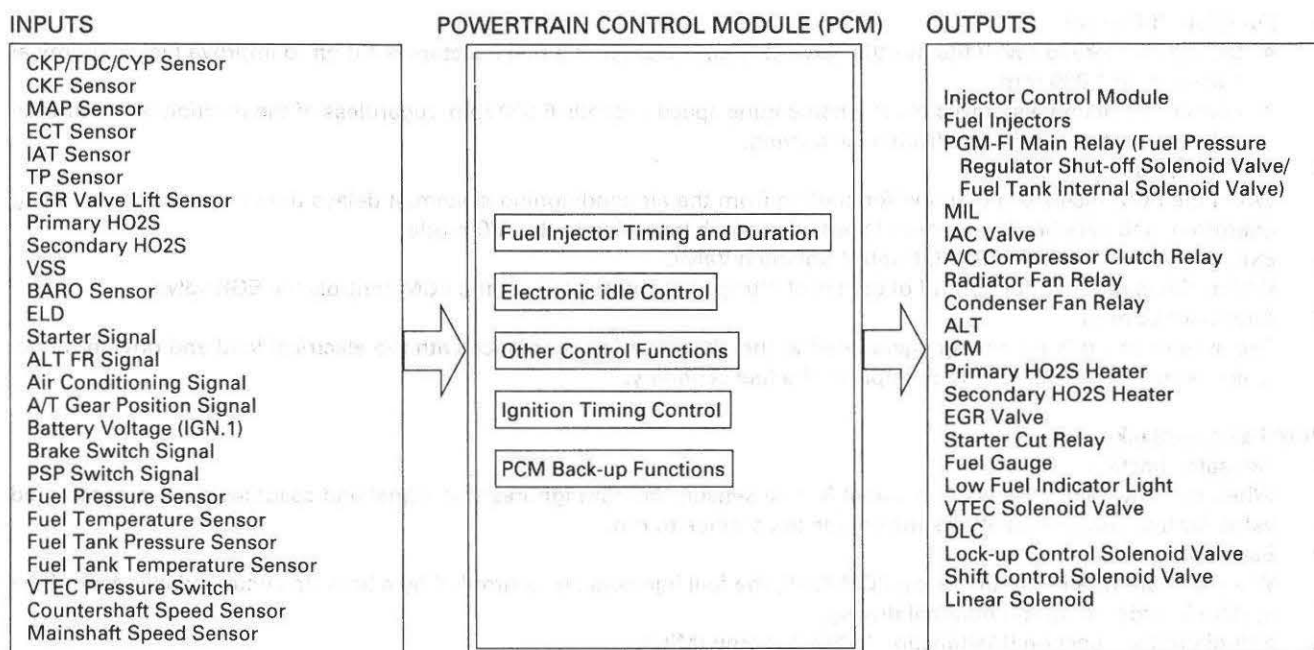
NOTE:

- The term "Intermittent Failure" is used in these charts. It simply means a system may have had a failure, but it checks out OK at this time. If the Malfunction Indicator Lamp (MIL) on the dash does not come on, check for poor connections or loose wires at all connectors related to the circuit that you are troubleshooting (see illustration below).
- Most of the troubleshooting flowcharts have you reset the Powertrain Control Module (PCM) and try to duplicate the Diagnostic Trouble Code (DTC). If the problem is intermittent and you can't duplicate the code, do not continue through the flowchart. To do so will only result in confusion and, possibly, a needlessly replaced PCM.
- "Open" and "Short" are common electrical terms. An open is a break in a wire or at a connection. A short is an accidental connection of a wire to ground or to another wire. In simple electronics, this usually means something won't work at all. In complex electronics (like PCM's), this can sometimes mean something works, but not the way it's supposed to.





System Description



PGM-FI System

The PGM-FI system on this model is a sequential multiport fuel injection system.

Fuel injector Timing and Duration

The PCM contains memories for the basic discharge durations at various engine speeds and manifold air flow rates. The basic discharge duration, after being read out from the memory, is further modified by signals sent from various sensors to obtain the final discharge duration.

Idle Air Control

Idle Air Control Valve (IAC Valve)

When the engine is cold, the A/C compressor is on, the transmission is in gear, the brake pedal is depressed, the P/S load is high, or the alternator is charging, the PCM controls current to the IAC Valve to maintain the correct idle speed.

Ignition Timing Control

The PCM contains data for basic ignition timing at various engine speeds and manifold air flow rates. Ignition timing is also adjusted for engine coolant temperature.

Other Control Functions

1. Starting Control

When the engine is started, the PCM and injector control module provides a rich mixture by increasing fuel injector duration.
2. Fuel pressure regulator shut-off solenoid valve/fuel tank internal solenoid valve control
 - When the ignition switch is initially turned on, the PCM supplies ground to the PGM-FI main relay that supplies current to the fuel pressure regulator shut-off solenoid valve/fuel tank internal solenoid valve for two seconds to pressurize the fuel system.
 - When the engine is running, the PCM supplies ground to the PGM-FI main relay that supplies current to the fuel pressure regulator shut-off solenoid valve/fuel tank internal solenoid valve.
 - When the engine is not running and the ignition is on, the PCM cuts ground to the PGM-FI main relay which cuts current to the fuel pressure regulator shut-off solenoid valve/fuel tank internal solenoid valve.

(cont'd)

System Description (cont'd)

3. Fuel Cut-off Control
 - During deceleration with the throttle valve closed, current to the fuel injectors is cut off to improve fuel economy at speeds over 1,000 rpm.
 - Fuel cut-off action also takes place when engine speed exceeds 6,900 rpm, regardless of the position of the throttle valve, to protect the engine from over-revving.
4. A/C Compressor Clutch Relay

When the PCM receives a demand for cooling from the air conditioning system, it delays the compressor from being energized, and enriches the mixture to assure smooth transition to the A/C mode.
5. Exhaust Gas Recirculation (EGR) Control Solenoid Valve.

When EGR is required for control of oxides of nitrogen (NOx) emissions, the PCM controls the EGR valve.
6. Alternator Control

The system controls the voltage generated at the alternator in accordance with the electrical load and driving mode, which reduces the engine load to improve the fuel economy.

PCM Fail-safe/Back-up Functions

1. Fail-safe Function

When an abnormality occurs in a signal from a sensor, the PCM ignores that signal and assumes a pre-programmed value for that sensor that allows the engine to continue to run.
2. Back-up Function

When an abnormality occurs in the PCM itself, the fuel injectors are controlled by a back-up circuit independent of the system in order to permit minimal driving.
3. Self-diagnosis Function [Malfunction Indicator Lamp (MIL)]

When an abnormality occurs in a signal from a sensor, the PCM supplies ground for the MIL and stores the DTC in erasable memory. When the ignition is initially turned ON (II), the PCM supplies ground for the MIL for two seconds to check the MIL bulb condition.
4. Low fuel Indicator light

The PCM lights the low fuel indicator light and informs the driver that the fuel level is low.
The PCM calculates the gas quantity in the fuel tank by using the fuel pressure value detected by the fuel tank pressure sensor and the fuel temperature value detected by the fuel tank temperature sensor, and outputs the signal to the gauge assembly.
When the PCM detects a malfunction of the fuel tank pressure sensor and/or fuel tank temperature sensor, the PCM blinks the low fuel indicator light and causes the fuel gauge to read empty.
When the PCM detects a gas leak, the PCM blinks the low fuel indicator light and reduces the fuel meter to 0.
If the engine is stopped while the low fuel indicator light is blinking, the engine will not start until the PCM is reset.
5. Two Trip Detection Method

To prevent false indications, the Two Trip Detection Method is used for the HO2S, fuel metering-related, idle control system, ECT sensor and EGR system self-diagnostic functions. When an abnormality occurs, the PCM stores it in its memory. When the same abnormality recurs after the ignition switch is turned OFF and ON (II) again, the PCM informs the driver by lighting the MIL. However, to ease troubleshooting, this function is cancelled when you jump the service check connector. The MIL will then blink immediately when an abnormality occurs.
6. Two (or Three) Driving Cycle Detection Method

A "Driving Cycle" consists of starting the engine, beginning closed loop operation, and stopping the engine. If misfiring that increases emissions is detected during two consecutive driving cycles, or TWC deterioration is detected during three consecutive driving cycles, the PCM turns the MIL on. However, to ease troubleshooting, this function is cancelled when you jump the service check connector. The MIL will then blink immediately when an abnormality occurs.

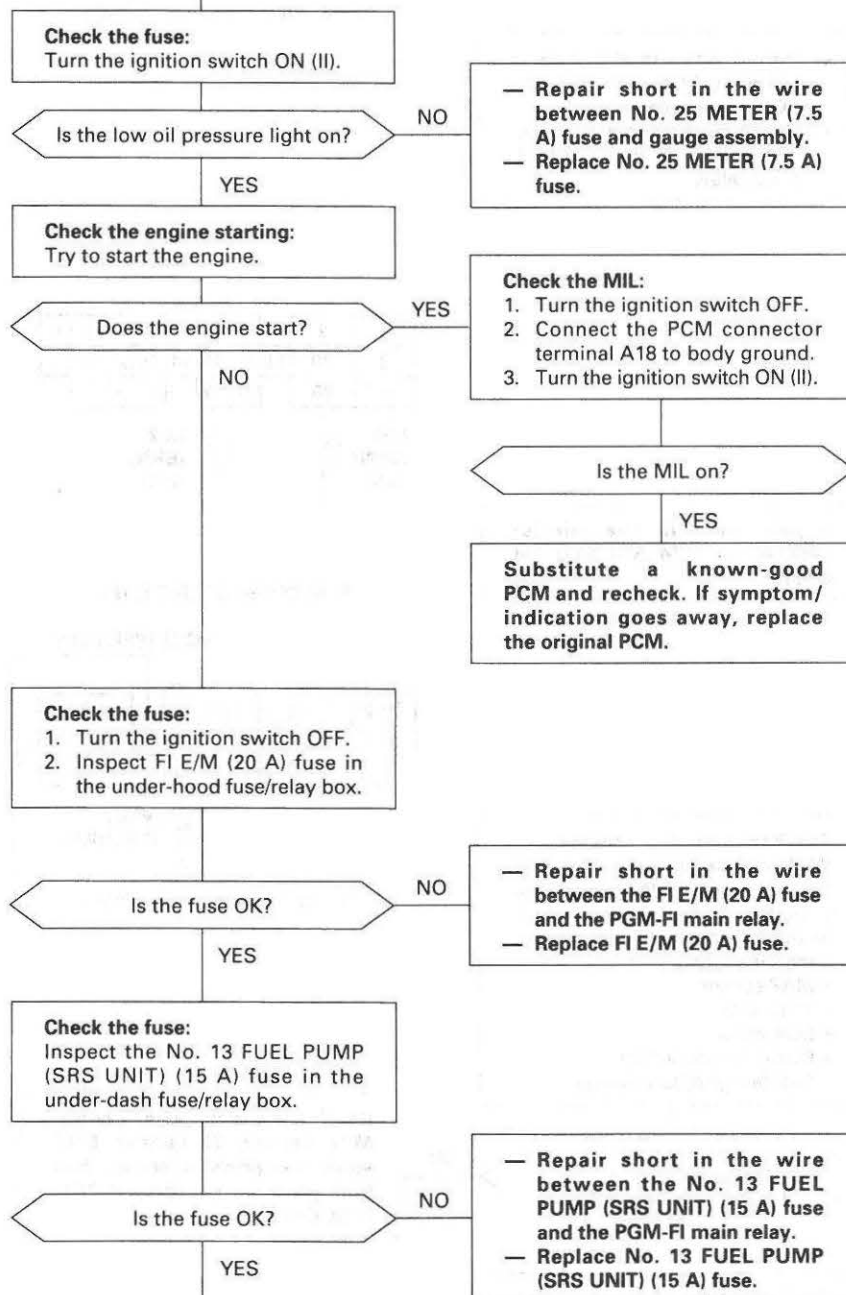


Powertrain Control Module (PCM)

The Malfunction Indicator Lamp (MIL) never comes on (even for two seconds) after ignition is turned ON (II).

NOTE:

- If this symptom is intermittent, check for:
 - A loose FI E/M (20 A) fuse in the under-hood fuse/relay box
 - A loose No. 25 METER (7.5 A) fuse in the under-dash fuse/relay box
 - A loose No. 13 FUEL PUMP (SRS UNIT) (15 A) fuse in the under-dash fuse/relay box
 - An intermittent short in the wire between the PCM (A18) and the gauge assembly
 - An intermittent short in the wire between the PCM (C19) and the MAP sensor
 - An intermittent short in the wire between the PCM (C28), the TP sensor, the EGR valve lift sensor, the fuel pressure sensor and/or fuel tank pressure sensor
 - PGM-FI main relay



PCM CONNECTOR A (32P)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
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MIL
(GRN/ORN)

JUMPER WIRE

Wire side of female terminals

- Replace the MIL bulb.
- Repair open wire between the PCM (A18) and the gauge assembly.

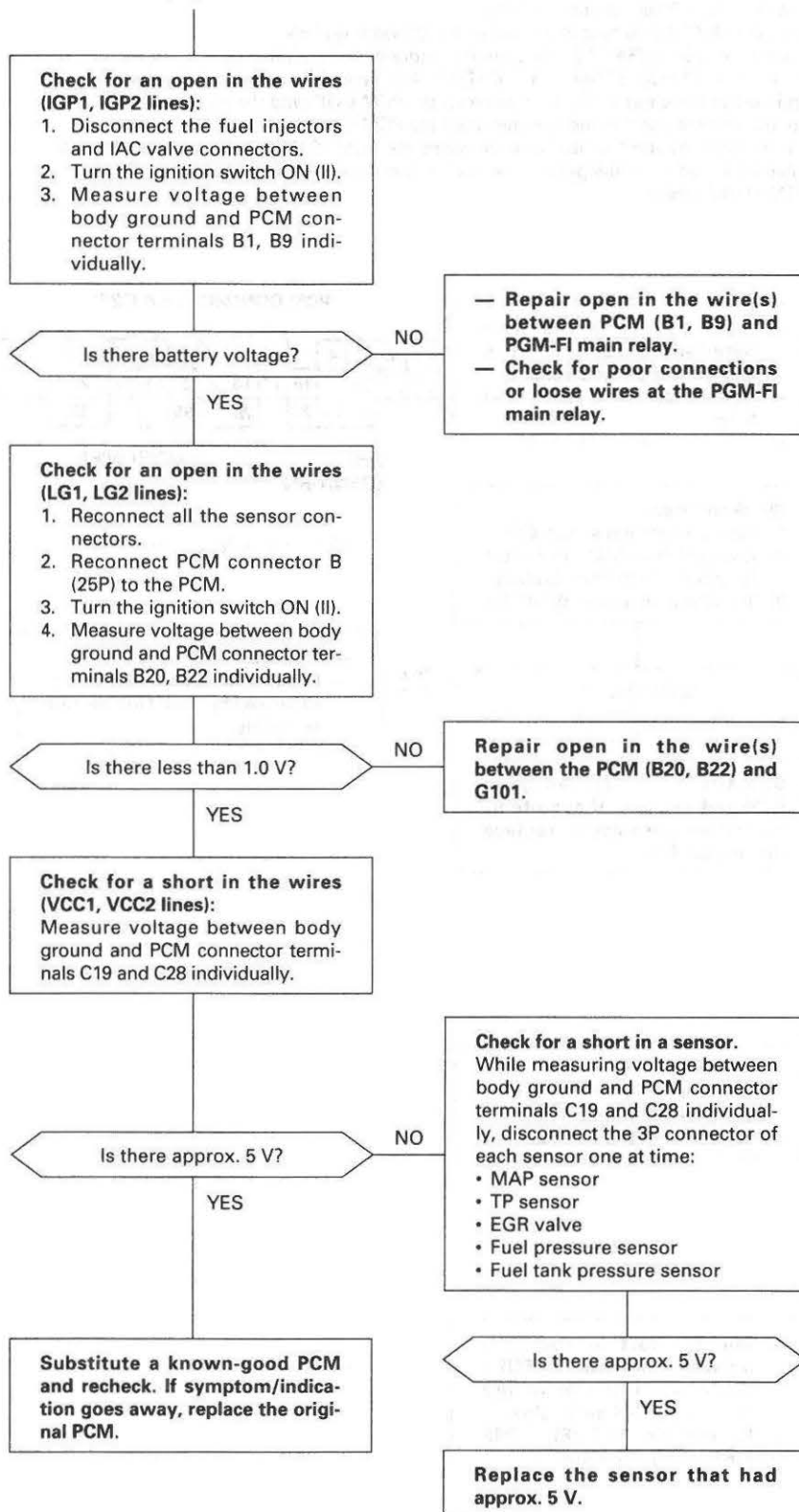
(To page 11-48)

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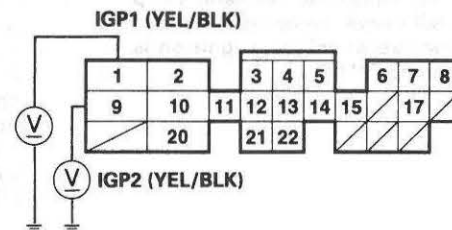
PGM-FI System

Powertrain Control Module (PCM) (cont'd)

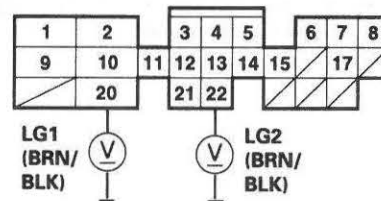
(From page 11-47)



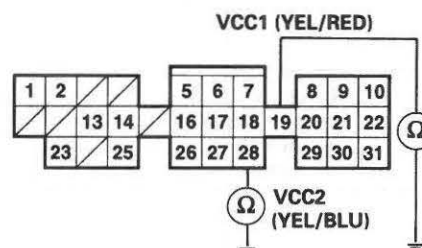
PCM CONNECTOR B (25P)



Wire side of female terminals



PCM CONNECTOR C (31P)



Wire side of female terminals



The Malfunction Indicator Lamp (MIL) stays on or comes on after two seconds.

NOTE:

- When there is no Diagnostic Trouble Code (DTC) stored, the MIL will stay on if the SCS service connector is connected and the ignition switch is ON (II).
- If this symptom is intermittent, check for:
 - An intermittent short in the wire between the PCM (A10) and the service check connector.
 - An intermittent short in the wire between the PCM (A18) and the gauge assembly.

Check the DTC by MIL indication:
 1. Turn the ignition switch OFF.
 2. Connect the SCS service connector to the service check connector.
 3. Turn the ignition switch ON (II).

Does the MIL indicate any DTC? **YES** → Go to troubleshooting procedures (see page 11-39).

NO

Check the engine starting:
 1. Remove the SCS service connector from the service check connector.
 2. Try to start the engine.

Does the engine start? **NO** → Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

YES

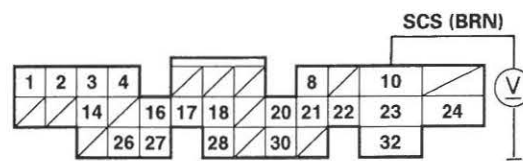
Check for a short in the wire (SCS line):
 1. Turn the ignition switch OFF and turn the ignition switch ON (II).
 2. Measure voltage between body ground and the PCM connector terminal A10.

Is there battery voltage? **NO** → Repair short to body ground in the wire between PCM (A10) and service check connector.

YES

(To page 11-50)

PCM CONNECTOR A (32P)



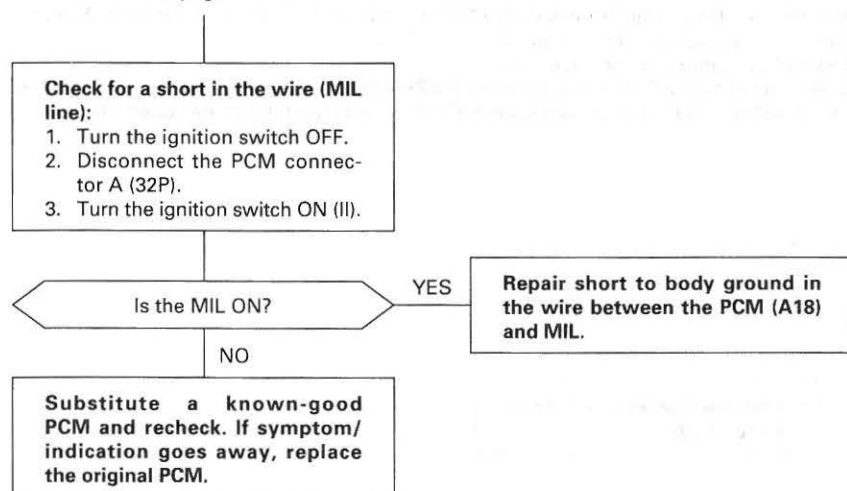
Wire side of female terminals

(cont'd)

PGM-FI System

Powertrain Control Module (PCM) (cont'd)

(From page 11-49)





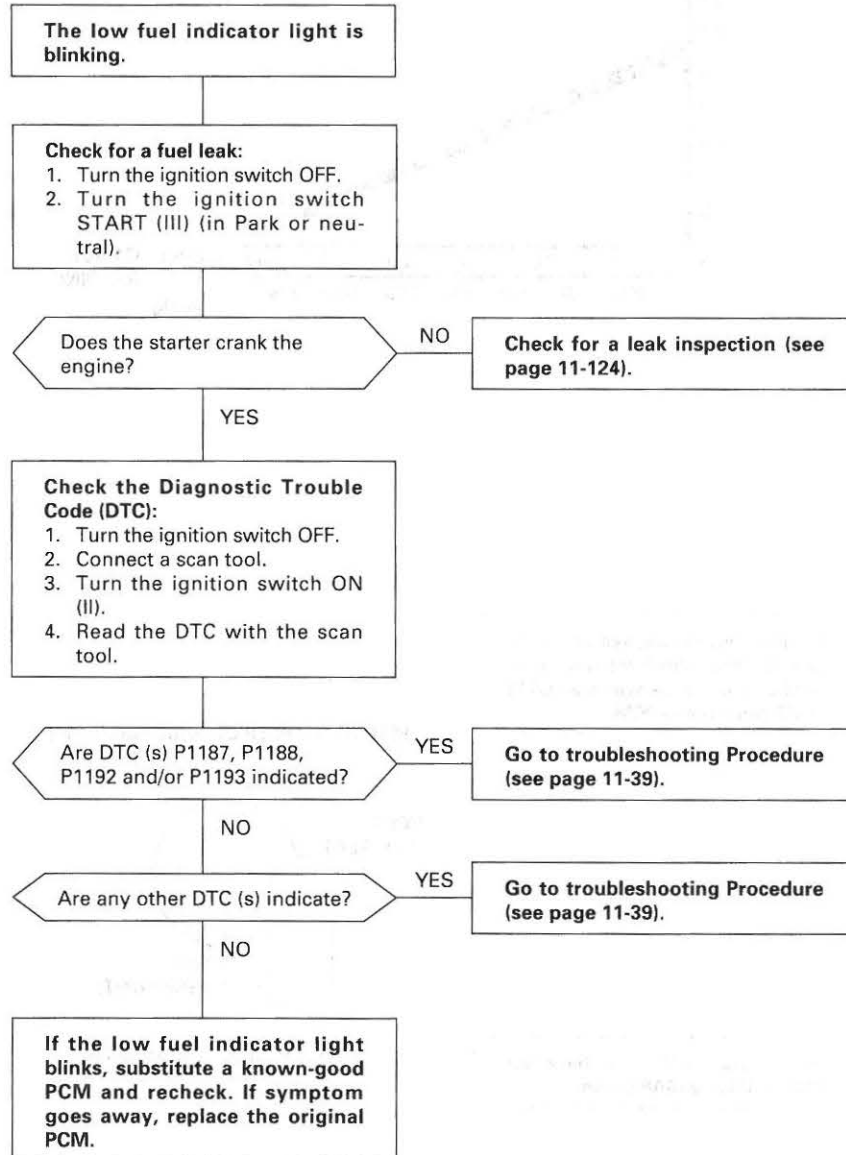
Low Fuel Indicator Light

Description

The low fuel indicator light turns on when the fuel level is low.

The low fuel indicator light blinks when a problem is detected with the fuel tank pressure sensor or the fuel tank temperature sensor.

NOTE: If a fuel leak is detected, the fuel pressure regulator shut-off solenoid valve/fuel tank internal solenoid valve will not reopen until the PCM is reset.

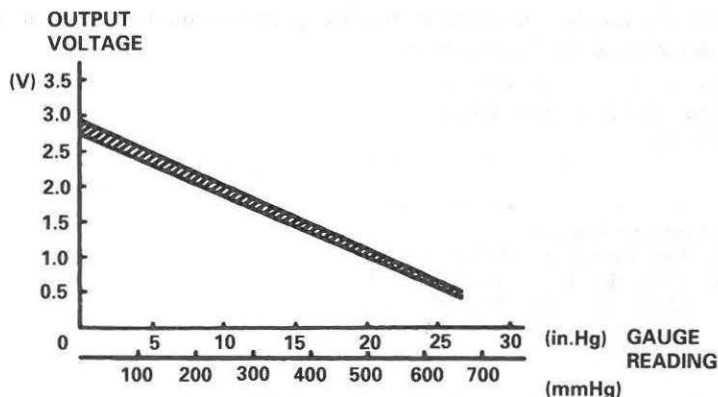
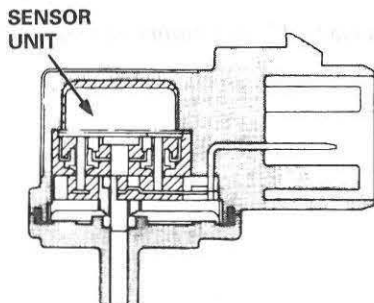


PGM-FI System

Manifold Absolute Pressure (MAP) Sensor

P0107 The scan tool indicates Diagnostic Trouble Code (DTC) P0107: A low voltage (high vacuum) problem in the Manifold Absolute Pressure (MAP) sensor.

The MAP sensor converts manifold absolute pressure into electrical signals and inputs those signals into the PCM.



— The MIL has been reported on.
— DTC P0107 is stored.

Problem verification:

1. Turn the ignition switch ON (II).
2. Check the MAP with the scan tool.

Is approx. 101 kPa (760 mmHg, 30 in.Hg) indicated?

YES

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C111 (MAP sensor) and PCM.

NO

Check for an open in wire (VCC1 line):

1. Turn the ignition switch OFF.
2. Disconnect the MAP sensor 3P connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between the MAP sensor connector No. 1 terminal and No. 2 terminal.

Is there approx. 5 V?

NO

Repair open in the wire between PCM (C19) and MAP sensor.

YES

Check for an open or short in the MAP sensor:
Check the MAP with the scan tool.

Is 2 kPa (15 mmHg, 0.6 in.Hg) or less indicated?

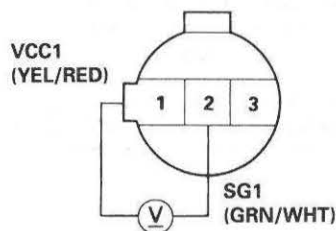
NO

Replace the MAP sensor.

YES

(To page 11-53)

MAP SENSOR 3P CONNECTOR (C111)



Wire side of female terminals



(From page 11-52)

Check for a short in the wire (MAP line):

1. Turn the ignition switch OFF.
2. Disconnect the PCM connector C (31P).
3. Check for continuity between the MAP sensor connector No. 3 terminal and body ground.

Is there continuity?

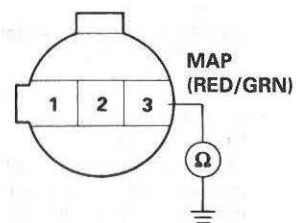
YES

Repair short in the wire between PCM (C17) and MAP sensor.

NO

Substitute a known-good PCM and recheck. If normal MAP is indicated, replace the original PCM.

MAP SENSOR 3P CONNECTOR (C111)



Wire side of female terminals

(cont'd)

PGM-FI System

Manifold Absolute Pressure (MAP) Sensor (cont'd)

P0108

The scan tool indicates Diagnostic Trouble Code (DTC) P0108: A high voltage (low vacuum) problem in the Manifold Absolute Pressure (MAP) sensor.

- The MIL has been reported on.
- DTC P0108 is stored.

Problem verification:

1. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
2. Check the MAP with the scan tool.

Is 101 kPa (760 mmHg, 30.0 in.Hg) or higher indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C111 (MAP sensor) and PCM.

YES

Check for an open in the MAP sensor:

1. Turn the ignition switch OFF.
2. Disconnect the MAP sensor 3P connector.
3. Install a jumper wire between the MAP sensor 3P connector terminals No. 3 and No. 2.
4. Turn the ignition switch ON (II).
5. Check the MAP with the scan tool.

Is 101 kPa (760 mmHg, 30.0 in.Hg) or higher indicated?

NO

Replace the MAP sensor.

YES

Check for an open in wire (SG1 line):

1. Remove the jumper wire.
2. Measure voltage between the MAP sensor 3P connector terminals No. 1 and No. 2.

Is there approx. 5 V?

NO

Repair open in the wire between PCM (C7) and MAP sensor.

YES

Check for an open in the wire (MAP line):

1. Turn the ignition switch OFF.
2. Connect the PCM connector terminals C7 and C17 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the MAP with the scan tool.

Is 101 kPa (760 mmHg, 30.0 in.Hg) or higher indicated?

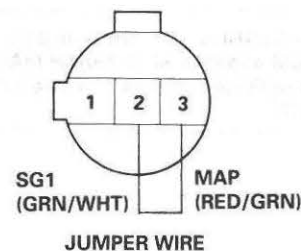
NO

Repair open in the wires between PCM (C17) and MAP sensor.

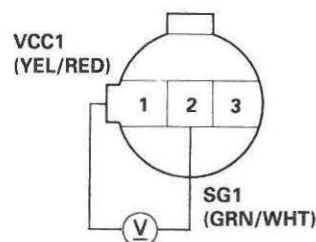
YES

Substitute a known-good PCM and recheck. If normal MAP is indicated, replace the original PCM.

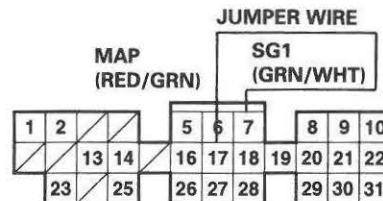
MAP SENSOR 3P CONNECTOR (C111)



Wire side of female terminals



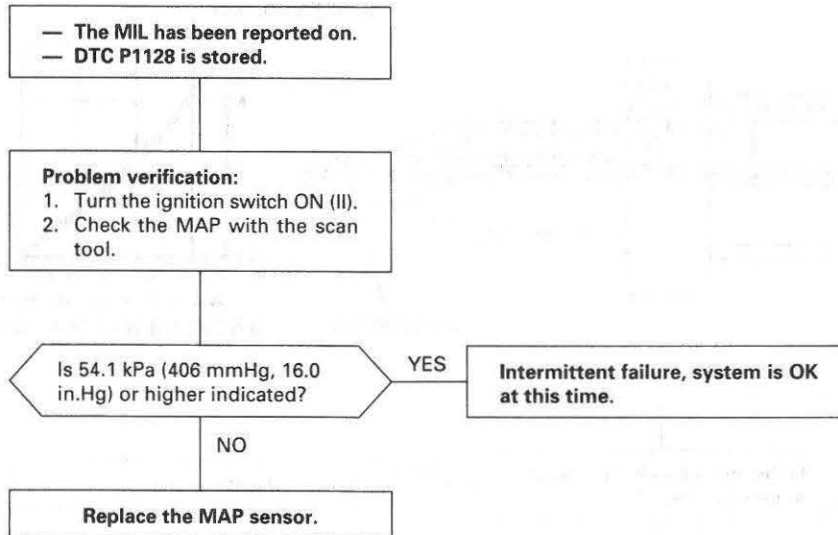
PCM CONNECTOR C (31P)



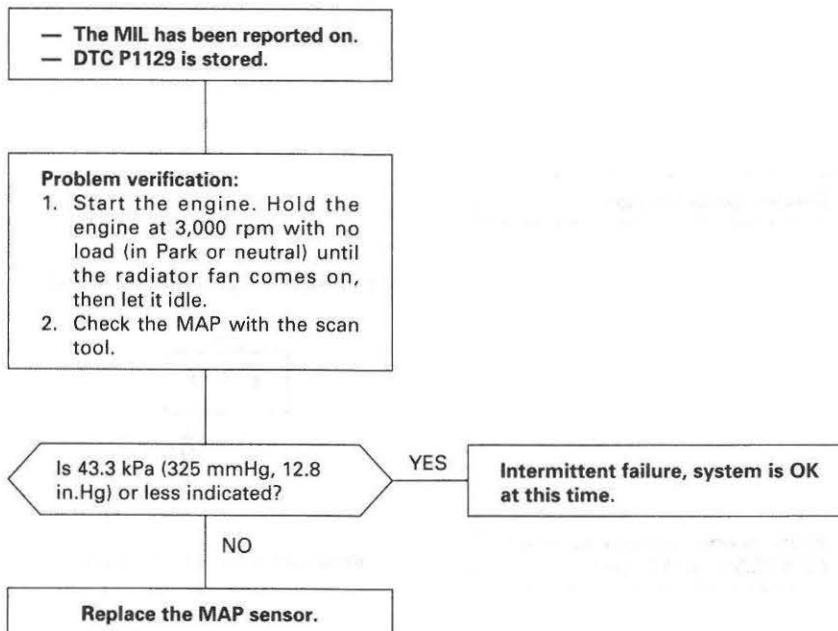
Wire side of female terminals



P1128 The scan tool indicates Diagnostic Trouble Code (DTC) P1128: Manifold Absolute Pressure (MAP) lower than expected.



P1129 The scan tool indicates Diagnostic Trouble Code (DTC) P1129: Manifold Absolute Pressure (MAP) higher than expected.



PGM-FI System

Intake Air Temperature (IAT) Sensor

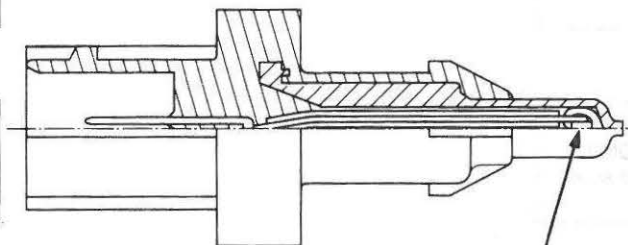
P0112

The scan tool indicates Diagnostic Trouble Code (DTC) P0112: A low voltage (high temperature) problem in the Intake Air Temperature (IAT) sensor circuit.

- The MIL has been reported on.
- DTC P0112 is stored.

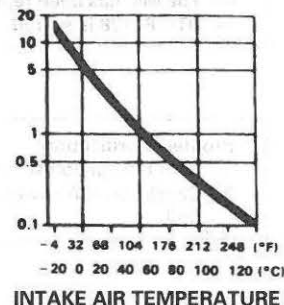
Problem verification:

1. Turn the ignition switch ON (II).
2. Check the IAT with the scan tool.



THERMISTOR

RESISTANCE (kΩ)



INTAKE AIR TEMPERATURE

Is 302°F (150°C) or higher (or H-Limit*1) indicated?

NO

YES

Is the correct ambient temperature indicated*2?

NO

Replace the IAT sensor.

YES

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C112 (IAT sensor) and PCM.

Check for a short in the IAT sensor:

1. Disconnect the IAT sensor connector.
2. Check the IAT with the scan tool.

Is 302°F (150°C) or higher (or H-Limit*1) indicated?

NO

Replace the IAT sensor.

YES

Check for a short in the wire (IAT line):

1. Turn the ignition switch OFF.
2. Disconnect the PCM connector C (31P).
3. Check for continuity between the IAT sensor 2P connector terminal No. 2 and body ground.

Is there continuity?

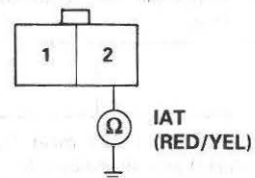
YES

Repair short in the wire between PCM (C25) and IAT sensor.

NO

Substitute a known-good PCM and recheck. If normal IAT is indicated, replace the original PCM.

IAT SENSOR 2P CONNECTOR (C112)



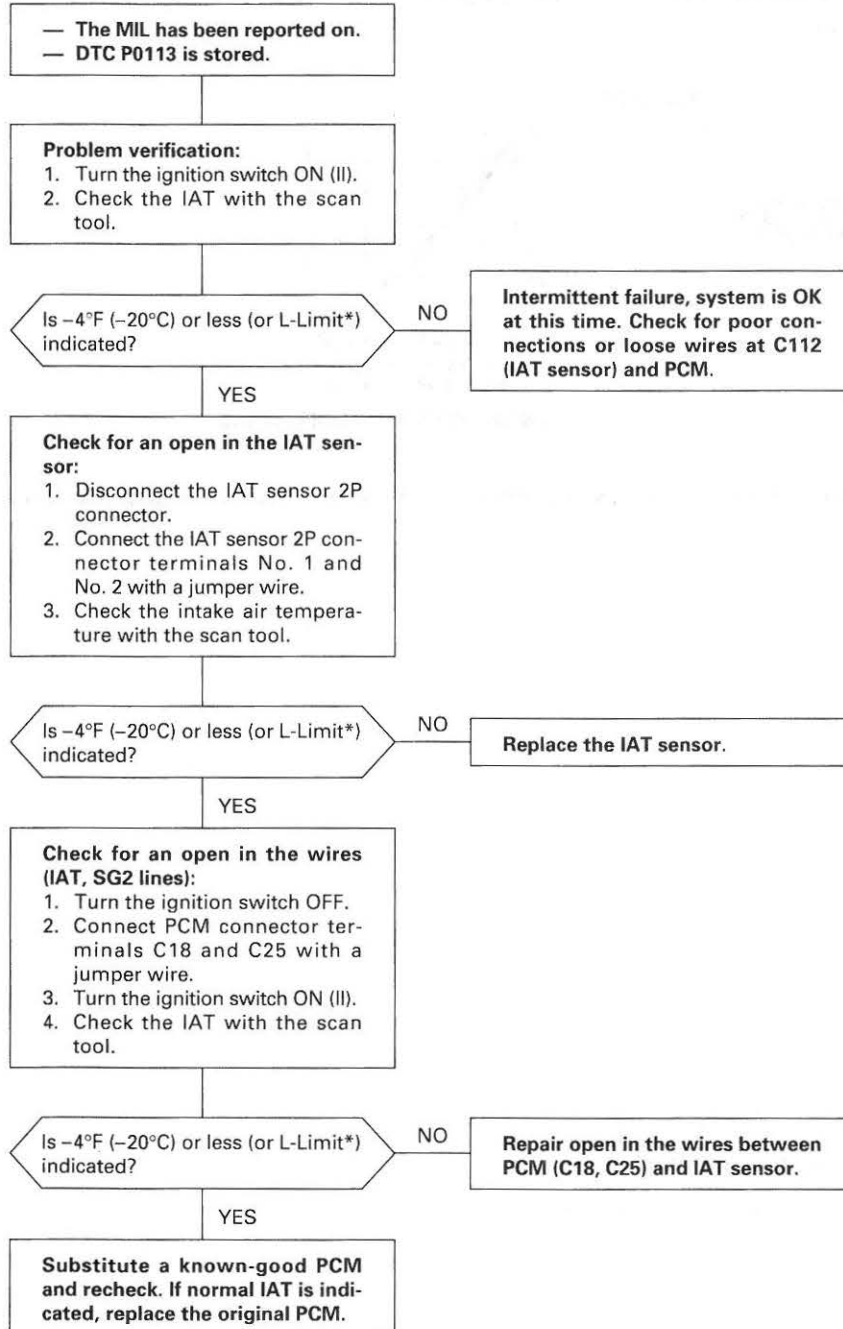
Wire side of female terminals

*1: With Honda PGM Tester in Honda mode.

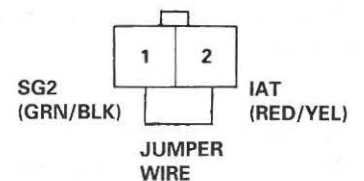
*2: If the engine is warm, it will be higher than ambient temperature.



P0113 The scan tool indicates Diagnostic Trouble Code (DTC) P0113: A high voltage (low temperature) problem in the Intake Air Temperature (IAT) sensor circuit.

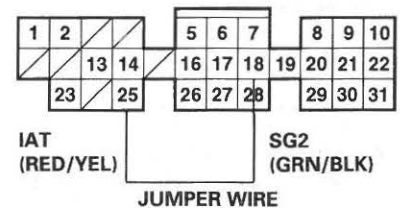


IAT SENSOR 2P CONNECTOR (C112)



Wire side of female terminals

PCM CONNECTOR C (31P)



Wire side of female terminals

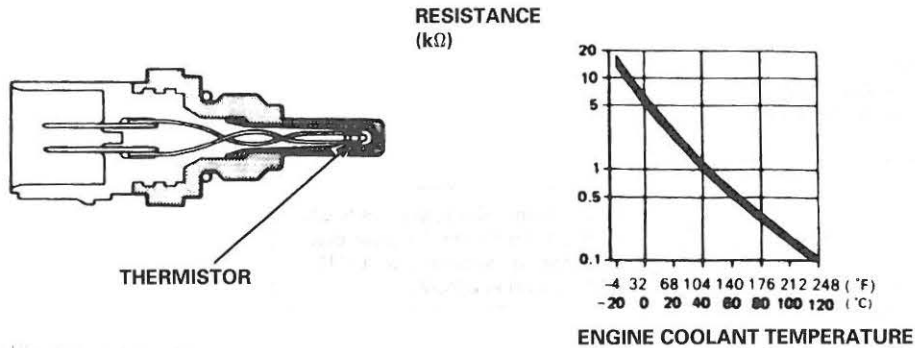
*: With Honda PGM Tester in Honda mode.

PGM-FI System

Engine Coolant Temperature (ECT) Sensor

P0116 The scan tool indicates Diagnostic Trouble Code (DTC) P0116: A range/performance problem in the Engine Coolant Temperature (ECT) Sensor circuit.

The ECT Sensor is a temperature dependent resistor (thermistor). The resistance of the thermistor decreases as the engine coolant temperature increases as shown below.

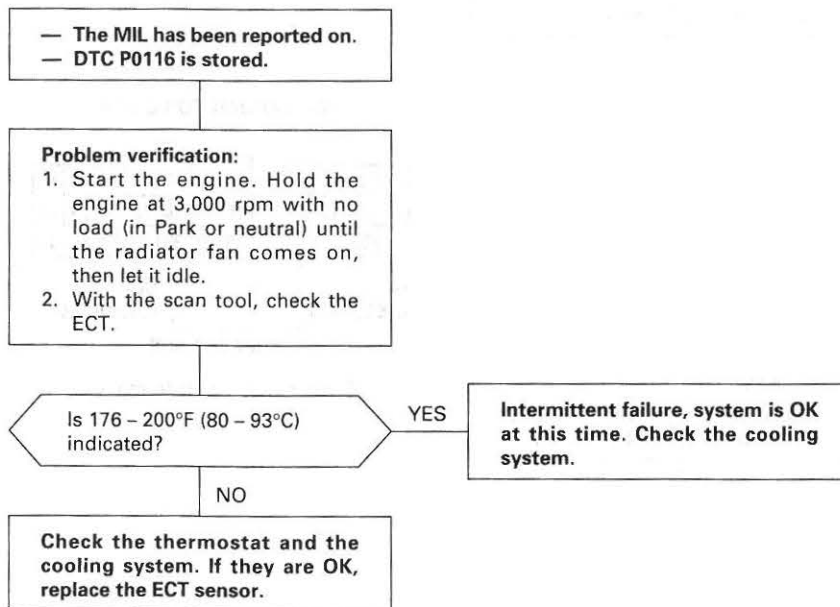


NOTE: If DTC P0117 and/or P0118 are stored at the same time as DTC P0116, troubleshoot those DTCs first, then troubleshoot DTC P0116.

Possible Cause

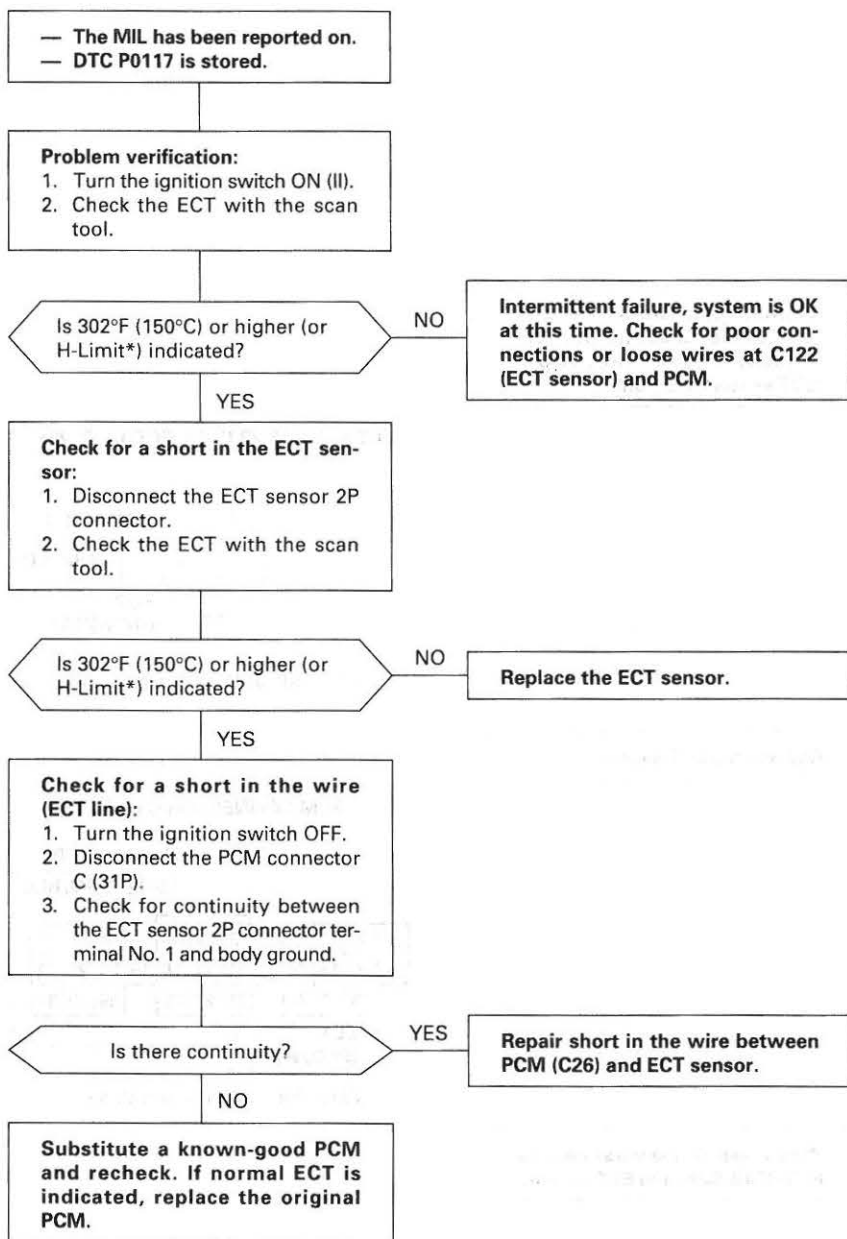
- ECT sensor deterioration
- Malfunction in the cooling system

Troubleshooting Flowchart

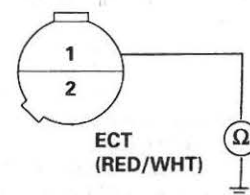




P0117 The scan tool indicates Diagnostic Trouble Code (DTC) P0117: A low voltage (high temperature) problem in the Engine Coolant Temperature (ECT) sensor circuit.



ECT SENSOR 2P CONNECTOR (C122)



Wire side of female terminals

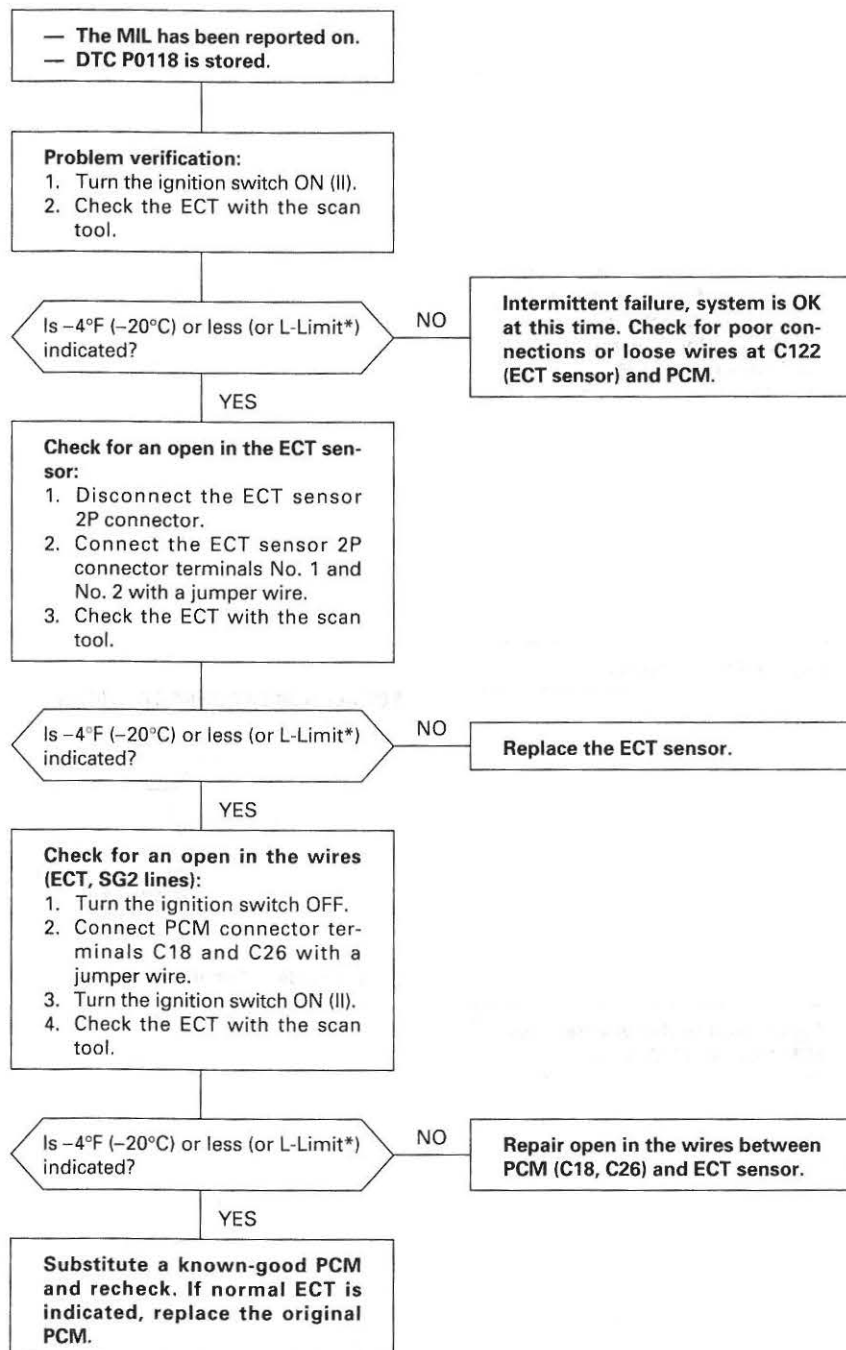
*: With Honda PGM Tester in Honda mode.

(cont'd)

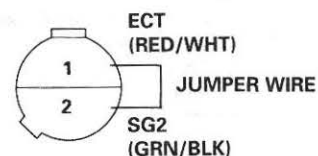
PGM-FI System

Engine Coolant Temperature (ECT) Sensor (cont'd)

P0118 The scan tool indicates Diagnostic Trouble Code (DTC) P0118: A high voltage (low temperature) problem in the Engine Coolant Temperature (ECT) sensor circuit.

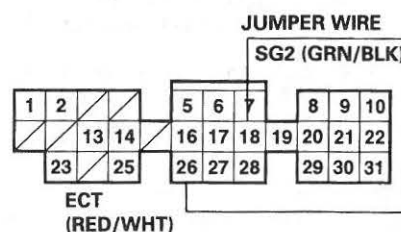


ECT SENSOR 2P CONNECTOR (C122)



Wire side of female terminals

PCM CONNECTOR C (31P)



Wire side of female terminals

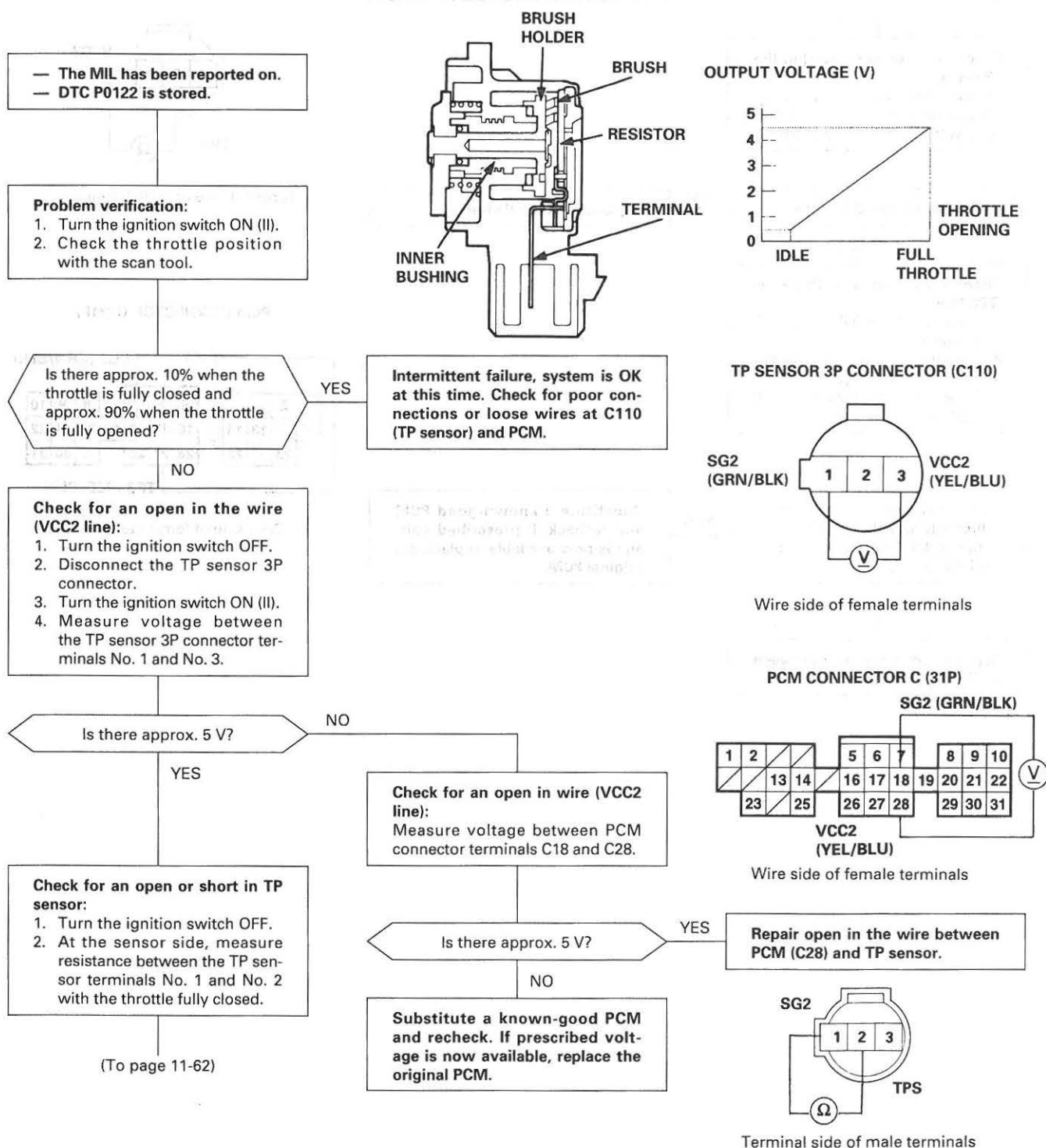
*: With Honda PGM Tester in Honda mode.



Throttle Position (TP) Sensor

P0122 The scan tool indicates Diagnostic Trouble Code (DTC) P0122: A low voltage problem in the Throttle Position (TP) sensor circuit.

The TP Sensor is a potentiometer. It is connected to the throttle valve shaft. As the throttle position changes, the throttle position sensor varies the voltage signal to the PCM.

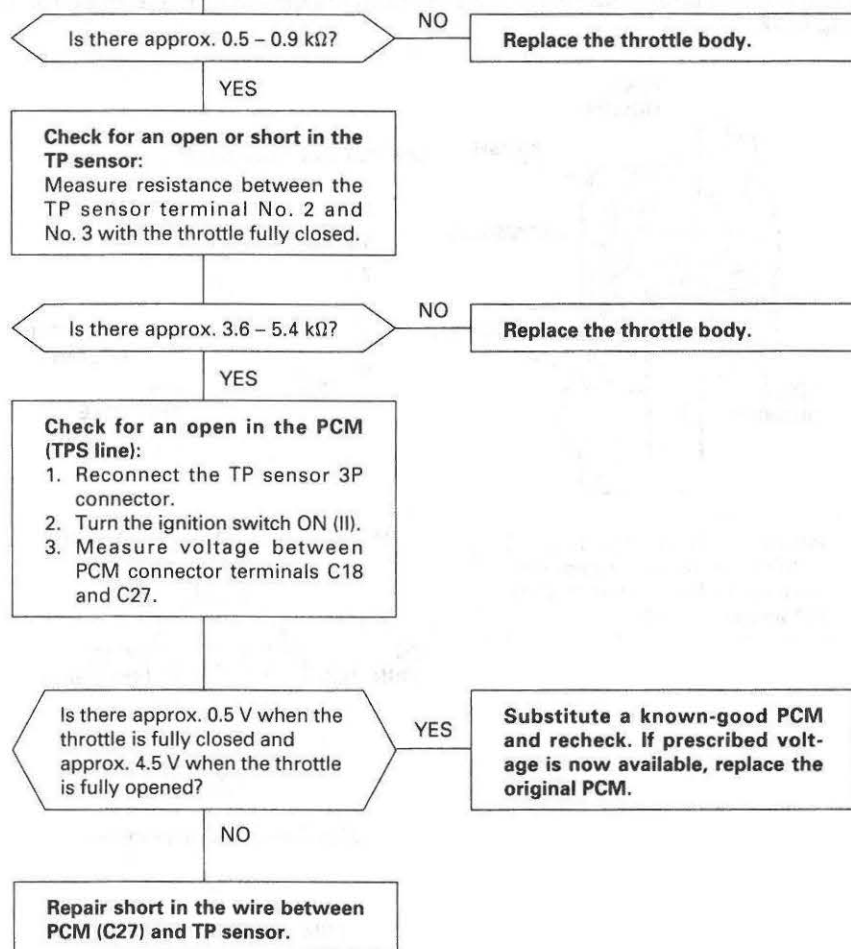


(cont'd)

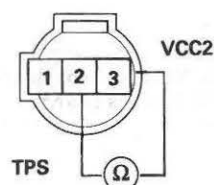
PGM-FI System

Throttle Position (TP) Sensor (cont'd)

(From page 11-61)

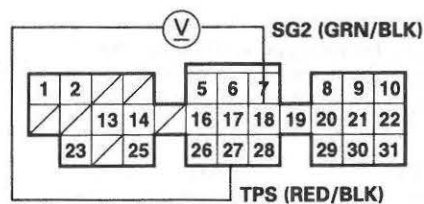


TP SENSOR 3P CONNECTOR



Terminal side of male terminals

PCM CONNECTOR C (31P)



Wire side of female terminals



P0123

The scan tool indicates Diagnostic Trouble Code (DTC) P0123: A high voltage problem in the Throttle Position (TP) sensor circuit.

- The MIL has been reported on.
- DTC P0123 is stored.

Problem verification:

1. Turn the ignition switch ON (II).
2. Check the throttle position with the scan tool.

Is there approx. 10% when the throttle is fully closed and approx. 90% when the throttle is fully opened?

YES

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C110 (TP sensor) and PCM.

NO

Check for an open in the TP sensor:

1. Turn the ignition switch OFF.
2. Disconnect the TP sensor 3P connector.
3. Turn the ignition switch ON (II).
4. At the harness side, measure voltage between the TP sensor 3P connector terminals No. 1 and No. 3.

Is there approx. 5 V?

YES

Replace the throttle body.

NO

Check for an open in the wire (SG2 line):

Measure voltage between PCM connector terminals C18 and C28.

Is there approx. 5 V?

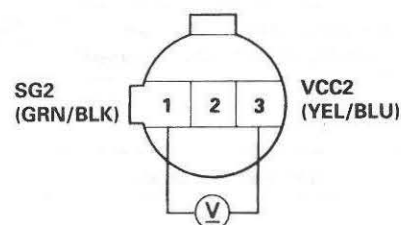
YES

Repair open in the wire between PCM (C18) and TP sensor.

NO

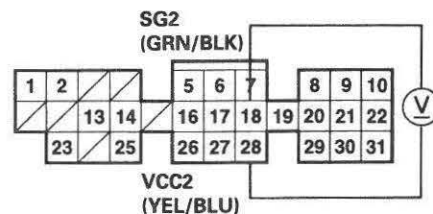
Substitute a known-good PCM and recheck. If prescribed voltage is now available, replace the original PCM.

TP SENSOR 3P CONNECTOR (C110)



Wire side of female terminals

PCM CONNECTOR C (31P)



Wire side of female terminals

(cont'd)

PGM-FI System

Throttle Position (TP) Sensor (cont'd)

P1121 The scan tool indicates Diagnostic Trouble Code (DTC) P1121: Throttle Position (TP) lower than expected.

- The MIL has been reported on.
- DTC P1121 is stored.

Problem verification:

1. Turn the ignition switch ON (II).
2. Check the throttle position with the scan tool.

Is 12.2 % or higher indicated when the throttle is fully opened?

YES

Intermittent failure, system is OK at this time.

NO

Replace the TP sensor.



P1122 The scan tool indicates Diagnostic Trouble Code (DTC) P1122: Throttle Position (TP) higher than expected.

- The MIL has been reported on.
- DTC P1122 is stored.

Problem verification:

1. Turn the ignition switch ON (II).
2. Check the throttle position with the scan tool.

Is 16.5 % or less indicated when the throttle is fully closed?

YES

Intermittent failure, system is OK at this time.

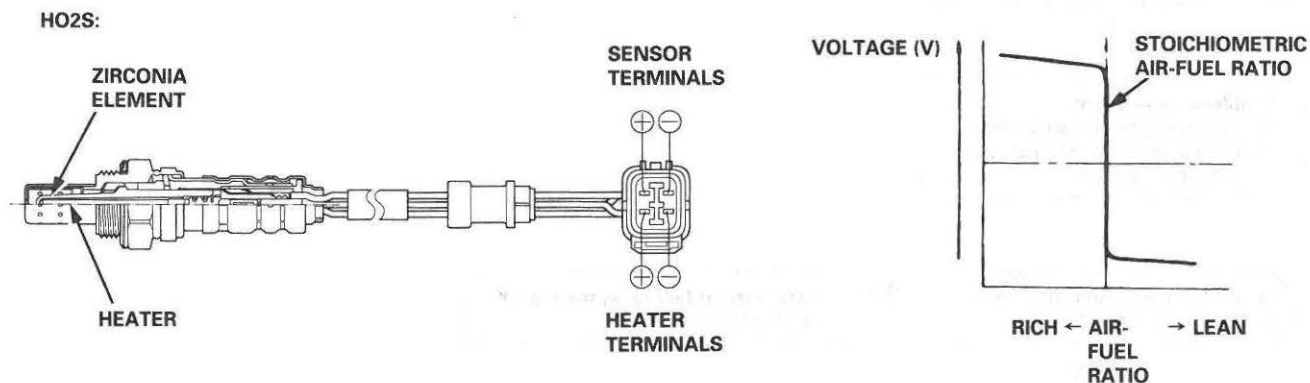
NO

Replace the TP sensor.

PGM-FI System

Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1)

The Heated Oxygen Sensor (HO2S) detects the oxygen content in the exhaust gas and signals the PCM. In operation, the PCM receives the signals from the sensor and varies the duration during which fuel is injected. To stabilize the sensor's output, the sensor has an internal heater. The Primary HO2S (Sensor 1) is installed in the exhaust manifold.



P0131 The scan tool indicates Diagnostic Trouble Code (DTC) P0131: A low voltage problem in the Primary Heated Oxygen Sensor (HO2S) (Sensor 1) circuit.

- The MIL has been reported on.
- DTC P0131 is stored.

Problem verification:

1. Do the PCM Reset Procedure.
2. Start the engine and let it idle with no load (in Park or neutral) until the radiator fan comes on.
3. Rev the engine up to 5,000 rpm, then quickly release the throttle and let the engine idle. Do this three times.
4. Check the Primary HO2S (Sensor 1) output voltage with the scan tool for 200 seconds.

Does the voltage stay at 0.1 V or less?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C123 (Primary HO2S, sensor 1) and PCM.

YES

Check the fuel pressure with the scan tool.

Is it normal?

NO

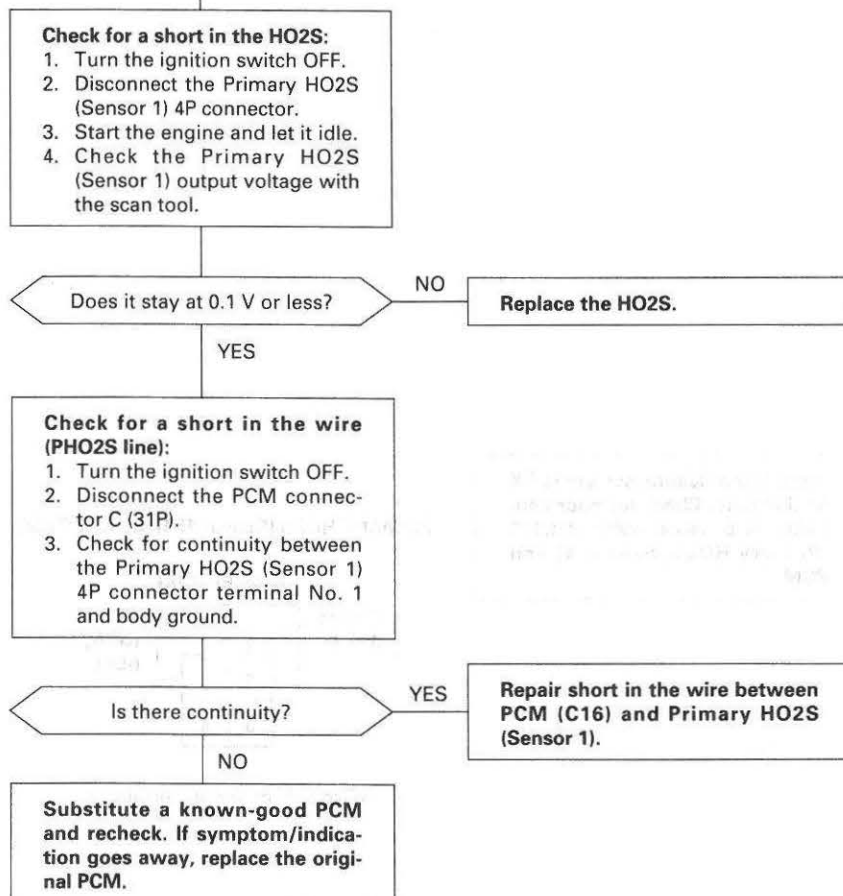
Repair fuel supply system.

YES

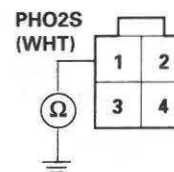
(To page 11-67)



(From page 11-66)



PRIMARY HO2S (Sensor 1) 4P CONNECTOR (C123)



Wire side of female terminals

(cont'd)

PGM-FI System

Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) (cont'd)

P0132 The scan tool indicates Diagnostic Trouble Code (DTC) P0132: A high voltage problem in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) circuit.

- The MIL has been reported on.
- DTC P0132 is stored.

Problem verification:

1. Do the PCM Reset Procedure.
2. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on.
3. Test-drive with the transmission in **2** position.
4. Check the Primary HO2S (Sensor 1) output voltage with the scan tool during deceleration using completely closed throttle.

Does the voltage stay at 1.0 V or more?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C123 (Primary HO2S, Sensor 1) and PCM.

YES

Check for an open in the Primary HO2S:

1. Turn the ignition switch OFF.
2. Disconnect the Primary HO2S (Sensor 1) 4P connector.
3. Connect the Primary HO2S (Sensor 1) 4P connector terminals No. 1 and No. 2 with a jumper wire.
4. Turn the ignition switch ON (II).
5. Check the Primary HO2S (Sensor 1) output voltage with the scan tool.

Is there 1.0 V or more?

NO

Replace the Primary HO2S.

YES

Check for an open in the wires (PHO2S, SG2 lines):

1. Turn the ignition switch OFF.
2. Connect PCM connector terminals C16 and C18 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the Primary HO2S (Sensor 1) output voltage with the scan tool.

Is there 1.0 V or more?

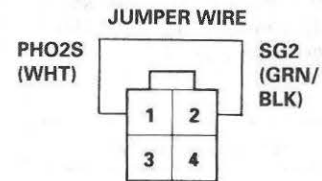
NO

Repair open in the wires between PCM (C16, C18) and Primary HO2S (Sensor 1).

YES

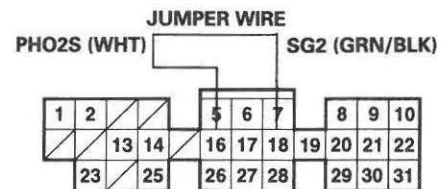
Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

PRIMARY HO2S (Sensor 1) 4P CONNECTOR



Wire side of female terminals

PCM CONNECTOR C (31P)



Wire side of female terminals



P0133 The scan tool indicates Diagnostic Trouble Code (DTC) P0133: A slow response problem in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) circuit.

Description

By controlling the air/fuel ratio with a Primary HO2S (Sensor 1) and a Secondary HO2S (Sensor 2), the deterioration of the Primary HO2S (Sensor 1) can be evaluated by its feedback period. When the feedback period of the HO2S exceeds a certain value during stable driving conditions, the sensor will be judged as deteriorated.

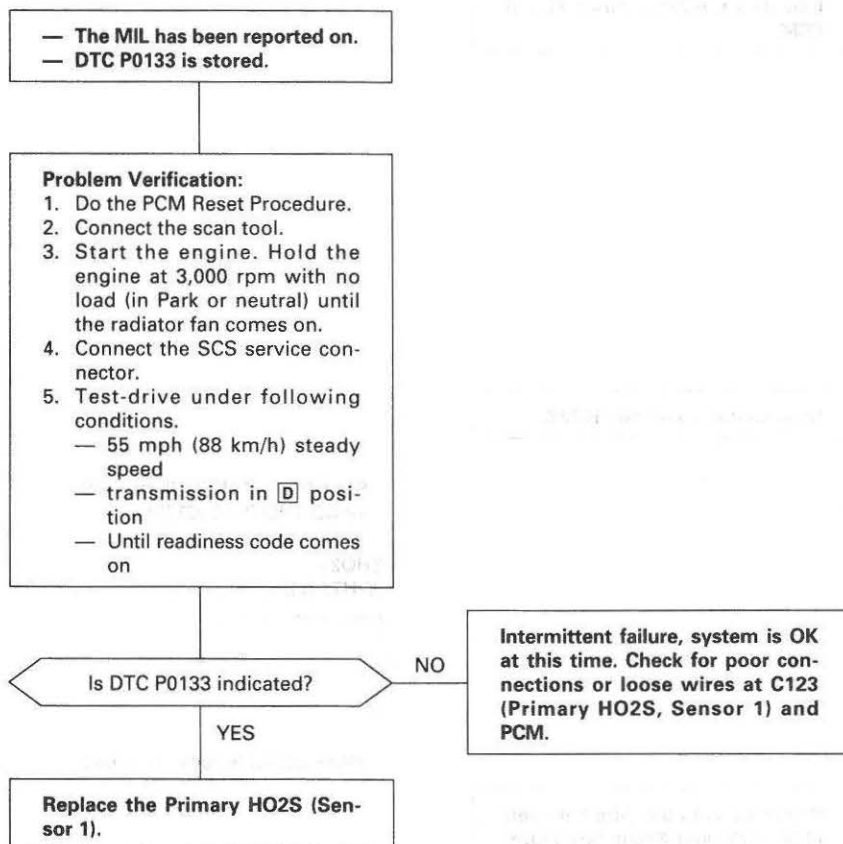
When deterioration has been detected during two consecutive trips, the MIL comes on and DTC P0133 will be stored.

NOTE: If DTC P0131, P0132 and/or P0135 are stored at the same time as DTC P0133, troubleshoot those DTCs first, then troubleshoot DTC P0133.

Possible Cause

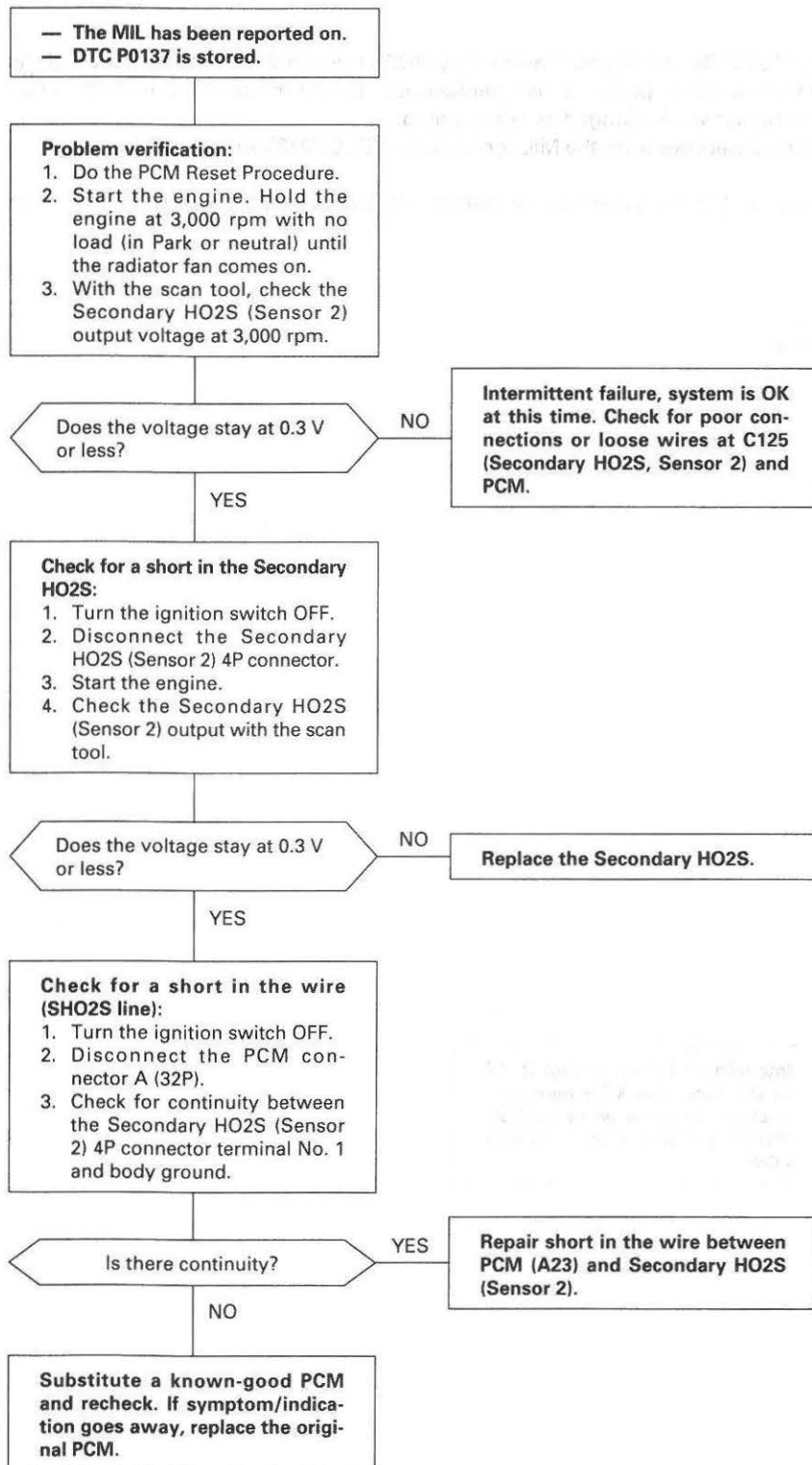
- Primary HO2S (Sensor 1) Deterioration
- Primary HO2S Heater (Sensor 1) Deterioration
- Exhaust system leakage

Troubleshooting Flowchart

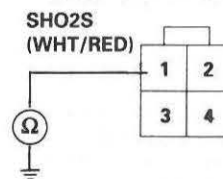


Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2)

P0137 The scan tool indicates Diagnostic Trouble Code (DTC) P0137: A low voltage problem in the Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) circuit.



**SECONDARY HO2S (Sensor 2)
4P CONNECTOR (C125)**



Wire side of female terminals



P0138

The scan tool indicates Diagnostic Trouble Code (DTC) P0138: A high voltage problem in the Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) circuit.

- The MIL has been reported on.
- DTC P0138 is stored.

Problem verification:

1. Do the PCM Reset Procedure.
2. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on.
3. With the scan tool, check the Secondary HO2S (Sensor 2) output voltage at 3,000 rpm.

Does the voltage stay at 0.6 V or more?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C125 (Secondary HO2S, Sensor 2) and PCM.

YES

Check for an open in the Secondary HO2S:

1. Turn the ignition switch OFF.
2. Disconnect the Secondary HO2S (Sensor 2) 4P connector.
3. Connect the Secondary HO2S (Sensor 2) 4P connector terminals No. 1 and No. 2 with a jumper wire.
4. Turn the ignition switch ON (II).
5. Check the Secondary HO2S (Sensor 2) output voltage with the scan tool.

Is there 0.6 V or more?

NO

Replace the Secondary HO2S (Sensor 2).

YES

Check for an open in the wire (SHO2S line):

1. Turn the ignition switch OFF.
2. Connect PCM connector terminals A23 and C18 with a jumper wire.
3. Turn the ignition switch ON (II).
4. Check the Secondary HO2S (Sensor 2) output voltage with the scan tool.

Is there 0.6 V or more?

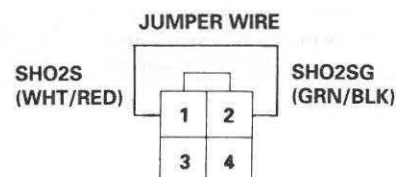
NO

Repair open in the wire between PCM (A23 and/or C18) and Secondary HO2S (Sensor 2).

YES

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

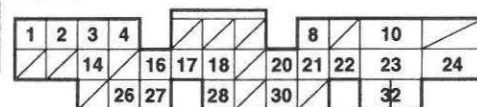
SECONDARY HO2S (Sensor 2) 4P CONNECTOR C125



Wire side of female terminals

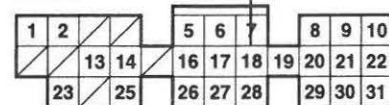
PCM CONNECTORS

A (32P)



SHO2S (WHT/RED)

C (31P)



SG2 (GRN/BLK)

JUMPER WIRE

Wire side of female terminals

(cont'd)

PGM-FI System

Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) (cont'd)

P0139

The scan tool indicates Diagnostic Trouble Code (DTC) P0139: A slow response problem in the Secondary Heated Oxygen Sensor (HO2S) (Sensor 2) circuit.

- The MIL has been reported on.
- DTC P0139 is stored.

Problem verification:

1. Do the PCM Reset Procedure.
2. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on.
3. With the scan tool, check the Secondary HO2S (Sensor 2) output at 3,000 rpm.

Does the voltage stay within 0.3 – 0.6 V for two minutes?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C125 (Secondary HO2S, Sensor 2) and PCM.

YES

Replace the Secondary HO2S (Sensor 2).



Heated Oxygen Sensor (HO2S) Heater

P0135 The scan tool indicates Diagnostic Trouble Code (DTC) P0135: An electrical problem in the Primary Heated Oxygen Sensor (Primary HO2S) (Sensor 1) Heater system.

P0141 The scan tool indicates Diagnostic Trouble Code (DTC) P0141: A problem in the Secondary Heated Oxygen Sensor (Secondary HO2S) (Sensor 2) Heater circuit.

- The MIL has been reported on.
- DTC P0135, and/or P0141 are stored.

Problem verification:
1. Do the PCM Reset Procedure.
2. Start the engine.

Is DTC P0135 or P0141 indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C123 (Primary HO2S, Sensor 1) C125 (Secondary HO2S, Sensor 2)* and PCM.

YES

Check for an open or short in the HO2S:

1. Turn the ignition switch OFF.
2. Disconnect the HO2S (Primary or Secondary*) (Sensor 1 or Sensor 2) 4P connector.
3. At the HO2S side, measure resistance between the HO2S 4P connector terminals No. 3 and No. 4.

Is there 2.0 – 20.0 Ω (10 – 40 Ω)?*

NO

Replace the HO2S (Primary or Secondary*).

YES

Check for continuity between body ground and the HO2S 4P connector terminals No. 3 and No. 4 individually.

Is there continuity?

YES

Replace the HO2S (Primary or Secondary*).

NO

Check for an open or short in the wire (PO2SHTC, SO2SHTC* line):

1. Turn the ignition switch ON (II).
2. Measure voltage between the HO2S 4P connector terminals No. 3 and No. 4.

Is there battery voltage?

YES

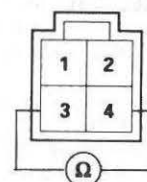
NO

(To page 11-74)

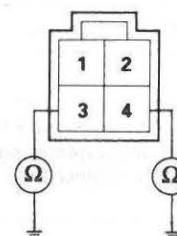
*: P0141

(To page 11-74)

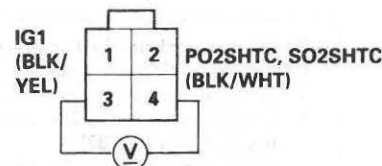
PRIMARY HO2S (Sensor 1) 4P CONNECTOR
SECONDARY HO2S (Sensor 2) 4P CONNECTOR*



Terminal side of male terminals



PRIMARY HO2S (Sensor 1) 4P CONNECTOR (C123)
SECONDARY HO2S (Sensor 2) 4P CONNECTOR (C125)*



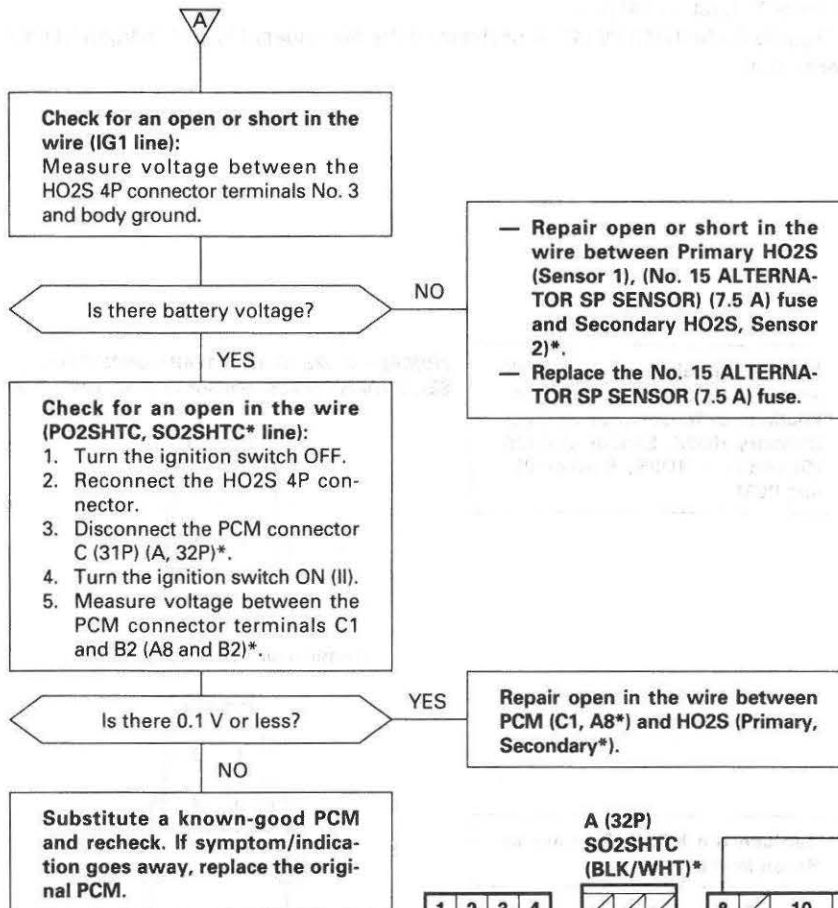
Wire side of female terminals

(cont'd)

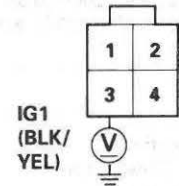
PGM-FI System

Heated Oxygen Sensor (HO2S) Heater (cont'd)

(From page 11-73)

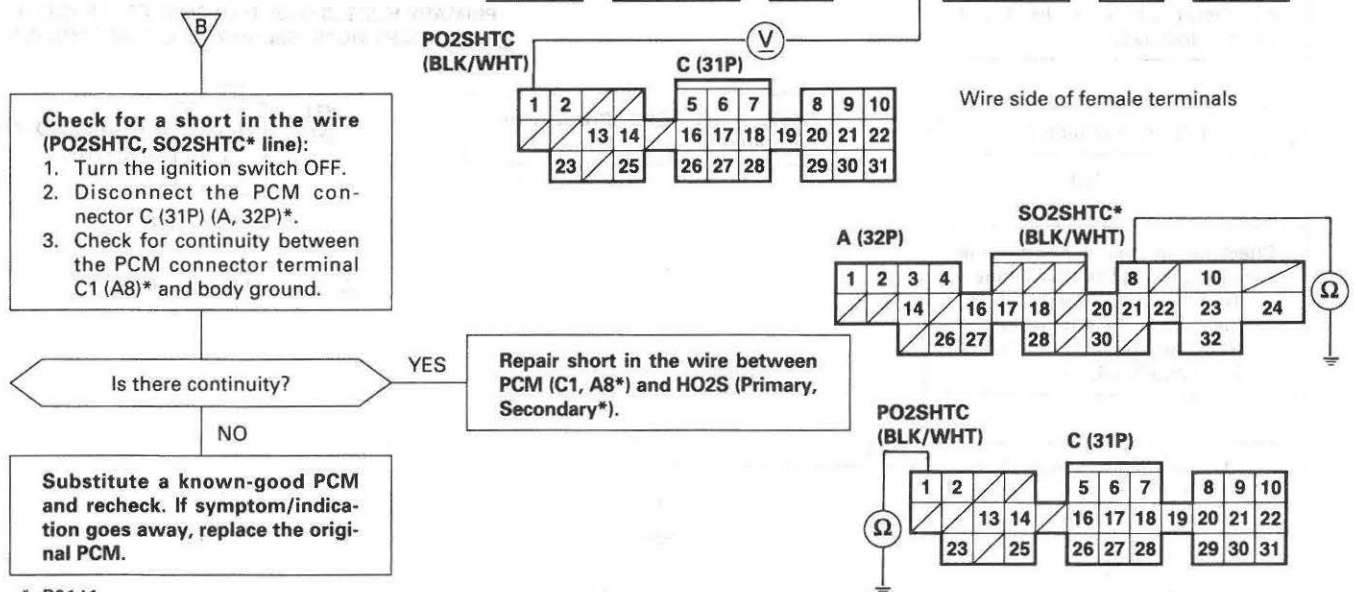


PRIMARY HO2S (Sensor 1) 4P CONNECTOR (C123)
SECONDARY HO2S (Sensor 2) 4P CONNECTOR (C125)*



Wire side of female terminals

(From page 11-73)



*: P0141



Fuel Supply System

P0171 The scan tool indicates Diagnostic Trouble Code (DTC) P0171: The fuel system is too lean.

P0172 The scan tool indicates Diagnostic Trouble Code (DTC) P0172: The fuel system is too rich.

Description

By monitoring the Long Term Fuel Trim, long term malfunctions in the fuel system will be detected.

If a malfunction has been detected during two consecutive trips, the MIL will come on and DTC P0171 and/or P0172 will be stored.

NOTE: If some of the DTCs listed below are stored at the same time as DTC P0171 and/or P0172, troubleshoot those DTCs first, then troubleshoot DTC P0171 and/or P0172.

P0107-8, P1128-9: MAP Sensor

P0191: Fuel Pressure Sensor

P0135: Primary HO2S Heater

P0137-8: Secondary HO2S

P0141: Secondary HO2S Heater

P0401: EGR Flow Insufficient

P1259: VTEC System

P1491: EGR Valve Lift Insufficient

P1498: EGR Valve Lift Sensor High Voltage

Possible Cause

DTC P0171
System too lean

- Fuel Feed Line clogged, leaking
- Fuel Pressure Regulator stuck open
- Fuel Filter clogged
- Fuel Injector clogged, air inclusion
- Fuel doesn't meet Owner's Manual spec.
- Primary HO2S (Sensor 1) deteriorated
- EGR System malfunction (too much flow)
- Valve Clearance
- Exhaust leak
- Fuel Pressure Sensor range/performance

DTC P0172
System too rich

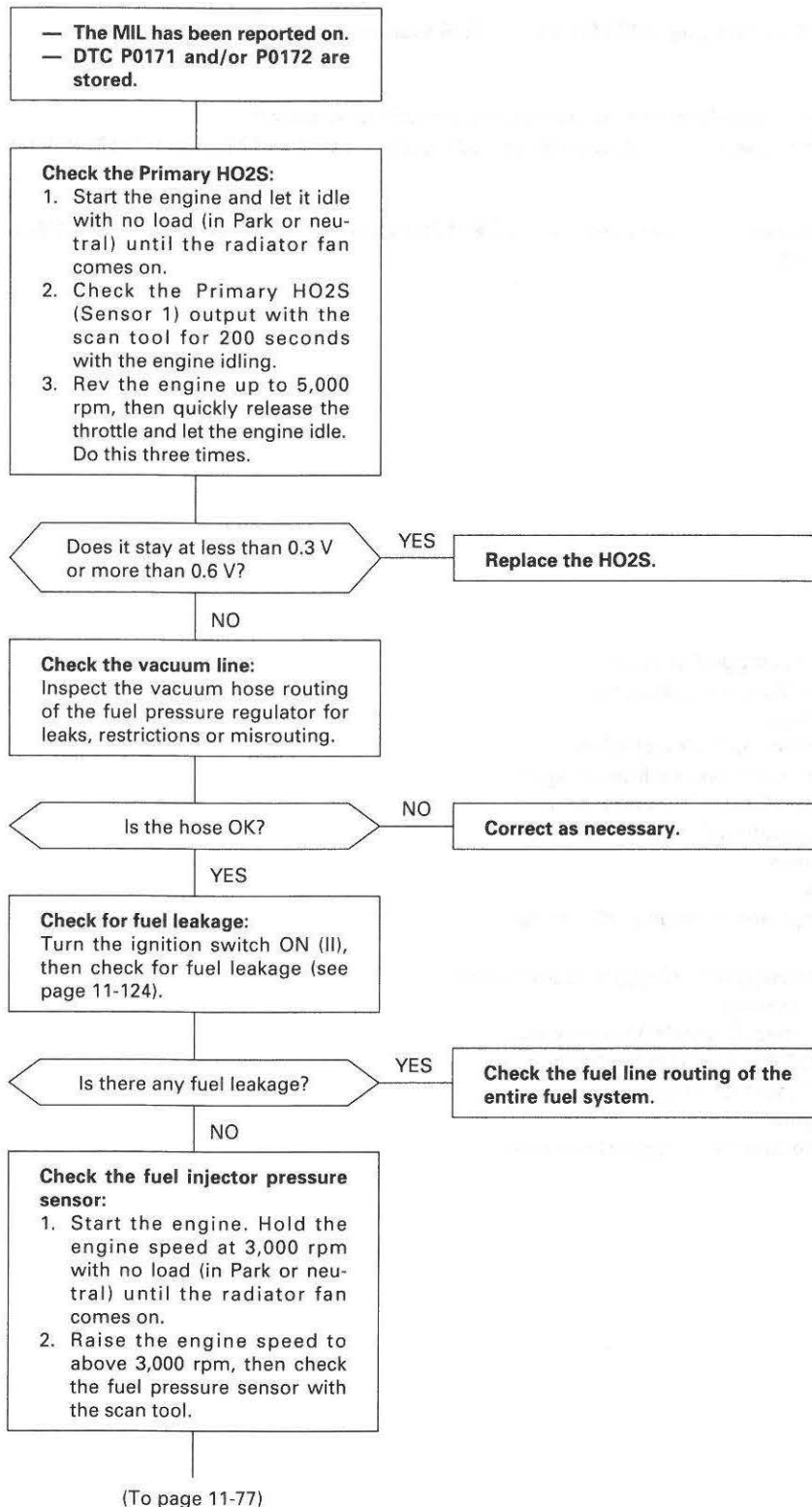
- Fuel Pressure Regulator clogged, stuck closed
- Fuel Injector leaking
- Fuel doesn't meet Owner's Manual spec.
- Primary HO2S (Sensor 1) deteriorated
- EGR System insufficient flow
- Valve Clearance
- Fuel Pressure Sensor range/performance

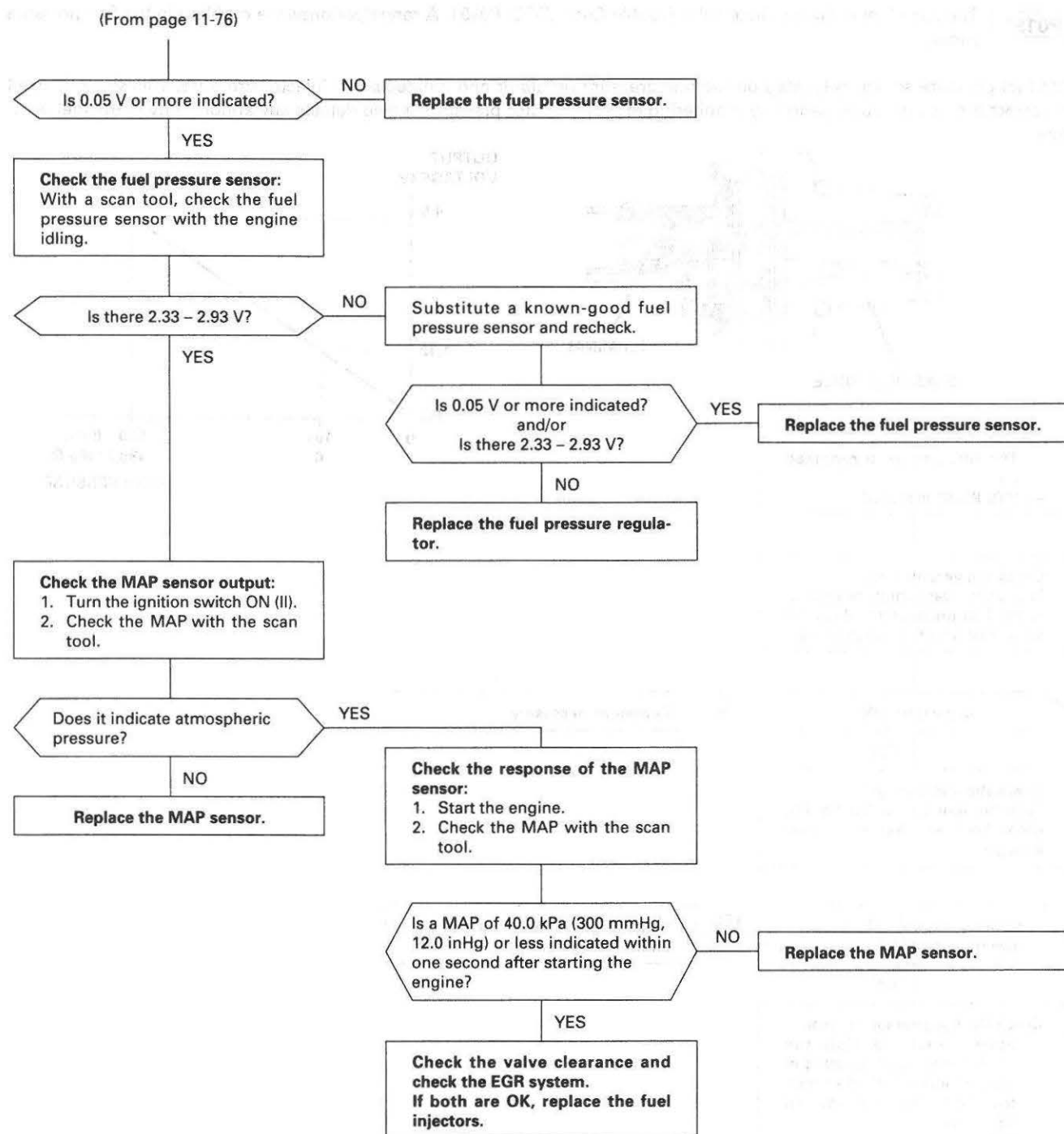
(cont'd)

PGM-FI System

Fuel Supply System (cont'd)

Troubleshooting Flowchart





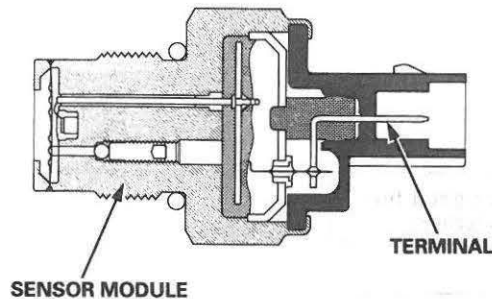
PGM-FI System

Fuel Pressure Sensor

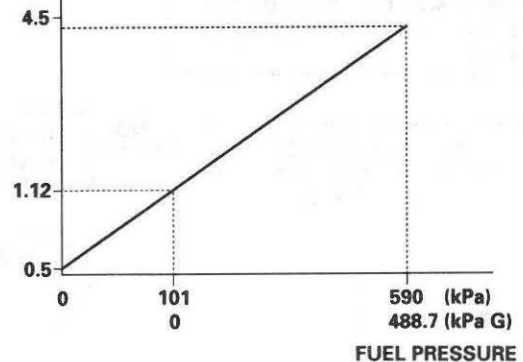
P0191

The scan tool indicates Diagnostic Trouble Code (DTC) P0191: A range/performance problem in the fuel pressure circuit.

The fuel pressure sensor is located on the fuel pressure regulator and it detects fuel injector pressure. This signal is used to correct the fuel injection period by monitoring the fuel injector pressure. It also detects any abnormality in the fuel pressure.



OUTPUT VOLTAGE (V)



- The MIL has been reported on.
- DTC P0191 is stored.

Check the vacuum line:

Inspect the vacuum hose routing of the fuel pressure regulator for leaks, restrictions or misrouting.

Is the hose OK?

NO

Correct as necessary.

YES

Check the fuel leakage:

Turn the ignition switch ON (II), then check whether is any fuel leakage.

Is there any fuel leakage (see page 11-124)?

YES

Check the fuel line routing of the entire fuel system.

NO

Check the fuel pressure sensor:

1. Start the engine. Hold the engine speed at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on.
2. Raise the engine speed to above 3,000 rpm, then check the fuel pressure sensor with the scan tool.

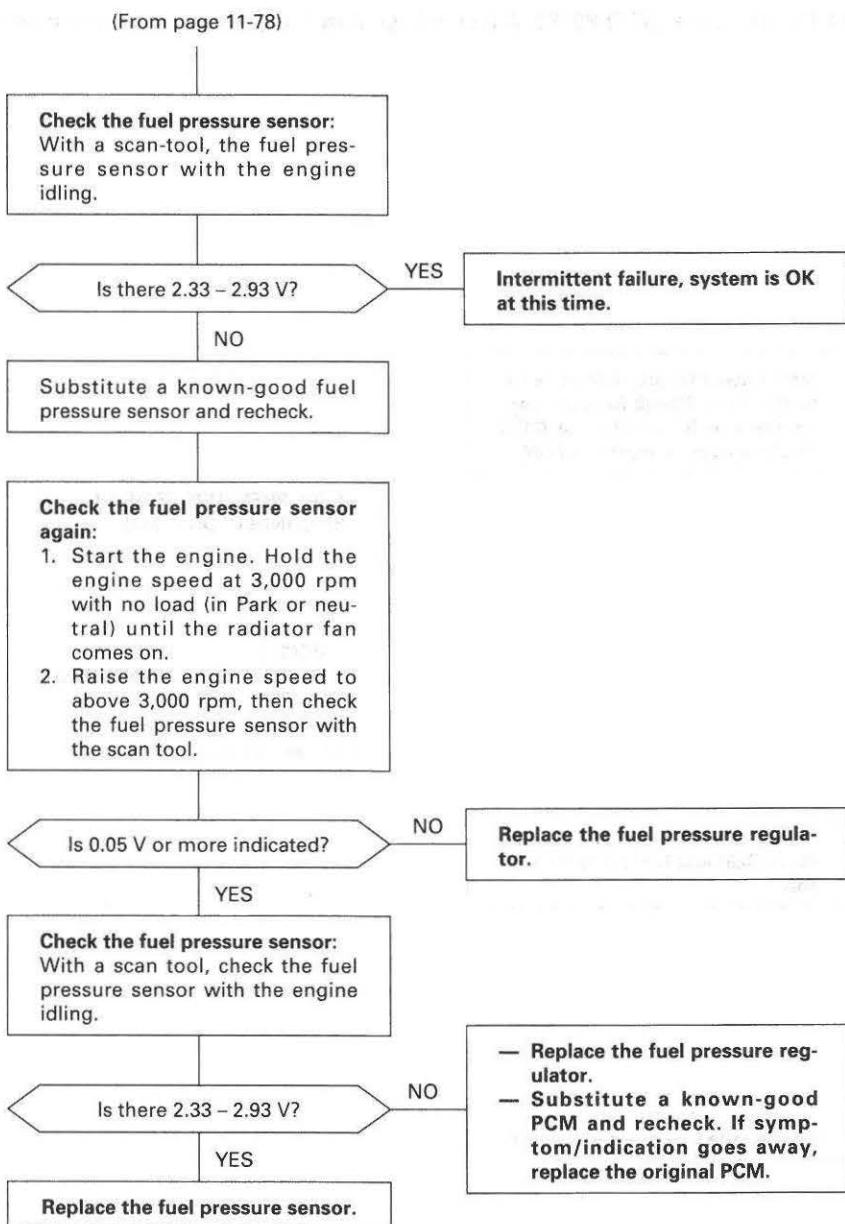
Is 0.05 V or more indicated?

NO

Perform the troubleshooting procedure for DTC P0192 (see page 11-80).

YES

(To page 11-79)

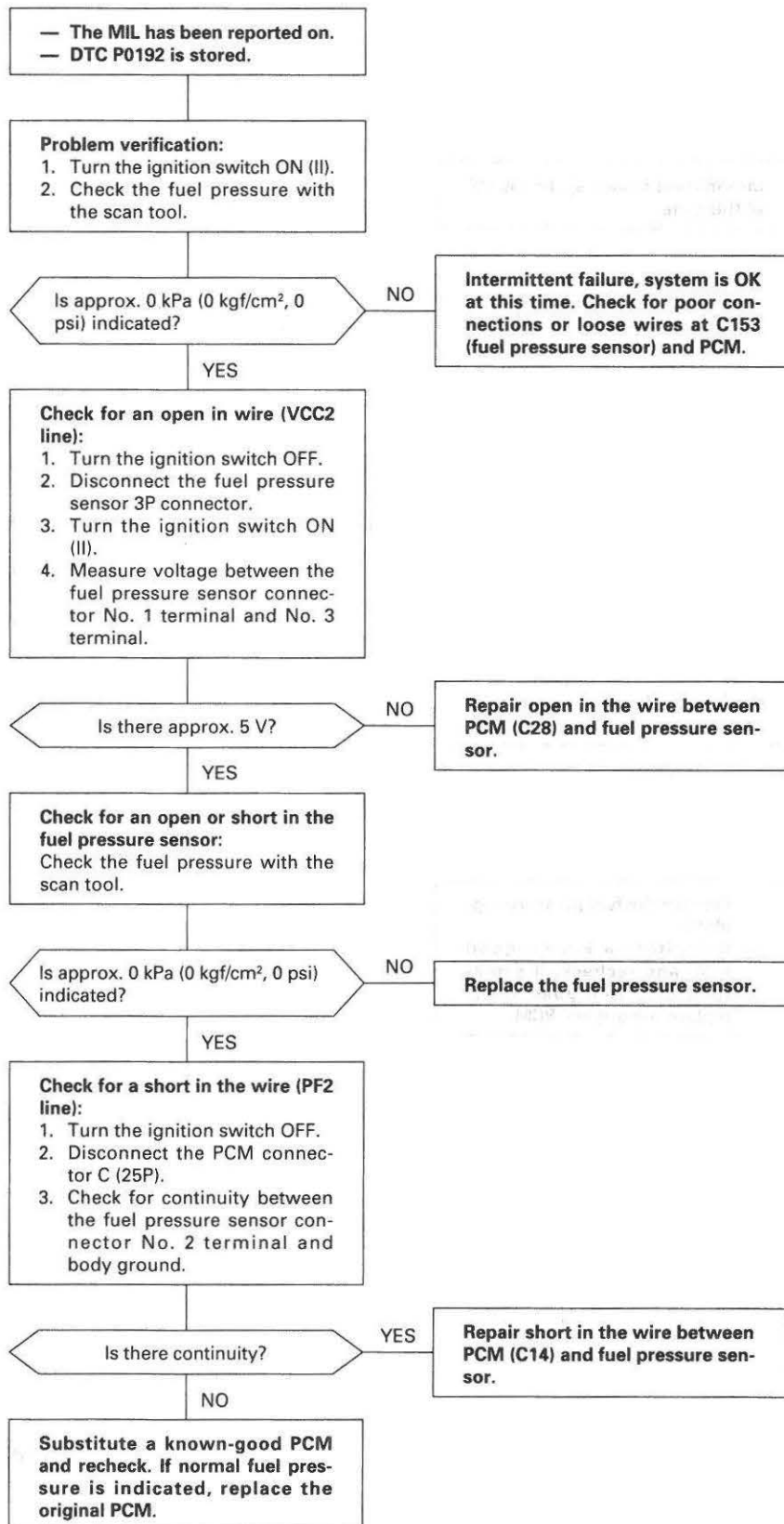


(cont'd)

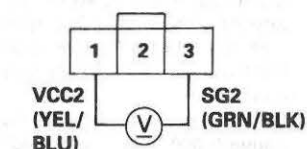
PGM-FI System

Fuel Pressure Sensor (cont'd)

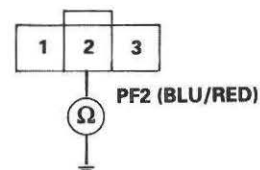
P0192 The scan tool indicates Diagnostic Trouble Code (DTC) P0192: A low voltage (low fuel pressure) problem in the Fuel Pressure sensor.



FUEL PRESSURE SENSOR
3P CONNECTOR (C153)

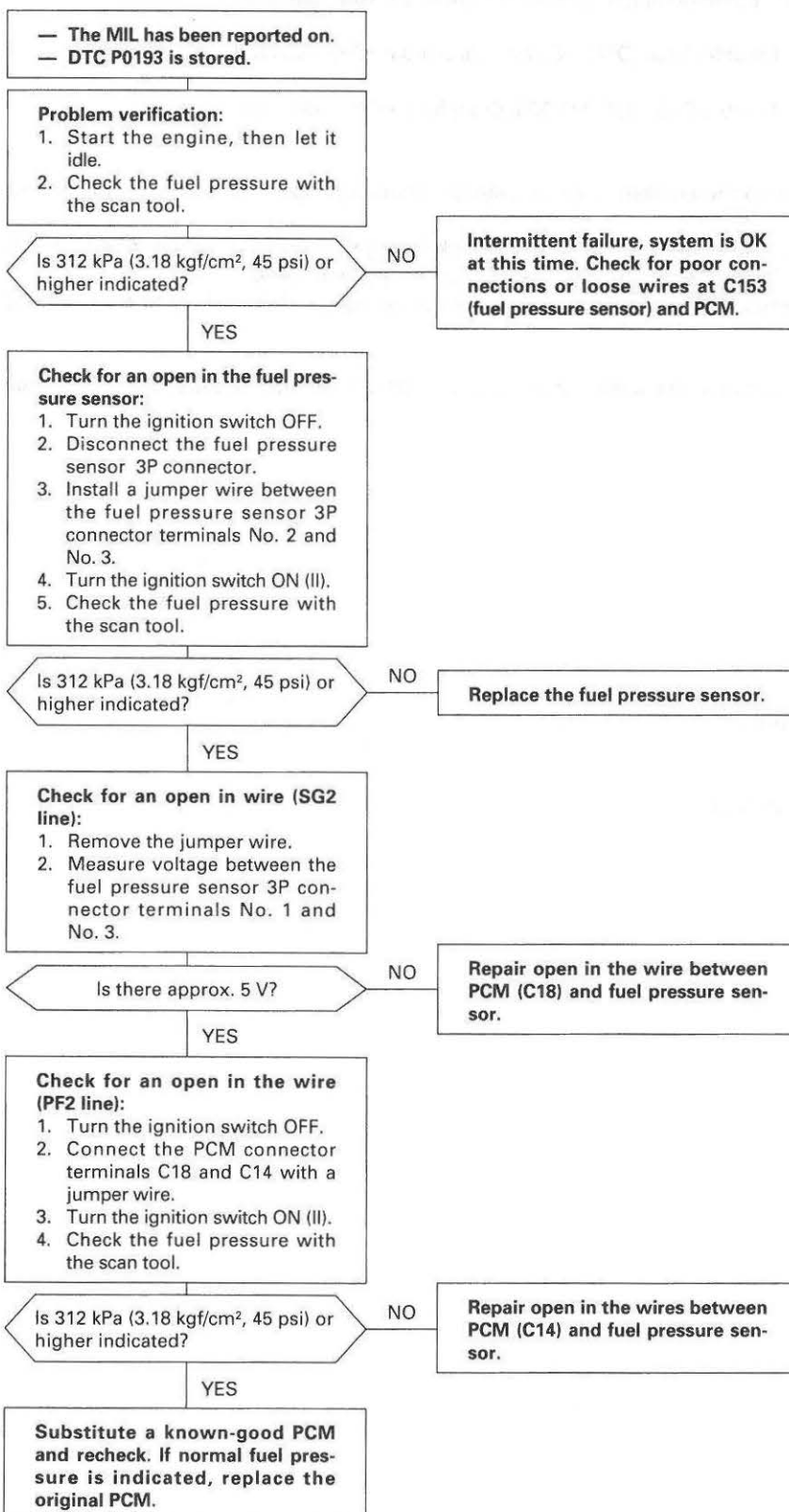


Wire side of female terminals

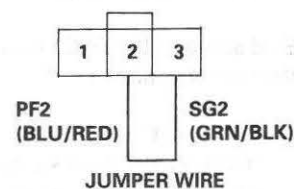




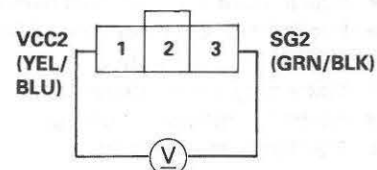
P0193 The scan tool indicates Diagnostic Trouble Code (DTC) P0193: A high voltage (high fuel pressure) problem in the Fuel Pressure sensor.



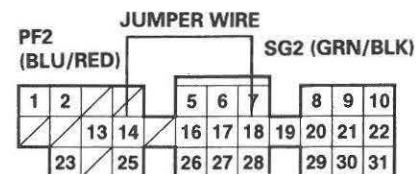
FUEL PRESSURE SENSOR 3P CONNECTOR (C153)



Wire side of female terminals



PCM CONNECTOR C (31P)



Wire side of female terminals

PGM-FI System

Misfire Detected in One Cylinder

P0301 The scan tool indicates Diagnostic Trouble Code (DTC) P0301: Cylinder 1 misfire detected.

P0302 The scan tool indicates Diagnostic Trouble Code (DTC) P0302: Cylinder 2 misfire detected.

P0303 The scan tool indicates Diagnostic Trouble Code (DTC) P0303: Cylinder 3 misfire detected.

P0304 The scan tool indicates Diagnostic Trouble Code (DTC) P0304: Cylinder 4 misfire detected.

Description

Misfire detection is accomplished by monitoring the crankshaft speed with the crankshaft speed fluctuation (CKF) sensor which is attached to the crankshaft.

If misfiring strong enough to damage the catalyst is detected, the MIL will blink during the time of its occurrence, and DTC P0301, P0302, P0303 or P0304 will be stored. Then, after the misfire has ceased, the MIL will come on.

If misfiring that increases emissions is detected during two consecutive driving cycles, the MIL will come on, and DTC P0301, P0302, P0303 or P0304 will be stored.

NOTE: If some of the DTCs listed below are stored at the same time as a misfire DTC, troubleshoot those DTCs first, then troubleshoot the misfire DTC.

P0131, P0132: HO2S

P0171, P0172: Fuel supply system

P0335, P0336: CKF sensor

P0401, P1491, P1498: EGR system

P1359, P1361, P1362: TDC sensor

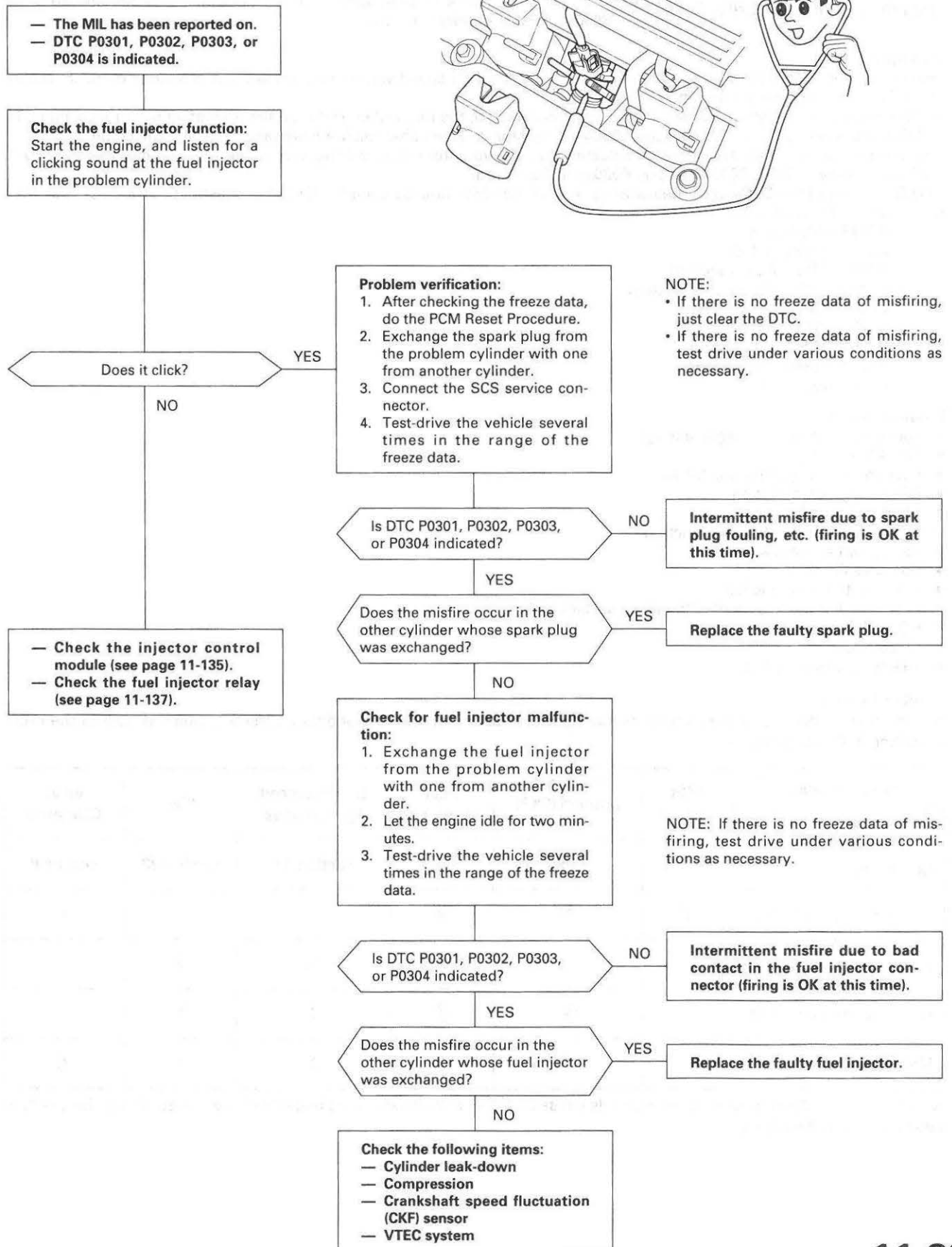
P1381, P1382: CYP sensor

Possible Cause

- Fuel injector clogging, fuel leakage, air leakage
- Fuel injector circuit open or shorted
- Injector control module
- Spark plug carbon deposits, fouling, malfunction
- Ignition wires open, leaking
- Distributor malfunction
- Compression low
- Valve clearance out of spec
- VTEC system malfunction
- HO2S
- HO2S circuit



Troubleshooting Flowchart



PGM-FI System

Random Misfire

P0300 and **P0301 through P0304**

The scan tool indicates Diagnostic Trouble Code (DTC) P0300 and some of P0301 – P0304: Random misfire.

Description

Misfire detection is accomplished by monitoring the crankshaft speed with the crankshaft speed fluctuation (CKF) sensor which is attached to the crankshaft.

If misfiring strong enough to damage the catalyst is detected, the MIL will blink during the time of its occurrence, and DTC P0300 and some of DTCs P0301 through P0304 will be stored. Then, after misfire has ceased, the MIL will come on.

If misfiring that increases emissions is detected during two consecutive driving cycles, the MIL will come on, and DTC P0300 and some of DTCs P0301 through P0304 will be stored.

NOTE: If some of the DTCs listed below are stored at the same time as a misfire DTC. Troubleshoot those DTCs first, then troubleshoot the misfire DTC.

P1128-9 MAP sensor
P0131, P0132: HO2S
P0171, P0172: Fuel metering
P0401, P1491, P1498: EGR system
P0505: Idle Control System
P1253: VTEC System
P1361, P1362: TDC sensor
P1381, P1382: CYP sensor
P1508: IAC valve

Possible Cause

- Fuel line clogging, blockage, leakage
- Fuel filter clogging
- Fuel pressure regulator stuck open
- EGR system malfunction
- Distributor malfunction
- Ignition control module malfunction
- Valves carbon deposit
- Compression low
- VTEC system malfunction
- Fuel does not meet Owner's Manual spec., lack of fuel
- HO2S
- HO2S circuit
- Injector control module

Troubleshooting

By test-driving, determine the conditions during which misfire occurs. Depending on these conditions, test in the order described in the table below.

Possible cause	EGR system	Crankshaft position (CKP) sensor	Fuel pressure	Distributor and Ignition wires	ICM	Valve Clearance
Page						
Condition	11-147	11-99	—	section 23	section 23	section 6
Only low rpm and load	①	③	②			③
Only accelerating			②	①	③	
Only high rpm and load		④	①	②	③	④
Not specification		④	①	②	③	④

NOTE: If misfire doesn't recur, some possible causes are fuel that doesn't meet owner's manual spec, lack of fuel, carbon deposits on spark plug, etc.



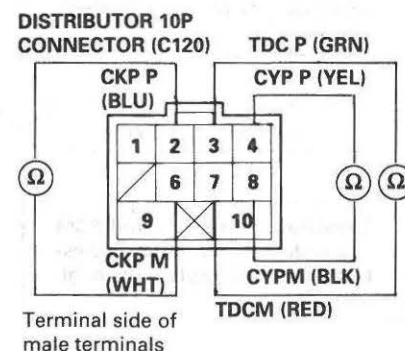
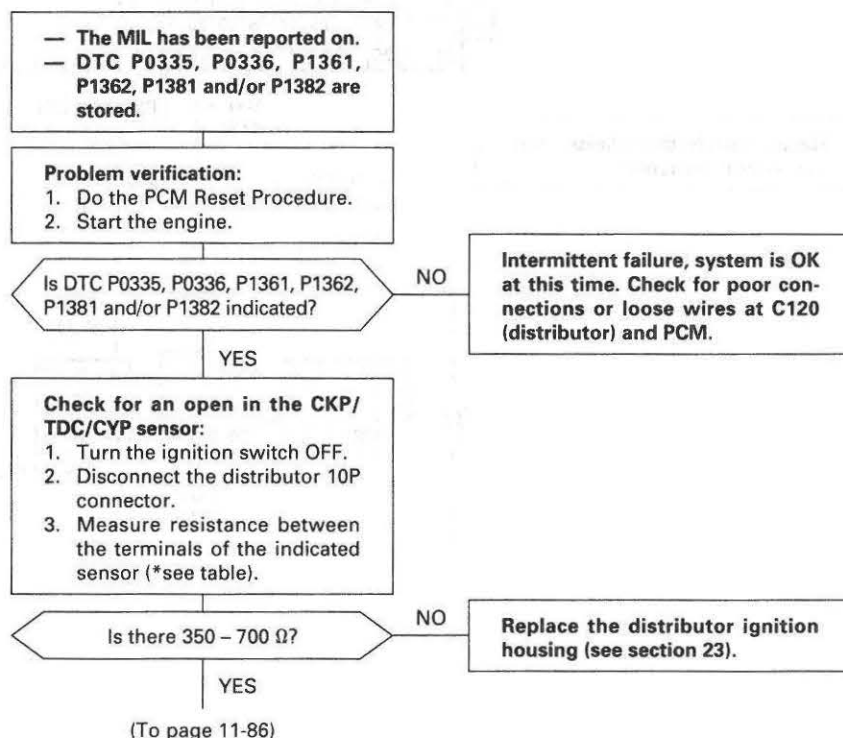
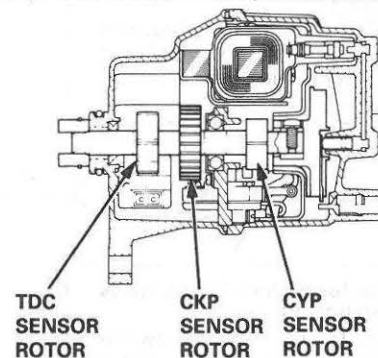
Crankshaft Position/Top Dead Center/Cylinder Position (CKP/TDC/CYP) Sensor

- P0335** The scan tool indicates Diagnostic Trouble Code (DTC) P0335: A malfunction in the Crankshaft Position (CKP) sensor circuit.
- P0336** The scan tool indicates Diagnostic Trouble Code (DTC) P0336: A range/performance problem in the Crankshaft Position (CKP) sensor circuit.
- P1361** The scan tool indicates Diagnostic Trouble Code (DTC) P1361: Intermittent interruption in the Top Dead Center (TDC) sensor circuit.
- P1362** The scan tool indicates Diagnostic Trouble Code (DTC) P1362: No signal in the Top Dead Center (TDC) sensor circuit.
- P1381** The scan tool indicates Diagnostic Trouble Code (DTC) P1381: Intermittent interruption in the Cylinder Position (CYP) sensor circuit.
- P1382** The scan tool indicates Diagnostic Trouble Code (DTC) P1382: No signal in the Cylinder Position (CYP) sensor circuit.

Description

The CKP Sensor determines timing for fuel injection and ignition of each cylinder and also detects engine speed. The TDC Sensor determines ignition timing at start-up (cranking) and when crank angle is abnormal. The CYP Sensor detects the position of No. 1 cylinder for sequential fuel injection to each cylinder. The CKP/TDC/CYP Sensor is built into the distributor.

NOTE: If DTC P1359 is stored at the same time as DTC P0335, P0336, P1361, P1362, P1381 and/or P1382, troubleshoot DTC P1359 first, then troubleshoot those DTCs.



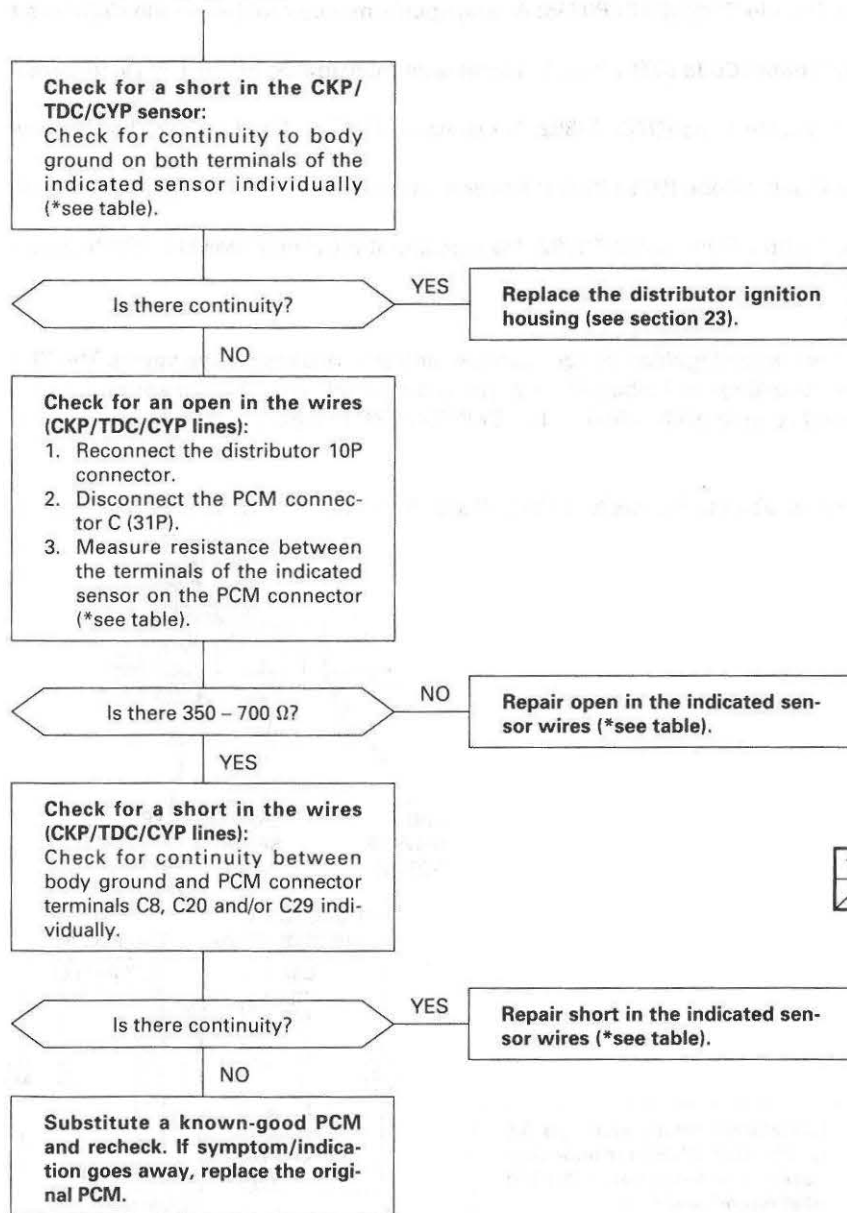
SENSOR	DTC	SENSOR TERMINAL	PCM TERMINAL	WIRE COLOR
CKP	P0335	2	C8	BLU
	P0336	6	C9	WHT
TDC	P1361	3	C20	GRN
	P1362	7	C21	RED
CYP	P1381	4	C29	YEL
	P1382	8	C30	BLK

(cont'd)

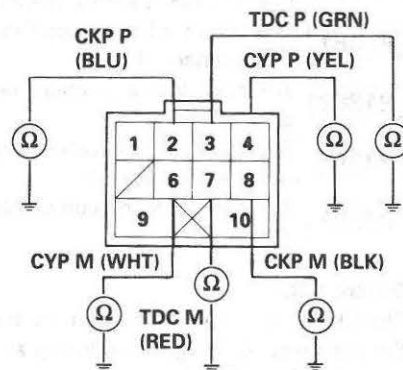
PGM-FI System

Crankshaft Position/Top Dead Center/Cylinder Position (CKP/TDC/CYP) Sensor (cont'd)

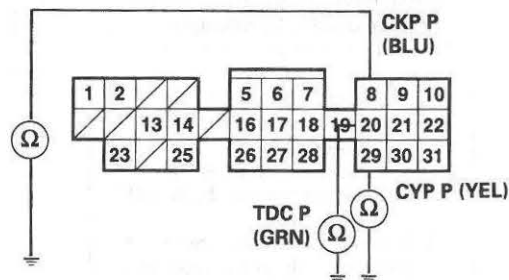
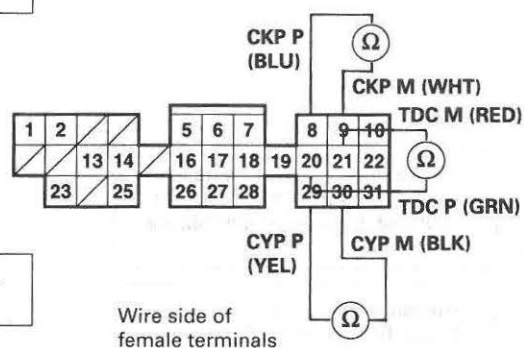
(From page 11-85)



**DISTRIBUTOR
10P CONNECTOR (C120)**



PCM CONNECTORS C (31P)





Vehicle Speed Sensor (VSS)

P0501

The scan tool indicates Diagnostic Trouble Code (DTC) P0501: A range/performance problem in the Vehicle Speed Sensor (VSS) circuit.

- The MIL has been reported on.
- DTC P0501 is stored.

Problem verification:

1. Test-drive the vehicle.
2. Check the vehicle speed with the scan tool.

Is the correct speed indicated?

YES

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C117 (VSS) and PCM.

NO

Check for an open in the PCM:

1. Turn the ignition switch OFF.
2. Block the rear wheels and set the parking brake.
3. Jack up the front of the vehicle and support it with safety stands.
4. Turn the ignition switch ON (II).
5. Block the right front wheel and slowly rotate the left front wheel.
6. Measure voltage between the PCM connector terminals B20 and C23.

Does the voltage pulse 0 V and 5 V or battery voltage?

YES

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

NO

Check for a short in the PCM:

1. Turn the ignition switch OFF.
2. Disconnect the PCM connector C (31P).
3. Turn the ignition switch ON (II).
4. Block the right front wheel and slowly rotate the left front wheel.
5. Measure voltage between the PCM connector terminals B20 and C23.

Does the voltage pulse 0 V and 5 V or battery voltage?

YES

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

NO

- Repair short in the wire between PCM (C23) and VSS.
- Repair open in the wire between PCM (C23) and VSS.
- If wire is OK, test the VSS (see section 23).

PCM CONNECTORS

B (25P)

1	2		3	4	5		6	7	8
9	10	11	12	13	14	15		17	
		20		21	22				

LG1
(BRN/BLK)

C (31P)

1	2			5	6	7		8	9	10
		13	14	16	17	18	19	20	21	22
		23	25	26	27	28		29	30	31

VSS (BLU/WHT)

Wire side of female terminals

1	2		3	4	5		6	7	8
9	10	11	12	13	14	15		17	
		20		21	22				

LG1
(BRN/BLK)

1	2			5	6	7		8	9	10
		13	14	16	17	18	19	20	21	22
		23	25	26	27	28		29	30	31

VSS (BLU/WHT)

PGM-FI System

Barometric Pressure (Baro) Sensor

P1106

The scan tool indicates Diagnostic Trouble Code (DTC) P1106: A range/performance problem in the Barometric Pressure (Baro) Sensor circuit.

- The MIL has been reported on.
- DTC P1106 is stored.

Problem verification:

1. Do the PCM reset procedure.
2. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
3. Connect the SCS Service connector.
4. Test-drive with the transmission in **2** position.
5. Accelerate for five seconds using wide open throttle.

Is DTC P1106 indicated?

NO

Intermittent failure, system is OK at this time.

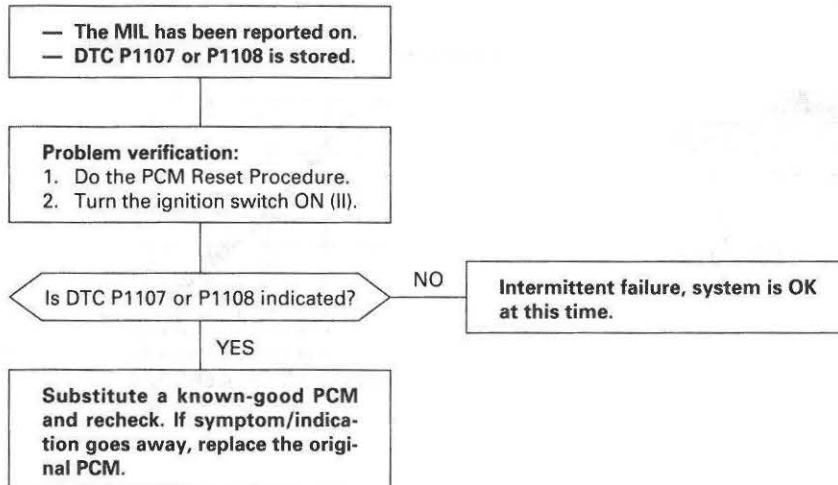
YES

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.



P1107 The scan tool indicates Diagnostic Trouble Code (DTC) P1107: A low voltage problem in the Baro sensor circuit.

P1108 The scan tool indicates Diagnostic Trouble Code (DTC) P1108: A high voltage problem in the Baro sensor circuit.



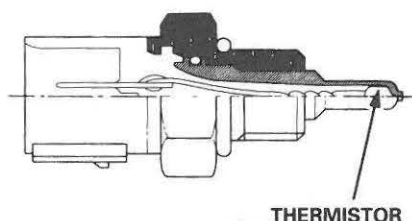
PGM-FI System

Fuel Temperature Sensor

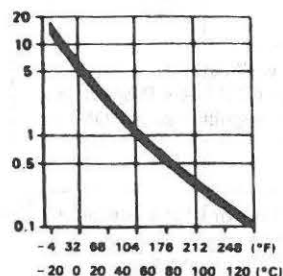
P1182

The scan tool indicates Diagnostic Trouble Code (DTC) P1182: A low voltage (high temperature) problem in the Fuel Temperature sensor circuit.

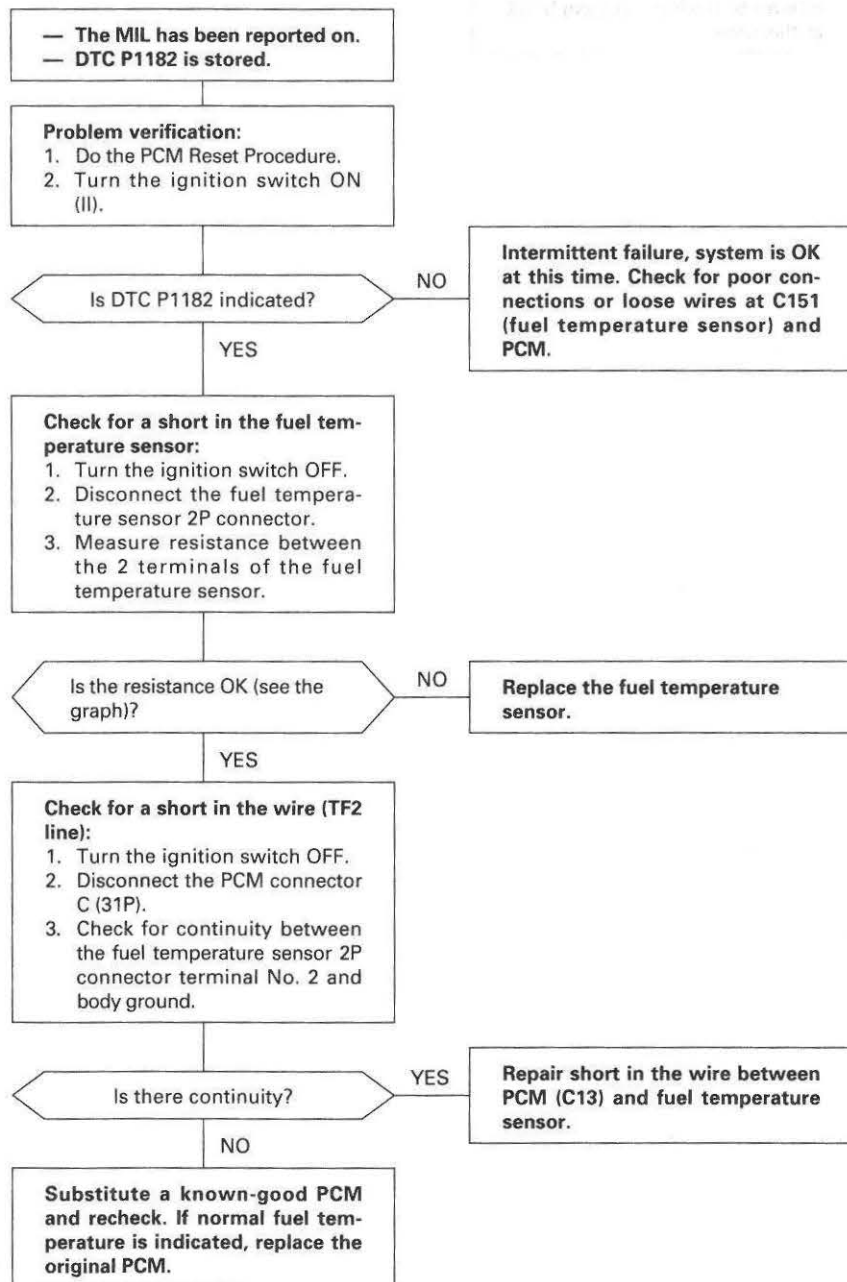
Fuel injector temperature sensor is located on the fuel rail and detects the temperature of the fuel. This signal is used to correct the fuel injection period by fuel temperature.



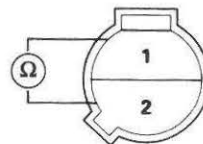
RESISTANCE (k Ω)



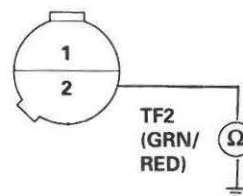
INTAKE AIR TEMPERATURE



FUEL TEMPERATURE SENSOR 2P CONNECTOR

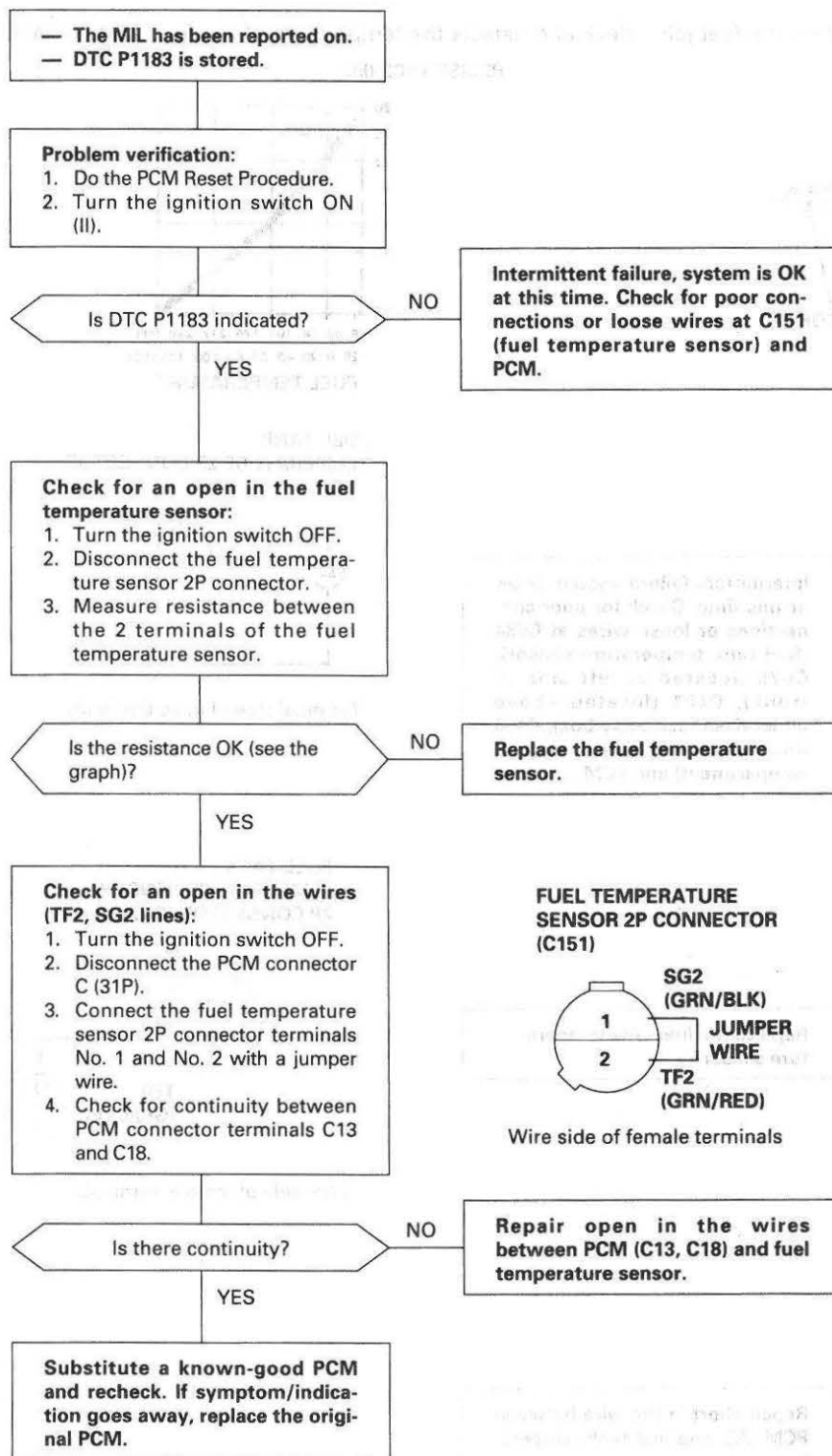


FUEL TEMPERATURE SENSOR 2P CONNECTOR (C151)

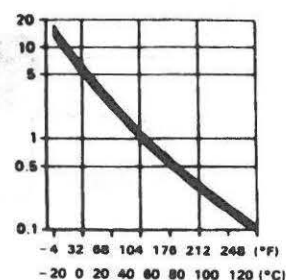




P1183 The scan tool indicates Diagnostic Trouble Code (DTC) P1183: A high voltage (low temperature) problem in the Fuel Temperature sensor circuit.

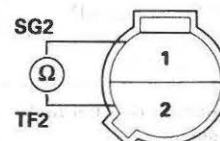


RESISTANCE (k Ω)



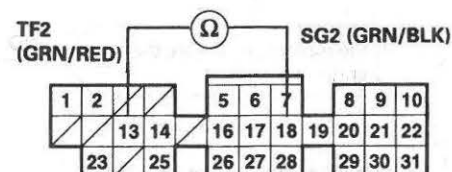
INTAKE AIR TEMPERATURE

FUEL TEMPERATURE SENSOR 2P CONNECTOR



Terminal side of male terminals

PCM CONNECTOR C (31P)



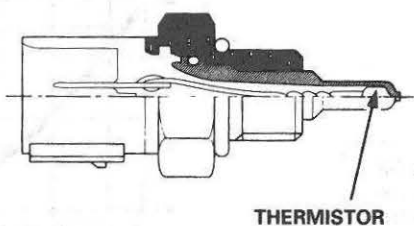
Wire side of female terminals

PGM-FI System

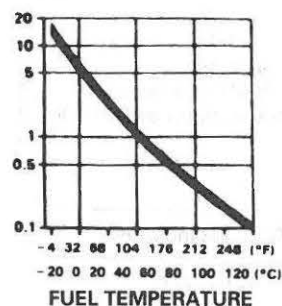
Fuel Tank Temperature Sensor

P1187 The scan tool indicates Diagnostic Trouble Code (DTC) P1187: A low voltage (high temperature) problem in the Fuel Tank Temperature sensor circuit.

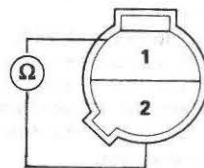
The fuel tank temperature sensor is located on the fuel joint block and detects the temperature of the fuel. This signal is used to calculate injector duration.



RESISTANCE (kΩ)

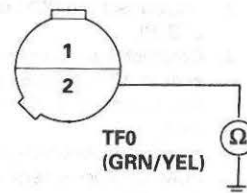


FUEL TANK TEMPERATURE 2P CONNECTOR

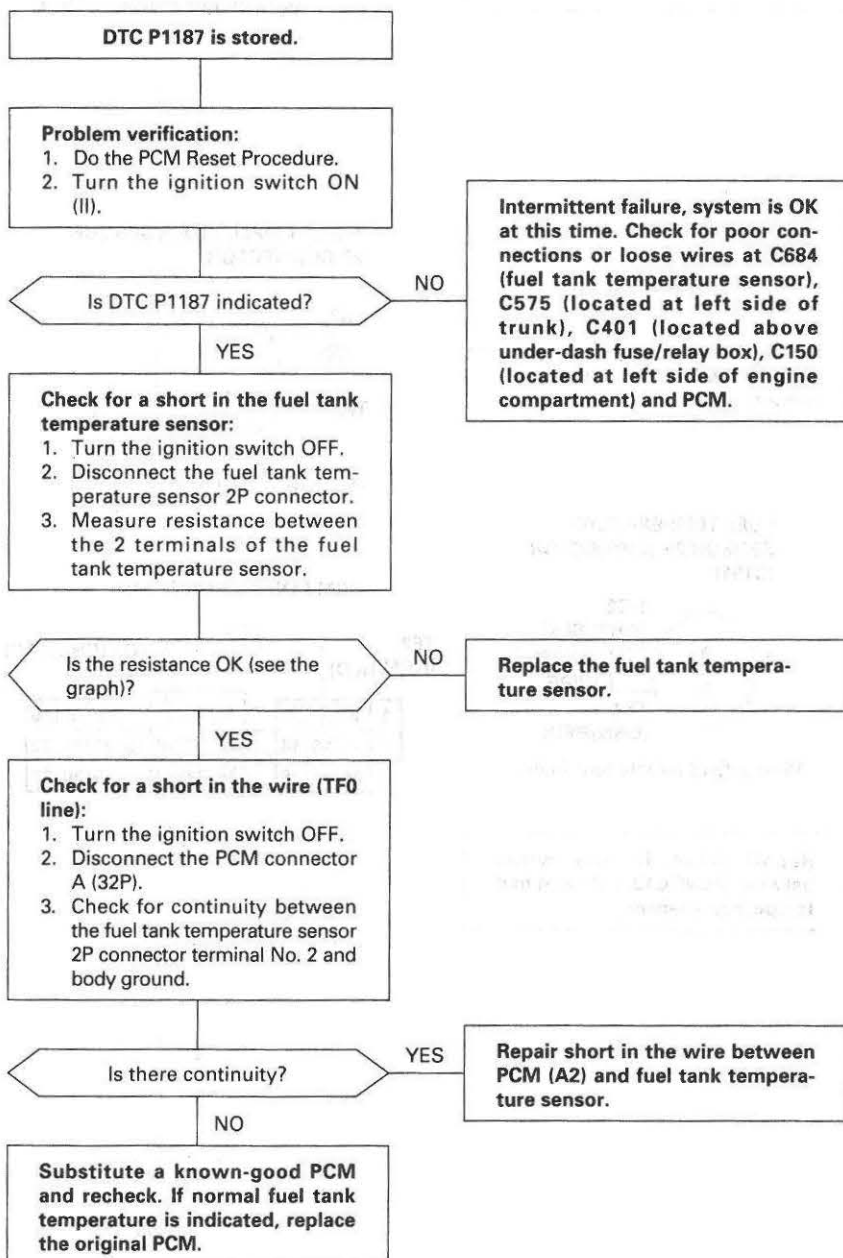


Terminal side of male terminals

FUEL TANK TEMPERATURE SENSOR 2P CONNECTOR (C684)

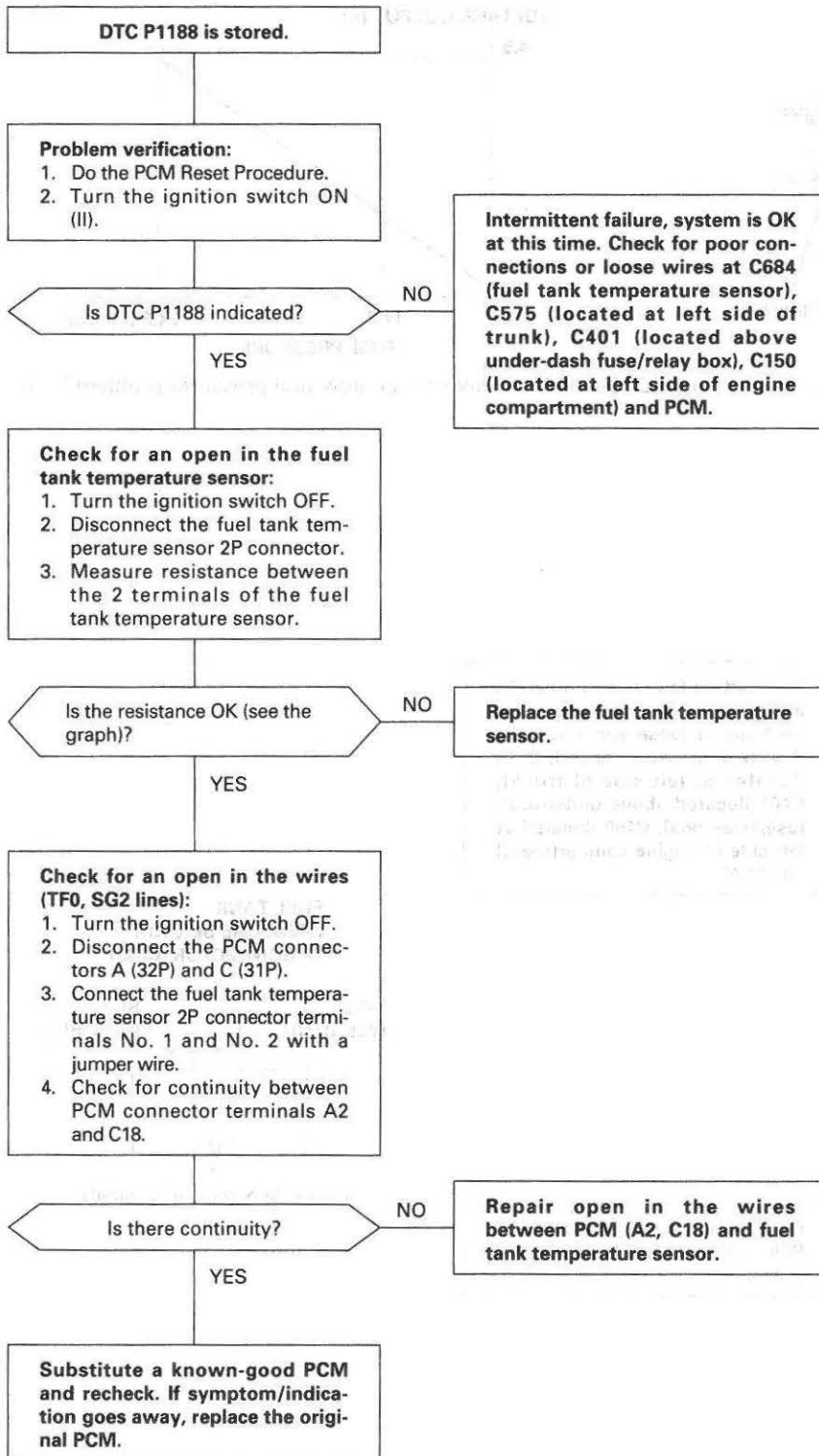


Wire side of female terminals

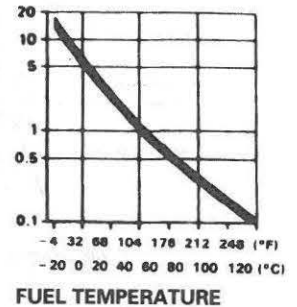




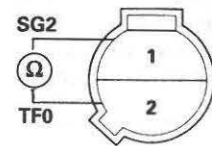
P1188 The scan tool indicates Diagnostic Trouble Code (DTC) P1188: A high voltage (low temperature) problem in the Fuel Tank Temperature sensor circuit.



RESISTANCE
(k Ω)

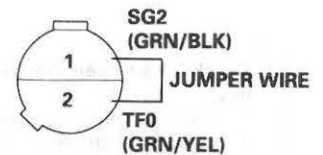


FUEL TANK TEMPERATURE SENSOR 2P CONNECTOR



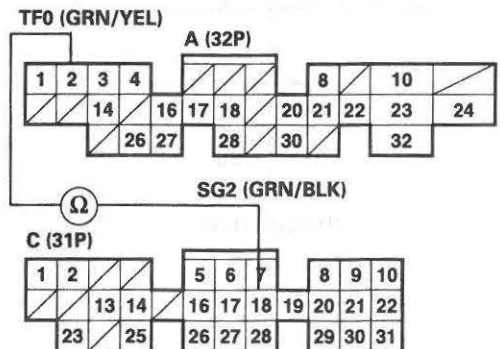
Terminal side of male terminals

FUEL TANK TEMPERATURE SENSOR 2P CONNECTOR (C684)



Wire side of female terminals

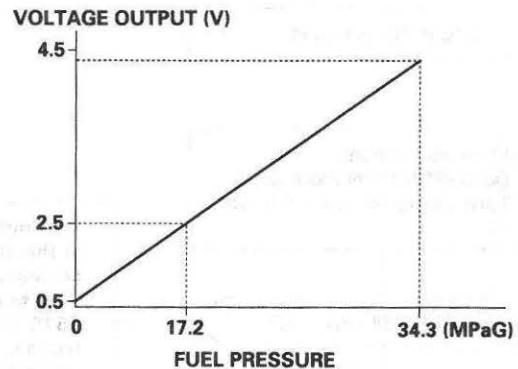
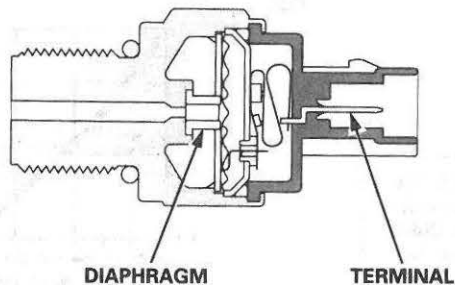
PCM CONNECTORS



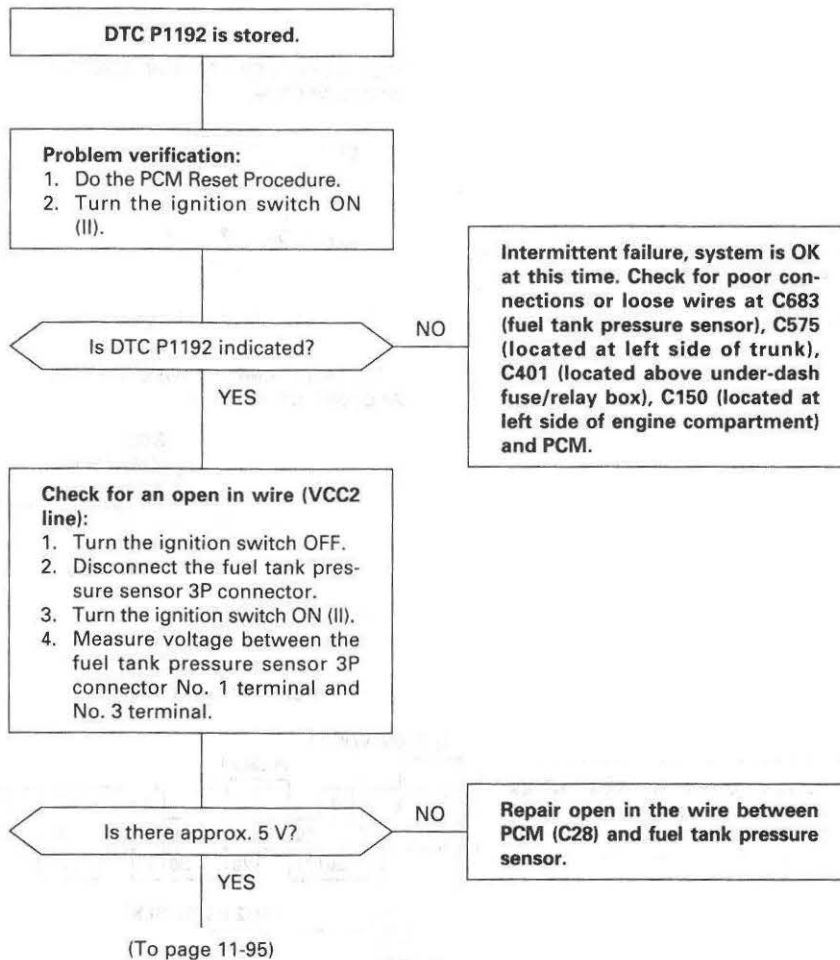
Wire side of female terminals

Fuel Tank Pressure Sensor

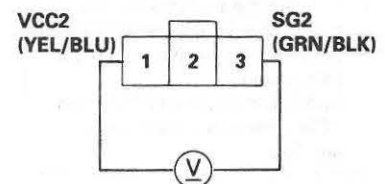
The fuel tank pressure sensor is located on the fuel joint block, and it detects fuel tank pressure. This signal is used to calculate the fuel injection duration in the tank and to detect any leakage.



P1192 The scan tool indicates Diagnostic Trouble Code (DTC) P1192: A low voltage (low fuel pressure) problem in the Fuel Tank Pressure sensor.



FUEL TANK PRESSURE SENSOR 3P CONNECTOR (C683)



Wire side of female terminals



(From page 11-94)

Check for a short in the wire (PF0 line):

1. Turn the ignition switch OFF.
2. Disconnect the PCM connector A (32P).
3. Check for continuity between the fuel tank pressure sensor connector No. 2 terminal and body ground.

Is there continuity?

YES

Repair short in the wire between PCM (A22) and fuel tank pressure sensor.

NO

Check the fuel tank pressure sensor:

1. Reconnect the PCM connector A (32P).
2. Do the PCM Reset Procedure.
3. Turn the ignition switch ON (II).

Is DTC P1193 indicated?

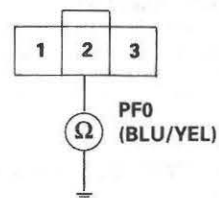
YES

Replace the fuel tank pressure sensor.

NO

Substitute a known-good PCM and recheck. If normal fuel tank pressure is indicated, replace the original PCM.

**FUEL TANK
PRESSURE SENSOR
3P CONNECTOR (C683)**



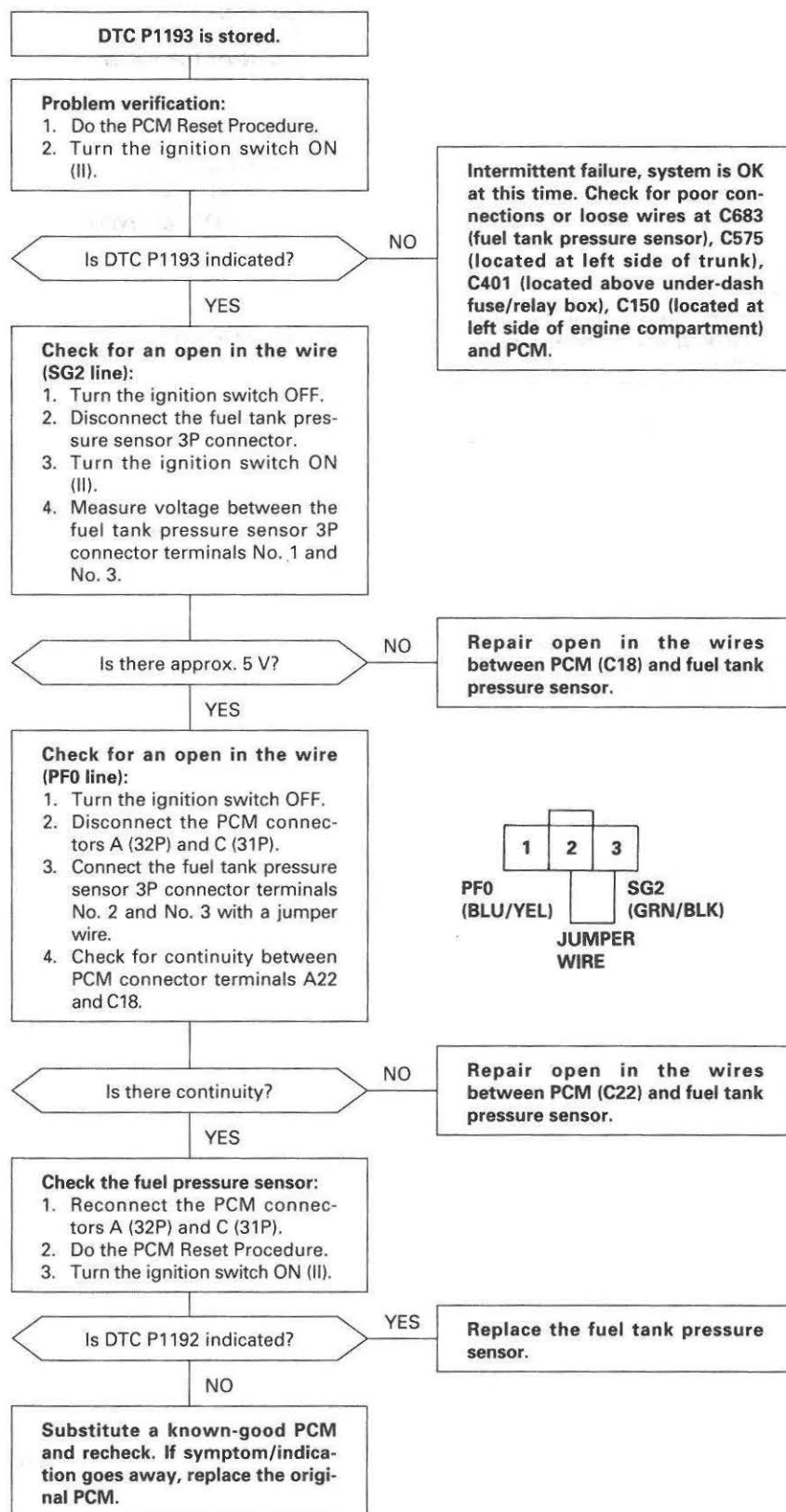
Wire side of female terminals

(cont'd)

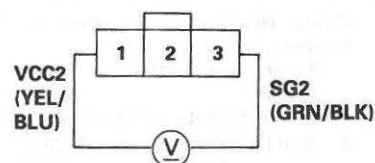
Fuel Tank Pressure Sensor (cont'd)

P1193

The scan tool indicates Diagnostic Trouble Code (DTC) P1193: A high voltage (high fuel pressure) problem in the Fuel Tank Pressure sensor circuit.

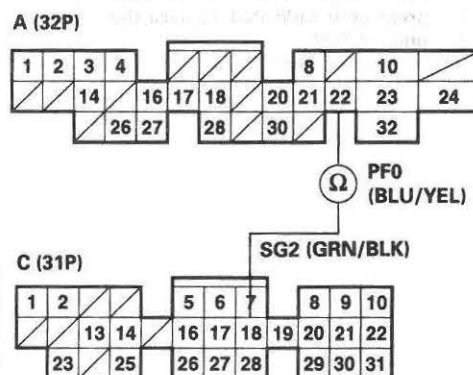


FUEL TANK PRESSURE SENSOR 3P CONNECTOR (C683)



Wire side of female terminals

PCM CONNECTORS



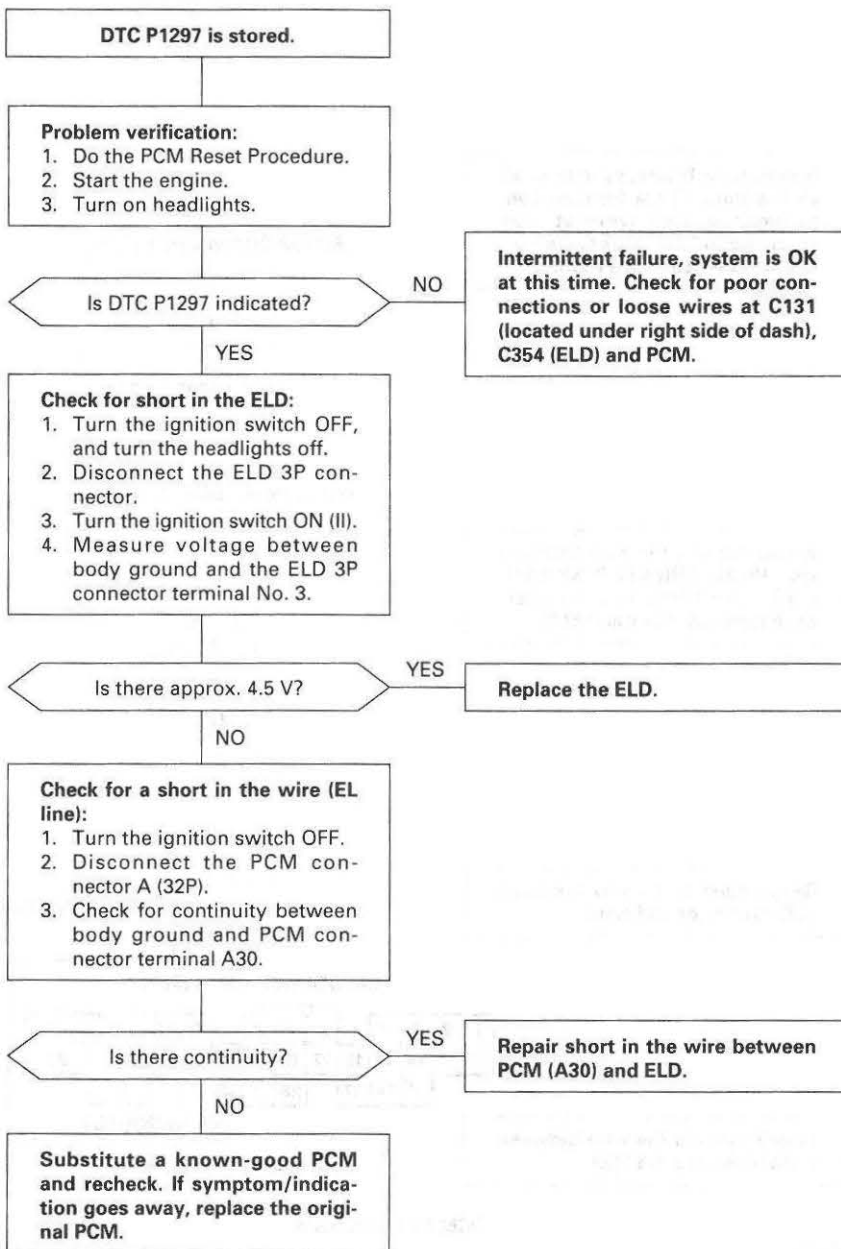
Wire side of female terminals



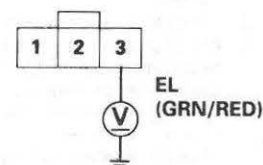
Electrical Load Detector (ELD)

P1297

The scan tool indicates Diagnostic Trouble Code (DTC) P1297: A low voltage problem in the Electrical Load Detector (ELD) circuit.

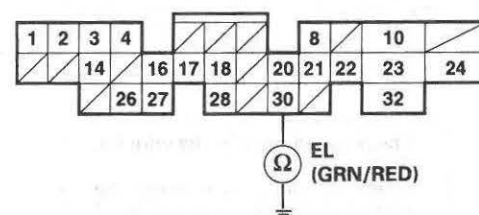


ELD 3P CONNECTOR (C354)



Wire side of female terminals

PCM CONNECTOR A (32P)



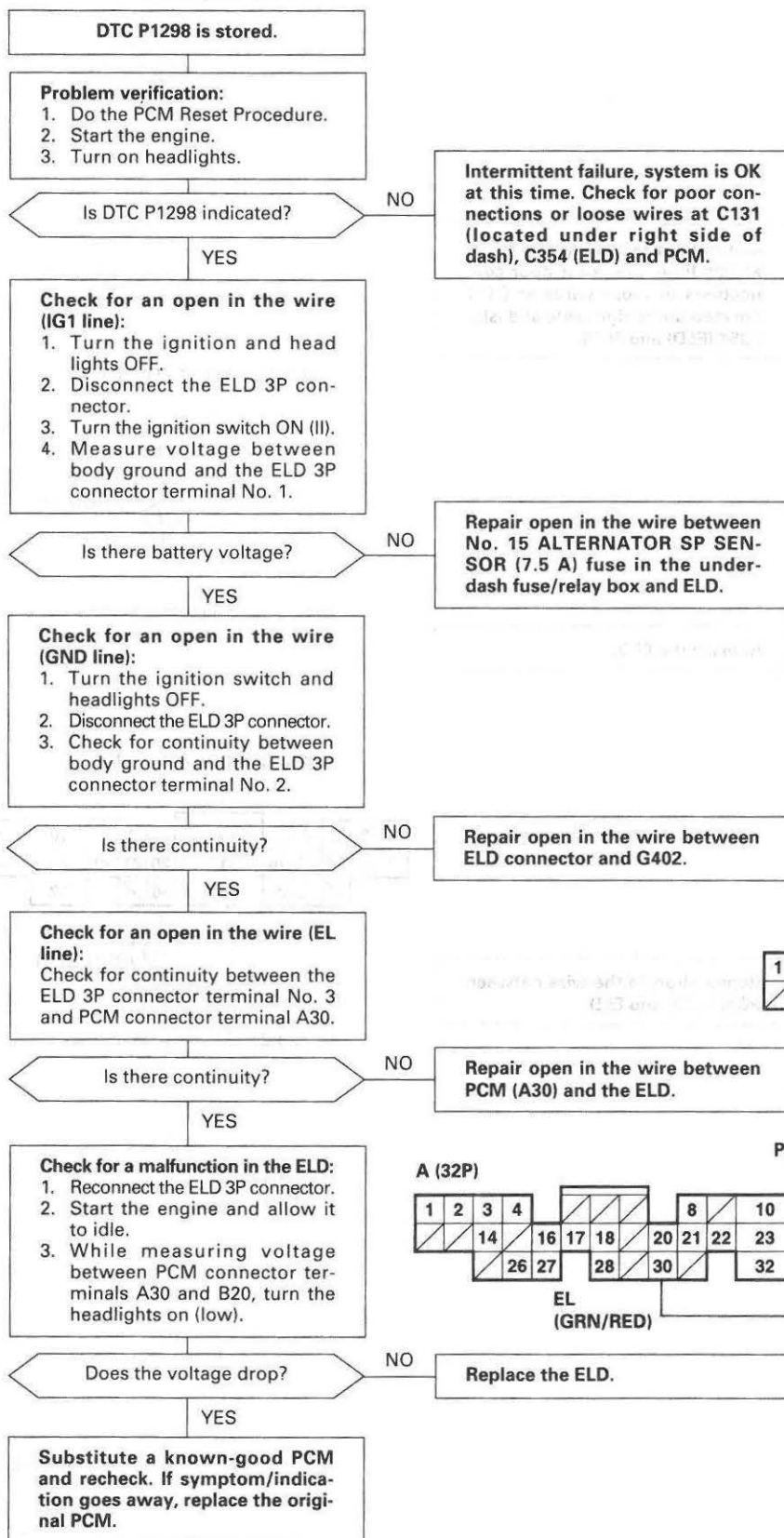
Wire side of female terminals

(cont'd)

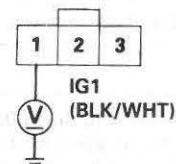
Electrical Load Detector (ELD) (cont'd)

P1298

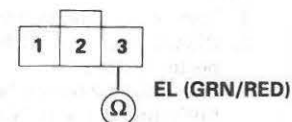
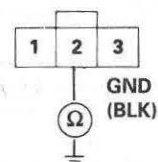
The scan tool indicates Diagnostic Trouble Code (DTC) P1298: A high voltage problem in the Electrical Load Detector (ELD) circuit.



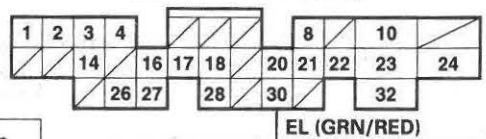
ELD 3P CONNECTOR (C354)



Wire side of female terminals

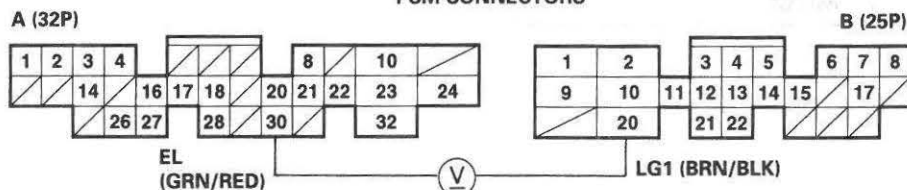


PCM CONNECTOR A (32P)



Wire side of female terminals

PCM CONNECTORS





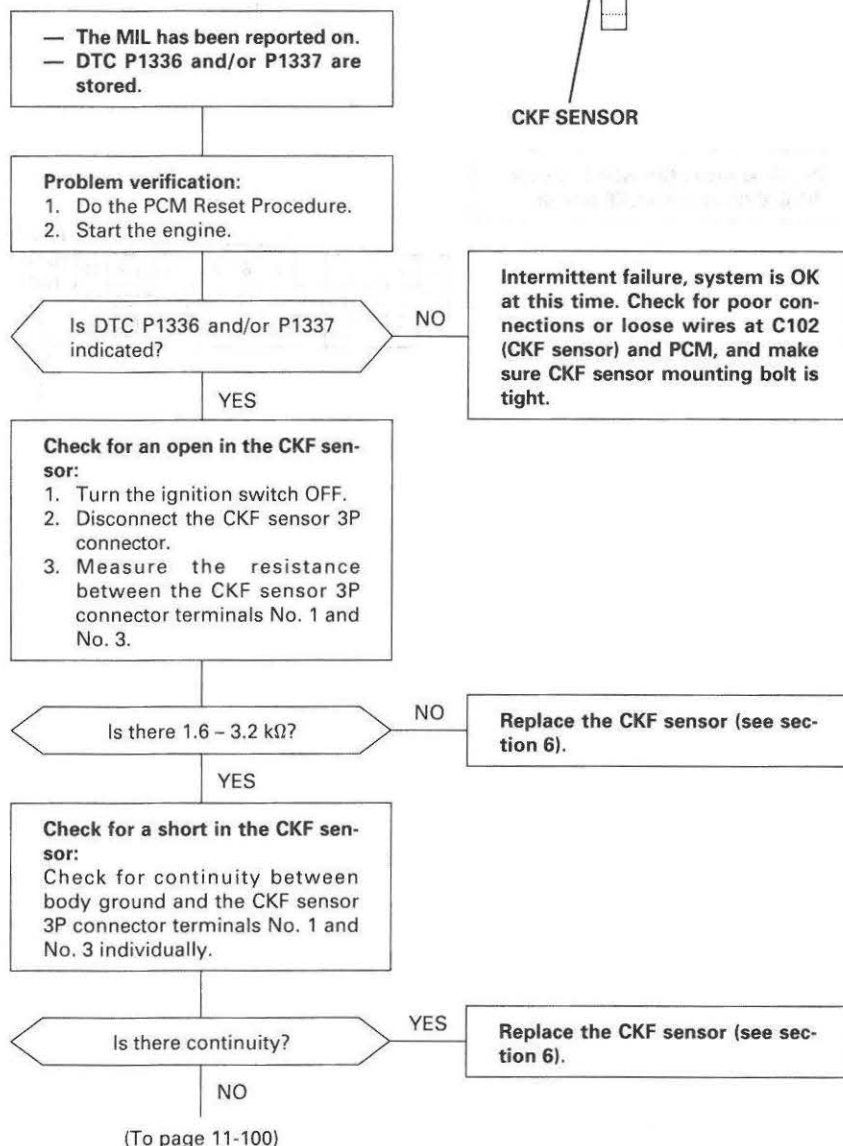
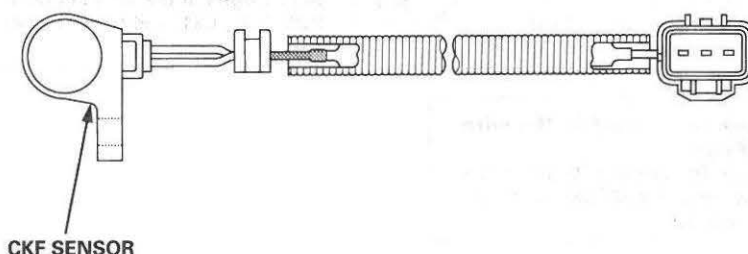
Crankshaft Speed Fluctuation (CKF) Sensor

P1336 The scan tool indicates Diagnostic Trouble Code (DTC) P1336: Intermittent interruption in the Crankshaft Speed Fluctuation (CKF) sensor circuit.

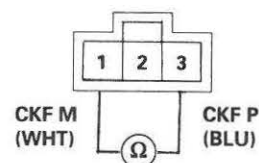
P1337 The scan tool indicates Diagnostic Trouble Code (DTC) P1337: No signal in the Crankshaft Speed Fluctuation (CKF) sensor circuit.

Description

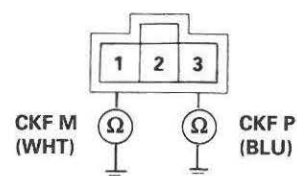
The diagnostic system has a pulser rotor on the crankshaft and a pulse pick-up sensor on the engine block. The PCM monitors the crankshaft speed fluctuation based on the CKF sensor signal, and judges that an engine misfire occurred if the fluctuation goes beyond a predetermined limit.



CKF SENSOR 3P CONNECTOR



Terminal side of male terminals

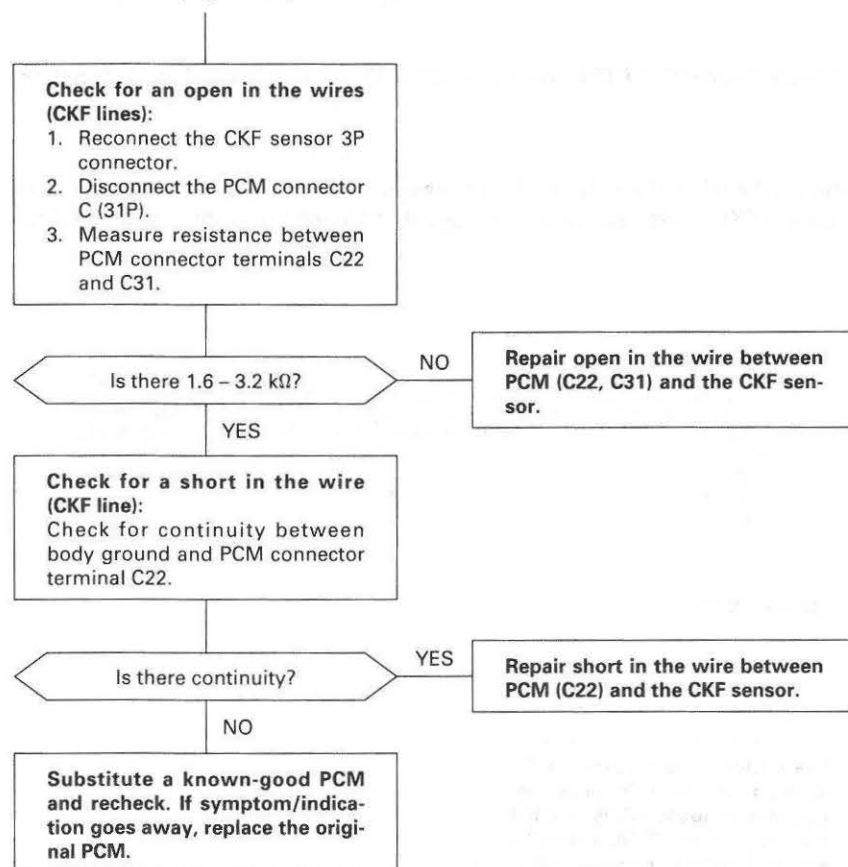


(cont'd)

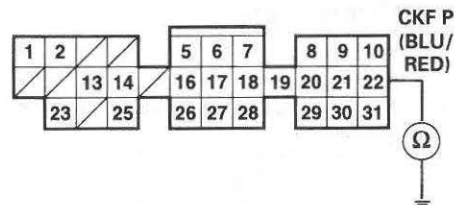
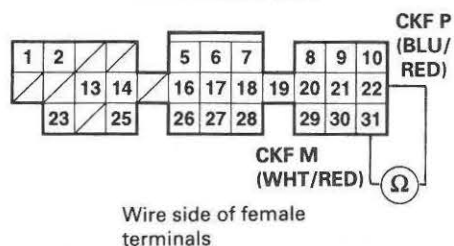
PGM-FI System

Crankshaft Speed Fluctuation (CKF) Sensor (cont'd)

(From page 11-99)



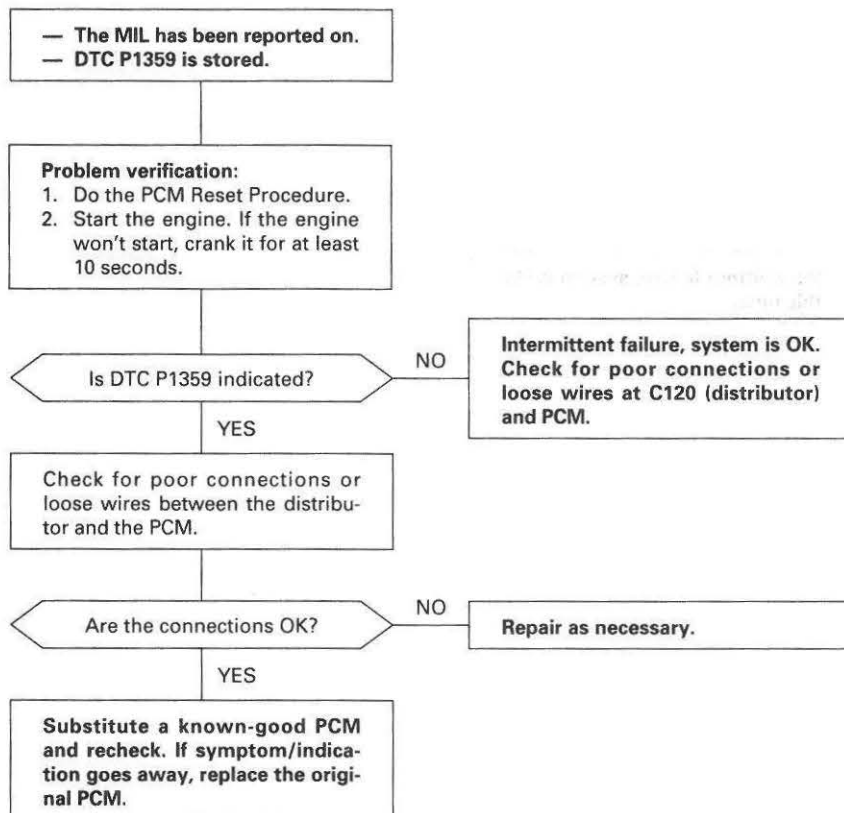
PCM CONNECTOR C (31P)





Crankshaft Position/Top Dead Center/Cylinder Position (CKP/TDC/CYP) Sensor

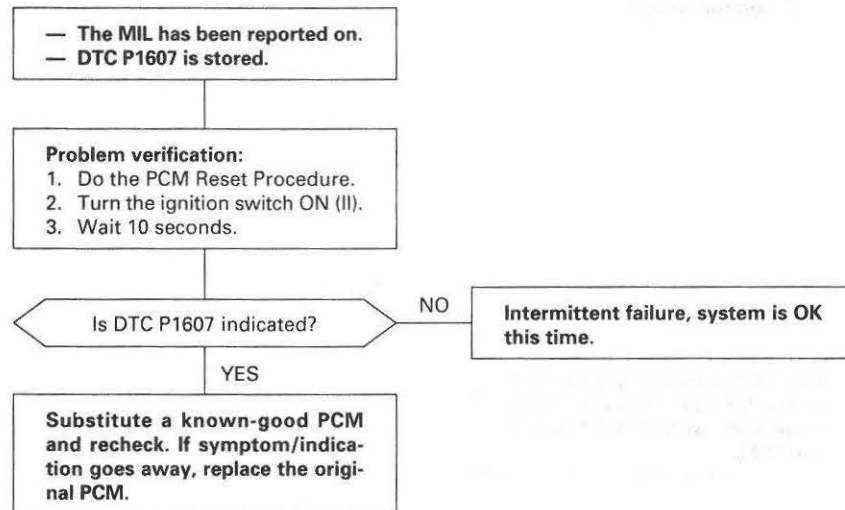
P1359 The scan tool indicates Diagnostic Trouble Code (DTC) P1359: A problem in the Crankshaft Position/Top Dead Center/Cylinder Position (CKP/TDC/CYP) sensor circuit.



PGM-FI System

PCM Internal Circuit

P1607 The scan tool indicates Diagnostic Trouble Code (DTC) P1607: A PCM Internal Circuit Problem.

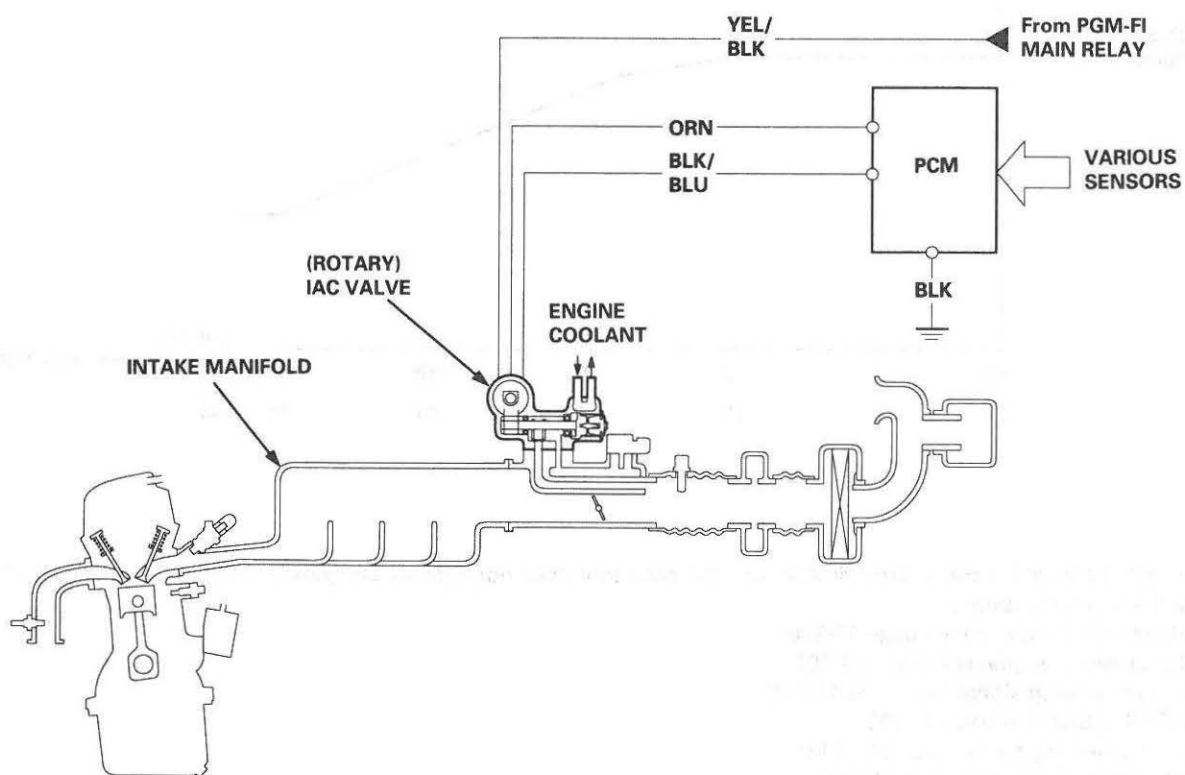


Idle Control System



System Description

The idle speed of the engine is controlled by the Idle Air Control (IAC) Valve. The valve changes the amount of air bypassing into the intake manifold in response to electric current controlled by the PCM. When the IAC Valve is activated, the valve opens to maintain the proper idle speed.

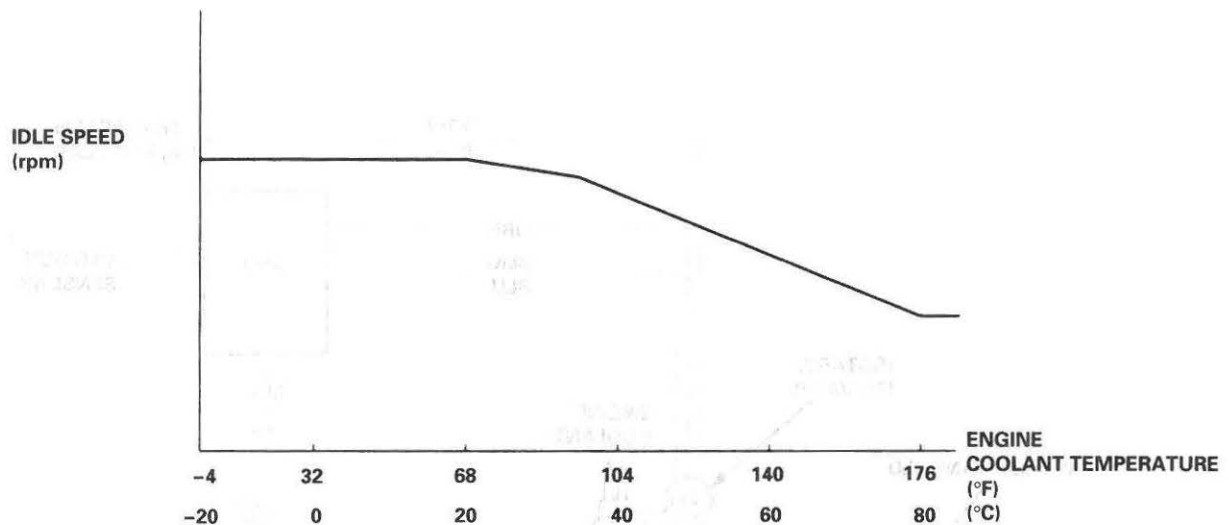


(cont'd)

Idle Control System

System Description (cont'd)

1. After the engine starts, the IAC valve opens for a certain time. The amount of air is increased to raise the idle speed about 150 – 300 rpm.
2. When the coolant temperature is low, the IAC valve is opened to obtain the proper fast idle speed. The amount of bypassed air is thus controlled in relation to the engine coolant temperature.



1. When the idle speed is out of specification and the scan tool does not indicate Diagnostic Trouble Code (DTC) P0505, check the following items:
 - Adjust the idle speed (see page 11-116)
 - Starter switch signal (see page 11-109)
 - Air conditioning signal (see page 11-110)
 - ALT FR signal (see page 11-112)
 - Brake switch signal (see page 11-113)
 - PSP switch signal (see page 11-114)
 - A/T gear position signal (see section 14)
 - Hoses and connections
 - IAC valve and its mounting O-rings
2. If the above items are normal, substitute a known-good IAC valve and readjust the idle speed (see page 11-116).

If the idle speed still cannot be adjusted to specification (and the scan tool does not indicate DTC P0505) after IAC valve replacement, substitute a known-good PCM and recheck. If symptom goes away, replace the original PCM.



Idle Control System

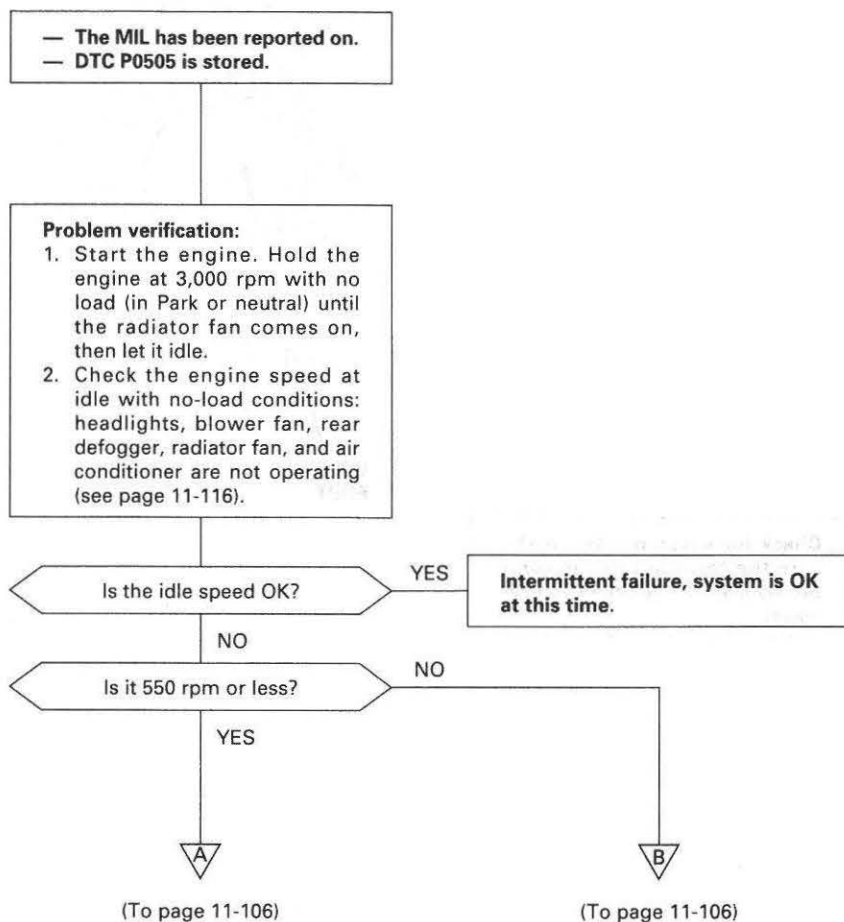
P0505 The scan tool indicates Diagnostic Trouble Code (DTC) P0505: Idle control system malfunction.

NOTE: If DTC P1509 is stored at the same time as DTC P0505, troubleshoot DTC P1509 first, then troubleshoot DTC P0505.

Possible Cause

- IAC valve mechanical malfunction
- Throttle body clogged port, improper adjustment
- Intake manifold gasket leakage
- Vacuum hose leakage
- Vacuum leak
- ECT sensor incorrect output

Troubleshooting Flowchart

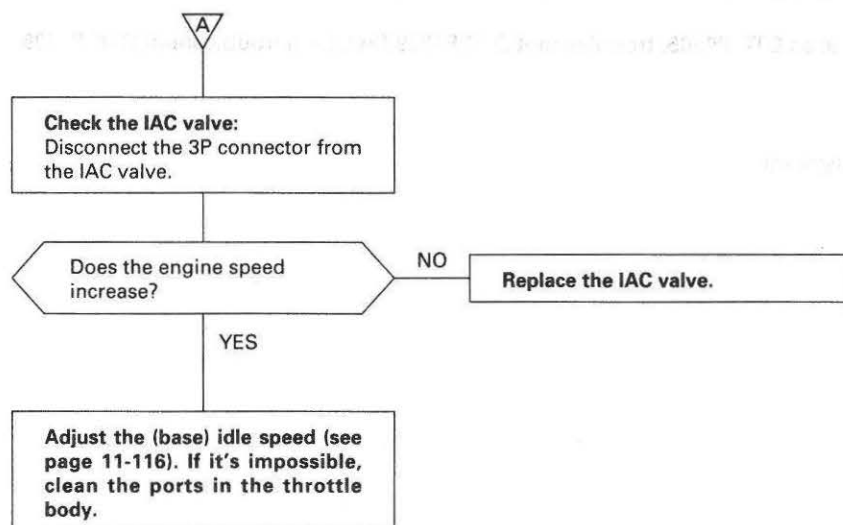


(cont'd)

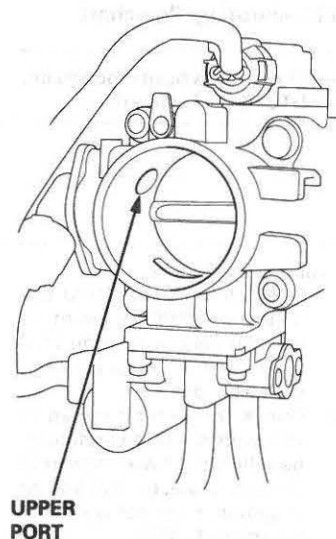
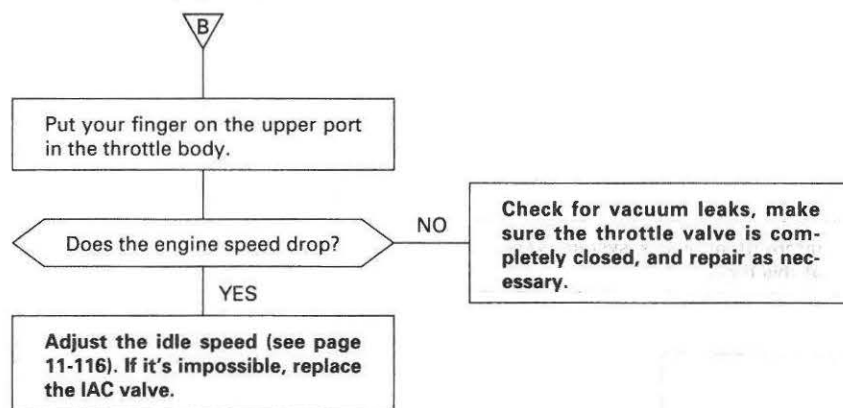
Idle Control System

Idle Control System (cont'd)

(From page 11-105)



(From page 11-105)

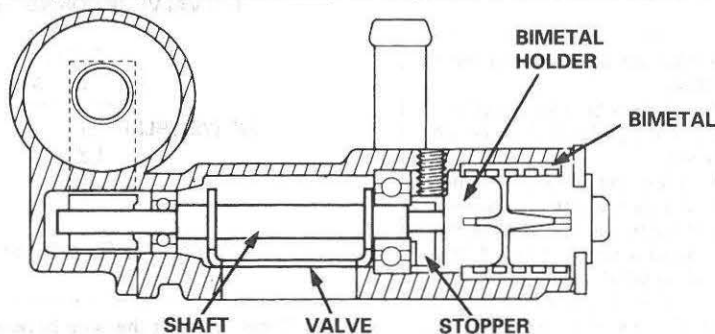




Idle Air Control (IAC) Valve

P1509 The scan tool indicates Diagnostic Trouble Code (DTC) P1509: A problem in the idle Air Control (IAC) valve circuit.

The (Rotary) IAC Valve changes the amount of air bypassing the throttle body in response to a current signal from the PCM in order to maintain the proper idle speed.



— The MIL has been reported on.
— DTC P1509 is stored.

Problem verification:

1. Do the PCM Reset Procedure.
2. Turn the ignition switch ON (II).

Is DTC P1509 indicated?

NO
Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C109 (IAC valve) and PCM.

YES

Check for an open in the wires (PG lines):

Measure voltage between body ground and PCM connector terminals B2 and B10 individually.

Is there more than 1.0 V?

YES
Repair open in the wires between PCM and G101 (located at the thermostat housing).

NO

Check the PCM input voltage:

1. Turn the ignition switch OFF.
2. Disconnect PCM connector B (25P) from the PCM.
3. Turn the ignition switch ON (II).
4. Measure voltage between body ground and PCM connector terminals B6 and B15* individually.

Is there battery voltage?

NO → (To page 11-108)

YES

Check the IAC valve:

1. Turn the ignition switch OFF.
2. Disconnect the IAC valve 3P connector.
3. Measure resistance between IAC valve 3P connector terminal No. 2 and terminals No. 1 and 3 individually.

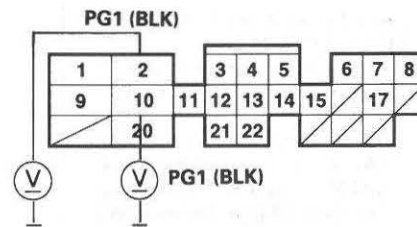
Is there 16 – 28 Ω?

NO → Replace the IAC valve.

YES

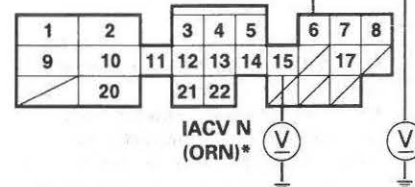
Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

PCM CONNECTOR B (25P)

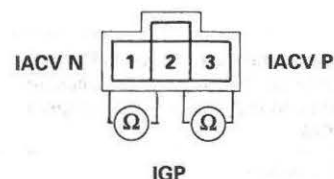


Wire side of female terminals

IACV P (BLK/BLU)



IAC VALVE 3P CONNECTOR



Terminal side of male terminals

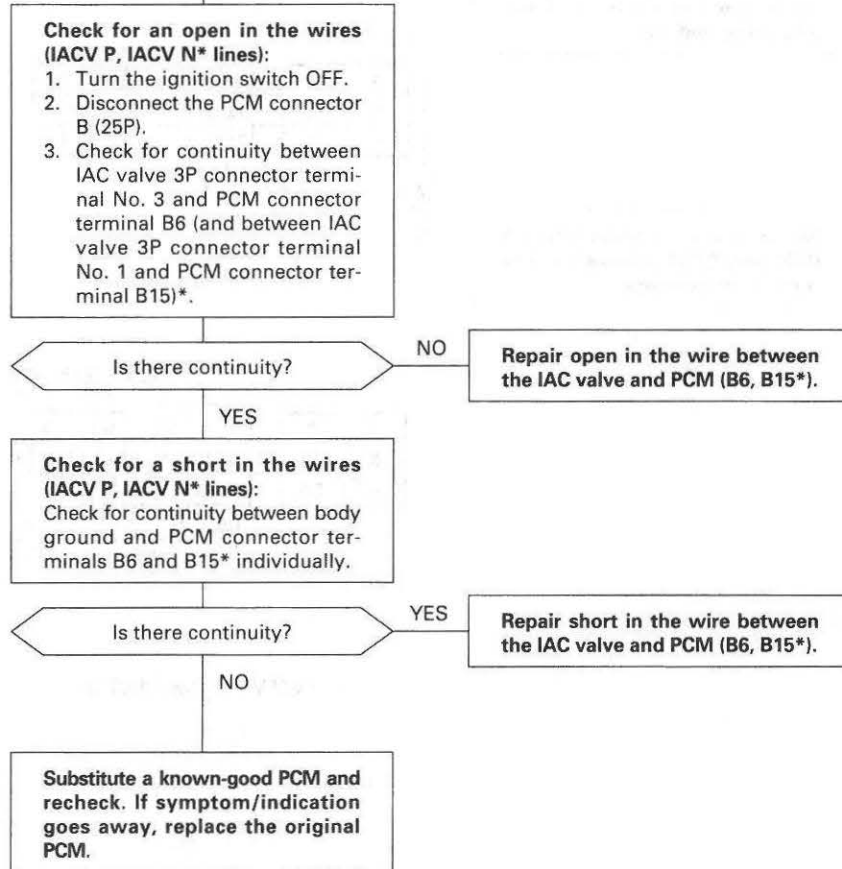
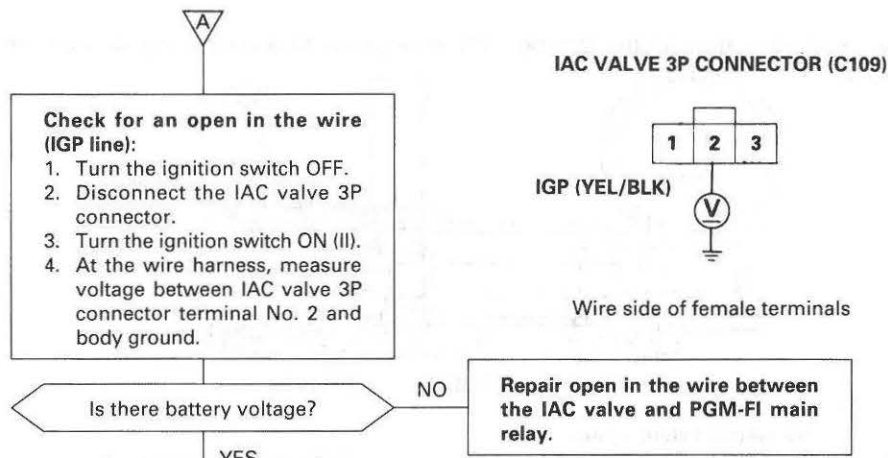
*: IACV N line

(cont'd)

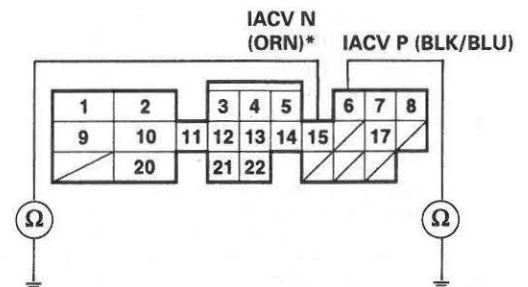
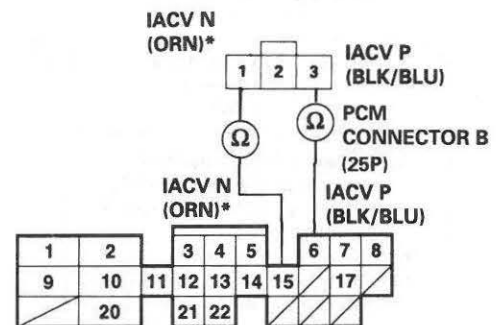
Idle Control System

Idle Air Control (IAC) Valve (cont'd)

(From page 11-107)



*: IACV N line





Starter Switch Signal

This signals the PCM when the engine is cranking.

Inspection of Starter Switch Signal.

NOTE: Transmission in Park or neutral position.

Check for an open or short in the wire (STS line):

Measure voltage between PCM connector terminals A24 and B20 with the ignition switch in the start (III) position.

PCM CONNECTORS

A (32P)

1	2	3	4						8			10																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													</
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B (25P)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

STS (BLU/ORN)



LG1 (BRN/BLK)

Wire side of female terminals

Is there battery voltage?

NO

Inspect the No. 31 STARTER SIGNAL (7.5 A) fuse in the under-dash fuse/relay box.

YES

Starter switch signal is OK.

Is the fuse OK?

NO

- Repair short in the wire between the PCM (A24) and the No. 31 STARTER SIGNAL (7.5 A) fuse or the PGM-FI main relay.
- Replace the No. 31 STARTER SIGNAL (7.5 A) fuse.

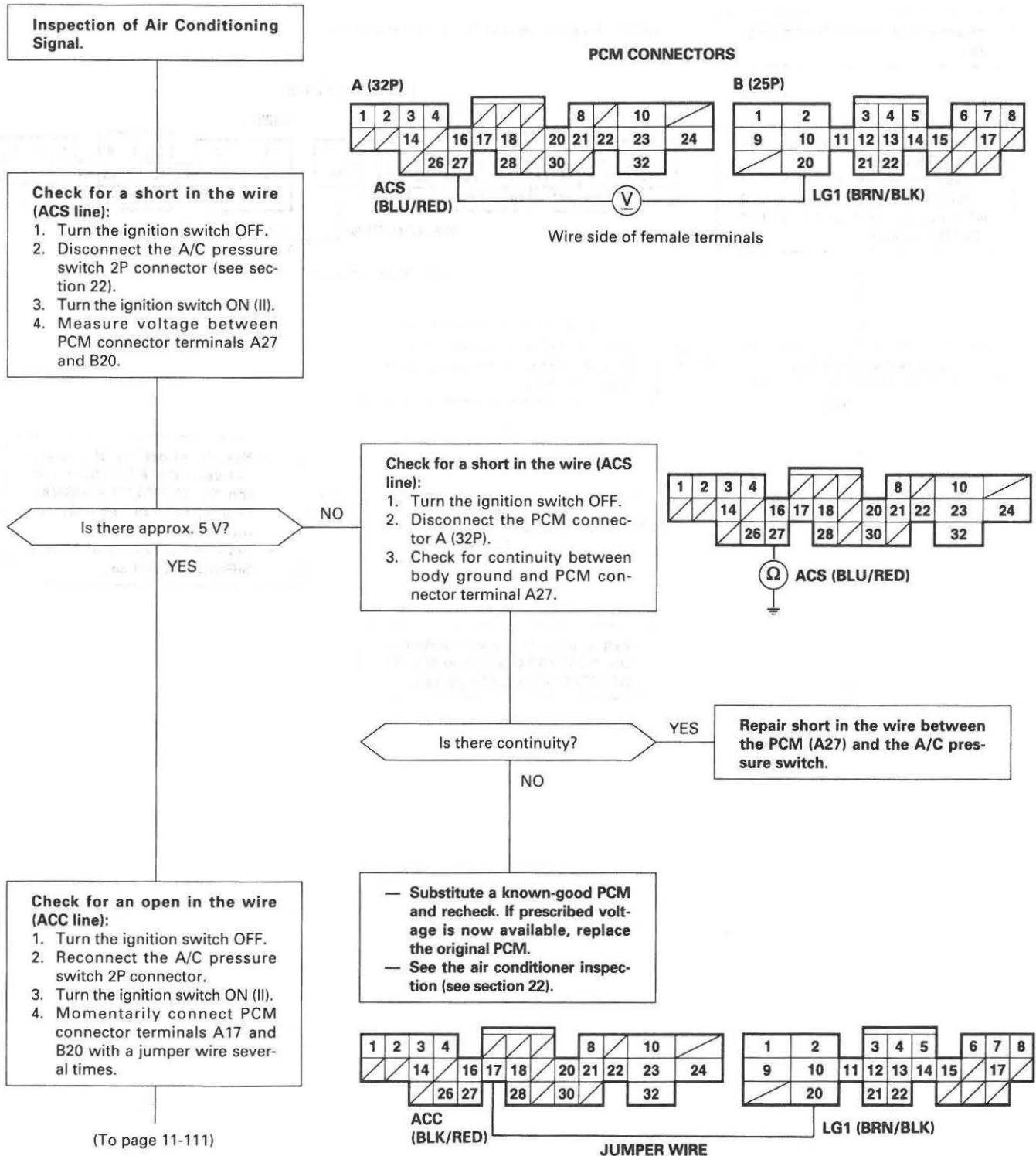
YES

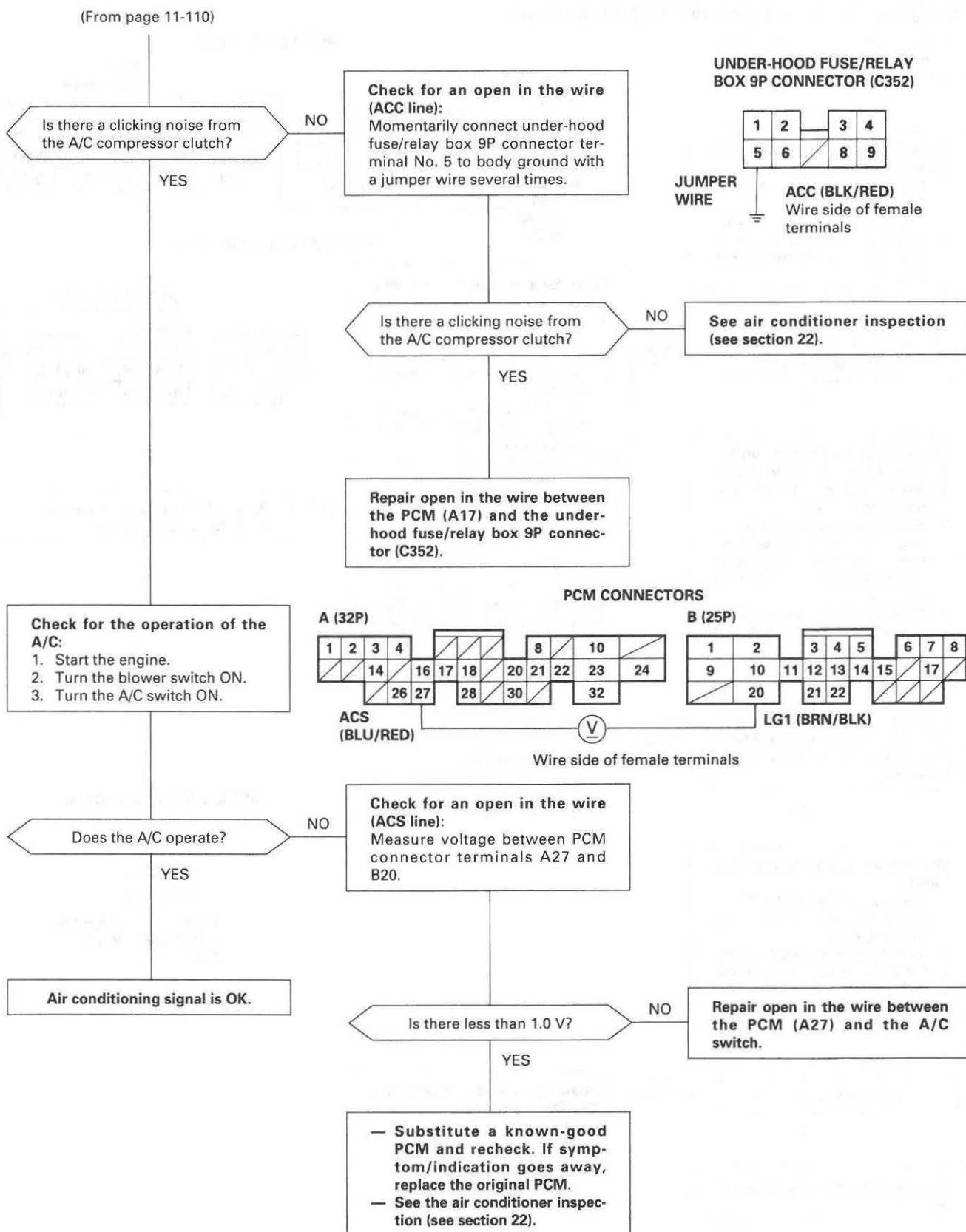
Repair open in the wire between the PCM (A24) and the No. 31 STARTER SIGNAL (7.5 A) fuse.

Idle Control System

Air Conditioning Signal

This signals the PCM when there is a demand for cooling from the air conditioning system.

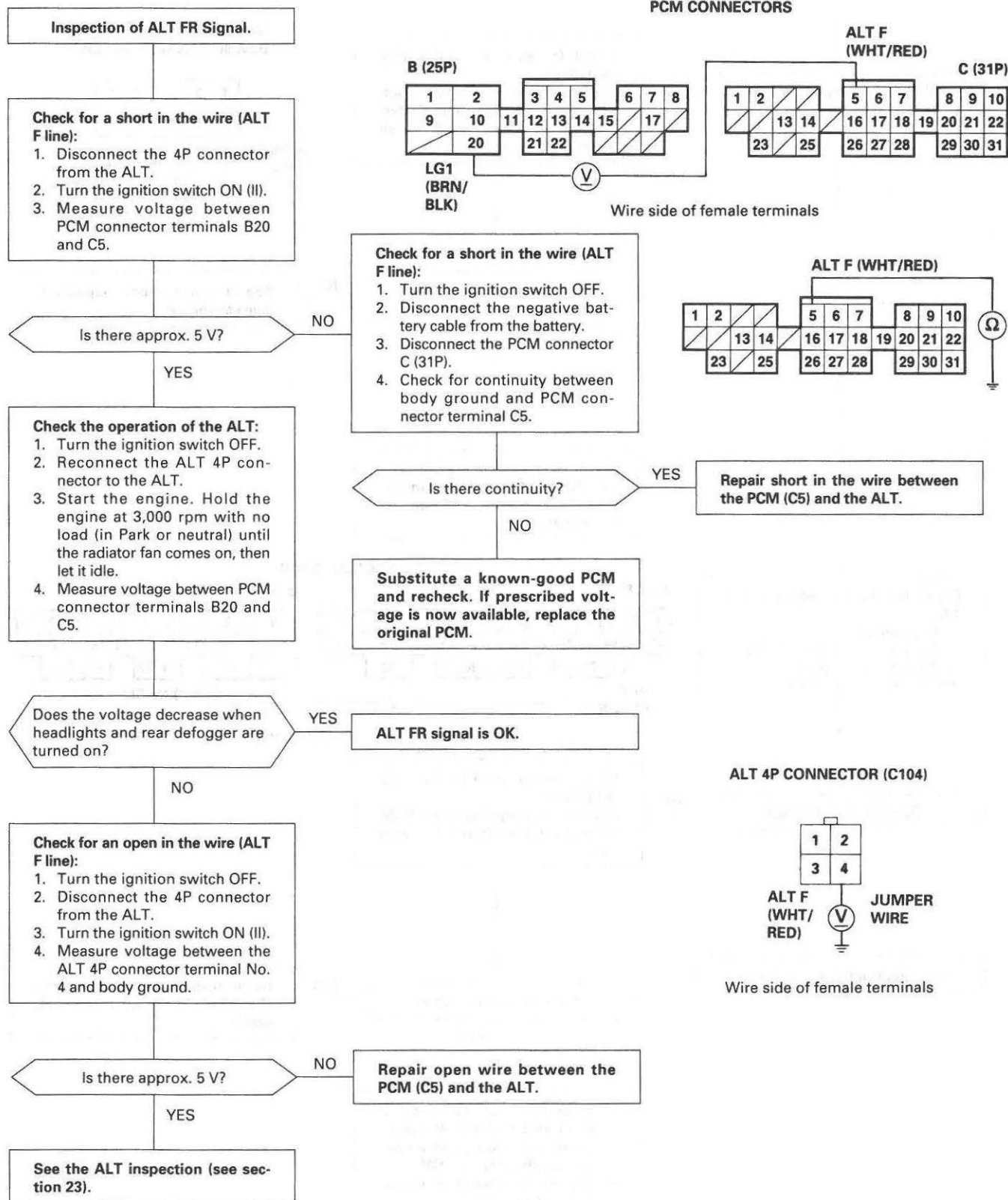




Idle Control System

Alternator (ALT) FR Signal

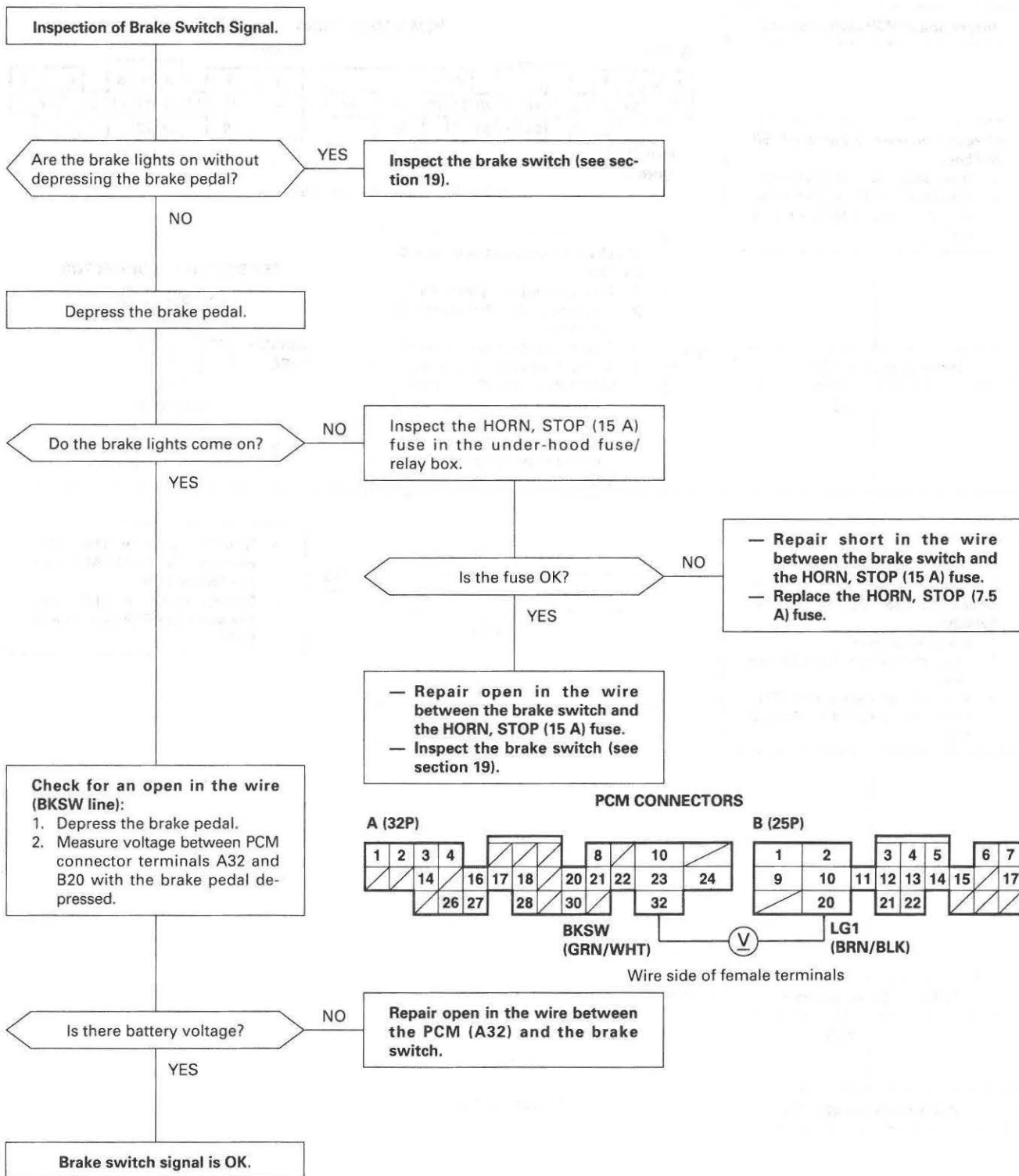
This signals the PCM when the Alternator (ALT) is charging.





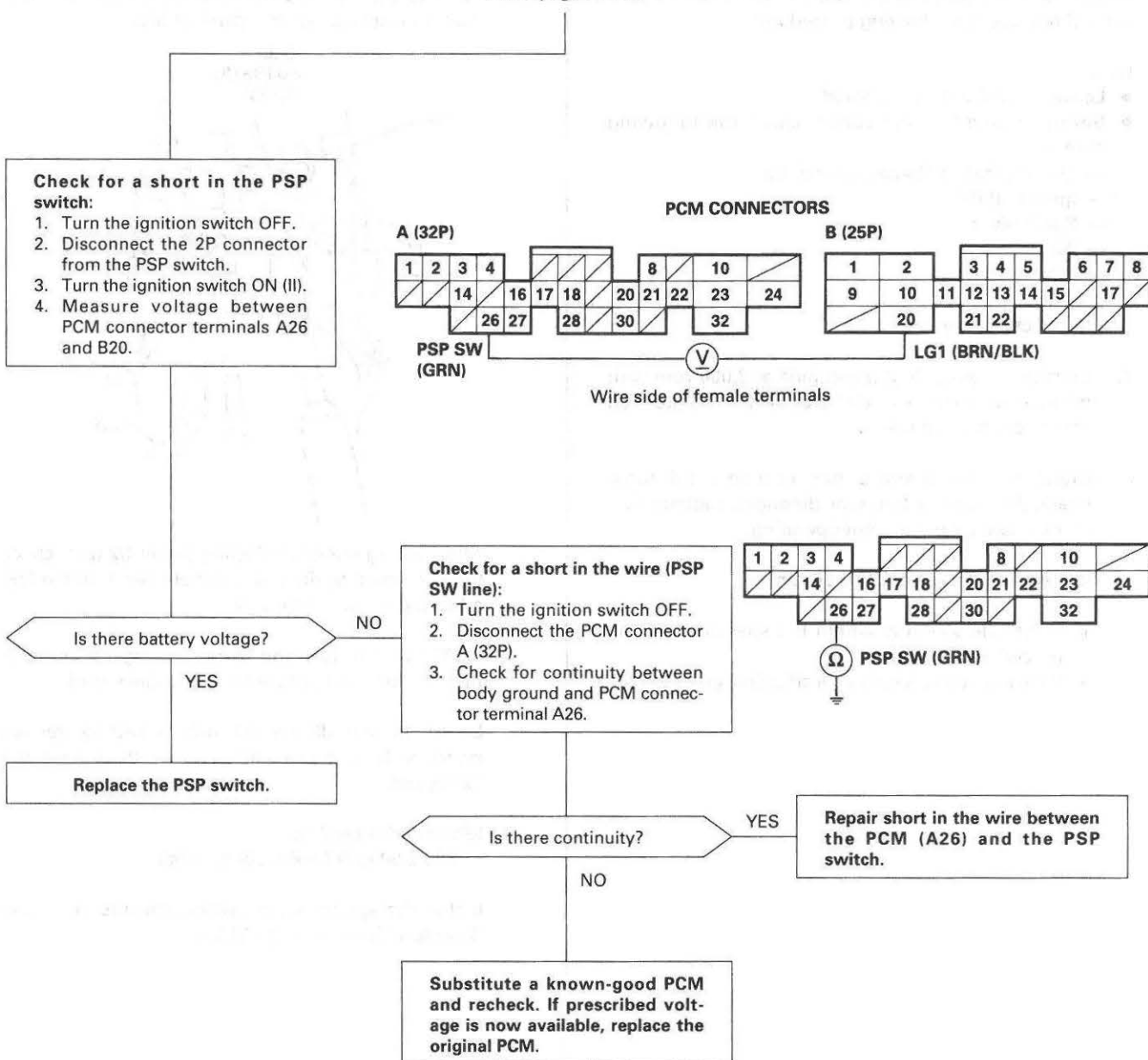
Brake Switch Signal

This signals the PCM when the brake pedal is depressed.





(From page 11-114)



Idle Control System

Idle Speed Setting

Adjust the idle speed using a Honda PGM Tester if possible. If not, use the following procedure:

NOTE:

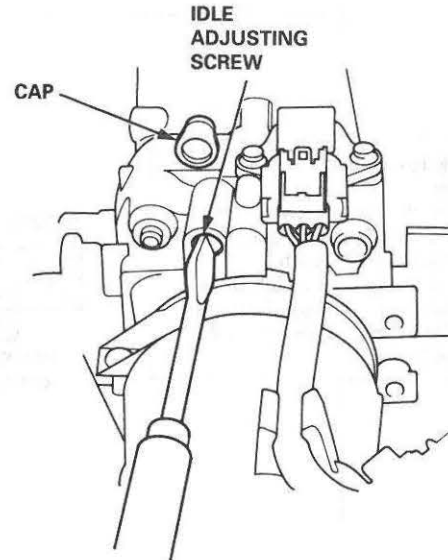
- Leave the IAC valve connected.
- Before setting the idle speed, check the following items:
 - The MIL has not been reported on.
 - Ignition timing
 - Spark plugs
 - Air cleaner
 - PCV system

1. Connect a tachometer.
2. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
3. Check the idle speed under no-load conditions: headlights, blower fan, rear defogger, radiator fan, and air conditioner are not operating.

Idle speed should be: 700 ± 50 rpm

- If the idle speed is within the specification, the procedure is complete.
- If the idle speed is out of specification, go to step 4.

4. Remove the cap and turn the idle adjusting screw 1/2-turn clockwise or counterclockwise.



5. After turning the idle adjusting screw 1/2-turn, check the idle speed again. If it is out of spec, turn the idle adjusting screw 1/2-turn again.

NOTE: Do not turn the idle adjusting screw more than 1/2-turn without checking the idle speed.

6. Let the engine idle for one minute with heater fan switch at HI and air conditioner on, then check the idle speed.

Idle speed should be:

830 ± 50 rpm (in Park or neutral)

If the idle speed is not within specification, see Symptom Chart on page 11-32.

Fuel Supply System



System Description

The fuel supply system consists of a fuel tank, fuel injectors, fuel tank pressure sensor, fuel tank temperature sensor, fuel pressure sensor, fuel temperature sensor, injector control module, fuel injector relay, fuel pressure regulator shut-off solenoid valve, fuel tank internal solenoid valve, fuel pressure regulator, fuel filter and manual shut-off valve.

Manual shut-off valve

This vehicle is equipped with a manual shut-off valve which can cut the fuel supplied to the engine when needed.

Low fuel indicator light

The PCM lights the low fuel indicator light and informs the driver that the fuel level is low.

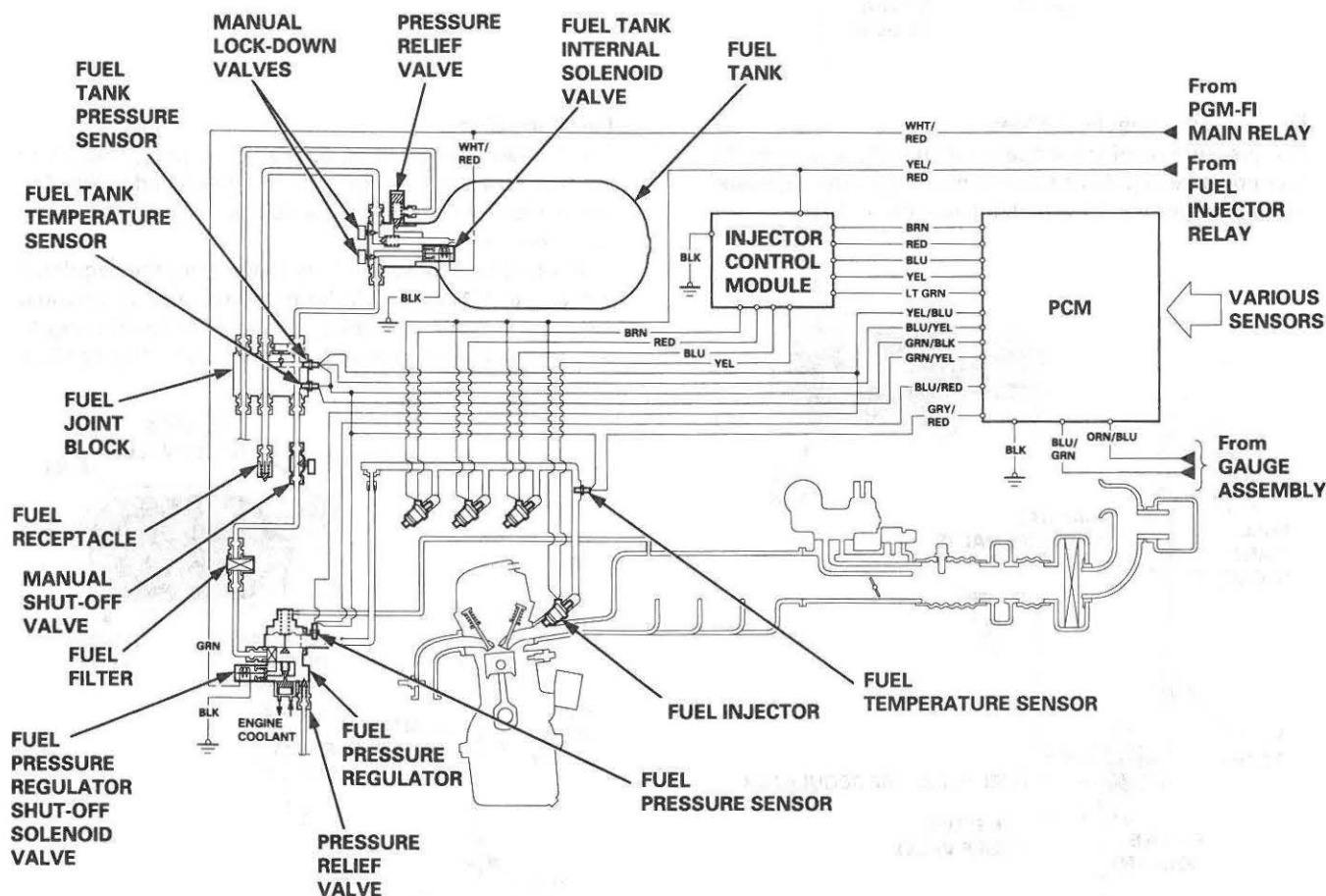
The PCM calculates the gas quantity in the fuel tank by using the fuel pressure value detected by fuel tank pressure sensor and the fuel temperature value detected by fuel tank temperature sensor, and outputs the signal to the gauge assembly.

When the PCM detects a malfunction of the fuel tank pressure sensor and/or fuel tank temperature sensor, the PCM blinks the low fuel indicator light and causes the fuel gauge to read empty.

When the PCM detects a gas leak, the PCM blinks the low fuel indicator light and reduces the fuel meter to 0. After the engine is stopped while the low fuel indicator light is blinking for a gas leak, the engine will not start until the PCM is reset.

Injector control module

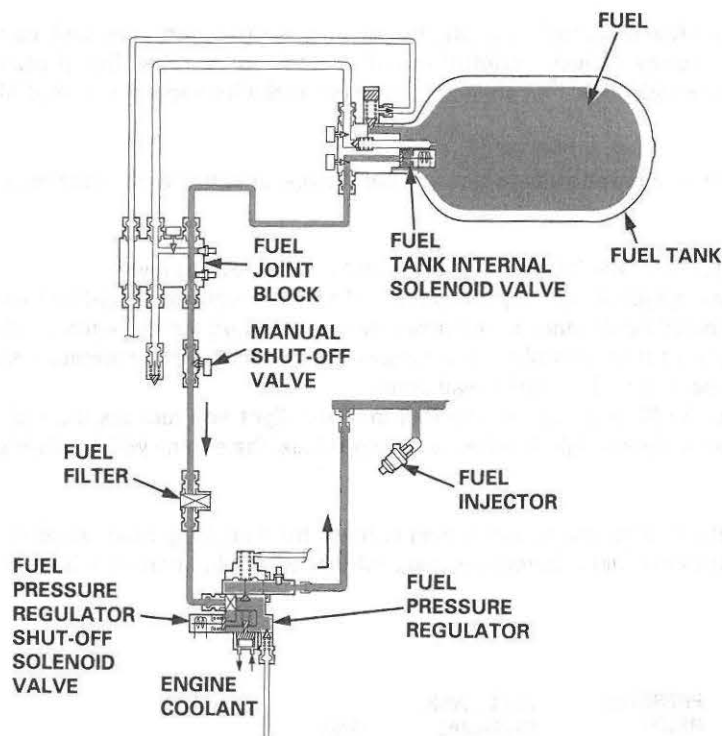
Injector control module controls the fuel injectors, and prevents them from sticking when starting in the extremely low temperatures. Current is increased to the fuel injectors momentarily, when the ignition switch is turned ON (II) to loosen any sticking fuel injectors.



(cont'd)

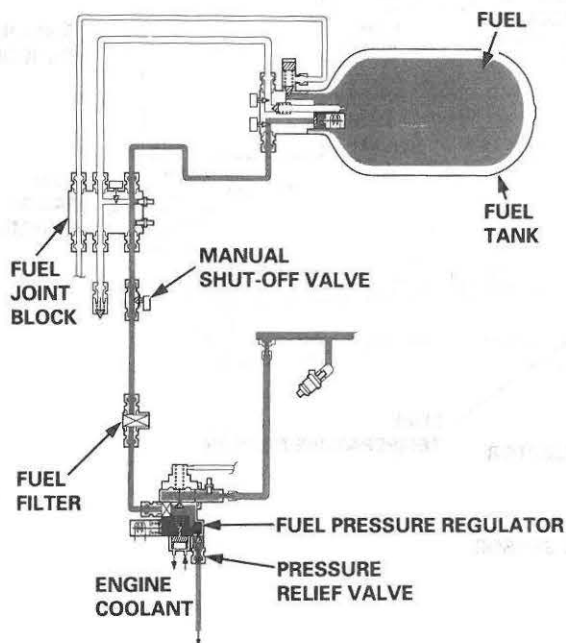
Fuel Supply System

System Description (cont'd)



Fuel Pressure Regulator Side:

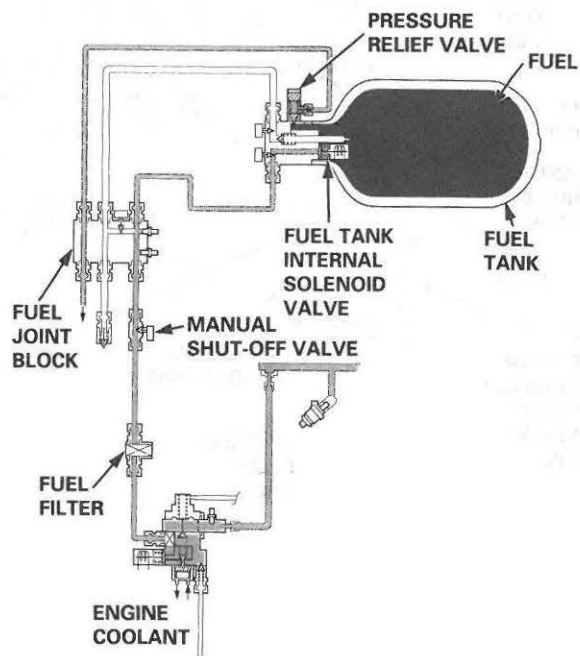
The pressure relief valve opens when fuel pressure in the fuel pressure regulator rises to more than the regulated value. The gas is discharged outside the vehicle.



Fuel Tank Side:

The pressure relief valve opens when fuel pressure in the fuel tank rises to more than the regulated value. The gas is discharged outside the vehicle to prevent the fuel tank from being damaged.

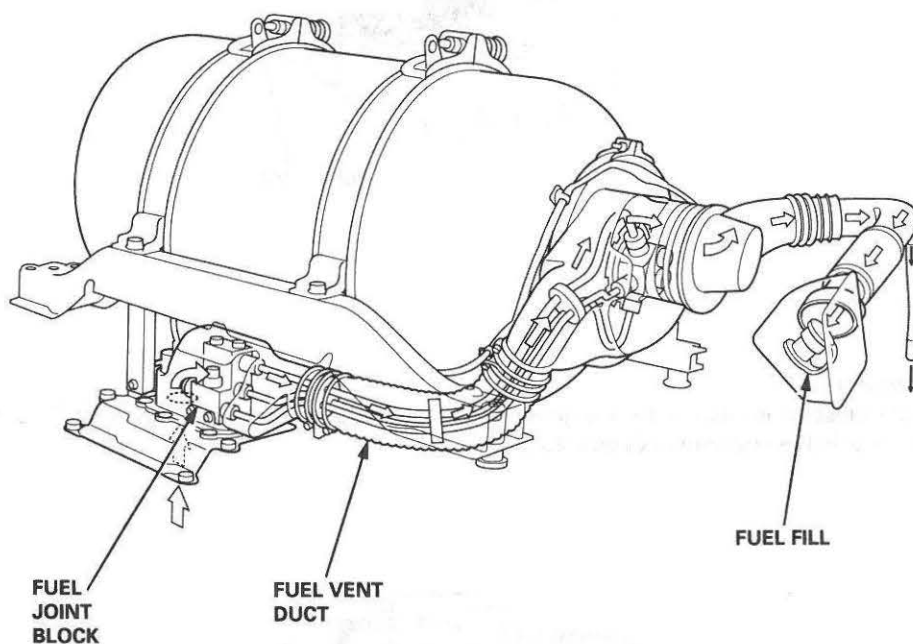
When fuel tank pressure falls lower than the regulated value, the PCM turns off the fuel tank internal solenoid valve to prevent the tank pressure from continuing to drop (too low a pressure could cause the tank to deform).





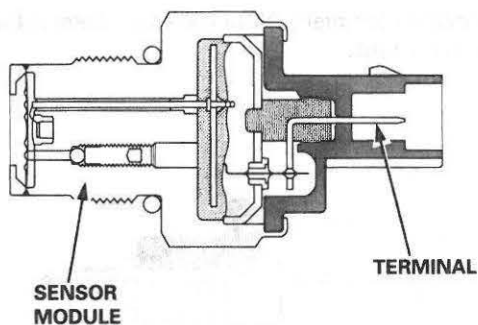
Fuel Vent Duct

The fuel lines are enclosed in a duct that will contain any escaped fuel in case there is a leak in the fill pipe. Any leaking fuel is rerouted to the fuel fill compartment to prevent fuel from leaking into the trunk or passenger compartment.



Fuel pressure sensor

The fuel pressure sensor is located on the fuel pressure regulator, and it detects the fuel injector pressure. This signal is used to correct the fuel injection period by monitoring fuel injector pressure. It also detects any abnormality in the fuel pressure.



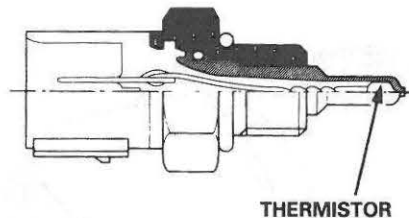
(cont'd)

Fuel Supply System

System Description (cont'd)

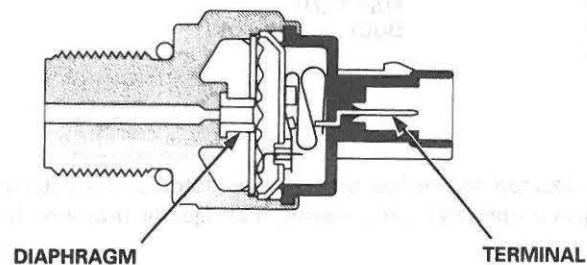
Fuel temperature sensor

The fuel temperature sensor is located on the fuel rail, and it detects the temperature of the fuel. This signal is used to correct the fuel injection period duration.



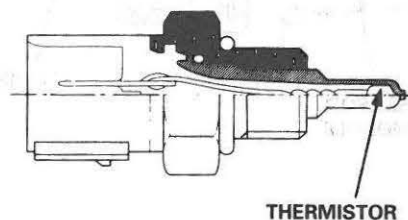
Fuel tank pressure sensor

The fuel tank pressure sensor is located on the fuel joint block, and it detects the fuel tank pressure. This signal is used to calculate the amount of fuel in the tank and to detect any gas leakage.



Fuel tank temperature sensor

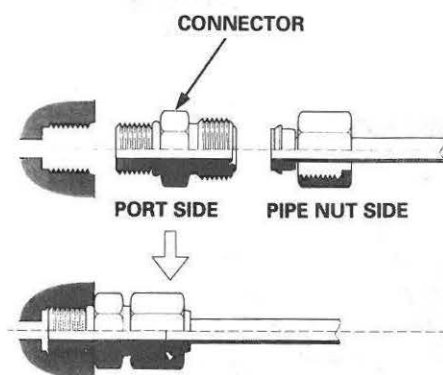
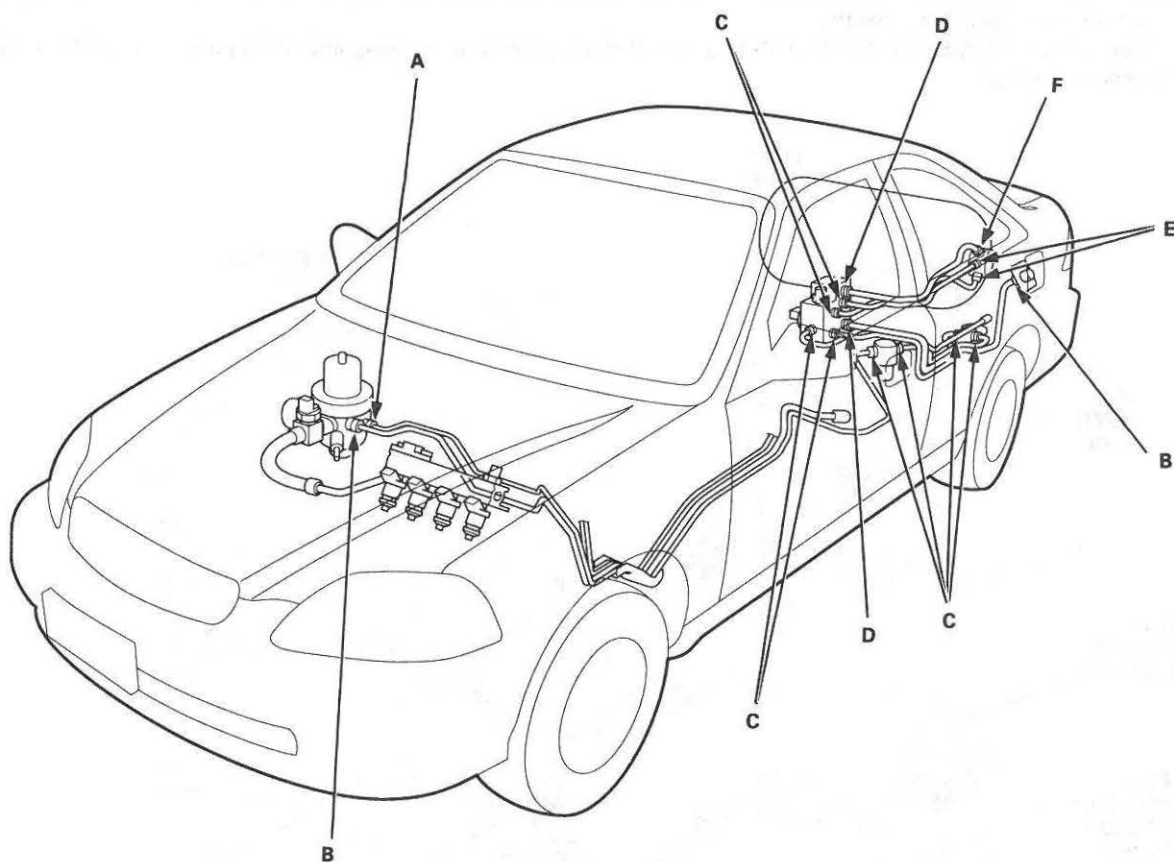
The fuel tank temperature sensor is located on the fuel joint block, and it detects the temperature of the fuel. This signal is used to calculate the amount of the fuel in the tank.





Fuel Lines

Check fuel system lines, hoses, fuel filter, and other components for damage, leaks and deterioration, and replace them if necessary.



PART	PORT SIDE TORQUE	PIPE NUT SIDE TORQUE
A	—	26 N·m (2.7 kgf·m, 20 lbf·ft)
B	—	47 N·m (4.8 kgf·m, 35 lbf·ft)
C	31 N·m (3.2 kgf·m, 23 lbf·ft)	26 N·m (2.7 kgf·m, 20 lbf·ft)
D	56 N·m (5.7 kgf·m, 41 lbf·ft)	47 N·m (4.8 kgf·m, 35 lbf·ft)
E*	21 N·m (2.1 kgf·m, 15 lbf·ft)	26 N·m (2.7 kgf·m, 20 lbf·ft)
F*	34 N·m (3.5 kgf·m, 25 lbf·ft)	47 N·m (4.8 kgf·m, 35 lbf·ft)

*: Hold the port side and tighten the pipe nut.

(cont'd)

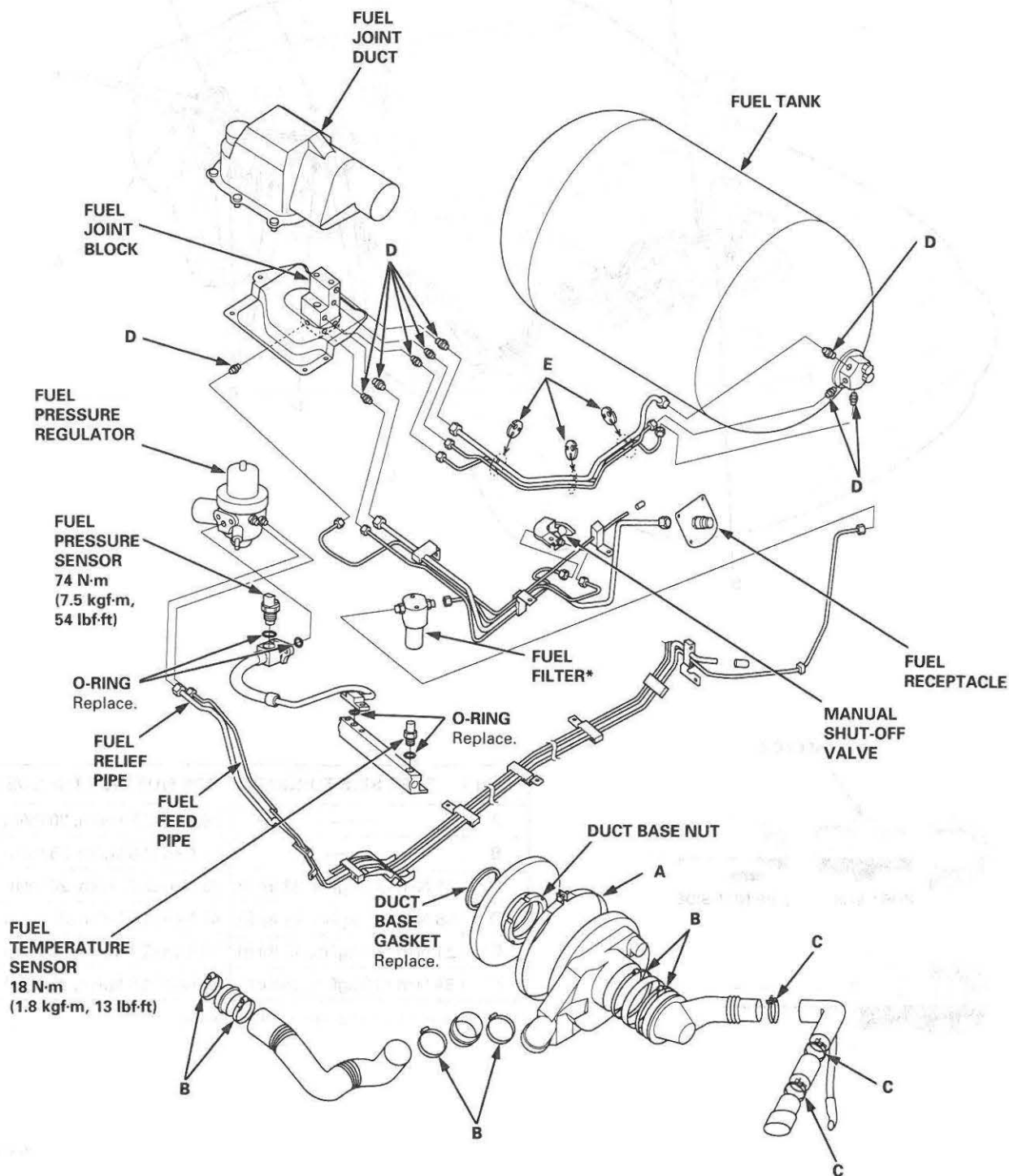
Fuel Supply System

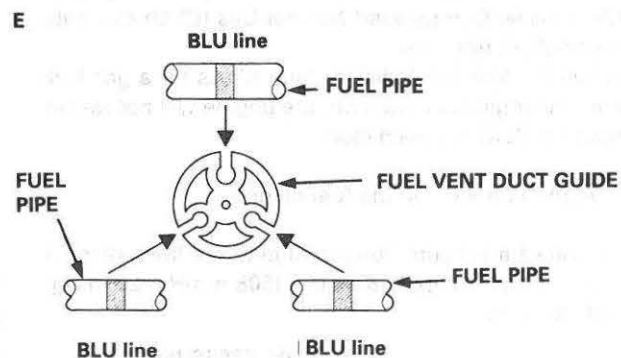
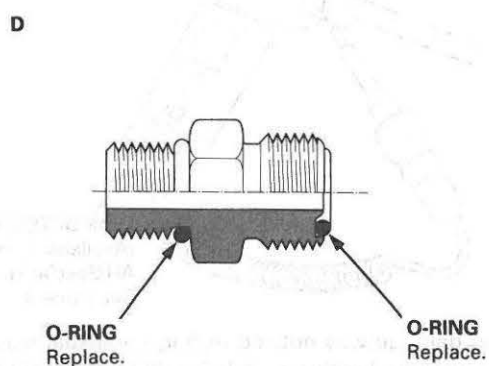
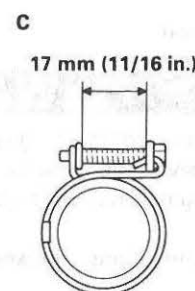
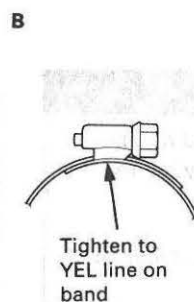
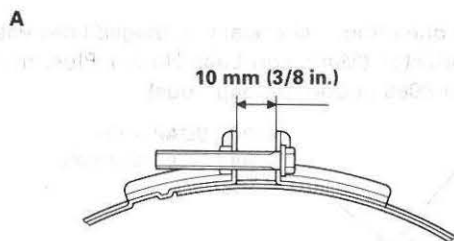
Fuel Lines (cont'd)

NOTE:

- Check all hose clamps and retighten if necessary.
- Apply silicon grease (Shinetsu silicon GR10M) or glycol compressor oil (Mobile GLYGOYLE 22) to a new O-ring, and carefully install it into its proper position.

*: Apply silicon grease (PARKER CHRISTO-LUB) to a new O-ring at fuel filter housing and drain plug, and carefully install it into its proper position.





O-ring

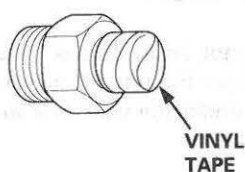
Installation

NOTE:

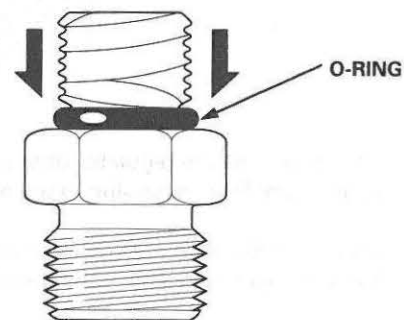
- To prevent O-ring contamination, be sure O-rings and mating surfaces are clean just before assembly.
- Install O-rings with clean hands. Do not install O-rings while wearing fibrous gloves.
- Do not twist the O-ring.

1. Wrap vinyl tape around the threads, and coat the surface of the tape with PAG oil.

NOTE: Wrap the vinyl tape so that there is no stepped portion.



2. Install the O-ring into the groove. Be careful not damage the sealing face of the O-ring.



3. Using a small brush, apply PAG oil on one half of the O-ring.
4. Remove the vinyl tape.

Fuel Supply System

Leak Inspection

Inspection

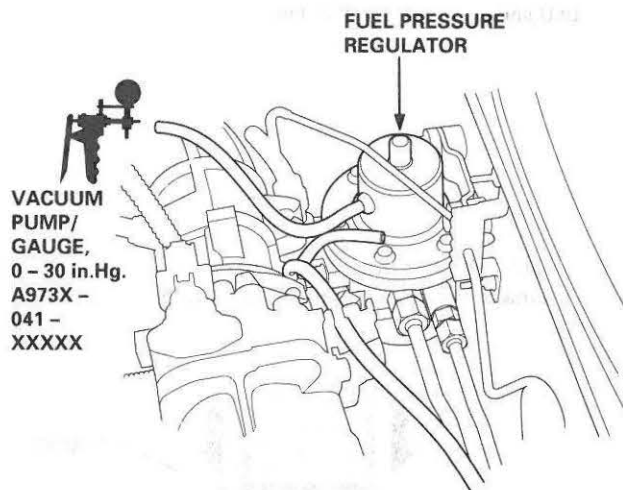
⚠ WARNING

Compressed natural gas is flammable and highly explosive. You could be killed or seriously injured if leaking natural gas is ignited.

Stop the engine, and keep heat, sparks and flames away.

- Check for a gas leak if there is an odor coming from the vehicle. Compressed Natural Gas (CNG) can only be smelled, not seen.
- When the low fuel indicator light blinks for a gas leak and the engine is turned off, the engine will not restart until the PCM has been reset.

1. Open the hood and the fuel fill door.
2. Connect a vacuum pump/gauge to the fuel pressure regulator, and apply 67.7 kPa (508 mmHg, 20 in.Hg) of vacuum.

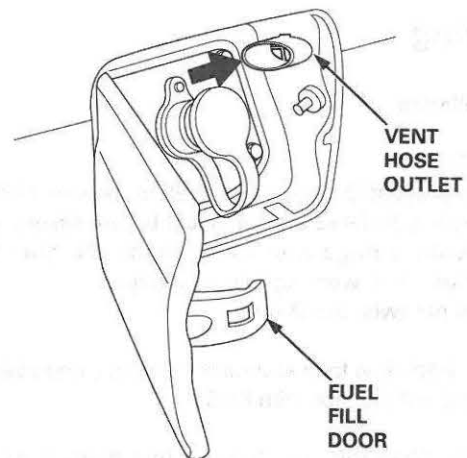


3. If the fuel pressure regulator does not hold vacuum, replace it before continuing to the next step.
4. Visually inspect the fuel pipes and hoses under the hood for kinks, abrasion, and other signs of damage.
5. With the manual shut-off valve open, turn the ignition switch ON (II), but do not start the engine. After the fuel pressure regulator shut-off solenoid valve/fuel tank internal solenoid valve operates for approximately two seconds, the fuel pressure in the fuel lines rises. Turn the ignition switch OFF. Repeat this two or three times.

6. Within one minute, check any damaged lines with a leak detector (Matheson Leak Hunter Plus, model number 8066 or Snoop Soap Suds).



7. If no damage was noticed during the visual inspection, turn the ignition switch ON (II) for two seconds, then turn the ignition switch OFF. Within one minute, check for a leak at the vent hose outlet inside the fuel fill door.



8. If you detect a leak, remove the vent hose, and check the fuel pipes and fitting at the solenoid valve with a leak detector.
9. If you cannot find the leak, raise the vehicle on a hoist, remove the under-floor cover, and inspect all the pipes under the vehicle visually and with a leak detector.
10. If you still cannot find the leak, remove the rear seat, and check all fuel pipes and fittings at the fuel tank and the fuel joint block.



Fuel Pressure

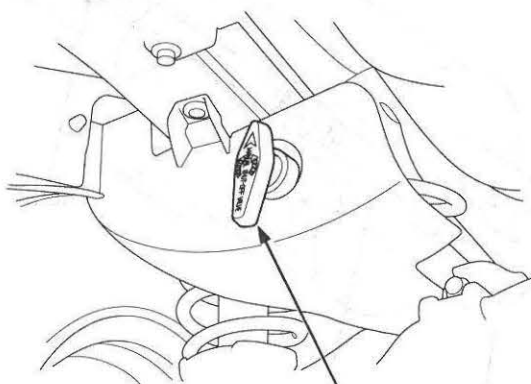
Relieving

⚠ WARNING This procedure should be done outside in a well-ventilated area.

Relieving between the engine and the manual shut-off valve

This procedure will allow you to safely work on any part of the fuel system downstream of the manual shut-off valve, such as the fuel pressure regulator or the fuel injectors.

1. Close the manual shut-off valve.



MANUAL SHUT-OFF VALVE

2. Start the engine, and let it idle. After a few minutes, the engine will stall.
3. Turn the ignition switch OFF.

Relieving between the fuel tank and the manual shut-off valve

This procedure will allow you to safely work on any part of the fuel system upstream of the manual shut-off valve, such as the fuel tank or fuel joint block.

1. Relieve the fuel pressure between the engine and the manual shut-off valve (see the procedure above).
2. Disconnect the negative cable from the battery.
3. Disconnect the fuel supply pipe from the pressure regulator. Be careful not to lose the O-rings.
4. Connect the vent tube to the fuel supply pipe.
5. Open the manual shut-off valve slowly.

Relieving between the fuel receptacle and the fuel tank

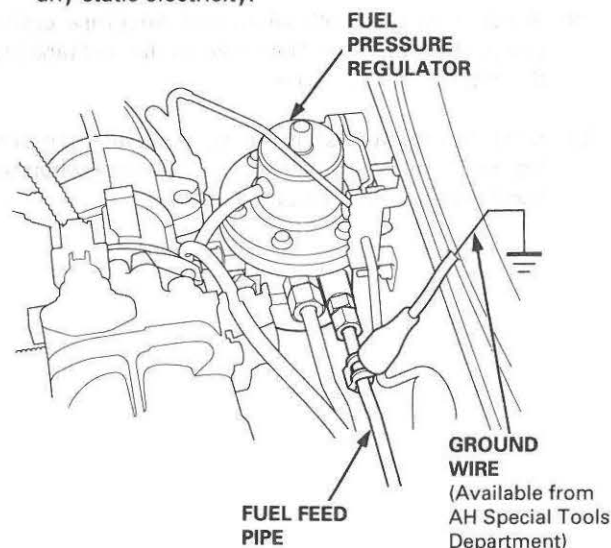
This procedure will allow you to safely work on any part of the fuel system between the fuel joint block and fuel receptacle.

1. Relieve the fuel pressure between the fuel tank and the manual shut-off valve (see the previous procedure).
2. Loosen the sealing bolt on the fuel joint block slowly.
3. Turn the fuel stem assembly 1/2-1 turn counter-clockwise.
4. Replace the fuel stem assembly and sealing bolt O-ring.

Relieving the fuel tank

NOTE: When you do this procedure, the fuel tank suffers. Do not reinstall the original fuel tank. Install a new fuel tank.

1. Close the manual shut-off valve.
2. Start the engine, and let it idle. After a few minutes, the engine will stall.
3. Turn the ignition switch OFF, and disconnect the negative cable from the battery.
4. Connect a ground wire to the fuel line to eliminate any static electricity.



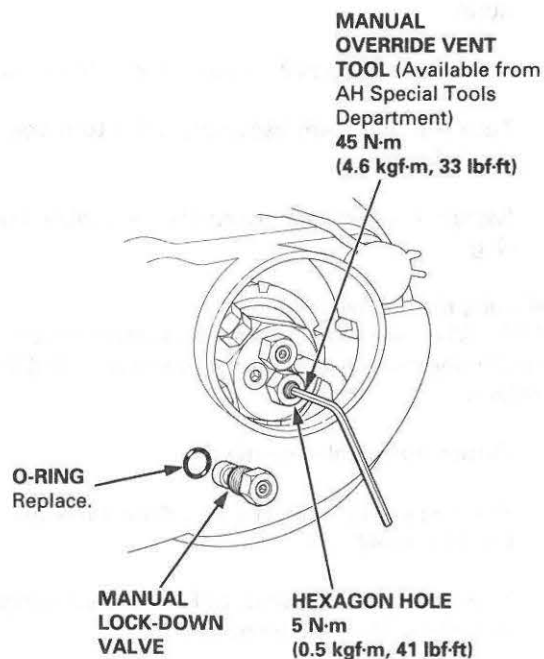
5. Disconnect the fuel supply pipe from the pressure regulator. Be careful not to lose the O-rings.
6. Connect the vent tube to the fuel supply pipe.

(cont'd)

Fuel Supply System

Fuel Pressure (cont'd)

7. Secure the other end of the vent tube to the highest possible location.
8. Remove the fuel pipe duct, and slowly remove the manual lock-down valve. Install the manual override vent tool in its place.

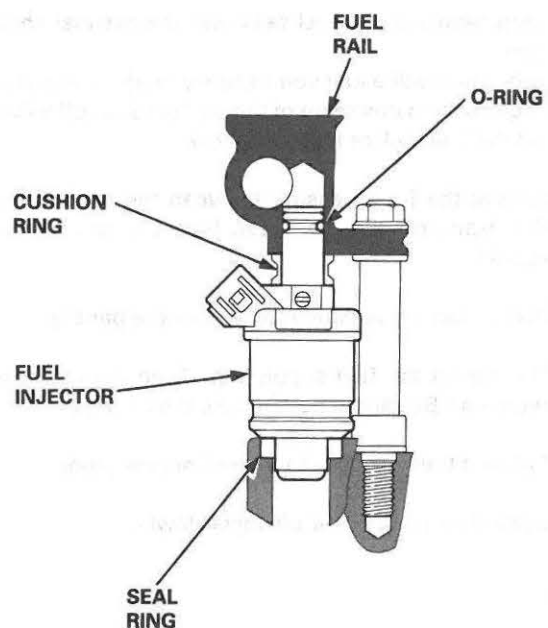
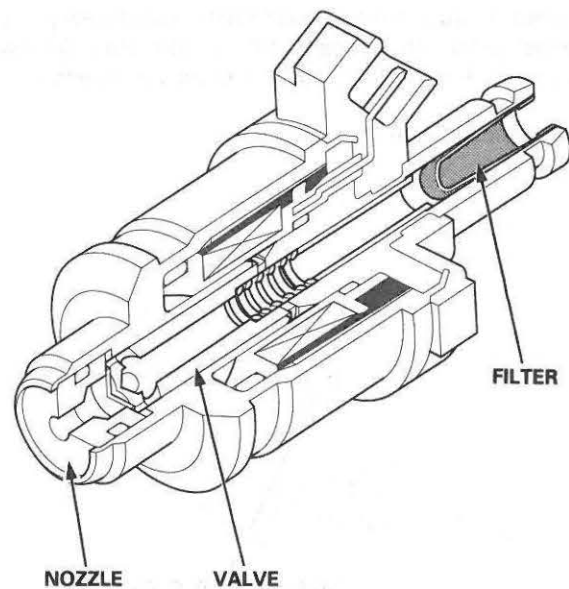


9. Slowly turn the tool's Allen bolt clockwise until it stops. This opens the line between the fuel tank and the manual shut-off valve.
10. Open the manual shut-off valve so fuel can vent from the fuel tank. The fuel tank is empty when the hissing sound goes away.

Fuel Injectors

Description

The vehicle is equipped with a high flow type injector.





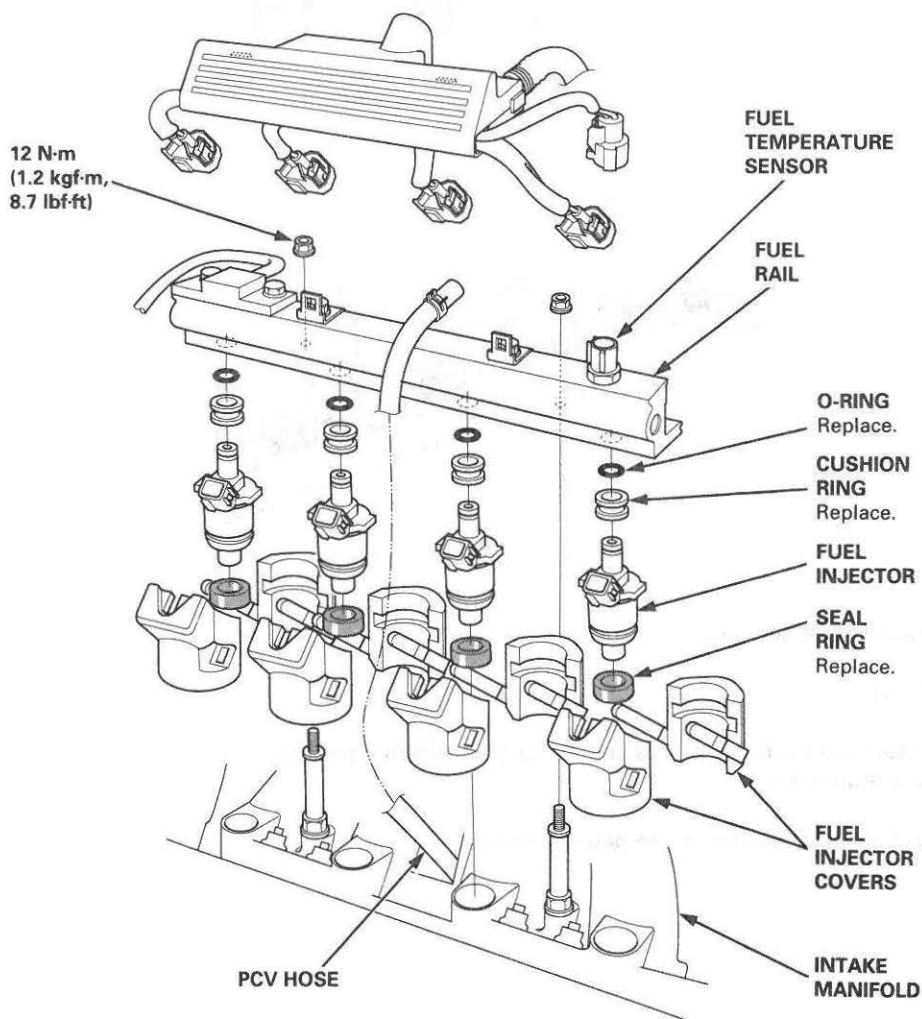
Replacement

⚠ WARNING

Compressed natural gas is flammable and highly explosive. You could be killed or seriously injured if leaking natural gas is ignited.

Stop the engine, and keep heat, sparks and flames away.

1. Relieve the fuel pressure (between the engine and manual shut-off valve) (see page 11-125).
2. Remove the fuel injector covers. Disconnect the connectors from the fuel injectors and the fuel temperature sensor.
3. Disconnect the PCV hose.
4. Remove the retainer nuts on the fuel rail.
5. Disconnect the fuel rail.
6. Remove the fuel injectors from the intake manifold.



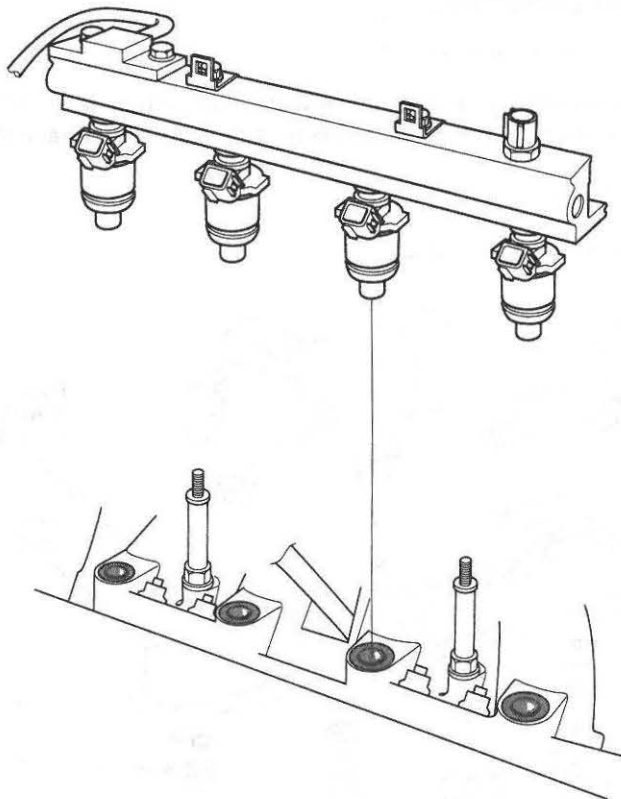
7. Slide new cushion rings onto the fuel injectors.
8. Coat new O-rings with PAG oil, and put them on the fuel injectors.
9. Insert the fuel injectors into the fuel rail first.
10. Coat new seal rings with PAG oil, and press them into the intake manifold.

(cont'd)

Fuel Supply System

Fuel Injectors (cont'd)

11. To prevent damage to the O-rings, install the fuel injectors in the fuel rail first, then install them in the intake manifold.



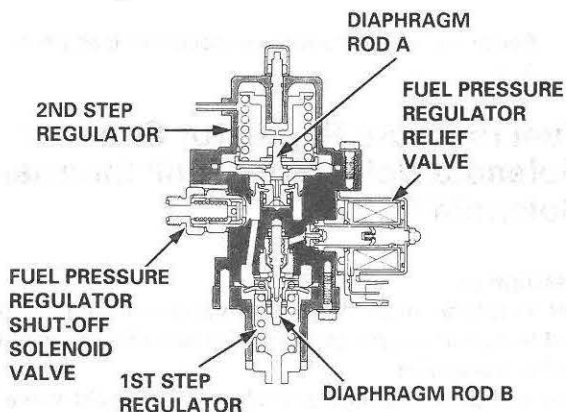
12. Install and tighten the retainer nuts.
13. Connect the PCV hose.
14. Install the connectors on the fuel injectors and the fuel temperature sensor.
Install the fuel injector covers.
15. Perform the leak inspection procedure (see page 11-124).



Fuel Pressure Regulator

Description

Fuel pressure regulator lowers the pressure of the fuel supplied from the fuel tank by two steps and supplies it to the fuel injectors.



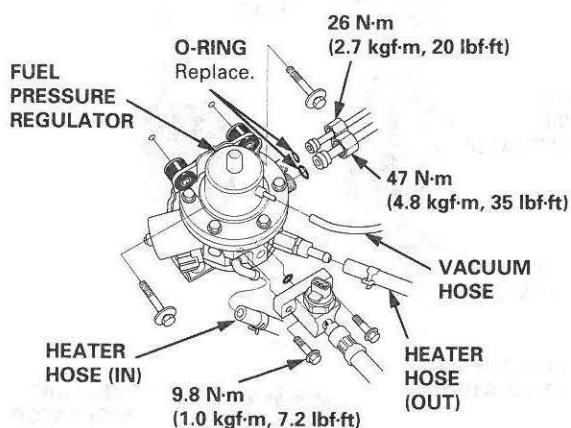
Replacement

⚠ WARNING

Compressed natural gas is flammable and highly explosive. You could be killed or seriously injured if leaking natural gas is ignited.

Stop the engine, and keep heat, sparks and flames away.

1. Relieve fuel pressure (between the engine and the manual shut-off valve) (see page 11-125).
2. Disconnect the vacuum hose, fuel pipes and heater hoses. Disconnect the connectors from the fuel pressure regulator.
3. Remove the bolts and the fuel pressure regulator.

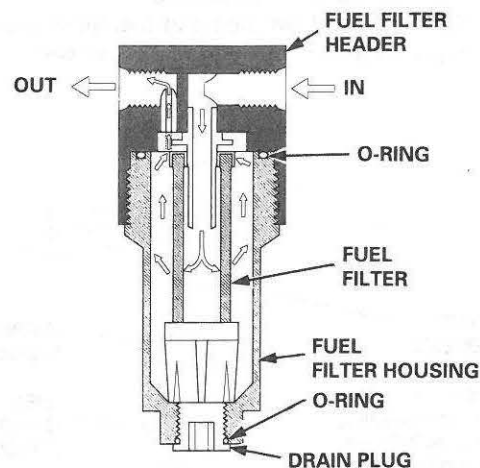


4. Apply PAG oil to a new O-ring, and carefully install it into its proper position.
5. Install the fuel pressure regulator in the reverse order of removal. Be careful not to deform any of the lines, and assemble them securely when you assemble the heater hoses.
6. Perform the leak inspection procedure (see page 11-124).

Fuel Filter

Description

The fuel filter prevents contamination contained in the fuel from being supplied the engine.



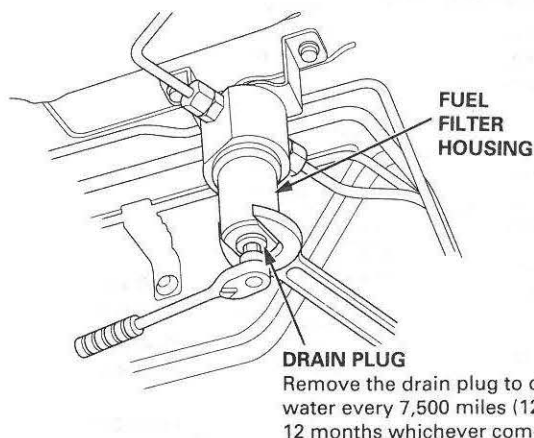
Inspection

⚠ WARNING

Compressed natural gas is flammable and highly explosive. You could be killed or seriously injured if leaking natural gas is ignited.

Stop the engine, and keep heat, sparks and flames away.

1. Relieve the fuel pressure (between the engine and the manual shut-off valve) (see page 11-125).
2. Remove the under-floor cover.
3. Loosen the drain plug on the fuel filter slowly. Hold the fuel filter housing when loosening drain plug.



4. Apply PAG oil to a new O-ring, and carefully install it into its proper position.
5. Install parts in reverse order of removal.
6. Perform the leak inspection procedure (see page 11-124).

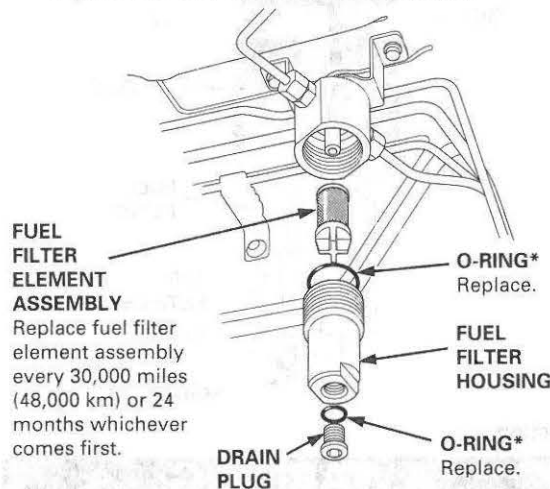
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Fuel Supply System

Fuel Filter (cont'd)

Fuel filter element replacement

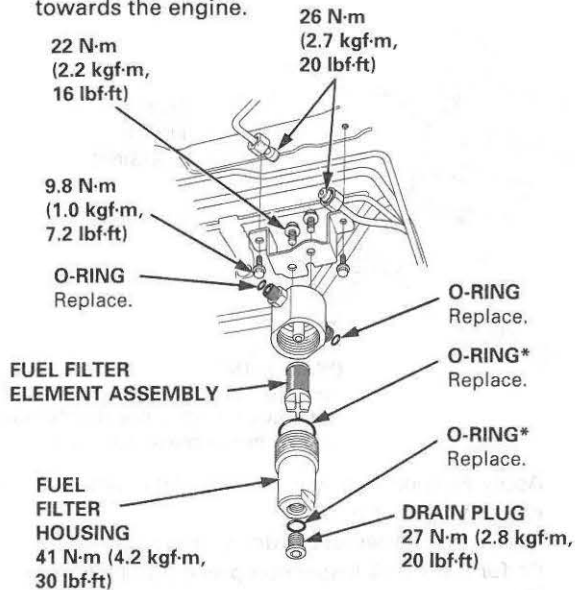
1. Relieve the fuel pressure (between the engine and manual shut-off valve) (see page 11-125).
2. Remove the under-floor cover.
3. Remove the drain plug and fuel filter housing, and replace the fuel filter element assembly.



4. Apply PAG oil to a new O-ring, and carefully install it into its proper position.
5. Install parts in reverse order of removal.
6. Perform the leak inspection procedure (see page 11-124).

Disassembly

1. Relieve the fuel pressure (between the engine and manual shut-off valve) (see page 11-125).
2. Remove the under-floor cover.
3. Remove the drain plug and fuel filter housing.
4. Remove the fuel pipes, stay and bolts. Replace the fuel filter housing. Make sure the arrow is pointing towards the engine.



*: Apply silicon grease (PARKER CHRISTO-LUB) to a new O-ring.

5. Apply PAG oil to a new O-ring, and carefully install it into its proper position.
6. Install parts in reverse order of removal.
7. Perform the leak inspection procedure (see page 11-124).

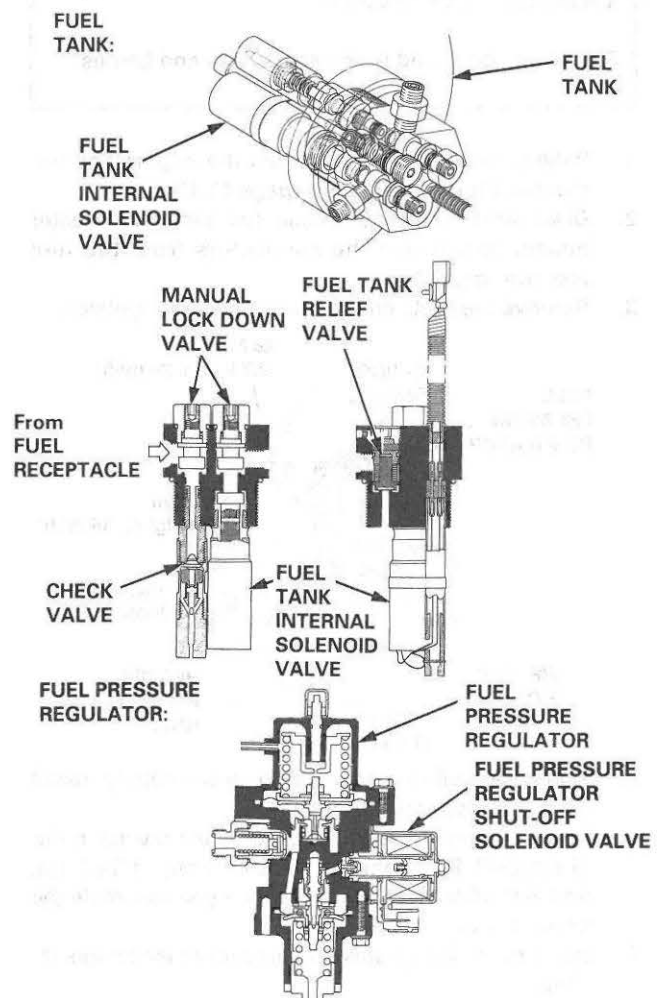
Fuel Pressure Regulator Shut-off Solenoid Valve/Fuel Tank Internal Solenoid Valve

Description

The fuel tank internal solenoid valve is located in the fuel tank, and it turns the valve ON or OFF to supply the fuel to the engine.

The fuel pressure regulator shut-off solenoid valve is located on the fuel pressure regulator, and it turns the valve ON or OFF to supply the fuel to the engine.

When the ignition switch is turned ON (II), the fuel tank internal solenoid valve and the fuel pressure regulator shut-off solenoid valve are opened for two seconds normally.



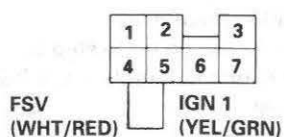


Fuel Pressure Regulator Shut-off Solenoid Valve

Testing

1. Disconnect the fuel pressure regulator shut-off solenoid valve 2P connector.
2. Connect the PGM-FI main relay 7P connector terminals No. 4 and No. 5 with a jumper wire.

PGM-FI MAIN RELAY 7P CONNECTOR (C443)

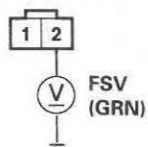


JUMPER WIRE

Wire side of female terminals

3. Check that battery voltage is available between the fuel pressure regulator shut-off solenoid valve 2P connector terminal No. 2 and body ground.

FUEL PRESSURE REGULATOR SHUT-OFF SOLENOID VALVE (C152)



Wire side of female terminals

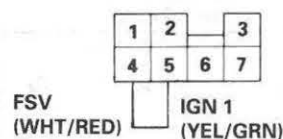
- If battery voltage is available, check the fuel pressure regulator shut-off solenoid valve ground. If the ground is OK, replace the fuel pressure regulator shut-off solenoid valve.
- If there is no voltage, check the wire harness (see page 11-133).

Fuel Tank Internal Solenoid Valve

Testing

1. Remove the rear seat cushion (see section 20).
2. Make sure the ignition switch is OFF, then disconnect the fuel sub-harness 6P connector.
3. Connect the PGM-FI main relay 7P connector terminals No. 4 and No. 5 with a jumper wire.

PGM-FI MAIN RELAY 7P CONNECTOR (C443)

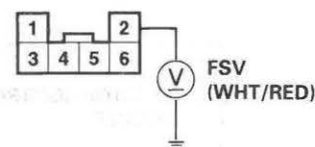


JUMPER WIRE

Wire side of female terminals

4. Check that battery voltage is available between the fuel sub harness 6P connector terminal No. 2 and body ground.

FUEL SUB-HARNESS 6P CONNECTOR (C575)



Wire side of female terminals

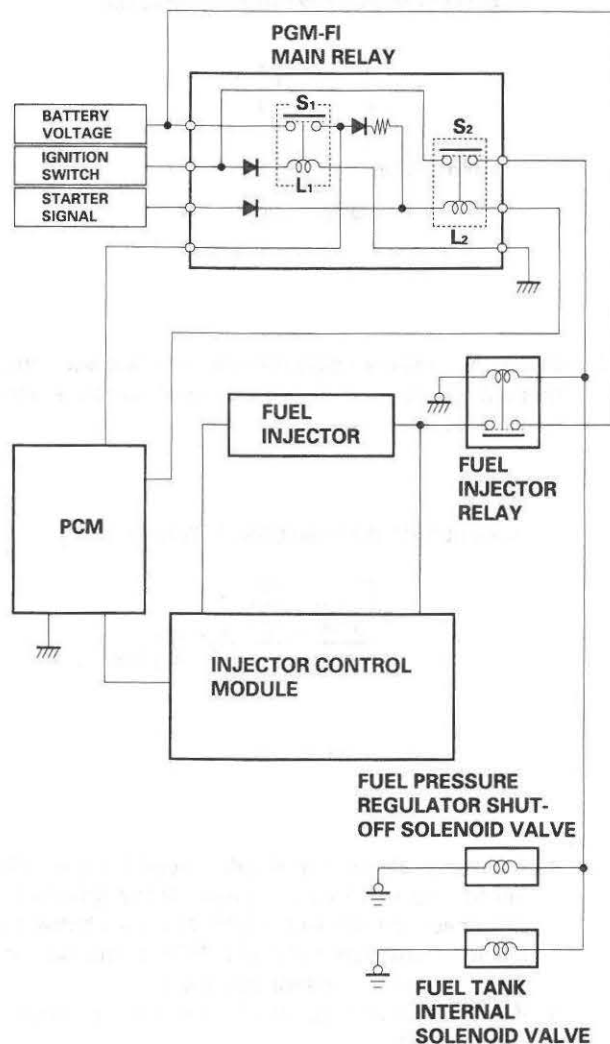
- If battery voltage is available, check the fuel tank internal solenoid valve ground. If the ground is OK, check the WHT/RED and BLK wire between the fuel tank assembly and C575. If the wire is OK, replace the fuel tank assembly.
- If there is no voltage, check the wire harness (see page 11-133).

Fuel Supply System

PGM-FI Main Relay

Description

The PGM-FI main relay actually contains two individual relays. This relay is located at the right side of the cowl. One relay is energized whenever the ignition is on which supplies the battery voltage to the PCM, power to the fuel injectors, and power for the second relay. The second relay is energized for two seconds when the ignition is switched ON (II), and when the engine is running, to supply power to the fuel injector relay, fuel pressure regulator shut-off solenoid valve and fuel tank internal solenoid valve.

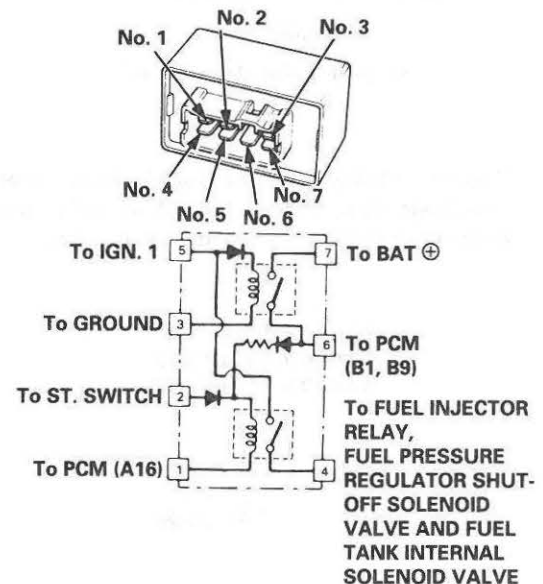


Relay Testing

NOTE:

- If the engine starts and continues to run, the PGM-FI main relay is OK.
- Use the terminal numbers below; ignore the terminal numbers molded into the relay.

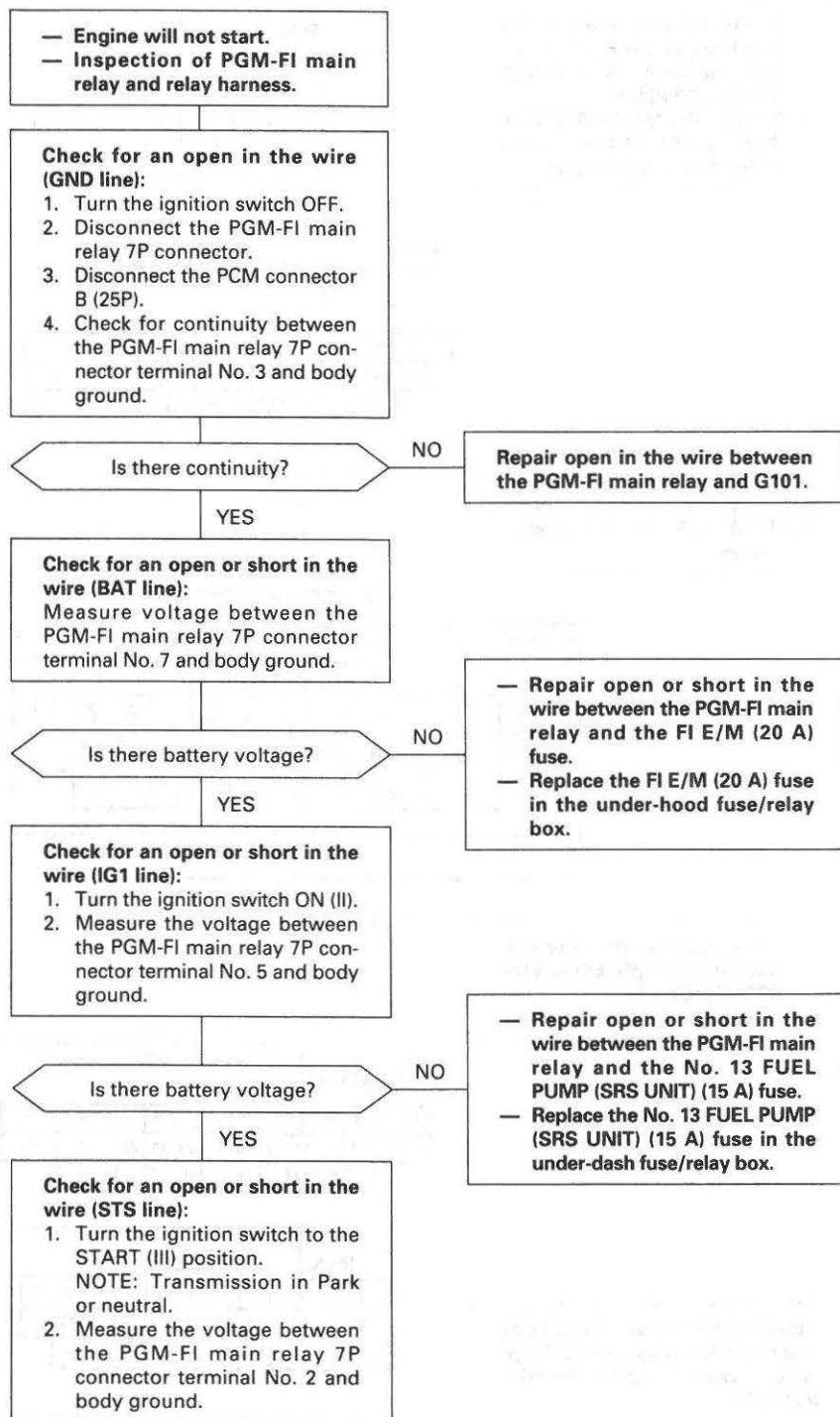
1. Remove the PGM-FI main relay.
2. Attach the battery positive terminal to the No. 2 terminal and the battery negative terminal to the No. 1 terminal of the PGM-FI main relay. Then check for continuity between the No. 5 terminal and No. 4 terminal of the PGM-FI main relay.
 - If there is continuity, go on to step 3.
 - If there is no continuity, replace the PGM-FI main relay and retest.



3. Attach the battery positive terminal to the No. 5 terminal and the battery negative terminal to the No. 3 terminal of the PGM-FI main relay. Then check that there is continuity between the No. 7 terminal and No. 6 terminal of the PGM-FI main relay.
 - If there is continuity, go on to step 4.
 - If there is no continuity, replace the PGM-FI main relay and retest.
4. Attach the battery positive terminal to the No. 6 terminal and the battery negative terminal to the No. 1 terminal of the PGM-FI main relay. Then check that there is continuity between the No. 5 terminal and No. 4 terminal of the PGM-FI main relay.
 - If there is continuity, the PGM-FI main relay is OK. If the fuel injector relay, fuel pressure regulator shut-off solenoid valve and fuel tank internal solenoid valve still do not work, go to Harness Testing on the next page.
 - If there is no continuity, replace the PGM-FI main relay and retest.

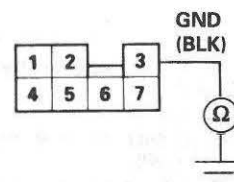


Circuit Troubleshooting

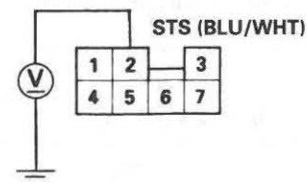
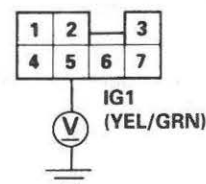
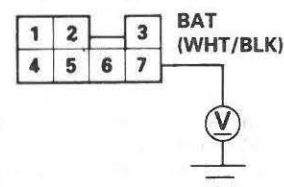


(To page 11-134)

PGM-FI MAIN RELAY 7P CONNECTOR (C443)



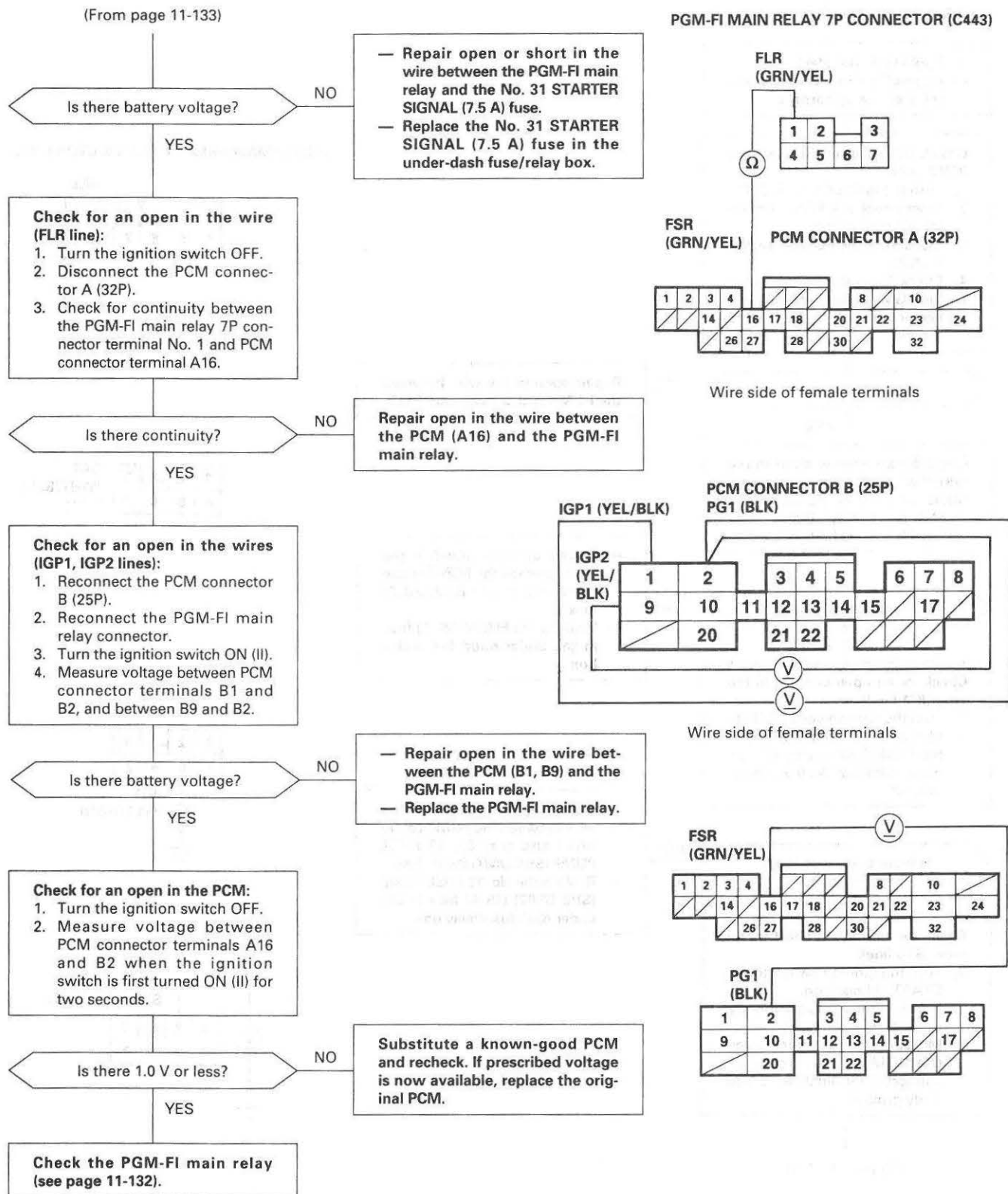
Wire side of female terminals



(cont'd)

Fuel Supply System

PGM-FI Main Relay (cont'd)





Injector Control Module

Circuit Troubleshooting

- Engine will not start.
- Fuel injectors do not click.
- Injector control module inspection.

Check for an open in the wire (INJ1-4 lines):

1. Turn the ignition switch OFF.
2. Disconnect the injector control module 26P connector.
3. Check for continuity between the fuel injector 2P connector terminal No. 1 and the injector control module 26P connector. *see table 1

Is there continuity?

NO

Repair open in the indicated fuel injector wires. *see table 1

YES

Check for a short in the wire (INJ1-4 lines):

- Check for continuity between the fuel injector 2P connector terminal No. 1 and body ground. *see table 1

Is there continuity?

YES

Repair short in the indicated fuel injector wires. *see table 1

NO

Check for an open in the wire (INJ CNTL 1-4, INJ MODE lines):

1. Disconnect the PCM connector B (25P) from the PCM.
2. Check for continuity between the injector control module and PCM connector terminals of the indicated fuel injector. *see table 2

Is there continuity?

NO

Repair open in the indicated fuel injector wires. *see table 2

YES

Check for a short in the wire (INJ CNTL 1-4, INJ MODE lines):

- Check for continuity between body ground and PCM connector terminals of the indicated fuel injectors. *see table 2

Is there continuity?

YES

Repair short in the indicated fuel injector wires. *see table 2

NO

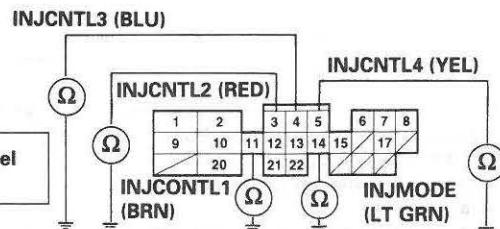
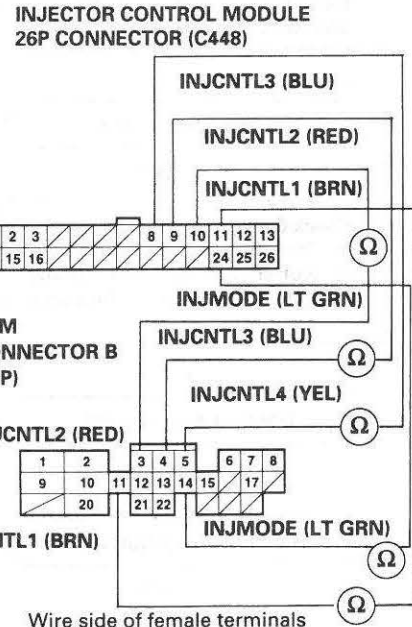
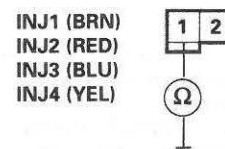
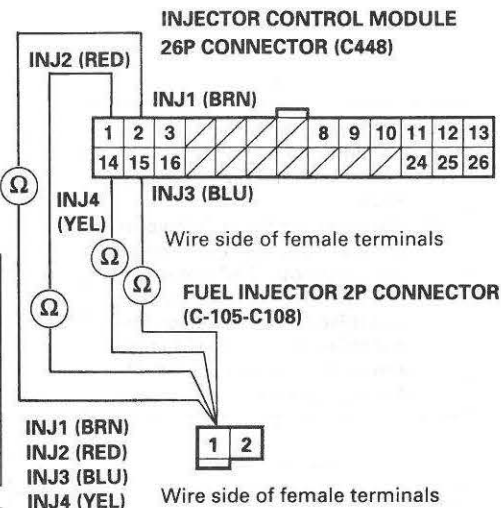
(To page 11-136)

*1:

FUEL INJECTOR TERMINAL	INJECTOR CONTROL MODULE TERMINAL	WIRE COLOR
No. 1	No. 2	BRN
No. 2	No. 1	RED
No. 3	No. 15	BLU
No. 4	No. 14	YEL

*2:

PCM TERMINAL	PCM TERMINAL NAME	INJECTOR CONTROL MODULE TERMINAL	WIRE COLOR
B11	INJCNTL1	No. 11	BRN
B3	INJCNTL2	No. 10	RED
B4	INJCNTL3	No. 9	BLU
B5	INJCNTL4	No. 8	YEL
B14	INJMODE	No. 24	LT GRN



(cont'd)

Fuel Supply System

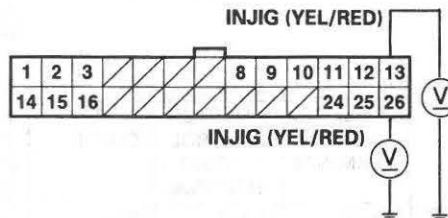
Injector Control Module (cont'd)

(From page 11-135)

Check for an open in the wire (INJ IG line):

1. Reconnect the PCM connector B (25P).
2. Measure voltage between body ground and the injector control module 26P connector terminals No. 13, No. 26, and fuel injector 2P connector terminal No. 2 when the ignition switch is first turned ON (II) for two seconds.

INJECTOR CONTROL MODULE 26P CONNECTOR (C448)



Wire side of female terminals

FUEL INJECTOR 2P CONNECTOR (C105-C108)



Wire side of female terminals

Is there battery voltage?

YES

NO

Check the fuel injector relay (see page 11-137).

Check for an open in the wire (LG1, GND lines):

Check for continuity between body ground and the injector control module 26P connector terminals No. 3, No. 12, No. 16, and No. 25 individually.

Is there continuity?

YES

NO

- Repair open in wire(s) between injector control module and G101.
- Repair open in wire(s) between injector control module and G401, 402.

Check the injector control module:
1. Turn the ignition switch OFF.
2. Substitute a known-good injector control module and recheck.

Does the engine start?

NO

YES

Replace the original injector control module.

Does the fuel injector click?

YES

NO

Check the fuel injectors:

1. Turn the ignition switch OFF.
2. Disconnect the fuel injector 2P connector.
3. Measure resistance between the fuel injector 2P connector terminals No. 1 and No. 2.

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

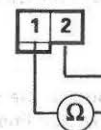
Is there 1.1 – 1.4 Ω?

YES

Check for loose or corroded connectors at the injector control module.

NO

FUEL INJECTOR 2P CONNECTOR (C105-C108)



Terminal side of male terminals

Replace the fuel injector.



Fuel Injector Relay

Circuit Troubleshooting

- Engine will not start.
- Fuel injector does not click.
- Fuel injector relay inspection.

Check for an open or short in the wire (BAT line):

1. Turn the ignition switch OFF.
2. Disconnect the fuel injector 4P connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between the fuel injector relay 4P connector terminal No. 1 and body ground.

Is there battery voltage?

NO

- Repair open or short in the wire between the fuel injector relay and the FI E/M (20 A) fuse.
- Replace the FI E/M (20 A) fuse in the under-hood fuse/relay box.

YES

Check for an open or short in the wire (FSV line):

1. Turn the ignition switch OFF.
2. Measure voltage between the fuel injector relay 4P connector terminal No. 2 and body ground when the ignition switch is first turned ON (II) for two seconds.

Is there battery voltage?

NO

- Repair open in the wire between the fuel injector relay and the PGM-FI main relay.
- Check the PGM-FI main relay (see page 11-132).

YES

Check for an open in the wire (GND line):

Check for continuity between the fuel injector relay 4P connector terminal No. 4 and body ground.

Is there continuity?

NO

Repair open in wire between fuel injector relay and G401, 402.

YES

Check the fuel injector relay:

1. Turn the ignition switch OFF.
2. Reconnect the fuel injector relay 4P connector.
3. Measure voltage between the fuel injector relay 4P connector terminal No. 3 and body ground when the ignition switch is first turned ON (II) for two seconds.

Is there battery voltage?

NO

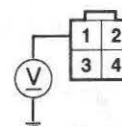
Replace the fuel injector relay.

YES

Fuel injector relay circuits are OK.
Check the injector control module circuit (see page 11-135).

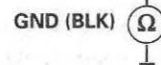
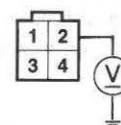
FUEL INJECTOR RELAY (C447)

BAT (WHT/BLK)

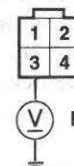


Wire side of female terminals

FSV (WHT/RED)



GND (BLK)



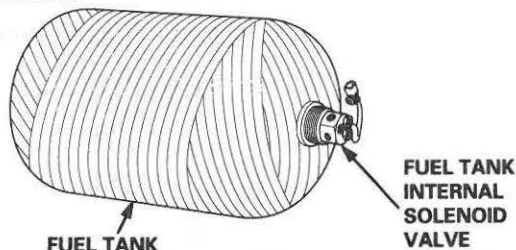
INJIG (YEL/RED)

Fuel Supply System

Fuel Tank

Description

The fuel tank is made of carbon fiber and fiberglass reinforced plastics.



⚠ WARNING

Compressed natural gas is flammable and highly explosive. You could be killed or seriously injured if leaking natural gas is ignited.

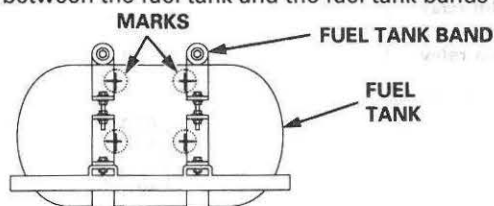
Stop the engine, and keep heat, sparks and flames away.

NOTE: You must be a Lincoln-certified technician in order to perform the inspection procedure.

Inspection

Inspect fuel tank every 36 months for following.

- abrasions
- cuts
- dents
- expansion, transformation
- heating
- gap between the fuel tank and the fuel tank bands



- fuel tank band spring length [62.8 mm (2 15/32 in.) with no pressure inside tank].
- torque of the fuel tank frame bolts, fuel tank band bolts and nuts

Scrapping

⚠ WARNING

This procedure should be done outside in a well-ventilated area. If it is performed inside a shop, the shop should be equipped with a stand pipe for venting gas to the outside. Do not vent the system in an area with an ignition source, such as arcing light fixtures and indoor heaters.

Replace the fuel tank 15 years after production.

1. Remove the fuel tank.
2. Slowly remove the manual lock-down valve. Install the manual override vent tool in its place. Relieve the gas from the fuel tank.

3. Remove the fuel tank internal solenoid valve.
4. Purge any remaining fuel from the tank with compressed air.
5. Dispose the fuel tank following your local regulations.

Replacement

Removal

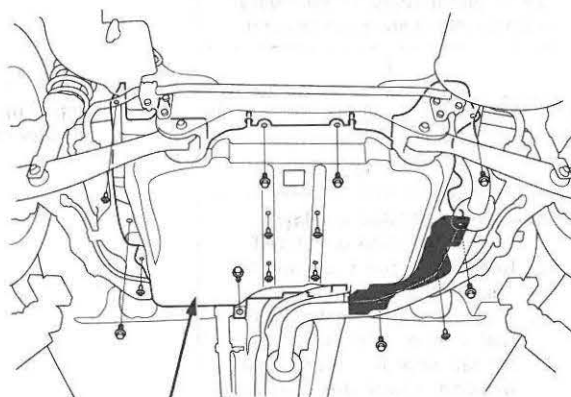
⚠ WARNING

Compressed natural gas is flammable and highly explosive. You could be killed or seriously injured if leaking natural gas is ignited.

Stop the engine, and keep heat, sparks and flames away.

NOTE: When you do this procedure, the fuel tank suffers. Do not reinstall the original fuel tank. Install a new fuel tank.

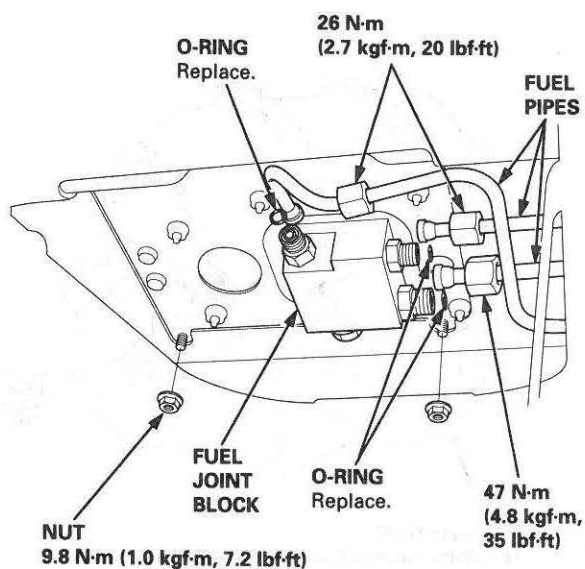
1. Relieve the fuel tank (see page 11-125).
2. Remove the high mount brake light (see section 23). Remove the left-rear door, rear seat, rear shelf, rear console, trunk trim panel, spare tire lid and rear tray panel (see section 20).
3. Raise the vehicle on a lift, and remove the under-floor cover.



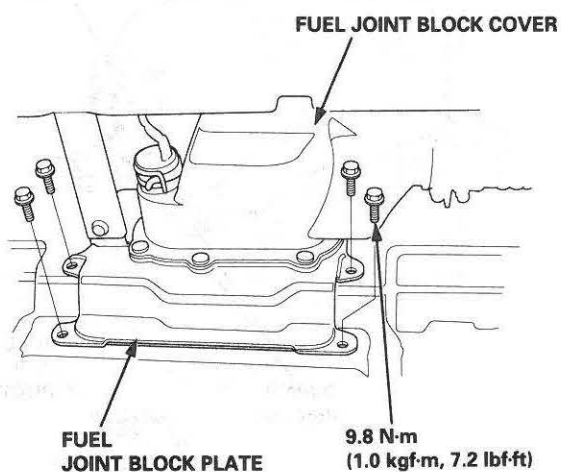
UNDER FLOOR COVER



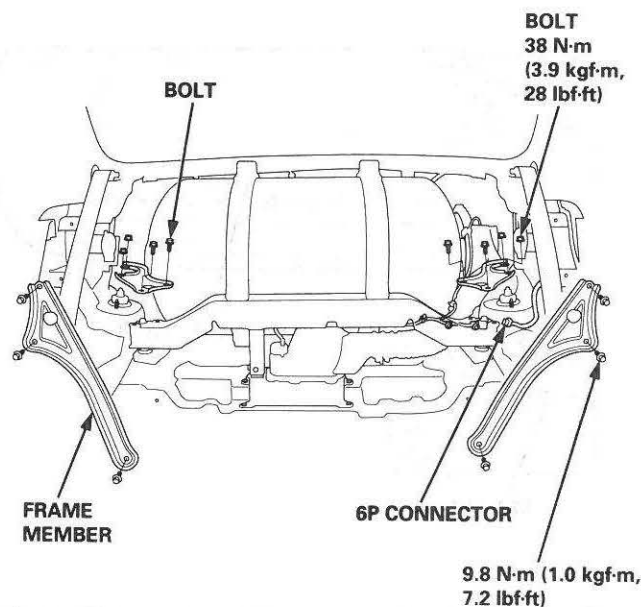
4. Remove the three fuel pipes at the fuel joint block and the two fuel joint block mounting nuts.



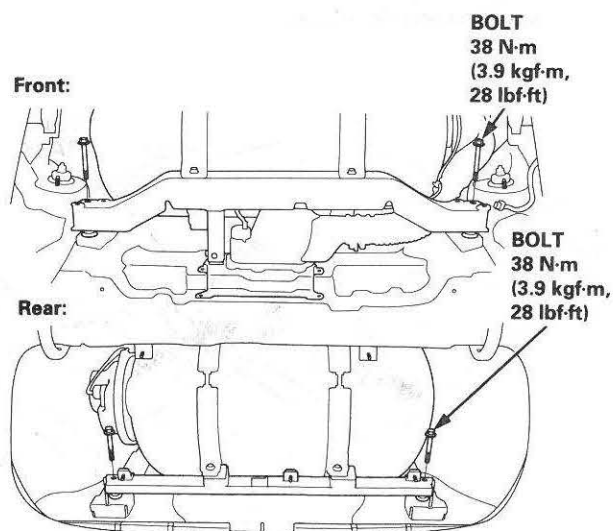
5. Remove the fuel joint block plate from inside the passenger compartment.



6. Remove the frame members, and disconnect the 6P connector.



7. Remove the tank frame mounting bolts.

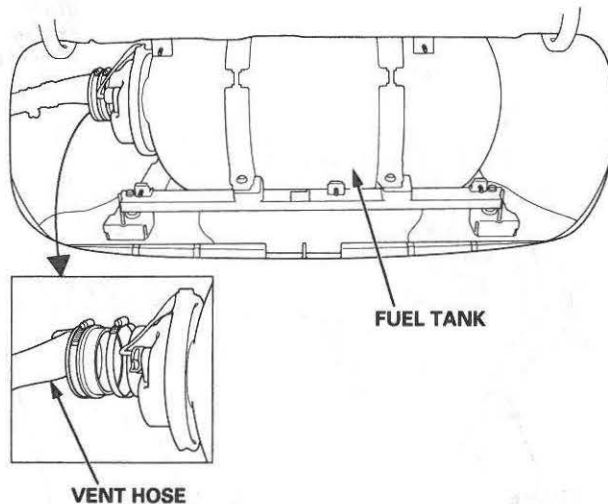


(cont'd)

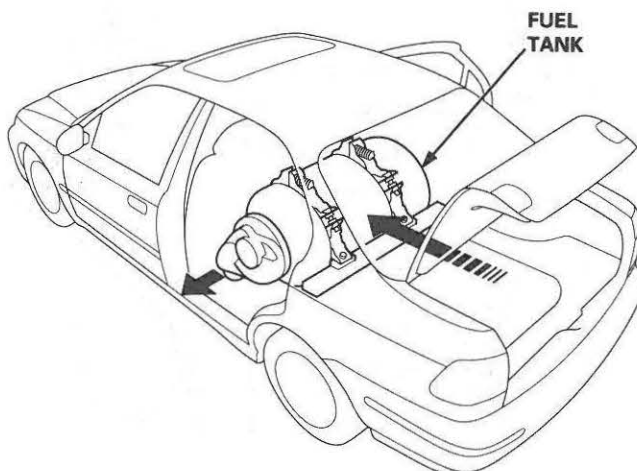
Fuel Supply System

Fuel Tank (cont'd)

8. Disconnect the vent hose from the fuel tank.



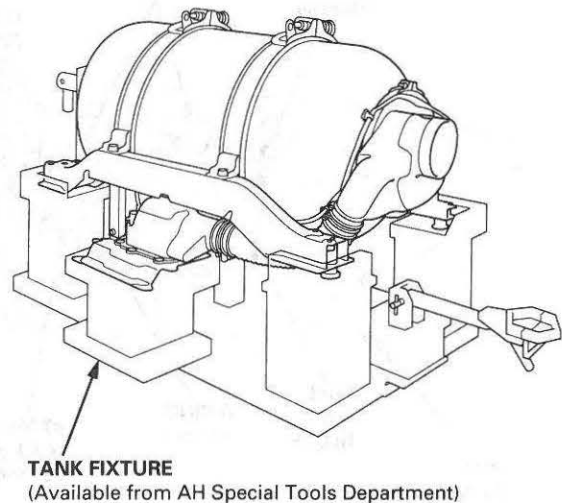
9. Push the front seats forward, and cover the seats and floor with a tarp or similar material.
10. With the assistance of two other technicians, lift the frame, and slide the entire fuel tank assembly into the passenger compartment. Be careful not to damage the fuel joint block.



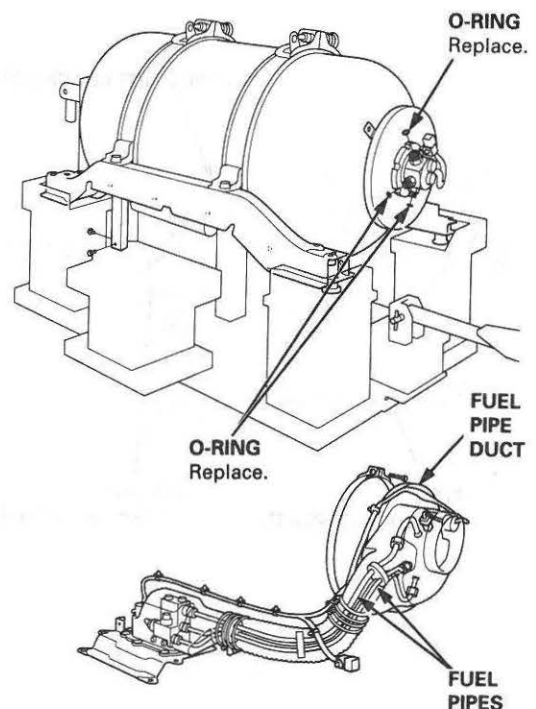
11. Rotate the fuel tank so the fuel joint block and the frame can clear the door opening, then carefully remove the fuel tank assembly from the vehicle.

Disassembly

1. Bolt the fuel tank assembly in the tank fixture for disassembly.

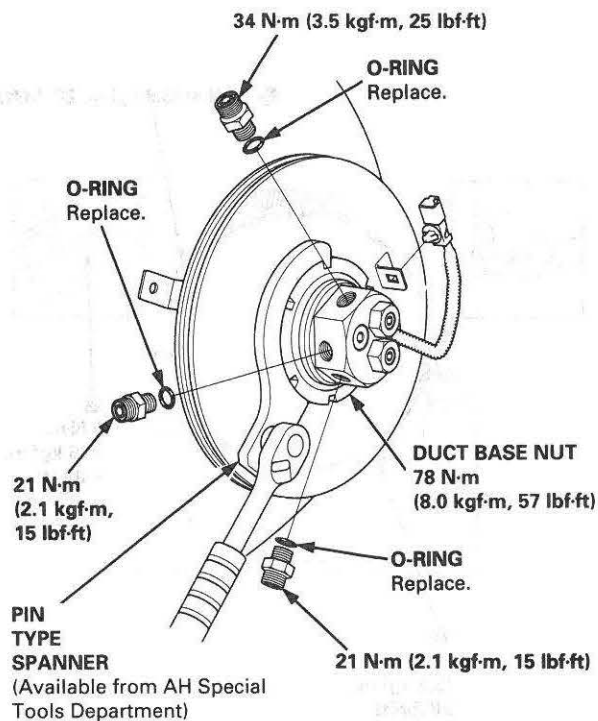


2. Remove the fuel pipe duct, then remove the three fuel pipes from the fuel tank.

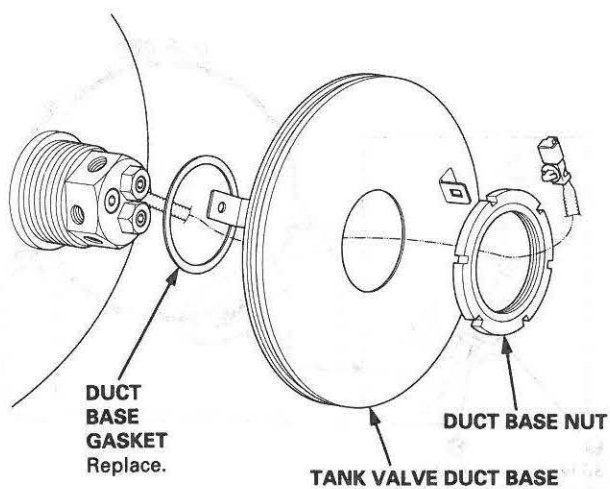




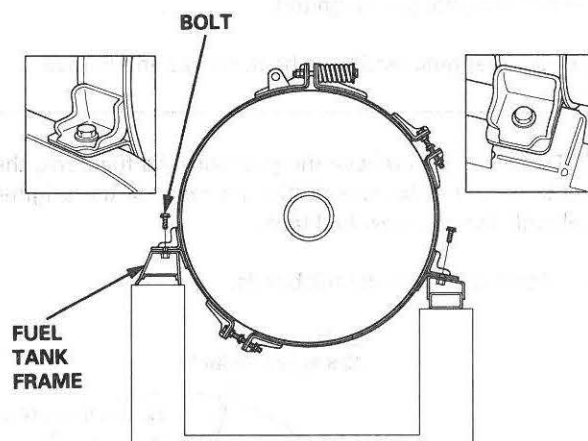
3. Using the special tool, loosen the duct base nut.



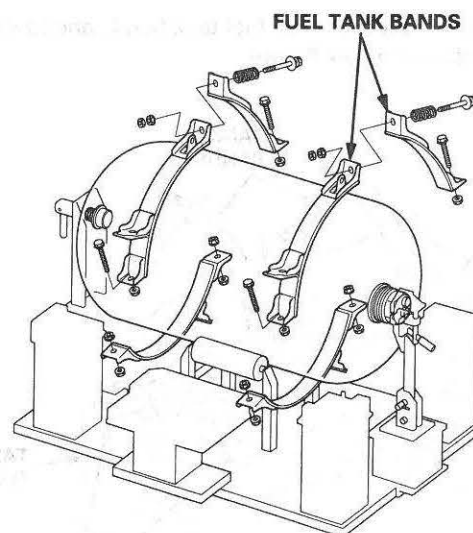
4. Remove the duct base nut, tank valve duct base, and the tank base gasket.



5. Unbolt the fuel tank bands from the fuel tank frame, and remove the old fuel tank.



6. With the old fuel tank lifted from the fuel tank frame, remove the fuel tank bands from the fuel tank.



(cont'd)

Fuel Supply System

Fuel Tank (cont'd)

Installation

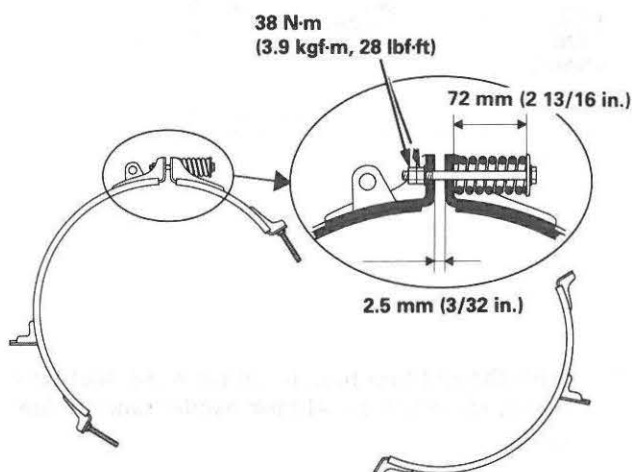
⚠ WARNING

Compressed natural gas is flammable and highly explosive. You could be killed or seriously injured if leaking natural gas is ignited.

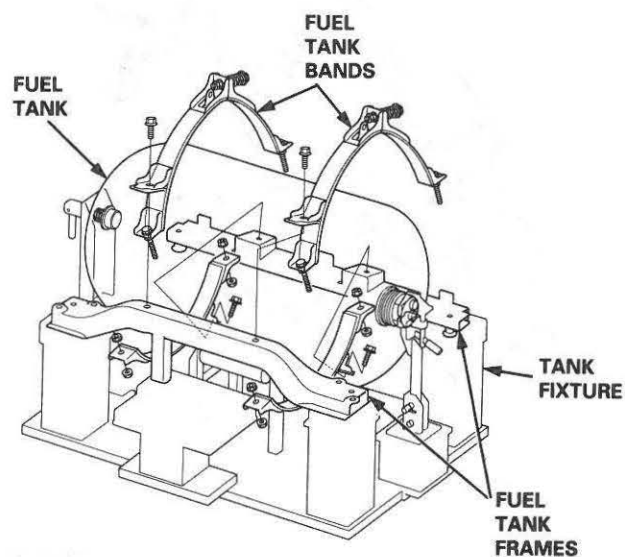
Stop the engine, and keep heat, sparks and flames away.

NOTE: When you relieve the gas from the fuel tank, the fuel tank cannot be reused. Do not reinstall the original fuel tank. Install a new fuel tank.

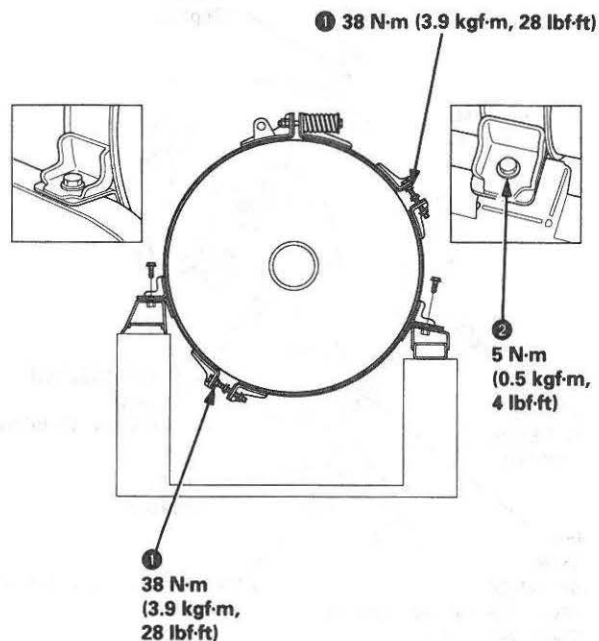
1. Assemble the fuel tank bands.



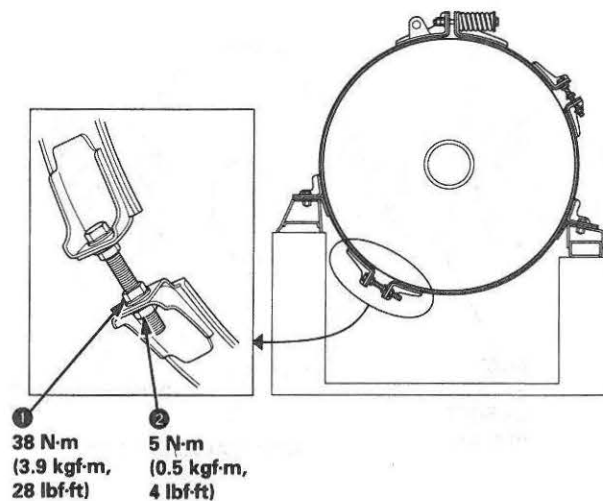
2. Install a new fuel tank, fuel tank bands and fuel tank frame on the tank fixture.



3. Tighten the bolts.

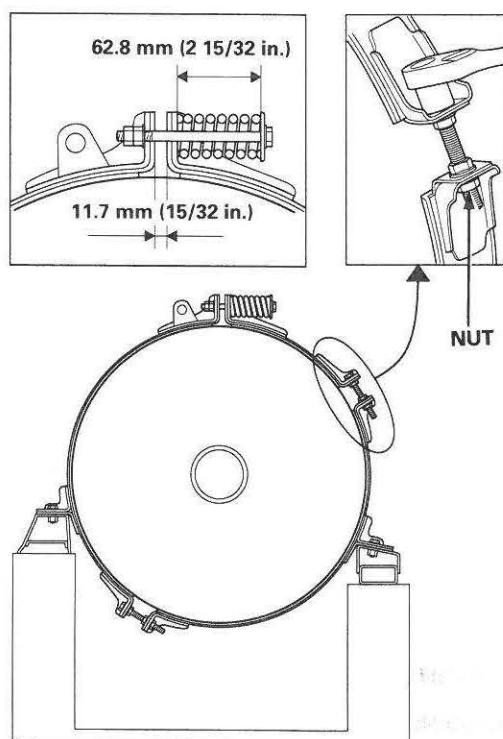


4. Tighten the nuts.

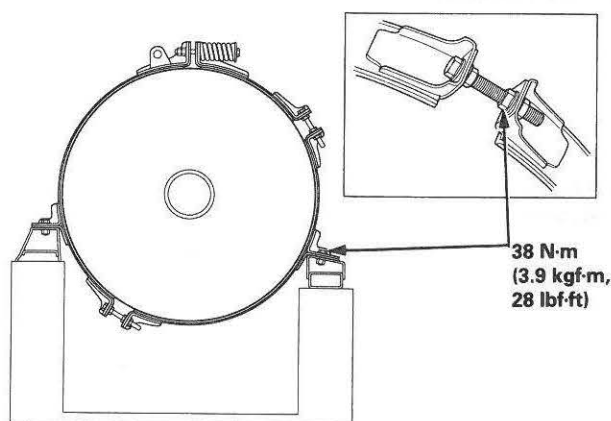




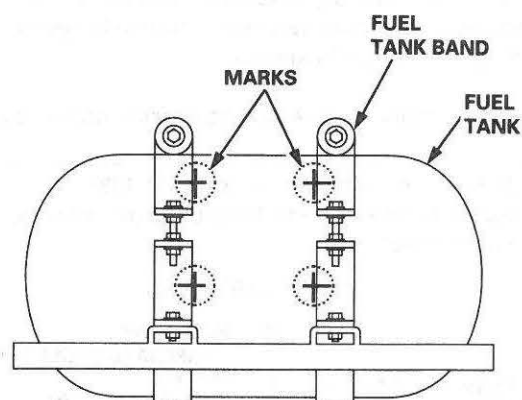
5. Tighten the nuts. The nuts should be tightened until a gap of 11.7 mm (15/32 in.) at the centerline of the bolt is obtained.



6. Tighten the nuts and bolts.



7. Mark the fuel tank and the fuel tank bands.



8. Apply PAG oil to a new O-ring, and carefully install it onto its proper position (see page 11-118).
9. Install the fuel joint block and fuel pipes.
10. Install the tank assembly in the reverse order of removal.
11. Perform the leak inspection procedure (see page 11-124).
12. Apply the CNG warning label. Then enter the CNG tank expiration date.

Fill Procedure

If a tank has less than 690 ± 340 kPa (7.0 ± 3.5 kgf/cm², 100 \pm 50 psi) of internal pressure and is at an ambient temperature of 32°F (0°C) or less, follow the procedure below. Otherwise, fill the tank normally.

1. Fill the fuel tank to $4,800 \pm 340$ kPa (49.2 ± 3.5 kgf/cm², 700 \pm 50 psi) slowly (from a compressor, not from a cascade storage system).
2. Wait one hour.
3. Fill the rest of the tank normally.

Fuel Supply System

Fuel Joint Block

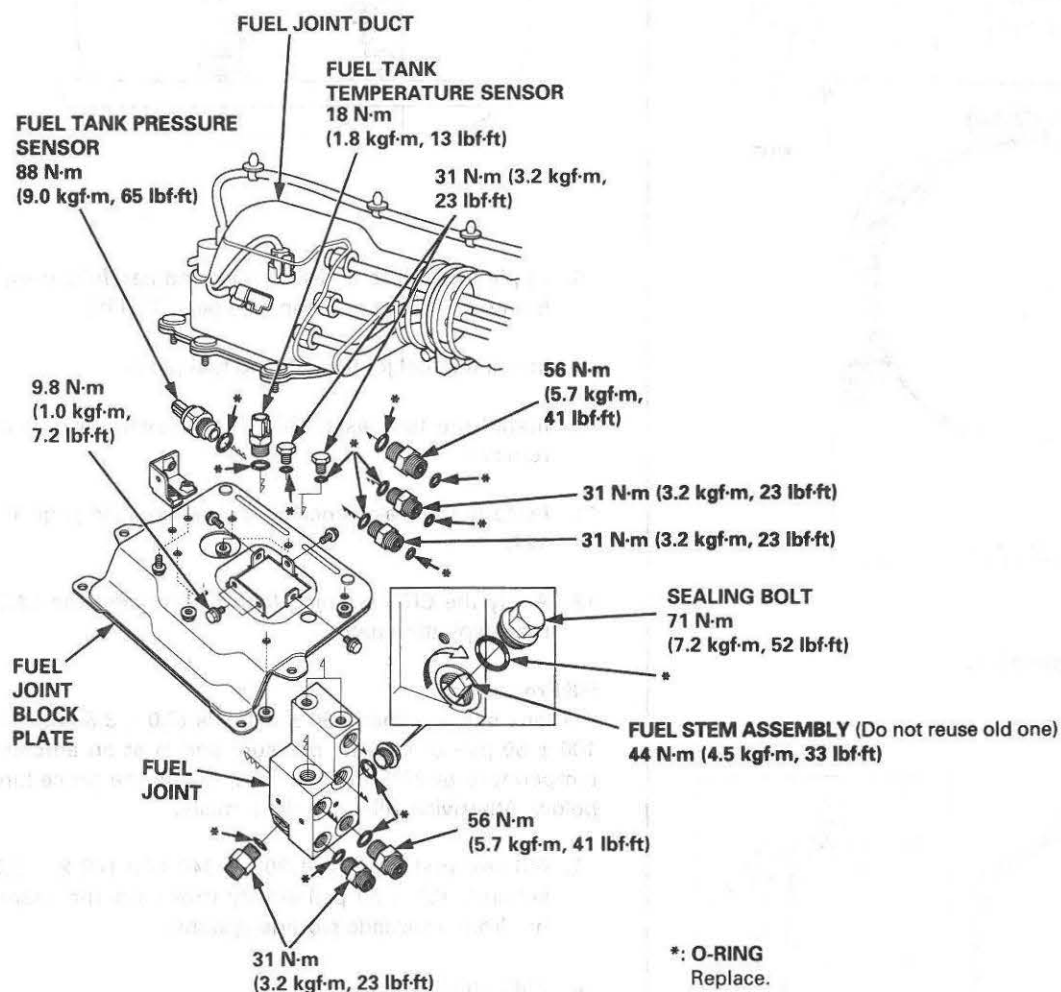
Replacement

⚠ WARNING

Compressed natural gas is flammable and highly explosive. You could be killed or seriously injured if leaking natural gas is ignited.

Stop the engine, and keep heat, sparks and flames away.

1. Remove the fuel tank (see page 11-138).
2. Remove the fuel joint duct, fuel pipe, sensors, bolts and connectors.



3. Apply PAG oil to a new O-ring, and carefully install it into its proper position.
4. Install parts in reverse order of removal.
5. Tighten the fuel stem assembly.
NOTE: Do not loosen the fuel stem assembly it is tightened. Replace the fuel stem assembly if you loosen it.
6. Perform the leak inspection procedure (see page 11-124).

Emission Control System



System Description

The emission control system includes the Warm-up Three way Catalytic Converter (WU-TWC), Three Way Catalytic Converter (TWC), Exhaust Gas Recirculation (EGR) system and Positive Crankcase Ventilation (PCV) system. The emission control system is designed to meet federal and state emission standards.

Tailpipe Emission

Inspection

1. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on, then let it idle.
2. Connect a tachometer.
3. Check and, if necessary, adjust the idle speed (see page 11-116).
4. Warm up and calibrate the CO meter according to the meter manufacturer's instructions.
5. Check idle CO with the headlights, heater blower, rear window defogger, cooling fan, and air conditioner off.

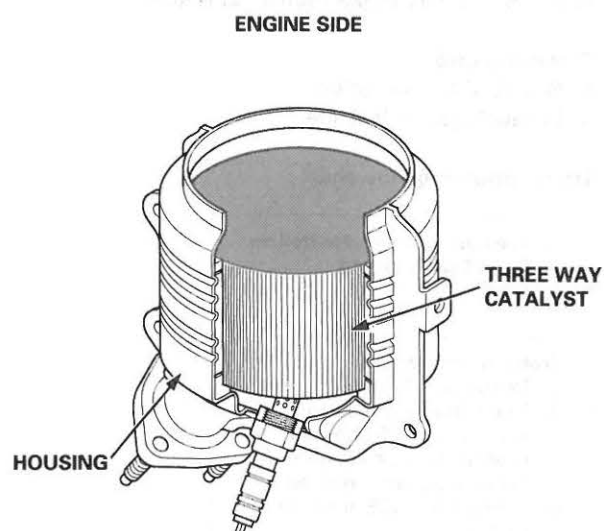
CO meter should indicate 0.1% maximum.

Warm-up Three way Catalytic Converter (WU-TWC)/Three Way Catalytic Converter (TWC)

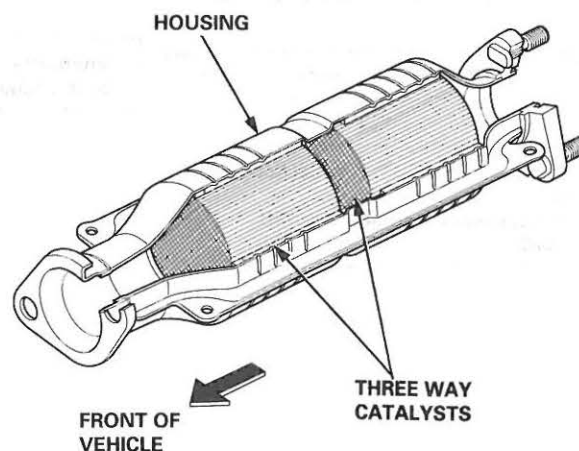
Description

The Warm-up Three way Catalytic Converter (WU-TWC) and Three Way Catalytic Converter (TWC) are used to convert hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) in the exhaust gas to carbon dioxide (CO₂), dinitrogen (N₂) and water vapor.

WU-TWC:



TWC:



(cont'd)

Emission Control System

Warm-up Three way Catalytic Converter (WU-TWC)/ Three Way Catalytic Converter (TWC) (cont'd)

P0420 The scan tool indicates Diagnostic Trouble Code (DTC) P0420: Catalyst system efficiency below threshold.

Description

This system evaluates the catalyst's capacity by means of the HO₂S (Primary and Secondary) output during stable driving conditions. If deterioration has been detected during two consecutive driving cycles, the MIL comes on and DTC P0420 will be stored.

NOTE: If some of the DTCs listed below are stored at the same time as DTC P0420, troubleshoot those DTCs first, then troubleshoot DTC P0420.

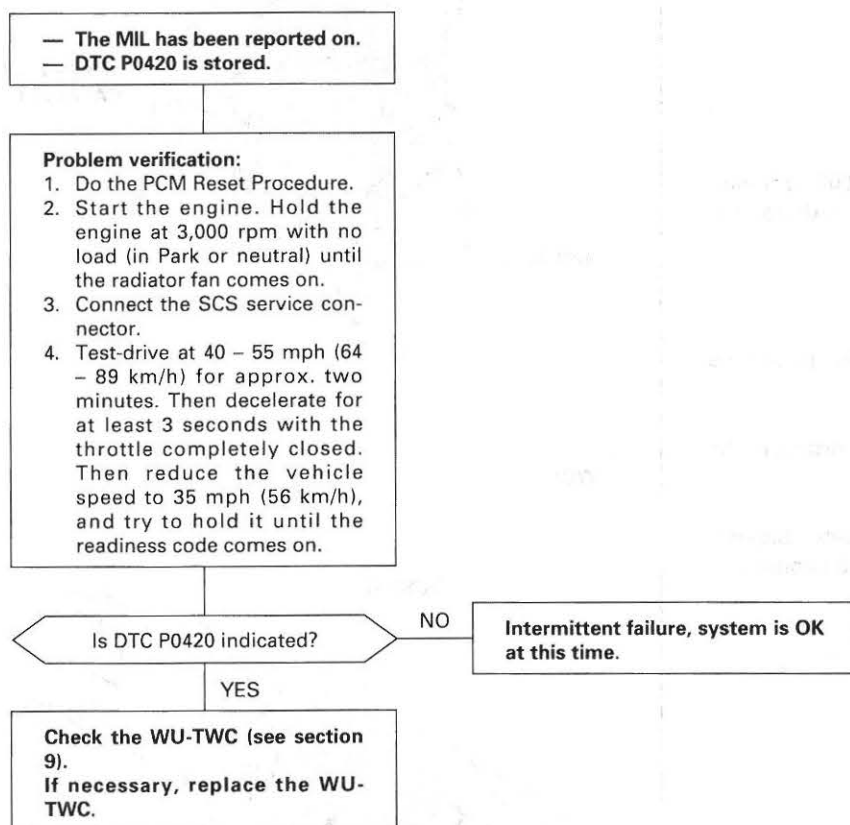
P0137, P0138: Secondary HO₂S (Sensor 2)

P0141: Secondary HO₂S (Sensor 2) Heater

Possible Cause

- WU-TWC Deterioration
- Exhaust system leakage

Troubleshooting Flowchart



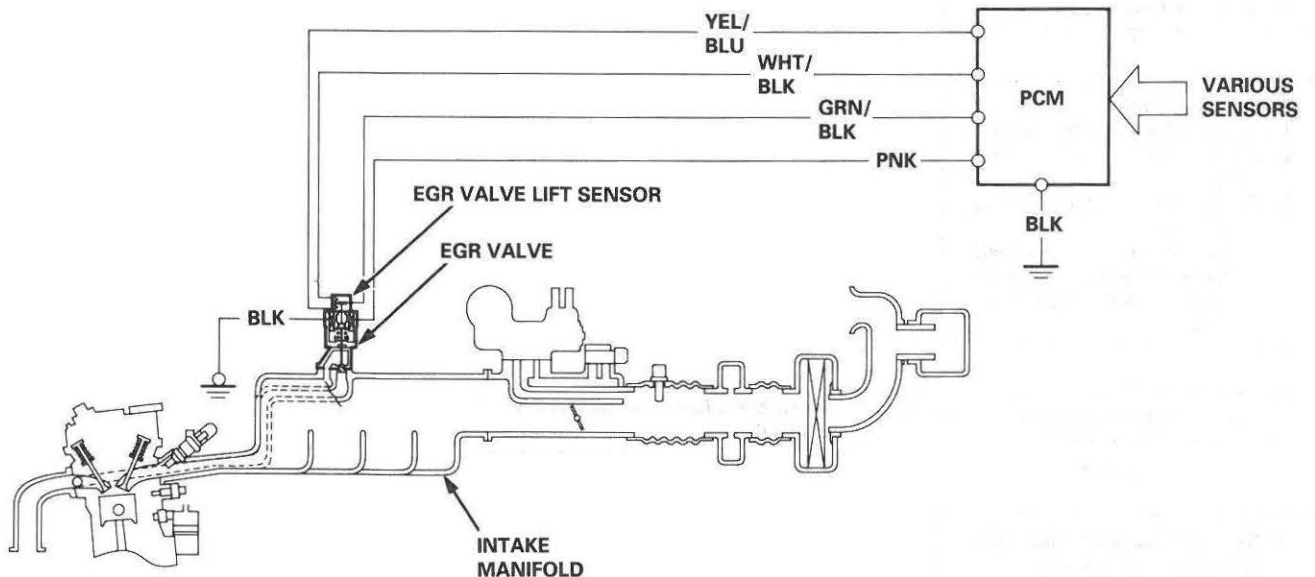


Exhaust Gas Recirculation (EGR) System

Description

The EGR system reduces oxides of nitrogen (NOx) emissions by recirculating exhaust gas through the EGR valve and the intake manifold into the combustion chambers. The PCM memory includes the ideal EGR valve lift for varying operating conditions.

The EGR valve lift sensor detects the amount of EGR valve lift and sends it to the PCM. The PCM then compares it with the ideal lift in its memory (based on signals sent from other sensors). If there is any difference between the two, the PCM cuts current to the EGR valve.



(cont'd)

Emission Control System

Exhaust Gas Recirculation (EGR) System (cont'd)

P0401

The scan tool indicates Diagnostic Trouble Code (DTC) P0401: Insufficient flow in the Exhaust Gas Recirculation (EGR) system.

Description

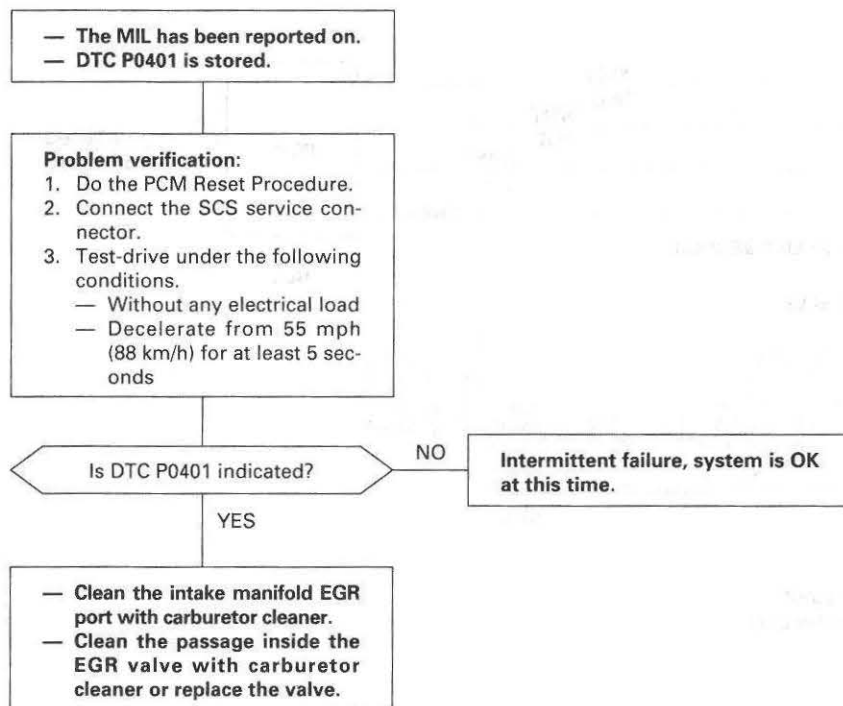
Deterioration (clogging, leakage, etc.) in the EGR line or EGR valve is detected by means of the changes in MAP before and after the operation of the EGR valve.

If deterioration has been detected during two consecutive driving cycles, the MIL will come on and DTC P0401 will be stored.

Possible Causes

- Clogging, leakage in the EGR line
- Faulty EGR valve

Troubleshooting Flowchart





P1491 The scan tool indicates Diagnostic Trouble Code (DTC) P1491: A malfunction in the Exhaust Gas Recirculation (EGR) system.

- The MIL has been reported on.
- DTC P1491 is stored.

Problem verification:

1. Do the PCM Reset Procedure.
2. Connect the SCS service connector.
3. Start the engine. Hold the engine at 3,000 rpm with no load (in Park or neutral) until the radiator fan comes on.
4. Drive the vehicle on the road for approx. 10 minutes. Try to keep the engine speed in the 1,700 – 2,500 rpm range.

Is DTC P1491 indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C144 (EGR valve) and PCM.

YES

Check for a malfunction in the EGR valve:

1. Turn the ignition switch OFF.
2. Disconnect the EGR valve 6P connector.
3. Start the engine and let it idle.
4. Measure voltage between the EGR valve 6P connector terminal No. 4 and No. 6.

Is there battery voltage?

NO

Check for an open in the wire (VCC2 line):

1. Turn the ignition switch OFF.
2. Turn the ignition switch ON (II).
3. Measure voltage between the EGR valve 6P connector terminal No. 2 and No. 3.

YES

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

(To page 11-150)

Is there approx. 5 V?

YES

Repair open in the wire between the EGR valve and PCM (C28).

NO

Check for an open in the wire (VCC2 line):

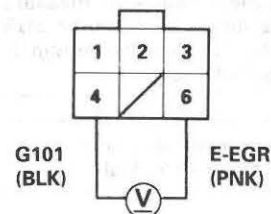
Measure voltage between the PCM connector terminals C18 and C28.

Is there approx. 5 V?

NO

Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

EGR VALVE 6P CONNECTOR (C144)

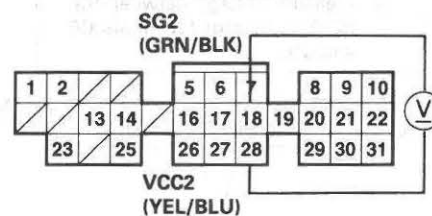


Wire side of female terminals

SG2 (GRN/BLK) VCC2 (YEL/BLU)



PCM CONNECTOR C (31P)



Wire side of female terminals

(cont'd)

Emission Control System

Exhaust Gas Recirculation (EGR) System (cont'd)

(From page 11-149)

Check for an open or short in the EGR valve:
 1. Turn the ignition switch OFF.
 2. At the sensor side, measure resistance between the EGR valve 6P connector terminals No. 1 and No. 2.

Is there continuity or resistance of 100 k Ω or higher? YES

Replace the EGR valve.

NO

Check for an open or short in the EGR valve:
 Measure resistance between the EGR valve 6P connector terminals No. 1 and No. 3.

Is there 100 k Ω or higher? YES

Replace the EGR valve.

NO

Check for an open or short in the wire (EGRL line):
 1. Reconnect the EGR valve connector.
 2. Turn the ignition switch ON (II).
 3. Measure voltage between the PCM connector terminals C6 and C18.

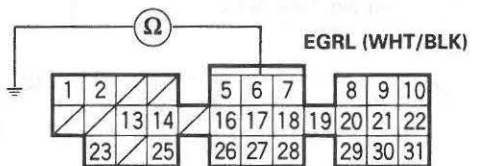
Is there approx. 1.2 V? YES

NO

Check for a short in the wire (EGRL line):
 Check for continuity between PCM connector terminal C6 and the body ground.

Is there continuity? YES

Repair short in the wire between the EGR valve and PCM (C6).



Wire side of female terminals

Check the EGR valve:
 1. Turn the ignition switch OFF.
 2. Disconnect the EGR valve 6P connector.
 3. Connect the battery positive terminal to EGR valve 6P connector terminal No. 6.
 4. Start the engine and let it idle, then connect the battery negative terminal to EGR valve 6P connector terminal No. 4.

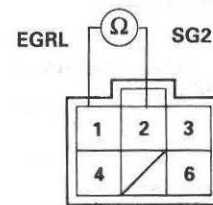
Does the engine stall or run rough? YES

Replace the EGR valve.

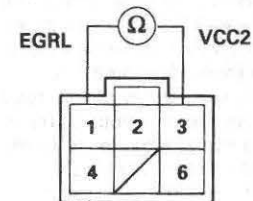
NO

(To page 11-151)

EGR VALVE 6P CONNECTOR



Terminal side of male terminals



PCM CONNECTOR C (31P)

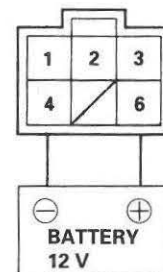


Wire side of female terminals



Repair open in the wire between the EGR valve and the PCM (C6).

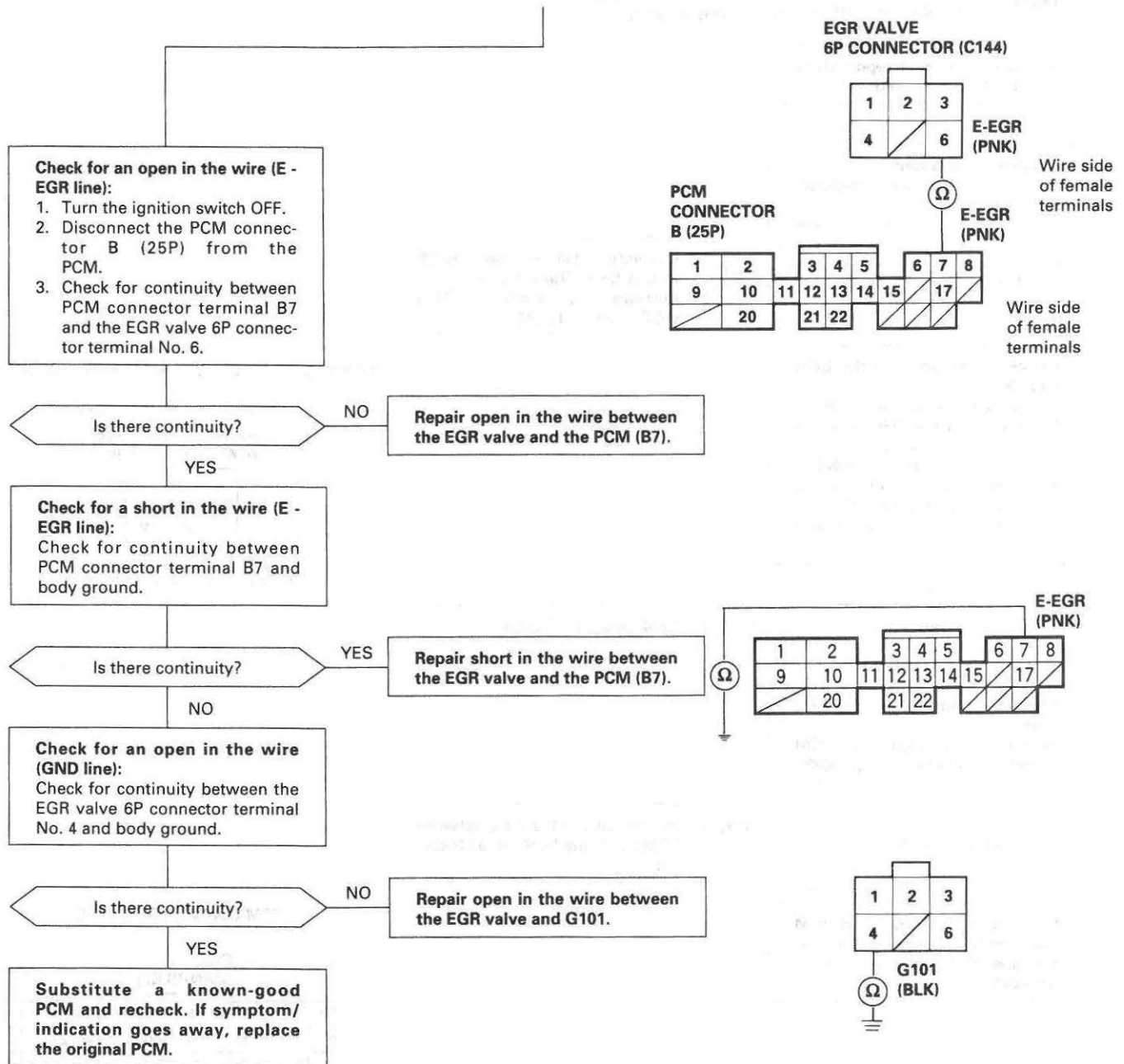
EGR VALVE 6P CONNECTOR



Terminal side of male terminals



(From page 11-150)



(cont'd)

Emission Control System

Exhaust Gas Recirculation (EGR) System (cont'd)

P1498

The scan tool indicates Diagnostic Trouble Code (DTC) P1498: A high voltage problem in the Exhaust Gas Recirculation (EGR) valve lift sensor circuit.

- The MIL has been reported on.
- DTC P1498 is stored.

Problem verification:

1. Do the PCM Reset Procedure.
2. Start the engine.

Is DTC P1498 indicated?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at C144 (EGR valve) and PCM.

YES

Check for an open in the EGR valve lift sensor:

1. Turn the ignition switch OFF.
2. Disconnect the EGR valve lift sensor 6P connector.
3. Turn the ignition switch ON (II).
4. Measure voltage between the EGR valve lift sensor 6P connector terminals No. 3 and No. 2.

Is there approx. 5 V?

YES

Replace the EGR valve.

NO

Check for open in the wire (SG2 line):

Measure voltage between PCM connector terminals C18 and C28.

Is there approx. 5 V?

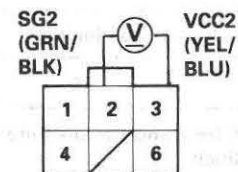
YES

Repair open in the wire between PCM (C18) and EGR valve lift sensor.

NO

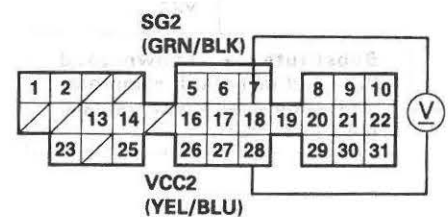
Substitute a known-good PCM and recheck. If symptom/indication goes away, replace the original PCM.

EGR VALVE LIFT SENSOR 6P CONNECTOR (C144)



Wire side of female terminals

PCM CONNECTOR C (31P)



Wire side of female terminals

Automatic Transmission

Special Tools	14-2
Description	
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Electrical System	
PCM Circuit Diagram	
(A/T Control System)	14-4
PCM Terminal Voltage/Measuring	
Conditions	
A/T Control System	14-6
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Electrical Troubleshooting	
Troubleshooting Flowcharts	14-10
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NOTE: Refer to the '96 – '99 Civic Service Manual, P/N 61S0305, for the items not shown in this section.

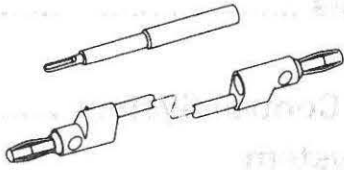


Outline of Model Changes

- The PCM connector terminal arrangement has been changed.
- The road test shift schedule has been changed.

Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07SAZ - 001000A	Backprobe Set	2	14-34

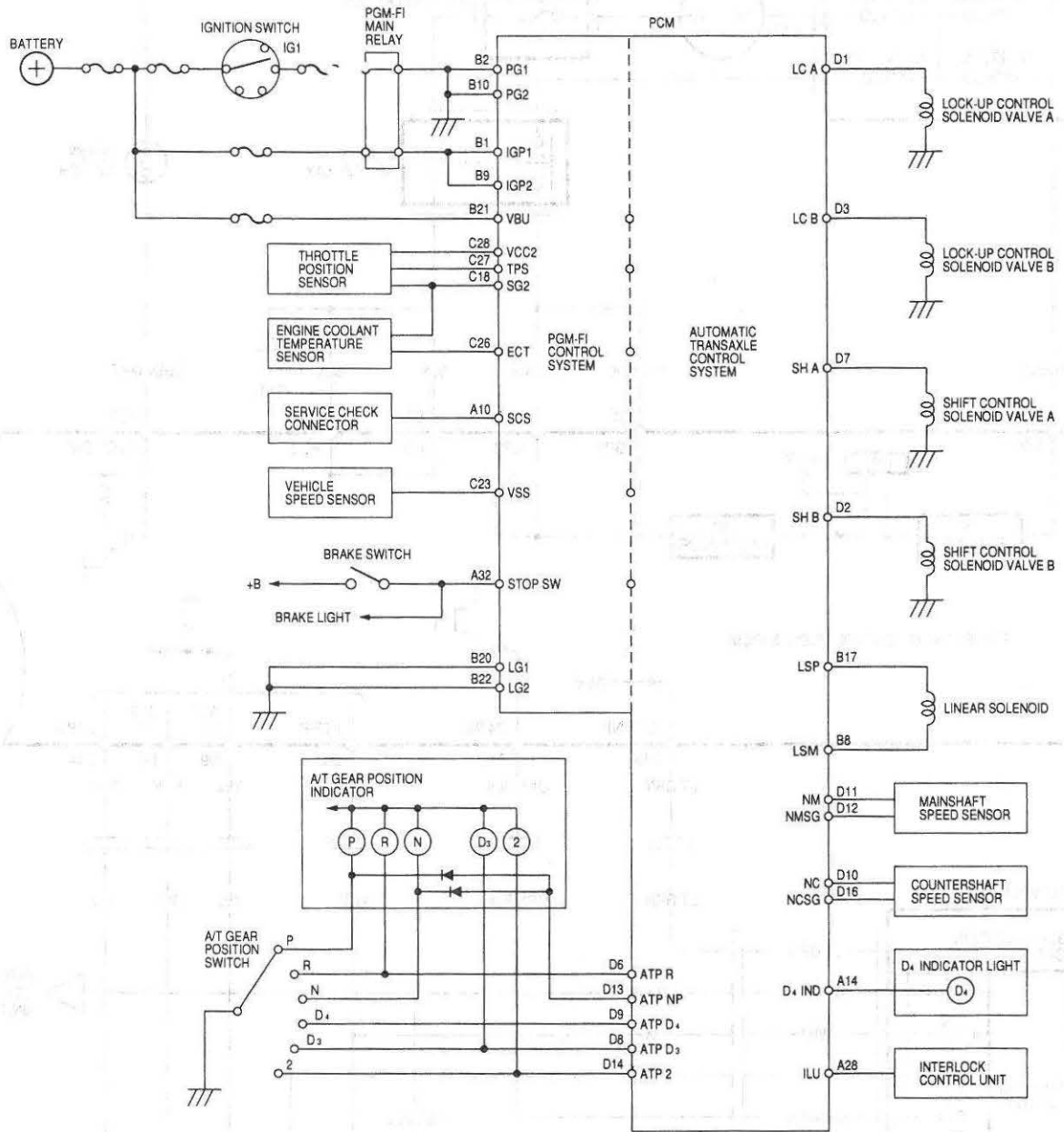


Description

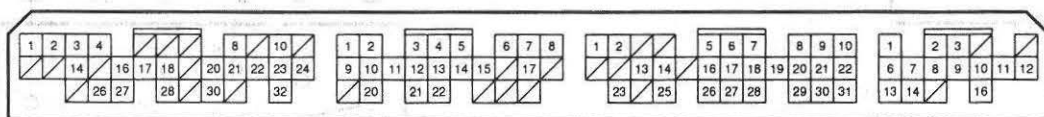


Electrical Control System

Circuit Diagram and Terminal Locations



PCM Connector Terminal Locations



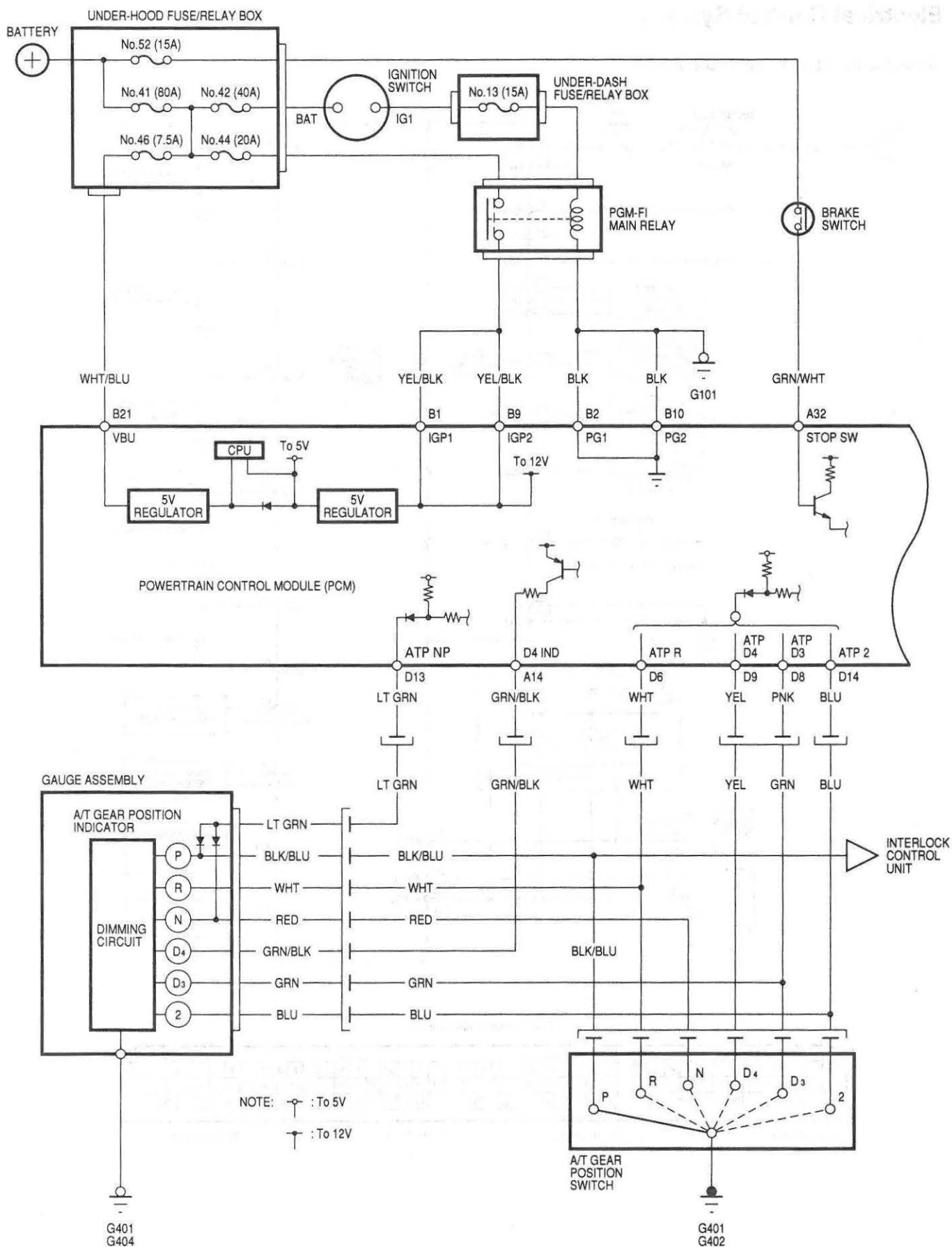
A (32P) Connector

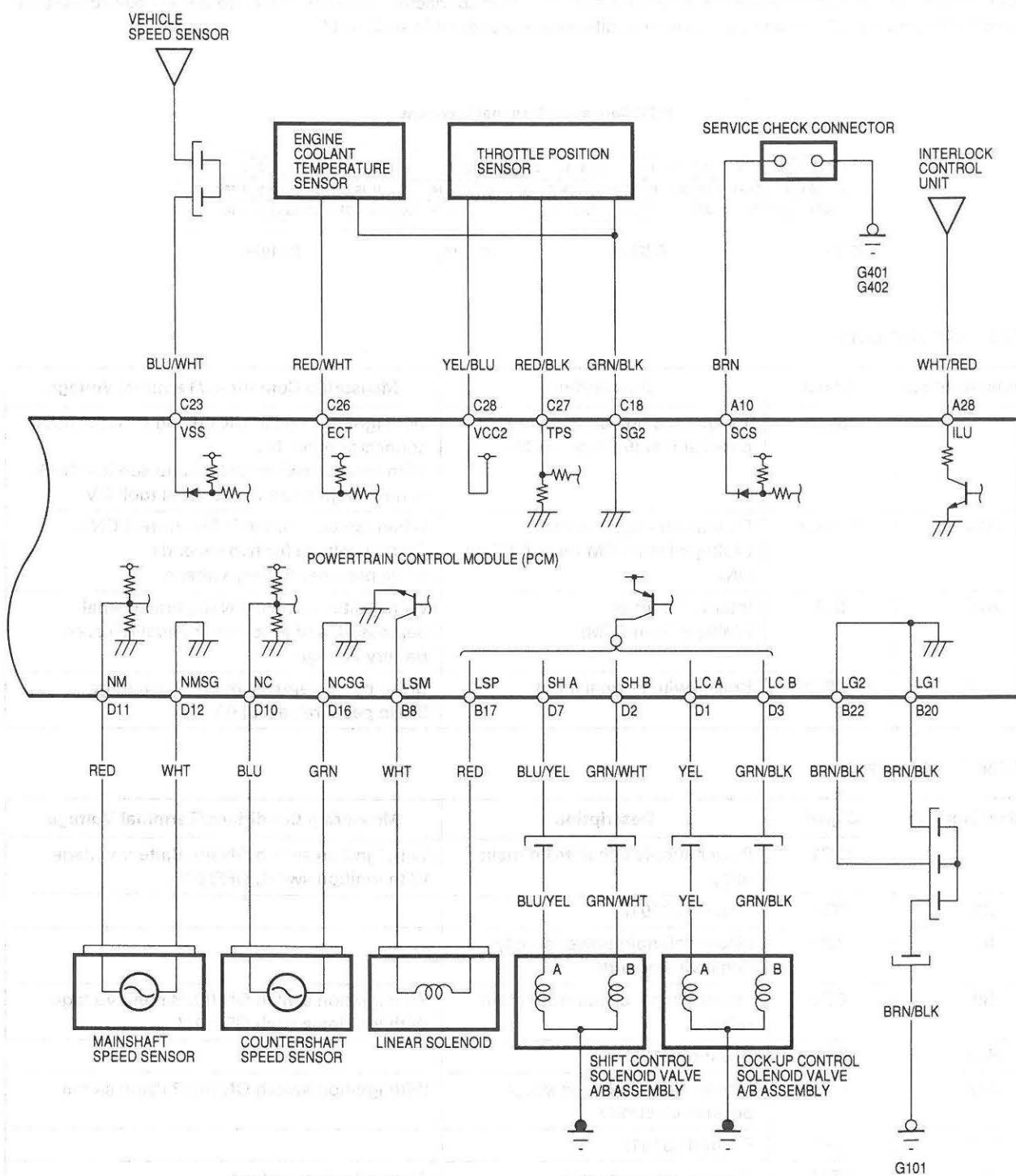
B (25P) Connector

C (31P) Connector

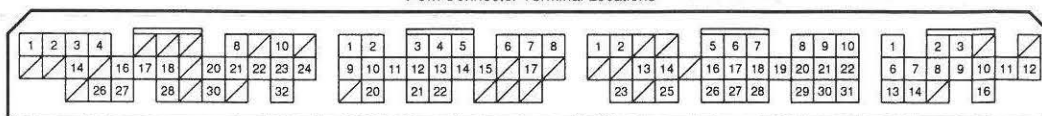
D (16P) Connector

PCM Circuit Diagram (A/T Control System)





PCM Connector Terminal Locations



A (32P) Connector

B (25P) Connector

C (31P) Connector

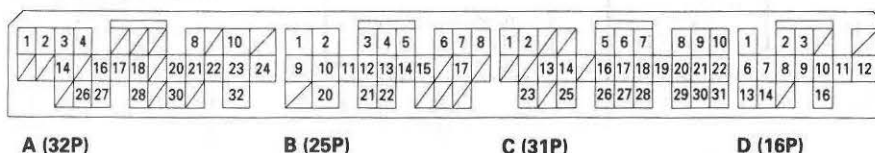
D (16P) Connector

PCM Terminal Voltage/Measuring Conditions


A/T Control System

The PCM terminal voltage and measuring conditions are shown for connector terminals related to the A/T control system. The other PCM terminal voltage and measuring conditions are described in section 11.

PCM Connector Terminal Locations



PCM CONNECTOR A (32P)

Terminal Number	Signal	Description	Measuring Conditions/Terminal Voltage
A10	SCS	Timing and adjustment service check signal (5 V from PCM)	With ignition switch ON (II) and service check connector open: 5 V With ignition switch ON (II) and service check connector jumped with special tool: 0 V
A14	D4 IND	D4 indicator light control (Voltage from PCM turns D4 light ON)	When ignition switch is first turned ON (II): Battery voltage for two seconds In  position: Battery voltage
A28	ILU	Interlock control (Voltage from PCM)	With ignition switch ON (II), brake pedal depressed, and accelerator pedal released: Battery voltage
A32	STOP SW	Brake switch signal input	Brake pedal depressed: Battery voltage Brake pedal released: 0 V

PCM CONNECTOR B (25P)

Terminal Number	Signal	Description	Measuring Conditions/Terminal Voltage
B1	IGP1	Power supply circuit from main relay	With ignition switch ON (II): Battery voltage With ignition switch OFF: 0 V
B2	PG1	Ground (G101)	
B8	LSM	Linear solenoid power supply negative electrode	
B9	IGP2	Power supply circuit from main relay	With ignition switch ON (II): Battery voltage With ignition switch OFF: 0 V
B10	PG2	Ground (G101)	
B17	LSP	Linear solenoid power supply positive electrode	With ignition switch ON (II): Pulsing signal
B20	LG1	Ground (G101)	
B21	VBU	Back-up power supply	Always battery voltage
B22	LG2	Ground (G101)	





PCM CONNECTOR D (16P)

Terminal Number	Signal	Description	Measuring Conditions/Terminal Voltage
D1	LC A	Lock-up control solenoid valve A control	During lock-up conditions: Battery voltage During no lock-up condition: 0 V
D2	SH B	Shift control solenoid valve B control	Battery voltage in following positions: • [2] position • [D₄] , and [D₃] positions in 1st and 2nd gear 0 V in following positions: • [D₄] , and [D₃] positions in 3rd gear • [D₄] position in 4th gear • [P] , [R] , and [N] positions
D3	LC B	Lock-up control solenoid valve B control	During full lock-up conditions: Battery voltage During partial lock-up conditions: Pulsing signal
D4	—	Not used	
D5	—	Not used	
D6	ATP R	A/T gear position switch [R] position input	In [R] position: 0 V In other than [R] position: Battery voltage
D7	SH A	Shift control solenoid valve A control	Battery voltage in following positions: • [2] position • [D₄] , and [D₃] positions in 2nd and 3rd gear • [R] position 0 V in following positions: • [D₄] , and [D₃] positions in 1st gear • [D₄] position in 4th gear • [P] and [N] positions
D8	ATP D3	A/T gear position switch [D₃] position input	In [D₃] position: 0 V In other than [D₃] position: Battery voltage
D9	ATP D4	A/T gear position switch [D₄] position input	In [D₄] position: 0 V In other than [D₄] position: 5 V or more
D10	NC	Countershaft speed sensor input	Depending on vehicle speed: Pulsing signal When vehicle is stopped: Approx. 0 V
D11	NM	Mainshaft speed sensor input	Depending on vehicle speed: Pulsing signal When engine is stopped: Approx. 0 V
D12	NMSG	Mainshaft speed sensor ground	
D13	ATP NP	A/T gear position switch [P] and [N] positions input	In [P] and [N] positions: 0 V In other than [P] and [N] position: 5 V or more
D14	ATP 2	A/T gear position switch [2] position input	In [2] position: 0 V In other than [2] position: Battery voltage
D15	—	Not used	
D16	NCSG	Countershaft speed sensor ground	

Symptom-to-Component Chart

Electrical System

Diagnostic Trouble Code (DTC)*	 Indicator Light	Symptom	Possible Cause	Refer to Page
P1753 (1)	Blinks	<ul style="list-style-type: none"> Lock-up clutch does not engage. Lock-up clutch does not disengage. 	<ul style="list-style-type: none"> Disconnected lock-up control solenoid valve A/B assembly connector Short or open in lock-up control solenoid valve A wire Faulty lock-up control solenoid valve A 	14-10
P1758 (2)	Blinks	Lock-up clutch does not engage.	<ul style="list-style-type: none"> Disconnected lock-up control solenoid valve A/B assembly connector Short or open in lock-up control solenoid valve B wire Faulty lock-up control solenoid valve B 	14-12
P1705 (5)	Blinks	<ul style="list-style-type: none"> Fails to shift other than 2nd – 4th gears. Lock-up clutch does not engage. 	<ul style="list-style-type: none"> Short in A/T gear position switch wire Faulty A/T gear position switch 	14-14
P1706 (6)	OFF	<ul style="list-style-type: none"> Fails to shift other than 2nd – 3rd – 4th gears. Lock-up clutch does not engage. 	<ul style="list-style-type: none"> Disconnected A/T gear position switch connector Open in A/T gear position switch wire Faulty A/T gear position switch 	14-16
P0753 (7)	Blinks	<ul style="list-style-type: none"> Fails to shift (between 1st – 4th, or 2nd – 3rd gear only). Fails to shift (stuck in 4th gear). 	<ul style="list-style-type: none"> Disconnected shift control solenoid valve A/B assembly connector Short or open in shift control solenoid valve A wire Faulty shift control solenoid valve A 	14-18
P0758 (8)	Blinks	Fails to shift (stuck in 1st or 4th gears).	<ul style="list-style-type: none"> Disconnected shift control solenoid valve A/B assembly connector Short or open in shift control solenoid valve B wire Faulty shift control solenoid valve B 	14-20
P0720 (9)	Blinks	Lock-up clutch does not engage.	<ul style="list-style-type: none"> Disconnected countershaft speed sensor connector Short or open in countershaft speed sensor wire Faulty countershaft speed sensor 	14-22

(DTC)*: The DTC in parentheses is the code the  indicator light indicates when the service check connector is connected to the special tool (SCS service connector).



Diagnostic Trouble Code (DTC)*	Indicator Light	Symptom	Possible Cause	Refer to Page
P0715 (15)	Blinks	Lock-up clutch does not engage.	<ul style="list-style-type: none"> • Disconnected mainshaft speed sensor connector • Short or open in mainshaft speed sensor wire • Faulty mainshaft speed sensor 	14-24
P1768 (16)	Blinks	<ul style="list-style-type: none"> • Transmission jerks hard when shifting. • Fails to shift (stuck in 4th gear) • Lock-up clutch does not engage. 	<ul style="list-style-type: none"> • Disconnected linear solenoid connector • Short or open in linear solenoid wire • Faulty linear solenoid • Disconnected or loosed PG terminals 	14-26
P0740 (40)	OFF	Lock-up clutch does not engage.	Faulty lock-up control system	14-28
P0730 (41)	OFF	<ul style="list-style-type: none"> • Fails to shift (between 1st – 2nd, 1st – 4th, 2nd – 4th, 2nd – 3rd, 3rd – 4th, 1st – 2nd – 3rd, 1st – 3rd – 4th, or 2nd – 3rd – 4th gears only). • Fails to shift (stuck in 1st or 2nd gears). 	Faulty shift control system	14-29

(DTC)*: The DTC in parentheses is the code the indicator light indicates when the service check connector is connected to the special tool (SCS service connector).

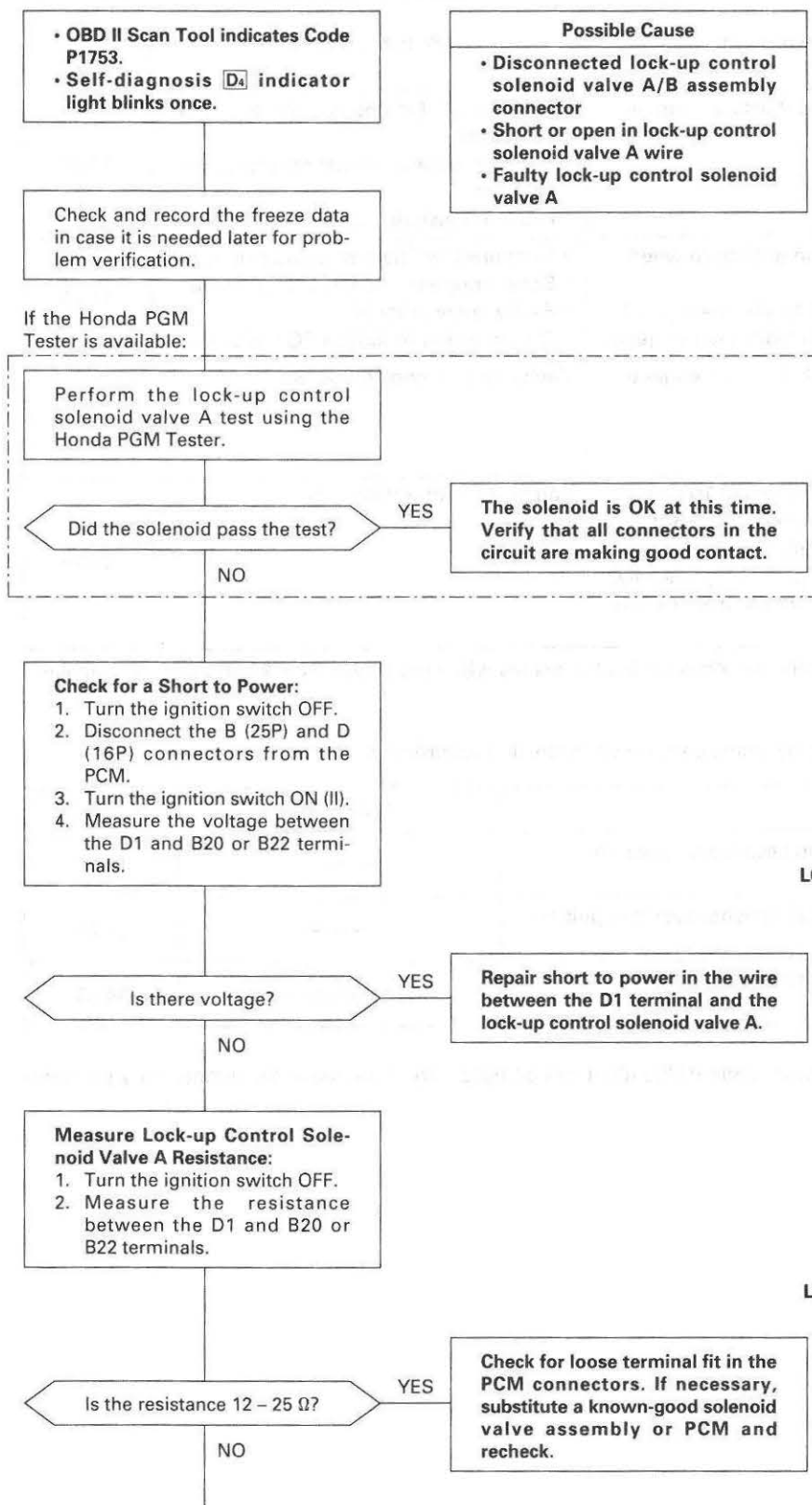
If the self-diagnostic indicator light does not blink, perform an inspection according to the table below.

Symptom	Inspection	Ref. page
indicator light does not come on for two seconds after ignition switch is first turned ON (II).	_____	14-30
indicator light is on constantly (not blinking) whenever the ignition switch is ON (II).	_____	14-32
Shift lever cannot be moved from position with the brake pedal depressed.	Brake switch signal	14-33

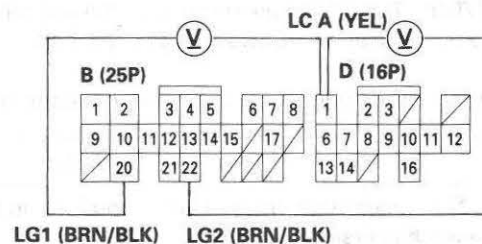
NOTE: If a customer describes the symptom for code P1706 (6), it will be necessary to recreate the symptom by test-driving, then recheck the DTC.

Electrical Troubleshooting

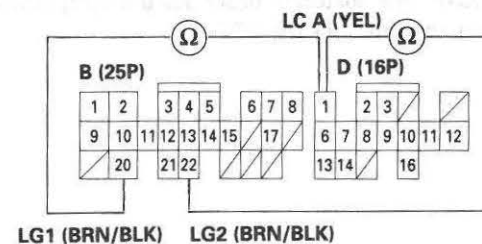
Troubleshooting Flowchart — Lock-up Control Solenoid Valve A



PCM CONNECTORS



Wire side of female terminals



To page 14-11



From page 14-10

Check Lock-up Control Solenoid Valve A for a Short Circuit:

1. Disconnect the 2P connector from the lock-up control solenoid valve A/B assembly.
2. Check for continuity between the D1 and B20 or B22 terminals.

Is there continuity?

YES

Repair short to ground in the wire between the D1 terminal and the lock-up control solenoid valve A.

NO

Measure Lock-up Control Solenoid Valve A Resistance at the Solenoid Valve Connector:

Measure the resistance between the No. 2 terminal of the connector and body ground.

Is the resistance 12 – 25 Ω ?

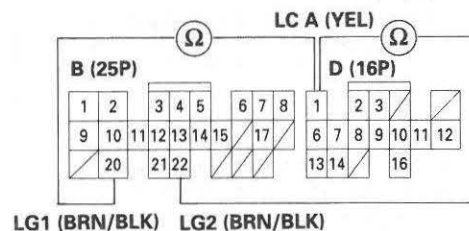
YES

Check for open in the wire between the D1 terminal and the lock-up control solenoid valve A.

NO

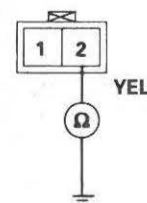
Replace the lock-up control solenoid valve A/B assembly.

PCM CONNECTORS



Wire side of female terminals

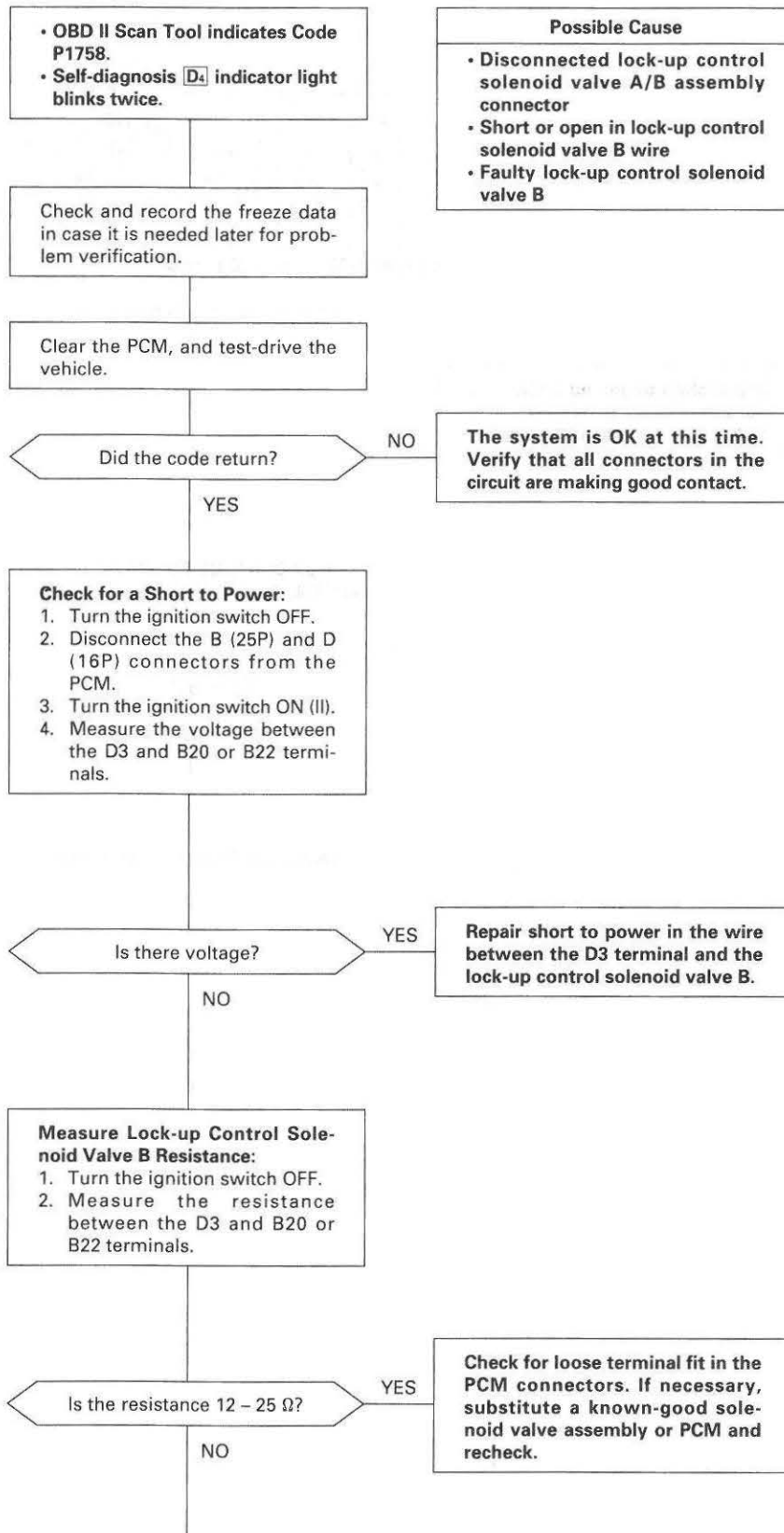
LOCK-UP CONTROL SOLENOID VALVE A/B ASSEMBLY CONNECTOR



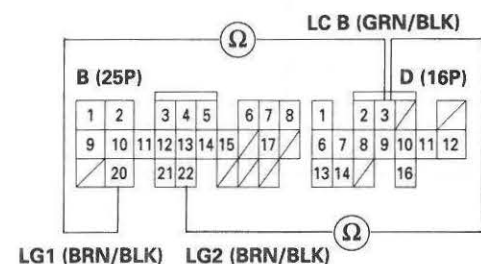
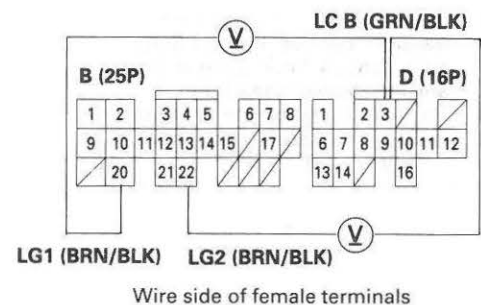
Terminal side of male terminals

Electrical Troubleshooting

Troubleshooting Flowchart — Lock-up Control Solenoid Valve B



PCM CONNECTORS



To page 14-13



From page 14-12

Check Lock-up Control Solenoid Valve B for a Short Circuit:

1. Disconnect the 2P connector from the lock-up control solenoid valve A/B assembly.
2. Check for continuity between the D3 and B20 or B22 terminals.

Is there continuity?

YES

Repair short to ground in the wire between the D3 terminal and the lock-up control solenoid valve B.

NO

Measure Lock-up Control Solenoid Valve B Resistance at the Solenoid Valve Connector:

Measure the resistance between the No. 1 terminal of the connector and body ground.

Is the resistance 12 – 25 Ω ?

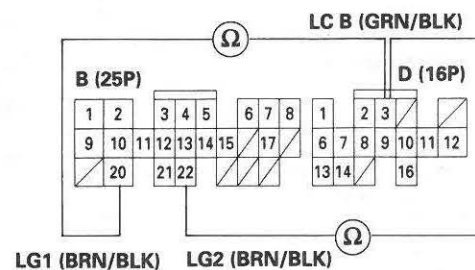
YES

Check for open in the wire between the D3 terminal and the lock-up control solenoid valve B.

NO

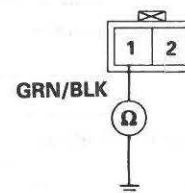
Replace the lock-up control solenoid valve A/B assembly.

PCM CONNECTORS



Wire side of female terminals

LOCK-UP CONTROL SOLENOID VALVE A/B ASSEMBLY CONNECTOR



Terminal side of male terminals

Electrical Troubleshooting

Troubleshooting Flowchart — A/T Gear Position Switch (Short)

- OBD II Scan Tool indicates Code P1705.
- Self-diagnosis **D4** indicator light blinks five times.

Check and record the freeze data in case it is needed later for problem verification.

Observe the A/T Gear Position Indicator:

1. Turn the ignition switch ON (II).
2. Observe the A/T gear position indicator, and shift to each position separately.

Does any indicator stay on when the shift lever is not in that position?

NO

The system is OK at this time. Check the wire harness for damage.

YES

Disconnect the A/T gear position switch connector.

Do all gear position indicators go out?

YES

Replace the A/T gear position switch.

NO

Connect the A/T gear position switch connector.

Measure ATP R Voltage:

1. Shift to all positions other than **R**.
2. Measure the voltage between the D6 and B20 or B22 terminals.

Is there battery voltage?

NO

Check for short in the wire between the D6 terminal and the A/T gear position switch or A/T gear position indicator. If wire is OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

YES

Measure ATP NP Voltage:

1. Shift to all positions other than **N** or **P**.
2. Measure the voltage between the D13 and B20 or B22 terminals.

Is there battery voltage?

NO

Check for short in the wire between the D13 terminal and the A/T gear position indicator, or a short in the wires between the A/T gear position indicator and the A/T gear position switch. If wires are OK, check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

YES

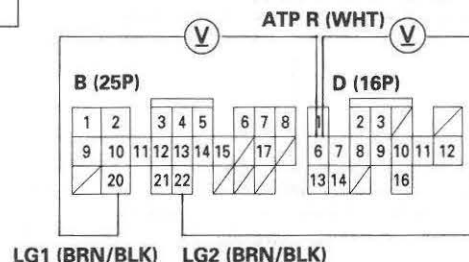
To page 14-15

Possible Cause

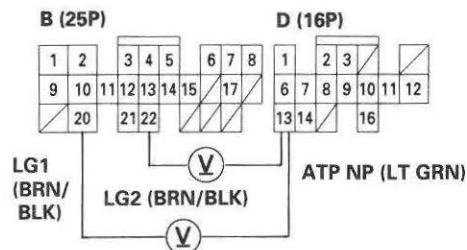
- Short in A/T gear position switch wire
- Faulty A/T gear position switch

NOTE: Code P1705 (5) is caused when the PCM receives two gear position inputs at the same time.

PCM CONNECTORS

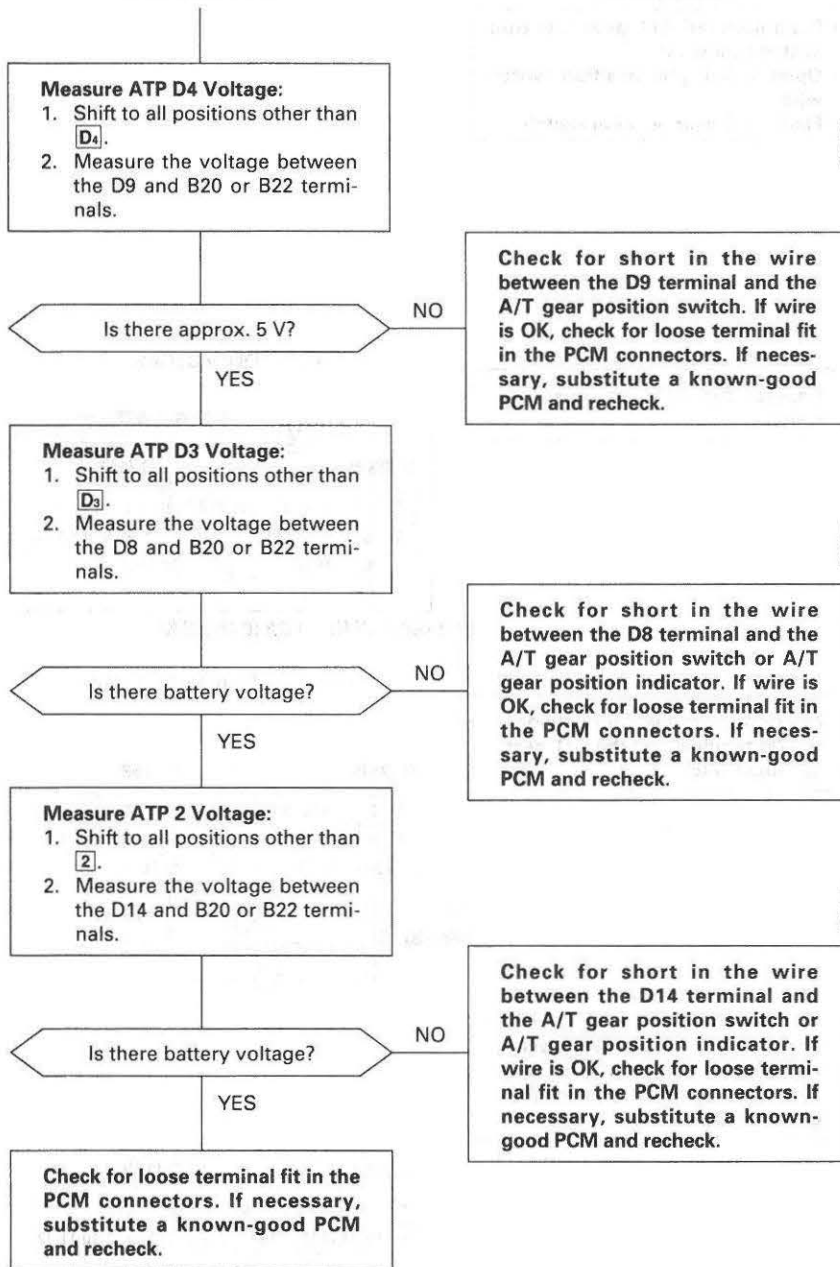


Wire side of female terminals

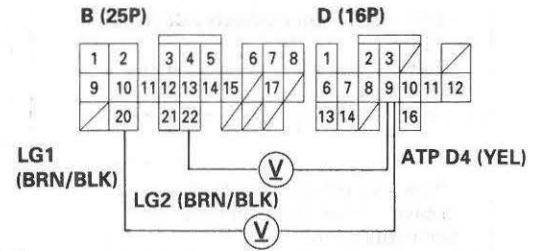




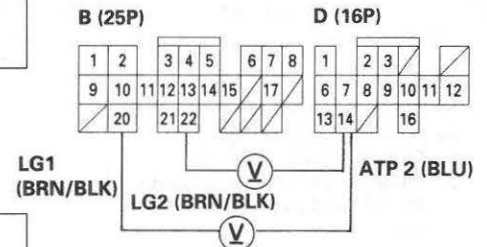
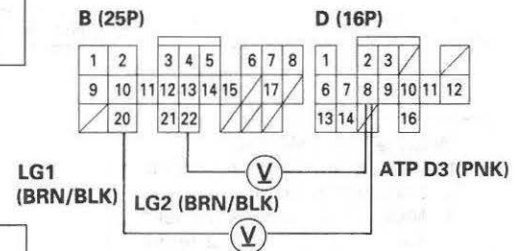
From page 14-14



PCM CONNECTORS

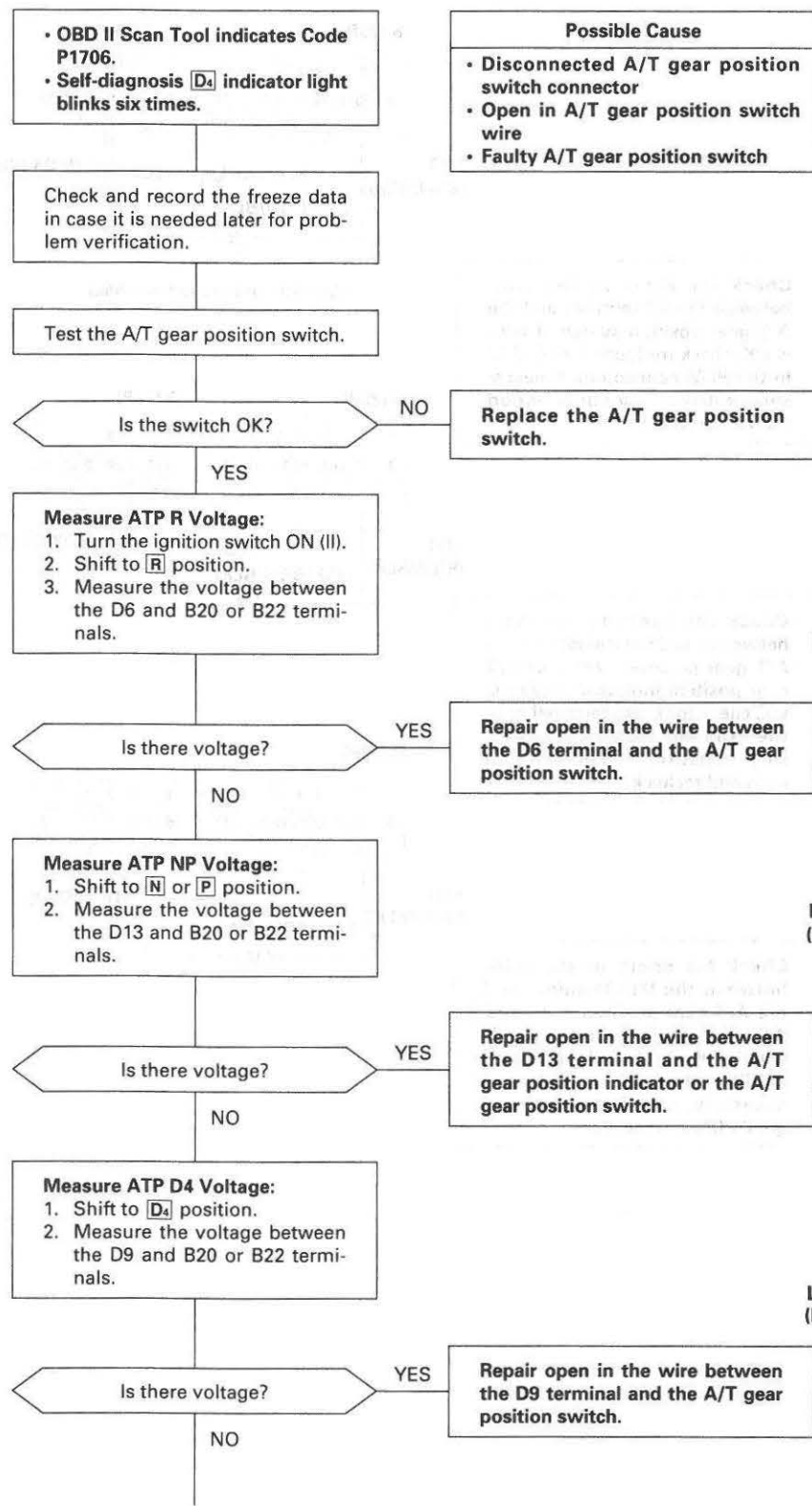


Wire side of female terminals

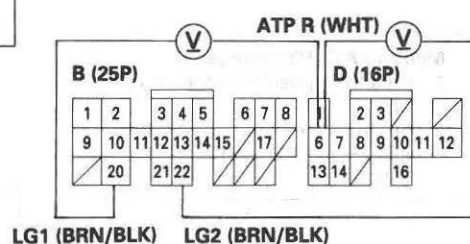


Electrical Troubleshooting

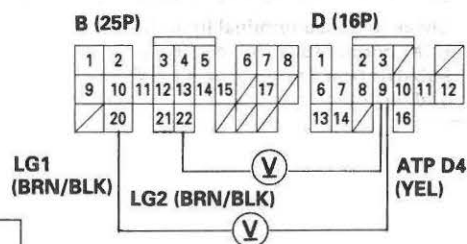
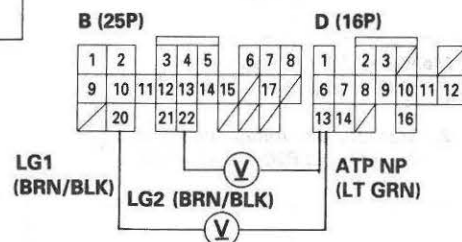
Troubleshooting Flowchart — A/T Gear Position Switch (Open)



PCM CONNECTORS



Wire side of female terminals



To page 14-17



From page 14-16

Measure ATP D3 Voltage:

1. Shift to **D3** position.
2. Measure the voltage between the D8 and B20 or B22 terminals.

Is there voltage?

YES

Repair open in the wire between the D8 terminal and the A/T gear position switch.

NO

Measure ATP2 Voltage:

1. Shift to **2** position.
2. Measure the voltage between the D14 and B20 or B22 terminals.

Is there voltage?

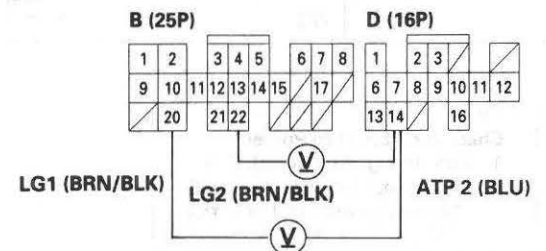
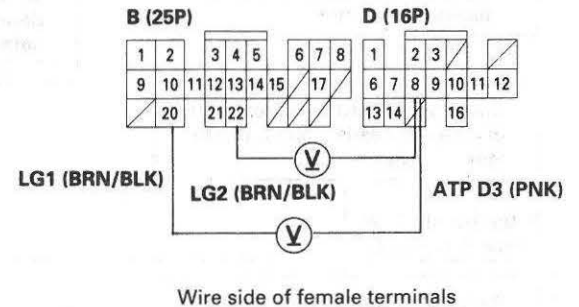
YES

Repair open in the wire between the D14 terminal and the A/T gear position switch.

NO

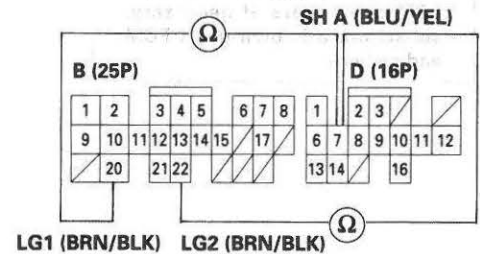
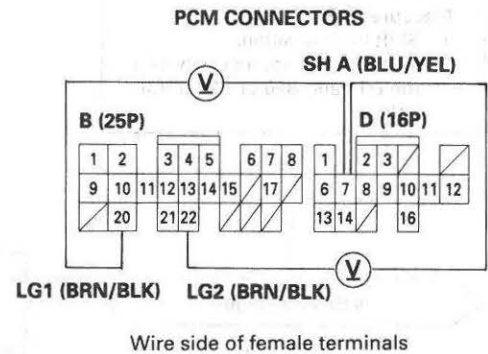
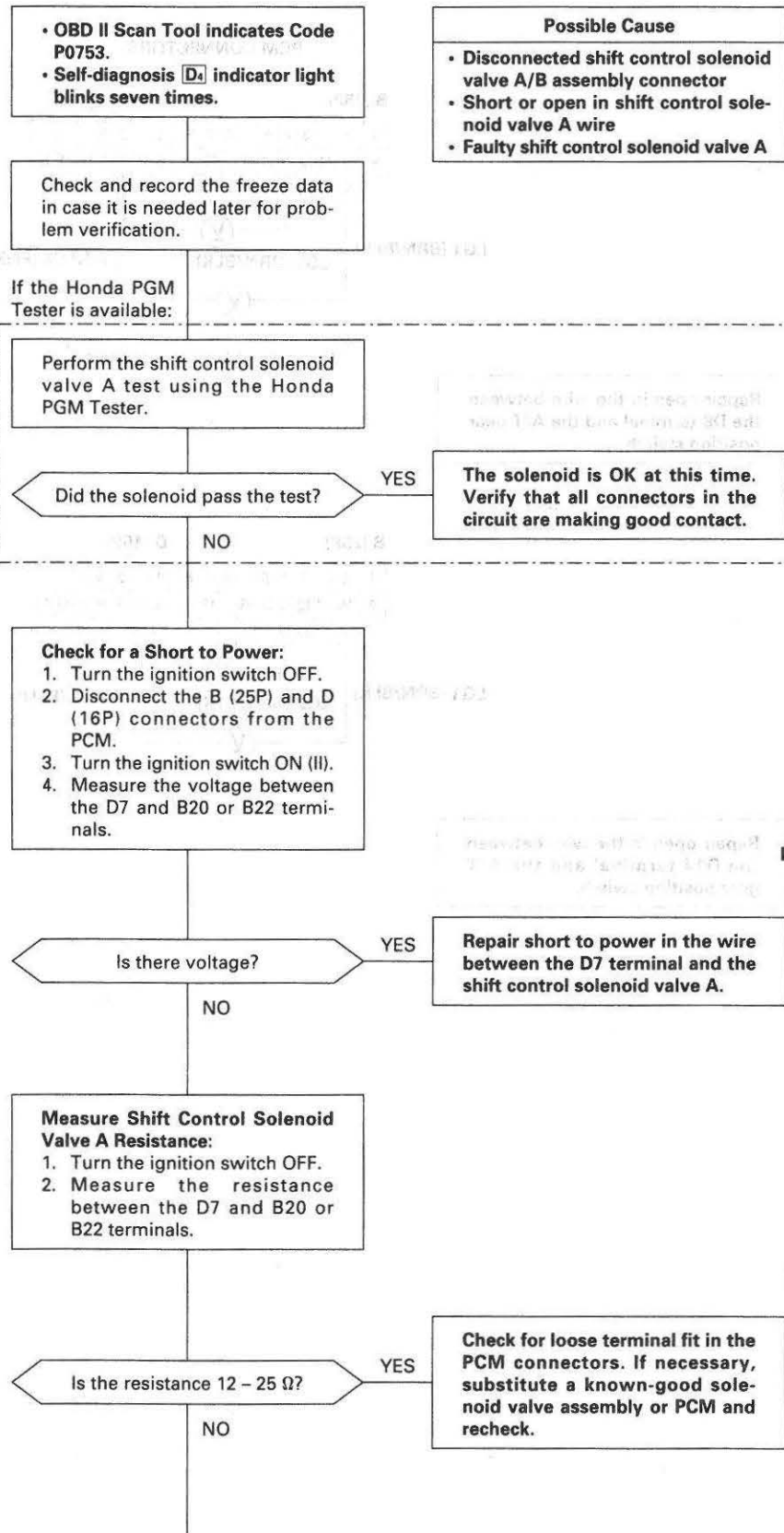
Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

PCM CONNECTORS



Electrical Troubleshooting

Troubleshooting Flowchart — Shift Control Solenoid Valve A



To page 14-19



From page 14-18

Check Shift Control Solenoid Valve A for a Short Circuit:

1. Disconnect the 2P connector from the shift control solenoid valve A/B assembly.
2. Check for continuity between the D7 and B20 or B22 terminals.

Is there continuity?

YES

Repair short to ground in the wire between the D7 terminal and the shift control solenoid valve A.

NO

Measure Shift Control Solenoid Valve A Resistance at the Solenoid Valve Connector:

Measure the resistance between the No. 1 terminal of the connector and body ground.

Is the resistance 12 – 25 Ω ?

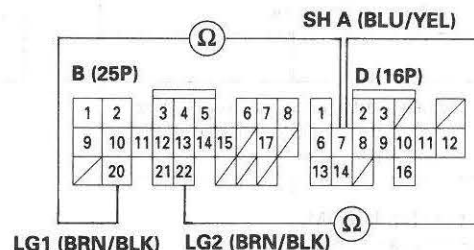
YES

Check for open in the wire between the D7 terminal and the shift control solenoid valve A.

NO

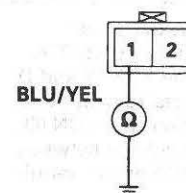
Replace the shift control solenoid valve A/B assembly.

PCM CONNECTORS



Wire side of female terminals

SHIFT CONTROL SOLENOID VALVE A/B ASSEMBLY CONNECTOR



Terminal side of male terminals

Electrical Troubleshooting

Troubleshooting Flowchart — Shift Control Solenoid Valve B

- OBD II Scan Tool indicates Code P0758.
- Self-diagnosis **D₄** indicator light blinks eight times.

Possible Cause

- Disconnected shift control solenoid valve A/B assembly connector
- Short or open in shift control solenoid valve B wire
- Faulty shift control solenoid valve B

Check and record the freeze data in case it is needed later for problem verification.

If the Honda PGM Tester is available:

Test solenoid valve B with the Honda PGM Tester in the Function test mode.

Did the solenoid pass the test?

YES

The solenoid is OK at this time. Verify that all connectors in the circuit are making good contact.

NO

Check for a Short to Power:

1. Turn the ignition switch OFF.
2. Disconnect the B (25P) and D (16P) connectors from the PCM.
3. Turn the ignition switch ON (II).
4. Measure the voltage between the D2 and B20 or B22 terminals.

Is there voltage?

YES

Repair short to power in the wire between the D2 terminal and the shift control solenoid valve B.

NO

Measure Shift Control Solenoid Valve B Resistance:

1. Turn the ignition switch OFF.
2. Measure the resistance between the D2 and B20 or B22 terminals.

Is the resistance 12 – 25 Ω ?

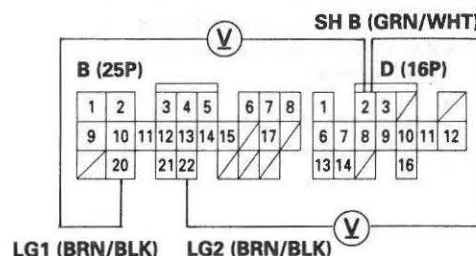
YES

Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good solenoid valve assembly or PCM and recheck.

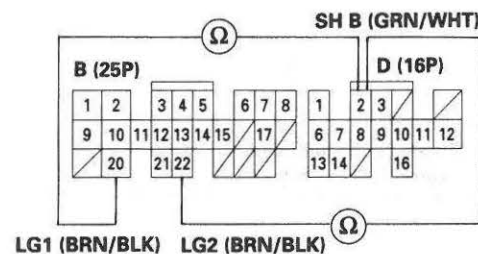
NO

To page 14-21

PCM CONNECTORS



Wire side of female terminals





From page 14-20

Check Shift Control Solenoid Valve B for a Short Circuit:

1. Disconnect the 2P connector from the shift control solenoid valve assembly.
2. Check for continuity between the D2 and B20 or B22 terminals.

Is there continuity?

YES

Repair short to ground in the wire between the D2 terminal and the shift control solenoid valve B.

NO

Measure Shift Control Solenoid Valve B Resistance at the Solenoid Valve Connector:

Measure the resistance between the No. 2 terminal of the connector and body ground.

Is the resistance 12 – 25 Ω ?

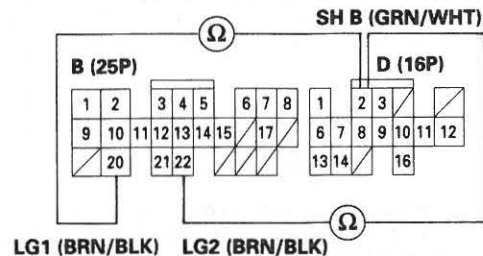
YES

Check for open in the wire between the D2 terminal and the shift control solenoid valve B.

NO

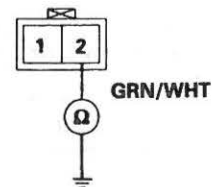
Replace the shift control solenoid valve A/B assembly.

PCM CONNECTORS



Wire side of female terminals

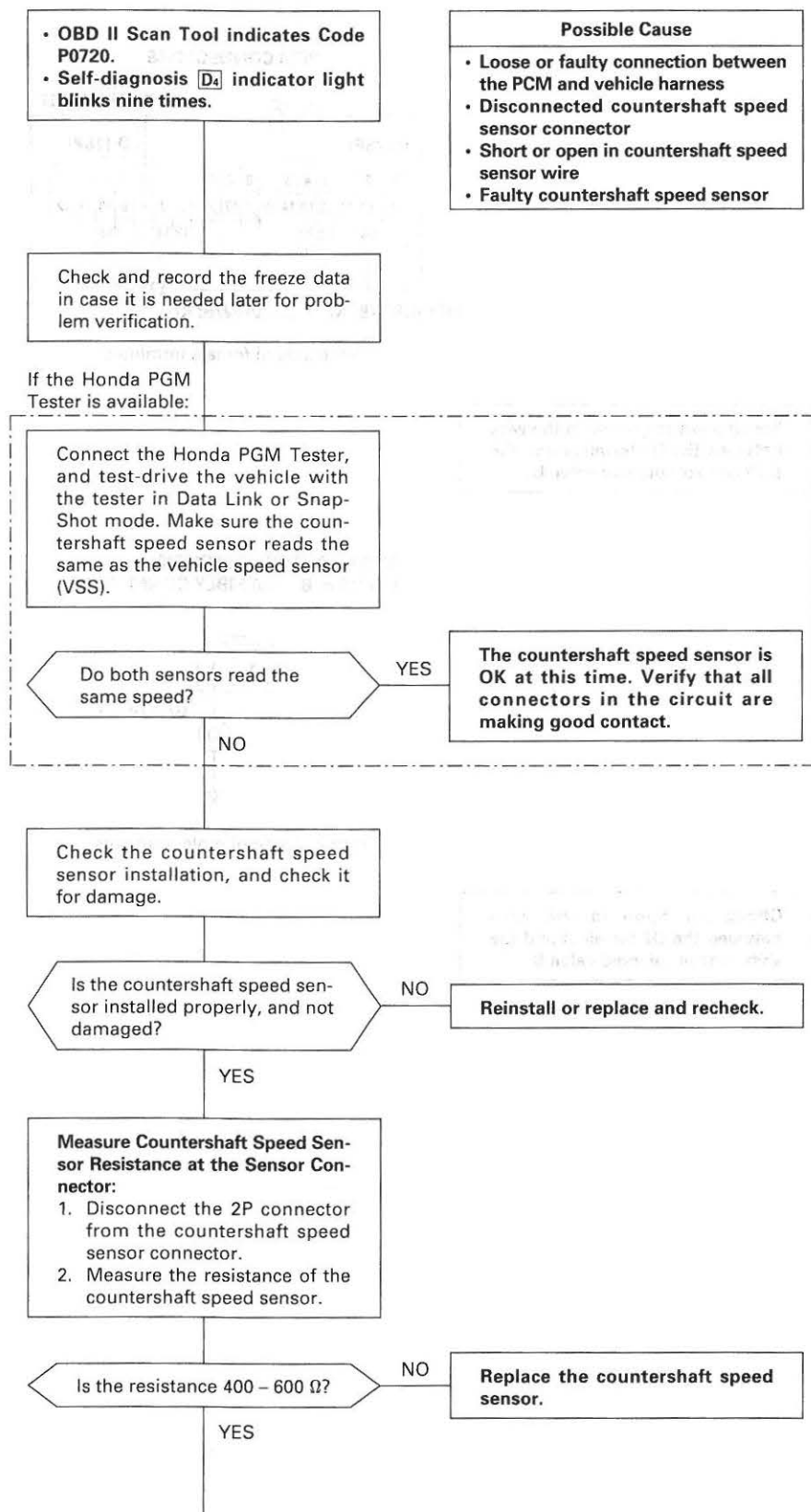
SHIFT CONTROL SOLENOID VALVE A/B ASSEMBLY CONNECTOR



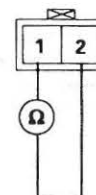
Terminal side of male terminals

Electrical Troubleshooting

Troubleshooting Flowchart — Countershaft Speed Sensor



COUNTERSHAFT SPEED SENSOR CONNECTOR

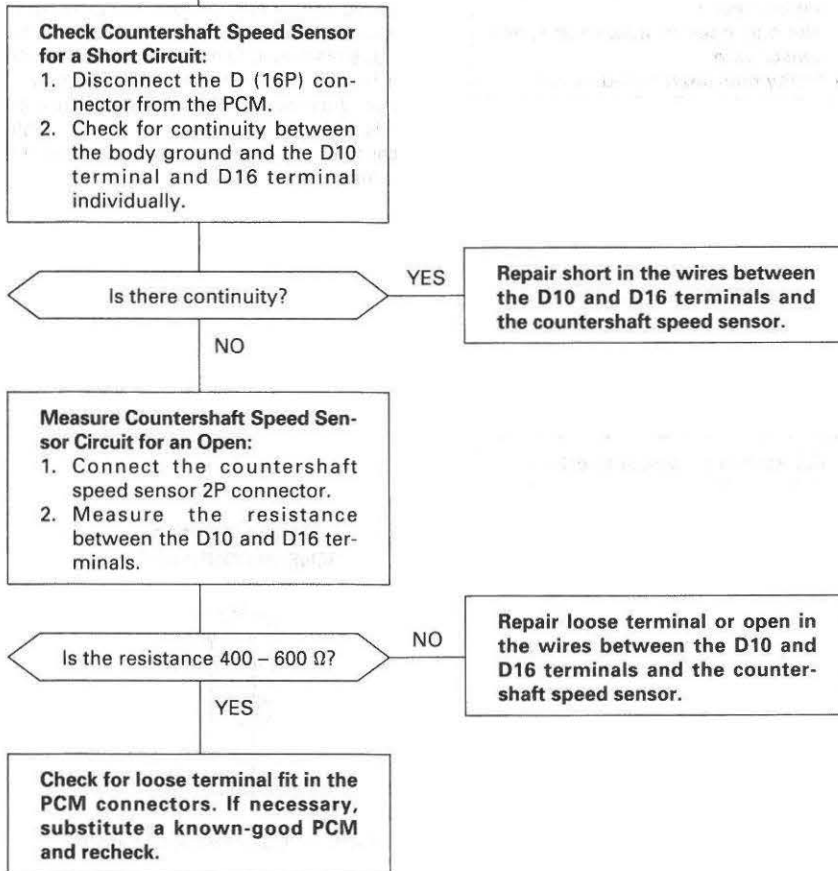


Terminal side of male terminals

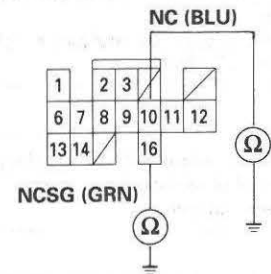
To page 14-23



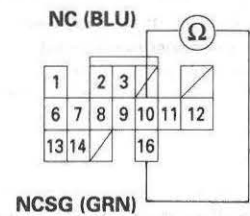
From page 14-22



PCM CONNECTOR D (16P)

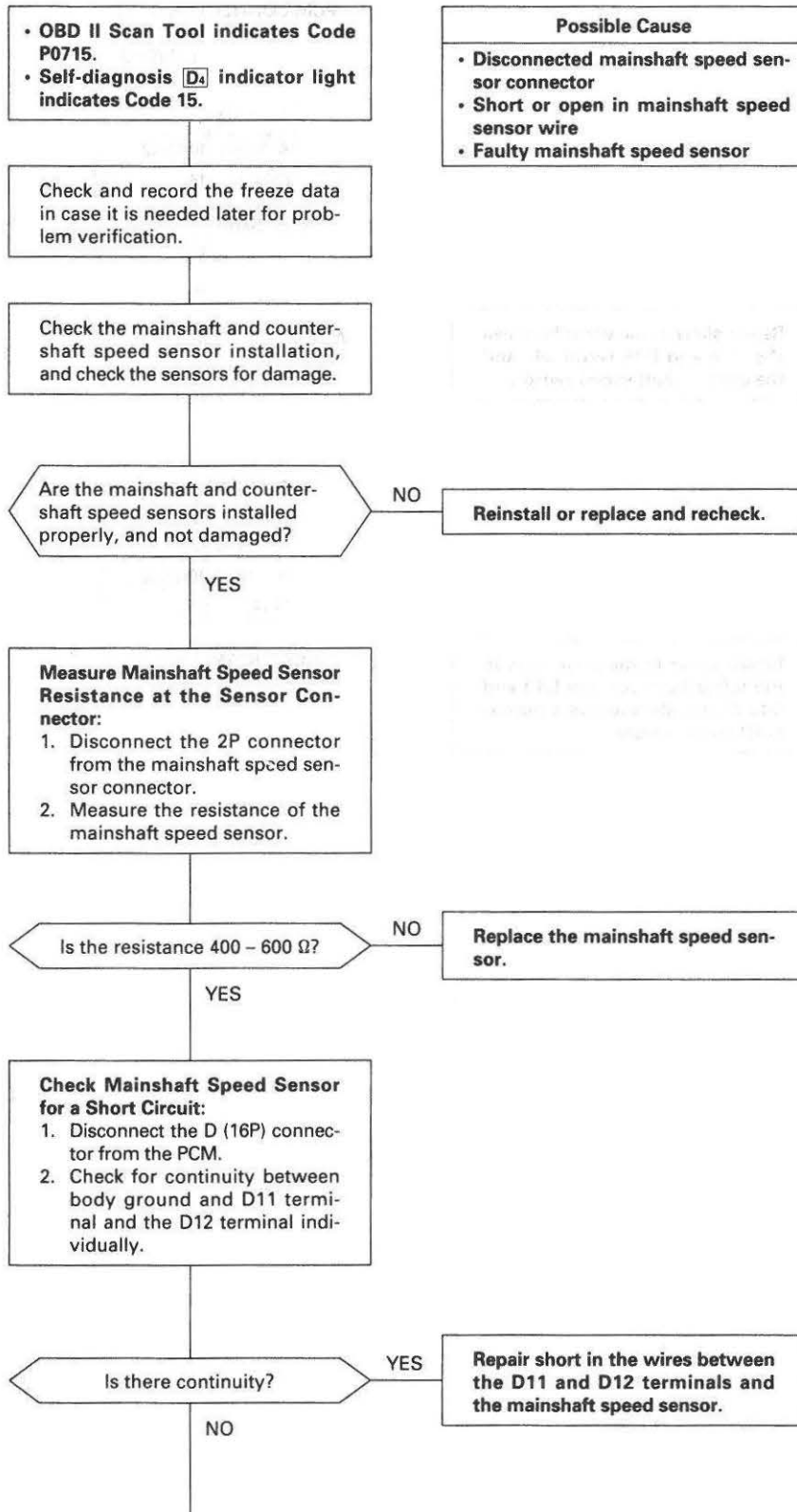


Wire side of female terminals



Electrical Troubleshooting

Troubleshooting Flowchart — Mainshaft Speed Sensor

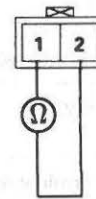


Possible Cause

- Disconnected mainshaft speed sensor connector
- Short or open in mainshaft speed sensor wire
- Faulty mainshaft speed sensor

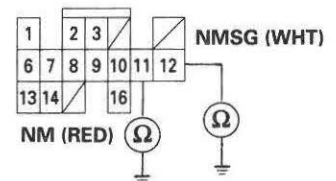
NOTE: Code P0715(15) on the PCM doesn't always mean there's an electrical problem in the mainshaft or countershaft speed sensor circuit; code P0715(15) may also indicate a mechanical problem in the transmission. Check the freeze data with a Honda PGM Tester. If the mainshaft speed sensor rpm was 0, proceed with this troubleshooting. If not, the probable cause is a mechanical problem within the transmission.

MAINSHAFT SPEED SENSOR CONNECTOR



Terminal side of male terminals

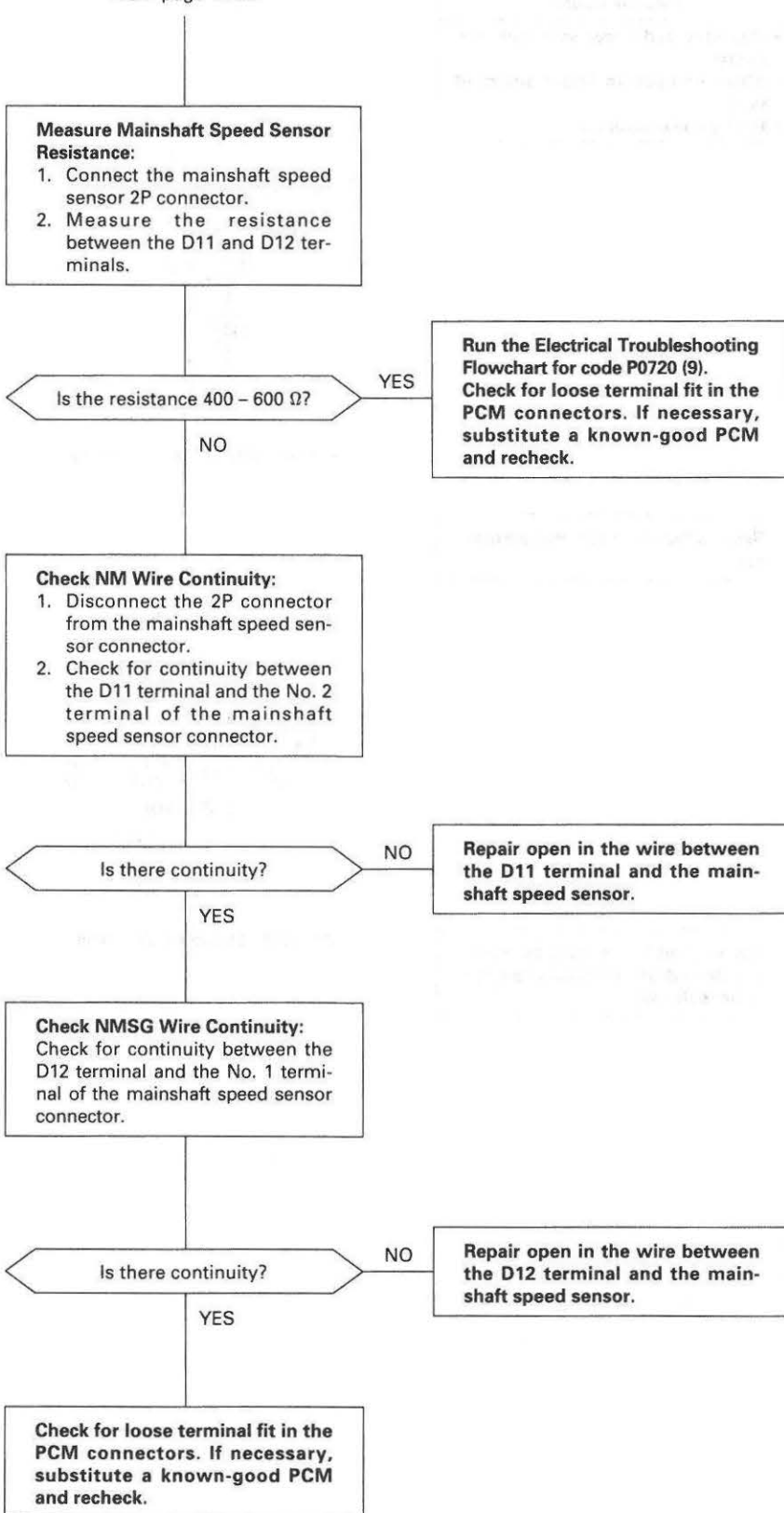
PCM CONNECTOR D (16P)



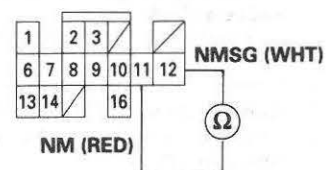
Wire side of female terminals



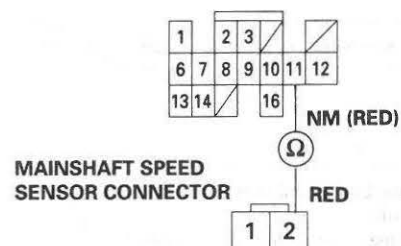
From page 14-24



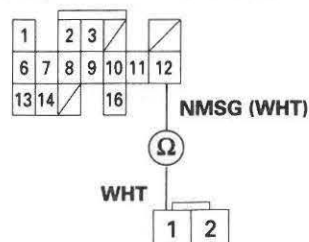
PCM CONNECTOR D (16P)



Wire side of female terminals



Wire side of female terminals



Electrical Troubleshooting

Troubleshooting Flowchart — Linear Solenoid

- OBD II Scan Tool indicates Code P1768.
- Self-diagnosis **D4** indicator light indicates Code 16.

Possible Cause

- Disconnected linear solenoid connector
- Short or open in linear solenoid wire
- Faulty linear solenoid

Check and record the freeze data in case it is needed later for problem verification.

Measure Linear Solenoid Resistance at the Solenoid Connector:

1. Disconnect the 2P connector from the linear solenoid connector.
2. Measure the resistance of the linear solenoid.

Is the resistance about 5.0 Ω ?

NO

Replace the linear solenoid assembly.

YES

Check Linear Solenoid for a Short Circuit:

1. Disconnect the B (25P) connector from the PCM.
2. Check for continuity between the body ground and the B8 terminal and B17 terminal individually.

Is there continuity?

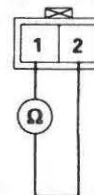
YES

Repair short in the wires between the B8 and B17 terminals and the linear solenoid.

NO

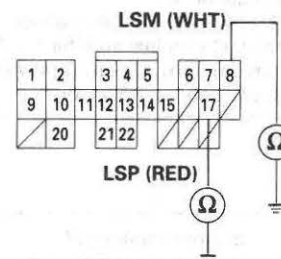
To page 14-27

LINEAR SOLENOID CONNECTOR



Terminal side of male terminals

PCM CONNECTOR B (25P)



Wire side of female terminals



From page 14-26

Check Ground Line:

1. Disconnect the B (25P) connector from the PCM.
2. Check for continuity between terminal B2 and B22 and between B10 and B20.

Is there continuity?

NO

Repair loose terminal or open in the wires between terminals B2, B10, B20 and B22 and ground, and repair poor ground (G101).

YES

Measure Linear Solenoid Resistance:

1. Connect the linear solenoid 2P connector.
2. Measure the resistance between the B8 and B17 terminals.

Is the resistance about 5.0 Ω ?

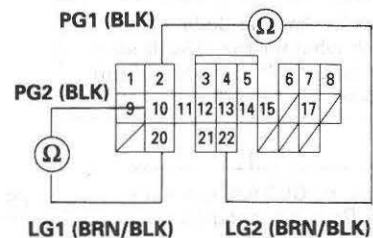
NO

Repair loose terminal or open in the wires between the B8 and B17 terminals and the linear solenoid.

YES

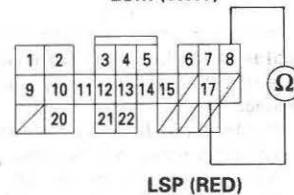
Check for loose terminal fit in the PCM connectors. If necessary, substitute a known-good PCM and recheck.

PCM CONNECTOR B (25P)



Wire side of female terminals

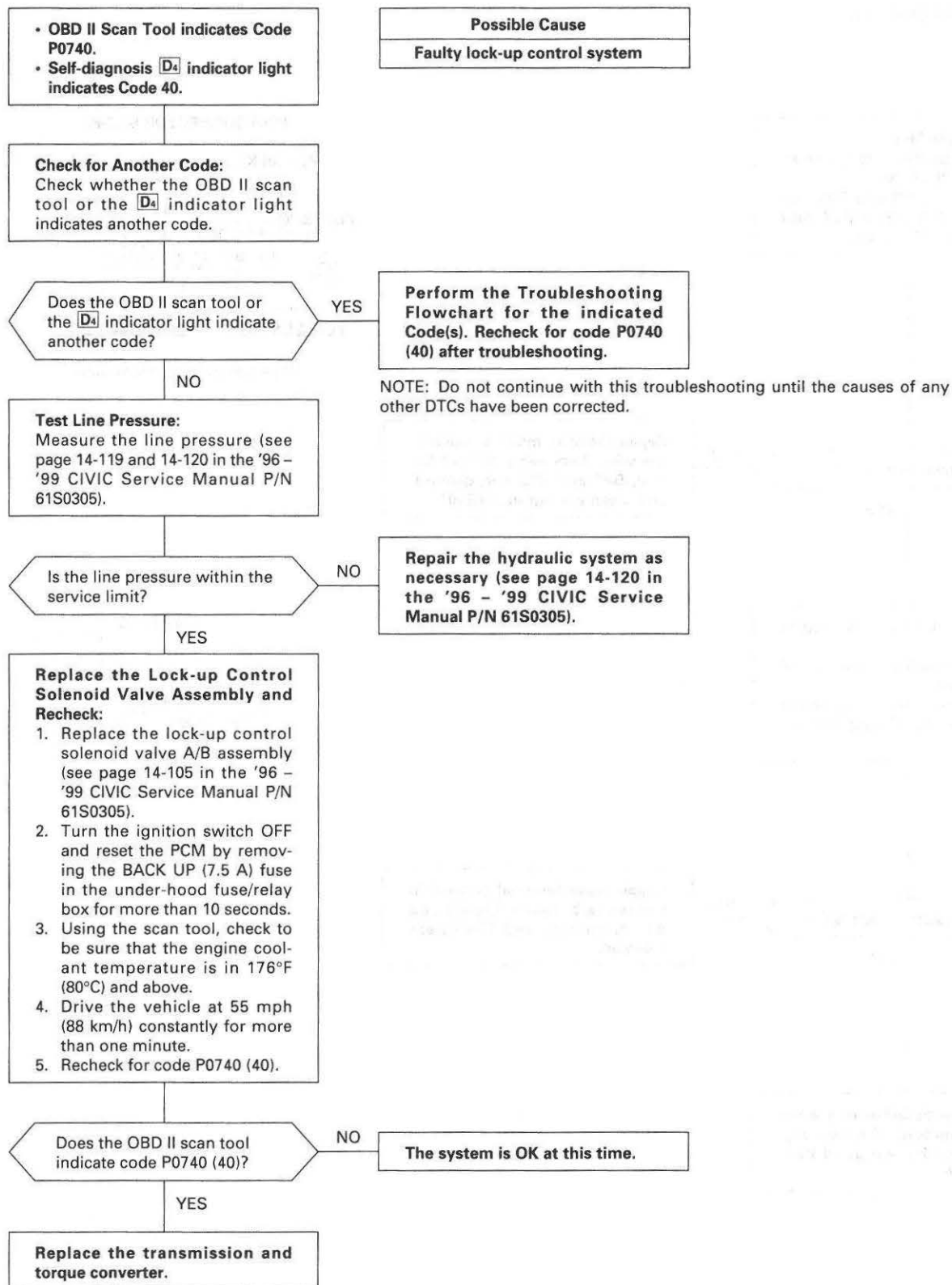
LSM (WHT)



LSP (RED)

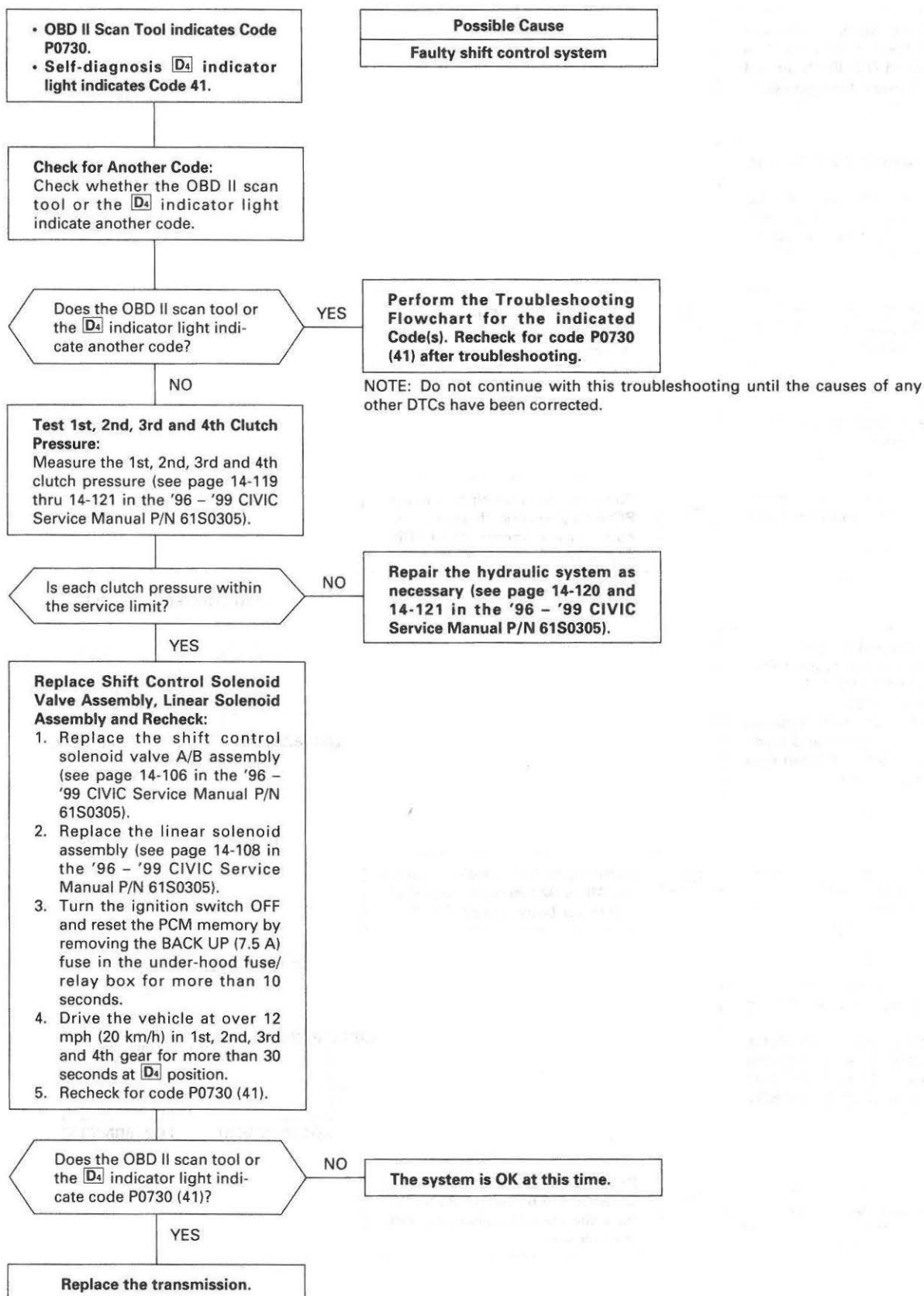
Electrical Troubleshooting

Troubleshooting Flowchart — Lock-up Control System



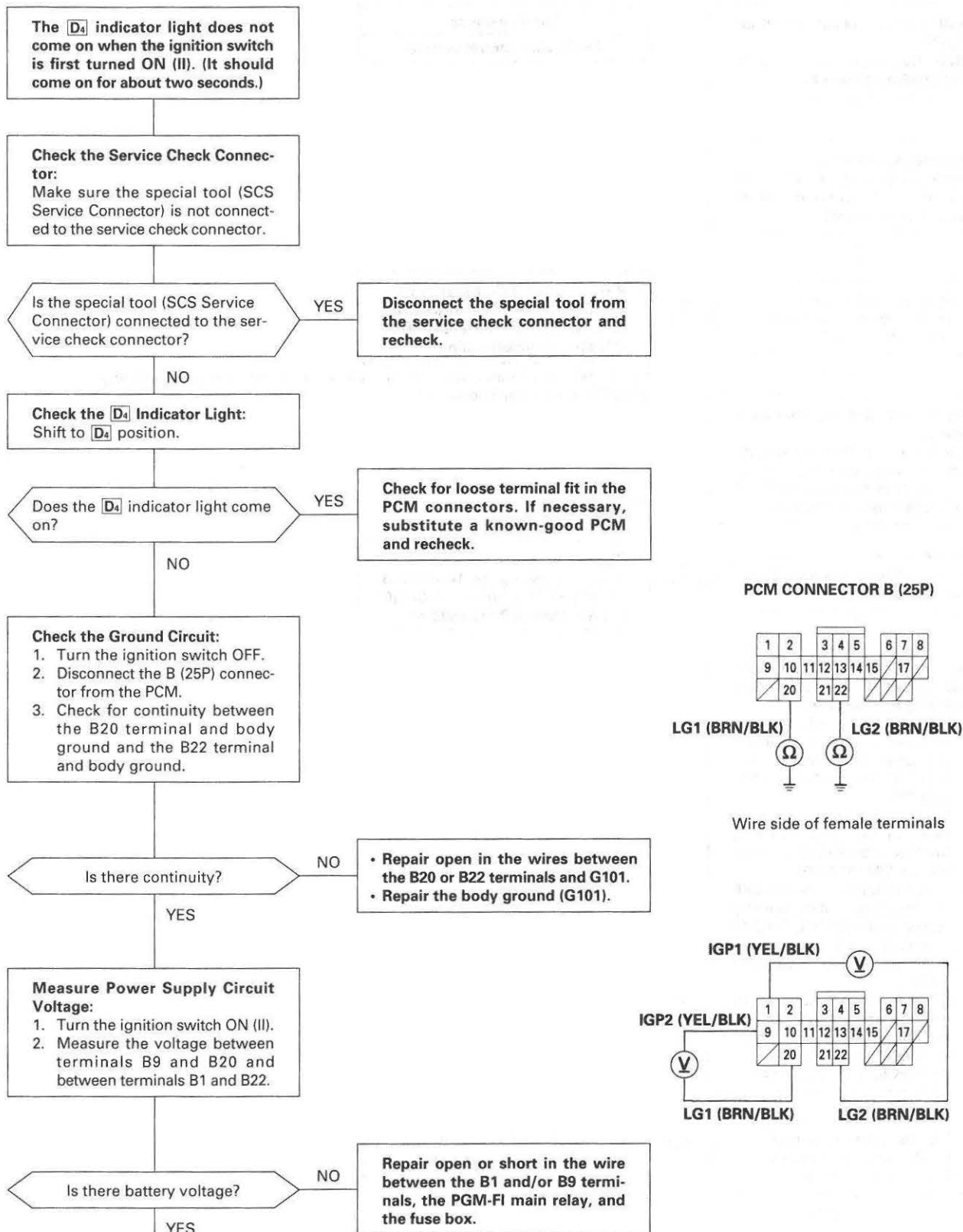


Troubleshooting Flowchart — Shift Control System



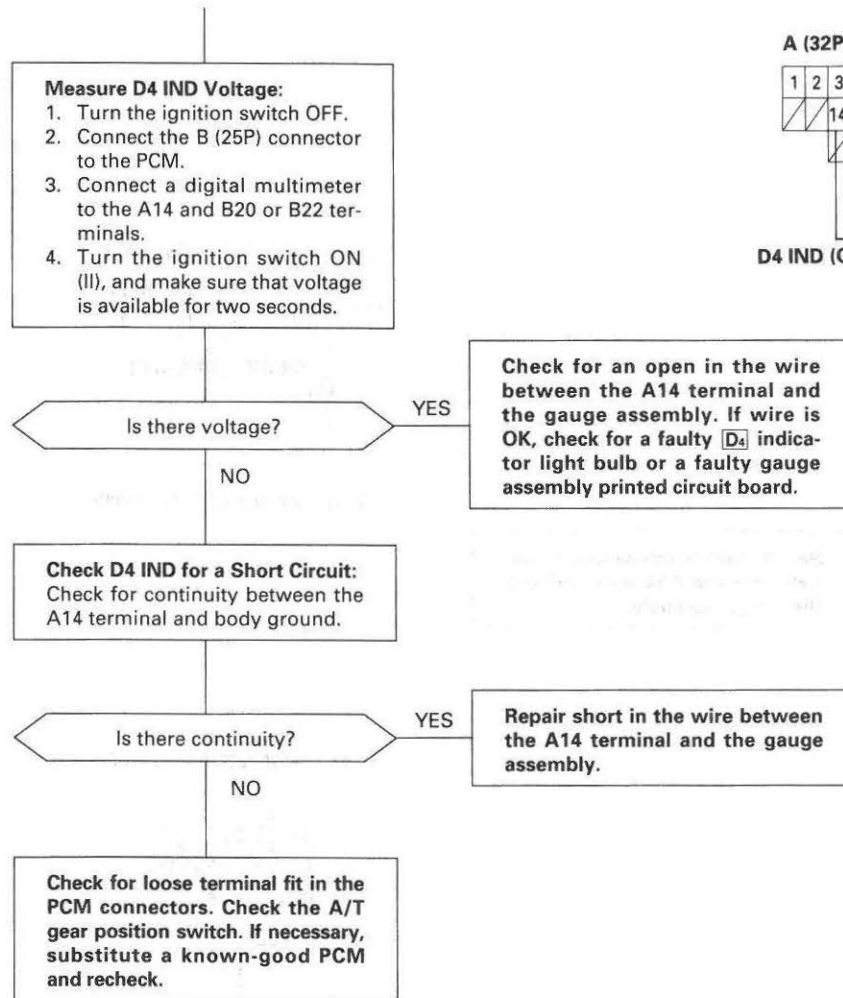
Electrical Troubleshooting

Troubleshooting Flowchart — **D₄** Indicator Light Does Not Come On

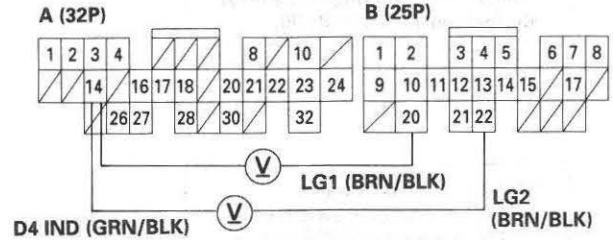




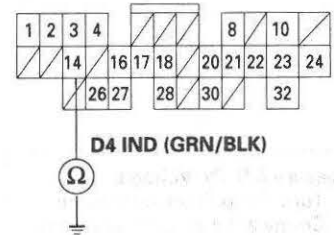
From page 14-30



PCM CONNECTORS



Wire side of female terminals



Electrical Troubleshooting

Troubleshooting Flowchart — **D₄** Indicator Light On Constantly

The **D₄** indicator light is on constantly (not blinking) whenever the ignition switch is ON (II).

Measure D4 IND Voltage:

1. Turn the ignition switch OFF.
2. Disconnect the A (32P) connector from the PCM.
3. Turn the ignition switch ON (II).
4. Measure the voltage between the A14 terminal and body ground.

Is there voltage?

YES

Repair short to power in the wire between the A14 terminal and the gauge assembly.

NO

Measure ATP D4 Voltage:

1. Turn the ignition switch OFF.
2. Connect the A (32P) connector to the PCM.
3. Turn the ignition switch ON (II).
4. Shift to any position other than **D₄**.
5. Measure the voltage between the D9 terminal and body ground.

Is there voltage?

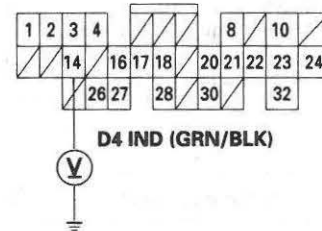
NO

Check for a short to ground on the wire. If wire is OK, replace the A/T gear position indicator.

YES

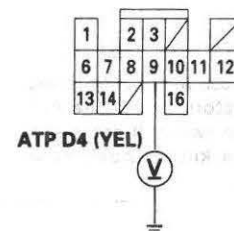
Replace the PCM.

PCM CONNECTOR A (32P)



Wire side of female terminals

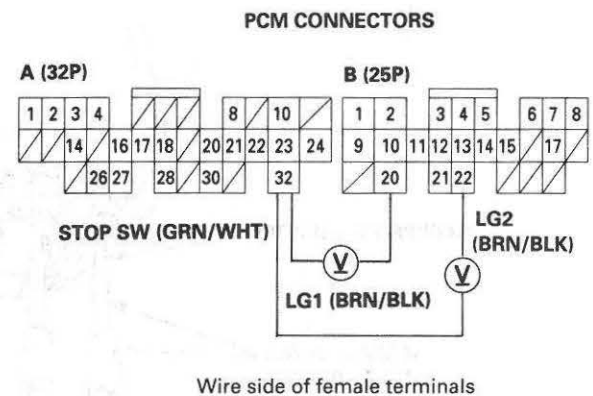
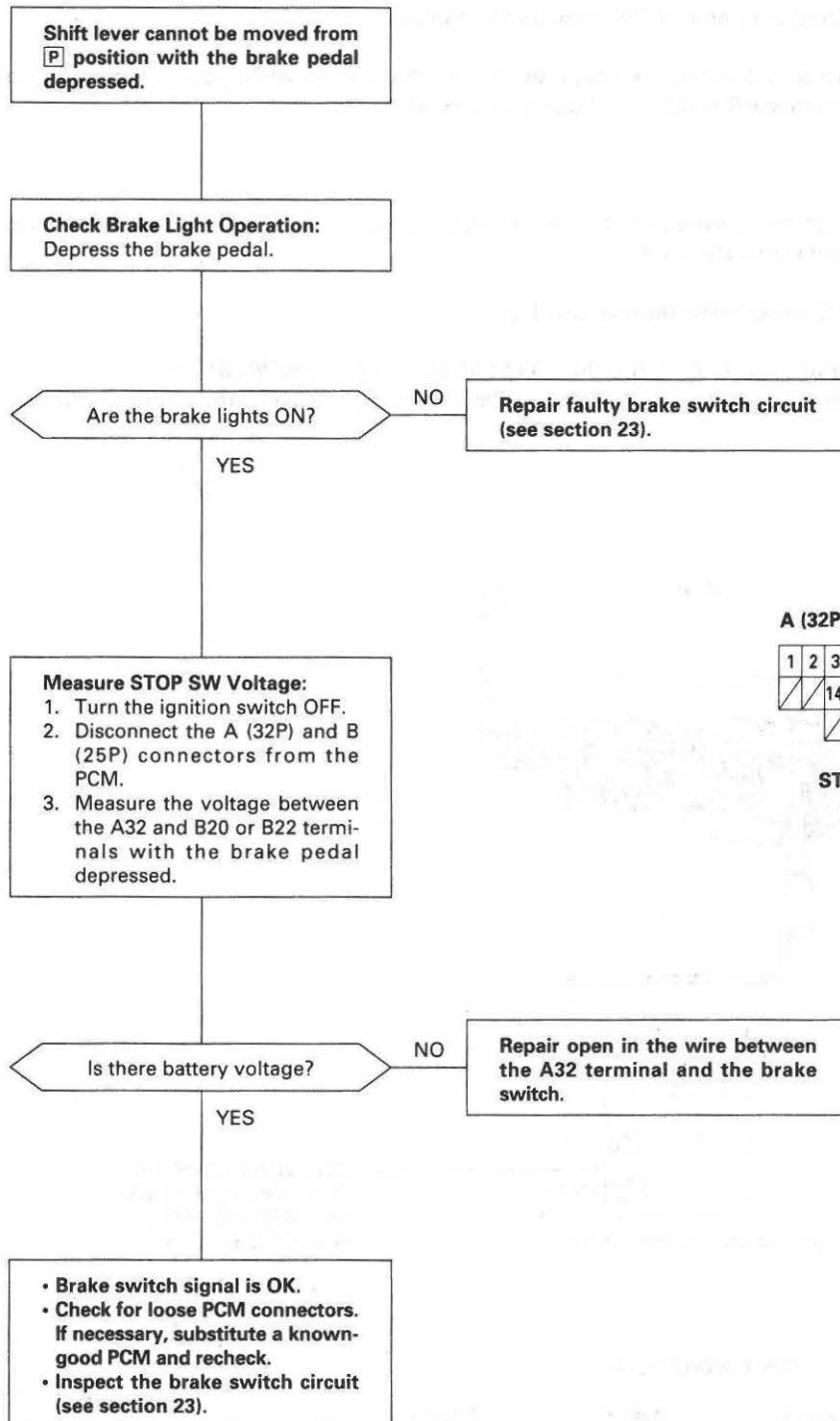
PCM CONNECTOR D (16P)



Wire side of female terminals



Troubleshooting Flowchart — Brake Switch Signal



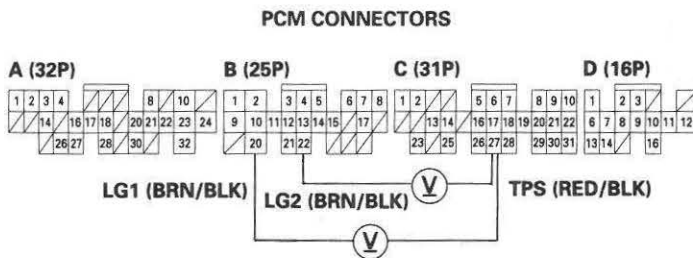
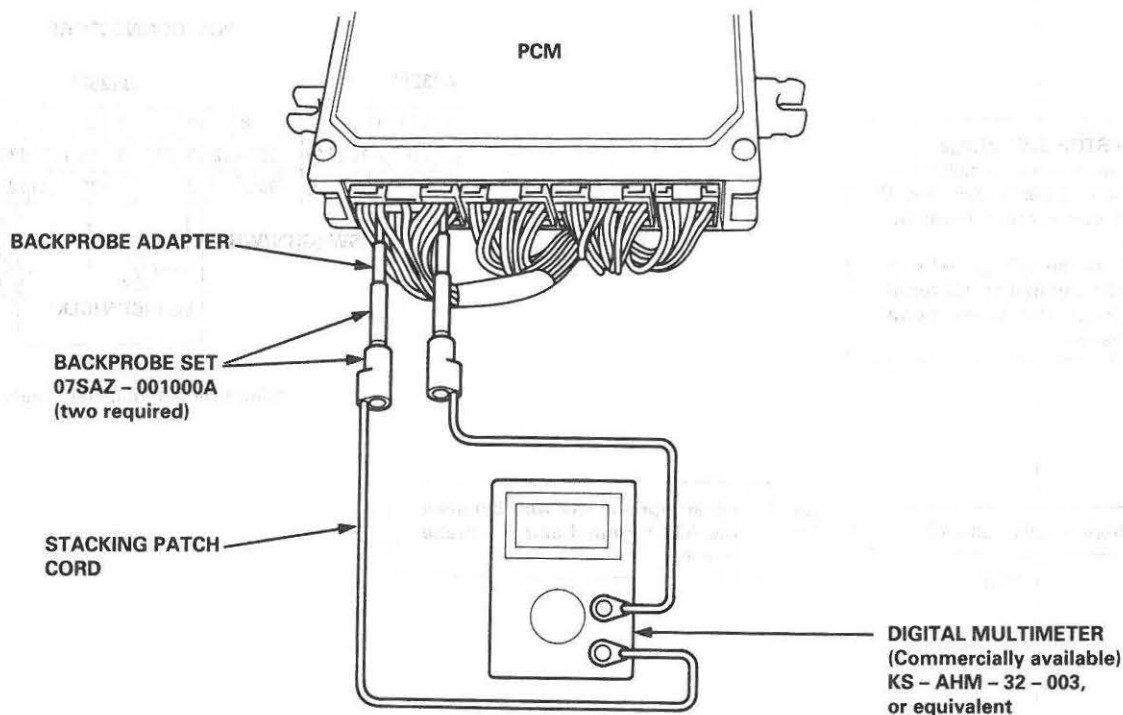
Road Test

NOTE: Warm up the engine to normal operating temperature (the radiator fan comes on).

1. Apply the parking brake and block the wheels. Start the engine, then shift to **D₄** position while depressing the brake pedal. Depress the accelerator pedal and release it suddenly. The engine should not stall.
2. Repeat same test in **D₃** position.
3. Test-drive the vehicle on a flat road in the **D₄** position. Check that the shift points occur at the approximate speeds shown. Also check for abnormal noise and clutch slippage.

NOTE: Throttle position sensor voltage represents the throttle opening.

- a. Unbolt the PCM for road testing; refer to page 14-50 in the '96 - '99 CIVIC Service Manual P/N 61S0305.
- b. Set the digital multimeter to check voltage between C27 (+) terminal and B20 (-) or B22 (-) terminal of the PCM for the throttle position sensor.



Wire side of female terminals



Upshift

Throttle Opening	Unit of speed	1st → 2nd	2nd → 3rd	3rd → 4th	Lock-up ON
Throttle position sensor voltage: 0.75 V	mph	9 – 12	20 – 23	28 – 32	21 – 24
	km/h	15 – 19	32 – 37	45 – 52	34 – 39
Throttle position sensor voltage: 2.25 V	mph	21 – 25	40 – 45	59 – 65	62 – 67
	km/h	34 – 40	65 – 73	95 – 104	99 – 108
Fully-opened throttle Throttle position sensor voltage: 4.5 V	mph	31 – 36	61 – 69	88 – 98	89 – 99
	km/h	50 – 58	98 – 111	141 – 158	143 – 159

Downshift

Throttle Opening	Unit of speed	Lock-up OFF	4th → 3rd	3rd → 2nd	2nd → 1st
Fully-closed throttle Throttle position sensor voltage: 0.5 V	mph	19 – 22	17 – 20	6 – 9 (3rd → 1st)	
	km/h	30 – 35	27 – 32	10 – 15 (3rd → 1st)	
Fully-opened throttle Throttle position sensor voltage: 4.5 V	mph	85 – 95	76 – 86	54 – 61	25 – 30
	km/h	137 – 153	123 – 139	87 – 98	40 – 48

NOTE:

- Lock-up ON: The lock-up control solenoid valve A turns ON.
- Lock-up OFF: The lock-up control solenoid valve A turns OFF.

- Accelerate to about 35 mph (57 km/h) so the transmission is in 4th, then shift from **D₄** position to **2** position. The vehicle should immediately begin slowing down from engine braking.

CAUTION: Do not shift from **D₄** or **D₃** position to **2** position at speeds over 63 mph (100 km/h); you may damage the transmission.

- Check for abnormal noise and clutch slippage in the following positions.

2 (2nd Gear) Position

- Accelerate from a stop at full throttle. Check that there is no abnormal noise or clutch slippage.
- Upshifts and downshifts should not occur with the selector in this position.

R (Reverse) Position

Accelerate from a stop at full throttle, and check for abnormal noise and clutch slippage.

- Test in **P** (Parking) Position

Park the vehicle on slope (approx. 16°), apply the parking brake, and shift into **P** position. Release the brake; the vehicle should not move.

Suspension

Rear Suspension

Suspension Arm Replacement 18-2

NOTE: Refer to the 1996 – 1999 CIVIC Service Manual, P/N 61S0305, for items not shown in this section.



Outline of Model Change

The rear stabilizer has been added.

Rear Suspension

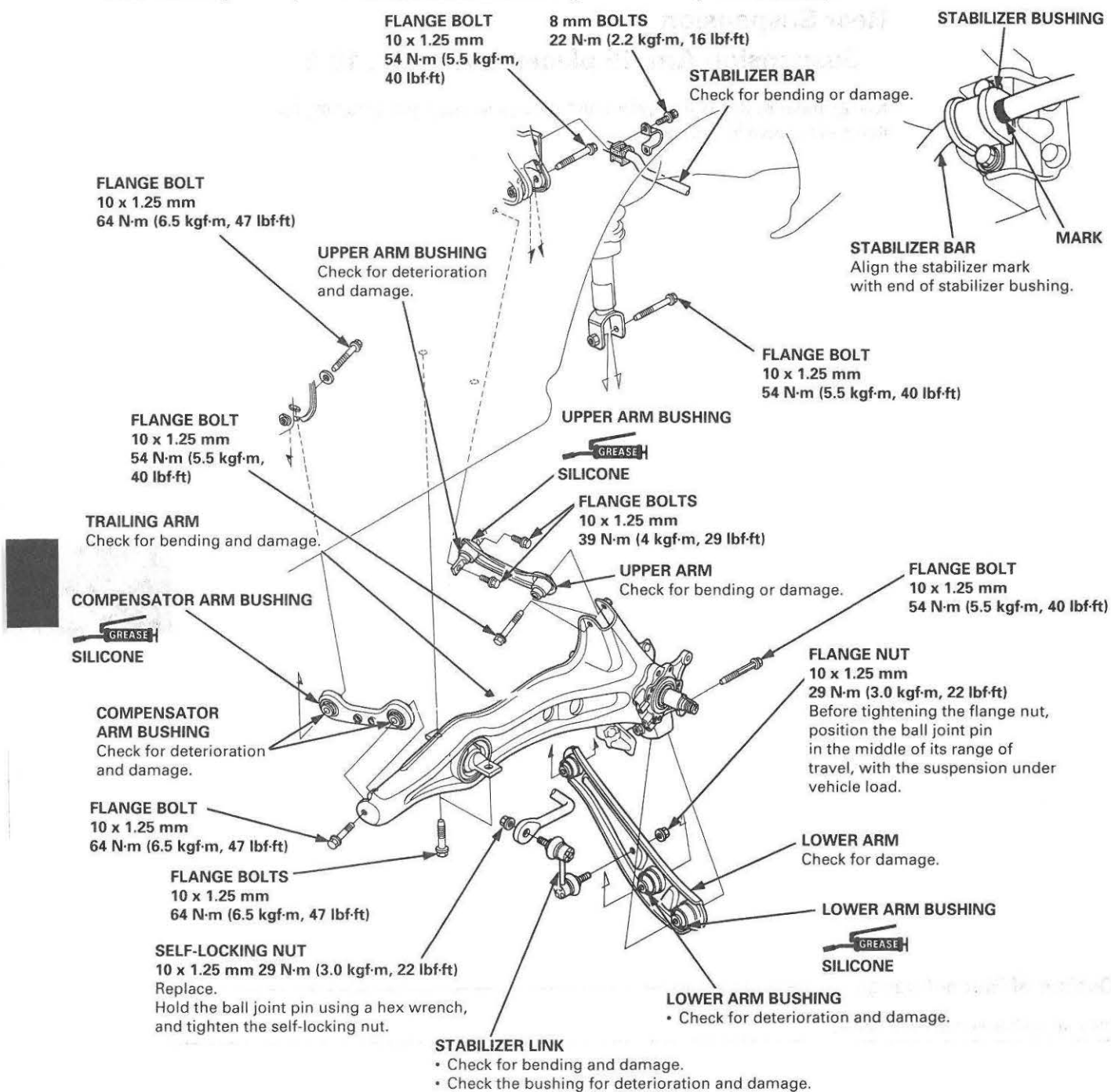
Suspension Arms Replacement

CAUTION:

- Replace the self-locking nut after removal.
- Any bolts or nuts connected to rubber mounts or bushings should be tightened with the vehicle on the ground.
- The vehicle should be on the ground before any bolts or nuts connected to rubber mounts or bushings are tightened.

NOTE:

- Make sure the toe adjusting bolts on the compensator arm are installed in the same direction.
- "↑ UP LH G" is stamped on the left upper arm and "↑ UP RH G" is stamped on the right upper arm.
- The right and left compensator arm are symmetrical. Install so the "UP ↑" mark points to the front.
- After installing the suspension arm, check the wheel alignment and adjust if necessary.



Body

Emblems

Installation 20-8

Fuel Pipe Protector

Replacement 20-7

Interior Trim

Replacement 20-2

Rear Seat

Removal 20-4

Seat Cover Replacement 20-5

Trunk Trim

Replacement 20-3

Under-Floor Brace

Replacement 20-7

NOTE: Refer to the '96 – 99 CIVIC Service Manual, P/N. 61S0305, for the items not shown in this section.



Outline of Model Changes

The CIVIC CNG model has been added.

- Some emblems have been added.
- The fuel pipe protector replacement procedure is different.
- The rear shelf and trunk trim are different.
- The rear seat has been changed.
- An under-floor brace has been added.

Interior Trim

Replacement

CAUTION:

- Wear gloves to protect your hands.
- When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

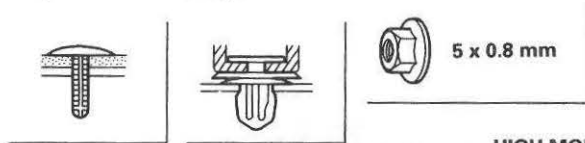
NOTE: Take care not to bend or scratch the rear shelf.

▷: Clip locations

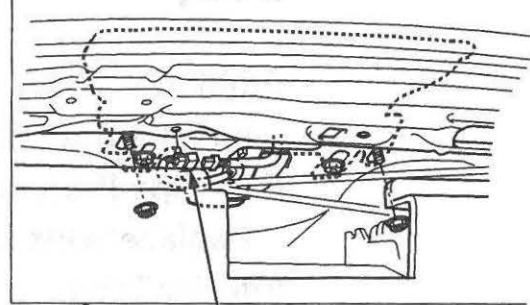
A ▷, 3

B ▷, 6

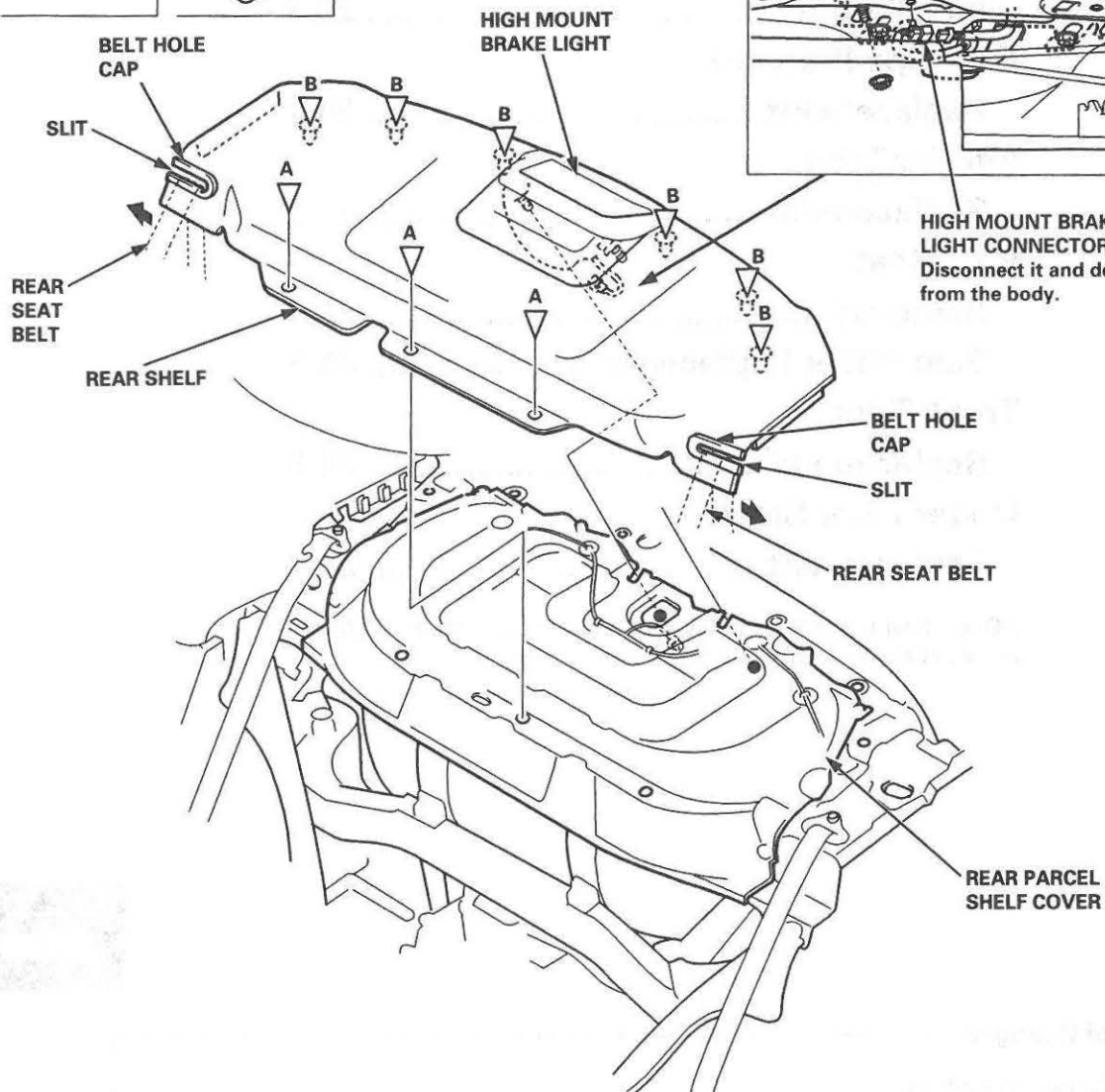
●: Nut locations, 2



From trunk compartment:



HIGH MOUNT BRAKE LIGHT CONNECTOR
Disconnect it and detach it from the body.



Installation is the reverse of the removal procedure.

NOTE:

- If necessary, replace any damaged clips.
- Slip the rear seat belts through the slits in the belt hole caps.
- Make sure the connector is plugged in properly.

Trunk Trim



Replacement

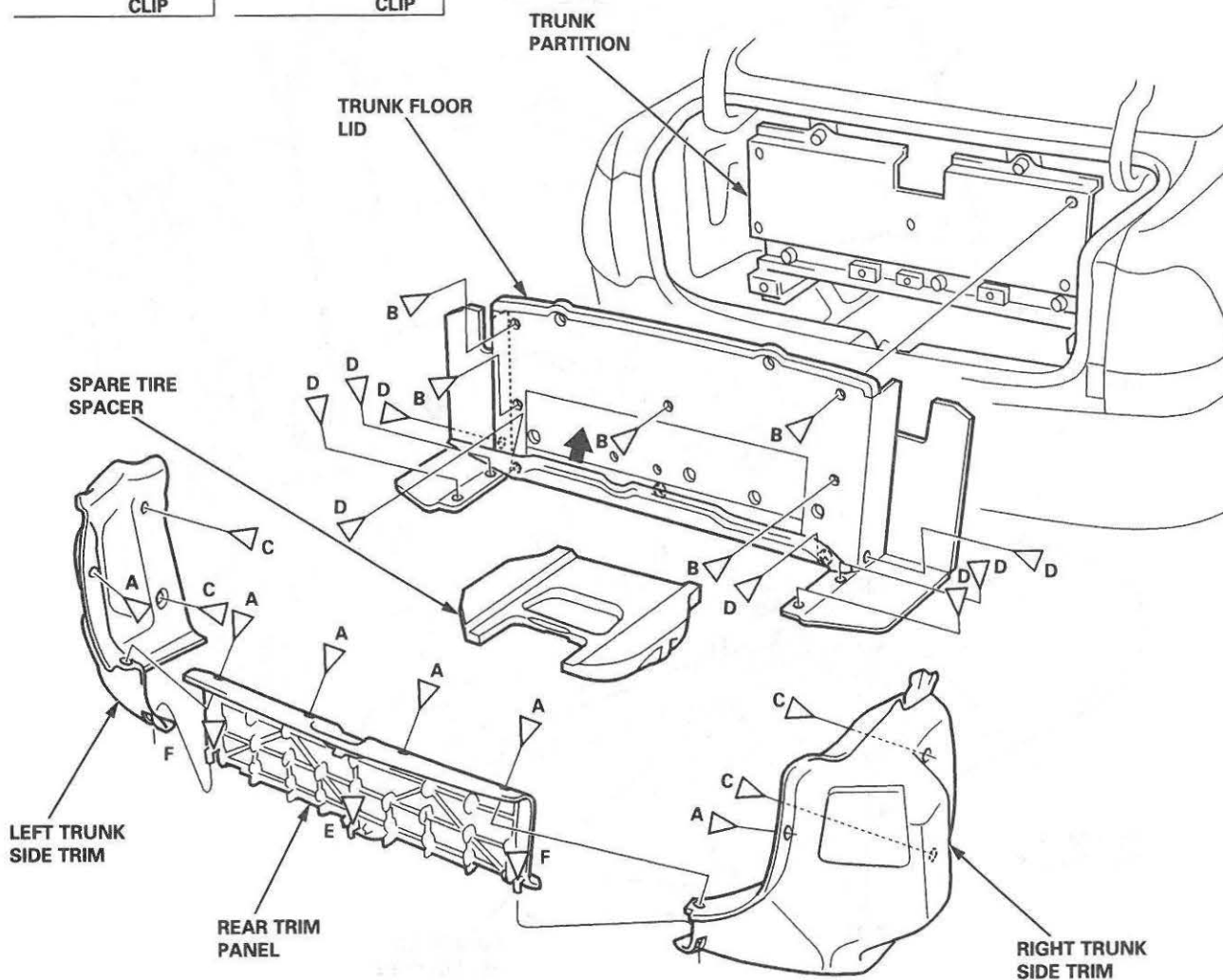
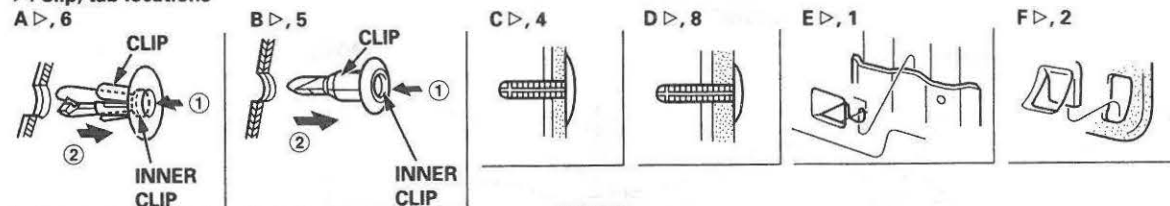
CAUTION:

- Wear gloves to protect your hands.
- When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

NOTE:

- Take care not to bend or scratch the trim and panels.
- When removing the A and B clips, do not push the inner clip in too far.

▷: Clip, tab locations



Installation is the reverse of the removal procedure.

NOTE:

- If necessary, replace any damaged clips.
- To install the A and B clips, pull the inner clip up, install the clip, then push the inner clip until it's flush.

Rear Seat

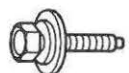
Removal

NOTE: Take care not to scratch the seat covers and body.

►: Bolt locations

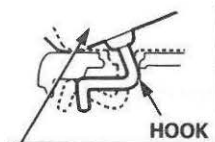
A ►, 1

B ►, 2

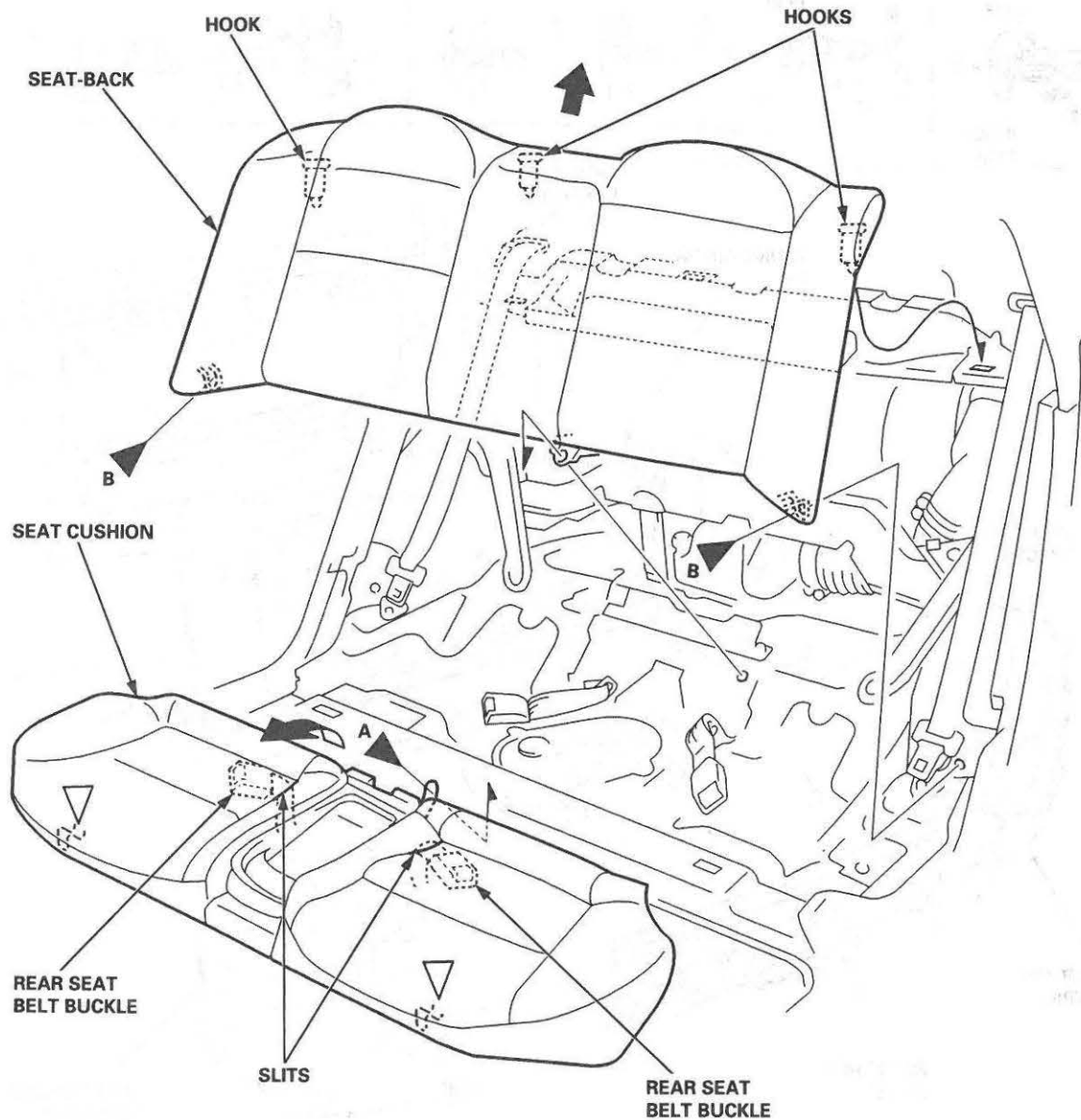


6 x 1.0 mm
9.8 N·m (1.0 kgf·m,
7.2 lbf·ft)

▷: Hook locations, 2



SEAT CUSHION



Installation is the reverse of the removal procedure.

NOTE:

- Before attaching the seat-back and seat cushion, make sure there are no twists or kinks in the rear seat belts.
- When installing the seat cushion, slip the seat belt buckles through the slits in the seat cushion.



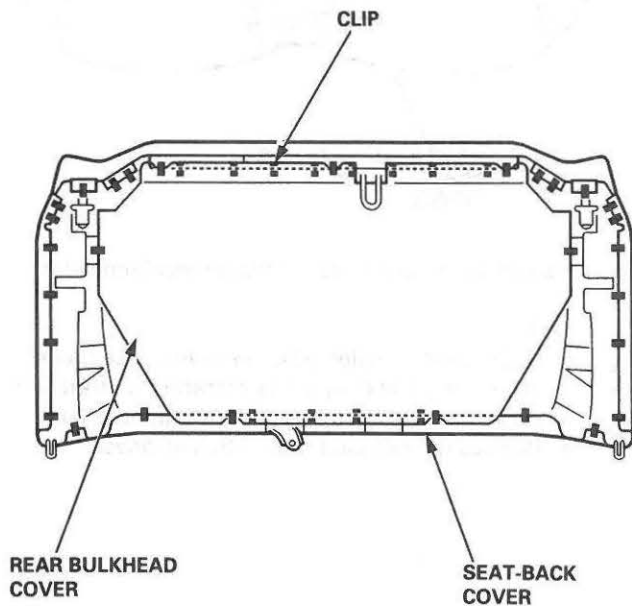
Seat Cover Replacement

CAUTION: Wear gloves to protect your hands.

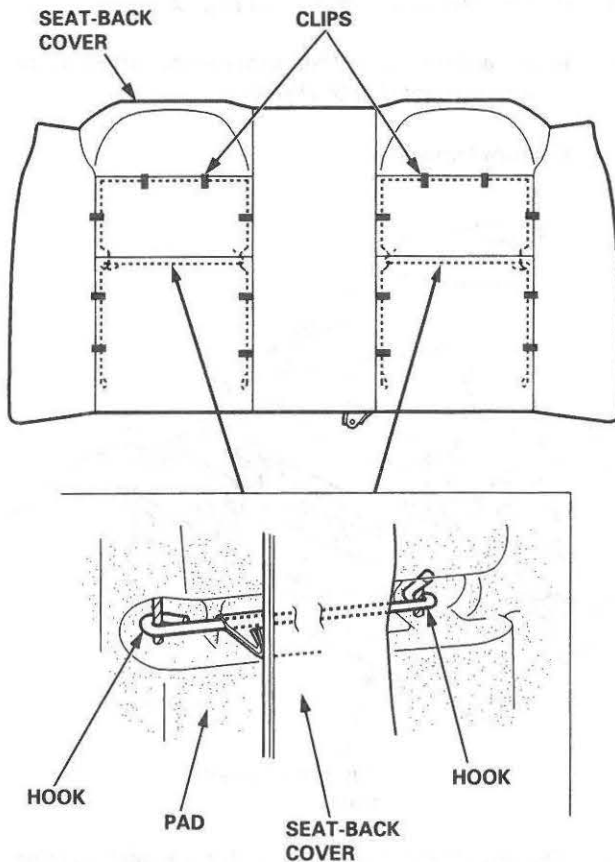
NOTE: Take care not to tear the seams or damage the seat covers.

Seat-back cover removal:

1. Remove the seat cushion and seat-back.
2. Release all the clips, then remove the rear bulkhead cover, and fold back the seat-back cover.



3. Pull back of the seat-back cover all the way around, and release the clips and hooks from the pad.



4. Installation is the reverse of the removal procedure.

NOTE:

- To prevent wrinkles when installing a seat-back cover, make sure the material is stretched evenly over the pad before securing the hooks and clips.
- Replace the released clips with new ones.

(cont'd)

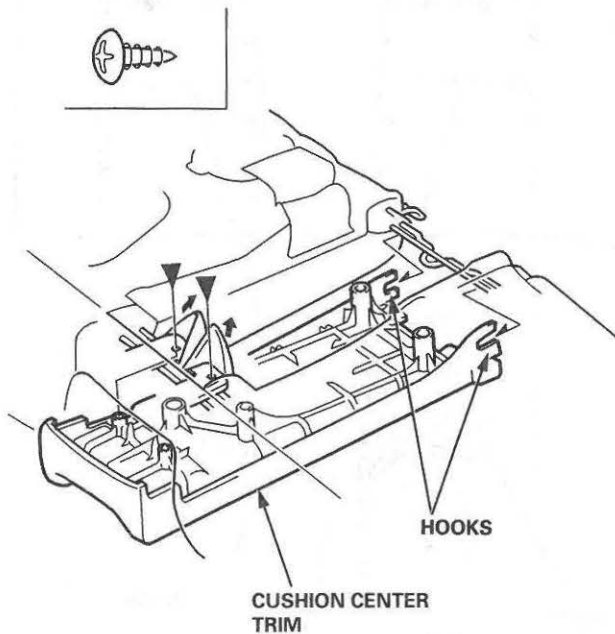
Rear Seat

Seat Cover Replacement (cont'd)

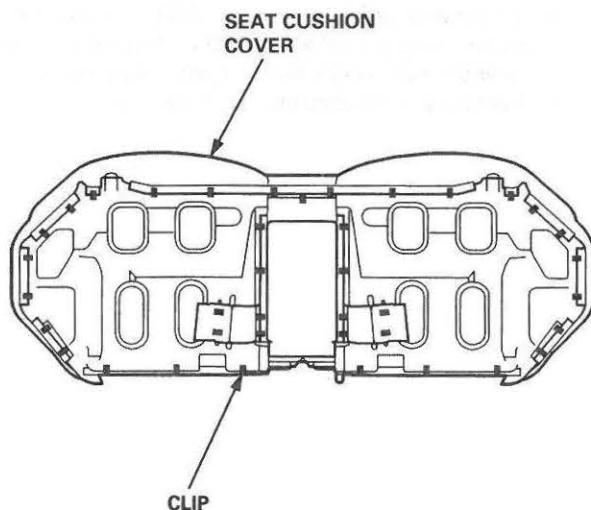
Seat cushion cover removal:

1. Remove the seat cushion (see page 20-4).
2. Remove the screws, then remove the cushion center trim by releasing the hooks.

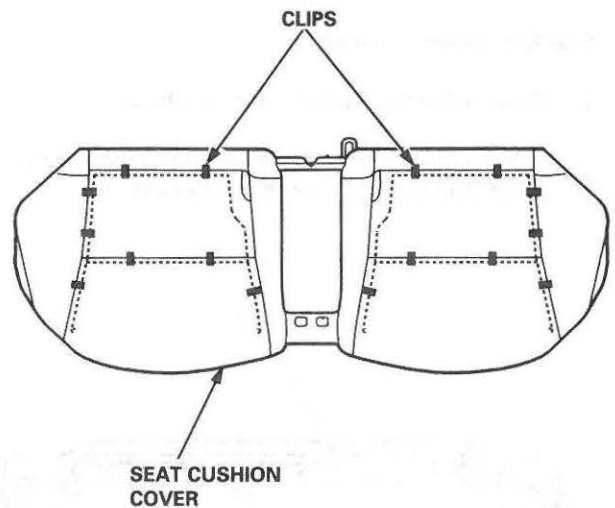
►: Screw locations, 2



3. Release all the clips from under the seat cushion, and fold back the seat cushion cover.



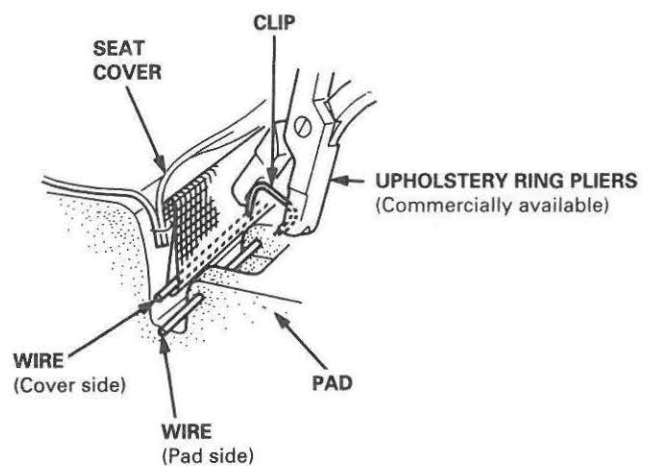
4. Pull back the edge of the seat cushion cover all the way around, and release the clips, then remove the seat cushion cover.



5. Installation is the reverse of the removal procedure.

NOTE:

- To prevent wrinkles when installing a seat cushion cover, make sure the material is stretched evenly over the pad before securing the clips.
- Replace the released clips with new ones.



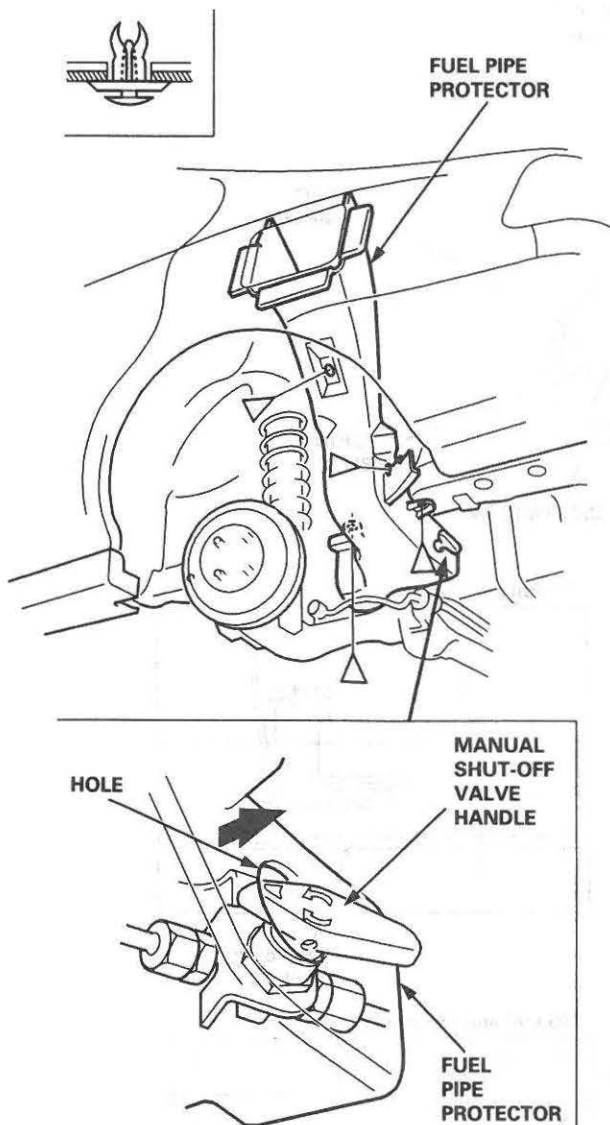


Replacement

NOTE: Take care not to scratch the body.

1. Remove the rear wheel.
2. Remove the clips, then remove the fuel pipe protector.

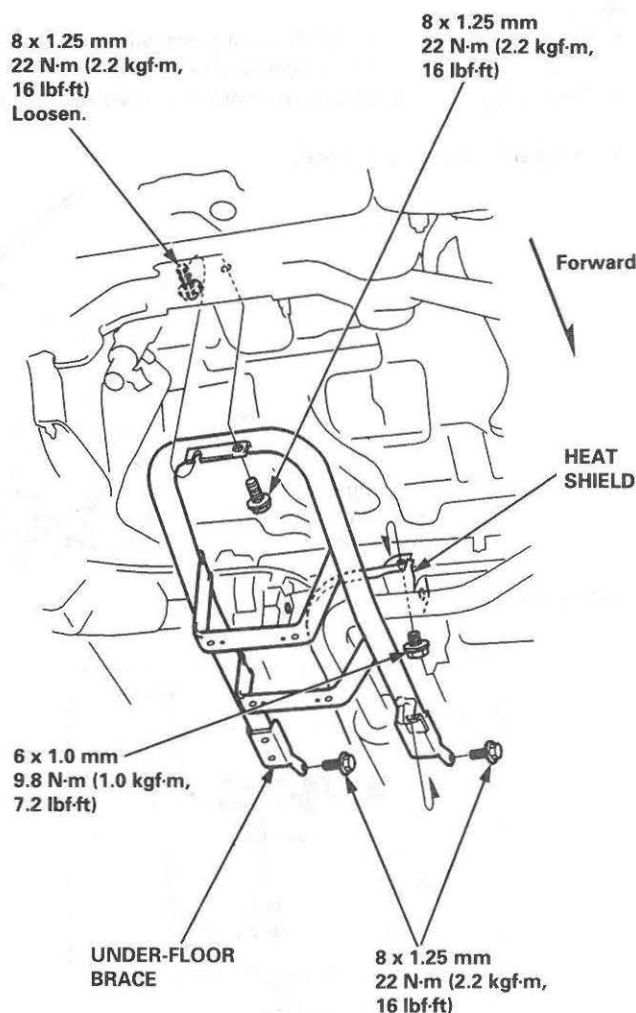
▷: Clip locations, 4



3. Slip the manual shut-off valve handle through the hole in the fuel pipe protector. Do not remove the manual shut-off valve handle.
4. Installation is the reverse of the removal procedure. If necessary, replace any damaged clips.

Replacement

1. Remove the under-floor cover (see section 11).
2. Remove and loosen the bolts, then remove the under-floor brace.



3. Installation is the reverse of the removal procedure.

Emblems

Installation

Apply the emblems where shown.

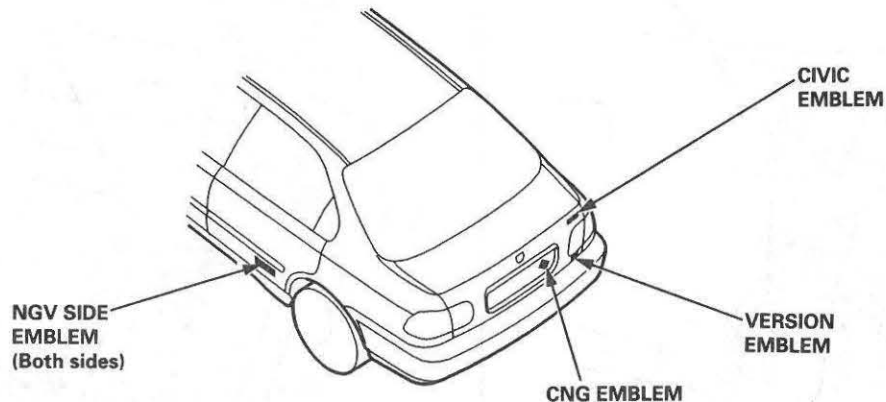
CNG emblem: Align the application tape with the trunk lid lock cylinder hole and the license plate trim shape, as shown, then press the emblem into place. Remove the application tape.

NGV side emblem: Align the application tape with the lower edge of the rear door molding and the edge of the rear door, as shown, then press the emblem into place. Remove the application tape.

NOTE:

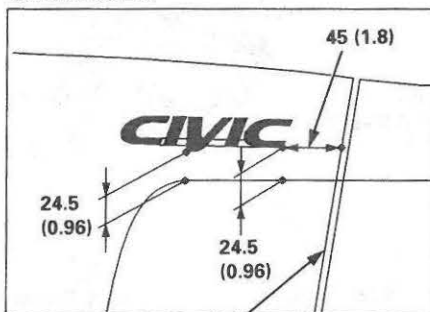
- Before applying, clean the body surface with a sponge dampened in alcohol.
- After cleaning, keep oil, grease and water from getting on the surface.
- During application, make sure there are no wrinkles in the emblems.

Attachment Points (Reference):

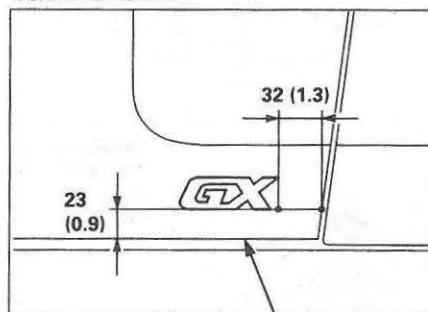


Unit: mm (in.)

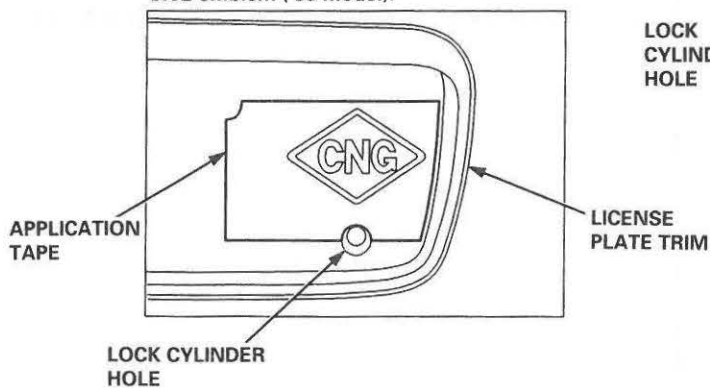
CIVIC emblem:



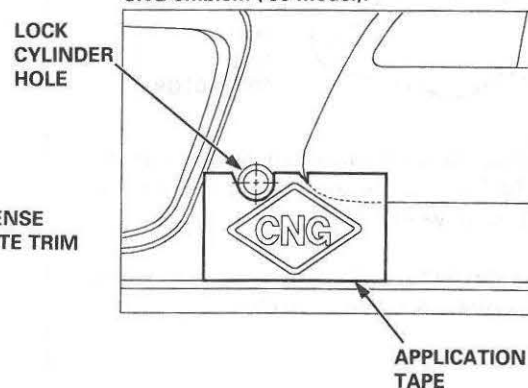
Version emblem:



CNG emblem ('98 model):

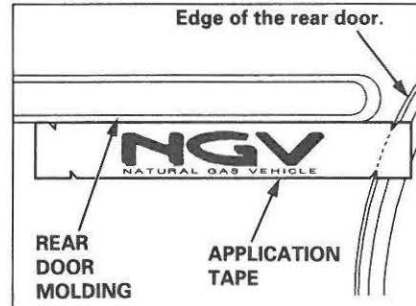


CNG emblem ('99 model):

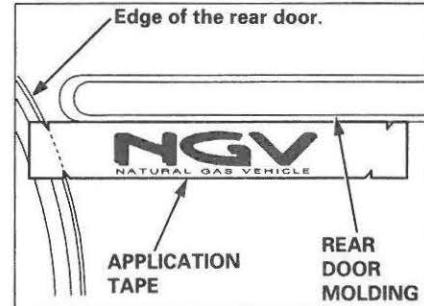




**NGV side emblem:
Left side:**



Right side:



Electrical

Relay and Control Unit Locations

Dashboard 23-2

Connector Identification and Wire

Harness Routing 23-3

Fuses

Under-hood Fuse/Relay Box 23-16

Under-dash Fuse/Relay Box 23-18

Power Distribution

Circuit Identification 23-20

Ground Distribution

Circuit Identification 23-22

Power Relays

Relay Test 23-24

Ignition System

Spark Plug Inspection 23-25

Gauge Assembly

Gauge/Indicator Location Index 23-26

Bulb Locations 23-27

Circuit Diagram 23-28

Fuel Gauge

Gauge Test 23-30

Brake Lights

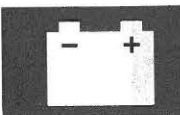
High Mount Brake Light

Replacement 23-31

NOTE: Refer to the '96 - '99 Civic Service Manual, P/N 61S0305, for the items not shown in this section.

Outline of Model Change

A natural gas-powered model has been added; any related information is included here.



Relay and Control Unit Locations

Dashboard

CRUISE CONTROL UNIT

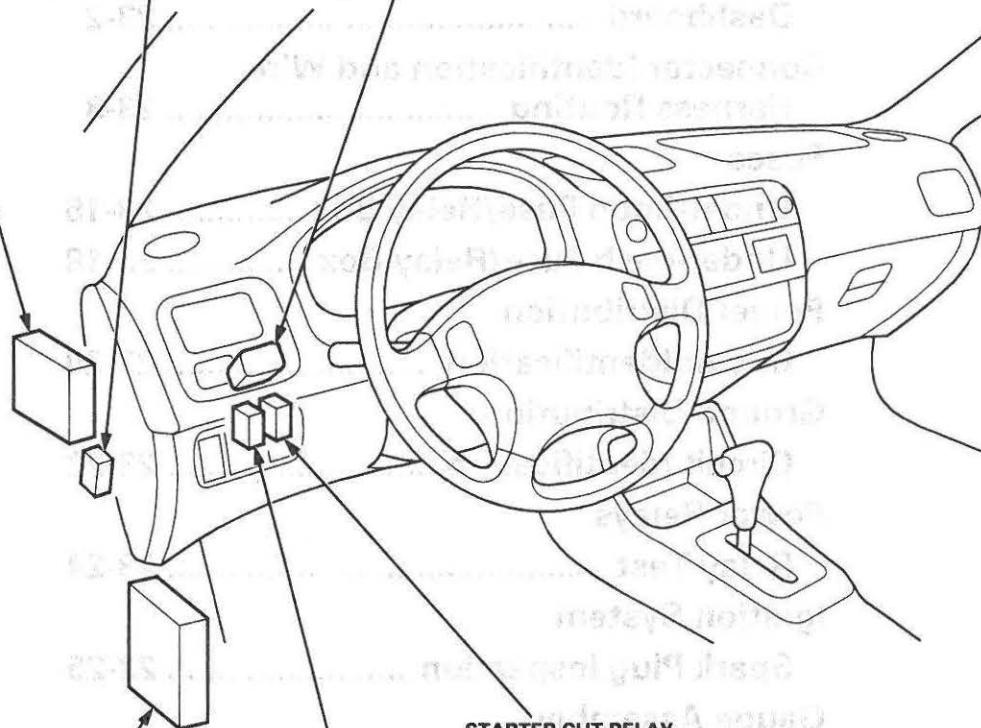
DASH LIGHTS BRIGHTNESS CONTROLLER
(Has built-in control unit)

FUEL INJECTOR RELAY
[Wire colors: WHT/BLK, WHT/RED,
YEL/RED and BLK]

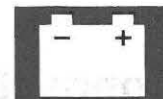
STARTER CUT RELAY
[Wire colors: BLK/RED, BLK/RED,
BLU/BLK and BLK/RED]

INJECTOR CONTROL MODULE

HORN RELAY
[Wire colors: WHT/GRN, BLU/RED,
GRY and WHT/GRN]



Connector Identification and Wire Harness Routing



How to Identify Connectors:

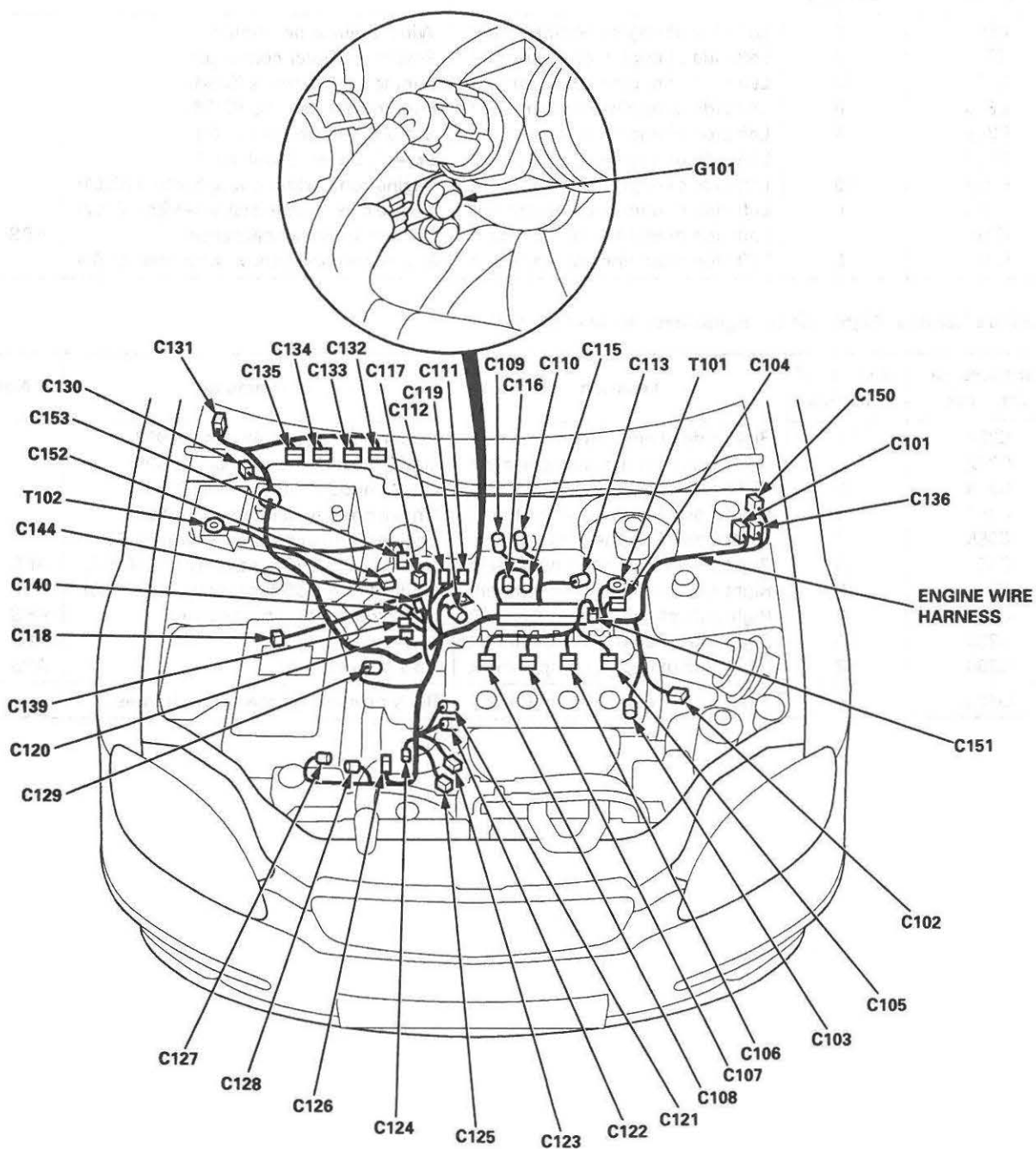
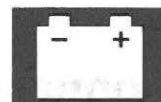
Identification numbers have been assigned to all connectors. The number is preceded by the letter "C" for connectors, "G" for ground terminals or "T" for non-ground terminals.

Harness	Location	Engine Compartment	Dashboard	Others (Floor, Door, Trunk, and Roof)
Starter cable		T1, T2 and ⊕		
Battery ground cable		G1 and ⊖		
Engine ground cable A		T3 G2		
Engine ground cable B		T4 G3		
Under-hood ABS fuse/relay box wire harness (with ABS)		T5 and ⊕		
Engine wire harness		C101 thru C153 T101 and T102 G101		
Engine compartment wire harness		C201 thru C214 G201 and G202		
Main wire harness		C301 thru C311 C351 thru C360	C401 thru C448 G401 and G402	
Dashboard wire harness			C501 thru C520 G501	
Floor wire harness			C551 thru C575 G551 and G552	
Rear wire harness				C601 thru C621 G601
Driver's door wire harness				C631 thru C640
Passenger's door wire harness				C651 thru C656
Left rear door wire harness				C661 thru C664
Right rear door wire harness				C671 thru C674
Fuel sub-harness				C681 thru C684
Roof wire harness				C701 thru C703
Heater sub-harness A			C721 thru C727	
Heater sub-harness B			C741 thru C743	
A/C wire harness		C751 thru C754 G751		
Rear window defogger ground wire				C771 G771
SRS main harness				C801 thru C807 G801

Connector Identification and Wire Harness Routing

Engine Wire Harness

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C101	10	Left side of engine compartment	Main wire harness (C303)	
C102	3	Middle of engine	Crankshaft speed fluctuation (CKF) sensor	
C103	1	Middle of engine	Engine oil pressure switch	
C104	4	Left side of engine compartment	Alternator	
C105	2	Left side of engine compartment	No. 1 fuel injector	
C106	2	Middle of engine	No. 2 fuel injector	
C107	2	Middle of engine	No. 3 fuel injector	
C108	2	Middle of engine	No. 4 fuel injector	
C109	3	Middle of engine	IAC valve	
C110	3	Middle of engine	Throttle position (TP) sensor	
C111	3	Middle of engine	Manifold absolute pressure (MAP) sensor	
C112	2	Middle of engine	Intake air temperature (IAT) sensor	
C113	2	Middle of engine	Power steering pressure (PSP) switch	
C115	14	Middle of engine	Junction connector	
C116	14	Middle of engine	Junction connector	
C117	3	Left side of engine compartment	Vehicle speed sensor (VSS)	
C118	2	Middle of engine	Countershaft speed sensor	
C119	2	Middle of engine	Engine coolant temperature (ECT) switch A	
C120	10	Middle of engine	Distributor	
C121	1	Middle of engine	Engine coolant temperature (ECT) sending unit	
C122	2	Middle of engine	Engine coolant temperature (ECT) sensor	
C123	4	Middle of engine	Primary HO2S (sensor 1)	
C124	2	Middle of engine	Lock-up control solenoid valve	
C125	4	Middle of engine	Secondary HO2S (sensor 2)	
C126	2	Middle of engine	Mainshaft speed sensor	
C127	2	Middle of engine	Liner solenoid valve	
C128	2	Middle of engine	Shift control solenoid valve	
C129	1	Right side of engine compartment	Starter solenoid	
C130	20	Behind right kick panel	Junction connector	
C131	22	Under right side of dash	Main wire harness (C446)	
C132	32	Under right side of dash	PCM	
C133	25	Under right side of dash	PCM	
C134	31	Under right side of dash	PCM	
C135	16	Under right side of dash	PCM	
C136	8	Left side of engine compartment	Main wire harness (C305)	
C139	1	Middle of engine	VTEC solenoid valve	
C140	2	Middle of engine	VTEC pressure switch	
C144	6	Middle of engine	EGR valve	
C150	8	Left side of engine compartment	Main wire harness (C311)	
C151	2	Middle of engine	Fuel temperature sensor	
C152	2	Right side of engine compartment	Fuel pressure regulator shut-off solenoid valve	
C153	3	Right side of engine compartment	Fuel pressure sensor	
T101		Left side of engine compartment	Alternator	
T102		Right side of engine compartment	Under-hood fuse/relay box	
G101		Middle of engine	Engine ground, via engine wire harness	



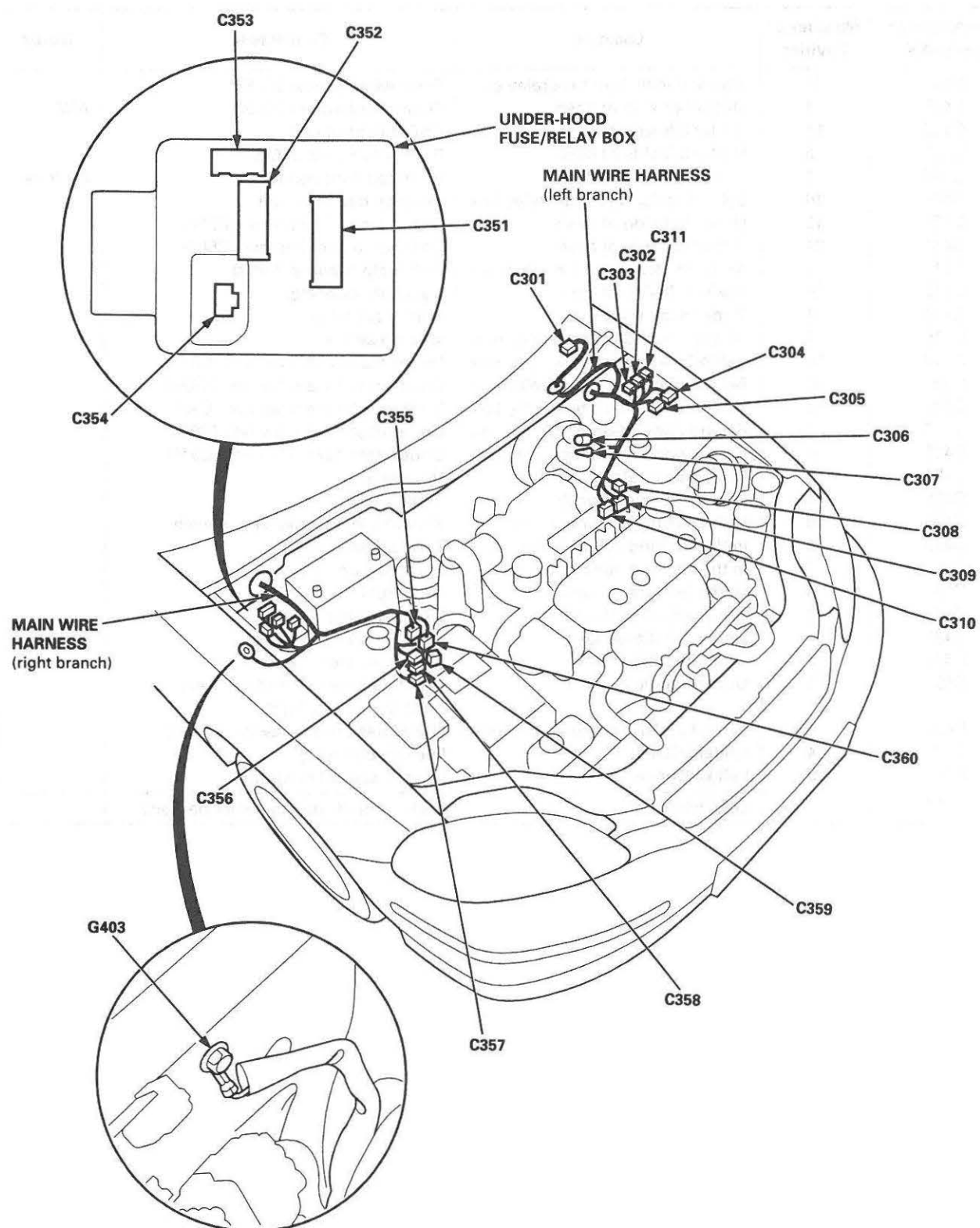
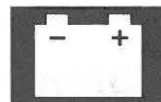
Connector Identification and Wire Harness Routing

Main Wire Harness (Left side of engine compartment branch)

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C301	5	Left side of engine compartment	Windshield wiper motor	ABS
C302	2	Left side of engine compartment	Test tachometer connector	
C303	10	Left side of engine compartment	Engine wire harness (C101)	
C305	8	Left side of engine compartment	Engine wire harness (C136)	
C306	1	Left side of engine compartment	Brake fluid level switch (+)	
C307	1	Left side of engine compartment	Brake fluid level switch (-)	
C308	10	Left side of engine compartment	Engine compartment wire harness (C201)	
C309	6	Left side of engine compartment	Engine compartment wire harness (C202)	
C310	2	Left side of engine compartment	Left front ABS wheel sensor	
C311	8	Left side of engine compartment	Engine compartment wire harness (C150)	

Main Wire Harness (Right side of engine compartment branch)

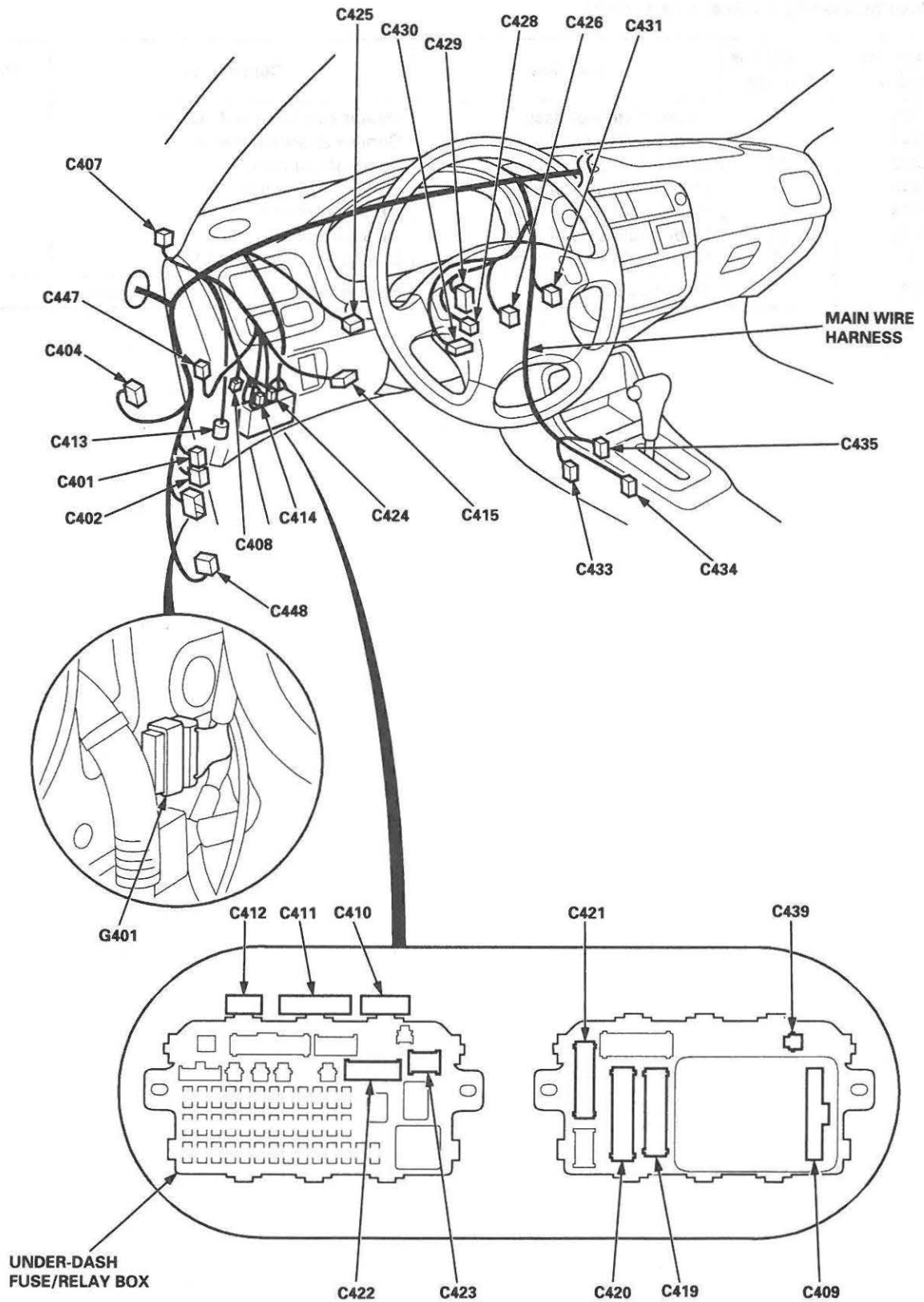
Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C351	11	Right side of engine compartment	Under-hood fuse/relay box (C908)	ABS
C352	9	Right side of engine compartment	Under-hood fuse/relay box (C906)	
C353	5	Right side of engine compartment	Under-hood fuse/relay box (C905)	
C354	3	Right side of engine compartment	Under-hood fuse/relay box (C907)	
C355	8	Right side of engine compartment	Engine compartment wire harness (C214)	
C356	3	Right side of engine compartment	Under-hood ABS fuse/relay box (C927)	
C357	2	Right side of engine compartment	Under-hood ABS fuse/relay box (C926)	
C358	2	Right side of engine compartment	Right front ABS wheel sensor	
C359	10	Right side of engine compartment	ABS solenoid	
C360	2	Right side of engine compartment	ABS pump motor	
G403		Right side of engine compartment	Body ground, via main wire harness	



Connector Identification and Wire Harness Routing

Main Wire Harness (Left side of dash and floor branch)

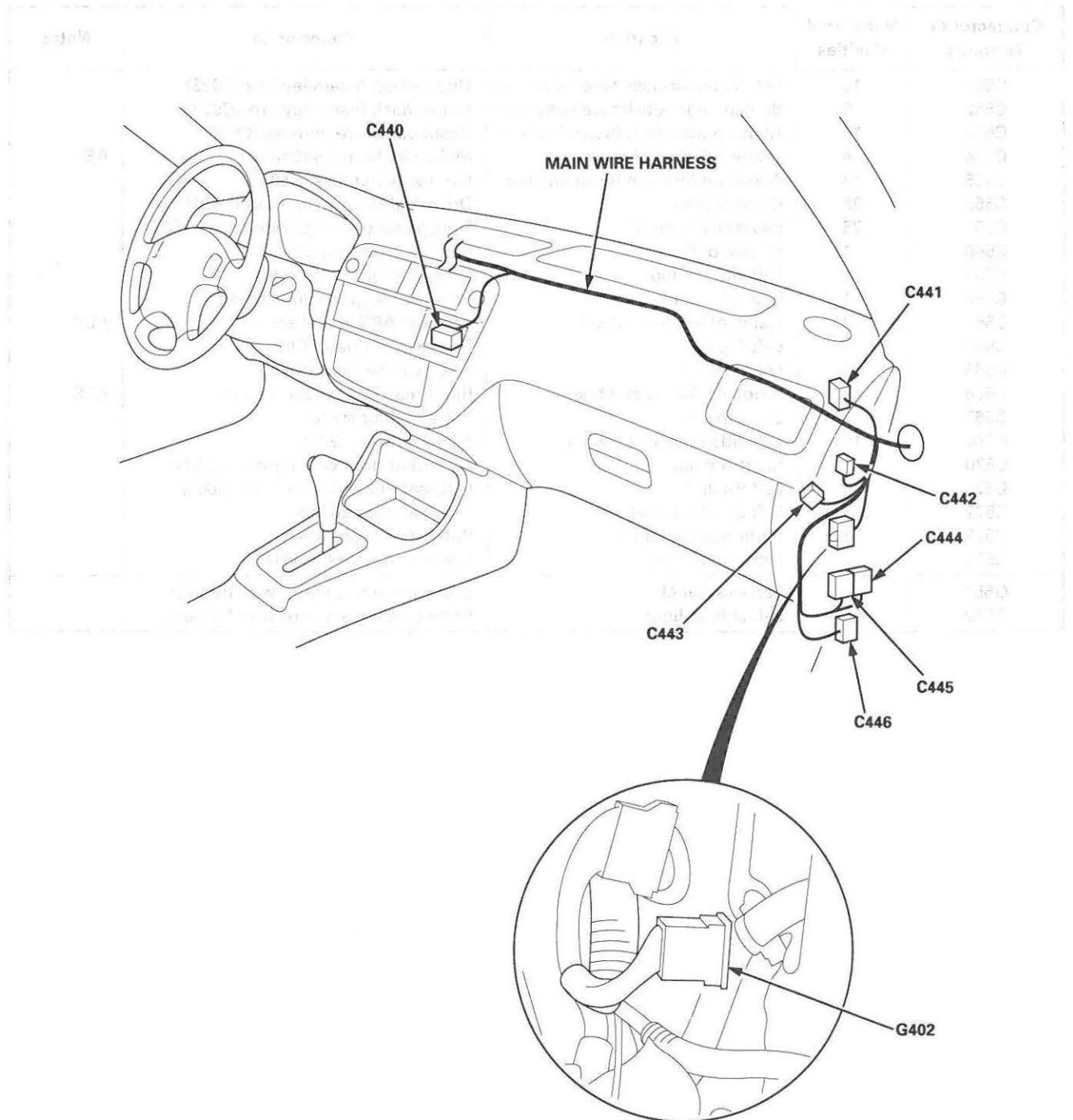
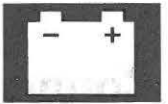
Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C401	14	Above under-dash fuse/relay box	Floor wire harness (C555)	ABS
C402	4	Under left side of dash	Floor wire harness (C554)	
C404	14	Under left side of dash	Cruise control unit	Optional
C407	6	Under left side of dash	Roof wire harness (C701)	
C408	1	Under left side of dash	Front fog light connector	
C409	10	Behind under-dash fuse/relay box	Integrated control unit	
C410	12	Under left side of dash	Dashboard wire harness (C504)	
C411	24	Under left side of dash	Dashboard wire harness (C502)	
C412	3	Above under-dash fuse/relay box	SRS main harness (C802)	
C413	16	Under left side of dash	Data link connector	
C414	4	Under-dash relay box	Starter cut relay	
C415	7	Above under-dash fuse/relay box	Ignition switch	
C419	18	Behind under-dash fuse/relay box	Under-dash fuse/relay box (C919)	
C420	20	Behind under-dash fuse/relay box	Under-dash fuse/relay box (C920)	
C421	18	Behind under-dash fuse/relay box	Under-dash fuse/relay box (C922)	
C422	7	Behind under-dash fuse/relay box	Under-dash fuse/relay box (C914)	
C423	6	Behind under-dash fuse/relay box	Under-dash fuse/relay box (C915)	
C424	4	Under-dash relay box	Horn relay	
C425	4	Under left side of dash	Brake switch	
C426	8	In the steering column cover	Windshield wiper/washer switch	
C428	4	In the steering column cover	Turn signal switch	
C429	7	In the steering column cover	Combination light switch	
C430	3	Under left side of dash	Cable reel	
C431	8	Under left side of dash	Interlock control unit	
C433	14	Under middle of dash	A/T gear position switch	
C434	2	Under middle of dash	Shift lock solenoid	
C435	4	Under middle of dash	Parking pin switch and A/T gear position console light	
C439	1	Behind under-dash fuse/relay box	Under-dash fuse/relay box (C925)	
C447	4	Under left side of dash	Fuel injector relay	
C448	26	Left kick panel	Injector control module	
G401		Left kick panel	Body ground, via main wire harness	



Connector Identification and Wire Harness Routing

Main Wire Harness (Right side of dash branch)

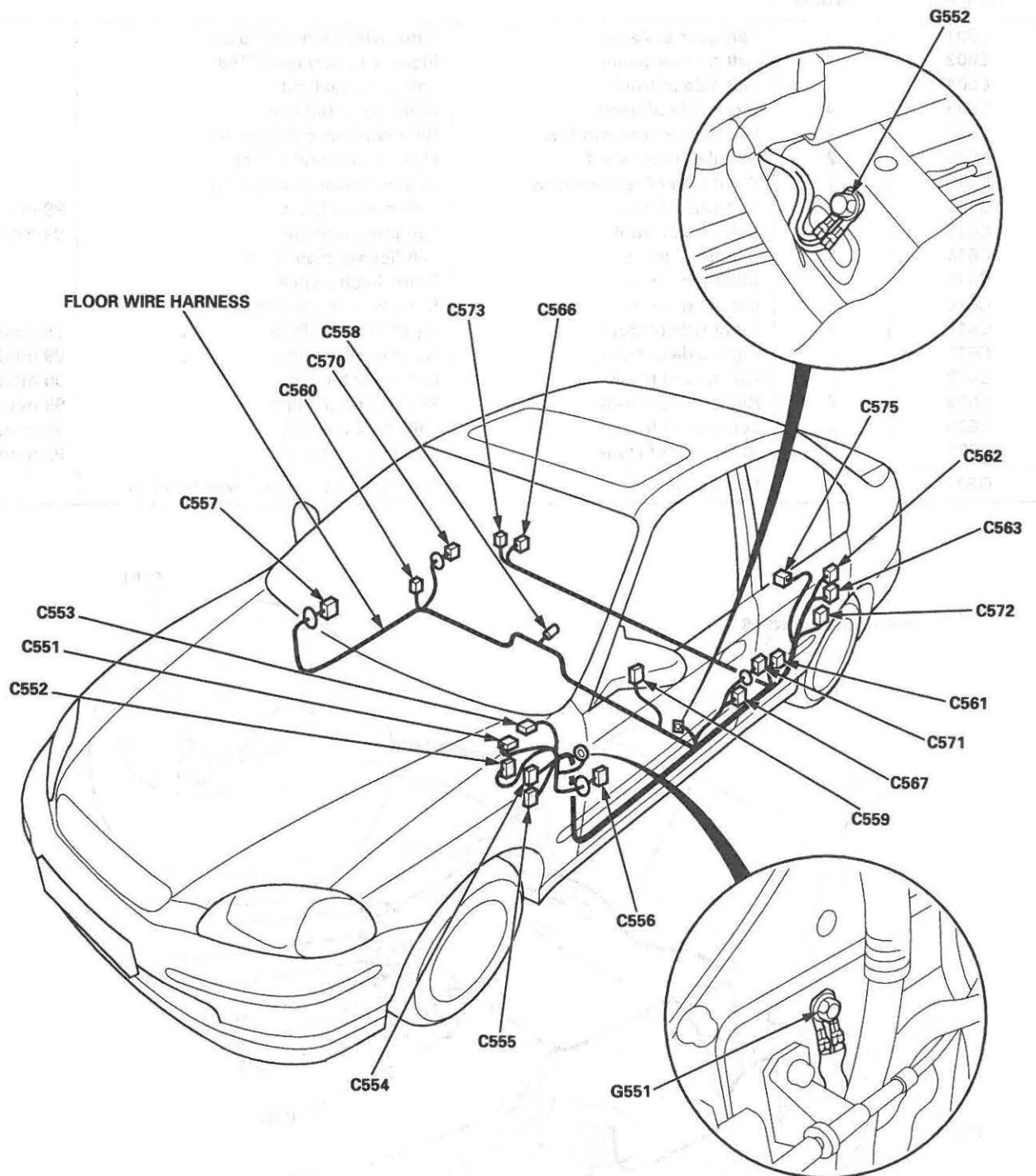
Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C440	16	Under middle of dash	Heater sub-harness A (C721)	
C441	2	Under right side of dash	Service check connector	
C442	20	Under right side of dash	Junction connector	
C443	7	Under right side of dash	PGM-FI main relay	
C444	22	Under right side of dash	ABS control unit	
C445	26	Under right side of dash	ABS control unit	
C446	22	Under right side of dash	Engine wire harness (C131)	
G402		Right kick panel	Body ground, via main wire harness	



Connector Identification and Wire Harness Routing

Floor Wire Harness

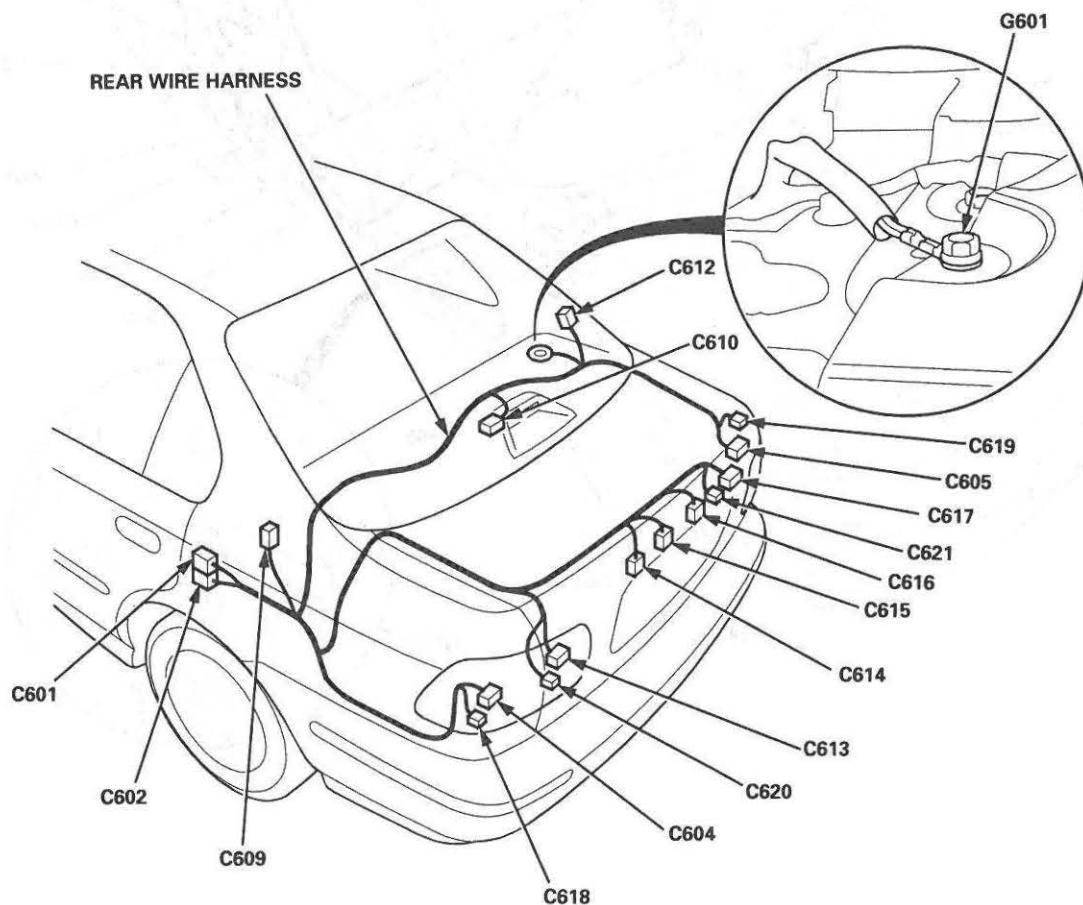
Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C551	16	Behind under-dash fuse/relay box	Under-dash fuse/relay box (C923)	ABS
C552	8	Behind under-dash fuse/relay box	Under-dash fuse/relay box (C921)	
C553	16	Above under-dash fuse/relay box	Dashboard wire harness (C503)	
C554	4	Under left side of dash	Main wire harness (C402)	
C555	14	Above under-dash fuse/relay box	Main wire harness (C401)	
C556	25	Driver's door	Driver's door wire harness (C631)	
C557	25	Passenger's door	Front passenger's door wire harness (C651)	
C558	1	Middle of floor	Parking brake switch	
C559	2	Left side of floor	Driver's seat belt switch	
C560	1	Right B-pillar	Front passenger's door switch	
C561	2	Inside of left rear wheel	Left rear ABS wheel sensor	ABS
C562	8	Left C-pillar	Rear wire harness (C601)	
C563	2	Left C-pillar	Rear wire harness (C602)	ABS
C566	2	Inside of right rear wheel	Right rear ABS wheel sensor	
C567	1	Left B-pillar	Driver's door switch	
C569	10	Left side of steering wheel	Power mirror switch	
C570	6	Right B-pillar	Right rear door wire harness (C671)	
C571	6	Left B-pillar	Left rear door wire harness (C661)	
C572	1	Left quarter panel	Left rear door switch	
C573	1	Right quarter panel	Right rear door switch	
C575	6	Left side of trunk	Fuel sub-harness (C681)	
G551		Left kick panel	Body ground, via floor wire harness	
G552		Left side of floor	Body ground, via floor wire harness	



Connector Identification and Wire Harness Routing

Rear Wire Harness

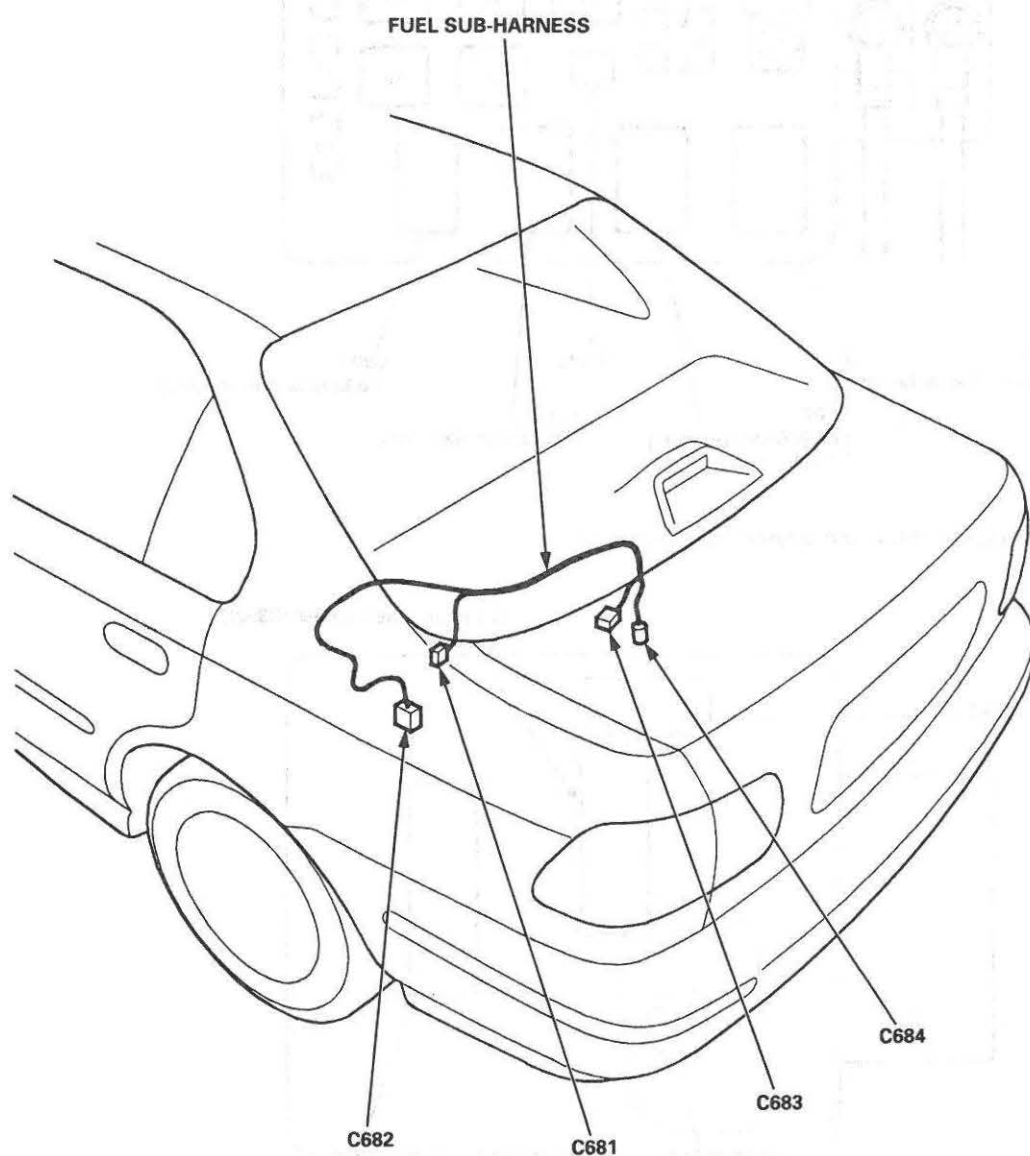
Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C601	8	Left quarter panel	Floor wire harness (C562)	
C602	2	Left quarter panel	Floor wire harness (C563)	
C604	4	Left side of trunk	Left outer taillight	
C605	4	Right side of trunk	Right outer taillight	
C609	1	Left side of rear window	Rear window defogger (+)	
C610	2	Middle of rear shelf	High mount brake light	
C612	1	Right side of rear window	Rear window defogger (-)	
C613	4	Left side of trunk	Left inner taillight	98 model
C613	3	Left side of trunk	Left inner taillight	99 model
C614	2	Middle of trunk	Left license plate light	
C615	2	Middle of trunk	Trunk latch switch	
C616	2	Middle of trunk	Right license plate light	
C617	4	Right side of trunk	Right inner taillight	98 model
C617	3	Right side of trunk	Right inner taillight	99 model
C618	2	Left side of trunk	Left outer taillight	99 model
C619	2	Right side of trunk	Right outer taillight	99 model
C620	2	Left side of trunk	Left inner taillight	99 model
C621	2	Right side of trunk	Right inner taillight	99 model
G601		Middle of trunk	Body ground, via rear wire harness	





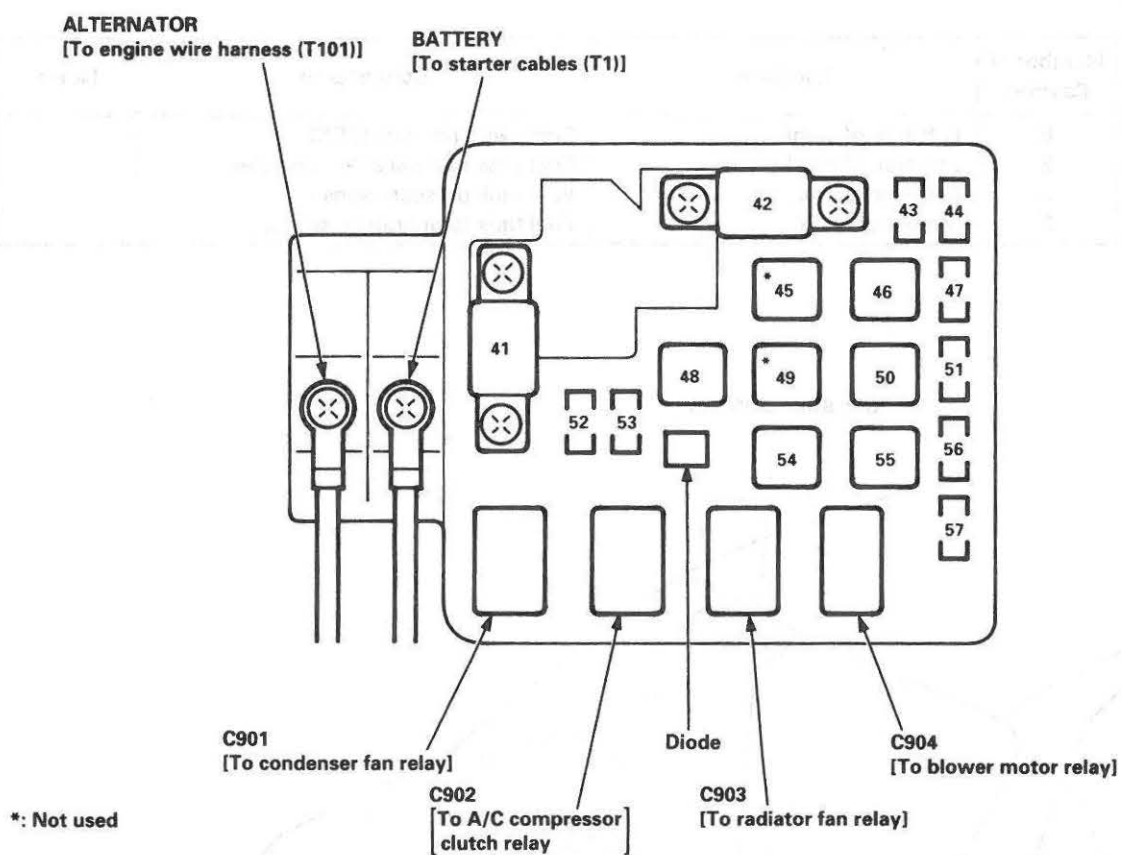
Fuel Sub-harness

Connector or Terminal	Number of Cavities	Location	Connects to	Notes
C681	6	Left side of trunk	Floor wire harness (C575)	
C682	2	Left side of trunk	Fuel tank internal solenoid valve	
C683	3	Middle of trunk	Fuel tank pressure sensor	
C684	2	Middle of trunk	Fuel tank temperature sensor	

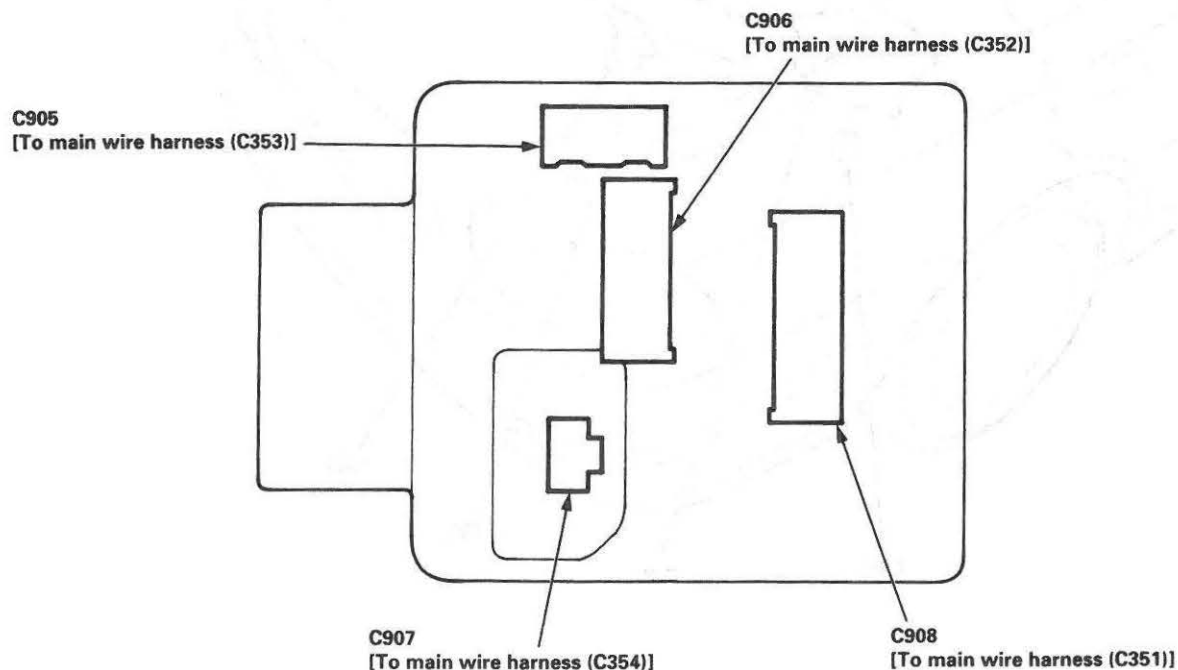


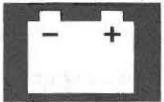
Fuses

Under-hood Fuse/Relay Box



NOTE: View from the backside of the under-hood fuse/relay box.

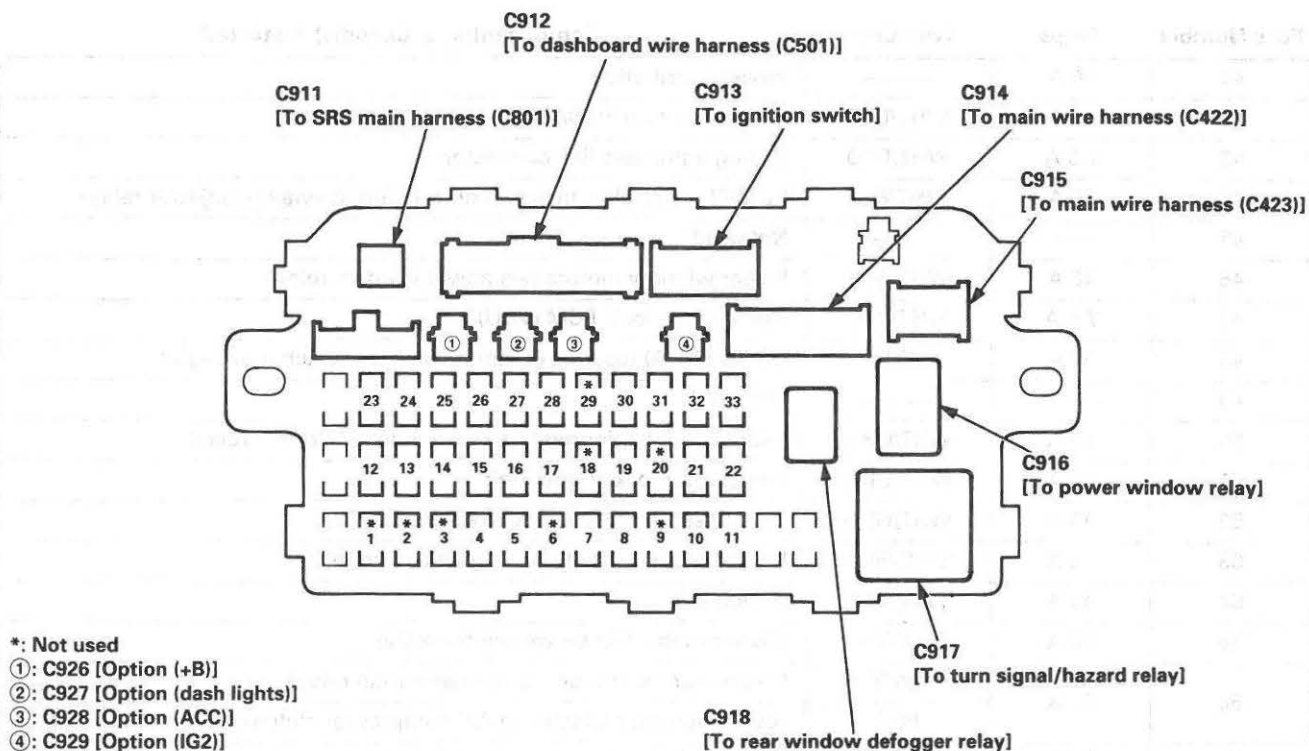




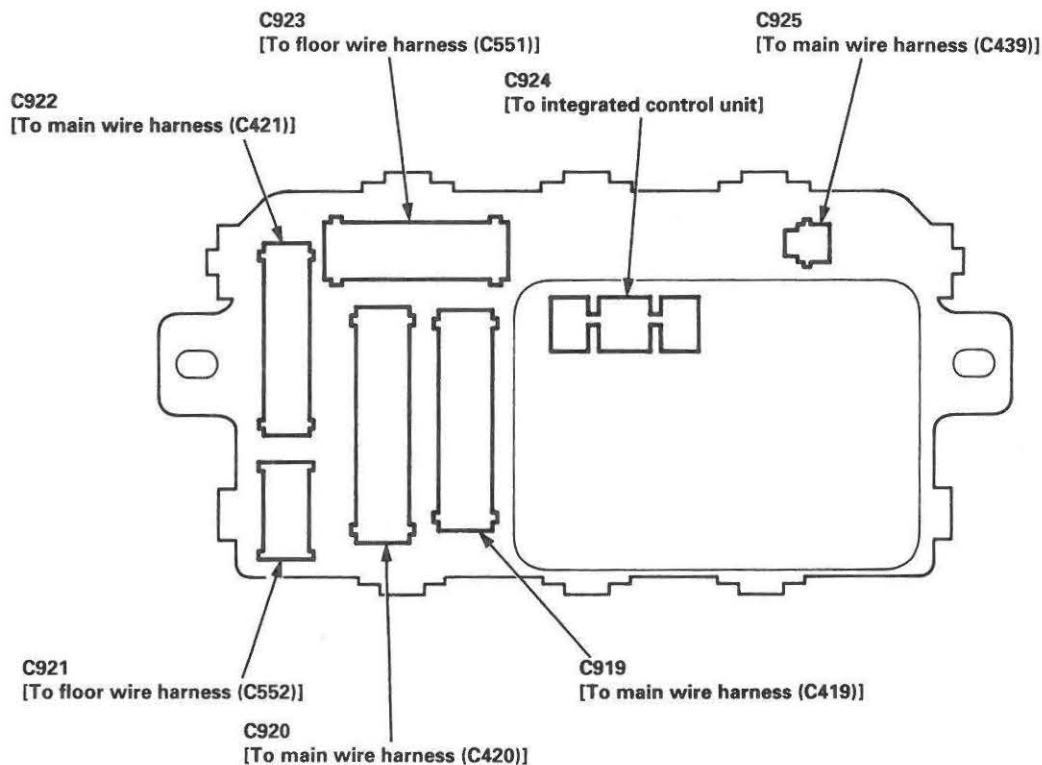
Fuse Number	Amps	Wire Color	Component(s) or Circuit(s) Protected
41	80 A	——	Power distribution
42	40 A	WHT/BLK	To ignition switch (BAT)
43	7.5 A	WHT/RED	Ceiling light, data link connector
44	20 A	WHT/BLK	PGM-FI main relay, injector control module (via fuel injector relay)
45	——	——	Not used
46	40 A	WHT/BLU	Power window motors (via power window relay)
47	7.5 A	WHT/BLU	Audio unit, clock, PCM (VBU)
48	30 A	WHT	No. 33 (7.5 A) fuse, To combination light switch (headlight)
49	——	——	Not used
50	30 A	WHT/GRN	Rear window defogger (via rear window defogger relay)
51	20 A	WHT/GRN	Power door lock control unit
52	15 A	WHT/GRN	Horn system, brake lights, brake signal
53	10 A	WHT/BLK	Hazard warning light, turn signal/hazard relay
54	40 A	WHT/RED	Option (+B)
55	40 A	BLU/WHT	Blower motor (via blower motor relay)
56	20 A	WHT	Condenser fan motor (via condenser fan relay)
		RED	A/C compressor clutch (via A/C compressor clutch relay)
57	20 A	BLK/RED	Radiator fan motor (via radiator fan relay)

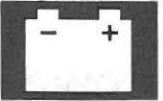
Fuses

Under-dash Fuse/Relay Box



NOTE: View from the backside of the under-dash fuse/relay box.

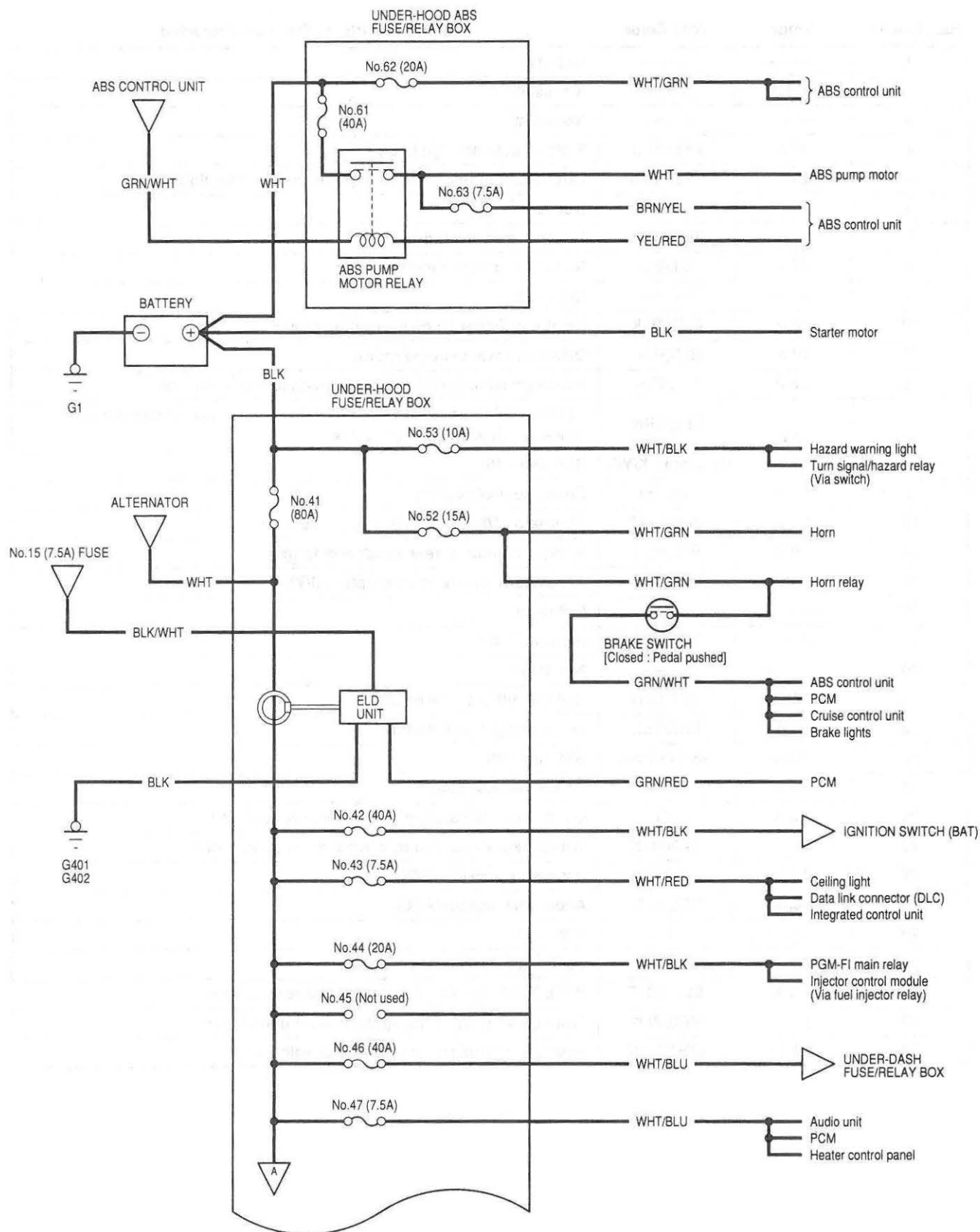


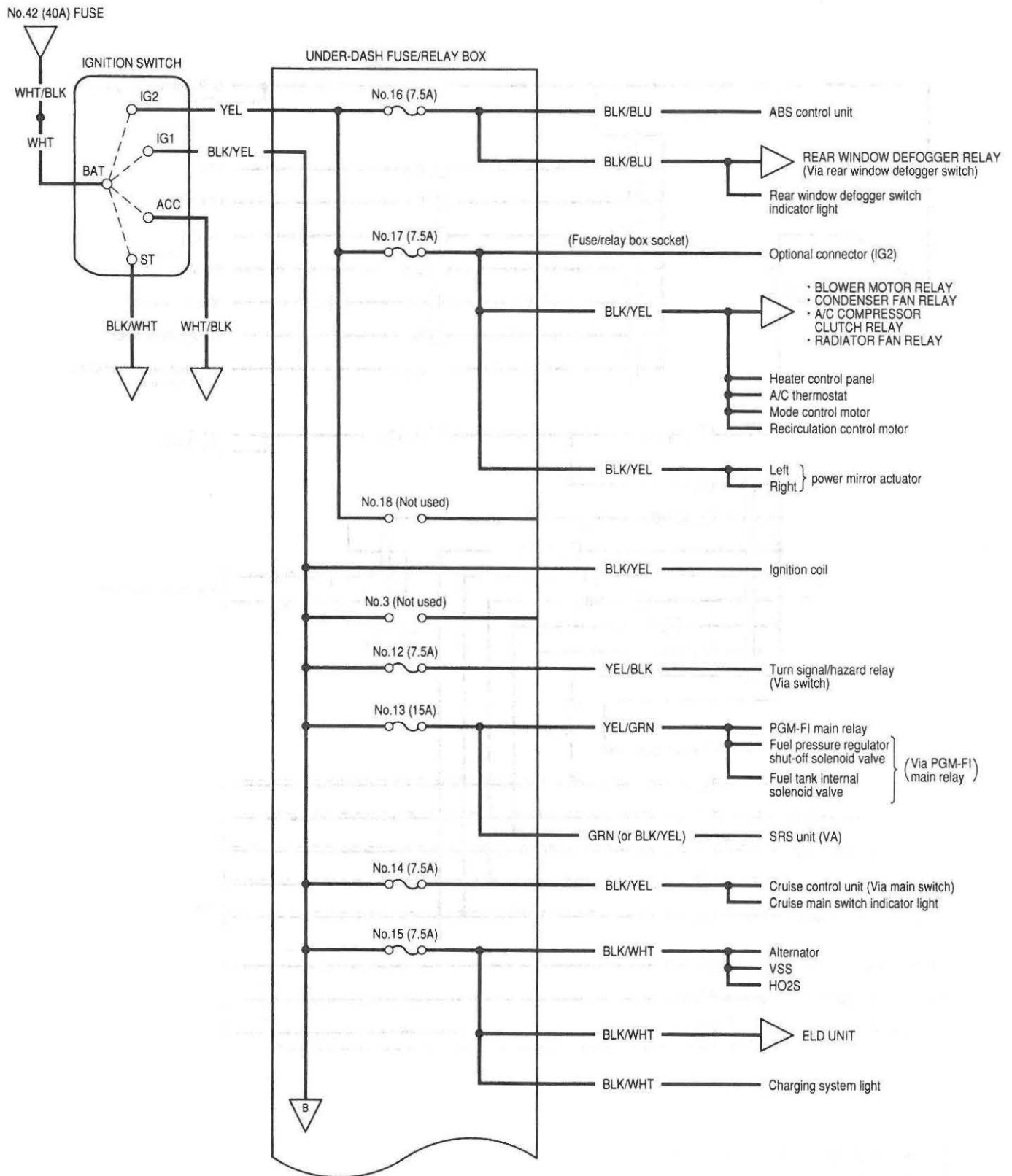
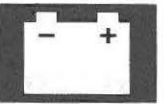


Fuse Number	Amps	Wire Color	Component(s) or Circuit(s) Protected
1	—	—	Not used
2	—	—	Not used
3	—	—	Not used
4	10 A	RED/BLU	Right headlight (high beam)
5	10 A	RED/GRN	Left headlight (high beam), high beam indicator light
6	—	—	Not used
7	20 A	RED/WHT	Left rear power window motor
8	20 A	YEL/BLK	Right rear power window motor
9	—	—	Not used
10	20 A	GRN/BLK	Front passenger's power window motor
11	20 A	BLU/BLK	Driver's power window motor
12	7.5 A	YEL/BLK	Turn signal/hazard relay (via turn signal/hazard switch)
13	15 A	YEL/GRN	PGM-FI main relay, fuel tank internal solenoid valve, fuel pressure regulator shut-off solenoid valve
		GRN or BLK/YEL	SRS unit (VA)
14	7.5 A	BLK/YEL	Cruise control system.
15	7.5 A	BLK/WHT	Alternator, VSS, ELD unit, oxygen sensors
16	7.5 A	BLK/BLU	ABS pump motor, rear window defogger
17	7.5 A	BLK/YEL	A/C system, power mirror, option (IG2)
18	—	—	Not used
19	7.5 A	YEL/RED	Back-up lights
20	—	—	Not used
21	10 A	RED/WHT	Right headlight (low beam)
22	10 A	RED/YEL	Left headlight (low beam)
23	10 A	GRN or PNK	SRS unit (VB)
24	7.5 A	—	Power window relay
25	7.5 A	YEL	Gauge and indicator lights, interlock control unit
26	20 A	GRN/BLK	Windshield wiper motor, windshield washer motor
27	15 A	YEL/GRN	Accessory socket (ACC)
28	10 A	YEL/RED	Audio unit, option (ACC)
29	—	—	Not used
30	7.5 A	RED/BLK	Dash lights, option (dash lights)
31	7.5 A	BLU/WHT	PCM, PGM-FI main relay, integrated control unit
32	7.5 A	RED/BLK	Front parking lights, taillights, license plate lights
33	7.5 A	WHT/GRN	Interlock control unit, key interlock solenoid

Power Distribution

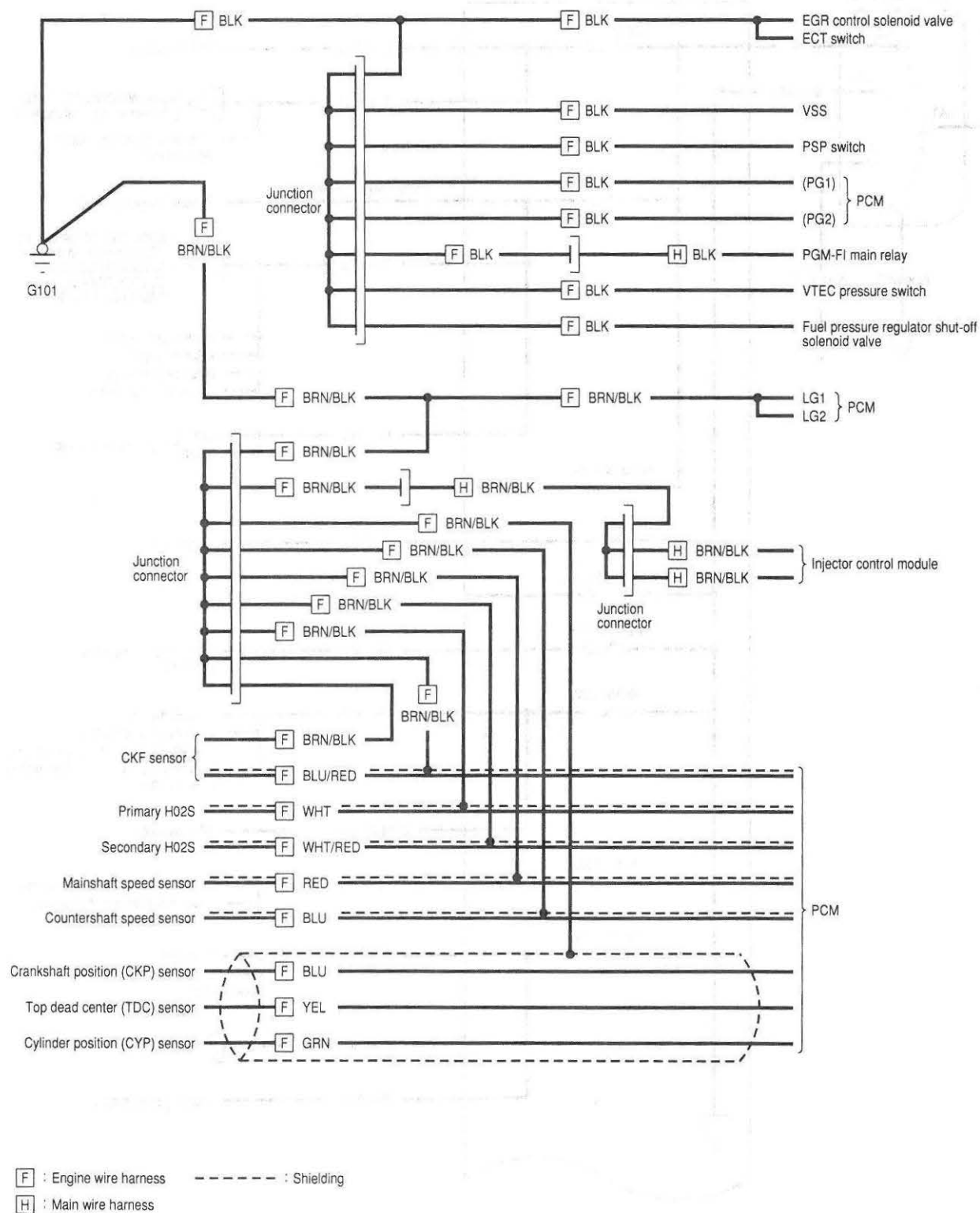
Circuit Identification

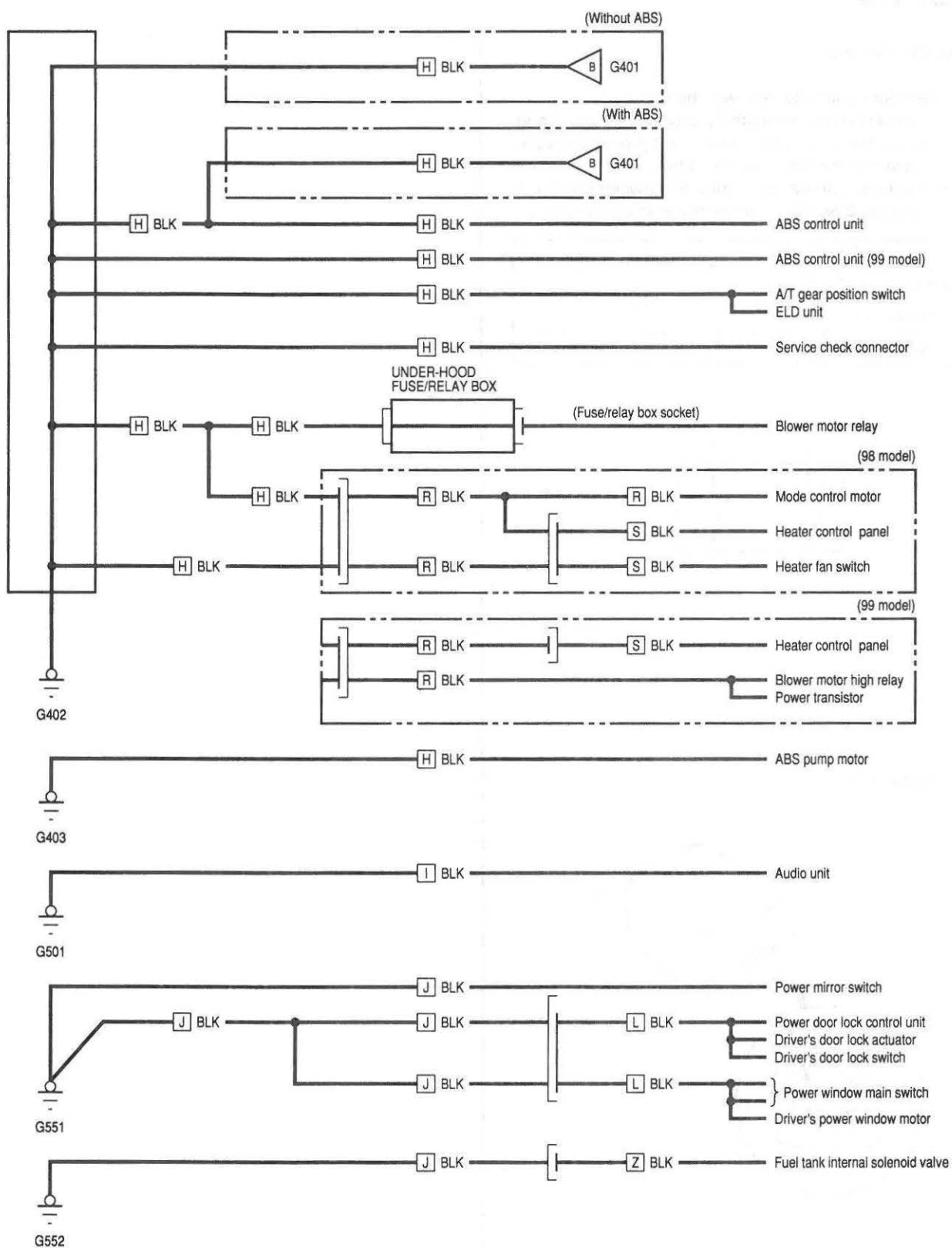




Ground Distribution

Circuit Identification





[H] : Main wire harness
[I] : Dashboard wire harness
[J] : Floor wire harness

[L] : Driver's door wire harness
[R] : Heater sub-harness A
[S] : Heater sub-harness B



[Z] : Fuel sub-harness

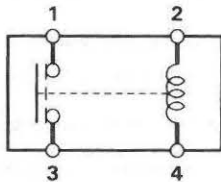
Power Relays

Relay Test

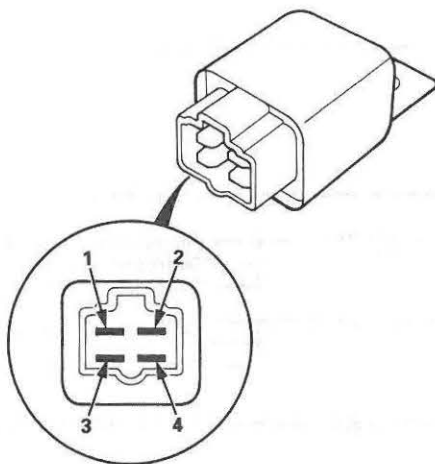
Normally-open type:

1. Check for continuity between the terminals.
 - There should be continuity between the No. 1 and No. 3 terminals when power and ground are connected to the No. 2 and No. 4 terminals.
 - There should be no continuity between the No. 1 and No. 3 terminals when power is disconnected.

Terminal	1	3
Power (No. 2 – No. 4)		
Disconnected		
Connected		



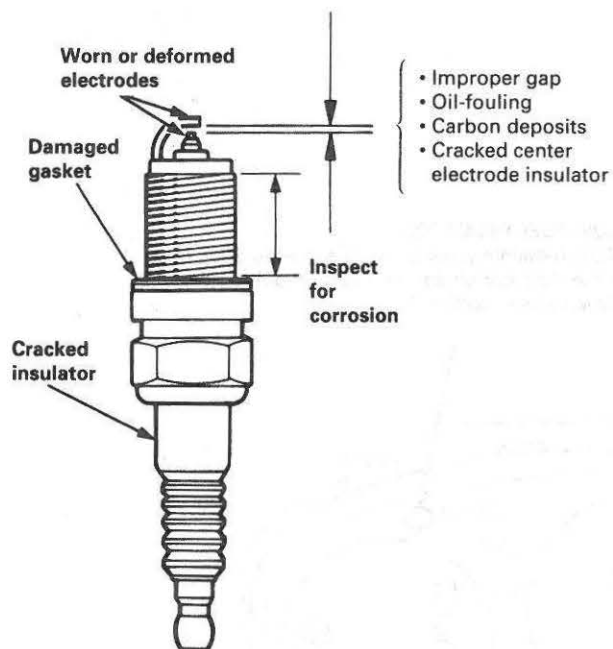
Fuel injector relay





Spark Plug Inspection

1. Inspect the electrodes and ceramic insulator for:



2. Inspect the threads tip of the spark plugs for corrosion.

If you find any corrosion in that area, the spark plugs should be replaced. You should not clean the spark plugs with a wire brush and reuse them.

Burned or worn electrodes may be caused by:

- Advanced ignition timing
- Loose spark plug
- Plug heat range too low
- Insufficient cooling

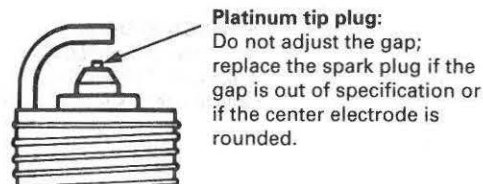
Fouled plug may be caused by:

- Retarded ignition timing
- Oil in combustion chamber
- Incorrect spark plug gap
- Plug heat range too high
- Excessive idling/low speed running
- Clogged air cleaner element
- Deteriorated ignition coil or ignition wires

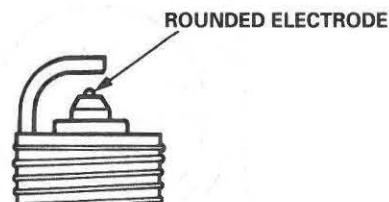
2. Do not adjust the gap of platinum tip plugs; replace the spark plug if the gap is out of specification or if the center electrode is rounded.

Electrode Gap:

Standard	0.7 – 0.8 mm (0.028 – 0.031 in)
----------	---------------------------------



3. Replace the plug at the specified interval, or if the center electrode is rounded as shown below:



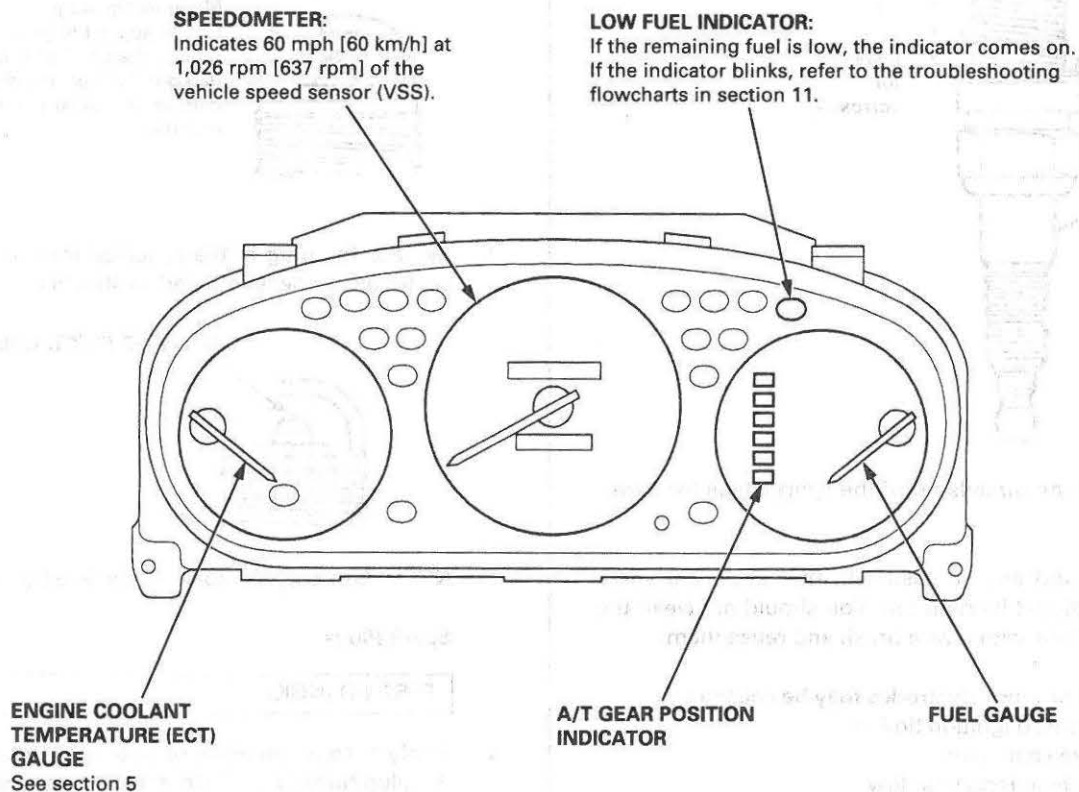
NOTE: Use only the spark plugs listed below.

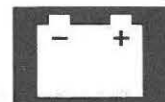
Spark Plugs

PFR7N-D (NGK)

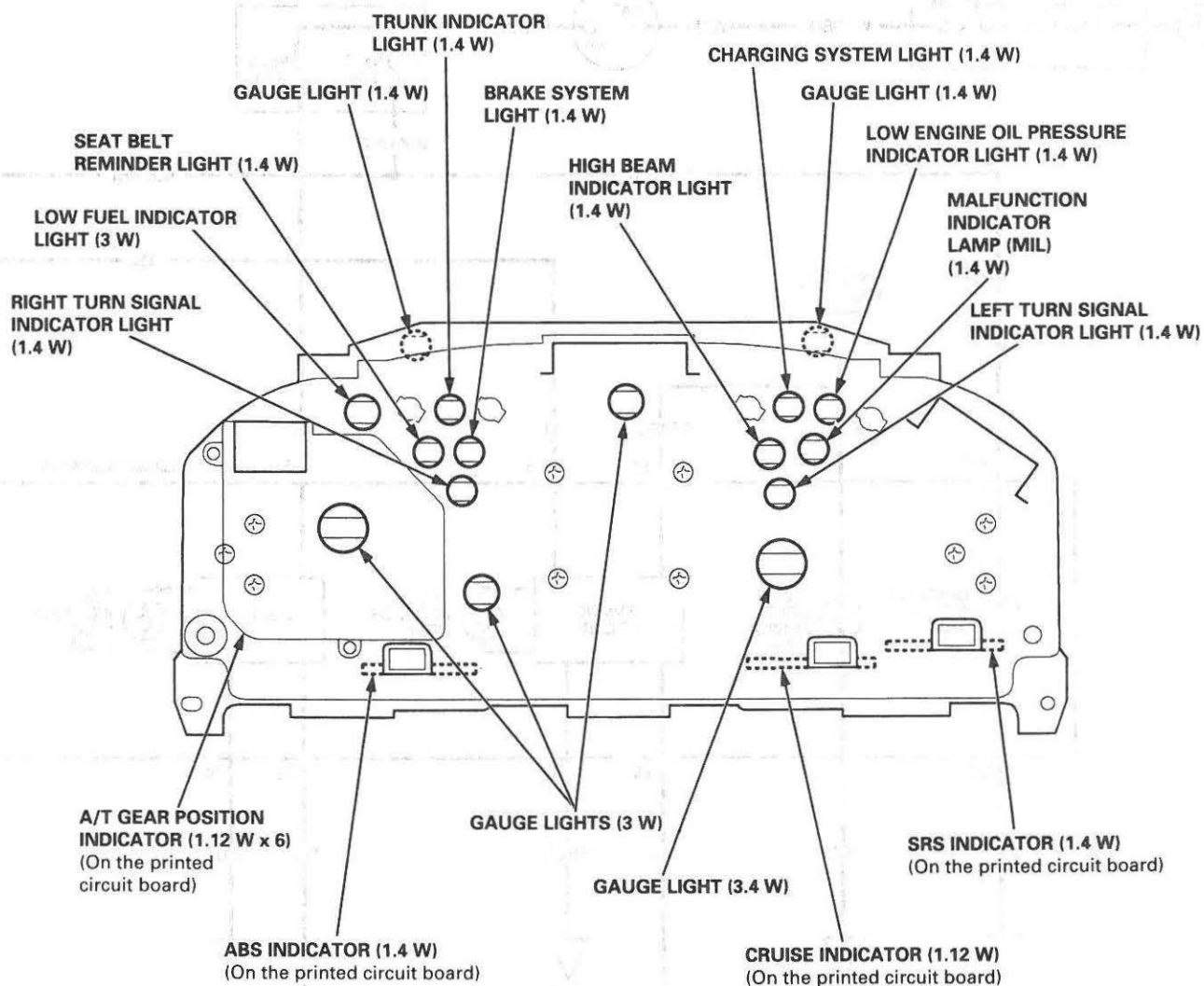
4. Apply a small quantity of anti-seize compound to the plug threads, and screw the plugs into the cylinder head finger-tight. Then torque them to 18 N·m (1.8 kgf·m, 13 lbf·ft).

Gauge/Indicator Location Index





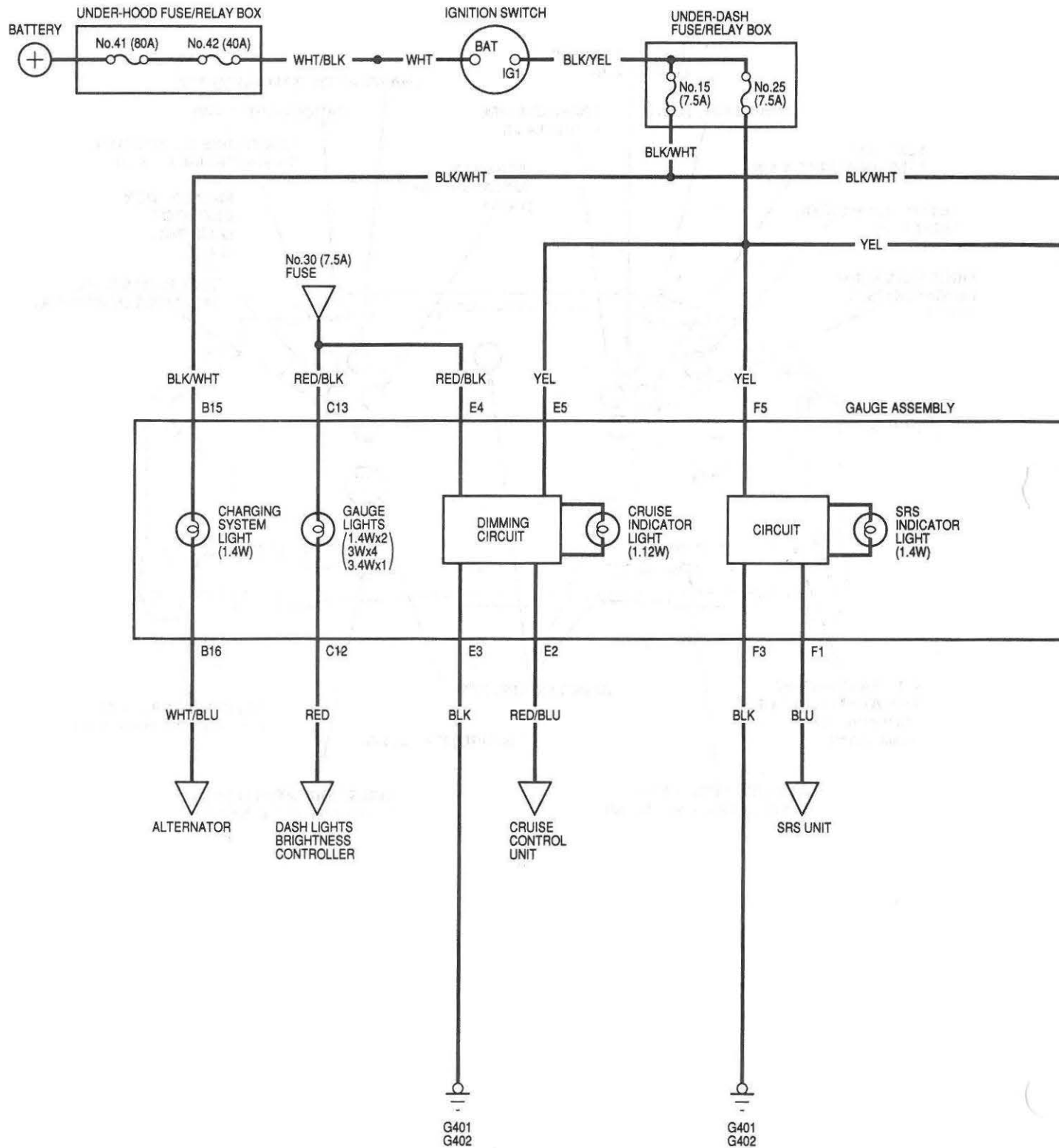
Bulb Locations



Gauge Assembly

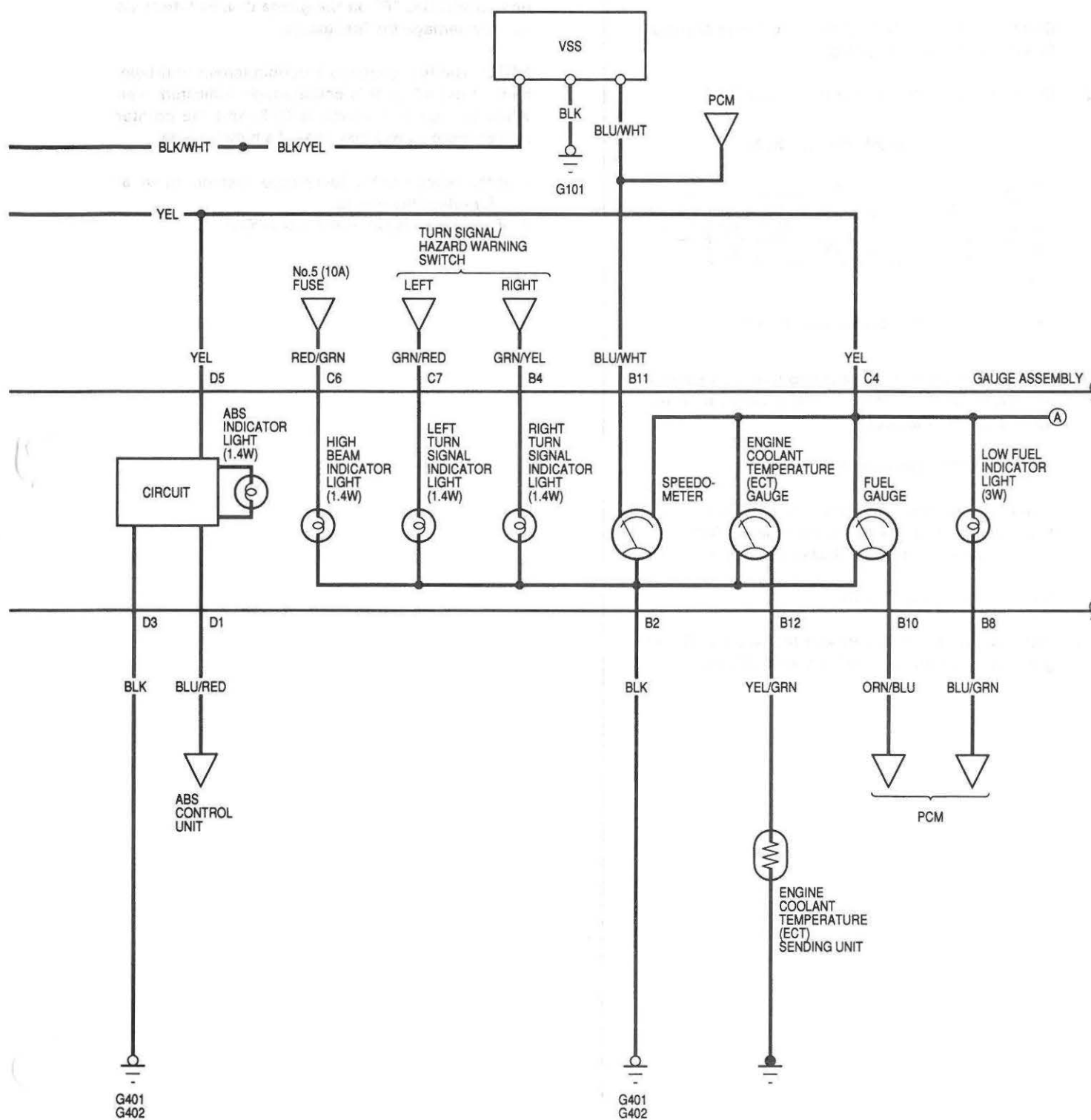
Circuit Diagram

NOTE: This page corresponds to page 23-131 in Service Manual 61S0305.





NOTE: This page corresponds to page 23-132 and 133 in Service Manual 61S0305.



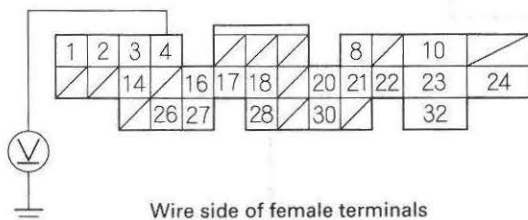
Fuel Gauge

Gauge Test

NOTE:

- Check to see if diagnostic trouble code is indicated (see section 11).
 - Refer to page 23-29 for the fuel gauge system circuit.
1. Check the No. 25 (7.5 A) fuse in the under-dash fuse/relay box before testing.
 2. Disconnect the 32P connector from the PCM.

PCM 32P CONNECTOR A



3. Connect the voltmeter positive to the No. 4 terminal and the negative probe to body ground, then turn the ignition switch ON (II).

There should be between 5 and 8 V.

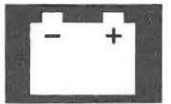
- If the voltage is as specified, go to step 4.
 - If the voltage is not as specified, check for:
 - an open in the ORN/BLU or ORN wire.
4. Turn the ignition switch OFF.
 5. Attach a jumper wire between the No. 4 and body ground, then turn the ignition switch ON (II).

6. Check that the pointer of the fuel gauge starts moving toward the "F" mark.

CAUTION: Turn the ignition switch OFF before the pointer reaches "F" on the gauge dial. Failure to do so may damage the fuel gauge.

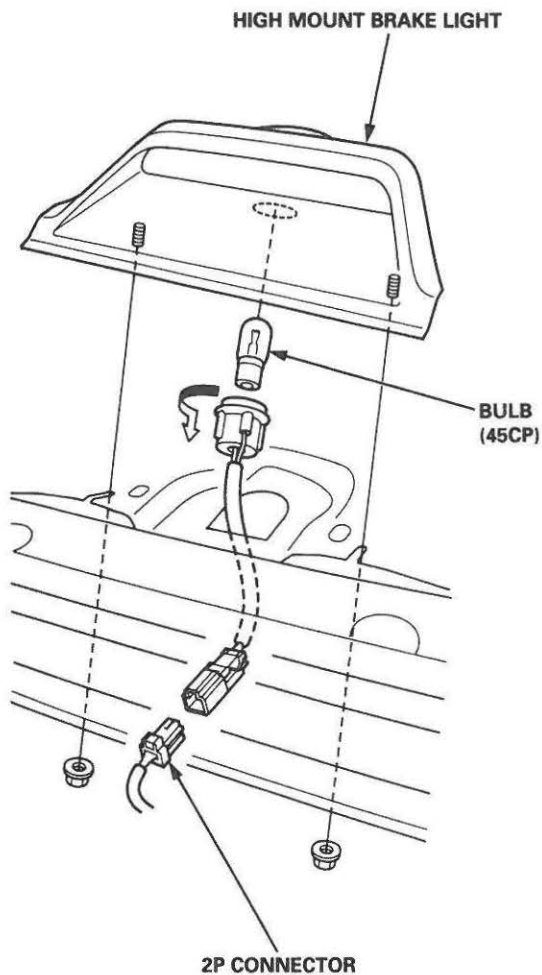
NOTE: The fuel gauge is a bobbin (cross-coil) type, hence the fuel level is continuously indicated even when the ignition switch is OFF, and the pointer moves more slowly than that of a bimetal type.

- If the pointer of the fuel gauge does not move at all, replace the gauge.
- If the gauge is OK, replace the PCM.



High Mount Brake Light Replacement

1. Remove the rear shelf (see section 20).
2. Remove the two nuts from the high mount brake light.



3. Disconnect the 2P connector, then remove the high mount brake light.



specs



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